NM1-62

Engineering Certification

Cell 1B

April 2019

Engineering Certification Report

FOR LANDFILL CELL 1B CONSTRUCTION

Sundance West, Inc.
Lea County, New Mexico



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4/30/2019
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Submitted To:

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Prepared For:

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Prepared By:

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April 2019

Gordon/PSC Project #: 01053018

GORDON ENVIRONMENTAL PSC

GORDON PSC ENVIRONMENTAL

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April 30, 2019

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

Re: Sundance West, Inc. Engineering Certification Report: Landfill Cell 1B Construction [01053018]

Dear Mr. Griswold:

This submittal is provided as engineering certification for the construction of the Landfill Cell 1B 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 Cell 1B 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 Landfill Cell 1B 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 cell…” in advance of construction (**Appendix F**). The following Certification Report describes the activities and procedures performed during the construction of Cell 1B to document compliance with the approved Engineering Design Plans, Project Specifications, and the CQA Plan.

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We appreciate the opportunity of working with the OCD regarding the construction quality assurance for the construction of Cell 1B 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 Environmental/PSC

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

Charles W. Fiedler, P.E.
Senior Associate

cc: Mr. Jose M. Carrillo, General Manager Sundance West Inc. (Facility Operating Record)
Mr. Michael Ginsberg Esq., Trust Attorney, Sundance West Inc. (electronic only)
Mr. Andrew Wombsganss Esq., Site Attorney, Sundance West Inc. (electronic only)
Project File, 01053018

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G.4. Don Gray, Engineering Technician, Gordon/PSC Project Technologist

1.0 INTRODUCTION

This Engineering Certification Report describes the Construction Quality Assurance (CQA) activities and procedures applied during the construction of Landfill Cell 1B, henceforth known as *"Cell 1B"*, at Sundance West, Inc. (SWI) located in Lea County, New Mexico. The CQA activities performed document Cell 1B was 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 EMNRD OCD Notification

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

1.2 Project Description

The SWI Landfill is 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 12, 2018 through January 3, 2019. Geosynthetic Clay Liner (GCL), Secondary Flexible Membrane Liner (FML), Geonet, Leak Detection System, Primary FML, and Geosynthetic Cushion/Drainage Layer installation activities were performed by Southwest Liner Systems, Inc. from January 4, 2019 through January 28, 2019.

1.3 Project Overview

From September 12, 2018 through February 03, 2019, Landfill Cell 1B was constructed at Sundance West Inc., (SWI), located in Lea County, New Mexico. Gordon/PSC developed Cell 1B, Project Technical Specifications and the CQA Plan (February 2015); and performed on-site CQA activities. The primary construction activities for Cell 1B are as listed in **Table 1**.

TABLE 1 - Primary Construction Activities

Activity Number	Construction Activity
1	Mass Excavation
2	Construction of perimeter berms
3	Fine Grading
4	Compaction
5	Installation of the Geosynthetic Clay Liner (GCL)
6	Installation of the Secondary Flexible Membrane Liner (FML)
7	Installation of Geonet and Leak Detection System
8	Installation of the Primary Flexible Membrane Liner (FML)
9	Installation of the Geosynthetic Cushion/Drainage Layer
10	Construction of the Landfill stormwater management system

Mass excavation; placement and compaction of structural fill soils for the perimeter berms; fine grading and compaction to the design base grades were completed by 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 leak detection, and leak detection system installation procedures. The purpose of the CQA work is to document that construction activities performed at SWI comply with the Cell 1B 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 Cell 1B 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.**

TABLE 2 - 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, Nonwoven Geotextile, and Geocomposite
6	Inspect delivered FML, GCL, Geonet, Nonwoven Geotextile, Geocomposite, and leachate collection pipe
7	Observe GCL, secondary FML, Leak Detection System, primary FML, and Geocomposite installation procedures
8	Observe GCL secondary FML, Leak Detection System, primary FML, and Geocomposite 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 Cell 1B 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 Mr. Charles W. Fiedler, P.E., Engineer-of-Record

Mr. Charles W. Fiedler, P.E. is the Engineer-of-Record for 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 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 Cell 1B 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**).

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

Mr. Don Gray is the Site CQA Engineer/Manager for the SWI Cell 1B 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 140 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**).

2.0 LANDFILL CELL 1B CONSTRUCTION

2.1 Summary

The SWI Landfill Cell 1B is a continuation of the previously constructed Cell 1A. The Landfill is the second component of a new facility, and will eventually be complemented with process equipment, administrative offices, and additional evaporation ponds. The total double lined project area, Cell 1B, is approximately 7.0 acres in size 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. (SLS) performed the installation of the GCL, Secondary FML, Leak Detection System, Primary FML, and a Geocomposite Cushion/Drainage. Conformance testing of geosynthetics was performed by TRI, while documentation and quality assurance were performed by Gordon/PSC. **Tables 3** and **4** summarize these construction activities.

Enviroworks LLC. (EW) of Edgewood, New Mexico performed the construction activities listed **Table 3**.

TABLE 3 - 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 the cell floor, transition zone, and berms
4	Compaction of the landfill cell, surrounding areas, and berms
5	Installation of Leachate Collection System
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 - SLS Construction Activities

Activity Number	SLS Construction Activity
1	Installation of Geosynthetic Clay Liner (GCL)
2	Installation of 60-mil Secondary HDPE FML
3	Installation of the HDPE Geocomposite material (Drainage Layer)
4	Installation of 60-mil Primary HDPE FML
5	Installation of the Geocomposite material (Geosynthetic Cushion/Drainage Layer)
6	Installation of 40-mil smooth HDPE FML stormwater flap

Surveying services for the Contractor, as defined in the Contract Documents, were provided by Southwest Survey Solutions (S_3). S_3 is a licensed land surveyor in the State of New Mexico, and survey support activities are listed in **Table 5**.

