*Submitted to:*

**Florida Department of Environmental Protection**

# CERTIFICATION REPORT
# CONSTRUCTION OF CELL 1A AND LEACHATE STORAGE AREA
## Oak Hammock Disposal Facility
## Osceola County, Florida

*Prepared for*

Omni Waste

**Omni Waste of Osceola County, LLC**
**1501 Omni Way**
**Holopaw, Florida**


**GeoSyntec Consultants**
eredge Drive, Suite 300
orida 33637

mber FX0521
004

FLORIDA

# Department of
# Environmental Protection

Jeb Bush
Governor

Central District
3319 Maguire Boulevard, Suite 232
Orlando, Florida 32803-3767

David B. Struhs
Secretary

ELECTRONIC MAIL

January 21, 2004

Mr. Timothy J. Salopek, President
(tjsomni@aol.com)
Omni Waste of Seminole County, LLC
1501 Omni Way
Holopaw, Florida 34773

OCD-SW-04-0035

Osceola County SW
Oak Hammock Disposal Facility
Certification of Construction Completion

Dear Mr. Salopek:

This will acknowledge receipt of the *Certification of Construction Completion of a Solid Waste Management Facility*, dated, January 18, 2004 by Kenneth W. Cargill, P.E. of GeoSyntec Consultants, addressing Cell 1A.

Based upon my inspection on January 20, 2004, construction of the Cell 1A, as certified by the professional engineer of record, has been completed and is substantially consistent with plans and specifications approved under DEP Permit No. SC49-0199726-001. Accordingly, solid waste may be placed in Cell 1A for disposal upon the Department's acceptance of the certification of construction completion for applicable features of the surface water management system referenced in DEP Permit No. ERP49-199752-001-EI.

Please contact me at 407-893-3329 if you have questions or need further information.

Sincerely,

James N. Bradner

James N. Bradner, P.E., Manager
Solid and Hazardous Waste Program

/jnb

cc: David S. Dee, Landers and Parsons (ddee@landersandparsons.com)
Kenneth Cargill, P.E., GeoSyntec Consultants (kcargill@geosyntec.com)
Debra Laisure, P.E., FDEP Environmental Resource Permitting

# Department of Environmental Protection

Jeb Bush
Governor

Central District
3319 Maguire Boulevard, Suite 232
Orlando, Florida 32803-3767

David B. Struhs
Secretary

January 23, 2004

Omni Waste of Osceola County, LLC
C/o Mr. Kenneth Cargill, P.E.
GeoSyntec Consultants
14055 Riveredge Drive, Suite 300
Tampa, FL 33637

OCD-ERP-04-0076

Osceola County ERP
Oak Hammock Disposal Facility, ERP49-199752-001-EI
Certification of Construction Completion

Dear Mr. Cargill:

This will acknowledge receipt of the *Environmental Resource Permit As-Built Certification by a Registered Professional*, dated January 19, 2004, addressing construction of the initial phase of the storm water management system at the Oak Hammock Disposal Facility in Osceola County.

Based upon my inspection on January 20, 2004, and as certified by the professional engineer of record, construction of the initial phase of the storm water management system for the facility has been completed and is substantially consistent with plans and specifications approved under DEP Permit No. ERP49-199752-001-EI. This initial phase consists of the storm water management berm along the site access road, around the landfill footprint and around Borrow Area A, the storm water culvert crossings and structures along the site access road, and the emergency spillway on the east side of the landfill footprint.

As discussed during our inspection, as-built drawings will be submitted once the wetlands improvements and installation of the check dams along Bull Creek have been completed.

Please contact me at 407-893-7874 if you have questions or need further information.

Sincerely,

Debra Laisure, P.E.
Engineering Support
Submerged Lands and Environmental
Resources Program

/dl

cc: Lenny Marion, Omni Waste of Osceola County
James N. Bradner, P.E., FDEP Solid and Hazardous Waste Program

GEOSYNTEC CONSULTANTS

14055 Riveredge Drive, Suite 300
Tampa, Florida 33637 • USA
Telephone (813) 558-0990 • Fax (813) 558-9726

19 January 2004

Mr. James N. Bradner, P.E.
Program Manager, Solid/Hazardous Waste
Florida Department of Environmental Protection, Central District
3319 Maguire Boulevard, Suite 232
Orlando, Florida 32803-3767



Re: Certification Report
Oak Hammock Disposal Facility
Omni waste of Osceola County, LLC
Permit Application Nos. SC49-0199726-001

Dear Mr. Bradner:

Submitted herewith are two (2) copies of the certification report (including Record Drawings) for Cell 1A and the initial leachate storage area at the Oak Hammock Disposal Facility in Osceola County, Florida. FDEP form #62-701.900(2) titled *Certification of Construction Completion of a Solid Waste Management Facility*, duly completed and signed, is also attached.

If you have any questions or need additional information, please do not hesitate to contact the undersigned.

Sincerely,

Kenneth W. Cargill, P.E.
Principal

Attachments

Copy: Mr. Lenny Marion, Omni Waste of Osceola County

FX0521/Contract 1/Report/Transmittal

DEP Form # 62-701.900(2)
Form Title Certification of Construction Completion
Effective Date May 19, 1994

DEP Application No. _____
(Filled by DEP)

Florida Department of Environmental Protection
Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, FL 32399-2400

# Certification of Construction Completion of a Solid Waste Management Facility

DEP Construction Permit No: SC-49-0199726-001 County: Osceola

RECEIVED
JAN 20 2004
FDEP-CENTRAL DISTRICT
SOLID WASTE

Name of Project: Oak Hammock Disposal Facility

Name of Owner: Omni Waste of Osceola County, L.L.C.

Name of Engineer: GeoSyntec Consultants

Type of Project: Initial Construction of a Class I Solid Waste Landfill Facility

Cost: Estimate $ 6.44 million Actual $ 7.75 million

Site Design: Quantity: 1,700 ton/day Site Acreage: Cell 1A, Approximately 12 Acres

Deviations from Plans and Application Approved by DEP:

No significant deviations from the approved plans and application.

Address and Telephone No. of Site: 1501 Omni Way, Holopaw, Florida 34773, Phone: (407)891-3720

Name(s) of Site Supervisor: Leonard Marion (Omni)

Date Site inspection is requested: 20 January 2004

This is to certify that, with the exception of any deviation noted above, the construction of the project has been completed in substantial accordance with the plans authorized by Construction

Permit No. SC-49-0199726-001 :Dated: 18 October 2002

Date: 1/20/2004

Signature of Professional Engineer



Northwest District
160 Governmental Center
Pensacola, FL 32501-5794
850-595-8360

Northeast District
7825 Baymeadows Way, Ste. B200
Jacksonville, FL 32256-7590
904-448-4300

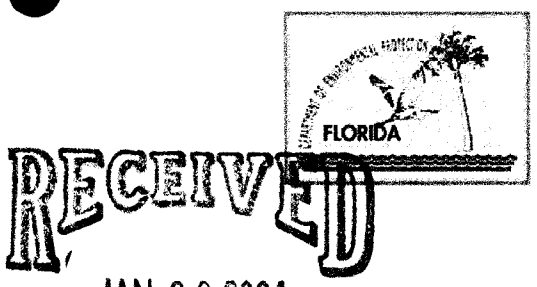
Central District
3319 Maguire Blvd., Ste. 232
Orlando, FL 32803-3767
407-894-7555

Southwest District
3804 Coconut Palm Dr.
Tampa, FL 33619
813-744-6100

South District
2295 Victoria Ave., Ste. 364
Fort Myers, FL 33901-3881
941-332-6975

Southeast District
400 North Congress Ave.
West Palm Beach, FL 334(
561-681-6600

*Submitted to:*




# Florida Department of Environmental Protection

# CERTIFICATION REPORT
# CONSTRUCTION OF CELL 1A AND LEACHATE STORAGE AREA

## Oak Hammock Disposal Facility
## Osceola County, Florida

*Prepared for*

Omni Waste

Omni Waste of Osceola County, LLC
1501 Omni Way
Holopaw, Florida

*Prepared by*

GeoSyntec Consultants

14055 Riveredge Drive, Suite 300
Tampa, Florida 33637

Project Number FX0521
January 2004

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# 1. INTRODUCTION

## 1.1 Overview

This certification report summarizes the Construction Quality Assurance (CQA) activities performed by GeoSyntec Consultants (GeoSyntec) of Tampa, Florida during construction of Cell 1A and ancillary facilities at the Oak Hammock Disposal Facility (OHDF), a Class I landfill, in Osceola County, Florida. The CQA activities performed by GeoSyntec include monitoring of:

(i) earthwork construction;

(ii) geosynthetics installation;

(iii) leachate collection, transmission, and storage systems construction; and

(iv) ancillary construction associated with development of the landfill.

The CQA activities were performed to confirm that the construction materials and procedures were in compliance with the Construction Permit SC49-0199726-001 issued by the Florida Department of Environmental Protection (FDEP) Central District in accordance with Chapter 62-701, Solid Waste Management Facilities, Florida Administrative Code (FAC).

This certification report was prepared for Messrs. Timothy Salopek and Leonard Marion of Omni Waste of Osceola County, LLC (Omni). It was prepared by Mr. Ayushman Gupta P.E., Mr. Kirk Wills, Dr. Steven Dapp P.E., and Ms. Aidee Cira, and was reviewed by Mr. Ken Cargill, P.E., all of GeoSyntec.

It should be noted that this report covers only Cell 1A and the initial leachate management systems. Cell 1B is currently under construction. The liner system of Cell 1A is continuous through Cell 1B. The liner system in Cell 1 will terminate in an anchor trench in the intercell berms between Cells 1 and 2 on the east side and Cells 1 and 4 on the south side. Cell 1A is separated from Cell 1B by a geomembrane rain flap in order to manage storm water runoff and divert clean storm water from Cell 1B area prior to placing Cell 1B in service for waste deposition.

## 1.2 Report Organization

This certification report is organized as described below.

- A brief description of the project is provided in Section 2.
- A summary of the CQA program is presented in Section 3.

- A description of the CQA monitoring and testing activities performed during the earthwork related construction activities is provided in Section 4.

- A description of the CQA monitoring and testing activities performed during the geosynthetics installation is provided in Section 5 (including the geomembrane utilized for construction of the flexible leachate storage containers).

- A description of the CQA monitoring and testing activities performed during construction of the leachate management system (i.e., leachate collection, transmission, and storage systems) is provided in Section 6.

- A description of the CQA monitoring and testing performed during the construction of ancillary facilities associated with development of the landfill (i.e., culvert crossings, storm water structures, emergency spillway, utilities, etc.) is provided in Section 7.

- A summary of the observations resulting from the CQA monitoring and testing activities performed by GeoSyntec and a certification statement signed and sealed by a professional engineer registered in the State of Florida are presented in Section 8.

Record drawings presenting as-built surveys for select earthwork activities, primary and secondary liners, and leachate transmission pipe are included in Appendix A. A photographic log of major construction activities is included in Appendix B of this report.

Results of CQA monitoring and testing that are critical with respect to the adequate performance of the OHDF landfill and protection of the surrounding environment have been summarized in a tabular form and are included in this certification report. CQA monitoring and testing results for non-critical activities are not included in this certification report but will be made available upon request.

# 2. PROJECT DESCRIPTION

## 2.1 General

The OHDF is located in eastern Osceola County, Florida, west of highway U.S. 441, approximately 6.5 miles south of Holopaw. The landfill facility is connected to highway U.S. 441 by way of a 2.86-mile improved access road, constructed as part of the overall project site development.

The OHDF site comprises a total of approximately 2,179 acres. The landfill footprint at build-out is approximately 264 acres and consists of a total of 21 landfill cells that provide available waste capacity for a period of approximately 30 years. FDEP issued a construct and operate permit for the landfill on 18 October 2002. The first five-year construct and operate permit is referenced as Phase 1 and includes up to four landfill cells (Cells 1 through 4), in the northern part of the landfill at build-out and covering approximately 52 acres. Phase 1 will provide available waste capacity for a period greater than five years based on the projected incoming waste rate of approximately 1,700 tons per day.

The construction of Cell 1A, which is the first half of Cell 1 in the Phase 1 development, has been completed. It is noted that the construction of Cell 1 has been split into a northern half (Cell 1A, now complete) and a southern half (Cell 1B, currently under construction). The liner system of Cell 1A is continuous through Cell 1B. For initial operation, Cells 1A and 1B are separated by a temporary berm and a rain flap. After construction of Cell 1B is completed and Cell 1A is filled to the planned height, the berm and rain flap will be removed, the leachate collection systems will be connected, and the cell will then operate as a single unit (Cell 1).

## 2.2 Construction Activities

This certification report pertains to CQA monitoring and testing activities only for the construction of Cell 1A and associated facilities indicated in the construction drawings prepared for the initial phase of construction. The initial construction of the OHDF, documented herein, included the construction of:

- landfill perimeter berm;
- storm water management system (along site access road and around landfill footprint and Borrow Area A);
- Cell 1A (including earthwork, liner system, and leachate collection system);
- Cell 1 sump area;
- low-permeability soil layer in sump area of Cells 1 through 6;
- Phase 1 leachate transmission system;
- leachate storage area for Phases 1 and 2;

- site access road, landfill haul road, and cell access road;
- groundwater monitoring wells;
- administration and future use areas;
- site utilities; and
- other ancillary facilities discussed in Section 7.

The construction of the Cell 1A liner system and the leachate management system was the primary focus of the CQA activity, as this was considered critical with respect to the adequate performance of the OHDF landfill and protection of the surrounding environment. The landfill design incorporates a double-composite liner system and other engineering controls that meet or exceed the requirements of Chapter 62-701, FAC. The Cell 1A liner system consists of the following components (from top to bottom):

- minimum 24-in. (610-mm) thick liner protective layer;
- primary geocomposite drainage layer, consisting of a high-density polyethylene (HDPE) geonet with a needle-punched, non-woven geotextile heat bonded to each side, hereafter referred to as primary geocomposite;
- primary liner, consisting of a 60-mil (1.5-mm) thick textured HDPE geomembrane;
- primary geosynthetic clay liner (GCL) consisting of needle-punched reinforced composite composed of granular sodium bentonite encapsulated between non-woven geotextiles (with needle-punched fibers thermally fused to the bottom scrim reinforced non-woven geotextile);
- secondary geocomposite drainage layer, consisting of a HDPE geonet with a needle-punched, non-woven geotextile heat bonded to each side, hereafter referred to as secondary geocomposite;
- secondary liner, consisting of a 60-mil (1.5-mm) thick textured HDPE geomembrane;
- secondary GCL consisting of needle-punched reinforced composite composed of granular sodium bentonite encapsulated between non-woven geotextiles (with needle-punched fibers thermally fused to the bottom scrim reinforced non-woven geotextile); and
- minimum 6-in (152-mm) thick prepared subbase.

The leachate management system is composed of the leachate collection, transmission, and storage systems. The construction of the leachate management system

for Phase 1 development of the OHDF landfill included construction of leachate collection system in Cell 1A, Cell 1 sump, leachate transmission system for Phase 1, and the initial leachate storage area as described below.

*Cell 1A Leachate Collection System:*

- a 6-in. diameter perforated leachate collection pipe surrounded by gravel aggregate and non-woven geotextile filter fabric, as part of the primary leachate collection system;
- a 6-ft wide secondary geocomposite layer as part of the secondary leachate collection system;

*Cell 1 Sump:*

- sump gravel beds covered with geotextile separator fabric;
- three 48-in diameter sump risers (2 primary and 1 secondary sump risers);

*Phase 1 Leachate Transmission System:*

- a 8-inch diameter leachate transmission pipe and manholes from Cell 5 sump area (south of Cell 4) to the leachate storage area (south of Cell 3);

*Leachate Storage Area:*

- containment area liner system included (from top to bottom) a primary 60-mil thick textured HDPE geomembrane, minimum 2-ft thick liner protective layer, a secondary 60-mil thick textured HDPE geomembrane, and a GCL);
- leak detection and toe drains;
- four flexible storage containers constructed using 60-mil (1.5-mm) thick HDPE geomembrane, which are contained within the double-lined containment area; and
- a leachate truck load out pad with associated leachate transfer pumps, instrumentation, and pipe system.

# 3. CONSTRUCTION QUALITY ASSURANCE PROGRAM

## 3.1 General

The scope of CQA monitoring, testing, and documentation services performed by GeoSyntec during the OHDF construction included review of documents, field CQA operations, and preparation of a final certification report and record drawings for the liner system. These activities are described in the following sections of this report.

GeoSyntec provided the CQA monitoring, testing, and documentation as well as the original design and construction drawings. A list of personnel involved in construction of the OHDF is included in Section 3.2 of this report.

GeoSyntec arrived on site to observe the initial earthwork construction associated with the site access road and storm water management berms on 26 June 2003. The earthwork for construction of the landfill perimeter berm and Cell 1A commenced on 18 August 2003. The construction of the leachate storage area started on 24 October 2003. The installation of the liner system in Cell 1A commenced on 16 October 2003. The placement of the liner protective layer in Cell 1A commenced on 17 November 2003. Construction of the Cell 1A and the associated facilities described in this certification report was substantially completed on 19 January 2004.

## 3.2 Related Documents

As previously noted, this certification report summarizes the CQA activities performed by GeoSyntec during construction of the OHDF. The CQA activities conducted by GeoSyntec were intended to satisfy the requirements of the following documents:

- permit application entitled "*Application for a Permit to Construct and Operate a Class I Landfill*", prepared and submitted by GeoSyntec of Tampa, Florida on 24 May 2002 and approved by the FDEP Central District on 18 October 2002;
- "*Construction Quality Assurance (CQA) Plan*", Appendix Q of the OHDF Permit Application, dated May 2002;
- "*Technical Specifications*", Appendix P of the OHDF Permit Application, dated May 2002;
- permit drawings entitled "*Oak Hammock Disposal, A Solid Waste Facility*", dated May 2002;

- construction drawings entitled "*OHDF Site Access and Storm Water Management*" and Project Manual containing Technical Specifications, dated May 2003, prepared by GeoSyntec of Tampa, Florida; and

- construction drawings entitled "*OHDF Cell 1 and Leachate Systems*" and Project Manuals for Earthwork and Geosynthetics, dated August 2003, prepared by GeoSyntec of Tampa, Florida.

All of the above documents are collectively referred to as the CQA Documents hereafter in this certification report. During construction, minor modifications to include clarifications to the intent of the design and changes to accommodate existing site conditions or preferred construction techniques were made to these documents. However, no substantial changes were made to the CQA Documents.

## 3.3 Field CQA Operations

The following activities were performed as part of GeoSyntec's on-site CQA services:

*Earthwork:*

- collecting samples of soils used as general fill to construct the subgrade, liner subbase, landfill perimeter berms, leachate storage area, access and haul roads, and administration and future uses area building pads for testing at either an on-site or an off-site geotechnical laboratory;

- collecting samples of soils used in the liner protective and low-permeability soil layers for testing at either an on-site or an off-site geotechnical laboratory;

- reviewing and evaluating geotechnical laboratory test results to ensure compliance with the requirements of the CQA Documents;

- monitoring placement, grading, and compaction of earthwork related construction activities (including storm water management berms and related structures);

- testing in-situ density, moisture content, and/or percent compaction of earthwork related construction activities to ensure compliance with the requirements of the CQA Documents;

- notifying Contractor of areas that need additional compaction based on failing in-situ tests and re-testing these areas to ensure compliance with the requirements of the CQA Documents; and

- monitoring anchorage of the geosynthetics in the perimeter anchor trenches.

*Geosynthetics:*

- monitoring delivery and storage and tracking the inventory of geosynthetic materials delivered for the project;
- coordinating the collection of geosynthetic conformance samples from in-plant sources or delivered rolls and forwarding samples to an off-site geosynthetics testing laboratory;
- collecting and reviewing geosynthetic manufacturers' quality control (MQC) and certification documents and geosynthetic laboratory conformance test results to verify compliance with the requirements of the CQA Documents;
- monitoring installation of geosynthetic materials in Cell 1A and Phase 1 leachate storage area including trial seams, destructive and nondestructive tests, and repair operations; and
- performing destructive testing of geomembrane seams at the minimum frequency required by the CQA Documents.

*Leachate Management System:*

- collecting samples of aggregate used in the leachate collection system for testing at an off-site geotechnical laboratory;
- reviewing quality control (QC) documents of materials used in the leachate management system, geotechnical laboratory conformance test results on samples of aggregate, and geosynthetic laboratory conformance test results on samples of geotextile filter/separator fabric to verify compliance with the requirements of the CQA Documents;
- monitoring construction of leachate collection system in Cell 1A, Cell 1 sump, leachate transmission system for Phase 1, and leachate storage area; and
- monitoring pressure testing of the leachate transmission line.

*Other Construction:*

- reviewing QC documents of materials used in the construction of the access and haul roads base course, groundwater monitoring wells, culvert crossings, storm water structures along site access road, drainage storm water structures along Phase 1 perimeter berm, site utilities, and facility fencing;

- monitoring placement, grading, and compaction of access and haul roads base course (limerock) and testing in-situ density and percent compaction to ensure compliance with the requirements of the CQA Documents;

- continuously monitoring installation of the groundwater monitoring wells at the perimeter of Phase 1 development;

- developing and sampling the groundwater monitoring wells and forwarding samples to an analytical testing laboratory;

- periodically monitoring construction of the culvert crossings, storm water structures along site access road, drainage storm water structures along Phase 1 perimeter berm, site utilities, and facility fencing; and

- collecting samples of limerock used in the access and haul road base-course for testing at an off-site geotechnical laboratory.

During construction activities involving monitoring and/or testing, the observations made and results obtained by GeoSyntec CQA personnel were compared with the requirements of the CQA Documents. The construction manager and the appropriate contractor were notified of deficiencies in construction practices and/or materials to ensure appropriate corrective actions are taken. The corrective actions were monitored and/or tested by CQA personnel to ensure compliance with the requirements of the CQA Documents.

## 3.4 Certification Report and Record Drawings

Record drawings for the Cell 1A earthwork and liner systems and this CQA certification report were prepared as the final task of the CQA program for construction of Cell 1A and associated facilities. This certification report summarizes the CQA monitoring, testing, and documentation activities performed by GeoSyntec.

During construction, CQA monitoring and testing activities were documented by CQA personnel in Daily Field Reports (DFRs) and various other forms. In addition, QC certificates for the geosynthetic and other materials and surveyor's data were provided to GeoSyntec for review. These and other documents are maintained by GeoSyntec and will be made available for FDEP review upon request. Results of CQA monitoring and testing activities that are critical with respect to the adequate performance of the OHDF landfill and protection of the surrounding environment have been summarized in a tabular form and are included in this certification report.

## 3.5 Project Personnel

Senior personnel or representatives of the firms involved in the project are as follows:

*Owner:* Omni Waste of Osceola County, LLC

- Tim Salopeck, President
- Lenny Marion, Operations Manager

*CQA Consultant:* GeoSyntec Consultants - Tampa, Florida

- Ken Cargill, P.E., Project Manager and Certification Engineer
- Ayushman Gupta, P.E., Project Engineer
- Kirk Wills, Field Services Manager
- Richard Chocolas, Site CQA Manager

*Earthwork Contractor:* Lundquist Excavating, Inc., Kissimmee, Florida

- William Lundquist, Project Manager
- Fred Brunson, Project Manager
- Kenny Jones, Site Superintendent/Surveyor

*Earthwork Subcontractor:* Bul-Hed, Mulberry, Florida

- Jerry Martin, Project Manager
- Ruben Brock, Site Superintendent

*Geosynthetics Installer:* Comanco Environmental Corporation, Tampa, Florida

- Jerry Pryor, Project Manager
- Prisciliano Segura, Site Superintendent

*Leachate System Contractor* Comanco Environmental Corporation, Tampa, Florida

- Steve Kitzmiller, Project Manager
- Mike D'Orazio, Site Superintendent

| | |
|---|---|
| *Surveyor:* | Atlantic Land Design, Orlando, Florida |
| | • Gary Burden, P.L.E., Professional Surveyor |
| *Geotechnical Laboratories:* | Excel Geotechnical Testing, Roswell, Georgia |
| | • Nader Rad, Ph.D., P.E., Project Manager |
| | Atlantic Testing Laboratories, Inc., Melbourne, Florida |
| | • Donald Tucker Jr., P.E., Project Manager |
| *Geosynthetics Laboratory:* | Texas Research Institute, Austin, Texas |
| | • Sam Allen, Project Manager |
| | SGI Testing Services, LLC, Norcross, Georgia |
| | • Rob Swan, Project Manager |

# 4. CONSTRUCTION QUALITY ASSURANCE - EARTHWORK

## 4.1 General

GeoSyntec monitored the construction of the earthwork related to various components of the OHDF landfill including the landfill perimeter berm; Cell 1A including the intercell berm (between Cells 1A and 2); leachate storage area berms; low-permeability soil layer in sump area of six cells; liner protective layer; building pads; site access road; landfill haul roads (including haul road to leachate storage area and cell access road); storm water management berms (along access road, around the landfill footprint, and around the borrow area); and anchorage of the geosynthetic components of the double-composite liner system. Different materials were used to construct the various components of the landfill. These materials included general fill, low-permeability soil, liner protective layer soil, and stripped materials.

General fill was used to construct the landfill perimeter berm; Cell 1A base, intercell berm, and 6-inch liner subbase; leachate storage area berms; building pads; site access and landfill haul roads embankment and 12-inch subbase; and anchorage of the geosynthetics. The low-permeability soil was used to construct the 2-ft thick compacted layer in sump area of Cells 1 through 6. The liner protective layer soil was used to cover the geosynthetics components of the liner system, construct the drainage soil layer between the primary and secondary liners in the leachate storage area, and to construct the temporary inner cell berm for a rain flap between Cells 1A and 1B. Stripped materials (relatively free of roots) were used to construct the storm water management berms along the site access road, around the landfill footprint, and around Borrow Area A.

CQA personnel observed these earthwork related construction activities and tested the soils to confirm that the material properties conformed to the CQA Documents, specific maximum lift thicknesses were not exceeded, and compaction requirements were met. GeoSyntec personnel also performed geotechnical soil tests during construction. The testing was performed in-situ, in the on-site geotechnical laboratory, or at off-site geotechnical laboratories. The off-site geotechnical laboratories included Atlantic Testing Laboratories, Inc. (ATL) in Melbourne, Florida and Excel Geotechnical Testing (EGT) in Roswell, Georgia.

## 4.2 Soil Source Sampling Activities

The general fill and liner protective layer soil were obtained from on-site borrow area (Borrow Area A). The low-permeability soil was obtained from an off-site source north of Haines City, Florida. Clayey soils from this off-site source were tested and approved by GeoSyntec prior to borrowing materials for use in the sump areas.

Representative samples of general fill, low-permeability soil, and liner protective layer soil were obtained from their respective sources and tested to verify conformance with specified material requirements in the CQA Documents. The geotechnical tests were performed to confirm that the following requirements were met for the different materials used in construction of the OHDF landfill.

- *General Fill:* classified as SW, SP, or SM in accordance with the Unified Soil Classification System (USCS) per ASTM D 2487 and was relatively free of debris, foreign objects, large rock fragments, organic matter, and other deleterious materials. In addition, general fill used as liner subbase in Cell 1A and the leachate storage area was free of sharp materials or materials larger than 0.5 inches.

- *Low-Permeability Soil:* was fine-grained soil (i.e., at least 50 percent by weight passing U.S. Standard sieve #200 per ASTM D 422); classified as CL or CH in accordance with the USCS per ASTM D 2487; had maximum particle size of 0.75 inches; and was relatively homogeneous soil free of deleterious materials. Regardless of the classification, the compacted low-permeability soil (compacted to at least 95 percent of the standard Proctor maximum dry unit weight) was required to exhibit a maximum hydraulic conductivity of $1.0 \times 10^{-7}$ centimeters per second (cm/sec) at a confining stress of 20 pounds per square inch (psi) when tested in accordance with ASTM D 5084.

- *Liner Protective Layer Soil:* classified as SW or SP in accordance with the USCS; had maximum particle size of 0.75 inches; had an average fines content of less than 5 percent per ASTM D 1140; had carbonate content of less than 5 percent per ASTM D 4373; and was relatively homogeneous soil free of deleterious materials. Regardless of the classification, liner protective layer soil was required to exhibit a hydraulic conductivity no less than $1.0 \times 10^{-3}$ cm/sec in accordance with ASTM D 2434.

- *Stripped Materials:* consisted of sandy soils that were relatively free of roots larger than 2 inches in diameter or 24 inches in length.

A description of the geotechnical tests performed on placed materials and results of these tests are presented in the following sections of this report.

## 4.3 CQA Monitoring and Testing

GeoSyntec's CQA personnel monitored the placement and/or compaction of soils as described in Section 3. At times, several earthwork construction operations were conducted simultaneously. When this occurred, the on-site personnel monitored the operations considered most critical to the performance of the landfill liner system or leachate storage area. Potentially nonconforming or questionable practices observed by CQA personnel were brought to the attention of the concerned parties for review and correction.

As part of CQA activities, geotechnical testing was performed on each of the soils used in the construction of the OHDF landfill. Depending on the specific test, testing was performed in-situ, at the on-site laboratory, or at an off-site laboratory (ATL or EGT).

The following geotechnical tests were performed:

- in-situ nuclear moisture/density tests on compacted lifts of general fill and low-permeability soils (the tests were performed in accordance with ASTM D 2922 for density and ASTM D 3017 for moisture content);
- in-situ density tests using the sand cone method (ASTM D 1556) to compare to the density tests results obtained using the nuclear gauge;
- moisture content tests on general fill and low-permeability soils in accordance with ASTM D 2216;
- standard Proctor compaction tests on general fill and low-permeability soils in accordance with ASTM D 698;
- modified Proctor compaction tests on general fill and limerock (used as base course for the roads) in accordance with ASTM D 1557;
- grain-size analysis or fines content determination in accordance with ASTM D 422, ASTM C 136, or ASTM D 1140, respectively;
- Atterberg limits tests on the low-permeability soil in accordance with ASTM D 4318;
- hydraulic conductivity tests on the liner protective layer soils in accordance with ASTM D 2434 and on low-permeability soil in accordance with ASTM D 5084; and

- interface friction tests for the interfaces between general fill and GCL and between liner protective layer soil and primary geocomposite, as discussed in Section 5.

GeoSyntec supplied two nuclear gauges (Troxler Model #3440 Serial #15334 and Troxler Model #3430 Serial #25657) that were used to perform the moisture/density tests. The gauges were calibrated daily prior to use by the "standard count" method. These counts were recorded on standard count logs, which are not included in the certification report but are available for review upon request. The in-situ density tests using the sand cone method (ASTM D 1556) were performed periodically to compare to the density tests results obtained using the nuclear gauge.

## 4.4 General Fill

CQA personnel monitored the excavation (from the Borrow Area A), placement, and compaction of general fill, which was used to construct the landfill perimeter berm; Cell 1A base, intercell berm, and 6-inch liner subbase; leachate storage area berms; building pads; site access and landfill haul roads embankment and 12-inch subbase; and anchorage of the geosynthetics. Earthwork using general fill consisted of following activities:

- clearing, grubbing, and/or stripping areas receiving general fill, as needed;
- monitoring existing subgrade by CQA personnel to confirm that unsuitable materials were removed;
- proof rolling of subgrade by the contractor to detect soft or loose zones using scraper pans, articulated dump trucks, or tires of heavy equipment;
- excavating and hauling general fill from on-site source, Borrow Area A, using scraper pans or excavators and articulated dump trucks;
- placing and spreading general fill in relatively thin lifts using scraper pans and bulldozers or articulated dump trucks and bulldozers;
- compacting general fill using scraper pans or smooth drum rollers;
- scarifying surface of each compacted lift using tracks of a bulldozer or tires of heavy equipment, prior to placement and compaction of subsequent lifts; and
- surveying the limits and elevations of the compacted general fill (Record Drawing for compacted general fill in Cell 1A is included in Appendix A).

General fill was typically required to be compacted to at least 95 percent of the corresponding standard Proctor (ASTM D 698) maximum dry unit weight. However, general fill used to construct the embankments for access and haul roads was required to be compacted to at least 95 percent of the corresponding modified Proctor (ASTM D 1557) maximum dry unit weight. The 12-inch subbase for access and haul roads was required to be compacted to at least 100 percent of the corresponding modified Proctor (ASTM D 1557) maximum dry unit weight.

The geotechnical tests performed on compacted general fill materials are discussed below. It is noted that only earthwork related construction activities that are critical with respect to the adequate performance of the OHDF landfill and protection of the surrounding environment (i.e., construction the landfill perimeter berm; Cell 1A base, intercell berm, and 6-inch liner subbase; leachate storage area berms; and anchorage of the geosynthetics) are discussed in detail. These construction activities are hereafter referred to as *critical construction activities*. Construction activities not critical with respect to the adequate performance of the OHDF landfill and protection of the surrounding environment (i.e., construction of building pads, site access road, and landfill haul roads) are discussed only briefly. These construction activities are hereafter referred to as *non-critical construction activities*.

### 4.4.1 Standard Proctor Tests

Standard Proctor tests were performed to evaluate the percent compaction from the measured in-situ densities of compacted general fill. Standard Proctor tests were required to be performed at a minimum frequency of 1 test per 25,000 cubic yards (cyd) of compacted general fill.

Nineteen standard Proctor tests were performed during construction for approximately 413,000 cyd of compacted general fill placed for critical construction activities. The CQA test frequency of 1 test per 22,000 cyd (approx.) of compacted general fill exceeded the minimum testing frequency required by the CQA Documents. The standard Proctor tests performed during construction are summarized in Table 4-1 and are presented in Figure 4-1. As noted, the maximum dry unit weight varied from 100.1 to 107.5 pounds per cubic foot (pcf) and the optimum moisture content varied from 13.0 to 17.0 percent.

### 4.4.2 Density and Percent Compaction

In-situ nuclear moisture/density tests were required to be performed at a frequency of 1 test per 200 lineal feet (lf) per lift per lane for the access and haul roads and at a frequency of 5 tests per acre per lift or 1 test per 250 lf per lift for all other earthwork using general fill. A minimum of two in-situ nuclear moisture/density tests were

performed on each day of active earthwork related construction activities. If the density test failed to meet the minimum compaction requirements, the contractor reworked and recompacted the area surrounding the failure and the area was retested by CQA personnel. The procedure was repeated until satisfactory moisture/density test results were obtained at each test location.

A total of 274,000 cyd (approx.) of general fill was placed to construct the 5,800 lf of perimeter berm around Phase 1 of the OHDF landfill. The in-situ nuclear moisture/density tests performed to evaluate the compaction of the perimeter berm are presented in Table 4-2. A total of 1,024 in-situ nuclear moisture/density tests were performed, which correspond to a CQA test frequency of 1 test per 270 cyd (approx.) of compacted general fill. As noted, areas corresponding to the failing test were reworked and recompacted by the contractor and retested by the CQA personnel.

A total of 103,000 cyd (approx.) of general fill was placed to construct the Cell 1A (Cell 1A base, intercell berm between Cells 1A and 2, and the 6-inch liner subbase). The in-situ nuclear moisture/density tests performed to evaluate the compaction of the Cell 1A are presented in Table 4-3. A total of 220 nuclear moisture/density tests were performed, which correspond to a CQA test frequency of 1 test per 470 cyd (approx.) of compacted general fill. As noted, areas corresponding to the failing test were reworked and recompacted by the contractor and retested by the CQA personnel.

A total of 36,000 cyd of general fill was placed to construct the leachate storage area berms. The in-situ nuclear moisture/density tests performed to evaluate the compaction of the leachate storage area berms are presented in Table 4-4. A total of 62 in-situ nuclear moisture/density tests were performed, which correspond to a CQA test frequency of 1 test per 580 cyd (approx.) of compacted general fill.

For the non-critical construction activities, in-situ nuclear moisture/density tests were performed by CQA personnel at the required minimum frequency. The areas corresponding to the failing tests were reworked and recompacted by the contractor and retested by CQA personnel until the minimum compaction requirements were met. As discussed earlier, the moisture/density tests for non-critical construction activities are not included in this certification report but are available for review upon request.

### 4.4.3 Grain Size Analyses and USCS Classification

Grain-size distribution analyses (ASTM D 422 and ASTM C 136) and fines content determinations (ASTM D 1140) were performed to evaluate the USCS classification (ASTM D 2487) of general fill materials excavated from Borrow Area A. The grain size distribution analyses and USCS classification were required to be performed at a minimum frequency of 1 test per 10,000 cyd of compacted general fill.

Forty two grain-size distribution analyses or fines content determinations and USCS classification were performed during construction for approximately 413,000 cyd of compacted general fill placed for critical construction activities. The CQA test frequency of 1 test per 9,800 cyd (approx.) of compacted general fill exceeded the minimum testing frequency required by the CQA Documents. The grain-size distribution analyses or fines content determinations and USCS classification performed during construction are summarized in Table 4-5. As noted, the general fill materials excavated from Borrow Area A classified as SP, SP-SM, or SM in accordance with the USCS classification.

### 4.4.4 Sand Cone Tests

In-situ moisture/densities were measured using the sand cone method (ASTM D 1556) periodically to verify the moisture/density tests results obtained using the nuclear gauge. A total of 21 moisture/densities were measured during construction using the sand cone method and the nuclear density gauge and are summarized in Table 4-6. As noted, the densities measured using the two methods were in general agreement.

### 4.4.5 Anchorage of Geosynthetics

GeoSyntec CQA personnel periodically monitored the method of anchorage for the geosynthetic materials along the perimeter berm (on north and west sides of Cell 1A) and the intercell berm between Cells 1A and 2 (on east side of Cell 1A). Along the south side of Cell 1A, the layers of geosynthetics were extended into the future Cell 1B area. In the anchor trench, geosynthetics were initially ballasted by sand bags placed over top of the last geosynthetic layer deployed. Soil was subsequently placed and compacted in the trench to provide permanent anchorage for the liner system. The construction sequence for the anchor trenches was as follows:

- a 2-ft deep by 2-ft wide (minimum) trench was excavated approximately 2 feet from the inside crest of perimeter berm and 6 feet from the inside crest of intercell berm;
- the geosynthetic components were then placed in and across the bottom of the anchor trench and ballasted with sandbags; and
- lifts of backfill were placed over the geosynthetic materials and compacted.

## 4.5 Low-Permeability Soil

As part of this construction project, a low-permeability soil layer was constructed in the sump area of Cells 1 through 6. The low-permeability soil layer in the sump areas was over-built and sloped to prevent ponding of water in the sump areas and within the

perimeter berm embankment. As additional cells are constructed during future development of the OHDF landfill, the sumps will be graded to the required shape and thickness. Since Cell 1 was constructed as part of this project, only Cell 1 sump area was graded to the required shape and thickness indicated in the CQA Documents. The construction of the low-permeability soil layer in the sump areas consisted of the following activities:

- low-permeability soils were trucked from the off-site borrow area to the site;
- soils were stockpiled on-site and subsequently hauled to the sump area using articulated dump trucks;
- low-permeability soil was placed in two approximately 1-foot thick lifts using a bulldozer and moisture conditioned, as needed;
- each lift of soil was compacted using a sheepsfoot roller;
- the surface of each compacted lift was typically scarified with the tracks of a bulldozer prior to placement of the subsequent lift;
- a bulldozer was used to grade/shape the over-built low-permeability soil layer;
- the final lift was rolled with a smooth drum roller to seal the top surface; and
- the limits and elevations of the low-permeability soil layer in the sump areas were surveyed.

When the contractor was ready to install the geosynthetics in Cell 1 sump area, the sump area was excavated and graded to the required shape and thickness using excavator, gradall, and hand tools. The final shape and thickness of the low-permeability soil layer were surveyed and are presented in a record drawing in Appendix A. Prior to deployment of the geosynthetics, the compacted low-permeability soil layer surface was visually observed by CQA personnel for surface cracks and oversized particles. If drying or cracking of the surface was observed, the contractor moisture conditioned and reworked the affected area. Any observed oversized particles were manually removed.

The low-permeability soil layer was required to be compacted to at least 95 percent of the corresponding standard Proctor (ASTM D 698) maximum dry unit weight at a moisture content no more than 4 percent wet of the optimum moisture content. However, the primary acceptance criterion was that the compacted low-permeability soil layer exhibit a maximum hydraulic conductivity of $1.0 \times 10^{-7}$ cm/sec at a confining stress of 20 psi when tested in accordance with ASTM D 5084.

A series of tests were performed on the low-permeability soil layer. These included nuclear moisture/density, fines content, Atterberg limits, hydraulic conductivity, and standard Proctor tests. The nuclear moisture/density tests performed for the low-permeability soil layer in Cells 1 through 6 are summarized in Table 4-7. The percent

compaction indicated in Table 4-7 were computed using the standard Proctor test results. Two standard Proctor tests were performed by EGT for the low-permeability soils and are presented in Figure 4-2. As noted, the test results for moisture content, density, and percent compaction met or exceeded the requirements of the CQA Documents.

Off-site geotechnical laboratory EGT performed the fines content, Atterberg limits, and hydraulic conductivity tests on thin-walled Shelby tube samples of the compacted low-permeability soil layer. One Shelby tube sample was collected and tested from each cell sump area. The laboratory test results for the Shelby tube samples of the low-permeability soils are summarized in Table 4-8. As noted, the measured hydraulic conductivities of low-permeability soil layer ranged from $8.6 \times 10^{-9}$ cm/sec to $9.2 \times 10^{-8}$ cm/sec, exceeding the requirements of the CQA Documents.

Fine-grained soils used to construct the 2-ft thick compacted low-permeability soil layer in the sump area of the cells classified as CH, except for the soils used to construct Cell 5 sump area. The low-permeability soils in Cell 5 sump area had a fines content of 49 percent (i.e., slightly less than the required 50 percent) and thus classified as SC. However, these soils were accepted since the measured hydraulic conductivity of the compacted low-permeability soil layer was less than $1.0 \times 10^{-7}$ cm/sec.

Nuclear density test holes and holes at the Shelby tube sample locations were filled with 10 percent soil-bentonite mixture. The soil-bentonite mixture was placed in the test holes in thin lifts and was manually compacted.

## 4.6 Liner Protective Layer Soils

Liner protective layer soil was used to cover the geosynthetic components of the liner system in Cell 1A, to construct the soil layer between the primary and secondary liners in the leachate storage area, and to construct the temporary inner cell berm for a rain flap between Cells 1A and 1B. The minimum thickness of the liner protective layer atop the geosynthetic components of the liner system in Cell 1A was 2 feet. The thickness of the soil layer between the primary and secondary liners in the leachate storage area varied from 1 to 3 feet.

Sandy soils from on-site source, Borrow Area A, were used as liner protective layer soil. CQA personnel periodically monitored the placement of the liner protective layer soil in Cell 1A and leachate storage area. The construction sequence of liner protective layer was as follows:

- articulated dump trucks hauled the sandy soils from Borrow Area A to Cell 1A and leachate storage area; and

- the sandy soils were spread and graded using relatively low ground pressure equipment.

During placement of the liner protective layer soils, CQA personnel periodically monitored the contractor's activities to assure that the risk of damage to the underlying geosynthetics was minimized. CQA personnel also confirmed that at least a 2-ft thick layer of sandy soils was maintained over the geosynthetics where the contractor operated the equipment. A minimum of 3-ft thick layer of sandy soils was maintained over the geosynthetics in heavily trafficked areas.

Off-site geotechnical laboratory EGT performed fines content (ASTM D 1140), soil classification in accordance with USCS (ASTM D 2487), and hydraulic conductivity (ASTM D 2434) tests on samples of the liner protective layer soils. Fines content (ASTM D 1140) and soil classification in accordance with USCS (ASTM D 2487) were required at a minimum frequency of 1 test per 2,000 cyd of in-place liner protective layer soils. Hydraulic conductivity tests were required at a minimum frequency of 1 test per 3,000 cyd of in-place liner protective layer soils.

A total of 41,000 cyd (approx.) of liner protective layer soil was placed in Cell 1A. Twenty three fines content (and USCS classification) and 16 hydraulic conductivity tests were performed on the liner protective layer soils from Cell 1A and are presented in Table 4-9. This corresponds to CQA test frequencies of 1 test per 1,800 cyd (approx.) for fines content (and USCS classification) and 1 test per 2,600 cyd (approx.) for hydraulic conductivity, which exceed the minimum testing frequencies required by the CQA Documents.

A total of 3,000 cyd (approx.) of liner protective layer soil was placed in the leachate storage area. Four fines content (and USCS classification) and 2 hydraulic conductivity tests were performed on the liner protective layer soils from the leachate storage area and are also presented in Table 4-9. This corresponds to CQA test frequencies of 1 test per 750 cyd (approx.) for fines content (and USCS classification) and 1 test per 1,500 cyd (approx.) for hydraulic conductivity, which exceed the minimum testing frequencies required by the CQA Documents.

As noted, the measured hydraulic conductivities of liner protective layer soils exceeded the minimum hydraulic conductivity of $1.0 \times 10^{-3}$ cm/sec required by the CQA Documents. Some of the liner protective layer soil samples had a fines content greater than the required 5 percent and thus classified as SP-SM. However, these soils were accepted since the measured hydraulic conductivity of the liner protective layer soil samples was at least 4 times the required minimum hydraulic conductivity of $1.0 \times 10^{-3}$ cm/sec.

## 4.7 Storm Water Berms

Stripped materials (relatively free of roots) were used to construct the storm water management berms along the site access road, around the landfill footprint, and around the borrow area (Borrow Area A). CQA personal periodically monitored the construction of the storm water management berms to ensure that the stripped materials were relatively free of roots and the placed materials were being tracked and reasonably compacted by construction traffic.

**Table 4-1**

**STANDARD PROCTOR TEST RESULTS FOR GENERAL FILL**

| SAMPLE ID | SOIL DESCRIPTION | OPTIMUM MOISTURE CONTENT (%) | MAXIMUM DRY DENSITY (pcf) |
|---|---|---|---|
| GF-1S | Brown & gray sand with trace of silt and clay | 14.0 | 107.5 |
| GF-2S | Brown & gray sand with trace of silt and clay | 13.0 | 105.8 |
| GF-3S | Dark brown and gray sand with trace of silt and clay | 16.2 | 100.1 |
| GF-4S | Dark brown and gray sand with trace of silt and clay | 16.5 | 101.0 |
| GF-6S | Brown & gray sand with trace of silt | 14.3 | 105.9 |
| GF-7S | Dark brown & gray sand with trace of silt | 14.9 | 103.7 |
| GF-8S | Dark brown & gray sand with silt | 15.9 | 102.9 |
| GF-9S | Dark brownish gray sand with trace of silt | 15.8 | 103.1 |
| GF-10S | Dark brown gray sand with trace of silt | 15.7 | 103.4 |
| GF-11S | Dark brownish gray sand with trace of silt | 16.0 | 102.9 |
| GF-12S | Dark brownish gray sand with trace of silt | 17.0 | 102.4 |
| GF-13S | Dark grayish brown | 15.9 | 101.3 |
| GF-15S | Dark grayish brown | 15.5 | 102.4 |
| GF-16S | Brown sand with trace of silt | 16.2 | 104.7 |
| GF-17S | Brown sand with trace of silt | 15.7 | 103.2 |
| GF-18S | Brown sand with trace of silt | 15.1 | 105.6 |
| GF-19S | Brown sand with trace of silt | 15.6 | 104.5 |
| GF-20S | Dark brown sand with trace of silt | 15.1 | 105.3 |
| GF-21S | Dark brown sand with trace of silt | 14.8 | 106.6 |

