

NM1-62

**Engineering
Certification
Ponds A1-3 and B1-3**

April 2018

April 2018
Project No. 01011717

**ENGINEERING CERTIFICATION REPORT
FOR
EVAPORATION PONDS A1-3 AND B1-3 CONSTRUCTION
SUNDANCE WEST INC.
LEA COUNTY, NEW MEXICO
APRIL 2018**



SUBMITTED TO:
NEW MEXICO OIL CONSERVATION DIVISION
ENVIRONMENTAL BUREAU
1220 SOUTH SAINT FRANCIS DR #3
SANTA FE, NEW MEXICO 87505

PREPARED FOR:
SUNDANCE WEST, INC.
LEA COUNTY, NEW MEXICO

PREPARED BY:



CHARLES W. FIEDLER NEW MEXICO P.E. NO. 19731

April 23, 2018

Mr. Jim Griswold
Environmental Bureau Chief
Oil Conservation Division
NM Energy, Minerals and Natural Resources Department
1220 South Saint Francis Drive
Santa Fe, NM 87505

**Re: Sundance West, Inc. Engineering Certification Report
Evaporation Ponds A1-3 and B1-3 Construction [01011717]**

Dear Mr. Griswold:

This submittal is provided as engineering certification for the construction of the Evaporation Ponds A1-3 and B1-3 at Sundance West Inc. located in Lea County, New Mexico. Specifically, this Certification Report demonstrates that the double containment liner and leak detection system for the Evaporation Ponds have been installed in compliance with the following applicable documents and regulatory requirements:

- Approved Construction Quality Assurance (CQA) Plan February 2015.
- Construction Plans and Project Technical Specifications (September 2017) for Evaporation Ponds A1-3 and B1-3 Construction, Sundance West Inc.
- New Mexico Energy, Minerals and Natural Resources Department Regulations (19.15.36.1-19.15.36.20).
- Approved Permit and Permit Conditions.
- Geosynthetic Research Institute (GRI) and American Society of Testing Materials (ASTM) and Industry Standards.

Per Condition of the Permit, the Division was notified “at least 30 days prior to the start of construction of the landfill, evaporations ponds, stabilization and solidification area, or process area...” in advance of construction (**Appendix F**). The following Certification Report describes the activities and procedures performed during the construction of the Evaporation Ponds to document compliance with the approved Engineering Design Plans, Project Specifications, and the CQA Plan.

Mr. Jim Griswold

April 23, 2018

Page 2

We appreciate the opportunity of working with the OCD regarding the construction quality assurance for the construction of the Evaporation Ponds at Sundance West Inc. Please contact us with your questions and comments regarding this Engineering Certification Report. (cking@team-psc.com; 505-867-6990)

Very truly yours,

Gordon/PSC

Carl R. King, P.E.
Senior Project Manager

Charles W. Fiedler, P.E.
Associate

cc: Mr. Jose M. Carrillo, General Manager Sundance West Inc. (Facility Operating Record)
Mr. Michael Ginsberg Esq., Trust Attorney, Sundance West Inc.

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
1.1	Project Overview	1
1.2	Project Description	1
1.3	Project Overview	2
1.4	Report Organization	3
1.5	Qualifications	3
1.5.1	Charles W. Fiedler, P.E., Engineer-of-Record	3
1.5.2	Mr. Carl R. King, P.E., Senior Project Manager, Gordon/PSC Site CQA Engineer ...	4
1.5.3	Mr. Braden Belliveau, EIT, Gordon/PSC Site CQA Engineer/Manager	4
1.5.4	Mr. Don Gray, Engineering Technician, Gordon/PSC, Project Technologist	5
1.5.5	Ms. Sarah Schnell, Staff Scientist, Gordon/PSC, Project Technologist	5
2.0	EVAPORATION PONDS CONSTRUCTION.....	5
2.1	Summary	5
2.2	Subgrade Preparation	7
2.2.1	Clearing, Grubbing and Mass Excavation.....	7
2.2.2	Coordinate System	7
2.2.3	Subgrade and Berm Compaction.....	8
2.2.4	Subgrade Acceptance	8
2.3	Geosynthetic Clay Liner.....	9
2.3.1	Geosynthetic Clay Liner Product	9
2.3.2	Geosynthetic Clay Liner Installation.....	9
2.3.3	Geosynthetic Clay Liner Testing.....	10
2.3.4	Geosynthetic Clay Liner Deployment Records.....	13
2.4	60-Mil Secondary Flexible Membrane Liner	13
2.4.1	Flexible Membrane Liner Product	13
2.4.2	Flexible Membrane Liner Installation.....	14
2.4.3	Flexible Membrane Liner Testing.....	15
2.5	Leak Detection Sump Construction	20
2.5.1	Leak Detection Sumps	21
2.5.2	Geotextile Fabric	21
2.5.3	Leak Detection Sump Aggregate	23
2.5.4	Leak Detection Sump Riser Pipe	23
2.6	Geonet Drainage Layer	24



**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

TABLE OF CONTENTS

2.6.1	Geonet Drainage Layer Product	24
2.6.2	Geonet Drainage Layer Installation	24
2.6.3	Geonet Drainage Layer Testing	25
2.6.4	Geonet Deployment Records	27
2.7	60-Mil Primary Flexible Membrane Liner	28
2.7.1	Flexible Membrane Liner Product	28
2.7.2	Flexible Membrane Liner Installation	29
2.7.3	Flexible Membrane Liner Testing	29
2.7.4	FML Deployment Records	35
3.0	ENGINEERING CERTIFICATION	36

LIST OF TABLES

Table No.	Title	Page
1	Sundance West, Inc. Pond Construction, Primary Construction Activities	2
2	Sundance West, Inc. Pond Construction, Gordon/PSC CQA Activities	3
3	Sundance West, Inc. Pond Construction, Enviroworks, LLC Construction Activities	6
4	Sundance West, Inc. Pond Construction, SLS Construction Activities	6
5	Sundance West, Inc. Pond Construction, Surveying Support Activities	7
6	Sundance West, Inc. Pond Construction, GSE Environmental Bentoliner NSL GCL – MQC/MQA Testing	11
7	Sundance West, Inc. Pond Construction, GSE Environmental Bentoliner NSL GCL – Conformance Testing	12
8	Sundance West, Inc. Pond Construction, Agru America HDPE FML – MQA Testing	15
9	Sundance West, Inc. Pond Construction, Agru America HDPE FML – Conformance Testing	16
10	Sundance West, Inc. Pond Construction, HDPE FML Deployment CQA Documentation	20
11	Sundance West, Inc. Pond Construction, Agru America Nonwoven Geotextile – MQC Testing	22
12	Sundance West, Inc. Pond Construction, GSE Nonwoven Geotextile – Conformance Testing	23



**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

TABLE OF CONTENTS

13	Sundance West, Inc. Pond Construction, Agru America Geonet – MQC Testing	25
14	Sundance West, Inc. Pond Construction, Agru America Geonet – Conformance Testing	26
15	Sundance West, Inc. Pond Construction, Geonet Deployment CQA Documentation.....	27
16	Sundance West, Inc. Pond Construction, Agru America HDPE FML – MQA Testing	30
17	Sundance West, Inc. Pond Construction, Agru America HDPE FML – Conformance Testing.....	31
18	Sundance West, Inc. Pond Construction, HDPE FML Deployment CQA Documentation.....	35

LIST OF FIGURES

Figure 1	Sundance West – Site Location Map
Figure 2	Sundance West – Subgrade Design Grades
Figure 3	Sundance West – Subgrade As-built Grades
Figure 4	Sundance West – Field Density Test Locations
Figure 5	Sundance West – Leak Detection Sump GCL Layout
Figure 6	Sundance West – 60-Mil Secondary Liner Panel Layout
Figure 7	Sundance West – Geonet Panel Layout
Figure 8	Sundance West – 60-Mil Primary Liner Panel Layout

FIELD LOGS AND PHOTOGRAPHS

1. Daily Summary Reports
2. Project Photographs

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

TABLE OF CONTENTS

APPENDICES

Appendix A	Geotechnical Soils Testing
A.1.	Moisture / Density Relationships
A.2.	Subgrade (Roads and Ponds) Testing Results
A.3.	Berm Density Testing Results
Appendix B	Material Manufacturer Certification and Conformance Testing Results
B.1.	GCL Certifications
B.2.	GCL Conformance Testing Results
B.3.	FML Certifications
B.4.	FML Conformance Testing Results
B.5.	Geonet Certifications
B.6.	Geonet Conformance Testing Results
B.7.	Geotextile Certifications
B.8.	Geotextile Conformance Testing Results
Appendix C	Evaporation Ponds Liner Installation Documentation
C.1.	GCL Inventory Control Log
C.2.	Geonet Inventory Control Log
C.3.	FML Inventory Control Log
C.4.	Geotextile Inventory Control Log
C.5.	Leak Detection Sump Riser Pipe Inventory Control Log
C.6.	GCL Deployment Log
C.7.	Secondary FML Deployment Log
C.8.	Secondary and Primary FML Pre-weld Qualification Test Logs
C.9.	Secondary FML Seaming Log
C.10.	Secondary FML Seam Pressure Test Log
C.11.	Secondary FML Seam Vacuum Test and Defect-Repair Log

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

TABLE OF CONTENTS

C.12.	FML Seam Field Destructive Test Records
C.13.	Geotextile Deployment Log
C.14.	Geonet Deployment Log
C.15.	Primary FML Deployment Log
C.16.	Primary FML Seaming Log
C.17.	Primary FML Seam Pressure Test Log
C.18.	Primary FML Seam Vacuum Test and Defect-Repair Log
C.19.	Demtech Tensiometer Calibration Certificate

Appendix D Independent Laboratory FML Destructive Testing Results

D.1	Secondary Liner Destructive Test
D.2	Primary Liner Destructive Test
D.3	Overspray Liner Destructive Test

Appendix E Leak Detection System Certifications

E.1.	Leak Detection Riser Pipe Parts Certification
------	---

Appendix F EMNRD Correspondence

F.1	Conformation of Compliance: Sundance West, Inc. Surface Waste Management Facility
-----	---

Appendix G Resumés

G.1	Charles W. Fiedler, P.E., Associate, Gordon/PSC
G.2	Carl R. King, P.E., Senior Project Manager, Gordon/PSC Site CQA Engineer
G.3	Braden Belliveau, EIT, Gordon/PSC Site CQA Engineer/Manager
G.4	Don Gray, Engineering Technician, Gordon/PSC Project Technologist
G.5	Sarah Schnell, Staff Scientist, Gordon/PSC Project Technologist



**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

1.0 INTRODUCTION

This Engineering Certification Report describes the Construction Quality Assurance (CQA) activities and procedures applied during the construction of Evaporation Ponds A1-3 and B1-3, henceforth known as “*the Ponds*”, at Sundance West, Inc. (SWI) located in Lea County, New Mexico. The CQA activities performed document the ponds were constructed in accordance with the approved Construction Plans, Project Technical Specifications, 2015 CQA Plan, Geosynthetic Research Institute (GRI) and American Society of Testing Materials (ASTM) Industry Standards, and New Mexico Energy, Minerals and Natural Resources Department (EMNRD), Oil Conservation Division (OCD) regulatory standards.

1.1 Project Overview

The EMNRD OCD was notified prior to the Ponds liner installation, and responded with a Conformation of Compliance letter dated August 2, 2017, and is included in this report in **Appendix F.1**. Construction subsequently began on February 12, 2018. This Engineering Certification Report satisfies the requirements of the applicable Permit Conditions.

1.2 Project Description

The SWI Ponds are located directly west and contiguous with, Sundance Services Inc. (SSI), and approximately 1.5 miles east of the intersection of Wallach Ln. and NM highway 18 as shown on the Site Location Map (**Figure 1**). Mass excavation was performed by Enviroworks LLC. with the excavation of soils, placement and compaction of perimeter berm soils, and subgrade fine grading and compaction, performed from September 18, 2017 through March 9, 2018. Geosynthetic Clay Liner (GCL), Secondary Flexible Membrane Liner (FML), Geonet, Leak Detection System, and Primary FML installation activities were performed by Southwest Liner Systems Inc. from February 12, 2018 through March 22, 2018.

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

1.3 Project Overview

From September 18, 2017 through March 22, 2018, the Ponds were constructed at Sundance West Inc., SWI, located in Lea County, New Mexico. Gordon/PSC developed the Ponds, Project Technical Specifications and the CQA Plan (February 2015); and performed on-site CQA activities. The primary construction activities for the Ponds are as listed in **Table 1**.

TABLE 1
Sundance West, Inc. Pond Construction
Primary Construction Activities

Activity Number	Construction Activity
1	Mass Excavation
	Construction of North, East, and Southern perimeter berms
2	Fine Grading
3	Compaction
4	Installation of the Geosynthetic Clay Liner (GCL)
5	Installation of the Secondary Flexible Membrane Liner (FML)
6	Installation of Geonet and Leak Detection System
7	Installation of the Primary Flexible Membrane Liner (FML)
8	Construction of the Ponds stormwater management system; and western liner protection berm

During mass excavation; placement and compaction of structural fill soils for the North, East, and Southern berms; fine grading and compaction to the design base grades were completed by the Enviroworks LLC. (**Figure 2**). Upon review and approval of the subgrade by the Gordon/PSC Site CQA Engineer, the Gordon/PSC Site CQA Engineer was on-site during geosynthetics installation to observe, inspect, and record geosynthetic and leak detection system installation procedures. The purpose of the CQA work is to document that construction activities performed at SWI comply with the Ponds Construction Plans, Project Technical Specifications, 2015 CQA Plan, Geosynthetic Research Institute (GRI) and American Society of Testing Materials (ASTM) Industry Standards, and EMNRD OCD regulatory requirements. The SWI Ponds Construction Plans, Project Technical Specifications, 2015 CQA Plan, field observations, and tests were used to provide quantitative criteria with which to evaluate construction.

Gordon/PSC personnel were responsible for the full range of CQA activities as listed in **Table 2**.

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

**TABLE 2
Sundance West, Inc. Pond Construction
Gordon/PSC CQA Activities**

Activity Number	Gordon/PSC CQA Activity
1	Collect select on-site soils to perform laboratory moisture/density tests (i.e., standard Proctor: ASTM D698) and grain size analyses
2	Review surveying results to confirm that the subgrade met design elevations and slope
3	Provide field density testing of compacted berm soil fill and subgrade soils
4	Review manufacturer's quality assurance and manufacturer's quality control testing results for geosynthetics
5	Review conformance testing results for FML, GCL, Geonet and Nonwoven Geotextile
6	Inspect delivered FML, GCL, Geonet, Nonwoven Geotextile and leak detection pipe
7	Observe GCL, secondary FML, leak detection system, and primary FML installation procedures
8	Observe GCL secondary FML, Geonet, and primary FML material seaming and testing procedures
9	Review documentation, including laboratory and field test results
10	Complete and submit this Engineering Certification Report of completed construction to OCD

1.4 Report Organization

This Certification Report describes the CQA activities and procedures performed during the construction of the Ponds at SWI. The attached figures, appendices, photographs and daily logs provide appropriate quantitative and qualitative documentation. Cross-reference to the Figures and Attachments are in **bold** type to facilitate the Division's review.

1.5 Qualifications

1.5.1 Charles W. Fiedler, P.E., Engineer-of-Record

Mr. Charles W. Fiedler, P.E. is the Engineer-of-Record for the SWI. He has over 40 years of directly applicable experience in solid waste engineering. Mr. Fiedler is a registered professional engineer in New Mexico and Texas. Mr. Fiedler has supervised construction plans, bid documents, and CQA for over 1,800 acres of landfill development, including 30 Subtitle D



**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

landfill cells in New Mexico and Texas. Mr. Fiedler is a regular instructor for NMED and SWANA solid waste operator certification courses. The current resumé for Mr. Fiedler is included in the **Resumés** section (**Appendix G.1**).

1.5.2 Mr. Carl R. King, P.E., Senior Project Manager, Gordon/PSC Site CQA Engineer

Mr. Carl R. King, P.E. is the Site CQA Engineer for SWI. He has over thirty years of experience developing and constructing lined landfill cells, geosynthetic impoundments, transfer and material recovery facilities and waste-to-energy facilities. Mr. King has served as a Site Construction Quality Assurance (CQA) Engineer for over 1,280 acres of Subtitle D municipal solid waste landfill cells and Subtitle C hazardous waste landfill cells in Arizona, New Mexico, Oklahoma and Texas. Components included construction plan development, project technical specification development, CQA Plan development and updating, soil liner installation, GCL installation, HDPE geomembrane installation, leachate collection system installation, protective soil layer evaluation and installation and construction management. Mr. King's site CQA Engineer duties included assessment and equivalency evaluation and calculations for liner and leak detection system components in compliance with the Construction Plans, CQA Plan and Project Technical Specifications. The current resumé for Mr. King is included in the **Resumés** section (**Appendix G.2**).

1.5.3 Mr. Braden Belliveau, EIT, Gordon/PSC Site CQA Engineer/Manager

Mr. Braden Belliveau is the Site CQA Engineer/Manager for the SWI project. He serves as the Site CQA Engineer/Manager for Gordon/PSC, and is trained and certified on field instrumentation, industry standards, health and safety, etc. Mr. Belliveau is an EIT and has served as a Site CQA Engineer/Manager at various Subtitle D municipal solid waste landfills in New Mexico. Mr. Belliveau's primary duties are field CQA for cell subgrade soil testing and certification, observation and documentation for geosynthetics installation. The current resumé for Mr. Belliveau is included in the **Resumés** section (**Appendix G.3**).

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

1.5.4 Mr. Don Gray, Engineering Technician, Gordon/PSC, Project Technologist

Mr. Don Gray is the Site CQA Engineer/Manager for the LCLF project. He serves as the Site CQA Engineer/Manager for Gordon/PSC, and is trained and certified on field instrumentation, industry standards, health and safety, etc. Mr. Gray is an Engineering Technician and has served as a Site CQA Engineer/Manager for over 115 acres of Subtitle D municipal solid waste landfills and impoundments in New Mexico. Mr. Gray's primary duties are field CQA for cell subgrade soil testing and certification, observation and documentation for geosynthetics installation, leachate collection system installation, and PSL testing and installation. The current resumé for Mr. Gray is included in the **Resumés** section (**Appendix G.4**).

1.5.5 Ms. Sarah Schnell, Staff Scientist, Gordon/PSC, Project Technologist

Ms. Sarah Schnell is the Site CQA Project Technologist for the SWI project. She is trained and certified on field instrumentation, industry standards, health and safety, etc. Ms. Schnell has served as a Site Project Technologist at various Subtitle D municipal solid waste landfills in New Mexico. Ms. Schnell's primary duties are field CQA for cell subgrade soil testing and certification. The current resumé for Ms. Schnell is included in the **Resumés** section (**Appendix G.5**).

2.0 EVAPORATION PONDS CONSTRUCTION

2.1 Summary

The SWI Evaporation Ponds are the initial component of a new facility, and will eventually be complemented with process equipment, administrative offices, and a landfill. The total double lined project area is approximately 15 acres in size with each pond comprising of approximately 1.75 acres as shown on the Sundance West Design Grades (**Figure 2**).

Mass excavation, berm construction, and fine-grading was conducted by Enviroworks LLC. (EW); and Southwest Liner Systems, Inc. (SWLS) performed the installation of the GCL, Secondary FML, Geotextile, Geonet, and Primary FML. Conformance testing of geosynthetics

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

was performed by SWLS, while documentation and quality assurance were performed by Gordon/PSC. **Tables 3 through 5** summarize these construction activities.

Enviroworks LLC. (EW) of Edgewood, New Mexico performed the construction activities listed **Table 4**.

**TABLE 3
Sundance West, Inc. Pond Construction
Enviroworks LLC Construction Activities**

Activity Number	Enviroworks Construction Activity
1	Mass-Excavation to overall design grades
2	Installation of perimeter berms
3	Fine grading of ponds, surrounding areas, and berms
4	Compaction of ponds, surrounding areas, and berms
5	Installation of Leak Detection System Select Aggregate; and Leak Detection Riser Pipe
6	Construction of the site stormwater management system; and site protection berms

Southwest Liner Systems, Inc. (SLS) of Bernalillo, New Mexico performed the construction activities listed **Table 4**.

**TABLE 4
Sundance West, Inc. Pond Construction
SLS Construction Activities**

Activity Number	SLS Construction Activity
1	Installation of Geosynthetic Clay Liner (GCL)
2	Installation of 60-mil smooth Secondary HDPE FML
3	Installation of the nonwoven geotextile
4	Installation of the HDPE Geonet material
5	Installation of 60-mil Primary HDPE FML
6	Installation of 60-mil textured "Overspray" HDPE FML on surrounding berms

Surveying services for the Contractor; as defined in the Contract Documents were provided by Southwest Survey Solutions (S3). S3 is a licensed land surveyor in the State of New Mexico, and survey support activities are listed in **Table 5**.

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

**TABLE 5
Sundance West, Inc. Pond Construction
Surveying Support Activities**

Licensed Land Surveyor	Support Activity
Southwest Survey Solutions	Record Surveying Services to Enviroworks including: • Final grades of all six evaporation ponds • Top of all berms surrounding the project • Edge of liner system

2.2 Subgrade Preparation

The following sections describe the activities performed during mass excavation, compacted berm soil fill placement, subgrade preparation, and CQA soil testing.

2.2.1 Clearing, Grubbing and Mass Excavation

EW performed the clearing and grubbing, mass excavation, subgrade fine grading and compaction in addition to placing and compacting perimeter berm soils using select materials from excavation activities. Perimeter berms located on all four sides of the ponds were constructed to the design grades shown on the Construction Plans. Once design grades were attained and density testing was complete, EW's surveyor, S3 performed record certification surveys to document that the subgrade, berm elevations and slopes met the design requirements shown on the Construction Plans; and as set forth in the Project Technical Specifications and 2015 CQA Plan.

2.2.2 Coordinate System

The project area was surveyed in a grid pattern so that the locations of sample and testing points used during construction were readily discernible by the CQA Site CQA Engineer/Manager. The survey grid, shown on **Figure 2**, was established by EW's Surveyor, S3, for use during construction and testing.

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

2.2.3 Subgrade and Berm Compaction

During excavation, berms were constructed surrounding the evaporation ponds using excavated soils. Soils were placed in maximum one-foot thick lifts and compacted to 90% of Standard Proctor Dry Density as verified by field density tests. After berm construction, mass excavation, and fine grading to the elevations shown on **Figure 3** was completed, the floor soils were compacted using a vibratory roller. The in-place density was measured at a minimum frequency of 4 tests per acre, using a InstroTek 3500Explorer®, requiring 60 tests for the 15-acre± footprint and 54 tests for berm construction. A total of 62 density tests in the double lined area, and 77 for the berms, was performed (**Figure 4**), and all results passed the required specification of 90%, or higher, of the Reference Standard Proctor. The results for the Standard Proctor laboratory tests used as references are provided in **Appendix A.1**, and field compaction testing results are tabulated in **Appendix A.2. and A.3.** A maximum density of 113.5 lb/ft³ was used as the Reference Maximum Density for the Ponds and roads. The berms were constructed with excavated soils above the final elevations; these soils are more representative of the maximum density of 111.3 lb/ft³.

2.2.4 Subgrade Acceptance

Upon completion of subgrade construction, the Ponds were surveyed by S3, of Gilbert, AZ. The topography of the subgrade was then verified and accepted by the Gordon/PSC CQA Engineer/Manager prior to geosynthetic liner deployment. **Figure 2** shows the design grades, and **Figure 3** provides the as-built grades for the finished subgrade surface.

The Gordon/PSC Site CQA Engineer/Manager and SLS Field Installation Superintendent (FIS) conducted daily inspections of the subgrade surface prior to liner installation activities for the anticipated liner deployment area. The subgrade surface was found to be in good condition and free from sticks, sharp stones, vegetation and other deleterious material after each daily inspection. The Gordon/PSC CQA Engineer/Manager and the FIS continued to inspect the subgrade surface during liner installation in areas immediately ahead of deployment to identify

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

and remove any large or angular particles, sharp objects, etc. EW provided continual moisture conditioning and rolling of the subgrade ahead of the liner installation as requested by SLS's FIS and the Gordon/PSC Site CQA Engineer/Manager. The results of the inspection and the FIS's acceptance of the subgrade are provided in the Daily Summary Reports, which are included in the **Field Logs and Photographs** section.

2.3 Geosynthetic Clay Liner

In accordance with the Construction Plans, Project Technical Specifications and 2015 CQA Plan, the Geosynthetic Clay Liner (GCL) was placed in direct contact with the prepared subgrade. The following sections describe the procedures and activities performed during the GCL installation, observation, and CQA testing to confirm compliance with the Project Specifications.

2.3.1 Geosynthetic Clay Liner Product

Approximately 9,564 ft² of Bentoliner NSL, the reinforced GCL material manufactured by GSE Environmental, Houston, Texas, was used in the construction of the Ponds and installed in the leak detection sumps. Per Project Technical Specifications, granular bentonite was required to be placed between horizontal and longitudinal seams of deployed GCL panels. Copies of the manufacturer's quality assurance (MQA) and manufacturer's quality control (MQC) test results and certifications are included in **Appendix B.1.** for the delivered GSE Environmental Bentoliner NSL GCL.

2.3.2 Geosynthetic Clay Liner Installation

The guidelines specified in the Project Technical Specifications, 2015 updated CQA Plan, Construction Plans; and industry standards for GCL installation procedures were strictly followed during lining of the Ponds. Each roll of GCL was carefully transported from the Contractor's Staging Area to the Ponds using a rubber-tracked forklift; as verified by the Gordon/PSC Site CQA Engineer/Manager. As each roll was moved, the manufacturer's identification label was removed and submitted to the Gordon/PSC Site CQA Engineer/Manager

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

for documentation in the *GCL Deployment Log* (**Appendix C.6.**) and the Leak Detection Sump GCL Layout Drawing (**Figure 5**). These labels were compared with the shipping invoice to verify that the GCL delivered to SWI corresponded with GCL subjected to MQC and MQA (manufacturer) testing (see **Section 2.3.3**). Each GCL roll was placed in direct contact with the prepared subgrade with the nonwoven geotextile facing upward. GCL was not placed in standing water or deployed during rainfall.

After each roll had been deployed, adjoining rolls were positioned maintaining the minimum overlap used for the on-site GCL of nine (9) inches on the longitudinal seams for the leak detection sumps as specified in the Project Technical Specifications and 2015 CQA Plan. Free bentonite was applied on each longitudinal and perpendicular seam at a minimum of 0.25 lbs per linear foot of seam. Material placement was observed by the Gordon/PSC Site CQA Engineer/Manager and FIS for potential damage due to handling or installation. No damages were observed by the Gordon/PSC Site CAQ Engineer/Manager or the installers FIS.

2.3.3 Geosynthetic Clay Liner Testing

GCL testing included manufacturing quality control (MQC), manufacturing quality assurance (MQA), third-party conformance testing, construction quality control (CQC) and construction quality assurance (CQA). Each type of testing is described in the following sections.

2.3.3.1. Geosynthetic Clay Liner Manufacturing Quality Control (MQC) and Manufacturing Quality Assurance (MQA)

MQC and MQA testing of the bentonite and geotextile components, as well as the finished GCL, were performed by the manufacturer prior to shipment of the GCL to SWI. Random samples of the finished GCL were collected from each day's production and tested for the properties listed in **Table 6**.

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

**TABLE 6
Sundance West, Inc. Pond Construction
GSE Environmental Bentoliner NSL GCL - MQC/MQA Testing**

Bentoliner NSL GCL Property	ASTM Method
Free swell	ASTM D5890
Fluid loss	ASTM D5891
Mass per unit area	ASTM D5993
Grab strength	ASTM D6768 and ASTM D4632, Modified
Peel strength	ASTM D6496 and ASTM D4632, Modified
Moisture content	ASTM D2216
Nonwoven and Woven Geotextile Encapsulating Bentonite	ASTM Method
Grab strength	ASTM D4632
Mass per unit area	ASTM D5261

The GCL quality control certification, GCL property values and testing frequencies for the on-site material delivered to SWI are provided in **Appendix B.1**.

2.3.3.2. Conformance Testing

Conformance sampling for GCL material was performed by TRI/Environmental, Inc. (TRI), Austin, Texas at the manufacturer's facility prior to shipment of the GCL to SWI. TRI collected samples approximately two feet long from the entire roll width and performed conformance testing at the TRI laboratory in Austin, Texas. Conformance samples were collected at a frequency of at least one (1) per 100,000 ft² of GCL installed to verify that the GCL delivered to SWI met the minimum properties listed in the Project Technical Specifications and 2015 CQA Plan. Approximately 9,564 ft² of GCL material was deployed within the Ponds, requiring a minimum of one (1) sample. One (1) sample was tested by TRI for the properties listed in **Table 7**; as specified in the Project Technical Specifications and 2015 CQA Plan.

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

**TABLE 7
Sundance West, Inc. Pond Construction
GSE Environmental Bentoliner NSL GCL – Conformance Testing**

Bentoliner NSL GCL Property	ASTM Method
Mass per unit area	ASTM D5993
Bentonite – Fluid Loss	ASTM D5891
Bentonite – Swell Index	ASTM D5890

Conformance test results were reviewed by the Gordon/PSC CQA Engineer and accepted in accordance with Project Technical Specifications and 2015 CQA Plan. The conformance test results indicate that the GCL meets the minimum property requirements specified in the Project Technical Specifications and 2015 CQA Plan. The conformance test results for the seven (7) samples are included in **Appendix B.2**.

2.3.3.3 Construction Quality Control (CQC) for Geosynthetic Clay Liner

The CQC procedures specified in the Project Technical Specifications and 2015 CQA Plan were strictly followed in order to provide a method to measure and regulate the quality of GCL installation. The Gordon/PSC Site CQA Engineer/Manager and FIS observed and documented GCL panel placement activities to verify that the deployment and seaming procedures were performed in accordance with the Project Technical Specifications and 2015 CQA Plan, including subgrade inspection, seam overlap, application of free bentonite, and precautions against potential GCL damage.

2.3.3.4. Construction Quality Assurance (CQA) for Geosynthetic Clay Liner

The Gordon/PSC Site CQA Engineer/Manager and the FIS inspected each roll of GCL transported to the Ponds from the staging area. The GCL was inspected for potential damage and uniformity. The roll identification labels were compared with the shipping invoice to verify that the GCL delivered to SWI corresponded with GCL subjected to manufacturers' quality control and quality assurance testing (see **Sections 2.3.3.1.**).

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

The Gordon/PSC Site CQA Engineer/Manager and the FIS visually inspected GCL rolls for potential damage during deployment. Any damaged portions of the GCL deployed were repaired by covering the defect with a GCL patch that provided a minimum twelve (12)-inch overlap on all sides of the defect with bentonite powder applied to the edges of the patch as specified in the Project Technical Specifications and 2015 CQA Plan.

2.3.4 Geosynthetic Clay Liner Deployment Records

Documentation of the GCL deployment and inspection of each panel for damage was required prior to approval and acceptance. The GCL installation was not accepted until the deployment records (**Appendix C.6.**), manufacturer's certification reports (**Appendix B.1.**) and conformance test results (**Appendix B.2.**) were submitted to and approved by the Gordon/PSC Site CQA Engineer. The Ponds As-Built Leak Detection Sump GCL Layout is shown on **Figure 5**. The Daily Summary Reports and documentation of GCL panel placement was recorded throughout each construction day. Copies of the Daily Summary Reports, the day's GCL panel deployment approval, and photographs documenting GCL panel placement activities are provided in the **Field Logs and Photographs** section of this Report.

2.4 60-Mil Secondary Flexible Membrane Liner

The Secondary FML was installed in direct contact above the GCL in the leak detection sumps, and the subgrade in accordance with the engineering design drawings, project specifications, and the 2015 CQA plan. The following sections describe the procedures and activities performed during FML installation, observation, and CQA testing.

2.4.1 Flexible Membrane Liner Product

The FML utilized in the Ponds construction was 60-mil, high-density polyethylene (HDPE), manufactured by Agru America of Georgetown, North Carolina. Smooth FML was designated for the entire secondary lining of the Ponds, and was delivered to SWI in rolls twenty-three (23) feet wide by five hundred and sixty (560) feet long. The FML was stored in the Contractor's

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

Staging Area and in accordance with the Project Technical Specifications and the 2015 CQA Plan. The stored FML was not stacked more than two (2) rolls high. The Gordon/PSC Site CQA Engineer/Manager compared roll identification labels with shipping invoices to verify that the FML delivered to SWI corresponded with FML subjected to manufacturer's quality control and quality assurance testing (**Section 2.4.3**).

2.4.2 Flexible Membrane Liner Installation

The FML installation activities were performed in accordance with the guidelines specified in the Construction Plans, Project Technical Specifications and 2015 CQA Plan; and industry standards for FML handling, placement, and testing. Each roll of FML was carefully moved from the Contractor's Staging Area west of the Ponds using a rubber-tired forklift, and FML was not placed in standing water or deployed during rainfall. Upon deployment, each roll identification label was removed and submitted to the Gordon/PSC Site CQA Engineer/Manager and then compared with the shipping invoices to verify that the FML delivered to SWI corresponded with FML subjected to manufacturers' quality control and quality assurance testing. FML being deployed was documented in the *Secondary FML Deployment Log* (**Appendix C.7.**) and the Secondary 60-Mil Liner Panel Layout drawing (**Figure 6**).

After each FML panel had been deployed, adjoining panels were positioned with a four (4) to six (6)- inch longitudinal overlap required for hot-wedge fusion welding. The overlap distance is required for proper seaming, and to allow peel and shear tests to be performed on the seams. Seams were oriented at approximately forty-five (45) degrees to the line of prevailing base grade slope on the pond floor, and parallel to the pond sideslopes, per the Project Technical Specifications and 2015 CQA Plan (see Secondary 60-Mil Liner Panel Layout, **Figure 6**).

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

2.4.3 Flexible Membrane Liner Testing

FML testing included manufacturer's quality control (MQC) and manufacturer's quality assurance (MQA), conformance testing, construction quality control (CQC), CQA, and seam testing. Each type of testing methodology is discussed in the following sections.

2.4.3.1 Manufacturer's Quality Control (MQC)

CPCChem Materials Evaluation Laboratory (CPCChem) performed resin testing on the raw materials used in the manufacturing of the FML. These test results and written certifications verified that the FML delivered to SWI has been extruded from an acceptable resin meeting the properties specified in GRI-GM 13, "Test Methods, Test Properties and Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes", are included in **Appendix B.3**.

2.4.3.2 Manufacturer's Quality Assurance (MQA)

As a part of the MQA testing, specific performance and characterization properties were evaluated on random samples collected from the manufactured FML rolls prior to their delivery to SWI as listed in **Table 8**.

TABLE 8
Sundance West, Inc. Pond Construction
Aggu America HDPE FML - MQA Testing

60-mil HDPE Smooth HDPE FML Property	ASTM Method
Thickness	ASTM D5994
Asperity Height	ASTM D7466
Density	ASTM D1505
Mass per unit area	ASTM D5993
Melt Flow Index	ASTM D1238, Condition E
Tensile Properties	ASTM D6693 and ASTM D 6693, Modified
Tear Resistance	ASTM D1004, Modified
Puncture Resistance	ASTM D4833, Modified
Carbon Black Content	ASTM D4218
Carbon Black Dispersion	ASTM D5596
Environmental Stress Crack Resistance using Notched Constant Tensile Load	ASTM D5397

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

MQA test results are included in **Appendix B.3**. These results were reviewed by the Gordon/PSC Site CQA Engineer and confirmed against the Project Technical Specifications and 2015 CQA Plan requirements. MQA testing results met the requirements set forth in the Project Technical Specifications and 2015 CQA Plan.

2.4.3.3 Conformance Testing

Conformance sampling for FML material was performed by TRI, Austin, Texas at the manufacturer's facility prior to shipment of the FML to SWI. TRI collected samples approximately two feet long from the entire roll width, and performed conformance testing at the TRI laboratory in Austin, Texas. Conformance samples were collected at a frequency of at least one (1) per 100,000 ft² of FML installed to verify that the FML delivered to SWI met the minimum properties listed in the Project Technical Specifications and 2015 CQA Plan. Approximately 757,574 ft² of smooth HDPE Secondary FML was installed in the Ponds; requiring a minimum of eight (8) conformance samples. A total of twelve (12) samples of the smooth HDPE FML were tested by TRI for conformance.

TRI tested the eight (8) FML samples for the properties listed in **Table 9**; as specified in the Project Technical Specifications and 2015 CQA Plan.

**TABLE 9
Sundance West, Inc. Pond Construction
Agru America HDPE FML – Conformance Testing**

60-mil HDPE (Smooth) FML Property	ASTM Method
Thickness	ASTM D5994
Density	ASTM D1505
Mass per unit area	ASTM D5993
Tensile Properties	ASTM D6693 and ASTM D 6693, Modified
Tear Resistance	ASTM D1004, Modified
Puncture Resistance	ASTM D4833, Modified
Carbon Black Content	ASTM D4218
Carbon Black Dispersion	ASTM D5596

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

The conformance test results were reviewed by the Gordon/PSC Site CQA Engineer and accepted in accordance with Project Technical Specifications and 2015 CQA Plan. The conformance test results indicated that the smooth FML met the minimum property requirements specified in the Project Technical Specifications and 2015 CQA Plan. The conformance testing results for the twelve (12) samples are included in **Appendix B.4**.

2.4.3.4 Construction Quality Control (CQC)

The quality control procedures specified in the Project Technical Specifications, 2015 CQA Plan; and industry standards were strictly followed in order to provide a method to measure and regulate the quality of Secondary FML installation. These procedures included such activities as start-up trial welds, destructive and non-destructive seam testing, and verification that the deployment and seaming procedures were performed in accordance with the Project Technical Specifications, 2015 CQA Plan and industry standards.

Trial welds were performed at the start and midpoint of each workday; after each break in seaming of one hour or more; and after any equipment shutdown. The trial welds were a minimum of ten (10) feet in length for fusion welders; and a minimum of three (3) feet in length for extrusion fillet welders. One-inch-wide cutouts of the trial welds were field-tested for shear and peel strength using an on-site tensiometer (SLS's tensiometer calibration certificate is provided in **Appendix C.19**.) and testing was performed in the presence of the Gordon/PSC Site CQA Engineer/Manager. If the results of the trial weld testing did not comply with the Project Technical Specifications and 2015 CQA Plan, the welder was not permitted to continue seaming until the deficiencies were corrected and an additional trial weld was performed which passed the field testing requirements. Trial weld documentation is included in **Appendix C.8**.

The seam testing protocol for the Ponds deployed FML included peel and shear testing on mathematically random samples cut from the installed FML (destructive samples) and non-destructive testing (air pressure and/or vacuum box testing) on field seams. The seam-testing program is detailed in **Section 2.4.3.5** of this report.



**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

The Gordon/PSC Site CQA Engineer/Manager and FIS observed FML placement activities to verify that the deployment and seaming procedures were performed in accordance with the Project Technical Specifications and 2015 CQA Plan; which included the underlying GCL inspection and approval, seam cleaning, and precautions against potential FML damage during deployment and seaming.

2.4.3.5 Construction Quality Assurance (CQA)

The Gordon/PSC Site CQA Engineer/Manager and FIS visually inspected FML material for manufacturing and installation defects as the FML was deployed. No manufacturing flaws were observed in the deployed FML. The Gordon/PSC Site CQA Engineer/Manager inspected seamed and non-seamed areas of the FML for wrinkles, defects, holes, blisters, etc. After each panel was deployed, the Gordon/PSC Site CQA Engineer/Manager and FIS walked the length of each panel and identified any suspect areas (e.g., defects or blemishes) by marking these areas for repair with a highly visible paint marker.

2.4.3.6 Seam Testing

In accordance with the Project Technical Specifications and 2015 CQA Plan, the field seam verification program consisted of both destructive and non-destructive testing. Sampling and field-testing was performed by the FML installer (SLS) in the presence of the Gordon/PSC Site CQA Engineer/Manager. In addition to field-testing, destructive samples were sent to an independent quality assurance laboratory (TRI/Environmental, Inc., Austin, Texas) for peel and shear strength testing.

A. Destructive Seam Testing

In accordance with the Project Technical Specifications and 2015 CQA Plan, a minimum of one (1) destructive test for every five hundred (500) linear feet of welded seam (an average taken throughout the entire project) was performed on the FML. There were approximately 27,782 lineal feet of welded seam during installation of the secondary liner, requiring a minimum of

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

fifty-five (55) destructive tests (SDT prefix tests). Seventy-six (76) destructive test samples were collected and evaluated in accordance with the Project Technical Specifications and 2015 CQA Plan.

Each destructive test sample was divided into three segments. The first segment was tested in the field for peel and shear strength by the installer using an on-site tensiometer. The second segment was shipped to an independent quality assurance laboratory (TRI/Environmental, Inc., Austin, Texas) for laboratory testing. The third sample segment was retained by the Gordon/PSC Site CQA Engineer/Manager and delivered to SWI to be archived in the Facility Operating Record. Results of the field destructive tests are provided in **Appendix C.12**; and the independent quality assurance laboratory test results (TRI/Environmental, Inc.) are included in **Appendix D.1**. The field destructive test results, and the independent quality assurance laboratory test results were reviewed by the Gordon/PSC Site CQA Engineer/Manager for conformance with the Project Technical Specifications and 2015 CQA Plan. All peel and shear test results met the requirements of the Project Technical Specifications and 2015 CQA Plan.

B. Non-Destructive Seam Testing

Air pressure testing was performed on double-wedge fusion welded seams except where a channel blockage occurred. Where channel blockages occurred, the seam was air tested on either side of the area was extrusion-welded and vacuum box tested. An additional patch was extrusion welded over the repaired area and vacuum box tested. Vacuum box testing was performed on all extrusion-welded portions of seams and patches. Test results are documented on the *Secondary FML Seam Pressure Test Log (Appendix C.10.)* and the *Secondary FML Seam Vacuum Test and Defect-Repair Log (Appendix C.11.)*. Seams and repairs were required to pass the non-destructive testing specifications outlined in the Project Technical Specifications and 2015 CQA Plan before being accepted by the Gordon/PSC Site CQA Engineer/Manager.

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

2.4.3.7 Secondary Liner Deployment Records

Documentation for Secondary FML deployment and testing for each panel deployed was required prior to FML approval and acceptance. CQA documentation for the FML deployed in the Ponds is listed in **Table 10**.

TABLE 10
Sundance West, Inc. Pond Construction
HDPE FML Deployment CQA Documentation

HDPE FML Deployment CQA Documentation	Certification Report Appendix Location
Secondary FML Deployment Log	Appendix C.7.
Secondary FML Pre-Weld Qualification Test Record	Appendix C.8.
Secondary FML Seaming Log	Appendix C.9.
Secondary FML Seam Pressure Test Log	Appendix C.10.
Secondary FML Seam Vacuum Test and Defect-Repair Log	Appendix C.11.
FML Seam Field Destructive Test Log	Appendix C.12.
Demtech Tensiometer Calibration Certification	Appendix C.19

The FML installation was accepted after the data listed in **Table 10** was submitted to, reviewed by, and approved by the Gordon/PSC Site CQA Engineer. The Ponds As-built Secondary FML Panel Layout is included as **Figure 6**. Daily Summary Reports were completed after each construction day, and photo documentation recorded the FML placement activity on the pond floor and sideslopes. The Daily Summary Reports and forms indicating approval of the previous day's FML installation and project photographs are provided in the **Field Logs and Photographs** Section.

2.5 Leak Detection Sump Construction

The leak detection system for the Ponds were constructed as described in the engineering design plans, 2015 CQA Plan and project specifications. Construction activities are summarized below.

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

2.5.1 Leak Detection Sumps

After installation of the Secondary FML Liner, the geotextile was aligned in the leak detection sumps prior to placement of select aggregate. The purpose of the geotextile is to provide a cushion between the aggregate and the secondary HDPE liner. Four layers of 200-Mil geonet were banded together and attached at the base of the 6" HDPE leak detection riser pipe for support and protection of the secondary liner. Prior to installation, all leak detection sump collection system piping was inspected to verify that identification markings, pipe construction, and perforations met project specifications. To finish, the leak detection sumps were filled with select aggregate, and the geotextile was "enveloped". During the entire process of constructing the leak detection sumps, extreme caution was taken as to not jeopardize the integrity, alignment, and slope of the piping, or integrity of the secondary liner.

2.5.2 Geotextile Fabric

Approximately 15,945 ft² of ten (10) oz/yd² nonwoven geotextile fabric manufactured by Agru America was installed in the Ponds leak detection system as shown on the Construction Plans and specified in the Project Technical Specifications and 2015 CQA Plan. The geotextile fabric was delivered, stored and handled as specified in the Project Technical Specifications and 2015 CQA Plan; and applicable industry standards. The Gordon/PSC Site CQA Engineer/Manager inspected the delivered nonwoven geotextile, and no damage was observed.

2.5.2.1 Manufacturer's Quality Control Documentation

As required by the Project Technical Specifications and 2015 CQA Plan, the manufacturer (Agru America) performed the nonwoven geotextile property testing listed in **Table 11** prior to delivery of the geotextile to the site.

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

**TABLE 11
Sundance West, Inc. Pond Construction
Agru America Nonwoven Geotextile - MQC Testing**

Nonwoven Geotextile Property	ASTM Method
Mass/Unit Area	Calculated based on Roll Weight/Roll Area
Grab Tensile Strength	ASTM D4632
Elongation (ASTM D4632)	ASTM D4632
Puncture Strength (CBR)	ASTM D6241
Trapezoidal Tear Strength	ASTM D4533
UV Resistance	ASTM D4355
Permittivity	ASTM D4491
Flow Rate	ASTM D4491
Apparent Opening Size	ASTM D4751

Appendix B.7. provides the Geotextile Materials Certification provided by the manufacturer.

2.5.2.2 Conformance Testing

Conformance sampling for the geotextile material was performed by TRI, Austin, Texas at the manufacturer's facility prior to shipment to SWI. TRI collected a sample approximately two feet long from the entire roll width and performed conformance testing at the TRI laboratory in Austin, Texas. Conformance samples were collected at a frequency of at least one (1) per 100,000 ft² of nonwoven geotextile installed to verify that the geotextile delivered to the SWI met the minimum properties listed in the Project Technical Specifications and 2015 CQA Plan. Approximately 15,945 ft² of geotextile material was installed in the Ponds requiring a minimum of one (1) sample. TRI tested the one (1) conformance sample for the properties listed in **Table 11**; as specified in the Project Technical Specifications and 2015 CQA Plan.

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

**TABLE 12
Sundance West, Inc. Pond Construction
GSE Nonwoven Geotextile - Conformance Testing**

Nonwoven Geotextile Property	ASTM Method
Mass/Unit Area	ASTM D5261
Thickness	ASTM D5199
Grab Tensile Strength	ASTM D4632
Puncture Strength	ASTM D4833
Trapezoidal Tear Strength	ASTM D4533
Mullen Burst Strength	ASTM D3786
Apparent Opening Size	ASTM D4751

Appendix B.8. provides the independent quality assurance laboratory test results. The results were reviewed by the Gordon/PSC CQA Engineer and compared with the Project Technical Specifications and 2015 CQA Plan for geotextile fabric. The properties of the nonwoven geotextile meet or exceed the Project Technical Specifications and 2015 CQA Plan requirements.

2.5.3 Leak Detection Sump Aggregate

The Project Technical Specifications and 2015 CQA Plan state “select aggregate shall be durable, resistant to weathering and shall be free of organic material...” and “select aggregate shall have particle shapes that will not damage the HDPE liner with the use of a 10 oz/yd² nonwoven geotextile cushion layer. The select aggregate shall be approved by the Engineer.” Gordon/PSC reviewed the select aggregate submittal in comparison to visual inspections of the delivered aggregate, project performance standards, and found the aggregate to be acceptable for the intended use.

2.5.4 Leak Detection Sump Riser Pipe

The twelve leak detection sumps, two for each pond, consist of inclined riser pipes that are placed along the central line of the project, and do not penetrate the liner system. The lowest two-feet for the pipes have been perforated using a ½” drill bit. These perforations are located within the aggregate filled areas of the leak detection sumps; the remaining pipe is solid;

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

transverses up the center slope; and is terminated with a HDPE blind flange. **Appendix E.1** provides the leak detection riser pipe material certifications.

2.6 Geonet Drainage Layer

The Geonet was installed directly above the Secondary FML in accordance with the engineering design drawings, project specifications, and 2015 CQA plan. The following sections describe the procedures and activities performed during Geonet installation, observation, and CQA testing.

2.6.1 Geonet Drainage Layer Product

The Geonet utilized in the Ponds construction is 200-mil, high-density polyethylene (HDPE), manufactured by Agru America of Georgetown, South Carolina. Geonet is specified to encompass the entire double lined system and were delivered on-site in rolls 14.5 feet wide by 300 feet long. Rolls were staged along the western perimeter of the Ponds to provide easy access, and to minimize handling of the material. In accordance with the CQA Plan and project specifications, material was not stacked more than two rolls high. The labels were compared with the shipping invoice to verify that the materials received corresponded with materials subjected to manufactures quality control/manufactures quality assurance testing (see **Section 2.6.3**). The material was also inspected for damage during off-loading and staging.

2.6.2 Geonet Drainage Layer Installation

The Geonet installation activities were performed in accordance with the guidelines stipulated in the 2015 CQA Plan, project specifications, the engineering design drawings, and industry standards for Geonet handling, and placement. Each roll of Geonet was carefully moved from the staging area to the Ponds using a rubber-tired extendable forklift. The forklift was not permitted on the Secondary FML, and the Geonet was placed by hand. Upon deployment, each roll label was removed and submitted to the Gordon/PSC Site CQA Engineer/Manager, and panel location documented (see **Figure 7**).

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

After each Geonet panel had been placed, adjoining panels were positioned with a 4 to 6-inch overlap. The overlap distance is required for proper attachment using zip ties placed at 6" and 5', longitudinally and end-to-end seams respectively. Seams were oriented at approximately 45 degrees to the line of prevailing base grade slope, and perpendicular to the sideslopes.

2.6.3 Geonet Drainage Layer Testing

Geonet testing included manufacturer's quality control (MQC) and quality assurance (MQA), conformance testing, construction quality control (CQC), CQA, and seam testing. Each type of testing is discussed in the following sections.

2.6.3.1. Manufacturer's Quality Control (MQC)

CPCChem Materials Evaluation Laboratory, performed resin testing on the raw materials used in the manufacturing of the Geonet. These test results and written certifications that the product delivered has been extruded from an acceptable resin are included in **Appendix B.5**.

2.6.3.2. Manufacturer's Quality Assurance (MQA)

As required by the Project Technical Specifications and 2015 CQA Plan, the manufacturer (Agru America) performed the geonet property testing listed in **Table 13** prior to delivery of the geotextile to the site.

TABLE 13
Sundance West, Inc. Pond Construction
Agru America Geonet - MQC Testing

Geonet Property	ASTM Method
Thickness	ASTM D1777
Density	ASTM D1505
Melt Index	ASTM D1238
Carbon Black Content	ASTM D1603
Tensile Strength	ASTM D1682
Mass Per Unit Area	ASTM D3776
Transmissivity (loaded)	ASTM D4716

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

The Geonet quality control certification and Geonet property values and testing frequencies for the on-site material delivered to SWI are provided in **Appendix B.5**.

2.6.3.3. Conformance Testing

Conformance sampling for the geonet material was performed by TRI, Austin, Texas at the manufacturer's facility prior to shipment of the geonet to SWI. TRI collected a sample approximately two feet long from the entire roll width and performed conformance testing at the TRI laboratory in Austin, Texas. Conformance samples were collected at a frequency of at least one (1) per 100,000 ft² of geonet installed to verify that the geonet delivered to the SWI met the minimum properties listed in the Project Technical Specifications and 2015 CQA Plan. Approximately 718,559 ft² of geonet material was installed in the Ponds requiring a minimum of eight (8) samples. TRI tested ten (10) conformance samples for the properties listed in **Table 14**; as specified in the Project Technical Specifications and 2015 CQA Plan.

TABLE 14
Sundance West, Inc. Pond Construction
Agru America Geonet - Conformance Testing

Nonwoven Geotextile Property	ASTM Method
Thickness	ASTM D1777
Density	ASTM D1505
Wide Width Tensile Properties	ASTM D1682
Mass Per Unit Area	ASTM D3776
Carbon Black	ASTM D1603
Melt Index	ASTM D1238

Appendix B.6. provides the independent quality assurance laboratory test results. The results were reviewed by the Gordon/PSC CQA Engineer and compared with the Project Technical Specifications and 2015 CQA Plan for geonet. The properties of the geonet meet or exceed the Project Technical Specifications and 2015 CQA Plan requirements.

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

2.6.3.4. Construction Quality Control (CQC)

The quality control procedures specified in the project documents were strictly followed in order to provide a method to measure and regulate the quality of geonet installation. These procedures included such activities as proper overlap and correct zip-tie spacing on floor and slopes.

Both the Gordon/PSC Site CQA Engineer/Manager and FIS observed placement activities to verify that the deployment and seaming procedures were performed in accordance with the CQA Plan and project specifications.

2.6.3.5. Construction Quality Assurance (CQA)

The Gordon/PSC Site CQA Engineer/Manager and FIM visually inspected all material for manufacturing and installation defects. No manufacturing flaws were observed in the installed geonet. The Gordon/PSC Site CQA Engineer/Manager inspected all seamed and non-seamed areas of the geonet for wrinkles, defects, etc. After each panel was deployed, the Gordon/PSC Site CQA Engineer/Manager and FIS walked the length of each panel to identify any suspect areas (e.g., defects or tears) by marking these areas for repair with a highly visible paint. No suspect areas were found.

2.6.4 Geonet Deployment Records

Documentation for geonet deployment was required prior to geonet approval and acceptance. CQA documentation for the geonet deployed in the Ponds is listed in **Table 15**.

TABLE 15
Sundance West, Inc. Pond Construction
Geonet Deployment CQA Documentation

Geonet Deployment CQA Documentation	Certification Report Appendix Location
Geonet Deployment Log	Appendix C.14.

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

The Geonet installation was accepted after the above-listed data was submitted to, reviewed, and approved by the GEI CQA Officer. The As-built Geonet Panel Layout for the Ponds is included as **Figure 7**. Daily Summary Reports were logged during each construction day, and photographs were taken showing the Geonet placement activity. The Daily Summary Reports and project photographs are provided in the **Field Logs and Photographs** Section.

2.7 60-Mil Primary Flexible Membrane Liner

The Primary FML was installed in direct contact above the geonet in accordance with the Construction Plans, Project Technical Specifications, and 2015 CQA Plan. The following sections describe the procedures and activities performed during Primary FML installation, observation, and CQA testing.

2.7.1 Flexible Membrane Liner Product

The Primary FML utilized in the Ponds construction was 60-mil, high-density polyethylene (HDPE), manufactured by Agru America of Georgetown, South Carolina and consisted of three types of FML material. Conductive FML was designated for the Ponds, smooth FML designated for the areas surrounding the Ponds up to the textured FML utilized for the overspray and the road areas. The material was delivered to SWI in rolls twenty-three (23) feet wide with by five hundred-sixty (560) feet long for the textured and six-hundred (600) feet long for the smooth and conductive liners. The FML was stored in the Contractor's Staging Area and in accordance with the Project Technical Specifications and 2015 CQA Plan. The stored FML was not stacked more than two (2) rolls high. The Gordon/PSC Site CQA Engineer/Manager compared roll identification labels with shipping invoices to verify that the FML delivered to SWI corresponded with FML subjected to manufacturer's quality control and quality assurance testing (**Section 2.7.3**).

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

2.7.2 Flexible Membrane Liner Installation

The FML installation activities were performed in accordance with the guidelines specified in the Construction Plans, Project Technical Specifications and 2015 CQA Plan; and industry standards for FML handling, placement, and testing. Each roll of FML was carefully moved from the Contractor's Staging Area at the west end of SWI using a rubber-tired forklift; and FML was not placed in standing water or deployed during rainfall. The forklift was not allowed on the geonet, the Primary HDPE Liner was placed by hand and aided with the use of wire rope and pulling equipment. Upon deployment, each roll identification label was removed and submitted to the Gordon/PSC Site CQA Engineer/Manager and were compared with the shipping invoices to verify that the FML delivered to SWI corresponded with FML subjected to manufacturers' quality control and quality assurance testing. FML being deployed was documented in the *Primary FML Deployment Log (Appendix C.15.)* and the Ponds 60-Mil Primary Liner Panel Layout drawing (**Figure 8**).