TABLE 5 - Surveying Support Activities

Licensed Land Surveyor	Support Activity
Southwest Survey Solutions	Record Surveying Services to Enviroworks including: • Final grades of the Landfill Cell 1B • Top of all berms surrounding the project • Edge of liner system • Thickness conformation of PSL (Protective Soil Layer)

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 the north, south, and west were constructed to the design grades shown on the Construction Plans. Once design grades were attained and density testing was complete, EW's surveyor, S_3 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 Site CQA Engineer/Manager. The survey grid, shown on **Figure 3**, was established by EW's Surveyor, S_3, for use during construction and testing.

2.2.3 Subgrade and Berm Compaction

During excavation, perimeter berms were constructed by extending the Cell 1A north and south berms and constructing the Cell 1B West berm, 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 2** 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 28 tests for the 7.0-acre± footprint of Cell 1B and approximately 240 tests for berm construction for Cells 1A and 1B. Note that Cell 1A and 1B berms were generally constructed monolithically and as continuous elements due to construction contractual obligations and scheduling. Therefore berm construction densities as reported in the February 2019 Engineering Certification Report for Landfill Cell 1A Construction have been repeated and appropriately supplemented in **Appendix A.3**. A total of 28 density tests in the double lined floor area of Cell 1B and 388 for Cells 1A and 1B berm construction were performed (**Figure 4**). 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** for Cell 1B floor and north sidewall, and **A.3** for Cells 1A and 1B perimeter berms. A maximum density of 113.3 lb/ft^3 was used as the Reference Maximum Density for Cell 1B and berms depending on soils encountered during construction activities. The type of soil encountered and stockpiled produced a composite soil that was placed for initial berm construction. As the project continued, berms were constructed either from the stockpile composite or direct placement from subgrade excavation. The maximum density references are labeled in **Appendix A.2.**

2.2.4 Subgrade Acceptance

Upon completion of subgrade construction, Cell 1B was surveyed by S_3. 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. Please note that the Cell 1A and 1B subgrade were built simultaneously and are presented in **Figure 3** as one completed 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 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.

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 304,413 ft^2 of Bentoliner NSL, the reinforced GCL material manufactured by GSE Environmental, Houston, Texas, was used in the construction of Cell 1B. 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 Cell 1B. Each roll of GCL was carefully transported from the Contractor's Staging Area to Cell 1B using a rubber-tired 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 for documentation in the *GCL Deployment Log* (**Appendix C.7**) and the 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 and twelve (12) inches on the end seams 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 CQA 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.**

TABLE 6 - 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 and 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 ft^2 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

300,000 ft^2 of GCL material was deployed within the Landfill Cell 1B, requiring a minimum of three (3) samples. Three (3) samples were tested by TRI for the properties listed in **Table 7**; as specified in the Project Technical Specifications and 2015 CQA Plan.

TABLE 7 - 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 three (3) 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 Cell 1B 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.).

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.7**), 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 Cell 1B 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 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 Cell 1B construction was 60-mil, high-density polyethylene (HDPE), manufactured by GSE Environmental of Houston, Texas. Textured FML was designated for the berms/sideslopes and smooth FML was designated for the cell floor lining of Cell 1B and was delivered to SWI in rolls twenty-two and a half (22.5) feet wide by five hundred and sixty (560) feet long and five hundred twenty (520) feet long for smooth and textured liner, respectively. The FML was stored in the Contractor's 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 southwest of Cell 1B 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 corresponds with FML subjected to manufacturers' quality control and quality assurance testing. FML being deployed was documented in the *Secondary FML Deployment Log* (**Appendix C.8**) 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 Cell 1B floor, and parallel to the Cell 1B sideslopes, per the Project Technical Specifications and 2015 CQA Plan (see Secondary 60-Mil Liner Panel Layout, **Figure 6**).

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)

Formosa Plastics Corporation, Texas 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 - GSE Environmental HDPE FML - MQA Testing

60-mil HDPE Smooth/Textured HDPE FML Property	ASTM Method
Thickness	ASTM D5994
Asperity Height (Textured)	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 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 ft^2 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 310,384 ft^2 of HDPE Secondary FML was installed in the Landfill; requiring a minimum of four (4) conformance samples. A total of fourteen (14) samples of HDPE FML were tested by TRI for conformance.

TRI tested the fourteen (14) FML samples for the properties listed in **Table 9**; as specified in the Project Technical Specifications and 2015 CQA Plan.

TABLE 9 - GSE Environmental HDPE FML – Conformance Testing

60-mil HDPE (Smooth/Textured) 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 conformance test results indicated that the FML met the minimum property requirements specified in the Project Technical Specifications and 2015 CQA Plan. The conformance testing results for the fourteen (14) 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.20**) 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.9**.

The seam testing protocol for the Cell 1B 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.

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.

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 15,000 lineal

feet of welded seam during installation of the secondary liner, requiring a minimum of thirty (30) destructive tests (SDT prefix tests). Thirty (30) 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.13**; 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.11**) and the *FML Seam Vacuum Test and Defect-Repair Log* (**Appendix C.17**). Seams and repairs were required to pass the non-destructive testing specifications outlined in the Project Technical Specifications, GRI test method GM-6, and the 2015 CQA Plan before being accepted by the Gordon/PSC Site CQA Engineer/Manager.

2.4.4 FML 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 Cell 1B is listed in **Table 10**.

TABLE 10 - HDPE FML Deployment CQA Documentation

HDPE FML Deployment CQA Documentation	Certification Report Appendix Location
Secondary FML Deployment Log	Appendix C.8
Secondary and Primary FML Pre-Weld Qualification Test Record	Appendix C.9
Secondary FML Seaming Log	Appendix C.10
Secondary FML Seam Pressure Test Log	Appendix C.11
FML Seam Field Destructive Test Log	Appendix C.12
FML Seam Vacuum Test and Defect-Repair Log	Appendix C.17
Demtech Tensiometer Calibration Certification	Appendix C.20

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 Cell 1B 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 Landfill 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 Zone

Leak-detection zone material was installed directly above the Secondary FML in accordance with the engineering design drawings, project specifications, and 2015 CQA plan. This zone consists of a double sided Geocomposite for the sideslopes and a Geonet for the floor. The following sections describe the procedures and activities performed during the drainage layer installation, observation, and CQA testing.