## Table 4-2

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-204 | 14.5 | 103.4 | 97.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-205 | 9.0 | 106.0 | 100.1 | GF-6S | 14.3 | 105.9 | | P |
| LF-206 | 14.3 | 101.6 | 95.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-207 | 12.1 | 103.4 | 97.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-208 | 10.4 | 104.1 | 98.3 | GF-6S | 14.3 | 105.9 | | P |
| LF-209 | 12.8 | 101.8 | 96.1 | GF-6S | 14.3 | 105.9 | | P |
| LF-210 | 12.1 | 103.3 | 97.5 | GF-6S | 14.3 | 105.9 | | P |
| LF-211 | 10.3 | 101.3 | 95.7 | GF-6S | 14.3 | 105.9 | | P |
| LF-212 | 9.7 | 101.4 | 95.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-223 | 8.8 | 107.8 | 104.8 | GF-8S | 15.9 | 102.9 | | P |
| LF-224 | 7.2 | 102.0 | 99.1 | GF-8S | 15.9 | 102.9 | | P |
| LF-225 | 9.3 | 102.6 | 99.7 | GF-8S | 15.9 | 102.9 | | P |
| LF-226 | 8.6 | 103.1 | 100.2 | GF-8S | 15.9 | 102.9 | | P |
| LF-227 | 11.1 | 102.9 | 100.0 | GF-8S | 15.9 | 102.9 | | P |
| LF-228 | 8.1 | 103.9 | 101.0 | GF-8S | 15.9 | 102.9 | | P |
| LF-229 | 10.4 | 103.9 | 101.0 | GF-8S | 15.9 | 102.9 | | P |
| LF-230 | 11.0 | 103.5 | 100.6 | GF-8S | 15.9 | 102.9 | | P |
| LF-231 | 10.5 | 104.5 | 101.6 | GF-8S | 15.9 | 102.9 | | P |
| LF-232 | 11.6 | 104.8 | 101.8 | GF-8S | 15.9 | 102.9 | | P |
| LF-233 | 10.6 | 105.3 | 102.3 | GF-8S | 15.9 | 102.9 | | P |
| LF-234 | 11.9 | 103.6 | 100.7 | GF-8S | 15.9 | 102.9 | | P |
| LF-235 | 9.6 | 104.5 | 101.6 | GF-8S | 15.9 | 102.9 | | P |
| LF-236 | 10.2 | 104.2 | 101.3 | GF-8S | 15.9 | 102.9 | | P |
| LF-237 | 11.3 | 103.8 | 100.9 | GF-8S | 15.9 | 102.9 | | P |
| LF-238 | 14.1 | 100.6 | 97.8 | GF-8S | 15.9 | 102.9 | | P |
| LF-239 | 12.4 | 104.1 | 101.2 | GF-8S | 15.9 | 102.9 | | P |
| LF-240 | 14.8 | 103.7 | 100.8 | GF-8S | 15.9 | 102.9 | | P |
| LF-241 | 10.5 | 103.6 | 100.7 | GF-8S | 15.9 | 102.9 | | P |
| LF-242 | 12.2 | 104.4 | 101.5 | GF-8S | 15.9 | 102.9 | | P |
| LF-243 | 13.0 | 105.1 | 102.1 | GF-8S | 15.9 | 102.9 | | P |
| LF-244 | 10.8 | 101.2 | 98.3 | GF-8S | 15.9 | 102.9 | | P |
| LF-245 | 12.6 | 101.6 | 98.7 | GF-8S | 15.9 | 102.9 | | P |
| LF-246 | 13.2 | 100.2 | 97.4 | GF-8S | 15.9 | 102.9 | | P |
| LF-247 | 9.2 | 100.0 | 97.2 | GF-8S | 15.9 | 102.9 | | P |
| LF-248 | 10.9 | 101.2 | 98.3 | GF-8S | 15.9 | 102.9 | | P |
| LF-249 | 9.4 | 103.3 | 100.4 | GF-8S | 15.9 | 102.9 | | P |
| LF-250 | 12.9 | 102.0 | 99.1 | GF-8S | 15.9 | 102.9 | | P |
| LF-251 | 12.6 | 100.6 | 97.8 | GF-8S | 15.9 | 102.9 | | P |
| LF-252 | 13.8 | 100.0 | 97.2 | GF-8S | 15.9 | 102.9 | | P |
| LF-265 | 11.2 | 102.4 | 99.5 | GF-8S | 15.9 | 102.9 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| **TEST RESULTS** | | | | | | | | |
| LF-266 | 12.9 | 103.6 | 100.7 | GF-8S | 15.9 | 102.9 | | P |
| LF-267 | 11.2 | 100.6 | 97.8 | GF-8S | 15.9 | 102.9 | | P |
| LF-268 | 12.4 | 103.6 | 100.7 | GF-8S | 15.9 | 102.9 | | P |
| LF-269 | 15.7 | 101.3 | 98.4 | GF-8S | 15.9 | 102.9 | | P |
| LF-270 | 11.6 | 101.5 | 98.6 | GF-8S | 15.9 | 102.9 | | P |
| LF-271 | 11.9 | 102.8 | 99.9 | GF-8S | 15.9 | 102.9 | | P |
| LF-272 | 12.3 | 103.9 | 101.0 | GF-8S | 15.9 | 102.9 | | P |
| LF-273 | 13.0 | 104.1 | 101.2 | GF-8S | 15.9 | 102.9 | | P |
| LF-274 | 12.4 | 102.0 | 99.1 | GF-8S | 15.9 | 102.9 | | P |
| LF-275 | 9.6 | 104.7 | 101.7 | GF-8S | 15.9 | 102.9 | | P |
| LF-276 | 10.3 | 105.7 | 102.7 | GF-8S | 15.9 | 102.9 | | P |
| LF-277 | 12.6 | 103.5 | 100.6 | GF-8S | 15.9 | 102.9 | | P |
| LF-278 | 11.8 | 101.7 | 98.8 | GF-8S | 15.9 | 102.9 | | P |
| LF-279 | 12.3 | 102.3 | 99.4 | GF-8S | 15.9 | 102.9 | | P |
| LF-280 | 10.1 | 106.3 | 103.3 | GF-8S | 15.9 | 102.9 | | P |
| LF-281 | 9.6 | 105.0 | 102.0 | GF-8S | 15.9 | 102.9 | | P |
| LF-282 | 15.1 | 101.5 | 98.6 | GF-8S | 15.9 | 102.9 | | P |
| LF-283 | 10.1 | 105.9 | 102.9 | GF-8S | 15.9 | 102.9 | | P |
| LF-284 | 10.6 | 105.0 | 102.0 | GF-8S | 15.9 | 102.9 | | P |
| LF-285 | 11.7 | 103.9 | 101.0 | GF-8S | 15.9 | 102.9 | | P |
| LF-286 | 13.7 | 103.5 | 100.6 | GF-8S | 15.9 | 102.9 | | P |
| LF-287 | 16.0 | 101.3 | 98.4 | GF-8S | 15.9 | 102.9 | | P |
| LF-288 | 12.2 | 104.9 | 101.9 | GF-8S | 15.9 | 102.9 | | P |
| LF-289 | 11.8 | 103.2 | 100.3 | GF-8S | 15.9 | 102.9 | | P |
| LF-290 | 14.7 | 99.5 | 96.7 | GF-8S | 15.9 | 102.9 | | P |
| LF-291 | 16.6 | 100.3 | 97.5 | GF-8S | 15.9 | 102.9 | | P |
| LF-292 | 16.9 | 100.4 | 97.6 | GF-8S | 15.9 | 102.9 | | P |
| LF-293 | 18.5 | 99.2 | 96.4 | GF-8S | 15.9 | 102.9 | | P |
| LF-294 | 13.5 | 103.9 | 101.0 | GF-8S | 15.9 | 102.9 | | P |
| LF-295 | 10.5 | 103.5 | 100.6 | GF-8S | 15.9 | 102.9 | | P |
| LF-316 | 11.7 | 103.2 | 100.3 | GF-8S | 15.9 | 102.9 | | P |
| LF-317 | 12.5 | 105.6 | 102.6 | GF-8S | 15.9 | 102.9 | | P |
| LF-318 | 9.1 | 101.8 | 98.9 | GF-8S | 15.9 | 102.9 | | P |
| LF-319 | 10.7 | 104.4 | 101.5 | GF-8S | 15.9 | 102.9 | | P |
| LF-320 | 8.6 | 104.2 | 101.3 | GF-8S | 15.9 | 102.9 | | P |
| LF-321 | 12.3 | 100.9 | 98.1 | GF-8S | 15.9 | 102.9 | | P |
| LF-322 | 9.0 | 107.6 | 104.6 | GF-8S | 15.9 | 102.9 | | P |
| LF-323 | 10.5 | 103.8 | 100.9 | GF-8S | 15.9 | 102.9 | | P |
| LF-324 | 12.1 | 101.7 | 98.8 | GF-8S | 15.9 | 102.9 | | P |
| LF-325 | 10.3 | 106.9 | 103.9 | GF-8S | 15.9 | 102.9 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-326 | 11.6 | 104.8 | 101.8 | GF-8S | 15.9 | 102.9 | | P |
| LF-327 | 10.0 | 103.9 | 101.0 | GF-8S | 15.9 | 102.9 | | P |
| LF-328 | 10.9 | 104.3 | 101.4 | GF-8S | 15.9 | 102.9 | | P |
| LF-329 | 11.0 | 104.0 | 101.1 | GF-8S | 15.9 | 102.9 | | P |
| LF-330 | 12.3 | 103.3 | 100.4 | GF-8S | 15.9 | 102.9 | | P |
| LF-331 | 10.7 | 103.7 | 100.8 | GF-8S | 15.9 | 102.9 | | P |
| LF-332 | 11.2 | 104.1 | 101.2 | GF-8S | 15.9 | 102.9 | | P |
| LF-333 | 12.4 | 105.6 | 102.6 | GF-8S | 15.9 | 102.9 | | P |
| LF-334 | 11.5 | 103.6 | 100.7 | GF-8S | 15.9 | 102.9 | | P |
| LF-335 | 11.3 | 104.2 | 101.3 | GF-8S | 15.9 | 102.9 | | P |
| LF-346 | 10.5 | 106.6 | 100.7 | GF-6S | 14.3 | 105.9 | | P |
| LF-347 | 13.5 | 105.6 | 99.7 | GF-6S | 14.3 | 105.9 | | P |
| LF-348 | 12.1 | 107.6 | 101.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-349 | 11.8 | 105.7 | 99.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-350 | 9.2 | 102.5 | 96.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-351 | 11.3 | 103.4 | 97.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-352 | 11.8 | 106.1 | 100.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-353 | 16.8 | 100.7 | 95.1 | GF-6S | 14.3 | 105.9 | | P |
| LF-354 | 16.8 | 100.7 | 95.1 | GF-6S | 14.3 | 105.9 | | P |
| LF-355 | 13.2 | 103.3 | 97.5 | GF-6S | 14.3 | 105.9 | | P |
| LF-356 | 12.0 | 103.4 | 97.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-357 | 10.7 | 100.8 | 95.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-358 | 9.0 | 105.7 | 99.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-359 | 10.1 | 103.7 | 97.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-360 | 10.3 | 103.8 | 98.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-361 | 13.6 | 104.3 | 98.5 | GF-6S | 14.3 | 105.9 | | P |
| LF-362 | 11.2 | 103.5 | 97.7 | GF-6S | 14.3 | 105.9 | | P |
| LF-363 | 11.4 | 103.5 | 97.7 | GF-6S | 14.3 | 105.9 | | P |
| LF-364 | 12.9 | 102.5 | 96.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-365 | 14.3 | 102.8 | 97.1 | GF-6S | 14.3 | 105.9 | | P |
| LF-372 | 12.9 | 99.6 | 96.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-373 | 9.8 | 101.8 | 98.2 | GF-7S | 14.9 | 103.7 | | P |
| LF-374 | 10.3 | 103.9 | 100.2 | GF-7S | 14.9 | 103.7 | | P |
| LF-375 | 18.4 | 99.0 | 93.5 | GF-6S | 14.3 | 105.9 | LF-501 | F |
| LF-376 | 19.9 | 97.4 | 92.0 | GF-6S | 14.3 | 105.9 | LF-502 | F |
| LF-377 | 13.7 | 104.0 | 98.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-378 | 19.9 | 98.2 | 92.7 | GF-6S | 14.3 | 105.9 | LF-504 | F |
| LF-379 | 14.1 | 103.4 | 97.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-380 | 15.1 | 100.8 | 95.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-381 | 11.1 | 105.2 | 99.3 | GF-6S | 14.3 | 105.9 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-382 | 12.3 | 104.1 | 98.3 | GF-6S | 14.3 | 105.9 | | P |
| LF-383 | 12.3 | 104.7 | 98.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-384 | 16.5 | 101.4 | 95.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-385 | 14.1 | 103.0 | 97.3 | GF-6S | 14.3 | 105.9 | | P |
| LF-386 | 12.8 | 104.7 | 98.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-387 | 10.4 | 106.6 | 100.7 | GF-6S | 14.3 | 105.9 | | P |
| LF-388 | 14.5 | 103.1 | 97.4 | GF-6S | 14.3 | 105.9 | | P |
| LF-389 | 11.8 | 105.8 | 99.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-390 | 9.0 | 105.8 | 99.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-391 | 16.5 | 99.8 | 94.2 | GF-6S | 14.3 | 105.9 | LF-506 | F |
| LF-392 | 13.5 | 103.7 | 97.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-393 | 14.8 | 102.5 | 96.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-394 | 13.3 | 104.1 | 98.3 | GF-6S | 14.3 | 105.9 | | P |
| LF-455 | 7.5 | 104.9 | 101.9 | GF-11S | 16.0 | 102.9 | | P |
| LF-456 | 10.8 | 105.4 | 102.4 | GF-11S | 16.0 | 102.9 | | P |
| LF-457 | 11.6 | 104.2 | 101.3 | GF-11S | 16.0 | 102.9 | | P |
| LF-458 | 10.6 | 106.4 | 103.4 | GF-11S | 16.0 | 102.9 | | P |
| LF-459 | 6.7 | 101.2 | 98.3 | GF-11S | 16.0 | 102.9 | | P |
| LF-460 | 18.4 | 100.0 | 97.2 | GF-11S | 16.0 | 102.9 | | P |
| LF-461 | 8.5 | 104.7 | 101.7 | GF-11S | 16.0 | 102.9 | | P |
| LF-462 | 10.7 | 102.2 | 99.3 | GF-11S | 16.0 | 102.9 | | P |
| LF-463 | 11.6 | 103.6 | 100.7 | GF-11S | 16.0 | 102.9 | | P |
| LF-464 | 12.1 | 104.1 | 101.2 | GF-11S | 16.0 | 102.9 | | P |
| LF-465 | 13.3 | 101.5 | 98.6 | GF-11S | 16.0 | 102.9 | | P |
| LF-466 | 10.9 | 103.4 | 100.5 | GF-11S | 16.0 | 102.9 | | P |
| LF-467 | 12.6 | 98.2 | 95.4 | GF-11S | 16.0 | 102.9 | | P |
| LF-468 | 16.1 | 100.4 | 97.6 | GF-11S | 16.0 | 102.9 | | P |
| LF-469 | 11.7 | 98.0 | 95.2 | GF-11S | 16.0 | 102.9 | | P |
| LF-470 | 12.8 | 98.4 | 95.6 | GF-11S | 16.0 | 102.9 | | P |
| LF-471 | 15.5 | 101.9 | 99.0 | GF-11S | 16.0 | 102.9 | | P |
| LF-472 | 13.6 | 102.8 | 99.9 | GF-11S | 16.0 | 102.9 | | P |
| LF-473 | 15.8 | 100.9 | 98.1 | GF-11S | 16.0 | 102.9 | | P |
| LF-474 | 16.5 | 100.8 | 98.0 | GF-11S | 16.0 | 102.9 | | P |
| LF-475 | 15.0 | 101.1 | 98.3 | GF-11S | 16.0 | 102.9 | | P |
| LF-476 | 11.3 | 103.4 | 100.5 | GF-11S | 16.0 | 102.9 | | P |
| LF-477 | 16.1 | 99.2 | 96.4 | GF-11S | 16.0 | 102.9 | | P |
| LF-478 | 14.4 | 101.3 | 98.4 | GF-11S | 16.0 | 102.9 | | P |
| LF-479 | 15.0 | 102.2 | 99.3 | GF-11S | 16.0 | 102.9 | | P |
| LF-480 | 16.2 | 99.0 | 96.2 | GF-11S | 16.0 | 102.9 | | P |
| LF-481 | 15.8 | 100.6 | 97.8 | GF-11S | 16.0 | 102.9 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-483 | 7.9 | 100.8 | 98.0 | GF-11S | 16.0 | 102.9 | | P |
| LF-484 | 11.2 | 105.0 | 102.0 | GF-11S | 16.0 | 102.9 | | P |
| LF-485 | 9.8 | 107.3 | 104.3 | GF-11S | 16.0 | 102.9 | | P |
| LF-486 | 12.0 | 106.6 | 103.6 | GF-11S | 16.0 | 102.9 | | P |
| LF-487 | 7.2 | 104.6 | 101.7 | GF-11S | 16.0 | 102.9 | | P |
| LF-488 | 15.0 | 101.8 | 98.2 | GF-7S | 14.9 | 103.7 | | P |
| LF-489 | 12.3 | 101.9 | 98.3 | GF-7S | 14.9 | 103.7 | | P |
| LF-490 | 12.8 | 101.3 | 97.7 | GF-7S | 14.9 | 103.7 | | P |
| LF-491 | 11.6 | 103.5 | 99.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-492 | 11.2 | 100.6 | 97.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-501 | 13.9 | 102.2 | 96.5 | GF-6S | 14.3 | 105.9 | | P |
| LF-502 | 6.8 | 104.9 | 99.1 | GF-6S | 14.3 | 105.9 | | P |
| LF-503 | 7.5 | 106.0 | 100.1 | GF-6S | 14.3 | 105.9 | | P |
| LF-504 | 8.6 | 106.2 | 100.3 | GF-6S | 14.3 | 105.9 | | P |
| LF-505 | 10.1 | 107.4 | 101.4 | GF-6S | 14.3 | 105.9 | | P |
| LF-506 | 8.0 | 103.0 | 97.3 | GF-6S | 14.3 | 105.9 | | P |
| LF-516 | 14.6 | 104.5 | 98.7 | GF-6S | 14.3 | 105.9 | | P |
| LF-517 | 10.7 | 107.6 | 101.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-518 | 8.8 | 111.1 | 104.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-519 | 10.0 | 109.3 | 103.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-520 | 10.4 | 108.5 | 102.5 | GF-6S | 14.3 | 105.9 | | P |
| LF-521 | 10.8 | 107.9 | 101.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-522 | 10.4 | 106.9 | 100.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-523 | 10.3 | 109.1 | 103.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-524 | 7.4 | 106.8 | 100.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-525 | 11.4 | 103.7 | 97.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-526 | 11.2 | 108.7 | 102.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-527 | 10.8 | 108.7 | 102.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-528 | 11.7 | 104.3 | 98.5 | GF-6S | 14.3 | 105.9 | | P |
| LF-541 | 18.9 | 101.7 | 96.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-542 | 14.8 | 101.5 | 95.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-543 | 9.5 | 101.4 | 95.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-544 | 13.2 | 102.9 | 97.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-545 | 14.7 | 103.6 | 97.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-546 | 13.7 | 105.9 | 100.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-547 | 16.6 | 100.8 | 95.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-548 | 13.5 | 105.5 | 99.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-549 | 11.5 | 106.8 | 100.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-550 | 11.0 | 105.9 | 100.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-551 | 10.8 | 107.9 | 101.9 | GF-6S | 14.3 | 105.9 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-560 | 16.2 | 97.6 | 95.3 | GF-12S | 17.0 | 102.4 | | P |
| LF-561 | 14.5 | 97.2 | 94.9 | GF-12S | 17.0 | 102.4 | | P |
| LF-562 | 13.7 | 97.6 | 95.3 | GF-12S | 17.0 | 102.4 | | P |
| LF-536 | 13.6 | 105.0 | 102.5 | GF-12S | 17.0 | 102.4 | | P |
| LF-564 | 18.4 | 101.0 | 98.6 | GF-12S | 17.0 | 102.4 | | P |
| LF-565 | 13.7 | 101.1 | 98.7 | GF-12S | 17.0 | 102.4 | | P |
| LF-566 | 14.5 | 104.6 | 102.1 | GF-12S | 17.0 | 102.4 | | P |
| LF-567 | 14.6 | 102.8 | 100.4 | GF-12S | 17.0 | 102.4 | | P |
| LF-568 | 15.0 | 100.0 | 97.7 | GF-12S | 17.0 | 102.4 | | P |
| LF-569 | 16.1 | 101.2 | 98.8 | GF-12S | 17.0 | 102.4 | | P |
| LF-570 | 10.8 | 98.7 | 96.4 | GF-12S | 17.0 | 102.4 | | P |
| LF-571 | 12.6 | 102.9 | 100.5 | GF-12S | 17.0 | 102.4 | | P |
| LF-572 | 7.6 | 106.7 | 104.2 | GF-12S | 17.0 | 102.4 | | P |
| LF-573 | 10.4 | 104.3 | 101.9 | GF-12S | 17.0 | 102.4 | | P |
| LF-574 | 11.3 | 105.4 | 101.6 | GF-7S | 14.9 | 103.7 | | P |
| LF-575 | 10.1 | 102.2 | 98.6 | GF-7S | 14.9 | 103.7 | | P |
| LF-576 | 10.1 | 102.1 | 98.5 | GF-7S | 14.9 | 103.7 | | P |
| LF-577 | 12.2 | 103.8 | 100.1 | GF-7S | 14.9 | 103.7 | | P |
| LF-578 | 13.0 | 102.8 | 97.1 | GF-6S | 14.3 | 105.9 | | P |
| LF-579 | 11.7 | 108.7 | 102.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-581 | 13.4 | 102.5 | 96.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-582 | 13.0 | 102.7 | 97.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-583 | 12.6 | 104.4 | 98.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-584 | 13.8 | 103.4 | 97.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-585 | 11.2 | 101.6 | 95.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-586 | 12.2 | 101.5 | 95.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-587 | 13.6 | 102.3 | 96.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-588 | 12.7 | 102.8 | 97.1 | GF-6S | 14.3 | 105.9 | | P |
| LF-589 | 11.8 | 102.1 | 96.4 | GF-6S | 14.3 | 105.9 | | P |
| LF-590 | 13.0 | 101.5 | 95.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-604 | 10.8 | 104.3 | 98.5 | GF-6S | 14.3 | 105.9 | | P |
| LF-605 | 8.6 | 105.9 | 100.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-606 | 10.3 | 105.9 | 100.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-607 | 8.1 | 100.7 | 95.1 | GF-6S | 14.3 | 105.9 | | P |
| LF-608 | 8.3 | 101.6 | 95.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-609 | 12.9 | 100.7 | 95.1 | GF-6S | 14.3 | 105.9 | | P |
| LF-610 | 15.0 | 101.7 | 96.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-611 | 9.9 | 102.8 | 97.1 | GF-6S | 14.3 | 105.9 | | P |
| LF-612 | 11.4 | 106.8 | 100.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-613 | 18.0 | 97.9 | 92.4 | GF-6S | 14.3 | 105.9 | LF-650 | F |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| **TEST RESULTS** | | | | | | | | |
| LF-614 | 13.7 | 105.5 | 99.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-615 | 10.2 | 100.1 | 94.5 | GF-6S | 14.3 | 105.9 | LF-652 | F |
| LF-616 | 14.2 | 100.3 | 94.7 | GF-6S | 14.3 | 105.9 | | P |
| LF-617 | 12.3 | 102.3 | 96.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-618 | 13.2 | 102.7 | 97.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-619 | 11.2 | 103.4 | 97.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-620 | 12.9 | 103.1 | 97.4 | GF-6S | 14.3 | 105.9 | | P |
| LF-621 | 13.5 | 102.4 | 96.7 | GF-6S | 14.3 | 105.9 | | P |
| LF-622 | 12.1 | 105.3 | 99.4 | GF-6S | 14.3 | 105.9 | | P |
| LF-623 | 24.6 | 79.5 | 75.1 | GF-6S | 14.3 | 105.9 | LF-654 | F |
| LF-624 | 11.8 | 107.2 | 101.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-625 | 12.2 | 103.7 | 97.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-626 | 11.2 | 102.0 | 96.3 | GF-6S | 14.3 | 105.9 | | P |
| LF-627 | 9.6 | 103.3 | 97.5 | GF-6S | 14.3 | 105.9 | | P |
| LF-628 | 7.4 | 103.7 | 97.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-629 | 11.9 | 103.8 | 98.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-630 | 9.2 | 104.6 | 98.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-631 | 11.7 | 104.6 | 98.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-632 | 9.7 | 103.7 | 97.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-633 | 12.1 | 101.6 | 95.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-634 | 10.8 | 104.3 | 98.5 | GF-6S | 14.3 | 105.9 | | P |
| LF-635 | 9.0 | 107.2 | 101.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-636 | 13.2 | 105.5 | 99.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-637 | 10.1 | 107.9 | 101.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-638 | 8.6 | 101.2 | 95.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-639 | 8.9 | 105.3 | 99.4 | GF-6S | 14.3 | 105.9 | | P |
| LF-640 | 7.8 | 104.3 | 98.5 | GF-6S | 14.3 | 105.9 | | P |
| LF-641 | 7.5 | 106.7 | 100.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-642 | 8.3 | 104.2 | 98.4 | GF-6S | 14.3 | 105.9 | | P |
| LF-643 | 6.8 | 101.2 | 95.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-644 | 13.0 | 101.2 | 95.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-645 | 10.3 | 100.9 | 95.3 | GF-6S | 14.3 | 105.9 | | P |
| LF-646 | 9.7 | 98.5 | 95.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-647 | 12.7 | 98.7 | 95.2 | GF-7S | 14.9 | 103.7 | | P |
| LF-648 | 14.9 | 98.9 | 95.4 | GF-7S | 14.9 | 103.7 | | P |
| LF-649 | 9.7 | 106.8 | 103.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-650 | 7.7 | 102.2 | 98.6 | GF-7S | 14.9 | 103.7 | | P |
| LF-651 | 16.9 | 99.9 | 96.3 | GF-7S | 14.9 | 103.7 | | P |
| LF-652 | 17.3 | 98.8 | 95.3 | GF-7S | 14.9 | 103.7 | | P |
| LF-653 | 15.2 | 100.4 | 96.8 | GF-7S | 14.9 | 103.7 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| TEST STANDARD | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| TESTING FREQUENCY | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 yd$^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-654 | 16.3 | 100.6 | 95.6 97.0 | GF-7S 65 | 14.9 14.3 | 103.7 105.9 | | P |
| LF-655 | 9.7 | 99.8 | 96.2 | GF-7S | 14.9 | 103.7 | | P |
| LF-656 | 14.7 | 101.7 | 98.1 | GF-7S | 14.9 | 103.7 | | P |
| LF-657 | 7.2 | 101.2 | 97.6 | GF-7S | 14.9 | 103.7 | | P |
| LF-658 | 15.0 | 104.2 | 100.5 | GF-7S | 14.9 | 103.7 | | P |
| LF-659 | 10.1 | 106.1 | 102.3 | GF-7S | 14.9 | 103.7 | | P |
| LF-660 | 8.6 | 103.5 | 99.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-661 | 12.4 | 105.7 | 101.9 | GF-7S | 14.9 | 103.7 | | P |
| LF-662 | 11.4 | 110.0 | 106.1 | GF-7S | 14.9 | 103.7 | | P |
| LF-663 | 9.0 | 109.1 | 105.2 | GF-7S | 14.9 | 103.7 | | P |
| LF-664 | 8.7 | 111.3 | 107.3 | GF-7S | 14.9 | 103.7 | | P |
| LF-665 | 11.7 | 105.0 | 101.3 | GF-7S | 14.9 | 103.7 | | P |
| LF-666 | 23.0 | 96.6 | 93.2 | GF-7S | 14.9 | 103.7 | LF-739 | F |
| LF-667 | 20.2 | 94.5 | 91.1 | GF-7S | 14.9 | 103.7 | LF-738 | F |
| LF-668 | 19.2 | 101.2 | 97.6 | GF-7S | 14.9 | 103.7 | | P |
| LF-669 | 21.9 | 96.7 | 93.2 | GF-7S | 14.9 | 103.7 | LF-737 | F |
| LF-670 | 23.3 | 93.8 | 90.5 | GF-7S | 14.9 | 103.7 | LF-736 | F |
| LF-671 | 21.2 | 96.3 | 92.9 | GF-7S | 14.9 | 103.7 | LF-735 | F |
| LF-672 | 21.3 | 98.5 | 95.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-673 | 18.5 | 99.0 | 95.5 | GF-7S | 14.9 | 103.7 | | P |
| LF-674 | 18.5 | 101.5 | 97.9 | GF-7S | 14.9 | 103.7 | | P |
| LF-675 | 11.1 | 104.8 | 101.1 | GF-7S | 14.9 | 103.7 | | P |
| LF-676 | 9.4 | 108.4 | 104.5 | GF-7S | 14.9 | 103.7 | | P |
| LF-677 | 8.8 | 102.0 | 98.4 | GF-7S | 14.9 | 103.7 | | P |
| LF-678 | 10.4 | 107.4 | 103.6 | GF-7S | 14.9 | 103.7 | | P |
| LF-679 | 11.7 | 105.3 | 101.5 | GF-7S | 14.9 | 103.7 | | P |
| LF-680 | 9.3 | 102.1 | 98.5 | GF-7S | 14.9 | 103.7 | | P |
| LF-681 | 18.0 | 102.5 | 98.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-682 | 15.3 | 104.0 | 100.3 | GF-7S | 14.9 | 103.7 | | P |
| LF-683 | 14.0 | 104.5 | 100.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-684 | 15.9 | 102.6 | 98.9 | GF-7S | 14.9 | 103.7 | | P |
| LF-685 | 17.5 | 102.4 | 98.7 | GF-7S | 14.9 | 103.7 | | P |
| LF-686 | 16.3 | 103.3 | 99.6 | GF-7S | 14.9 | 103.7 | | P |
| LF-687 | 15.8 | 104.8 | 101.1 | GF-7S | 14.9 | 103.7 | | P |
| LF-688 | 13.0 | 99.3 | 95.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-689 | 13.0 | 105.1 | 101.4 | GF-7S | 14.9 | 103.7 | | P |
| LF-690 | 13.7 | 99.3 | 95.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-691 | 16.0 | 99.0 | 95.5 | GF-7S | 14.9 | 103.7 | | P |
| LF-692 | 15.5 | 99.6 | 96.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-693 | 14.5 | 106.0 | 102.2 | GF-7S | 14.9 | 103.7 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-694 | 11.9 | 108.7 | 104.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-695 | 11.6 | 105.5 | 101.7 | GF-7S | 14.9 | 103.7 | | P |
| LF-696 | 12.6 | 110.3 | 106.4 | GF-7S | 14.9 | 103.7 | | P |
| LF-697 | 10.7 | 108.7 | 104.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-698 | 11.5 | 103.2 | 98.6 | GF-16S | 16.2 | 104.7 | | P |
| LF-699 | 10.5 | 104.8 | 100.1 | GF-16S | 16.2 | 104.7 | | P |
| LF-700 | 10.5 | 99.7 | 95.2 | GF-16S | 16.2 | 104.7 | | P |
| LF-701 | 11.7 | 103.8 | 99.1 | GF-16S | 16.2 | 104.7 | | P |
| LF-702 | 10.6 | 103.3 | 98.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-703 | 9.7 | 100.7 | 96.2 | GF-16S | 16.2 | 104.7 | | P |
| LF-704 | 11.5 | 106.5 | 101.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-705 | 12.3 | 107.8 | 103.0 | GF-16S | 16.2 | 104.7 | | P |
| LF-706 | 12.1 | 106.1 | 101.3 | GF-16S | 16.2 | 104.7 | | P |
| LF-707 | 11.5 | 105.1 | 100.4 | GF-16S | 16.2 | 104.7 | | P |
| LF-716 | 12.6 | 103.7 | 100.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-717 | 15.9 | 104.1 | 100.4 | GF-7S | 14.9 | 103.7 | | P |
| LF-718 | 14.2 | 99.5 | 95.9 | GF-7S | 14.9 | 103.7 | | P |
| LF-719 | 21.3 | 99.4 | 95.9 | GF-7S | 14.9 | 103.7 | | P |
| LF-720 | 20.8 | 100.3 | 96.7 | GF-7S | 14.9 | 103.7 | | P |
| LF-721 | 25.0 | 95.9 | 92.5 | GF-7S | 14.9 | 103.7 | LF-734 | F |
| LF-722 | 16.1 | 102.1 | 98.5 | GF-7S | 14.9 | 103.7 | | P |
| LF-723 | 18.1 | 99.9 | 96.3 | GF-7S | 14.9 | 103.7 | | P |
| LF-724 | 15.8 | 101.4 | 97.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-725 | 18.8 | 98.1 | 94.6 | GF-7S | 14.9 | 103.7 | | P |
| LF-726 | 13.6 | 101.8 | 98.2 | GF-7S | 14.9 | 103.7 | | P |
| LF-727 | 14.1 | 98.4 | 94.9 | GF-7S | 14.9 | 103.7 | | P |
| LF-728 | 15.6 | 100.3 | 96.7 | GF-7S | 14.9 | 103.7 | | P |
| LF-729 | 17.7 | 99.0 | 95.5 | GF-7S | 14.9 | 103.7 | | P |
| LF-730 | 19.3 | 98.6 | 95.1 | GF-7S | 14.9 | 103.7 | | P |
| LF-731 | 13.9 | 99.9 | 96.3 | GF-7S | 14.9 | 103.7 | | P |
| LF-732 | 15.8 | 100.9 | 97.3 | GF-7S | 14.9 | 103.7 | | P |
| LF-733 | 21.3 | 95.5 | 92.1 | GF-7S | 14.9 | 103.7 | LF-741 | F |
| LF-734 | 20.7 | 100.0 | 96.4 | GF-7S | 14.9 | 103.7 | | P |
| LF-735 | 18.6 | 100.4 | 96.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-736 | 13.2 | 103.6 | 99.9 | GF-7S | 14.9 | 103.7 | | P |
| LF-737 | 11.8 | 108.8 | 104.9 | GF-7S | 14.9 | 103.7 | | P |
| LF-738 | 14.7 | 101.4 | 97.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-739 | 17.0 | 100.5 | 96.9 | GF-7S | 14.9 | 103.7 | | P |
| LF-740 | 15.9 | 99.8 | 96.2 | GF-7S | 14.9 | 103.7 | | P |
| LF-741 | 14.5 | 101.9 | 98.3 | GF-7S | 14.9 | 103.7 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-742 | 15.8 | 101.1 | 97.5 | GF-7S | 14.9 | 103.7 | | P |
| LF-743 | 11.3 | 104.4 | 100.7 | GF-7S | 14.9 | 103.7 | | P |
| LF-744 | 9.8 | 104.0 | 100.3 | GF-7S | 14.9 | 103.7 | | P |
| LF-745 | 8.3 | 109.4 | 104.5 | GF-16S | 16.2 | 104.7 | | P |
| LF-746 | 9.2 | 105.7 | 101.0 | GF-16S | 16.2 | 104.7 | | P |
| LF-747 | 8.9 | 105.6 | 100.9 | GF-16S | 16.2 | 104.7 | | P |
| LF-748 | 9.1 | 104.0 | 99.3 | GF-16S | 16.2 | 104.7 | | P |
| LF-749 | 8.9 | 107.5 | 102.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-750 | 16.4 | 103.6 | 98.9 | GF-16S | 16.2 | 104.7 | | P |
| LF-751 | 12.1 | 101.5 | 96.9 | GF-16S | 16.2 | 104.7 | | P |
| LF-752 | 11.2 | 100.6 | 96.1 | GF-16S | 16.2 | 104.7 | | P |
| LF-753 | 10.1 | 103.7 | 99.0 | GF-16S | 16.2 | 104.7 | | P |
| LF-754 | 9.9 | 103.4 | 98.8 | GF-16S | 16.2 | 104.7 | | P |
| LF-755 | 9.5 | 99.8 | 95.3 | GF-16S | 16.2 | 104.7 | | P |
| LF-756 | 8.6 | 102.4 | 97.8 | GF-16S | 16.2 | 104.7 | | P |
| LF-757 | 8.3 | 104.4 | 99.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-758 | 7.0 | 105.6 | 100.9 | GF-16S | 16.2 | 104.7 | | P |
| LF-759 | 9.1 | 102.9 | 98.3 | GF-16S | 16.2 | 104.7 | | P |
| LF-760 | 10.0 | 102.4 | 97.8 | GF-16S | 16.2 | 104.7 | | P |
| LF-761 | 10.2 | 102.5 | 97.9 | GF-16S | 16.2 | 104.7 | | P |
| LF-762 | 10.4 | 106.3 | 101.5 | GF-16S | 16.2 | 104.7 | | P |
| LF-763 | 10.4 | 104.8 | 100.1 | GF-16S | 16.2 | 104.7 | | P |
| LF-764 | 12.9 | 104.1 | 99.4 | GF-16S | 16.2 | 104.7 | | P |
| LF-765 | 10.9 | 101.1 | 96.6 | GF-16S | 16.2 | 104.7 | | P |
| LF-766 | 11.0 | 100.2 | 95.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-767 | 12.9 | 102.1 | 98.5 | GF-7S | 14.9 | 103.7 | | P |
| LF-768 | 12.6 | 100.2 | 96.6 | GF-7S | 14.9 | 103.7 | | P |
| LF-769 | 16.1 | 101.1 | 97.5 | GF-7S | 14.9 | 103.7 | | P |
| LF-770 | 17.9 | 99.9 | 96.3 | GF-7S | 14.9 | 103.7 | | P |
| LF-771 | 13.4 | 101.3 | 97.7 | GF-7S | 14.9 | 103.7 | | P |
| LF-772 | 15.5 | 100.3 | 96.7 | GF-7S | 14.9 | 103.7 | | P |
| LF-773 | 5.6 | 107.6 | 103.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-774 | 13.4 | 106.4 | 102.6 | GF-7S | 14.9 | 103.7 | | P |
| LF-775 | 11.8 | 103.9 | 100.2 | GF-7S | 14.9 | 103.7 | | P |
| LF-776 | 12.6 | 104.6 | 100.9 | GF-7S | 14.9 | 103.7 | | P |
| LF-777 | 15.7 | 100.8 | 97.2 | GF-7S | 14.9 | 103.7 | | P |
| LF-778 | 13.1 | 100.8 | 97.2 | GF-7S | 14.9 | 103.7 | | P |
| LF-779 | 15.5 | 98.7 | 95.2 | GF-7S | 14.9 | 103.7 | | P |
| LF-780 | 13.6 | 99.2 | 95.7 | GF-7S | 14.9 | 103.7 | | P |
| LF-781 | 13.9 | 98.1 | 94.6 | GF-7S | 14.9 | 103.7 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| | | | **TEST RESULTS** | | | | | |
| LF-782 | 17.3 | 101.6 | 98.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-783 | 17.3 | 99.3 | 95.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-784 | 17.2 | 99.8 | 96.2 | GF-7S | 14.9 | 103.7 | | P |
| LF-785 | 18.2 | 104.2 | 100.5 | GF-7S | 14.9 | 103.7 | | P |
| LF-786 | 17.7 | 101.1 | 97.5 | GF-7S | 14.9 | 103.7 | | P |
| LF-787 | 11.0 | 105.1 | 101.4 | GF-7S | 14.9 | 103.7 | | P |
| LF-788 | 18.2 | 101.1 | 97.5 | GF-7S | 14.9 | 103.7 | | P |
| LF-789 | 20.1 | 98.5 | 95.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-790 | 17.9 | 101.7 | 98.1 | GF-7S | 14.9 | 103.7 | | P |
| LF-791 | 14.3 | 102.8 | 99.1 | GF-7S | 14.9 | 103.7 | | P |
| LF-972 | 14.8 | 103.4 | 99.7 | GF-7S | 14.9 | 103.7 | | P |
| LF-793 | 13.0 | 101.6 | 98.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-794 | 7.1 | 104.8 | 101.1 | GF-7S | 14.9 | 103.7 | | P |
| LF-795 | 8.4 | 106.6 | 102.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-796 | 19.8 | 99.8 | 95.3 | GF-16S | 16.2 | 104.7 | | P |
| LF-797 | 15.9 | 100.1 | 95.6 | GF-16S | 16.2 | 104.7 | | P |
| LF-798 | 19.0 | 100.2 | 95.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-799 | 17.4 | 102.5 | 97.9 | GF-16S | 16.2 | 104.7 | | P |
| LF-800 | 12.8 | 101.7 | 97.1 | GF-16S | 16.2 | 104.7 | | P |
| LF-801 | 19.2 | 100.8 | 96.3 | GF-16S | 16.2 | 104.7 | | P |
| LF-802 | 16.7 | 100.2 | 95.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-803 | 16.0 | 100.5 | 96.0 | GF-16S | 16.2 | 104.7 | | P |
| LF-804 | 15.6 | 100.8 | 96.3 | GF-16S | 16.2 | 104.7 | | P |
| LF-805 | 20.5 | 99.7 | 95.2 | GF-16S | 16.2 | 104.7 | | P |
| LF-806 | 13.2 | 102.2 | 97.6 | GF-16S | 16.2 | 104.7 | | P |
| LF-807 | 14.4 | 101.2 | 96.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-808 | 17.5 | 102.5 | 97.9 | GF-16S | 16.2 | 104.7 | | P |
| LF-809 | 14.6 | 100.8 | 96.3 | GF-16S | 16.2 | 104.7 | | P |
| LF-810 | 15.3 | 101.0 | 96.5 | GF-16S | 16.2 | 104.7 | | P |
| LF-811 | 19.1 | 100.2 | 95.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-812 | 16.3 | 100.9 | 96.4 | GF-16S | 16.2 | 104.7 | | P |
| LF-813 | 11.3 | 105.3 | 100.6 | GF-16S | 16.2 | 104.7 | | P |
| LF-814 | 10.6 | 105.1 | 100.4 | GF-16S | 16.2 | 104.7 | | P |
| LF-815 | 9.6 | 103.2 | 98.6 | GF-16S | 16.2 | 104.7 | | P |
| LF-816 | 12.1 | 101.9 | 97.3 | GF-16S | 16.2 | 104.7 | | P |
| LF-817 | 11.8 | 101.6 | 97.0 | GF-16S | 16.2 | 104.7 | | P |
| LF-818 | 9.7 | 103.8 | 99.1 | GF-16S | 16.2 | 104.7 | | P |
| LF-819 | 10.2 | 106.0 | 101.2 | GF-16S | 16.2 | 104.7 | | P |
| LF-820 | 10.6 | 103.5 | 98.9 | GF-16S | 16.2 | 104.7 | | P |
| LF-821 | 10.7 | 102.5 | 97.9 | GF-16S | 16.2 | 104.7 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| | | | **TEST RESULTS** | | | | | |
| LF-822 | 9.8 | 100.8 | 96.3 | GF-16S | 16.2 | 104.7 | | P |
| LF-823 | 9.4 | 100.0 | 95.5 | GF-16S | 16.2 | 104.7 | | P |
| LF-824 | 12.5 | 101.2 | 96.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-825 | 10.1 | 101.1 | 96.6 | GF-16S | 16.2 | 104.7 | | P |
| LF-826 | 10.3 | 102.6 | 98.0 | GF-16S | 16.2 | 104.7 | | P |
| LF-827 | 12.4 | 103.3 | 98.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-828 | 15.8 | 102.4 | 97.8 | GF-16S | 16.2 | 104.7 | | P |
| LF-829 | 13.4 | 101.5 | 96.9 | GF-16S | 16.2 | 104.7 | | P |
| LF-830 | 11.6 | 103.9 | 99.2 | GF-16S | 16.2 | 104.7 | | P |
| LF-831 | 18.9 | 99.7 | 95.2 | GF-16S | 16.2 | 104.7 | | P |
| LF-832 | 9.8 | 102.6 | 98.0 | GF-16S | 16.2 | 104.7 | | P |
| LF-833 | 11.9 | 109.3 | 104.4 | GF-16S | 16.2 | 104.7 | | P |
| LF-834 | 9.2 | 108.0 | 103.2 | GF-16S | 16.2 | 104.7 | | P |
| LF-835 | 9.6 | 103.2 | 98.6 | GF-16S | 16.2 | 104.7 | | P |
| LF-836 | 8.3 | 99.7 | 95.2 | GF-16S | 16.2 | 104.7 | | P |
| LF-837 | 10.2 | 103.4 | 98.8 | GF-16S | 16.2 | 104.7 | | P |
| LF-838 | 13.5 | 103.3 | 98.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-839 | 12.5 | 104.5 | 99.8 | GF-16S | 16.2 | 104.7 | | P |
| LF-840 | 15.1 | 100.0 | 95.5 | GF-16S | 16.2 | 104.7 | | P |
| LF-841 | 17.3 | 99.5 | 95.0 | GF-16S | 16.2 | 104.7 | | P |
| LF-842 | 7.9 | 101.6 | 97.0 | GF-16S | 16.2 | 104.7 | | P |
| LF-843 | 8.5 | 106.0 | 101.2 | GF-16S | 16.2 | 104.7 | | P |
| LF-866 | 20.5 | 100.0 | 95.5 | GF-16S | 16.2 | 104.7 | | P |
| LF-867 | 16.8 | 100.9 | 96.4 | GF-16S | 16.2 | 104.7 | | P |
| LF-868 | 19.8 | 99.8 | 95.3 | GF-16S | 16.2 | 104.7 | | P |
| LF-869 | 21.1 | 99.5 | 95.0 | GF-16S | 16.2 | 104.7 | | P |
| LF-870 | 18.3 | 100.3 | 95.8 | GF-16S | 16.2 | 104.7 | | P |
| LF-871 | 17.5 | 100.1 | 95.6 | GF-16S | 16.2 | 104.7 | | P |
| LF-872 | 18.6 | 100.5 | 96.0 | GF-16S | 16.2 | 104.7 | | P |
| LF-873 | 16.8 | 100.3 | 95.8 | GF-16S | 16.2 | 104.7 | | P |
| LF-874 | 20.1 | 100.6 | 96.1 | GF-16S | 16.2 | 104.7 | | P |
| LF-875 | 17.5 | 101.1 | 96.6 | GF-16S | 16.2 | 104.7 | | P |
| LF-876 | 22.8 | 100.2 | 95.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-877 | 17.7 | 101.9 | 97.3 | GF-16S | 16.2 | 104.7 | | P |
| LF-878 | 13.9 | 100.5 | 96.0 | GF-16S | 16.2 | 104.7 | | P |
| LF-879 | 12.8 | 106.5 | 101.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-880 | 13.8 | 106.9 | 102.1 | GF-16S | 16.2 | 104.7 | | P |
| LF-881 | 15.0 | 107.6 | 102.8 | GF-16S | 16.2 | 104.7 | | P |
| LF-888 | 13.6 | 103.6 | 100.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-889 | 12.2 | 102.5 | 99.3 | GF-17S | 15.7 | 103.2 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-890 | 11.8 | 100.3 | 97.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-891 | 10.2 | 99.7 | 96.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-892 | 13.0 | 103.4 | 100.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-893 | 12.4 | 102.0 | 98.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-907 | 14.5 | 103.3 | 100.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-908 | 13.5 | 104.1 | 100.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-909 | 8.9 | 107.9 | 103.1 | GF-16S | 16.2 | 104.7 | | P |
| LF-910 | 7.6 | 109.2 | 104.3 | GF-16S | 16.2 | 104.7 | | P |
| LF-911 | 8.6 | 107.3 | 102.5 | GF-16S | 16.2 | 104.7 | | P |
| LF-912 | 11.7 | 107.3 | 102.5 | GF-16S | 16.2 | 104.7 | | P |
| LF-913 | 9.3 | 111.7 | 106.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-914 | 14.8 | 103.5 | 98.9 | GF-16S | 16.2 | 104.7 | | P |
| LF-915 | 13.4 | 105.1 | 100.4 | GF-16S | 16.2 | 104.7 | | P |
| LF-916 | 8.7 | 102.2 | 97.6 | GF-16S | 16.2 | 104.7 | | P |
| LF-917 | 12.0 | 100.9 | 96.4 | GF-16S | 16.2 | 104.7 | | P |
| LF-918 | 11.3 | 104.6 | 99.9 | GF-16S | 16.2 | 104.7 | | P |
| LF-919 | 12.1 | 100.5 | 96.0 | GF-16S | 16.2 | 104.7 | | P |
| LF-920 | 11.5 | 103.4 | 98.8 | GF-16S | 16.2 | 104.7 | | P |
| LF-921 | 15.0 | 100.6 | 96.1 | GF-16S | 16.2 | 104.7 | | P |
| LF-922 | 6.4 | 99.7 | 95.2 | GF-16S | 16.2 | 104.7 | | P |
| LF-923 | 12.3 | 105.1 | 100.4 | GF-16S | 16.2 | 104.7 | | P |
| LF-924 | 16.0 | 99.5 | 95.0 | GF-16S | 16.2 | 104.7 | | P |
| LF-925 | 13.7 | 99.7 | 95.2 | GF-16S | 16.2 | 104.7 | | P |
| LF-926 | 14.4 | 103.3 | 98.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-927 | 7.4 | 104.1 | 99.4 | GF-16S | 16.2 | 104.7 | | P |
| LF-928 | 10.4 | 99.7 | 95.2 | GF-16S | 16.2 | 104.7 | | P |
| LF-929 | 12.9 | 99.3 | 94.8 | GF-16S | 16.2 | 104.7 | | P |
| LF-930 | 15.0 | 102.4 | 97.8 | GF-16S | 16.2 | 104.7 | | P |
| LF-931 | 14.3 | 99.9 | 95.4 | GF-16S | 16.2 | 104.7 | | P |
| LF-932 | 14.3 | 104.1 | 100.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-933 | 13.6 | 102.9 | 99.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-934 | 19.0 | 101.1 | 98.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-935 | 18.0 | 99.2 | 96.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-936 | 18.9 | 101.1 | 98.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-937 | 16.1 | 103.9 | 100.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-938 | 15.9 | 103.3 | 100.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-939 | 11.9 | 106.4 | 103.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-940 | 15.3 | 107.0 | 103.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-941 | 16.1 | 104.8 | 101.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-942 | 18.4 | 102.0 | 98.8 | GF-17S | 15.7 | 103.2 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-943 | 15.5 | 107.0 | 103.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-944 | 14.0 | 104.3 | 101.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-945 | 14.7 | 103.2 | 100.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-946 | 14.6 | 100.3 | 97.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-949 | 6.1 | 108.3 | 104.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-950 | 11.8 | 102.5 | 99.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-951 | 10.1 | 103.8 | 100.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-952 | 17.7 | 99.4 | 96.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-953 | 16.1 | 102.6 | 99.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-954 | 15.9 | 100.9 | 97.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-955 | 12.5 | 102.9 | 99.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-956 | 17.9 | 99.4 | 96.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-957 | 17.7 | 98.0 | 95.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-958 | 15.3 | 104.0 | 100.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-959 | 19.2 | 98.3 | 95.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-960 | 14.7 | 101.2 | 98.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-961 | 12.9 | 101.8 | 98.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-962 | 15.2 | 101.4 | 98.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-963 | 13.8 | 103.4 | 100.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-964 | 14.4 | 102.0 | 98.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-965 | 13.8 | 105.4 | 102.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-966 | 17.6 | 103.0 | 99.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-967 | 15.9 | 102.6 | 99.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-968 | 16.8 | 100.7 | 97.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-969 | 18.5 | 101.4 | 98.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-970 | 20.5 | 98.2 | 95.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-971 | 20.9 | 98.0 | 95.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-972 | 13.1 | 102.3 | 99.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-973 | 17.0 | 100.8 | 97.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-974 | 19.6 | 98.3 | 95.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-975 | 17.6 | 99.0 | 95.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-976 | 15.3 | 100.4 | 97.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-977 | 19.0 | 98.4 | 95.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-978 | 18.4 | 99.6 | 96.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-979 | 13.0 | 102.5 | 97.9 | GF-16S | 16.2 | 104.7 | | P |
| LF-980 | 11.5 | 105.0 | 100.3 | GF-16S | 16.2 | 104.7 | | P |
| LF-981 | 13.5 | 101.2 | 96.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-982 | 15.9 | 104.4 | 99.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-983 | 14.8 | 104.8 | 100.1 | GF-16S | 16.2 | 104.7 | | P |
| LF-984 | 13.1 | 105.1 | 100.4 | GF-16S | 16.2 | 104.7 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-985 | 13.1 | 106.5 | 101.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-986 | 14.1 | 105.8 | 101.1 | GF-16S | 16.2 | 104.7 | | P |
| LF-987 | 11.6 | 102.7 | 99.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-988 | 8.1 | 98.9 | 95.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-989 | 10.0 | 98.7 | 95.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-990 | 15.7 | 99.7 | 96.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-991 | 11.3 | 107.3 | 102.5 | GF-16S | 16.2 | 104.7 | | P |
| LF-992 | 8.3 | 105.3 | 100.6 | GF-16S | 16.2 | 104.7 | | P |
| LF-993 | 10.9 | 107.2 | 102.4 | GF-16S | 16.2 | 104.7 | | P |
| LF-994 | 12.2 | 105.6 | 100.9 | GF-16S | 16.2 | 104.7 | | P |
| LF-995 | 11.4 | 102.6 | 98.0 | GF-16S | 16.2 | 104.7 | | P |
| LF-996 | 17.4 | 100.3 | 95.8 | GF-16S | 16.2 | 104.7 | | P |
| LF-997 | 15.9 | 102.8 | 99.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-998 | 16.6 | 103.3 | 100.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-999 | 14.9 | 100.3 | 97.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1000 | 16.3 | 99.4 | 96.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1001 | 17.2 | 99.6 | 96.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1002 | 16.1 | 99.1 | 96.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1003 | 14.3 | 100.4 | 97.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1004 | 15.5 | 99.0 | 95.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1005 | 16.0 | 99.3 | 96.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1006 | 15.7 | 101.4 | 98.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1007 | 15.1 | 98.9 | 95.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1008 | 14.7 | 99.4 | 96.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1009 | 16.3 | 100.3 | 97.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1010 | 15.8 | 99.1 | 96.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1011 | 14.2 | 103.4 | 98.8 | GF-16S | 16.2 | 104.7 | | P |
| LF-1012 | 14.5 | 106.3 | 101.5 | GF-16S | 16.2 | 104.7 | | P |
| LF-1013 | 14.2 | 103.0 | 98.4 | GF-16S | 16.2 | 104.7 | | P |
| LF-1014 | 13.3 | 99.9 | 95.4 | GF-16S | 16.2 | 104.7 | | P |
| LF-1015 | 12.0 | 104.1 | 99.4 | GF-16S | 16.2 | 104.7 | | P |
| LF-1016 | 14.8 | 105.4 | 100.7 | GF-16S | 16.2 | 104.7 | | P |
| LF-1017 | 19.0 | 99.5 | 95.0 | GF-16S | 16.2 | 104.7 | | P |
| LF-1018 | 14.4 | 107.1 | 102.3 | GF-16S | 16.2 | 104.7 | | P |
| LF-1019 | 14.7 | 104.9 | 100.2 | GF-16S | 16.2 | 104.7 | | P |
| LF-1020 | 23.9 | 94.6 | 90.4 | GF-16S | 16.2 | 104.7 | LF-1351 | F |
| LF-1021 | 14.9 | 103.5 | 98.9 | GF-16S | 16.2 | 104.7 | | P |
| LF-1022 | 11.8 | 103.3 | 100.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-1023 | 10.9 | 102.8 | 99.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1024 | 18.9 | 98.1 | 95.1 | GF-17S | 15.7 | 103.2 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-1025 | 17.6 | 100.0 | 96.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1026 | 16.8 | 99.1 | 96.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1027 | 15.3 | 101.0 | 97.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1028 | 14.6 | 105.6 | 102.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1029 | 15.2 | 103.5 | 100.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1030 | 12.3 | 103.7 | 100.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1031 | 16.4 | 99.0 | 95.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1032 | 18.9 | 98.3 | 95.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1033 | 15.3 | 97.8 | 94.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1034 | 10.7 | 104.7 | 101.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1035 | 18.6 | 101.5 | 98.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-1036 | 16.8 | 101.5 | 98.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-1037 | 14.6 | 103.7 | 100.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1038 | 16.5 | 99.5 | 96.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-1039 | 20.1 | 99.7 | 96.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1040 | 18.1 | 101.8 | 98.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1041 | 20.1 | 98.9 | 95.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1042 | 16.1 | 105.5 | 102.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1043 | 9.2 | 104.2 | 101.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1044 | 15.6 | 98.5 | 95.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-1045 | 20.3 | 98.9 | 95.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1046 | 18.4 | 99.5 | 96.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-1047 | 22.0 | 97.9 | 94.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1048 | 18.3 | 96.1 | 93.1 | GF-17S | 15.7 | 103.2 | LF-1050 | F |
| LF-1049 | 13.4 | 99.2 | 96.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-1050 | 21.2 | 97.7 | 94.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1051 | 17.5 | 98.9 | 95.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1052 | 18.3 | 102.3 | 99.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-1053 | 21.6 | 97.9 | 94.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1054 | 22.8 | 97.0 | 94.0 | GF-17S | 15.7 | 103.2 | LF-1071 | F |
| LF-1055 | 18.9 | 99.6 | 96.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1056 | 19.2 | 101.3 | 98.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1057 | 9.3 | 103.8 | 100.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1058 | 14.7 | 101.5 | 98.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-1059 | 7.5 | 103.9 | 100.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1060 | 5.5 | 100.5 | 97.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-1061 | 9.3 | 104.0 | 100.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1062 | 7.1 | 105.3 | 102.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1063 | 9.1 | 102.7 | 99.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1064 | 11.9 | 104.1 | 100.9 | GF-17S | 15.7 | 103.2 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-1065 | 11.6 | 99.2 | 96.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-1066 | 10.9 | 98.0 | 95.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1067 | 13.0 | 98.4 | 95.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1068 | 14.8 | 97.9 | 94.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1069 | 10.4 | 101.3 | 98.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1070 | 5.1 | 102.9 | 99.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1071 | 18.6 | 103.0 | 99.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1072 | 20.0 | 100.1 | 97.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1073 | 18.1 | 100.0 | 96.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1074 | 18.6 | 99.3 | 96.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1075 | 21.1 | 97.6 | 94.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1076 | 19.3 | 98.3 | 95.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1077 | 13.6 | 104.1 | 100.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1078 | 19.9 | 99.7 | 96.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1079 | 18.3 | 100.5 | 97.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-1080 | 15.7 | 103.8 | 100.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1081 | 13.4 | 105.8 | 102.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1082 | 11.3 | 100.9 | 97.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1083 | 9.9 | 109.0 | 105.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1084 | 13.8 | 100.0 | 96.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1085 | 9.9 | 102.7 | 99.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1086 | 9.5 | 98.7 | 95.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1087 | 17.6 | 98.6 | 95.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1088 | 13.4 | 100.6 | 97.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1089 | 14.7 | 99.2 | 96.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-1090 | 8.6 | 103.0 | 99.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1091 | 9.5 | 106.2 | 102.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1092 | 15.9 | 103.7 | 100.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1093 | 13.9 | 104.6 | 101.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-1094 | 11.3 | 103.9 | 100.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1095 | 12.1 | 105.2 | 101.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1096 | 8.8 | 102.5 | 99.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1097 | 10.3 | 106.9 | 103.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1098 | 7.5 | 104.0 | 100.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1099 | 11.5 | 99.8 | 96.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1100 | 12.2 | 97.8 | 94.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1101 | 10.6 | 103.3 | 100.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-1102 | 11.5 | 103.0 | 99.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1103 | 8.1 | 106.1 | 102.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1104 | 17.7 | 98.7 | 95.6 | GF-17S | 15.7 | 103.2 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| TEST STANDARD | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| TESTING FREQUENCY | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