After each FML panel had been deployed, adjoining panels were positioned with a four (4) to six (6)- inch longitudinal overlap required for hot-wedge fusion welding. The overlap distance is required for proper seaming, and to allow peel and shear tests to be performed on the seams. Seams were oriented at approximately forty-five (45) degrees to the line of prevailing base grade slope on the pond floor, and parallel to the pond sideslopes, per the Project Technical Specifications and 2015 CQA Plan (see 60-Mil Primary Liner Panel Layout, **Figure 8**).

2.7.3 Flexible Membrane Liner Testing

FML testing included manufacturer's quality control (MQC) and manufacturer's quality assurance (MQA), conformance testing, construction quality control (CQC), CQA, and seam testing. Each type of testing methodology is discussed in the following sections.

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

2.7.3.1 Manufacturer's Quality Control (MQC)

CPCHEM Materials Evaluation Laboratory (CPCHEM) performed resin testing on the raw materials used in the manufacturing of the smooth, textured, and conductive FML. These test results and written certifications verified that the FML delivered to SWI has been extruded from an acceptable resin meeting the properties specified in GRI-GM 13, “*Test Methods, Test Properties and Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes*”, are included in **Appendix B.4**.

2.7.3.2 Manufacturer's Quality Assurance (MQA)

As a part of the MQA testing, specific performance and characterization properties were evaluated on random samples collected from the manufactured FML rolls prior to their delivery to SWI as listed in **Table 16**.

TABLE 16
Sundance West, Inc. Pond Construction
Agri America HDPE FML - MQA Testing

60-mil HDPE Double-Sided Textured HDPE FML Property	ASTM Method
Thickness	ASTM D5994
Asperity Height	ASTM D7466
Density	ASTM D1505
Mass per unit area	ASTM D5993
Melt Flow Index	ASTM D1238, Condition E
Tensile Properties	ASTM D6693 and ASTM D 6693, Modified
Tear Resistance	ASTM D1004, Modified
Puncture Resistance	ASTM D4833, Modified
Carbon Black Content	ASTM D4218
Carbon Black Dispersion	ASTM D5596
Environmental Stress Crack Resistance using Notched Constant Tensile Load	ASTM D5397

MQA test results are included in **Appendix B.3**. These results were reviewed by the Gordon/PSC Site CQA Engineer and confirmed against the Project Technical Specifications and

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

2015 CQA Plan requirements. MQA testing results met the requirements set forth in the Project Technical Specifications and 2015 CQA Plan.

2.7.3.3. Conformance Testing

Conformance sampling for FML material was performed by TRI, Austin, Texas at the manufacturer's facility prior to shipment of the FML to SWI. TRI collected samples approximately two feet long from the entire roll width, and performed conformance testing at the TRI laboratory in Austin, Texas. Conformance samples were collected at a frequency of at least one (1) per 100,000 ft² of FML installed to verify that the FML delivered to the SWI met the minimum properties listed in the Project Technical Specifications and 2015 CQA Plan. Approximately 553,188 ft² of smooth and conductive; and 319,760 ft² of textured HDPE FML were installed during pond construction; requiring a minimum of six (6) for the smooth and conductive; and four (4) textured HDPE FML conformance samples. Twelve (12) samples of the smooth and conductive, and eight (8) textured HDPE FML were tested by TRI for conformance.

TRI tested the total of twenty (20) FML samples for the properties listed in **Table 17**; as specified in the Project Technical Specifications and 2015 CQA Plan.

TABLE 17
Sundance West, Inc. Pond Construction
Agru America HDPE FML – Conformance Testing

60-mil HDPE (Smooth) FML Property	ASTM Method
Thickness	ASTM D5994
Density	ASTM D1505
Mass per unit area	ASTM D5993
Tensile Properties	ASTM D6693 and ASTM D 6693, Modified
Tear Resistance	ASTM D1004, Modified
Puncture Resistance	ASTM D4833, Modified
Carbon Black Content	ASTM D4218
Carbon Black Dispersion	ASTM D5596

The conformance test results were reviewed by the Gordon/PSC Site CQA Engineer and accepted in accordance with Project Technical Specifications and 2015 CQA Plan. The



**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

conformance test results indicated that all three types of FML met the minimum property requirements specified in the Project Technical Specifications and 2015 CQA Plan. The conformance testing results for the twenty (20) samples are included in **Appendix B.4**.

2.7.3.4. Construction Quality Control (CQC)

The quality control procedures specified in the Project Technical Specifications, 2015 CQA Plan; and industry standards were strictly followed in order to provide a method to measure and regulate the quality of FML installation. These procedures included such activities as start-up trial welds, destructive and non-destructive seam testing, and verification that the deployment and seaming procedures were performed in accordance with the Project Technical Specifications, 2015 CQA Plan and industry standards.

Trial welds were performed at the start and midpoint of each workday; after each break in seaming of one hour or more; and after any equipment shutdown. The trial welds were a minimum of ten (10) feet in length for fusion welders; and a minimum of three (3) feet in length for extrusion fillet welders. One-inch-wide cutouts of the trial welds were field-tested for shear and peel strength using an on-site tensiometer (SLS's tensiometer calibration certificate is provided in **Appendix C.19.**) and testing was performed in the presence of the Gordon/PSC Site CQA Engineer/Manager. If the results of the trial weld testing did not comply with the Project Technical Specifications and 2015 CQA Plan, the welder was not permitted to continue seaming until the deficiencies were corrected and an additional trial weld was performed which passed the field testing requirements. Primary trial weld documentation is included in **Appendix C.8**.

The seam testing protocol for the deployed FML included peel and shear testing on mathematically random samples cut from the installed FML (destructive samples) and non-destructive testing (air pressure and/or vacuum box testing) on field seams. The seam-testing program is detailed in **Section 2.7.3.6** of this report.

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

The Gordon/PSC Site CQA Engineer/Manager and FIS observed FML placement activities to verify that the deployment and seaming procedures were performed in accordance with the Project Technical Specifications and 2015 CQA Plan; which included the underlying geonet inspection and approval, seam cleaning, and precautions against potential FML damage during deployment and seaming.

2.7.3.5. Construction Quality Assurance (CQA)

The Gordon/PSC Site CQA Engineer/Manager and FIS visually inspected FML material for manufacturing and installation defects as the FML was deployed. No manufacturing flaws were observed in the deployed FML. The Gordon/PSC Site CQA Engineer/Manager inspected seamed and non-seamed areas of the FML for wrinkles, defects, holes, blisters, etc. After each panel was deployed, the Gordon/PSC Site CQA Engineer/Manager and FIS walked the length of each panel and identified any suspect areas (e.g., defects or blemishes) by marking these areas for repair with a highly visible paint marker.

2.7.3.6. Seam Testing

In accordance with the Project Technical Specifications and 2015 CQA Plan, the field seam verification program consisted of both destructive and non-destructive testing. Sampling and field-testing was performed by the FML installer (SLS) in the presence of the Gordon/PSC Site CQA Engineer/Manager. In addition to field-testing, destructive samples were sent to an independent quality assurance laboratory (TRI/Environmental, Inc., Austin, Texas) for peel and shear strength testing.

A. Destructive Seam Testing

In accordance with the Project Technical Specifications and 2015 CQA Plan, a minimum of one (1) destructive test for every five hundred (500) linear feet of welded seam (an average taken throughout the entire project) was performed on the FML. There were approximately 29,312 lineal feet of welded seam in the Primary Liner, and 15,374 linear feet of welded seam for the overspray liner, requiring a minimum of fifty-nine (59) and thirty-one (31) destructive tests



**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

respectively. Sixty-seven (67) and thirty-three (33) destructive test samples (PDT and RF tests) were collected and evaluated in accordance with the Project Technical Specifications and 2015 CQA Plan.

Each destructive test sample was divided into three segments. The first segment was tested in the field for peel and shear strength by the installer using an on-site tensiometer. The second segment was shipped to an independent quality assurance laboratory (TRI/Environmental, Inc., Austin, Texas) for laboratory testing. The third sample segment was retained by the Gordon/PSC Site CQA Engineer/Manager and delivered to SWI to be archived in the Facility Operating Record. Results of the field destructive tests are provided in **Appendix C.12**; and the independent quality assurance laboratory test results (TRI/Environmental, Inc.) are included in **Appendix D.2 & D.3**. The field destructive test results, and the independent quality assurance laboratory test results were reviewed by the Gordon/PSC Site CQA Engineer/Manager for conformance with the Project Technical Specifications and 2015 CQA Plan. All peel and shear test results met the requirements of the Project Technical Specifications and 2015 CQA Plan.

B. Non-Destructive Seam Testing

Air pressure testing was performed on double-wedge fusion welded seams except where a channel blockage occurred. Where channel blockages occurred, the seam was air tested on either side of the area extrusion-welded and vacuum box tested. An additional patch was extrusion welded over the repaired area and vacuum box tested. Vacuum box testing was performed on all extrusion-welded portions of seams and patches. Test results are documented on the *Primary FML Seam Pressure Test Log (Appendix C.17.)* and the *Primary FML Seam Vacuum Test and Defect-Repair Log (Appendix C.18.)*. Seams and repairs were required to pass the non-destructive testing specifications outlined in the Project Technical Specifications and 2015 CQA Plan before being accepted by the Gordon/PSC Site CQA Engineer/Manager.

**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

2.7.4 FML Deployment Records

Documentation for FML deployment and testing for each panel deployed was required prior to FML approval and acceptance. CQA documentation for the FML deployed in the Ponds are listed in **Table 18**.

TABLE 18
Sundance West, Inc. Pond Construction
HDPE Primary FML Deployment CQA Documentation

HDPE FML Deployment CQA Documentation	Certification Report Appendix Location
FML Pre-Weld Qualification Test Record	Appendix C.8.
FML Seam Field Destructive Test Log	Appendix C.12.
FML Deployment Log	Appendix C.15.
FML Seaming Log	Appendix C.16.
FML Seam Pressure Test Log	Appendix C.17.
FML Seam Vacuum Test and Defect-Repair Log	Appendix C.18.
Demtech Tensiometer Calibration Certification	Appendix C.19.

The FML installation was accepted after the data listed in **Table 18** was submitted to, reviewed by, and approved by the Gordon/PSC Site CQA Engineer. The Ponds As-built FML Panel Layout is included as **Figure 8**. Daily Summary Reports were completed after each construction day, and photo documentation recorded the FML placement activity on the pond floor and sideslopes. The Daily Summary Reports and forms indicating approval of the previous day's FML installation and project photographs are provided in the **Field Logs and Photographs** Section.

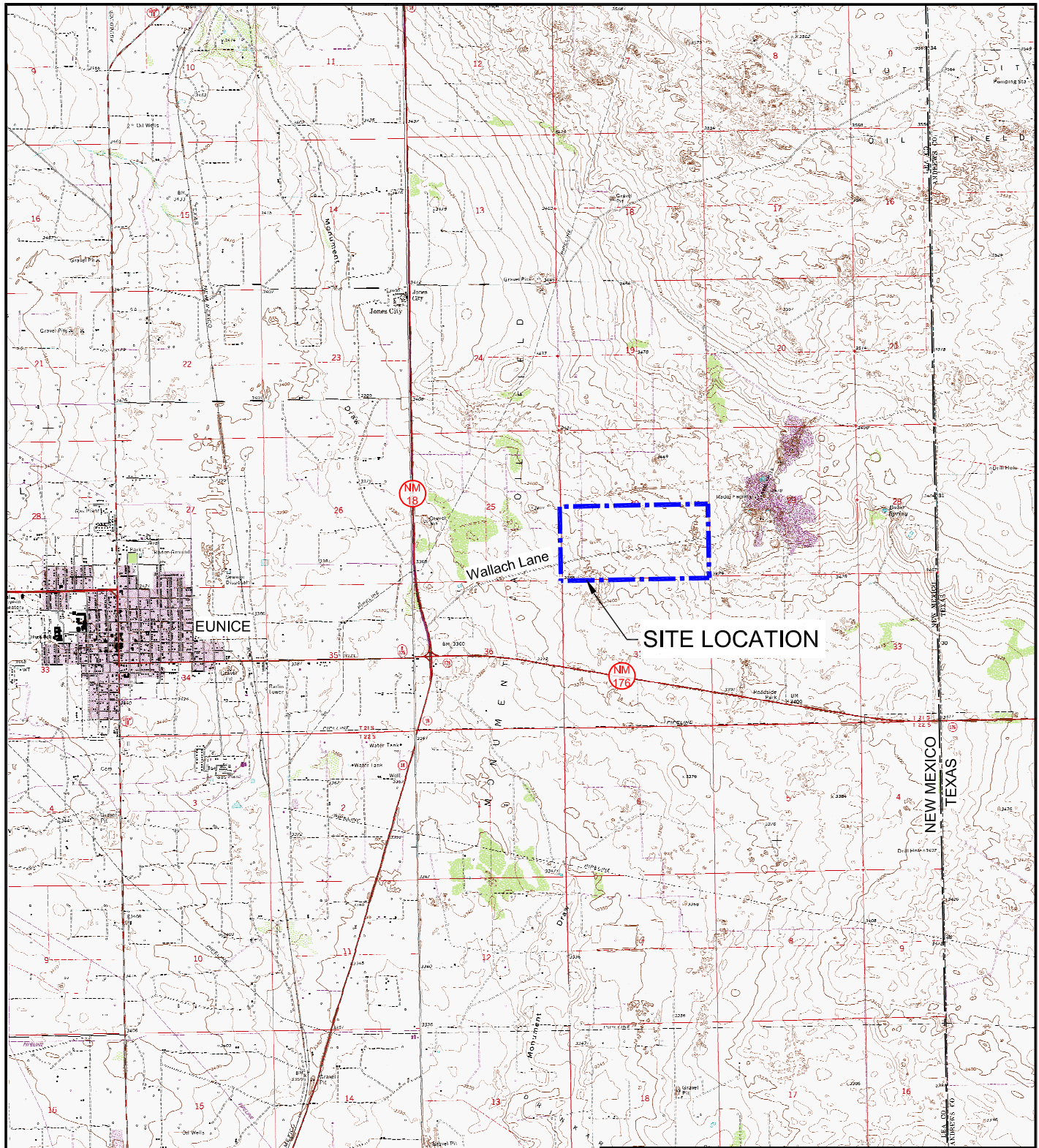
**Engineering Certification Report
Sundance West Inc.
Evaporation Ponds A1-3 and B1-3**

3.0 ENGINEERING CERTIFICATION

This Engineering Certification Report demonstrates that the composite liner and leak detection system for the Ponds has been installed in accordance with the New Mexico Energy, Minerals and Natural Resources Department Regulations (19.15.36.11 – 19.15.36.112 NMAC). This Certification is sealed by Charles W. Fiedler, a New Mexico Professional Engineer with extensive applicable experience with waste engineering and geosynthetic liner systems (**Appendix G**).

FIGURES

Figure 1	Sundance West – Site Location Map
Figure 2	Sundance West – Subgrade Design Grades
Figure 3	Sundance West - Subgrade As-built Grades
Figure 4	Sundance West – Field Density Test Locations
Figure 5	Sundance West – Leak Detection Sump GCL Layout
Figure 6	Sundance West – 60 Mil Secondary FML Panel Layout
Figure 7	Sundance West – Geonet Panel Layout
Figure 8	Sundance West – 60 Mil Primary FML Panel Layout



Based on Eunice NE, TX.- NM (1969) Photorevised (1979);
 Eunice, NM (1969) Photorevised (1978);
 Quadrangles, USGS 7.5' SERIES (1:24,000 Scale)



0' 2500' 5000'

SITE LOCATION MAP

SUNDANCE WEST
 SURFACE WASTE MANAGEMENT FACILITY
 LEA COUNTY, NEW MEXICO

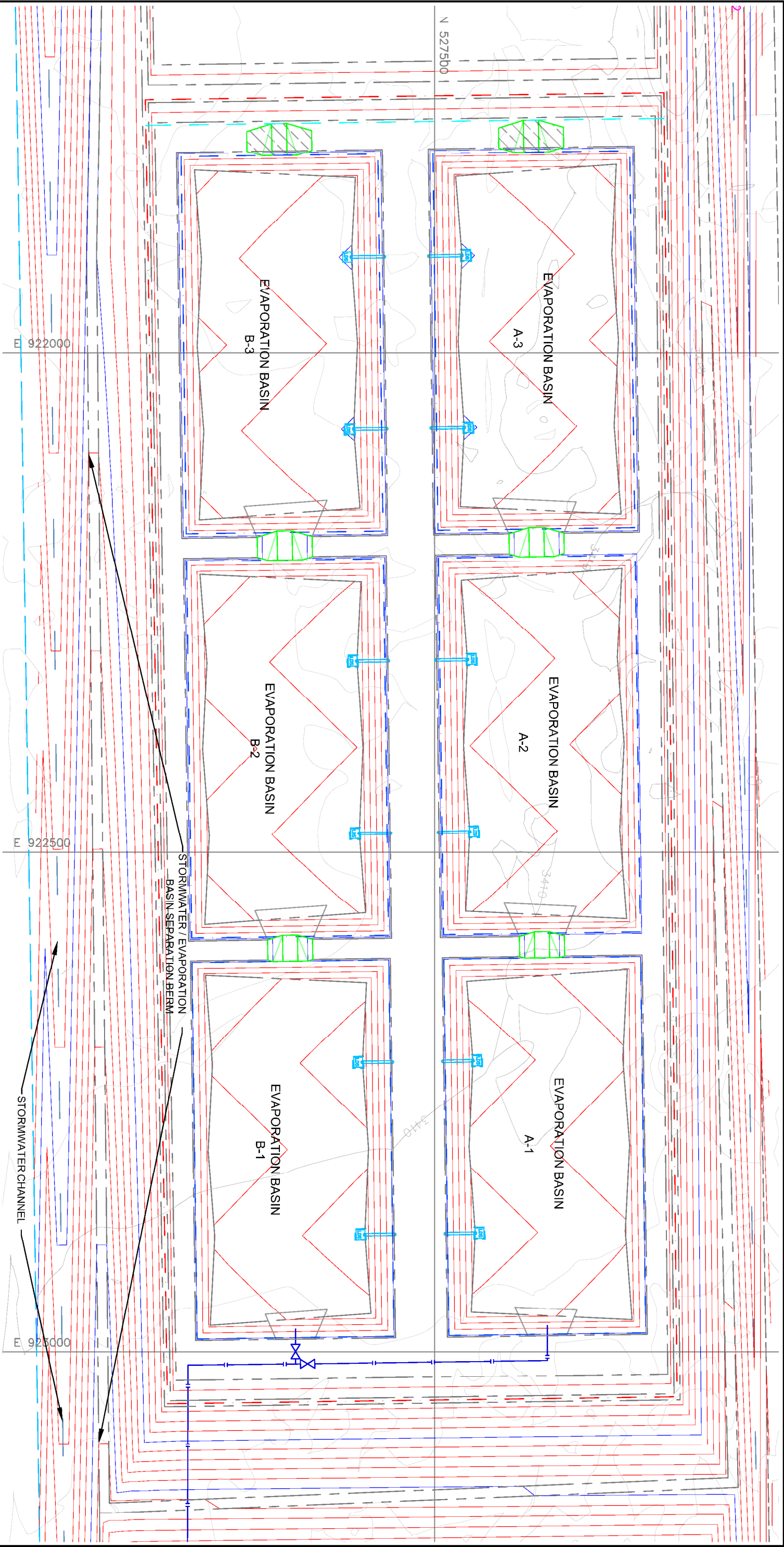


333 Rio Rancho Blvd., NE.
 Suite 400.
 Rio Rancho, New Mexico
 Phone: 505-867-6990
 Fax: 505-867-6991

Drawing: X:\2017\0117.17\05_POST_CONSTR\03_AS_BLT\Figures\SITE LOC.dwg
 Date/Time: Apr. 23, 2018-11:24:17
 Copyright © All Rights Reserved, Gordon Environmental | PCS 2018.

DATE: 04/09/2018	CAD: CadFileName.dwg	PROJECT #: 010117.17
DRAWN BY: DMI	REVIEWED BY: CRK	
APPROVED BY: CWF	www.team-psc.com	

FIGURE 1



NOTE:
TOTAL DOUBLE LINED AREA =15 ACRES±
ACREAGE PER POND = 1.75 ACRES±

- LEGEND
- EXISTING GRADE CONTOUR - 10'
 - EXISTING GRADE CONTOUR - 2'
 - PROPOSED GRADE CONTOUR - 10'
 - PROPOSED GRADE CONTOUR - 2'
 - LEAK DETECTION SUMP

SITE GRID

NOT FOR CONSTRUCTION
Drawing: X:\2017\0117-7\05_POST_CONSTR\003_AS_BLT\Figures\DESIGN GRADES.dwg
SIZE: ANS1-B Date/Time: Apr. 23, 2018-11:09:43 LAYOUT: B (L/S)
Copyright: © All Rights Reserved, Gordon Environmental | PSC - 2016

SUBGRADE DESIGN GRADES

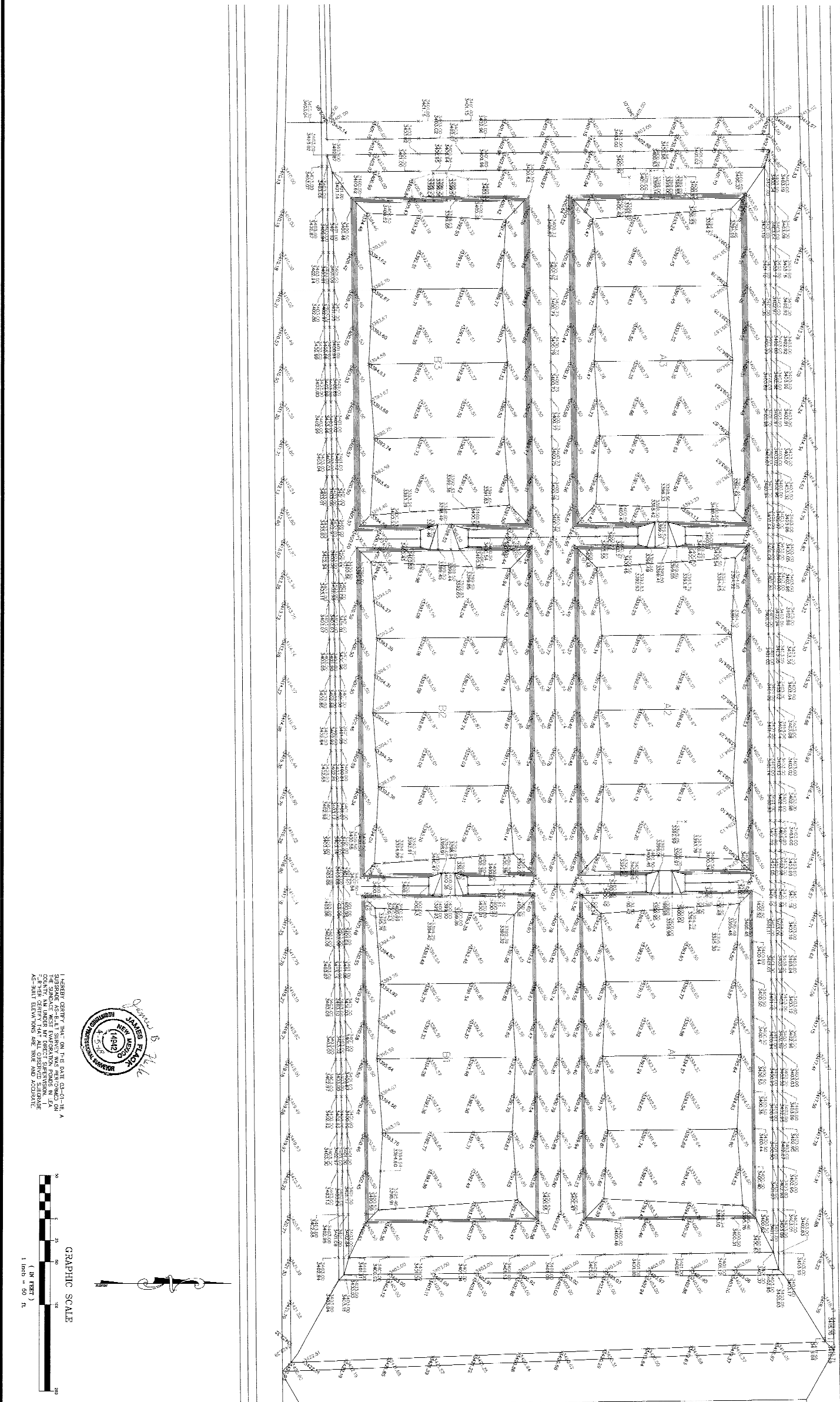
SUNDANCE WEST
SURFACE WASTE MANAGEMENT FACILITY
LEA COUNTY, NEW MEXICO

GORDON PSC
ENVIRONMENTAL

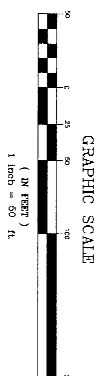
333 Rio Rancho Blvd., NE
Suite 400,
Rio Rancho, New Mexico
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 04/11/2018 CAD: SUBGRADE DESIGN.dwg PROJECT #: 010117-17
DRAWN BY: DMI REVIEWED BY: CRK
APPROVED BY: CWF www.leam-psc.com

FIGURE 2



I HEREBY CERTIFY THAT ON THE DATE 03-01-18, A
SUBGRADE AS-BUILT SURVEY WAS PERFORMED ON
THE SURFACE OF THE LAND SHOWN HEREON IN
LEA COUNTY, NEW MEXICO, IN ACCORDANCE WITH
THE REQUIREMENTS OF THE LEA COUNTY HEALTH
DEPARTMENT. THE SURVEY WAS CONDUCTED BY
GORDON PSC ENVIRONMENTAL, P.C. THE
AS-BUILT ELEVATIONS ARE TRUE AND ACCURATE.



SHEET NUMBER 1 OF 1	PROJECT NO. 17-0925V	SUNDANCE WEST WASTE MANAGEMENT	DRAWN: JB		18213 E WARNER ROAD BLDG A SUITE 5 GILBERT, AZ 85296 PHONE: (480) 414-1221 FAX: (888) 870-6203 EMAIL: s3survey@s3-az.com	REV.		DATE	BY	-
		PHASE 1 EVAPORATION BASINS 1-3	CHECKED: GR							
			DATE: 03/01/18							
			DWG:							
		SUBGRADE ASBUILT EXHIBIT								

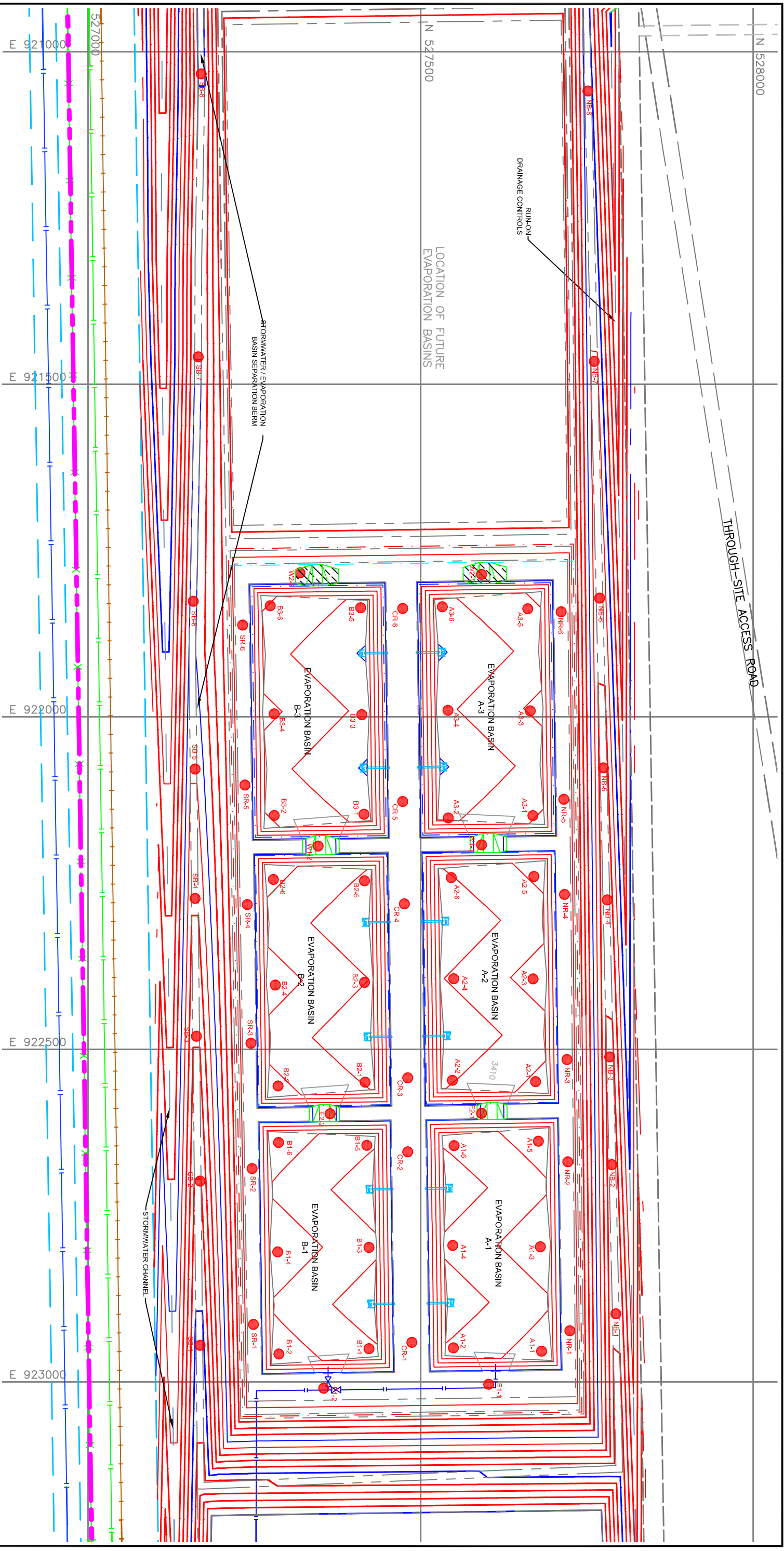
SUBGRADE AS-BUILT GRADES

SUNDANCE WEST
SURFACE WASTE MANAGEMENT FACILITY
LEA COUNTY, NEW MEXICO

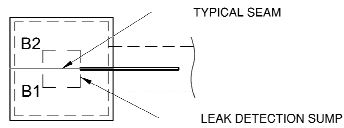
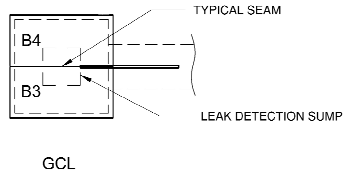


333 Rio Rancho Blvd., NE.
Suite 400,
Rio Rancho, New Mexico
Phone: 505-867-6990
Fax: 505-867-6991

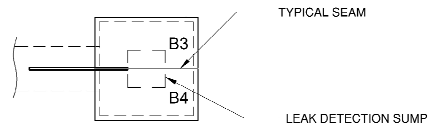
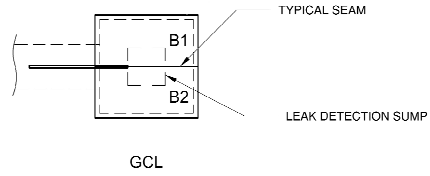
DATE: 04/10/2018	CAD: AS-BUILT.dwg	PROJECT #: 010117.17
DRAWN BY: DMI	REVIEWED BY: CRK	FIGURE 3
APPROVED BY: CWF	www.team-psc.com	



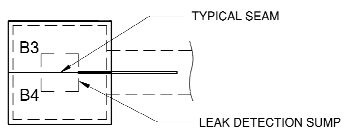
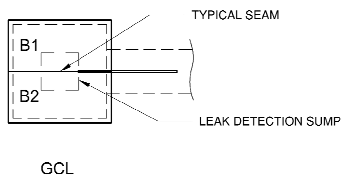
LEAK DETECTION SUMP AREA
POND A-1



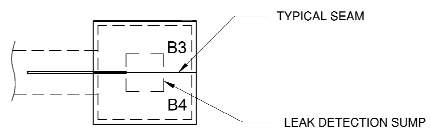
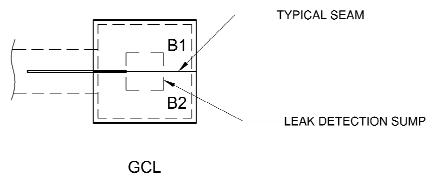
LEAK DETECTION SUMP AREA
POND B-1



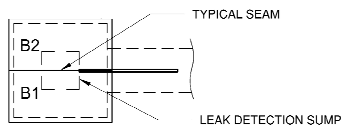
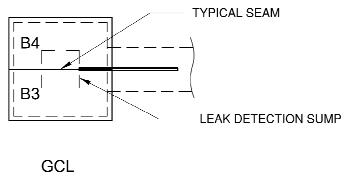
LEAK DETECTION SUMP AREA
POND A-2



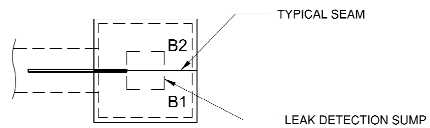
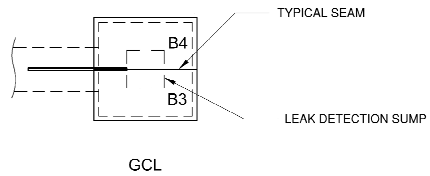
LEAK DETECTION SUMP AREA
POND B-2



LEAK DETECTION SUMP AREA
POND A-3



LEAK DETECTION SUMP AREA
POND B-3



Southwest Liner Systems, Inc.	SUNDANCE WEST SURFACE WASTE MANAGEMENT FACILITY LEA COUNTY, NEW MEXICO EVAPORATION BASINS	
	3/31/2018	NO SCALE

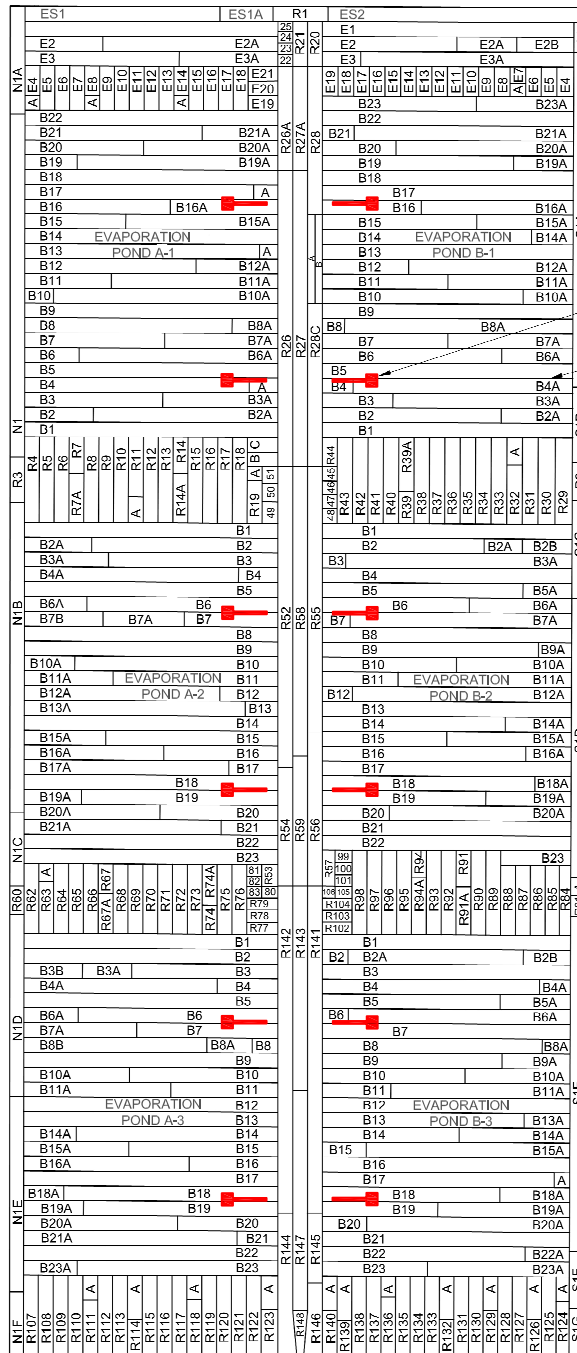
LEAK DETECTION SUMP
GCL LAYOUT

SUNDANCE WEST
SURFACE WASTE MANAGEMENT FACILITY
LEA COUNTY, NEW MEXICO



333 Rio Rancho Blvd., NE.
Suite 400.
Rio Rancho, New Mexico
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 04/10/2018	CAD: SUMP.dwg	PROJECT #: 010117.17
DRAWN BY: DMI	REVIEWED BY: CRK	FIGURE 5
APPROVED BY: CWF	www.team-psc.com	



Southwest Liner Systems, Inc.	SUNDANCE WEST			
	SURFACE WASTE MANAGEMENT FACILITY			
	LEA COUNTY, NEW MEXICO			
	EVAPORATION PONDS A-1, A-2, A-3, B-1, B-2, B-3		4/2/2018	NO SCALE

LEGEND

LEAK DETECTION SUMP

NOT FOR CONSTRUCTION

Drawing: X:\2017\0117.17\05_POST_CONSTR\03_AS_BLT\Figures\GEONET.dwg

SIZE: ANSI-A Date/Time: Apr. 23, 2018-12:04:22; LAYOUT: A (P)

Copyright © All Rights Reserved, Gordon Environmental | PSC - 2016

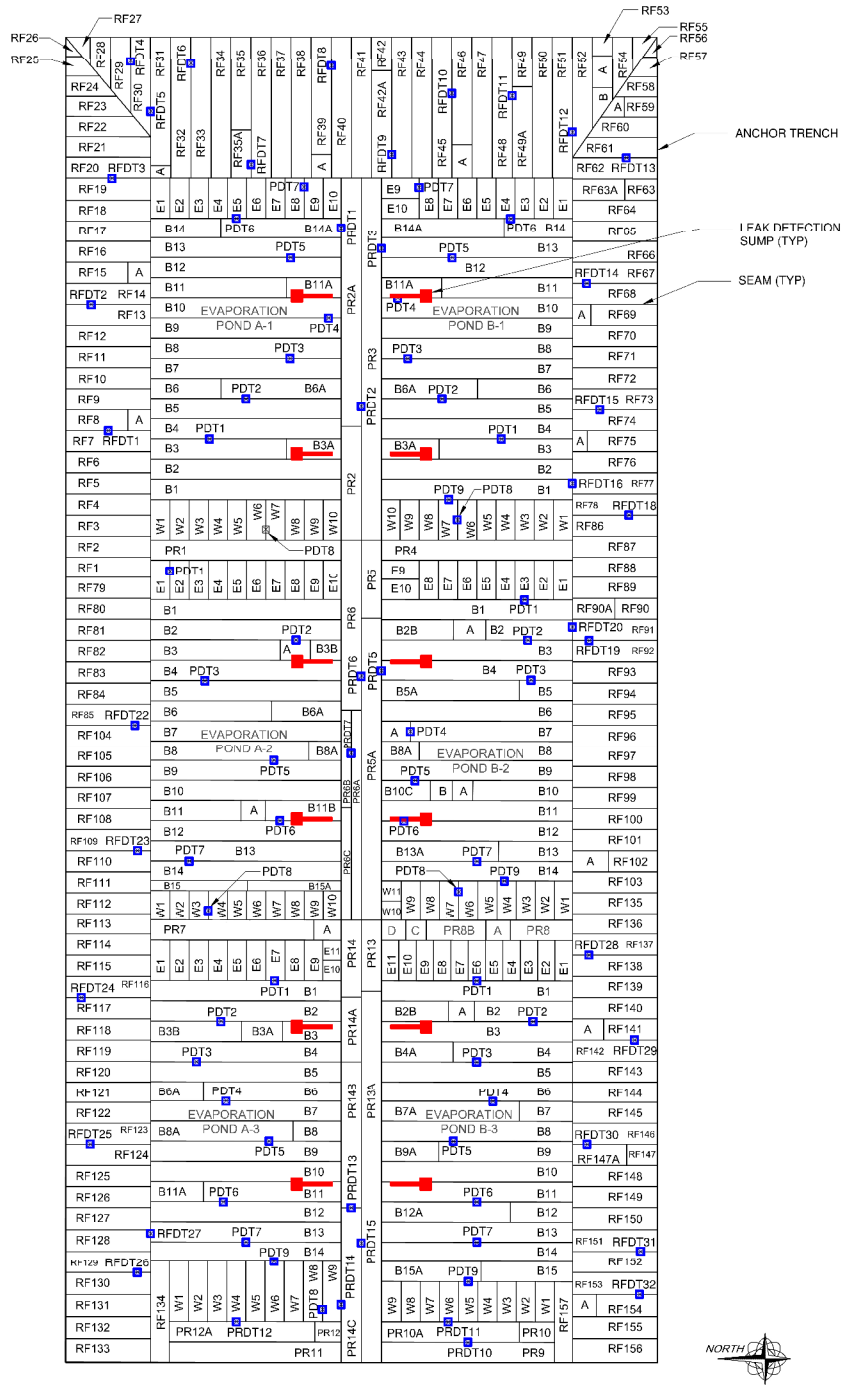
GEONET PANEL LAYOUT

SUNDANCE WEST
SURFACE WASTE MANAGEMENT FACILITY
LEA COUNTY, NEW MEXICO



333 Rio Rancho Blvd., NE.
Suite 400.
Rio Rancho, New Mexico
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 04/10/2018	CAD: GEONET.dwg	PROJECT #: 010117.17
DRAWN BY: DMI	REVIEWED BY: CRK	FIGURE 7
APPROVED BY: CWF	www.team-psc.com	



Southwest Liner Systems, Inc.	SUNDANCE WEST				
	SURFACE WASTE MANAGEMENT FACILITY				
	LEA COUNTY, NEW MEXICO				
	EVAPORATION PONDS A-1 A-2 A-3 B-1 B-2 B-3			4/6/2018	NO SCALE

LEGEND

- LEAK DETECTION SUMP
- SDT4 DESTRUCT TEST LOCATION

NOT FOR CONSTRUCTION

Drawing: X:\2017\0117.17\05_POST_CONSTR\03_AS_BLT\Figures\PRIMARY LINER.dwg

SIZE: ANSI-A Date/Time: Apr. 23, 2018-12:06:49 ; LAYOUT: A (P)

Copyright © All Rights Reserved, Gordon Environmental | PSC - 2016

60-MIL PRIMARY LINER PANEL LAYOUT

SUNDANCE WEST
SURFACE WASTE MANAGEMENT FACILITY
LEA COUNTY, NEW MEXICO



333 Rio Rancho Blvd., NE.
Suite 400.
Rio Rancho, New Mexico
Phone: 505-867-0990
Fax: 505-867-6991

DATE: 04/10/2018	CAD: PRIMARY.dwg	PROJECT #: 010117.17
DRAWN BY: DMI	REVIEWED BY: CRK	FIGURE 8
APPROVED BY: CWF	www.team-psc.com	

FIELD LOGS AND PHOTOGRAPHS

Daily Summary Reports

FIELD LOGS AND PHOTOGRAPHS

Project Photographs

APPENDIX A

Subgrade Material Testing

A.1. Moisture / Density Relationships

November 7, 2017

Gordon Environmental, Inc
213 S. Camino del Pueblo
Bernalillo, NM 87004

Job No.:3-71015
Lab No.:9411

PROJECT: **Sundance West**

LOCATION OF SAMPLE: Southeast Excavation

DATE SAMPLED: October 26, 2017

SAMPLE: Clayey Sand, Reddish Brown (SC)

MOISTURE-DENSITY RELATIONSHIP ASTM-D-1557

Maximum Density 111.3 pcf
Optimum Moisture 9.1 percent

SIEVE ANALYSIS

Sieve Size	Percent Passing
3/4"	100
1/2"	99
3/8"	99
4"	97
No. 10	94
No. 40	84
No. 80	60
No. 200	37.8

ATTERBERG LIMITS

Plasticity Index 21
Liquid Limit 33

Submitted by:

GEO-TEST, INC.



Tim Byres, SET

cc: mshepard@gordonenvironmental.com
dgray@team-psc.com

TB/cb

GEO-TEST, INC.
3204 RICHARDS LANE
SANTA FE,
NEW MEXICO
87507
(505) 471-1101
FAX (505) 471-2245

8528 CALLE ALAMEDA
ALBUQUERQUE,
NEW MEXICO
87113
(505) 857-0933
FAX (505) 857-0803

2805-A LAS VEGAS CT
LAS CRUCES,
NEW MEXICO
88007
(575) 526-6260
FAX (575) 526-1660

November 8, 2017

Gordon Environmental, Inc
213 S. Camino del Pueblo
Bernalillo, NM 87004

Job No.:3-71015
Lab No.:9412

PROJECT: **Sundance West**

LOCATION OF SAMPLE: Southeast Red

DATE SAMPLED: October 26, 2017

SAMPLE: Clayey Sand, Reddish Brown (SC)

MOISTURE-DENSITY RELATIONSHIP ASTM-D-1557

Maximum Density 112.8 pcf
Optimum Moisture 9.8 percent

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 10	100
No. 40	99
No. 80	58
No. 200	31.2

ATTERBERG LIMITS

Plasticity Index 20
Liquid Limit 33

Submitted by:

GEO-TEST, INC.



Tim Byres, SET

cc: mshepard@gordonenvironmental.com
dgray@team-psc.com

TB/cb

GEO-TEST, INC.
3204 RICHARDS LANE
SANTA FE,
NEW MEXICO
87507
(505) 471-1101
FAX (505) 471-2245

8528 CALLE ALAMEDA
ALBUQUERQUE,
NEW MEXICO
87113
(505) 857-0933
FAX (505) 857-0803

2805-A LAS VEGAS CT
LAS CRUCES,
NEW MEXICO
88007
(575) 526-6260
FAX (575) 526-1660

November 7, 2017

Gordon Environmental, Inc
213 S. Camino del Pueblo
Bernalillo, NM 87004

Job No.:3-71015
Lab No.:9413

PROJECT: **Sundance West**

LOCATION OF SAMPLE: East Stockpile

DATE SAMPLED: October 26, 2017

SAMPLE: Silty Sand, Fine Grained, Brown (SM)

MOISTURE-DENSITY RELATIONSHIP ASTM-D-1557

Maximum Density 113.5 pcf
Optimum Moisture 10.2 percent

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 10	100
No. 40	97
No. 80	45
No. 200	12.8

ATTERBERG LIMITS

Plasticity Index NP
Liquid Limit NV

Submitted by:

GEO-TEST, INC.



Tim Byres, SET

cc: mshepard@gordonenvironmental.com
dgray@team-psc.com

TB/cb

GEO-TEST, INC.
3204 RICHARDS LANE
SANTA FE,
NEW MEXICO
87507
(505) 471-1101
FAX (505) 471-2245

8528 CALLE ALAMEDA
ALBUQUERQUE,
NEW MEXICO
87113
(505) 857-0933
FAX (505) 857-0803

2805-A LAS VEGAS CT
LAS CRUCES,
NEW MEXICO
88007
(575) 526-6260
FAX (575) 526-1660

December 4, 2017

Gordon Environmental, Inc
213 S. Camino del Pueblo
Bernalillo, NM 87004

Job No.:3-71121
Lab No.:9477

PROJECT: **Sundance West Pond**

LOCATION OF SAMPLE: Caliche Mix Southeast

DATE SAMPLED: November 22, 2017

SAMPLE: Silty Sand, Some Gravel (SM)

MOISTURE-DENSITY RELATIONSHIP ASTM-D-698

Maximum Density	105.7	pcf
Optimum Moisture	17.3	percent

SIEVE ANALYSIS

Sieve Size	Percent Passing
1 1/2"	100
1"	88
3/4"	88
1/2"	88
3/8"	88
No. 4	84
No. 10	78
No. 40	68
No. 80	40
No. 200	17.0

ATTERBERG LIMITS

Plasticity Index	NP
Liquid Limit	NV

Submitted by:

GEO-TEST, INC.



Tim Byres, SET

cc: mshepard@gordonenvironmental.com
dgray@team-psc.com

TB/cb

GEO-TEST, INC.
3204 RICHARDS LANE
SANTA FE,
NEW MEXICO
87507
(505) 471-1101
FAX (505) 471-2245

8528 CALLE ALAMEDA
ALBUQUERQUE,
NEW MEXICO
87113
(505) 857-0933
FAX (505) 857-0803

2805-A LAS VEGAS CT
LAS CRUCES,
NEW MEXICO
88007
(575) 526-6260
FAX (575) 526-1660

December 1, 2017

Gordon Environmental, Inc
213 S. Camino del Pueblo
Bernalillo, NM 87004

Job No.:3-71121
Lab No.:9478

PROJECT: **Sundance West Pond**

LOCATION OF SAMPLE: Center Stockpile

DATE SAMPLED: November 22, 2017

SAMPLE: Silty Sand, Fine Grained (SM)

MOISTURE-DENSITY RELATIONSHIP ASTM-D-1557

Maximum Density	116.6	pcf
Optimum Moisture	12.2	percent

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 10	100
No. 40	98
No. 80	53
No. 200	18.5

ATTERBERG LIMITS

Plasticity Index	NP
Liquid Limit	NV

Submitted by:

GEO-TEST, INC.



Tim Byres, SET

cc: mshepard@gordonenvironmental.com
dgray@team-psc.com

TB/cb

GEO-TEST, INC.
3204 RICHARDS LANE
SANTA FE,
NEW MEXICO
87507
(505) 471-1101
FAX (505) 471-2245

8528 CALLE ALAMEDA
ALBUQUERQUE,
NEW MEXICO
87113
(505) 857-0933
FAX (505) 857-0803

2805-A LAS VEGAS CT
LAS CRUCES,
NEW MEXICO
88007
(575) 526-6260
FAX (575) 526-1660

December 4, 2017

Gordon Environmental, Inc
213 S. Camino del Pueblo
Bernalillo, NM 87004

Job No.:3-71121
Lab No.:9479

PROJECT: **Sundance West Pond**

LOCATION OF SAMPLE: Caliche Spoils

DATE SAMPLED: November 22, 2017

SAMPLE: Clayey Sand, Some Gravel (SC)

MOISTURE-DENSITY RELATIONSHIP ASTM-D-698

Maximum Density 101.0 pcf
Optimum Moisture 18.2 percent

SIEVE ANALYSIS

Sieve Size	Percent Passing
1"	100
3/4"	98
1/2"	97
3/8"	94
No. 4	86
No. 10	78
No. 40	68
No. 80	45
No. 200	26.8

ATTERBERG LIMITS

Plasticity Index 22
Liquid Limit 37

Submitted by:

GEO-TEST, INC.



Tim Byres, SET

cc: mshepard@gordonenvironmental.com
dgray@team-psc.com

TB/cb

GEO-TEST, INC.
3204 RICHARDS LANE
SANTA FE,
NEW MEXICO
87507
(505) 471-1101
FAX (505) 471-2245

8528 CALLE ALAMEDA
ALBUQUERQUE,
NEW MEXICO
87113
(505) 857-0933
FAX (505) 857-0803

2805-A LAS VEGAS CT
LAS CRUCES,
NEW MEXICO
88007
(575) 526-6260
FAX (575) 526-1660

APPENDIX A

Subgrade Material Testing

A.2. Subgrade (Roads and Ponds) Testing Results

FIELD COMPACTION TESTING RESULTS

PROJECT INFORMATION		
PROJECT NAME: Sundance West Pond Construction		PROJECT NUMBER: 0101011717
OWNER: Sundance West Inc.		DATE: See Below
PROJECT LOCATION: Eunice, NM		SHEET NUMBER: 2 - Road Density Tests
TESTING INSTRUMENT: InstroTek 3500 Explorer®		TECHNICIAN: Don Gray
REFERENCE STANDARD PROCTOR (RSP): 113.5 lbs/ft ³		REFERENCE MOISTURE (%): NA

[illegible][illegible]

REVIEWED BY: Carl King

FIELD COMPACTION TESTING RESULTS

PROJECT INFORMATION		
PROJECT NAME: Sundance West Pond Construction		PROJECT NUMBER: 0101011717
OWNER: Sundance West Inc.		DATE: See Below
PROJECT LOCATION: Eunice, NM		SHEET NUMBER: 1 - Pond Floor Tests
TESTING INSTRUMENT: InstronTek 3500 Explorer®		TECHNICIAN: Don Gray
REFERENCE STANDARD PROCTOR (RSP): 113.5 lbs/ft ³		REFERENCE MOISTURE (%): NA

TEST NUMBER	DRY DENSITY (lbs/ft³)	% RSP	% MOISTURE	DATE TAKEN
B1-1	111.8	98.5%	8.2%	2/6/2018
B1-2	109.5	96.5%	12.2%	2/6/2018
B1-3	110.2	97.1%	4.5%	2/6/2018
B1-4	109.1	96.1%	12.4%	2/6/2018
B1-5	112.2	98.9%	10.3%	2/6/2018
B1-6	112.5	99.1%	12.5%	2/6/2018
A1-1	110.8	97.6%	11.7%	2/7/2018
A1-2	104.9	92.4%	7.6%	2/7/2018
A1-3	113.1	99.6%	12.3%	2/7/2018
A1-4	103.6	91.3%	5.5%	2/7/2018
A1-5	111.4	98.1%	6.5%	2/7/2018
A1-6	110.1	97.0%	12.2%	2/7/2018
B2-1	109.6	96.6%	6.9%	2/13/2018
B2-2	115.4	101.7%	7.6%	2/13/2018
B2-3	102.9	90.7%	4.5%	2/13/2018
B2-4	109.3	96.3%	9.8%	2/13/2018
B2-5	107.0	94.3%	5.9%	2/13/2018
B2-6	114.6	101.0%	11.3%	2/13/2018
A2-1	107.7	94.9%	8.6%	2/16/2018
A2-2	106.7	94.0%	66.0%	2/16/2018
A2-3	104.7	92.2%	5.9%	2/16/2018
A2-4	104.6	92.2%	4.9%	2/16/2018
A2-5	105.9	93.3%	8.1%	2/16/2018
A2-6	106.4	93.7%	5.8%	2/16/2018

[illegible]

REVIEWED BY: Carl King

APPENDIX A

Subgrade Material Testing

A.3. Berm Density Testing Results

FIELD COMPACTION TESTING RESULTS

PROJECT INFORMATION				
PROJECT NAME: Sundance West Pond Construction			PROJECT NUMBER: 0101011717	
OWNER: Sundance West Inc.			DATE: See Below	
PROJECT LOCATION: Eunice, NM			SHEET NUMBER: 1 - Pond Floor Tests	
TESTING INSTRUMENT: InstronTek 3500 Explorer®			TECHNICIAN: Don Gray	
REFERENCE STANDARD PROCTOR (RSP): 113.5 lbs/ft ³			REFERENCE MOISTURE (%): NA	

TEST NUMBER	DRY DENSITY (lbs/ft ³)	% RSP	% MOISTURE	DATE TAKEN
B1-1	111.8	98.5%	8.2%	2/6/2018
B1-2	109.5	96.5%	12.2%	2/6/2018
B1-3	110.2	97.1%	4.5%	2/6/2018
B1-4	109.1	96.1%	12.4%	2/6/2018
B1-5	112.2	98.9%	10.3%	2/6/2018
B1-6	112.5	99.1%	12.5%	2/6/2018
A1-1	110.8	97.6%	11.7%	2/7/2018
A1-2	104.9	92.4%	7.6%	2/7/2018
A1-3	113.1	99.6%	12.3%	2/7/2018
A1-4	103.6	91.3%	5.5%	2/7/2018
A1-5	111.4	98.1%	6.5%	2/7/2018
A1-6	110.1	97.0%	12.2%	2/7/2018
B2-1	109.6	96.6%	6.9%	2/13/2018
B2-2	115.4	101.7%	7.6%	2/13/2018
B2-3	102.9	90.7%	4.5%	2/13/2018
B2-4	109.3	96.3%	9.8%	2/13/2018
B2-5	107.0	94.3%	5.9%	2/13/2018
B2-6	114.6	101.0%	11.3%	2/13/2018
A2-1	107.7	94.9%	8.6%	2/16/2018
A2-2	106.7	94.0%	66.0%	2/16/2018
A2-3	104.7	92.2%	5.9%	2/16/2018
A2-4	104.6	92.2%	4.9%	2/16/2018
A2-5	105.9	93.3%	8.1%	2/16/2018
A2-6	106.4	93.7%	5.8%	2/16/2018

TEST NUMBER	DRY DENSITY (lbs/ft ³)	% RSP	% MOISTURE	DATE TAKEN
B3-1	106.8	94.1%	5.5%	3/6/2018
B3-2	104.8	92.3%	6.0%	3/6/2018
B3-3	106.0	93.4%	5.7%	3/6/2018
B3-4	109.3	96.3%	7.9%	3/6/2018
B3-5	107.5	94.7%	5.8%	3/6/2018
B3-6	112.7	99.3%	10.2%	3/6/2018
A3-1	105.2	92.7%	6.6%	3/6/2018
A3-2	106.6	93.9%	6.1%	3/6/2018
A3-3	102.6	90.4%	6.6%	3/6/2018
A3-4	109.2	96.2%	9.5%	3/6/2018
A3-5	102.8	90.6%	7.3%	3/6/2018
A3-6	106.6	93.9%	7.5%	3/6/2018

REVIEWED BY: Carl King

FIELD COMPACTION TESTING RESULTS

PROJECT INFORMATION		
PROJECT NAME: Sundance West Pond Construction		PROJECT NUMBER: 0101011717
OWNER: Sundance West Inc.		DATE: See Below
PROJECT LOCATION: Eunice, NM		SHEET NUMBER: 2 - Road Density Tests
TESTING INSTRUMENT: InstroTek 3500 Explorer®		TECHNICIAN: Don Gray
REFERENCE STANDARD PROCTOR (RSP): 113.5 lbs/ft ³		REFERENCE MOISTURE (%): NA

[illegible][illegible]

REVIEWED BY: Carl King

APPENDIX B

Material Manufacturer Certification and Conformance Testing Results

B.1. GCL Certifications



BentoLiner Manufacturing Certification

Sales Order: 81175
Customer: Southwest Liner Systems, Inc.
Project: SWLS Lea County Landfill Cell 5
Product Type: BLI-075-06N-03S-D-00 BentoLiner NSL

The GCL purchased and shipped for the above referenced project does meet or exceed the project specifications.