2.5.1 Leak-Detection Zone Product

The Geocomposite utilized in Cell 1B construction is a 200-mil, high-density polyethylene (HDPE) encapsulated by Nonwoven Geotextile, manufactured by GSE Environmental of Houston, Texas. The Geonet utilized in Cell 1B construction is a 200-mil, high-density polyethylene (HDPE), manufactured by GSE Environmental of Houston, Texas. The leak-detection zone is specified to encompass the entire double lined system and materials were delivered on-site in rolls 15 feet wide by 300 feet long for the Geocomposite and 15 feet wide by 330 feet long for the Geonet. Rolls were staged along the western perimeter of Cell 1B 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.

2.5.2 Leak-Detection Zone Material Installation

The leak detection zone material 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 handling, and placement. Each roll was carefully moved from the staging area to Cell 1B using a rubber-tired extendable forklift. The forklift was not permitted on the Secondary FML, and the material 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**).

After each 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 5 feet and 6 inches, longitudinally and end-to-end seams respectively. The Geotextile encapsulating the Geonet core of the Geocomposite were then fused together from panel to panel using industry standard heat tacking methods. Seams were oriented at approximately 45 degrees to the line of prevailing base grade slope, and perpendicular to the sideslopes.

2.5.3 Leak-Detection Zone Testing

Material 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.

2.5.3.1 Manufacturer's Quality Control (MQC)

Formosa Plastics Corporation, Texas performed resin testing on the raw materials used in the manufacturing of the Geocomposite and Geonet. These test results and written certifications that the product delivered has been extruded from an acceptable resin are included in **Appendix B.5** and **B.9**.

2.5.3.2 Manufacturer's Quality Assurance (MQA)

As required by the Project Technical Specifications and 2015 CQA Plan, the manufacturer (GSE) performed the Geocomposite and Geonet property testing listed in **Table 11** prior to delivery of the materials to the site.

TABLE 11 – GSE Environmental Geocomposite and Geonet – MQC Testing

Geocomposite	Geonet	Test Property	ASTM Method
✓	✓	Thickness	ASTM D5199
✓	✓	Density	ASTM D1505
	✓	Melt Index	ASTM D1238
✓	✓	Carbon Black Content	ASTM D4218
✓	✓	Tensile Strength	ASTM D7179
✓		Peel Strength	ASTM D7005
✓	✓	Mass Per Unit Area	ASTM D5261
✓	✓	Transmissivity (loaded)	ASTM D4716

The Geocomposite and Geonet quality control certifications, property values and testing frequencies for the on-site material delivered to SWI are provided in **Appendix B.5** and **B.9**.

2.5.3.3 Conformance Testing

Conformance sampling for the Geocomposite and Geonet material was performed by TRI, Austin, Texas at the manufacturer's facility prior to shipment of the materials 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 ft^2 of material installed to verify that the Geocomposite and Geonet delivered to the SWI met the minimum properties listed in the Project Technical Specifications and 2015 CQA Plan. Approximately 53,238 ft^2 of Geocomposite and approximately 255,435 ft^2 of Geonet material was installed in Cell 1B requiring a minimum of one (1) Geocomposite and three (3) Geonet samples. TRI tested five (5) Geocomposite and four (4) Geonet conformances samples for the properties listed in **Table 12**; as specified in the Project Technical Specifications and 2015 CQA Plan.

Table 12 – GSE Environmental Geocomposite and Geonet – Conformance Testing

Geocomposite	Geonet	Test Property	ASTM Method
	✓	Thickness	ASTM D1777
✓	✓	Density	ASTM D1505
	✓	Wide Width Tensile Properties	ASTM D4595
	✓	Mass Per Unit Area	ASTM D3776
	✓	Carbon Black	ASTM D1603
	✓	Melt Index	ASTM D1238
✓		Transmissivity	ASTM D4716
✓		Peel Strength	ASTM D7005
✓		Tensile Strength	ASTM D7179

Appendix B.6 and **B.10** 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 Geocomposite and geonet meet or exceed the Project Technical Specifications and 2015 CQA Plan requirements.

2.5.3.4 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 Geocomposite and geonet installation. These procedures included such activities as proper overlap and correct zip-tie spacing on the 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.

2.5.3.5 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 Geocomposite and Geonet. The Gordon/PSC Site CQA Engineer/Manager inspected all seamed and non-seamed areas of the material 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.

2.5.4 Leak Detection Zone Deployment Records

Documentation for the Leak Detection Zone material deployment was required prior to approval and acceptance. Deployment documentation for the materials deployed in Cell 1B are provided in **Appendix C.13**.

The Leak Detection Zone material installation was accepted after the above-listed data was submitted to, reviewed, and approved by the Gordon/PSC CQA Engineer. The Leak Detection Zone Panel As-built for Cell 1B is included as **Figure 7**. Daily Summary Reports were logged during each construction day, and photographs were taken showing the panel placement activity. The Daily Summary Reports and project photographs are provided in the **Field Logs** and **Photographs** Section.

2.6 60-Mil Primary Flexible Membrane Liner

The Primary FML was installed in direct contact above the Leak Detection Zone materials 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.

2.6.1 Flexible Membrane Liner Product

The Primary FML utilized in Cell 1B construction was 60-mil, high-density polyethylene (HDPE), manufactured by GSE Environmental of Houston, Texas. Smooth FML was designated for the floor and textured FML was designated for the sideslopes of Cell 1B. The material was delivered to SWI in rolls twenty-two and a half (22.5) feet wide with by five hundred-sixty (560) feet long for the smooth and five hundred-twenty (520) feet long for the textured FML. 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 2.6.3).

2.6.2 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 Leak Detection Zone materials, the Primary HDPE Liner was placed by hand and aided with the use of wire rope and pulling equipment. Upon deployment, each role 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 Cell 1B 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 Cell 1B floor, and parallel to the Cell 1B sideslopes, per the Project Technical Specifications and 2015 CQA Plan (see 60-Mil Primary Liner Panel Layout, **Figure 8**).

2.6.3 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.

2.6.3.1 Manufacturer's Quality Control (MQC)

Formosa Plastics Corp, Texas performed resin testing on the raw materials used in the manufacturing of the smooth, and textured 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**.