| TEST RESULTS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
| LF-1105 | 12.1 | 106.0 | 102.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1106 | 17.2 | 103.1 | 99.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1107 | 9.2 | 105.0 | 101.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1108 | 8.9 | 107.9 | 104.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1109 | 11.7 | 105.7 | 102.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-1110 | 16.3 | 105.2 | 101.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1111 | 9.2 | 102.4 | 99.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1112 | 5.8 | 100.0 | 96.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1113 | 17.1 | 102.9 | 99.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1114 | 9.6 | 107.3 | 104.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1115 | 10.7 | 107.3 | 104.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1116 | 8.7 | 107.6 | 104.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1117 | 11.9 | 100.6 | 97.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1118 | 11.6 | 103.5 | 100.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1119 | 10.0 | 107.5 | 104.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1120 | 8.9 | 100.1 | 97.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1121 | 10.2 | 104.4 | 101.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1122 | 6.4 | 102.7 | 99.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1123 | 9.0 | 105.0 | 101.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1124 | 15.7 | 97.9 | 94.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1125 | 8.0 | 107.1 | 103.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1126 | 15.1 | 104.3 | 101.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-1127 | 17.1 | 104.5 | 101.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1128 | 13.7 | 104.9 | 101.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1129 | 17.8 | 102.9 | 99.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1130 | 15.3 | 105.3 | 102.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1131 | 19.1 | 100.4 | 97.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1132 | 11.7 | 99.7 | 96.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1133 | 16.6 | 104.8 | 101.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1134 | 16.5 | 100.1 | 97.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1135 | 19.0 | 100.4 | 97.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1136 | 19.1 | 99.1 | 96.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1137 | 15.3 | 98.8 | 95.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1138 | 12.7 | 103.0 | 99.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1139 | 12.1 | 101.3 | 98.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1140 | 17.3 | 101.9 | 98.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1141 | 13.0 | 103.9 | 100.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1142 | 16.0 | 100.6 | 97.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1143 | 21.1 | 98.0 | 95.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1144 | 15.9 | 102.8 | 99.6 | GF-17S | 15.7 | 103.2 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-1145 | 15.9 | 101.4 | 98.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1146 | 18.9 | 100.0 | 96.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1147 | 11.9 | 101.8 | 98.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1148 | 16.4 | 103.5 | 100.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1149 | 17.7 | 101.5 | 98.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-1150 | 17.7 | 101.6 | 98.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-1151 | 16.6 | 100.4 | 97.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1152 | 14.8 | 100.9 | 97.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1153 | 16.8 | 104.3 | 101.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-1154 | 18.6 | 102.9 | 99.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1155 | 15.5 | 100.1 | 97.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1156 | 18.5 | 98.3 | 95.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1157 | 17.5 | 99.8 | 96.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1158 | 20.3 | 99.3 | 96.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1159 | 19.5 | 98.2 | 95.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1160 | 19.5 | 100.7 | 97.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1161 | 14.3 | 100.9 | 97.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1162 | 18.5 | 99.1 | 96.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1163 | 16.7 | 101.1 | 98.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1164 | 19.6 | 97.8 | 94.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1165 | 19.3 | 98.8 | 95.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1166 | 18.5 | 99.0 | 95.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1167 | 18.3 | 99.6 | 96.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1168 | 18.0 | 98.9 | 95.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1169 | 18.3 | 97.9 | 94.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1170 | 17.1 | 100.9 | 97.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1171 | 16.0 | 103.0 | 99.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1172 | 8.4 | 99.5 | 96.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-1173 | 13.2 | 101.1 | 98.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1174 | 14.4 | 101.5 | 98.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-1175 | 15.1 | 99.8 | 96.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1176 | 18.5 | 101.0 | 97.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1177 | 18.9 | 99.3 | 96.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1178 | 16.7 | 98.1 | 95.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-1179 | 19.1 | 98.7 | 95.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1180 | 18.3 | 99.8 | 96.7 | GF-17S | 15.7 | 103.2 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-1181 | 17.8 | 99.1 | 96.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1182 | 12.3 | 99.2 | 96.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-1183 | 12.1 | 98.0 | 95.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1184 | 15.6 | 100.9 | 97.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1185 | 14.1 | 104.0 | 100.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1186 | 13.7 | 101.2 | 98.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-1187 | 13.9 | 101.7 | 98.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1188 | 17.4 | 98.4 | 95.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1189 | 18.2 | 98.7 | 95.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1190 | 16.6 | 100.9 | 97.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1191 | 18.0 | 100.0 | 96.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1192 | 18.1 | 99.1 | 96.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1193 | 20.6 | 97.6 | 94.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1194 | 16.5 | 98.2 | 95.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1195 | 16.4 | 101.8 | 98.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1196 | 19.8 | 98.1 | 95.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-1197 | 16.3 | 98.3 | 95.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1198 | 14.4 | 102.2 | 99.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1199 | 11.4 | 100.8 | 97.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1200 | 18.4 | 99.8 | 96.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1201 | 14.4 | 99.6 | 96.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1202 | 14.5 | 103.2 | 100.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1203 | 12.4 | 97.9 | 94.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1204 | 20.1 | 98.2 | 95.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1205 | 12.8 | 105.8 | 102.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1206 | 19.4 | 101.4 | 98.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1207 | 18.5 | 100.5 | 97.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-1208 | 17.5 | 101.3 | 98.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1209 | 16.4 | 101.0 | 97.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1210 | 12.7 | 107.8 | 104.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1211 | 19.2 | 97.8 | 94.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1212 | 18.6 | 101.2 | 98.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-1213 | 19.5 | 98.0 | 95.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1214 | 18.5 | 101.7 | 98.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1215 | 15.6 | 105.8 | 102.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1216 | 15.1 | 100.3 | 97.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1217 | 18.3 | 99.4 | 96.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1218 | 16.8 | 101.1 | 98.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1219 | 20.0 | 98.7 | 95.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1220 | 15.6 | 98.6 | 95.5 | GF-17S | 15.7 | 103.2 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-1221 | 20.9 | 97.8 | 94.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1222 | 17.3 | 98.8 | 95.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1223 | 20.4 | 97.7 | 94.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1224 | 16.6 | 100.6 | 97.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1225 | 10.4 | 110.1 | 105.2 | GF-16S | 16.8 | 104.7 | | P |
| LF-1226 | 9.5 | 101.6 | 97.0 | GF-16S | 16.8 | 104.7 | | P |
| LF-1227 | 12.3 | 107.5 | 102.7 | GF-16S | 16.8 | 104.7 | | P |
| LF-1228 | 12.8 | 107.0 | 102.2 | GF-16S | 16.8 | 104.7 | | P |
| LF-1229 | 14.8 | 105.7 | 101.0 | GF-16S | 16.8 | 104.7 | | P |
| LF-1230 | 10.4 | 106.5 | 101.7 | GF-16S | 16.8 | 104.7 | | P |
| LF-1231 | 14.2 | 105.3 | 100.6 | GF-16S | 16.8 | 104.7 | | P |
| LF-1232 | 15.4 | 103.3 | 98.7 | GF-16S | 16.8 | 104.7 | | P |
| LF-1233 | 9.4 | 104.7 | 100.0 | GF-16S | 16.8 | 104.7 | | P |
| LF-1234 | 12.4 | 109.5 | 104.6 | GF-16S | 16.8 | 104.7 | | P |
| LF-1235 | 11.0 | 106.6 | 101.8 | GF-16S | 16.8 | 104.7 | | P |
| LF-1236 | 9.1 | 105.5 | 100.8 | GF-16S | 16.8 | 104.7 | | P |
| LF-1237 | 9.2 | 108.8 | 103.9 | GF-16S | 16.8 | 104.7 | | P |
| LF-1238 | 6.9 | 109.0 | 104.1 | GF-16S | 16.8 | 104.7 | | P |
| LF-1239 | 8.0 | 108.4 | 103.5 | GF-16S | 16.8 | 104.7 | | P |
| LF-1240 | 11.8 | 110.0 | 105.1 | GF-16S | 16.8 | 104.7 | | P |
| LF-1241 | 8.5 | 107.3 | 102.5 | GF-16S | 16.8 | 104.7 | | P |
| LF-1242 | 7.4 | 101.9 | 97.3 | GF-16S | 16.8 | 104.7 | | P |
| LF-1243 | 15.0 | 107.9 | 103.1 | GF-16S | 16.8 | 104.7 | | P |
| LF-1244 | 11.5 | 101.0 | 96.5 | GF-16S | 16.8 | 104.7 | | P |
| LF-1245 | 20.9 | 98.9 | 95.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1246 | 22.0 | 98.3 | 95.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1247 | 21.2 | 98.2 | 95.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1248 | 12.2 | 105.1 | 101.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1249 | 19.4 | 102.6 | 99.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-1250 | 18.4 | 102.4 | 99.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1251 | 20.2 | 99.3 | 96.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1252 | 20.0 | 98.9 | 95.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1253 | 16.3 | 103.2 | 100.0 | GF-17S | 15.7 | 103.2 | | P |
| LF-1254 | 15.3 | 104.3 | 101.1 | GF-17S | 15.7 | 103.2 | | P |
| LF-1255 | 12.9 | 105.9 | 102.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1258B | 8.4 | 105.7 | 101.0 | GF-16S | 16.8 | 104.7 | | P |
| LF-1259B | 9.6 | 104.4 | 99.7 | GF-16S | 16.8 | 104.7 | | P |
| LF-1260B | 15.1 | 107.5 | 102.7 | GF-16S | 16.8 | 104.7 | | P |
| LF-1261B | 16.4 | 107.4 | 102.6 | GF-16S | 16.8 | 104.7 | | P |
| LF-1262B | 14.4 | 106.0 | 101.2 | GF-16S | 16.8 | 104.7 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-1263B | 15.8 | 107.4 | 102.6 | GF-16S | 16.8 | 104.7 | | P |
| LF-1264B | 12.3 | 105.0 | 100.3 | GF-16S | 16.8 | 104.7 | | P |
| LF-1265B | 13.0 | 109.8 | 104.9 | GF-16S | 16.8 | 104.7 | | P |
| LF-1266B | 12.1 | 107.8 | 103.0 | GF-16S | 16.8 | 104.7 | | P |
| LF-1267B | 14.3 | 106.2 | 101.4 | GF-16S | 16.8 | 104.7 | | P |
| LF-1268B | 12.7 | 107.9 | 103.1 | GF-16S | 16.8 | 104.7 | | P |
| LF-1269B | 12.1 | 109.7 | 104.8 | GF-16S | 16.8 | 104.7 | | P |
| LF-1270B | 12.6 | 105.2 | 100.5 | GF-16S | 16.8 | 104.7 | | P |
| LF-1271B | 13.4 | 106.8 | 102.0 | GF-16S | 16.8 | 104.7 | | P |
| LF-1274 | 12.0 | 107.1 | 103.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1275 | 18.3 | 98.5 | 95.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-1276 | 14.9 | 101.9 | 98.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1277 | 11.3 | 105.5 | 102.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1278 | 14.7 | 100.3 | 97.2 | GF-17S | 15.7 | 103.2 | | P |
| LF-1279 | 15.2 | 102.7 | 99.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-1280 | 12.5 | 103.0 | 99.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1281 | 14.7 | 103.1 | 99.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-1282 | 18.5 | 99.9 | 96.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1283 | 17.4 | 101.9 | 98.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-1284 | 9.8 | 102.5 | 99.3 | GF-17S | 15.7 | 103.2 | | P |
| LF-1285 | 14.0 | 103.0 | 99.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-1288 | 17.0 | 105.3 | 100.6 | GF-16S | 16.8 | 104.7 | | P |
| LF-1289 | 14.5 | 106.7 | 101.9 | GF-16S | 16.8 | 104.7 | | P |
| LF-1290 | 21.8 | 99.3 | 94.8 | GF-16S | 16.8 | 104.7 | | P |
| LF-1291 | 21.2 | 99.8 | 95.3 | GF-16S | 16.8 | 104.7 | | P |
| LF-1292 | 15.2 | 103.9 | 99.2 | GF-16S | 16.8 | 104.7 | | P |
| LF-1293 | 15.2 | 106.5 | 101.7 | GF-16S | 16.8 | 104.7 | | P |
| LF-1294 | 19.4 | 100.8 | 96.3 | GF-16S | 16.8 | 104.7 | | P |
| LF-1295 | 13.5 | 108.4 | 103.5 | GF-16S | 16.8 | 104.7 | | P |
| LF-1296 | 10.7 | 108.2 | 103.3 | GF-16S | 16.8 | 104.7 | | P |
| LF-1297 | 9.9 | 105.2 | 100.5 | GF-16S | 16.8 | 104.7 | | P |
| LF-1298 | 10.2 | 106.8 | 102.0 | GF-16S | 16.8 | 104.7 | | P |
| LF-1299 | 10.9 | 105.9 | 101.1 | GF-16S | 16.8 | 104.7 | | P |
| LF-1300 | 10.3 | 108.4 | 103.5 | GF-16S | 16.8 | 104.7 | | P |
| LF-1301 | 13.8 | 102.4 | 97.8 | GF-16S | 16.8 | 104.7 | | P |
| LF-1302 | 12.9 | 102.0 | 97.4 | GF-16S | 16.8 | 104.7 | | P |
| LF-1303 | 12.2 | 106.9 | 102.1 | GF-16S | 16.8 | 104.7 | | P |
| LF-1304 | 12.8 | 99.3 | 94.8 | GF-16S | 16.8 | 104.7 | | P |
| LF-1305 | 12.0 | 101.7 | 97.1 | GF-16S | 16.8 | 104.7 | | P |
| LF-1306 | 13.3 | 100.9 | 96.4 | GF-16S | 16.8 | 104.7 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-1307 | 11.3 | 103.0 | 98.4 | GF-16S | 16.8 | 104.7 | | P |
| LF-1308 | 13.8 | 100.3 | 95.8 | GF-16S | 16.8 | 104.7 | | P |
| LF-1309 | 12.6 | 101.2 | 96.7 | GF-16S | 16.8 | 104.7 | | P |
| LF-1310 | 13.0 | 102.7 | 98.1 | GF-16S | 16.8 | 104.7 | | P |
| LF-1331 | 15.2 | 103.6 | 98.2 | GF-18S | 15.8 | 105.5 | | P |
| LF-1332 | 13.3 | 103.3 | 97.9 | GF-18S | 15.8 | 105.5 | | P |
| LF-1333 | 15.2 | 106.5 | 100.9 | GF-18S | 15.8 | 105.5 | | P |
| LF-1334 | 13.1 | 102.8 | 97.4 | GF-18S | 15.8 | 105.5 | | P |
| LF-1335 | 14.4 | 106.6 | 101.0 | GF-18S | 15.8 | 105.5 | | P |
| LF-1336 | 14.1 | 108.3 | 102.7 | GF-18S | 15.8 | 105.5 | | P |
| LF-1337 | 14.3 | 106.2 | 100.7 | GF-18S | 15.8 | 105.5 | | P |
| LF-1338 | 11.6 | 101.5 | 96.2 | GF-18S | 15.8 | 105.5 | | P |
| LF-1339 | 10.3 | 102.6 | 97.3 | GF-18S | 15.8 | 105.5 | | P |
| LF-1340 | 22.6 | 94.9 | 90.0 | GF-18S | 15.8 | 105.5 | LF-1402 | F |
| LF-1341 | 23.1 | 95.7 | 90.7 | GF-18S | 15.8 | 105.5 | LF-1401 | F |
| LF-1342 | 13.6 | 101.3 | 96.0 | GF-18S | 15.8 | 105.5 | | P |
| LF-1343 | 12.3 | 105.3 | 99.8 | GF-18S | 15.8 | 105.5 | | P |
| LF-1344 | 13.7 | 100.0 | 94.8 | GF-18S | 15.8 | 105.5 | | P |
| LF-1345 | 14.2 | 101.2 | 95.9 | GF-18S | 15.8 | 105.5 | | P |
| LF-1346 | 15.6 | 102.3 | 97.0 | GF-18S | 15.8 | 105.5 | | P |
| LF-1347 | 14.8 | 102.5 | 97.2 | GF-18S | 15.8 | 105.5 | | P |
| LF-1348 | 13.3 | 103.6 | 98.2 | GF-18S | 15.8 | 105.5 | | P |
| LF-1349 | 14.5 | 105.0 | 99.5 | GF-18S | 15.8 | 105.5 | | P |
| LF-1350 | 15.1 | 102.3 | 97.0 | GF-18S | 15.8 | 105.5 | | P |
| LF-1351 | 14.1 | 105.8 | 100.3 | GF-18S | 15.8 | 105.5 | | P |
| LF-1352 | 13.9 | 101.3 | 96.0 | GF-18S | 15.8 | 105.5 | | P |
| LF-1353 | 15.7 | 104.1 | 98.7 | GF-18S | 15.8 | 105.5 | | P |
| LF-1354 | 14.5 | 104.4 | 99.0 | GF-18S | 15.8 | 105.5 | | P |
| LF-1355 | 15.6 | 102.7 | 97.3 | GF-18S | 15.8 | 105.5 | | P |
| LF-1356 | 12.4 | 103.5 | 98.1 | GF-18S | 15.8 | 105.5 | | P |
| LF-1357 | 13.0 | 104.3 | 98.9 | GF-18S | 15.8 | 105.5 | | P |
| LF-1358 | 13.3 | 103.5 | 98.1 | GF-18S | 15.8 | 105.5 | | P |
| LF-1359 | 16.1 | 103.2 | 97.8 | GF-18S | 15.8 | 105.5 | | P |
| LF-1360b | 19.7 | 99.7 | 96.6 | GF-17S | 15.7 | 103.2 | | P |
| LF-1361 | 14.5 | 101.3 | 96.8 | GF-19S | 15.6 | 104.6 | | P |
| LF-1362 | 14.1 | 101.7 | 97.2 | GF-19S | 15.6 | 104.6 | | P |
| LF-1363 | 12.6 | 102.5 | 98.0 | GF-19S | 15.6 | 104.6 | | P |
| LF-1364 | 13.8 | 103.4 | 98.9 | GF-19S | 15.6 | 104.6 | | P |
| LF-1365 | 12.8 | 103.0 | 98.5 | GF-19S | 15.6 | 104.6 | | P |
| LF-1390 | 21.4 | 99.6 | 95.2 | GF-19S | 15.6 | 104.6 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-1391 | 14.5 | 100.7 | 96.3 | GF-19S | 15.6 | 104.6 | | P |
| LF-1392 | 18.9 | 99.7 | 95.3 | GF-19S | 15.6 | 104.6 | | P |
| LF-1393 | 20.8 | 99.6 | 95.2 | GF-19S | 15.6 | 104.6 | | P |
| LF-1394 | 14.3 | 105.3 | 100.7 | GF-19S | 15.6 | 104.6 | | P |
| LF-1395 | 14.0 | 102.8 | 98.3 | GF-19S | 15.6 | 104.6 | | P |
| LF-1396 | 14.8 | 102.9 | 98.4 | GF-19S | 15.6 | 104.6 | | P |
| LF-1397 | 20.6 | 99.1 | 94.7 | GF-19S | 15.6 | 104.6 | | P |
| LF-1398 | 17.1 | 105.3 | 100.7 | GF-19S | 15.6 | 104.6 | | P |
| LF-1399 | 19.3 | 99.7 | 95.3 | GF-19S | 15.6 | 104.6 | | P |
| LF-1400 | 16.7 | 104.3 | 99.7 | GF-19S | 15.6 | 104.6 | | P |
| LF-1401 | 13.9 | 106.7 | 101.1 | GF-18S | 15.8 | 105.5 | | P |
| LF-1402 | 11.6 | 108.1 | 102.5 | GF-18S | 15.8 | 105.5 | | P |
| LF-1403 | 12.3 | 108.3 | 102.7 | GF-18S | 15.8 | 105.5 | | P |
| LF-1404 | 12.8 | 106.1 | 100.6 | GF-18S | 15.8 | 105.5 | | P |
| LF-1405 | 17.4 | 101.8 | 96.5 | GF-18S | 15.8 | 105.5 | | P |
| LF-1406 | 11.7 | 107.4 | 101.8 | GF-18S | 15.8 | 105.5 | | P |
| LF-1407 | 10.8 | 107.7 | 102.1 | GF-18S | 15.8 | 105.5 | | P |
| LF-1408 | 11.1 | 108.5 | 102.8 | GF-18S | 15.8 | 105.5 | | P |
| LF-1409 | 13.4 | 106.5 | 100.9 | GF-18S | 15.8 | 105.5 | | P |
| LF-1410 | 12.6 | 109.3 | 103.6 | GF-18S | 15.8 | 105.5 | | P |
| LF-1411 | 14.5 | 106.2 | 100.7 | GF-18S | 15.8 | 105.5 | | P |
| LF-1412 | 15.5 | 107.2 | 101.6 | GF-18S | 15.8 | 105.5 | | P |
| LF-1413 | 15.2 | 105.8 | 100.3 | GF-18S | 15.8 | 105.5 | | P |
| LF-1414 | 14.0 | 104.0 | 98.6 | GF-18S | 15.8 | 105.5 | | P |
| LF-1415 | 13.7 | 106.6 | 101.0 | GF-18S | 15.8 | 105.5 | | P |
| LF-1416 | 13.1 | 107.5 | 101.9 | GF-18S | 15.8 | 105.5 | | P |
| LF-1417 | 15.2 | 104.7 | 99.2 | GF-18S | 15.8 | 105.5 | | P |
| LF-1418 | 14.3 | 105.3 | 99.8 | GF-18S | 15.8 | 105.5 | | P |
| LF-1421 | 17.2 | 100.9 | 95.6 | GF-18S | 15.8 | 105.5 | | P |
| LF-1422 | 19.9 | 99.8 | 94.6 | GF-18S | 15.8 | 105.5 | | P |
| LF-1423 | 15.7 | 101.1 | 95.8 | GF-18S | 15.8 | 105.5 | | P |
| LF-1424 | 16.3 | 101.5 | 96.2 | GF-18S | 15.8 | 105.5 | | P |
| LF-1425 | 12.7 | 101.5 | 96.2 | GF-18S | 15.8 | 105.5 | | P |
| LF-1426 | 14.5 | 101.0 | 95.7 | GF-18S | 15.8 | 105.5 | | P |
| LF-1427 | 12.2 | 101.9 | 96.6 | GF-18S | 15.8 | 105.5 | | P |
| LF-1428 | 15.8 | 100.0 | 94.8 | GF-18S | 15.8 | 105.5 | | P |
| LF-1439 | 13.1 | 102.7 | 97.3 | GF-18S | 15.8 | 105.5 | | P |
| LF-1140 | 14.5 | 102.0 | 96.7 | GF-18S | 15.8 | 105.5 | | P |
| LF-1441 | 13.6 | 103.5 | 98.1 | GF-18S | 15.8 | 105.5 | | P |
| LF-1442 | 13.0 | 103.0 | 97.6 | GF-18S | 15.8 | 105.5 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-1443 | 14.2 | 103.4 | 98.0 | GF-18S | 15.8 | 105.5 | | P |
| LF-1444 | 13.9 | 102.1 | 96.8 | GF-18S | 15.8 | 105.5 | | P |
| LF-1445 | 14.8 | 104.6 | 99.1 | GF-18S | 15.8 | 105.5 | | P |
| LF-1446 | 20.0 | 99.2 | 94.8 | GF-19S | 15.6 | 104.6 | | P |
| LF-1447 | 20.3 | 99.7 | 95.3 | GF-19S | 15.6 | 104.6 | | P |
| LF-1448 | 20.0 | 100.7 | 96.3 | GF-19S | 15.6 | 104.6 | | P |
| LF-1449 | 16.7 | 100.3 | 95.9 | GF-19S | 15.6 | 104.6 | | P |
| LF-1450 | 15.8 | 99.4 | 95.0 | GF-19S | 15.6 | 104.6 | | P |
| LF-1451 | 18.7 | 99.6 | 95.2 | GF-19S | 15.6 | 104.6 | | P |
| LF-1452 | 19.8 | 99.8 | 95.4 | GF-19S | 15.6 | 104.6 | | P |
| LF-1453 | 20.9 | 99.2 | 94.8 | GF-19S | 15.6 | 104.6 | | P |
| LF-1454 | 15.9 | 101.1 | 96.7 | GF-19S | 15.6 | 104.6 | | P |
| LF-1455 | 15.6 | 101.8 | 97.3 | GF-19S | 15.6 | 104.6 | | P |
| LF-1456 | 9.8 | 102.5 | 97.2 | GF-18S | 15.8 | 105.5 | | P |
| LF-1457 | 10.3 | 106.2 | 100.7 | GF-18S | 15.8 | 105.5 | | P |
| LF-1458 | 8.5 | 103.2 | 97.8 | GF-18S | 15.8 | 105.5 | | P |
| LF-1459 | 9.6 | 101.9 | 96.6 | GF-18S | 15.8 | 105.5 | | P |
| LF-1460 | 10.4 | 101.4 | 96.1 | GF-18S | 15.8 | 105.5 | | P |
| LF-1461 | 9.2 | 101.0 | 95.7 | GF-18S | 15.8 | 105.5 | | P |
| LF-1462 | 12.4 | 103.2 | 97.8 | GF-18S | 15.8 | 105.5 | | P |
| LF-1463 | 10.0 | 103.6 | 98.2 | GF-18S | 15.8 | 105.5 | | P |
| LF-1464 | 9.7 | 101.5 | 96.2 | GF-18S | 15.8 | 105.5 | | P |
| LF-1465 | 11.1 | 106.5 | 100.9 | GF-18S | 15.8 | 105.5 | | P |
| LF-1466 | 10.4 | 101.1 | 95.8 | GF-18S | 15.8 | 105.5 | | P |
| LF-1467 | 9.6 | 101.3 | 96.0 | GF-18S | 15.8 | 105.5 | | P |
| LF-1499 | 9.1 | 109.2 | 103.5 | GF-18S | 15.8 | 105.5 | | P |
| LF-1500 | 12.1 | 104.7 | 99.2 | GF-18S | 15.8 | 105.5 | | P |
| LF-1501 | 12.1 | 106.1 | 100.6 | GF-18S | 15.8 | 105.5 | | P |
| LF-1502 | 14.3 | 102.6 | 97.3 | GF-18S | 15.8 | 105.5 | | P |
| LF-1503 | 11.5 | 103.8 | 98.4 | GF-18S | 15.8 | 105.5 | | P |
| LF-1504 | 8.0 | 105.2 | 99.7 | GF-18S | 15.8 | 105.5 | | P |
| LF-1505 | 11.9 | 102.1 | 96.8 | GF-18S | 15.8 | 105.5 | | P |
| LF-1506 | 10.2 | 108.1 | 102.5 | GF-18S | 15.8 | 105.5 | | P |
| LF-1507 | 14.8 | 103.9 | 98.5 | GF-18S | 15.8 | 105.5 | | P |
| LF-1508 | 12.9 | 103.8 | 98.4 | GF-18S | 15.8 | 105.5 | | P |
| LF-1509 | 16.9 | 104.5 | 99.1 | GF-18S | 15.8 | 105.5 | | P |
| LF-1510 | 14.7 | 103.9 | 98.5 | GF-18S | 15.8 | 105.5 | | P |
| LF-1511 | 13.0 | 106.9 | 101.3 | GF-18S | 15.8 | 105.5 | | P |
| LF-1512 | 7.6 | 109.6 | 103.9 | GF-18S | 15.8 | 105.5 | | P |
| LF-1513 | 11.2 | 103.8 | 98.4 | GF-18S | 15.8 | 105.5 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-1514 | 8.8 | 108.1 | 102.5 | GF-18S | 15.8 | 105.5 | | P |
| LF-1531 | 14.9 | 100.2 | 95.8 | GF-19S | 15.6 | 104.6 | | P |
| LF-1532 | 14.1 | 99.4 | 95.0 | GF-19S | 15.6 | 104.6 | | P |
| LF-1533 | 20.1 | 99.0 | 94.6 | GF-19S | 15.6 | 104.6 | | P |
| LF-1534 | 19.5 | 99.4 | 95.0 | GF-19S | 15.6 | 104.6 | | P |
| LF-1535 | 20.0 | 99.8 | 95.4 | GF-19S | 15.6 | 104.6 | | P |
| LF-1536 | 19.3 | 100.0 | 95.6 | GF-19S | 15.6 | 104.6 | | P |
| LF-1537 | 17.2 | 100.3 | 95.9 | GF-19S | 15.6 | 104.6 | | P |
| LF-1538 | 19.4 | 99.6 | 95.2 | GF-19S | 15.6 | 104.6 | | P |
| LF-1539 | 18.7 | 99.2 | 94.8 | GF-19S | 15.6 | 104.6 | | P |
| LF-1540 | 18.3 | 99.9 | 95.5 | GF-19S | 15.6 | 104.6 | | P |
| LF-1541 | 19.1 | 100.2 | 95.8 | GF-19S | 15.6 | 104.6 | | P |
| LF-1578 | 16.1 | 101.7 | 95.4 | GF-21S | 14.8 | 106.6 | | P |
| LF-1579 | 17.6 | 100.3 | 95.2 | GF-20S | 15.1 | 105.3 | | P |
| LF-1580 | 15.7 | 100.2 | 95.1 | GF-20S | 15.1 | 105.3 | | P |
| LF-1581 | 17.3 | 101.3 | 96.2 | GF-20S | 15.1 | 105.3 | | P |
| LF-1582 | 7.0 | 107.1 | 101.7 | GF-20S | 15.1 | 105.3 | | P |
| LF-1583 | 12.7 | 105.4 | 100.1 | GF-20S | 15.1 | 105.3 | | P |
| LF-1584 | 7.4 | 105.2 | 99.9 | GF-20S | 15.1 | 105.3 | | P |
| LF-1585 | 6.1 | 106.9 | 101.5 | GF-20S | 15.1 | 105.3 | | P |
| LF-1586 | 9.8 | 111.7 | 106.0 | GF-20S | 15.1 | 105.3 | | P |
| LF-1587 | 8.6 | 111.0 | 105.4 | GF-20S | 15.1 | 105.3 | | P |
| LF-1588 | 12.3 | 101.4 | 96.3 | GF-20S | 15.1 | 105.3 | | P |
| LF-1589 | 7.0 | 105.3 | 100.0 | GF-20S | 15.1 | 105.3 | | P |
| LF-1590 | 11.7 | 105.9 | 100.6 | GF-20S | 15.1 | 105.3 | | P |
| LF-1591 | 12.8 | 106.8 | 101.4 | GF-20S | 15.1 | 105.3 | | P |
| LF-1595 | 12.3 | 103.8 | 98.0 | GF-20S | 15.1 | 105.3 | | P |
| LF-1596 | 13.1 | 100.9 | 95.2 | GF-20S | 15.1 | 105.3 | | P |
| LF-1597 | 14.9 | 100.6 | 95.5 | GF-20S | 15.1 | 105.3 | | P |
| LF-1598 | 23.0 | 98.5 | 93.5 | GF-20S | 15.1 | 105.3 | LF-1621 | F |
| LF-1599 | 16.0 | 105.3 | 100.0 | GF-20S | 15.1 | 105.3 | | P |
| LF-1600 | 13.8 | 101.0 | 96.0 | GF-20S | 15.1 | 105.3 | | P |
| LF-1601 | 15.3 | 104.5 | 99.3 | GF-20S | 15.1 | 105.3 | | P |
| LF-1602 | 11.8 | 101.6 | 96.5 | GF-20S | 15.1 | 105.3 | | P |
| LF-1603 | 9.4 | 108.8 | 103.3 | GF-20S | 15.1 | 105.3 | | P |
| LF-1604 | 13.7 | 105.2 | 99.9 | GF-20S | 15.1 | 105.3 | | P |
| LF-1621 | 20.1 | 98.3 | 93.3 | GF-21S | 14.8 | 106.6 | LF-1641 | F |
| LF-1622 | 11.3 | 104.7 | 98.2 | GF-21S | 14.8 | 106.6 | | P |
| LF-1623 | 13.3 | 107.3 | 100.7 | GF-21S | 14.8 | 106.6 | | P |
| LF-1624 | 10.1 | 107.3 | 100.6 | GF-21S | 14.8 | 106.6 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-2 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT PERIMETER BERM

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-1625 | 8.7 | 106.3 | 99.7 | GF-21S | 14.8 | 106.6 | | P |
| LF-1626 | 10.0 | 103.7 | 97.3 | GF-21S | 14.8 | 106.6 | | P |
| LF-1627 | 17.1 | 96.8 | 90.8 | GF-21S | 14.8 | 106.6 | LF-1666 | F |
| LF-1628 | 19.2 | 101.4 | 95.1 | GF-21S | 14.8 | 106.6 | | P |
| LF-1629 | 17.2 | 103.7 | 97.3 | GF-21S | 14.8 | 106.6 | | P |
| LF-1630 | 17.8 | 102.8 | 96.4 | GF-21S | 14.8 | 106.6 | | P |
| LF-1631 | 16.6 | 102.6 | 96.2 | GF-21S | 14.8 | 106.6 | | P |
| LF-1632 | 14.0 | 105.8 | 99.3 | GF-21S | 14.8 | 106.6 | | P |
| LF-1641 | 17.3 | 101.1 | 96.0 | GF-20S | 15.1 | 105.3 | | P |
| LF-1666 | 12.4 | 104.5 | 98.0 | GF-21S | 14.8 | 106.6 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-3

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT CELL 1A

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent of Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-41 | 18.0 | 100.3 | 93.3 | GF-1S | 14.0 | 107.5 | LF-56 | F |
| LF-42 | 17.3 | 103.9 | 96.7 | GF-1S | 14.0 | 107.5 | | P |
| LF-43 | 18.3 | 102.2 | 95.1 | GF-1S | 14.0 | 107.5 | | P |
| LF-56 | 15.8 | 104.7 | 97.4 | GF-1S | 14.0 | 107.5 | | P |
| LF-57 | 20.4 | 104.5 | 97.2 | GF-1S | 14.0 | 107.5 | | P |
| LF-58 | 18.3 | 103.9 | 96.7 | GF-1S | 14.0 | 107.5 | | P |
| LF-59 | 17.8 | 104.2 | 96.9 | GF-1S | 14.0 | 107.5 | | P |
| LF-60 | 16.9 | 102.5 | 95.3 | GF-1S | 14.0 | 107.5 | | P |
| LF-61 | 17.0 | 98.3 | 91.4 | GF-1S | 14.0 | 107.5 | LF-83 | F |
| LF-62 | 15.3 | 99.3 | 92.4 | GF-1S | 14.0 | 107.5 | LF-442 | F |
| LF-63 | 14.2 | 104.1 | 96.8 | GF-1S | 14.0 | 107.5 | | P |
| LF-64 | 18.5 | 102.2 | 95.1 | GF-1S | 14.0 | 107.5 | | P |
| LF-65 | 16.9 | 102.3 | 95.2 | GF-1S | 14.0 | 107.5 | | P |
| LF-66 | 14.5 | 102.2 | 95.1 | GF-1S | 14.0 | 107.5 | | P |
| LF-67 | 12.2 | 101.2 | 94.1 | GF-1S | 14.0 | 107.5 | LF-442 | F |
| LF-68 | 17.8 | 98.1 | 91.3 | GF-1S | 14.0 | 107.5 | LF-82 | F |
| LF-69 | 18.7 | 98.2 | 91.3 | GF-1S | 14.0 | 107.5 | LF-89 | F |
| LF-70 | 16.9 | 97.3 | 90.5 | GF-1S | 14.0 | 107.5 | LF-104 | F |
| LF-71 | 12.8 | 100.9 | 93.9 | GF-1S | 14.0 | 107.5 | LF-78 | F |
| LF-72 | 13.9 | 105.3 | 98.0 | GF-1S | 14.0 | 107.5 | | P |
| LF-73 | 14.5 | 100.0 | 93.0 | GF-1S | 14.0 | 107.5 | LF-79 | F |
| LF-74 | 13.3 | 100.6 | 93.6 | GF-1S | 14.0 | 107.5 | LF-80 | F |
| LF-75 | 12.6 | 105.0 | 97.7 | GF-1S | 14.0 | 107.5 | | P |
| LF-76 | 14.7 | 101.3 | 94.2 | GF-1S | 14.0 | 107.5 | LF-81 | F |
| LF-77 | 13.0 | 100.5 | 93.5 | GF-1S | 14.0 | 107.5 | LF-82 | F |
| LF-78 | 19.0 | 102.8 | 95.6 | GF-1S | 14.0 | 107.5 | | P |
| LF-79 | 17.9 | 102.0 | 94.9 | GF-1S | 14.0 | 107.5 | | P |
| LF-80 | 13.5 | 103.4 | 96.2 | GF-1S | 14.0 | 107.5 | | P |
| LF-81 | 13.7 | 103.9 | 96.7 | GF-1S | 14.0 | 107.5 | | P |
| LF-82 | 18.2 | 102.8 | 95.6 | GF-1S | 14.0 | 107.5 | | P |
| LF-83 | 15.3 | 102.4 | 95.3 | GF-1S | 14.0 | 107.5 | | P |
| LF-84 | 17.8 | 103.4 | 96.2 | GF-1S | 14.0 | 107.5 | | P |
| LF-85 | 16.3 | 104.1 | 96.8 | GF-1S | 14.0 | 107.5 | | P |
| LF-86 | 12.1 | 103.7 | 96.5 | GF-1S | 14.0 | 107.5 | | P |
| LF-87 | 16.6 | 102.9 | 95.7 | GF-1S | 14.0 | 107.5 | | P |
| LF-89 | 16.0 | 103.2 | 96.0 | GF-1S | 14.0 | 107.5 | | P |
| LF-90 | 17.2 | 102.8 | 95.6 | GF-1S | 14.0 | 107.5 | | P |
| LF-91 | 20.1 | 102.4 | 95.3 | GF-1S | 14.0 | 107.5 | | P |
| LF-92 | 20.5 | 99.3 | 92.4 | GF-1S | 14.0 | 107.5 | LF-158 | F |
| LF-93 | 17.3 | 102.2 | 95.1 | GF-1S | 14.0 | 107.5 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-3 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT CELL 1A

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR | | | | | |
|---|---|---|---|---|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 | | | | | |
| **TESTING FREQUENCY** | 5 test per acre per lift | | 1 test per 25,000 $yd^3$ | | | | | |
| **TEST RESULTS** | | | | | | | | |
| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent of Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
| LF-94 | 14.8 | 102.2 | 95.1 | GF-1S | 14.0 | 107.5 | | P |
| LF-95 | 19.3 | 101.8 | 94.7 | GF-1S | 14.0 | 107.5 | | P |
| LF-96 | 18.3 | 102.4 | 95.3 | GF-1S | 14.0 | 107.5 | | P |
| LF-97 | 15.6 | 103.1 | 95.9 | GF-1S | 14.0 | 107.5 | | P |
| LF-98 | 14.7 | 102.2 | 95.1 | GF-1S | 14.0 | 107.5 | | P |
| LF-99 | 13.3 | 103.3 | 96.1 | GF-1S | 14.0 | 107.5 | | P |
| LF-100 | 13.3 | 103.9 | 96.7 | GF-1S | 14.0 | 107.5 | | P |
| LF-101 | 15.7 | 95.9 | 89.2 | GF-1S | 14.0 | 107.5 | LF-156 | F |
| LF-102 | 16.7 | 95.9 | 89.2 | GF-1S | 14.0 | 107.5 | LF-161 | F |
| LF-103 | 17.3 | 102.6 | 95.4 | GF-1S | 14.0 | 107.5 | | P |
| LF-104 | 16.8 | 103.5 | 96.3 | GF-1S | 14.0 | 107.5 | | P |
| LF-105 | 17.3 | 103.1 | 95.9 | GF-1S | 14.0 | 107.5 | | P |
| LF-106 | 16.0 | 104.0 | 96.7 | GF-1S | 14.0 | 107.5 | | P |
| LF-120 | 12.5 | 96.6 | 96.5 | GF-3S | 16.2 | 100.1 | | P |
| LF-121 | 20.2 | 98.4 | 98.3 | GF-3S | 16.2 | 100.1 | | P |
| LF-122 | 19.5 | 98.4 | 98.3 | GF-3S | 16.2 | 100.1 | | P |
| LF-123 | 11.8 | 102.3 | 102.2 | GF-3S | 16.2 | 100.1 | | P |
| LF-124 | 17.8 | 99.8 | 99.7 | GF-3S | 16.2 | 100.1 | | P |
| LF-125 | 13.8 | 98.2 | 98.1 | GF-3S | 16.2 | 100.1 | | P |
| LF-126 | 11.0 | 101.4 | 101.3 | GF-3S | 16.2 | 100.1 | | P |
| LF-127 | 12.2 | 99.7 | 99.6 | GF-3S | 16.2 | 100.1 | | P |
| LF-128 | 18.4 | 100.1 | 100.0 | GF-3S | 16.2 | 100.1 | | P |
| LF-129 | 16.6 | 96.3 | 96.2 | GF-3S | 16.2 | 100.1 | | P |
| LF-130 | 19.3 | 98.7 | 98.6 | GF-3S | 16.2 | 100.1 | | P |
| LF-131 | 19.1 | 101.7 | 101.6 | GF-3S | 16.2 | 100.1 | | P |
| LF-132 | 16.8 | 97.4 | 97.3 | GF-3S | 16.2 | 100.1 | | P |
| LF-133 | 18.2 | 99.1 | 99.0 | GF-3S | 16.2 | 100.1 | | P |
| LF-134 | 15.3 | 99.3 | 99.2 | GF-3S | 16.2 | 100.1 | | P |
| LF-135 | 17.4 | 97.9 | 97.8 | GF-3S | 16.2 | 100.1 | | P |
| LF-136 | 8.6 | 101.9 | 101.8 | GF-3S | 16.2 | 100.1 | | P |
| LF-137 | 6.6 | 102.7 | 102.6 | GF-3S | 16.2 | 100.1 | | P |
| LF-138 | 11.5 | 100.6 | 100.5 | GF-3S | 16.2 | 100.1 | | P |
| LF-139 | 8.1 | 102.5 | 102.4 | GF-3S | 16.2 | 100.1 | | P |
| LF-140 | 14.1 | 98.2 | 98.1 | GF-3S | 16.2 | 100.1 | | P |
| LF-141 | 9.4 | 102.3 | 102.2 | GF-3S | 16.2 | 100.1 | | P |
| LF-142 | 12.1 | 101.0 | 100.9 | GF-3S | 16.2 | 100.1 | | P |
| LF-143 | 6.0 | 99.7 | 99.6 | GF-3S | 16.2 | 100.1 | | P |
| LF-144 | 7.3 | 101.4 | 101.3 | GF-3S | 16.2 | 100.1 | | P |
| LF-145 | 11.0 | 103.7 | 103.6 | GF-3S | 16.2 | 100.1 | | P |
| LF-146 | 12.8 | 100.8 | 100.7 | GF-3S | 16.2 | 100.1 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-3 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT CELL 1A

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent of Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-147 | 10.9 | 99.2 | 99.1 | GF-3S | 16.2 | 100.1 | | P |
| LF-148 | 16.6 | 99.5 | 99.4 | GF-3S | 16.2 | 100.1 | | P |
| LF-149 | 20.8 | 99.3 | 99.2 | GF-3S | 16.2 | 100.1 | | P |
| LF-150 | 10.6 | 101.2 | 101.1 | GF-3S | 16.2 | 100.1 | | P |
| LF-151 | 16.6 | 99.3 | 99.2 | GF-3S | 16.2 | 100.1 | | P |
| LF-152 | 12.9 | 101.7 | 101.6 | GF-3S | 16.2 | 100.1 | | P |
| LF-153 | 11.6 | 99.9 | 99.8 | GF-3S | 16.2 | 100.1 | | P |
| LF-154 | 11.1 | 103.4 | 97.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-155 | 12.3 | 107.4 | 101.4 | GF-6S | 14.3 | 105.9 | | P |
| LF-156 | 10.7 | 101.0 | 95.4 | GF-6S | 14.3 | 105.9 | | P |
| LF-157 | 14.2 | 101.5 | 95.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-158 | 16.7 | 106.4 | 100.5 | GF-6S | 14.3 | 105.9 | | P |
| LF-159 | 14.7 | 104.8 | 99.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-160 | 13.8 | 105.3 | 99.4 | GF-6S | 14.3 | 105.9 | | P |
| LF-161 | 15.1 | 104.4 | 98.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-162 | 13.2 | 105.7 | 99.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-163 | 12.0 | 105.3 | 99.4 | GF-6S | 14.3 | 105.9 | | P |
| LF-164 | 12.6 | 104.1 | 98.3 | GF-6S | 14.3 | 105.9 | | P |
| LF-165 | 10.8 | 102.9 | 97.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-166 | 11.3 | 104.8 | 99.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-167 | 12.9 | 104.6 | 98.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-168 | 11.6 | 105.5 | 99.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-169 | 19.5 | 100.8 | 95.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-170 | 21.7 | 96.5 | 91.1 | GF-6S | 14.3 | 105.9 | LF-175 | F |
| LF-171 | 19.4 | 100.8 | 95.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-172 | 18.4 | 101.0 | 95.4 | GF-6S | 14.3 | 105.9 | | P |
| LF-173 | 15.1 | 104.6 | 98.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-174 | 11.5 | 102.0 | 96.3 | GF-6S | 14.3 | 105.9 | | P |
| LF-175 | 15.3 | 103.1 | 97.4 | GF-6S | 14.3 | 105.9 | | P |
| LF-176 | 15.5 | 101.8 | 96.1 | GF-6S | 14.3 | 105.9 | | P |
| LF-177 | 15.1 | 104.5 | 98.7 | GF-6S | 14.3 | 105.9 | | P |
| LF-178 | 15.3 | 102.6 | 96.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-179 | 14.9 | 103.3 | 97.5 | GF-6S | 14.3 | 105.9 | | P |
| LF-180 | 14.3 | 103.7 | 97.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-181 | 14.1 | 102.8 | 97.1 | GF-6S | 14.3 | 105.9 | | P |
| LF-182 | 11.5 | 105.2 | 99.3 | GF-6S | 14.3 | 105.9 | | P |
| LF-183 | 15.7 | 103.2 | 97.5 | GF-6S | 14.3 | 105.9 | | P |
| LF-184 | 16.1 | 104.9 | 99.1 | GF-6S | 14.3 | 105.9 | | P |
| LF-185 | 15.5 | 104.5 | 98.7 | GF-6S | 14.3 | 105.9 | | P |
| LF-186 | 15.3 | 104.8 | 99.0 | GF-6S | 14.3 | 105.9 | | P |

Notes:

[1] Missing test numbers correspond to non-critical construction activities.

[2] Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

[3] Retest number for failing density tests.

## Table 4-3 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT CELL 1A

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent of Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-187 | 11.7 | 103.2 | 97.5 | GF-6S | 14.3 | 105.9 | | P |
| LF-188 | 12.5 | 101.7 | 96.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-189 | 15.8 | 102.1 | 96.4 | GF-6S | 14.3 | 105.9 | | P |
| LF-190 | 11.6 | 102.9 | 97.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-191 | 12.3 | 102.0 | 96.3 | GF-6S | 14.3 | 105.9 | | P |
| LF-192 | 9.9 | 102.4 | 96.7 | GF-6S | 14.3 | 105.9 | | P |
| LF-193 | 7.7 | 103.8 | 98.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-194 | 9.9 | 105.4 | 99.5 | GF-6S | 14.3 | 105.9 | | P |
| LF-195 | 10.8 | 106.5 | 100.6 | GF-6S | 14.3 | 105.9 | | P |
| LF-196 | 11.9 | 105.1 | 99.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-197 | 14.0 | 104.6 | 98.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-198 | 14.4 | 106.7 | 100.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-199 | 14.7 | 102.9 | 97.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-200 | 12.7 | 103.8 | 98.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-201 | 14.8 | 100.6 | 95.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-202 | 14.7 | 101.5 | 95.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-203 | 13.9 | 102.0 | 96.3 | GF-6S | 14.3 | 105.9 | | P |
| LF-204B | 15.6 | 100.7 | 95.1 | GF-6S | 14.3 | 105.9 | | P |
| LF-205B | 15.0 | 99.1 | 93.6 | GF-6S | 14.3 | 105.9 | LF-313 | F |
| LF-206B | 13.7 | 101.6 | 95.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-207B | 13.8 | 101.6 | 95.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-208B | 11.0 | 97.9 | 92.4 | GF-6S | 14.3 | 105.9 | LF-311 | F |
| LF-209B | 7.1 | 104.2 | 98.4 | GF-6S | 14.3 | 105.9 | | P |
| LF-210B | 11.1 | 100.7 | 95.1 | GF-6S | 14.3 | 105.9 | | P |
| LF-211B | 12.5 | 100.6 | 95.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-212B | 14.9 | 100.8 | 95.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-213 | 14.8 | 100.8 | 95.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-214 | 9.9 | 105.8 | 99.9 | GF-6S | 14.3 | 105.9 | | P |
| LF-253 | 11.8 | 105.5 | 101.7 | GF-7S | 14.9 | 103.7 | | P |
| LF-254 | 6.8 | 102.5 | 98.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-255 | 7.3 | 93.4 | 90.1 | GF-7S | 14.9 | 103.7 | LF-259 | F |
| LF-256 | 7.9 | 104.5 | 100.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-257 | 10.1 | 98.8 | 95.3 | GF-7S | 14.9 | 103.7 | | P |
| LF-258 | 14.9 | 101.5 | 97.9 | GF-7S | 14.9 | 103.7 | | P |
| LF-259 | 8.7 | 100.2 | 96.6 | GF-7S | 14.9 | 103.7 | | P |
| LF-260 | 8.3 | 100.9 | 97.3 | GF-7S | 14.9 | 103.7 | | P |
| LF-261 | 13.1 | 98.0 | 95.2 | GF-8S | 15.9 | 102.9 | | P |
| LF-262 | 8.6 | 99.4 | 96.6 | GF-8S | 15.9 | 102.9 | | P |
| LF-263 | 11.4 | 103.7 | 100.8 | GF-8S | 15.9 | 102.9 | | P |
| LF-264 | 9.2 | 98.8 | 96.0 | GF-8S | 15.9 | 102.9 | | P |

Notes:

[1] Missing test numbers correspond to non-critical construction activities.

[2] Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

[3] Retest number for failing density tests.

## Table 4-3 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT CELL 1A

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent of Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-296 | 7.4 | 107.4 | 101.4 | GF-6S | 14.3 | 105.9 | | P |
| LF-297 | 8.0 | 108.0 | 102.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-298 | 7.2 | 106.6 | 100.7 | GF-6S | 14.3 | 105.9 | | P |
| LF-299 | 6.6 | 107.0 | 101.0 | GF-6S | 14.3 | 105.9 | | P |
| LF-300 | 6.8 | 106.6 | 100.7 | GF-6S | 14.3 | 105.9 | | P |
| LF-301 | 6.1 | 106.2 | 100.3 | GF-6S | 14.3 | 105.9 | | P |
| LF-302 | 7.9 | 107.4 | 101.4 | GF-6S | 14.3 | 105.9 | | P |
| LF-303 | 6.9 | 106.1 | 100.2 | GF-6S | 14.3 | 105.9 | | P |
| LF-304 | 8.2 | 106.7 | 100.8 | GF-6S | 14.3 | 105.9 | | P |
| LF-305 | 8.7 | 107.7 | 101.7 | GF-6S | 14.3 | 105.9 | | P |
| LF-306 | 7.7 | 106.2 | 100.3 | GF-6S | 14.3 | 105.9 | | P |
| LF-307 | 13.0 | 100.4 | 96.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-308 | 11.6 | 104.0 | 100.3 | GF-7S | 14.9 | 103.7 | | P |
| LF-309 | 11.2 | 101.4 | 97.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-310 | 10.9 | 100.8 | 97.2 | GF-7S | 14.9 | 103.7 | | P |
| LF-311 | 12.8 | 101.5 | 97.9 | GF-7S | 14.9 | 103.7 | | P |
| LF-312 | 11.3 | 102.0 | 98.4 | GF-7S | 14.9 | 103.7 | | P |
| LF-313 | 10.6 | 103.9 | 100.2 | GF-7S | 14.9 | 103.7 | | P |
| LF-314 | 11.7 | 103.3 | 99.6 | GF-7S | 14.9 | 103.7 | | P |
| LF-315 | 11.0 | 102.4 | 98.7 | GF-7S | 14.9 | 103.7 | | P |
| LF-336 | 17.1 | 99.7 | 96.1 | GF-7S | 14.9 | 103.7 | | P |
| LF-337 | 7.5 | 99.3 | 95.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-338 | 14.8 | 99.2 | 95.7 | GF-7S | 14.9 | 103.7 | | P |
| LF-339 | 14.2 | 100.3 | 96.7 | GF-7S | 14.9 | 103.7 | | P |
| LF-340 | 15.9 | 98.9 | 95.4 | GF-7S | 14.9 | 103.7 | | P |
| LF-341 | 11.7 | 102.9 | 99.2 | GF-7S | 14.9 | 103.7 | | P |
| LF-342 | 16.9 | 99.3 | 95.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-343 | 10.1 | 106.6 | 102.8 | GF-7S | 14.9 | 103.7 | | P |
| LF-344 | 13.6 | 103.3 | 99.6 | GF-7S | 14.9 | 103.7 | | P |
| LF-345 | 10.3 | 102.8 | 99.1 | GF-7S | 14.9 | 103.7 | | P |
| LF-366 | 7.4 | 104.7 | 101.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-367 | 12.4 | 107.8 | 104.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-368 | 13.6 | 100.6 | 97.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-369 | 9.4 | 100.2 | 96.6 | GF-7S | 14.9 | 103.7 | | P |
| LF-370 | 7.3 | 104.4 | 100.7 | GF-7S | 14.9 | 103.7 | | P |
| LF-371 | 14.6 | 103.7 | 100.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-395 | 13.0 | 107.9 | 104.4 | GF-10S | 15.7 | 103.4 | | P |
| LF-396 | 9.6 | 100.4 | 97.1 | GF-10S | 15.7 | 103.4 | | P |
| LF-397 | 7.8 | 105.3 | 101.8 | GF-10S | 15.7 | 103.4 | | P |
| LF-398 | 9.5 | 101.3 | 98.0 | GF-10S | 15.7 | 103.4 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-3 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT CELL 1A

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent of Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-399 | 8.7 | 105.7 | 102.2 | GF-10S | 15.7 | 103.4 | | P |
| LF-400 | 6.4 | 101.2 | 97.9 | GF-10S | 15.7 | 103.4 | | P |
| LF-401 | 8.1 | 101.9 | 98.5 | GF-10S | 15.7 | 103.4 | | P |
| LF-402 | 9.2 | 102.6 | 99.2 | GF-10S | 15.7 | 103.4 | | P |
| LF-403 | 11.0 | 105.8 | 102.3 | GF-10S | 15.7 | 103.4 | | P |
| LF-404 | 9.0 | 105.4 | 101.9 | GF-10S | 15.7 | 103.4 | | P |
| LF-405 | 9.8 | 104.0 | 100.6 | GF-10S | 15.7 | 103.4 | | P |
| LF-406 | 10.1 | 105.8 | 102.3 | GF-10S | 15.7 | 103.4 | | P |
| LF-407 | 13.3 | 99.4 | 96.1 | GF-10S | 15.7 | 103.4 | | P |
| LF-408 | 10.2 | 102.6 | 99.2 | GF-10S | 15.7 | 103.4 | | P |
| LF-409 | 7.8 | 103.3 | 99.9 | GF-10S | 15.7 | 103.4 | | P |
| LF-410 | 12.4 | 100.8 | 97.5 | GF-10S | 15.7 | 103.4 | | P |
| LF-411 | 8.2 | 105.6 | 102.1 | GF-10S | 15.7 | 103.4 | | P |
| LF-412 | 16.9 | 100.9 | 97.6 | GF-10S | 15.7 | 103.4 | | P |
| LF-413 | 8.8 | 99.3 | 96.0 | GF-10S | 15.7 | 103.4 | | P |
| LF-414 | 7.5 | 100.3 | 97.0 | GF-10S | 15.7 | 103.4 | | P |
| LF-415 | 7.5 | 107.7 | 104.2 | GF-10S | 15.7 | 103.4 | | P |
| LF-416 | 10.6 | 100.7 | 97.4 | GF-10S | 15.7 | 103.4 | | P |
| LF-417 | 10.9 | 103.4 | 100.0 | GF-10S | 15.7 | 103.4 | | P |
| LF-418 | 11.7 | 106.4 | 102.9 | GF-10S | 15.7 | 103.4 | | P |
| LF-419 | 10.8 | 105.9 | 102.4 | GF-10S | 15.7 | 103.4 | | P |
| LF-420 | 8.1 | 98.2 | 95.0 | GF-10S | 15.7 | 103.4 | | P |
| LF-421 | 11.0 | 102.4 | 99.0 | GF-10S | 15.7 | 103.4 | | P |
| LF-422 | 12.6 | 100.8 | 97.5 | GF-10S | 15.7 | 103.4 | | P |
| LF-423 | 15.5 | 99.1 | 95.8 | GF-10S | 15.7 | 103.4 | | P |
| LF-424 | 8.3 | 103.5 | 100.1 | GF-10S | 15.7 | 103.4 | | P |
| LF-425 | 20.0 | 98.6 | 95.4 | GF-10S | 15.7 | 103.4 | | P |
| LF-426 | 11.7 | 104.0 | 100.6 | GF-10S | 15.7 | 103.4 | | P |
| LF-427 | 13.0 | 103.1 | 99.7 | GF-10S | 15.7 | 103.4 | | P |
| LF-428 | 17.6 | 98.7 | 95.5 | GF-10S | 15.7 | 103.4 | | P |
| LF-429 | 14.8 | 99.6 | 96.3 | GF-10S | 15.7 | 103.4 | | P |
| LF-430 | 15.0 | 101.2 | 97.9 | GF-10S | 15.7 | 103.4 | | P |
| LF-431 | 16.0 | 100.2 | 96.9 | GF-10S | 15.7 | 103.4 | | P |
| LF-432 | 16.8 | 100.6 | 97.3 | GF-10S | 15.7 | 103.4 | | P |
| LF-433 | 11.3 | 107.4 | 103.9 | GF-10S | 15.7 | 103.4 | | P |
| LF-434 | 16.7 | 98.7 | 95.5 | GF-10S | 15.7 | 103.4 | | P |
| LF-435 | 10.9 | 99.4 | 96.1 | GF-10S | 15.7 | 103.4 | | P |
| LF-436 | 16.1 | 97.4 | 94.2 | GF-10S | 15.7 | 103.4 | | F |
| LF-442 | 10.2 | 105.0 | 101.5 | GF-10S | 15.7 | 103.4 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

## Table 4-4

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT LEACHATE STORAGE AREA BERMS

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent of Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-493 | 15.7 | 101.6 | 98.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-494 | 12.3 | 104.3 | 100.6 | GF-7S | 14.9 | 103.7 | | P |
| LF-495 | 11.5 | 100.8 | 97.2 | GF-7S | 14.9 | 103.7 | | P |
| LF-496 | 19.2 | 98.5 | 95.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-497 | 13.7 | 99.0 | 95.5 | GF-7S | 14.9 | 103.7 | | P |
| LF-498 | 16.8 | 98.5 | 95.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-499 | 17.7 | 101.3 | 97.7 | GF-7S | 14.9 | 103.7 | | P |
| LF-500 | 12.4 | 105.8 | 102.0 | GF-7S | 14.9 | 103.7 | | P |
| LF-508B | 10.1 | 102.3 | 99.9 | GF-15S | 15.5 | 102.4 | | P |
| LF-509 | 13.6 | 102.3 | 99.9 | GF-15S | 15.5 | 102.4 | | P |
| LF-510 | 11.1 | 103.4 | 101.0 | GF-15S | 15.5 | 102.4 | | P |
| LF-511 | 15.1 | 100.6 | 98.2 | GF-15S | 15.5 | 102.4 | | P |
| LF-512 | 17.4 | 98.3 | 96.0 | GF-15S | 15.5 | 102.4 | | P |
| LF-513 | 11.2 | 99.6 | 97.3 | GF-15S | 15.5 | 102.4 | | P |
| LF-514 | 10.8 | 99.0 | 96.7 | GF-15S | 15.5 | 102.4 | | P |
| LF-515 | 7.5 | 105.6 | 103.1 | GF-15S | 15.5 | 102.4 | | P |
| LF-529 | 17.0 | 104.3 | 101.9 | GF-15S | 15.5 | 102.4 | | P |
| LF-530 | 10.6 | 104.0 | 101.6 | GF-15S | 15.5 | 102.4 | | P |
| LF-531 | 9.8 | 102.6 | 100.2 | GF-15S | 15.5 | 102.4 | | P |
| LF-532 | 14.0 | 102.0 | 99.6 | GF-15S | 15.5 | 102.4 | | P |
| LF-533 | 8.9 | 99.7 | 97.4 | GF-15S | 15.5 | 102.4 | | P |
| LF-534 | 13.1 | 106.0 | 103.5 | GF-15S | 15.5 | 102.4 | | P |
| LF-535 | 9.8 | 98.5 | 96.2 | GF-15S | 15.5 | 102.4 | | P |
| LF-536 | 10.8 | 107.0 | 104.5 | GF-15S | 15.5 | 102.4 | | P |
| LF-537 | 9.7 | 101.8 | 99.4 | GF-15S | 15.5 | 102.4 | | P |
| LF-538 | 19.2 | 97.9 | 95.6 | GF-15S | 15.5 | 102.4 | | P |
| LF-539 | 14.3 | 100.1 | 97.8 | GF-15S | 15.5 | 102.4 | | P |
| LF-540 | 18.5 | 100.3 | 97.9 | GF-15S | 15.5 | 102.4 | | P |
| LF-552 | 11.0 | 101.6 | 99.2 | GF-15S | 15.5 | 102.4 | | P |
| LF-553 | 13.6 | 103.3 | 100.9 | GF-15S | 15.5 | 102.4 | | P |
| LF-554 | 14.9 | 102.0 | 99.6 | GF-15S | 15.5 | 102.4 | | P |
| LF-555 | 11.2 | 100.2 | 97.9 | GF-15S | 15.5 | 102.4 | | P |
| LF-556 | 13.6 | 102.4 | 100.0 | GF-15S | 15.5 | 102.4 | | P |
| LF-557 | 16.5 | 97.7 | 95.4 | GF-15S | 15.5 | 102.4 | | P |
| LF-558 | 15.6 | 100.5 | 98.1 | GF-15S | 15.5 | 102.4 | | P |
| LF-559 | 16.6 | 100.0 | 97.7 | GF-15S | 15.5 | 102.4 | | P |
| LF-591 | 14.7 | 102.7 | 100.3 | GF-15S | 15.5 | 102.4 | | P |
| LF-592 | 14.9 | 101.3 | 98.9 | GF-15S | 15.5 | 102.4 | | P |
| LF-593 | 11.0 | 105.4 | 102.9 | GF-15S | 15.5 | 102.4 | | P |
| LF-594 | 19.1 | 99.7 | 97.4 | GF-15S | 15.5 | 102.4 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

Table 4-4 (continued)

## COMPACTION TEST RESULTS FOR GENERAL FILL USED TO CONSTRUCT LEACHATE STORAGE AREA PONDS

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 5 test per acre per lift or 1 test per 250 lf per lift | | 1 test per 25,000 $yd^3$ |

**TEST RESULTS**

| CQA Test No.[1] | Moisture Content (%) | Dry Unit Weight (pcf) | Percent of Compaction[2] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Retest No.[3] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| LF-595 | 10.0 | 105.2 | 102.7 | GF-15S | 15.5 | 102.4 | | P |
| LF-596 | 10.8 | 106.0 | 103.5 | GF-15S | 15.5 | 102.4 | | P |
| LF-597 | 11.0 | 103.2 | 100.8 | GF-15S | 15.5 | 102.4 | | P |
| LF-598 | 15.5 | 99.4 | 97.1 | GF-15S | 15.5 | 102.4 | | P |
| LF-599 | 14.7 | 103.5 | 101.1 | GF-15S | 15.5 | 102.4 | | P |
| LF-600 | 17.4 | 100.9 | 98.5 | GF-15S | 15.5 | 102.4 | | P |
| LF-601 | 11.4 | 102.7 | 100.3 | GF-15S | 15.5 | 102.4 | | P |
| LF-602 | 16.7 | 102.3 | 99.9 | GF-15S | 15.5 | 102.4 | | P |
| LF-603 | 15.9 | 101.3 | 98.9 | GF-15S | 15.5 | 102.4 | | P |
| LF-894 | 8.5 | 107.2 | 103.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-895 | 10.4 | 113.9 | 110.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-896 | 11.6 | 109.3 | 105.9 | GF-17S | 15.7 | 103.2 | | P |
| LF-897 | 9.7 | 108.1 | 104.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-989 | 9.9 | 110.1 | 106.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-899 | 15.9 | 105.7 | 102.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-900 | 15.0 | 103.0 | 99.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-901 | 10.1 | 109.8 | 106.4 | GF-17S | 15.7 | 103.2 | | P |
| LF-902 | 10.8 | 109.1 | 105.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-903 | 9.4 | 104.7 | 101.5 | GF-17S | 15.7 | 103.2 | | P |
| LF-904 | 10.5 | 103.0 | 99.8 | GF-17S | 15.7 | 103.2 | | P |
| LF-905 | 11.6 | 101.9 | 98.7 | GF-17S | 15.7 | 103.2 | | P |
| LF-906 | 11.5 | 103.2 | 100.0 | GF-17S | 15.7 | 103.2 | | P |

Notes:

1 Missing test numbers correspond to non-critical construction activities.

2 Required minimum percent compaction was 95% of Standard Proctor (ASTM D 698) maximum dry unit weight.

3 Retest number for failing density tests.

Table 4-5

## GRAIN SIZE ANALYSES AND USCS CLASSIFICATION FOR GENERAL FILL MATERIALS OBTAINED FROM BORROW AREA A

| | PARTICLE SIZE ANALYSIS | SOIL CLASSIFICATION |
|---|---|---|
| TEST STANDARD | ASTM D 422 | ASTM D 2847 |
| TESTING FREQUENCY | 1 test per 10,000 $yd^3$ | 1 test per 10,000 $yd^3$ |

**TEST RESULTS**

| Sample No. [2] | Soil Description | Percent Passing by Weight Through U.S. Standard Sieve | | | | | | Classification[1] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|---|
| | | No. 4 | No. 10 | No. 40 | No. 60 | No. 80 | No. 200 | | |
| ATL-1 | Brown & gray sand with trace silt | 100.0 | 99.7 | 95.5 | 77.7 | 44.7 | 4.8 | SP | P |
| ATL-2 | Dark brown & gray sand with trace silt | 100.0 | 99.9 | 97.7 | 85.2 | 50.1 | 5.1 | SP-SM | P |
| ATL-3 | Dark brown & gray sand with trace silt | 100.0 | 99.9 | 97.1 | 83.0 | 46.7 | 3.6 | SP | P |
| ATL-4 | Dark brown & gray sand with trace silt | 100.0 | 99.9 | 97.4 | 82.0 | 45.8 | 5.0 | SP | P |
| ATL-5 | Dark brown & gray sand with trace silt | 100.0 | 99.9 | 96.5 | 81.1 | 44.8 | 4.5 | SP | P |
| ATL-6 | Dark brown & gray sand with trace silt | 100.0 | 100.0 | 97.4 | 83.3 | 47.2 | 5.0 | SP | P |
| ATL-7 | Dark brown & gray sand with trace silt | 100.0 | 99.9 | 97.5 | 83.0 | 45.4 | 4.7 | SP | P |
| ATL-10 | Dark grayish brown | 100.0 | 100.0 | 97.5 | 80.8 | 43.9 | 3.7 | SP | P |
| ATL-11 | Dark brown & gray sand with trace silt and clay | 100.0 | 99.1 | 97.5 | 82.5 | 47.4 | 2.8 | SP | P |
| PB-03 | Medium brown silty sand | 100.0 | 100.0 | 96.0 | 75.0 | 53.0 | 4.0 | SP | P |
| PB-04 | Medium brown silty sand | 100.0 | 99.0 | 94.0 | 73.0 | 51.0 | 4.0 | SP | P |
| PB-05 | Medium brown silty sand | 100.0 | 100.0 | 95.0 | 70.0 | 49.0 | 4.0 | SP | P |
| PB-06 | Medium brown silty sand | 100.0 | 100.0 | 97.0 | 79.0 | 50.0 | 2.0 | SP | P |
| PB-07 | Medium brown silty sand | 100.0 | 100.0 | 96.0 | 80.0 | 50.0 | 2.0 | SP | P |
| PB-08 | Dark brown silty sand | 100.0 | 100.0 | 97.0 | 77.0 | 50.0 | 3.0 | SP | P |
| PB-09 | Dark brown silty sand | 100.0 | 100.0 | 98.0 | 80.0 | 45.0 | 1.0 | SP | P |
| PB-10 | Medium brown silty sand | 100.0 | 100.0 | 95.0 | 73.0 | 45.0 | 1.0 | SP | P |
| PB-11 | Medium brown silty sand | 100.0 | 99.0 | 91.0 | 57.0 | 26.0 | 1.0 | SP | P |

Notes:

[1] General fill material was required to classify as SW, SP, or SM.

[2] Samples "ATL" were tested by Atlantic Testing Laboratories, Inc.; Samples "PB" were tested in the on-site laboratory; and Samples "TP" were tested by Excel Geotechnical Testing as part of a soil investigation performed in the Borrow Area A during construction.