The GCL supplied to this project has been continuously inspected for the presence of needles and is certified to be needle free.

Chuck Taylor
Laboratory Technician



Roll Allocation List

Sales Order SO-081175
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS Lea County Landfill Cell 5

Conformance: 1' x rw, 1/100,000sf, min 1 /lot
TRI TX

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length	
502289559	BLI-075-06N-03S-D-00	27041903	15.50	2024886796	2024786874	1041117C	144.00	Conformance
502289560	BLI-075-06N-03S-D-00	27041903	15.50	2024886796	2024786874	1041117C	144.00	
502289561	BLI-075-06N-03S-D-00	27041903	15.50	2024886796	2024786874	1041117C	144.00	
502289562	BLI-075-06N-03S-D-00	27041903	15.50	2024886796	2024786874	1041117C	144.00	
502289563	BLI-075-06N-03S-D-00	27041903	15.50	2024886796	2024786874	1041117C	144.00	
502289564	BLI-075-06N-03S-D-00	27041903	15.50	2024898679	2024786874	1041117C	144.00	
502289565	BLI-075-06N-03S-D-00	27041903	15.50	2024898679	2024786874	1041117C	144.00	
502289566	BLI-075-06N-03S-D-00	27041903	15.50	2024898679	2024786874	1041117C	144.00	
502289567	BLI-075-06N-03S-D-00	27041903	15.50	2024898679	2024786874	1041117C	144.00	
502289568	BLI-075-06N-03S-D-00	27041903	15.50	2024898679	2024786874	1041117C	144.00	
502289569	BLI-075-06N-03S-D-00	27041903	15.50	2024898679	2024786874	1041117C	144.00	
502289570	BLI-075-06N-03S-D-00	27041903	15.50	2024898679	2024786874	1041117C	144.00	
502289571	BLI-075-06N-03S-D-00	27041903	15.50	2024898679	2024786874	1041117C	144.00	
502289572	BLI-075-06N-03S-D-00	27041903	15.50	2024898679	2024786874	1041117C	144.00	
502289573	BLI-075-06N-03S-D-00	27041903	15.50	2024898679	2024786874	1041117C	144.00	
502289574	BLI-075-06N-03S-D-00	27041903	15.50	2024898679	2024786874	1041117C	144.00	
502289575	BLI-075-06N-03S-D-00	27041903	15.50	2024898679	2024786874	1041117D	144.00	
502289576	BLI-075-06N-03S-D-00	27041903	15.50	2024898679	2024786874	1041117D	144.00	
502289577	BLI-075-06N-03S-D-00	27041903	15.50	2024898679	2024786874	1041117D	144.00	
502289578	BLI-075-06N-03S-D-00	27041903	15.50	2024898675	2024786874	1041117D	144.00	
502289579	BLI-075-06N-03S-D-00	27041903	15.50	2024898675	2024786874	1041117D	144.00	
502289580	BLI-075-06N-03S-D-00	27041903	15.50	2024898675	2024786874	1041117D	144.00	
502289592	BLI-075-06N-03S-D-00	27041903	15.50	2024898673	2024761756	1041117D	150.00	
502289593	BLI-075-06N-03S-D-00	27041903	15.50	2024898673	2024761756	1041117D	150.00	
502289594	BLI-075-06N-03S-D-00	27041903	15.50	2024898673	2024761756	1041117D	150.00	
502289595	BLI-075-06N-03S-D-00	27041903	15.50	2024898673	2024761756	1041117D	150.00	
502289596	BLI-075-06N-03S-D-00	27041903	15.50	2024898673	2024761756	1041117D	150.00	
502289597	BLI-075-06N-03S-D-00	27041903	15.50	2024898673	2024761756	1041117D	150.00	
502289598	BLI-075-06N-03S-D-00	27041903	15.50	2024898673	2024761756	1041117D	150.00	
502289599	BLI-075-06N-03S-D-00	27041903	15.50	2024898673	2024761756	1041117D	150.00	
502289600	BLI-075-06N-03S-D-00	27041903	15.50	2024898673	2024761756	1041117D	150.00	
502289601	BLI-075-06N-03S-D-00	27041903	15.50	2024898673	2024761756	1041117D	150.00	
502289602	BLI-075-06N-03S-D-00	27041903	15.50	2024898673	2024761756	1041117D	150.00	
502289603	BLI-075-06N-03S-D-00	27041903	15.50	2024898673	2024761756	1041317A	150.00	
502289604	BLI-075-06N-03S-D-00	27041903	15.50	2024898673	2024761756	1041317A	150.00	
502289605	BLI-075-06N-03S-D-00	27041903	15.50	2024898685	2024761756	1041317A	150.00	
502289606	BLI-075-06N-03S-D-00	27041903	15.50	2024898685	2024761756	1041317A	150.00	
502289607	BLI-075-06N-03S-D-00	27041903	15.50	2024898685	2024761756	1041317A	150.00	
502289608	BLI-075-06N-03S-D-00	27041903	15.50	2024898685	2024761756	1041317A	150.00	
502289609	BLI-075-06N-03S-D-00	27041903	15.50	2024898685	2024761756	1041317A	150.00	
502289610	BLI-075-06N-03S-D-00	27041903	15.50	2024898685	2024761756	1041317A	150.00	
502289611	BLI-075-06N-03S-D-00	27041903	15.50	2024898685	2024761756	1041317A	150.00	



Roll Allocation List

Sales Order SO-081175
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS Lea County Landfill Cell 5

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length	
502289612	BLI-075-06N-03S-D-00	27041903	15.50	2024898685	2024761756	1041317A	150.00	Conformance
502289613	BLI-075-06N-03S-D-00	27041903	15.50	2024898685	2024761756	1041317A	150.00	
502289614	BLI-075-06N-03S-D-00	27041903	15.50	2024898685	2024761756	1041317A	150.00	
502289615	BLI-075-06N-03S-D-00	27041903	15.50	2024898685	2024761756	1041317A	150.00	
502289616	BLI-075-06N-03S-D-00	27041903	15.50	2024898685	2024759131	1041317A	150.00	
502289617	BLI-075-06N-03S-D-00	27041903	15.50	2024898685	2024759131	1041317A	150.00	
502289618	BLI-075-06N-03S-D-00	27041903	15.50	2024898685	2024759131	1041317A	150.00	
502289619	BLI-075-06N-03S-D-00	27041903	15.50	2024898677	2024759131	1041317A	150.00	
502289620	BLI-075-06N-03S-D-00	27041903	15.50	2024898677	2024759131	1041317A	150.00	
502289621	BLI-075-06N-03S-D-00	27041903	15.50	2024898677	2024759131	1041317A	150.00	
502289622	BLI-075-06N-03S-D-00	27041903	15.50	2024898677	2024759131	1041317A	150.00	
502289623	BLI-075-06N-03S-D-00	27041903	15.50	2024898677	2024759131	1041317A	150.00	
502289624	BLI-075-06N-03S-D-00	27041903	15.50	2024898677	2024759131	1041317A	150.00	
502289625	BLI-075-06N-03S-D-00	27041903	15.50	2024898677	2024759131	1041317A	150.00	
502289626	BLI-075-06N-03S-D-00	27041903	15.50	2024898677	2024759131	1041317A	150.00	
502289627	BLI-075-06N-03S-D-00	27041903	15.50	2024898677	2024759131	1041317A	150.00	
502289628	BLI-075-06N-03S-D-00	27041903	15.50	2024898677	2024759131	1041317A	150.00	
502289629	BLI-075-06N-03S-D-00	27041903	15.50	2024898677	2024759131	1041317A	150.00	
502289630	BLI-075-06N-03S-D-00	27041903	15.50	2024898677	2024759131	1041317A	150.00	
502289631	BLI-075-06N-03S-D-00	27041903	15.50	2024898677	2024759131	1041317A	150.00	
502289632	BLI-075-06N-03S-D-00	27041903	15.50	2024898690	2024759131	1041317B	150.00	
502289633	BLI-075-06N-03S-D-00	27041903	15.50	2024898690	2024759131	1041317B	150.00	
502289634	BLI-075-06N-03S-D-00	27041903	15.50	2024898690	2024834516	1041317B	150.00	
502289635	BLI-075-06N-03S-D-00	27041903	15.50	2024898690	2024834516	1041317B	150.00	
502289636	BLI-075-06N-03S-D-00	27041903	15.50	2024898690	2024834516	1041317B	150.00	
502289637	BLI-075-06N-03S-D-00	27041903	15.50	2024898690	2024834516	1041317B	150.00	Conformance
502289638	BLI-075-06N-03S-D-00	27041903	15.50	2024898690	2024834516	1041317B	150.00	
502289639	BLI-075-06N-03S-D-00	27041903	15.50	2024898690	2024834516	1041317B	150.00	
502289640	BLI-075-06N-03S-D-00	27041903	15.50	2024898690	2024834516	1041317B	150.00	
502289641	BLI-075-06N-03S-D-00	27041903	15.50	2024898690	2024834516	1041317B	150.00	
502289642	BLI-075-06N-03S-D-00	27041903	15.50	2024898690	2024834516	1041317B	150.00	
502289643	BLI-075-06N-03S-D-00	27041903	15.50	2024898690	2024834516	1041317B	150.00	
502289644	BLI-075-06N-03S-D-00	27041903	15.50	2024898690	2024834516	1041317B	150.00	
502289645	BLI-075-06N-03S-D-00	27042003	15.50	2024898693	2024834516	1041317B	150.00	
502289646	BLI-075-06N-03S-D-00	27042003	15.50	2024898693	2024834516	1041317B	150.00	
502289647	BLI-075-06N-03S-D-00	27042003	15.50	2024898693	2024834516	1041317B	150.00	
502289648	BLI-075-06N-03S-D-00	27042003	15.50	2024898693	2024834516	1041317B	150.00	
502289649	BLI-075-06N-03S-D-00	27042003	15.50	2024898693	2024834516	1041317B	150.00	
502289650	BLI-075-06N-03S-D-00	27042003	15.50	2024898693	2024834516	1041317B	150.00	
502289651	BLI-075-06N-03S-D-00	27042003	15.50	2024898693	2024834516	1041317B	150.00	
502289652	BLI-075-06N-03S-D-00	27042003	15.50	2024898693	2024834516	1041317B	150.00	
502289653	BLI-075-06N-03S-D-00	27042003	15.50	2024898693	2024834516	1041317B	150.00	



Roll Allocation List

Sales Order SO-081175
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS Lea County Landfill Cell 5

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length
502289654	BLI-075-06N-03S-D-00	27042003	15.50	2024898678	2024834516	1041317B	150.00
502289655	BLI-075-06N-03S-D-00	27042003	15.50	2024898678	2024834516	1041317B	150.00
502289656	BLI-075-06N-03S-D-00	27042003	15.50	2024898678	2024834516	1041317B	150.00
502289657	BLI-075-06N-03S-D-00	27042003	15.50	2024898678	2024834516	1041317B	150.00
502289658	BLI-075-06N-03S-D-00	27042003	15.50	2024898678	2024834516	1041317B	150.00
502289659	BLI-075-06N-03S-D-00	27042003	15.50	2024898678	2024834516	1041317C	150.00
502289660	BLI-075-06N-03S-D-00	27042003	15.50	2024898678	2024834516	1041317C	150.00
502289661	BLI-075-06N-03S-D-00	27042003	15.50	2024898678	2024834516	1041317C	150.00
502289662	BLI-075-06N-03S-D-00	27042003	15.50	2024898678	2024834516	1041317C	150.00
502289663	BLI-075-06N-03S-D-00	27042003	15.50	2024898678	2024834516	1041317C	150.00
502289664	BLI-075-06N-03S-D-00	27042003	15.50	2024898678	2024834516	1041317C	150.00
502289665	BLI-075-06N-03S-D-00	27042003	15.50	2024898678	2024834516	1041317C	150.00
502289666	BLI-075-06N-03S-D-00	27042003	15.50	2024898678	2024834516	1041317C	150.00
502289667	BLI-075-06N-03S-D-00	27042003	15.50	2024898687	2024844487	1041317C	150.00
502289668	BLI-075-06N-03S-D-00	27042003	15.50	2024898687	2024844487	1041317C	150.00
502289669	BLI-075-06N-03S-D-00	27042003	15.50	2024898687	2024844487	1041317C	150.00
502289670	BLI-075-06N-03S-D-00	27042003	15.50	2024898687	2024844487	1041317C	92.00
502289671	BLI-075-06N-03S-D-00	27042003	15.50	2024898687	2024844487	1041317C	150.00
502289672	BLI-075-06N-03S-D-00	27042003	15.50	2024898687	2024844487	1041317C	150.00
502289673	BLI-075-06N-03S-D-00	27042003	15.50	2024898687	2024844487	1041317C	150.00
502289674	BLI-075-06N-03S-D-00	27042003	15.50	2024898687	2024844487	1041317C	150.00
502289675	BLI-075-06N-03S-D-00	27042003	15.50	2024898687	2024844487	1041317C	150.00
502289676	BLI-075-06N-03S-D-00	27042003	15.50	2024898687	2024844487	1041317C	150.00
502289677	BLI-075-06N-03S-D-00	27042003	15.50	2024898687	2024844487	1041317C	150.00
502289678	BLI-075-06N-03S-D-00	27042003	15.50	2024898687	2024844487	1041317C	150.00
502289679	BLI-075-06N-03S-D-00	27042003	15.50	2024898687	2024844487	1041317C	150.00
502289680	BLI-075-06N-03S-D-00	27042003	15.50	2024898687	2024844487	1041317C	150.00
502289681	BLI-075-06N-03S-D-00	27042003	15.50	2024898676	2024844487	1041317C	150.00
502289682	BLI-075-06N-03S-D-00	27042003	15.50	2024898676	2024844487	1041317C	150.00
502289683	BLI-075-06N-03S-D-00	27042003	15.50	2024898676	2024844487	1041317C	150.00
502289684	BLI-075-06N-03S-D-00	27042003	15.50	2024898676	2024844487	1041317C	150.00
502289685	BLI-075-06N-03S-D-00	27042003	15.50	2024898676	2024844487	1041317C	150.00
502289686	BLI-075-06N-03S-D-00	27042003	15.50	2024898676	2024844487	1041317C	150.00
502289687	BLI-075-06N-03S-D-00	27042003	15.50	2024898676	2024844487	1041317D	150.00
502289688	BLI-075-06N-03S-D-00	27042003	15.50	2024898676	2024844487	1041317D	150.00
502289689	BLI-075-06N-03S-D-00	27042003	15.50	2024898676	2024844487	1041317D	150.00
502289690	BLI-075-06N-03S-D-00	27042003	15.50	2024898676	2024844487	1041317D	150.00
502289691	BLI-075-06N-03S-D-00	27042003	15.50	2024898676	2024844487	1041317D	150.00
502289692	BLI-075-06N-03S-D-00	27042003	15.50	2024898676	2024844487	1041317D	150.00
502289693	BLI-075-06N-03S-D-00	27042003	15.50	2024898676	2024844487	1041317D	150.00
502289694	BLI-075-06N-03S-D-00	27042003	15.50	2024898688	2024844487	1041317D	150.00
502289695	BLI-075-06N-03S-D-00	27042003	15.50	2024898688	2024844487	1041317D	150.00

Conformance



Roll Allocation List

Sales Order SO-081175
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS Lea County Landfill Cell 5

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length
502289696	BLI-075-06N-03S-D-00	27042003	15.50	2024898688	2024844487	1041317D	150.00
502289697	BLI-075-06N-03S-D-00	27042003	15.50	2024898688	2024844487	1041317D	150.00
502289698	BLI-075-06N-03S-D-00	27042003	15.50	2024898688	2024844487	1041317D	150.00
502289699	BLI-075-06N-03S-D-00	27042003	15.50	2024898688	2024844487	1041317D	150.00
502289700	BLI-075-06N-03S-D-00	27042003	15.50	2024898688	2024844487	1041317D	150.00
502289701	BLI-075-06N-03S-D-00	27042003	15.50	2024898688	2024776881	1041317D	86.00
502289702	BLI-075-06N-03S-D-00	27042003	15.50	2024898688	2024776881	1041317D	150.00
502289704	BLI-075-06N-03S-D-00	27042003	15.50	2024898688	2024776881	1041317D	150.00
502289705	BLI-075-06N-03S-D-00	27042003	15.50	2024898688	2024776881	1041317D	150.00
502289706	BLI-075-06N-03S-D-00	27042003	15.50	2024898688	2024776881	1041317D	150.00
502289707	BLI-075-06N-03S-D-00	27042003	15.50	2024898686	2024776881	1041317D	150.00
502289708	BLI-075-06N-03S-D-00	27042003	15.50	2024898686	2024776881	1041317D	150.00
502289709	BLI-075-06N-03S-D-00	27042003	15.50	2024898686	2024776881	1041317D	150.00
502289710	BLI-075-06N-03S-D-00	27042003	15.50	2024898686	2024776881	1041317D	150.00
502289711	BLI-075-06N-03S-D-00	27042003	15.50	2024898686	2024776881	1041317D	150.00
502289712	BLI-075-06N-03S-D-00	27042003	15.50	2024898686	2024776881	1041317D	150.00
502289713	BLI-075-06N-03S-D-00	27042003	15.50	2024898686	2024776881	1041317D	150.00
502289714	BLI-075-06N-03S-D-00	27042003	15.50	2024898686	2024776881	1041317D	150.00
502289715	BLI-075-06N-03S-D-00	27042003	15.50	2024898686	2024776881	1041317D	150.00
502289716	BLI-075-06N-03S-D-00	27042003	15.50	2024898686	2024776881	1041317D	150.00
502289717	BLI-075-06N-03S-D-00	27042003	15.50	2024898686	2024776881	1041717A	150.00
502289718	BLI-075-06N-03S-D-00	27042003	15.50	2024898686	2024776881	1041717A	150.00
502289719	BLI-075-06N-03S-D-00	27042003	15.50	2024898686	2024776881	1041717A	150.00
502289720	BLI-075-06N-03S-D-00	27042003	15.50	2024898686	2024776881	1041717A	150.00
502289721	BLI-075-06N-03S-D-00	27042003	15.50	2024898689	2024776881	1041717A	150.00
502289722	BLI-075-06N-03S-D-00	27042003	15.50	2024898689	2024776881	1041717A	150.00
502289723	BLI-075-06N-03S-D-00	27042003	15.50	2024898689	2024776881	1041717A	150.00
502289724	BLI-075-06N-03S-D-00	27042003	15.50	2024898689	2024776881	1041717A	150.00
502289725	BLI-075-06N-03S-D-00	27042003	15.50	2024898689	2024776881	1041717A	150.00
502289726	BLI-075-06N-03S-D-00	27042003	15.50	2024898689	2024776881	1041717A	150.00
502289727	BLI-075-06N-03S-D-00	27042003	15.50	2024898689	2024776881	1041717A	150.00
502289728	BLI-075-06N-03S-D-00	27042003	15.50	2024898689	2024776881	1041717A	150.00
502289729	BLI-075-06N-03S-D-00	27042003	15.50	2024898689	2024776881	1041717A	150.00
502289730	BLI-075-06N-03S-D-00	27042003	15.50	2024898689	2024776881	1041717A	150.00
502289731	BLI-075-06N-03S-D-00	27042003	15.50	2024898689	2024776881	1041717A	80.00
502289732	BLI-075-06N-03S-D-00	27042103	15.50	2024898689	2024776881	1041717A	150.00
502289733	BLI-075-06N-03S-D-00	27042103	15.50	2024898689	2024776881	1041717A	150.00
502289734	BLI-075-06N-03S-D-00	27042103	15.50	2024898689	2024776881	1041717A	150.00
502289736	BLI-075-06N-03S-D-00	27042103	15.50	2024898708	2024844488	1041717A	150.00
502289737	BLI-075-06N-03S-D-00	27042103	15.50	2024898708	2024844488	1041717A	150.00
502289738	BLI-075-06N-03S-D-00	27042103	15.50	2024898708	2024844488	1041717A	150.00
502289739	BLI-075-06N-03S-D-00	27042103	15.50	2024898708	2024844488	1041717A	150.00



Roll Allocation List

Sales Order SO-081175
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS Lea County Landfill Cell 5

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length	
502289740	BLI-075-06N-03S-D-00	27042103	15.50	2024898708	2024844488	3561463	150.00	Conformance
502289741	BLI-075-06N-03S-D-00	27042103	15.50	2024898708	2024844488	3561463	150.00	
502289742	BLI-075-06N-03S-D-00	27042103	15.50	2024898708	2024844488	3561463	150.00	
502289743	BLI-075-06N-03S-D-00	27042103	15.50	2024898708	2024844488	3561463	150.00	
502289744	BLI-075-06N-03S-D-00	27042103	15.50	2024898692	2024844488	3561463	150.00	
502289745	BLI-075-06N-03S-D-00	27042103	15.50	2024898692	2024844488	3561463	150.00	
502289746	BLI-075-06N-03S-D-00	27042103	15.50	2024898692	2024844488	3561463	150.00	
502289747	BLI-075-06N-03S-D-00	27042103	15.50	2024898692	2024844488	3561463	150.00	
502289748	BLI-075-06N-03S-D-00	27042103	15.50	2024898692	2024844488	3561463	150.00	
502289749	BLI-075-06N-03S-D-00	27042103	15.50	2024898692	2024844488	3561463	150.00	
502289750	BLI-075-06N-03S-D-00	27042103	15.50	2024898692	2024844488	3561463	150.00	
502289751	BLI-075-06N-03S-D-00	27042103	15.50	2024898692	2024844488	3561463	150.00	
502289752	BLI-075-06N-03S-D-00	27042103	15.50	2024898692	2024844488	3561463	150.00	
502289753	BLI-075-06N-03S-D-00	27042103	15.50	2024898738	2024844488	3561463	150.00	
502289754	BLI-075-06N-03S-D-00	27042103	15.50	2024898738	2024844488	3561463	150.00	
502289755	BLI-075-06N-03S-D-00	27042103	15.50	2024898738	2024844488	3561463	150.00	
502289756	BLI-075-06N-03S-D-00	27042103	15.50	2024898738	2024844488	3561463	150.00	
502289757	BLI-075-06N-03S-D-00	27042103	15.50	2024898738	2024844488	3561463	150.00	
502289758	BLI-075-06N-03S-D-00	27042103	15.50	2024898738	2024844488	3561463	150.00	
502289759	BLI-075-06N-03S-D-00	27042103	15.50	2024898738	2024844488	3561463	150.00	
502289760	BLI-075-06N-03S-D-00	27042103	15.50	2024898738	2024844488	3561463	150.00	
502289761	BLI-075-06N-03S-D-00	27042103	15.50	2024898738	2024844488	3561463	150.00	
502289762	BLI-075-06N-03S-D-00	27042103	15.50	2024898737	2024844488	3561463	150.00	
502289763	BLI-075-06N-03S-D-00	27042103	15.50	2024898737	2024844488	3561463	150.00	
502289764	BLI-075-06N-03S-D-00	27042103	15.50	2024898737	2024844488	3561463	150.00	
502289765	BLI-075-06N-03S-D-00	27042103	15.50	2024898737	2024844488	3561463	150.00	
502289766	BLI-075-06N-03S-D-00	27042103	15.50	2024898737	2024844488	3561463	150.00	
502289767	BLI-075-06N-03S-D-00	27042103	15.50	2024898737	2024844488	3561463	150.00	
502289768	BLI-075-06N-03S-D-00	27042103	15.50	2024898737	2024844488	3561463	150.00	
502289769	BLI-075-06N-03S-D-00	27042103	15.50	2024898737	2024844488	3561463	150.00	
502289770	BLI-075-06N-03S-D-00	27042103	15.50	2024898737	2024763624	3561463	150.00	
502289771	BLI-075-06N-03S-D-00	27042103	15.50	2024898712	2024763624	1041717A	150.00	
502289772	BLI-075-06N-03S-D-00	27042103	15.50	2024898712	2024763624	1041717A	150.00	
502289773	BLI-075-06N-03S-D-00	27042103	15.50	2024898712	2024763624	1041717A	150.00	
502289774	BLI-075-06N-03S-D-00	27042103	15.50	2024898712	2024763624	1041717A	150.00	
502289775	BLI-075-06N-03S-D-00	27042103	15.50	2024898712	2024763624	1041717A	150.00	
502289776	BLI-075-06N-03S-D-00	27042103	15.50	2024898712	2024763624	1041717A	150.00	
502289777	BLI-075-06N-03S-D-00	27042103	15.50	2024898712	2024763624	1041717B	150.00	
502289778	BLI-075-06N-03S-D-00	27042103	15.50	2024898712	2024763624	1041717B	150.00	
502289779	BLI-075-06N-03S-D-00	27042103	15.50	2024898712	2024763624	1041717B	150.00	
502289780	BLI-075-06N-03S-D-00	27042103	15.50	2024898498	2024763624	1041717B	150.00	
502289781	BLI-075-06N-03S-D-00	27042103	15.50	2024898498	2024763624	1041717B	150.00	



Roll Allocation List

Sales Order SO-081175
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS Lea County Landfill Cell 5

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length	
502289782	BLI-075-06N-03S-D-00	27042103	15.50	2024898498	2024763624	1041717B	150.00	Conformance
502289783	BLI-075-06N-03S-D-00	27042103	15.50	2024898498	2024763624	1041717B	150.00	
502289784	BLI-075-06N-03S-D-00	27042103	15.50	2024898498	2024763624	1041717B	150.00	
502289785	BLI-075-06N-03S-D-00	27042103	15.50	2024898498	2024763624	1041717B	150.00	
502289786	BLI-075-06N-03S-D-00	27042103	15.50	2024898498	2024763624	1041717B	150.00	
502289787	BLI-075-06N-03S-D-00	27042103	15.50	2024898498	2024763624	1041717B	150.00	
502289788	BLI-075-06N-03S-D-00	27042103	15.50	2024898498	2024763624	1041717B	150.00	
502289789	BLI-075-06N-03S-D-00	27042103	15.50	2024898700	2024763624	1041717B	150.00	
502289790	BLI-075-06N-03S-D-00	27042103	15.50	2024898700	2024763624	1041717B	150.00	
502289791	BLI-075-06N-03S-D-00	27042103	15.50	2024898700	2024763624	1041717B	150.00	
502289792	BLI-075-06N-03S-D-00	27042103	15.50	2024898700	2024763624	1041717B	150.00	
502289793	BLI-075-06N-03S-D-00	27042103	15.50	2024898700	2024763624	1041717B	150.00	
502289794	BLI-075-06N-03S-D-00	27042103	15.50	2024898700	2024763624	1041717B	150.00	
502289795	BLI-075-06N-03S-D-00	27042103	15.50	2024898700	2024763624	1041717B	150.00	
502289796	BLI-075-06N-03S-D-00	27042103	15.50	2024898700	2024763624	1041717B	150.00	
502289797	BLI-075-06N-03S-D-00	27042103	15.50	2024898700	2024763624	1041717B	150.00	
502289798	BLI-075-06N-03S-D-00	27042103	15.50	2024898722	2024763624	1041717B	150.00	
502289799	BLI-075-06N-03S-D-00	27042103	15.50	2024898722	2024763624	1041717B	150.00	
502289800	BLI-075-06N-03S-D-00	27042103	15.50	2024898722	2024763624	1041717B	150.00	
502289801	BLI-075-06N-03S-D-00	27042103	15.50	2024898722	2024763624	1041717B	150.00	
502289802	BLI-075-06N-03S-D-00	27042103	15.50	2024898722	2024763624	1041717B	150.00	
502289803	BLI-075-06N-03S-D-00	27042103	15.50	2024898722	2024763624	1041717B	150.00	Conformance
502289804	BLI-075-06N-03S-D-00	27042103	15.50	2024898722	2024842349	1041717B	150.00	
502289805	BLI-075-06N-03S-D-00	27042103	15.50	2024898722	2024842349	1041717B	150.00	
502289806	BLI-075-06N-03S-D-00	27042103	15.50	2024898722	2024842349	1041717C	150.00	
502289807	BLI-075-06N-03S-D-00	27042103	15.50	2024898705	2024842349	1041717C	150.00	
502289808	BLI-075-06N-03S-D-00	27042103	15.50	2024898705	2024842349	1041717C	150.00	
502289809	BLI-075-06N-03S-D-00	27042103	15.50	2024898705	2024842349	1041717C	150.00	
502289810	BLI-075-06N-03S-D-00	27042103	15.50	2024898705	2024842349	1041717C	150.00	
502289811	BLI-075-06N-03S-D-00	27042103	15.50	2024898705	2024842349	1041717C	150.00	
502289812	BLI-075-06N-03S-D-00	27042103	15.50	2024898705	2024842349	1041717C	150.00	
502289813	BLI-075-06N-03S-D-00	27042103	15.50	2024898705	2024842349	1041717C	150.00	
502289814	BLI-075-06N-03S-D-00	27042103	15.50	2024898705	2024842349	1041717C	150.00	
502289815	BLI-075-06N-03S-D-00	27042103	15.50	2024898705	2024842349	1041717C	150.00	
502289816	BLI-075-06N-03S-D-00	27042103	15.50	2024886805	2024842349	1041717C	150.00	
502289817	BLI-075-06N-03S-D-00	27042103	15.50	2024886805	2024842349	1041717C	150.00	
502289818	BLI-075-06N-03S-D-00	27042103	15.50	2024886805	2024842349	1041717C	150.00	
502289819	BLI-075-06N-03S-D-00	27042203	15.50	2024886805	2024842349	1041717C	150.00	
502289820	BLI-075-06N-03S-D-00	27042203	15.50	2024886805	2024842349	1041717C	150.00	
502289821	BLI-075-06N-03S-D-00	27042203	15.50	2024886805	2024842349	1041717C	150.00	
502289822	BLI-075-06N-03S-D-00	27042203	15.50	2024886805	2024842349	1041717C	150.00	
502289823	BLI-075-06N-03S-D-00	27042203	15.50	2024886805	2024842349	1041717C	150.00	



Roll Allocation List

Sales Order SO-081175
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS Lea County Landfill Cell 5

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length
502289824	BLI-075-06N-03S-D-00	27042203	15.50	2024886805	2024842349	1041717C	150.00
502289825	BLI-075-06N-03S-D-00	27042203	15.50	2024886788	2024842349	1041717C	150.00
502289826	BLI-075-06N-03S-D-00	27042203	15.50	2024886788	2024842349	1041717C	174.00
502289827	BLI-075-06N-03S-D-00	27042203	15.50	2024886788	2024842349	1041717C	150.00
502289828	BLI-075-06N-03S-D-00	27042203	15.50	2024886788	2024842349	1041717C	150.00

ROLL TEST DATA REPORT



Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-081175	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-00	

Roll Number	ASTM D4632 Grab Strength (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6708 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)
502289559	155	38	50.7	7.4	0.92	33.5	9.2	12.8
502289560	162	32	55.4	6.3	0.83	33.5	9.2	12.8
502289561	162	32	55.4	6.3	0.83	33.5	9.2	12.8
502289562	162	32	55.4	6.3	0.83	33.5	9.2	12.8
502289563	162	32	55.4	6.3	0.83	33.5	9.2	12.8
502289564	162	32	55.4	6.3	0.83	33.5	9.2	12.8
502289565	162	32	55.4	6.3	0.83	33.5	9.2	12.8
502289566	162	32	55.4	6.3	0.83	33.5	9.2	12.8
502289567	162	32	55.4	6.3	0.83	33.5	9.2	12.8
502289568	155	38	50.7	7.4	0.92	33.5	9.2	12.8
502289569	155	38	50.7	7.4	0.92	33.5	9.2	12.8
502289570	155	38	50.7	7.4	0.92	33.5	9.2	12.8
502289571	155	38	50.7	7.4	0.92	33.5	9.2	12.8
502289572	155	38	50.7	7.4	0.92	33.5	9.2	12.8
502289573	155	38	50.7	7.4	0.92	33.5	9.2	12.8
502289574	155	38	50.7	7.4	0.92	33.5	9.2	12.8
502289575	155	38	50.7	7.4	0.92	33.5	8.8	13.6
502289576	155	38	50.7	7.4	0.92	33.5	8.8	13.6
502289577	155	38	50.7	7.4	0.92	33.5	8.8	13.6
502289578	155	38	50.7	7.4	0.92	33.5	8.8	13.6
502289579	155	38	50.7	7.4	0.92	33.5	8.8	13.6
502289580	155	38	50.7	7.4	0.92	33.5	8.8	13.6
502289592	187	37	56.3	7.4	0.82	33.5	8.8	13.6
502289593	187	37	56.3	7.4	0.82	33.5	8.8	13.6
502289594	187	37	56.3	7.4	0.82	33.5	8.8	13.6
502289595	187	37	56.3	7.4	0.82	33.5	8.8	13.6
502289596	187	37	56.3	7.4	0.82	33.5	8.8	13.6
502289597	187	37	56.3	7.4	0.82	33.5	8.8	13.6
502289598	179	29	57.8	5.4	0.86	33.5	8.8	13.6
502289599	179	29	57.8	5.4	0.86	33.5	8.8	13.6
502289600	179	29	57.8	5.4	0.86	33.5	8.8	13.6
502289601	179	29	57.8	5.4	0.86	33.5	8.8	13.6
502289602	179	29	57.8	5.4	0.86	33.5	8.8	13.6
502289603	179	29	57.8	5.4	0.86	32.0	9.3	13.4

ROLL TEST DATA REPORT



Report Date: Apr/24/2017

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-081175	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-00	

Roll Number	ASTM D4632 Grab Strength (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6708 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)
502289604	179	29	57.8	5.4	0.86	32.0	9.3	13.4
502289605	179	29	57.8	5.4	0.86	32.0	9.3	13.4
502289606	179	29	57.8	5.4	0.86	32.0	9.3	13.4
502289607	179	29	57.8	5.4	0.86	32.0	9.3	13.4
502289608	179	29	57.8	5.4	0.86	32.0	9.3	13.4
502289609	179	29	57.8	5.4	0.86	32.0	9.3	13.4
502289610	179	29	57.8	5.4	0.86	32.0	9.3	13.4
502289611	179	29	57.8	5.4	0.86	32.0	9.3	13.4
502289612	179	29	57.8	5.4	0.86	32.0	9.3	13.4
502289613	179	29	57.8	5.4	0.86	32.0	9.3	13.4
502289614	177	30	59.0	6.2	0.79	32.0	9.3	13.4
502289615	177	42	50.2	8.1	0.83	32.0	9.3	13.4
502289616	177	42	50.2	8.1	0.83	32.0	9.3	13.4
502289617	177	42	50.2	8.1	0.83	32.0	9.3	13.4
502289618	177	42	50.2	8.1	0.83	32.0	9.3	13.4
502289619	177	42	50.2	8.1	0.83	32.0	9.3	13.4
502289620	177	42	50.2	8.1	0.83	32.0	9.3	13.4
502289621	177	42	50.2	8.1	0.83	32.0	9.3	13.4
502289622	177	42	50.2	8.1	0.83	32.0	9.3	13.4
502289623	177	42	50.2	8.1	0.83	32.0	9.3	13.4
502289624	177	42	50.2	8.1	0.83	32.0	9.3	13.4
502289625	177	42	50.2	8.1	0.83	32.0	9.3	13.4
502289626	177	42	50.2	8.1	0.83	32.0	9.3	13.4
502289627	177	42	50.2	8.1	0.83	32.0	9.3	13.4
502289628	177	42	50.2	8.1	0.83	32.0	9.3	13.4
502289629	177	42	50.2	8.1	0.83	32.0	9.3	13.4
502289630	177	42	50.2	8.1	0.83	32.0	9.3	13.4
502289631	177	39	43.6	7.9	0.80	32.0	9.3	13.4
502289632	177	39	43.6	7.9	0.80	32.0	9.3	13.6
502289633	177	39	43.6	7.9	0.80	32.0	9.3	13.6
502289634	177	39	43.6	7.9	0.80	32.0	9.3	13.6
502289635	177	39	43.6	7.9	0.80	32.0	9.3	13.6
502289636	177	39	43.6	7.9	0.80	32.0	9.3	13.6
502289637	177	39	43.6	7.9	0.80	32.0	9.3	13.6

ROLL TEST DATA REPORT



Report Date: Apr/24/2017

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-081175	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-00	

Roll Number	ASTM D4632 Grab Strength (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)
502289638	177	39	43.6	7.9	0.80	32.0	9.3	13.6
502289639	177	39	43.6	7.9	0.80	32.0	9.3	13.6
502289640	177	39	43.6	7.9	0.80	32.0	9.3	13.6
502289641	177	39	43.6	7.9	0.80	32.0	9.3	13.6
502289642	177	39	43.6	7.9	0.80	32.0	9.3	13.6
502289643	177	39	43.6	7.9	0.80	32.0	9.3	13.6
502289644	177	39	43.6	7.9	0.80	32.0	9.3	13.6
502289645	177	39	43.6	7.9	0.80	32.0	9.3	13.6
502289646	177	39	43.6	7.9	0.80	32.0	9.3	13.6
502289647	169	31	56.8	6.3	0.82	32.0	9.3	13.6
502289648	169	31	56.8	6.3	0.82	32.0	9.3	13.6
502289649	169	31	56.8	6.3	0.82	32.0	9.3	13.6
502289650	169	31	56.8	6.3	0.82	32.0	9.3	13.6
502289651	169	31	56.8	6.3	0.82	32.0	9.3	13.6
502289652	169	31	56.8	6.3	0.82	32.0	9.3	13.6
502289653	169	31	56.8	6.3	0.82	32.0	9.3	13.6
502289654	169	31	56.8	6.3	0.82	32.0	9.3	13.6
502289655	169	31	56.8	6.3	0.82	32.0	9.3	13.6
502289656	169	31	56.8	6.3	0.82	32.0	9.3	13.6
502289657	169	31	56.8	6.3	0.82	32.0	9.3	13.6
502289658	169	31	56.8	6.3	0.82	32.0	9.3	13.6
502289659	169	31	56.8	6.3	0.82	32.5	9.5	13.2
502289660	169	31	56.8	6.3	0.82	32.5	9.5	13.2
502289661	169	31	56.8	6.3	0.82	32.5	9.5	13.2
502289662	169	31	56.8	6.3	0.82	32.5	9.5	13.2
502289663	127	51	42.4	8.9	0.81	32.5	9.5	13.2
502289664	127	51	42.4	8.9	0.81	32.5	9.5	13.2
502289665	127	51	42.4	8.9	0.81	32.5	9.5	13.2
502289666	127	51	42.4	8.9	0.81	32.5	9.5	13.2
502289667	127	51	42.4	8.9	0.81	32.5	9.5	13.2
502289668	127	51	42.4	8.9	0.81	32.5	9.5	13.2
502289669	127	51	42.4	8.9	0.81	32.5	9.5	13.2
502289670	127	51	42.4	8.9	0.81	32.5	9.5	13.2
502289671	127	51	42.4	8.9	0.81	32.5	9.5	13.2

ROLL TEST DATA REPORT



Report Date: Apr/24/2017

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-081175	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-00	

Roll Number	ASTM D4632 Grab Strength (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)
502289672	127	51	42.4	8.9	0.81	32.5	9.5	13.2
502289673	127	51	42.4	8.9	0.81	32.5	9.5	13.2
502289674	127	51	42.4	8.9	0.81	32.5	9.5	13.2
502289675	127	51	42.4	8.9	0.81	32.5	9.5	13.2
502289676	127	51	42.4	8.9	0.81	32.5	9.5	13.2
502289677	127	51	42.4	8.9	0.81	32.5	9.5	13.2
502289678	127	51	42.4	8.9	0.81	32.5	9.5	13.2
502289679	159	49	45.2	9.3	0.83	32.5	9.5	13.2
502289680	159	49	45.2	9.3	0.83	32.5	9.5	13.2
502289681	159	49	45.2	9.3	0.83	32.5	9.5	13.2
502289682	159	49	45.2	9.3	0.83	32.5	9.5	13.2
502289683	159	49	45.2	9.3	0.83	32.5	9.5	13.2
502289684	159	49	45.2	9.3	0.83	32.5	9.5	13.2
502289685	159	49	45.2	9.3	0.83	32.5	9.5	13.2
502289686	159	49	45.2	9.3	0.83	32.5	9.5	13.2
502289687	159	49	45.2	9.3	0.83	33.0	9.1	12.6
502289688	159	49	45.2	9.3	0.83	33.0	9.1	12.6
502289689	159	49	45.2	9.3	0.83	33.0	9.1	12.6
502289690	159	49	45.2	9.3	0.83	33.0	9.1	12.6
502289691	159	49	45.2	9.3	0.83	33.0	9.1	12.6
502289692	159	49	45.2	9.3	0.83	33.0	9.1	12.6
502289693	159	49	45.2	9.3	0.83	33.0	9.1	12.6
502289694	159	49	45.2	9.3	0.83	33.0	9.1	12.6
502289695	238	41	42.1	8.3	0.85	33.0	9.1	12.6
502289696	238	41	42.1	8.3	0.85	33.0	9.1	12.6
502289697	238	41	42.1	8.3	0.85	33.0	9.1	12.6
502289698	238	41	42.1	8.3	0.85	33.0	9.1	12.6
502289699	238	41	42.1	8.3	0.85	33.0	9.1	12.6
502289700	238	41	42.1	8.3	0.85	33.0	9.1	12.6
502289701	238	41	42.1	8.3	0.85	33.0	9.1	12.6
502289702	238	41	42.1	8.3	0.85	33.0	9.1	12.6
502289704	238	41	42.1	8.3	0.85	33.0	9.1	12.6
502289705	238	41	42.1	8.3	0.85	33.0	9.1	12.6
502289706	238	41	42.1	8.3	0.85	33.0	9.1	12.6

ROLL TEST DATA REPORT



Report Date: Apr/24/2017

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-081175	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-00	

Roll Number	ASTM D4632 Grab Strength (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)
502289707	238	41	42.1	8.3	0.85	33.0	9.1	12.6
502289708	238	41	42.1	8.3	0.85	33.0	9.1	12.6
502289709	238	41	42.1	8.3	0.85	33.0	9.1	12.6
502289710	238	41	42.1	8.3	0.85	33.0	9.1	12.6
502289711	238	41	42.1	8.3	0.85	33.0	9.1	12.6
502289712	177	43	41.3	8.1	0.78	33.0	9.1	12.6
502289713	177	43	41.3	8.1	0.78	33.0	9.1	12.6
502289714	177	43	41.3	8.1	0.78	33.0	9.1	12.6
502289715	177	43	41.3	8.1	0.78	33.0	9.1	12.6
502289716	177	43	41.3	8.1	0.78	33.0	9.1	12.6
502289717	177	43	41.3	8.1	0.78	32.0	9.3	13.4
502289718	177	43	41.3	8.1	0.78	32.0	9.3	13.4
502289719	177	43	41.3	8.1	0.78	32.0	9.3	13.4
502289720	177	43	41.3	8.1	0.78	32.0	9.3	13.4
502289721	177	43	41.3	8.1	0.78	32.0	9.3	13.4
502289722	177	43	41.3	8.1	0.78	32.0	9.3	13.4
502289723	177	43	41.3	8.1	0.78	32.0	9.3	13.4
502289724	177	43	41.3	8.1	0.78	32.0	9.3	13.4
502289725	170	43	43.8	8.3	0.86	32.0	9.3	13.4
502289726	170	43	43.8	8.3	0.86	32.0	9.3	13.4
502289727	170	43	43.8	8.3	0.86	32.0	9.3	13.4
502289728	170	43	43.8	8.3	0.86	32.0	9.3	13.4
502289729	170	43	43.8	8.3	0.86	32.0	9.3	13.4
502289730	170	43	43.8	8.3	0.86	32.0	9.3	13.4
502289731	170	43	43.8	8.3	0.86	32.0	9.3	13.4
502289732	170	43	43.8	8.3	0.86	32.0	9.3	13.4
502289733	170	43	43.8	8.3	0.86	32.0	9.3	13.4
502289734	170	43	43.8	8.3	0.86	32.0	9.3	13.4
502289736	170	43	43.8	8.3	0.86	32.0	9.3	13.4
502289737	170	43	43.8	8.3	0.86	32.0	9.3	13.4
502289738	170	43	43.8	8.3	0.86	32.0	9.3	13.4
502289739	170	43	43.8	8.3	0.86	32.0	9.3	13.4
502289740	170	43	43.8	8.3	0.86	36.5	10.1	10.6
502289741	170	43	43.8	8.3	0.86	36.5	10.1	10.6

ROLL TEST DATA REPORT



Report Date: Apr/24/2017

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-081175	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-00	

Roll Number	ASTM D4632 Grab Strength (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)
502289742	180	33	45.9	6.4	0.78	36.5	10.1	10.6
502289743	180	33	45.9	6.4	0.78	36.5	10.1	10.6
502289744	180	33	45.9	6.4	0.78	36.5	10.1	10.6
502289745	180	33	45.9	6.4	0.78	36.5	10.1	10.6
502289746	180	33	45.9	6.4	0.78	36.5	10.1	10.6
502289747	180	33	45.9	6.4	0.78	36.5	10.1	10.6
502289748	180	33	45.9	6.4	0.78	36.5	10.1	10.6
502289749	180	33	45.9	6.4	0.78	36.5	10.1	10.6
502289750	180	33	45.9	6.4	0.78	36.5	10.1	10.6
502289751	180	33	45.9	6.4	0.78	36.5	10.1	10.6
502289752	180	33	45.9	6.4	0.78	36.5	10.1	10.6
502289753	180	33	45.9	6.4	0.78	36.5	10.1	10.6
502289754	180	33	45.9	6.4	0.78	36.5	10.1	10.6
502289755	180	33	45.9	6.4	0.78	36.5	10.1	10.6
502289756	180	33	45.9	6.4	0.78	36.5	10.1	10.6
502289757	180	33	45.9	6.4	0.78	36.5	10.1	10.6
502289758	195	34	46.8	7.0	0.83	36.5	10.1	10.6
502289759	195	34	46.8	7.0	0.83	36.5	10.1	10.6
502289760	195	34	46.8	7.0	0.83	36.5	10.1	10.6
502289761	195	34	46.8	7.0	0.83	36.5	10.1	10.6
502289762	195	34	46.8	7.0	0.83	36.5	10.1	10.6
502289763	195	34	46.8	7.0	0.83	36.5	10.1	10.6
502289764	195	34	46.8	7.0	0.83	36.5	10.1	10.6
502289765	195	34	46.8	7.0	0.83	36.5	10.1	10.6
502289766	195	34	46.8	7.0	0.83	36.5	10.1	10.6
502289767	195	34	46.8	7.0	0.83	36.5	10.1	10.6
502289768	195	34	46.8	7.0	0.83	36.5	10.1	10.6
502289769	195	34	46.8	7.0	0.83	36.5	10.1	10.6
502289770	195	34	46.8	7.0	0.83	36.5	10.1	10.6
502289771	195	34	46.8	7.0	0.83	32.0	9.3	13.4
502289772	195	34	46.8	7.0	0.83	32.0	9.3	13.4
502289773	195	34	46.8	7.0	0.83	32.0	9.3	13.4
502289774	172	44	38.5	7.3	0.78	32.0	9.3	13.4
502289775	172	44	38.5	7.3	0.78	32.0	9.3	13.4

ROLL TEST DATA REPORT



Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-081175	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-00	

Roll Number	ASTM D4632 Grab Strength (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6708 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)
502289776	172	44	38.5	7.3	0.78	32.0	9.3	13.4
502289777	172	44	38.5	8.3	0.78	30.0	10.7	13.4
502289778	172	44	38.5	8.3	0.78	30.0	10.7	13.4
502289779	172	44	38.5	8.3	0.78	30.0	10.7	13.4
502289780	172	44	38.5	8.3	0.78	30.0	10.7	13.4
502289781	172	44	38.5	8.3	0.78	30.0	10.7	13.4
502289782	172	44	38.5	8.3	0.78	30.0	10.7	13.4
502289783	172	44	38.5	8.3	0.78	30.0	10.7	13.4
502289784	172	44	38.5	8.3	0.78	30.0	10.7	13.4
502289785	172	44	38.5	8.3	0.78	30.0	10.7	13.4
502289786	172	44	38.5	8.3	0.78	30.0	10.7	13.4
502289787	172	44	38.5	8.3	0.78	30.0	10.7	13.4
502289788	172	44	38.5	8.3	0.78	30.0	10.7	13.4
502289789	172	44	38.5	8.3	0.78	30.0	10.7	13.4
502289790	181	46	52.7	9.7	0.84	30.0	10.7	13.4
502289791	181	46	52.7	9.7	0.84	30.0	10.7	13.4
502289792	181	46	52.7	9.7	0.84	30.0	10.7	13.4
502289793	181	46	52.7	9.7	0.84	30.0	10.7	13.4
502289794	181	46	52.7	9.7	0.84	30.0	10.7	13.4
502289795	181	46	52.7	9.7	0.84	30.0	10.7	13.4
502289796	181	46	52.7	9.7	0.84	30.0	10.7	13.4
502289797	181	46	52.7	9.7	0.84	30.0	10.7	13.4
502289798	181	46	52.7	9.7	0.84	30.0	10.7	13.4
502289799	181	46	52.7	9.7	0.84	30.0	10.7	13.4
502289800	181	46	52.7	9.7	0.84	30.0	10.7	13.4
502289801	181	46	52.7	9.7	0.84	30.0	10.7	13.4
502289802	181	46	52.7	9.7	0.84	30.0	10.7	13.4
502289803	181	46	52.7	9.7	0.84	30.0	10.7	13.4
502289804	181	46	52.7	9.7	0.84	30.0	10.7	13.4
502289805	181	46	52.7	9.7	0.84	30.0	10.7	13.4
502289806	140	37	43.6	7.5	0.92	29.5	9.8	13.2
502289807	140	37	43.6	7.5	0.92	29.5	9.8	13.2
502289808	140	37	43.6	7.5	0.92	29.5	9.8	13.2
502289809	140	37	43.6	7.5	0.92	29.5	9.8	13.2



ROLL TEST DATA REPORT



Report Date: Apr/24/2017

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-081175	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-00	

Roll Number	ASTM D4632 Grab Strength (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6708 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)
502289810	140	37	43.6	7.5	0.92	29.5	9.8	13.2
502289811	140	37	43.6	7.5	0.92	29.5	9.8	13.2
502289812	140	37	43.6	7.5	0.92	29.5	9.8	13.2
502289813	140	37	43.6	7.5	0.92	29.5	9.8	13.2
502289814	140	37	43.6	7.5	0.92	29.5	9.8	13.2
502289815	140	37	43.6	7.5	0.92	29.5	9.8	13.2
502289816	140	37	43.6	7.5	0.92	29.5	9.8	13.2
502289817	140	37	43.6	7.5	0.92	29.5	9.8	13.2
502289818	140	37	43.6	7.5	0.92	29.5	9.8	13.2
502289819	140	37	43.6	7.5	0.92	29.5	9.8	13.2
502289820	140	37	43.6	7.5	0.92	29.5	9.8	13.2
502289821	140	37	43.6	7.5	0.92	29.5	9.8	13.2
502289822	171	51	42.1	10.4	0.84	29.5	9.8	13.2
502289823	171	51	42.1	10.4	0.84	29.5	9.8	13.2
502289824	171	51	42.1	10.4	0.84	29.5	9.8	13.2
502289825	171	51	42.1	10.4	0.84	29.5	9.8	13.2
502289826	171	51	42.1	10.4	0.84	29.5	9.8	13.2
502289827	171	51	42.1	10.4	0.84	29.5	9.8	13.2
502289828	171	51	42.1	10.4	0.84	29.5	9.8	13.2

Laboratory Manager



GSE Environmental, LLC

ROLL TEST DATA REPORT



Report Date:

24-Apr-2017

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-081175	Southwest Liner Systems, Inc.	Eunice NM US	BLI-GEO-NW-0605	

Roll Number	Mass per Unit Area ASTM D5261 (oz/yd ²)
2024886788	7.45
2024886796	7.80
2024886805	7.64
2024897808	7.78
2024898498	7.27
2024898673	7.67
2024898675	7.45
2024898676	7.45
2024898677	7.45
2024898678	7.15
2024898679	7.15
2024898685	7.83
2024898686	7.52
2024898687	7.52
2024898688	7.52
2024898689	7.52
2024898690	7.67
2024898692	7.67
2024898693	7.67
2024898700	7.76
2024898705	7.63
2024898708	7.52
2024898712	7.33
2024898722	7.84
2024898737	7.92
2024898738	7.94

Laboratory Manager

Mauricio Ossa



ROLL TEST DATA REPORT



Report Date: 24-Apr-2017

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-081175	Southwest Liner Systems, Inc.	Eunice NM US	BLI-GEO-WS-030	

Roll Number	Mass per Unit Area ASTM D5261 (oz/yd ²)
2024759131	3.47
2024761756	3.51
2024763624	3.60
2024776881	3.47
2024786874	3.23
2024834516	3.33
2024842349	3.25
2024844487	3.24
2024844488	3.24

Laboratory Manager

Mauricio Ossa

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2017

PRODUCT : NATIONAL® 30

SHIPPED FROM: **BENTONITE PERFORMANCE MINERALS LLC**
554 US HWY 212
COLONY PLANT
BELLE FOURCHE, S.D. 57717

BOL #	LOAD DATE	LOT CODE	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC MEQ 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN		% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN	
B0003554244	04-12-17	1041117C	8.5	0.34	1.90	13.2	116	32	1025	APRIL No. of CARS 17	M AVG STD DEV	8.80 0.68	0.35 0.32	3.09 1.19	13.53 0.48	116.47 1.88	31.06 1.66	988.71 27.07
										YTD No. of CARS 147	M AVG STD DEV	8.83 0.70	0.34 0.57	3.34 1.80	14.00 0.85	115.93 4.15	31.14 1.67	993.87 60.00

SOLD TO: **GSE CLAY LINING TECHNOLOGY, Co.**
3150 FIRST AVENUE
SPEARFISH, SD 57783

Attn: **Bob Stadler (rstadler@gseworld.com)**
Chuck Taylor (ctaylor@gseworld.com)
Cheryl Hofer (chofer@gseworld.com)
(ezimmel@gseworld.com)