2.6.3.2 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 13.**

TABLE 13 - GSE Environmental HDPE FML - MQA Testing

60-mil HDPE Double-Sided Textured and Smooth HDPE FML Property	**ASTM Method**
Thickness	ASTM D5994
Asperity Height (Textured)	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 2015 CQA Plan

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

2.6.3.3 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 ft^2 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 320,760 ft^2 of primary HDPE FML were installed during Cell 1B construction; requiring a minimum of four (4) HDPE FML conformance samples. Fourteen (14) samples of the HDPE FML were tested by TRI for conformance.

TRI tested the FML samples for the properties listed in **Table 14**; as specified in the Project Technical Specifications and 2015 CQA Plan.

TABLE 14 - GSE Environmental HDPE FML – Conformance Testing

60-mil HDPE Smooth and Double-sided Textured 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 conformance test results indicated that the FML met the minimum property requirements specified in the Project Technical Specifications and 2015 CQA Plan. The conformance testing results for the fourteen (14) samples are included in **Appendix B.4.**

2.6.3.4 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.20**) 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.9**.

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.

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 Leak Detection Zone materials inspection and approval, seam cleaning, and precautions against potential FML damage during deployment and seaming.

2.6.3.5. 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.

2.6.3.6 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 15,534 lineal feet of welded seam in the Primary Liner requiring a minimum of thirty-one (31) destructive tests. Thirty-one (31) 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.2** . 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 all double-wedge fusion welded seams in accordance with GRI GM6 “Practice for Pressurized Air Channel Test for Dual Seamed Geomembranes”, 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 *Primary FML Seam Pressure Test Log* (**Appendix C.16**) and the *FML Seam Vacuum Test and Defect-Repair Log* (**Appendix C.17**). Seams and repairs were required to pass the non-destructive testing specifications outlined in the Project Technical Specifications, GRI Test Method GM-6, and 2015 CQA Plan before being accepted by the Gordon/PSC Site CQA Engineer/Manager.

2.6.4 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 Cell 1B are listed in **Table 15**.

TABLE 15 - HDPE Primary FML Deployment CQA Documentation

HDPE FML Deployment CQA Documentation	Certification Report Appendix Location
Secondary and Primary FML Pre-Weld Qualification Test Log	Appendix C.9
Primary FML Deployment Log	Appendix C.14
Primary FML Seaming Log	Appendix C.15
Primary FML Seam Pressure Test Log	Appendix C.16
FML Seam Vacuum Test and Defect-Repair Log	Appendix C.17
Demtech Tensiometer Calibration Certification	Appendix C.20

The FML installation was accepted after the data listed in **Table 15** was submitted to, reviewed by, and approved by the Gordon/PSC Site CQA Engineer. The Cell 1B 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 Cell 1B floor and sideslopes.

2.7 Geosynthetic Cushion/Drainage Layer

Geosynthetic Cushion/Drainage Layer was installed directly above the primary FML in accordance with the engineering design drawings, project specifications, and 2015 CQA plan. This layer consists of a double sided Geocomposite for the sideslopes and a single-sided Geocomposite for the floor. The following sections describe the procedures and activities performed during the drainage layer installation, observation, and CQA testing.

2.7.1 Geosynthetic Cushion/Drainage Layer Product

The Geocomposite utilized in Cell 1B construction is a 200-mil, high-density polyethylene (HDPE) encapsulated on both sides for double-sided and one side for a single-sided Geocomposite, manufactured by GSE Environmental of Huston, Texas. The Cushion/Drainage Layer material is specified to encompass the entire double lined system and were delivered on-site in rolls 15 feet wide by 288 feet long for single-sided Geocomposite and 15 feet wide by 200 feet long for double-sided Geocomposite. Rolls were staged along the western perimeter of Cell 1B 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 2.7.3). The material was also inspected for damage during off-loading and staging.

2.7.2 Geosynthetic Cushion/Drainage Layer Material Installation

The Cushion/Drainage Layer material 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 handling, and placement. Each roll was carefully moved from the staging area to Cell 1B using a rubber-tired extendable forklift. The forklift was not permitted on the Primary FML, and the material 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 9**).

After each 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 5 feet and 6 inches, longitudinally and end-to-end seams respectively. The Geotextile encapsulating the Geonet core of the Geocomposite were then fused together using industry standard heat tacking methods. Seams were oriented at approximately 45 degrees to the line of prevailing base grade slope, and perpendicular to the sideslopes.

2.7.3 Geosynthetic Cushion/Drainage Layer Testing

Geocomposite 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.

2.7.3.1 Manufacturer's Quality Control (MQC)

Formosa Plastics Corp, Texas performed resin testing on the raw materials used in the manufacturing of the Geocomposite. These test results and written certifications that the product delivered has been extruded from an acceptable resin are included in **Appendix B.9**.

2.7.3.2 Manufacturer's Quality Assurance (MQA)

As required by the Project Technical Specifications and 2015 CQA Plan, the manufacturer (GSE) performed the Geocomposite property testing listed in **Table 16** prior to delivery of the materials to the site.

TABLE 16 - GSE Environmental Geocomposite - MQC Testing

Geocomposite Property	ASTM Method
Thickness	ASTM D5199
Density	ASTM D1505
Carbon Black Content	ASTM D4218
Tensile Strength	ASTM D7179
Peel Strength	ASTM D7005
Mass Per Unit Area	ASTM D5261
Transmissivity (loaded)	ASTM D4716

The Geocomposite quality control certifications, property values and testing frequencies for the on-site material delivered to SWI are provided in **Appendix B.10**.

2.7.3.3 Conformance Testing

Conformance sampling for the Geocomposite material was performed by TRI, Austin, Texas at the manufacturer's facility prior to shipment of the Geocomposite 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 ft^2 installed to verify that the Geocomposite delivered to the SWI met the minimum properties listed in the Project Technical Specifications and 2015 CQA Plan. Approximately 27,135 ft^2 of double-sided Geocomposite and approximately 266,411 ft^2 of single-sided Geocomposite material was installed in Cell 1B requiring a minimum of one (1) double-sided Geocomposite and three (3) single-sided Geocomposite samples. TRI tested three (3) single-sided and two (2) double-

sided Geocomposite conformance sample for the properties listed in **Table 17**; as specified in the Project Technical Specifications and 2015 CQA Plan.