Table 4-5 (continued)

## GRAIN SIZE ANALYSES AND USCS CLASSIFICATION FOR GENERAL FILL MATERIALS OBTAINED FROM BORROW AREA A

| | PARTICLE SIZE ANALYSIS | SOIL CLASSIFICATION |
|---|---|---|
| TEST STANDARD | ASTM D 422 | ASTM D 2847 |
| TESTING FREQUENCY | 1 test per 10,000 $yd^3$ | 1 test per 10,000 $yd^3$ |

**TEST RESULTS**

| Sample No. [2] | Soil Description | Percent Passing by Weight Through U.S. Standard Sieve | | | | | | Classification[1] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|---|
| | | No. 4 | No. 10 | No. 40 | No. 60 | No. 80 | No. 200 | | |
| PB-12 | Medium brown silty sand | 100.0 | 100.0 | 96.0 | 74.0 | 40.0 | 5.0 | SP | P |
| PB-13 | Medium brown silty sand | 100.0 | 99.0 | 92.0 | 66.0 | 21.0 | 2.0 | SP | P |
| PB-14 | Medium brown silty sand | 100.0 | 100.0 | 92.5 | 59.0 | 30.0 | 3.0 | SP | P |
| PB-15 | Medium brown silty sand | 100.0 | 100.0 | 93.0 | 60.0 | 30.0 | 3.0 | SP | P |
| PB-16 | Dark brown silty sand | 100.0 | 100.0 | 92.0 | 58.0 | 27.0 | 4.0 | SP | P |
| PB-17 | Dark brown silty sand | 100.0 | 100.0 | 93.0 | 57.0 | 25.0 | 5.0 | SP | P |
| PB-18 | Dark brown silty sand | 100.0 | 100.0 | 93.0 | 54.0 | 26.0 | 3.0 | SP | P |
| PB-19 | Dark brown silty sand | 100.0 | 100.0 | 95.0 | 71.0 | 25.0 | 4.0 | SP | P |
| PB-20 | Light brown silty sand | 99.0 | 99.0 | 95.0 | 68.0 | 38.0 | 2.0 | SP | P |
| PB-21 | Light brown silty sand | 100.0 | 99.0 | 92.0 | 72.0 | 6.0 | 2.0 | SP | P |
| PB-22 | Light brown silty sand | 100.0 | 98.0 | 90.0 | 70.0 | 9.0 | 2.0 | SP | P |
| PB-23 | Light brown silty sand | 100.0 | 100.0 | 96.0 | 75.0 | 13.0 | 2.0 | SP | P |
| TP-1C | Brown silty fine sand | - | - | - | - | - | 7.4 | SP-SM | P |
| TP-1E | Light brown silty fine sand | - | - | - | - | - | 17.4 | SM | P |
| TP-3E | Dark brown slightly cemented silty fine sand | - | - | - | - | - | 15.7 | SM | P |
| TP-4A | Light grey to light brown silty fine sand | - | - | - | - | - | 12.7 | SM | P |
| TP-4D | Light brown silty fine sand | - | - | - | - | - | 7.9 | SP-SM | P |
| TP-5A | Light grey silty fine sand | - | - | - | - | - | 5.9 | SP-SM | P |
| TP-5C | Dark brown to black silty fine sand | - | - | - | - | - | 11.9 | SP-SM | P |

Notes:

[1] General fill material was required to classify as SW, SP, or SM.

[2] Samples "ATL" were tested by Atlantic Testing Laboratories, Inc.; Samples "PB" were tested in the on-site laboratory; and Samples "TP" were tested by Excel Geotechnical Testing as part of a soil investigation performed in the Borrow Area A during construction.

Table 4-5 (continued)

## GRAIN SIZE ANALYSES AND USCS CLASSIFICATION FOR GENERAL FILL MATERIALS OBTAINED FROM BORROW AREA A

| | PARTICLE SIZE ANALYSIS | SOIL CLASSIFICATION |
|---|---|---|
| **TEST STANDARD** | ASTM D 422 | ASTM D 2847 |
| **TESTING FREQUENCY** | 1 test per 10,000 $yd^3$ | 1 test per 10,000 $yd^3$ |

**TEST RESULTS**

| Sample No. [2] | Soil Description | Percent Passing by Weight Through U.S. Standard Sieve | | | | | | Classification[1] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|---|
| | | No. 4 | No. 10 | No. 40 | No. 60 | No. 80 | No. 200 | | |
| TP-7D | Brown silty fine sand | - | - | - | - | - | 8.5 | SP-SM | P |
| TP-7E | Light brown silty fine sand | 100.0 | 100.0 | 96.0 | 63.0 | 40.0 | 8.3 | SP-SM | P |
| TP-Comp 1 | Light grey to light brown silty fine sand | 100.0 | 100.0 | 98.0 | 83.0 | 55.0 | 3.0 | SP | P |
| TP-Comp 2 | Brown silty fine sand | 100.0 | 100.0 | 98.0 | 82.0 | 55.0 | 6.0 | SP-SM | P |
| TP-Comp 3 | Brown silty fine sand | 100.0 | 100.0 | 97.0 | 82.0 | 54.0 | 11.0 | SP-SM | P |

Notes:

[1] General fill material was required to classify as SW, SP, or SM.

[2] Samples "ATL" were tested by Atlantic Testing Laboratories, Inc.; Samples "PB" were tested in the on-site laboratory; and Samples "TP" were tested by Excel Geotechnical Testing as part of a soil investigation performed in the Borrow Area A during construction.

**Table 4-6**

**SAND CONE TESTS FOR GENERAL FILL**
**PERFORMED TO VERIFY NUCLEAR DENSITY TEST RESULTS**

| SAND CONE | | | NUCLEAR GAUGE | | | DIFFERENCE (Sand Cone - Nuclear) | |
|---|---|---|---|---|---|---|---|
| Test No. | Dry Unit Weight (pcf) ASTM D 1556 | Moisture Content (%) ASTM D 2216 | Test No. | Dry Unit Weight (pcf) ASTM D 2922 | Moisture Content (%) ASTM D 3017 | Dry Unit Weight (pcf) | Moisture Content (%) |
| SCT-1 | 104.6 | 8.4 | LF-366 | 104.7 | 7.4 | -0.1 | 1.0 |
| SCT-2 | 101.1 | 10.4 | AR-396 | 103.1 | 5.9 | -2.0 | 4.5 |
| SCT-3 | 97.6 | 14.8 | LF-382 | 101.2 | 12.3 | -3.6 | 2.5 |
| SCT-4 | 96.6 | 9.2 | LF-413 | 99.3 | 8.8 | -2.7 | 0.4 |
| SCT-5 | 98.7 | 11.8 | LF-469 | 98.0 | 11.7 | 0.7 | 0.1 |
| SCT-6 | 102.0 | 8.4 | LF-515 | 105.6 | 7.5 | -3.6 | 0.9 |
| SCT-7 | 102.7 | 14.4 | LF-614 | 105.5 | 13.7 | -2.8 | 0.7 |
| SCT-8 | 108.5 | 14.9 | LF-658 | 104.2 | 15.0 | 4.3 | -0.1 |
| SCT-9 | 101.2 | 15.3 | LF-871 | 100.1 | 17.5 | 1.1 | -2.2 |
| SCT-10 | 110.2 | 11.3 | HR-156 | 107.1 | 12.6 | 3.1 | -1.3 |
| SCT-11 | 107.8 | 10.0 | LF-1015 | 104.1 | 12.0 | 3.7 | -2.0 |
| SCT-12 | 102.9 | 16.0 | LF-1133 | 104.8 | 16.6 | -1.9 | -0.6 |
| SCT-13 | 100.5 | 14.2 | LF-1168 | 98.9 | 18.0 | 1.6 | -3.8 |
| SCT-14 | 101.4 | 9.4 | LF-1203 | 97.9 | 12.4 | 3.5 | -3.0 |
| SCT-15 | 97.3 | 17.8 | LF-1251 | 99.3 | 20.2 | -2.0 | -2.4 |
| SCT-16 | 109.7 | 10.3 | HR-734 | 107.6 | 12.2 | 2.1 | -1.9 |
| SCT-17 | 98.6 | 19.4 | LF-1498 | 99.4 | 20.3 | -0.8 | -0.9 |
| SCT-18 | 108.0 | 11.1 | LF-1583 | 105.4 | 12.7 | 2.6 | -1.6 |
| SCT-19 | 110.8 | 13.2 | LF-1603 | 108.8 | 9.4 | 2.0 | 3.8 |
| SCT-20 | 107.2 | 8.3 | LF-1625 | 106.3 | 8.7 | 0.9 | -0.4 |
| SCT-21 | 99.1 | 14.4 | LF-1641 | 101.1 | 17.3 | -2.0 | -2.9 |

## Table 4-7

## COMPACTION TEST RESULTS FOR LOW PERMEABILITY SOIL LAYER IN SUMP AREA OF CELLS

| | NUCLEAR GAUGE | | APPLICABLE STANDARD PROCTOR |
|---|---|---|---|
| | In-Situ Moisture | In-Situ Density | |
| **TEST STANDARD** | ASTM D 3017 | ASTM D 2922 | ASTM D 698 |
| **TESTING FREQUENCY** | 1 test per lift per cell sump | | |

**TEST RESULTS**

| Location | CQA Test No. | Moisture Content (%) | Dry Unit Weight (pcf) | Percent of Compaction[1] (%) | Sample ID | Optimum Moisture Content (%) | Maximum Dry Unit Weight (pcf) | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|
| Cell 1 Sump | LF-708 | 30.8 | 88.8 | 105.5 | CB-04 S | 34.8 | 84.2 | P |
| | LF-709 | 36.8 | 83.4 | 99.0 | CB-04 S | 34.8 | 84.2 | P |
| | LF-710 | 31.4 | 89.3 | 106.1 | CB-04 S | 34.8 | 84.2 | P |
| | LF-711 | 32.5 | 80.1 | 95.1 | CB-04 S | 34.8 | 84.2 | P |
| | LF-712 | 32.9 | 80.8 | 96.0 | CB-04 S | 34.8 | 84.2 | P |
| | LF-713 | 33.3 | 87.5 | 103.9 | CB-04 S | 34.8 | 84.2 | P |
| | LF-714 | 35.2 | 82.4 | 97.9 | CB-04 S | 34.8 | 84.2 | P |
| | LF-715 | 34.2 | 81.1 | 96.3 | CB-04 S | 34.8 | 84.2 | P |
| Cell 2 Sump | LF-1419 | 30.8 | 90.5 | 96.4 | CB-04N | 27.6 | 93.9 | P |
| | LF-1420 | 28.2 | 90.5 | 96.4 | CB-04N | 27.6 | 93.9 | P |
| Cell 3 Sump | LF-1360 | 28.9 | 91.5 | 97.4 | CB-04N | 27.6 | 93.9 | P |
| Cell 4 Sump | LF-882 | 34.2 | 80.4 | 95.5 | CB-04 S | 34.8 | 84.2 | P |
| | LF-883 | 30.5 | 81.4 | 96.7 | CB-04 S | 34.8 | 84.2 | P |
| | LF-884 | 32.6 | 82.5 | 98.0 | CB-04 S | 34.8 | 84.2 | P |
| | LF-885 | 35.0 | 81.0 | 96.2 | CB-04 S | 34.8 | 84.2 | P |
| | LF-886 | 30.6 | 85.6 | 101.7 | CB-04 S | 34.8 | 84.2 | P |
| | LF-887 | 31.0 | 89.1 | 105.8 | CB-04 S | 34.8 | 84.2 | P |
| Cell 5 Sump | LF-947 | 31.3 | 88.6 | 105.2 | CB-04 S | 34.8 | 84.2 | P |
| | LF-948 | 29.2 | 90.6 | 107.6 | CB-04 S | 34.8 | 84.2 | P |
| Cell 6 Sump | LF-1311 | 31.0 | 90.4 | 96.3 | CB-04N | 27.6 | 93.9 | P |
| | LF-1312 | 27.6 | 91.9 | 97.9 | CB-04N | 27.6 | 93.9 | P |
| | LF-1313 | 28.6 | 90.5 | 96.4 | CB-04N | 27.6 | 93.9 | P |
| | LF-1314 | 27.8 | 91.5 | 97.4 | CB-04N | 27.6 | 93.9 | P |

Note:

[1] Required minimum percent compaction was 95 percent of Standard Proctor maximum dry unit weight at a moisture content no more than 4 percent wet of the optimum moisture content.

## Table 4-8

## LABORATORY TEST RESULTS FOR LOW PERMEABILITY SOIL LAYER IN SUMP AREA OF CELLS 1 THROUGH 6

| | FINES CONTENT DETERMINATION | SOIL CLASSIFICATION | HYDRAULIC CONDUCTIVITY |
|---|---|---|---|
| **TEST STANDARD** | ASTM D 1140 | ASTM D 2487 | ASTM ASTM D 5084 |
| **TEST FREQUENCY** | 1 test per Cell | | 1 test per Cell |

**TEST RESULTS**

| Sample No.[1] | Fines Content (Passing No. 200 Sieve) (%) | Atterberg Limits | | | Soil Classification[2] | Hydraulic Conductivity[3] (cm/s) | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|
| | | LL | PL | PI | | | |
| ST-1 (Cell 1 Sump) | 54.5 | 81 | 20 | 61 | CH | $8.6 \times 10^{-9}$ | P |
| ST-2 (Cell 2 Sump) | 51.6 | 84 | 18 | 66 | CH | $1.5 \times 10^{-8}$ | P |
| ST-3 (Cell 3 Sump) | 50.6 | 80 | 22 | 58 | CH | $2.0 \times 10^{-8}$ | P |
| ST-4 (Cell 4 Sump) | 55.9 | - | - | - | CH | $2.2 \times 10^{-8}$ | P |
| ST-5 (Cell 5 Sump) | 48.6 | - | - | - | SC | $9.2 \times 10^{-8}$ | P |
| ST-6 (Cell 6 Sump) | 54.7 | 88 | 24 | 64 | CH | $4.5 \times 10^{-8}$ | P |
| CB-04 N[4] (Borrow Source) | 68.9 | 93 | 25 | 68 | CH | $1.3 \times 10^{-8}$ | P |
| CB-04 S[4] (Borrow Source) | 74.2 | 106 | 29 | 77 | CH | $1.1 \times 10^{-8}$ | P |

Notes:

[1] Tests performed by Excel Geotechnical Testing (EGT).

[2] CL or CH soils in accordance with USCS were required.

[3] Required hydraulic conductivity was less than or equal to $1.0 \times 10^{-7}$ cm/sec at confining stress of 20 psi.

[4] Conformance tests performed during identification of borrow area for low-permeability soils.

## Table 4-9

## LABORATORY TEST RESULTS FOR LINER PROTECTIVE LAYER SOIL

| | FINES CONTENT | SOIL CLASSIFICATION | HYDRAULIC CONDUCTIVITY | |
|---|---|---|---|---|
| **TEST STANDARD** | ASTM D 1140 | ASTM D 2487 | ASTM D 2434 | |
| **TESTING FREQUENCY** | 1 test per 2,000 $yd^3$ | 1 test per 2,000 $yd^3$ | 1 test per 3,000 $yd^3$ | |
| **TEST RESULTS** | | | | |
| Sample ID[1] | Fines Content Passing No. 200 Sieve (%) | Soil Classification[2] | Hydraulic Conductivity[3] (cm/sec) | Pass/Fail (P/F) |
| PC-01 | - | - | $6.9X10^{-3}$ | P |
| PC-02 | - | - | $4.7x10^{-3}$ | P |
| PC-03 | 7 | SP-SM | $8.0x10^{-3}$ | P |
| PC-04 | 3 | SP | $7.3x10^{-3}$ | P |
| PC-05 | 2 | SP | $8.9x10^{-3}$ | P |
| PC-06 | 2 | SP | $6.7x10^{-3}$ | P |
| PC-07 | 2 | SP | $7.6x10^{-3}$ | P |
| PC-08 | 6 | SP-SM | $5.1x10^{-3}$ | P |
| PC-09 | 2 | SP | $6.9x10^{-3}$ | P |
| PC-10 | 1 | SP | $7.1x10^{-3}$ | P |
| PC-11 | 4 | SP | $4.2x10^{-3}$ | P |
| PC-12 | 2 | SP | $7.1x10^{-3}$ | P |
| PC-13 | 11 | SP-SM | $4.9x10^{-3}$ | P |
| PC-14 | 1 | SP | $5.7x10^{-3}$ | P |
| PC-15 | 1 | SP | - | P |
| PC-16 | 0 | SP | - | P |
| PC-17 | 9 | SP-SM | $5.3x10^{-3}$ | P |
| PC-18 | 3 | SP | - | P |
| PC-19 | 2 | SP | - | P |
| PC-20 | 4 | SP | - | P |
| PC-21 | 9 | SP-SM | $4.3x10^{-3}$ | P |
| PC-22 | 1 | SP | - | P |
| PC-23 | 2 | SP | - | P |
| PC-24 | 1 | SP | - | P |
| PC-25 | 2 | SP | - | P |
| LP-01 | 9 | SP-SM | $8.3x10^{-3}$ | P |
| LP-02 | 2 | SP | $7.5x10^{-3}$ | P |
| LP-03 | 3 | SP | - | P |
| LP-04 | 4 | SP | - | P |

Notes:

[1] Samples "PC" and "LP" correspond to liner protective layer soils from Cell 1A and leachate storage area, respectively.

[2] Liner protective layer material was required to classify as SW or SP.

[3] Required hydraulic conductivity was greater than or equal to $1.0x10^{-3}$ cm/sec.

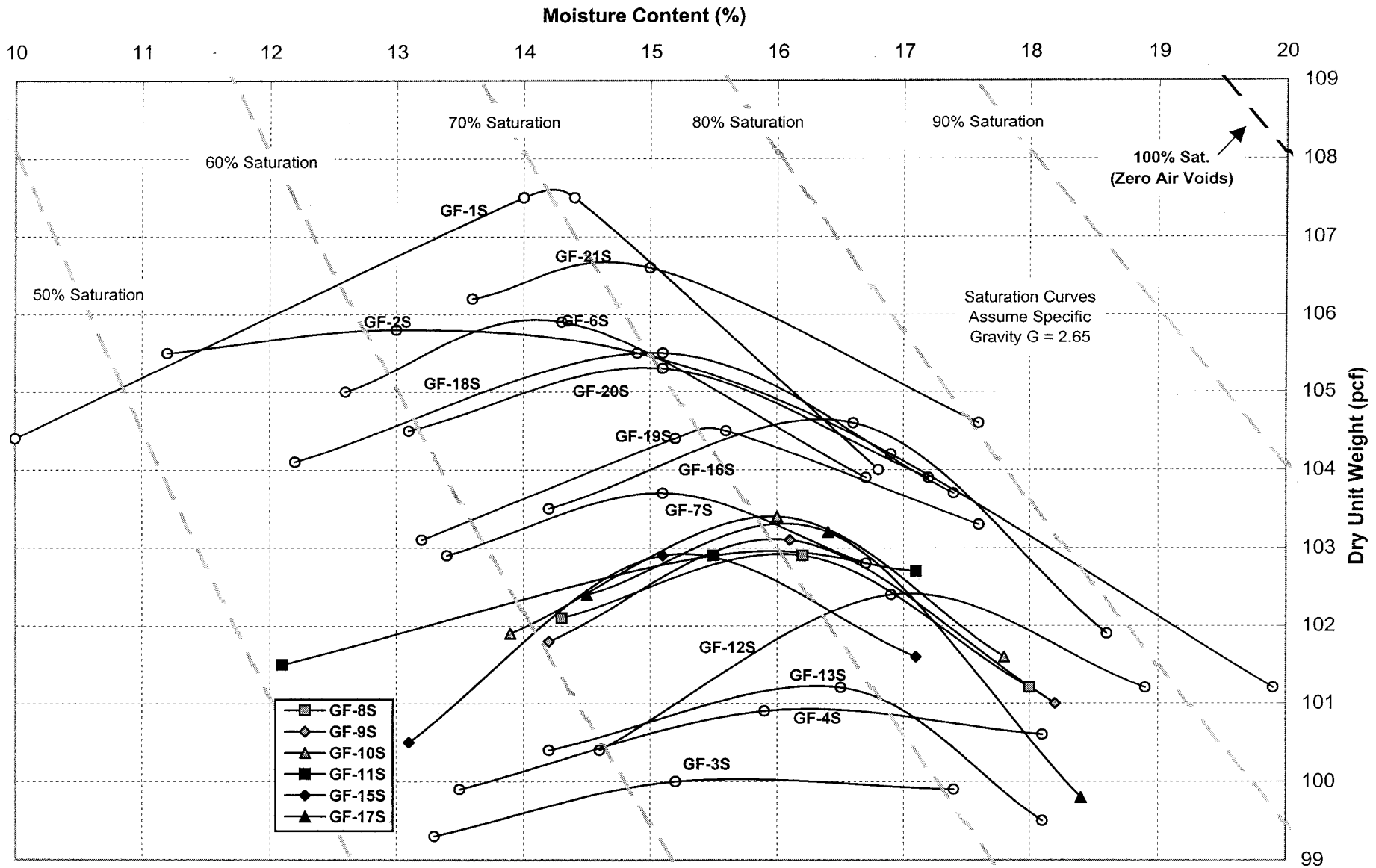


**Figure 4-1: Standard Proctor Test Results for General Fill**

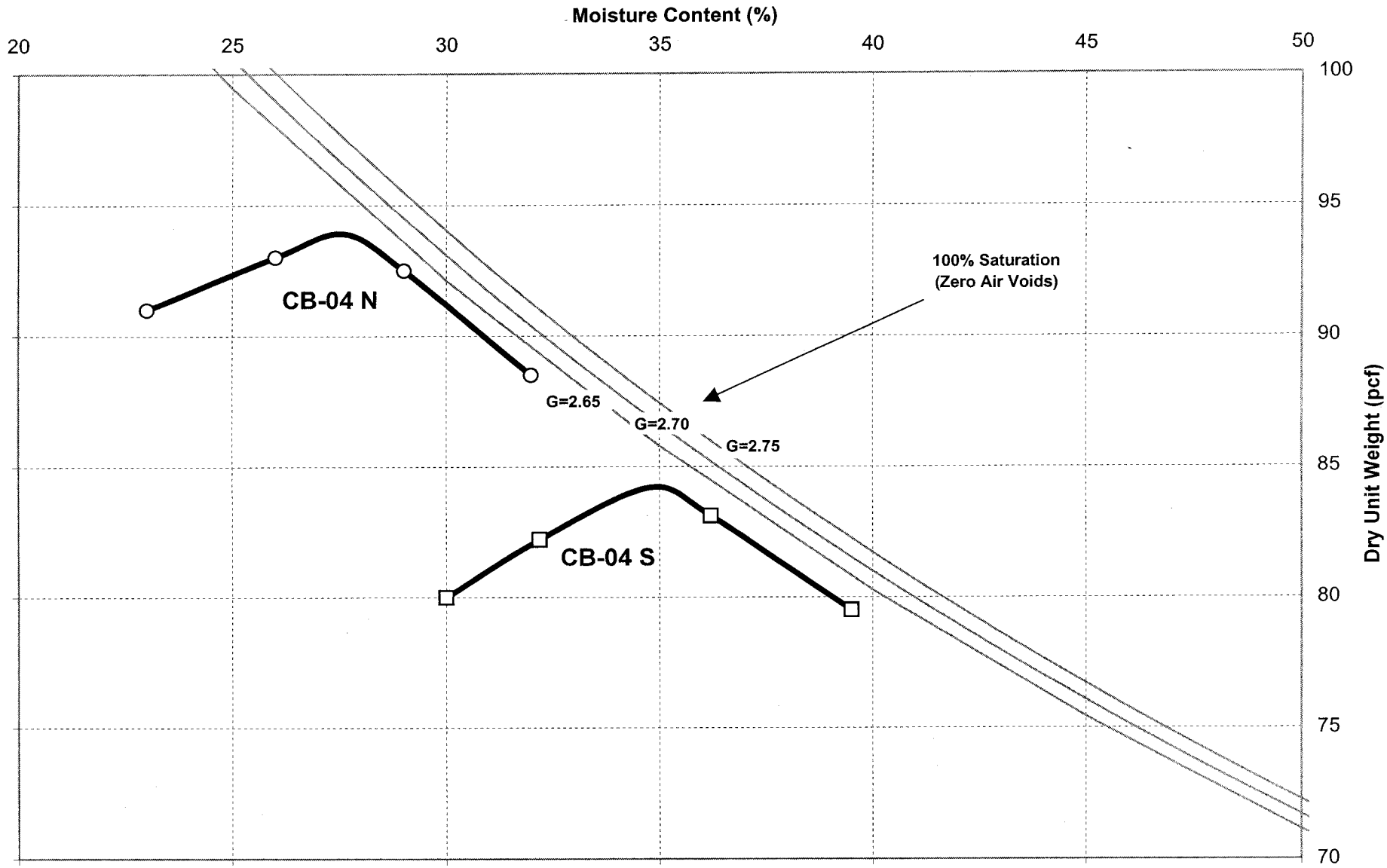


**Figure 4-2: Standard Proctor Test Results for Low-Permeability Soil**

# 5. CONSTRUCTION QUALITY ASSURANCE - GEOSYNTHETICS

## 5.1 General

GeoSyntec monitored the installation of the geosynthetic components of the double composite liner system in Cell 1A and the leachate storage area, as described in Section 2. At times, several liner system installation operations were conducted simultaneously during OHDF construction. When this occurred, the on-site CQA personnel monitored the operations that were considered most critical to the performance of the liner systems.

## 5.2 CQA of Geosynthetic Clay Liner

### 5.2.1 Conformance Testing and Documentation

A geosynthetic clay liner (GCL) was used in construction of the liner systems in Cell 1A and the leachate storage area. The Thermal Lock NWL-35 GCL used was manufactured by Bentofix Technologies, Inc. (Bentofix) in Barrie, Ontario, Canada. The GCL conformance samples were collected, from the rolls produced for the project, by Texas Research Institute (TRI) (an independent contractor authorized to collect samples for CQA testing) at Bentofix's manufacturing plant. TRI also performed the CQA conformance testing in accordance with the CQA Documents on the samples of GCL collected.

The MQC certificates and test results and the CQA conformance test results were reviewed by CQA personnel and were found to be in compliance with the CQA Documents. The results of the MQC and CQA conformance tests are summarized in Table 5-1. Table 5-1 also indicates the tests that were conducted, the required test frequencies, and the acceptance criteria in accordance with the CQA Documents.

It is noted that Table 5-1 is organized with respect to the GCL lot numbers and indicates the roll numbers in each lot of GCL that were sampled and tested as part of the MQC and CQA conformance testing. Each sheet of Table 5-1 also presents the total number of rolls (and square footage) of the GCL received from the respective lot number and also the cumulative number of rolls (and square footage) of the GCL received for the project (to evaluate the MQC and CQA test frequencies for each lot and for the project).

A total of 13 CQA conformance samples were tested for 1,860,000 square feet ($ft^2$) of GCL delivered to the site for installation in Cell 1A, Cell 1B, and the leachate storage area. The CQA test frequency of 1 test per 143,000 $ft^2$ of GCL exceeded the minimum testing frequency of 1 test per 200,000 $ft^2$ required by the CQA Documents. As noted in Table 5-1, a minimum of one conformance sample was tested during CQA from each lot of GCL supplied for the project.

To evaluate the influence of leachate on the hydraulic conductivity of GCL, a sample from Roll # 86967 (Lot # 23092319) was tested using deionized water and leachate from St. Cloud Landfill (a similar solid waste landfill currently being used by City of St. Cloud in Osceola County) as permeant fluids during MQC testing. As noted in Table 5-1, the measured hydraulic conductivity of GCL with leachate as the permeant fluid was an order of magnitude lower than the measured hydraulic conductivity of GCL with deionized water as the permeant fluid. As a result, remaining MQC and CQA conformance tests were performed using water as the permeant fluid to avoid collection, handling, and transportation of leachate.

### 5.2.2 Field Monitoring Activities

#### 5.2.2.1 Delivery and On-Site Storage

Upon delivery, GCL rolls were unloaded in an area located east of the Cell 1A construction area (i.e., in future Cell 2 footprint), stacked on a 1.5-ft high berm, and covered with a plastic sheets. The rolls were typically transported on site by a tractor with a special lifting attachment. CQA personnel periodically monitored the installer's delivery, unloading, and storage procedures and observed that the GCL was handled in an appropriate manner. The CQA personnel also compared the roll numbers of the GCL rolls delivered to the manufacturer's bill of lading. An inventory of the rolls delivered for the project was maintained by the CQA personnel and is available upon request. This inventory also includes the rolls that were approved for installation based on MQC and CQA test results and the rolls that were used during construction of Cell 1A and the leachate storage area. Only approved rolls were incorporated into the work.

#### 5.2.2.2 Deployment

Prior to GCL deployment, the installer signed certificates of acceptance for the liner subbase, which are not included in the report but are available upon request. The GCL rolls were lifted using a spreader bar attached to a tractor. The panels were positioned using laborers assisted by a track-mounted, low-ground pressure, all-terrain vehicle (ATV).

CQA personnel monitored the deployment of the GCL rolls. During deployment, the CQA personnel checked for the following:

- manufacturing defects;
- damage that may have occurred during shipment, storage, and handling; and
- damage resulting from installation activities.

If any materials were observed to be damaged, the installer was notified and the damaged materials were either discarded or repaired. CQA personnel observed repair locations to verify conformance with the requirements of the CQA Documents.

CQA personnel also periodically monitored the deployment of the GCL as well as its condition after installation to ensure that the installer followed the following procedures:

- the GCL was unrolled and placed in a manner which kept the GCL in sufficient tension to avoid excessive wrinkling and was securely anchored in the anchor trench or ballasted with sand bags;
- the rolls were deployed with the non heat-treated, non-woven geotextile in contact with the geomembrane;
- adjacent GCL panels were overlapped a minimum of 6 inches along the length of the panels and 12 inches along the width of the panels; and
- granular bentonite was added between overlap areas;
- measures were taken to keep the GCL free of contamination and protected from premature hydration; and
- geomembrane installation immediately followed installation of the GCL.

Any observed holes or tears in the GCL were repaired by the installer by placing a patch of the same material over the hole or tear and at a distance of at least 1 ft beyond the edges of the hole or tear. In areas where premature hydration of the GCL was detected, the GCL was removed and replaced with new material.

## 5.3 CQA of Textured Geomembrane

### 5.3.1 Conformance Testing and Documentation

A 60-mil textured geomembrane was installed as primary and secondary liners in Cell 1A and the leachate storage area. The 60-mil textured geomembrane liner HDT 060A000 was supplied by GSE Lining Technologies, Inc. (GSE) in Houston, Texas. Conformance samples for textured geomembrane were collected (from the rolls produced for the project) by TRI at GSE's manufacturing plant in Houston Texas. TRI also performed the CQA conformance testing in accordance with the CQA Documents on the samples of textured geomembrane collected.

The MQC certificates and test results and the CQA conformance test results were reviewed by CQA personnel and were found to be in compliance with the CQA

Documents. The results of the MQC and CQA conformance tests are summarized in Table 5-2. Table 5-2 also indicates the tests that were conducted, the required test frequencies, and the acceptance criteria in accordance with the CQA Documents.

It is noted that Table 5-2 is organized with respect to the resin lot numbers and indicates the roll numbers from each resin lot that were sampled and tested as part of the MQC and CQA conformance testing. Each sheet of Table 5-2 also presents the total number of rolls (and square footage) of the textured geomembrane received from the respective resin lot number and the cumulative number of rolls (and square footage) of the textured geomembrane received for the project (to evaluate the MQC and CQA test frequencies for each lot and for the project).

A total of 21 CQA conformance samples were tested for approximately 2,021,000 $ft^2$ of textured geomembrane delivered to the site for installation in Cell 1A, Cell 1B, and the leachate storage area. The CQA test frequency of 1 test per 96,000 $ft^2$ for the textured geomembrane exceeded the minimum frequency of 1 test per 100,000 $ft^2$ required by the CQA Documents. As noted in Table 5-2, a minimum of one conformance sample was tested during CQA from each resin lot supplied for the project.

### 5.3.2 Field Monitoring Activities

#### 5.3.2.1 Delivery and On-Site Storage

Upon delivery to the site, geomembrane rolls were stored in an area located east of the Cell 1A construction area (i.e., in future Cell 2 footprint) and stacked on HDPE perforated pipes. The rolls were typically transported by a tractor with a special lifting attachment. CQA personnel periodically monitored the installer's delivery, unloading, and storage procedures to ensure that the material was handled in an appropriate manner. The CQA personnel also compared the roll numbers of the geomembrane rolls delivered to the manufacturer's bill of lading. An inventory of the rolls delivered for the project was maintained by the CQA personnel and is available upon request. This inventory also includes the rolls that were approved for installation based on MQC and CQA test results and the rolls that were used during construction of Cell 1A and leachate storage area. Only approved rolls were incorporated into the work.

#### 5.3.2.2 Deployment

The geomembrane rolls were lifted using a spreader bar attached to a tractor. The panels were positioned using laborers assisted by a track-mounted, low-ground pressure, ATV.

CQA personnel monitored the deployment of each geomembrane panel. During deployment, the CQA personnel checked for the following:

- manufacturing defects;
- damage that may have occurred during shipment, storage, and handling; and
- damage resulting from installation activities, including damage as a consequence of panel placement, seaming operations, or weather.

If any materials were observed to be damaged or deficient, the installer was notified and the damaged materials were either discarded or repaired. CQA personnel observed and documented the repair locations to verify compliance with the CQA Documents. Details of the geomembrane panel placement were recorded by CQA personnel on panel placement logs, which are not included in the report but are available upon request. Panel and repair locations are indicated on the Record Drawings included in Appendix A for the primary and secondary liners in Cell 1A and the leachate storage area.

5.3.2.3 Trial Seams

Prior to production seaming, the installer prepared geomembrane trial seams for each technician using each piece of seaming equipment. Additional trial seams were prepared every four to five hours. CQA personnel evaluated the trial seams as follows:

- trial seams were welded under similar conditions as production seaming;
- test strips were cut from the trial seams at random locations with a die press;
- three test strips were tested using a field tensiometer and compared to the passing criteria for the tests, which were as follows:

Fusion

- *Peel tests* - a minimum bonded seam strength of 78 lb/in.; and
- *Shear test* - a minimum bonded seam strength of 120 lb/in.

Extrusion

- *Peel test* - a minimum bonded seam strength of 70 lb/in.; and
- *Shear test* - a minimum bonded seam strength of 108 lb/in.

A total of 167 trial seams were observed by CQA personnel during OHDF construction; 112 trial seams were made using double-track fusion (i.e., hot wedge) welders and 55 were made using extrusion welders. If trial welds failed, the machine or welding process was adjusted and a new trial seam was made. The new sample was tested to ensure compliance with the above strength requirements. The procedure was repeated, as needed, until passing results were obtained.

Trial seam samples were not archived. Details of the trial seams, including the trial seam test results, are not included in the report but are available upon request.

5.3.2.4 Production Seams

Geomembrane production seaming operations were monitored by CQA personnel. The majority of the geomembrane production seams were fabricated using double-track fusion welders. Seam repairs were made using hand-held extrusion welders. Rub sheets were periodically used during production seaming to provide a clean surface to weld over. During or after fabrication, the geomembrane seams were visually examined for workmanship and continuity. Geomembrane seaming logs are not included in the report but are available upon request.

### 5.3.3 Nondestructive Seam Testing

5.3.3.1 Scope

Nondestructive testing of geomembrane seams was periodically monitored by CQA personnel. All geomembrane seams were nondestructively tested for continuity by the installer using the air pressure procedure for double-track fusion seams and the vacuum-box test procedure for extrusion welded seams. Failed air pressure seams, if applicable, were capped and then retested using vacuum-box test methods after determining the failed seam length. Leaks identified using the vacuum-box method were repaired and retested as described in Section 5.3.5.

5.3.3.2 Air Pressure Testing

Accessible double-track fusion seams were nondestructively tested using the air pressure test. The procedure used by the installer for air pressure testing was as follows:

- visually observe the integrity of the annulus of the section of seam being tested and isolating the section by sealing the ends using heat and pressure;
- insert the needle of a pressure test apparatus into the annulus at one end of the seam;

- inflate the annulus to a gauge pressure of a minimum 25 psi with an air pump and maintain the gauge pressure for at least 5 minutes;
- repair faulty area in accordance with Section 5.3.5 if the pressure loss exceeds 3 psi or if the pressure does not stabilize; and
- confirm airflow through the entire annulus by releasing the air from the seam at the opposite end from where the needle was inserted.

5.3.3.3 Vacuum-Box Testing

The vacuum-box was used by the installer to nondestructively test extrusion seams and repairs. The procedure used by the installer for vacuum testing was as follows:

- wet a strip of seam with a soapy solution;
- place the vacuum-box assembly over the wetted area, close the bleed valve and open the vacuum valve;
- force the box onto the sheet until a vacuum is observed;
- examine the seam through the viewing window for a period of approximately 20 seconds for the occurrence of air bubbles;
- remove the assembly and continue the process over the entire length of the seam; and
- record the location of any leaks.

Table 5-3 contains a summary of the nondestructive tests performed for the textured geomembrane seams. Table 5-3A presents nondestructive seam test results for primary liner in Cell 1A. Table 5-3B presents nondestructive seam test results for secondary liner in Cell 1A. Table 5-3C presents nondestructive seam test results for primary and secondary liners in the leachate storage area. If nondestructive testing indicated that repairs were necessary, repairs were made in accordance with procedures presented in Section 5.3.5. All repairs were tested using the vacuum-box test procedure.

### 5.3.4 Destructive Seam Sample Testing

5.3.4.1 Scope

In accordance with the CQA Documents, CQA personnel identified and collected geomembrane seam samples for destructive testing. The samples were tested by the CQA personnel in the on-site geosynthetics laboratory.

For a destructive seam sample to be considered as passing, the seam strength criteria described in Section 5.3.2.3 had to be met for at least four out of the five test specimens obtained from the sample. In addition, if one non-FTB failure was observed, the average of the five test specimens had to meet the specified strength criterion.

5.3.4.2 Sampling Procedures

Prior to the removal of the full seam sample, two geomembrane test strips were taken by the installer from either end of the proposed destructive sample. Each strip was peel-tested in the field. If the peel samples exhibited passing results, the adjacent destructive seam sample was removed and tested. At each destructive seam sample location, a test sample measuring approximately 12 in. across the seam and 42 in. along the seam, was obtained. The sample was divided into three pieces and distributed to: (i) the on-site geosynthetics laboratory for testing, (ii) the installer, and (iii) the owner as an archive sample.

5.3.4.3 Test Results

On-site laboratory testing of geomembrane seam samples was performed in accordance with the CQA Documents. At the on-site geosynthetics laboratory, five 1-in wide test specimens were removed from the destructive seam sample using a die press. On a calibrated tensiometer, five test specimens were peel-tested for adhesion strength. For fusion seams, peel tests were performed on both the bottom (inside track) and top (outside track) peels. Additionally, five specimens were tested for shear strength. The seam acceptance/rejection criteria described in Sections 5.3.2.3 and 5.3.4.1 were used to evaluate the destructive seam samples.

The destructive seam test results are summarized in Table 5-4. The destructive seam test results for primary and secondary liners installed in Cell 1A are presented in Tables 5-4A and 5-4B, respectively. For primary liner installed in Cell 1A, 61 destructive seam samples were tested for a total seam length of 25,000 ft (approx.). This corresponds to an approximate sample frequency of 1 per 400 lf of seam. For secondary liner installed in Cell 1A, 52 destructive seam samples were tested for a total seam length of 23,000 ft (approx.). This corresponds to an approximate sample frequency of 1 per 450 lf of seam.

The destructive seam test results for primary and secondary liners installed in the leachate storage area are presented in Table 5-4C. For primary liner installed in the leachate storage area, 11 destructive seam samples were tested for a total seam length of 5,500 ft (approx.). This corresponds to an approximate sample frequency of 1 per 500 lf of seam. For secondary liner installed in the leachate storage area, 12 destructive seam samples were tested for a total seam length of 4,700 ft (approx.). This corresponds to an approximate sample frequency of 1 per 400 lf of seam. As noted, the destructive seam test frequencies met or exceeded the minimum frequency of 1 per 500 lf of production seams required by the CQA Documents.

As part of destructive seam testing of geomembranes during CQA, a total of 136 destruct sample were tested. Out of all the seam samples tested destructively, 5 failed to meet the required criteria. For the failed samples, additional test strips were taken from the seam at locations approximately 10 ft from each side of the failing sample location. If the additional test strips had passing results, full destructive seam sample was collected. If the samples did not pass, test strips were obtained at another location approximately 10 ft further from the failure and the procedure was repeated until passing samples were obtained and the failing area was localized. These destructive seam samples were tested in accordance with procedures described previously in this section. Once the limits of the failing seam were evaluated, the entire seam length between the passing samples was repaired by the procedures described in Section 5.3.5.

### 5.3.5 Geomembrane Repairs

The repair procedures presented in this subsection were used by the installer to patch holes and tears, spot-extrude impact damage or other minor defects, and for grinding and extrusion welding small sections of failed fusion seams (if the exposed edge was accessible). In the cases where patches or caps were used to repair the damaged geomembrane (i.e., small holes, tears, or on seams which failed nondestructive or destructive testing), an approximately 12-in. wide capping strip was used.

During the repair or panel tie-in operations, the following procedures were implemented:

- technicians and seaming equipments used were required to pass trial welds;
- patches or caps extended at least 6 in. beyond the edge of the defect and all corners were rounded; and
- repairs were tested using vacuum box and visually observed for continuity.

Seam and panel repair logs prepared by GeoSyntec during CQA are not included in the report but are available upon request. Record drawings illustrating layout of panels and the location of seams and repairs are included in Appendix A.

## 5.4 CQA of Smooth Geomembrane

A 60-mil smooth geomembrane was used only to construct the four flexible storage containers in the leachate storage area. The 60-mil smooth geomembrane HDE 060A000 was supplied by GSE. Conformance samples for smooth geomembrane were collected (from the rolls produced for the project) by TRI at GSE's manufacturing plant in Houston Texas. TRI also performed the CQA conformance testing on the samples of the smooth geomembrane collected.

The MQC certificates and test results and the CQA conformance test results were reviewed by CQA personnel and were found to be in compliance with the CQA Documents. The results of the MQC and CQA conformance tests are summarized in Table 5-5. Table 5-5 includes the test that were conducted, the required test frequencies, and the acceptance criteria in accordance with the CQA Documents. Table 5-5 also presents the total number of rolls (and square footage) of the smooth geomembrane received for the project to evaluate the MQC and CQA test frequencies.

A total of 3 CQA conformance samples were tested for approximately 202,000 $ft^2$ of smooth geomembrane delivered to the site for use in the construction of the four flexible storage containers in the leachate storage area. The CQA test frequency of 1 test per 67,000 $ft^2$ (approx.) of smooth geomembrane exceeded the minimum frequency of 1 test per 100,000 $ft^2$ required by the CQA Documents.

All smooth geomembrane seams were nondestructively tested using the air pressure or the vacuum-box test procedure as discussed in Section 5.3.3. Table 5-6 summarizes the nondestructive tests performed for the smooth geomembrane seams. If nondestructive testing indicated that repairs were necessary, repairs were made in accordance with procedures presented in Section 5.3.5. All repairs were tested using the vacuum-box test procedure.

The destructive seam tests for the smooth geomembrane were performed in accordance with Section 5.3.4 and are summarized in Table 5-7. As noted, 10 destructive seam samples were tested for a total seam length of 4,000 ft (approx.). This corresponds to an approximate sample frequency of 1 per 400 lf of seam, which exceeds the minimum sample frequency of 1 per 500 lf of production seams required by the CQA Documents.

## 5.5 CQA of Primary Geocomposite

### 5.5.1 Conformance Testing and Documentation

A tri-planar geocomposite was used as the primary drainage geocomposite in the double composite liner system in Cell 1A. The primary geocomposite used was Tendrain 7100-2 manufactured by the Tenax Corporation (Tenax) in Baltimore, Maryland. The primary geocomposite conformance samples were collected (from the rolls produced for the project) by TRI at the Tenax's manufacturing plant in Evergreen, Alabama. TRI also performed the CQA conformance testing on the samples of primary geocomposite collected.

The MQC certificates and test results and the CQA conformance test results were reviewed by CQA personnel and were found to be in compliance with the CQA Documents. The results of the MQC and CQA conformance tests are summarized in Tables 5-8A, 5-8B, and 5-8C. Table 5-8A presents the CQA and MQC test results for the primary geocomposite rolls produced for the project. Table 5-8B presents the MQC test results for the geotextile rolls used to manufacture the primary geocomposite rolls produced for the project. Table 5-8C presents the MQC test results for the geonet rolls used to manufacture the primary geocomposite rolls for the project.

Table 5-8A presents the CQA and MQC test results for the primary geocomposite rolls and CQA test results for the geotextile component of the primary geocomposite. Table 5-8A also indicates the tests that were conducted, the required test frequencies, and the acceptance criteria in accordance with the CQA Documents. A total of 5 CQA conformance samples were tested for approximately 895,000 $ft^2$ of primary geocomposite approved for installation in Cells 1A and 1B. The CQA test frequency of 1 test per 179,000 $ft^2$ (approx.) of the primary geocomposite exceeded the minimum frequency of 1 test per 200,000 $ft^2$ required by the CQA Documents. As noted in Table 5-8A, a minimum of one conformance sample was tested during CQA from each geocomposite lot.

It is noted that during CQA and MQC testing, the transmissivity of the primary geocomposite was measured under compressive stresses of 500 psf and 13,500 psf for 100 hours. The tests were performed with the primary geocomposite sandwiched between 60-mil textured geomembrane and the soil actually used in the liner protective layer. The transmissivity of the primary geocomposite reported in Table 5-8A is the minimum transmissivity measured during the 100-hour test.

As noted in Table 5-8A, the transmissivity measured under compressive stress of 500 psf for the primary geocomposite Roll # 3506561 (PGC-3) marginally failed to meet the specified requirement. As a result, additional tests were performed to bracket the failing roll which included testing rolls on either side of the failing roll until results meeting the

specified requirements were obtained. Four rolls between the passing rolls (3506560 and 3506565) were rejected and not used for the project.

Table 5-8B presents the MQC test results for the geotextile component of the primary geocomposite rolls approved for the project. Several rolls of primary geocomposite were manufactured from the same roll of geotextile. Approximately 1,790,000 $ft^2$ of geotextile was used to manufacture the primary geocomposite rolls for the project. As part of the MQC testing, 27 geotextile rolls were tested for mass per unit area, grab strength, trapezoidal tear strength, and puncture strength. Apparent opening size and permittivity tests were also performed on 16 of these 27 geotextile samples. The approximate MQC test frequency of 1 test per 66,000 $ft^2$ (or 112,000 $ft^2$) for the geotextile component of the primary geocomposite exceeded the minimum frequency of 1 test per 100,000 $ft^2$ (or 250,000 $ft^2$) required by the CQA Documents for the respective tests.

Table 5-8C presents the MQC test results for the geonet component of the primary geocomposite rolls approved for the project. Several rolls of primary geocomposite were manufactured from the same roll of geonet. Thirty two geonet rolls were tested for approximately 895,000 $ft^2$ of geonet used to manufacture the primary geocomposite rolls for the project. The MQC test frequency of 1 test per 28,000 $ft^2$ (approx.) for the geonet component of the primary geocomposite exceeded the minimum frequency of 1 test per 100,000 $ft^2$ required by the CQA Documents.

### 5.5.2 Field Monitoring Activities

#### 5.5.2.1 Delivery and On-Site Storage

Upon delivery to the site, primary geocomposite rolls were stored in an area located east of the Cell 1A construction area (i.e., in future Cell 2 footprint) and stacked on HDPE perforated pipes. The rolls were typically transported by a tractor with a special lifting attachment. CQA personnel periodically monitored the installer's delivery, unloading, and storage procedures to ensure that the material was handled in an appropriate manner. The CQA personnel also compared the roll numbers of the primary geocomposite rolls delivered to the manufacturer's bill of lading. An inventory of the rolls delivered for the project was maintained by the CQA personnel and is available upon request. This inventory also includes the rolls that were approved for installation based on MQC and CQA test results and the rolls that were used during construction of Cell 1A. Only approved rolls were incorporated into the work.

#### 5.5.2.2 Deployment

CQA personnel monitored the deployment of the primary geocomposite for manufacturing defects, damage that may have occurred during shipment, storage, or

handling, and damage resulting from installation activities. If the materials were observed to be damaged, the installer was notified and the damaged materials were either discarded or repaired. CQA personnel observed repair locations to verify conformance with the CQA Documents. CQA personnel periodically monitored the deployment of the primary geocomposite, as well as its condition after installation, to confirm that the installer took measures to:

- securely anchor the geonet composite in the anchor trench or ballast it with sand bags;
- unroll the geonet composite down the slope (i.e., rolls were aligned perpendicular to the slope contours) in a manner that kept the panel in sufficient tension to avoid excessive wrinkling;
- avoid entrapment of dust, stones, or other objects that would damage or clog the geonet composite;
- avoid damaging the underlying geomembrane during deployment;
- secure the geonet composite panels with nylon fasteners, installed on a maximum 5-ft spacing laterally and at 1-ft spacing on end seams; and
- overlap and continuously sew the upper geotextile edges.

Any observed holes in the geotextile component of the primary geocomposite were repaired by placing a patch of non-woven geotextile over the hole that extended at least one foot beyond the edge of the hole. These patches were continuously thermally bonded to the undamaged portion of the geocomposite. This method was also used along the tie-in at the toe of the slope and along trimmed panels. Any observed holes or tears in the geonet component of the composite were repaired by the installer by placing a patch of the same material over or under the hole or tear, at least 2-ft beyond the edges of the hole or tear. These patches were secured using nylon fasteners, followed by thermal bonding of the uppermost geotextile of the patch to the undamaged portion of the geocomposite.

## 5.6 CQA of Secondary Geocomposite

### 5.6.1 Conformance Testing and Documentation

A bi-planar geocomposite was used as secondary drainage geocomposite in the double composite liner system in Cell 1A. The secondary geocomposite used was Fabrinet HS geocomposite manufactured by GSE in Kingstree, South Carolina. The secondary geocomposite conformance samples were collected (from the rolls produced

for the project) by TRI at GSE's manufacturing plant in Kingstree, South Carolina. TRI also performed the CQA conformance testing on the samples of the secondary geocomposite collected.

The MQC certificates and test results and the CQA conformance test results were reviewed by CQA personnel and were found to be in compliance with the CQA Documents. The results of the MQC and CQA conformance tests are summarized in Tables 5-9A, 5-9B, and 5-9C. Table 5-9A presents the CQA and MQC test results for the secondary geocomposite rolls produced for the project. Table 5-9B presents the MQC test results for the geotextile rolls used to manufacture the secondary geocomposite rolls for the project. Table 5-9C presents the MQC test results for the geonet rolls used to manufacture the secondary geocomposite rolls for the project.

Table 5-9A presents the CQA and MQC test results for the secondary geocomposite rolls and CQA test results for the geotextile component of the secondary geocomposite. It includes the test that were conducted, the required test frequencies, and the acceptance criteria in accordance with the CQA Documents. A total of 5 CQA conformance samples were tested for approximately 887,000 $ft^2$ of secondary geocomposite delivered to the site for installation in Cells 1A and 1B. The CQA test frequency of 1 test per 177,000 $ft^2$ (approx.) for the secondary geocomposite exceeded the minimum frequency of 1 test per 200,000 $ft^2$ required by the CQA Documents. As noted in Table 5-9A, a minimum of one conformance sample was tested during CQA from each geonet lot.

It is noted that during CQA and MQC testing, the transmissivity of the secondary geocomposite was measured under compressive stresses of 500 psf and 13,500 psf for 100 hours. The tests were performed with the secondary geocomposite sandwiched between a GCL and a 60-mil textured geomembrane. The transmissivity of the secondary geocomposite reported in Table 5-9A is the minimum transmissivity measured during the 100-hour test.

Table 5-9B presents the MQC test results for the geotextile component of the secondary geocomposite rolls delivered for the project. Several rolls of secondary geocomposite were manufactured from the same roll of geotextile. 42 geotextile rolls were tested for approximately 1,775,000 $ft^2$ of geotextile used to manufacture the secondary geocomposite rolls for the project. The MQC test frequency of 1 test per 42,000 $ft^2$ (approx.) for the geotextile component of the secondary geocomposite exceeded the minimum frequency of 1 test per 100,000 $ft^2$ required by the CQA Documents.

Table 5-9C presents the MQC test results for the geonet component of the secondary geocomposite rolls delivered for the project. Several rolls of secondary geocomposite were manufactured from the same roll of geonet. 40 geonet rolls were tested for approximately 887,000 $ft^2$ of geonet used to manufacture the secondary geocomposite rolls delivered for the project. The MQC test frequency of 1 test per 22,000 $ft^2$ (approx.)

for the geonet component of the secondary geocomposite exceeded the minimum frequency of 1 test per 100,000 $ft^2$ required by the CQA Documents.

### 5.6.2 Field Monitoring Activities

#### 5.6.2.1 Delivery and On-Site Storage

Upon delivery to the site, secondary geocomposite rolls were stored in an area located east of the Cell 1A construction area (i.e., in future Cell 2 footprint) and stacked on HDPE perforated pipes. The rolls were typically transported by a tractor with a special lifting attachment. CQA personnel periodically monitored the installer's delivery, unloading, and storage procedures to ensure that the material was handled in an appropriate manner. The CQA personnel also compared the roll numbers of the secondary geocomposite rolls delivered to the manufacturer's bill of lading. An inventory of the rolls delivered for the project was maintained by the CQA personnel and is available upon request. This inventory also includes the rolls that were approved for installation based on MQC and CQA test results and the rolls that were used during construction of Cell 1A. Only approved rolls were incorporated into the work.

#### 5.6.2.2 Deployment

CQA personnel monitored the deployment of the secondary geocomposite for manufacturing defects, damage that may have occurred during shipment, storage, or handling, and damage resulting from installation activities. If the materials were observed to be damaged, the installer was notified and the damaged materials were either discarded or repaired. CQA personnel observed repair locations to verify conformance with the CQA Documents. CQA personnel periodically monitored the deployment of the secondary geocomposite, as well as its condition after installation, to confirm that the installer took measures to:

- securely anchor the geonet composite in the anchor trench or ballast it with sand bags;
- unroll the geonet composite down the slope (i.e., rolls were aligned perpendicular to the slope contours) in a manner that kept the panel in sufficient tension to avoid excessive wrinkling;
- avoid entrapment of dust, stones, or other objects that would damage or clog the geonet composite;
- avoid damaging the underlying geomembrane during deployment;

- secure the geonet composite panels with nylon fasteners, installed on a maximum 5-ft spacing laterally and at 1-ft spacing on end seams; and

- overlap and continuously sew the upper geotextile edges.

Any observed holes in the geotextile component of the secondary geocomposite were repaired by placing a patch of non-woven geotextile over the hole that extended at least one foot beyond the edge of the hole. These patches were continuously thermally bonded to the undamaged portion of the geocomposite. This method was also used along the tie-in at the toe of the slope and along trimmed panels. Any observed holes or tears in the geonet component of the composite were repaired by the installer by placing a patch of the same material over or under the hole or tear, at least 2-ft beyond the edges of the hole or tear. These patches were secured using nylon fasteners, followed by thermal bonding of the uppermost geotextile of the patch to the undamaged portion of the geocomposite.

## 5.7 CQA of Non-Woven Geotextile

### 5.7.1 Conformance Testing and Documentation

A non-woven geotextile was used as filter/separator fabric to surround the aggregate in the leachate collection system in Cell 1A, cover the gravel bed in Cell 1 sump, and to wrap the gravel in the leachate storage area sumps in the leak detection layer (between the primary and secondary liners). The 8-oz/yd$^2$, needle-punched, non-woven geotextile (GE 00808002) was manufactured by GSE in Kingstree, South Carolina. The CQA conformance samples for the non-woven geotextile were collected by GeoSyntec on-site and shipped to TRI. TRI performed the CQA conformance testing on the samples of the non-woven geotextile collected.

The MQC certificates and test results and the CQA conformance test results were reviewed by CQA personnel and were found to be in compliance with the CQA Documents. The results of the MQC and CQA conformance tests are summarized in Table 5-10. Table 5-10 also indicates the tests that were conducted, the required test frequencies, and the acceptance criteria in accordance with the CQA Documents.

A CQA conformance samples was tested for approximately 36,000 ft$^2$ of the non-woven geotextile delivered to the site for installation in Cell 1A, Cell 1B, and the leachate storage area. The CQA test frequency of 1 test per 36,000 ft$^2$ of non-woven geotextile exceeded the minimum testing frequency of 1 test per 200,000 ft$^2$ required by the CQA Documents.

### 5.7.2 Field Monitoring Activities

5.7.2.1 Delivery and On-Site Storage

Upon delivery to the site, secondary geocomposite rolls were stored in an area located east of the Cell 1A construction area (i.e., in future Cell 2 footprint) and stacked on HDPE perforated pipes. The rolls were typically transported by a tractor with a special lifting attachment. CQA personnel periodically monitored the installer's delivery, unloading, and storage procedures to ensure that the material was handled in an appropriate manner.

5.7.2.2 Deployment

CQA personnel monitored the deployment of the non-woven geotextile rolls for manufacturing defects; damage that may have occurred during shipment, storage, and handling; and damage resulting from installation activities. If any materials were observed to be damaged, the installer was notified and the damaged materials were either discarded or repaired. CQA personnel observed repair locations to verify conformance with the requirements of the CQA Documents.

After deployment of the geotextile, CQA personnel observed that the installer overlapped geotextile panels end-to-end a minimum of 24-in. and laterally a minimum of 6-in.

## 5.8 Interface Friction Testing

As discussed in Section 2, the liner system in Cell 1A consists (from top to bottom) of the liner protective layer, primary geocomposite, primary liner, primary GCL, secondary geocomposite, secondary liner, secondary GCL and prepared subbase. Tests were performed in accordance with the CQA Documents to evaluate the interface shear strength for the various components of the liner system and the internal strength of the GCL. All tests for interface shear strength and the internal strength of the GCL were performed by SGI Testing Services, LLC, (SGI) in Norcross, Georgia.

Tests were performed using samples of geosynthetics collected from rolls that were actually installed in Cell 1A. The soils for liner protective layer and liner subbase were obtained from the on-site borrow source, Borrow Area A, and were similar to the sandy soils used in construction of these two soil components of the liner system. The following rolls of geosynthetics were used in the interface friction tests as indicated in the tables presented above (i.e., Tables 5-1, 5-2, 5-8A, and 5-9A):

- GCL – Roll #87000 (Lot #23092319);
- Textured geomembrane –Roll #108101974 (Lot #8230906);
- Tri-Planar geocomposite – Roll #3506717 (Lot #35041); and
- Bi-Planar geocomposite – Roll #131131239 (Lot #CB13080403).

The 6 different interfaces between the various components of the liner system and the internal strength of the GCL were tested at normal stresses of 5,000, 10,000, and 15,000 psf. Peak (at small displacement) and residual (at large displacements) shear strengths were measured at each normal stress. The interface shear tests were conducted under wetted conditions. GCL was soaked and consolidated prior to testing. The following liner system interfaces were tested (from top to bottom):

(1) Liner protective layer soil / Tri-planar geocomposite;
(2) Tri-planar geocomposite / Textured geomembrane;
(3) Textured geomembrane / GCL (non-heat treated side);
(4) GCL (heat treated side) / Bi-planar geocomposite;
(5) Bi-planar geocomposite / Textured geomembrane;
(6) GCL (heat treated side) / Subbase soil; and
(7) Internal strength of the GCL.

The minimum shear strengths required by the CQA Documents are presented in Table 5-11A. The measured peak and residual shear strengths are summarized in Table 5-11B and are presented in Figures 5-1 and 5-2, respectively. As noted, the measured peak and residual shear strengths exceeded the minimum specification requirements.