SHIPPED TO: **GSE CLAY LINING TECHNOLOGY, Co.**
3150 FIRST AVENUE
SPEARFISH, SD 57783

CC: Thomas Anderson
Jason Tawse

Q.A. SUPERVISOR
Don Staley/BPM
04/12/17

Prepared by: **BAM**

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2017

PRODUCT : NATIONAL® 30

SHIPPED FROM: **BENTONITE PERFORMANCE MINERALS LLC**
554 US HWY 212
COLONY PLANT
BELLE FOURCHE, S.D. 57717

BOL #	LOAD DATE	LOT CODE	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC MEQ 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN	APRIL No. of CARS 2	M AVG STD DEV	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN
B0003554245	04-13-17	1041117D	8.0	0.10	4.74	13.0	116	31	1004			8.25	0.13	5.14	13.20	117.00	30.50	995.50
B0003554246	04-13-17	1041317A	8.5	0.15	5.54	13.4	118	30	987			0.25	0.03	0.40	0.20	1.00	0.50	8.50
YTD No. of CARS 2											M AVG STD DEV	8.25 0.25	0.13 0.03	5.14 0.40	13.20 0.20	117.00 1.00	30.50 0.50	995.50 8.50

SOLD TO: **GSE CLAY LINING TECHNOLOGY, Co.**
3150 FIRST AVENUE
SPEARFISH, SD 57783

Attn: **Bob Stadler (rstadler@gseworld.com)**
Chuck Taylor (ctaylor@gseworld.com)
Cheryl Hofer (chofer@gseworld.com)
(ezimmel@gseworld.com)

SHIPPED TO: **GSE CLAY LINING TECHNOLOGY, Co.**
3150 FIRST AVENUE
SPEARFISH, SD 57783

CC: Thomas Anderson
Jason Tawse

Q.A. SUPERVISOR
Don Staley/BPM
04/24/17

Prepared by: **BAM**

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2017

PRODUCT : NATIONAL® 30

SHIPPED FROM: **BENTONITE PERFORMANCE MINERALS LLC**
554 US HWY 212
COLONY PLANT
BELLE FOURCHE, S.D. 57717

BOL #	LOAD DATE	LOT CODE	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC MEQ 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN			% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN
B0003554247	04-14-17	1041317B	8.3	0.13	2.35	13.4	118	31	969	APRIL No. of CARS 20	M AVG STD DEV	8.72 0.66	0.31 0.31	3.26 1.28	13.49 0.46	116.60 1.80	31.00 1.55	988.40 25.57
										YTD No. of CARS 150	M AVG STD DEV	8.82 0.70	0.34 0.57	3.36 1.80	13.98 0.85	115.96 4.12	31.13 1.66	993.73 59.46

SOLD TO: **GSE CLAY LINING TECHNOLOGY, Co.**
3150 FIRST AVENUE
SPEARFISH, SD 57783

Attn: **Bob Stadler (rstadler@gseworld.com)**
Chuck Taylor (ctaylor@gseworld.com)
Cheryl Hofer (chofer@gseworld.com)
(ezimmel@gseworld.com)

SHIPPED TO: **GSE CLAY LINING TECHNOLOGY, Co.**
3150 FIRST AVENUE
SPEARFISH, SD 57783

CC: Thomas Anderson
Jason Tawse

Q.A. SUPERVISOR
Don Staley/BPM
04/14/17

Prepared by: **BAM**

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2017

PRODUCT : NATIONAL® 30

SHIPPED FROM: **BENTONITE PERFORMANCE MINERALS LLC**
554 US HWY 212
COLONY PLANT
BELLE FOURCHE, S.D. 57717

BOL #	LOAD DATE	LOT CODE	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC MEQ 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN			% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN
B0003554248	04-14-17	1041317C	8.8	0.25	2.50	13.6	118	29	1065	APRIL								
B0003554249	04-14-17	1041317D	8.4	0.23	4.13	14.2	120	30	1096	No. of CARS	M AVG	8.72	0.31	3.26	13.49	116.60	31.00	988.40
										20	STD DEV	0.66	0.31	1.28	0.46	1.80	1.55	25.57
										YTD								
										No. of CARS	M AVG	8.82	0.34	3.36	13.98	115.96	31.13	993.73
										150	STD DEV	0.70	0.57	1.80	0.85	4.12	1.66	59.46

SOLD TO: **GSE CLAY LINING TECHNOLOGY, Co.**
3150 FIRST AVENUE
SPEARFISH, SD 57783

Attn: **Bob Stadler (rstadler@gseworld.com)**
Chuck Taylor (ctaylor@gseworld.com)
Cheryl Hofer (chofer@gseworld.com)
(ezimmel@gseworld.com)

SHIPPED TO: **GSE CLAY LINING TECHNOLOGY, Co.**
3150 FIRST AVENUE
SPEARFISH, SD 57783

CC: Thomas Anderson
Jason Tawse

Q.A. SUPERVISOR
Don Staley/BPM
04/14/17

Prepared by: **BAM**

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2017

PRODUCT : NATIONAL® 30

SHIPPED FROM: **BENTONITE PERFORMANCE MINERALS LLC**
554 US HWY 212
COLONY PLANT
BELLE FOURCHE, S.D. 57717

BOL #	LOAD DATE	LOT CODE	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC MEQ 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN			% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN
B0003554250	04-17-17	1041717A	9.5	0.20	3.42	14.0	118	30	1033	APRIL No. of CARS 23	M AVG STD DEV	8.74 0.64	0.30 0.29	3.27 1.22	13.55 0.46	116.87 1.85	30.83 1.52	998.35 36.26
										YTD No. of CARS 153	M AVG STD DEV	8.82 0.70	0.34 0.56	3.36 1.78	13.98 0.84	116.01 4.10	31.10 1.65	995.08 59.78

SOLD TO: **GSE CLAY LINING TECHNOLOGY, Co.**
3150 FIRST AVENUE
SPEARFISH, SD 57783

Attn: **Bob Stadler (rstadler@gseworld.com)**
Chuck Taylor (ctaylor@gseworld.com)
Cheryl Hofer (chofer@gseworld.com)
(ezimmel@gseworld.com)

SHIPPED TO: **GSE CLAY LINING TECHNOLOGY, Co.**
3150 FIRST AVENUE
SPEARFISH, SD 57783

CC: Thomas Anderson
Jason Tawse

Q.A. SUPERVISOR
Don Staley/BPM
04/17/17

Prepared by: **BAM**

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2017

PRODUCT : NATIONAL® 30

SHIPPED FROM: **BENTONITE PERFORMANCE MINERALS LLC**
554 US HWY 212
COLONY PLANT
BELLE FOURCHE, S.D. 57717

BOL #	LOAD DATE	LOT CODE	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC MEQ 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN			% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN
B0003554253	04-17-17	1041717B	9.4	0.28	5.42	13.6	112	29	985	APRIL No. of CARS 24	M AVG STD DEV	8.77 0.64	0.30 0.28	3.36 1.27	13.55 0.45	116.67 2.05	30.75 1.53	997.79 35.59
										YTD No. of CARS 154	M AVG STD DEV	8.82 0.69	0.34 0.56	3.37 1.78	13.98 0.84	115.99 4.10	31.09 1.66	995.01 59.60

SOLD TO: **GSE CLAY LINING TECHNOLOGY, Co.**
3150 FIRST AVENUE
SPEARFISH, SD 57783

Attn: **Bob Stadler (rstadler@gseworld.com)**
Chuck Taylor (ctaylor@gseworld.com)
Cheryl Hofer (chofer@gseworld.com)
(ezimmel@gseworld.com)

SHIPPED TO: **GSE CLAY LINING TECHNOLOGY, Co.**
3150 FIRST AVENUE
SPEARFISH, SD 57783

CC: Thomas Anderson
Jason Tawse

Q.A. SUPERVISOR
Don Staley/BPM
04/18/17

Prepared by: **BAM**

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2017

PRODUCT : NATIONAL® 30

SHIPPED FROM: **BENTONITE PERFORMANCE MINERALS LLC**
554 US HWY 212
COLONY PLANT
BELLE FOURCHE, S.D. 57717

BOL #	LOAD DATE	LOT CODE	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC MEQ 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN		% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN	
B0003554254	04-18-17	1041717C	8.8	0.10	4.34	13.6	116	31	959	APRIL No. of CARS 25	M AVG STD DEV	8.77 0.63	0.29 0.28	3.40 1.26	13.55 0.44	116.64 2.02	30.76 1.50	996.24 35.69
										YTD No. of CARS 155	M AVG STD DEV	8.82 0.69	0.33 0.56	3.38 1.78	13.98 0.84	115.99 4.08	31.09 1.65	994.79 59.48

SOLD TO: **GSE CLAY LINING TECHNOLOGY, Co.**
3150 FIRST AVENUE
SPEARFISH, SD 57783

Attn: **Bob Stadler (rstadler@gseworld.com)**
Chuck Taylor (ctaylor@gseworld.com)
Cheryl Hofer (chofer@gseworld.com)
(ezimmel@gseworld.com)

SHIPPED TO: **GSE CLAY LINING TECHNOLOGY, Co.**
3150 FIRST AVENUE
SPEARFISH, SD 57783

CC: Thomas Anderson
Jason Tawse

Q.A. SUPERVISOR
Don Staley/BPM
04/18/17

Prepared by: **BAM**

GSE BENTONLINER

SIS 2017

30 LP

SHIPPED FROM: BENTONITE PERFORMANCE MINERALS LLC
554 US HWY 212
COLONY PLANT
BELLE FOURCHE, S.D. 57717

BOL #	LOAD DATE	Bulk Lot No.	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL	SWELL INDEX	PWA			% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL	SWELL INDEX	PWA
3561463	04-19-17	1041917A	8.9	0.31	4.48	9.2	38	990	APRIL No. of CARS 1	M AVG STD DEV	8.92 0.00	0.31 0.00	4.48 0.00	9.20 0.00	38.00 0.00	990.00 0.00
									YTD No. of CARS 1	M AVG STD DEV	8.92 0.00	0.31 0.00	4.48 0.00	9.20 0.00	38.00 0.00	990.00 0.00

SOLD TO: GSE CLAY LINING TECHNOLOGY, Co.
3150 FIRST AVENUE
SPEARFISH, SD 57783

Attn: Bob Stadler (rstadler@gseworld.com)
Chuck Taylor (ctaylor@gseworld.com)
Cheryl Hofer (chofer@gseworld.com)
(ezimmel@gseworld.com)
USE GSE FOLDER

SHIPPED TO: GSE CLAY LINING TECHNOLOGY, Co.
3150 FIRST AVENUE
SPEARFISH, SD 57783

CC : Thomas Anderson
Jason Tawse
File

Q.A. SUPERVISOR
Don Staley
04/24/17

Prepared by: BAM

APPENDIX B

Material Manufacturer Certification and Conformance Testing Results

B.2. GCL Conformance Testing Results



November 6, 2017

Mail To:

Mark DeCarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo, NM 87004

email: swls.md@gmail.com

Bill To:

<= Same

Dear Mr. DeCarlo:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:	Sundance West Evaporated Basin
TRI Job Reference Number:	33355
Material(s) Tested:	One, GCL(s)
Test(s) Requested:	Mass/Unit Area (ASTM D5993) Bentonite - Swell Index (ASTM D5890) Bentonite - Fluid Loss (ASTM D5891)

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

Sincerely,

Shawn O'Connor
Geosynthetic Services Division
www.GeosyntheticTesting.com
cc: jkuhn@tri-env.com (Jeffrey A. Kuhn, Ph.D., P.E. - Division Director)

GCL TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: GCL
Sample Identification: 9683
TRI Log #: 33355

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Bentonite - Mass/Unit Area (ASTM D5993, result @ 0% M.C.)													
Bentonite mass/unit area (lbs/ft ²)	0.80	0.89	0.85	0.81	0.82						0.83	0.04	0.75
Moisture Content (%)	9.1	8.7	8.2	8.9	8.9						8.8	0.3	35 max
Bentonite - Swell Index (ASTM D5890)													
Swell index (mL/2g)		32									32		24 min
Note: Bentonite sample tested is taken from finished GCL product.													
Bentonite - Fluid Loss (ASTM D5891)													
Slurry temperature at test initiation:		26.1 ° C											
Fluid Loss (mL)		16.4									16.4		18 max
Note: Bentonite sample tested is taken from finished GCL product.													
MD Machine Direction	TD Transverse Direction				NA Not Available								

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

APPENDIX B

Material Manufacturer Certification and Conformance Testing Results

B.3. FML Certifications



Cust: Southwest Liner Systems, Inc.
 PO#: SW1728 Sundance West Surface Waste Facility
 Dest: Eunice, NM

Doc#: 38616

56 rolls 60HD smooth (600)	772,800	ft ²
31 rolls 60HD Ssmicro (560)	399,280	ft ²
2 rolls 60HD micro	24,840	ft ²
40 rolls 60HD smooth BL/Cond (600) (SC)	552,000	ft ²
177 rolls 200 Geonet (300) (SC)	769,950	ft ²
		ft ²

roll #	width	English length	area	check weld rod qty (if ordered)	wgt	resin lot #
	ft.	ft.	ft ² .		lbs.	

1FT FROM END OF ROLLS 1, 8, 15, 22, 29, 37, 44, 51

100K / LOT SQS TRITX U2

F17C003693	23	600	13,800	60HD smooth 56tot 1	4,236	FULL 1 FT	HHK820010
F17C003694	23	600	13,800	60HD smooth 56tot 2	4,242		HHK820010
F17C003695	23	600	13,800	60HD smooth 56tot 3	4,238		HHK820010
F17C003696	23	600	13,800	60HD smooth 56tot 4	4,230		HHK820010
F17C003697	23	600	13,800	60HD smooth 56tot 5	4,232		HHK820010
F17C003698	23	600	13,800	60HD smooth 56tot 6	4,242	FULL	HHK820010
F17C003699	23	600	13,800	60HD smooth 56tot 7	4,222		HHK820010
F17C003701	23	600	13,800	60HD smooth 56tot 8	4,202	1 FT	HHK820010
F17C003702	23	600	13,800	60HD smooth 56tot 9	4,212		HHK820010
F17C003703	23	600	13,800	60HD smooth 56tot 10	4,208	FULL	HHK820010
F17C003704	23	600	13,800	60HD smooth 56tot 11	4,202		HHK820010
F17C003705	23	600	13,800	60HD smooth 56tot 12	4,208		HHK820010
F17C003706	23	600	13,800	60HD smooth 56tot 13	4,212		HHK820010
F17C003707	23	600	13,800	60HD smooth 56tot 14	4,184		HHK820010
F17C003708	23	600	13,800	60HD smooth 56tot 15	4,178	FULL 1 FT	HHK820010
F17C003709	23	600	13,800	60HD smooth 56tot 16	4,210		HHK820010



quality certificate

ROLL #: F17C003693**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	61 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	62 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.6 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	28 N/mm	159	ppi	2651 psi
		TD	29 N/mm	164	ppi	2736 psi
	Average Strength @ Break	MD	50 N/mm	287	ppi	4775 psi
		TD	55 N/mm	311	ppi	5191 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				18 %
	Average Elongation @Break	MD				784 %
		TD				922 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		240.2	N	54 lbs.
		TD		253.5	N	57 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			591.6	N	133 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/19/2017 OA#: 38616

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003694**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	28 N/mm	159	ppi	2651 psi
		TD	29 N/mm	164	ppi	2736 psi
	Average Strength @ Break	MD	50 N/mm	287	ppi	4775 psi
		TD	55 N/mm	311	ppi	5191 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				18 %
	Average Elongation @Break	MD				784 %
		TD				922 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		240.2	N	54 lbs.
		TD		253.5	N	57 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			591.6	N	133 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/19/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003695**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	28 N/mm	159	ppi	2651 psi
		TD	29 N/mm	164	ppi	2736 psi
	Average Strength @ Break	MD	50 N/mm	287	ppi	4775 psi
		TD	55 N/mm	311	ppi	5191 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				18 %
	Average Elongation @Break	MD				784 %
		TD				922 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		240.2	N	54 lbs.
		TD		253.5	N	57 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			591.6	N	133 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/19/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003696**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	28 N/mm	159	ppi	2651 psi
		TD	29 N/mm	164	ppi	2736 psi
	Average Strength @ Break	MD	50 N/mm	287	ppi	4775 psi
		TD	55 N/mm	311	ppi	5191 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				18 %
	Average Elongation @Break	MD				784 %
		TD				922 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		240.2	N	54 lbs.
		TD		253.5	N	57 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			591.6	N	133 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/19/2017 OA#: 38616

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F17C003697**

LOT #: **HHK820010**

LINER TYPE:

60 HD SMOOTH

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	59 mil	Thickness:	1.52 mm	60 mil
Measurement				Length:	182.880 m	600 feet
ASTM D5199	MAX:	1.7 mm	66 mil	Width:	7.01 m	23 feet
(Modified)	AVE:	1.6 mm	61 mil			
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	28 N/mm	159	ppi	2651 psi
		TD	29 N/mm	164	ppi	2736 psi
	Average Strength @ Break	MD	50 N/mm	287	ppi	4775 psi
		TD	55 N/mm	311	ppi	5191 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				18 %
	Average Elongation @Break	MD				784 %
		TD				922 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		240.2	N	54 lbs.
		TD		253.5	N	57 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			591.6	N	133 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **10/19/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003698**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	59 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	65 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.944 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	27 N/mm	157	ppi	2614 psi
		TD	29 N/mm	164	ppi	2731 psi
	Average Strength @ Break	MD	52 N/mm	297	ppi	4952 psi
		TD	55 N/mm	315	ppi	5252 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				20 %
		TD				18 %
	Average Elongation @Break	MD				803 %
		TD				927 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		262.4	N	59 lbs.
		TD		258.0	N	58 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			596.0	N	134 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/19/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F17C003699**

LOT #: **HHK820010**

LINER TYPE:

60 HD SMOOTH

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	59 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.944 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	27 N/mm	157	ppi	2614 psi
		TD	29 N/mm	164	ppi	2731 psi
	Average Strength @ Break	MD	52 N/mm	297	ppi	4952 psi
		TD	55 N/mm	315	ppi	5252 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				20 %
		TD				18 %
	Average Elongation @Break	MD				803 %
		TD				927 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		262.4	N	59 lbs.
		TD		258.0	N	58 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			596.0	N	134 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **10/19/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003701**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	60 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	66 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.944 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.8 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	27 N/mm	157	ppi	2614 psi
		TD	29 N/mm	164	ppi	2731 psi
	Average Strength @ Break	MD	52 N/mm	297	ppi	4952 psi
		TD	55 N/mm	315	ppi	5252 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				20 %
		TD				18 %
	Average Elongation @Break	MD				803 %
		TD				927 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		262.4	N	59 lbs.
		TD		258.0	N	58 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			596.0	N	134 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/19/2017 OA#: 38616

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003702**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	59 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.6 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.944 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.8 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	27 N/mm	157	ppi	2614 psi
		TD	29 N/mm	164	ppi	2731 psi
	Average Strength @ Break	MD	52 N/mm	297	ppi	4952 psi
		TD	55 N/mm	315	ppi	5252 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				20 %
		TD				18 %
	Average Elongation @Break	MD				803 %
		TD				927 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		262.4	N	59 lbs.
		TD		258.0	N	58 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			596.0	N	134 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/19/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003703**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	59 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	145	ppi	2421 psi
		TD	27 N/mm	156	ppi	2595 psi
	Average Strength @ Break	MD	48 N/mm	274	ppi	4573 psi
		TD	50 N/mm	288	ppi	4792 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				15 %
		TD				17 %
	Average Elongation @Break	MD				776 %
		TD				875 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		240.2	N	54 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			604.9	N	136 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/19/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003704**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	65 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.6 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	145	ppi	2421 psi
		TD	27 N/mm	156	ppi	2595 psi
	Average Strength @ Break	MD	48 N/mm	274	ppi	4573 psi
		TD	50 N/mm	288	ppi	4792 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				15 %
		TD				17 %
	Average Elongation @Break	MD				776 %
		TD				875 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		240.2	N	54 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			604.9	N	136 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/19/2017 OA#: 38616

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003705**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	59 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	145	ppi	2421 psi
		TD	27 N/mm	156	ppi	2595 psi
	Average Strength @ Break	MD	48 N/mm	274	ppi	4573 psi
		TD	50 N/mm	288	ppi	4792 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				15 %
		TD				17 %
	Average Elongation @Break	MD				776 %
		TD				875 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		240.2	N	54 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			604.9	N	136 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/19/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F17C003706**

LOT #: **HHK820010**

LINER TYPE:

60 HD SMOOTH

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.6 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	145	ppi	2421 psi
		TD	27 N/mm	156	ppi	2595 psi
	Average Strength @ Break	MD	48 N/mm	274	ppi	4573 psi
		TD	50 N/mm	288	ppi	4792 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				15 %
		TD				17 %
	Average Elongation @Break	MD				776 %
		TD				875 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		240.2	N	54 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			604.9	N	136 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **10/19/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003707**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement	MAX:	1.6 mm	63 mil	Length:	182.880 m	600 feet
ASTM D5199	AVE:	1.6 mm	61 mil	Width:	7.01 m	23 feet
(Modified)						
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.3 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	145	ppi	2421 psi
		TD	27 N/mm	156	ppi	2595 psi
	Average Strength @ Break	MD	48 N/mm	274	ppi	4573 psi
		TD	50 N/mm	288	ppi	4792 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				15 %
		TD				17 %
	Average Elongation @Break	MD				776 %
		TD				875 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		240.2	N	54 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			604.9	N	136 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/19/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003708**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	150	ppi	2502 psi
		TD	28 N/mm	160	ppi	2660 psi
	Average Strength @ Break	MD	51 N/mm	290	ppi	4834 psi
		TD	55 N/mm	313	ppi	5210 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				16 %
	Average Elongation @Break	MD				806 %
		TD				936 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		249.1	N	56 lbs.
		TD		235.7	N	53 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			613.8	N	138 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/19/2017 OA#: 38616

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003709**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	62 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	150	ppi	2502 psi
		TD	28 N/mm	160	ppi	2660 psi
	Average Strength @ Break	MD	51 N/mm	290	ppi	4834 psi
		TD	55 N/mm	313	ppi	5210 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				16 %
	Average Elongation @Break	MD				806 %
		TD				936 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		249.1	N	56 lbs.
		TD		235.7	N	53 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			613.8	N	138 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/19/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department

Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 EAST NEWLANDS
FERNLEY NV 89408
USA

Recipient: PALMER
Fax:

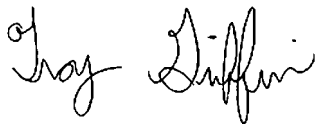
Delivery #: 89540012
PO #: 11969
Weight: 176700.000 LB
Ship Date: 10/04/2017
Package: BULK
Mode: Hopper Car
Car #: CHVX889428
Seal No: 99561

Product:
MARLEX K307 POLYETHYLENE in Bulk

Lot Number: HHK820010

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.23	g/10min
HLMI Flow Rate	ASTM D1238	20	g/10min
Density	D1505 or D4883	0.938	g/cm3
Pellet Count	P02.08.03	29	pelet/gram
Production Date		10/01/2017	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Troy Griffin
Quality Systems Coordinator

For CoA questions contact Customer Service Representative at +1832813



Yingying Lu, Ph.D., Geomembrane Technical Service & Applications Development
Highways 60 & 123, Bartlesville Research and Technology Center, Room 149 PTC
Bartlesville, OK 74003

■ 918-977-6894 ■ luyy@cpchem.com ■ Fax: 918-977-7599 ■ www.cpchem.com

June 17, 2015

Grant Palmer
Agru America
500 Garrison Road
Georgetown, SC 29440

Dear Grant:

This letter is to report the final results of oven-aging and UV-aging tests (according to GRI-GM13 and GRI-GM17) on Agru America black sheet samples that you provided to us recently. These tests were performed by CPChem's Materials Evaluation Laboratory in Bartlesville, OK. The tests were completed June 2015.

The GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) durability tests were done according to the following procedures.

Test	Exposure	Method
HP-OIT	150 °C, 500 psi oxygen	D5885
Oven Aging	90 days, 85 °C	D5721
UV Aging	1600 UV hrs (Conditions were 20 hours UVA-340 at 75 °C followed by 4 hrs dark with condensation at 60 °C. Irradiance was 0.72 W/m ² at 340 nm.)	D7238

Oven-Aging Results

Sample	Initial HP-OIT (min)	HP-OIT Value after Oven Aging 90 Days (min)	% HP-OIT Retained after Oven Aging 90 Days	GRI-GM13 and GRI-GM17% Retained Requirement (Oven Aging 90 Days)
60 mil HDPE Roll # G14F514045 from Marlex® K307 Polyethylene Lot # H71-4-1337	1066	883	83	80
40 mil LLDPE Roll # G14C243027 from Marlex® 7104 Polyethylene Lot # CEC810320	512	422	82	60

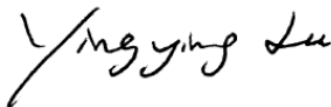
UV-Aging Results

Sample	Initial HP-OIT (min)	HP-OIT Value after UV Aging (min)	% HP-OIT Retained	GRI-GM13 and GRI-GM17 % Retained Requirement
60 mil HDPE Roll # G14F514045 from Marlex® K307 Polyethylene Lot # H71-4-1337	1066	930	87	50
40 mil LLDPE Roll # G14C243027 from Marlex® 7104 Polyethylene Lot # CEC810320	512	351	69	35

According to these test results, the durability requirements are met.

If you have any questions, please call me at 918-977-6894.

Sincerely,



Yingying Lu, Ph. D.

Polyethylene Technical Service and Applications Development

*Any technical advice, recommendations, results, or analysis ("Information") contained herein, including, without limitation, Information as it may relate to the selection of a specific product ("Product") for your use and application, is given **without warranty or guarantee** and is accepted at your sole risk. It is imperative that you test the Information (and Product, if applicable) to determine to your own satisfaction whether the Information (and Product, if applicable) are suitable for your intended use and application. **You expressly assume, and release Chevron Phillips Chemical Company, from all risk and liability, whether based in contract, tort or otherwise, in connection with the use of, or results obtained from, such Information (and Product, if applicable).***



Cust: Southwest Liner Systems, Inc.
 PO#: SW1728 Sundance West Surface Waste Facility
 Dest: Eunice, NM

Doc#: 38616

56 rolls 60HD smooth (600)	772,800	ft ²
31 rolls 60HD Ssmicro (560)	399,280	ft ²
2 rolls 60HD micro	24,840	ft ²
40 rolls 60HD smooth BL/Cond (600) (SC)	552,000	ft ²
177 rolls 200 Geonet (300) (SC)	769,950	ft ²
		ft ²

roll #	width	length	area	check weld rod qty (if ordered)	wgt	resin lot #
	ft.	ft.	ft ²		lbs.	

1FT FROM END OF ROLLS 1, 8, 15, 22, 29, 37, 44, 51

100K / LOT SQS TRITX U2

F17C003710	23	600	13,800	60HD smooth 56tot 17	4,212		HHK820010
F17C003711	23	600	13,800	60HD smooth 56tot 18	4,200		HHK820010
F17C003712	23	600	13,800	60HD smooth 56tot 19	4,196		HHK820010
F17C003713	23	653	15,019	60HD smooth 56tot 20	4,644	FULL	HHK820010
F17C003715	23	547	12,581	60HD smooth 56tot 21	3,820		HHK820010
F17C003716	23	600	13,800	60HD smooth 56tot 22	4,198	1 FT	HHK820010
F17C003717	23	600	13,800	60HD smooth 56tot 23	4,222		HHK820010
F17C003718	23	600	13,800	60HD smooth 56tot 24	4,224		HHK820010
F17C003719	23	600	13,800	60HD smooth 56tot 25	4,210	FULL	HHK820010
F17C003720	23	600	13,800	60HD smooth 56tot 26	4,220		HHK820010
F17C003723	23	600	13,800	60HD smooth 56tot 27	4,242	FULL	HHK820010
F17C003724	23	600	13,800	60HD smooth 56tot 28	4,174		HHK820010
F17C003725	23	600	13,800	60HD smooth 56tot 29	4,182	1ft	HHK820010
F17C003726	23	600	13,800	60HD smooth 56tot 30	4,174		HHK820010
F17C003727	23	600	13,800	60HD smooth 56tot 31	4,190		HHK820010
F17C003728	23	600	13,800	60HD smooth 56tot 32	4,188	FULL	HHK820010
F17C003729	23	600	13,800	60HD smooth 56tot 33	4,180		HHK820010
F17C003730	23	600	13,800	60HD smooth 56tot 34	4,188		HHK820010
F17C003731	23	600	13,800	60HD smooth 56tot 35	4,190		HHK820010
F17C003732	23	600	13,800	60HD smooth 56tot 36	4,184		HHK820010
F17C003733	23	600	13,800	60HD smooth 56tot 37	4,178	1ft full	HHK820010
F17C003734	23	600	13,800	60HD smooth 56tot 38	4,188		HHK820010
F17C003735	23	600	13,800	60HD smooth 56tot 39	4,202		HHK820010
F17C003736	23	600	13,800	60HD smooth 56tot 40	4,164		HHK820010
F17C003737	23	600	13,800	60HD smooth 56tot 41	4,176		HHK820110
F17C003738	23	600	13,800	60HD smooth 56tot 42	4,182	FULL	HHK820110
F17C003739	23	600	13,800	60HD smooth 56tot 43	4,182		HHK820110
F17C003740	23	600	13,800	60HD smooth 56tot 44	4,170	1ft	HHK820110
F17C003741	23	600	13,800	60HD smooth 56tot 45	4,172		HHK820110
F17C003742	23	600	13,800	60HD smooth 56tot 46	4,182		HHK820110
F17C003743	23	600	13,800	60HD smooth 56tot 47	4,198	FULL	HHK820110
F17C003744	23	600	13,800	60HD smooth 56tot 48	4,180		HHK820110
F17C003745	23	600	13,800	60HD smooth 56tot 49	4,134		HHK820110
F17C003746	23	600	13,800	60HD smooth 56tot 50	4,128		HHK820110
F17C003747	23	600	13,800	60HD smooth 56tot 51	4,132	1ft	HHK820110
F17C003748	23	600	13,800	60HD smooth 56tot 52	4,130	FULL	HHK820110
F17C003749	23	600	13,800	60HD smooth 56tot 53	4,136		HHK820110
F17C003750	23	600	13,800	60HD smooth 56tot 54	4,130		HHK820110
F17C003751	23	600	13,800	60HD smooth 56tot 55	4,142		HHK820110
F17C003752	23	600	13,800	60HD smooth 56tot 56	4,130		HHK820110

772,800
total for order

234,732



quality certificate

ROLL #: F17C003710**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	62 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	150	ppi	2502 psi
		TD	28 N/mm	160	ppi	2660 psi
	Average Strength @ Break	MD	51 N/mm	290	ppi	4834 psi
		TD	55 N/mm	313	ppi	5210 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				16 %
	Average Elongation @Break	MD				806 %
		TD				936 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		249.1	N	56 lbs.
		TD		235.7	N	53 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			613.8	N	138 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/20/2017 OA#: 38616

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003711**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	150	ppi	2502 psi
		TD	28 N/mm	160	ppi	2660 psi
	Average Strength @ Break	MD	51 N/mm	290	ppi	4834 psi
		TD	55 N/mm	313	ppi	5210 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				16 %
	Average Elongation @Break	MD				806 %
		TD				936 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		249.1	N	56 lbs.
		TD		235.7	N	53 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			613.8	N	138 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/20/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003712**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	63 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	150	ppi	2502 psi
		TD	28 N/mm	160	ppi	2660 psi
	Average Strength @ Break	MD	51 N/mm	290	ppi	4834 psi
		TD	55 N/mm	313	ppi	5210 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				16 %
	Average Elongation @Break	MD				806 %
		TD				936 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		249.1	N	56 lbs.
		TD		235.7	N	53 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			613.8	N	138 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/20/2017 OA#: 38616

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003713**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	63 mil	Length:	199.034 m	653 feet
(Modified)	AVE:	1.5 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.944 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2478 psi
		TD	27 N/mm	155	ppi	2586 psi
	Average Strength @ Break	MD	50 N/mm	286	ppi	4774 psi
		TD	52 N/mm	298	ppi	4974 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				17 %
	Average Elongation @Break	MD				803 %
		TD				898 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6 N		55 lbs.
		TD		235.7 N		53 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			609.4 N		137 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/20/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003715**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.8 mm	70 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	63 mil	Length:	166.725 m	547 feet
(Modified)	AVE:	1.6 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.944 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2478 psi
		TD	27 N/mm	155	ppi	2586 psi
	Average Strength @ Break	MD	50 N/mm	286	ppi	4774 psi
		TD	52 N/mm	298	ppi	4974 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				17 %
	Average Elongation @Break	MD				803 %
		TD				898 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		235.7	N	53 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			609.4	N	137 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/20/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003716**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	60 mil	Thickness:	1.52 mm	60 mil
Measurement				Length:	182.880 m	600 feet
ASTM D5199	MAX:	1.7 mm	65 mil	Width:	7.01 m	23 feet
(Modified)	AVE:	1.6 mm	62 mil			
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.944 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2478 psi
		TD	27 N/mm	155	ppi	2586 psi
	Average Strength @ Break	MD	50 N/mm	286	ppi	4774 psi
		TD	52 N/mm	298	ppi	4974 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				17 %
	Average Elongation @Break	MD				803 %
		TD				898 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		235.7	N	53 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			609.4	N	137 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/20/2017 OA#: 38616

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003717**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	60 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.944 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2478 psi
		TD	27 N/mm	155	ppi	2586 psi
	Average Strength @ Break	MD	50 N/mm	286	ppi	4774 psi
		TD	52 N/mm	298	ppi	4974 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				17 %
	Average Elongation @Break	MD				803 %
		TD				898 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		235.7	N	53 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			609.4	N	137 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/20/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003718**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	60 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	65 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.944 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2478 psi
		TD	27 N/mm	155	ppi	2586 psi
	Average Strength @ Break	MD	50 N/mm	286	ppi	4774 psi
		TD	52 N/mm	298	ppi	4974 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				17 %
	Average Elongation @Break	MD				803 %
		TD				898 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		235.7	N	53 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			609.4	N	137 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/20/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003719**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	59 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	63 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.6 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.947 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength	Average Strength @ Yield	MD	27 N/mm	157 ppi	2609 psi	
		TD	27 N/mm	157 ppi	2615 psi	
	Average Strength @ Break	MD	52 N/mm	295 ppi	4923 psi	
		TD	54 N/mm	307 ppi	5122 psi	
Tensile Elongation	Average Elongation @ Yield	MD			18 %	
		TD			17 %	
	Average Elongation @Break	MD			812 %	
		TD			936 %	
Tear Resistance	Average Tear Resistance	MD		249.1 N	56 lbs.	
		TD		249.1 N	56 lbs.	
Puncture Resistance	Average Peak Load			591.6 N	133 lbs.	
ASTM D4833 (Modified)						
Notched Constant Tensile Load	Pass/Fail @ 30%			500 Hrs.	ONGOING	
ASTM D5397						

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/20/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003720**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	66 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.947 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	27 N/mm	157	ppi	2609 psi
		TD	27 N/mm	157	ppi	2615 psi
	Average Strength @ Break	MD	52 N/mm	295	ppi	4923 psi
		TD	54 N/mm	307	ppi	5122 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				17 %
	Average Elongation @Break	MD				812 %
		TD				936 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		249.1	N	56 lbs.
		TD		249.1	N	56 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			591.6	N	133 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/20/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003723**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	56 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	62 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.7 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	148	ppi	2467 psi
		TD	28 N/mm	159	ppi	2653 psi
	Average Strength @ Break	MD	50 N/mm	286	ppi	4761 psi
		TD	54 N/mm	309	ppi	5157 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				15 %
	Average Elongation @Break	MD				784 %
		TD				948 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		235.7	N	53 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			613.8	N	138 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/20/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F17C003724**

LOT #: **HHK820010**

LINER TYPE:

60 HD SMOOTH

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement				Length:	182.880 m	600 feet
ASTM D5199	MAX:	1.6 mm	64 mil	Width:	7.01 m	23 feet
(Modified)	AVE:	1.5 mm	61 mil			
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.7 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	148	ppi	2467 psi
		TD	28 N/mm	159	ppi	2653 psi
	Average Strength @ Break	MD	50 N/mm	286	ppi	4761 psi
		TD	54 N/mm	309	ppi	5157 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				15 %
	Average Elongation @ Break	MD				784 %
		TD				948 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		235.7	N	53 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			613.8	N	138 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **10/20/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003725**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	63 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.7 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	148	ppi	2467 psi
		TD	28 N/mm	159	ppi	2653 psi
	Average Strength @ Break	MD	50 N/mm	286	ppi	4761 psi
		TD	54 N/mm	309	ppi	5157 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				15 %
	Average Elongation @Break	MD				784 %
		TD				948 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6 N		55 lbs.
		TD		235.7 N		53 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			613.8 N		138 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/20/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003726**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	148	ppi	2467 psi
		TD	28 N/mm	159	ppi	2653 psi
	Average Strength @ Break	MD	50 N/mm	286	ppi	4761 psi
		TD	54 N/mm	309	ppi	5157 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				15 %
	Average Elongation @Break	MD				784 %
		TD				948 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		235.7	N	53 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			613.8	N	138 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003727**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	65 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.6 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	148	ppi	2467 psi
		TD	28 N/mm	159	ppi	2653 psi
	Average Strength @ Break	MD	50 N/mm	286	ppi	4761 psi
		TD	54 N/mm	309	ppi	5157 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				15 %
	Average Elongation @Break	MD				784 %
		TD				948 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		235.7	N	53 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			613.8	N	138 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003728**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	63 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2488 psi
		TD	27 N/mm	154	ppi	2561 psi
	Average Strength @ Break	MD	51 N/mm	289	ppi	4809 psi
		TD	52 N/mm	296	ppi	4930 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				19 %
		TD				17 %
	Average Elongation @Break	MD				805 %
		TD				901 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6 N		55 lbs.
		TD		258.0 N		58 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			591.6 N		133 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.

PO:

Destination:

Production Date: 10/21/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003729**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement	MAX:	1.6 mm	62 mil	Length:	182.880 m	600 feet
ASTM D5199	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
(Modified)						
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2488 psi
		TD	27 N/mm	154	ppi	2561 psi
	Average Strength @ Break	MD	51 N/mm	289	ppi	4809 psi
		TD	52 N/mm	296	ppi	4930 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				19 %
		TD				17 %
	Average Elongation @Break	MD				805 %
		TD				901 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		258.0	N	58 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			591.6	N	133 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003730**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	59 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2488 psi
		TD	27 N/mm	154	ppi	2561 psi
	Average Strength @ Break	MD	51 N/mm	289	ppi	4809 psi
		TD	52 N/mm	296	ppi	4930 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				19 %
		TD				17 %
	Average Elongation @Break	MD				805 %
		TD				901 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6 N		55 lbs.
		TD		258.0 N		58 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			591.6 N		133 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003731**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2488 psi
		TD	27 N/mm	154	ppi	2561 psi
	Average Strength @ Break	MD	51 N/mm	289	ppi	4809 psi
		TD	52 N/mm	296	ppi	4930 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				19 %
		TD				17 %
	Average Elongation @Break	MD				805 %
		TD				901 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6 N		55 lbs.
		TD		258.0 N		58 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			591.6 N		133 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003732**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	65 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2488 psi
		TD	27 N/mm	154	ppi	2561 psi
	Average Strength @ Break	MD	51 N/mm	289	ppi	4809 psi
		TD	52 N/mm	296	ppi	4930 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				19 %
		TD				17 %
	Average Elongation @ Break	MD				805 %
		TD				901 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6 N		55 lbs.
		TD		258.0 N		58 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			591.6 N		133 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003733**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	62 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.8 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	145	ppi	2410 psi
		TD	27 N/mm	152	ppi	2531 psi
	Average Strength @ Break	MD	50 N/mm	288	ppi	4805 psi
		TD	55 N/mm	315	ppi	5251 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				18 %
	Average Elongation @Break	MD				803 %
		TD				937 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		240.2	N	54 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			609.4	N	137 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003734**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	63 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.8 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	145	ppi	2410 psi
		TD	27 N/mm	152	ppi	2531 psi
	Average Strength @ Break	MD	50 N/mm	288	ppi	4805 psi
		TD	55 N/mm	315	ppi	5251 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				18 %
	Average Elongation @Break	MD				803 %
		TD				937 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		240.2	N	54 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			609.4	N	137 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003735**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	56 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	63 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.8 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	145	ppi	2410 psi
		TD	27 N/mm	152	ppi	2531 psi
	Average Strength @ Break	MD	50 N/mm	288	ppi	4805 psi
		TD	55 N/mm	315	ppi	5251 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				18 %
	Average Elongation @Break	MD				803 %
		TD				937 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		240.2	N	54 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			609.4	N	137 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003736**LOT #: HHK820010****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	62 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	145	ppi	2410 psi
		TD	27 N/mm	152	ppi	2531 psi
	Average Strength @ Break	MD	50 N/mm	288	ppi	4805 psi
		TD	55 N/mm	315	ppi	5251 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				18 %
	Average Elongation @Break	MD				803 %
		TD				937 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		240.2	N	54 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			609.4	N	137 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003737**LOT #: HHK820110****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	59 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	61 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						208 minutes
Specific Gravity	Average Density					.943 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.22
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	145	ppi	2410 psi
		TD	27 N/mm	152	ppi	2531 psi
	Average Strength @ Break	MD	50 N/mm	288	ppi	4805 psi
		TD	55 N/mm	315	ppi	5251 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				18 %
	Average Elongation @Break	MD				803 %
		TD				937 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		240.2	N	54 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			609.4	N	137 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003738**LOT #: HHK820110****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						208 minutes
Specific Gravity	Average Density					.943 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.22
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2479 psi
		TD	28 N/mm	163	ppi	2711 psi
	Average Strength @ Break	MD	49 N/mm	282	ppi	4706 psi
		TD	51 N/mm	292	ppi	4872 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				16 %
	Average Elongation @ Break	MD				767 %
		TD				907 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		231.3	N	52 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			596.0	N	134 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003739**LOT #: HHK820110****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	63 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						208 minutes
Specific Gravity	Average Density					.943 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.22
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2479 psi
		TD	28 N/mm	163	ppi	2711 psi
	Average Strength @ Break	MD	49 N/mm	282	ppi	4706 psi
		TD	51 N/mm	292	ppi	4872 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				16 %
	Average Elongation @Break	MD				767 %
		TD				907 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		231.3	N	52 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			596.0	N	134 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003740**LOT #: HHK820110****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						208 minutes
Specific Gravity	Average Density					.943 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.22
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2479 psi
		TD	28 N/mm	163	ppi	2711 psi
	Average Strength @ Break	MD	49 N/mm	282	ppi	4706 psi
		TD	51 N/mm	292	ppi	4872 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				16 %
	Average Elongation @Break	MD				767 %
		TD				907 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		231.3	N	52 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			596.0	N	134 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003741**LOT #: HHK820110****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	60 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	62 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.6 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						208 minutes
Specific Gravity	Average Density					.943 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.22
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.3 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2479 psi
		TD	28 N/mm	163	ppi	2711 psi
	Average Strength @ Break	MD	49 N/mm	282	ppi	4706 psi
		TD	51 N/mm	292	ppi	4872 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				16 %
	Average Elongation @Break	MD				767 %
		TD				907 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		231.3	N	52 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			596.0	N	134 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003742**LOT #: HHK820110****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	60 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						208 minutes
Specific Gravity	Average Density					.943 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.22
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.3 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2479 psi
		TD	28 N/mm	163	ppi	2711 psi
	Average Strength @ Break	MD	49 N/mm	282	ppi	4706 psi
		TD	51 N/mm	292	ppi	4872 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				16 %
	Average Elongation @Break	MD				767 %
		TD				907 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		231.3	N	52 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			596.0	N	134 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003743**LOT #: HHK820110****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						208 minutes
Specific Gravity	Average Density					.944 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.22
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	28 N/mm	160	ppi	2674 psi
		TD	27 N/mm	153	ppi	2553 psi
	Average Strength @ Break	MD	49 N/mm	277	ppi	4624 psi
		TD	51 N/mm	293	ppi	4886 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				16 %
		TD				16 %
	Average Elongation @Break	MD				758 %
		TD				905 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		289.1	N	65 lbs.
		TD		258.0	N	58 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			600.5	N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003744**LOT #: HHK820110****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	56 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	63 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						208 minutes
Specific Gravity	Average Density					.943 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.22
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.3 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2479 psi
		TD	28 N/mm	163	ppi	2711 psi
	Average Strength @ Break	MD	49 N/mm	282	ppi	4706 psi
		TD	51 N/mm	292	ppi	4872 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				16 %
	Average Elongation @Break	MD				767 %
		TD				907 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		231.3	N	52 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			596.0	N	134 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003745**LOT #: HHK820110****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	62 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						208 minutes
Specific Gravity	Average Density					.943 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.22
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.3 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2479 psi
		TD	28 N/mm	163	ppi	2711 psi
	Average Strength @ Break	MD	49 N/mm	282	ppi	4706 psi
		TD	51 N/mm	292	ppi	4872 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				16 %
	Average Elongation @Break	MD				767 %
		TD				907 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		231.3	N	52 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			596.0	N	134 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/21/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003746**LOT #: HHK820110****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	62 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						208 minutes
Specific Gravity	Average Density					.943 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.22
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.3 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2479 psi
		TD	28 N/mm	163	ppi	2711 psi
	Average Strength @ Break	MD	49 N/mm	282	ppi	4706 psi
		TD	51 N/mm	292	ppi	4872 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				16 %
	Average Elongation @ Break	MD				767 %
		TD				907 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		231.3	N	52 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			596.0	N	134 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **10/22/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003747**LOT #: HHK820110****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	56 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	62 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						208 minutes
Specific Gravity	Average Density					.943 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.22
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.3 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2479 psi
		TD	28 N/mm	163	ppi	2711 psi
	Average Strength @ Break	MD	49 N/mm	282	ppi	4706 psi
		TD	51 N/mm	292	ppi	4872 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				16 %
	Average Elongation @Break	MD				767 %
		TD				907 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		244.6	N	55 lbs.
		TD		231.3	N	52 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			596.0	N	134 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/22/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003748**LOT #: HHK820110****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	62 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						208 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.22
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2477 psi
		TD	28 N/mm	161	ppi	2683 psi
	Average Strength @ Break	MD	48 N/mm	273	ppi	4552 psi
		TD	52 N/mm	298	ppi	4972 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				14 %
		TD				16 %
	Average Elongation @Break	MD				753 %
		TD				909 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		280.2	N	63 lbs.
		TD		275.8	N	62 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			627.2	N	141 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **10/22/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003749**LOT #: HHK820110****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	56 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	62 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						208 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.22
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2477 psi
		TD	28 N/mm	161	ppi	2683 psi
	Average Strength @ Break	MD	48 N/mm	273	ppi	4552 psi
		TD	52 N/mm	298	ppi	4972 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				14 %
		TD				16 %
	Average Elongation @Break	MD				753 %
		TD				909 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		280.2	N	63 lbs.
		TD		275.8	N	62 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			627.2	N	141 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/22/2017 OA#: 38616

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003750**LOT #: HHK820110****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement				Length:	182.880 m	600 feet
ASTM D5199	MAX:	1.6 mm	63 mil	Width:	7.01 m	23 feet
(Modified)	AVE:	1.5 mm	60 mil			
OIT(Standard) ASTM D 3895						208 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.22
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2477 psi
		TD	28 N/mm	161	ppi	2683 psi
	Average Strength @ Break	MD	48 N/mm	273	ppi	4552 psi
		TD	52 N/mm	298	ppi	4972 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				14 %
		TD				16 %
	Average Elongation @Break	MD				753 %
		TD				909 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		280.2	N	63 lbs.
		TD		275.8	N	62 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			627.2	N	141 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/22/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C003751**LOT #: HHK820110****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	59 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	62 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						208 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.22
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.8 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2477 psi
		TD	28 N/mm	161	ppi	2683 psi
	Average Strength @ Break	MD	48 N/mm	273	ppi	4552 psi
		TD	52 N/mm	298	ppi	4972 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				14 %
		TD				16 %
	Average Elongation @Break	MD				753 %
		TD				909 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		280.2	N	63 lbs.
		TD		275.8	N	62 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			627.2	N	141 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 10/22/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F17C003752**

LOT #: **HHK820110**

LINER TYPE:

60 HD SMOOTH

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	63 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						208 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.22
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.8 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149	ppi	2477 psi
		TD	28 N/mm	161	ppi	2683 psi
	Average Strength @ Break	MD	48 N/mm	273	ppi	4552 psi
		TD	52 N/mm	298	ppi	4972 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				14 %
		TD				16 %
	Average Elongation @Break	MD				753 %
		TD				909 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		280.2	N	63 lbs.
		TD		275.8	N	62 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			627.2	N	141 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **10/22/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department

Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 EAST NEWLANDS
FERNLEY NV 89408
USA

Recipient: PALMER
Fax:

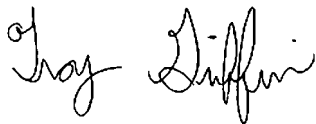
Delivery #: 89540012
PO #: 11969
Weight: 176700.000 LB
Ship Date: 10/04/2017
Package: BULK
Mode: Hopper Car
Car #: CHVX889428
Seal No: 99561

Product:
MARLEX K307 POLYETHYLENE in Bulk

Lot Number: HHK820010

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.23	g/10min
HLMI Flow Rate	ASTM D1238	20	g/10min
Density	D1505 or D4883	0.938	g/cm3
Pellet Count	P02.08.03	29	pelet/gram
Production Date		10/01/2017	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Troy Griffin
Quality Systems Coordinator

For CoA questions contact Customer Service Representative at +1832813

Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 EAST NEWLANDS
FERNLEY NV 89408
USA

Recipient: PALMER
Fax:

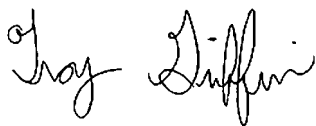
Delivery #: 89541328
PO #: 11969
Weight: 183200.000 LB
Ship Date: 10/05/2017
Package: BULK
Mode: Hopper Car
Car #: CHVX889389
Seal No: 102152

Product:
MARLEX K307 POLYETHYLENE in Bulk

Lot Number: HHK820110

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.22	g/10min
HLMI Flow Rate	ASTM D1238	20	g/10min
Density	D1505 or D4883	0.938	g/cm3
Pellet Count	P02.08.03	29	pelet/gram
Production Date		10/02/2017	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Troy Griffin
Quality Systems Coordinator

For CoA questions contact Customer Service Representative at +1832813



Yingying Lu, Ph.D., Geomembrane Technical Service & Applications Development
Highways 60 & 123, Bartlesville Research and Technology Center, Room 149 PTC
Bartlesville, OK 74003

■ 918-977-6894 ■ luyy@cpchem.com ■ Fax: 918-977-7599 ■ www.cpchem.com

June 17, 2015

Grant Palmer
Agru America
500 Garrison Road
Georgetown, SC 29440

Dear Grant:

This letter is to report the final results of oven-aging and UV-aging tests (according to GRI-GM13 and GRI-GM17) on Agru America black sheet samples that you provided to us recently. These tests were performed by CPChem's Materials Evaluation Laboratory in Bartlesville, OK. The tests were completed June 2015.

The GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) durability tests were done according to the following procedures.

Test	Exposure	Method
HP-OIT	150 °C, 500 psi oxygen	D5885
Oven Aging	90 days, 85 °C	D5721
UV Aging	1600 UV hrs (Conditions were 20 hours UVA-340 at 75 °C followed by 4 hrs dark with condensation at 60 °C. Irradiance was 0.72 W/m ² at 340 nm.)	D7238

Oven-Aging Results

Sample	Initial HP-OIT (min)	HP-OIT Value after Oven Aging 90 Days (min)	% HP-OIT Retained after Oven Aging 90 Days	GRI-GM13 and GRI-GM17% Retained Requirement (Oven Aging 90 Days)
60 mil HDPE Roll # G14F514045 from Marlex® K307 Polyethylene Lot # H71-4-1337	1066	883	83	80
40 mil LLDPE Roll # G14C243027 from Marlex® 7104 Polyethylene Lot # CEC810320	512	422	82	60

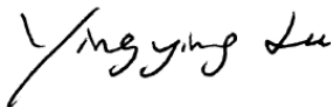
UV-Aging Results

Sample	Initial HP-OIT (min)	HP-OIT Value after UV Aging (min)	% HP-OIT Retained	GRI-GM13 and GRI-GM17 % Retained Requirement
60 mil HDPE Roll # G14F514045 from Marlex® K307 Polyethylene Lot # H71-4-1337	1066	930	87	50
40 mil LLDPE Roll # G14C243027 from Marlex® 7104 Polyethylene Lot # CEC810320	512	351	69	35

According to these test results, the durability requirements are met.

If you have any questions, please call me at 918-977-6894.

Sincerely,



Yingying Lu, Ph. D.

Polyethylene Technical Service and Applications Development

*Any technical advice, recommendations, results, or analysis ("Information") contained herein, including, without limitation, Information as it may relate to the selection of a specific product ("Product") for your use and application, is given **without warranty or guarantee** and is accepted at your sole risk. It is imperative that you test the Information (and Product, if applicable) to determine to your own satisfaction whether the Information (and Product, if applicable) are suitable for your intended use and application. **You expressly assume, and release Chevron Phillips Chemical Company, from all risk and liability, whether based in contract, tort or otherwise, in connection with the use of, or results obtained from, such Information (and Product, if applicable).***



Cust: Southwest Liner Systems, Inc.
 PO#: SW1803 Sundance West Surface Waste Facility
 Dest: Eunice, NM

Doc#: 40171

roll #	width	English length	area				
				check weld rod qty (if ordered)		wgt	resin lot #
	ft.	ft.	ft²			lbs.	