TABLE 17 - GSE Environmental Geocomposite - Conformance Testing

Geocomposite Property	ASTM Method
Density	ASTM D1505
Transmissivity	ASTM D4716
Peel Strength	ASTM D7005
Tensile Strength	ASTM D7179

Appendix B.10. 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 Geocomposite. The properties of the Geocomposite meet or exceed the Project Technical Specifications and 2015 CQA Plan requirements.

2.7.3.4 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 Geocomposite installation. These procedures included such activities as proper overlap and correct zip-tie spacing on the floor and sideslopes.

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.

2.7.3.5 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 Geocomposite. The Gordon/PSC Site CQA Engineer/Manager inspected all seamed and non-seamed areas of the Geocomposite 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.

2.7.4 Geosynthetic Cushion/Drainage Layer Deployment Records

Documentation for the Cushion/Drainage Layer material deployment was required prior to approval and acceptance. CQA documentation for the Geocomposite deployed in Cell 1B is provided in **Appendix C.18**.

The Drainage/Cushion Layer material installation was accepted after the above-listed data was submitted to, reviewed, and approved by the Gordon/PSC CQA Officer. The Geosynthetic Cushion/Drainage Layer Panel As-built for Cell 1B is included as **Figure 9**. Daily Summary Reports were logged during each construction day, and photographs were taken showing the Geocomposite placement activity. The Daily Summary Reports and project photographs are provided in the **Field Logs** and **Photographs** Section.

2.8 Protective Soil Layer

Upon completion of the Liner System installation, and after confirming that all repairs were adequately addressed, Enviroworks began placing a minimum two (2) foot thickness of PSL on the cell floor and sideslope. Material for the PSL is comprised of on-site soil material pre-qualified by the Gordon/PSC Site CQA Engineer/Manager.

Gordon/PSC observed the placement of the PSL to ensure that the methods and material used during construction did not damage the installed liner system. The thickness of the PSL was verified by field survey measurements on February 5th conducted by S_3 (**Figure 10**). The survey indicates that a minimum of two (2) feet of PSL was placed over the top of the cell floor and sideslope liner systems **(Figure 11).**

2.9 Future Liner Tie-in Details, Stormwater and Liner Protection Berm

Future liner tie-in will be to Cell 1C directly to the west, and Cell 2A directly to the south of Cell 1A. The design for the stormwater and liner protection berm constructed in the perimeter transition zones of Cell 1B, as shown on **Figure 2,** serves the intended purpose to control stormwater run-on and to protect the installed liner system.

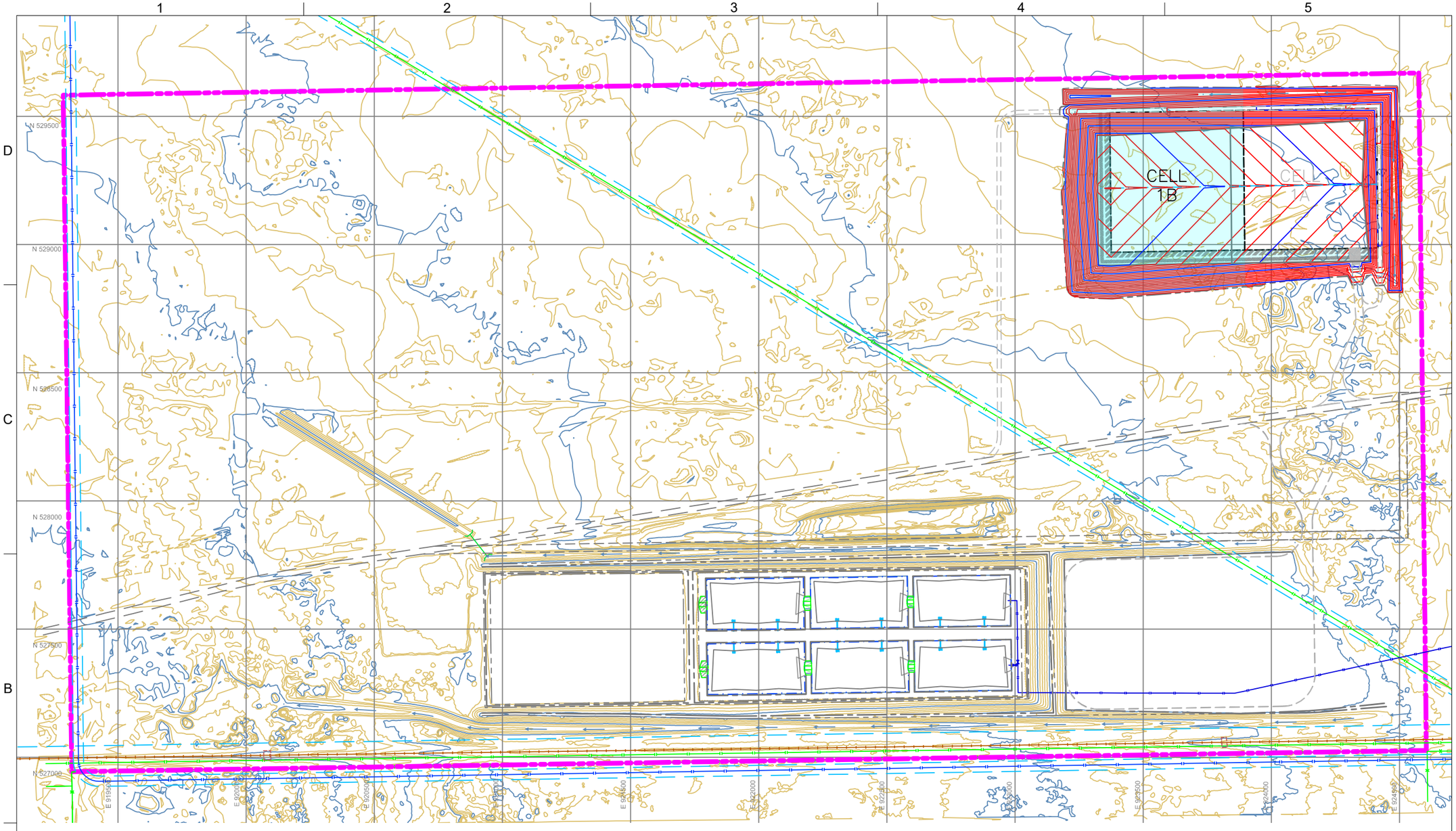
The Contractor constructed the stormwater and liner protection berm by placing soil along the floor and sideslope of the cell until design grades were achieved. The stormwater and liner protection berm as-built is shown on **Figure 2.**