## Table 5-1

## CQA AND MQC TEST RESULTS FOR GEOSYNTHETIC CLAY LINER (BENTOFIX)
## LOT NO. 23092319

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | MANUFACTURING QUALITY CONTROL (MQC) | | | | |
|---|---|---|---|---|---|---|
| **PROPERTY** | Hydraulic Conductivity (cm/s) | Bentonite Content ($lb/ft^2$) | Bentonite Moisture Content [1] (%) | Bentonite Free Swell [2] (ml) | Peel Strength (lb) | Hydraulic Conductivity (cm/s) |
| **TEST STANDARD** | ASTM D 5887 | ASTM D 5993 | ASTM D 4643 | ASTM D 5890 | ASTM D 4632 | ASTM D 5887 |
| **PROJECT SPECS.** | $\leq 5.0x10^{-9}$ | $\geq 0.75$ | $\leq 25$ | $\geq 24$ | $\geq 15$ | $\leq 5.0x10^{-9}$ |
| **TESTING FREQUENCY** | 1 per 200,000 $ft^2$ [3] | 1 per 40,000 $ft^2$ [3] | | | | 1 per 100,000 $ft^2$ [3] |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | CQA | MQC |
| 86967 | GCL-1 | $9.3x10^{-10}$ | 0.92 | 8 | 33 | 48 | $2.11x10^{-9}$ (w/ Deionized Water)<br>$2.12x10^{-10}$ (w/ Leachate) | P | P |
| 86983 | | | 0.93 | 8 | 33 | 46 | | | P |
| 86999 | | | 0.96 | 8 | 33 | 50 | $1.97x10^{-9}$ | | P |
| 87000 [4] | GCL-2 | $2.6x10^{-9}$ | | | | | | P | |
| 87015 | | | 1.09 | 8 | 33 | 42 | | | P |
| 87031 | | | 0.99 | 8 | 33 | 38 | | | P |

Notes:

[1] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents maximum bentonite moisture content for the 4 tests.

[2] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents minimum bentonite free swell for the 4 tests.

[3] A minimum of 1 test per lot was required.

[4] This roll was used to perform interface friction tests.

| | | | | | | |
|---|---|---|---|---|---|---|
| Average Roll Area (150 ft x 15.5 ft): | 2,325 | $ft^2$ | **SHEET NO.** | **1** | **of** | **11** |
| No. of Rolls in Lot: | 77 | | **CUMULATIVE NUMBER OF ROLLS:** | **77** | | |
| Area in Lot: | 179,025 | $ft^2$ | **CUMULATIVE AREA:** | **179,025** | $ft^2$ | |

## Table 5-1 (continued)

## CQA AND MQC TEST RESULTS FOR GEOSYNTHETIC CLAY LINER (BENTOFIX)
## LOT NO. 23092409

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | MANUFACTURING QUALITY CONTROL (MQC) | | | | |
|---|---|---|---|---|---|---|
| **PROPERTY** | Hydraulic Conductivity (cm/s) | Bentonite Content ($lb/ft^2$) | Bentonite Moisture Content [1] (%) | Bentonite Free Swell [2] (ml) | Peel Strength (lb) | Hydraulic Conductivity (cm/s) |
| **TEST STANDARD** | ASTM D 5887 | ASTM D 5993 | ASTM D 4643 | ASTM D 5890 | ASTM D 4632 | ASTM D 5887 |
| **PROJECT SPECS.** | $\leq 5.0 \times 10^{-9}$ | $\geq 0.75$ | $\leq 25$ | $\geq 24$ | $\geq 15$ | $\leq 5.0 \times 10^{-9}$ |
| **TESTING FREQUENCY** | 1 per 200,000 $ft^2$ [3] | 1 per 40,000 $ft^2$ [3] | | | | 1 per 100,000 $ft^2$ [3] |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | CQA | MQC |
| 87046 | | | 0.94 | 6 | 26 | 46 | | | P |
| 87055 | GCL-3 | $1.2 \times 10^{-9}$ | 1.05 | 6 | 26 | 50 | $1.25 \times 10^{-9}$ | P | P |
| 87062 | | | 0.97 | 6 | 26 | 43 | | | P |
| 87129 | | | 0.95 | 6 | 26 | 42 | | | P |
| 87153 | | | 0.92 | 6 | 26 | 48 | $1.99 \times 10^{-9}$ | | P |
| 87161 | GCL-4 | $1.1 \times 10^{-9}$ | | | | | | P | |
| 87177 | | | 0.93 | 6 | 26 | 41 | | | P |

Notes:

[1] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents maximum bentonite moisture content for the 4 tests.

[2] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents minimum bentonite free swell for the 4 tests.

[3] A minimum of 1 test per lot was required.

| | | | | | | |
|---|---|---|---|---|---|---|
| Average Roll Area (150 ft x 15.5 ft): | 2,325 | $ft^2$ | **SHEET NO.** | **2** | of | 11 |
| No. of Rolls in Lot: | 78 | | **CUMULATIVE NUMBER OF ROLLS:** | **155** | | |
| Area in Lot: | 181,350 | $ft^2$ | **CUMULATIVE AREA:** | **360,375** | $ft^2$ | |

## Table 5-1 (continued)

## CQA AND MQC TEST RESULTS FOR GEOSYNTHETIC CLAY LINER (BENTOFIX)
## LOT NO. 13093009

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | MANUFACTURING QUALITY CONTROL (MQC) | | | | |
|---|---|---|---|---|---|---|
| **PROPERTY** | Hydraulic Conductivity (cm/s) | Bentonite Content ($lb/ft^2$) | Bentonite Moisture Content [1] (%) | Bentonite Free Swell [2] (ml) | Peel Strength (lb) | Hydraulic Conductivity (cm/s) |
| **TEST STANDARD** | ASTM D 5887 | ASTM D 5993 | ASTM D 4643 | ASTM D 5890 | ASTM D 4632 | ASTM D 5887 |
| **PROJECT SPECS.** | $\leq 5.0 \times 10^{-9}$ | $\geq 0.75$ | $\leq 25$ | $\geq 24$ | $\geq 15$ | $\leq 5.0 \times 10^{-9}$ |
| **TESTING FREQUENCY** | 1 per 200,000 $ft^2$ [3] | 1 per 40,000 $ft^2$ [3] | | | | 1 per 100,000 $ft^2$ [3] |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | CQA | MQC |
| 96501 | GCL-5 | $6.8 \times 10^{-10}$ | 0.94 | 6 | 28 | 44 | | P | P |
| 96502 | | | 0.94 | 6 | 28 | 44 | | | P |
| 96517 | | | 1.12 | 6 | 28 | 37 | $1.31 \times 10^{-9}$ | | P |
| 96533 | | | 1.01 | 6 | 28 | 42 | | | P |
| 96544 | | | 1.13 | 6 | 28 | 50 | $1.87 \times 10^{-9}$ | | P |
| 96560 | | | 0.96 | 6 | 28 | 45 | | | P |
| 96576 | | | 0.99 | 6 | 28 | 48 | | | P |

Notes:

[1] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents maximum bentonite moisture content for the 4 tests.

[2] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents minimum bentonite free swell for the 4 tests.

[3] A minimum of 1 test per lot was required.

| | | | | | | |
|---|---|---|---|---|---|---|
| Average Roll Area (150 ft x 15.5 ft): | 2,325 | $ft^2$ | **SHEET NO.** | 3 | of | 11 |
| No. of Rolls in Lot: | 77 | | **CUMULATIVE NUMBER OF ROLLS:** | 232 | | |
| Area in Lot: | 179,025 | $ft^2$ | **CUMULATIVE AREA:** | 539,400 | $ft^2$ | |

## Table 5-1 (continued)

## CQA AND MQC TEST RESULTS FOR GEOSYNTHETIC CLAY LINER (BENTOFIX)
## LOT NO. 13100209

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | MANUFACTURING QUALITY CONTROL (MQC) | | | | |
|---|---|---|---|---|---|---|
| **PROPERTY** | Hydraulic Conductivity (cm/s) | Bentonite Content ($lb/ft^2$) | Bentonite Moisture Content [1] (%) | Bentonite Free Swell [2] (ml) | Peel Strength (lb) | Hydraulic Conductivity (cm/s) |
| **TEST STANDARD** | ASTM D 5887 | ASTM D 5993 | ASTM D 4643 | ASTM D 5890 | ASTM D 4632 | ASTM D 5887 |
| **PROJECT SPECS.** | $\leq 5.0 \times 10^{-9}$ | $\geq 0.75$ | $\leq 25$ | $\geq 24$ | $\geq 15$ | $\leq 5.0 \times 10^{-9}$ |
| **TESTING FREQUENCY** | 1 per 200,000 $ft^2$ [3] | 1 per 40,000 $ft^2$ [3] | | | | 1 per 100,000 $ft^2$ [3] |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | TEST RESULTS | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | CQA | MQC |
| 96578 | GCL-6 | $2.2 \times 10^{-9}$ | 1.02 | 10 | 38 | 47 | | P | P |
| 96594 | | | 0.91 | 10 | 38 | 55 | $1.23 \times 10^{-9}$ | | P |
| 96606 | | | 0.91 | 10 | 38 | 55 | | | P |
| 96617 | | | 0.95 | 10 | 38 | 40 | | | P |
| 96626 | | | 0.94 | 10 | 38 | 51 | $1.56 \times 10^{-9}$ | | P |
| 96642 | | | 0.93 | 10 | 38 | 51 | | | P |

Notes:

[1] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents maximum bentonite moisture content for the 4 tests.

[2] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents minimum bentonite free swell for the 4 tests.

[3] A minimum of 1 test per lot was required.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Average Roll Area (150 ft x 15.5 ft): | 2,325 | $ft^2$ | **SHEET NO.** | **4** | **of** | **11** | |
| No. of Rolls in Lot: | 78 | | **CUMULATIVE NUMBER OF ROLLS:** | **310** | | | |
| Area in Lot: | 181,350 | $ft^2$ | **CUMULATIVE AREA:** | **720,750** | $ft^2$ | | |

## Table 5-1 (continued)

## CQA AND MQC TEST RESULTS FOR GEOSYNTHETIC CLAY LINER (BENTOFIX)
## LOT NO. 13100609

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | MANUFACTURING QUALITY CONTROL (MQC) | | | | |
|---|---|---|---|---|---|---|
| **PROPERTY** | Hydraulic Conductivity (cm/s) | Bentonite Content ($lb/ft^2$) | Bentonite Moisture Content [1] (%) | Bentonite Free Swell [2] (ml) | Peel Strength (lb) | Hydraulic Conductivity (cm/s) |
| **TEST STANDARD** | ASTM D 5887 | ASTM D 5993 | ASTM D 4643 | ASTM D 5890 | ASTM D 4632 | ASTM D 5887 |
| **PROJECT SPECS.** | $\leq 5.0x10^{-9}$ | $\geq 0.75$ | $\leq 25$ | $\geq 24$ | $\geq 15$ | $\leq 5.0x10^{-9}$ |
| **TESTING FREQUENCY** | 1 per 200,000 $ft^2$ [3] | 1 per 40,000 $ft^2$ [3] | | | | 1 per 100,000 $ft^2$ [3] |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | TEST RESULTS | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | CQA | MQC |
| 96707 | | | 0.87 | 6 | 30 | 66 | | | P |
| 96719 | | | 0.89 | 6 | 30 | 66 | | | P |
| 96723 | GCL-7 | $1.8x10^{-9}$ | 0.94 | 6 | 30 | 41 | $1.66x10^{-9}$ | P | P |
| 96739 | | | 0.96 | 6 | 30 | 45 | | | P |
| 96755 | | | 1.01 | 6 | 30 | 48 | $2.11x10^{-9}$ | | P |
| 96771 | | | 0.99 | 6 | 30 | 51 | | | P |

Notes:

1 Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents maximum bentonite moisture content for the 4 tests.

2 Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents minimum bentonite free swell for the 4 tests.

3 A minimum of 1 test per lot was required.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Average Roll Area (150 ft x 15.5 ft): | 2,325 | $ft^2$ | **SHEET NO.** | **5** | of | **11** | |
| No. of Rolls in Lot: | 77 | | **CUMULATIVE NUMBER OF ROLLS:** | **387** | | | |
| Area in Lot: | 179,025 | $ft^2$ | **CUMULATIVE AREA:** | **899,775** | $ft^2$ | | |

## Table 5-1 (continued)

## CQA AND MQC TEST RESULTS FOR GEOSYNTHETIC CLAY LINER (BENTOFIX)
## LOT NO. 23100809

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | MANUFACTURING QUALITY CONTROL (MQC) | | | | |
|---|---|---|---|---|---|---|
| **PROPERTY** | Hydraulic Conductivity (cm/s) | Bentonite Content ($lb/ft^2$) | Bentonite Moisture Content [1] (%) | Bentonite Free Swell [2] (ml) | Peel Strength (lb) | Hydraulic Conductivity (cm/s) |
| **TEST STANDARD** | ASTM D 5887 | ASTM D 5993 | ASTM D 4643 | ASTM D 5890 | ASTM D 4632 | ASTM D 5887 |
| **PROJECT SPECS.** | $\leq 5.0 \times 10^{-9}$ | $\geq 0.75$ | $\leq 25$ | $\geq 24$ | $\geq 15$ | $\leq 5.0 \times 10^{-9}$ |
| **TESTING FREQUENCY** | 1 per 200,000 $ft^2$ [3] | 1 per 40,000 $ft^2$ [3] | | | | 1 per 100,000 $ft^2$ [3] |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | TEST RESULTS | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | CQA | MQC |
| 87541 | GCL-8 | $1.7 \times 10^{-9}$ | 0.90 | 6 | 27 | 46 | | P | P |
| 87557 | | | 0.95 | 6 | 27 | 43 | $1.81 \times 10^{-9}$ | | P |
| 87573 | | | 0.94 | 6 | 27 | 50 | | | P |
| 87589 | | | 0.94 | 6 | 27 | 41 | $1.60 \times 10^{-9}$ | | P |
| 87597 | | | 0.92 | 6 | 27 | 51 | | | P |
| 87613 | | | 0.93 | 6 | 27 | 46 | | | P |

Notes:

[1] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents maximum bentonite moisture content for the 4 tests.

[2] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents minimum bentonite free swell for the 4 tests.

[3] A minimum of 1 test per lot was required.

| | | | | | | |
|---|---|---|---|---|---|---|
| Average Roll Area (150 ft x 15.5 ft): | 2,325 | $ft^2$ | **SHEET NO.** | **6** | **of** | **11** |
| No. of Rolls in Lot: | 78 | | **CUMULATIVE NUMBER OF ROLLS:** | **465** | | |
| Area in Lot: | 181,350 | $ft^2$ | **CUMULATIVE AREA:** | **1,081,125** | **$ft^2$** | |

## Table 5-1 (continued)

## CQA AND MQC TEST RESULTS FOR GEOSYNTHETIC CLAY LINER (BENTOFIX)
## LOT NO. 23100909

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | MANUFACTURING QUALITY CONTROL (MQC) | | | | |
|---|---|---|---|---|---|---|
| **PROPERTY** | Hydraulic Conductivity (cm/s) | Bentonite Content ($lb/ft^2$) | Bentonite Moisture Content [1] (%) | Bentonite Free Swell [2] (ml) | Peel Strength (lb) | Hydraulic Conductivity (cm/s) |
| **TEST STANDARD** | ASTM D 5887 | ASTM D 5993 | ASTM D 4643 | ASTM D 5890 | ASTM D 4632 | ASTM D 5887 |
| **PROJECT SPECS.** | $\leq 5.0 \times 10^{-9}$ | $\geq 0.75$ | $\leq 25$ | $\geq 24$ | $\geq 15$ | $\leq 5.0 \times 10^{-9}$ |
| **TESTING FREQUENCY** | 1 per 200,000 $ft^2$ [3] | 1 per 40,000 $ft^2$ [3] | | | | 1 per 100,000 $ft^2$ [3] |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | TEST RESULTS | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | CQA | MQC |
| 87619 | GCL-9 | $2.0 \times 10^{-9}$ | 0.92 | 9 | 37 | 44 | | P | P |
| 87635 | | | 0.91 | 9 | 37 | 42 | $1.54 \times 10^{-9}$ | | P |
| 87651 | | | 1.06 | 9 | 37 | 43 | | | P |
| 87667 | | | 0.92 | 9 | 37 | 47 | $1.93 \times 10^{-9}$ | | P |
| 87683 | | | 0.96 | 9 | 37 | 39 | | | P |
| 87690 | | | 0.96 | 9 | 37 | 39 | | | P |

Notes:

[1] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents maximum bentonite moisture content for the 4 tests.

[2] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents minimum bentonite free swell for the 4 tests.

[3] A minimum of 1 test per lot was required.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Average Roll Area (150 ft x 15.5 ft): | 2,325 | $ft^2$ | **SHEET NO.** | **7** | of | 11 |
| No. of Rolls in Lot: | 77 | | **CUMULATIVE NUMBER OF ROLLS:** | **542** | | |
| Area in Lot: | 179,025 | $ft^2$ | **CUMULATIVE AREA:** | **1,260,150** | $ft^2$ | |

## Table 5-1 (continued)

## CQA AND MQC TEST RESULTS FOR GEOSYNTHETIC CLAY LINER (BENTOFIX)
## LOT NO. 23101009

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | MANUFACTURING QUALITY CONTROL (MQC) | | | | |
|---|---|---|---|---|---|---|
| **PROPERTY** | Hydraulic Conductivity (cm/s) | Bentonite Content ($lb/ft^2$) | Bentonite Moisture Content [1] (%) | Bentonite Free Swell [2] (ml) | Peel Strength (lb) | Hydraulic Conductivity (cm/s) |
| **TEST STANDARD** | ASTM D 5887 | ASTM D 5993 | ASTM D 4643 | ASTM D 5890 | ASTM D 4632 | ASTM D 5887 |
| **PROJECT SPECS.** | $\leq 5.0x10^{-9}$ | $\geq 0.75$ | $\leq 25$ | $\geq 24$ | $\geq 15$ | $\leq 5.0x10^{-9}$ |
| **TESTING FREQUENCY** | 1 per 200,000 $ft^2$ [3] | 1 per 40,000 $ft^2$ [3] | | | | 1 per 100,000 $ft^2$ [3] |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | TEST RESULTS | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | CQA | MQC |
| 87696 | | | 0.90 | 8 | 26 | 47 | | | P |
| 87712 | | | 0.96 | 8 | 26 | 46 | $2.13x10^{-9}$ | | P |
| 87713 | | | 0.96 | 8 | 26 | 46 | | | P |
| 87719 | GCL-10 | $1.9x10^{-9}$ | 0.92 | 8 | 26 | 48 | | P | P |
| 87720 | | | 0.93 | 8 | 26 | 48 | | | P |
| 87732 | | | 0.92 | 8 | 26 | 48 | | | P |
| 87736 | | | 0.98 | 8 | 26 | 38 | $1.18x10^{-9}$ | | P |
| 87752 | | | 0.92 | 8 | 26 | 50 | | | P |
| 87768 | | | 1.01 | 8 | 26 | 46 | | | P |

Notes:

[1] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents maximum bentonite moisture content for the 4 tests.

[2] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents minimum bentonite free swell for the 4 tests.

[3] A minimum of 1 test per lot was required.

| | | | | | | |
|---|---|---|---|---|---|---|
| Average Roll Area (150 ft x 15.5 ft): | 2,325 | $ft^2$ | **SHEET NO.** | **8** | **of** | **11** |
| No. of Rolls in Lot: | 77 | | **CUMULATIVE NUMBER OF ROLLS:** | **619** | | |
| Area in Lot: | 179,025 | $ft^2$ | **CUMULATIVE AREA:** | **1,439,175** | $ft^2$ | |

## Table 5-1 (continued)

## CQA AND MQC TEST RESULTS FOR GEOSYNTHETIC CLAY LINER (BENTOFIX)
## LOT NO. 23101409

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | MANUFACTURING QUALITY CONTROL (MQC) | | | | |
|---|---|---|---|---|---|---|
| **PROPERTY** | Hydraulic Conductivity (cm/s) | Bentonite Content ($lb/ft^2$) | Bentonite Moisture Content [1] (%) | Bentonite Free Swell [2] (ml) | Peel Strength (lb) | Hydraulic Conductivity (cm/s) |
| **TEST STANDARD** | ASTM D 5887 | ASTM D 5993 | ASTM D 4643 | ASTM D 5890 | ASTM D 4632 | ASTM D 5887 |
| **PROJECT SPECS.** | $\leq 5.0x10^{-9}$ | $\geq 0.75$ | $\leq 25$ | $\geq 24$ | $\geq 15$ | $\leq 5.0x10^{-9}$ |
| **TESTING FREQUENCY** | 1 per 200,000 $ft^2$ [3] | 1 per 40,000 $ft^2$ [3] | | | | 1 per 100,000 $ft^2$ [3] |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | TEST RESULTS | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | CQA | MQC |
| 87773 | GCL-11 | $1.7x10^{-9}$ | 0.91 | 10 | 35 | 45 | | P | P |
| 87789 | | | 0.94 | 10 | 35 | 50 | $8.70x10^{-10}$ | | P |
| 87800 | | | 0.94 | 10 | 35 | 50 | | | P |
| 87805 | | | 0.93 | 10 | 35 | 45 | | | P |
| 87821 | | | 0.98 | 10 | 35 | 48 | $1.50x10^{-9}$ | | P |
| 87835 | | | 0.97 | 10 | 35 | 48 | | | P |
| 87837 | | | 0.93 | 10 | 35 | 42 | | | P |

Notes:

[1] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents maximum bentonite moisture content for the 4 tests.

[2] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents minimum bentonite free swell for the 4 tests.

[3] A minimum of 1 test per lot was required.

| | | | | | | |
|---|---|---|---|---|---|---|
| Average Roll Area (150 ft x 15.5 ft): | 2,325 | $ft^2$ | **SHEET NO.** | **9** | of | 11 |
| No. of Rolls in Lot: | 77 | | **CUMULATIVE NUMBER OF ROLLS:** | **773** | | |
| Area in Lot: | 179,025 | $ft^2$ | **CUMULATIVE AREA:** | **1,797,225** | $ft^2$ | |

## Table 5-1 (continued)

## CQA AND MQC TEST RESULTS FOR GEOSYNTHETIC CLAY LINER (BENTOFIX)
## LOT NO. 23101509

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | MANUFACTURING QUALITY CONTROL (MQC) | | | | |
|---|---|---|---|---|---|---|
| **PROPERTY** | Hydraulic Conductivity (cm/s) | Bentonite Content ($lb/ft^2$) | Bentonite Moisture Content [1] (%) | Bentonite Free Swell [2] (ml) | Peel Strength (lb) | Hydraulic Conductivity (cm/s) |
| **TEST STANDARD** | ASTM D 5887 | ASTM D 5993 | ASTM D 4643 | ASTM D 5890 | ASTM D 4632 | ASTM D 5887 |
| **PROJECT SPECS.** | $\leq 5.0x10^{-9}$ | $\geq 0.75$ | $\leq 25$ | $\geq 24$ | $\geq 15$ | $\leq 5.0x10^{-9}$ |
| **TESTING FREQUENCY** | 1 per 200,000 $ft^2$ [3] | 1 per 40,000 $ft^2$ [3] | | | | 1 per 100,000 $ft^2$ [3] |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | TEST RESULTS | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | CQA | MQC |
| 87850 | | | 0.92 | 9 | 33 | 57 | | | P |
| 87858 | GCL-12 | $2.3x10^{-9}$ | 0.87 | 9 | 33 | 51 | $1.37x10^{-9}$ | P | P |
| 87876 | | | 0.96 | 9 | 33 | 41 | | | P |
| 87890 | | | 0.94 | 9 | 33 | 41 | $1.61x10^{-9}$ | | P |
| 87906 | | | 0.96 | 9 | 33 | 44 | | | P |
| 87922 | | | 0.99 | 9 | 33 | 46 | | | P |

Notes:

[1] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents maximum bentonite moisture content for the 4 tests.

[2] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents minimum bentonite free swell for the 4 tests.

[3] A minimum of 1 test per lot was required.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Average Roll Area (150 ft x 15.5 ft): | 2,325 | $ft^2$ | **SHEET NO.** | **10** | of | 11 |
| No. of Rolls in Lot: | 78 | | **CUMULATIVE NUMBER OF ROLLS:** | **774** | | |
| Area in Lot: | 181,350 | $ft^2$ | **CUMULATIVE AREA:** | **1,799,550** | $ft^2$ | |

## Table 5-1 (continued)

## CQA AND MQC TEST RESULTS FOR GEOSYNTHETIC CLAY LINER (BENTOFIX)
## LOT NO. 23101609

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | MANUFACTURING QUALITY CONTROL (MQC) | | | | |
|---|---|---|---|---|---|---|
| **PROPERTY** | Hydraulic Conductivity (cm/s) | Bentonite Content ($lb/ft^2$) | Bentonite Moisture Content [1] (%) | Bentonite Free Swell [2] (ml) | Peel Strength (lb) | Hydraulic Conductivity (cm/s) |
| **TEST STANDARD** | ASTM D 5887 | ASTM D 5993 | ASTM D 4643 | ASTM D 5890 | ASTM D 4632 | ASTM D 5887 |
| **PROJECT SPECS.** | $\leq 5.0 \times 10^{-9}$ | $\geq 0.75$ | $\leq 25$ | $\geq 24$ | $\geq 15$ | $\leq 5.0 \times 10^{-9}$ |
| **TESTING FREQUENCY** | 1 per 200,000 $ft^2$ [3] | 1 per 40,000 $ft^2$ [3] | | | | 1 per 100,000 $ft^2$ [3] |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | TEST RESULTS | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | CQA | MQC |
| 87928 | GCL-13 | $8.8 \times 10^{-10}$ | 0.98 | 9 | 34 | 41 | | P | P |
| 87944 | | | 0.92 | 9 | 34 | 53 | $1.04 \times 10^{-9}$ | | P |

Notes:

[1] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents maximum bentonite moisture content for the 4 tests.

[2] Four tests were performed per railcar (approximately 200,000 lbs). Reported value represents minimum bentonite free swell for the 4 tests.

[3] A minimum of 1 test per lot was required.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Average Roll Area (150 ft x 15.5 ft): | 2,325 | $ft^2$ | **SHEET NO.** | **11** | of | **11** |
| No. of Rolls in Lot: | 26 | | **CUMULATIVE NUMBER OF ROLLS:** | **800** | | |
| Area in Lot: | 60,450 | $ft^2$ | **CUMULATIVE AREA:** | **1,860,000** | $ft^2$ | |

## Table 5-2

## CQA AND MQC TEST RESULTS FOR 60-mil TEXTURED GEOMEMBRANE (GSE)
## RESIN LOT NO. 8230906

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | | | | | | | | MANUFACTURING QUALITY CONTROL (MQC) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROPERTY** | Thickness (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Thickness[1] (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Tear Resistance[2] (lb) | Puncture Resistance (lb) |
| **TEST STANDARD** | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 1004 | ASTM D 4833 |
| **PROJECT SPECS.** | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 40 | ≥ 80 |
| **TESTING FREQUENCY** | 1 per 100,000 $ft^2$ [4] | | | | | | | | 1 per 50,000 $ft^2$ [4] | | | | | | | | | |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | | | | | | | | TEST RESULTS | | | | | | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | CQA | MQC |
| 108101974[5] | GMT-1 | 62 | 0.946 | 2.58 | 10 | 181 | 205 | 17 | 534 | 61 | 0.946 | 2.6 | 10 | 167 | 177 | 16 | 399 | 62 | 156 | P | P |
| 108101976 | | | | | | | | | | 62 | 0.944 | 2.6 | 10 | 166 | 180 | 16 | 431 | 61 | 137 | | P |
| 108101980 | | | | | | | | | | 61 | 0.944 | 2.4 | 10 | 159 | 209 | 15 | 446 | 58 | 155 | | P |
| 108101984 | GMT-2 | 68 | 0.945 | 2.46 | 10 | 180 | 191 | 17 | 430 | 61 | 0.946 | 2.7 | 10 | 160 | 187 | 15 | 414 | 61 | 153 | P | P |
| 108101988 | | | | | | | | | | 61 | 0.945 | 2.6 | 10 | 165 | 173 | 16 | 427 | 56 | 154 | | P |
| 108101992 | | | | | | | | | | 62 | 0.945 | 2.6 | 10 | 165 | 173 | 16 | 430 | 56 | 154 | | P |
| 108101993 | | | | | | | | | | 62 | 0.945 | 2.6 | 10 | 153 | 143 | 17 | 389 | 57 | 149 | | P |
| 108101994 | GMT-3 | 69 | 0.944 | 2.54 | 10 | 180 | 170 | 17 | 375 | 61 | | | | | | | | | | P | |
| 108101997 | | | | | | | | | | 61 | 0.944 | 2.5 | 10 | 170 | 191 | 15 | 411 | 61 | 156 | | P |

Notes:

1 Thickness was measured for every roll.

2 Smaller of machine direction (MD) and transverse direction (TD).

3 Project specifications for carbon black dispersion are: 8 of 10 in Category 1 or 2 and all in Category 1,2, or 3. Results are for Category 1 or 2.

4 A minimum of 1 test per lot was required.

5 This roll was used to perform interface friction tests.

Average Roll Area (460 ft x 23 ft): 10,580 $ft^2$

No. of Rolls in Lot: 25

Area in Lot: 264,500 $ft^2$

**SHEET NO. 1 OF 7**

**CUMULATIVE NUMBER OF ROLLS: 25**

**CUMULATIVE AREA: 264,500 $ft^2$**

## Table 5-2 (continued)

## CQA AND MQC TEST RESULTS FOR 60-mil TEXTURED GEOMEMBRANE (GSE)
## RESIN LOT NO. 8230879

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | | | | | | | | MANUFACTURING QUALITY CONTROL (MQC) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROPERTY** | Thickness (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Thickness[1] (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Tear Resistance[2] (lb) | Puncture Resistance (lb) |
| **TEST STANDARD** | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 1004 | ASTM D 4833 |
| **PROJECT SPECS.** | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 40 | ≥ 80 |
| **TESTING FREQUENCY** | 1 per 100,000 $ft^2$ (4) | | | | | | | | 1 per 50,000 $ft^2$ (4) | | | | | | | | | |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | | | | | | | | TEST RESULTS | | | | | | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | CQA | MQC |
| 108102147 | GMT-4 | 68 | 0.945 | 2.6 | 10 | 173 | 181 | 15 | 429 | 61 | 0.946 | 2.5 | 10 | 166 | 201 | 16 | 419 | 59 | 155 | P | P |
| 108102151 | | | | | | | | | | 61 | 0.947 | 2.5 | 10 | 167 | 160 | 16 | 379 | 58 | 156 | | P |
| 108102155 | | | | | | | | | | 61 | 0.945 | 2.7 | 10 | 171 | 176 | 15 | 449 | 57 | 151 | | P |
| 108102156 | GMT-5 | 64 | 0.947 | 2.66 | 10 | 172 | 207 | 15 | 556 | 60 | | | | | | | | | | P | |

Notes:

1 Thickness was measured for every roll.

2 Smaller of machine direction (MD) and transverse direction (TD).

3 Project specifications for carbon black dispersion are: 8 of 10 in Category 1 or 2 and all in Category 1,2, or 3. Results are for Category 1 or 2.

4 A minimum of 1 test per lot was required.

Average Roll Area (460 ft x 23 ft): 10,580 $ft^2$

No. of Rolls in Lot: 10

Area in Lot: 105,800 $ft^2$

SHEET NO. 2 OF 7

CUMULATIVE NUMBER OF ROLLS: 35

CUMULATIVE AREA: 370,300 $ft^2$

## Table 5-2 (continued)

## CQA AND MQC TEST RESULTS FOR 60-mil TEXTURED GEOMEMBRANE (GSE)
## RESIN LOT NO. 8230884

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | | | | | | | | MANUFACTURING QUALITY CONTROL (MQC) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROPERTY** | Thickness (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Thickness[1] (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Tear Resistance[2] (lb) | Puncture Resistance (lb) |
| **TEST STANDARD** | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 1004 | ASTM D 4833 |
| **PROJECT SPECS.** | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 40 | ≥ 80 |
| **TESTING FREQUENCY** | 1 per 100,000 $ft^2$ (4) | | | | | | | | 1 per 50,000 $ft^2$ (4) | | | | | | | | | |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | | | | | | | | TEST RESULTS | | | | | | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | CQA | MQC |
| 108102159 | | | | | | | | | | 60 | 0.944 | 2.6 | 10 | 163 | 182 | 14 | 380 | 62 | 155 | | P |
| 108102164 | | | | | | | | | | 61 | 0.945 | 2.6 | 10 | 168 | 192 | 16 | 458 | 60 | 150 | | P |
| 108102168 | GMT-6 | 64 | 0.947 | 2.58 | 10 | 174 | 191 | 22 | 489 | 61 | 0.944 | 2.5 | 10 | 166 | 189 | 16 | 410 | 62 | 157 | P | P |
| 108102172 | | | | | | | | | | 62 | 0.946 | 2.6 | 10 | 174 | 199 | 15 | 376 | 62 | 162 | | P |
| 108102177 | | | | | | | | | | 61 | 0.948 | 2.6 | 10 | 167 | 185 | 15 | 458 | 62 | 135 | | P |
| 108102181 | | | | | | | | | | 61 | 0.947 | 2.4 | 10 | 169 | 191 | 16 | 448 | 60 | 130 | | P |
| 108102185 | | | | | | | | | | 61 | 0.946 | 2.5 | 10 | 167 | 216 | 16 | 462 | 62 | 161 | | P |
| 108102186 | GMT-7 | 64 | 0.946 | 2.66 | 10 | 179 | 201 | 17 | 484 | 61 | | | | | | | | | | P | |
| 108102189 | | | | | | | | | | 61 | 0.944 | 2.5 | 10 | 172 | 217 | 16 | 462 | 60 | 160 | | P |
| 108102195 | | | | | | | | | | 61 | 0.945 | 2.5 | 10 | 162 | 184 | 16 | 464 | 55 | 157 | | P |
| 108102197 | GMT-8 | 65 | 0.946 | 2.71 | 10 | 178 | 192 | 15 | 502 | 61 | 0.946 | 2.6 | 10 | 159 | 196 | 17 | 479 | 55 | 157 | P | P |
| 108102198 | | | | | | | | | | 61 | 0.946 | 2.6 | 10 | 159 | 196 | 17 | 479 | 54 | 152 | | P |

Notes:

1 Thickness was measured for every roll.

2 Smaller of machine direction (MD) and transverse direction (TD).

3 Project specifications for carbon black dispersion are: 8 of 10 in Category 1 or 2 and all in Category 1,2, or 3. Results are for Category 1 or 2.

4 A minimum of 1 test per lot was required.

## Table 5-2 (continued)

## CQA AND MQC TEST RESULTS FOR 60-mil TEXTURED GEOMEMBRANE (GSE)
## RESIN LOT NO. 8230884

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | | | | | | | | MANUFACTURING QUALITY CONTROL (MQC) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PROPERTY | Thickness (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Thickness[1] (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Tear Resistance[2] (lb) | Puncture Resistance (lb) |
| TEST STANDARD | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 1004 | ASTM D 4833 |
| PROJECT SPECS. | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 40 | ≥ 80 |
| TESTING FREQUENCY | 1 per 100,000 $ft^2$ (4) | | | | | | | | 1 per 50,000 $ft^2$ (4) | | | | | | | | | |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | | | | | | | | TEST RESULTS | | | | | | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | CQA | MQC |
| 108102201 | | | | | | | | | | 62 | 0.947 | 2.4 | 10 | 168 | 175 | 17 | 406 | 57 | 157 | | P |
| 108102203 | | | | | | | | | | 61 | 0.947 | 2.4 | 10 | 165 | 184 | 16 | 417 | 61 | 159 | | P |
| 108102206 | GMT-9 | 68 | 0.947 | 2.51 | 10 | 173 | 202 | 16 | 500 | 61 | 0.947 | 2.4 | 10 | 168 | 175 | 17 | 406 | 57 | 157 | P | P |
| 108102210 | | | | | | | | | | 61 | 0.946 | 2.6 | 10 | 162 | 155 | 17 | 480 | 55 | 154 | | P |
| 108102211 | | | | | | | | | | 61 | 0.946 | 2.6 | 10 | 164 | 204 | 18 | 480 | 55 | 154 | | P |
| 108102213 | | | | | | | | | | 61 | 0.946 | 2.6 | 10 | 162 | 164 | 18 | 476 | 55 | 154 | | P |
| 108102214 | | | | | | | | | | 61 | 0.947 | 2.5 | 10 | 166 | 191 | 17 | 441 | 61 | 153 | | P |
| 108102215 | GMT-10 | 67 | 0.945 | 2.68 | 10 | 180 | 214 | 13 | 559 | 61 | | | | | | | | | | P | |
| 108102218 | | | | | | | | | | 61 | 0.948 | 2.5 | 10 | 164 | 185 | 16 | 430 | 57 | 156 | | P |

Notes:

1 Thickness was measured for every roll.

2 Smaller of machine direction (MD) and transverse direction (TD).

3 Project specifications for carbon black dispersion are: 8 of 10 in Category 1 or 2 and all in Category 1,2, or 3. Results are for Category 1 or 2.

4 A minimum of 1 test per lot was required.

Average Roll Area (460 ft x 23 ft): 10,580 $ft^2$

No. of Rolls in Lot: 58

Area in Lot: 613,640 $ft^2$

SHEET NO. 3 OF 7

CUMULATIVE NUMBER OF ROLLS: 93

CUMULATIVE AREA: 983,940 $ft^2$

LOT SHEET 2 OF 2

## Table 5-2 (continued)

## CQA AND MQC TEST RESULTS FOR 60-mil TEXTURED GEOMEMBRANE (GSE)
## RESIN LOT NO. 8230913

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | | | | | | | | MANUFACTURING QUALITY CONTROL (MQC) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROPERTY** | Thickness (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Thickness[1] (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Tear Resistance[2] (lb) | Puncture Resistance (lb) |
| **TEST STANDARD** | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 1004 | ASTM D 4833 |
| **PROJECT SPECS.** | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 40 | ≥ 80 |
| **TESTING FREQUENCY** | 1 per 100,000 $ft^2$ [4] | | | | | | | | 1 per 50,000 $ft^2$ [4] | | | | | | | | | |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | | | | | | | | TEST RESULTS | | | | | | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | CQA | MQC |
| 108102222 | | | | | | | | | | 61 | 0.949 | 2.5 | 10 | 168 | 196 | 16 | 445 | 57 | 152 | | P |
| 108102229 | GMT-11 | 67 | 0.945 | 2.63 | 10 | 184 | 179 | 15 | 424 | 61 | 0.946 | 2.6 | 9 | 171 | 174 | 15 | 250 | 59 | 160 | P | P |
| 108102230 | | | | | | | | | | 61 | 0.946 | 2.6 | 9 | 162 | 199 | 17 | 473 | 59 | 153 | | P |
| 108102233 | | | | | | | | | | 61 | 0.945 | 2.7 | 10 | 170 | 206 | 17 | 411 | 62 | 156 | | P |
| 108102237 | | | | | | | | | | 60 | 0.944 | 2.6 | 10 | 170 | 211 | 16 | 454 | 62 | 162 | | P |
| 108102238 | GMT-12 | 66 | 0.946 | 2.47 | 10 | 181 | 211 | 18 | 459 | 60 | | | | | | | | | | P | |

Notes:

1 Thickness was measured for every roll.

2 Smaller of machine direction (MD) and transverse direction (TD).

3 Project specifications for carbon black dispersion are: 8 of 10 in Category 1 or 2 and all in Category 1,2, or 3. Results are for Category 1 or 2.

4 A minimum of 1 test per lot was required.

Average Roll Area (460 ft x 23 ft): 10,580 $ft^2$
No. of Rolls in Lot: 13
Area in Lot: 137,540 $ft^2$

**SHEET NO.** 4 **OF** 7
**CUMULATIVE NUMBER OF ROLLS:** 106
**CUMULATIVE AREA:** 1,121,480 $ft^2$

## Table 5-2 (continued)

## CQA AND MQC TEST RESULTS FOR 60-mil TEXTURED GEOMEMBRANE (GSE)
## RESIN LOT NO. 8230912

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | | | | | | | | MANUFACTURING QUALITY CONTROL (MQC) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PROPERTY | Thickness (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Thickness[1] (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Tear Resistance[2] (lb) | Puncture Resistance (lb) |
| TEST STANDARD | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 1004 | ASTM D 4833 |
| PROJECT SPECS. | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 40 | ≥ 80 |
| TESTING FREQUENCY | 1 per 100,000 $ft^2$ (4) | | | | | | | | 1 per 50,000 $ft^2$ (4) | | | | | | | | | |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | | | | | | | | TEST RESULTS | | | | | | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | CQA | MQC |
| 108102241 | | | | | | | | | | 61 | 0.944 | 2.5 | 10 | 172 | 208 | 15 | 466 | 61 | 158 | | P |
| 108102245 | | | | | | | | | | 61 | 0.946 | 2.7 | 10 | 154 | 204 | 17 | 486 | 58 | 145 | | P |
| 108102247 | GMT-13 | 66 | 0.947 | 2.62 | 10 | 180 | 208 | 17 | 559 | 61 | | | | | | | | | | P | |
| 108102249 | | | | | | | | | | 61 | 0.945 | 2.5 | 10 | 153 | 191 | 17 | 514 | 57 | 145 | | P |
| 108102254 | | | | | | | | | | 61 | 0.94 | 2.8 | 10 | 149 | 187 | 18 | 509 | 55 | 142 | | P |
| 108102257 | GMT-14 | 66 | 0.947 | 2.62 | 10 | 175 | 213 | 15 | 503 | 61 | | | | | | | | | | P | |
| 108102258 | | | | | | | | | | 62 | 0.943 | 2.3 | 10 | 162 | 210 | 17 | 456 | 57 | 150 | | P |
| 108102262 | | | | | | | | | | 61 | 0.946 | 2.7 | 9 | 161 | 200 | 17 | 447 | 62 | 149 | | P |
| 108102266 | GMT-15 | 65 | 0.946 | 2.82 | 10 | 184 | 206 | 17 | 540 | 61 | 0.946 | 2.5 | 10 | 165 | 216 | 16 | 471 | 60 | 157 | P | P |
| 108102270 | | | | | | | | | | 61 | 0.944 | 2.7 | 10 | 161 | 175 | 16 | 438 | 61 | 163 | | P |
| 108102274 | | | | | | | | | | 61 | 0.948 | 2.4 | 10 | 170 | 205 | 16 | 454 | 64 | 164 | | P |
| 108102275 | GMT-16 | 68 | 0.947 | 2.61 | 10 | 180 | 214 | 17 | 568 | 63 | | | | | | | | | | P | |

Notes:

1 Thickness was measured for every roll.

2 Smaller of machine direction (MD) and transverse direction (TD).

3 Project specifications for carbon black dispersion are: 8 of 10 in Category 1 or 2 and all in Category 1,2, or 3. Results are for Category 1 or 2.

4 A minimum of 1 test per lot was required.

Average Roll Area (460 ft x 23 ft): 10,580 $ft^2$

No. of Rolls in Lot: 34

Area in Lot: 359,720 $ft^2$



CUMULATIVE NUMBER OF ROLLS: 140

CUMULATIVE AREA: 1,481,200 $ft^2$

## Table 5-2 (continued)

## CQA AND MQC TEST RESULTS FOR 60-mil TEXTURED GEOMEMBRANE (GSE)
## RESIN LOT NO. 8230914

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | | | | | | | | MANUFACTURING QUALITY CONTROL (MQC) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROPERTY** | Thickness (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Thickness[1] (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Tear Resistance[2] (lb) | Puncture Resistance (lb) |
| **TEST STANDARD** | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 1004 | ASTM D 4833 |
| **PROJECT SPECS.** | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 40 | ≥ 80 |
| **TESTING FREQUENCY** | 1 per 100,000 $ft^2$ (4) | | | | | | | | 1 per 50,000 $ft^2$ (4) | | | | | | | | | |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | | | | | | | | TEST RESULTS | | | | | | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | CQA | MQC |
| 108102280 | | | | | | | | | | 61 | 0.947 | 2.4 | 10 | 170 | 216 | 16 | 445 | 61 | 158 | | P |
| 108102283 | | | | | | | | | | 61 | 0.942 | 2.5 | 10 | 169 | 191 | 15 | 401 | 57 | 157 | | P |
| 108102286 | GM T-17 | 67 | 0.946 | 2.49 | 10 | 182 | 222 | 15 | 581 | 60 | | | | | | | | | | P | |
| 108102287 | | | | | | | | | | 60 | 0.948 | 2.6 | 10 | 163 | 162 | 15 | 308 | 59 | 155 | | P |
| 108102291 | | | | | | | | | | 60 | 0.948 | 2.6 | 10 | 172 | 185 | 15 | 447 | 61 | 160 | | P |
| 108102295 | GMT-18 | 67 | 0.945 | 2.58 | 10 | 181 | 219 | 17 | 576 | 60 | 0.947 | 2.5 | 10 | 172 | 187 | 16 | 458 | 63 | 158 | P | P |
| 108102298 | | | | | | | | | | 61 | 0.946 | 2.6 | 10 | 161 | 196 | 16 | 455 | 59 | 153 | | P |
| 108102302 | | | | | | | | | | 60 | 0.949 | 2.5 | 10 | 159 | 198 | 16 | 422 | 59 | 156 | | P |
| 108102304 | GMT-19 | 67 | 0.946 | 2.6 | 10 | 184 | 210 | 15 | 544 | 60 | | | | | | | | | | P | |
| 108102306 | | | | | | | | | | 60 | 0.948 | 2.6 | 10 | 168 | 200 | 16 | 386 | 61 | 160 | | P |
| 108102310 | | | | | | | | | | 60 | 0.948 | 2.6 | 10 | 170 | 208 | 15 | 462 | 62 | 158 | | P |
| 108102313 | GMT-20 | 66 | 0.946 | 2.51 | 10 | 176 | 217 | 16 | 557 | 61 | | | | | | | | | | P | |
| 108102314 | | | | | | | | | | 61 | 0.948 | 2.5 | 10 | 169 | 214 | 15 | 462 | 62 | 162 | | P |

Notes:

1 Thickness was measured for every roll.

2 Smaller of machine direction (MD) and transverse direction (TD).

3 Project specifications for carbon black dispersion are: 8 of 10 in Category 1 or 2 and all in Category 1,2, or 3. Results are for Category 1 or 2.

4 A minimum of 1 test per lot was required.

Average Roll Area (460 ft x 23 ft): 10,580 $ft^2$

No. of Rolls in Lot: 40

Area in Lot: 423,200 $ft^2$



CUMULATIVE NUMBER OF ROLLS: 180

CUMULATIVE AREA: 1,904,400 $ft^2$

## Table 5-2 (continued)

## CQA AND MQC TEST RESULTS FOR 60-mil TEXTURED GEOMEMBRANE (GSE)
## RESIN LOT NO. 8230916

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | | | | | | | | MANUFACTURING QUALITY CONTROL (MQC) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROPERTY** | Thickness (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Thickness[1] (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Tear Resistance[2] (lb) | Puncture Resistance (lb) |
| **TEST STANDARD** | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 1004 | ASTM D 4833 |
| **PROJECT SPECS.** | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 40 | ≥ 80 |
| **TESTING FREQUENCY** | 1 per 100,000 $ft^2$ (4) | | | | | | | | 1 per 50,000 $ft^2$ (4) | | | | | | | | | |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | | | | | | | | TEST RESULTS | | | | | | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | CQA | MQC |
| 108102318 | | | | | | | | | | 60 | 0.947 | 2.7 | 10 | 166 | 182 | 16 | 446 | 61 | 160 | | P |
| 108102322 | GMT-21 | 70 | 0.946 | 2.56 | 10 | 182 | 201 | 19 | 539 | 61 | 0.948 | 2.6 | 10 | 167 | 166 | 15 | 430 | 60 | 163 | P | P |
| 108102326 | | | | | | | | | | 60 | 0.947 | 2.5 | 10 | 165 | 185 | 16 | 451 | 63 | 163 | | P |
| 108102333 | | | | | | | | | | 62 | 0.946 | 2.3 | 10 | 169 | 203 | 17 | 462 | 62 | 155 | | P |

Notes:

1 Thickness was measured for every roll.

2 Smaller of machine direction (MD) and transverse direction (TD).

3 Project specifications for carbon black dispersion are: 8 of 10 in Category 1 or 2 and all in Category 1,2, or 3. Results are for Category 1 or 2.

4 A minimum of 1 test per lot was required.

Average Roll Area (460 ft x 23 ft): 10,580 $ft^2$

No. of Rolls in Lot: 11

Area in Lot: 116,380 $ft^2$



CUMULATIVE NUMBER OF ROLLS: 191

CUMULATIVE AREA: 2,020,780 $ft^2$

## Table 5-3A

## NONDESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY LINER INSTALLED IN CELL 1A

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| P1-P2 | 453 | - | 34 | 0 | P |
| P1-P27 | 23 | - | 35 | 0 | P |
| P2-P3 | 455 | - | 34 | 0 | P |
| P2-P27 | 22 | - | 35 | 0 | P |
| P3-P4 | 458 | - | 33 | 0 | P |
| P3-P27 | 22 | - | 35 | 0 | P |
| P4-P5 | 456 | - | 34 | 0 | P |
| P4-P27 | 23 | - | 35 | 0 | P |
| P5-P6 | 455 | - | 34 | 0 | P |
| P5-P26 | 17 | - | 34 | 0 | P |
| P5-P27 | 6 | - | 33 | 0 | P |
| P6-P7 | 457 | - | 34 | 0 | P |
| P6-P26 | 22 | - | 35 | 0 | P |
| P7-P8 | 457 | - | 34 | 0 | P |
| P7-P26 | 22 | - | 35 | 0 | P |
| P8-P9 | 460 | - | 34 | 0 | P |
| P8-P26 | 23 | - | 35 | 0 | P |
| P9-P10 | 458 | - | 34 | 0 | P |
| P9-P26 | 22 | - | 35 | 0 | P |
| P10-P11 | 379 | - | 30 | 0 | P |
| P10-P11A | 76 | - | 30 | 0 | P |
| P10-P26 | 22 | - | 35 | 0 | P |
| P11-P11A | 23 | - | 30 | 0 | P |
| P11-P12 | 379 | - | 30 | 0 | P |
| P11A-P12 | 76 | - | 30 | 0 | P |
| P11A-P26 | 22 | - | 33 | 0 | P |
| P12-P13 | 458 | - | 30 | 0 | P |
| P12-P26 | 24 | - | 34 | 0 | P |
| P13-P14 | 458 | - | 30 | 0 | P |
| P13-P26 | 22 | - | 35 | 0 | P |
| P14-P15 | 458 | - | 30 | 0 | P |
| P14-P26 | 22 | - | 35 | 0 | P |
| P15-P16 | 460 | - | 30 | 0 | P |
| P15-P26 | 23 | - | 34 | 0 | P |
| P16-P17 | 458 | - | 30 | 0 | P |
| P16-P26 | 22 | - | 35 | 0 | P |
| P17-P18 | 455 | - | 30 | 1 | P |
| P17-P26 | 22 | - | 34 | 1 | P |
| P18-P19 | 455 | - | 30 | 0 | P |
| P18-P26 | 23 | - | 34 | 1 | P |
| P19-P20 | 455 | - | 30 | 1 | P |
| P19-P26 | 22 | - | 34 | 1 | P |
| P20-P21 | 455 | - | 30 | 0 | P |
| P20-P26 | 22 | - | 34 | 0 | P |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-3A (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY LINER INSTALLED IN CELL 1A

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| P21-P22 | 455 | - | 30 | 0 | P |
| P21-P26 | 22 | - | 35 | 1 | P |
| P22-P23 | 455 | - | 30 | 0 | P |
| P22-P26 | 22 | - | 35 | 0 | P |
| P23-P24 | 455 | - | 33 | 0 | P |
| P23-P26 | 23 | - | 35 | 0 | P |
| P24-P25 | 455 | - | 35 | 0 | P |
| P24-P26 | 23 | - | 35 | 0 | P |
| P25-P93 | 4 | - | 30 | 1 | P |
| P26-P27 | 23 | - | 35 | 1 | P |
| P26-P28 | 453 | - | 34 | 0 | P |
| P26-P93 | 20 | - | 30 | 0 | P |
| P27-P32 | 97 | - | 34 | 0 | P |
| P28-P29 | 459 | - | 35 | 0 | P |
| P28-P32 | 22 | - | 35 | 0 | P |
| P28-P94 | 21 | - | 30 | 0 | P |
| P29-P30 | 459 | - | 35 | 0 | P |
| P29-P33 | 22 | - | 34 | 0 | P |
| P29-P97 | 22 | - | 30 | 0 | P |
| P30-P31 | 459 | - | 34 | 0 | P |
| P30-P34 | 22 | - | 33 | 0 | P |
| P30-P96 | 23 | - | 30 | 0 | P |
| P31-P35 | 22 | - | 34 | 0 | P |
| P31-P36 | 458 | - | 35 | 0 | P |
| P31-P98 | 18 | - | 30 | 0 | P |
| P32-P33 | 96 | - | 35 | 0 | P |
| P33-P34 | 96 | - | 34 | 0 | P |
| P34-P35 | 96 | - | 34 | 0 | P |
| P35-P39 | 97 | - | 35 | 0 | P |
| P36-P37 | 458 | - | 35 | 0 | P |
| P36-P39 | 22 | - | 35 | 0 | P |
| P37-P38 | 458 | - | 35 | 0 | P |
| P37-P40 | 22 | - | 35 | 0 | P |
| P38-P42 A | 37 | - | 35 | 0 | P |
| P38-P42 B | 424 | - | 35 | 0 | P |
| P39-P40 | 97 | - | 35 | 0 | P |
| Cap8-P39 | 242 | P | - | - | - |
| P41-P38 | 22 | - | 35 | 0 | P |
| P41-P40 | 97 | - | 35 | 0 | P |
| P41-P43 | 97 | - | 35 | 0 | P |
| P42-P43 | 22 | - | 35 | 0 | P |
| P44-P43 | 22 | - | 33 | 0 | P |
| P44-P45 A | 62 | - | 34 | 1 | P |
| P44-P45 B | 58 | - | 35 | 0 | P |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-3A (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY LINER INSTALLED IN CELL 1A

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| P45-P43 | 22 | - | 33 | 0 | P |
| P45-P46 | 58 | - | 34 | 0 | P |
| P46-P43 | 22 | - | 33 | 0 | P |
| P46-P47 | 58 | - | 36 | 0 | P |
| P47-P43 | 22 | - | 33 | 0 | P |
| P47-P48 | 60 | - | 36 | 1 | P |
| P48-P42 | 12 | - | 35 | 0 | P |
| P48-P43 | 10 | - | 33 | 0 | P |
| P48-P49 | 60 | - | 35 | 0 | P |
| P49-P42 | 22 | - | 35 | 0 | P |
| P49-P50 | 60 | - | 35 | 0 | P |
| P50-P42 | 23 | - | 35 | 0 | P |
| P50-P51 | 60 | - | 40 | 2 | P |
| P51-P42 | 24 | - | 35 | 0 | P |
| P51-P52 | 60 | - | 35 | 0 | P |
| P52-P42 | 21 | - | 35 | 0 | P |
| P52-P53 | 60 | - | 35 | 0 | P |
| P53-P42 | 22 | - | 35 | 0 | P |
| P53-P54 | 60 | - | 34 | 0 | P |
| P54-P42 | 21 | - | 35 | 0 | P |
| P54-P55 | 60 | - | 34 | 2 | P |
| P55-P42 | 24 | - | 35 | 0 | P |
| P55-P56 | 60 | - | 35 | 0 | P |
| Cap4-P55 | 16 | P | - | - | - |
| Cap8-P55 | 16 | P | - | - | - |
| P56-P42 | 23 | - | 35 | 0 | P |
| P56-P57 | 60 | - | 33 | 0 | P |
| Cap5-P56 | 16 | P | - | - | - |
| Cap8-P56 | 21 | P | - | - | - |
| P57-P42 | 22 | - | 35 | 0 | P |
| P57-P58 | 60 | - | 34 | 2 | P |
| Cap6-P57 | 16 | P | - | - | - |
| Cap8-Cap6 | 2 | P | - | - | - |
| Cap8-P57 | 23 | P | - | - | - |
| P58-P42 | 23 | - | 35 | 0 | P |
| P58-P59 | 60 | - | 35 | 1 | P |
| Cap6-P58 | 16 | P | - | - | - |
| Cap8-P58 | 21 | P | - | - | - |
| P59-P42 | 22 | - | 35 | 0 | P |
| P59-P60 | 60 | - | 35 | 0 | P |
| Cap8-P59 | 22 | P | - | - | - |
| P60-P42 | 23 | - | 35 | 0 | P |
| P60-P61 | 60 | - | 36 | 2 | P |
| Cap8-P60 | 23 | P | - | - | - |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-3A (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY LINER INSTALLED IN CELL 1A

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| P61-P42 | 22 | - | 35 | 0 | P |
| P61-P62 | 60 | - | 36 | 0 | P |
| P61-Cap3 | 51 | P | - | - | - |
| Cap8-P61 A | 13 | P | - | - | - |
| Cap8-P61 B | 5 | P | - | - | - |
| Cap8-Cap7 | 2 | P | - | - | - |
| P62-P42 | 22 | - | 35 | 0 | P |
| P62-P63 | 60 | - | 34 | 0 | P |
| P62-Cap2 | 41 | P | - | - | - |
| P62-Cap3 | 51 | P | - | - | - |
| Cap8-P62 A | 27 | P | - | - | - |
| Cap8-P62 B | 20 | P | - | - | - |
| P63-P42 | 23 | - | 35 | 0 | P |
| P63-P64 | 60 | - | 35 | 0 | P |
| P63-Cap1 | 22 | P | - | - | - |
| P63-Cap2 | 41 | P | - | - | - |
| P64-P42 | 23 | - | 35 | 0 | P |
| P64-P65 | 60 | - | 35 | 0 | P |
| P64-Cap1 | 22 | P | - | - | - |
| Cap8-P64 | 23 | P | - | - | - |
| P65-P42 | 22 | - | 35 | 0 | P |
| P65-P66 | 4 | P | - | - | - |
| Cap8-P65 | 22 | P | - | - | - |
| P68-P99 | 63 | - | 34 | 0 | P |
| P69-P25 | 455 | - | 35 | 0 | P |
| P69-P70 | 452 | - | 33 | 0 | P |
| P69-P93 | 22 | - | 30 | 0 | P |
| P69-RS134 | 25 | P | - | - | P |
| P70-71 | 450 | - | 32 | 0 | P |
| P70-P93 | 23 | - | 30 | 0 | P |
| P70-RS134 | 13 | P | - | - | - |
| P71-P72 | 310 | - | 36 | 0 | P |
| P71-P93 | 22 | - | 30 | 0 | P |
| P72-P89 | 22 | - | 30 | 0 | P |
| P72-P90 | 22 | - | 30 | 0 | P |
| P72-P91 | 22 | - | 30 | 0 | P |
| P72-P92 | 22 | - | 30 | 0 | P |
| P72-P93 | 22 | - | 30 | 0 | P |
| P73-P71 | 22 | - | 32 | 0 | P |
| P73-RS134 | 14 | P | - | - | - |
| P74-P71 | 22 | - | 32 | 0 | P |
| P74-P73 | 45 | - | 32 | 0 | P |
| P75-P71 | 22 | - | 33 | 1 | P |
| P75-P74 | 56 | - | 33 | 0 | P |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-3A (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY LINER INSTALLED IN CELL 1A