	16 rolls 60HD SS micro (560)	206,080 ft²
FG-HDSMTH060BBBEA	8 rolls 60HD smooth (600)	110,400 ft²
	2 rolls 60HD smooth-cond. (600)	27,600 ft²
	22 rolls 200net (300)	95,700 ft²
	1 roll 60HD micro (540)	12,420 ft²

TRI-TX: waiting on conformance instructions

F18C000786	23	600	13,800	FG-HDSMTH060BBBEA	8tot 1	4134	1 FT	17L1011
F18C000787	23	600	13,800	FG-HDSMTH060BBBEA	8tot 2	4148		17L1011
F18C000788	23	600	13,800	FG-HDSMTH060BBBEA	8tot 3	4148		17L1011
F18C000789	23	600	13,800	FG-HDSMTH060BBBEA	8tot 4	4126		17L1011
F18C000790	23	600	13,800	FG-HDSMTH060BBBEA	8tot 5	4122		17L1011
F18C000791	23	600	13,800	FG-HDSMTH060BBBEA	8tot 6	4152		17L1011
F18C000792	23	600	13,800	FG-HDSMTH060BBBEA	8tot 7	4134		17L1011
F18C000794	23	600	13,800	FG-HDSMTH060BBBEA	8tot 8	4216		17L1011

110,400
running total

F18B000015	23	560	12,880	FG-HDSMTH060BBCEA	2tot 1	4260	FULL	HHN821710
F18B000016	23	560	12,880	FG-HDSMTH060BBCEA	2tot 2	4320	list in	HHN821710

25,760
total for order



quality certificate

ROLL #: F18B000015**LOT #: HHN821710****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	68 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.6 mm	63 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						205 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.27
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	23 N/mm	134	ppi	2232 psi
		TD	27 N/mm	155	ppi	2576 psi
	Average Strength @ Break	MD	45 N/mm	257	ppi	4285 psi
		TD	50 N/mm	286	ppi	4772 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				15 %
		TD				15 %
	Average Elongation @Break	MD				711 %
		TD				885 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		235.7	N	53 lbs.
		TD		222.4	N	50 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			604.9	N	136 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/22/2018 OA#: 40171

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18B000016**LOT #: HHN821710****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	68 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.6 mm	64 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						205 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.27
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	23 N/mm	134	ppi	2232 psi
		TD	27 N/mm	155	ppi	2576 psi
	Average Strength @ Break	MD	45 N/mm	257	ppi	4285 psi
		TD	50 N/mm	286	ppi	4772 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				15 %
		TD				15 %
	Average Elongation @Break	MD				711 %
		TD				885 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		235.7	N	53 lbs.
		TD		222.4	N	50 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			604.9	N	136 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/22/2018 OA#: 40171

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18C000786**LOT #: 17L1011****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	65 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.947 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.21
Grade: DF3712A						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	27 N/mm	155	ppi	2580 psi
		TD	29 N/mm	163	ppi	2717 psi
	Average Strength @ Break	MD	50 N/mm	287	ppi	4781 psi
		TD	50 N/mm	288	ppi	4794 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				16 %
	Average Elongation @Break	MD				792 %
		TD				892 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		231.3	N	52 lbs.
		TD		213.5	N	48 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			573.8	N	129 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/21/2018 OA#: 40171

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18C000787**LOT #: 17L1011****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	56 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	63 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.947 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.21
Grade: DF3712A						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	27 N/mm	155	ppi	2580 psi
		TD	29 N/mm	163	ppi	2717 psi
	Average Strength @ Break	MD	50 N/mm	287	ppi	4781 psi
		TD	50 N/mm	288	ppi	4794 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				16 %
	Average Elongation @Break	MD				792 %
		TD				892 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		231.3	N	52 lbs.
		TD		213.5	N	48 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			573.8	N	129 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **2/21/2018** OA#: **40171**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18C000788**LOT #: 17L1011****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	66 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.947 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.21
Grade: DF3712A						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	27 N/mm	155	ppi	2580 psi
		TD	29 N/mm	163	ppi	2717 psi
	Average Strength @ Break	MD	50 N/mm	287	ppi	4781 psi
		TD	50 N/mm	288	ppi	4794 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				18 %
		TD				16 %
	Average Elongation @Break	MD				792 %
		TD				892 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		231.3	N	52 lbs.
		TD		213.5	N	48 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			573.8	N	129 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/21/2018 OA#: 40171

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F18C000789**

LOT #: **17L1011**

LINER TYPE:

60 HD SMOOTH

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.6 mm	64 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes
Specific Gravity	Average Density					.945 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.21
Grade: DF3712A						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	146	ppi	2437 psi
		TD	27 N/mm	154	ppi	2562 psi
	Average Strength @ Break	MD	47 N/mm	268	ppi	4460 psi
		TD	49 N/mm	279	ppi	4642 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17 %
		TD				15 %
	Average Elongation @Break	MD				765 %
		TD				881 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		222.4	N	50 lbs.
		TD		209.1	N	47 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			573.8	N	129 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **2/21/2018** OA#: **40171**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18C000790**LOT #: 17L1011****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH			METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:		1.52 mm	60 mil
Measurement				Length:		182.880 m	600 feet
ASTM D5199	MAX:	1.7 mm	65 mil	Width:		7.01 m	23 feet
(Modified)	AVE:	1.5 mm	60 mil				
OIT(Standard) ASTM D 3895				217 minutes			
Specific Gravity	Average Density			.945 g/cc			
ASTM D792							
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min			.21			
Grade: DF3712A							
Carbon Black Content ASTM D4218	Range			2.5 %			
Carbon Black Dispersion ASTM D5596	Category			10 in Category 1			
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	146	ppi	2437	psi
		TD	27 N/mm	154	ppi	2562	psi
	Average Strength @ Break	MD	47 N/mm	268	ppi	4460	psi
		TD	49 N/mm	279	ppi	4642	psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17	%
		TD				15	%
	Average Elongation @Break	MD				765	%
		TD				881	%
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		222.4	N	50	lbs.
		TD		209.1	N	47	lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			573.8	N	129	lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/21/2018 OA#: 40171

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F18C000791**

LOT #: **17L1011**

LINER TYPE:

60 HD SMOOTH

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	65 mil	Length:	182.880 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						217 minutes

Specific Gravity	Average Density	.945 g/cc
ASTM D792		

MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min	.21
Grade: DF3712A		

Carbon Black Content ASTM D4218	Range	2.5 %
---------------------------------	-------	-------

Carbon Black Dispersion ASTM D5596	Category	10 in Category 1
------------------------------------	----------	------------------

Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	146 ppi	2437 psi
		TD	27 N/mm	154 ppi	2562 psi
	Average Strength @ Break	MD	47 N/mm	268 ppi	4460 psi
		TD	49 N/mm	279 ppi	4642 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			17 %
		TD			15 %
	Average Elongation @Break	MD			765 %
		TD			881 %

Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD	222.4 N	50 lbs.
		TD	209.1 N	47 lbs.

Puncture Resistance ASTM D4833 (Modified)	Average Peak Load	573.8 N	129 lbs.
--	-------------------	---------	----------

Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%	500 Hrs.	ONGOING
---	-----------------	----------	---------

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **2/21/2018** OA#: **40171**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18C000792**LOT #: 17L1011****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH			METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil	
Measurement							
ASTM D5199	MAX:	1.7 mm	65 mil	Length:	182.880 m	600 feet	
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet	
OIT(Standard) ASTM D 3895						217 minutes	
Specific Gravity	Average Density					.945 g/cc	
ASTM D792							
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.21	
Grade: DF3712A							
Carbon Black Content ASTM D4218	Range					2.5 %	
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1	
Tensile Strength	Average Strength @ Yield	MD	26 N/mm	146 ppi	2437 psi		
		TD	27 N/mm	154 ppi	2562 psi		
		MD	47 N/mm	268 ppi	4460 psi		
		TD	49 N/mm	279 ppi	4642 psi		
ASTM D6693	Average Strength @ Break	MD					
		TD					
		MD					
		TD					
(2 inches / minute)	Average Elongation @ Yield	MD					
		TD					
		MD					
		TD					
Tensile Elongation	Average Elongation @ Break	MD					
		TD					
		MD					
		TD					
ASTM D6693	Average Elongation @ Yield	MD					
		TD					
(2 inches / minute)	Average Elongation @ Break	MD					
		TD					
Lo = 1.3" Yield	Average Elongation @Break	MD					
		TD					
Lo = 2.0" Break		MD					
		TD					
Tear Resistance	Average Tear Resistance	MD		222.4 N	50 lbs.		
		TD		209.1 N	47 lbs.		
ASTM D1004 (Modified)							
Puncture Resistance	Average Peak Load				573.8 N	129 lbs.	
ASTM D4833 (Modified)							
Notched Constant Tensile Load	Pass/Fail @ 30%				500 Hrs.	ONGOING	
ASTM D5397							

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/21/2018 OA#: 40171

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18C000794**LOT #: 17L1011****LINER TYPE:****60 HD SMOOTH**

		METRIC	ENGLISH			METRIC	ENGLISH
Thickness	MIN:	1.5 mm	59 mil	Thickness:		1.52 mm	60 mil
Measurement				Length:		182.880 m	600 feet
ASTM D5199	MAX:	1.7 mm	67 mil	Width:		7.01 m	23 feet
(Modified)	AVE:	1.6 mm	61 mil				
OIT(Standard) ASTM D 3895							217 minutes
Specific Gravity	Average Density						.944 g/cc
ASTM D792							
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min						.21
Grade: DF3712A							
Carbon Black Content ASTM D4218	Range						2.6 %
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	27 N/mm	154	ppi	2565	psi
		TD	29 N/mm	164	ppi	2726	psi
	Average Strength @ Break	MD	47 N/mm	268	ppi	4474	psi
		TD	50 N/mm	285	ppi	4752	psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17	%
		TD				16	%
	Average Elongation @Break	MD				728	%
		TD				883	%
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		226.8	N	51	lbs.
		TD		213.5	N	48	lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			582.7	N	131	lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/22/2018 OA#: 40171

Signature:


Maria Coffey

Quality Control Department

Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 EAST NEWLANDS
FERNLEY NV 89408
USA

Recipient: PALMER
Fax:

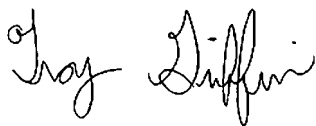
Delivery #: 89587636
PO #: 012407
Weight: 180700.000 LB
Ship Date: 01/05/2018
Package: BULK
Mode: Hopper Car
Car #: CHVX896833
Seal No: 92136

Product:
MARLEX K307 POLYETHYLENE in Bulk

Lot Number: HHN821710

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.27	g/10min
HLMI Flow Rate	ASTM D1238	24	g/10min
Density	D1505 or D4883	0.937	g/cm3
Pellet Count	P02.08.03	29	pelet/gram
Production Date		12/30/2017	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Troy Griffin
Quality Systems Coordinator

For CoA questions contact Patricia Royall at +1-832-813-4806



Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS

201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT

TX 77978

PHONE: (888) FPCUSA3

Certificate of Analysis (CONFIDENTIAL)

CUSTOMER: AGRU/AMERICA, INC.
2000 EAST NEWLANDS DRIVE
FERNLEY NV 89408
PRODUCT : DF3721A
RAILCAR FPAX980127

S/O NO : ET1A230
CUSTOMER PO : 012385
DATE SHIPPED: 1/09/18
LOT NO : 17L1011
WEIGHT (LB) : 163,350.00
CUSTID: FT03888 SPIDM1

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index, g/10min	ASTM D1238	.19
HLMI, g/10 min.	ASTM D1238	21.4
Density, g/cm3	ASTM D1505	.9382

Linda Kao

QC SUPERVISOR: LINDA KAO



Vergil H. Rhodes, PE, CPlasT - Tech Svc & App Dev Engineer, Geomembranes
Highways 60 & 123, Bartlesville Research and Technology Center, Room 103 PTC
Bartlesville, OK 74003
■ 918-977-4229 ■ rhodevh@cpchem.com ■ Fax: 918-977-7599 ■ www.cpchem.com

October 31, 2017

Filename: Agru Oven and QUV Exposure Testing_103117.pdf

Nathan Ivy - Corporate Quality Control/Technical Manager
Agru America, Inc.
800 Rockmead #122
Kingwood, TX 77339
281-358-4741

Dear Mr. Ivy:

Please recall your request for testing of oven-exposed and UV-exposed geomembrane samples produced primarily from Marlex® 7104 LLDPE and Marlex® K307 HDPE. Agru blended other components with each of these polyethylenes to produce the geomembrane samples for testing. Smooth geomembrane samples have been received from Agru and test results are reported below. The samples were tested for HP-OIT in their as-received condition, and were also tested after oven and UV exposures of 90 days and 1600 hours of irradiance, respectively, in accordance with GRI-GM13 and GRI-GM17.

The following geomembrane sheet samples were received from Agru in mid-June 2017 and were reported to be primarily composed of each of the Chevron Phillips Chemical Company grades in the description below:

- K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick.
- 7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick.

Exposure and testing conditions, along with the test results are tabulated on the next page. GM-13 and GM-17 require minimum % HP-OIT retention after a 90-day oven exposure and after a 1600 hour UV irradiance exposure. These test results indicate these GM-13 and GM-17 minimum % HP-OIT retentions were exceeded by these Agru-supplied K307 and 7104 sheet samples, respectively.

If you have any questions, please feel free to contact me (contact information given above).

Sincerely,

Vergil Rhodes
Polyethylene Technical Service and Applications Development, Geomembrane

NOTICES

Technical Information - By using any Technical Information contained herein, Recipient agrees that said Technical Information is given by CPChem for convenience only, without any warranty or guarantee of any kind, and is accepted and used at your sole risk. Recipients are encouraged to verify independently any such information to their reasonable satisfaction. As used in this paragraph, "Technical Information" includes any technical advice, recommendations, testing, or analysis, including, without limitation, information as it may relate to the selection of a product for a specific use and application.



GEOMEMBRANE TEST RESULTS

TRI Client: Agru America
Project: Geomembrane Testing

Material: Agru 60 mil Smooth HDPE Geomembrane
Sample Identification: Formosa - HDPE , Resin DF3721A
TRI Log #: E2339-36-07 April 19, 2010

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.	
	1	2	3	4	5	6	7	8	9	10				
UV Resistance (GRI GM 13)														
The resistance to degradation due to exposure to ultraviolet light and moisture was determined in accordance with GRI-GM11, Accelerated Weathering of Geomembranes Using a Fluorescent UVA Device. This standard covers the basic principles for using the QUV apparatus to accelerate the weathering of geomembranes using UVA bulbs and condensation. To comply with Specification GRI GM13, the sample was exposed to 1600 hours of UV exposure composed of 80 cycles of UA at 75 C for 20 hours followed by condensation at 60 C for 4 hours. The High Pressure Oxidative Induction Time (HPOIT) was evaluated before and after the exposure and results were as follows.														
HPOIT (minutes) - Baseline		1201										1201		PERCENT RETAINED
HPOIT (minutes) - After QUV Aging		1010										1010		
Note: No surface cracking was observed.														
Oven Aging (ASTM D 5721)														
The geomembrane was exposed to 90 days of elevated temperature exposure in an air oven maintained at 85°C ± 0.5°C in accordance with ASTM D 5721-95, Standard Practice for Air-Oven Aging of Polyolefin Geomembranes. Oxidative Induction Time (OIT) was tested for after exposure and compared to values generated for unexposed material. The results are provided below.														
HPOIT (minutes) - Baseline		1201										1201		PERCENT
HPOIT (minutes) - After QUV Aging		1114										1114		
Note: No surface cracking was observed.														
MD Machine Direction				TD Transverse Direction				NA Not Available						

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



Formosa Plastics®

Formosa Plastics Corporation, U.S.A.
9 Peach Tree Hill Road
Livingston, NJ 07039
Telephone: (973)-992-2090
Fax: (973)-992-9627

February 1, 2018

Grant Palmer
Materials Manager
AGRU America, Inc.
500 Garrison Road
Georgetown, South Carolina 29440 USA

Dear Mr. Palmer,

Formosa Plastics Corporation U.S.A. (Formosa) is a leading producer of Polyethylene in North America. Formolene® HL3721 is a geomembrane medium density polyethylene resin that is produced on our HDPE II Plant in Point Comfort, Texas. Formolene® HL3721 prior to January of 2018 was sold as Formolene® DF3721A. The two resins are one in the same and are equivalent.

If you have any questions, please do not hesitate to contact your salesperson or myself. Thank you.

Sincerely,

Yonas Kebede
Global Marketing Coordinator

The following oven aging and UV exposure test methods were conducted in accordance with the GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) requirements:

Test Name	Exposure Conditions	Test Method
Oven Aging	90 days in an oven at 85 °C	ASTM D5721
UV Exposure	1600 UV irradiance hours. Cycle: 20 hours UVA-340 at 75 °C followed by 4 hours dark with condensation at 60 °C. Irradiance was 0.78 W/m ² at wavelength 340 nm. Note: This implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of dark/condensation.	ASTM D7238
HP-OIT	150 °C in an oxygen atmosphere at 500 psi	ASTM D5885

Oven Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 90 days of oven aging. (min)	% HP-OIT Retained after 90 days of oven aging.	GRI-GM13 and GRI-GM17 minimum % HP-OIT retained after 90 days of oven aging.
K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick	1264	1123	89	GRI-GM13: 80 minimum
7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick	550	508	92	GRI-GM17: 60 minimum

UV Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 1600 hrs of UV exposure. (min)	% HP-OIT Retained after 1600 hrs of UV exposure.	GRI-GM13 and GRI-GM17 minimum % HP-OIT retained after 1600 hrs of UV exposure.
K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick	1264	1024	81	GRI-GM13: 50 minimum
7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick	550	470	85	GRI-GM17: 35 minimum

Note: 1600 hours of UV exposure in accordance with ASTM D7238 implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of darkness with condensation.

NOTICES

Technical Information - By using any Technical Information contained herein, Recipient agrees that said Technical Information is given by CPChem for convenience only, without any warranty or guarantee of any kind, and is accepted and used at your sole risk. Recipients are encouraged to verify independently any such information to their reasonable satisfaction. As used in this paragraph, "Technical Information" includes any technical advice, recommendations, testing, or analysis, including, without limitation, information as it may relate to the selection of a product for a specific use and application.



Cust: Southwest Liner Systems, Inc.
 PO#: SW1728 Sundance West Surface Waste Facility
 Dest: Eunice, NM

Doc#: 38616

56 rolls 60HD smooth (600)	772,800	ft ²
31 rolls 60HD SS micro (560)	399,280	ft ²
2 rolls 60HD micro	24,840	ft ²
40 rolls 60HD smooth-cond. (600) (SC)	552,000	ft ²
177 rolls 200 Geonet (300) (SC)	769,950	ft ²
		ft ²

roll #	width	length	area	check weld rod qty (if ordered)	wgt	resin lot #
	ft.	ft.	ft ² .		lbs.	

1FT FROM END OF ROLLS 1, 8, 15, 22, 29, 37, 44, 51

100K / LOT SQS TRITX U2

G17C004054	23	600	13,800	60HD smooth-cond.	40tot	1	4492	*1ft	HHK820810
G17C004055	23	600	13,800	60HD smooth-cond.	40tot	2	4514		HHK820810
G17C004056	23	600	13,800	60HD smooth-cond.	40tot	3	4496		HHK820810
G17C004057	23	600	13,800	60HD smooth-cond.	40tot	4	4540		HHK820810
G17C004058	23	600	13,800	60HD smooth-cond.	40tot	5	4540		HHK820810
G17C004059	23	600	13,800	60HD smooth-cond.	40tot	6	4544		HHK820810
G17C004060	23	600	13,800	60HD smooth-cond.	40tot	7	4396		HHK820810
G17C004061	23	600	13,800	60HD smooth-cond.	40tot	8	4528	*1FT	HHK820810
G17C004062	23	600	13,800	60HD smooth-cond.	40tot	9	4531		HHK820810
G17C004063	23	600	13,800	60HD smooth-cond.	40tot	10	4316		HHK820810
G17C004064	23	600	13,800	60HD smooth-cond.	40tot	11	4434		HHK820810
G17C004065	23	600	13,800	60HD smooth-cond.	40tot	12	4372		HHK820810
G17C004066	23	600	13,800	60HD smooth-cond.	40tot	13	4326		HHK820810
G17C004067	23	600	13,800	60HD smooth-cond.	40tot	14	4480		HHK820810
G17C004068	23	600	13,800	60HD smooth-cond.	40tot	15	4412	*1FT	HHK820810
G17C004069	23	600	13,800	60HD smooth-cond.	40tot	16	4420		HHK820810
G17C004070	23	600	13,800	60HD smooth-cond.	40tot	17	4424		HHK820810
G17C004071	23	600	13,800	60HD smooth-cond.	40tot	18	4442		HHK820810
G17C004072	23	600	13,800	60HD smooth-cond.	40tot	19	4410		HHK820810
G17C004073	23	600	13,800	60HD smooth-cond.	40tot	20	4362		HHK820810
G17C004075	23	600	13,800	60HD smooth-cond.	40tot	21	4366		HHK820810
G17C004077	23	600	13,800	60HD smooth-cond.	40tot	22	4340	*1FT	HHK820810
G17C004078	23	600	13,800	60HD smooth-cond.	40tot	23	4336		HHK820810
G17C004083	23	600	13,800	60HD smooth-cond.	40tot	24	4402		HHK820810
G17C004084	23	600	13,800	60HD smooth-cond.	40tot	25	4282		HHK820810
G17C004085	23	600	13,800	60HD smooth-cond.	40tot	26	4287		HHK820810
G17C004086	23	600	13,800	60HD smooth-cond.	40tot	27	4280		HHK820810
G17C004087	23	600	13,800	60HD smooth-cond.	40tot	28	4302		HHK820810
G17C004088	23	600	13,800	60HD smooth-cond.	40tot	29	4294	*1 FT	HHK820810
G17C004089	23	600	13,800	60HD smooth-cond.	40tot	30	4264		HHK820810
G17C004090	23	600	13,800	60HD smooth-cond.	40tot	31	4250		HHK820810
G17C004091	23	600	13,800	60HD smooth-cond.	40tot	32	4290		HHK820810
G17C004092	23	600	13,800	60HD smooth-cond.	40tot	33	4266		HHK820810
G17C004093	23	600	13,800	60HD smooth-cond.	40tot	34	4260		HHK820810
G17C004094	23	600	13,800	60HD smooth-cond.	40tot	35	4280		HHK820810
G17C004095	23	600	13,800	60HD smooth-cond.	40tot	36	4270		HHK820810
G17C004096	23	600	13,800	60HD smooth-cond.	40tot	37	4278	1 FT	HHK820810
G17C004097	23	600	13,800	60HD smooth-cond.	40tot	38	4284		HHK820810
G17C004098	23	600	13,800	60HD smooth-cond.	40tot	39	4298		HHK820810
G17C004099	23	600	13,800	60HD smooth-cond.	40tot	40	4290		HHK820810

552,000
 total for order



quality certificate

ROLL #: **G17C004054**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH			METRIC	ENGLISH
Thickness Measurement ASTM D5199 (Modified)	MIN:	1.4 mm	55 mil	Thickness:	1.52 mm	60 mil	
	MAX:	1.8 mm	69 mil		Length: 182.882 m	600 feet	
	AVE:	1.6 mm	62 mil		Width: 7.01 m	23 feet	
OIT(Standard) ASTM D 3895						176 minutes	
Specific Gravity ASTM D792		Average Density				.946 g/cc	
MFI ASTM D1238 COND. E Grade: K307		Melt Flow Index 190C/2160 g - g/10 min				.23	
Carbon Black Content ASTM D4218		Range				2.3 %	
Carbon Black Dispersion ASTM D5596		Category				10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	29 N/mm	168 ppi	2728 psi		
		TD	32 N/mm	182 ppi	2937 psi		
	Average Strength @ Break	MD	44 N/mm	252 ppi	4126 psi		
		TD	52 N/mm	295 ppi	4762 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			16 %		
		TD			15 %		
	Average Elongation @Break	MD			779 %		
		TD			896 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7 N	64 lbs.		
		TD		280.2 N	63 lbs.		
Puncture Resistance ASTM D4833 (Modified)		Average Peak Load				582.7 N	131 lbs.
Notched Constant Tensile Load ASTM D5397		Pass/Fail @ 30%				500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/3/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004055**

LOT #: **HHK820810**

LINER TYPE:

60 HD SMOOTH COND.

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.9 mm	73 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	64 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.3 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	29 N/mm	168	ppi	2728 psi
		TD	32 N/mm	182	ppi	2937 psi
	Average Strength @ Break	MD	44 N/mm	252	ppi	4126 psi
		TD	52 N/mm	295	ppi	4762 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				16 %
		TD				15 %
	Average Elongation @Break	MD				779 %
		TD				896 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64 lbs.
		TD		280.2	N	63 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			582.7	N	131 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/3/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004056**

LOT #: **HHK820810**

LINER TYPE:

60 HD SMOOTH COND.

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	59 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.9 mm	73 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.7 mm	65 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.4 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	29 N/mm	168	ppi	2728 psi
		TD	32 N/mm	182	ppi	2937 psi
	Average Strength @ Break	MD	44 N/mm	252	ppi	4126 psi
		TD	52 N/mm	295	ppi	4762 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				16 %
		TD				15 %
	Average Elongation @Break	MD				779 %
		TD				896 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64 lbs.
		TD		280.2	N	63 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			582.7	N	131 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/3/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004057**

LOT #: **HHK820810**

LINER TYPE:

60 HD SMOOTH COND.

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.9 mm	74 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.7 mm	65 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.4 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	29 N/mm	168	ppi	2728 psi
		TD	32 N/mm	182	ppi	2937 psi
	Average Strength @ Break	MD	44 N/mm	252	ppi	4126 psi
		TD	52 N/mm	295	ppi	4762 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				16 %
		TD				15 %
	Average Elongation @Break	MD				779 %
		TD				896 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64 lbs.
		TD		280.2	N	63 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			582.7	N	131 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/3/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004058**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH			METRIC	ENGLISH
Thickness Measurement ASTM D5199 (Modified)	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil	
	MAX:	1.9 mm	73 mil		Length:	182.882 m	600 feet
	AVE:	1.7 mm	65 mil		Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes	
Specific Gravity ASTM D792		Average Density				.946 g/cc	
MFI ASTM D1238 COND. E Grade: K307		Melt Flow Index 190C/2160 g - g/10 min				.23	
Carbon Black Content ASTM D4218		Range				2.4 %	
Carbon Black Dispersion ASTM D5596		Category				10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	29 N/mm	168 ppi	2728 psi		
		TD	32 N/mm	182 ppi	2937 psi		
	Average Strength @ Break	MD	44 N/mm	252 ppi	4126 psi		
		TD	52 N/mm	295 ppi	4762 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			16 %		
		TD			15 %		
	Average Elongation @Break	MD			779 %		
		TD			896 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7 N	64 lbs.		
		TD		280.2 N	63 lbs.		
Puncture Resistance ASTM D4833 (Modified)		Average Peak Load				582.7 N	131 lbs.
Notched Constant Tensile Load ASTM D5397		Pass/Fail @ 30%				500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/3/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: G17C004059**LOT #: HHK820810****LINER TYPE:****60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	59 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.9 mm	74 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.7 mm	66 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.4 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	32 N/mm	182	ppi	2770 psi
		TD	32 N/mm	183	ppi	2835 psi
	Average Strength @ Break	MD	49 N/mm	282	ppi	4296 psi
		TD	51 N/mm	289	ppi	4470 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17 %
		TD				15 %
	Average Elongation @Break	MD				740 %
		TD				830 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64 lbs.
		TD		280.2	N	63 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			582.7	N	131 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/3/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004060**

LOT #: **HHK820810**

LINER TYPE:

60 HD SMOOTH COND.

		METRIC	ENGLISH			METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:		1.52 mm	60 mil
Measurement							
ASTM D5199	MAX:	1.9 mm	73 mil	Length:		182.882 m	600 feet
(Modified)	AVE:	1.7 mm	65 mil	Width:		7.01 m	23 feet
OIT(Standard) ASTM D 3895							176 minutes
Specific Gravity	Average Density						.946 g/cc
ASTM D792							
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min						.23
Grade: K307							
Carbon Black Content ASTM D4218	Range						2.4 %
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	32 N/mm	182	ppi	2770	psi
		TD	32 N/mm	183	ppi	2835	psi
	Average Strength @ Break	MD	49 N/mm	282	ppi	4296	psi
		TD	51 N/mm	289	ppi	4470	psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17	%
		TD				15	%
	Average Elongation @Break	MD				740	%
		TD				830	%
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64	lbs.
		TD		280.2	N	63	lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			582.7	N	131	lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/3/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004061**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.8 mm	71 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	63 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.4 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	32 N/mm	182	ppi	2770 psi
		TD	32 N/mm	183	ppi	2835 psi
	Average Strength @ Break	MD	49 N/mm	282	ppi	4296 psi
		TD	51 N/mm	289	ppi	4470 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17 %
		TD				15 %
	Average Elongation @Break	MD				740 %
		TD				830 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64 lbs.
		TD		280.2	N	63 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			582.7	N	131 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/3/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004062**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.8 mm	72 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	63 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.1 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	32 N/mm	182	ppi	2770 psi
		TD	32 N/mm	183	ppi	2835 psi
	Average Strength @ Break	MD	49 N/mm	282	ppi	4296 psi
		TD	51 N/mm	289	ppi	4470 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17 %
		TD				15 %
	Average Elongation @Break	MD				740 %
		TD				830 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64 lbs.
		TD		280.2	N	63 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			582.7	N	131 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/3/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004063**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	56 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.8 mm	69 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.1 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	32 N/mm	182	ppi	2770 psi
		TD	32 N/mm	183	ppi	2835 psi
	Average Strength @ Break	MD	49 N/mm	282	ppi	4296 psi
		TD	51 N/mm	289	ppi	4470 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17 %
		TD				15 %
	Average Elongation @Break	MD				740 %
		TD				830 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64 lbs.
		TD		280.2	N	63 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			582.7	N	131 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/3/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004064**

LOT #: **HHK820810**

LINER TYPE:

60 HD SMOOTH COND.

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	55 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.9 mm	73 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	31 N/mm	179	ppi	2834 psi
		TD	32 N/mm	185	ppi	2796 psi
	Average Strength @ Break	MD	51 N/mm	292	ppi	4635 psi
		TD	51 N/mm	289	ppi	4367 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				16 %
		TD				13 %
	Average Elongation @Break	MD				785 %
		TD				821 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64 lbs.
		TD		271.3	N	61 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			618.3	N	139 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/3/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004065**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	59 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.9 mm	73 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.7 mm	65 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	31 N/mm	179	ppi	2834 psi
		TD	32 N/mm	185	ppi	2796 psi
	Average Strength @ Break	MD	51 N/mm	292	ppi	4635 psi
		TD	51 N/mm	289	ppi	4367 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				16 %
		TD				13 %
	Average Elongation @Break	MD				785 %
		TD				821 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64 lbs.
		TD		271.3	N	61 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			618.3	N	139 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/3/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: G17C004066**LOT #: HHK820810****LINER TYPE:****60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.8 mm	71 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	31 N/mm	179	ppi	2834 psi
		TD	32 N/mm	185	ppi	2796 psi
	Average Strength @ Break	MD	51 N/mm	292	ppi	4635 psi
		TD	51 N/mm	289	ppi	4367 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				16 %
		TD				13 %
	Average Elongation @Break	MD				785 %
		TD				821 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64 lbs.
		TD		271.3	N	61 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			618.3	N	139 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/3/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004067**

LOT #: **HHK820810**

LINER TYPE:

60 HD SMOOTH COND.

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	55 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.8 mm	71 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	31 N/mm	179	ppi	2834 psi
		TD	32 N/mm	185	ppi	2796 psi
	Average Strength @ Break	MD	51 N/mm	292	ppi	4635 psi
		TD	51 N/mm	289	ppi	4367 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				16 %
		TD				13 %
	Average Elongation @Break	MD				785 %
		TD				821 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64 lbs.
		TD		271.3	N	61 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			618.3	N	139 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/3/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004068**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.8 mm	70 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	63 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	31 N/mm	179	ppi	2834 psi
		TD	32 N/mm	185	ppi	2796 psi
	Average Strength @ Break	MD	51 N/mm	292	ppi	4635 psi
		TD	51 N/mm	289	ppi	4367 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				16 %
		TD				13 %
	Average Elongation @Break	MD				785 %
		TD				821 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64 lbs.
		TD		271.3	N	61 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			618.3	N	139 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/3/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004069**

LOT #: **HHK820810**

LINER TYPE:

60 HD SMOOTH COND.

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.8 mm	70 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	64 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.8 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	30 N/mm	174	ppi	2754 psi
		TD	31 N/mm	176	ppi	2792 psi
	Average Strength @ Break	MD	51 N/mm	292	ppi	4619 psi
		TD	51 N/mm	291	ppi	4602 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17 %
		TD				15 %
	Average Elongation @Break	MD				798 %
		TD				857 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64 lbs.
		TD		271.3	N	61 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			618.3	N	139 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/3/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004070**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.8 mm	72 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	64 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.8 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	30 N/mm	174	ppi	2754 psi
		TD	31 N/mm	176	ppi	2792 psi
	Average Strength @ Break	MD	51 N/mm	292	ppi	4619 psi
		TD	51 N/mm	291	ppi	4602 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17 %
		TD				15 %
	Average Elongation @Break	MD				798 %
		TD				857 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64 lbs.
		TD		271.3	N	61 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			618.3	N	139 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/3/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004071**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.8 mm	72 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.7 mm	65 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.8 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	30 N/mm	174	ppi	2754 psi
		TD	31 N/mm	176	ppi	2792 psi
	Average Strength @ Break	MD	51 N/mm	292	ppi	4619 psi
		TD	51 N/mm	291	ppi	4602 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17 %
		TD				15 %
	Average Elongation @Break	MD				798 %
		TD				857 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64 lbs.
		TD		271.3	N	61 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			618.3	N	139 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/3/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004072**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.8 mm	72 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	64 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	30 N/mm	174	ppi	2754 psi
		TD	31 N/mm	176	ppi	2792 psi
	Average Strength @ Break	MD	51 N/mm	292	ppi	4619 psi
		TD	51 N/mm	291	ppi	4602 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17 %
		TD				15 %
	Average Elongation @Break	MD				798 %
		TD				857 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64 lbs.
		TD		271.3	N	61 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			618.3	N	139 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/3/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004073**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.8 mm	71 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	63 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	30 N/mm	174	ppi	2754 psi
		TD	31 N/mm	176	ppi	2792 psi
	Average Strength @ Break	MD	51 N/mm	292	ppi	4619 psi
		TD	51 N/mm	291	ppi	4602 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17 %
		TD				15 %
	Average Elongation @Break	MD				798 %
		TD				857 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		284.7	N	64 lbs.
		TD		271.3	N	61 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			618.3	N	139 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/4/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004075**

LOT #: **HHK820810**

LINER TYPE:

60 HD SMOOTH COND.

		METRIC	ENGLISH			METRIC	ENGLISH
Thickness	MIN:	1.4 mm	54 mil	Thickness:		1.52 mm	60 mil
Measurement							
ASTM D5199	MAX:	1.8 mm	69 mil	Length:		182.882 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:		7.01 m	23 feet
OIT(Standard) ASTM D 3895							176 minutes
Specific Gravity	Average Density						.946 g/cc
ASTM D792							
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min						.23
Grade: K307							
Carbon Black Content ASTM D4218	Range						2.5 %
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	30 N/mm	170	ppi	2576	psi
		TD	30 N/mm	172	ppi	2682	psi
	Average Strength @ Break	MD	47 N/mm	271	ppi	4093	psi
		TD	51 N/mm	291	ppi	4532	psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17	%
		TD				14	%
	Average Elongation @Break	MD				722	%
		TD				850	%
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5	N	57	lbs.
		TD		244.6	N	55	lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				600.5	N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%				500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/4/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004077**

LOT #: **HHK820810**

LINER TYPE:

60 HD SMOOTH COND.

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.8 mm	70 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	30 N/mm	170	ppi	2576 psi
		TD	30 N/mm	172	ppi	2682 psi
	Average Strength @ Break	MD	47 N/mm	271	ppi	4093 psi
		TD	51 N/mm	291	ppi	4532 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17 %
		TD				14 %
	Average Elongation @Break	MD				722 %
		TD				850 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5	N	57 lbs.
		TD		244.6	N	55 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			600.5	N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/4/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004078**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	55 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.8 mm	69 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	63 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	30 N/mm	170	ppi	2576 psi
		TD	30 N/mm	172	ppi	2682 psi
	Average Strength @ Break	MD	47 N/mm	271	ppi	4093 psi
		TD	51 N/mm	291	ppi	4532 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17 %
		TD				14 %
	Average Elongation @Break	MD				722 %
		TD				850 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5	N	57 lbs.
		TD		244.6	N	55 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			600.5	N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/4/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004083**

LOT #: **HHK820810**

LINER TYPE:

60 HD SMOOTH COND.

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.9 mm	73 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	64 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.4 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	30 N/mm	170	ppi	2576 psi
		TD	30 N/mm	172	ppi	2682 psi
	Average Strength @ Break	MD	47 N/mm	271	ppi	4093 psi
		TD	51 N/mm	291	ppi	4532 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17 %
		TD				14 %
	Average Elongation @Break	MD				722 %
		TD				850 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5	N	57 lbs.
		TD		244.6	N	55 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			600.5	N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/5/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004084**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.5 mm	58 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.8 mm	70 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	64 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.4 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	30 N/mm	170	ppi	2576 psi
		TD	30 N/mm	172	ppi	2682 psi
	Average Strength @ Break	MD	47 N/mm	271	ppi	4093 psi
		TD	51 N/mm	291	ppi	4532 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17 %
		TD				14 %
	Average Elongation @Break	MD				722 %
		TD				850 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5	N	57 lbs.
		TD		244.6	N	55 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			600.5	N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/5/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004085**

LOT #: **HHK820810**

LINER TYPE:

60 HD SMOOTH COND.

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	54 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	67 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	27 N/mm	152	ppi	2526 psi
		TD	32 N/mm	180	ppi	2868 psi
	Average Strength @ Break	MD	44 N/mm	252	ppi	4200 psi
		TD	50 N/mm	283	ppi	4508 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				14 %
		TD				15 %
	Average Elongation @Break	MD				741 %
		TD				845 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5	N	57 lbs.
		TD		244.6	N	55 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			600.5	N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/5/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004086**

LOT #: **HHK820810**

LINER TYPE:

60 HD SMOOTH COND.

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	54 mil	Thickness:	1.52 mm	60 mil
Measurement				Length:	182.882 m	600 feet
ASTM D5199	MAX:	1.8 mm	69 mil	Width:	7.01 m	23 feet
(Modified)	AVE:	1.5 mm	60 mil			
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength	Average Strength @ Yield	MD	27 N/mm	152 ppi	2526 psi	
		TD	32 N/mm	180 ppi	2868 psi	
	Average Strength @ Break	MD	44 N/mm	252 ppi	4200 psi	
		TD	50 N/mm	283 ppi	4508 psi	
Tensile Elongation	Average Elongation @ Yield	MD			14 %	
		TD			15 %	
	Average Elongation @Break	MD			741 %	
		TD			845 %	
Tear Resistance	Average Tear Resistance	MD		253.5 N	57 lbs.	
		TD		244.6 N	55 lbs.	
Puncture Resistance	Average Peak Load			600.5 N	135 lbs.	
ASTM D4833 (Modified)						
Notched Constant Tensile Load	Pass/Fail @ 30%			500 Hrs.	ONGOING	
ASTM D5397						

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/5/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004087**

LOT #: **HHK820810**

LINER TYPE:

60 HD SMOOTH COND.

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	55 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	68 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.5 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	27 N/mm	152	ppi	2526 psi
		TD	32 N/mm	180	ppi	2868 psi
	Average Strength @ Break	MD	44 N/mm	252	ppi	4200 psi
		TD	50 N/mm	283	ppi	4508 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				14 %
		TD				15 %
	Average Elongation @Break	MD				741 %
		TD				845 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5	N	57 lbs.
		TD		244.6	N	55 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			600.5	N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/5/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004088**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.8 mm	69 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	27 N/mm	152	ppi	2526 psi
		TD	32 N/mm	180	ppi	2868 psi
	Average Strength @ Break	MD	44 N/mm	252	ppi	4200 psi
		TD	50 N/mm	283	ppi	4508 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				14 %
		TD				15 %
	Average Elongation @Break	MD				741 %
		TD				845 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5	N	57 lbs.
		TD		244.6	N	55 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			600.5	N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/5/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004089**

LOT #: **HHK820810**

LINER TYPE:

60 HD SMOOTH COND.

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	54 mil	Thickness:	1.52 mm	60 mil
Measurement				Length:	182.882 m	600 feet
ASTM D5199	MAX:	1.8 mm	69 mil	Width:	7.01 m	23 feet
(Modified)	AVE:	1.6 mm	62 mil			
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.6 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	27 N/mm	152	ppi	2526 psi
		TD	32 N/mm	180	ppi	2868 psi
	Average Strength @ Break	MD	44 N/mm	252	ppi	4200 psi
		TD	50 N/mm	283	ppi	4508 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				14 %
		TD				15 %
	Average Elongation @Break	MD				741 %
		TD				845 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5	N	57 lbs.
		TD		244.6	N	55 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			600.5	N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/5/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004090**

LOT #: **HHK820810**

LINER TYPE:

60 HD SMOOTH COND.

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	56 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	68 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.8 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	30 N/mm	174	ppi	2798 psi
		TD	33 N/mm	188	ppi	2989 psi
	Average Strength @ Break	MD	48 N/mm	275	ppi	4375 psi
		TD	52 N/mm	299	ppi	4760 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17 %
		TD				15 %
	Average Elongation @Break	MD				723 %
		TD				870 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		275.8	N	62 lbs.
		TD		275.8	N	62 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			636.1	N	143 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/5/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004091**

LOT #: **HHK820810**

LINER TYPE:

60 HD SMOOTH COND.

		METRIC	ENGLISH			METRIC	ENGLISH
Thickness	MIN:	1.4 mm	54 mil	Thickness:		1.52 mm	60 mil
Measurement				Length:		182.882 m	600 feet
ASTM D5199	MAX:	1.8 mm	70 mil	Width:		7.01 m	23 feet
(Modified)	AVE:	1.6 mm	62 mil				
OIT(Standard) ASTM D 3895							176 minutes
Specific Gravity	Average Density						.946 g/cc
ASTM D792							
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min						.23
Grade: K307							
Carbon Black Content ASTM D4218	Range						2.8 %
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	30 N/mm	174	ppi	2798	psi
		TD	33 N/mm	188	ppi	2989	psi
	Average Strength @ Break	MD	48 N/mm	275	ppi	4375	psi
		TD	52 N/mm	299	ppi	4760	psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17	%
		TD				15	%
	Average Elongation @Break	MD				723	%
		TD				870	%
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		275.8	N	62	lbs.
		TD		275.8	N	62	lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			636.1	N	143	lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/5/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: G17C004092**LOT #: HHK820810****LINER TYPE:****60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	55 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	66 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.5 mm	61 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.8 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	30 N/mm	174	ppi	2798 psi
		TD	33 N/mm	188	ppi	2989 psi
	Average Strength @ Break	MD	48 N/mm	275	ppi	4375 psi
		TD	52 N/mm	299	ppi	4760 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				17 %
		TD				15 %
	Average Elongation @Break	MD				723 %
		TD				870 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		275.8	N	62 lbs.
		TD		275.8	N	62 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			636.1	N	143 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/5/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004093**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	67 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.8 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	31 N/mm	175	ppi	2810 psi
		TD	31 N/mm	178	ppi	2846 psi
	Average Strength @ Break	MD	44 N/mm	253	ppi	4086 psi
		TD	44 N/mm	249	ppi	4152 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				16 %
		TD				15 %
	Average Elongation @Break	MD				717 %
		TD				752 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		275.8	N	62 lbs.
		TD		275.8	N	62 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			636.1	N	143 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/6/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004094**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	56 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	67 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.8 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	31 N/mm	175	ppi	2810 psi
		TD	31 N/mm	178	ppi	2846 psi
	Average Strength @ Break	MD	44 N/mm	253	ppi	4086 psi
		TD	44 N/mm	249	ppi	4152 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				16 %
		TD				15 %
	Average Elongation @Break	MD				717 %
		TD				752 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		275.8	N	62 lbs.
		TD		275.8	N	62 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			636.1	N	143 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/6/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004095**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	56 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	68 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	63 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	28 N/mm	158	ppi	2660 psi
		TD	32 N/mm	183	ppi	2971 psi
	Average Strength @ Break	MD	48 N/mm	272	ppi	4575 psi
		TD	46 N/mm	261	ppi	4239 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				16 %
		TD				15 %
	Average Elongation @Break	MD				807 %
		TD				769 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		275.8	N	62 lbs.
		TD		275.8	N	62 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			636.1	N	143 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/6/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004096**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	54 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	67 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	28 N/mm	158	ppi	2660 psi
		TD	32 N/mm	183	ppi	2971 psi
	Average Strength @ Break	MD	48 N/mm	272	ppi	4575 psi
		TD	46 N/mm	261	ppi	4239 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				16 %
		TD				15 %
	Average Elongation @Break	MD				807 %
		TD				769 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		275.8	N	62 lbs.
		TD		275.8	N	62 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			636.1	N	143 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/6/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004097**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	55 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.8 mm	69 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	28 N/mm	158	ppi	2660 psi
		TD	32 N/mm	183	ppi	2971 psi
	Average Strength @ Break	MD	48 N/mm	272	ppi	4575 psi
		TD	46 N/mm	261	ppi	4239 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				16 %
		TD				15 %
	Average Elongation @Break	MD				807 %
		TD				769 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		275.8	N	62 lbs.
		TD		275.8	N	62 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			636.1	N	143 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/6/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004098**

LOT #: **HHK820810**

LINER TYPE: **60 HD SMOOTH COND.**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	54 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.7 mm	68 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	28 N/mm	158	ppi	2660 psi
		TD	32 N/mm	183	ppi	2971 psi
	Average Strength @ Break	MD	48 N/mm	272	ppi	4575 psi
		TD	46 N/mm	261	ppi	4239 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				16 %
		TD				15 %
	Average Elongation @Break	MD				807 %
		TD				769 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		275.8	N	62 lbs.
		TD		275.8	N	62 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			636.1	N	143 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/6/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **G17C004099**

LOT #: **HHK820810**

LINER TYPE:

60 HD SMOOTH COND.

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN:	1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement						
ASTM D5199	MAX:	1.8 mm	69 mil	Length:	182.882 m	600 feet
(Modified)	AVE:	1.6 mm	62 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						176 minutes
Specific Gravity	Average Density					.946 g/cc
ASTM D792						
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min					.23
Grade: K307						
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	28 N/mm	158	ppi	2660 psi
		TD	32 N/mm	183	ppi	2971 psi
	Average Strength @ Break	MD	48 N/mm	272	ppi	4575 psi
		TD	46 N/mm	261	ppi	4239 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD				16 %
		TD				15 %
	Average Elongation @Break	MD				807 %
		TD				769 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		275.8	N	62 lbs.
		TD		275.8	N	62 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			636.1	N	143 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/6/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department

Certificate of Analysis

Shipped To: AGRU AMERICA INC:GEORGETOWN
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

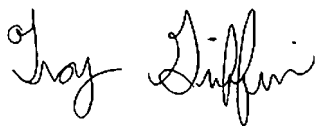
Delivery #: 89549294
PO #: 11965
Weight: 188000.000 LB
Ship Date: 10/24/2017
Package: BULK
Mode: Hopper Car
Car #: CPCX814225
Seal No: 102237

Product:
MARLEX K307 POLYETHYLENE in Bulk

Lot Number: HHK820810

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.23	g/10min
HLMI Flow Rate	ASTM D1238	21	g/10min
Density	D1505 or D4883	0.938	g/cm3
Pellet Count	P02.08.03	30	pelet/gram
Production Date		10/15/2017	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Troy Griffin
Quality Systems Coordinator

For CoA questions contact Patricia Royall at +1832813



Vergil H. Rhodes, PE, CPlasT - Tech Svc & App Dev Engineer, Geomembranes
Highways 60 & 123, Bartlesville Research and Technology Center, Room 103 PTC
Bartlesville, OK 74003
■ 918-977-4229 ■ rhodevh@cpchem.com ■ Fax: 918-977-7599 ■ www.cpchem.com

October 31, 2017

Filename: Agru Oven and QUV Exposure Testing_103117.pdf

Nathan Ivy - Corporate Quality Control/Technical Manager
Agru America, Inc.
800 Rockmead #122
Kingwood, TX 77339
281-358-4741

Dear Mr. Ivy:

Please recall your request for testing of oven-exposed and UV-exposed geomembrane samples produced primarily from Marlex® 7104 LLDPE and Marlex® K307 HDPE. Agru blended other components with each of these polyethylenes to produce the geomembrane samples for testing. Smooth geomembrane samples have been received from Agru and test results are reported below. The samples were tested for HP-OIT in their as-received condition, and were also tested after oven and UV exposures of 90 days and 1600 hours of irradiance, respectively, in accordance with GRI-GM13 and GRI-GM17.

The following geomembrane sheet samples were received from Agru in mid-June 2017 and were reported to be primarily composed of each of the Chevron Phillips Chemical Company grades in the description below:

- K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick.
- 7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick.

Exposure and testing conditions, along with the test results are tabulated on the next page. GM-13 and GM-17 require minimum % HP-OIT retention after a 90-day oven exposure and after a 1600 hour UV irradiance exposure. These test results indicate these GM-13 and GM-17 minimum % HP-OIT retentions were exceeded by these Agru-supplied K307 and 7104 sheet samples, respectively.

If you have any questions, please feel free to contact me (contact information given above).

Sincerely,

Vergil Rhodes
Polyethylene Technical Service and Applications Development, Geomembrane

NOTICES

Technical Information - By using any Technical Information contained herein, Recipient agrees that said Technical Information is given by CPChem for convenience only, without any warranty or guarantee of any kind, and is accepted and used at your sole risk. Recipients are encouraged to verify independently any such information to their reasonable satisfaction. As used in this paragraph, "Technical Information" includes any technical advice, recommendations, testing, or analysis, including, without limitation, information as it may relate to the selection of a product for a specific use and application.

The following oven aging and UV exposure test methods were conducted in accordance with the GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) requirements:

Test Name	Exposure Conditions	Test Method
Oven Aging	90 days in an oven at 85 °C	ASTM D5721
UV Exposure	1600 UV irradiance hours. Cycle: 20 hours UVA-340 at 75 °C followed by 4 hours dark with condensation at 60 °C. Irradiance was 0.78 W/m ² at wavelength 340 nm. Note: This implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of dark/condensation.	ASTM D7238
HP-OIT	150 °C in an oxygen atmosphere at 500 psi	ASTM D5885

Oven Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 90 days of oven aging. (min)	% HP-OIT Retained after 90 days of oven aging.	GRI-GM13 and GRI-GM17 minimum % HP-OIT retained after 90 days of oven aging.
K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick	1264	1123	89	GRI-GM13: 80 minimum
7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick	550	508	92	GRI-GM17: 60 minimum

UV Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 1600 hrs of UV exposure. (min)	% HP-OIT Retained after 1600 hrs of UV exposure.	GRI-GM13 and GRI-GM17 minimum % HP-OIT retained after 1600 hrs of UV exposure.
K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick	1264	1024	81	GRI-GM13: 50 minimum
7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick	550	470	85	GRI-GM17: 35 minimum

Note: 1600 hours of UV exposure in accordance with ASTM D7238 implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of darkness with condensation.

NOTICES

Technical Information - By using any Technical Information contained herein, Recipient agrees that said Technical Information is given by CPChem for convenience only, without any warranty or guarantee of any kind, and is accepted and used at your sole risk. Recipients are encouraged to verify independently any such information to their reasonable satisfaction. As used in this paragraph, "Technical Information" includes any technical advice, recommendations, testing, or analysis, including, without limitation, information as it may relate to the selection of a product for a specific use and application.