3.0 ENGINEERING CERTIFICATION

This Engineering Certification Report demonstrates that the composite liner and leak detection system for Cell 1B 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 – GCL Panel Layout
Figure 6 Sundance West – 60 Mil Secondary FML Panel Layout
Figure 7 Sundance West – Geosynthetic Leak Detection Layer As-built
Figure 8 Sundance West – 60 Mil Primary FML Panel Layout
Figure 9 Sundance West – Geosynthetic Cushion Drainage Layout As-Built
Figure 10 Sundance West – Top of PSL As-Built Grades
Figure 11 Sundance West – PSL As-Built Thickness



FILE NAME: X:\2018\0530.18\06_POST_CONSTR\01_CLOSEOUT\CQA Report Cell 1B\FIGURES\ACAD\FIG 1 Site Location Map-Final.dwg LAYOUT NAME: FIGURE 1 PRINTED: Wednesday, May 01, 2019 - 1:20pm USER: DRoillard

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SUNDANCE WEST SURFACE WASTE MANAGEMENT FACILITY

SUB-PHASE 2
LAND DISPOSAL CELL 1B
CQA REPORT FIGURES

LEA COUNTY, NEW MEXICO

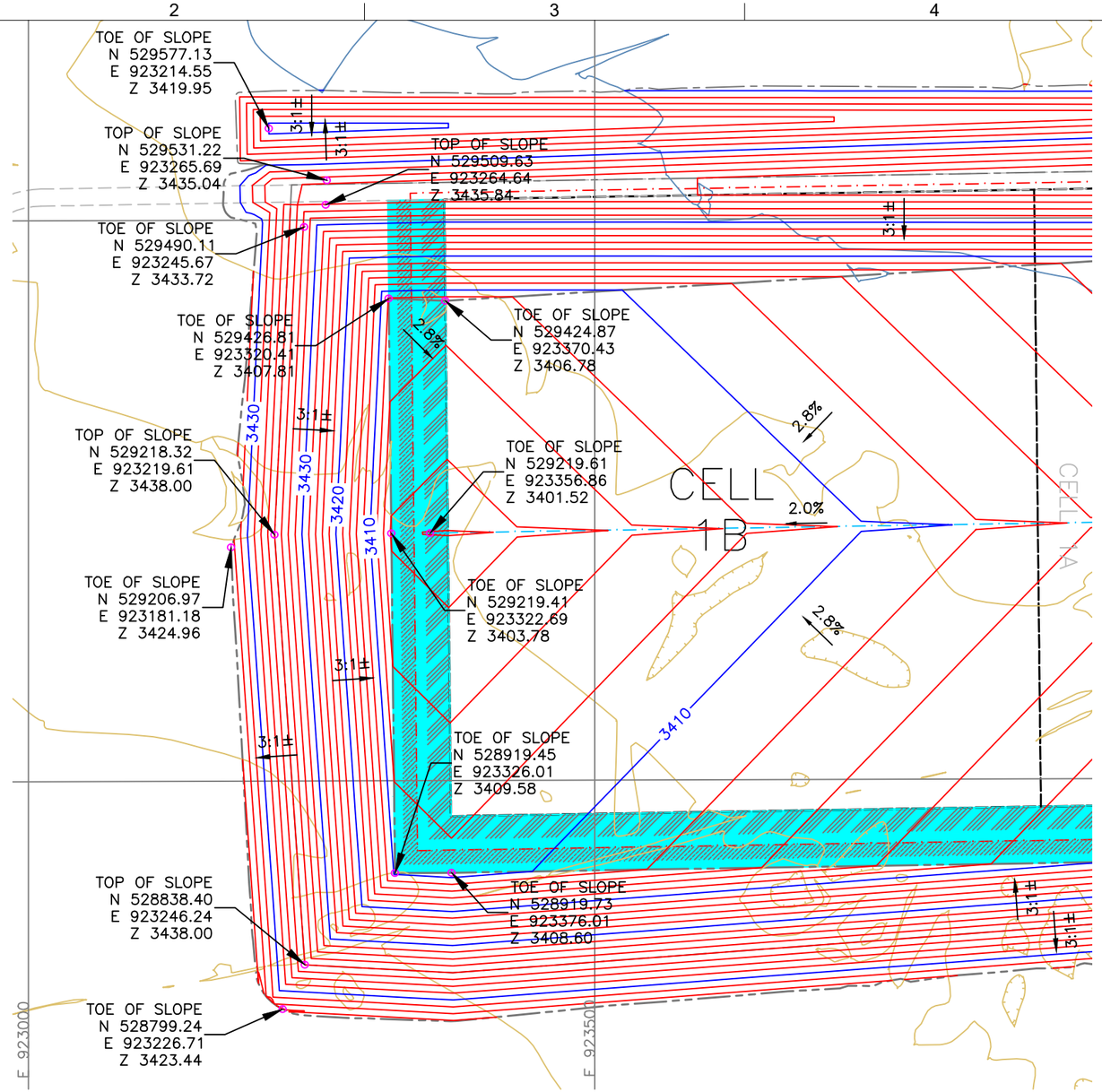
KEY PLAN

NO	DATE	DESCRIPTION
-	01/31/2019	REPORT ISSUE

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SITE LOCATION MAP

FIGURE 1



LEGEND

- PROPERTY BOUNDARY
- 3400 EXISTING GRADE CONTOUR – 10'
- EXISTING GRADE CONTOUR – 2'
- 3400 EXISTING GRADE DEPRESSION CONTOUR – 10'
- EXISTING GRADE DEPRESSION CONTOUR – 2'
- 3400 PROPOSED GRADE CONTOUR – 10'
- PROPOSED GRADE CONTOUR – 2'
- PROPOSED ROAD – UNPAVED
- TOE OF SLOPE
- TOP OF SLOPE
- RUN–ON/RUNOFF CONTROLS
- EDGE OF CELL (LIMIT OF WASTE)
- EDGE OF LEACHATE CONTAINMENT LINER
- EDGE OF LEAK DETECTION LINER
- CELL TRANSITION ZONE
- E 923000 N 529000 SITE GRID