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| P76-P71 | 22 | - | 33 | 0 | P |
| P76-P75 | 66 | - | 30 | 0 | P |
| P77-P71 | 22 | - | 33 | 0 | P |
| P77-P72 | 20 | - | 33 | 0 | P |
| P77-P76 | 75 | - | 32 | 0 | P |
| P77-RS134 | 14 | P | - | - | - |
| P78-P72 | 22 | - | 32 | 0 | P |
| P78-P77 | 58 | - | 33 | 0 | P |
| P79-P72 | 23 | - | 32 | 0 | P |
| P79-P78 | 67 | - | 30 | 0 | P |
| P80-P72 | 22 | - | 32 | 0 | P |
| P80-P79 | 67 | - | 32 | 0 | P |
| P81-P72 | 22 | - | 32 | 0 | P |
| P81-P80 | 67 | - | 32 | 0 | P |
| P82-P72 | 23 | - | 32 | 0 | P |
| P82-P81 | 68 | - | 33 | 0 | P |
| P83-P72 | 23 | - | 34 | 0 | P |
| P83-P82 | 67 | - | 32 | 0 | P |
| P84-P72 | 23 | - | 34 | 0 | P |
| P84-P83 | 67 | - | 35 | 0 | P |
| P85-P72 | 23 | - | 34 | 0 | P |
| P85-P84 | 67 | - | 31 | 0 | P |
| P86-P72 | 22 | - | 34 | 0 | P |
| P86-P85 | 67 | - | 34 | 0 | P |
| P87-P72 | 23 | - | 34 | 0 | P |
| P87-P86 | 67 | - | 34 | 0 | P |
| P88-P72 | 22 | - | 34 | 0 | P |
| P88-P87 | 67 | - | 33 | 0 | P |
| P88-P89 | 63 | - | 30 | 0 | P |
| P89-P90 | 63 | - | 40 | 0 | P |
| P90-P91 | 63 | - | 35 | 0 | P |
| P91-P92 | 63 | - | 30 | 0 | P |
| P92-P93 | 63 | - | 30 | 0 | P |
| P93-P94 | 160 | - | 30 | 0 | P |
| P94-P37 | 22 | - | 31 | 0 | P |
| P94-P95 | 115 | - | 30 | 0 | P |
| P94-P97 | 45 | - | 30 | 0 | P |
| P95-P96 | 114 | - | 30 | 0 | P |
| P95-P97 | 22 | - | 30 | 0 | P |
| P96-P98 | 160 | - | 30 | 0 | P |
| P97-P96 | 46 | - | 30 | 0 | P |
| P98-P99 | 22 | - | 30 | 0 | P |
| P98-P100 | 22 | - | 34 | 0 | P |
| P98-P101 | 116 | - | 34 | 0 | P |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-3A (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY LINER INSTALLED IN CELL 1A

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| P99-P31 | - | P | - | - | - |
| P99-P36 | 23 | - | 32 | 0 | P |
| P99-P37 | 22 | - | 31 | 0 | P |
| P99-P38 | 23 | - | 30 | 0 | P |
| P99-P42 | 22 | - | 30 | 0 | P |
| P99-P100 A | 155 | - | 34 | 0 | P |
| P99-P100 B | 185 | - | 34 | 0 | P |
| P100-P101 | 22 | - | 32 | 0 | P |
| P100-P117 | 44 | - | 34 | 0 | P |
| P101-P100 | 22 | - | 32 | 0 | P |
| P101-P102 | 25 | - | 32 | 0 | P |
| P101-P104 | 39 | - | 34 | 0 | P |
| P101-P105 | 6 | - | 32 | 0 | P |
| P101-P106 | 23 | - | 32 | 0 | P |
| P102-P103 | 25 | - | 34 | 0 | P |
| P103-P104 | 64 | - | 36 | 0 | P |
| P104-P106 | 23 | - | 32 | 0 | P |
| P104-P107 | 23 | - | 31 | 0 | P |
| P104-P108 | 24 | - | 35 | 0 | P |
| P104-P109 | 18 | - | 32 | 0 | P |
| P104-P113 | 19 | - | 34 | 0 | P |
| P105-P100 | 7 | - | 31 | 0 | P |
| P105-P106 | 10 | - | 33 | 0 | P |
| P106-P100 | 29 | - | 30 | 0 | P |
| P107-P100 | 30 | - | 32 | 0 | P |
| P107-P106 | 34 | - | 32 | 0 | P |
| P108-P100 | 2 | - | 33 | 0 | P |
| P108-P107 | 79 | - | 30 | 0 | P |
| P108-P109 | 74 | - | 34 | 0 | P |
| P108-P116 | 18 | - | 30 | 0 | P |
| P108-P117 | 36 | - | 33 | 0 | P |
| P109-P110 | 28 | - | 30 | 0 | P |
| P109-P113 | 19 | - | 34 | 0 | P |
| P109-P116 A | 55 | - | 36 | 0 | P |
| P109-P116 B | 37 | - | 34 | 0 | P |
| P109-P117 | 16 | - | 30 | 0 | P |
| P110-P111 | 11 | - | - | - | - |
| P110-P112 | 19 | - | 34 | 0 | P |
| P110-P113 | 13 | - | - | - | - |
| P111-P112 | 15 | - | - | - | - |
| P112-P113 | 25 | - | 31 | 0 | P |
| P113-P114 | 23 | - | 30 | 0 | P |
| P115-P113 | 19 | - | - | - | - |
| P115-P114 | 11 | - | - | - | - |
| P115-P116 | 12 | - | - | - | - |
| P116-P114 | 17 | - | 30 | 0 | P |
| P118-P119 | 61 | P | - | - | - |
| P118-P120 | 6 | P | - | - | - |
| P119-P120 | 22.5 | P | - | - | - |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-3B

## NONDESTRUCTIVE SEAM TEST RESULTS FOR SECONDARY LINER INSTALLED IN CELL 1A

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| S2-S1 | 457 | - | 35 | 0 | P |
| S3-S2 A | 13 | - | 35 | 0 | P |
| S3-S2 B | 444 | - | 35 | 0 | P |
| S4-S3 | 457 | - | 35 | 1 | P |
| S5-S4 | 456 | - | 35 | 1 | P |
| S5-S26 | 13 | P | - | - | - |
| S6-S5 | 457 | - | 35 | 0 | P |
| S6-S26 | 23 | P | - | - | - |
| S7-S6 | 457 | - | 35 | 0 | P |
| S7-S26 | 23 | - | 31 | 0 | P |
| S8-S7 | 455 | - | 35 | 0 | P |
| S8-S9 | 455 | - | 32 | 0 | P |
| S8-S26 | 23 | - | 31 | 0 | P |
| S9-S10 | 455 | - | 30 | 0 | P |
| S9-S26 | 23 | - | 32 | 0 | P |
| S10-S11 | 455 | - | 30 | 0 | P |
| S10-S26 | 23 | - | 31 | 0 | P |
| S11-S12 | 456 | - | 30 | 0 | P |
| S11-S26 | 23 | - | 31 | 0 | P |
| S12-S13 | 457 | - | 30 | 0 | P |
| S12-S26 | 23 | - | 32 | 0 | P |
| S13-S14 | 456 | - | 30 | 0 | P |
| S13-S26 | 23 | - | 32 | 0 | P |
| S14-S15 | 457 | - | 35 | 0 | P |
| S14-S26 | 23 | - | 31 | 0 | P |
| S15-S16 | 458 | - | 34 | 0 | P |
| S15-S26 | 23 | - | 32 | 0 | P |
| S16-S17 | 460 | - | 34 | 0 | P |
| S16-S26 | 23 | - | 31 | 0 | P |
| S17-S18 | 456 | - | 32 | 0 | P |
| S17-S26 | 23 | - | 32 | 0 | P |
| S18-S19 | 460 | - | 35 | 0 | P |
| S18-S26 | 23 | - | 32 | 0 | P |
| S19-S20 | 461 | - | 35 | 0 | P |
| S19-S26 | 23 | - | 31 | 0 | P |
| S20-S21 | 460 | - | 35 | 0 | P |
| S20-S26 | 23 | - | 32 | 0 | P |
| S21-S22 | 458 | - | 35 | 0 | P |
| S21-S26 | 23 | - | 32 | 0 | P |
| S22-S23 | 457 | - | 35 | 0 | P |
| S22-S26 | 23 | - | 32 | 0 | P |
| S23-S24 | 455 | - | 35 | 0 | P |
| S23-S26 | 23 | - | 32 | 0 | P |
| S24-S25 | 457 | - | 35 | 0 | P |
| S24-S26 | 23 | - | 32 | 0 | P |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-3B (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR SECONDARY LINER INSTALLED IN CELL 1A

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| S25-S26 | 23 | - | 32 | 0 | P |
| S25-S79 A | 385 | - | 35 | 0 | P |
| S25-S79 B | 27 | - | 34 | 0 | P |
| S26-S27 | 463 | - | 35 | 0 | P |
| S26-S31 | 23 | - | 35 | 0 | P |
| S26-S79 | 22 | - | 31 | 0 | P |
| S27-S28 | 463 | - | 35 | 0 | P |
| S27-S32 | 23 | - | 33 | 0 | P |
| S27-S79 | 24 | - | 32 | 0 | P |
| S28-S29 | 463 | - | 35 | 0 | P |
| S28-S33 | 23 | - | 35 | 0 | P |
| S28-S84 | 22 | - | 33 | 0 | P |
| S29-S30 | 463 | - | 35 | 0 | P |
| S29-S34 | 23 | - | 34 | 0 | P |
| S29-S84 | 22 | - | 33 | 0 | P |
| S30-S35 | 23 | - | 34 | 0 | P |
| S30-S36 | 463 | - | 35 | 0 | P |
| S30-S84 | 22 | - | 33 | 0 | P |
| S31-S32 A | 100 | - | 35 | 0 | P |
| S31-S32 B | 23 | P | - | - | - |
| S31-S1 | 23 | P | - | - | - |
| S31-S2 | 23 | P | - | - | - |
| S31-S4 | 23 | P | - | - | - |
| S31-S5 | 10 | P | - | - | - |
| S31-S6 | 23 | P | - | - | - |
| S32-S33 | 100 | - | 35 | 0 | P |
| S33-S34 | 100 | - | 35 | 0 | P |
| S34-S35 | 100 | - | 35 | 0 | P |
| S35-S40 | 97 | - | 35 | 0 | P |
| S36-S37 | 463 | - | 35 | 0 | P |
| S36-S84 | 22 | - | 33 | 0 | P |
| S36-S130 | 18 | P | - | - | - |
| S37-S38 | 462 | - | 35 | 0 | P |
| S37-S84 | 22 | - | 33 | 0 | P |
| S37-S130 | 22 | P | - | - | - |
| S38-S39 | 462 | - | 35 | 0 | P |
| S38-S84 | 22 | - | 33 | 0 | P |
| S38-S130 | 22 | P | - | - | - |
| S39-S43 | 22 | - | 35 | 0 | P |
| S39-S82 | 22 | - | 30 | 0 | P |
| S39-S83 | 22 | - | 34 | 0 | P |
| S39-S84 | 22 | - | 33 | 0 | P |
| Cap3-S39 | 123 | P | - | - | - |
| S39-S130 | 21 | P | - | - | - |
| S40-S41 | 98 | - | 35 | 0 | P |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-3B (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR SECONDARY LINER INSTALLED IN CELL 1A

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| S40-S36 | 22 | - | 34 | 1 | P |
| S41-S42 | 100 | - | 35 | 0 | P |
| S41-S37 | 22 | - | 35 | 0 | P |
| S42-S43 | 100 | - | 35 | 0 | P |
| S44-S43 | 22 | - | 35 | 0 | P |
| S44-S45 | 57 | - | 35 | 0 | P |
| S45-S43 | 22 | - | 35 | 0 | P |
| S45-S46 | 59 | - | 35 | 0 | P |
| S46-S43 | 22 | - | 35 | 0 | P |
| S46-S47 | 57 | - | 34 | 0 | P |
| S47-S43 | 22 | - | 35 | 0 | P |
| S47-S48 | 59 | - | 35 | 0 | P |
| S48-S39 | 10 | - | 35 | 0 | P |
| S48-S43 | 12 | - | 35 | 0 | P |
| S48-S49 | 59 | - | 35 | 0 | P |
| S49-S39 | 23 | - | 35 | 0 | P |
| S49-S50 | 59 | - | 35 | 0 | P |
| S50-S39 | 22 | - | 35 | 0 | P |
| S50-S51 | 59 | - | 34 | 1 | P |
| S51-S39 | 23 | - | 35 | 0 | P |
| S51-S52 | 59 | - | 34 | 0 | P |
| S52-S39 | 22 | - | 35 | 0 | P |
| S52-S53 | 59 | - | 35 | 0 | P |
| S53-S39 | 22 | - | 35 | 0 | P |
| S53-S54 | 59 | - | 34 | 0 | P |
| S54-S39 | 23 | - | 35 | 0 | P |
| S54-S55 | 60 | - | 35 | 0 | P |
| S55-S39 | 22 | - | 35 | 0 | P |
| S55-S56 | 60 | - | 35 | 1 | P |
| S56-S39 | 23 | - | 35 | 0 | P |
| S56-S57 | 60 | - | 35 | 0 | P |
| S57-S39 | 22 | - | 35 | 0 | P |
| S57-S58 | 60 | - | 35 | 0 | P |
| S58-S39 | 22 | - | 35 | 0 | P |
| S58-S59 | 60 | - | 34 | 1 | P |
| S59-S39 | 22 | - | 35 | 0 | P |
| S59-S60 | 60 | - | 36 | 1 | P |
| S60-S39 | 22 | - | 35 | 0 | P |
| S60-S61 | 60 | - | 35 | 0 | P |
| S61-S39 | 22 | - | 35 | 0 | P |
| S61-S62 | 60 | - | 35 | 0 | P |
| S62-S39 | 22 | - | 35 | 0 | P |
| S62-S63 | 61 | - | 35 | 0 | P |
| Cap3-Cap2-P | 4 | P | - | - | - |
| Cap3-S63 | 12 | P | - | - | - |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-3B (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR SECONDARY LINER INSTALLED IN CELL 1A

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| S63-S39 | 22 | - | 35 | 0 | P |
| S63-S64 | 57 | - | 35 | 0 | P |
| S63-S65 | 4 | - | 35 | 0 | P |
| S64-S65 | 22 | - | 35 | 0 | P |
| S64-S66 | 57 | - | 35 | 0 | P |
| S65-S39 | 22 | - | 35 | 0 | P |
| S65-S66 | 4 | P | - | - | - |
| Cap3-S65 | 20 | P | - | - | - |
| S66-S39 | 23 | - | 35 | 0 | P |
| S66-S67 | 62 | - | 35 | 0 | P |
| Cap3-S66 A | 17 | P | - | - | - |
| Cap3-S66 B | 22 | P | - | - | - |
| S67-S39 | 22 | - | 35 | 0 | P |
| S67-S82 | 62 | - | 30 | 0 | P |
| Cap3-S67 | 4 | P | - | - | - |
| S68-S69 A | 26 | - | 30 | 0 | P |
| S68-S69 B | 44 | - | 31 | 1 | P |
| S68-S78 A | 52 | - | 30 | 0 | P |
| S68-S78 B | 0 | P | - | - | - |
| S68-S78 C | 0 | - | 30 | 0 | P |
| S68-S127 | 60 | P | - | - | - |
| S69-S70 A | 43 | - | 30 | 0 | P |
| S69-S70 B | 41 | - | 30 | 0 | P |
| S70-S71 | 15 | - | 32 | 0 | P |
| S70-S73 | 32 | - | 30 | 0 | P |
| S71-S72 | 20 | - | 31 | 0 | P |
| S72-S73 | 15 | - | 30 | 0 | P |
| S73-S74 | 41 | - | 31 | 0 | P |
| S74-S75 | 15 | - | 30 | 0 | P |
| S74-S77 | 32 | - | 30 | 0 | P |
| S76-S77 A | 20 | - | 31 | 0 | P |
| S76-S77 B | 10 | P | - | - | - |
| S79-S80 | 460 | - | 34 | 0 | P |
| S79-S88 | 5 | P | - | - | - |
| S80-S81 | 385 | - | 36 | 0 | P |
| S80-S88 | 18 | - | 34 | 0 | P |
| S82-S83 | 61 | - | 30 | 0 | P |
| Cap3-S82 | 22 | P | - | - | - |
| S83-S84 | 57 | - | 36 | 0 | P |
| Cap3-S83 | 19 | P | - | - | - |
| S84-S79 | 18 | - | 35 | 0 | P |
| S84-S85 | 18 | - | 34 | 0 | P |
| S84-S86 | 50 | - | 34 | 0 | P |
| S84-S88 | 128 | - | 36 | 0 | P |
| S84-S131 | 22 | P | - | - | - |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-3B (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR SECONDARY LINER INSTALLED IN CELL 1A

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| S84-S130 | 21 | P | - | - | - |
| S84A-S130 | 20 | - | 30 | 0 | P |
| S85-S86 | 17 | - | 32 | 0 | P |
| S86-S87 | 65 | - | 34 | 0 | P |
| S86-S131 | 22 | P | - | - | - |
| S87-S68 | 24 | - | 32 | 0 | P |
| S87-S69 | 24 | - | 32 | 0 | P |
| S87-S88 | 22 | - | 36 | 0 | P |
| S87-S78 | 14 | - | 32 | 0 | P |
| S87-S131 | 19 | P | - | - | - |
| S114-S128 | 60 | - | 29 | 0 | P |
| S117-S128 | 6 | P | - | - | - |
| S119-S128 | 23 | P | - | - | - |
| S127-S87 | 22 | P | - | - | - |
| S127-S131 | 5 | P | - | - | - |
| S127-S132 A | 23 | - | 30 | 0 | P |
| S127-S132 B | 23 | - | 30 | 0 | P |
| S127-S133 A | 22 | - | 30 | 0 | P |
| S127-S133 B | 22 | - | 30 | 0 | P |
| S128-S68 | 20 | P | - | - | - |
| S128-S69 | 20 | P | - | - | - |
| S128-S127 | 24 | P | - | - | - |
| S128-S129 | 19 | - | 30 | 0 | P |
| S128-S131 A | 8 | - | 30 | 0 | P |
| S128-S131 B | 6 | - | 30 | 0 | P |
| S128-S132 A | 39 | - | 30 | 0 | P |
| S128-S132 B | 38 | - | 30 | 0 | P |
| S129-S68 | 2 | P | - | - | - |
| S130-S131 A | 71 | - | 30 | 0 | P |
| S130-S131 B | 77 | - | 30 | 0 | P |
| S131-S116 | 22 | - | 30 | 0 | P |
| S131-S132 A | 25 | - | 30 | 0 | P |
| S131-S132 B | 23 | - | 30 | 0 | P |
| S131-S133 A | 24 | - | 30 | 0 | P |
| S131-S133 B | 22 | - | 30 | 0 | P |
| S132-S133 A | 18 | - | 30 | 0 | P |
| S132-S133 B | 18 | - | 30 | 0 | P |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-3C

## NONDESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY AND SECONDARY LINERS INSTALLED IN THE LEACHATE STORAGE AREA

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| P1-P2 A | 25 | - | 30 | 0 | P |
| P1-P2 B | 291 | - | 30 | 0 | P |
| P2-P3 | 316 | - | 30 | 0 | P |
| P3-P15 | 23 | - | 30 | < 3 | P |
| P3-P17 | 22 | - | 30 | < 3 | P |
| P3-P20 | 76 | - | 30 | < 3 | P |
| P3-P23 | 23 | - | 30 | < 3 | P |
| P3-P24 | 22 | - | 30 | < 3 | P |
| P3-P25 | 22 | - | 30 | < 3 | P |
| P3-P26 | 22 | - | 30 | < 3 | P |
| P4-P1 | 12 | - | 30 | 0 | P |
| P4-P5 | 40 | - | 30 | 0 | P |
| P4-P9 | 40 | - | 30 | 0 | P |
| P4-P53 | 23 | P | - | - | - |
| P5-P1 | 22 | - | 30 | 0 | P |
| P5-P54 | 22 | P | - | - | - |
| P5-P6 | 40 | - | 30 | 0 | P |
| P6-P7 | 40 | - | 30 | 0 | P |
| P6-P55 | 23 | P | - | - | - |
| P7-P1 | 22 | - | 30 | 0 | P |
| P7-P8 | 40 | - | 30 | 0 | P |
| P7-P56 | 23 | P | - | - | - |
| P8-P1 | 22 | - | 30 | 0 | P |
| P8-P12 | 29 | - | 30 | 0 | P |
| P8-P57 | 19 | P | - | - | - |
| P9-P1 | 2 | P | - | - | - |
| P9-P10 | 32 | - | 30 | 0 | P |
| P9-P11 | 14 | - | 30 | 0 | P |
| P9-P52 | 23 | P | - | - | - |
| P10-P1 | 28 | - | 33 | 0 | P |
| P11-P10 | 11 | - | 30 | 0 | P |
| P12-P1 | 24 | - | 30 | 0 | P |
| P13-P3 | 46 | - | 30 | 0 | P |
| P14-P3 | 22 | - | 30 | 0 | P |
| P14-P15 | 53 | - | 30 | 0 | P |
| P14-P16 | 31 | - | 30 | 0 | P |
| P15-P17 | 53 | - | 30 | 0 | P |
| P16-P44 | 21 | - | 30 | 0 | P |
| P17-P18 | 31 | - | 30 | 0 | P |
| P17-P20 | 22 | - | 30 | < 3 | P |
| P18-P19 | 21 | - | 30 | 0 | P |
| P18-P20 | 8 | - | 30 | < 3 | P |
| P18-P31 | 12 | - | 30 | 0 | P |
| P19-P30 | 15 | - | 30 | 0 | P |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-3C (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY AND SECONDARY LINERS INSTALLED IN THE LEACHATE STORAGE AREA

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| P20-P21 | 65 | - | 30 | 0 | P |
| P21-P22 | 30 | - | 30 | 0 | P |
| P22-P23 | 31 | - | 30 | 0 | P |
| P22-P30 | 12 | P | - | - | - |
| P23-P20 | 21 | - | 30 | 0 | P |
| P23-P24 | 52 | - | 30 | 0 | P |
| P24-P25 | 52 | - | 30 | 0 | P |
| P25-P26 | 52 | - | 30 | 0 | P |
| P26-P27 | 22 | - | 30 | < 3 | P |
| P26-P28 | 30 | - | 30 | 0 | P |
| P27-P3 | 33 | - | 30 | < 3 | P |
| P28-P29 | 29 | - | 30 | < 3 | P |
| P29-P27 | 33 | - | 30 | < 3 | P |
| P30-P20 | 12 | - | 30 | < 3 | P |
| P30-P21 | 20 | - | 30 | < 3 | P |
| P30-P22 | 12 | - | 30 | < 3 | P |
| P30-P31 | 24 | - | 30 | < 3 | P |
| P31-P30 | 9 | - | 30 | < 3 | P |
| P32-P1 | 38 | - | 30 | 0 | P |
| P32-P33 | 15 | - | 30 | 0 | P |
| P32-P34 | 2 | P | - | - | - |
| P32-P35 | 32 | - | 30 | 0 | P |
| P33-P34 | 17 | - | 30 | 0 | P |
| P34-P35 | 14 | - | 30 | 0 | P |
| P34-P67 | 7 | P | - | - | - |
| P35-P1 | 2 | P | - | - | - |
| P35-P36 | 40 | - | 30 | 0 | P |
| P35-P66 | 6 | P | - | - | - |
| P35-P67 | 16 | P | - | - | - |
| P36-P1 | 22 | - | 30 | 0 | P |
| P36-P37 | 40 | - | 30 | 0 | P |
| P36-P65 | 6 | P | - | - | - |
| P36-P66 | 17 | P | - | - | - |
| P37-P1 | 23 | - | 30 | 1 | P |
| P37-P38 | 40 | - | 30 | 0 | P |
| P37-P64 | 7 | P | - | - | - |
| P37-P65 | 16 | P | - | - | - |
| P38-P1 | 22 | - | 30 | 0 | P |
| P38-P39 | 40 | - | 30 | 0 | P |
| P38-P63 | 7 | P | - | - | - |
| P38-P64 | 15 | P | - | - | - |
| P39-P40 | 44 | - | 30 | 0 | P |
| P39-P62 | 6 | P | - | - | - |
| P39-P63 | 17 | P | - | - | - |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-3C (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY AND SECONDARY LINERS INSTALLED IN THE LEACHATE STORAGE AREA

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| P40-P42 | 21 | - | 30 | < 3 | P |
| P40-P61 | 3 | P | - | - | - |
| P40-P62 | 16 | P | - | - | - |
| P42-P12 | 7 | - | 30 | < 3 | P |
| P42-P41 | 13 | - | 30 | < 3 | P |
| P42-P43 | 16 | - | 30 | < 3 | P |
| P42-P58 | 4 | P | - | - | - |
| P42-P61 | 10 | P | - | - | - |
| P43-P8 | 16 | - | 30 | < 3 | P |
| P43-P12 | 9 | - | 30 | < 3 | P |
| P43-P57 | 3 | P | - | - | - |
| P43-P58 | 7 | P | - | - | - |
| P44-P13 | 40 | - | 30 | 0 | P |
| P44-P45 | 9 | - | 30 | < 3 | P |
| P45-P16 | 11 | - | 30 | < 3 | P |
| P46-P47 | 312 | - | 30 | 0 | P |
| P46-P71 | 33 | - | 30 | 0 | P |
| P46-P74 | 22 | - | 30 | 0 | P |
| P46-P75 | 22 | - | 30 | 0 | P |
| P46-P76 | 23 | - | 30 | 0 | P |
| P46-P77 | 23 | - | 30 | 0 | P |
| P46-P80 | 68 | - | 30 | 0 | P |
| P46-P82 | 21 | - | 30 | 0 | P |
| P46-P83 | 23 | - | 30 | 0 | P |
| P46-P84 | 22 | - | 30 | 0 | P |
| P46-P85 | 17 | - | 30 | 0 | P |
| P46-P88 | 38 | - | 30 | 0 | P |
| P47-P48 | 313 | - | 30 | 1 | P |
| P48-P49 | 31 | - | 30 | 0 | P |
| P48-P53 | 22 | - | 30 | 0 | P |
| P48-P54 | 22 | - | 30 | 0 | P |
| P48-P55 | 22 | - | 30 | 0 | P |
| P48-P56 | 22 | - | 30 | 0 | P |
| P48-P60 | 70 | - | 30 | 0 | P |
| P48-P63 | 22 | - | 30 | 0 | P |
| P48-P64 | 23 | - | 30 | 0 | P |
| P48-P65 | 22 | - | 30 | 0 | P |
| P48-P66 | 22 | - | 30 | 0 | P |
| P48-P70 | 34 | - | 30 | 0 | P |
| P49-P50 | 20 | - | 30 | 0 | P |
| P49-P52 | 12 | - | 30 | 0 | P |
| P49-P53 | 10 | - | 30 | 0 | P |
| P50-P51 | 7 | - | 30 | 0 | P |
| P50-P52 | 19 | - | 30 | 0 | P |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-3C (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY AND SECONDARY LINERS INSTALLED IN THE LEACHATE STORAGE AREA

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| P51-P52 | 7 | - | 30 | 0 | P |
| P52-P53 | 39 | - | 30 | 1 | P |
| P53-P54 | 49 | - | 30 | 0 | P |
| P54-P55 | 48 | - | 30 | 1 | P |
| P55-P56 | 48 | - | 30 | 0 | P |
| P56-P57 | 48 | - | 30 | 0 | P |
| P56-P60 | 8 | - | 30 | 0 | P |
| P57-P58 | 13 | - | 30 | 0 | P |
| P57-P59 | 12 | - | 30 | 0 | P |
| P57-P60 | 15 | - | 30 | 0 | P |
| P58-P59 | 14 | - | 30 | 0 | P |
| P59-P60 | 42 | - | 30 | 0 | P |
| P60-P62 | 16 | - | 30 | 0 | P |
| P60-P63 | 7 | - | 30 | 0 | P |
| P61-P59 | 14 | - | 30 | 0 | P |
| P62-P59 | 13 | - | 30 | 0 | P |
| P62-P63 | 39 | - | 30 | 1 | P |
| P63-P64 | 48 | - | 30 | 0 | P |
| P64-P65 | 48 | - | 30 | 0 | P |
| P65-P66 | 48 | - | 30 | 1 | P |
| P66-P67 | 39 | - | 30 | 0 | P |
| P66-P70 | 9 | - | 30 | 0 | P |
| P67-P68 | 13 | - | 30 | 0 | P |
| P67-P69 | 12 | - | 30 | 0 | P |
| P67-P70 | 15 | - | 30 | 0 | P |
| P68-P69 | 14 | - | 30 | 1 | P |
| P72-P71 | 15 | - | 30 | 0 | P |
| P73-P71 | 15 | - | 30 | 0 | P |
| P73-P74 | 35 | - | 30 | 0 | P |
| P74-P71 | 7 | - | 30 | 0 | P |
| P74-P75 | 44 | - | 30 | 1 | P |
| P75-P76 | 45 | - | 30 | 1 | P |
| P76-P77 | 44 | - | 30 | 0 | P |
| P77-P78 | 37 | - | 30 | 1 | P |
| P77-P80 | 7 | - | 30 | 0 | P |
| P78-P79 | 22 | - | 30 | 0 | P |
| P78-P80 | 17 | - | 30 | 1 | P |
| P79-P80 | 38 | - | 30 | 0 | P |
| P79-P81 | 22 | - | 30 | 0 | P |
| P80-P81 | 20 | - | 30 | 0 | P |
| P81-P82 | 38 | - | 30 | 1 | P |
| P82-P83 | 43 | - | 30 | 0 | P |
| P83-P84 | 43 | - | 30 | 0 | P |
| P84-P85 | 43 | - | 30 | 0 | P |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-3C (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY AND SECONDARY LINERS INSTALLED IN THE LEACHATE STORAGE AREA

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| P85-P86 | 34 | - | 30 | 0 | P |
| P85-P88 | 6 | - | 30 | 0 | P |
| P86-P87 | 7 | - | 30 | 0 | P |
| P86-P88 | 19 | - | 30 | 1 | P |
| P87-P88 | 9 | - | 30 | 0 | P |
| S1-S2 | 314 | - | 34 | 0 | P |
| S2-S3 | 314 | - | 35 | 0 | P |
| S3-S33 | 76 | - | 34 | 0 | P |
| S4-S5 | 33 | - | 34 | 0 | P |
| S5-S6 | 32 | - | 35 | 0 | P |
| S6-S7 | 35 | - | 35 | 0 | P |
| S7-S8 | 33 | - | 35 | 0 | P |
| S8-S9 | 33 | - | 35 | 0 | P |
| S9-S10 | 33 | - | 34 | 0 | P |
| S10-S11 | 32 | - | 35 | 0 | P |
| S10-S13 | 3 | P | - | - | - |
| S11-S12 | 17 | - | 33 | 0 | P |
| S11-S13 | 25 | - | 34 | 0 | P |
| S12-S13 | 12 | - | 35 | 0 | P |
| S12-S14 | 32 | - | 35 | 0 | P |
| S12-S15 | 8 | - | 34 | 0 | P |
| S13-S14 | 22 | - | 33 | 0 | P |
| S14-S15 | 34 | - | 34 | 0 | P |
| S14-S16 | 4 | P | - | - | - |
| S15-S16 | 42 | - | 34 | 0 | P |
| S16-S17 | 39 | - | 34 | 0 | P |
| S17-S18 | 39 | - | 34 | 0 | P |
| S18-S19 | 40 | - | 35 | 0 | P |
| S19-S20 | 40 | - | 35 | 0 | P |
| S20-S21 | 38 | - | 34 | 0 | P |
| S21-S22 | 18 | - | 33 | 0 | P |
| S23-S3 | 32 | - | 34 | 0 | P |
| S23-S24 | 32 | - | 35 | 0 | P |
| S27-S3 | 22 | - | 35 | 0 | P |
| S28-S3 | 23 | - | 33 | 1 | P |
| S29-S3 | 23 | - | 34 | 0 | P |
| S30-S3 | 20 | - | 33 | 0 | P |
| S30-S31 | 28 | - | 33 | 0 | P |
| S30-S33 | 18 | - | 34 | 1 | P |
| S31-S32 | 4 | - | 35 | 0 | P |
| S32-S33 | 67 | - | 35 | 0 | P |
| S34-S31 | 13 | - | 33 | 0 | P |
| S34-S32 | 26 | - | 33 | 0 | P |
| S35-S36 A | 51 | - | 33 | 0 | P |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-3C (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY AND SECONDARY LINERS INSTALLED IN THE LEACHATE STORAGE AREA

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| S35-S36 B | 16 | - | 34 | 0 | P |
| S36-S37 A | 51 | - | 34 | 0 | P |
| S36-S37 B | 22 | - | 33 | 0 | P |
| S37-S38 A | 49 | - | 32 | 0 | P |
| S37-S38 B | 22 | - | 35 | 0 | P |
| S38-S39 A | 33 | P | - | - | - |
| S38-S39 B | 22 | - | 34 | 0 | P |
| S38-S43 | 15 | - | 33 | 0 | P |
| S39-S41 | 32 | - | 34 | 0 | P |
| S39-S42 | 3 | P | - | - | - |
| S39-S43 | 9 | - | 34 | 0 | P |
| S41-S42 | 39 | - | 35 | 0 | P |
| S43-S3 | 35 | - | 33 | 0 | P |
| S44-S45 | 15 | - | 35 | 0 | P |
| S44-S66 | 15 | - | 33 | 0 | P |
| S45-S65 | 8 | - | 33 | 0 | P |
| S45-S66 | 25 | - | 35 | 0 | P |
| S46-S47 | 40 | - | 35 | 0 | P |
| S46-S62 | 19 | - | 35 | 0 | P |
| S46-S65 | 15 | - | 35 | 0 | P |
| S46-S85 | 4 | P | - | - | - |
| S47-S48 | 40 | - | 35 | 1 | P |
| S47-S85 A | 23 | - | 35 | 0 | P |
| S47-S85 B | 23 | - | 35 | 0 | P |
| S48-S62 | 23 | - | 34 | 0 | P |
| S48-S85 | 41 | P | - | - | - |
| S49-S48 | 45 | - | 35 | 0 | P |
| S49-S50 | 32 | - | 35 | 0 | P |
| S49-S52 | 11 | - | 33 | 0 | P |
| S49-S62 | 21 | - | 34 | 0 | P |
| S50-S51 | 23 | - | 33 | 1 | P |
| S51-S52 | 46 | - | 33 | 1 | P |
| S52-S50 | 23 | - | 35 | 0 | P |
| S52-S62 A | 73 | - | 35 | 0 | P |
| S52-S62 B | 74 | - | 34 | 0 | P |
| S53-S51 | 25 | - | 35 | 0 | P |
| S53-S52 | 18 | - | 33 | 0 | P |
| S54-S52 | 10 | - | 32 | 0 | P |
| S54-S53 | 39 | - | 34 | 1 | P |
| S54-S55 | 45 | - | 35 | 0 | P |
| S54-S62 | 23 | - | 35 | 0 | P |
| S55-S56 | 44 | - | 32 | 0 | P |
| S55-S62 | 22 | - | 35 | 0 | P |
| S56-S62 | 23 | - | 33 | 0 | P |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

Table 5-3C (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY AND SECONDARY LINERS INSTALLED IN THE LEACHATE STORAGE AREA

| Panel No. | Seam Length (ft) | Vacuum Box [1] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [2] (psi) | Pass/Fail (P/F) |
| S57-S58 | 28 | - | 35 | 0 | P |
| S57-S62 | 22 | - | 35 | 0 | P |
| S60-S58 | 28 | - | 34 | 0 | P |
| S61-S57 | 14 | - | 34 | 1 | P |
| S61-S58 | 7 | - | 32 | 0 | P |
| S61-S60 | 28 | - | 35 | 0 | P |
| S62-S63 | 314 | - | 35 | 0 | P |
| S62-S65 | 28 | - | 35 | 0 | P |
| S62-S85 A | 11 | - | 35 | 0 | P |
| S62-S85 B | 12 | - | 35 | 0 | P |
| S63-S64 | 314 | - | 35 | 0 | P |
| S64-S67 | 31 | - | 35 | 0 | P |
| S64-S84 | 32 | - | 35 | 0 | P |
| S65-S66 | 30 | - | 35 | 0 | P |
| S67-S68 | 31 | - | 35 | 0 | P |
| S67-S70 A | 7 | - | 33 | 0 | P |
| S67-S70 B | 2 | P | - | - | - |
| S69-S70 | 33 | - | 33 | 0 | P |
| S70-S71 | 45 | - | 35 | 0 | P |
| S71-S64 | 23 | - | 35 | 0 | P |
| S71-S72 | 44 | - | 34 | 0 | P |
| S72-S64 | 22 | - | 34 | 0 | P |
| S72-S73 | 45 | - | 33 | 0 | P |
| S73-S64 | 23 | - | 32 | 0 | P |
| S73-S74 | 44 | - | 35 | 0 | P |
| S74-S75 | 23 | - | 35 | 0 | P |
| S74-S76 | 26 | - | 34 | 0 | P |
| S75-S76 | 37 | - | 35 | 0 | P |
| S75-S77 | 25 | - | 35 | 0 | P |
| S76-S64 | 68 | - | 33 | 0 | P |
| S76-S77 | 18 | - | 35 | 0 | P |
| S76-S78 | 11 | - | 33 | 0 | P |
| S77-S78 | 35 | - | 35 | 0 | P |
| S78-S64 | 22 | - | 34 | 0 | P |
| S78-S79 | 42 | - | 35 | 0 | P |
| S79-S64 | 23 | - | 34 | 0 | P |
| S80-S64 | 22 | - | 34 | 0 | P |
| S80-S79 | 44 | - | 35 | 0 | P |
| S80-S81 | 42 | - | 35 | 0 | P |
| S81-S64 | 21 | - | 34 | 0 | P |
| S81-S82 | 42 | - | 35 | 0 | P |
| S82-S64 | 5 | P | - | - | - |
| S82-S83 | 32 | - | 34 | 0 | P |
| S82-S84 | 2 | P | - | - | - |
| S83-S84 | 33 | - | 32 | 0 | P |

Notes:

[1] Using 5 psi gauge suction in the box.

[2] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-4A

## DESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY LINER INSTALLED IN CELL 1A

| Sample No. | Panel No. | Weld Type [1] | Peel Strength [2] (lb/in) | | | | | | | | | | Shear Strength [3] (lb/in) | | | | | Failure Type [4] | Pass/Fail (P/F) | Retest No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Bottom Peel (inside) | | | | | Top Peel (outside) | | | | | | | | | | | | |
| DSP-1 | P1-P2 | F | 114 | 113 | 122 | 125 | 130 | 133 | 134 | 130 | 119 | 119 | 180 | 188 | 182 | 183 | 182 | FTB | P | |
| DSP-2 | P2-P3 | F | 128 | 134 | 145 | 124 | 141 | 138 | 135 | 127 | 128 | 123 | 192 | 181 | 180 | 185 | 190 | FTB | P | |
| DSP-3 | P3-P4 | F | 131 | 120 | 128 | 124 | 129 | 126 | 124 | 126 | 126 | 134 | 213 | 180 | 186 | 179 | 185 | FTB | P | |
| DSP-4 | P4-P5 | F | 130 | 78 | 127 | 126 | 117 | 110 | 137 | 113 | 129 | 150 | 182 | 176 | 178 | 176 | 177 | FTB | P | |
| DSP-5 | P5-P6 | F | 120 | 122 | 118 | 121 | 134 | 130 | 120 | 133 | 132 | 121 | 196 | 174 | 169 | 170 | 183 | FTB | P | |
| DSP-6 | P6-P7 | F | 123 | 129 | 139 | 119 | 127 | 135 | 136 | 123 | 134 | 119 | 182 | 174 | 171 | 170 | 173 | FTB | P | |
| DSP-7 | P7-P8 | F | 123 | 131 | 148 | 140 | 133 | 126 | 150 | 104 | 128 | 155 | 189 | 170 | 188 | 192 | 191 | FTB | P | |
| DSP-8 | P8-P9 | F | 130 | 129 | 133 | 144 | 81 | 125 | 152 | 132 | 152 | 150 | 185 | 183 | 181 | 182 | 180 | FTB | P | |
| DSP-9 | P9-P10 | F | 151 | 132 | 131 | 130 | 130 | 128 | 135 | 140 | 123 | 128 | 183 | 184 | 193 | 185 | 184 | FTB | P | |
| DSP-10 | P10-P11 | F | 130 | 118 | 113 | 114 | 111 | 119 | 112 | 125 | 126 | 122 | 184 | 183 | 177 | 181 | 181 | FTB | P | |
| DSP-11 | P11-P12 | F | 123 | 124 | 145 | 148 | 119 | 121 | 123 | 122 | 127 | 136 | 177 | 182 | 177 | 176 | 173 | FTB | P | |
| DSP-12 | P12-P13 | F | 144 | 116 | 111 | 116 | 125 | 117 | 114 | 130 | 134 | 119 | 184 | 193 | 165 | 173 | 168 | FTB | P | |
| DSP-13 | P13-P14 | F | 118 | 124 | 127 | 115 | 130 | 125 | 107 | 116 | 121 | 117 | 209 | 179 | 145 | 183 | 174 | FTB | P | |
| DSP-14 | P14-P15 | F | 131 | 115 | 135 | 141 | 119 | 115 | 118 | 105 | 113 | 121 | 183 | 179 | 202 | 183 | 219 | FTB | P | |
| DSP-15 | P15-P16 | F | 148 | 128 | 139 | 120 | 146 | 122 | 113 | 117 | 122 | 126 | 178 | 178 | 175 | 177 | 175 | FTB | P | |
| DSP-16 | P16-P17 | F | 156 | 125 | 132 | 133 | 141 | 129 | 127 | 128 | 138 | 140 | 166 | 179 | 183 | 176 | 179 | FTB | P | |
| DSP-17 | P17-P18 | F | 131 | 126 | 130 | 142 | 119 | 126 | 140 | 130 | 139 | 136 | 195 | 192 | 190 | 184 | 196 | FTB | P | |
| DSP-18 | P18-P19 | F | 124 | 130 | 148 | 130 | 118 | 135 | 131 | 137 | 127 | 141 | 183 | 185 | 184 | 186 | 186 | FTB | P | |
| DSP-19 | P19-P20 | F | 132 | 133 | 131 | 131 | 162 | 128 | 139 | 153 | 130 | 117 | 200 | 187 | 194 | 183 | 182 | FTB | P | |
| DSP-20 | P20-P21 | F | 136 | 127 | 144 | 140 | 137 | 126 | 137 | 133 | 139 | 128 | 188 | 189 | 192 | 198 | 213 | FTB | P | |
| DSP-21 | P21-P22 | F | 134 | 149 | 123 | 136 | 80 | 146 | 137 | 138 | 143 | 139 | 197 | 201 | 208 | 197 | 191 | FTB | P | |
| DSP-22 | P22-P23 | F | 129 | 128 | 135 | 133 | 138 | 133 | 123 | 127 | 125 | 125 | 200 | 202 | 201 | 196 | 196 | FTB | P | |
| DSP-23 | P23-P24 | F | 118 | 131 | 121 | 122 | 132 | 117 | 131 | 122 | 116 | 122 | 189 | 192 | 191 | 199 | 205 | FTB | P | |
| DSP-24 | P24-P25 | F | 154 | 141 | 164 | 156 | 136 | 120 | 114 | 128 | 125 | 122 | 197 | 208 | 202 | 204 | 204 | FTB | P | |
| DSP-25 | P6-P26 | F | 142 | 149 | 142 | 144 | 146 | 138 | 142 | 142 | 159 | 137 | 191 | 196 | 196 | 192 | 193 | FTB | P | |

Notes:

[1] "F" is fusion and "E" is extrusion weld.

[2] Specified peel strength: 78 lb/in for fusion and 70 lb/in for extrusion

[3] Specified shear strength: 120 lb/in for fusion and 108 lb/in for extrusion

[4] "FTB" is Film Tear Bond (with maximum 10 percent seam separation) and "AD" is adhesion failure (Non-FTB).

## Table 5-4A (continued)

## DESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY LINER INSTALLED IN CELL 1A

| Sample No. | Panel No. | Weld Type [1] | Peel Strength [2] (lb/in) | | | | | | | | | | Shear Strength [3] (lb/in) | | | | | Failure Type [4] | Pass/Fail (P/F) | Retest No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Bottom Peel (inside) | | | | | Top Peel (outside) | | | | | | | | | | | | |
| DSP-26 | P26-P27 | F | 123 | 131 | 131 | 136 | 133 | 129 | 148 | 155 | 141 | 145 | 181 | 180 | 174 | 175 | 183 | FTB | P | |
| DSP-27 | P32-P33 | F | 141 | 136 | 128 | 127 | 132 | 126 | 123 | 126 | 124 | 127 | 202 | 199 | 186 | 198 | 195 | FTB | P | |
| DSP-28 | P26-P28 | F | 133 | 140 | 126 | 125 | 125 | 115 | 118 | 117 | 112 | 109 | 191 | 197 | 182 | 183 | 175 | FTB | P | |
| DSP-29 | P28-P29 | F | 120 | 129 | 122 | 126 | 125 | 122 | 120 | 127 | 118 | 123 | 193 | 186 | 190 | 183 | 188 | FTB | P | |
| DSP-30 | P29-P30 | F | 127 | 127 | 130 | 124 | 129 | 127 | 130 | 132 | 123 | 134 | 183 | 194 | 178 | 190 | 175 | FTB | P | |
| DSP-31 | P30-P31 | F | 131 | 147 | 127 | 154 | 138 | 130 | 134 | 135 | 134 | 131 | 180 | 186 | 193 | 190 | 193 | FTB | P | |
| DSP-32 | P31-P36 | F | 131 | 130 | 166 | 132 | 168 | 135 | 149 | 140 | 146 | 130 | 196 | 202 | 194 | 205 | 198 | FTB | P | |
| DSP-33 | P36-P37 | F | 130 | 130 | 140 | 145 | 140 | 137 | 137 | 142 | 133 | 135 | 194 | 193 | 189 | 195 | 194 | FTB | P | |
| DSP-34 | P40-P41 | F | 145 | 140 | 149 | 150 | 140 | 148 | 143 | 149 | 156 | 141 | 169 | 189 | 181 | 197 | 193 | FTB | P | |
| DSP-35 | P37-P38 | F | 152 | 155 | 144 | 156 | 136 | 132 | 132 | 130 | 140 | 135 | 198 | 184 | 204 | 192 | 180 | FTB | P | |
| DSP-36 | P41-P43 | F | 129 | 140 | 142 | 138 | 136 | 139 | 144 | 153 | 147 | 155 | 194 | 187 | 186 | 201 | 187 | FTB | P | |
| DSP-37 | P48-P49 | F | 148 | 134 | 144 | 134 | 147 | 136 | 145 | 132 | 147 | 136 | 201 | 185 | 190 | 187 | 186 | FTB | P | |
| DSP-38 | P55-P56 | F | 143 | 127 | 135 | 152 | 137 | 136 | 139 | 144 | 135 | 140 | 192 | 192 | 201 | 197 | 177 | FTB | P | |
| DSP-39 | P62-P63 | F | 135 | - | 136 | 154 | 148 | - | 140 | 133 | 128 | 133 | - | - | - | - | - | AD | F | 39A, 39B |
| DSP-39A | P63-P64 | F | 131 | 140 | 144 | 137 | 144 | 123 | 128 | 135 | 144 | 142 | 186 | 182 | 180 | 187 | 181 | FTB | P | |
| DSP-39B | P61-P62 | F | 136 | 138 | 126 | 141 | 126 | 139 | 131 | - | - | - | 183 | 177 | 173 | 179 | 181 | AD | F | 39B1 |
| DSP-39B1 | P61-P62 | F | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | AD | F [5] | 39B2 |
| DSP-39B2 | P61-P62 | F | 130 | 134 | 153 | 136 | 130 | 136 | 135 | 136 | 135 | 133 | 203 | 188 | 188 | 183 | 184 | FTB | P | |
| DSP-40 | P51-P42 | F | 154 | 135 | 137 | 150 | 142 | 144 | 142 | 140 | 130 | 130 | 187 | 195 | 185 | 183 | 191 | FTB | P | |
| DSP-41 | Cap2-P62 | E | 129 | 144 | 134 | 146 | 126 | - | - | - | - | - | 172 | 175 | 169 | 154 | 170 | FTB | P | |
| DSP-42 | Cap8-P62 | E | 133 | 136 | 165 | 162 | 150 | - | - | - | - | - | 171 | 175 | 170 | 174 | 176 | AD | F | 42A, 42B |
| DSP-42A | P60-Cap8 | E | 133 | 131 | 129 | 119 | 123 | - | - | - | - | - | 180 | 186 | 191 | 193 | 192 | FTB | P | |
| DSP-42B | P62-Cap8 | E | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | AD | F [5] | 42B1 |
| DSP-42B1 | P62-Cap8 | E | 114 | 152 | 124 | 123 | 119 | - | - | - | - | - | 184 | 178 | 183 | 180 | 183 | FTB | P | |
| DSP-43 | P42-P68 | E | 146 | 145 | 148 | 139 | 155 | - | - | - | - | - | 177 | 175 | 173 | 172 | 167 | FTB | P | |

Notes:

[1] "F" is fusion and "E" is extrusion weld.

[2] Specified peel strength: 78 lb/in for fusion and 70 lb/in for extrusion

[3] Specified shear strength: 120 lb/in for fusion and 108 lb/in for extrusion

[4] "FTB" is Film Tear Bond (with maximum 10 percent seam separation) and "AD" is adhesion failure (Non-FTB).

[5] No lab test was performed on this sample because field test failed.

## Table 5-4A (continued)

## DESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY LINER INSTALLED IN CELL 1A

| Sample No. | Panel No. | Weld Type [1] | Peel Strength [2] (lb/in) | | | | | | | | | | Shear Strength [3] (lb/in) | | | | | Failure Type [4] | Pass/Fail (P/F) | Retest No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Bottom Peel (inside) | | | | | Top Peel (outside) | | | | | | | | | | | | |
| DSP-44 | P25-P69 | F | 139 | 124 | 136 | 127 | 137 | 128 | 137 | 144 | 141 | 137 | 153 | 161 | 172 | 160 | 171 | FTB | P | |
| DSP-45 | P69-P70 | F | 141 | 123 | 137 | 117 | 147 | 133 | 133 | 124 | 121 | 126 | 174 | 182 | 177 | 170 | 180 | FTB | P | |
| DSP-46 | P70-P71 | F | 144 | 143 | 143 | 150 | 129 | 121 | 126 | 133 | 129 | 130 | 177 | 177 | 151 | 167 | 176 | FTB | P | |
| DSP-47 | P71-P72 | F | 128 | 122 | 130 | 127 | 131 | 144 | 126 | 120 | 124 | 124 | 175 | 175 | 173 | 171 | 175 | FTB | P | |
| DSP-48 | P74-P73 | F | 117 | 127 | 145 | 123 | 125 | 133 | 126 | 136 | 131 | 120 | 176 | 176 | 175 | 176 | 180 | FTB | P | |
| DSP-49 | P75-P74 | F | 120 | 130 | 130 | 122 | 122 | 123 | 115 | 119 | 115 | 121 | 164 | 176 | 173 | 182 | 179 | FTB | P | |
| DSP-50 | P79-P78 | F | 113 | 126 | 124 | 121 | 142 | 131 | 116 | 135 | 127 | 134 | 168 | 168 | 166 | 168 | 166 | FTB | P | |
| DSP-51 | P88-P87 | F | 132 | 133 | 130 | 129 | 121 | 115 | 123 | 136 | 146 | 124 | 174 | 171 | 175 | 170 | 170 | FTB | P | |
| DSP-52 | P86-P85 | F | 132 | 128 | 120 | 136 | 137 | 132 | 138 | 142 | 129 | 133 | 175 | 176 | 181 | 174 | 173 | FTB | P | |
| DSP-53 | P87-P72 | F | 124 | 113 | 147 | 125 | 135 | 112 | 139 | 123 | 109 | 114 | 167 | 163 | 162 | 170 | 166 | FTB | P | |
| DSP-54 | P96-P97 | F | 123 | 152 | 131 | 128 | 125 | 145 | 132 | 150 | 129 | 135 | 166 | 179 | 185 | 164 | 169 | FTB | P | |
| DSP-55 | P30-P96 | F | 136 | 137 | 135 | 138 | 141 | 116 | 143 | 129 | 135 | 142 | 159 | 155 | 167 | 167 | 162 | FTB | P | |
| DSP-56 | RP149-P96 | E | 112 | 122 | 124 | 147 | 118 | - | - | - | - | - | 153 | 163 | 163 | 167 | 164 | FTB | P | |
| DSP-57 | P71-P70 | E | 153 | 139 | 141 | 121 | 125 | - | - | - | - | - | 163 | 156 | 165 | 165 | 165 | FTB | P | |
| DSP-58 | P99-P100 | F | 131 | 130 | 123 | 126 | 117 | 126 | 122 | 126 | 140 | 122 | 192 | 190 | 196 | 183 | 185 | FTB | P | |
| DSP-59 | P98-P101 | F | 138 | 122 | 131 | 136 | 119 | 133 | 131 | 141 | 130 | 128 | 199 | 190 | 192 | 195 | 190 | FTB | P | |
| DSP-60 | P108-P109 | F | 128 | 141 | 136 | 129 | 135 | 143 | 140 | 139 | 137 | 141 | 196 | 188 | 193 | 200 | 192 | FTB | P | |
| DSP-61 | P38-P99 | F | 143 | 133 | 126 | 131 | 130 | 131 | 130 | 125 | 123 | 147 | 186 | 199 | 197 | 191 | 190 | FTB | P | |

Notes:

[1] "F" is fusion and "E" is extrusion weld.

[2] Specified peel strength: 78 lb/in for fusion and 70 lb/in for extrusion

[3] Specified shear strength: 120 lb/in for fusion and 108 lb/in for extrusion

[4] "FTB" is Film Tear Bond (with maximum 10 percent seam separation) and "AD" is adhesion failure (Non-FTB).

## Table 5-4B

## DESTRUCTIVE SEAM TEST RESULTS FOR SECONDARY LINER INSTALLED IN CELL 1A

| Sample No. | Panel No. | Weld Type [1] | Peel Strength [2] (lb/in) | | | | | | | | | | Shear Strength [3] (lb/in) | | | | | Failure Type [4] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Bottom Peel (inside) | | | | | Top Peel (outside) | | | | | | | | | | | |
| DSS-1 | S1-S2 | F | 151 | 143 | 139 | 139 | 137 | 123 | 133 | 123 | 134 | 126 | 188 | 183 | 183 | 178 | 187 | FTB | P |
| DSS-2 | S2-S3 | F | - | 136 | 136 | 140 | 133 | - | 129 | 124 | 120 | 132 | 180 | 182 | 179 | 183 | 177 | FTB | P |
| DSS-3 | S3-S4 | F | 146 | 141 | 142 | 147 | 142 | 120 | 126 | 135 | 147 | 129 | 179 | 172 | 181 | 183 | 187 | FTB | P |
| DSS-4 | S4-S5 | F | 135 | 138 | 141 | 138 | 140 | 127 | 128 | 138 | 125 | 149 | 190 | 191 | 188 | 186 | 184 | FTB | P |
| DSS-5 | S5-S6 | F | 133 | 133 | 139 | 137 | 130 | 123 | 136 | 136 | 138 | 126 | 182 | 181 | 180 | 183 | 183 | FTB | P |
| DSS-6 | S6-S7 | F | 138 | 132 | 147 | 131 | 143 | 132 | 132 | 129 | 133 | 130 | 188 | 185 | 189 | 187 | 187 | FTB | P |
| DSS-7 | S7-S8 | F | 134 | 145 | 139 | 139 | 136 | 141 | 131 | 137 | 130 | 134 | 185 | 180 | 182 | 177 | 180 | FTB | P |
| DSS-8 | S8-S9 | F | 131 | 146 | 150 | 142 | 147 | 119 | 130 | 100 | 133 | 136 | 190 | 183 | 179 | 183 | 185 | FTB | P |
| DSS-9 | S9-S10 | F | 131 | 137 | 128 | 130 | 134 | 132 | 142 | 131 | 125 | 138 | 184 | 174 | 169 | 182 | 183 | FTB | P |
| DSS-10 | S10-S11 | F | 148 | 150 | 140 | 140 | 141 | 146 | 146 | 115 | 119 | 115 | 189 | 187 | 181 | 181 | 180 | FTB | P |
| DSS-11 | S11-S12 | F | 145 | 136 | 133 | 141 | 121 | 121 | 122 | 126 | 115 | 137 | 179 | 179 | 185 | 185 | 186 | FTB | P |
| DSS-12 | S12-S13 | F | 123 | 122 | 132 | 129 | 143 | 133 | 134 | 133 | 121 | 143 | 167 | 179 | 177 | 170 | 179 | FTB | P |
| DSS-13 | S13-S14 | F | 137 | 125 | 130 | 140 | 131 | 130 | 121 | 123 | 128 | 121 | 181 | 179 | 179 | 179 | 179 | FTB | P |
| DSS-14 | S14-S15 | F | 133 | 146 | 135 | 149 | 136 | 137 | 131 | 128 | 131 | 123 | 176 | 175 | 171 | 184 | 170 | FTB | P |
| DSS-15 | S15-S16 | F | 130 | 122 | 139 | 133 | 118 | 112 | 117 | 121 | 115 | 117 | 170 | 170 | 174 | 194 | 192 | FTB | P |
| DSS-16 | S16-S17 | F | 126 | 128 | 134 | 133 | 136 | 124 | 110 | 116 | 118 | 117 | 168 | 172 | 177 | 174 | 176 | FTB | P |
| DSS-17 | S17-S18 | F | 117 | 128 | 133 | 117 | 129 | 125 | 114 | 121 | 123 | 117 | 170 | 171 | 172 | 172 | 168 | FTB | P |
| DSS-18 | S18-S19 | F | 125 | 122 | 137 | 134 | 120 | 126 | 126 | 115 | 125 | 115 | 172 | 171 | 173 | 176 | 174 | FTB | P |
| DSS-19 | S19-S20 | F | 128 | 113 | 146 | 119 | 116 | 118 | 124 | 118 | 121 | 123 | 171 | 195 | 171 | 171 | 173 | FTB | P |
| DSS-20 | S20-S21 | F | 123 | 136 | 119 | 119 | 125 | 121 | 120 | 118 | 126 | 137 | 175 | 173 | 173 | 174 | 170 | FTB | P |
| DSS-21 | S21-S22 | F | 126 | 123 | 109 | 127 | 116 | 139 | 127 | 124 | 131 | 118 | 174 | 160 | 167 | 165 | 164 | FTB | P |
| DSS-22 | S22-S23 | F | 125 | 129 | 114 | 115 | 132 | 123 | 115 | 120 | 123 | 138 | 188 | 199 | 170 | 168 | 166 | FTB | P |
| DSS-23 | S23-S24 | F | 115 | 119 | 127 | 126 | 143 | 130 | 132 | 144 | 126 | 136 | 183 | 177 | 174 | 173 | 182 | FTB | P |
| DSS-24 | S24-S25 | F | 113 | 119 | 115 | 119 | 157 | 114 | 119 | 120 | 114 | 127 | 186 | 176 | 175 | 171 | 166 | FTB | P |
| DSS-25 | S26-S27 | F | 128 | 124 | 124 | 120 | 140 | 133 | 132 | 116 | 124 | 131 | 208 | 183 | 193 | 177 | 175 | FTB | P |

Notes:

1 "F" is fusion and "E" is extrusion weld.