Cust: Southwest Liner Systems, Inc.
 PO#: SW1728 Sundance West Surface Waste Facility
 Dest: Eunice, NM

Doc#: 38616

				56 rolls 60HD smooth (600)		772,800	ft ²
				31 rolls 60HD SS micro (560)		399,280	ft ²
				2 rolls 60HD micro		24,840	ft ²
				40 rolls 60HD smooth-cond. (600) (SC)		552,000	ft ²
				177 rolls 200 Geonet (300) (SC)		769,950	ft ²
							ft ²
				check weld rod qty (if ordered)	wgt	resin lot #	
roll #	width	length	area				
	ft.	ft.	ft ² .		lbs.		
1FT FROM END OF ROLLS 1, 8, 15, 22, 29, 37, 44, 51							
100K / LOT SQS TRITX U2							

F17C004434	23	560	12,880	60HD Ssmicro	31tot	1	3,868	FULL + 1FT	HHK820610
F17C004435	23	560	12,880	60HD Ssmicro	31tot	2	3,856		HHK820610
F17C004436	23	560	12,880	60HD Ssmicro	31tot	3	3,894		HHK820610
F17C004437	23	560	12,880	60HD Ssmicro	31tot	4	3,888		HHK820610
F17C004438	23	560	12,880	60HD Ssmicro	31tot	5	3,896		HHK820610
F17C004439	23	560	12,880	60HD Ssmicro	31tot	6	3,906	mini	HHK820610
F17C004440	23	560	12,880	60HD Ssmicro	31tot	7	3,886		HHK820610
F17C004441	23	560	12,880	60HD Ssmicro	31tot	8	3,878		HHK820610
F17C004442	23	560	12,880	60HD Ssmicro	31tot	9	3,888		HHK820610
F17C004443	23	560	12,880	60HD Ssmicro	31tot	10	3,886	1 ft	HHK820610
F17C004444	23	560	12,880	60HD Ssmicro	31tot	11	3,890	FULL	HHK820610
F17C004445	23	560	12,880	60HD Ssmicro	31tot	12	3,888		HHK820610
F17C004446	23	560	12,880	60HD Ssmicro	31tot	13	3,892		HHK820610
F17C004447	23	560	12,880	60HD Ssmicro	31tot	14	3,846		HHK820610
F17C004449	23	560	12,880	60HD Ssmicro	31tot	15	3,828		HHK820610
F17C004450	23	560	12,880	60HD Ssmicro	31tot	16	3,846	MINI	HHK820610
F17C004451	23	560	12,880	60HD Ssmicro	31tot	17	3,886		HHK820610
F17C004452	23	560	12,880	60HD Ssmicro	31tot	18	3,856		HHK820610
F17C004453	23	560	12,880	60HD Ssmicro	31tot	19	3,892		HHK820610
F17C004454	23	560	12,880	60HD Ssmicro	31tot	20	3,870	1FT	HHK820610
F17C004455	23	560	12,880	60HD Ssmicro	31tot	21	3,884	FULL	HHK820610
F17C004456	23	560	12,880	60HD Ssmicro	31tot	22	3,886		HHK820610
F17C004457	23	560	12,880	60HD Ssmicro	31tot	23	3,886		HHK820610
F17C004458	23	560	12,880	60HD Ssmicro	31tot	24	3,886		HHK820610
F17C004459	23	560	12,880	60HD Ssmicro	31tot	25	3,896		HHK820610
F17C004460	23	560	12,880	60HD Ssmicro	31tot	26	3,886	MINI	HHK820610
F17C004461	23	560	12,880	60HD Ssmicro	31tot	27	3,836		HHK820610
F17C004462	23	560	12,880	60HD Ssmicro	31tot	28	3,846		HHK820610
F17C004463	23	560	12,880	60HD Ssmicro	31tot	29	3,846	1ft	HHK820610
F17C004464	23	560	12,880	60HD Ssmicro	31tot	30	3,848		HHK820610
F17C004465	23	560	12,880	60HD Ssmicro	31tot	31	3,782	FULL	HHK820610

399,280
total for order

120,022



quality certificate

ROLL #: F17C004434**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

Thickness Measurement ASTM D5994 (Modified)	MIN:	METRIC 1.4 mm	ENGLISH 53 mil	Thickness:	METRIC 1.52 mm	ENGLISH 60 mil
	MAX:	1.5 mm	61 mil	Length:	170.688 m	560 feet
	AVE:	1.4 mm	57 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						222 minutes
Asperity ASTM D7466	Average	Bottom			.66 mm	26 mil
Specific Gravity ASTM D792	Average Density					.946 g/cc
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min					.20
Carbon Black Content ASTM D4218	Range					2.5 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	149 ppi	2486 psi	
		TD	29 N/mm	165 ppi	2746 psi	
	Average Strength @ Break	MD	40 N/mm	229 ppi	3815 psi	
		TD	33 N/mm	190 ppi	3162 psi	
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			16 %	
		TD			14 %	
	Average Elongation @Break	MD			565 %	
		TD			581 %	
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5 N	57 lbs.	
		TD		235.7 N	53 lbs.	
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				600.5 N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%				500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/6/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004435**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		54 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.5 mm		60 mil	Length:	170.688 m		560 feet
	AVE:	1.4 mm		57 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							222 minutes	
Asperity ASTM D7466	Average	Bottom				.69 mm		27 mil
Specific Gravity ASTM D792	Average Density						.946 g/cc	
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.20	
Carbon Black Content ASTM D4218	Range						2.5 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	26 N/mm	149 ppi	2486 psi		
			TD	29 N/mm	165 ppi	2746 psi		
	Average Strength @ Break		MD	40 N/mm	229 ppi	3815 psi		
			TD	33 N/mm	190 ppi	3162 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD			16 %		
			TD			14 %		
	Average Elongation @Break		MD			565 %		
			TD			581 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		253.5 N	57 lbs.		
			TD		235.7 N	53 lbs.		
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load					600.5 N	135 lbs.	
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%					500 Hrs.	ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/6/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F17C004436**

LOT #: **HHK820610**

LINER TYPE:

60 HD MICROSPIKE SS

	METRIC		ENGLISH		METRIC		ENGLISH		
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		54 mil	Thickness:	1.52 mm		60 mil	
	MAX:	1.5 mm		60 mil	Length:	170.688 m		560 feet	
	AVE:	1.5 mm		58 mil	Width:	7.01 m		23 feet	
OIT(Standard) ASTM D 3895							222 minutes		
Asperity ASTM D7466	Average	Bottom				.69 mm	27 mil		
Specific Gravity ASTM D792	Average Density						.946 g/cc		
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.20		
Carbon Black Content ASTM D4218	Range						2.5 %		
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1		
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	26	N/mm	149	ppi	2486	psi
			TD	29	N/mm	165	ppi	2746	psi
	Average Strength @ Break		MD	40	N/mm	229	ppi	3815	psi
			TD	33	N/mm	190	ppi	3162	psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD					16	%
			TD					14	%
	Average Elongation @Break		MD					565	%
			TD					581	%
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD			253.5	N	57	lbs.
			TD			235.7	N	53	lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load					600.5	N	135	lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%					500	Hrs.	ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/6/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F17C004437**

LOT #: **HHK820610**

LINER TYPE:

60 HD MICROSPIKE SS

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.3 mm		53 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.6 mm		62 mil	Length:	170.688 m		560 feet
	AVE:	1.4 mm		57 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895								222 minutes
Asperity ASTM D7466	Average	Bottom				.71 mm		28 mil
Specific Gravity ASTM D792	Average Density							.946 g/cc
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min							.20
Carbon Black Content ASTM D4218	Range							2.6 %
Carbon Black Dispersion ASTM D5596	Category							10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	26 N/mm	149 ppi		2486 psi	
			TD	29 N/mm	165 ppi		2746 psi	
	Average Strength @ Break		MD	40 N/mm	229 ppi		3815 psi	
			TD	33 N/mm	190 ppi		3162 psi	
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD				16 %	
			TD				14 %	
	Average Elongation @Break		MD				565 %	
			TD				581 %	
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		253.5 N		57 lbs.	
			TD		235.7 N		53 lbs.	
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load					600.5 N		135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%					500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/6/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004438**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH			METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		54 mil		Thickness:	1.52 mm		60 mil
	MAX:	1.5 mm		60 mil		Length:	170.688 m		560 feet
	AVE:	1.5 mm		58 mil		Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895									222 minutes
Asperity ASTM D7466	Average	Bottom					.66 mm		26 mil
Specific Gravity ASTM D792	Average Density								.946 g/cc
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min								.20
Carbon Black Content ASTM D4218	Range								2.6 %
Carbon Black Dispersion ASTM D5596	Category								10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	26 N/mm	149 ppi	2486 psi			
			TD	29 N/mm	165 ppi	2746 psi			
	Average Strength @ Break		MD	40 N/mm	229 ppi	3815 psi			
			TD	33 N/mm	190 ppi	3162 psi			
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD			16 %			
			TD			14 %			
	Average Elongation @Break		MD			565 %			
			TD			581 %			
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		253.5 N	57 lbs.			
			TD		235.7 N	53 lbs.			
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load					600.5 N	135 lbs.		
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%					500 Hrs.	ONGOING		

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/6/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004439**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN: 1.3 mm	52 mil	Thickness:	1.52 mm	60 mil
	MAX: 1.5 mm	61 mil	Length:	170.688 m	560 feet
	AVE: 1.5 mm	58 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895					222 minutes
Asperity ASTM D7466	Average	Bottom		.71 mm	28 mil
Specific Gravity ASTM D792	Average Density				.946 g/cc
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min				.20
Carbon Black Content ASTM D4218	Range				2.7 %
Carbon Black Dispersion ASTM D5596	Category				10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	150 ppi	2499 psi
		TD	29 N/mm	163 ppi	2721 psi
	Average Strength @ Break	MD	41 N/mm	237 ppi	3944 psi
		TD	36 N/mm	205 ppi	3414 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			14 %
		TD			15 %
	Average Elongation @Break	MD			590 %
		TD			648 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5 N	57 lbs.
		TD		235.7 N	53 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			600.5 N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/6/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004440**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN: 1.4 mm	55 mil	Thickness:	1.52 mm	60 mil
Measurement	MAX: 1.6 mm	62 mil	Length:	170.688 m	560 feet
ASTM D5994	AVE: 1.5 mm	58 mil	Width:	7.01 m	23 feet
(Modified)					
OIT(Standard) ASTM D 3895					222 minutes
Asperity	Average	Bottom		.71 mm	28 mil
ASTM D7466					
Specific Gravity	Average Density				.946 g/cc
ASTM D792					
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min				.20
Grade: K307					
Carbon Black Content ASTM D4218	Range				2.7 %
Carbon Black Dispersion ASTM D5596	Category				10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	150 ppi	2499 psi
		TD	29 N/mm	163 ppi	2721 psi
	Average Strength @ Break	MD	41 N/mm	237 ppi	3944 psi
		TD	36 N/mm	205 ppi	3414 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			14 %
		TD			15 %
	Average Elongation @Break	MD			590 %
		TD			648 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5 N	57 lbs.
		TD		235.7 N	53 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			600.5 N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/6/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004441**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		56 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.6 mm		62 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		59 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							222 minutes	
Asperity ASTM D7466	Average	Bottom				.74 mm		29 mil
Specific Gravity ASTM D792	Average Density			.946 g/cc				
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.20	
Carbon Black Content ASTM D4218	Range						2.7 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	26 N/mm	150 ppi	2499 psi		
			TD	29 N/mm	163 ppi	2721 psi		
	Average Strength @ Break		MD	41 N/mm	237 ppi	3944 psi		
			TD	36 N/mm	205 ppi	3414 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD			14 %		
			TD			15 %		
	Average Elongation @Break		MD			590 %		
			TD			648 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		253.5 N	57 lbs.		
			TD		235.7 N	53 lbs.		
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load					600.5 N	135 lbs.	
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%					500 Hrs.	ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/6/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004442**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm	54 mil	Thickness:	1.52 mm	60 mil
	MAX:	1.6 mm	62 mil	Length:	170.688 m	560 feet
	AVE:	1.5 mm	58 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						222 minutes
Asperity ASTM D7466	Average	Bottom			.71 mm	28 mil
Specific Gravity ASTM D792	Average Density					.946 g/cc
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min					.20
Carbon Black Content ASTM D4218	Range					2.7 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	150 ppi	2499 psi	
		TD	29 N/mm	163 ppi	2721 psi	
	Average Strength @ Break	MD	41 N/mm	237 ppi	3944 psi	
		TD	36 N/mm	205 ppi	3414 psi	
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			14 %	
		TD			15 %	
	Average Elongation @Break	MD			590 %	
		TD			648 %	
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5 N	57 lbs.	
		TD		235.7 N	53 lbs.	
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				600.5 N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%				500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/6/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F17C004443**

LOT #: **HHK820610**

LINER TYPE:

60 HD MICROSPIKE SS

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		55 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.6 mm		64 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		59 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							222 minutes	
Asperity ASTM D7466	Average	Bottom				.76 mm	30 mil	
Specific Gravity ASTM D792	Average Density						.946 g/cc	
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.20	
Carbon Black Content ASTM D4218	Range						2.7 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	26 N/mm	150 ppi	2499 psi		
			TD	29 N/mm	163 ppi	2721 psi		
	Average Strength @ Break		MD	41 N/mm	237 ppi	3944 psi		
			TD	36 N/mm	205 ppi	3414 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD			14 %		
			TD			15 %		
	Average Elongation @Break		MD			590 %		
			TD			648 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		253.5 N	57 lbs.		
			TD		235.7 N	53 lbs.		
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				600.5 N		135 lbs.	
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%				500 Hrs.		ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/7/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F17C004444**

LOT #: **HHK820610**

LINER TYPE:

60 HD MICROSPIKE SS

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement	MIN:	1.4 mm	54 mil		Thickness:	1.52 mm	60 mil	
ASTM D5994	MAX:	1.6 mm	61 mil		Length:	170.688 m	560 feet	
(Modified)	AVE:	1.5 mm	58 mil		Width:	7.01 m	23 feet	
OIT(Standard) ASTM D 3895							222 minutes	
Asperity ASTM D7466	Average		Bottom			.99 mm		39 mil
Specific Gravity ASTM D792	Average Density							.943 g/cc
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min							.20
Grade: K307								
Carbon Black Content ASTM D4218	Range							2.6 %
Carbon Black Dispersion ASTM D5596	Category							10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	25 N/mm	145 ppi	2423 psi		
			TD	28 N/mm	160 ppi	2668 psi		
	Average Strength @ Break		MD	42 N/mm	239 ppi	3990 psi		
			TD	36 N/mm	204 ppi	3401 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD				16 %	
			TD				14 %	
	Average Elongation @Break		MD				592 %	
			TD				636 %	
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD	249.1 N			56 lbs.	
			TD	222.4 N			50 lbs.	
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load					600.5 N		135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%					500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/7/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004445**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN: 1.4 mm	55 mil	Thickness:	1.52 mm	60 mil
Measurement	MAX: 1.6 mm	61 mil	Length:	170.688 m	560 feet
ASTM D5994	AVE: 1.5 mm	58 mil	Width:	7.01 m	23 feet
(Modified)					
OIT(Standard) ASTM D 3895					222 minutes
Asperity	Average	Bottom		.69 mm	27 mil
ASTM D7466					
Specific Gravity	Average Density				.943 g/cc
ASTM D792					
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min				.20
Grade: K307					
Carbon Black Content ASTM D4218	Range				2.6 %
Carbon Black Dispersion ASTM D5596	Category				10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	145 ppi	2423 psi
		TD	28 N/mm	160 ppi	2668 psi
	Average Strength @ Break	MD	42 N/mm	239 ppi	3990 psi
		TD	36 N/mm	204 ppi	3401 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			16 %
		TD			14 %
	Average Elongation @Break	MD			592 %
		TD			636 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		249.1 N	56 lbs.
		TD		222.4 N	50 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			600.5 N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/7/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F17C004446**

LOT #: **HHK820610**

LINER TYPE:

60 HD MICROSPIKE SS

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		55 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.5 mm		60 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		58 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895								222 minutes
Asperity ASTM D7466	Average	Bottom				.94 mm	37 mil	
Specific Gravity ASTM D792	Average Density							.943 g/cc
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min							.20
Carbon Black Content ASTM D4218	Range							2.6 %
Carbon Black Dispersion ASTM D5596	Category							10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield			MD	25 N/mm	145 ppi	2423 psi	
				TD	28 N/mm	160 ppi	2668 psi	
	Average Strength @ Break			MD	42 N/mm	239 ppi	3990 psi	
				TD	36 N/mm	204 ppi	3401 psi	
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield			MD			16 %	
				TD			14 %	
	Average Elongation @Break			MD			592 %	
				TD			636 %	
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance			MD		249.1 N	56 lbs.	
				TD		222.4 N	50 lbs.	
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load					600.5 N	135 lbs.	
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%					500 Hrs.	ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/7/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004447**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		54 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.5 mm		61 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		58 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							222 minutes	
Asperity ASTM D7466	Average	Bottom				.79 mm		31 mil
Specific Gravity ASTM D792	Average Density			.943 g/cc				
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.20	
Carbon Black Content ASTM D4218	Range						2.6 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	25 N/mm	145 ppi	2423 psi		
			TD	28 N/mm	160 ppi	2668 psi		
	Average Strength @ Break		MD	42 N/mm	239 ppi	3990 psi		
			TD	36 N/mm	204 ppi	3401 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD			16 %		
			TD			14 %		
	Average Elongation @Break		MD			592 %		
			TD			636 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		249.1 N	56 lbs.		
			TD		222.4 N	50 lbs.		
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				600.5 N	135 lbs.		
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%				500 Hrs.	ONGOING		

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/7/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F17C004449**

LOT #: **HHK820610**

LINER TYPE:

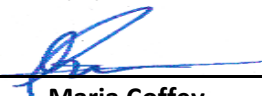
60 HD MICROSPIKE SS

	METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN: 1.4 mm	55 mil	Thickness:	1.52 mm	60 mil
Measurement					
ASTM D5994	MAX: 1.6 mm	62 mil	Length:	170.688 m	560 feet
(Modified)	AVE: 1.5 mm	58 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895					222 minutes
Asperity	Average	Bottom		.89 mm	35 mil
ASTM D7466					
Specific Gravity	Average Density				.943 g/cc
ASTM D792					
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min				.20
Grade: K307					
Carbon Black Content ASTM D4218	Range				2.6 %
Carbon Black Dispersion ASTM D5596	Category				10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	145 ppi	2423 psi
		TD	28 N/mm	160 ppi	2668 psi
	Average Strength @ Break	MD	42 N/mm	239 ppi	3990 psi
		TD	36 N/mm	204 ppi	3401 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			16 %
		TD			14 %
	Average Elongation @Break	MD			592 %
		TD			636 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		249.1 N	56 lbs.
		TD		222.4 N	50 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			600.5 N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/7/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004450**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		54 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.4 mm		56 mil	Length:	170.688 m		560 feet
	AVE:	1.4 mm		57 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							222 minutes	
Asperity ASTM D7466	Average	Bottom				.94 mm		37 mil
Specific Gravity ASTM D792	Average Density						.943 g/cc	
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.20	
Carbon Black Content ASTM D4218	Range						2.4 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm		143 ppi		2389 psi	
		TD	28 N/mm		160 ppi		2669 psi	
	Average Strength @ Break	MD	39 N/mm		225 ppi		3752 psi	
		TD	29 N/mm		163 ppi		2724 psi	
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD					18 %	
		TD					14 %	
	Average Elongation @Break	MD					507 %	
		TD					534 %	
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			249.1 N		56 lbs.	
		TD			222.4 N		50 lbs.	
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				600.5 N		135 lbs.	
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%				500 Hrs.		ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/7/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F17C004451**

LOT #: **HHK820610**

LINER TYPE:

60 HD MICROSPIKE SS

	METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN: 1.4 mm	56 mil	Thickness:	1.52 mm	60 mil
Measurement	MAX: 1.6 mm	62 mil	Length:	170.688 m	560 feet
ASTM D5994	AVE: 1.5 mm	58 mil	Width:	7.01 m	23 feet
(Modified)					
OIT(Standard) ASTM D 3895					222 minutes
Asperity	Average	Bottom		.86 mm	34 mil
ASTM D7466					
Specific Gravity	Average Density				.943 g/cc
ASTM D792					
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min				.20
Grade: K307					
Carbon Black Content ASTM D4218	Range				2.4 %
Carbon Black Dispersion ASTM D5596	Category				10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	143 ppi	2389 psi
		TD	28 N/mm	160 ppi	2669 psi
	Average Strength @ Break	MD	39 N/mm	225 ppi	3752 psi
		TD	29 N/mm	163 ppi	2724 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			18 %
		TD			14 %
	Average Elongation @Break	MD			507 %
		TD			534 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		249.1 N	56 lbs.
		TD		222.4 N	50 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			600.5 N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/7/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004452**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

Thickness Measurement ASTM D5994 (Modified)	MIN:	METRIC 1.4 mm	ENGLISH 56 mil	Thickness:	METRIC 1.52 mm	ENGLISH 60 mil
	MAX:	1.6 mm	62 mil	Length:	170.688 m	560 feet
	AVE:	1.5 mm	58 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						222 minutes
Asperity ASTM D7466	Average	Bottom			.89 mm	35 mil
Specific Gravity ASTM D792	Average Density					.943 g/cc
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min					.20
Carbon Black Content ASTM D4218	Range					2.4 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	143 ppi	2389 psi	
		TD	28 N/mm	160 ppi	2669 psi	
	Average Strength @ Break	MD	39 N/mm	225 ppi	3752 psi	
		TD	29 N/mm	163 ppi	2724 psi	
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			18 %	
		TD			14 %	
	Average Elongation @Break	MD			507 %	
		TD			534 %	
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		249.1 N	56 lbs.	
		TD		222.4 N	50 lbs.	
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				600.5 N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%				500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/7/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004453**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		54 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.5 mm		59 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		57 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							222 minutes	
Asperity ASTM D7466	Average	Bottom				.99 mm	39 mil	
Specific Gravity ASTM D792	Average Density						.943 g/cc	
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.20	
Carbon Black Content ASTM D4218	Range						2.5 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	25 N/mm	143 ppi	2389 psi		
			TD	28 N/mm	160 ppi	2669 psi		
	Average Strength @ Break		MD	39 N/mm	225 ppi	3752 psi		
			TD	29 N/mm	163 ppi	2724 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD			18 %		
			TD			14 %		
	Average Elongation @Break		MD			507 %		
			TD			534 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		249.1 N	56 lbs.		
			TD		222.4 N	50 lbs.		
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load					600.5 N	135 lbs.	
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%					500 Hrs.	ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/7/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department

ROLL #: F17C004454
LOT #: HHK820610
LINER TYPE:
60 HD MICROSPIKE SS

	METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN: 1.4 mm	55 mil	Thickness:	1.52 mm	60 mil
Measurement	MAX: 1.6 mm	62 mil	Length:	170.688 m	560 feet
ASTM D5994	AVE: 1.5 mm	58 mil	Width:	7.01 m	23 feet
(Modified)					
OIT(Standard) ASTM D 3895					222 minutes
Asperity	Average	Bottom		.86 mm	34 mil
ASTM D7466					
Specific Gravity	Average Density				.943 g/cc
ASTM D792					
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min				.20
Grade: K307					
Carbon Black Content ASTM D4218	Range				2.5 %
Carbon Black Dispersion ASTM D5596	Category				10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	143 ppi	2389 psi
		TD	28 N/mm	160 ppi	2669 psi
	Average Strength @ Break	MD	39 N/mm	225 ppi	3752 psi
		TD	29 N/mm	163 ppi	2724 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			18 %
		TD			14 %
	Average Elongation @Break	MD			507 %
		TD			534 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		249.1 N	56 lbs.
		TD		222.4 N	50 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			600.5 N	135 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
 PO: SW1728 Sundance West Surface Waste Facility
 Destination: Eunice, NM

Production Date: **12/7/2017** OA#: **38616**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004455**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

Thickness Measurement ASTM D5994 (Modified)	MIN:	METRIC	ENGLISH	Thickness:	METRIC	ENGLISH
		1.4 mm	54 mil		1.52 mm	60 mil
	MAX:	1.5 mm	59 mil	Length:	170.688 m	560 feet
	AVE:	1.5 mm	57 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						222 minutes
Asperity ASTM D7466	Average	Bottom			.94 mm	37 mil
Specific Gravity ASTM D792	Average Density					.944 g/cc
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min					.20
Carbon Black Content ASTM D4218	Range					2.4 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	142 ppi	2365 psi	
		TD	29 N/mm	165 ppi	2755 psi	
	Average Strength @ Break	MD	38 N/mm	218 ppi	3635 psi	
		TD	31 N/mm	176 ppi	2928 psi	
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			17 %	
		TD			14 %	
	Average Elongation @Break	MD			522 %	
		TD			553 %	
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5 N	57 lbs.	
		TD		240.2 N	54 lbs.	
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			591.6 N	133 lbs.	
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.	ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/7/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004456**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		55 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.5 mm		59 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		57 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							222 minutes	
Asperity ASTM D7466	Average	Bottom				.84 mm	33 mil	
Specific Gravity ASTM D792	Average Density						.944 g/cc	
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.20	
Carbon Black Content ASTM D4218	Range						2.4 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	25 N/mm	142 ppi	2365 psi		
			TD	29 N/mm	165 ppi	2755 psi		
	Average Strength @ Break		MD	38 N/mm	218 ppi	3635 psi		
			TD	31 N/mm	176 ppi	2928 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD			17 %		
			TD			14 %		
	Average Elongation @Break		MD			522 %		
			TD			553 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		253.5 N	57 lbs.		
			TD		240.2 N	54 lbs.		
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load					591.6 N	133 lbs.	
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%					500 Hrs.	ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/7/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004457**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

Thickness Measurement ASTM D5994 (Modified)	METRIC		ENGLISH		Thickness:	METRIC		ENGLISH	
	MIN:	1.4 mm	57 mil			1.52 mm	60 mil		
	MAX:	1.5 mm	60 mil		Length:	170.688 m	560 feet		
	AVE:	1.5 mm	58 mil		Width:	7.01 m	23 feet		
OIT(Standard) ASTM D 3895								222 minutes	
Asperity ASTM D7466	Average	Bottom				.84 mm	33 mil		
Specific Gravity ASTM D792	Average Density						.944 g/cc		
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min						.20		
Grade: K307									
Carbon Black Content ASTM D4218	Range						2.4 %		
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1		
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	142 ppi	2365 psi				
			29 N/mm	165 ppi	2755 psi				
	Average Strength @ Break	MD	38 N/mm	218 ppi	3635 psi				
			31 N/mm	176 ppi	2928 psi				
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			17 %				
					14 %				
	Average Elongation @Break	MD			522 %				
					553 %				
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5 N	57 lbs.				
		TD		240.2 N	54 lbs.				
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				591.6 N	133 lbs.			
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%				500 Hrs.	ONGOING			

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/8/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004458**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		55 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.6 mm		62 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		58 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							222 minutes	
Asperity ASTM D7466	Average	Bottom				.84 mm	33 mil	
Specific Gravity ASTM D792	Average Density						.944 g/cc	
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.20	
Carbon Black Content ASTM D4218	Range						2.8 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	25 N/mm	142 ppi	2365 psi		
			TD	29 N/mm	165 ppi	2755 psi		
	Average Strength @ Break		MD	38 N/mm	218 ppi	3635 psi		
			TD	31 N/mm	176 ppi	2928 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD			17 %		
			TD			14 %		
	Average Elongation @Break		MD			522 %		
			TD			553 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		253.5 N	57 lbs.		
			TD		240.2 N	54 lbs.		
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load					591.6 N	133 lbs.	
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%					500 Hrs.	ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/8/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F17C004459**

LOT #: **HHK820610**

LINER TYPE:

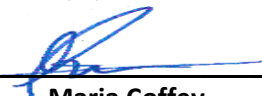
60 HD MICROSPIKE SS

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		55 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.5 mm		60 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		58 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							222 minutes	
Asperity ASTM D7466	Average	Bottom				.89 mm	35 mil	
Specific Gravity ASTM D792	Average Density						.944 g/cc	
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.20	
Carbon Black Content ASTM D4218	Range						2.8 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	25 N/mm	142 ppi	2365 psi		
			TD	29 N/mm	165 ppi	2755 psi		
	Average Strength @ Break		MD	38 N/mm	218 ppi	3635 psi		
			TD	31 N/mm	176 ppi	2928 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD			17 %		
			TD			14 %		
	Average Elongation @Break		MD			522 %		
			TD			553 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		253.5 N	57 lbs.		
			TD		240.2 N	54 lbs.		
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				591.6 N	133 lbs.		
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%				500 Hrs.	ONGOING		

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/8/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004460**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
	MIN:							
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm	54 mil		Thickness:	1.52 mm	60 mil	
	MAX:	1.6 mm	61 mil		Length:	170.688 m	560 feet	
	AVE:	1.5 mm	57 mil		Width:	7.01 m	23 feet	
OIT(Standard) ASTM D 3895							222 minutes	
Asperity ASTM D7466	Average	Bottom				.97 mm	38 mil	
Specific Gravity ASTM D792	Average Density						.944 g/cc	
MFI ASTM D1238 COND. E								
Grade: K307			Melt Flow Index 190C/2160 g - g/10 min				.20	
Carbon Black Content ASTM D4218	Range						2.7 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	147 ppi	2450 psi			
		TD	28 N/mm	161 ppi	2684 psi			
	Average Strength @ Break	MD	43 N/mm	245 ppi	4087 psi			
		TD	32 N/mm	183 ppi	3055 psi			
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			18 %			
		TD			14 %			
	Average Elongation @Break	MD			589 %			
		TD			587 %			
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5 N	57 lbs.			
		TD		240.2 N	54 lbs.			
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			591.6 N	133 lbs.			
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.	ONGOING			

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/8/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F17C004461**

LOT #: **HHK820610**

LINER TYPE:

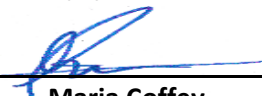
60 HD MICROSPIKE SS

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		55 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.5 mm		59 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		57 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895								222 minutes
Asperity ASTM D7466	Average	Bottom				1.07 mm		42 mil
Specific Gravity ASTM D792	Average Density							.944 g/cc
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min							.20
Carbon Black Content ASTM D4218	Range							2.7 %
Carbon Black Dispersion ASTM D5596	Category							10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield			MD	26 N/mm	147 ppi		2450 psi
				TD	28 N/mm	161 ppi		2684 psi
	Average Strength @ Break			MD	43 N/mm	245 ppi		4087 psi
				TD	32 N/mm	183 ppi		3055 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield			MD				18 %
				TD				14 %
	Average Elongation @Break			MD				589 %
				TD				587 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance			MD		253.5 N		57 lbs.
				TD		240.2 N		54 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load					591.6 N		133 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%					500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/8/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F17C004462**

LOT #: **HHK820610**

LINER TYPE:

60 HD MICROSPIKE SS

	METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN: 1.4 mm	56 mil	Thickness:	1.52 mm	60 mil
Measurement	MAX: 1.5 mm	59 mil	Length:	170.688 m	560 feet
ASTM D5994	AVE: 1.5 mm	58 mil	Width:	7.01 m	23 feet
(Modified)					
OIT(Standard) ASTM D 3895					222 minutes
Asperity	Average	Bottom		1.04 mm	41 mil
ASTM D7466					
Specific Gravity	Average Density				.944 g/cc
ASTM D792					
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min				.20
Grade: K307					
Carbon Black Content ASTM D4218	Range				2.7 %
Carbon Black Dispersion ASTM D5596	Category				10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	147 ppi	2450 psi
		TD	28 N/mm	161 ppi	2684 psi
	Average Strength @ Break	MD	43 N/mm	245 ppi	4087 psi
		TD	32 N/mm	183 ppi	3055 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			18 %
		TD			14 %
	Average Elongation @Break	MD			589 %
		TD			587 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5 N	57 lbs.
		TD		240.2 N	54 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			591.6 N	133 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **12/8/2017** OA#: **38616**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004463**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		54 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.5 mm		59 mil	Length:	170.688 m		560 feet
	AVE:	1.4 mm		57 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							222 minutes	
Asperity ASTM D7466	Average	Bottom				.99 mm	39 mil	
Specific Gravity ASTM D792	Average Density						.944 g/cc	
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.20	
Carbon Black Content ASTM D4218	Range						2.6 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm		147 ppi		2450 psi	
		TD	28 N/mm		161 ppi		2684 psi	
	Average Strength @ Break	MD	43 N/mm		245 ppi		4087 psi	
		TD	32 N/mm		183 ppi		3055 psi	
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD					18 %	
		TD					14 %	
	Average Elongation @Break	MD					589 %	
		TD					587 %	
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			253.5 N		57 lbs.	
		TD			240.2 N		54 lbs.	
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				591.6 N		133 lbs.	
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%				500 Hrs.		ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/8/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department

ROLL #: F17C004464
LOT #: HHK820610
LINER TYPE:
60 HD MICROSPIKE SS

	METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN: 1.4 mm	54 mil	Thickness:	1.52 mm	60 mil
Measurement	MAX: 1.5 mm	61 mil	Length:	170.688 m	560 feet
ASTM D5994	AVE: 1.5 mm	59 mil	Width:	7.01 m	23 feet
(Modified)					
OIT(Standard) ASTM D 3895					222 minutes
Asperity	Average	Bottom		.94 mm	37 mil
ASTM D7466					
Specific Gravity	Average Density				.944 g/cc
ASTM D792					
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min				.20
Grade: K307					
Carbon Black Content ASTM D4218	Range				2.6 %
Carbon Black Dispersion ASTM D5596	Category				10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm	147 ppi	2450 psi
		TD	28 N/mm	161 ppi	2684 psi
	Average Strength @ Break	MD	43 N/mm	245 ppi	4087 psi
		TD	32 N/mm	183 ppi	3055 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			18 %
		TD			14 %
	Average Elongation @Break	MD			589 %
		TD			587 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		253.5 N	57 lbs.
		TD		240.2 N	54 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			591.6 N	133 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
 PO: SW1728 Sundance West Surface Waste Facility
 Destination: Eunice, NM

Production Date: 12/8/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17C004465**LOT #: HHK820610****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		57 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.5 mm		59 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		58 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							222 minutes	
Asperity ASTM D7466	Average	Bottom				.84 mm	33 mil	
Specific Gravity ASTM D792	Average Density						.945 g/cc	
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.20	
Carbon Black Content ASTM D4218	Range						2.7 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	26 N/mm		147 ppi		2449 psi	
		TD	29 N/mm		163 ppi		2723 psi	
	Average Strength @ Break	MD	42 N/mm		240 ppi		3994 psi	
		TD	25 N/mm		143 ppi		2384 psi	
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD						17 %
		TD						13 %
	Average Elongation @Break	MD						537 %
		TD						470 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD					258.0 N	58 lbs.
		TD					226.8 N	51 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load						613.8 N	138 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%						500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 12/8/2017 OA#: 38616

Signature:

Maria Coffey

Quality Control Department

Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 EAST NEWLANDS
FERNLEY NV 89408
USA

Recipient: PALMER
Fax:

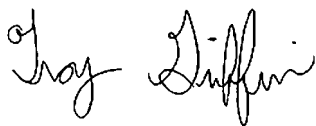
Delivery #: 89556924
PO #: 12169
Weight: 186200.000 LB
Ship Date: 11/07/2017
Package: BULK
Mode: Hopper Car
Car #: GPLX077042
Seal No: 93355

Product:
MARLEX K307 POLYETHYLENE in Bulk

Lot Number: HHK820610

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.20	g/10min
HLMI Flow Rate	ASTM D1238	19	g/10min
Density	D1505 or D4883	0.938	g/cm3
Pellet Count	P02.08.03	28	pelet/gram
Production Date		10/11/2017	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Troy Griffin
Quality Systems Coordinator

For CoA questions contact Patricia Royall at +1832813



Vergil H. Rhodes, PE, CPlasT - Tech Svc & App Dev Engineer, Geomembranes
Highways 60 & 123, Bartlesville Research and Technology Center, Room 103 PTC
Bartlesville, OK 74003
■ 918-977-4229 ■ rhodevh@cpchem.com ■ Fax: 918-977-7599 ■ www.cpchem.com

October 31, 2017

Filename: Agru Oven and QUV Exposure Testing_103117.pdf

Nathan Ivy - Corporate Quality Control/Technical Manager
Agru America, Inc.
800 Rockmead #122
Kingwood, TX 77339
281-358-4741

Dear Mr. Ivy:

Please recall your request for testing of oven-exposed and UV-exposed geomembrane samples produced primarily from Marlex® 7104 LLDPE and Marlex® K307 HDPE. Agru blended other components with each of these polyethylenes to produce the geomembrane samples for testing. Smooth geomembrane samples have been received from Agru and test results are reported below. The samples were tested for HP-OIT in their as-received condition, and were also tested after oven and UV exposures of 90 days and 1600 hours of irradiance, respectively, in accordance with GRI-GM13 and GRI-GM17.

The following geomembrane sheet samples were received from Agru in mid-June 2017 and were reported to be primarily composed of each of the Chevron Phillips Chemical Company grades in the description below:

- K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick.
- 7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick.

Exposure and testing conditions, along with the test results are tabulated on the next page. GM-13 and GM-17 require minimum % HP-OIT retention after a 90-day oven exposure and after a 1600 hour UV irradiance exposure. These test results indicate these GM-13 and GM-17 minimum % HP-OIT retentions were exceeded by these Agru-supplied K307 and 7104 sheet samples, respectively.

If you have any questions, please feel free to contact me (contact information given above).

Sincerely,

Vergil Rhodes
Polyethylene Technical Service and Applications Development, Geomembrane

NOTICES

Technical Information - By using any Technical Information contained herein, Recipient agrees that said Technical Information is given by CPChem for convenience only, without any warranty or guarantee of any kind, and is accepted and used at your sole risk. Recipients are encouraged to verify independently any such information to their reasonable satisfaction. As used in this paragraph, "Technical Information" includes any technical advice, recommendations, testing, or analysis, including, without limitation, information as it may relate to the selection of a product for a specific use and application.

The following oven aging and UV exposure test methods were conducted in accordance with the GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) requirements:

Test Name	Exposure Conditions	Test Method
Oven Aging	90 days in an oven at 85 °C	ASTM D5721
UV Exposure	1600 UV irradiance hours. Cycle: 20 hours UVA-340 at 75 °C followed by 4 hours dark with condensation at 60 °C. Irradiance was 0.78 W/m ² at wavelength 340 nm. Note: This implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of dark/condensation.	ASTM D7238
HP-OIT	150 °C in an oxygen atmosphere at 500 psi	ASTM D5885

Oven Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 90 days of oven aging. (min)	% HP-OIT Retained after 90 days of oven aging.	GRI-GM13 and GRI-GM17 minimum % HP-OIT retained after 90 days of oven aging.
K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick	1264	1123	89	GRI-GM13: 80 minimum
7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick	550	508	92	GRI-GM17: 60 minimum

UV Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 1600 hrs of UV exposure. (min)	% HP-OIT Retained after 1600 hrs of UV exposure.	GRI-GM13 and GRI-GM17 minimum % HP-OIT retained after 1600 hrs of UV exposure.
K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick	1264	1024	81	GRI-GM13: 50 minimum
7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick	550	470	85	GRI-GM17: 35 minimum

Note: 1600 hours of UV exposure in accordance with ASTM D7238 implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of darkness with condensation.

NOTICES

Technical Information - By using any Technical Information contained herein, Recipient agrees that said Technical Information is given by CPChem for convenience only, without any warranty or guarantee of any kind, and is accepted and used at your sole risk. Recipients are encouraged to verify independently any such information to their reasonable satisfaction. As used in this paragraph, "Technical Information" includes any technical advice, recommendations, testing, or analysis, including, without limitation, information as it may relate to the selection of a product for a specific use and application.



Cust: Southwest Liner Systems, Inc.
 PO#: SW1803 Sundance West Surface Waste Facility
 Dest: Eunice, NM

Doc#: 40171



				16 rolls 60HD SS micro (560)	206,080 ft²		
FG-HDSMTH060BBBEA				8 rolls 60HD smooth (600)	110,400 ft²		
				2 rolls 60HD smooth-cond. (600)	27,600 ft²		
				22 rolls 200net (300)	95,700 ft²		
				1 roll 60HD micro (540)	12,420 ft²		
roll #	width	English length	area	check weld rod qty (if ordered)		wgt	resin lot #
	ft.	ft.	ft².			lbs.	

TRI-TX - U2

F18B000030	23	560	12,880	FG-HDMSSS060BBBEG	16tot 1	3860	1 FT FULL	HHN821710
F18B000031	23	560	12,880	FG-HDMSSS060BBBEG	16tot 2	3840		HHN821710
F18B000032	23	560	12,880	FG-HDMSSS060BBBEG	16tot 3	3830		HHN821710
F18B000033	23	560	12,880	FG-HDMSSS060BBBEG	16tot 4	3830		HHN821710
F18B000034	23	560	12,880	FG-HDMSSS060BBBEG	16tot 5	3840		HHN821710
F18B000035	23	560	12,880	FG-HDMSSS060BBBEG	16tot 6	3840	MINI	HHN821710
F18B000036	23	560	12,880	FG-HDMSSS060BBBEG	16tot 7	3840	1 FT	HHN821710
F18B000037	23	560	12,880	FG-HDMSSS060BBBEG	16tot 8	3860		HHN821710
F18B000038	23	560	12,880	FG-HDMSSS060BBBEG	16tot 9	3850		HHN821710
F18B000039	23	560	12,880	FG-HDMSSS060BBBEG	16tot 10	3850		HHN821710
F18B000040	23	560	12,880	FG-HDMSSS060BBBEG	16tot 11	3850	FULL	HHN821710
F18B000041	23	560	12,880	FG-HDMSSS060BBBEG	16tot 12	3840		HHN821710
F18B000042	23	560	12,880	FG-HDMSSS060BBBEG	16tot 13	3860		HHN821710
F18B000043	23	560	12,880	FG-HDMSSS060BBBEG	16tot 14	3820	1 FT	HHN821710
F18B000044	23	560	12,880	FG-HDMSSS060BBBEG	16tot 15	3850		HHN821710
F18B000045	23	560	12,880	FG-HDMSSS060BBBEG	16tot 16	3830	MINI	HHN821710

206,080
 total for order

61490



quality certificate

ROLL #: F18B000030**LOT #: HHN821710****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		57 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.6 mm		62 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		60 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895								205 minutes
Asperity ASTM D7466	Average	Bottom				.81 mm	32 mil	
Specific Gravity ASTM D792	Average Density							.946 g/cc
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min							.27
Carbon Black Content ASTM D4218	Range							2.7 %
Carbon Black Dispersion ASTM D5596	Category							10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm		140 ppi		2340 psi	
		TD	28 N/mm		161 ppi		2686 psi	
	Average Strength @ Break	MD	37 N/mm		209 ppi		3489 psi	
		TD	26 N/mm		151 ppi		2519 psi	
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD						17 %
		TD						15 %
	Average Elongation @Break	MD						598 %
		TD						425 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD					231.3 N	52 lbs.
		TD					218.0 N	49 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load					596.0 N		134 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%					500 Hrs.		ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/23/2018 OA#: 40171

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18B000031**LOT #: HHN821710****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		57 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.6 mm		62 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		60 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							205 minutes	
Asperity ASTM D7466	Average	Bottom				.81 mm	32 mil	
Specific Gravity ASTM D792	Average Density						.946 g/cc	
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.27	
Carbon Black Content ASTM D4218	Range						2.7 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm		140 ppi		2340 psi	
		TD	28 N/mm		161 ppi		2686 psi	
	Average Strength @ Break	MD	37 N/mm		209 ppi		3489 psi	
		TD	26 N/mm		151 ppi		2519 psi	
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD						17 %
		TD						15 %
	Average Elongation @Break	MD						598 %
		TD						425 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD					231.3 N	52 lbs.
		TD					218.0 N	49 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load						596.0 N	134 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%						500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/23/2018 OA#: 40171

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18B000032**LOT #: HHN821710****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.5 mm		58 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.6 mm		61 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		60 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							205 minutes	
Asperity ASTM D7466	Average	Bottom				.81 mm		32 mil
Specific Gravity ASTM D792	Average Density							.946 g/cc
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min							.27
Carbon Black Content ASTM D4218	Range							2.7 %
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	25 N/mm	140 ppi	2340 psi		
			TD	28 N/mm	161 ppi	2686 psi		
	Average Strength @ Break		MD	37 N/mm	209 ppi	3489 psi		
			TD	26 N/mm	151 ppi	2519 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD			17 %		
			TD			15 %		
	Average Elongation @Break		MD			598 %		
			TD			425 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		231.3 N	52 lbs.		
			TD		218.0 N	49 lbs.		
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load					596.0 N	134 lbs.	
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%					500 Hrs.	ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/23/2018 OA#: 40171

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18B000033**LOT #: HHN821710****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		57 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.5 mm		59 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		60 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							205 minutes	
Asperity ASTM D7466	Average	Bottom				.84 mm	33 mil	
Specific Gravity ASTM D792	Average Density						.946 g/cc	
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.27	
Carbon Black Content ASTM D4218	Range						2.7 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	25 N/mm	140 ppi	2340 psi		
			TD	28 N/mm	161 ppi	2686 psi		
	Average Strength @ Break		MD	37 N/mm	209 ppi	3489 psi		
			TD	26 N/mm	151 ppi	2519 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD			17 %		
			TD			15 %		
	Average Elongation @Break		MD			598 %		
			TD			425 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		231.3 N	52 lbs.		
			TD		218.0 N	49 lbs.		
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				596.0 N	134 lbs.		
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%				500 Hrs.	ONGOING		

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/24/2018 OA#: 40171

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18B000034**LOT #: HHN821710****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.5 mm		57 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.6 mm		62 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		59 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							205 minutes	
Asperity ASTM D7466	Average	Bottom				.84 mm		33 mil
Specific Gravity ASTM D792	Average Density							.946 g/cc
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min							.27
Carbon Black Content ASTM D4218	Range							2.7 %
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	25 N/mm	140 ppi	2340 psi		
			TD	28 N/mm	161 ppi	2686 psi		
	Average Strength @ Break		MD	37 N/mm	209 ppi	3489 psi		
			TD	26 N/mm	151 ppi	2519 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD			17 %		
			TD			15 %		
	Average Elongation @Break		MD			598 %		
			TD			425 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		231.3 N	52 lbs.		
			TD		218.0 N	49 lbs.		
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load					596.0 N	134 lbs.	
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%					500 Hrs.	ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **2/24/2018** OA#: **40171**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18B000035**LOT #: HHN821710****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN: 1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement			Length:	170.688 m	560 feet
ASTM D5994	MAX: 1.5 mm	61 mil	Width:	7.01 m	23 feet
(Modified)	AVE: 1.5 mm	59 mil			
OIT(Standard) ASTM D 3895					205 minutes
Asperity	Average	Bottom		.81 mm	32 mil
ASTM D7466					
Specific Gravity	Average Density				.946 g/cc
ASTM D792					
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min				.27
Grade: K307					
Carbon Black Content ASTM D4218	Range				2.6 %
Carbon Black Dispersion ASTM D5596	Category				10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	24 N/mm	140 ppi	2327 psi
		TD	30 N/mm	169 ppi	2812 psi
	Average Strength @ Break	MD	40 N/mm	227 ppi	3782 psi
		TD	39 N/mm	222 ppi	3694 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			14 %
		TD			16 %
	Average Elongation @Break	MD			626 %
		TD			581 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		231.3 N	52 lbs.
		TD		218.0 N	49 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			596.0 N	134 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/24/2018 OA#: 40171

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18B000036**LOT #: HHN821710****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement	MIN:	1.4 mm	56 mil		Thickness:	1.52 mm	60 mil	
ASTM D5994	MAX:	1.6 mm	62 mil		Length:	170.688 m	560 feet	
(Modified)	AVE:	1.5 mm	60 mil		Width:	7.01 m	23 feet	
OIT(Standard) ASTM D 3895							205 minutes	
Asperity ASTM D7466	Average	Bottom			.84 mm		33 mil	
Specific Gravity ASTM D792	Average Density						.946 g/cc	
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.27	
Carbon Black Content ASTM D4218	Range						2.6 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	24 N/mm		140 ppi		2327 psi	
		TD	30 N/mm		169 ppi		2812 psi	
	Average Strength @ Break	MD	40 N/mm		227 ppi		3782 psi	
		TD	39 N/mm		222 ppi		3694 psi	
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD					14 %	
		TD					16 %	
	Average Elongation @Break	MD					626 %	
		TD					581 %	
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			231.3 N		52 lbs.	
		TD			218.0 N		49 lbs.	
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				596.0 N		134 lbs.	
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%				500 Hrs.		ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/24/2018 OA#: 40171

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18B000037**LOT #: HHN821710****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN: 1.4 mm	57 mil	Thickness:	1.52 mm	60 mil
Measurement					
ASTM D5994	MAX: 1.6 mm	61 mil	Length:	170.688 m	560 feet
(Modified)	AVE: 1.5 mm	60 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895					205 minutes
Asperity	Average	Bottom		.81 mm	32 mil
ASTM D7466					
Specific Gravity	Average Density				.946 g/cc
ASTM D792					
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min				.27
Grade: K307					
Carbon Black Content ASTM D4218	Range				2.6 %
Carbon Black Dispersion ASTM D5596	Category				10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	24 N/mm	140 ppi	2327 psi
		TD	30 N/mm	169 ppi	2812 psi
	Average Strength @ Break	MD	40 N/mm	227 ppi	3782 psi
		TD	39 N/mm	222 ppi	3694 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			14 %
		TD			16 %
	Average Elongation @Break	MD			626 %
		TD			581 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		231.3 N	52 lbs.
		TD		218.0 N	49 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			596.0 N	134 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/24/2018 OA#: 40171

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18B000038**LOT #: HHN821710****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		54 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.6 mm		62 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		58 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							205 minutes	
Asperity ASTM D7466	Average	Bottom				.84 mm		33 mil
Specific Gravity ASTM D792	Average Density							.946 g/cc
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min							.27
Carbon Black Content ASTM D4218	Range							2.6 %
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	24 N/mm	140 ppi	2327 psi		
			TD	30 N/mm	169 ppi	2812 psi		
	Average Strength @ Break		MD	40 N/mm	227 ppi	3782 psi		
			TD	39 N/mm	222 ppi	3694 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD			14 %		
			TD			16 %		
	Average Elongation @Break		MD			626 %		
			TD			581 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		231.3 N	52 lbs.		
			TD		218.0 N	49 lbs.		
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load					596.0 N	134 lbs.	
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%					500 Hrs.	ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/24/2018 OA#: 40171

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18B000039**LOT #: HHN821710****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		55 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.6 mm		61 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		59 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							205 minutes	
Asperity ASTM D7466	Average	Bottom				.71 mm	28 mil	
Specific Gravity ASTM D792	Average Density						.946 g/cc	
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.27	
Carbon Black Content ASTM D4218	Range						2.6 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	24 N/mm	140 ppi	2327 psi		
			TD	30 N/mm	169 ppi	2812 psi		
	Average Strength @ Break		MD	40 N/mm	227 ppi	3782 psi		
			TD	39 N/mm	222 ppi	3694 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD			14 %		
			TD			16 %		
	Average Elongation @Break		MD			626 %		
			TD			581 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		231.3 N	52 lbs.		
			TD		218.0 N	49 lbs.		
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				596.0 N	134 lbs.		
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%				500 Hrs.	ONGOING		

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/24/2018 OA#: 40171

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18B000040**LOT #: HHN821710****LINER TYPE:****60 HD MICROSPIKE SS**

Thickness Measurement ASTM D5994 (Modified)	METRIC		ENGLISH		Thickness:	METRIC		ENGLISH	
	MIN:	1.4 mm	56 mil			1.52 mm	60 mil		
	MAX:	1.6 mm	63 mil		Length:	170.688 m	560 feet		
	AVE:	1.5 mm	59 mil		Width:	7.01 m	23 feet		
OIT(Standard) ASTM D 3895								205 minutes	
Asperity ASTM D7466	Average	Bottom				.86 mm	34 mil		
Specific Gravity ASTM D792	Average Density						.945 g/cc		
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.27		
Carbon Black Content ASTM D4218	Range						2.6 %		
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1		
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	24 N/mm	138 ppi	2293 psi				
			TD	27 N/mm	154 ppi	2568 psi			
	Average Strength @ Break	MD	39 N/mm	222 ppi	3701 psi				
			TD	39 N/mm	224 ppi	3741 psi			
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			15 %				
			TD		15 %				
	Average Elongation @ Break	MD			592 %				
			TD		714 %				
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		231.3 N	52 lbs.				
		TD		209.1 N	47 lbs.				
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				578.2 N	130 lbs.			
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%				500 Hrs.	ONGOING			

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/24/2018 OA#: 40171

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: **F18B000041**

LOT #: **HHN821710**

LINER TYPE:

60 HD MICROSPIKE SS

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm	56 mil		Thickness:	1.52 mm	60 mil	
	MAX:	1.6 mm	62 mil		Length:	170.688 m	560 feet	
	AVE:	1.5 mm	60 mil		Width:	7.01 m	23 feet	
OIT(Standard) ASTM D 3895							205 minutes	
Asperity ASTM D7466	Average	Bottom				.89 mm	35 mil	
Specific Gravity ASTM D792	Average Density						.945 g/cc	
MFI ASTM D1238 COND. E			Melt Flow Index 190C/2160 g - g/10 min				.27	
Grade: K307								
Carbon Black Content ASTM D4218	Range						2.6 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	24 N/mm	138 ppi	2293 psi		
			TD	27 N/mm	154 ppi	2568 psi		
	Average Strength @ Break		MD	39 N/mm	222 ppi	3701 psi		
			TD	39 N/mm	224 ppi	3741 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD			15 %		
			TD			15 %		
	Average Elongation @Break		MD			592 %		
			TD			714 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		231.3 N	52 lbs.		
			TD		209.1 N	47 lbs.		
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				578.2 N	130 lbs.		
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%				500 Hrs.	ONGOING		

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **2/24/2018** OA#: **40171**

Signature:


Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18B000042**LOT #: HHN821710****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm	57 mil		Thickness:	1.52 mm	60 mil	
	MAX:	1.6 mm	62 mil		Length:	170.688 m	560 feet	
	AVE:	1.5 mm	59 mil		Width:	7.01 m	23 feet	
OIT(Standard) ASTM D 3895							205 minutes	
Asperity ASTM D7466	Average	Bottom				.89 mm	35 mil	
Specific Gravity ASTM D792	Average Density						.945 g/cc	
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.27	
Carbon Black Content ASTM D4218	Range						2.6 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	24 N/mm		138 ppi		2293 psi	
		TD	27 N/mm		154 ppi		2568 psi	
	Average Strength @ Break	MD	39 N/mm		222 ppi		3701 psi	
		TD	39 N/mm		224 ppi		3741 psi	
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD					15 %	
		TD					15 %	
	Average Elongation @Break	MD					592 %	
		TD					714 %	
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			231.3 N		52 lbs.	
		TD			209.1 N		47 lbs.	
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				578.2 N		130 lbs.	
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%				500 Hrs.		ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/24/2018 OA#: 40171

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18B000043**LOT #: HHN821710****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.4 mm		55 mil	Thickness:	1.52 mm		60 mil
	MAX:	1.6 mm		62 mil	Length:	170.688 m		560 feet
	AVE:	1.5 mm		59 mil	Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895							205 minutes	
Asperity ASTM D7466	Average	Bottom				.86 mm		34 mil
Specific Gravity ASTM D792	Average Density						.945 g/cc	
MFI ASTM D1238 COND. E Grade: K307	Melt Flow Index 190C/2160 g - g/10 min						.27	
Carbon Black Content ASTM D4218	Range						2.6 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	24 N/mm	138 ppi	2293 psi		
			TD	27 N/mm	154 ppi	2568 psi		
	Average Strength @ Break		MD	39 N/mm	222 ppi	3701 psi		
			TD	39 N/mm	224 ppi	3741 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD			15 %		
			TD			15 %		
	Average Elongation @Break		MD			592 %		
			TD			714 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		231.3 N	52 lbs.		
			TD		209.1 N	47 lbs.		
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load					578.2 N	130 lbs.	
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%					500 Hrs.	ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/24/2018 OA#: 40171

Signature:

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18B000044**LOT #: HHN821710****LINER TYPE:****60 HD MICROSPIKE SS**

		METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement	MIN:	1.4 mm		56 mil		Thickness:	1.52 mm		60 mil
ASTM D5994	MAX:	1.5 mm		60 mil		Length:	170.688 m		560 feet
(Modified)	AVE:	1.5 mm		59 mil		Width:	7.01 m		23 feet
OIT(Standard) ASTM D 3895								205 minutes	
Asperity		Average		Bottom			.81 mm		32 mil
ASTM D7466									
Specific Gravity		Average Density						.945 g/cc	
ASTM D792									
MFI ASTM D1238 COND. E		Melt Flow Index 190C/2160 g - g/10 min						.27	
Grade: K307									
Carbon Black Content ASTM D4218		Range						2.6 %	
Carbon Black Dispersion ASTM D5596		Category						10 in Category 1	
Tensile Strength	ASTM D6693	(2 inches / minute)	Average Strength @ Yield	MD	24 N/mm	138 ppi	2293 psi		
				TD	27 N/mm	154 ppi	2568 psi		
				MD	39 N/mm	222 ppi	3701 psi		
				TD	39 N/mm	224 ppi	3741 psi		
Tensile Elongation	ASTM D6693	(2 inches / minute)	Average Elongation @ Yield	MD			15 %		
				TD			15 %		
				MD			592 %		
				TD			714 %		
Tear Resistance	ASTM D1004 (Modified)	Average Tear Resistance	MD		231.3 N	52 lbs.			
			TD		209.1 N	47 lbs.			
Puncture Resistance		Average Peak Load					578.2 N		130 lbs.
ASTM D4833 (Modified)									
Notched Constant Tensile Load		Pass/Fail @ 30%					500 Hrs.		ONGOING
ASTM D5397									

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: **2/24/2018** OA#: **40171**

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F18B000045**LOT #: HHN821710****LINER TYPE:****60 HD MICROSPIKE SS**

	METRIC		ENGLISH		METRIC		ENGLISH	
Thickness Measurement	MIN:	1.4 mm	56 mil		Thickness:	1.52 mm	60 mil	
ASTM D5994	MAX:	1.5 mm	60 mil		Length:	170.688 m	560 feet	
(Modified)	AVE:	1.5 mm	58 mil		Width:	7.01 m	23 feet	
OIT(Standard) ASTM D 3895							205 minutes	
Asperity ASTM D7466	Average		Bottom				.84 mm	33 mil
Specific Gravity ASTM D792	Average Density						.945 g/cc	
MFI ASTM D1238 COND. E			Melt Flow Index 190C/2160 g - g/10 min				.27	
Grade: K307								
Carbon Black Content ASTM D4218	Range						2.4 %	
Carbon Black Dispersion ASTM D5596	Category						10 in Category 1	
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield		MD	25 N/mm	141 ppi	2347 psi		
			TD	27 N/mm	153 ppi	2554 psi		
			MD	40 N/mm	227 ppi	3782 psi		
			TD	39 N/mm	222 ppi	3706 psi		
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		MD			16 %		
			TD			15 %		
			MD			604 %		
			TD			700 %		
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance		MD		231.3 N	52 lbs.		
			TD		209.1 N	47 lbs.		
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				578.2 N		130 lbs.	
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%				500 Hrs.		ONGOING	

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 2/24/2018 OA#: 40171

Signature:

Maria Coffey

Quality Control Department



Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 EAST NEWLANDS
FERNLEY NV 89408
USA

Recipient: PALMER
Fax:

Delivery #: 89587636
PO #: 012407
Weight: 180700.000 LB
Ship Date: 01/05/2018
Package: BULK
Mode: Hopper Car
Car #: CHVX896833
Seal No: 92136

Product:
MARLEX K307 POLYETHYLENE in Bulk

Lot Number: HHN821710

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.27	g/10min
HLMI Flow Rate	ASTM D1238	24	g/10min
Density	D1505 or D4883	0.937	g/cm3
Pellet Count	P02.08.03	29	pelet/gram
Production Date		12/30/2017	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

Troy Griffin
Quality Systems Coordinator

For CoA questions contact Patricia Royall at +1-832-813-4806



Vergil H. Rhodes, PE, CPlasT - Tech Svc & App Dev Engineer, Geomembranes
Highways 60 & 123, Bartlesville Research and Technology Center, Room 103 PTC
Bartlesville, OK 74003
■ 918-977-4229 ■ rhodevh@cpchem.com ■ Fax: 918-977-7599 ■ www.cpchem.com

October 31, 2017

Filename: Agru Oven and QUV Exposure Testing_103117.pdf

Nathan Ivy - Corporate Quality Control/Technical Manager
Agru America, Inc.
800 Rockmead #122
Kingwood, TX 77339
281-358-4741

Dear Mr. Ivy:

Please recall your request for testing of oven-exposed and UV-exposed geomembrane samples produced primarily from Marlex® 7104 LLDPE and Marlex® K307 HDPE. Agru blended other components with each of these polyethylenes to produce the geomembrane samples for testing. Smooth geomembrane samples have been received from Agru and test results are reported below. The samples were tested for HP-OIT in their as-received condition, and were also tested after oven and UV exposures of 90 days and 1600 hours of irradiance, respectively, in accordance with GRI-GM13 and GRI-GM17.

The following geomembrane sheet samples were received from Agru in mid-June 2017 and were reported to be primarily composed of each of the Chevron Phillips Chemical Company grades in the description below:

- K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick.
- 7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick.

Exposure and testing conditions, along with the test results are tabulated on the next page. GM-13 and GM-17 require minimum % HP-OIT retention after a 90-day oven exposure and after a 1600 hour UV irradiance exposure. These test results indicate these GM-13 and GM-17 minimum % HP-OIT retentions were exceeded by these Agru-supplied K307 and 7104 sheet samples, respectively.

If you have any questions, please feel free to contact me (contact information given above).

Sincerely,

Vergil Rhodes
Polyethylene Technical Service and Applications Development, Geomembrane

NOTICES

Technical Information - By using any Technical Information contained herein, Recipient agrees that said Technical Information is given by CPChem for convenience only, without any warranty or guarantee of any kind, and is accepted and used at your sole risk. Recipients are encouraged to verify independently any such information to their reasonable satisfaction. As used in this paragraph, "Technical Information" includes any technical advice, recommendations, testing, or analysis, including, without limitation, information as it may relate to the selection of a product for a specific use and application.

The following oven aging and UV exposure test methods were conducted in accordance with the GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) requirements:

Test Name	Exposure Conditions	Test Method
Oven Aging	90 days in an oven at 85 °C	ASTM D5721
UV Exposure	1600 UV irradiance hours. Cycle: 20 hours UVA-340 at 75 °C followed by 4 hours dark with condensation at 60 °C. Irradiance was 0.78 W/m ² at wavelength 340 nm. Note: This implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of dark/condensation.	ASTM D7238
HP-OIT	150 °C in an oxygen atmosphere at 500 psi	ASTM D5885

Oven Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 90 days of oven aging. (min)	% HP-OIT Retained after 90 days of oven aging.	GRI-GM13 and GRI-GM17 minimum % HP-OIT retained after 90 days of oven aging.
K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick	1264	1123	89	GRI-GM13: 80 minimum
7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick	550	508	92	GRI-GM17: 60 minimum

UV Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 1600 hrs of UV exposure. (min)	% HP-OIT Retained after 1600 hrs of UV exposure.	GRI-GM13 and GRI-GM17 minimum % HP-OIT retained after 1600 hrs of UV exposure.
K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick	1264	1024	81	GRI-GM13: 50 minimum
7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick	550	470	85	GRI-GM17: 35 minimum

Note: 1600 hours of UV exposure in accordance with ASTM D7238 implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of darkness with condensation.