N

0 60' 120'

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SUNDANCE WEST SURFACE WASTE MANAGEMENT FACILITY

SUB-PHASE 2
LAND DISPOSAL CELL 1B
CQA REPORT FIGURES

LEA COUNTY, NEW MEXICO

KEY PLAN

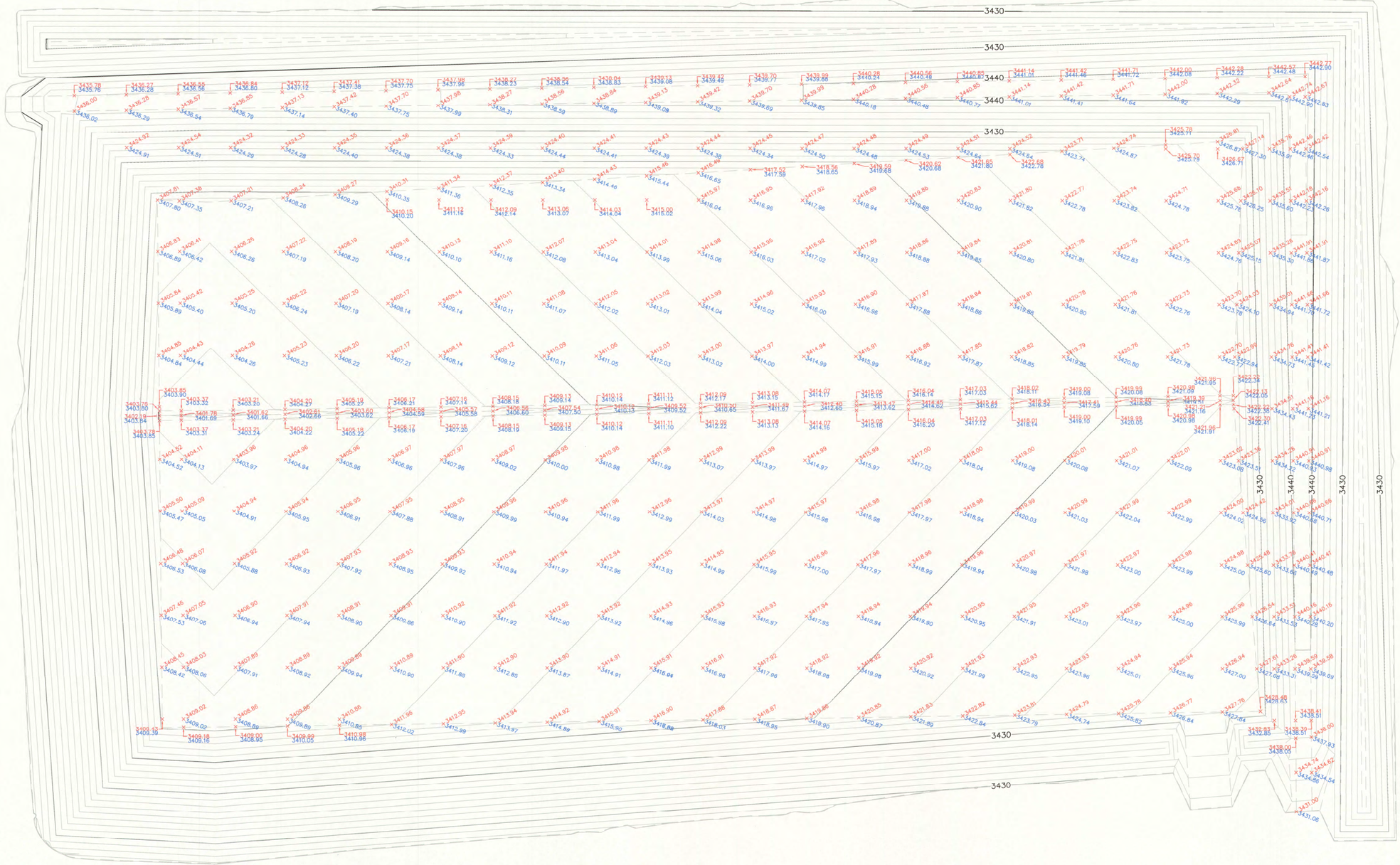
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SUBGRADE DESIGN GRADES

FIGURE 2

FILE NAME: X:\2018\0530.18\06_POST_CONSTR\01_CLOSEOUT\CQA Report Cell 1B\FIGURES\ACAD\FIG 2 Subgrade Design Grades Final.dwg LAYOUT NAME: FIGURE 2 PRINTED: Wednesday, May 01, 2019 - 2:11pm USER: DRobillard



LEGEND

–5180–	= CONTOUR
	= FEATURE LINE
3400.00	= DESIGN SUBGRADE LAYER
3400.00	= ASBUILT SUBGRADE LAYER

JAMES FLACK
NEW MEXICO
14942
REGISTERED PROFESSIONAL SURVEYOR
12-05-18

I HEREBY CERTIFY THAT ON THIS DATE 12–05–18, A SUB GRADE AS–BUILT SURVEY WAS PERFORMED ON THE EUNICE LANDFILL IN EUNICE, NM UNDER MY DIRECT SUPERVISION. I FURTHER CERTIFY THAT ALL OBSERVED SUB GRADE AS–BUILT ELEVATIONS ARE TRUE AND ACCURATE.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50