2 Specified peel strength: 78 lb/in for fusion and 70 lb/in for extrusion

3 Specified shear strength: 120 lb/in for fusion and 108 lb/in for extrusion

4 "FTB" is Film Tear Bond (with maximum 10 percent seam separation) and "AD" is adhesion failure (Non-FTB).

## Table 5-4B (continued)

## DESTRUCTIVE SEAM TEST RESULTS FOR SECONDARY LINER INSTALLED IN CELL 1A

| Sample No. | Panel No. | Weld Type [1] | Peel Strength [2] (lb/in) | | | | | | | | | | Shear Strength [3] (lb/in) | | | | | Failure Type [4] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Bottom Peel (inside) | | | | | Top Peel (outside) | | | | | | | | | | | |
| DSS-26 | S27-S28 | F | 147 | 126 | 147 | 127 | 135 | 129 | 136 | 136 | 141 | 126 | 154 | 185 | 187 | 183 | 185 | FTB | P |
| DSS-27 | S28-S29 | F | 131 | 122 | 129 | 125 | 119 | 117 | 136 | 125 | 121 | 123 | 182 | 175 | 181 | 187 | 183 | FTB | P |
| DSS-28 | S29-S30 | F | 127 | 131 | 136 | 128 | 133 | 126 | 120 | 124 | 127 | 129 | 188 | 181 | 176 | 177 | 177 | FTB | P |
| DSS-29 | S28-S33 | F | 119 | 132 | 146 | 148 | 128 | 147 | 151 | 126 | 148 | 155 | 176 | 172 | 168 | 165 | 172 | FTB | P |
| DSS-30 | S32-S33 | F | 139 | 132 | 133 | 139 | 143 | 143 | 146 | 136 | 132 | 144 | 202 | 182 | 195 | 181 | 182 | FTB | P |
| DSS-31 | S4-S31 | E | 85 | 109 | 120 | 110 | 105 | - | - | - | - | - | 193 | 172 | 166 | 175 | 169 | FTB | P |
| DSS-32 | S8-S26 | F | 124 | 114 | 137 | 142 | 124 | 146 | 134 | 126 | 122 | 138 | 171 | 177 | 177 | 176 | 170 | FTB | P |
| DSS-33 | S30-S36 | F | 124 | 122 | 124 | 126 | 130 | 118 | 127 | 120 | 131 | 128 | 180 | 182 | 177 | 191 | 185 | FTP | P |
| DSS-34 | S36-S37 | F | 133 | 127 | 121 | 130 | 128 | 121 | 117 | 133 | 119 | 127 | 183 | 192 | 184 | 187 | 180 | FTP | P |
| DSS-35 | S37-S38 | F | 134 | 126 | 129 | 131 | 127 | 131 | 128 | 125 | 127 | 124 | 194 | 188 | 185 | 185 | 196 | FTP | P |
| DSS-36 | S38-S39 | F | 126 | 122 | 119 | 130 | 131 | 120 | 118 | 126 | 122 | 124 | 181 | 183 | 186 | 180 | 182 | FTP | P |
| DSS-37 | S46-S43 | F | 136 | 128 | 131 | 137 | 130 | 130 | 126 | 125 | 129 | 120 | 190 | 190 | 192 | 188 | 187 | FTP | P |
| DSS-38 | S47-S48 | F | 126 | 124 | 128 | 120 | 130 | 124 | 124 | 122 | 129 | 133 | 179 | 185 | 183 | 180 | 184 | FTP | P |
| DSS-39 | S55-S56 | F | 139 | 129 | 132 | 131 | 136 | 133 | 134 | 130 | 126 | 130 | 187 | 181 | 184 | 183 | 182 | FTP | P |
| DSS-40 | S64-S65 | F | 144 | 158 | 161 | 153 | 156 | 136 | 163 | 148 | 137 | 140 | 188 | 199 | 184 | 185 | 183 | FTP | P |
| DSS-41 | S39-S61 | F | 141 | 137 | 140 | 141 | 138 | 130 | 131 | 136 | 129 | 131 | 185 | 194 | 188 | 179 | 186 | FTP | P |
| DSS-42 | S25-S79 | F | 147 | 134 | 145 | 146 | 140 | 140 | 132 | 138 | 125 | 143 | 180 | 202 | 178 | 187 | 180 | FTP | P |
| DSS-43 | S79-S80 | F | 137 | 127 | 143 | 130 | 144 | 154 | 132 | 127 | 129 | 158 | 171 | 171 | 187 | 155 | 185 | FTP | P |
| DSS-44 | S67-S82 | F | 124 | 119 | 134 | 137 | 138 | 120 | 148 | 134 | 128 | 126 | 187 | 181 | 188 | 180 | 179 | FTP | P |
| DSS-45 | Cap2-S39 | F | 124 | 131 | 127 | 108 | 120 | - | - | - | - | - | 122 | 166 | 169 | 167 | 170 | FTP | P |
| DSS-46 | S81-S89 | F | 130 | 119 | 126 | 125 | 128 | 119 | 123 | 124 | 126 | 127 | 190 | 183 | 185 | 184 | 190 | FTP | P |
| DSS-47 | S117-S119 | F | 133 | 128 | 125 | 119 | 120 | 128 | 123 | 126 | 117 | 123 | 191 | 188 | 185 | 183 | 180 | FTP | P |
| DSS-48 | S89-S98 | F | 131 | 127 | 120 | 119 | 114 | 127 | 125 | 120 | 114 | 117 | 190 | 183 | 180 | 193 | 180 | FTP | P |
| DSS-49 | S107-S106 | F | 135 | 122 | 134 | 136 | 129 | 139 | 141 | 132 | 136 | 139 | 182 | 179 | 180 | 187 | 185 | FTP | P |
| DSS-50 | S100-S101 | F | 128 | 142 | 134 | 143 | 143 | 145 | 141 | 125 | 130 | 135 | 181 | 184 | 177 | 187 | 185 | FTP | P |

Notes:

1 "F" is fusion and "E" is extrusion weld.

2 Specified peel strength: 78 lb/in for fusion and 70 lb/in for extrusion

3 Specified shear strength: 120 lb/in for fusion and 108 lb/in for extrusion

4 "FTB" is Film Tear Bond (with maximum 10 percent seam separation) and "AD" is adhesion failure (Non-FTB).

## Table 5-4B (continued)

## DESTRUCTIVE SEAM TEST RESULTS FOR SECONDARY LINER INSTALLED IN CELL 1A

| Sample No. | Panel No. | Weld Type [1] | Peel Strength [2] (lb/in) | | | | | | | | | | Shear Strength [3] (lb/in) | | | | | Failure Type [4] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Bottom Peel (inside) | | | | | Top Peel (outside) | | | | | | | | | | | |
| DSS-51 | S93-S94 | F | 145 | 130 | 139 | 137 | 130 | 133 | 134 | 138 | 135 | 127 | 173 | 163 | 171 | 171 | 171 | FTP | P |
| DSS-52 | S80-S124 | F | 137 | 137 | 139 | 136 | 136 | 134 | 126 | 149 | 124 | 125 | 195 | 194 | 181 | 179 | 176 | FTP | P |

Notes:

[1] "F" is fusion and "E" is extrusion weld.

[2] Specified peel strength: 78 lb/in for fusion and 70 lb/in for extrusion

[3] Specified shear strength: 120 lb/in for fusion and 108 lb/in for extrusion

[4] "FTB" is Film Tear Bond (with maximum 10 percent seam separation) and "AD" is adhesion failure (Non-FTB).

## Table 5-4C

## DESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY AND SECONDARY LINERS INSTALLED IN THE LEACHATE STORAGE AREA

| Sample No. | Panel No. | Weld Type [1] | Peel Strength [2] (lb/in) | | | | | | | | | | Shear Strength [3] (lb/in) | | | | | Failure Type [4] | Pass/Fail (P/F) | Retest No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Bottom Peel (inside) | | | | | Top Peel (outside) | | | | | | | | | | | | |
| DSSLP-1 | S7-S8 | F | 131 | 126 | 130 | 124 | 122 | 122 | 129 | 118 | 117 | 120 | 196 | 189 | 187 | 190 | 184 | FTB | P | |
| DSSLP-2 | S17-S1 | F | 127 | 118 | 123 | 131 | 126 | 119 | 115 | 130 | 124 | 123 | 177 | 183 | 179 | 188 | 185 | FTB | P | |
| DSSLP-3 | S37-S38 | F | 130 | 120 | 122 | 119 | 126 | 122 | 117 | 117 | 123 | 119 | 188 | 187 | 187 | 190 | 189 | FTB | P | |
| DSSLP-4 | S23-S27 | F | 129 | 132 | 123 | 126 | 126 | 120 | 126 | 120 | 120 | 119 | 193 | 190 | 180 | 185 | 187 | FTB | P | |
| DSSLP-5 | S2-S3 | F | 124 | 124 | 131 | 123 | 131 | 126 | 130 | 122 | 118 | 128 | 186 | 186 | 185 | 187 | 189 | FTB | P | |
| DSSLP-6 | S57-S62 | F | 124 | 126 | 119 | 122 | 120 | 126 | 121 | 128 | 120 | 117 | 189 | 183 | 187 | 185 | 180 | FTB | P | |
| DSSLP-7 | S63-S64 | F | 126 | 122 | 117 | 120 | 131 | 121 | 120 | 126 | 130 | 124 | 179 | 187 | 180 | 182 | 179 | FTB | P | |
| DSSLP-8 | S73-S64 | F | 114 | 122 | 130 | 119 | 121 | 120 | 123 | 127 | 127 | 119 | 186 | 177 | 186 | 190 | 188 | FTB | P | |
| DSSLP-9 | S46-S65 | F | 129 | 119 | 125 | 126 | 117 | 116 | 124 | 125 | 130 | 128 | 177 | 188 | 192 | 190 | 183 | FTB | P | |
| DSSLP-10 | S62-S63 | F | 126 | 123 | 116 | 127 | 130 | 126 | 118 | 122 | 133 | 119 | 177 | 181 | 179 | 186 | 185 | FTB | P | |
| DSSLP-11 | S40-S50 | E | 113 | 115 | 108 | 107 | 110 | - | - | - | - | - | 169 | 157 | 170 | 163 | 149 | AD | F | 11A, 11B |
| DSSLP-11A | S40-S50 | E | 120 | 105 | 83 | 91 | 106 | - | - | - | - | - | 139 | 150 | 163 | 174 | 168 | AD | F | 11C |
| DSSLP-11B | S35-S49 | E | 131 | 120 | 133 | 121 | 114 | - | - | - | - | - | 161 | 166 | 172 | 168 | 165 | FTB | P | |
| DSSLP-11C | S34-S51 | E | 113 | 109 | 103 | 111 | 106 | - | - | - | - | - | 156 | 164 | 161 | 160 | 153 | AD | F | 11D |
| DSSLP-11D | Cap1-S53 | E | 101 | 97 | 132 | 143 | 106 | - | - | - | - | - | 167 | 173 | 170 | 166 | 172 | FTB | P | |
| DSSLP-12 | S55-S29 | E | 116 | 145 | 140 | 136 | 154 | - | - | - | - | - | 168 | 165 | 169 | 163 | 164 | FTB | P | |
| DSPLP-1 | P1-P2 | F | 131 | 133 | 124 | 143 | 149 | 136 | 130 | 137 | 136 | 126 | 175 | 174 | 182 | 181 | 172 | FTB | P | |
| DSPLP-2 | P1-P2 | F | 123 | 150 | 138 | 153 | 149 | 145 | 128 | 145 | 126 | 126 | 178 | 180 | 177 | 178 | 185 | FTB | P | |
| DSPLP-3 | P9-P10 | F | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | F [5] | 3A, 3B |
| DSPLP-3A | P1-P12 | F | 117 | 125 | 118 | 119 | 120 | 114 | 120 | 118 | 107 | 111 | 147 | 151 | 153 | 157 | 144 | FTB | P | |
| DSPLP-3B | P6-P7 | F | 119 | 107 | 123 | 118 | 129 | 105 | 124 | 120 | 120 | 121 | 159 | 157 | 142 | 153 | 156 | FTB | P | |
| DSPLP-4 | P1-P37 | F | 122 | 130 | 121 | 119 | 125 | 119 | 121 | 115 | 126 | 128 | 188 | 180 | 183 | 185 | 180 | FTB | P | |
| DSPLP-5 | P60-P51 | E | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | F [5] | 5A |
| DSPLP-5A | Cap1-P22 | E | 115 | 119 | 123 | 128 | 120 | - | - | - | - | - | 189 | 191 | 188 | 183 | 185 | FTB | P | |

Notes:

[1] "F" is fusion and "E" is extrusion weld.

[2] Specified peel strength: 78 lb/in for fusion and 70 lb/in for extrusion

[3] Specified shear strength: 120 lb/in for fusion and 108 lb/in for extrusion

[4] "FTB" is Film Tear Bond (with maximum 10 percent seam separation) and "AD" is adhesion failure (Non-FTB).

[5] Sample failed in field testing.

## Table 5-4C (continued)

## DESTRUCTIVE SEAM TEST RESULTS FOR PRIMARY AND SECONDARY LINERS INSTALLED IN THE LEACHATE STORAGE AREA

| Sample No. | Panel No. | Weld Type [1] | Peel Strength [2] (lb/in) | | | | | | | | | | Shear Strength [3] (lb/in) | | | | | Failure Type [4] | Pass/Fail (P/F) | Retest No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Bottom Peel (inside) | | | | | Top Peel (outside) | | | | | | | | | | | | |
| DSPLP-6 | P46-P47 | F | 119 | 115 | 130 | 121 | 123 | 124 | 124 | 125 | 127 | 126 | 156 | 164 | 161 | 154 | 160 | FTB | P | |
| DSPLP-7 | P47-P48 | F | 122 | 112 | 108 | 111 | 111 | 112 | 119 | 119 | 118 | 121 | 168 | 177 | 180 | 163 | 157 | FTB | P | |
| DSPLP-8 | P4-P53 | E | 172 | 139 | 139 | 139 | 150 | - | - | - | - | - | 162 | 158 | 168 | 168 | 163 | FTB | P | |
| DSPLP-9 | P74-P75 | F | 147 | 131 | 129 | 130 | 119 | 134 | 128 | 133 | 131 | 132 | 175 | 165 | 195 | 177 | 172 | FTB | P | |
| DSPLP-10 | P46-P75 | F | 115 | 119 | 120 | 130 | 120 | 120 | 134 | 130 | 119 | 119 | 162 | 164 | 165 | 164 | 155 | FTB | P | |
| DSPLP-11 | Cap2-P36 | E | 130 | 126 | 122 | 100 | 109 | - | - | - | - | - | 179 | 191 | 183 | 190 | 185 | FTB | P | |

Notes:

[1] "F" is fusion and "E" is extrusion weld.

[2] Specified peel strength: 78 lb/in for fusion and 70 lb/in for extrusion

[3] Specified shear strength: 120 lb/in for fusion and 108 lb/in for extrusion

[4] "FTB" is Film Tear Bond (with maximum 10 percent seam separation) and "AD" is adhesion failure (Non-FTB).

## Table 5-5

## CQA AND MQC TEST RESULTS FOR 60-mil SMOOTH GEOMEMBRANE (GSE)
## RESIN LOT NO. D30520959

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | | | | | | | | MANUFACTURING QUALITY CONTROL (MQC) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROPERTY** | Thickness (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Thickness[1] (mil) | Density ($g/cm^3$) | Carbon Black Content (%) | Carbon Black Dispersion | Yield Strength[2] (lb/in) | Break Strength[2] (lb/in) | Yield Elongation[2] (%) | Break Elongation[2] (%) | Tear Resistance[2] (lb) | Puncture Resistance (lb) |
| **TEST STANDARD** | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 5994 | ASTM D 1505 | ASTM D 1603 | ASTM D 5596 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 6693 | ASTM D 1004 | ASTM D 4833 |
| **PROJECT SPECS.** | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 60 | ≥ 0.94 | 2 to 3 | See Note 3 | ≥ 130 | ≥ 72 | ≥ 12 | ≥ 100 | ≥ 40 | ≥ 80 |
| **TESTING FREQUENCY** | 1 per 100,000 $ft^2$ (4) | | | | | | | | 1 per 50,000 $ft^2$ (4) | | | | | | | | | |

| ROLL NUMBER | CQA SAMPLE ID | TEST RESULTS | | | | | | | | TEST RESULTS | | | | | | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | CQA | MQC |
| 115143502 | GMS-1 | 61 | 0.944 | 2.51 | 10 | 158 | 305 | 18 | 800 | 60 | 0.943 | 2.5 | 10 | 150 | 325 | 18 | 834 | 50 | 152 | P | P |
| 115143503 | | | | | | | | | | 60 | 0.943 | 2.5 | 10 | 150 | 343 | 18 | 889 | 50 | 152 | | P |
| 115143505 | | | | | | | | | | 60 | 0.943 | 2.5 | 10 | 150 | 434 | 18 | 889 | 50 | 152 | | P |
| 115143506 | | | | | | | | | | 60 | 0.943 | 2.4 | 10 | 150 | 336 | 17 | 859 | 50 | 152 | | P |
| 115143509 | GMS-2 | 61 | 0.943 | 2.34 | 10 | 157 | 307 | 19 | 787 | 61 | 0.943 | 2.5 | 10 | 151 | 331 | 17 | 842 | 51 | 152 | P | P |
| 115143512 | | | | | | | | | | 61 | 0.943 | 2.1 | 10 | 152 | 339 | 18 | 858 | 50 | 152 | | P |
| 115143515 | | | | | | | | | | 61 | 0.943 | 2.5 | 10 | 150 | 342 | 18 | 888 | 50 | 150 | | P |
| 115143516 | GMS-3 | 62 | 0.943 | 2.42 | 10 | 158 | 298 | 17 | 764 | 61 | | | | | | | | | | P | |

Notes:

1 Thickness was measured for every roll.

2 Smaller of machine direction (MD) and transverse direction (TD).

3 Project specifications for carbon black dispersion are: 8 of 10 in Category 1 or 2 and all in Category 1,2, or 3. Results are for Category 1 or 2.

4 A minimum of 1 test per lot was required.

Average Roll Area (560 ft x 22.5 ft): 12,600 $ft^2$

No. of Rolls in Lot: 16

Area in Lot: 201,600 $ft^2$

**SHEET NO. 1 OF 1**

**CUMULATIVE NUMBER OF ROLLS: 16**

**CUMULATIVE AREA: 201,600 $ft^2$**

## Table 5-6

## NONDESTRUCTIVE SEAM TEST RESULTS FOR SMOOTH GEOMEMBRANE IN FLEXIBLE STORAGE CONTAINERS

| Panel No. [1] | Seam Length (ft) | Vacuum Box [2] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [3] (psi) | Pass/Fail (P/F) |
| BB1-BB2 | 26 | - | 30 | 0 | P |
| BB1-BB14 | 33 | - | 30 | 0 | P |
| BB3-BB1 | 10 | - | 30 | 0 | P |
| BB3-BB14 | 22 | - | 30 | 0 | P |
| BB3-BB2 | 30 | - | 30 | 0 | P |
| BB4-BB14 | 22 | - | 30 | 0 | P |
| BB4-BB3 | 40 | - | 30 | 0 | P |
| BB5-BB14 | 21 | - | 30 | 0 | P |
| BB5-BB4 | 40 | - | 30 | 0 | P |
| BB6-BB14 | 23 | - | 30 | 0 | P |
| BB6-BB5 | 40 | - | 30 | 0 | P |
| BB7-BB14 | 23 | - | 30 | 0 | P |
| BB7-BB17 | 7 | - | 30 | 0 | P |
| BB7-BB18 | 36 | - | 30 | 0 | P |
| BB8-BB14 | 21 | - | 30 | 0 | P |
| BB8-BB7 | 44 | - | 30 | 0 | P |
| BB9-BB8 | 44 | - | 30 | 0 | P |
| BB10-BB9 | 44 | - | 30 | 0 | P |
| BB11-1113 | 25 | - | 30 | 0 | P |
| BB11-BB10 | 33 | - | 30 | 1 | P |
| BB13-BB10 | 8 | - | 30 | 0 | P |
| BB14-BB19 | 22 | - | 30 | < 3 | P |
| BB17-BB14 | 67 | - | 30 | 0 | P |
| BB18-BB17 | 21 | - | 30 | 0 | P |
| BB19-BB9 | 23 | - | 30 | 1 | P |
| BB19-BB10 | 23 | - | 30 | 1 | P |
| BB22-BB23 | 22 | - | 30 | 0 | P |
| BB22-BB21 | 22 | - | 30 | 0 | P |
| BB24-BB25 | 32 | - | 30 | 0 | P |
| BB25-BB24 | 144 | - | 33 | 0 | P |
| BB25-BB26 A | 27 | - | 31 | 0 | P |
| BB25-BB26 B | 144 | - | 33 | 0 | P |
| BB25-BB28 | 8 | - | 30 | 0 | P |
| BB26-BB27 | 37 | - | 32 | 0 | P |
| BB27-BB28 | 36 | - | 31 | 0 | P |
| BB28-BB29 | 20 | - | 31 | 0 | P |
| BB28-BB30 | 11 | - | 31 | 0 | P |
| BB29-BB23 | 21 | - | 30 | 0 | P |
| BB29-BB30 A | 86 | - | 30 | 0 | P |
| BB29-BB30 B | 20 | - | 31 | 0 | P |
| BB29-BB31 | 25 | - | 31 | 0 | P |
| BB29-BB48 | 23 | - | 30 | 0 | P |
| BB29-BB22 | 15 | - | 30 | 0 | P |
| BB30-BB22 | 18 | - | 30 | 0 | P |

Notes:

[1] "BB" and "BT" represent bottom and top of bladders, respectively.

[2] Using 5 psi gauge suction in the box.

[3] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-6 (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR SMOOTH GEOMEMBRANE IN FLEXIBLE STORAGE CONTAINERS

| Panel No. [1] | Seam Length (ft) | Vacuum Box [2] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [3] (psi) | Pass/Fail (P/F) |
| BB30-BB23 | 5 | - | 30 | 0 | P |
| BB30-BB31 A | 86 | - | 30 | 0 | P |
| BB30-BB31 B | 22 | - | 32 | 0 | P |
| BB30-BB48 | 22 | - | 30 | 0 | P |
| BB31-BB21 | 7 | - | 30 | 0 | P |
| BB31-BB32 A | 86 | - | 30 | 0 | P |
| BB31-BB32 B | 48 | - | 31 | 0 | P |
| BB31-BB48 | 22 | - | 30 | 0 | P |
| BB32-BB21 | 23 | - | 30 | 0 | P |
| BB32-BB26 | 21 | - | 31 | 0 | P |
| BB32-BB33 A | 74 | - | 30 | 0 | P |
| BB32-BB33 B | 49 | - | 31 | 0 | P |
| BB32-BB34 | 12 | - | 30 | 0 | P |
| BB32-BB48 | 22 | - | 30 | 0 | P |
| BB33-BB26 | 23 | - | 32 | 0 | P |
| BB33-BB36 | 18 | - | 30 | 0 | P |
| BB33-BB37 | 24 | - | 30 | 0 | P |
| BB33-BB48 | 5 | P | - | - | - |
| BB34-BB21 | 70 | - | 30 | 0 | P |
| BB34-BB33 | 23 | - | 30 | 0 | P |
| BB34-BB35 | 45 | - | 30 | 0 | P |
| BB34-BB38 | 22 | - | 31 | 0 | P |
| BB35-BB33 | 16 | - | 30 | 0 | P |
| BB35-BB38 | 24 | - | 31 | 0 | P |
| BB36-BB37 | 25 | - | 31 | 0 | P |
| BB36-BB38 | 18 | - | 34 | 0 | P |
| BB38-BB37 | 30 | - | 31 | 0 | P |
| BB38-BB39 | 86 | - | 31 | 0 | P |
| BB38-BB48 | 1 | P | - | - | - |
| BB39-BB21 | 23 | - | 30 | 0 | P |
| BB39-BB40 | 86 | - | 31 | 0 | P |
| BB39-BB48 | 22 | - | 32 | 0 | P |
| BB40-BB21 | 22 | - | 30 | 0 | P |
| BB40-BB41 | 86 | - | 31 | 0 | P |
| BB40-BB48 | 23 | - | 34 | 0 | P |
| BB41-BB21 | 22 | - | 30 | 0 | P |
| BB41-BB42 | 86 | - | 31 | 0 | P |
| BB42-BB21 | 23 | - | 30 | 0 | P |
| BB42-BB43 | 25 | - | 31 | 0 | P |
| BB43-BB44 | 19 | - | 31 | 0 | P |
| BB44-BB21 | 34 | - | 31 | 0 | P |
| BB44-BB42 | 10 | - | 31 | 0 | P |
| BB44-BB79 | 12 | - | 31 | 0 | P |
| BB45-BB43 | 22 | - | 31 | 0 | P |

Notes:

[1] "BB" and "BT" represent bottom and top of bladders, respectively.

[2] Using 5 psi gauge suction in the box.

[3] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-6 (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR SMOOTH GEOMEMBRANE IN FLEXIBLE STORAGE CONTAINERS

| Panel No. [1] | Seam Length (ft) | Vacuum Box [2] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [3] (psi) | Pass/Fail (P/F) |
| BB45-BB77 | 13 | - | 31 | 0 | P |
| BB46-BB45 | 31 | - | 31 | 0 | P |
| BB46-BB47 | 30 | - | 32 | 0 | P |
| BB47-BB41 | 4 | P | - | - | - |
| BB47-BB42 | 23 | - | 31 | 0 | P |
| BB47-BB48 | 22 | - | 30 | 0 | P |
| BB47-BB50 | 34 | - | 31 | 0 | P |
| BB48-BB37 | 66 | - | 30 | 0 | P |
| BB48-BB41 | 18 | - | 31 | 0 | P |
| BB48-BB49 A | 132 | - | 30 | 0 | P |
| BB48-BB49 B | 120 | - | 30 | 0 | P |
| BB47-BB49 C | 260 | - | 30 | 0 | P |
| BB50-BB51 | 34 | - | 31 | 0 | P |
| BB50-BB49 | 22 | - | 30 | 0 | P |
| BB51-BB52 | 35 | - | 32 | 0 | P |
| BB52-BB49 | 21 | - | 31 | 0 | P |
| BB52-BB53 | 22 | - | 31 | 0 | P |
| BB53-BB49 | 29 | - | 31 | 0 | P |
| BB53-BB54 | 22 | - | 31 | 0 | P |
| BB54-BB49 | 37 | - | 31 | 0 | P |
| BB54-BB55 | 22 | - | 30 | 0 | P |
| BB55-BB49 | 192 | - | 31 | 0 | P |
| BB55-BB60 | 22 | - | 31 | 0 | P |
| BB55-BB56 | 43 | - | 31 | 0 | P |
| BB56-BB57 | 42 | - | 31 | 0 | P |
| BB56-BB60 | 22 | - | 31 | 0 | P |
| BB57-BB58 | 23 | - | 31 | 0 | P |
| BB57-BB59 | 13 | - | 31 | 0 | P |
| BB58-BB59 | 21 | - | 31 | 0 | P |
| BB59-BB60 | 31 | - | 31 | 0 | P |
| BB60-BB61 A | 35 | - | 31 | 0 | P |
| BB60-BB61 B | 20 | - | 31 | 0 | P |
| BB61-BB55 | 22 | - | 31 | 0 | P |
| BB61-BB62 | 55 | - | 31 | 0 | P |
| BB62-BB63 | 38 | - | 31 | 0 | P |
| BB62-BB55 | 23 | - | 31 | 0 | P |
| BB63-BB67 | 17 | - | 31 | 0 | P |
| BB63-BB64 | 33 | - | 31 | 0 | P |
| BB65-BB64 | 8 | - | 31 | 0 | P |
| BB65-BB66 | 18 | - | 31 | 0 | P |
| BB65-BB68 | 7 | - | 31 | 0 | P |
| BB66-BB64 | 31 | - | 31 | 0 | P |
| BB66-BB67 | 62 | - | 29 | 0 | P |
| BB66-BB68 | 29 | - | 31 | 0 | P |

Notes:

[1] "BB" and "BT" represent bottom and top of bladders, respectively.

[2] Using 5 psi gauge suction in the box.

[3] Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-6 (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR SMOOTH GEOMEMBRANE IN FLEXIBLE STORAGE CONTAINERS

| Panel No. [1] | Seam Length (ft) | Vacuum Box [2] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [3] (psi) | Pass/Fail (P/F) |
| BB67-BB55 A | 10 | - | 31 | 0 | P |
| BB67-BB55 B | 46 | - | 31 | 0 | P |
| BB67-BB55 C | 23 | - | 30 | 0 | P |
| BB67-BB62 | 17 | - | 31 | 0 | P |
| BB67-BB68 | 22 | - | 33 | 0 | P |
| BB67-BB69 | 24 | - | 33 | 0 | P |
| BB68-BB69 | 30 | - | 31 | 0 | P |
| BB69-BB54 | 22 | - | 30 | 0 | P |
| BB69-BB70 | 54 | - | 31 | 0 | P |
| BB70-BB53 | 9 | - | 30 | 0 | P |
| BB70-BB54 | 12 | - | 31 | 0 | P |
| BB70-BB71 | 54 | - | 30 | 0 | P |
| BB71-BB53 | 23 | - | 30 | 0 | P |
| BB71-BB72 | 56 | - | 31 | 0 | P |
| BB72-BB52 | 21 | - | 32 | 0 | P |
| BB73-BB72 | 31 | - | 32 | 0 | P |
| BB74-BB73 | 30 | - | 29 | 0 | P |
| BB75-BB74 | 29 | - | 30 | 0 | P |
| BB75-BB76 | 35 | - | 31 | 0 | P |
| BB76-BB51 | 35 | - | 31 | 0 | P |
| BB76-BB72 A | 21 | - | 31 | 0 | P |
| BB76-BB72 B | 25 | - | 32 | 0 | P |
| BB77-BB46 | 12 | - | 31 | 0 | P |
| BB77-BB78 | 11 | - | 31 | 0 | P |
| BB78-BB43 | 13 | - | 31 | 0 | P |
| BB79-BB43 | 13 | - | 31 | 0 | P |
| BB79-BB78 | 12 | - | 31 | 0 | P |
| BB81-BB48 | 33 | - | 31 | 0 | P |
| BT1-BT2 | 149 | - | 33 | 0 | P |
| BT2-BT3 | 26 | - | 32 | 0 | P |
| BT2-BT5 | 22 | - | 30 | 0 | P |
| BT3-BT4 | 24 | - | 30 | 0 | P |
| BT3-BT5 | 7 | - | 30 | 0 | P |
| BT4-BT5 | 27 | - | 30 | 0 | P |
| BT5-BT6 | 34 | - | 30 | 0 | P |
| BT6-BT2 | 22 | - | 30 | 0 | P |
| BT6-BT7 | 34 | - | 30 | 0 | P |
| BT7-BT2 | 23 | - | 30 | 0 | P |
| BT7-BT8 | 34 | - | 30 | 0 | P |
| BT8-BT2 | 22 | - | 30 | 0 | P |
| BT8-BT9 | 21 | - | 31 | 0 | P |
| BT8-BT11 | 11 | - | 31 | 0 | P |
| BT9-BT10 | 15 | - | 31 | 0 | P |
| BT9-BT11 | 20 | - | 31 | 0 | P |

Notes:

1 "BB" and "BT" represent bottom and top of bladders, respectively.

2 Using 5 psi gauge suction in the box.

3 Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-6 (continued)

## NONDESTRUCTIVE SEAM TEST RESULTS FOR SMOOTH GEOMEMBRANE IN FLEXIBLE STORAGE CONTAINERS

| Panel No. [1] | Seam Length (ft) | Vacuum Box [2] Pass/Fail (P/F) | Air Pressure | | |
|---|---|---|---|---|---|
| | | | Applied Pressure (psi) | Loss of Pressure [3] (psi) | Pass/Fail (P/F) |
| BT10-BT11 | 11 | - | 31 | 0 | P |
| BT11-BT2 | 27 | - | 30 | 0 | P |
| BT11-BT12 | 149 | - | 33 | 0 | P |
| BT13-BT12 | 26 | - | 30 | 0 | P |
| BT13-BT14 | 18 | - | 30 | 0 | P |
| BT13-BT15 | 14 | - | 31 | 0 | P |
| BT13-BT16 | 14 | - | 33 | 0 | P |
| BT14-BT15 | 21 | - | 31 | 0 | P |
| BT15-BT16 | 25 | - | 30 | 0 | P |
| BT16-BT12 | 22 | - | 32 | 0 | P |
| BT16-BT17 | 39 | - | 31 | 0 | P |
| BT17-BT12 | 23 | - | 32 | 0 | P |
| BT17-BT18 | 39 | - | 30 | 0 | P |
| BT18-BT12 | 23 | - | 30 | 0 | P |
| BT19-BT12 | 21 | - | 33 | 0 | P |
| BT19-BT18 | 39 | - | 32 | 0 | P |
| BT23-BT24 | 24 | - | 32 | 0 | P |
| BT23-BT44 | 30 | - | 31 | 0 | P |
| BT31-BT26 | 24 | - | 30 | 0 | P |
| BT33-BT34 | 22 | - | 31 | 0 | P |
| BT34-BT35 | 18 | - | 30 | 0 | P |
| BT34-BT36 | 15 | - | 30 | 0 | P |
| BT34-BT37 | 12 | - | 31 | 0 | P |
| BT35-BT36 | 19 | - | 31 | 0 | P |
| BT37-BT26 | 44 | - | 31 | 0 | P |
| BT37-BT33 | 44 | - | 31 | 0 | P |
| BT37-BT36 | 28 | - | 31 | 0 | P |
| BT40-BT24 | 21 | - | 30 | 0 | P |
| BT40-BT44 | 27 | - | 30 | 0 | P |
| BT41-BT24 | 23 | - | 32 | 0 | P |
| BT41-BT40 | 27 | - | 31 | 0 | P |
| BT42-BT24 | 21 | - | 32 | 0 | P |
| BT42-BT41 | 27 | - | 30 | 0 | P |
| BT43-BT24 | 24 | - | 30 | 0 | P |
| BT43-BT42 | 27 | - | 30 | 0 | P |

Notes:

1 "BB" and "BT" represent bottom and top of bladders, respectively.

2 Using 5 psi gauge suction in the box.

3 Acceptance criterion: Loss of pressure does not exceed 3 psi for at least 5 minutes.

## Table 5-7

## DESTRUCTIVE SEAM TEST RESULTS FOR SMOOTH GEOMEMBRANE IN FLEXIBLE STORAGE CONTAINERS

| Sample No. | Panel No. | Weld Type [1] | Peel Strength [2] (lb/in) | | | | | | | | | | Shear Strength [3] (lb/in) | | | | | Failure Type [4] | Pass/Fail (P/F) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Bottom Peel (inside) | | | | | Top Peel (outside) | | | | | | | | | | | |
| DSB-1 | BB7-BB18 | F | 121 | 123 | 124 | 126 | 124 | 120 | 116 | 122 | 123 | 124 | 180 | 177 | 173 | 172 | 175 | FTB | P |
| DSB-2 | BB6-BB14 | F | 120 | 118 | 124 | 122 | 129 | 118 | 116 | 122 | 122 | 121 | 181 | 173 | 170 | 168 | 173 | FTB | P |
| DSB-3 | BB20-BB21 | F | 131 | 127 | 125 | 124 | 127 | 127 | 126 | 123 | 123 | 124 | 169 | 173 | 172 | 170 | 170 | FTB | P |
| DSB-4 | BB32-BB21 | F | 130 | 128 | 126 | 125 | 127 | 128 | 128 | 125 | 125 | 126 | 180 | 182 | 182 | 185 | 183 | FTB | P |
| DSB-5 | BB32-BB31 | F | 120 | 126 | 129 | 133 | 131 | 118 | 117 | 122 | 119 | 118 | 177 | 173 | 168 | 170 | 171 | FTB | P |
| DSB-6 | BB36-BB38 | F | 133 | 126 | 129 | 123 | 126 | 120 | 120 | 121 | 122 | 125 | 168 | 173 | 158 | 163 | 160 | FTB | P |
| DSB-7 | BB48-BB49 | F | 140 | 135 | 129 | 138 | 130 | 136 | 127 | 125 | 131 | 131 | 164 | 170 | 165 | 163 | 166 | FTB | P |
| DSB-8 | BB60-BB61 | F | 133 | 131 | 148 | 136 | 128 | 130 | 126 | 131 | 132 | 133 | 166 | 164 | 160 | 161 | 169 | FTB | P |
| DSB-9 | BB55-BB54 | F | 136 | 124 | 129 | 121 | 136 | 130 | 124 | 120 | 128 | 127 | 173 | 169 | 170 | 170 | 172 | FTB | P |
| DSB-10 | BB70-BB71 | F | 126 | 129 | 129 | 130 | 129 | 118 | 126 | 134 | 130 | 117 | 168 | 168 | 173 | 170 | 170 | FTB | P |

Notes:

[1] "F" is fusion and "E" is extrusion weld.

[2] Specified peel strength: 78 lb/in for fusion and 70 lb/in for extrusion

[3] Specified shear strength: 120 lb/in for fusion and 108 lb/in for extrusion

[4] "FTB" is Film Tear Bond (with maximum 10 percent seam separation) and "AD" is adhesion failure (Non-FTB).

# Table 5-8A

## CQA AND MQC TEST RESULTS FOR PRIMARY GEOCOMPOSITE (TENAX)

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | | | | | | | MANUFACTURING QUALITY CONTROL (MQC) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | GEOTEXTILE | | | | | GEOCOMPOSITE | | GEOCOMPOSITE | | |
| PROPERTY | Mass per Unit Area ($oz/yd^2$) | Grab Strength [1] (lb) | Trapezoidal Tear Strength [1] (lb) | Apparent Opening Size (mm) | Permittivity ($sec^{-1}$) | Transmissivity ($m^2/sec$) | Peel Strength [2] (lb/in) | Transmissivity ($m^2/sec$) | | Peel Strength [2] (lb/in) |
| TEST STANDARD | ASTM D 5261 | ASTM D 4632 | ASTM D 4533 | ASTM D 4751 | ASTM D 4491 | ASTM D 4716 | ASTM F 904 | ASTM D 4716 | | GRI GC7 |
| PROJECT SPECS. | ≥ 8 | ≥ 180 | ≥ 75 | ≤ 0.21 | ≥ 0.5 | ≥ $7.8x10^{-3}$ at 500 psf | ≥ $2.6x10^{-3}$ at 13,500 psf | ≥ 1 | ≥ $7.8x10^{-3}$ at 500 psf | ≥ $2.6x10^{-3}$ at 13,500 psf | ≥ 1 |
| TESTING FREQUENCY | 1 per 200,000 $ft^2$ [3] | | | 1 per 500,000 $ft^2$ [3] | | 1 per 200,000 $ft^2$ [3] | | 1 per 100,000 $ft^2$ [3] | | |

| GEOCOMPOSITE ROLL NUMBER | LOT NO. | CQA SAMPLE ID | CQA TEST RESULTS | | | | | | | | MQC TEST RESULTS | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | CQA | MQC |
| 3506332 | 35041 | | | | | | | | | | $7.8x10^{-3}$ | $4.77x10^{-3}$ | 3.2 | | P |
| 3506338 | | | | | | | | | | | | | 5.4 | | P |
| 3506356 | | | | | | | | | | | | | 3.5 | | P |
| 3506376 | | PGC-1 | 9.6 | 324 | 97.0 | 0.11 | 1.0 | $8.1x10^{-3}$ | $5.5x10^{-3}$ | 1.7 | | | 2.9 | P | P |
| 3506416 | | | | | | | | | | 2.1 | $1.04x10^{-2}$ | $4.5x10^{-3}$ | | P | P |
| 3506417 | | | | | | | | | | | | | 2.8 | | P |
| 3506436 | | | | | | | | | | | | | 3.2 | | P |
| 3506490 | | PGC-2 | 8.8 | 335 | 107.0 | 0.10 | 1.3 | $1.0x10^{-2}$ | $5.6x10^{-3}$ | 2.6 | $1.1x10^{-2}$ | $3.66x10^{-3}$ | | P | P |
| 3506528 | | | | | | | | | | 2.1 | $8.55x10^{-3}$ | $5.82x10^{-3}$ | | P | P |
| 3506531 | | | | | | | | | | | | | 3.2 | | P |
| 3506549 | | | | | | | | | | | | | 4.4 | | P |
| 3506560 | | PGC-3 | | | | | | $7.9x10^{-3}$ | | | | | | P | |
| 3506561 | | | 8.7 | 284 | 107.0 | 0.14 | 1.5 | $6.8x10^{-3}$ | $6.2x10^{-3}$ | 1.5 | | | | F [4] | |
| 3506562 | | | | | | | | | | | | | | F [4] | |
| 3506563 | | | | | | | | $7.7x10^{-3}$ | | | | | | F [4] | |
| 3506564 | | | | | | | | | | | | | | F [4] | |
| 3506565 | | | | | | | | $9.9x10^{-3}$ | | | | | | P | |
| 3506568 | | | | | | | | | | | $9.28x10^{-3}$ | $5.22x10^{-3}$ | 3.2 | | P |
| 3506587 | | | | | | | | | | | | | 4.3 | | P |
| 3506606 | | | | | | | | | | | | | 4.6 | | P |
| 3506611 | | | | | | | | | | | $8.65x10^{-3}$ | $3.29x10^{-3}$ | | | P |
| 3506624 | | | | | | | | | | | | | 5.0 | | P |
| 3506642 | | PGC-4 | 9.1 | 300 | 101.0 | | | $1.2x10^{-2}$ | $6.4x10^{-3}$ | 3.9 | $9.33x10^{-3}$ | $2.85x10^{-3}$ | | P | P |
| 3506643 | | | | | | | | | | | | | 4.2 | | P |
| 3506662 | | | | | | | | | | | $7.93x10^{-3}$ | $4.48x10^{-3}$ | 3.5 | | P |
| 3506692 | | | | | | | | | | | $8.32x10^{-3}$ | $6.76x10^{-3}$ | | | P |
| 3506699 | | | | | | | | | | | | | 2.6 | | P |
| 3506717 [5] | | | | | | | | | | | | | | P | |
| 3506719 | | | | | | | | | | | | | 3.3 | | P |
| 3507016 | 35043 | PGC-5 | 8.2 | 287 | 112.0 | 0.13 | 1.5 | $7.3x10^{-3}$ | $6.8x10^{-3}$ | 1.9 | $8.69x10^{-3}$ | $3.77x10^{-3}$ | 2.0 | P [6] | P |
| 3507035 | | | | | | | | | | | | | 1.9 | | P |
| 3507036 | | | | | | | | | | | | | 2.6 | | P |

Notes:

[1] Smaller value in machine and cross-machine directions.

[2] Smaller of top and bottom peel strength.

[3] A minimum of 1 test per lot was required.

[4] Additional tests performed to bracket failing roll. Rolls rejected between passing bracket rolls are shown.

[5] This roll was used to perform interface friction tests.

[6] The hydraulic transmissivity under compressive stress of 500 psf was accepted because the average of CQA and MQC tests was $8.0x10^{-3}$ $m^2/sec$.

| | | |
|---|---|---|
| Average Roll Area (200 ft x 12.5 ft): | 2,500 | $ft^2$ |
| Total No. of Rolls: | 358 | |
| Total Area of Rolls: | 895,000 | $ft^2$ |

## Table 5-8B

## MQC TEST RESULTS FOR GEOTEXTILE USED TO MANUFACTURE PRIMARY GEOCOMPOSITE (TENAX)

| PROPERTY | Mass per Unit Area ($oz/yd^2$) | Grab Strength [1] (lb) | Trapezoidal Tear Strength [1] (lb) | Puncture Strength (lb) | Apparent Opening Size (mm) | Permittivity ($sec^{-1}$) |
|---|---|---|---|---|---|---|
| TEST STANDARD | ASTM D 5261 | ASTM D 4632 | ASTM D 4533 | ASTM D 4833 | ASTM D 4751 | ASTM D 4491 |
| PROJECT SPECS. | ≥ 8 | ≥ 180 | ≥ 75 | ≥ 75 | ≤ 0.21 | ≥ 0.5 |
| TESTING FREQUENCY | 1 per 100,000 $ft^2$ | | | | 1 per 250,000 $ft^2$ | |

| GEOTEXTILE ROLL NUMBER | LOT NO. | TEST RESULTS | | | | | | PASS/FAIL (P/F) |
|---|---|---|---|---|---|---|---|---|
| 3012141 | 35041 | 9.4 | 285 | 116 | 159 | 0.09 | 1.3 | P |
| 3012149 | | 8.7 | 366 | 113 | 150 | 0.10 | 1.0 | P |
| 3012153 | | 8.4 | 349 | 119 | 135 | | | P |
| 3012157 | | 8.1 | 268 | 113 | 144 | 0.11 | 1.3 | P |
| 3012161 | | 8.2 | 274 | 137 | 148 | | | P |
| 3012163 | | 8.4 | 277 | 120 | 159 | 0.09 | 1.1 | P |
| 3012167 | | 8.6 | 284 | 120 | 146 | | | P |
| 3012171 | | 8.2 | 291 | 111 | 150 | 0.13 | 1.2 | P |
| 3012180 | | 8.6 | 271 | 102 | 141 | 0.12 | | P |
| 3012182 | | 8.2 | 309 | 117 | 145 | 0.11 | 1.0 | P |
| 3012186 | | 8.4 | 267 | 91 | 149 | | | P |
| 3012190 | | 8.8 | 263 | 87 | 156 | 0.09 | 1.0 | P |
| 3012195 | | 8.7 | 293 | 104 | 143 | 0.09 | 0.8 | P |
| 3012199 | | 9.0 | 291 | 149 | 147 | 0.08 | 1.1 | P |
| 3012203 | | 8.7 | 293 | 101 | 148 | | 1.4 | P |
| 3012207 | | 8.6 | 280 | 112 | 153 | 0.08 | 1.2 | P |
| 3012215 | | 8.4 | 281 | 114 | 156 | 0.10 | 1.1 | P |
| 3012219 | | 8.2 | 286 | 115 | 159 | | 1.1 | P |
| 3012223 | | 8.5 | 293 | 117 | 156 | 0.10 | 1.3 | P |
| 3012227 | | 8.4 | 280 | 110 | 152 | | | P |
| 3012231 | | 8.0 | 239 | 101 | 147 | 0.09 | 1.4 | P |
| 3012238 | | 8.2 | 287 | 117 | 142 | | | P |
| 3012241 | | 8.2 | 255 | 102 | 141 | 0.09 | 1.1 | P |
| 3012245 | | 8.4 | 298 | 110 | 152 | | | P |
| 3012246 | | 8.1 | 291 | 127 | 148 | 0.09 | 1.2 | P |
| 3012250 | | 8.4 | 303 | 116 | 144 | | | P |
| 3013888 | 35043 | 8.2 | 307 | 124 | 148 | 0.08 | 1.2 | P |

Note:
[1] Smaller value in machine and cross-machine directions.

| | | |
|---|---|---|
| Total Area of Geotextile Rolls: | 1,790,000 | $ft^2$ |
| No. of Geotextile Rolls Tested: | 27 / 16 | |
| Test Frequency: 1 per | 66,296 / 111,875 | $ft^2$ |

## Table 5-8C

## MQC TEST RESULTS FOR GEONET USED TO MANUFACTURE PRIMARY GEOCOMPOSITE (TENAX)

| PROPERTY | Polymer Density ($g/cm^3$) | Carbon Black Content (%) | Thickness (mil) |
|---|---|---|---|
| TEST STANDARD | ASTM D 1505 | ASTM D 1603 | ASTM D 5199 |
| PROJECT SPECS. | ≥ 0.93 | 2 to 3 | ≥ 200 |
| TESTING FREQUENCY | 1 per 100,000 $ft^2$ | | |

| GEONET ROLL NUMBER | LOT NO. | TEST RESULTS | | | PASS/FAIL (P/F) |
|---|---|---|---|---|---|
| 3302796 | 35041 | 0.947 | 2.2 | 337 | P |
| 3302815 | | 0.951 | 2.5 | 369 | P |
| 3302795 | | 0.948 | 2.1 | 347 | P |
| 3302825 | | 0.949 | 2.3 | 345 | P |
| 3302900 | | 0.948 | 2.5 | 355 | P |
| 3302903 | | 0.949 | 2.5 | 360 | P |
| 3302901 | | 0.951 | 2.5 | 353 | P |
| 3302889 | | 0.955 | 2.7 | 380 | P |
| 3302902 | | 0.956 | 2.9 | 362 | P |
| 3302915 | | 0.952 | 2.5 | 336 | P |
| 3302909 | | 0.953 | 2.8 | 335 | P |
| 3302925 | | 0.948 | 2.4 | 330 | P |
| 3302921 | | 0.952 | 2.5 | 359 | P |
| 3302931 | | 0.947 | 2.4 | 360 | P |
| 3302937 | | 0.949 | 2.3 | 385 | P |
| 3302944 | | 0.945 | 2.7 | 333 | P |
| 3302950 | | 0.953 | 2.6 | 336 | P |
| 3302955 | | 0.948 | 2.7 | 345 | P |
| 3302960 | | 0.953 | 2.7 | 354 | P |
| 3302961 | | 0.948 | 2.7 | 364 | P |
| 3302962 | | 0.953 | 2.7 | 341 | P |
| 3302968 | | 0.945 | 2.7 | 332 | P |
| 3302975 | | 0.952 | 2.4 | 333 | P |
| 3302976 | | 0.947 | 2.6 | 331 | P |
| 3302978 | | 0.954 | 2.6 | 325 | P |
| 3302984 | | 0.953 | 2.5 | 332 | P |
| 3302990 | | 0.949 | 2.5 | 340 | P |
| 3302996 | | 0.947 | 2.5 | 352 | P |
| 3303002 | | 0.947 | 2.5 | 355 | P |
| 3303100 | 35043 | 0.950 | 2.5 | 346 | P |
| 3303106 | | 0.950 | 2.4 | 358 | P |
| 3303109 | | 0.949 | 2.9 | 351 | P |

| | | | |
|---|---|---|---|
| Area of Geonet Rolls: | | 895,000 | $ft^2$ |
| No. of Geonet Rolls Tested: | | 32 | |
| Test Frequency: | 1 per | 27,969 | $ft^2$ |

## Table 5-9A

## CQA AND MQC TEST RESULTS FOR SECONDARY GEOCOMPOSITE (GSE)

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | | | | | | | MANUFACTURING QUALITY CONTROL (MQC) | |
|---|---|---|---|---|---|---|---|---|---|
| | GEOTEXTILE | | | | | GEOCOMPOSITE | | GEOCOMPOSITE | |
| **PROPERTY** | Mass per Unit Area ($oz/yd^2$) | Grab Strength [1] (lb) | Trapezoidal Tear Strength [1] (lb) | Apparent Opening Size (mm) | Permittivity ($sec^{-1}$) | Transmissivity ($m^2/sec$) | Peel Strength [2] (lb/in) | Transmissivity ($m^2/sec$) | Peel Strength [2] (lb/in) |
| **TEST STANDARD** | ASTM D 5261 | ASTM D 4632 | ASTM D 4533 | ASTM D 4751 | ASTM D 4491 | ASTM D 4716 | ASTM F 904 | ASTM D 4716 | GRI GC7 |
| **PROJECT SPECS.** | ≥ 8 | ≥ 180 | ≥ 75 | ≤ 0.21 | ≥ 0.5 | ≥ $5.0x10^{-4}$ at 500 psf; ≥ $1.5x10^{-4}$ at 13,500 psf | ≥ 1 | ≥ $5.0x10^{-4}$ at 500 psf; ≥ $1.5x10^{-4}$ at 13,500 psf | ≥ 1 |
| **TESTING FREQUENCY** | 1 per 200,000 $ft^2$ [3] | | | 1 per 500,000 $ft^2$ [3] | | 1 per 200,000 $ft^2$ [3] | | 1 per 100,000 $ft^2$ [3] | |

| GEOCOMPOSITE ROLL NUMBER | LOT NO. | CQA SAMPLE ID | TEST RESULTS | | | | | | | | TEST RESULTS | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | CQA | MQC |
| 131131239 [4] | CB13080403 | SGC-1 | 8.4 | 281 | 95.0 | 0.15 | 1.3 | $8.4x10^{-4}$ | $1.5x10^{-4}$ | 3.2 | | | | P | |
| 131131245 | | | | | | | | | | | $1.12x10^{-3}$ | $2.06x10^{-4}$ | 1.0 | | P |
| 131132511 | RPG120092 | | | | | | | | | | $1.70x10^{-3}$ | $6.37x10^{-4}$ | 1.1 | | P |
| 131132551 | | | | | | | | | | | $1.87x10^{-3}$ | $5.83x10^{-4}$ | 2.2 | | P |
| 131132591 | | | | | | | | | | | $1.31x10^{-3}$ | $4.24x10^{-4}$ | 2.0 | | P |
| 131132594 | | SGC-2 | 14.1 | 284 | 112.0 | 0.12 | 1.5 | $2.3x10^{-3}$ | $8.1x10^{-4}$ | 2.2 | | | | P | |
| 131132631 | RPG120091 | | | | | | | | | | $1.63x10^{-3}$ | $1.77x10^{-4}$ | 1.7 | | P |
| 131132670 | | SGC-3 | 14.4 | 267 | 106.0 | 0.13 | 1.4 | $2.3x10^{-3}$ | $6.7x10^{-4}$ | 2.5 | | | | P | |
| 131132671 | | | | | | | | | | | $1.69x10^{-3}$ | $3.51x10^{-4}$ | 2.2 | | P |
| 131132711 | | | | | | | | | | | $1.16x10^{-3}$ | $3.3x10^{-4}$ | 3.2 | | P |
| 131132750 | | SGC-4 | 9.0 | 267 | 100.0 | - | - | $1.4x10^{-3}$ | $5.8x10^{-4}$ | 2.9 | $1.26x10^{-3}$ | $2.64x10^{-4}$ | 2.3 | P | P |
| 131132790 | | | | | | | | | | | $1.27x10^{-3}$ | $6.15x10^{-4}$ | 2.4 | | P |
| 131132830 | | SGC-5 | 8.2 | 267 | 98.0 | - | - | $1.8x10^{-3}$ | $5.3x10^{-4}$ | 2.2 | $1.79x10^{-3}$ | $3.04x10^{-4}$ | 2.5 | P | P |

Notes:

1 Smaller value in machine and cross-machine directions.

2 Smaller of top and bottom peel strength.

3 A minimum of 1 test per lot was required.

4 This roll was used to perform interface friction tests.

| | | |
|---|---|---|
| Average Roll Area (170 ft x 14.5 ft): | 2,465 | $ft^2$ |
| Total No. of Rolls: | 360 | |
| Total Area of Rolls: | 887,400 | $ft^2$ |

## Table 5-9B

## MQC TEST RESULTS FOR GEOTEXTILE USED TO MANUFACTURE SECONDARY GEOCOMPOSITE (GSE)

| PROPERTY | Mass per Unit Area ($oz/yd^2$) | Grab Strength [1] (lb) | Trapezoidal Tear Strength [1] (lb) | Puncture Strength (lb) | Burst Strength ($lb/in^2$) | Apparent Opening Size (mm) | Permittivity ($sec^{-1}$) |
|---|---|---|---|---|---|---|---|
| **TEST STANDARD** | ASTM D 5261 | ASTM D 4632 | ASTM D 4533 | ASTM D 4833 | ASTM D 3786 | ASTM D 4751 | ASTM D 4491 |
| **PROJECT SPECS.** | ≥ 8 | ≥ 180 | ≥ 75 | ≥ 75 | ≥ 350 | ≤ 0.21 | ≥ 0.5 |
| **TESTING FREQUENCY** | 1 per 100,000 $ft^2$ | | | | | 1 per 250,000 $ft^2$ | |

| GEOTEXTILE ROLL NUMBER | TEST RESULTS | | | | | | | PASS/FAIL (P/F) |
|---|---|---|---|---|---|---|---|---|
| 130154602 | 8.2 | 258 | 128 | 148 | 454 | 0.18 | 2.0 | P |
| 130154606 | 8.2 | 275 | 142 | 172 | 480 | 0.18 | 2.0 | P |
| 130154609 | 8.8 | 281 | 141 | 179 | 494 | 0.18 | 2.0 | P |
| 130154613 | 8.5 | 277 | 133 | 163 | 482 | 0.18 | 1.8 | P |
| 130154617 | 9.1 | 288 | 189 | 184 | 522 | 0.18 | 1.8 | P |
| 130154622 | 8.4 | 261 | 156 | 151 | 486 | 0.18 | 1.8 | P |
| 130154629 | 8.6 | 275 | 158 | 178 | 473 | 0.18 | 1.6 | P |
| 130154645 | 8.5 | 276 | 124 | 157 | 476 | 0.18 | 1.8 | P |
| 130154823 | 8.7 | 265 | 120 | 147 | 456 | 0.18 | 2.1 | P |
| 130154828 | 8.3 | 258 | 122 | 155 | 426 | 0.18 | 2.1 | P |
| 130154832 | 8.1 | 250 | 127 | 162 | 460 | 0.18 | 2.1 | P |
| 130154837 | 8.6 | 263 | 144 | 155 | 470 | 0.18 | 2.1 | P |
| 130154842 | 8.8 | 261 | 139 | 176 | 486 | 0.18 | 2.1 | P |
| 130154843 | 8.9 | 286 | 144 | 171 | 476 | 0.18 | 2.1 | P |
| 130154854 | 8.2 | 243 | 165 | 167 | 412 | 0.18 | 1.9 | P |
| 130155191 | 9.0 | 304 | 144 | 150 | 506 | 0.18 | 2.1 | P |
| 130155195 | 8.7 | 295 | 149 | 174 | 480 | 0.18 | 2.1 | P |
| 130155198 | 8.0 | 264 | 130 | 151 | 416 | 0.18 | 2.1 | P |
| 130155202 | 8.6 | 266 | 126 | 163 | 428 | 0.18 | 1.9 | P |
| 130155206 | 8.6 | 291 | 115 | 162 | 444 | 0.18 | 1.9 | P |
| 130155210 | 8.2 | 258 | 117 | 140 | 470 | 0.18 | 1.9 | P |
| 130155214 | 8.7 | 278 | 128 | 159 | 498 | 0.18 | 2.0 | P |
| 130155220 | 8.3 | 263 | 118 | 149 | 440 | 0.18 | 2.0 | P |

Note:

[1] Smaller value in machine and cross-machine directions.