NOTICES

Technical Information - By using any Technical Information contained herein, Recipient agrees that said Technical Information is given by CPChem for convenience only, without any warranty or guarantee of any kind, and is accepted and used at your sole risk. Recipients are encouraged to verify independently any such information to their reasonable satisfaction. As used in this paragraph, "Technical Information" includes any technical advice, recommendations, testing, or analysis, including, without limitation, information as it may relate to the selection of a product for a specific use and application.



Cust: Southwest Liner Systems, Inc.
 PO#: SW1803 Sundance West Surface Waste Facility
 Dest: Eunice, NM

Doc#: 40171

				16 rolls 60HD SS micro (560)	206,080	ft ²
				FG-HDSMTH060BBBEA	8 rolls 60HD smooth (600)	110,400
					2 rolls 60HD smooth-cond. (600)	27,600
					22 rolls 200net (300)	95,700
					2 roll 60HD micro (540)	12,420
roll #	width	English length	area	check weld rod qty (if ordered)	wgt	resin lot #
	ft.	ft.	ft ²		lbs.	
TRI-TX - U2						

F18A000247	23	540	12,420	FG-HDMSDS060BBBEG	2tot 1	3858	1ft	HHN821700
F18A000248	23	540	12420	FG-HDMSDS060BBBEG	2tot 2	3856		HHN821700
			24,840			7714		



quality certificate

ROLL #: F17A000247**LOT #: HHC821330****LINER TYPE:****60 HD MICROSPIKE**

	METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN: 1.4 mm	54 mil	Thickness:	1.52 mm	60 mil
Measurement			Length:	164.592 m	540 feet
ASTM D5994	MAX: 1.6 mm	64 mil	Width:	7.01 m	23 feet
(Modified)	AVE: 1.5 mm	58 mil			
OIT(Standard) ASTM D 3895					209 minutes
Asperity	Average	Top		.74 mm	29 mil
ASTM D7466		Bottom		.81 mm	32 mil
Specific Gravity	Average Density				.942 g/cc
ASTM D792					
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min				.25
Grade: K307					
Carbon Black Content ASTM D4218	Range				2.0 %
Carbon Black Dispersion ASTM D5596	Category				10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Yield	MD	25 N/mm	144 ppi	2403 psi
		TD	26 N/mm	149 ppi	2486 psi
	Average Strength @ Break	MD	34 N/mm	192 ppi	3192 psi
		TD	29 N/mm	167 ppi	2786 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	MD			16 %
		TD			16 %
	Average Elongation @Break	MD			448 %
		TD			538 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		258.0 N	58 lbs.
		TD		240.2 N	54 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			613.8 N	138 lbs.
Notched Constant Tensile Load ASTM D5397	Pass/Fail @ 30%			500 Hrs.	ONGOING

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 4/28/2017 OA#: 40171

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17A000248**LOT #: HHC821330****LINER TYPE:****60 HD MICROSPIKE**

	METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN: 1.4 mm	55 mil	Thickness:	1.52 mm	60 mil
Measurement			Length:	164.592 m	540 feet
ASTM D5994	MAX: 1.6 mm	61 mil	Width:	7.01 m	23 feet
(Modified)	AVE: 1.5 mm	58 mil			
OIT(Standard) ASTM D 3895					209 minutes
Asperity	Average	Top		.71 mm	28 mil
ASTM D7466		Bottom		.81 mm	32 mil
Specific Gravity	Average Density				.942 g/cc
ASTM D792					
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min				.25
Grade: K307					
Carbon Black Content ASTM D4218	Range				2.0 %
Carbon Black Dispersion ASTM D5596	Category				10 in Category 1
Tensile Strength	Average Strength @ Yield	MD	25 N/mm	144 ppi	2403 psi
ASTM D6693		TD	26 N/mm	149 ppi	2486 psi
(2 inches / minute)	Average Strength @ Break	MD	34 N/mm	192 ppi	3192 psi
		TD	29 N/mm	167 ppi	2786 psi
Tensile Elongation	Average Elongation @ Yield	MD			16 %
ASTM D6693		TD			16 %
(2 inches / minute) Lo	Average Elongation @Break	MD			448 %
= 1.3" Yield		TD			538 %
Lo = 2.0" Break					
Tear Resistance	Average Tear Resistance	MD	258.0 N		58 lbs.
ASTM D1004 (Modified)		TD	240.2 N		54 lbs.
Puncture Resistance	Average Peak Load		613.8 N		138 lbs.
ASTM D4833 (Modified)					
Notched Constant Tensile Load	Pass/Fail @ 30%		500 Hrs.		ONGOING
ASTM D5397					

Customer: Southwest Liner Systems, Inc.
PO: SW1803 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 4/28/2017 OA#: 40171

Signature: _____

Maria Coffey

Quality Control Department

Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 EAST NEWLANDS
FERNLEY NV 89408
USA

Recipient: PALMER
Fax:

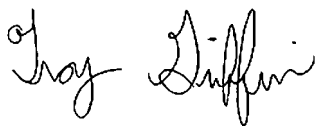
Delivery #: 89587635
PO #: 012407
Weight: 190000.000 LB
Ship Date: 01/05/2018
Package: BULK
Mode: Hopper Car
Car #: CBFX470089
Seal No: 92137

Product:
MARLEX K307 POLYETHYLENE in Bulk

Lot Number: HHN821700

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.30	g/10min
HLMI Flow Rate	ASTM D1238	24	g/10min
Density	D1505 or D4883	0.937	g/cm3
Pellet Count	P02.08.03	29	pelet/gram
Production Date		12/30/2017	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Troy Griffin
Quality Systems Coordinator

For CoA questions contact Patricia Royall at +1-832-813-4806



Vergil H. Rhodes, PE, CPlasT - Tech Svc & App Dev Engineer, Geomembranes
Highways 60 & 123, Bartlesville Research and Technology Center, Room 103 PTC
Bartlesville, OK 74003
■ 918-977-4229 ■ rhodevh@cpchem.com ■ Fax: 918-977-7599 ■ www.cpchem.com

October 31, 2017

Filename: Agru Oven and QUV Exposure Testing_103117.pdf

Nathan Ivy - Corporate Quality Control/Technical Manager
Agru America, Inc.
800 Rockmead #122
Kingwood, TX 77339
281-358-4741

Dear Mr. Ivy:

Please recall your request for testing of oven-exposed and UV-exposed geomembrane samples produced primarily from Marlex® 7104 LLDPE and Marlex® K307 HDPE. Agru blended other components with each of these polyethylenes to produce the geomembrane samples for testing. Smooth geomembrane samples have been received from Agru and test results are reported below. The samples were tested for HP-OIT in their as-received condition, and were also tested after oven and UV exposures of 90 days and 1600 hours of irradiance, respectively, in accordance with GRI-GM13 and GRI-GM17.

The following geomembrane sheet samples were received from Agru in mid-June 2017 and were reported to be primarily composed of each of the Chevron Phillips Chemical Company grades in the description below:

- K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick.
- 7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick.

Exposure and testing conditions, along with the test results are tabulated on the next page. GM-13 and GM-17 require minimum % HP-OIT retention after a 90-day oven exposure and after a 1600 hour UV irradiance exposure. These test results indicate these GM-13 and GM-17 minimum % HP-OIT retentions were exceeded by these Agru-supplied K307 and 7104 sheet samples, respectively.

If you have any questions, please feel free to contact me (contact information given above).

Sincerely,

Vergil Rhodes
Polyethylene Technical Service and Applications Development, Geomembrane

NOTICES

Technical Information - By using any Technical Information contained herein, Recipient agrees that said Technical Information is given by CPChem for convenience only, without any warranty or guarantee of any kind, and is accepted and used at your sole risk. Recipients are encouraged to verify independently any such information to their reasonable satisfaction. As used in this paragraph, "Technical Information" includes any technical advice, recommendations, testing, or analysis, including, without limitation, information as it may relate to the selection of a product for a specific use and application.

The following oven aging and UV exposure test methods were conducted in accordance with the GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) requirements:

Test Name	Exposure Conditions	Test Method
Oven Aging	90 days in an oven at 85 °C	ASTM D5721
UV Exposure	1600 UV irradiance hours. Cycle: 20 hours UVA-340 at 75 °C followed by 4 hours dark with condensation at 60 °C. Irradiance was 0.78 W/m ² at wavelength 340 nm. Note: This implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of dark/condensation.	ASTM D7238
HP-OIT	150 °C in an oxygen atmosphere at 500 psi	ASTM D5885

Oven Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 90 days of oven aging. (min)	% HP-OIT Retained after 90 days of oven aging.	GRI-GM13 and GRI-GM17 minimum % HP-OIT retained after 90 days of oven aging.
K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick	1264	1123	89	GRI-GM13: 80 minimum
7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick	550	508	92	GRI-GM17: 60 minimum

UV Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 1600 hrs of UV exposure. (min)	% HP-OIT Retained after 1600 hrs of UV exposure.	GRI-GM13 and GRI-GM17 minimum % HP-OIT retained after 1600 hrs of UV exposure.
K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick	1264	1024	81	GRI-GM13: 50 minimum
7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick	550	470	85	GRI-GM17: 35 minimum

Note: 1600 hours of UV exposure in accordance with ASTM D7238 implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of darkness with condensation.

NOTICES

Technical Information - By using any Technical Information contained herein, Recipient agrees that said Technical Information is given by CPChem for convenience only, without any warranty or guarantee of any kind, and is accepted and used at your sole risk. Recipients are encouraged to verify independently any such information to their reasonable satisfaction. As used in this paragraph, "Technical Information" includes any technical advice, recommendations, testing, or analysis, including, without limitation, information as it may relate to the selection of a product for a specific use and application.



Cust: Southwest Liner Systems, Inc.
 PO#: SW1728 Sundance West Surface Waste Facility
 Dest: Eunice, NM

Doc#:	38616
-------	-------

				56 rolls 60HD smooth (600)	772,800	ft ²
				31 rolls 60HD Ssmicro (560)	399,280	ft ²
				2 rolls 60HD micro	24,840	ft ²
				40 rolls 60HD smooth BL/Cond (600) (SC)	552,000	ft ²
				177 rolls 200 Geonet (300) (SC)	769,950	ft ²
						ft ²
				check weld rod qty (if ordered)	wgt	resin lot #
roll #	width	English length	area			
	ft.	ft.	ft ² .		lbs.	
1FT FROM END OF ROLLS 1, 8, 15, 22, 29, 37, 44, 51						
100K / LOT SQS TRITX U2						

F17D003880	23	540	12,420	60HD micro	2tot	1	3,936	1 FT	HHK821170
F17D003881	23	540	12,420	60HD micro	2tot	2	3,910		HHK821170
24,840							7,846		
total for order									

ROLL #: F17D003880
LOT #: HHK821170
LINER TYPE:
60 HD MICROSPIKE

	METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN: 1.4 mm	54 mil	Thickness:	1.52 mm	60 mil
Measurement	MAX: 1.6 mm	64 mil	Length:	164.592 m	540 feet
ASTM D5994	AVE: 1.5 mm	60 mil	Width:	7.01 m	23 feet
(Modified)					
OIT(Standard) ASTM D 3895					214 minutes
Asperity	Average	Top		.64 mm	25 mil
ASTM D7466		Bottom		.99 mm	39 mil
Specific Gravity	Average Density				.942 g/cc
ASTM D792					
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min				.23
Grade: K307					
Carbon Black Content ASTM D4218	Range				2.2 %
Carbon Black Dispersion ASTM D5596	Category				10 in Category 1
Tensile Strength	Average Strength @ Yield	MD	26 N/mm	148 ppi	2471 psi
ASTM D6693		TD	24 N/mm	137 ppi	2276 psi
(2 inches / minute)	Average Strength @ Break	MD	25 N/mm	145 ppi	2410 psi
		TD	31 N/mm	175 ppi	2918 psi
Tensile Elongation	Average Elongation @ Yield	MD			15 %
ASTM D6693		TD			15 %
(2 inches / minute) Lo	Average Elongation @Break	MD			477 %
= 1.3" Yield		TD			472 %
Lo = 2.0" Break					
Tear Resistance	Average Tear Resistance	MD	275.8 N		62 lbs.
ASTM D1004 (Modified)		TD	289.1 N		65 lbs.
Puncture Resistance	Average Peak Load		658.3 N		148 lbs.
ASTM D4833 (Modified)					
Notched Constant Tensile Load	Pass/Fail @ 30%		500 Hrs.		ONGOING
ASTM D5397					

Customer: Southwest Liner Systems, Inc.
 PO: SW1728 Sundance West Surface Waste Facility
 Destination: Eunice, NM

Production Date: 11/27/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department



quality certificate

ROLL #: F17D003881**LOT #: HHK821170****LINER TYPE:****60 HD MICROSPIKE**

	METRIC	ENGLISH		METRIC	ENGLISH
Thickness	MIN: 1.4 mm	56 mil	Thickness:	1.52 mm	60 mil
Measurement	MAX: 1.7 mm	66 mil	Length:	164.592 m	540 feet
ASTM D5994	AVE: 1.5 mm	60 mil	Width:	7.01 m	23 feet
(Modified)					
OIT(Standard) ASTM D 3895					214 minutes
Asperity	Average	Top		.64 mm	25 mil
ASTM D7466		Bottom		.81 mm	32 mil
Specific Gravity	Average Density				.942 g/cc
ASTM D792					
MFI ASTM D1238 COND. E	Melt Flow Index 190C/2160 g - g/10 min				.23
Grade: K307					
Carbon Black Content ASTM D4218	Range				2.2 %
Carbon Black Dispersion ASTM D5596	Category				10 in Category 1
Tensile Strength	Average Strength @ Yield	MD	26 N/mm	148 ppi	2471 psi
ASTM D6693		TD	24 N/mm	137 ppi	2276 psi
(2 inches / minute)	Average Strength @ Break	MD	25 N/mm	145 ppi	2410 psi
		TD	31 N/mm	175 ppi	2918 psi
Tensile Elongation	Average Elongation @ Yield	MD			15 %
ASTM D6693		TD			15 %
(2 inches / minute) Lo	Average Elongation @Break	MD			477 %
= 1.3" Yield		TD			472 %
Lo = 2.0" Break					
Tear Resistance	Average Tear Resistance	MD	275.8 N		62 lbs.
ASTM D1004 (Modified)		TD	289.1 N		65 lbs.
Puncture Resistance	Average Peak Load		658.3 N		148 lbs.
ASTM D4833 (Modified)					
Notched Constant Tensile Load	Pass/Fail @ 30%		500 Hrs.		ONGOING
ASTM D5397					

Customer: Southwest Liner Systems, Inc.
PO: SW1728 Sundance West Surface Waste Facility
Destination: Eunice, NM

Production Date: 11/27/2017 OA#: 38616

Signature: _____

Maria Coffey

Quality Control Department

Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 EAST NEWLANDS
FERNLEY NV 89408
USA

Recipient: PALMER
Fax:

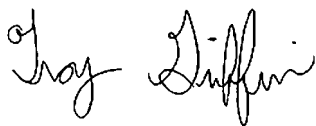
Delivery #: 89556931
PO #: 12169
Weight: 187600.000 LB
Ship Date: 11/07/2017
Package: BULK
Mode: Hopper Car
Car #: CHVX890301
Seal No: 93201

Product:
MARLEX K307 POLYETHYLENE in Bulk

Lot Number: HHK821170

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.23	g/10min
HLMI Flow Rate	ASTM D1238	20	g/10min
Density	D1505 or D4883	0.938	g/cm3
Pellet Count	P02.08.03	27	pelet/gram
Production Date		10/21/2017	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Troy Griffin
Quality Systems Coordinator

For CoA questions contact Patricia Royall at +1832813



Vergil H. Rhodes, PE, CPlasT - Tech Svc & App Dev Engineer, Geomembranes
Highways 60 & 123, Bartlesville Research and Technology Center, Room 103 PTC
Bartlesville, OK 74003
■ 918-977-4229 ■ rhodevh@cpchem.com ■ Fax: 918-977-7599 ■ www.cpchem.com

October 31, 2017

Filename: Agru Oven and QUV Exposure Testing_103117.pdf

Nathan Ivy - Corporate Quality Control/Technical Manager
Agru America, Inc.
800 Rockmead #122
Kingwood, TX 77339
281-358-4741

Dear Mr. Ivy:

Please recall your request for testing of oven-exposed and UV-exposed geomembrane samples produced primarily from Marlex® 7104 LLDPE and Marlex® K307 HDPE. Agru blended other components with each of these polyethylenes to produce the geomembrane samples for testing. Smooth geomembrane samples have been received from Agru and test results are reported below. The samples were tested for HP-OIT in their as-received condition, and were also tested after oven and UV exposures of 90 days and 1600 hours of irradiance, respectively, in accordance with GRI-GM13 and GRI-GM17.

The following geomembrane sheet samples were received from Agru in mid-June 2017 and were reported to be primarily composed of each of the Chevron Phillips Chemical Company grades in the description below:

- K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick.
- 7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick.

Exposure and testing conditions, along with the test results are tabulated on the next page. GM-13 and GM-17 require minimum % HP-OIT retention after a 90-day oven exposure and after a 1600 hour UV irradiance exposure. These test results indicate these GM-13 and GM-17 minimum % HP-OIT retentions were exceeded by these Agru-supplied K307 and 7104 sheet samples, respectively.

If you have any questions, please feel free to contact me (contact information given above).

Sincerely,

Vergil Rhodes
Polyethylene Technical Service and Applications Development, Geomembrane

NOTICES

Technical Information - By using any Technical Information contained herein, Recipient agrees that said Technical Information is given by CPChem for convenience only, without any warranty or guarantee of any kind, and is accepted and used at your sole risk. Recipients are encouraged to verify independently any such information to their reasonable satisfaction. As used in this paragraph, "Technical Information" includes any technical advice, recommendations, testing, or analysis, including, without limitation, information as it may relate to the selection of a product for a specific use and application.

The following oven aging and UV exposure test methods were conducted in accordance with the GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) requirements:

Test Name	Exposure Conditions	Test Method
Oven Aging	90 days in an oven at 85 °C	ASTM D5721
UV Exposure	1600 UV irradiance hours. Cycle: 20 hours UVA-340 at 75 °C followed by 4 hours dark with condensation at 60 °C. Irradiance was 0.78 W/m ² at wavelength 340 nm. Note: This implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of dark/condensation.	ASTM D7238
HP-OIT	150 °C in an oxygen atmosphere at 500 psi	ASTM D5885

Oven Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 90 days of oven aging. (min)	% HP-OIT Retained after 90 days of oven aging.	GRI-GM13 and GRI-GM17 minimum % HP-OIT retained after 90 days of oven aging.
K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick	1264	1123	89	GRI-GM13: 80 minimum
7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick	550	508	92	GRI-GM17: 60 minimum

UV Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 1600 hrs of UV exposure. (min)	% HP-OIT Retained after 1600 hrs of UV exposure.	GRI-GM13 and GRI-GM17 minimum % HP-OIT retained after 1600 hrs of UV exposure.
K307 Lot #HHB620720, Agru Roll #G17D000534, black sheet, smooth, nominal 0.040" thick	1264	1024	81	GRI-GM13: 50 minimum
7104 Lot #CFJ810540, Agru Roll #G15B434055, black sheet, smooth, nominal 0.040" thick	550	470	85	GRI-GM17: 35 minimum

Note: 1600 hours of UV exposure in accordance with ASTM D7238 implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of darkness with condensation.

NOTICES

Technical Information - By using any Technical Information contained herein, Recipient agrees that said Technical Information is given by CPChem for convenience only, without any warranty or guarantee of any kind, and is accepted and used at your sole risk. Recipients are encouraged to verify independently any such information to their reasonable satisfaction. As used in this paragraph, "Technical Information" includes any technical advice, recommendations, testing, or analysis, including, without limitation, information as it may relate to the selection of a product for a specific use and application.

APPENDIX B

Material Manufacturer Certification and Conformance Testing Results

B.4. FML Conformance Testing Results

November 1, 2017

Mail To:

Mark DeCarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo, NM 87004

email: swls.md@gmail.com

Bill To:

<= Same

Dear Mr. DeCarlo:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Project: **Sundance West Evaporated Basin**

TRI Job Reference Number: 33211

Material(s) Tested: Four, Agru 60 mil Smooth HDPE Geomembrane(s)

Test(s) Requested: Thickness (ASTM D 5199)
Density (ASTM D 1505)
Carbon Black Content (ASTM D 1603, mod.)
Carbon Dispersion (ASTM D 5596)
Tensile Properties (ASTM D 6693)
Puncture Strength (ASTM D 4833)
Tear Resistance (ASTM D 1004)

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

Sincerely,



Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file



GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Smooth HDPE Geomembrane

Sample Identification: F17C003693

TRI Log #: 33211

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	66.0	62.2	60.6	66.2	66.0	64.7	62.8	60.2	59.8	61.8	63.0 59.8	2.5 << min	60 min ave 54 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.948	0.948	0.948								0.948	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.50	2.52									2.51	0.01	2.0 - 3.0
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2 1 Cat 3
Rating - 2nd field view	1	1	1	1	1								
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	161	160	166	154	149						158	7	126 min
TD Yield Strength (ppi)	158	168	173	173	169						168	6	126 min
MD Break Strength (ppi)	272	248	274	269	275						268	11	228 min
TD Break Strength (ppi)	299	292	303	286	276						291	11	228 min
MD Yield Elongation (%)	19	19	19	20	21						20	1	12 min
TD Yield Elongation (%)	17	19	19	16	19						18	1	12 min
MD Break Elongation (%)	723	700	747	776	809						751	43	700 min
TD Break Elongation (%)	922	867	860	830	804						857	44	700 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	154	147	147	144	140						146	5	108 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	50	51	52	52	53	52	56	55	50	52	53	2	42 min
TD Tear Strength (lbs)	40	50	48	50	48	51	51	51	51	49	49	3	42 min
MD Machine Direction	TD Transverse Direction												



GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Smooth HDPE Geomembrane

Sample Identification: F17C003701

TRI Log #: 33211

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	62.1	60.8	60.6	64.7	64.6	64.4	65.6	60.6	62.5	63.4	62.9 60.6	1.9 << min	60 min ave 54 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.946	0.946	0.946								0.946	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.53	2.51									2.52	0.01	2.0 - 3.0
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2 1 Cat 3
Rating - 2nd field view	1	1	1	1	1								
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	164	157	151	158	153						157	5	126 min
TD Yield Strength (ppi)	158	168	162	162	169						164	5	126 min
MD Break Strength (ppi)	317	280	294	287	224						280	34	228 min
TD Break Strength (ppi)	283	319	291	317	330						308	20	228 min
MD Yield Elongation (%)	19	19	18	19	19						19	0	12 min
TD Yield Elongation (%)	17	17	17	17	18						17	0	12 min
MD Break Elongation (%)	876	771	872	784	614						783	106	700 min
TD Break Elongation (%)	873	930	897	972	957						926	41	700 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	134	138	135	132	131						134	3	108 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	52	52	51	49	51	47	50	48	47	47	49	2	42 min
TD Tear Strength (lbs)	50	50	48	46	49	55	50	48	50	51	50	2	42 min
MD Machine Direction	TD Transverse Direction												



GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Smooth HDPE Geomembrane

Sample Identification: F17C003708

TRI Log #: 33211

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	63.7	60.7	59.9	62.7	62.8	62.6	65.0	59.9	59.7	63.6	62.0 59.7	1.9 << min	60 min ave 54 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.948	0.948	0.948								0.948	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.57	2.59									2.58	0.01	2.0 - 3.0
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2 1 Cat 3
Rating - 2nd field view	1	1	1	1	1								
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	156	153	148	149	162						154	6	126 min
TD Yield Strength (ppi)	161	170	156	156	155						160	6	126 min
MD Break Strength (ppi)	305	239	269	269	281						273	24	228 min
TD Break Strength (ppi)	273	294	306	306	295						295	13	228 min
MD Yield Elongation (%)	20	20	19	20	21						20	1	12 min
TD Yield Elongation (%)	18	18	18	18	18						18	0	12 min
MD Break Elongation (%)	875	682	803	779	745						777	71	700 min
TD Break Elongation (%)	836	868	963	955	917						908	55	700 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	134	138	135	132	131						134	3	108 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	54	49	48	50	50	48	47	46	50	48	49	2	42 min
TD Tear Strength (lbs)	48	50	46	46	46	51	53	49	54	51	49	3	42 min
MD Machine Direction	TD Transverse Direction												

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Smooth HDPE Geomembrane
Sample Identification: F17C003716
TRI Log #: 33211

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	64.0	59.4	64.8	63.2	61.9	60.7	61.4	58.4	61.9	64.2	62.0 58.4	2.1 << min	60 min ave 54 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.948	0.948	0.948								0.948	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.52	2.50									2.51	0.01	2.0 - 3.0
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2 1 Cat 3
Rating - 2nd field view	1	1	1	1	1								
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	160	160	153	153	149						155	5	126 min
TD Yield Strength (ppi)	170	165	156	157	157						161	6	126 min
MD Break Strength (ppi)	246	308	302	295	279						286	25	228 min
TD Break Strength (ppi)	261	297	280	288	330						291	25	228 min
MD Yield Elongation (%)	19	21	20	21	20						20	1	12 min
TD Yield Elongation (%)	16	17	18	18	18						17	1	12 min
MD Break Elongation (%)	674	793	825	815	792						780	61	700 min
TD Break Elongation (%)	763	851	856	869	980						864	77	700 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	136	132	131	130	128						131	3	108 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	51	53	49	54	51	51	52	48	53	52	51	2	42 min
TD Tear Strength (lbs)	49	49	47	49	48	49	49	47	48	50	49	1	42 min
MD Machine Direction	TD Transverse Direction												

November 2, 2017

Mail To:

Mark DeCarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo, NM 87004

email: swls.md@gmail.com

Dear Mr. DeCarlo:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

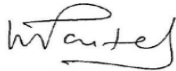
Bill To:

<= Same

Project:	Sundance West Evaporated Basin
TRI Job Reference Number:	33227
Material(s) Tested:	Four, Agru 60 mil Smooth HDPE Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D 5199) Density (ASTM D 1505) Carbon Black Content (ASTM D 1603, mod.) Carbon Dispersion (ASTM D 5596) Tensile Properties (ASTM D 6693) Puncture Strength (ASTM D 4833) Tear Resistance (ASTM D 1004)

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

Sincerely,



Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file



GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Smooth HDPE Geomembrane

Sample Identification: F17C003725

TRI Log #: 33227

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	57.5	63.0	54.3	54.8	59.1	50.2	57.6	59.9	59.1	61.5	57.7 50.2	3.8 << min	60 min ave 54 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.946	0.946	0.946								0.946	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.53	2.53									2.53	0.00	2.0 - 3.0
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2 1 Cat 3
Rating - 2nd field view	1	1	1	1	1								
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	147	160	156	163	156						156	6	126 min
TD Yield Strength (ppi)	145	162	161	156	151						155	7	126 min
MD Break Strength (ppi)	301	304	255	271	293						285	21	228 min
TD Break Strength (ppi)	295	306	323	319	304						309	11	228 min
MD Yield Elongation (%)	20	21	21	20	20						20	1	12 min
TD Yield Elongation (%)	17	16	19	17	19						18	1	12 min
MD Break Elongation (%)	833	758	643	695	724						731	71	700 min
TD Break Elongation (%)	904	877	903	894	882						892	12	700 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	144	141	139	141	138						141	3	108 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	48	55	49	54	54	53	54	54	51	51	52	2	42 min
TD Tear Strength (lbs)	46	49	45	48	50	50	50	50	47	48	49	2	42 min
MD Machine Direction	TD Transverse Direction												



GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Smooth HDPE Geomembrane

Sample Identification: F17C003733

TRI Log #: 33227

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	61.7	63.7	61.6	63.4	62.7	61.6	59.4	61.8	62.5	60.4	61.8 59.4	1.3 << min	60 min ave 54 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.946	0.947	0.947								0.947	0.001	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.48	2.55									2.52	0.05	2.0 - 3.0
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2 1 Cat 3
Rating - 2nd field view	1	1	1	1	1								
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	164	169	166	149	147						159	10	126 min
TD Yield Strength (ppi)	168	158	162	171	165						165	5	126 min
MD Break Strength (ppi)	272	289	285	265	257						274	13	228 min
TD Break Strength (ppi)	319	312	305	323	321						316	7	228 min
MD Yield Elongation (%)	19	18	18	20	19						19	1	12 min
TD Yield Elongation (%)	17	18	17	17	18						17	1	12 min
MD Break Elongation (%)	716	734	757	778	716						740	27	700 min
TD Break Elongation (%)	959	976	949	936	941						952	16	700 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	142	141	140	136	137						139	3	108 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	53	54	53	48	53	54	55	50	53	54	53	2	42 min
TD Tear Strength (lbs)	47	48	51	46	51	47	49	51	49	50	49	2	42 min
MD Machine Direction	TD Transverse Direction												



GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Smooth HDPE Geomembrane

Sample Identification: F17C003740

TRI Log #: 33227

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	63.9	63.5	60.8	59.8	63.0	64.0	60.0	61.7	64.6	60.3	62.1 59.8	1.8 << min	60 min ave 54 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.947	0.947	0.947								0.947	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.52	2.48									2.50	0.03	2.0 - 3.0
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2 1 Cat 3
Rating - 2nd field view	1	1	1	1	1								
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	154	161	143	153	143						151	8	126 min
TD Yield Strength (ppi)	155	163	163	149	158						158	6	126 min
MD Break Strength (ppi)	221	277	266	308	287						272	32	228 min
TD Break Strength (ppi)	274	305	294	279	284						287	12	228 min
MD Yield Elongation (%)	19	19	19	19	18						19	0	12 min
TD Yield Elongation (%)	16	18	17	18	18						17	1	12 min
MD Break Elongation (%)	613	756	820	888	861						788	110	700 min
TD Break Elongation (%)	869	920	882	893	881						889	19	700 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	136	134	131	133	130						133	2	108 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	50	53	50	51	53	53	53	49	52	50	51	2	42 min
TD Tear Strength (lbs)	48	48	46	48	46	48	49	46	49	46	48	1	42 min
MD Machine Direction	TD Transverse Direction												

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Smooth HDPE Geomembrane

Sample Identification: F17C003747

TRI Log #: 33227

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	63.8	62.4	61.6	63.3	59.4	64.3	61.1	58.5	58.3	60.3	61.3 58.3	2.2 << min	60 min ave 54 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.948	0.948	0.948								0.948	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.58	2.50									2.54	0.06	2.0 - 3.0
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2 1 Cat 3
Rating - 2nd field view	1	1	1	1	1								
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	157	155	156	160	156						157	2	126 min
TD Yield Strength (ppi)	165	157	163	160	159						161	3	126 min
MD Break Strength (ppi)	292	265	257	268	263						269	13	228 min
TD Break Strength (ppi)	321	279	286	311	271						294	21	228 min
MD Yield Elongation (%)	19	20	20	19	20						20	1	12 min
TD Yield Elongation (%)	17	17	18	19	18						18	1	12 min
MD Break Elongation (%)	851	772	703	772	751						770	53	700 min
TD Break Elongation (%)	999	873	869	964	838						909	69	700 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	137	136	135	136	131						135	2	108 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	49	49	52	50	51	50	51	50	46	50	50	2	42 min
TD Tear Strength (lbs)	47	47	46	47	46	47	48	47	47	47	47	1	42 min
MD Machine Direction	TD Transverse Direction												

December 14, 2017

Mail To:

Mark DeCarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo, NM 87004

email: swls.md@gmail.com

Bill To:

<= Same

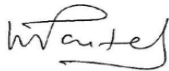
Dear Mr. DeCarlo:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Project:	Sundance West Evaporated Basin
TRI Job Reference Number:	34268
Material(s) Tested:	Three, Agru 60 mil Smooth HDPE Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D 5199) Density (ASTM D 1505) Carbon Black Content (ASTM D 1603, mod.) Carbon Dispersion (ASTM D 5596) Tensile Properties (ASTM D 6693) Puncture Strength (ASTM D 4833) Tear Resistance (ASTM D 1004)

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

Sincerely,



Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Smooth HDPE Geomembrane
Sample Identification: G17C004077
TRI Log #: 34268

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	57.8	62.0	64.1	61.3	58.1	58.3	67.7	69.5	67.6	65.8	63.2 57.8	4.4 << min	60 min Ave 54 minimum
Density (ASTM D 1505)													
Density (g/cm3)	0.947	0.947	0.947								0.947	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.84	2.86									2.85	0.01	2.0 - 3.0
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2
Rating - 2nd field view	1	1	1	1	1								1 Cat 3
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	165	146	149	180	162						160 164	14	126 min
TD Yield Strength (ppi)	159	147	165	166	185							14	126 min
MD Break Strength (ppi)	211	238	224	287	253						243 249	29	228 min
TD Break Strength (ppi)	229	233	259	261	261							16	228 min
MD Yield Elongation (%)	18	18	20	19	20						19 17	1	12 min
TD Yield Elongation (%)	16	16	19	17	19							2	12 min
MD Break Elongation (%)	639	770	669	738	730						709 790	54	700 min
TD Break Elongation (%)	780	807	811	810	741							30	700 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	142	129	130	137	136						135	5	108 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	50	51	46	59	52	52	58	46	51	49	51 48	4	42 min
TD Tear Strength (lbs)	45	49	44	54	50	46	48	44	53	49		4	42 min
MD Machine Direction	TD Transverse Direction												

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Smooth HDPE Geomembrane
Sample Identification: G17C004088
TRI Log #: 34268

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	56.2	56.6	55.8	58.7	59.5	60.8	68.0	68.2	66.8	67.7	61.8 55.8	5.3 << min	60 min Ave 54 minimum
Density (ASTM D 1505)													
Density (g/cm3)	0.947	0.947	0.947								0.947	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.69	2.68									2.69	0.01	2.0 - 3.0
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2 1 Cat 3
Rating - 2nd field view	1	1	1	1	1								
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	146	141	164	164	172						157 169	13 17	126 min 126 min
TD Yield Strength (ppi)	182	190	147	168	158								
MD Break Strength (ppi)	237	237	216	266	257						243 247	20 27	228 min 228 min
TD Break Strength (ppi)	236	286	220	263	230								
MD Yield Elongation (%)	18	18	19	19	19						19 18	1 1	12 min 12 min
TD Yield Elongation (%)	18	18	18	16	18								
MD Break Elongation (%)	709	767	621	751	667						703 770	60 43	700 min 700 min
TD Break Elongation (%)	697	800	774	804	775								
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	154	153	150	150	148						151	2	108 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	56	50	45	51	59	57	49	45	51	58	52 49	5 5	42 min 42 min
TD Tear Strength (lbs)	45	42	50	54	52	45	43	49	54	53			
MD Machine Direction	TD Transverse Direction												

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Smooth HDPE Geomembrane
Sample Identification: G17C004096
TRI Log #: 34268

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	58.0	68.8	67.3	64.9	56.6	55.4	68.2	67.0	62.6	63.1	63.2 55.4	5.0 << min	60 min Ave 54 minimum
Density (ASTM D 1505)													
Density (g/cm3)	0.949	0.949	0.949								0.949	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.66	2.64									2.65	0.01	2.0 - 3.0
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2 1 Cat 3
Rating - 2nd field view	1	1	1	1	1								
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	139	158	167	166	139						154	14	126 min
TD Yield Strength (ppi)	159	175	187	175	141						167	18	126 min
MD Break Strength (ppi)	236	246	255	274	240						250	15	228 min
TD Break Strength (ppi)	228	269	266	258	215						247	24	228 min
MD Yield Elongation (%)	19	18	19	19	22						19	2	12 min
TD Yield Elongation (%)	17	17	16	16	18						17	1	12 min
MD Break Elongation (%)	766	713	685	723	729						723	29	700 min
TD Break Elongation (%)	779	821	766	774	761						780	24	700 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	131	130	129	133	133						131	2	108 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	49	53	45	57	56	49	52	46	57	57	52	5	42 min
TD Tear Strength (lbs)	45	50	43	53	52	45	49	43	52	51	48	4	42 min
MD Machine Direction	TD Transverse Direction												

March 5, 2018

Mail To:

Mark DeCarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo NM 87004

email: mark@slsliner.com

Bill To:

<= Same (P.O. #SW1731)

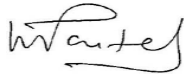
Dear Mr. DeCarlo:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Project:	Sundance West Evaporated Basin
TRI Job Reference Number:	35705
Material(s) Tested:	One, 60 mil Smooth HDPE Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D 5199) Density (ASTM D 1505) Carbon Black Content (ASTM D 1603, mod.) Carbon Dispersion (ASTM D 5596) Tensile Properties (ASTM D 6693) Tear Resistance (ASTM D 1004) Puncture Strength (ASTM D 4833)

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

Sincerely,



Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file



GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: 60 mil Smooth HDPE Geomembrane

Sample Identification: F18C000786

TRI Log #: 35705

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D 5199)												
Thickness (mils)	59.6	61.6	58.2	61.8	59.0	65.3	58.2	58.4	62.4	59.3	60.4 58.2	2.3 << min
Density (ASTM D 1505)												
Density (g/cm3)	0.948	0.948	0.948								0.948	0.000
Carbon Black Content (ASTM D 1603, mod.)												
% Carbon Black	2.74	2.69									2.72	0.04
Carbon Black Dispersion (ASTM D 5596)												
Rating - 1st field view	1	1	1	1	1							
Rating - 2nd field view	1	1	1	1	1							
Tensile Properties (ASTM D 6693, 2 ipm strain rate)												
MD Yield Strength (ppi)	156	161	157	162	152						158	4
TD Yield Strength (ppi)	155	165	157	163	157						159	4
MD Break Strength (ppi)	272	277	267	255	264						267	8
TD Break Strength (ppi)	256	279	263	283	280						272	12
MD Yield Elongation (%)	19	19	19	19	19						19	0
TD Yield Elongation (%)	18	17	17	18	20						18	1
MD Break Elongation (%)	782	758	775	721	797						767	29
TD Break Elongation (%)	832	859	837	883	888						860	26
Tear Resistance (ASTM D 1004)												
MD Tear Strength (lbs)	53	53	52	53	52	50	48	48	48	48	50	2
TD Tear Strength (lbs)	49	48	49	49	48	48	47	46	46	45	48	1
Puncture Resistance (ASTM D 4833)												
Puncture Strength (lbs)	138	134	130	130	127						132	4
MD Machine Direction	TD Transverse Direction											

December 14, 2017

Mail To:

Mark DeCarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo, NM 87004

email: swls.md@gmail.com

Bill To:

<= Same

Dear Mr. DeCarlo:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Project: **Sundance West Evaporated Basin**

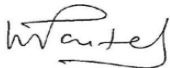
TRI Job Reference Number: 34333

Material(s) Tested: One, Agru 60 mil Single Sided Microspike HDPE Geomembrane

Test(s) Requested: Thickness (ASTM D 5994)
Density (ASTM D 1505)
Carbon Black Content (ASTM D 1603, mod.)
Carbon Dispersion (ASTM D 5596)
Tensile Properties (ASTM D 6693)
Puncture Strength (ASTM D 4833)
Tear Resistance (ASTM D 1004)

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

Sincerely,



Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Single Sided Microspike HDPE Geomembrane
Sample Identification: F17C004454
TRI Log #: 34333

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
Thickness (mils)	62	62	61	61	61	62	60	59	61	61	61	1	57 min ave
											59	<< min	54, 8 of 10 51 min ind.
Density (ASTM D 1505)													
Density (g/cm3)	0.947	0.947	0.947								0.947	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.64	2.61									2.63	0.02	2.0 - 3.0
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2
Rating - 2nd field view	1	1	1	1	1								1 Cat 3
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	150	155	153	155	151						153	2	126 min
TD Yield Strength (ppi)	163	150	159	148	155						155	6	126 min
MD Break Strength (ppi)	240	245	224	229	233						234	8	90 min
TD Break Strength (ppi)	171	163	169	173	195						174	12	90 min
MD Yield Elongation (%)	20	21	22	20	23						21	1	12 min
TD Yield Elongation (%)	15	18	15	17	16						16	1	12 min
MD Break Elongation (%)	669	563	541	589	675						607	61	100 min
TD Break Elongation (%)	550	512	509	557	633						552	50	100 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	143	136	135	135	136						137	3	90 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	55	51	54	49	56	55	50	53	48	55	53	3	42 min
TD Tear Strength (lbs)	46	46	47	46	46	46	46	46	46	46	46	1	42 min
MD Machine Direction	TD Transverse Direction												

December 14, 2017

Mail To:

Mark DeCarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo, NM 87004

email: swls.md@gmail.com

Bill To:

<= Same

Dear Mr. DeCarlo:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Project:	Sundance West Evaporated Basin
TRI Job Reference Number:	34376
Material(s) Tested:	One, Agru 60 mil Single Sided Microspike Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D 5994) Density (ASTM D 1505) Carbon Black Content (ASTM D 1603, mod.) Carbon Dispersion (ASTM D 5596) Tensile Properties (ASTM D 6693) Puncture Strength (ASTM D 4833) Tear Resistance (ASTM D 1004)

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

Sincerely,



Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Single Sided Microspike Geomembrane
Sample Identification: F17C004463
TRI Log #: 34376

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
Thickness (mils)	61	62	60	61	61	62	62	60	61	63	6160	1 << min	57 min ave 54, 8 of 10 51 min ind.
Density (ASTM D 1505)													
Density (g/cm3)	0.947	0.947	0.947								0.947	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.57	2.57									2.57	0.00	2.0 - 3.0
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2
Rating - 2nd field view	1	1	1	1	1								1 Cat 3
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	136	142	144	142	148						142	4	126 min
TD Yield Strength (ppi)	156	164	156	144	147						153	8	126 min
MD Break Strength (ppi)	216	246	237	210	245						231	17	90 min
TD Break Strength (ppi)	156	157	120	138	122						139	18	90 min
MD Yield Elongation (%)	23	23	23	23	19						22	2	12 min
TD Yield Elongation (%)	17	15	14	16	19						16	2	12 min
MD Break Elongation (%)	486	628	555	617	663						590	70	100 min
TD Break Elongation (%)	649	593	479	601	594						583	63	100 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	137	128	129	132	132						132	4	90 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	53	54	51	48	50	53	55	52	47	50	51	3	42 min
TD Tear Strength (lbs)	45	47	48	47	48	45	46	45	46	47	46	1	42 min
MD Machine Direction	TD Transverse Direction												

December 18, 2017

Mail To:

Mark DeCarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo, NM 87004

email: swls.md@gmail.com

Bill To:

<= Same

Dear Mr. DeCarlo:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Project:	Sundance West Evaporated Basin
TRI Job Reference Number:	34303
Material(s) Tested:	Two, Agru 60 mil Single Sided Microspike Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D 5994) Density (ASTM D 1505) Carbon Black Content (ASTM D 1603, mod.) Carbon Dispersion (ASTM D 5596) Tensile Properties (ASTM D 6693) Puncture Strength (ASTM D 4833) Tear Resistance (ASTM D 1004)

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

Sincerely,



Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file



GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Single Sided Microspike Geomembrane

Sample Identification: F17C004434

TRI Log #: 34303

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D 5994)												
Thickness (mils)	61	62	60	63	62	64	64	67	63	67	63 60	2 << min
Density (ASTM D 1505)												
Density (g/cm3)	0.946	0.947	0.947								0.947	0.001
Carbon Black Content (ASTM D 1603, mod.)												
% Carbon Black	2.44	2.47									2.46	0.02
Carbon Black Dispersion (ASTM D 5596)												
Rating - 1st field view	1	1	1	1	1							
Rating - 2nd field view	1	1	1	1	1							
Tensile Properties (ASTM D 6693, 2 ipm strain rate)												
MD Yield Strength (ppi)	150	151	149	148	158						151 159	4 5
TD Yield Strength (ppi)	163	157	153	164	157							
MD Break Strength (ppi)	215	234	255	243	240						237 199	15 16
TD Break Strength (ppi)	180	186	204	208	219							
MD Yield Elongation (%)	19	22	20	19	22						20 17	2 2
TD Yield Elongation (%)	15	17	19	17	19							
MD Break Elongation (%)	589	575	697	692	614						633 635	58 44
TD Break Elongation (%)	585	600	654	640	695							
Puncture Resistance (ASTM D 4833)												
Puncture Strength (lbs)	141	133	133	134	127						134	5
Tear Resistance (ASTM D 1004)												
MD Tear Strength (lbs)	49	51	51	54	54	49	49	49	54	54	51 47	2 1
TD Tear Strength (lbs)	46	46	48	47	46	45	46	45	48	47		
MD Machine Direction	TD Transverse Direction											

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Single Sided Microspike Geomembrane
Sample Identification: F17C004443
TRI Log #: 34303

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D 5994)												
Thickness (mils)	62	64	63	60	63	58	62	60	63	62	62 58	2 << min
Density (ASTM D 1505)												
Density (g/cm3)	0.947	0.947	0.947								0.947	0.000
Carbon Black Content (ASTM D 1603, mod.)												
% Carbon Black	2.56	2.57									2.57	0.01
Carbon Black Dispersion (ASTM D 5596)												
Rating - 1st field view	1	1	1	1	1							
Rating - 2nd field view	1	1	1	1	1							
Tensile Properties (ASTM D 6693, 2 ipm strain rate)												
MD Yield Strength (ppi)	148	145	141	139	145						144	4
TD Yield Strength (ppi)	173	169	167	173	165						169	4
MD Break Strength (ppi)	245	225	233	227	245						235	10
TD Break Strength (ppi)	196	173	131	203	159						172	29
MD Yield Elongation (%)	22	24	25	21	24						23	2
TD Yield Elongation (%)	15	16	16	16	18						16	1
MD Break Elongation (%)	643	499	458	500	539						528	70
TD Break Elongation (%)	612	582	426	632	461						543	93
Puncture Resistance (ASTM D 4833)												
Puncture Strength (lbs)	116	126	125	125	128						124	5
Tear Resistance (ASTM D 1004)												
MD Tear Strength (lbs)	55	53	51	51	50	55	52	54	54	49	52	2
TD Tear Strength (lbs)	43	44	46	47	45	44	47	46	46	43	45	1
MD Machine Direction	TD Transverse Direction											

December 4, 2017

Mail To:

Mark DeCarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo, NM 87004

email: swls.md@gmail.com

Dear Mr. DeCarlo:

Bill To:

<= Same

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Project:	Sundance West Evaporated Basin
TRI Job Reference Number:	34085
Material(s) Tested:	One, Agru 60 mil Microspike HDPE Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D 5994) Density (ASTM D 1505) Carbon Black Content (ASTM D 1603, mod.) Carbon Dispersion (ASTM D 5596) Tensile Properties (ASTM D 6693) Puncture Strength (ASTM D 4833) Tear Resistance (ASTM D 1004)

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

Sincerely,



Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Microspike HDPE Geomembrane
Sample Identification: F17D003880
TRI Log #: 34085

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
Thickness (mils)	62	63	62	61	62	63	61	63	63	65	62	1	57 min ave
											61	<< min	54, 8 of 10 51 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.944	0.944	0.944								0.944	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.26	2.25									2.26	0.01	2.0 - 3.0
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2
Rating - 2nd field view	1	1	1	1	1								1 Cat 3
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	178	168	180	172	161						172	8	126 min
TD Yield Strength (ppi)	178	191	190	168	180						181	9	126 min
MD Break Strength (ppi)	210	176	211	197	192						197	14	90 min
TD Break Strength (ppi)	138	117	150	123	163						138	19	90 min
MD Yield Elongation (%)	20	20	21	20	24						21	2	12 min
TD Yield Elongation (%)	18	17	16	17	17						17	1	12 min
MD Break Elongation (%)	464	474	489	491	493						482	13	100 min
TD Break Elongation (%)	446	361	473	229	527						407	116	100 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	148	147	146	146	144						146	2	90 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	52	57	55	58	58	56	60	60	56	60	57	3	42 min
TD Tear Strength (lbs)	47	50	46	49	51	48	50	54	48	52	49	2	42 min
MD Machine Direction	TD Transverse Direction												

March 13, 2018

Mail To:

Mark A. DeCarlo
Southwest Liner Systems, Inc.
301 Calle Industrial
Bernalillo NM 87004

email: swls.md@gmail.com

Dear Mr. De Carlo:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

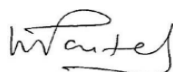
Bill To:

P.O. #SW1731

Project:	Sundance West Evaporated Basin
TRI Job Reference Number:	35707
Material(s) Tested:	Three, Agru 60 mil Single Sided Microspike HDPE Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D 5994) Density (ASTM D 1505) Carbon Black Content (ASTM D 1603, mod.) Carbon Dispersion (ASTM D 5596) Tensile Properties (ASTM D 6693) Tear Resistance (ASTM D 1004) Puncture Strength (ASTM D 4833)

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

Sincerely,



Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file



GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc.
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Single Sided Microspike HDPE Geomembrane

Sample Identification: F18B000030

TRI Log #: 35707

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D 5994)												
Thickness (mils)	60	60	61	62	64	63	62	61	62	60	62 60	1 << min
Density (ASTM D 1505)												
Density (g/cm3)	0.948	0.948	0.948								0.948	0.000
Carbon Black Content (ASTM D 1603, mod.)												
% Carbon Black	2.70	2.82									2.76	0.08
Carbon Black Dispersion (ASTM D 5596)												
Rating - 1st field view	1	1	1	1	1							
Rating - 2nd field view	1	1	1	1	1							
Tensile Properties (ASTM D 6693, 2 ipm strain rate)												
MD Yield Strength (ppi)	144	148	145	150	152						148	3
TD Yield Strength (ppi)	164	168	160	163	158						163	4
MD Break Strength (ppi)	223	235	231	229	243						232	7
TD Break Strength (ppi)	206	204	183	172	123						178	34
MD Yield Elongation (%)	19	19	19	18	22						19	2
TD Yield Elongation (%)	17	17	16	17	17						17	0
MD Break Elongation (%)	601	596	598	596	633						605	16
TD Break Elongation (%)	657	652	616	581	430						587	93
Tear Resistance (ASTM D 1004)												
MD Tear Strength (lbs)	53	53	51	55	49	50	52	53	50	52	52	2
TD Tear Strength (lbs)	48	48	47	45	44	47	46	47	45	44	46	2
Puncture Resistance (ASTM D 4833)												
Puncture Strength (lbs)	145	138	140	133	142						139	4
MD Machine Direction	TD Transverse Direction											

GEOMEMBRANE TEST RESULTS
 TRI Client: Southwest Liner Systems, Inc.
 Project: Sundance West Evaporated Basin

Material: Agru 60 mil Single Sided Microspike HDPE Geomembrane
 Sample Identification: F18B000036
 TRI Log #: 35707

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D 5994)												
Thickness (mils)	61	61	62	62	60	61	62	60	64	59	61 59	1

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc.
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Single Sided Microspike HDPE Geomembrane
Sample Identification: F18B000043
TRI Log #: 35707

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D 5994)												
Thickness (mils)	60	61	60	61	63	61	64	61	59	60	61 59	1 << min
Density (ASTM D 1505)												
Density (g/cm3)	0.950	0.950	0.950								0.950	0.000
Carbon Black Content (ASTM D 1603, mod.)												
% Carbon Black	2.69	2.67									2.68	0.01
Carbon Black Dispersion (ASTM D 5596)												
Rating - 1st field view	1	1	1	1	1							
Rating - 2nd field view	1	1	1	1	1							
Tensile Properties (ASTM D 6693, 2 ipm strain rate)												
MD Yield Strength (ppi)	149	144	141	138	151						145	5
TD Yield Strength (ppi)	163	167	162	158	168						164	4
MD Break Strength (ppi)	239	233	217	198	204						218	18
TD Break Strength (ppi)	190	244	273	197	206						222	35
MD Yield Elongation (%)	19	18	18	19	20						19	1
TD Yield Elongation (%)	15	17	16	15	17						16	1
MD Break Elongation (%)	629	619	577	499	590						583	51
TD Break Elongation (%)	642	764	833	706	661						721	78
Tear Resistance (ASTM D 1004)												
MD Tear Strength (lbs)	50	51	49	52	49	50	50	52	52	49	50	1
TD Tear Strength (lbs)	44	47	47	46	44	43	46	46	45	44	45	1
Puncture Resistance (ASTM D 4833)												
Puncture Strength (lbs)	131	129	129	131	128						130	1
MD Machine Direction	TD Transverse Direction											

March 5, 2018

Mail To:

Mark DeCarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo NM 87004

email: mark@slsliner.com

Bill To:

<= Same (P.O. #SW1731)

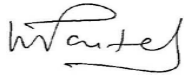
Dear Mr. DeCarlo:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Project:	Sundance West Evaporated Basin
TRI Job Reference Number:	35708
Material(s) Tested:	One, 60 mil Microspike HDPE Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D 5994) Density (ASTM D 1505) Carbon Black Content (ASTM D 1603, mod.) Carbon Dispersion (ASTM D 5596) Tensile Properties (ASTM D 6693) Tear Resistance (ASTM D 1004) Puncture Strength (ASTM D 4833)

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

Sincerely,



Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file



GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: 60 mil Microspike HDPE Geomembrane

Sample Identification: F18A000247

TRI Log #: 35708

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D 5994)												
Thickness (mils)	65	62	65	63	61	65	61	67	61	66	63.6 60.6	2.5 << min
Density (ASTM D 1505)												
Density (g/cm3)	0.944	0.945	0.945								0.945	0.001
Carbon Black Content (ASTM D 1603, mod.)												
% Carbon Black	2.49	2.47									2.48	0.01
Carbon Black Dispersion (ASTM D 5596)												
Rating - 1st field view	1	1	1	1	1							
Rating - 2nd field view	1	1	1	1	1							
Tensile Properties (ASTM D 6693, 2 ipm strain rate)												
MD Yield Strength (ppi)	158	161	148	146	152						153 159	6 4
TD Yield Strength (ppi)	152	157	161	161	163							
MD Break Strength (ppi)	171	169	162	158	168						166 172	5 19
TD Break Strength (ppi)	150	164	166	180	199							
MD Yield Elongation (%)	19	20	21	20	23						21 18	2 1
TD Yield Elongation (%)	18	18	17	19	19							
MD Break Elongation (%)	480	453	424	472	432						452 537	24 45
TD Break Elongation (%)	476	534	521	558	598							
Tear Resistance (ASTM D 1004)												
MD Tear Strength (lbs)	50	51	52	52	52	50	50	53	52	53	52 48	1 2
TD Tear Strength (lbs)	46	50	47	49	52	46	47	47	49	49		
Puncture Resistance (ASTM D 4833)												
Puncture Strength (lbs)	133	136	135	133	131						133	2
MD Machine Direction	TD Transverse Direction											

December 4, 2017

Mail To:

Mark DeCarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo, NM 87004

email: swls.md@gmail.com

Dear Mr. DeCarlo:

Bill To:

<= Same

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Project:	Sundance West Evaporated Basin
TRI Job Reference Number:	34085
Material(s) Tested:	One, Agru 60 mil Microspike HDPE Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D 5994) Density (ASTM D 1505) Carbon Black Content (ASTM D 1603, mod.) Carbon Dispersion (ASTM D 5596) Tensile Properties (ASTM D 6693) Puncture Strength (ASTM D 4833) Tear Resistance (ASTM D 1004)

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

Sincerely,



Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 60 mil Microspike HDPE Geomembrane
Sample Identification: F17D003880
TRI Log #: 34085

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
Thickness (mils)	62	63	62	61	62	63	61	63	63	65	62 61	1 << min	57 min ave 54, 8 of 10 51 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.944	0.944	0.944								0.944	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.26	2.25									2.26	0.01	2.0 - 3.0
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2 1 Cat 3
Rating - 2nd field view	1	1	1	1	1								
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	178	168	180	172	161						172	8	126 min
TD Yield Strength (ppi)	178	191	190	168	180						181	9	126 min
MD Break Strength (ppi)	210	176	211	197	192						197	14	90 min
TD Break Strength (ppi)	138	117	150	123	163						138	19	90 min
MD Yield Elongation (%)	20	20	21	20	24						21	2	12 min
TD Yield Elongation (%)	18	17	16	17	17						17	1	12 min
MD Break Elongation (%)	464	474	489	491	493						482	13	100 min
TD Break Elongation (%)	446	361	473	229	527						407	116	100 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	148	147	146	146	144						146	2	90 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	52	57	55	58	58	56	60	60	56	60	57	3	42 min
TD Tear Strength (lbs)	47	50	46	49	51	48	50	54	48	52	49	2	42 min
MD Machine Direction	TD Transverse Direction												