## Table 5-9B (continued)

## MQC TEST RESULTS FOR GEOTEXTILE USED TO MANUFACTURE SECONDARY GEOCOMPOSITE (GSE)

| PROPERTY | Mass per Unit Area ($oz/yd^2$) | Grab Strength [1] (lb) | Trapezoidal Tear Strength [1] (lb) | Puncture Strength (lb) | Burst Strength ($lb/in^2$) | Apparent Opening Size (mm) | Permittivity ($sec^{-1}$) |
|---|---|---|---|---|---|---|---|
| **TEST STANDARD** | ASTM D 5261 | ASTM D 4632 | ASTM D 4533 | ASTM D 4833 | ASTM D 3786 | ASTM D 4751 | ASTM D 4491 |
| **PROJECT SPECS.** | ≥ 8 | ≥ 180 | ≥ 75 | ≥ 75 | ≥ 350 | ≤ 0.21 | ≥ 0.5 |
| **TESTING FREQUENCY** | 1 per 100,000 $ft^2$ | | | | | 1 per 250,000 $ft^2$ | |

| GEOTEXTILE ROLL NUMBER | TEST RESULTS | | | | | | | PASS/FAIL (P/F) |
|---|---|---|---|---|---|---|---|---|
| 130155224 | 8.6 | 267 | 130 | 147 | 454 | 0.18 | 2.0 | P |
| 130155228 | 8.2 | 264 | 126 | 147 | 436 | 0.18 | 2.0 | P |
| 130155230 | 8.3 | 277 | 118 | 145 | 466 | 0.18 | 2.0 | P |
| 130155234 | 8.3 | 284 | 136 | 147 | 464 | 0.18 | 1.8 | P |
| 130155238 | 8.1 | 269 | 109 | 139 | 460 | 0.18 | 2.0 | P |
| 130155242 | 8.5 | 272 | 120 | 148 | 518 | 0.18 | 2.0 | P |
| 130155246 | 8.4 | 270 | 117 | 159 | 478 | 0.18 | 2.0 | P |
| 130155250 | 8.4 | 271 | 111 | 149 | 434 | 0.18 | 2.0 | P |
| 130155254 | 8.5 | 262 | 122 | 168 | 466 | 0.18 | 2.0 | P |
| 130155258 | 8.3 | 268 | 112 | 160 | 479 | 0.18 | 2.0 | P |
| 130155262 | 8.0 | 268 | 119 | 145 | 442 | 0.18 | 2.3 | P |
| 130155267 | 8.4 | 258 | 138 | 164 | 480 | 0.18 | 2.1 | P |
| 130155270 | 8.0 | 274 | 148 | 170 | 426 | 0.18 | 2.1 | P |
| 130155275 | 8.2 | 268 | 149 | 163 | 470 | 0.18 | 2.1 | P |
| 130155279 | 8.3 | 254 | 144 | 150 | 454 | 0.18 | 2.0 | P |
| 130155282 | 8.3 | 247 | 100 | 161 | 452 | 0.18 | 2.0 | P |
| 130155286 | 8.3 | 267 | 101 | 158 | 450 | 0.18 | 2.0 | P |
| 130155339 | 8.4 | 264 | 112 | 167 | 460 | 0.18 | 2.0 | P |
| 130155344 | 8.7 | 264 | 128 | 183 | 429 | 0.18 | 2.0 | P |

Note:
[1] Smaller value in machine and cross-machine directions.

| | | | |
|---|---|---|---|
| Total Area of Geotextile Rolls: | | 1,774,800 | $ft^2$ |
| No. of Geotextile Rolls Tested: | | 42 | |
| Test Frequency: | 1 per | 42,257 | $ft^2$ |

## Table 5-9C

## MQC TEST RESULTS FOR GEONET USED TO MANUFACTURE SECONDARY GEOCOMPOSITE (GSE)

| PROPERTY | Polymer Density ($g/cm^3$) | Carbon Black Content (%) | Thickness (mil) |
|---|---|---|---|
| TEST STANDARD | ASTM D 1505 | ASTM D 1603 | ASTM D 5199 |
| PROJECT SPECS. | ≥ 0.93 | 2 to 3 | ≥ 200 |
| TESTING FREQUENCY | 1 per 100,000 $ft^2$ | | |

| GEONET ROLL NUMBER | LOT NO. | TEST RESULTS | | | PASS/FAIL (P/F) |
|---|---|---|---|---|---|
| 131131239 | CB13080403 | 0.961 | 2.2 | 290 | P |
| 131131246 | | 0.961 | 2.4 | 291 | P |
| 131131256 | | 0.961 | 2.4 | 286 | P |
| 131131266 | | 0.961 | 2.4 | 287 | P |
| 131132511 | RPG120092 | 0.961 | 2.2 | 310 | P |
| 131132512 | | 0.961 | 2.3 | 303 | P |
| 131132522 | | 0.961 | 2.4 | 311 | P |
| 131132532 | | 0.959 | 2.3 | 300 | P |
| 131132542 | | 0.961 | 2.6 | 301 | P |
| 131132552 | | 0.961 | 2.6 | 297 | P |
| 131132562 | | 0.961 | 2.5 | 308 | P |
| 131132572 | | 0.961 | 2.4 | 302 | P |
| 131132582 | | 0.961 | 2.2 | 302 | P |
| 131132592 | | 0.961 | 2.3 | 305 | P |
| 131132602 | | 0.960 | 2.4 | 312 | P |
| 131132612 | | 0.961 | 2.4 | 306 | P |
| 131132622 | RPG120091 | 0.961 | 2.4 | 314 | P |
| 131132632 | | 0.961 | 2.5 | 301 | P |
| 131132642 | | 0.961 | 2.4 | 306 | P |
| 131132652 | | 0.960 | 2.3 | 302 | P |
| 131132662 | | 0.961 | 2.3 | 309 | P |
| 131132672 | | 0.960 | 2.7 | 304 | P |
| 131132682 | | 0.961 | 2.3 | 300 | P |
| 131132692 | | 0.961 | 2.6 | 301 | P |
| 131132702 | | 0.960 | 2.5 | 305 | P |
| 131132712 | | 0.960 | 2.3 | 305 | P |
| 131132722 | | 0.961 | 2.5 | 311 | P |
| 131132731 | | 0.961 | 2.5 | 307 | P |
| 131132741 | | 0.960 | 2.3 | 307 | P |
| 131132751 | | 0.960 | 2.9 | 303 | P |
| 131132761 | | 0.961 | 2.3 | 305 | P |
| 131132771 | | 0.961 | 2.3 | 308 | P |
| 131132781 | | 0.961 | 2.8 | 311 | P |
| 131132791 | | 0.961 | 2.4 | 303 | P |
| 131132801 | | 0.961 | 2.2 | 294 | P |
| 131132811 | | 0.961 | 2.9 | 302 | P |
| 131132821 | | 0.961 | 2.5 | 304 | P |
| 131132831 | | 0.961 | 2.6 | 304 | P |
| 131132841 | | 0.961 | 2.5 | 304 | P |
| 131132857 | | 0.960 | 2.4 | 307 | P |

| | | | |
|---|---|---|---|
| Area of Geonet Rolls: | | 887,400 | $ft^2$ |
| No. of Geonet Rolls Tested: | | 40 | |
| Test Frequency: | 1 per | 22,185 | $ft^2$ |

## Table 5-10

## CQA AND MQC TEST RESULTS FOR NON-WOVEN GEOTEXTILE (GSE)
## LOT NO: 20059427

| | CONSTRUCTION QUALITY ASSURANCE (CQA) | | | | | | | MANUFACTURING QUALITY CONTROL (MQC) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROPERTY** | Mass per Unit Area ($oz/yd^2$) | Grab Strength[1] (lb) | Trapezoidal Tear Strength[1] (lb) | Puncture Strength (lb) | Burst Strength ($lb/in^2$) | Apparent Opening Size (mm) | Permittivity ($sec^{-1}$) | Mass per Unit Area ($oz/yd^2$) | Grab Strength[1] (lb) | Trapezoidal Tear Strength[1] (lb) | Puncture Strength (lb) | Burst Strength ($lb/in^2$) | Apparent Opening Size (mm) | Permittivity ($sec^{-1}$) |
| **TEST STANDARD** | ASTM D 5261 | ASTM D 4632 | ASTM D 4533 | ASTM D 4833 | ASTM D 3786 | ASTM D 4751 | ASTM D 4491 | ASTM D 5261 | ASTM D 4632 | ASTM D 4533 | ASTM D 4833 | ASTM D 3786 | ASTM D 4751 | ASTM D 4491 |
| **PROJECT SPECS.** | ≥ 8 | ≥ 180 | ≥ 75 | ≥ 75 | ≥ 350 | ≤ 0.21 | ≥ 0.5 | ≥ 8 | ≥ 180 | ≥ 75 | ≥ 75 | ≥ 350 | ≤ 0.21 | ≥ 0.5 |
| **TESTING FREQUENCY** | 1 per 200,000 $ft^2$ | | | | | 1 per 500,000 $ft^2$ | | 1 per 100,000 $ft^2$ | | | | | 1 per 250,000 $ft^2$ | |

| ROLL NUMBER | CQA SAMPLE ID | CQA TEST RESULTS | | | | | | | MQC TEST RESULTS | | | | | | | PASS/FAIL (P/F) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | CQA | MQC |
| 130146805 | GF-1 | 8.5 | 284 | 101 | 145 | 460 | 0.12 | 1.5 | 8.2 | 236 | 106 | 144 | 431 | 0.18 | 2.1 | P | P |
| 130146811 | | | | | | | | | 8.5 | 257 | 105 | 156 | 430 | 0.18 | 2.1 | | P |
| 130146869 | | | | | | | | | 8.4 | 248 | 116 | 149 | 432 | 0.18 | 1.4 | | P |
| 130147130 | | | | | | | | | 8.0 | 221 | 101 | 129 | 386 | 0.18 | 1.7 | | P |
| 130154657 | | | | | | | | | 8.4 | 248 | 124 | 168 | 460 | 0.18 | 2.0 | | P |

Note:
[1] Smaller value in machine and cross-machine directions.

Total No. of Rolls: 5
Total Area of Rolls: 36,090 $ft^2$

## Table 5-11A

## MINIMUM INTERFACE SHEAR STRENGTHS REQUIRED BY THE CQA DOCUMENTS

| Normal Stress (psf) | Shear Strength (psf) |
|---|---|
| 2,005 | 429 |
| 5,013 | 787 |
| 10,025 | 1,143 |
| 15,038 | 1,594 |

## Table 5-11B

## INTERFACE SHEAR STRENGTHS FROM CQA TESTING

| | (1) Protective Layer Soil / Tri-Planar Geocomposite | | (2) Tri-Planar / Textured Geomembrane | | (3) Textured Geomembrane / GCL | | (4) GCL / Bi-Planar Geocomposite | | (5) Bi-Planar / Textured Geomembrane | | (6) GCL / Subbase Soil | | (7) GCL Internal Strength | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Normal Stress (psf)** | Peak Shear Strength (psf) | Residual Shear Strength (psf) | Peak Shear Strength (psf) | Residual Shear Strength (psf) | Peak Shear Strength (psf) | Residual Shear Strength (psf) | Peak Shear Strength (psf) | Residual Shear Strength (psf) | Peak Shear Strength (psf) | Residual Shear Strength (psf) | Peak Shear Strength (psf) | Residual Shear Strength (psf) | Peak Shear Strength (psf) | Residual Shear Strength (psf) |
| **5,000** | 3,714 | 3,458 | 2,905 | 1,902 | 2,810 | 1,381 | 3,057 | 1,824 | 2,750 | 1,738 | 2,807 | 2,293 | 3,300 | 1,190 |
| **10,000** | 7,056 | 6,700 | 5,025 | 3,035 | 4,522 | 1,839 | 4,637 | 1,658 | 5,177 | 2,870 | 4,320 | 2,166 | 4,863 | 1,763 |
| **15,000** | 10,177 | 9,776 | 7,352 | 4,410 | 5,768 | 2,112 | 5,874 | 1,872 | 7,265 | 4,334 | 5,865 | 2,022 | 6,197 | 2,383 |

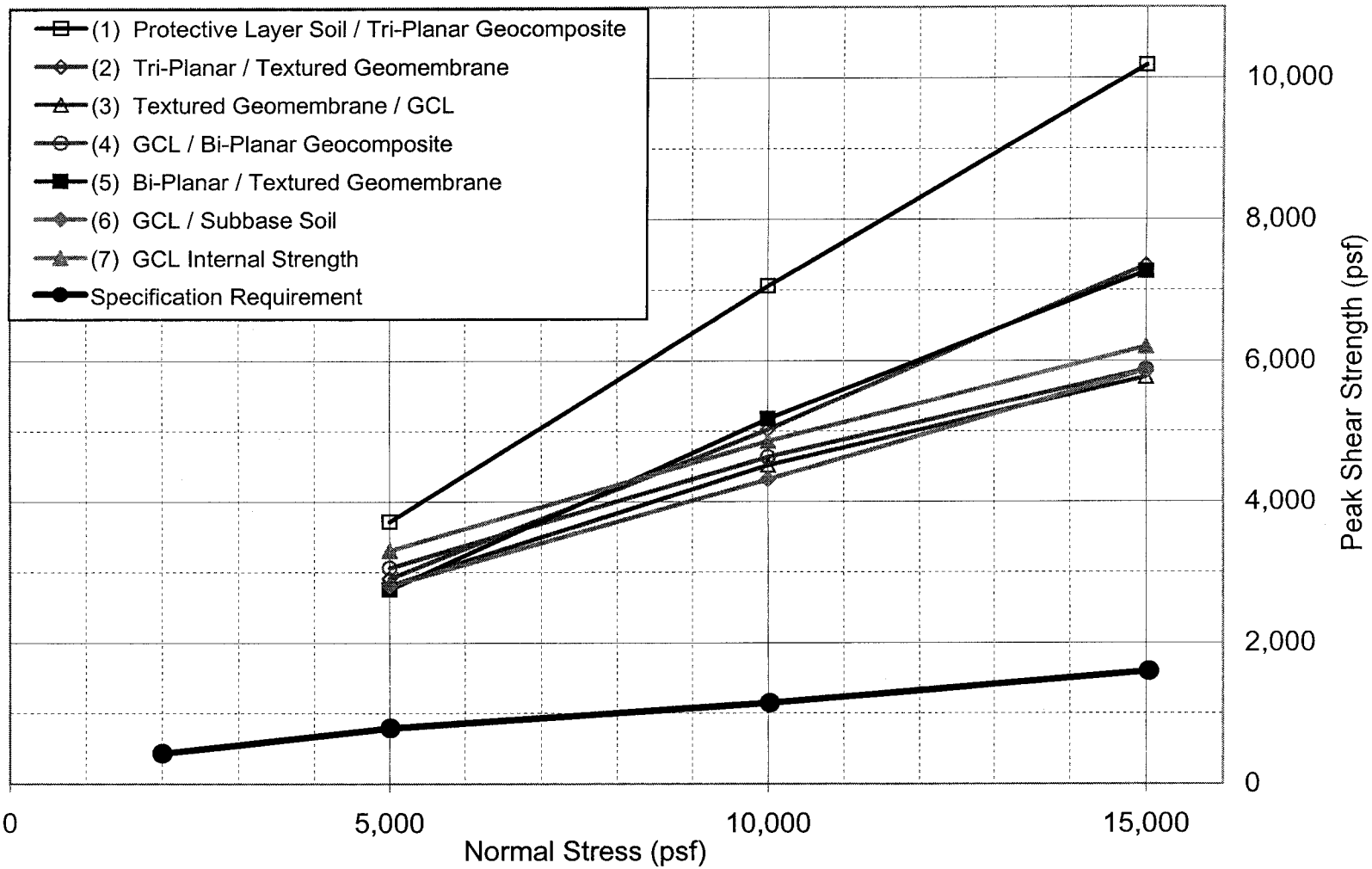


**Figure 5-1: Peak Shear Strengths from Interface Friction Tests**

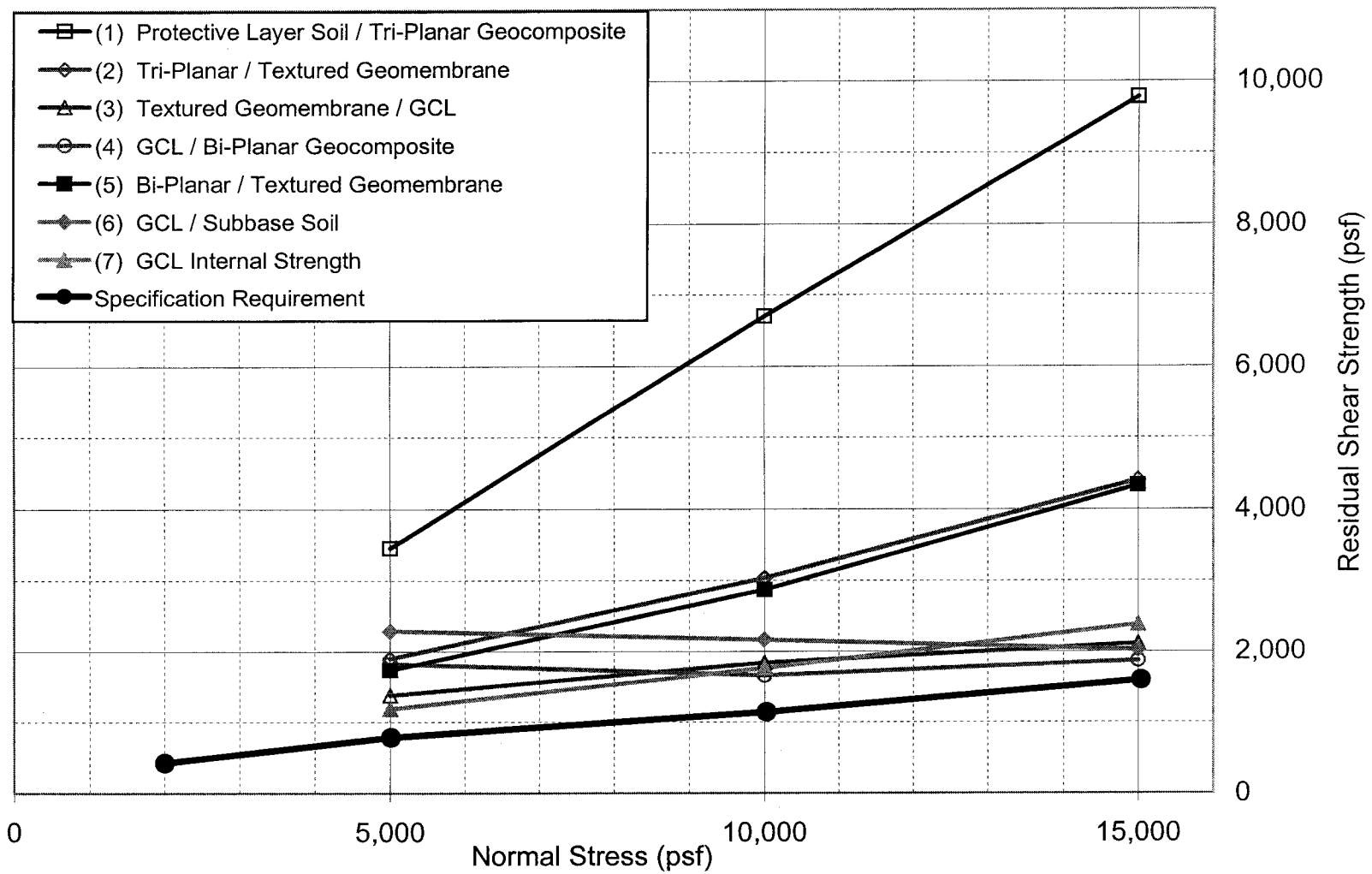


**Figure 5-2: Residual Shear Strengths from Interface Friction Tests**

# 6. CONSTRUCTION QUALITY ASSURANCE -- LEACHATE MANAGEMENT SYSTEM

## 6.1 General

The leachate management system is comprised of the leachate collection, transmission, and storage systems. The construction of the initial leachate management system for Phase 1 development of the OHDF landfill included construction of leachate collection system in Cell 1A, Cell 1 sump, leachate transmission system for Phase 1, and the initial leachate storage area.

The leachate collection system in Cell 1A consists of a primary and a secondary leachate collection system. The primary leachate collection system included 6-in diameter SDR 11 HDPE perforated leachate collection pipe surrounded by gravel aggregate and geotextile filter fabric at the toe of the perimeter berm on the north and the west sides of Cell 1A. The leachate collection pipe was provided with two rows of ½-in perforations in the bottom 1/3 of the pipe section. Granular drainage materials meeting the requirements of #57 and #4 stone (per ASTM D 448) were used as the gravel aggregate. An 8-oz/yd$^2$ needle-punched, non-woven geotextile was used as the filter fabric. Four cleanouts were installed along the inside slope of the perimeter dike in Cell 1A to maintain the leachate collection system piping. The cleanouts were constructed using 6-in diameter SDR 11 HDPE pipe and were finished with a blind flange. The secondary leachate collection system included an additional 6-ft wide secondary geocomposite layer at the toe of the perimeter berm on the north and west sides of Cell 1A.

The Cell 1 sump included gravel beds covered with geotextile separator fabric and three sump risers. The gravel beds for the primary and secondary sumps were separated by the primary liner system. Granular drainage materials meeting the requirements for #4 stone (per ASTM D 448) were used in the 1.5-ft to 3-ft thick drainage beds. The drainage beds were separated from the overlying liner protective layer by an 8-oz/yd$^2$ needle-punched, non-woven geotextile separator fabric. Two primary and one secondary sump risers were installed in the Cell 1 sump. The sump risers were constructed using 48-in diameter SDR 32.5 HDPE pipe and included a 2-in thick base plate and a bolted top lid. Each sump riser was provided with perforations in the bottom 1-ft and a 20-ft long, 8-in diameter, SDR 11 HDPE perforated collection pipe. The primary sump risers were connected to the secondary sump riser using a 3-in diameter SDR 11 HDPE overflow pipe with a 3-in gate valve in accordance with the CQA Documents. The Cell 1 sump area included a 2-ft thick compacted low permeability soil layer as discussed in Section 4. The geosynthetics in the sump area were installed as discussed in Section 5.

The Phase 1 leachate transmission system included an 8-inch diameter SDR 11 HDPE leachate transmission pipe from the Cell 5 sump area (south of Cell 4) to the leachate storage area (south of Cell 3). Seven manholes were installed along the leachate transmission line adjacent to the sump area of Cells 1 through 6 and Cell 9. The leachate transmission manholes were constructed using 48-in diameter SDR 32.5 HDPE pipe and included a 2-in thick base plate and a bolted top lid. The leachate transmission manholes included pipe stub-outs (for future connection to the cell sump risers) and valves (to allow isolation of the cell sump areas or leachate transmission line segments, as needed) in accordance with the CQA Documents.

The initial leachate storage area includes four flexible storage containers constructed using 60-mil thick smooth HDPE geomembrane. Two of these four flexible storage containers (#1 and #4) are complete at this time. The construction of the remaining two flexible storage containers (#2 and #3) will be completed in conjunction with the completion of Cell 1B. The flexible leachate storage containers were/are being constructed within a double-lined containment area as discussed in Section 2. The geosynthetics in the sump area were installed as discussed in Section 5. The construction of the leachate storage area also included a leachate truck load out pad with associated leachate transfer pumps, instrumentation, and piping system. Leak detection and toe drains were also installed in each of the four compartments of the leachate storage area in accordance with the CQA Documents.

Leachate from Cell 1A will be collected in the leachate collection system at the toe of the perimeter dike and will gravity flow to the Cell 1 sump. Leachate will be pumped from the sump risers through the leachate transmission line to the leachate storage area. Leachate from the leachate storage area will be loaded and trucked off-site to a waste water treatment plant for proper treatment and disposal.

To control the pumping and transfer of leachate, two control panels were installed as part of the leachate management system for the operation of Cell 1A. These control panels included sump control panel at the Cell 1 sump area and the leachate transfer control panel at the truck load-out pad. A third control panel will be installed during the completion of Cell 1B. This third panel will provide additional sensors and alarms for leachate levels in the flexible storage containers and controls for the automated valves used for routing leachate flow based on these levels.

GeoSyntec's CQA personnel monitored the construction of the leachate management system. The field monitoring and testing activities performed by the CQA personnel during construction of the leachate management system are discussed below.

## 6.2 HDPE Pipe

All pipes used in the construction of the leachate management system were SDR 11 HDPE pipes except for the sump risers and leachate transmission manholes, which were constructed using SDR 32.5 HDPE pipes. The MQC certificates for the HDPE pipes were reviewed by the CQA personnel and were found to be in compliance with the requirements of the CQA Documents.

HDPE pipe sections were joined using butt-fusion welding techniques. CQA personnel periodically monitored the butt-fusion welding techniques to ensure that industry-accepted procedures were used during construction. CQA personnel also verified the diameter of and perforation details (size, number of rows, orientation) for the various pipes used in the leachate management system and periodically monitored the installation of the various pipes to ensure compliance with the requirements of the CQA Documents. Record Drawing presenting the as-built location of the leachate transmission line is included in Appendix A

## 6.3 Granular Drainage Materials

Granular drainage materials meeting the requirements of #57 and/or #4 stone (per ASTM D 448) were used in Cell 1A leachate collection system, Cell 1 sump, and the leak detection drains in the leachate storage area. The #57 and #4 stones were supplied by Martin Marietta in Shorters, Alabama.

The QC certificates and test results and the CQA conformance test results were reviewed by CQA personnel and were found to be in compliance with the CQA Documents. The results of the QC and CQA conformance tests are summarized in Table 6-1. Table 6-1 presents the tests conducted, test frequencies, and the acceptance criteria in accordance with the CQA Documents. In addition to the tests presented in Table 6-1, a carbonate content test (per ASTM D 3042) was also performed on the granular drainage materials during the QC testing. The #57 and #4 stones used in construction of the leachate management system were found to be insoluble to 6N hydrochloric acid used in the tests.

CQA personnel periodically monitored the placement of the granular drainage material to ensure (i) the underlying geosynthetics were not damaged; (ii) the perforated pipes were properly surrounded by the drainage materials; and (iii) the drainage materials were placed in accordance with the requirements of the CQA Documents.

## 6.4 Pressure Testing

The leachate transmission line was pressure tested to detect any leaks or defective pipe joints. The hydrostatic pressure testing was performed in 2 segments. The first

segment included the leachate transmission line from MH-5 (manhole adjacent to Cell 5 sump area) to MH-1 (manhole adjacent to Cell 1 sump area). The second segment included the leachate transmission line from MH-1 to the leachate storage area.

The hydrostatic pressure testing was performed in two phases. In the first phase, the leachate transmission line segment was filled with water and the internal pressure was increased to 130 psi. This hydrostatic pressure was maintained for at least 3 hours to allow expansion of the pipe line. The second/test phase was performed for at least 1 hour. No drop in the hydrostatic pressure was allowed or observed during the second test phase.

During final grading of the outer slope of the perimeter dike on the east side of Cell 2, the leachate transmission line was accidentally damaged. The damaged length of the leachate transmission pipe was replaced using flange connections on both sides. The location of the repair is indicated on the Record Drawing for the leachate transmission line included in Appendix A. After completion of the repair, the leachate transmission line segment between manholes MH-2 and MH-3 was retested using the procedure discussed above.

### 6.5 Sump Pumps and Control Panel

Leachate collected in the leachate sumps will be extracted and pumped to the leachate storage area by two 5-hp electric submersible pumps located in the primary sump risers and one 3-hp electric submersible pump located in the secondary sump riser. The pumps are controlled by a control panel located at the Cell 1 sump near the top of the sump risers. The sump pumps and the associated control panel were provided by the EPG Companies (EPG) in Maple Grove, MN.

The following tests will be performed after installation of the pumps and control system at the Cell 1 sump area to confirm proper operation of the pumps and pump control panel. The testing is expected to be performed on 22 January 2004.

- Sump pumps tested in place by flooding the Cell 1 sump. Each pump will be connected to a piping assembly containing a pressure gauge, meter valve, and a flow meter. The pumps will be turned on and the pressure and flow rate of each pump will be recorded. The pressure and flow rate data for each pump will be compared to the pump curves provided by EPG.

- Float switches in each of the sump risers will be activated by hand to confirm that the switches are activating the correct pumps and alarms.

- The system will be tested to confirm that a manual signal from the leachate storage area is being received to shut down the Cell 1 sump pumps. A control panel to automatically indicate that all four storage containers are full will be installed during construction of Cell 1B.

## 6.6 Leachate Storage Area Control Panel

Control for the automatic valves located in the leachate storage area is provided by a control panel located at the truck load out station and a series of level switches located in each storage container. The leachate storage area control panel is currently being assembled. It is expected to be delivered to the site by early February 2004 and installed by end of February 2004.

It is noted that the Cell 1A can be safely operated without the leachate storage control panel because a manual cut-off switch is being installed (in addition to the controls indicated in the CQA Documents) in the leachate storage area to turn-off all pumps in the Cell 1 sump from the leachate storage area.

The control panel for the leachate storage area is being assembled by EPG. Level switches, and leak detection switches will also be supplied by EPG. The control panel; associated power and control conduit; and pipe valves and actuators will be supplied and installed by Comanco. Conductors for power and control will be supplied and installed by Curren Electric Co. in Okeechobe, Florida.

The level switches and leak detection switches in each storage area will be tested by immersing the switches in a tank of water. Each set point (LSL, LSH, LSHH) on the level switches will be marked on the cabling prior to immersion to confirm that set points are set accurately. As each level switch is immersed in water, GeoSyntec will confirm the response at the appropriate valve actuator and alarms.

Once the individual responses are verified, all four high level switches will be activated simultaneously to confirm that the pump disable signal is being sent to and received by the sump pump control panel and alarms.

The low level condition on all four pumps will also be activated to confirm the pump disable signal to the truck load out pumps.

## 6.7 Truck Load-Out Control Panel

Leachate stored in the leachate storage area will be loaded onto trucks using two 5-hp self-priming pumps. Pump operation is controlled by a separate control panel that will be tied into the leachate storage area control panel. The pumps and the control panel for the truck load out area were supplied by Barney's Pumps in Lakeland, Florida.

Operation of the leachate pump-out system will be confirmed by starting each pump to confirm that its direction of rotation is correct and there are no leaks in the piping system. The automated shut-off system will be tested to confirm that the signal from the leachate storage area indicating that all four low level switches are activated, will shut down the truck loading pumps when the leachate storage area control panel is installed. The operational testing of the leachate pump-out system is expected to be performed on 22 January 2004.

Table 6-1

## CQA AND MQC TEST RESULTS FOR GRANULAR DRAINAGE MATERIAL

| | | | PARTICLE SIZE ANALYSIS | | | | | | | SOIL CLASSIFICATION | HYDRAULIC CONDUCTIVITY | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TEST STANDARD | | ASTM D 422 | | | | | | | ASTM D 2847 | ASTM D 2434 | |
| | TESTING FREQUENCY | | 1 test per 2,000 $yd^3$ | | | | | | | 1 test per 2,000 $yd^3$ | 1 test per 3,000 $yd^3$ | |
| | TEST RESULTS | | | | | | | | | | | |
| | Sample No. | Stone # | Percent Passing by Weight Through U.S. Standard Sieve | | | | | | | USCS Classification | Hydraulic Conductivity[1] (cm/s) | Pass/Fail (P/F) |
| | | | 3-in | 2-in | 1.5-in | 1.0-in | 3/4-in | 3/8-in | #4 | | | |
| CQA[2] | SS-2 | 57 | 100.0 | 100.0 | 100.0 | 99.0 | 69.0 | 3.0 | 0.0 | GP | 31 | P |
| | I-45 | 4 | 100.0 | 100.0 | 81.0 | 10.0 | 2.0 | 1.0 | 0.0 | GP | 74 | P |
| MQC | | 57 | - | - | 100.0 | 82.8 | - | 0.7 | 0.4 | GP | 31 | P |
| | | 4 | - | 100.0 | 79.7 | 11.7 | 0.9 | 0.2 | - | GP | 52 | P |

Notes:

[1] Hydraulic conductivity greater than or equal to 1 cm/sec and 10 cm/sec was required for # 57 and # 4 stones, respectively.

[2] CQA conformance tests were performed by Excel Geotechnical Testing.

# 7. CONSTRUCTION QUALITY ASSURANCE - OTHER CONSTRUCTION ACTIVITIES

## 7.1 Ground Water Monitoring Wells

Forty five groundwater monitoring wells were installed in 15 clusters (MW-1 through MW-15) around the Phase 1 development of the OHDF landfill in accordance with the CQA Documents. Three monitoring wells (Type "A", Type "B", and Type "C") were installed at each cluster location.

Groundwater monitoring well clusters MW-1 through MW-6 and MW-8 through MW-14 were installed by Environmental Drilling Services, Orlando, Florida. Groundwater monitoring well clusters MW-7 and MW-15 were installed by Prosonic Corporation, Fort Lauderdale, Florida. GeoSyntec monitored the construction and performed the development and sampling of the groundwater monitoring wells. It is noted that a separate report is being prepared for groundwater monitoring installation, development, and sampling. The report will be submitted to FDEP after the laboratory testing of the groundwater samples is completed. Therefore, only a brief description of the groundwater monitoring wells is included herein.

Groundwater monitoring wells MW-1 through MW-13 were insalled along the outer edge of the perimeter berm from approximate Elevation 92 feet, NGVD. Groundwater monitoring wells MW-14 and MW-15 were insalled in the perimeter berm on south side of the Phase 1 development, as indicated in the CQA Documents, from approximate Elevation 84 feet, NGVD. All wells had 10-ft screened sections with the depth of the top of screen as discussed below:

- *Type "A" Shallow Wells:* The depth of top of screen was approximately 10 ft below existing (post-construction) grade at monitoring well clusters MW-1 through MW-13 and approximately 2.5 ft below existing grade at monitoring well clusters MW-14 and MW-15.
- *Type "B" Intermediate Wells:* The depth of top of screen was approximately 35 ft below existing grade at monitoring well clusters MW-1 through MW-13 and approximately 25 ft below existing grade at monitoring well clusters MW-14 and MW-15.
- *Type "C" Deep Wells:* The depth of top of screen was approximately 55 to 60 ft below existing grade at monitoring well clusters MW-1 through MW-13 and approximately 50 ft below existing grade at monitoring well clusters MW-14 and MW-15.

## 7.2 Ground Water Monitoring Well Abandonment

As part of the original site investigation during the permit process, several piezometers were installed within the footprnt of the OHDF, landfill. Two of these piezometers, DP-1 and DP-2, were within the footprint of Cell 1 (see Figure 2 in Appendix E of the Solid Waste Permit Application). These 2 piezometers were abandoned during the construction of Cell 1. The abandonment of the piezometers included removing the steel casing around the piezometers; grouting the piezometers from the bottom to the ground surface using a tremie pipe; and cutting the well casing 1-ft below the ground surface.

## 7.3 Culvert Crossings

A total of five culvert crossings were constructed along the site access road in accordance with the CQA Documents with two exceptions. The wetland crossings at Sta. 85+00 and Sta. 96+00, which were originally designed with a 24-in and a 12-in diameter corrugated HDPE pipe, respectively, were both constructed using a 24-in diameter reinforced concrete pipe (RCP). Thus, all five culvert crossings along the site access road were constructed using RCPs.

The RCP for the culvert crossings were supplied by Rinker Materials in Apopka, Florida. The MQC certificates were reviewed by the CQA personnel and were found to be in compliance with the CQA Documents.

## 7.4 Storm Water Structures Along Site Access Road

Twenty-four storm water structures were constructed along the site access road in accordance with the CQA Documents with two exceptions. First, the storm water structures included 2 ft by 2 ft pre-cast concrete structures (with a slotted cast iron grate on top) in lieu of the 18-in diameter corrugated HDPE pipe structure indicated on Sheet 50 of 50 of the Permit Drawings. The number and diameter of the orifices in and the height of the pre-cast concrete storm water structures used in construction, are presented in Table 7-1. Second, the invert elevations of some of the storm water structures were adjusted due to the conditions encountered in the field. The invert elevations of the storm water structures used during construction are also presented in Table 7-1.

The pre-cast concrete storm water structures were manufactured by Mack Concrete Industries in Astatula, Florida. The Advanced Drainage Systems, Inc. N-12 corrugated HDPE pipes were used for the 12-in diameter outfall pipes. The MQC certificates supplied by the manufacturers were reviewed by the CQA personnel and were found to be in compliance with the CQA Documents.

## 7.5 Storm Water Drainage Structures

Five storm water drainage structures were installed along the perimeter berm around Phase 1 development of the OHDF landfill in accordance with the CQA Documents. These structures will be used as part of the storm water management system after installation of the final cover system (see Sheet 36 of 50 of the Permit Drawings).

The pre-cast concrete storm water drainage structures were manufactured by Mack Concrete Industries in Astatula, Florida. The MQC certificates supplied by the manufacturer were reviewed by the CQA personnel and were found to be in compliance with the CQA Documents.

## 7.6 Utilities

Power and a phone lines were installed from U.S. Hwy 441 to the administrative area of the OHDF landfill. The power and phone lines to the administrative area are active at this time.

The overhead power lines were installed by Progress Energy. The power lines run along the north side of the site access road up to Bull Creek, cross the access road near Bull Creek, and run along the south side of the site access road from Bull Creek to the administrative area.

The installation of power lines around the landfill (i.e., to leachate storage area and sump areas of cells in Phase 1) are being installed by Irby Construction of Casselberry, Florida, a subcontractor to Progress Energy. The installation of power lines around the landfill commenced on 4 January 2004 and is expected to be completed by end of February 2004. Therefore, at the start of operation of the OHDF landfill, the pumps at the Cell 1 sump and at the leachate storage area will be operated using portable electric generators.

The below grade phone line was installed by Team Fischel. The phone line runs approximately 4 ft from the edge of the future pavement along the north side of the site access road. The phone is buried approximately 2.5 ft below the existing grade. At the locations of the culvert crossings along the site access road, the phone line was typically installed approximately 7 ft below the invert of the pipes using horizontal directional drilling. At the culvert crossing at Sta. 143+74 (i.e., the dry retention area to wet retention area crossing) the phone line was installed approximately 1 ft below the invert of the pipes.

## 7.7 Limerock Base Course for Access and Haul Roads

Limerock was placed as the base course on the site access road and the lanfill haul roads (including the haul road to the leachate storage area and the cell access road). A 14-in and 12-in thick layer of limerock base course was placed and compacted on top of the site access and the landfill haul roads subbase, respectively. The access road will be paved at a later time.

The limerock for the project was supplied by Bedrock Resources, Inc. in Ocala, Florida from a FDOT certified mine. CQA personnel periodically monitored the placement and compaction of the limerock base course and ensured compliance with the CQA Documents. The limerock was placed on the access and haul roads in two lifts and compacted in accordance with the CQA Documents. CQA personnel measured the density and percent compaction of the limerock base course at a frequency of one test per 200 linear feet per lane per lift in accordance with the CQA Documents. The results of the density tests along the site access and landfill haul roads are not included in this certification report but will be made available upon request.

## 7.8 Farm Fence

FDOT Type A farm fence was installed on both sides of the site access road, along the property boundary on east and north sides of the landfill footprint, and around Borrow Area A. The farm fence along the property boundary and around Borrow Area A was tied into the existing farm fence on the site to provide a continuous fence around the site access road, landfill footprint, and Borrow Area A. At 3 locations along the site access road, gates were provided on both sides of the site access road to serve as cattle crossings.

The farm fence was installed by Carroll Fencing in Kissimmee, Florida. CQA personnel periodically monitored the installation of the farm fence and ensured compliance with the CQA Documents.

## 7.9 Fire and Mosquito Control Ponds

The fire pond adjacent to the administrative area and the mosquito control pond in the dry retention basin on north side of the OHDF landfill footprint were excavated by Lundquist in accordance with the CQA Documents. CQA personnel periodically monitored the excavation of the fire and mosquito control ponds and ensured compliance with the CQA Documents.

## 7.10 Emergency Spillway

The emergency spillway along the storm water management berm on east side of the OHDF landfill footprint was constructed by Lundquist in accordance with the CQA Documents. CQA personnel periodically monitored the construction of the emergency spillway and ensured compliance with the CQA Documents.

**Table 7-1**

**STORM WATER STRUCTURES ALONG SITE ACCESS ROAD**

| Structure ID | Invert El. (ft NGVD) | Top of Riser El. (ft NGVD) | Height of Riser (ft) | Height of Back-splash (in) | Number of Structures | Number of 6-in Dia. Orifices | | Number of 7-in Dia. Orifices | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Each | Total | Each | Total |
| NN1 | 77.7 | 80.95 | 3.25 | 0 | 1 | 0 | 0 | 3 | 3 |
| NS1 | 78.4 | 81.65 | 3.25 | 0 | 1 | 1 | 1 | 0 | 0 |
| NN2 | 77.1 | 78.35 | 1.25 | 4 | 1 | 1 | 1 | 0 | 0 |
| NS2 | 77.3 | 78.55 | 1.25 | 4 | 1 | 1 | 1 | 0 | 0 |
| NN3 | 76.2 | 77.45 | 1.25 | 4 | 1 | 0 | 0 | 3 | 3 |
| NS3 | 76.2 | 77.45 | 1.25 | 4 | 1 | 0 | 0 | 3 | 3 |
| NN4 | 74.6 | 75.85 | 1.25 | 4 | 1 | 2 | 2 | 0 | 0 |
| NS4 | 74.6 | 75.85 | 1.25 | 4 | 1 | 2 | 2 | 0 | 0 |
| NN5 | 74.2 | 75.45 | 1.25 | 4 | 1 | 1 | 1 | 0 | 0 |
| NS5 | 74.5 | 75.75 | 1.25 | 4 | 1 | 1 | 1 | 0 | 0 |
| NN6 | 74.0 | 75.25 | 1.25 | 4 | 1 | 3 | 3 | 0 | 0 |
| NS6 | 74.1 | 75.35 | 1.25 | 4 | 1 | 3 | 3 | 0 | 0 |
| NN7 | 74.0 | 75.25 | 1.25 | 4 | 2 | 2 | 4 | 0 | 0 |
| NS7 | 74.0 | 75.25 | 1.25 | 4 | 2 | 2 | 4 | 0 | 0 |
| NN8 | 71.5 | 72.70 | 1.25 | 4 | 2 | 2 | 4 | 0 | 0 |
| NS8 | 71.5 | 72.70 | 1.25 | 4 | 2 | 2 | 4 | 0 | 0 |
| NN9 | 71.2 | 72.45 | 1.25 | 4 | 2 | 3 | 6 | 0 | 0 |
| NS9 | 71.1 | 72.35 | 1.25 | 4 | 2 | 3 | 6 | 0 | 0 |

## 8. CONCLUSIONS

Observation of the construction of Cell 1A and associated facilities at the OHDF was performed by GeoSyntec during the period of 26 June 2003 to 19 January 2004. During this time, CQA personnel monitored the installation of the following components of Cell 1A and the associated facilities:

- earthwork (landfill perimeter berm, storm water management system, Cell 1A subgrade and intercell berm, Cell 1 sump area, low permeability soil layer in sumps areas, liner protective layer, leachate storage area, site access road and landfill haul roads, administration and future use areas, and other ancillary construction);
- geosynthetics in Cell 1A and the leachate storage area;
- leachate collection, transmission, and storage system (Cell 1A leachate collection system, Cell 1 sump, Phase 1 leachate transmission system, and leachate storage area with truck load-out pad).
- other construction including groundwater monitoring wells, culvert crossings and storm water structures along site access road, storm water drainage structures, site utilities, limerock base course on access and haul roads, facility fence, and and other ancillary construction.

During construction of the above components, CQA personnel verified that performance and conformance testing was performed at the frequencies required by the CQA Documents and that the installation met or exceeded the requirements of the CQA Documents. CQA personnel also verified that conditions or materials identified as not conforming to the CQA Plan were replaced, repaired, and/or retested, as described in the report.

The results of the CQA activities undertaken by GeoSyntec as described in this report indicate that Cell 1A and associated facilities at the OHDF landfill were constructed in accordance with the CQA Documents and the solid waste permit.

Kirk Wills
Field Services Manager

Kenneth W. Cargill, P.E.
Project Manager, CQA Engineer-of-Record

| GeoSyntec Consultants<br>Photographic Record | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida | |

| | |
|---|---|
| Photograph 1<br>Date: June 27, 2003<br>Direction:<br>Comments:<br>Access road with silt fence. |  |

| | |
|---|---|
| Photograph 2<br>Date: June 25, 2003<br>Direction: East<br>Comments:<br>Silt fence installed to protect wetland area. North side of access road. |  |

| GeoSyntec Consultants<br>Photographic Record | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida . | |

| | |
|---|---|
| Photograph 3<br>Date: July 1, 2003<br>Direction:<br>Comments:<br>Palmetto plow in Borrow Area A. |  |

| | |
|---|---|
| Photograph 4<br>Date: June 25, 2003<br>Direction: South-West<br>Comments:<br>Stripping wetland area within limits of access road construction. |  |

| GeoSyntec Consultants<br>Photographic Record | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida | |

| | |
|---|---|
| Photograph 5<br>Date: July 3, 2003<br>Direction: East<br>Comments:<br>Excavation of rim ditch in Borrow Area A. |  |
| Photograph 6<br>Date: Aug 22, 2003<br>Direction: North-West<br>Comments:<br>Dozer shaping top and outer north wall of Borrow Area A. |  |

| GeoSyntec Consultants<br>Photographic Record | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida | |

| | |
|---|---|
| Photograph 7<br>Date: July 2, 2003<br>Direction: North-West<br>Comments:<br>Pan stripping at north-west berm area. |  |

| | |
|---|---|
| Photograph 8<br>Date: July 9, 2003<br>Direction: South<br>Comments:<br>Tractor with pans constructing storm water berm. |  |

| GeoSyntec Consultants<br>Photographic Record | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida | |

| | |
|---|---|
| Photograph 9<br>Date: July 14, 2003<br>Direction: North-East<br>Comments:<br>Subcontractor (BUL-HED) placing material for storm water management berm at Sta. 108+00. |  |

| | |
|---|---|
| Photograph 10<br>Date: July 2, 2003<br>Direction:<br>Comments:<br>Dozer tracking storm water management berm material. |  |

| GeoSyntec Consultants<br>Photographic Record | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida | |

| | |
|---|---|
| Photograph 11<br>Date: July 17, 2003<br>Direction:<br>Comments:<br>Access road earthwork. |  |

| | |
|---|---|
| Photograph 12<br>Date: July 16, 2003<br>Direction:<br>Comments:<br>Access road earthwork. |  |

| GeoSyntec Consultants<br>Photographic Record | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida | |

| | |
|---|---|
| Photograph 13<br>Date: July 22, 2003<br>Direction:<br>Comments:<br>Subgrade compaction for access road and storm water berms. |  |

| | |
|---|---|
| Photograph 14<br>Date: Aug 26, 2003<br>Direction: West<br>Comments:<br>Dump trucks placing materials in haul road. |  |

| GeoSyntec Consultants<br>Photographic Record | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida | |

| | |
|---|---|
| Photograph 15<br>Date: Aug 27, 2003<br>Direction:<br>Comments:<br>Placement and compaction of materials in Cell 1A. |  |

| | |
|---|---|
| Photograph 16<br>Date: Aug 22, 2003<br>Direction: South-West<br>Comments:<br>Sod placement along outer slope of storm water berm of Borrow Area A. |  |

GEOSYNTEC CONSULTANTS
Photographic Record

| | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida | |

| | |
|---|---|
| Photograph 17 |  |
| Date: 15 December 2003 | |
| Direction: | |
| Comments: Installation of primary liner over GCL in Cell 1A. | |

| | |
|---|---|
| Photograph 18 |  |
| Date: 9 December 2003 | |
| Direction: | |
| Comments: Geosynthetics installation in Cell1A. | |

GEOSYNTEC CONSULTANTS
Photographic Record

| | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
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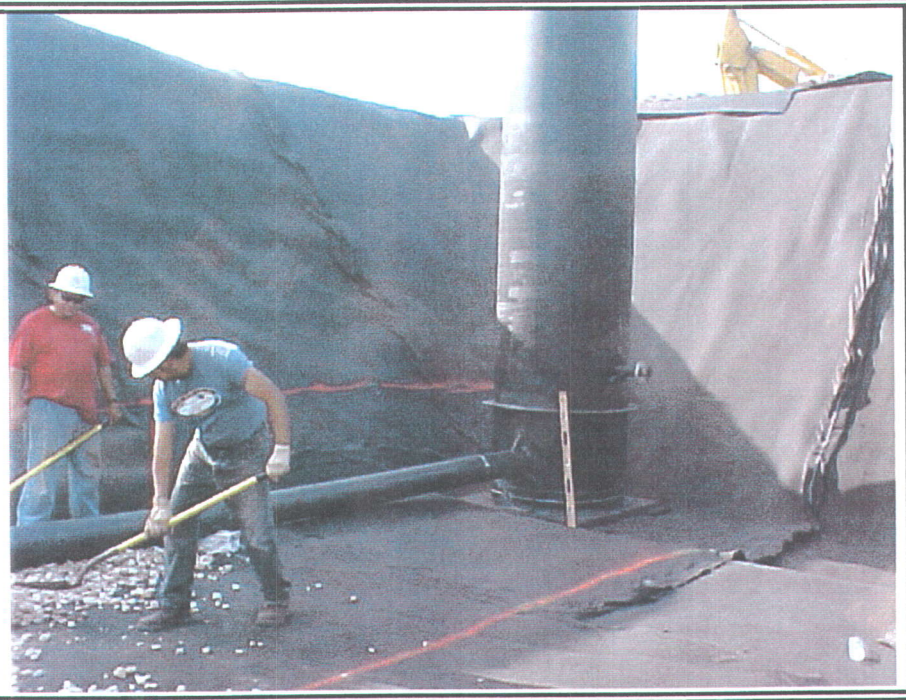
| Project Location: Near Holopaw in Osceola County, Florida | |

| | |
|---|---|
| Photograph 19 |  |
| Date: 9 December 2003 | |
| Direction: | |
| Comments: Compaction of low-permeability layer in Cell 1 sump. | |

| | |
|---|---|
| Photograph 20 |  |
| Date: 10 December 2003 | |
| Direction: | |
| Comments: Liner installation in Cell 1 sump. | |

GEOSYNTEC CONSULTANTS
Photographic Record

| | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida | |

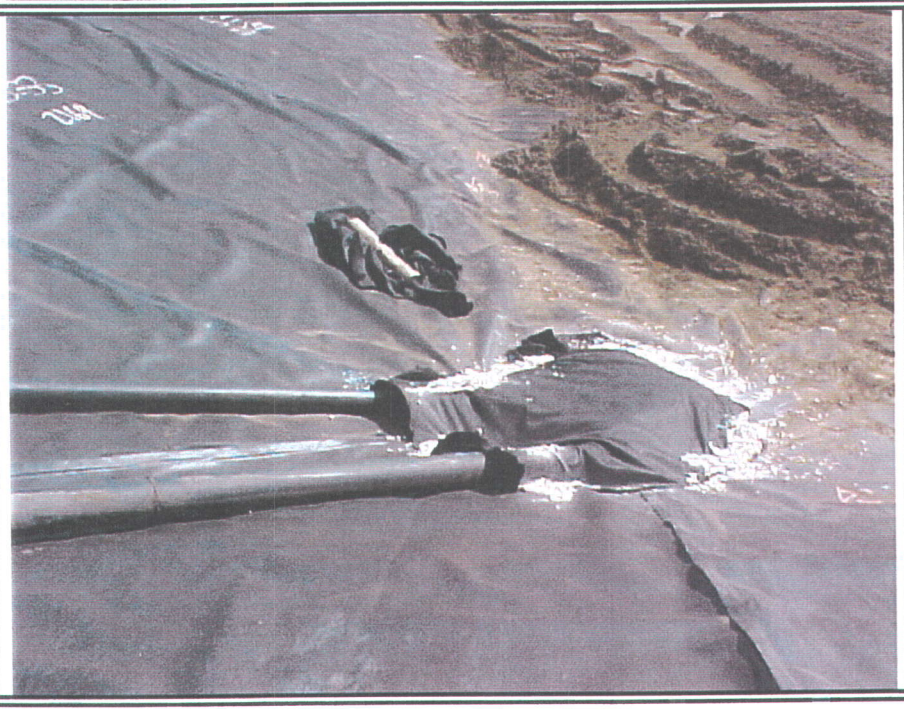
| | |
|---|---|
| Photograph 21 |  |
| Date: 13 December 2003 | |
| Direction: | |
| Comments: Cell 1 sump riser. | |

| | |
|---|---|
| Photograph 22 |  |
| Date: 13 December 2003 | |
| Direction: | |
| Comments: Construction of Cell 1 sump. | |

GEOSYNTEC CONSULTANTS
Photographic Record

| | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida | |

| | |
|---|---|
| Photograph 23 |  |
| Date: 28 November 2003 | |
| Direction: | |
| Comments: Secondary liner installation in leachate storage area. | |

| | |
|---|---|
| Photograph 24 |  |
| Date: 2 December 2003 | |
| Direction: | |
| Comments: Leak detection drain in leachate storage area. | |

| GeoSyntec Consultants<br>Photographic Record | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida | |

| | |
|---|---|
| Photograph 25<br>Date: 2 December 2003<br>Direction:<br>Comments: Placement of liner protective layer in leachate storage area. |  |

| | |
|---|---|
| Photograph 26<br>Date: 13 December 2003<br>Direction:<br>Comments: Placement of primary liner in leachate storage area. |  |

GEOSYNTEC CONSULTANTS
Photographic Record

| | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida | |

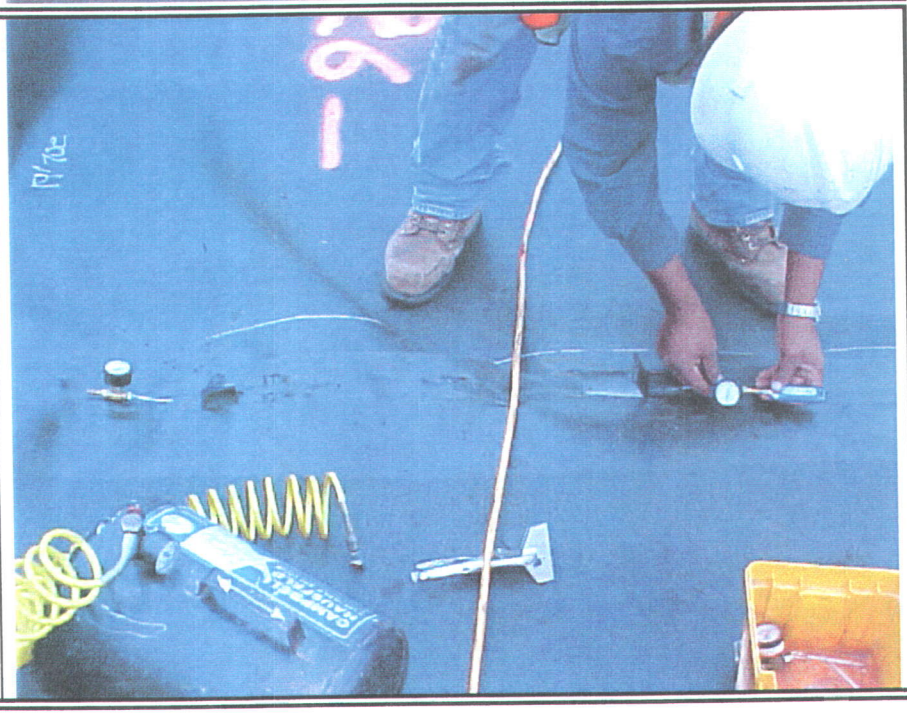
| | |
|---|---|
| Photograph 27 |  |
| Date: 28 November 2003 | |
| Direction: | |
| Comments: Extrusion welding. | |

| | |
|---|---|
| Photograph 28 |  |
| Date: 28 November 2003 | |
| Direction: | |
| Comments: Vacuum box test for extrusion welds. | |

GEOSYNTEC CONSULTANTS
Photographic Record

| | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida | |

| | |
|---|---|
| Photograph 29<br>Date: 13 December 2003<br>Direction:<br>Comments: Double track fusion welding. |  |

| | |
|---|---|
| Photograph 30<br>Date: 10 December 2003<br>Direction:<br>Comments: Air pressure test for fusion weld. |  |

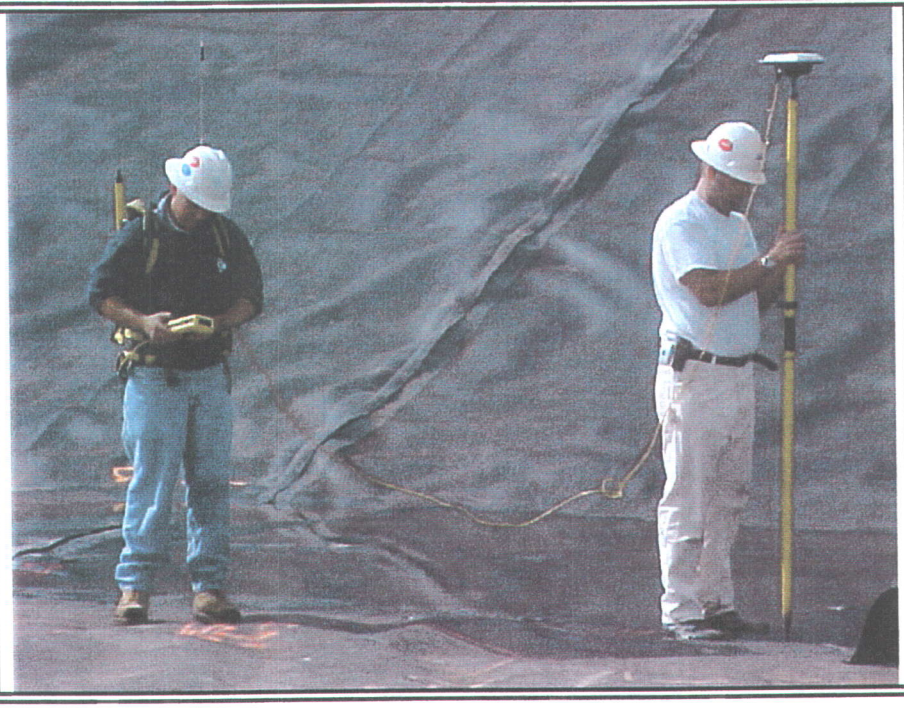
| GeoSyntec Consultants<br>Photographic Record | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida | |

| | |
|---|---|
| Photograph 31<br>Date: 2 December 2003<br>Direction:<br>Comments: Liner installation and repairs. |  |
| Photograph 32<br>Date: 6 December 2003<br>Direction:<br>Comments: Leachate transmission manhole and power pull/junction box. |  |

GEOSYNTEC CONSULTANTS
Photographic Record

| | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida | |

| | |
|---|---|
| Photograph 33 |  |
| Date: 23 December 2003 | |
| Direction: | |
| Comments: Moisture/density evaluation using nuclear gauge. | |

| | |
|---|---|
| Photograph 34 |  |
| Date: 23 December 2003 | |
| Direction: | |
| Comments: As-built survey of liner by CQA personnel. | |

GEOSYNTEC CONSULTANTS
Photographic Record

| | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida | |

| | |
|---|---|
| Photograph 35<br>Date: 23 December 2003<br>Direction:<br>Comments: Development of groundwater monitoring wells. |  |

| | |
|---|---|
| Photograph 36<br>Date: 21 November 2003<br>Direction:<br>Comments: Construction of truck scales. |  |

GEOSYNTEC CONSULTANTS
Photographic Record

| | |
|---|---|
| Client: Omni Waste of Osceola County, LLC | Project Number: FX 0521 |
| Project Name: Oak Hammock Disposal Facility – Cell 1A and Leachate Storage Area | |
| Project Location: Near Holopaw in Osceola County, Florida | |

| | |
|---|---|
| Photograph 37<br>Date: 11 December 2003<br>Direction:<br>Comments: Construction of site utilities. |  |

| | |
|---|---|
| Photograph 38<br>Date: 11 December 2003<br>Direction:<br>Comments: Construction of site utilities. |  |