APPENDIX B

Material Manufacturer Certification and Conformance Testing Results

B.5. Geonet Certifications

Customer:
PO#:
Destination:
doc #:

Geonet Quality Certification	
Southwest Liner Systems, Inc.	
SW1728	Sundance West Surface Waste Facility
Eunice, NM	
38616	


Maria Coffey
Quality Control Manager

Agru America
500 Garrison Road
Georgetown, SC 29440
ph: 843-546-0600



Report Date
10/30/2017

Agru America certifies the following results for the above project

GEONET
200 mil

***Transmissivity Conditions:**

0.1 gradient
10,000 psf
15 minute seating time

	Roll #	Width	Length	Area	ASTM D5199 Thickness	ASTM D4218 Carbon	ASTM D792 Density	ASTM D5035 Tensile	ASTM D4716 *Transmissivity
		ft.	ft.	sft.	mil	%	g/cc	lb/in	m ² /sec

Resin Lot #	Weight
----------------	--------

1.	G17E014986	14.5	300	4350	224.0	2.2	0.965	70.7	2.74E-03
2.	G17E014987	14.5	300	4350	224.0	2.2	0.965	70.7	2.74E-03
3.	G17E014988	14.5	300	4350	224.0	2.2	0.965	70.7	2.74E-03
4.	G17E014989	14.5	300	4350	224.0	2.2	0.965	70.7	2.74E-03
5.	G17E014990	14.5	300	4350	224.0	2.2	0.965	70.7	2.74E-03
6.	G17E014991	14.5	300	4350	224.0	2.2	0.965	70.7	2.74E-03
7.	G17E014992	14.5	300	4350	224.0	2.2	0.965	70.7	2.74E-03
8.	G17E014993	14.5	300	4350	224.0	2.2	0.965	70.7	2.74E-03
9.	G17E014994	14.5	300	4350	224.0	2.2	0.965	70.7	2.74E-03
10.	G17E014995	14.5	300	4350	224.0	2.2	0.965	70.7	2.74E-03
11.	G17E014996	14.5	300	4350	224.0	2.2	0.965	70.7	2.74E-03
12.	G17E014997	14.5	300	4350	229.0	2.3	0.964	64.9	2.74E-03
13.	G17E014998	14.5	300	4350	229.0	2.3	0.964	64.9	2.74E-03
14.	G17E014999	14.5	300	4350	229.0	2.3	0.964	64.9	2.74E-03
15.	G17E015000	14.5	300	4350	229.0	2.3	0.964	64.9	2.74E-03
16.	G17E015001	14.5	300	4350	229.0	2.3	0.964	64.9	2.74E-03
17.	G17E015002	14.5	300	4350	229.0	2.3	0.964	64.9	2.74E-03
18.	G17E015003	14.5	300	4350	229.0	2.3	0.964	64.9	2.74E-03
19.	G17E015004	14.5	300	4350	229.0	2.3	0.964	64.9	2.74E-03
20.	G17E015005	14.5	300	4350	229.0	2.3	0.964	64.9	2.74E-03
21.	G17E015006	14.5	300	4350	229.0	2.3	0.964	64.9	2.74E-03
22.	G17E015007	14.5	300	4350	229.0	2.3	0.964	64.9	2.74E-03
23.	G17E015008	14.5	300	4350	226.5	2.3	0.965	63.2	2.74E-03
24.	G17E015009	14.5	300	4350	226.5	2.3	0.965	63.2	2.74E-03
25.	G17E015011	14.5	300	4350	226.5	2.3	0.965	63.2	2.74E-03
26.	G17E015012	14.5	300	4350	226.5	2.3	0.965	63.2	2.74E-03
27.	G17E015013	14.5	300	4350	226.5	2.3	0.965	63.2	2.74E-03
28.	G17E015014	14.5	316	4582	226.5	2.3	0.965	63.2	2.74E-03
29.	G17E015031	14.5	300	4350	231.1	2.5	0.965	64.7	2.74E-03

CHH610170	812
CHH610170	817
CHH610170	774
CHH610170	732
CHH610170	730
CHH610170	733
CHH610170	732
CHH610170	731
CHH610170	734
CHH610170	728
CHH610170	733
CHH610170	731
CHH610170	731
CHH610170	728
CHH610170	749
CHH610170	741
CHH610170	739
CHH610170	737
CHH610170	741
CHH610170	737
CHH610170	738
CHH610170	728
CHH610170	738
CHH610170	730
CHH610170	741
CHH610170	720
CHH610170	741
CHH610170	788
CHH610170	714

Customer:
PO#:
Destination:
doc #:

Geonet Quality Certification	
Southwest Liner Systems, Inc.	
SW1728	Sundance West Surface Waste Facility
Eunice, NM	
38616	


Maria Coffey
Quality Control Manager

Agru America
500 Garrison Road
Georgetown, SC 29440
ph: 843-546-0600



Report Date
10/30/2017

Agru America certifies the following results for the above project

GEONET
200 mil

*Transmissivity Conditions:
0.1 gradient
10,000 psf
15 minute seating time

	Roll #	Width	Length	Area	ASTM D5199 Thickness	ASTM D4218 Carbon	ASTM D792 Density	ASTM D5035 Tensile	ASTM D4716 *Transmissivity
		ft.	ft.	sft.	mil	%	g/cc	lb/in	m ² /sec
30.	G17E015032	14.5	300	4350	231.1	2.5	0.965	64.7	2.74E-03
31.	G17E015033	14.5	300	4350	231.1	2.5	0.965	64.7	2.74E-03
32.	G17E015034	14.5	300	4350	231.1	2.5	0.965	64.7	2.74E-03
33.	G17E015035	14.5	300	4350	231.1	2.5	0.965	64.7	2.74E-03
34.	G17E015036	14.5	300	4350	216.8	2.2	0.963	52.0	2.74E-03
35.	G17E015037	14.5	300	4350	216.8	2.2	0.963	52.0	2.74E-03
36.	G17E015038	14.5	300	4350	216.8	2.2	0.963	52.0	2.74E-03
37.	G17E015039	14.5	300	4350	216.8	2.2	0.963	52.0	2.74E-03
38.	G17E015040	14.5	300	4350	216.8	2.2	0.963	52.0	2.74E-03
39.	G17E015041	14.5	300	4350	216.8	2.2	0.963	52.0	2.74E-03
40.	G17E015042	14.5	300	4350	216.8	2.2	0.963	52.0	2.74E-03
41.	G17E015043	14.5	300	4350	216.8	2.2	0.963	52.0	2.74E-03
42.	G17E015044	14.5	300	4350	216.8	2.2	0.963	52.0	2.74E-03
43.	G17E015045	14.5	300	4350	216.8	2.2	0.963	52.0	2.74E-03
44.	G17E015046	14.5	300	4350	216.8	2.2	0.963	52.0	2.74E-03
45.	G17E015047	14.5	300	4350	212.7	2.3	0.962	54.8	2.74E-03
46.	G17E015048	14.5	300	4350	212.7	2.3	0.962	54.8	2.74E-03
47.	G17E015049	14.5	300	4350	212.7	2.3	0.962	54.8	2.74E-03
48.	G17E015050	14.5	300	4350	212.7	2.3	0.962	54.8	2.74E-03
49.	G17E015051	14.5	300	4350	212.7	2.3	0.962	54.8	2.74E-03
50.	G17E015052	14.5	300	4350	212.7	2.3	0.962	54.8	2.74E-03
51.	G17E015053	14.5	300	4350	212.7	2.3	0.962	54.8	2.74E-03
52.	G17E015054	14.5	300	4350	212.7	2.3	0.962	54.8	2.74E-03
53.	G17E015055	14.5	300	4350	212.7	2.3	0.962	54.8	2.74E-03
54.	G17E015056	14.5	300	4350	212.7	2.3	0.962	54.8	2.74E-03
55.	G17E015057	14.5	300	4350	212.7	2.3	0.962	54.8	2.74E-03
56.	G17E015058	14.5	300	4350	211.7	2.3	0.961	55.3	2.74E-03
57.	G17E015059	14.5	300	4350	211.7	2.3	0.961	55.3	2.74E-03
58.	G17E015060	14.5	300	4350	211.7	2.3	0.961	55.3	2.74E-03
59.	G17E015061	14.5	300	4350	211.7	2.3	0.961	55.3	2.74E-03

Resin Lot #	Weight
CHH610170	636
CHH610170	660
CHH610170	674
CHH610170	672
CHH610170	674
CHH610170	678
CHH610170	674
CHH610170	678
CHH610170	671
CHH610170	674
CHH610170	684
CHH610170	676
CHH610170	681
CHH610170	678
CHH610170	670
CHH610170	676
CHH610170	678
CHH610170	680
CHH610170	681
CHH610170	676
CHH610170	679
CHH610170	681
CHH610170	678
CHH610170	678
CHH610170	679
CHH610170	677
CHH610170	677
CHH610170	673
CHH610170	676
CHH610170	675

Customer:
PO#:
Destination:
doc #:

Geonet Quality Certification	
Southwest Liner Systems, Inc.	
SW1728	Sundance West Surface Waste Facility
Eunice, NM	
38616	



Maria Coffey
Quality Control Manager

Agru America
500 Garrison Road
Georgetown, SC 29440
ph: 843-546-0600



Report Date
10/30/2017

Agru America certifies the following results for the above project

GEONET
200 mil

***Transmissivity Conditions:**

0.1 gradient
10,000 psf
15 minute seating time

	Roll #	Width	Length	Area	ASTM D5199 Thickness	ASTM D4218 Carbon	ASTM D792 Density	ASTM D5035 Tensile	ASTM D4716 *Transmissivity
		ft.	ft.	sft.	mil	%	g/cc	lb/in	m ² /sec
60.	G17E015062	14.5	300	4350	211.7	2.3	0.961	55.3	2.74E-03
61.	G17E015063	14.5	300	4350	211.7	2.3	0.961	55.3	2.74E-03
62.	G17E015064	14.5	300	4350	211.7	2.3	0.961	55.3	2.74E-03
63.	G17E015065	14.5	300	4350	211.7	2.3	0.961	55.3	2.74E-03
64.	G17E015066	14.5	300	4350	211.7	2.3	0.961	55.3	2.74E-03
65.	G17E015067	14.5	300	4350	211.7	2.3	0.961	55.3	2.74E-03
66.	G17E015068	14.5	300	4350	211.7	2.3	0.961	55.3	2.74E-03
67.	G17E015069	14.5	300	4350	209.4	2.4	0.961	54.4	2.74E-03
68.	G17E015070	14.5	300	4350	209.4	2.4	0.961	54.4	2.74E-03
69.	G17E015071	14.5	300	4350	209.4	2.4	0.961	54.4	2.74E-03
70.	G17E015072	14.5	300	4350	209.4	2.4	0.961	54.4	2.74E-03
71.	G17E015073	14.5	300	4350	209.4	2.4	0.961	54.4	2.74E-03
72.	G17E015074	14.5	300	4350	209.4	2.4	0.961	54.4	2.74E-03
73.	G17E015075	14.5	300	4350	209.4	2.4	0.961	54.4	2.74E-03
74.	G17E015076	14.5	300	4350	209.4	2.4	0.961	54.4	2.74E-03
75.	G17E015077	14.5	300	4350	209.4	2.4	0.961	54.4	2.74E-03
76.	G17E015078	14.5	300	4350	209.4	2.4	0.961	54.4	2.74E-03
77.	G17E015079	14.5	300	4350	209.4	2.4	0.961	54.4	2.74E-03
78.	G17E015080	14.5	300	4350	208.1	2.4	0.961	53.4	2.74E-03
79.	G17E015081	14.5	300	4350	208.1	2.4	0.961	53.4	2.74E-03
80.	G17E015082	14.5	300	4350	208.1	2.4	0.961	53.4	2.74E-03
81.	G17E015083	14.5	300	4350	208.1	2.4	0.961	53.4	2.74E-03
82.	G17E015084	14.5	300	4350	208.1	2.4	0.961	53.4	2.74E-03
83.	G17E015085	14.5	300	4350	208.1	2.4	0.961	53.4	2.74E-03
84.	G17E015086	14.5	300	4350	208.1	2.4	0.961	53.4	2.74E-03
85.	G17E015087	14.5	300	4350	208.1	2.4	0.961	53.4	2.74E-03
86.	G17E015088	14.5	300	4350	208.1	2.4	0.961	53.4	2.74E-03
87.	G17E015089	14.5	300	4350	208.1	2.4	0.961	53.4	2.74E-03
88.	G17E015090	14.5	300	4350	208.1	2.4	0.961	53.4	2.74E-03
89.	G17E015091	14.5	300	4350	207.4	2.4	0.963	51.6	2.74E-03

Resin Lot #	Weight
CHH610170	678
CHH610170	678
CHH610170	679
CHH610170	676
CHH610170	680
CHH610170	680
CHH610170	679
CHH610170	680
CHH610170	685
CHH610170	679
CHH610170	677
CHH610170	679
CHH610170	677
CHH610170	674
CHH610170	674
CHH610170	673
CHH610170	675
CHH610170	674
CHH610170	675
CHH610170	678
CHH610170	674
CHH610170	679
CHH610170	676
CHH610170	678
CHH610170	675
CHH610170	673
CHH610170	675
CHH610170	675
CHH610170	674
CHH610170	674

Customer:
PO#:
Destination:
doc #:

Geonet Quality Certification	
Southwest Liner Systems, Inc.	
SW1728	Sundance West Surface Waste Facility
Eunice, NM	
38616	



Maria Coffey
Quality Control Manager

Agru America
500 Garrison Road
Georgetown, SC 29440
ph: 843-546-0600



Report Date
10/30/2017

Agru America certifies the following results for the above project

GEONET
200 mil

***Transmissivity Conditions:**

0.1 gradient
10,000 psf
15 minute seating time

	Roll #	Width	Length	Area	ASTM D5199 Thickness	ASTM D4218 Carbon	ASTM D792 Density	ASTM D5035 Tensile	ASTM D4716 *Transmissivity
		ft.	ft.	sft.	mil	%	g/cc	lb/in	m ² /sec
90 .	G17E015092	14.5	300	4350	207.4	2.4	0.963	51.6	2.74E-03
91 .	G17E015093	14.5	300	4350	207.4	2.4	0.963	51.6	2.74E-03
92 .	G17E015094	14.5	300	4350	207.4	2.4	0.963	51.6	2.74E-03
93 .	G17E015095	14.5	300	4350	207.4	2.4	0.963	51.6	2.74E-03
94 .	G17E015096	14.5	300	4350	207.4	2.4	0.963	51.6	2.74E-03
95 .	G17E015097	14.5	300	4350	207.4	2.4	0.963	51.6	2.74E-03
96 .	G17E015098	14.5	300	4350	207.4	2.4	0.963	51.6	2.74E-03
97 .	G17E015099	14.5	300	4350	207.4	2.4	0.963	51.6	2.74E-03
98 .	G17E015100	14.5	300	4350	207.4	2.4	0.963	51.6	2.74E-03
99 .	G17E015101	14.5	300	4350	207.4	2.4	0.963	51.6	2.74E-03
100 .	G17E015102	14.5	300	4350	207.5	2.3	0.963	50.2	2.74E-03
101 .	G17E015103	14.5	300	4350	207.5	2.3	0.963	50.2	2.74E-03
102 .	G17E015104	14.5	300	4350	207.5	2.3	0.963	50.2	2.74E-03
103 .	G17E015105	14.5	300	4350	207.5	2.3	0.963	50.2	2.74E-03
104 .	G17E015106	14.5	300	4350	207.5	2.3	0.963	50.2	2.74E-03
105 .	G17E015107	14.5	300	4350	207.5	2.3	0.963	50.2	2.74E-03
106 .	G17E015108	14.5	300	4350	207.5	2.3	0.963	50.2	2.74E-03
107 .	G17E015109	14.5	300	4350	207.5	2.3	0.963	50.2	2.74E-03
108 .	G17E015110	14.5	300	4350	207.5	2.3	0.963	50.2	2.74E-03
109 .	G17E015111	14.5	300	4350	207.5	2.3	0.963	50.2	2.74E-03
110 .	G17E015112	14.5	300	4350	207.5	2.3	0.963	50.2	2.74E-03
111 .	G17E015113	14.5	300	4350	210.8	2.4	0.962	54.3	2.74E-03
112 .	G17E015114	14.5	300	4350	210.8	2.4	0.962	54.3	2.74E-03
113 .	G17E015115	14.5	300	4350	210.8	2.4	0.962	54.3	2.74E-03
114 .	G17E015116	14.5	300	4350	210.8	2.4	0.962	54.3	2.74E-03
115 .	G17E015117	14.5	300	4350	210.8	2.4	0.962	54.3	2.74E-03
116 .	G17E015118	14.5	300	4350	210.8	2.4	0.962	54.3	2.74E-03
117 .	G17E015119	14.5	300	4350	210.8	2.4	0.962	54.3	2.74E-03
118 .	G17E015120	14.5	300	4350	210.8	2.4	0.962	54.3	2.74E-03
119 .	G17E015121	14.5	300	4350	210.8	2.4	0.962	54.3	2.74E-03

Resin Lot #	Weight
CHH610170	676
CHH610170	678
CHH610170	676
CHH610170	674
CHH610170	678
CHH610170	677
CHH610170	676
CHH610170	674
CHH610170	678
CHH610170	676
CHH610170	678
CHH610170	676
CHH610170	678
CHH610170	676
CHH610170	680
CHH610170	674
CHH610170	678
CHH610170	676
CHH610170	680
CHH610170	674
CHH610170	676
CHH610170	682
CHH610170	676
CHH610170	674
CHH610170	682
CHH610170	676
CHH610170	682
CHH610170	678
CHH610170	674

Customer:
PO#:
Destination:
doc #:

Geonet Quality Certification	
Southwest Liner Systems, Inc.	
SW1728	Sundance West Surface Waste Facility
Eunice, NM	
38616	


Maria Coffey
Quality Control Manager

Agru America
500 Garrison Road
Georgetown, SC 29440
ph: 843-546-0600



Report Date
10/30/2017

Agru America certifies the following results for the above project

GEONET
200 mil

***Transmissivity Conditions:**

0.1 gradient
10,000 psf
15 minute seating time

	Roll #	Width	Length	Area	ASTM D5199 Thickness	ASTM D4218 Carbon	ASTM D792 Density	ASTM D5035 Tensile	ASTM D4716 *Transmissivity
		ft.	ft.	sft.	mil	%	g/cc	lb/in	m ² /sec
120 .	G17E015122	14.5	300	4350	210.8	2.4	0.962	54.3	2.74E-03
121 .	G17E015123	14.5	300	4350	210.8	2.4	0.962	54.3	2.74E-03
122 .	G17E015124	14.5	300	4350	206.1	2.2	0.961	51.2	2.74E-03
123 .	G17E015125	14.5	300	4350	206.1	2.2	0.961	51.2	2.74E-03
124 .	G17E015126	14.5	300	4350	206.1	2.2	0.961	51.2	2.74E-03
125 .	G17E015127	14.5	300	4350	206.1	2.2	0.961	51.2	2.74E-03
126 .	G17E015128	14.5	300	4350	206.1	2.2	0.961	51.2	2.74E-03
127 .	G17E015129	14.5	300	4350	206.1	2.2	0.961	51.2	2.74E-03
128 .	G17E015130	14.5	300	4350	206.1	2.2	0.961	51.2	2.74E-03
129 .	G17E015131	14.5	300	4350	206.1	2.2	0.961	51.2	2.74E-03
130 .	G17E015132	14.5	300	4350	206.1	2.2	0.961	51.2	2.74E-03
131 .	G17E015133	14.5	300	4350	206.1	2.2	0.961	51.2	2.74E-03
132 .	G17E015134	14.5	300	4350	206.1	2.2	0.961	51.2	2.74E-03
133 .	G17E015135	14.5	300	4350	205.0	2.2	0.961	58.1	2.74E-03
134 .	G17E015136	14.5	300	4350	205.0	2.2	0.961	58.1	2.74E-03
135 .	G17E015137	14.5	300	4350	205.0	2.2	0.961	58.1	2.74E-03
136 .	G17E015138	14.5	300	4350	205.0	2.2	0.961	58.1	2.74E-03
137 .	G17E015139	14.5	300	4350	205.0	2.2	0.961	58.1	2.74E-03
138 .	G17E015140	14.5	300	4350	205.0	2.2	0.961	58.1	2.74E-03
139 .	G17E015141	14.5	300	4350	205.0	2.2	0.961	58.1	2.74E-03
140 .	G17E015142	14.5	300	4350	205.0	2.2	0.961	58.1	2.74E-03
141 .	G17E015143	14.5	300	4350	205.0	2.2	0.961	58.1	2.74E-03
142 .	G17E015144	14.5	300	4350	205.0	2.2	0.961	58.1	2.74E-03
143 .	G17E015145	14.5	300	4350	205.0	2.2	0.961	58.1	2.74E-03
144 .	G17E015146	14.5	300	4350	210.7	2.4	0.962	51.5	2.74E-03
145 .	G17E015147	14.5	300	4350	210.7	2.4	0.962	51.5	2.74E-03
146 .	G17E015148	14.5	300	4350	210.7	2.4	0.962	51.5	2.74E-03
147 .	G17E015149	14.5	300	4350	210.7	2.4	0.962	51.5	2.74E-03
148 .	G17E015150	14.5	300	4350	210.7	2.4	0.962	51.5	2.74E-03
149 .	G17E015151	14.5	300	4350	210.7	2.4	0.962	51.5	2.74E-03

Resin Lot #	Weight
CHH610170	682
CHH610170	681
CHH610170	686
CHH610170	680
CHH610170	686
CHH610170	682
CHH610170	688
CHH610170	681
CHH610170	686
CHH610170	680
CHH610170	685
CHH610170	686
CHH610170	682
CHH610170	685
CHH610170	686
CHH610170	682
CHH610170	687
CHH610170	676
CHH610170	682
CHH610170	680
CHH610170	682
CHH610170	677
CHH610170	684
CHH610170	682
CHH610170	683
CHH610170	676
CHH610170	682
CHH610170	673
CHH610170	680
CHH610170	683

Customer:
PO#:
Destination:
doc #:

Geonet Quality Certification	
Southwest Liner Systems, Inc.	
SW1728	Sundance West Surface Waste Facility
Eunice, NM	
38616	


Maria Coffey
Quality Control Manager

Agru America
500 Garrison Road
Georgetown, SC 29440
ph: 843-546-0600



Report Date
10/30/2017

Agru America certifies the following results for the above project

GEONET
200 mil

*Transmissivity Conditions:
0.1 gradient
10,000 psf
15 minute seating time

	Roll #	Width	Length	Area	ASTM D5199 Thickness	ASTM D4218 Carbon	ASTM D792 Density	ASTM D5035 Tensile	ASTM D4716 *Transmissivity
		ft.	ft.	sft.	mil	%	g/cc	lb/in	m²/sec
150 .	G17E015152	14.5	300	4350	210.7	2.4	0.962	51.5	2.74E-03
151 .	G17E015153	14.5	300	4350	210.7	2.4	0.962	51.5	2.74E-03
152 .	G17E015154	14.5	300	4350	210.7	2.4	0.962	51.5	2.74E-03
153 .	G17E015155	14.5	300	4350	210.7	2.4	0.962	51.5	2.74E-03
154 .	G17E015156	14.5	300	4350	210.7	2.4	0.962	51.5	2.74E-03
155 .	G17E015157	14.5	300	4350	208.0	2.4	0.961	53.3	2.74E-03
156 .	G17E015158	14.5	300	4350	208.0	2.4	0.961	53.3	2.74E-03
157 .	G17E015159	14.5	300	4350	208.0	2.4	0.961	53.3	2.74E-03
158 .	G17E015160	14.5	300	4350	208.0	2.4	0.961	53.3	2.74E-03
159 .	G17E015161	14.5	300	4350	208.0	2.4	0.961	53.3	2.74E-03
160 .	G17E015162	14.5	300	4350	208.0	2.4	0.961	53.3	2.74E-03
161 .	G17E015163	14.5	300	4350	208.0	2.4	0.961	53.3	2.74E-03
162 .	G17E015164	14.5	300	4350	208.0	2.4	0.961	53.3	2.74E-03
163 .	G17E015165	14.5	300	4350	208.0	2.4	0.961	53.3	2.74E-03
164 .	G17E015166	14.5	300	4350	208.0	2.4	0.961	53.3	2.74E-03
165 .	G17E015167	14.5	300	4350	208.0	2.4	0.961	53.3	2.74E-03
166 .	G17E015168	14.5	300	4350	209.1	2.3	0.962	51.5	2.74E-03
167 .	G17E015169	14.5	300	4350	209.1	2.3	0.962	51.5	2.74E-03
168 .	G17E015170	14.5	300	4350	209.1	2.3	0.962	51.5	2.74E-03
169 .	G17E015171	14.5	300	4350	209.1	2.3	0.962	51.5	2.74E-03
170 .	G17E015172	14.5	300	4350	209.1	2.3	0.962	51.5	2.74E-03
171 .	G17E015173	14.5	300	4350	209.1	2.3	0.962	51.5	2.74E-03
172 .	G17E015174	14.5	300	4350	209.1	2.3	0.962	51.5	2.74E-03
173 .	G17E015175	14.5	300	4350	209.1	2.3	0.962	51.5	2.74E-03
174 .	G17E015176	14.5	300	4350	209.1	2.3	0.962	51.5	2.74E-03
175 .	G17E015177	14.5	300	4350	209.1	2.3	0.962	51.5	2.74E-03
176 .	G17E015178	14.5	300	4350	209.1	2.3	0.962	51.5	2.74E-03
177 .	G17E015179	14.5	300	4350	206.5	2.3	0.961	57.0	2.74E-03

Resin Lot #	Weight
CHH610170	684
CHH610170	682
CHH610170	684
CHH610170	686
CHH610170	682
CHH610170	684
CHH610170	686
CHH610170	682
CHH610170	684
CHH610170	684
CHH610170	686
CHH610170	688
CHH610170	684
CHH610170	682
CHH610170	688
CHH610170	684
CHH610170	686
CHH610170	684
CHH610170	682
CHH610170	688
CHH610170	692
CHH610170	688
CHH610170	684
CHH610170	688
CHH610170	684

Certificate of Analysis

Shipped To: AGRU AMERICA INC:GEORGETOWN
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

Delivery #: 89511591
PO #: 011807
Weight: 203900.000 LB
Ship Date: 08/05/2017
Package: BULK
Mode: Hopper Car
Car #: HLTX463380
Seal No: 95956

Product:
MARLEX HHM 5502BN POLYETHYLENE in Bulk

Lot Number: CHH610170

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.37	g/10min
Density	D1505 or D4883	0.9553	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



KEVIN AYRES
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Customer Service Representative at +1832813

Geonet Quality Certification	
Customer:	Southwest Liner Systems, Inc.
PO#:	SW1803 Sundance West Surface Waste Facility
Destination:	Eunice, NM
doc #:	40171


 Maria Coffey
 Quality Control Manager

Agru America
 500 Garrison Road
 Georgetown, SC 29440
 ph: 843-546-0600



Report Date
 3/6/2018

Agru America certifies the following results for the above project

GEONET
200 mil

*Transmissivity Conditions:
0.1 gradient
10,000 psf
15 minute seating time

	Roll #	Width	Length	Area	ASTM D5199 Thickness	ASTM D4218 Carbon	ASTM D792 Density	ASTM D5035 Tensile	ASTM D4716 *Transmissivity
		ft.	ft.	sft.	mil	%	g/cc	lb/in	m ² /sec

Resin Lot #	Weight
----------------	--------

1.	G15E225246	14.5	300	4350	225	2.5	0.964	52.8	3.45E -03
2.	G15E451038	14.5	300	4350	210	2.4	0.963	54.8	5.73E -03
3.	G17E004801	14.5	300	4350	206.0	2.3	0.962	53.0	2.70E-03
4.	G17E004925	14.5	300	4350	202.8	2.4	0.964	51.3	2.70E-03
5.	G17E004927	14.5	300	4350	202.8	2.4	0.964	51.3	2.70E-03
6.	G17E004970	14.5	300	4350	202.3	2.4	0.962	49.5	2.00E-03
7.	G17E004981	14.5	300	4350	207.8	2.4	0.961	51.0	2.00E-03
8.	G17E004982	14.5	300	4350	207.8	2.4	0.961	51.0	2.00E-03
9.	G17E004984	14.5	300	4350	207.8	2.4	0.961	51.0	2.00E-03
10.	G17E005031	14.5	300	4350	209.6	2.4	0.965	53.9	2.00E-03
11.	G17E005090	14.5	300	4350	209.0	2.4	0.964	50.1	2.73E-03
12.	G17E005127	14.5	300	4350	202.6	2.2	0.964	56.7	2.73E-03
13.	G17E005860	14.5	300	4350	200.2	2.4	0.964	50.3	4.43E-03
14.	G17E005864	14.5	300	4350	200.2	2.4	0.964	50.3	4.43E-03
15.	G17E005893	14.5	300	4350	204.0	2.3	0.962	51.7	2.22E-03
16.	G17E005895	14.5	300	4350	204.0	2.3	0.962	51.7	2.22E-03
17.	G17E005899	14.5	300	4350	204.0	2.3	0.962	51.7	2.22E-03
18.	G17E005901	14.5	300	4350	204.0	2.3	0.962	51.7	2.22E-03
19.	G17E005930	14.5	300	4350	204.6	2.3	0.964	51.8	2.22E-03
20.	G17E005932	14.5	300	4350	204.6	2.3	0.964	51.8	2.22E-03
21.	G17E005953	14.5	300	4350	202.0	2.4	0.963	52.6	2.22E-03
22.	G17E005955	14.5	300	4350	202.0	2.4	0.963	52.6	2.22E-03

CFE610371	686
15G1345	656
CHA611510	660
CHB610160	665
CHB610160	662
CHB610160	658
CHB610160	662
CHB610160	660
CHB610160	660
CHB610160	670
CHB610160	679
CHB610160	679
CHB611292	672
CHB611292	680
CHB611291	685
CHB611291	684
CHB611291	688
CHB611291	688
CHB611291	684
CHB611291	682
CHB611291	683
CHB611291	687



Certificate of Analysis

Shipped To: AGRU AMERICA INC:GEORGETOWN
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

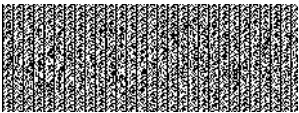
Delivery #: 89054475
PO #: 009359
Weight: 199350 LB
Ship Date: 05/11/2015
Package: BULK
Mode: Hopper Car
Car #: HCBX001286
Seal No: 17671

Product:
Marlex HHM 5502BN High Density Polyethylene Bulk

Lot Number: CFE610371

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.33	g/10mi
Density	D1505 or D4883	0.9547	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Kevin Ayres
Quality Control Supervisor

For CoA questions contact Customer Service Representative at +1-832-813-4806

Advantage Polymers, Inc.
Dba API Resin
1019 Estate Drive
Moon Township PA 15108
Office; 412-576-1966
Fax; 724-457-5253

Certificate of Quality

Grant Palmer
GP@AGRUAMERICA.COM
AGRU/AMERICA, INC.
GEORGETOWN, SC 29440
Phone; 843-325-8753

PURCHASE ORDER NUMBER; PO#009665 4 OF 6 AUGUST
SHIP TO LOCATION: AGRU/AMERICA, GEORGETOWN, SC 29440
CONTAINER; **FPAX940040**

POLYMER; POLYETHYLENE
PRODUCT TYPE; HDPE
PRODUCT CODE; HD252BP PRIME HDPE COPOLYMER
LOT#; API 15G1345
QUANTITY (ACTUAL); 192,350 lbs.
SHIP DATE; 8-14-15
CARRIER; CSX TO GEORGETOWN
MELT INDEX ASTM D1238; 0.36 GM/10 MIN.
DENSITY, ASTM D1505; 0.9549 GM/CM3

This is to certify that this material satisfies specifications set forth by AGRU/AMERICA and agreed to by API Resin.
COMMENTS; The data set forth herein have been carefully compiled by the Producer, however, there is no warranty of any kind, either expressed or implied, applicable to its use, and user assumes all risk and liability in connection therewith.

Thanks again,
Tom Klein
API Resin
kleintjk@aol.com
412-576-1966

www.apiresin.com



Certificate of Analysis

Shipped To: AGRU AMERICA INC:GEORGETOWN
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

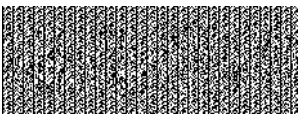
Delivery #: 89404480
PO #: 011146
Weight: 206000 LB
Ship Date: 02/02/2017
Package: BULK
Mode: Hopper Car
Car #: HLTX007078
Seal No: 72396

Product:
MARLEX HHM 5502BN POLYETHYLENE in Bulk

Lot Number: CHA611510

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.40	g/10mi
Density	D1505 or D4883	0.9542	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



KEVIN AYRES
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Customer Service Representative at +1-832-813-4806



Certificate of Analysis

Shipped To: AGRU AMERICA INC:GEORGETOWN
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

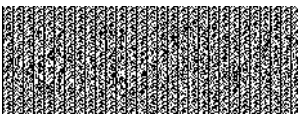
Delivery #: 89406097
PO #: 011146
Weight: 198200 LB
Ship Date: 02/06/2017
Package: BULK
Mode: Hopper Car
Car #: HCBX001541
Seal No: 72055

Product:
MARLEX HHM 5502BN POLYETHYLENE in Bulk

Lot Number: CHB610160

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.36	g/10mi
Density	D1505 or D4883	0.9541	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



KEVIN AYRES
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Customer Service Representative at +1-832-813-4806



Certificate of Analysis

Shipped To: AGRU AMERICA INC:GEORGETOWN
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

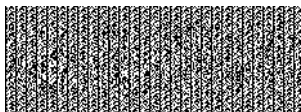
Delivery #: 89421075
PO #: 011262
Weight: 200500 LB
Ship Date: 03/01/2017
Package: BULK
Mode: Hopper Car
Car #: HLTX006078
Seal No: 82210

Product:
MARLEX HHM 5502BN POLYETHYLENE in Bulk

Lot Number: CHB611292

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.34	g/10mi
Density	D1505 or D4883	0.9545	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



KEVIN AYRES
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Customer Service Representative at +1-832-813-4806



Certificate of Analysis

Shipped To: AGRU AMERICA INC:GEORGETOWN
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

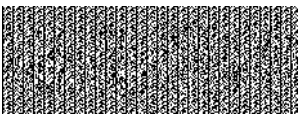
Delivery #: 89421074
PO #: 011262
Weight: 204600 LB
Ship Date: 03/01/2017
Package: BULK
Mode: Hopper Car
Car #: HLTX007222
Seal No: 82211

Product:
MARLEX HHM 5502BN POLYETHYLENE in Bulk

Lot Number: CHB611291

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.34	g/10mi
Density	D1505 or D4883	0.9545	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



KEVIN AYRES
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Customer Service Representative at +1-832-813-4806

APPENDIX B

Material Manufacturer Certification and Conformance Testing Results

B.6. Geonet Conformance Testing Results

November 8, 2017

Mail To:

Mark DeCarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo, NM 87004

email: swls.md@gmail.com

Bill To:

<= Same

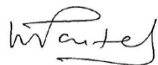
Dear Mr. DeCarlo:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Project:	Sundance West Evaporated Basin
TRI Job Reference Number:	33302
Material(s) Tested:	Two, Agru 200 Net Geonet(s)
Test(s) Requested:	Thickness (ASTM D 1777) Mass/Unit Area (ASTM D 3776, Option C) Density (ASTM D 1505) - GN Carbon Black Content (ASTM D 1603, mod.) - GN Tensile Properties (ASTM D 7179, 12 ipm strain rate) - GN Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)

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

Sincerely,



Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file

GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 200 Net Geonet
Sample Identification: G17E014986
TRI Log #: 33302

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 1777)													
Thickness (mils)	226	218	221	217	220	228	239	227	226	236	226 217	7 << min	200 min
Mass/Unit Area (ASTM D 3776, Option C)													
5" diameter circle (grams)	10.3	9.00	10.3	10.9	10.2	8.36	8.77	9.57	10.3	10.5	9.83 0.16	0.85 0.01	0.16 min
Mass/Unit Area lbs/sq.ft)	0.17	0.15	0.17	0.18	0.17	0.14	0.14	0.16	0.17	0.17			
Density (ASTM D 1505)													
Density (g/cm3)	0.953	0.953	0.953								0.953	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.43	2.39									2.41	0.03	2.0 - 3.0
Tensile Properties (ASTM D 7179, 12 ipm strain rate)													
MD Max. Strength (ppi)	65.6	74.2	72.1	78.9	69.2						72.0	5.1	45 min
MD Elong. @ Max. Strength (%)	25	23	23	27	29						25	3	
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.38										0.38		1.0 max
MD Machine Direction													

GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 200 Net Geonet
Sample Identification: G17E015008
TRI Log #: 33302

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 1777)													
Thickness (mils)	222	221	223	235	232	239	226	229	222	232	228 221	6 << min	200 min
Mass/Unit Area (ASTM D 3776, Option C)													
5" diameter circle (grams)	10.1	10.5	9.8	10.5	10.3	9.68	9.60	10.8	9.47	9.42	10.02 0.16	0.49 0.01	0.16 min
Mass/Unit Area lbs/sq.ft)	0.16	0.17	0.16	0.17	0.17	0.16	0.16	0.17	0.15	0.15			
Density (ASTM D 1505)													
Density (g/cm3)	0.952	0.952	0.952								0.952	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.19	2.22									2.21	0.02	2.0 - 3.0
Tensile Properties (ASTM D 7179, 12 ipm strain rate)													
MD Max. Strength (ppi)	61.0	83.0	66.9	57.0	72.2						68.0	10.2	45 min
MD Elong. @ Max. Strength (%)	20	17	19	23	16						19	3	
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.37										0.37		1.0 max
MD Machine Direction													

November 8, 2017

Mail To:

Mark DeCarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo, NM 87004

email: swls.md@gmail.com

Bill To:

<= Same

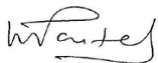
Dear Mr. DeCarlo:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Project:	Sundance West Evaporated Basin
TRI Job Reference Number:	33340
Material(s) Tested:	One, Agru 200 Net Geonet
Test(s) Requested:	Thickness (ASTM D 1777) Mass/Unit Area (ASTM D 3776, Option C) Density (ASTM D 1505) - GN Carbon Black Content (ASTM D 1603, mod.) - GN Tensile Properties (ASTM D 7179, 12 ipm strain rate) - GN Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)

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

Sincerely,



Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file

GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 200 Net Geonet
Sample Identification: G17E015045
TRI Log #: 33340

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 1777)													
Thickness (mils)	213	210	218	200	217	198	199	209	222	198	208 198	9	200 min
Mass/Unit Area (ASTM D 3776, Option C)													
5" diameter circle (grams)	9.03	9.85	10.20	8.19	8.39	8.56	9.54	9.39	9.80	9.07	9.20 0.15	0.67	0.16 min
Mass/Unit Area lbs/sq.ft)	0.15	0.16	0.16	0.13	0.14	0.14	0.15	0.15	0.16	0.15		0.01	
Density (ASTM D 1505)													
Density (g/cm3)	0.953	0.953	0.953								0.953	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.29	2.27									2.28	0.01	2.0 - 3.0
Tensile Properties (ASTM D 7179, 12 ipm strain rate)													
MD Max. Strength (ppi)	57.4	49.3	61.0	56.8	47.3						54.4	5.8	45 min
MD Elong. @ Max. Strength (%)	25	23	23	27	29						25	3	
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.42										0.42		1.0 max
MD Machine Direction													

November 10, 2017

Mail To:

Mark DeCarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo, NM 87004

email: swls.md@gmail.com

Bill To:

<= Same

Dear Mr. DeCarlo:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Project: **Sundance West Evaporated Basin**

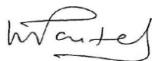
TRI Job Reference Number: 33423

Material(s) Tested: One, Agru 200 Net Geonet

Test(s) Requested: Thickness (ASTM D 1777)
Mass/Unit Area (ASTM D 3776, Option C)
Density (ASTM D 1505) - GN
Carbon Black Content (ASTM D 1603, mod.) - GN
Tensile Properties (ASTM D 7179, 12 ipm strain rate) - GN
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)

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

Sincerely,



Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file

GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 200 Net Geonet
Sample Identification: G17E015089
TRI Log #: 33423

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 1777)													
Thickness (mils)	222.8	217.5	207.0	215.5	209.6	229.0	222.4	210.0	216.3	204.0	215.4 204.0	7.9 << min	200 min
Mass/Unit Area (ASTM D 3776, Option C)													
5" diameter circle (grams)	9.64	9.51	9.19	8.87	8.60	9.19	10.10	9.81	9.67	8.68	9.33	0.50	
Mass/Unit Area lbs/sq.ft)	0.16	0.15	0.15	0.14	0.14	0.15	0.16	0.16	0.16	0.14	0.15	0.01	0.16 min
Density (ASTM D 1505)													
Density (g/cm3)	0.953	0.953	0.953								0.953	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.26	2.29									2.28	0.02	2.0 - 3.0
Tensile Properties (ASTM D 7179, 12 ipm strain rate)													
MD Max. Strength (ppi)	53.7	67.8	63.6	55.2	50.4						58.1	7.3	45 min
MD Elong. @ Max. Strength (%)	25	23	23	24	27						24	2	
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.44										0.44		1.0 max
MD Machine Direction													

GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 200 Net Geonet
Sample Identification: G17E015111
TRI Log #: 33423

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 1777)													
Thickness (mils)	203.9	209.5	211.6	220.6	226.7	213.9	214.8	212.4	230.2	226.4	217.0 203.9	8.6 << min	200 min
Mass/Unit Area (ASTM D 3776, Option C)													
5" diameter circle (grams)	9.01	8.98	9.43	8.89	9.82	8.99	9.93	10.62	10.68	9.57	9.59	0.67	
Mass/Unit Area lbs/sq.ft)	0.15	0.15	0.15	0.14	0.16	0.15	0.16	0.17	0.17	0.15	0.15	0.01	0.16 min
Density (ASTM D 1505)													
Density (g/cm3)	0.954	0.954	0.954								0.954	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.34	2.36									2.35	0.01	2.0 - 3.0
Tensile Properties (ASTM D 7179, 12 ipm strain rate)													
MD Max. Strength (ppi)	52.7	65.7	65.9	68.7	58.3						62.3	6.6	45 min
MD Elong. @ Max. Strength (%)	28	25	19	22	25						24	3	
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.42										0.42		1.0 max
MD Machine Direction													

GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 200 Net Geonet
Sample Identification: G17E015133
TRI Log #: 33423

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 1777)													
Thickness (mils)	208.8	197.0	219.7	205.4	213.4	213.2	212.8	216.0	203.2	217.8	210.7 197.0	7.1 << min	200 min
Mass/Unit Area (ASTM D 3776, Option C)													
5" diameter circle (grams)	10.02	9.76	9.51	9.24	8.86	9.88	9.48	8.23	9.26	9.50	9.37	0.52	0.16 min
Mass/Unit Area lbs/sq.ft)	0.16	0.16	0.15	0.15	0.14	0.16	0.15	0.13	0.15	0.15	0.15	0.01	
Density (ASTM D 1505)													
Density (g/cm3)	0.953	0.953	0.953								0.953	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.35	2.37									2.36	0.01	2.0 - 3.0
Tensile Properties (ASTM D 7179, 12 ipm strain rate)													
MD Max. Strength (ppi)	56.1	66.2	66.5	55.1	46.3						58.0	8.5	45 min
MD Elong. @ Max. Strength (%)	27	23	20	20	31						24	5	
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.42										0.42		1.0 max
MD Machine Direction													

GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 200 Net Geonet
Sample Identification: G17E015155
TRI Log #: 33423

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 1777)													
Thickness (mils)	226.9	225.8	224.8	197.6	215.6	222.9	218.0	190.1	208.4	223.0	215.3 190.1	12.7 << min	200 min
Mass/Unit Area (ASTM D 3776, Option C)													
5" diameter circle (grams)	9.96	9.01	10.52	8.86	9.01	7.87	8.04	9.14	9.68	10.51	9.26	0.92	0.16 min
Mass/Unit Area lbs/sq.ft)	0.16	0.15	0.17	0.14	0.15	0.13	0.13	0.15	0.16	0.17	0.15	0.01	
Density (ASTM D 1505)													
Density (g/cm3)	0.953	0.954	0.954								0.954	0.001	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.33	2.30									2.32	0.02	2.0 - 3.0
Tensile Properties (ASTM D 7179, 12 ipm strain rate)													
MD Max. Strength (ppi)	58.6	66.6	54.1	48.4	45.6						54.7	8.4	45 min
MD Elong. @ Max. Strength (%)	28	25	24	27	29						27	2	
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.41										0.41		1.0 max
MD Machine Direction													

November 13, 2017

Mail To:

Mark DeCarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo, NM 87004

email: swls.md@gmail.com

Bill To:

<= Same

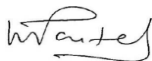
Dear Mr. DeCarlo:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Project:	Sundance West Evaporated Basin
TRI Job Reference Number:	33544
Material(s) Tested:	One, Agru 200 Net Geonet
Test(s) Requested:	Thickness (ASTM D 1777) Mass/Unit Area (ASTM D 3776, Option C) Density (ASTM D 1505) - GN Carbon Black Content (ASTM D 1603, mod.) - GN Tensile Properties (ASTM D 7179, 12 ipm strain rate) - GN Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)

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

Sincerely,



Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file

GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 200 Net Geonet
Sample Identification: G17E015067
TRI Log #: 33544

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 1777)													
Thickness (mils)	248.9	225.1	200.6	227.8	255.2	249.7	230.8	228.7	220.7	215.3	230.3 200.6	16.9 << min	200 min
Mass/Unit Area (ASTM D 3776, Option C)													
5" diameter circle (grams)	8.31	10.31	9.67	10.57	9.72	10.94	12.24	12.36	9.64	9.67	10.34	1.25	
Mass/Unit Area lbs/sq.ft)	0.13	0.17	0.16	0.17	0.16	0.18	0.20	0.20	0.16	0.16	0.17	0.02	0.16 min
Density (ASTM D 1505)													
Density (g/cm3)	0.944	0.944	0.944								0.944	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.35	2.36									2.36	0.01	2.0 - 3.0
Tensile Properties (ASTM D 7179, 12 ipm strain rate)													
MD Max. Strength (ppi)	56.1	65.9	76.3	66.1	63.3						65.6	7.3	45 min
MD Elong. @ Max. Strength (%)	25	21	21	23	25						23	2	
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.38										0.38		1.0 max
MD Machine Direction													

GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Evaporated Basin

Material: Agru 200 Net Geonet
Sample Identification: G17E015177
TRI Log #: 33544

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 1777)													
Thickness (mils)	200.1	200.4	213.8	197.8	204.4	212.3	206.0	215.8	227.7	215.6	209.4 197.8	9.3 << min	200 min
Mass/Unit Area (ASTM D 3776, Option C)													
5" diameter circle (grams)	8.32	9.83	10.62	10.32	8.20	8.88	8.97	8.58	9.01	8.19	9.09	0.88	0.16 min
Mass/Unit Area lbs/sq.ft)	0.13	0.16	0.17	0.17	0.13	0.14	0.14	0.14	0.15	0.13	0.15	0.01	
Density (ASTM D 1505)													
Density (g/cm3)	0.952	0.952	0.952								0.952	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.36	2.35									2.36	0.01	2.0 - 3.0
Tensile Properties (ASTM D 7179, 12 ipm strain rate)													
MD Max. Strength (ppi)	50.7	60.4	59.0	53.7	48.1						54.4	5.3	45 min
MD Elong. @ Max. Strength (%)	31	25	23	27	25						27	3	
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.39										0.39		1.0 max
MD Machine Direction													



March 13, 2018

Mail To:

Mark De Carlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo NM 87004

email: swls.md@gmail.com

Bill To:

P.O. #SW1731

Dear Mr. De Carlo:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Project: Sundance West Evaporated Basin - Additional Testing

TRI Job Reference Number: 35704

Material(s) Tested: One, Agru 200 Net Geonet(s)

Test(s) Requested:
Thickness (ASTM D 1777)
Mass/Unit Area (ASTM D 3776, Option C)
Density (ASTM D 1505)
Carbon Black Content (ASTM D 1603, mod.)
Melt Flow Index (ASTM D 1238)
Tensile Properties (ASTM D 7179)

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

Sincerely,

Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file



GEONET TEST RESULTS

TRI Client: Southwest Liner Systems

Project: Sundance West Evaporated Basin - Additional Testing

Material: Agru 200 Net Geonet

Sample Identification: G17E005901

TRI Log #: 35704

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D 1777)												
Thickness (mils)	194.5	204.7	218.3	223	213.1	215.5	199.3	209.5	196.4	199.2	207	10
Thickness (mm)	4.94	5.20	5.54	5.66	5.41	5.47	5.06	5.32	4.99	5.06	5.27	0.25
											4.94	<< min
Mass/Unit Area (ASTM D 3776, Option C)												
5" diameter circle (grams)	8.71	8.54	9.84	9.65	9.28	9.95	10.5	10.4	8.36	8.48	9.37	0.81
Mass/Unit Area (lb/sq.ft)	0.14	0.14	0.16	0.16	0.15	0.16	0.17	0.17	0.14	0.14	0.15	0.01
Mass/Unit Area (g/m2)	688	674	777	762	733	785	827	823	660	669	740	64
Density (ASTM D 1505)												
Density (g/cm3)	0.954	0.954	0.954								0.954	0.000
Carbon Black Content (ASTM D 1603, mod.)												
% Carbon Black	2.50	2.46									2.48	0.03
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)												
Melt Flow Index (g/10 min)	0.32	0.32									0.32	
Tensile Properties (ASTM D 7179, 12 ipm strain rate)												
MD Max. Strength (ppi)	68	62	64	52	51						59	7
MD Elong. @ Max. Strength (%)	23	27	17	25	22						23	4
MD Machine Direction												

APPENDIX B

Material Manufacturer Certification and Conformance Testing Results

B.7. Geotextile Certifications

Geotextile Quality Certification

OA # / PROJECT: 38616
 Customer: SW LIN SUNDANCE WEST SURFACE
 Destination: EUNICE NM
 Item Code/Description: AGRUTEX101
 DATE: 11/30/2017



ASTM	D5261	D4632				D4533		D4491	D4491	D4491	D6241	D475	D4355	
Method	Average Weight	Average Grab Tensile(MD)	Average Grab Tensile(CD)	Average Elongation (MD)	Average Elongation (CD)	Average Trap Tear (MD)	Average TRAP Tear (CD)	Water Flow Rate	Permeability	Permittivity	Average CBR Puncture	Apparent Opening Size	UV Resist % Retained @ 500 hrs	Roll Length
Units	oz / yd ²	Lbs	Lbs	%	%	Lbs	Lbs	gpm / ft ²	cm/sec	sec -1	Units: Lbs	sieve	* % ret.	yds
1111317010	10.26	330.00	419.00	109	117	145.00	197.00	122.00	.58	1.66	927	100	70	175
1111317011	10.26	330.00	419.00	109	117	145.00	197.00	122.00	.58	1.66	927	100	70	175
1111317012	10.26	330.00	419.00	109	117	145.00	197.00	122.00	.58	1.66	927	100	70	175
1111317013	10.26	330.00	419.00	109	117	145.00	197.00	122.00	.58	1.66	927	100	70	175
MIN	10.26	330	419	109	117	145	197	122	.58	1.66	927.00	100	70	4 ROLLS

Mark Locklear

Mark Locklear, Lab Manager, Agru Andrew

For Questions, Please Contact: Lab Manager, Agru Andrews
 Mark Locklear

Date: 11/30/2017

* UV test results are based on test performed at TRI Environmental Laboratory on similar weight products with the same raw material components per ASTM D-4355

APPENDIX B

Material Manufacturer Certification and Conformance Testing Results

B.8. Geotextile Conformance Testing Results

December 22, 2017

Mail To:

Mark A DeCarlo
Southwest Liner Systems, Inc
301 Calle Industrial
Bernalillo, NM 87004

email: swls.md@gmail.com

Dear Mr. DeCarlo:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Bill To:

<= Same

Project: Sundance West Evaporated Basin

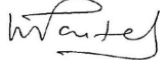
TRI Job Reference Number: 34232

Material(s) Tested: One, Agru AgruTex101 Nonwoven Geotextile(s)

Test(s) Requested: Thickness (ASTM D 5199)
Mass/Unit Area (ASTM D 5261)
Grab Tensile (ASTM D 4632)
Puncture Strength (ASTM D 4833)
Trapezoidal Tear (ASTM D 4533)
Mullen Burst (ASTM D 3786)
Apparent Opening Size (ASTM D 4751)

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

Sincerely,



Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file

GEOTEXTILE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance West Evaporated Basin

Material: Agru AgruTex101 Nonwoven Geotextile
Sample Identification: 1111317010
TRI Log #: 34232

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	115	108	96	94	102	105	102	112	106	108	105 94	7	<< min
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	5.14	4.61	4.28	4.07	4.07	4.31	4.10	4.78	4.24	4.77	4.44	0.37	
Mass/Unit Area (oz/sq.yd)	11.96	10.72	9.96	9.47	9.47	10.03	9.54	11.12	9.86	11.10	10.32	0.85	9.1 min
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	420	370	298	335	340	429	334	319	397	377	362	44	230 min
TD - Tensile Strength (lbs)	425	342	436	352	331	359	351	361	410	370	374	37	230 min
MD - Elong. @ Max. Load (%)	90	85	78	85	81	94	91	88	92	88	87	5	50 min
TD - Elong. @ Max. Load (%)	115	93	95	94	109	119	99	94	91	100	101	10	50 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	196	185	152	168	180						176	17	120 min
Trapezoidal Tear (ASTM D 4533)													
MD - Tear Strength (lbs)	153	181	111	164	208	217	150	182	144	134	164	33	90 min
TD - Tear Strength (lbs)	190	221	197	162	204	249	245	226	257	174	213	33	90 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi):	50												
Burst Strength (psi)	620	540	520	550	480	490	500	600	500	510	531	47	520 min
												Tare Not Subtracted	
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.119	0.129	0.147	0.124	0.151						0.134	0.014	
Sieve No.	100	100	100	100	70						100		80 max
MD Machine Direction	TD Transverse Direction												

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.1. GCL Inventory Control Log

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.2. Geonet Inventory Control Log

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.3. FML Inventory Control Log

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.4. Geotextile Inventory Control Log

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.5. Leak Detection Sump Riser Pipe Inventory Control Log

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.6. GCL Deployment Log

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.7. Secondary FML Deployment Log

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.8. Secondary and Primary FML Pre-weld Qualification Test Logs

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.9. Secondary FML Seaming Log

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.10. Secondary FML Seam Pressure Test Log

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.11. Secondary FML Seam Vacuum Test and Defect-Repair Log

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.12. FML Seam Field Destructive Test Records

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.13. Geotextile Deployment Log

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.14. Geonet Deployment Log

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.15. Primary FML Deployment Log

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.16. Primary FML Seaming Log

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.17. Primary FML Seam Pressure Test Log

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.18. Primary FML Seam Vacuum Test and Defect-Repair Log

APPENDIX C

Evaporation Ponds Liner Installation Documentation

C.19. Demtech Tensiometer Calibration Certificate

APPENDIX D

Independent Laboratory FML Destructive Testing Results

D.1. Secondary Liner Destructive Test

APPENDIX D

Independent Laboratory FML Destructive Testing Results

D.2. Primary Liner Destructive Test

APPENDIX D

Independent Laboratory FML Destructive Testing Results

D.3. Overspray Liner Destructive Test

APPENDIX E

Leak Detection System Certificates

E.1 Leak Detection Riser Pipe Parts Certification

APPENDIX F

EMNRD Correspondence

F.1 Conformation of Compliance: Sundance West, Inc. Surface Waste Management Facility

APPENDIX G

Resumés

G.1. Charles W. Fiedler, P.E., Associate, Gordon/PSC

APPENDIX G

Resumés

G.2. Carl R. King, P.E., Senior Project Manager, Gordon/PSC

APPENDIX G

Resumés

G.3. Braden S. Belliveau, EIT, Gordon/PSC

APPENDIX G

Resumés

G.4. Don Gray, Engineering Technician, Gordon/PSC Project Technologist

APPENDIX G

Resumés

G.5. Sarah Schnell, Staff Scientist, Gordon/PSC Project Technologist