18213 E WARNER ROAD
BLDG A SUITE 5
GILBERT, AZ 85296
PHONE: (480) 414-4121
FAX: (888) 870-4203
EMAIL: s3survey@s3-az.com

REV.	DATE	BY
–		

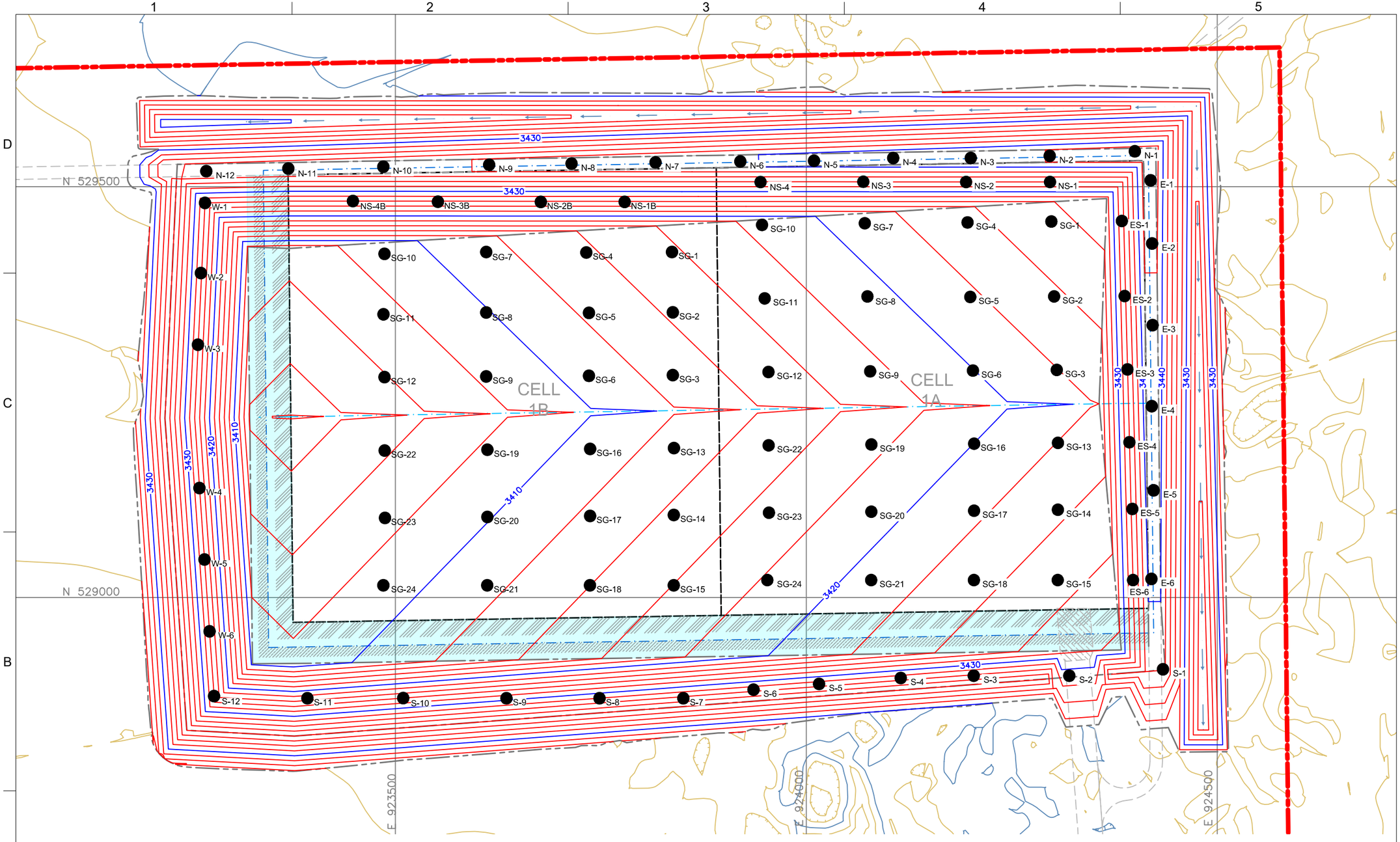
DRAWN: JB
CHECKED: GR
DATE: 12/19/18
DWG: –

SUNDANCE WEST LANDFILL
EUNICE, NEW MEXICO
CELL 1A–1B SG EXHIBIT

PROJECT NO.
18_120EW

SHEET NUMBER
1
1 OF 1

FIGURE 3



LEGEND

- PROPERTY BOUNDARY
- 3400 — EXISTING GRADE CONTOUR – 10'
- EXISTING GRADE CONTOUR – 2'
- 3400 — EXISTING GRADE DEPRESSION CONTOUR – 10'
- EXISTING GRADE DEPRESSION CONTOUR – 2'
- EXISTING ROAD – UNPAVED
- 3400 — PROPOSED GRADE CONTOUR – 10'
- PROPOSED GRADE CONTOUR – 2'
- PROPOSED ROAD – UNPAVED
- TOE OF SLOPE
- TOP OF SLOPE
- RUN-ON/RUNOFF CONTROLS
- EDGE OF CELL (LIMIT OF WASTE)
- EDGE OF LEACHATE CONTAINMENT LINER
- EDGE OF LEAK DETECTION LINER
- SG-3 — APPROXIMATE SUBGRADE DENSITY TEST LOCATION
- CELL TRANSITION ZONE
- E 923500 / N 529000 — SITE GRID

N

0 120' 240'

FILE NAME: X:\2018\0530.18\06_POST_CONSTR\01_CLOSEOUT\CQA Report Cell 1B\FIGURES\ACAD\FIG 4 Cell 1B Field Density Test Locations 01.29.2019.dwg LAYOUT NAME: FIGURE4 PRINTED: Thursday, May 02, 2019 - 8:18am USER: DRobillard

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SUNDANCE WEST SURFACE WASTE MANAGEMENT FACILITY

SUB-PHASE 2
LAND DISPOSAL CELL 1B
CQA REPORT FIGURES

LEA COUNTY, NEW MEXICO

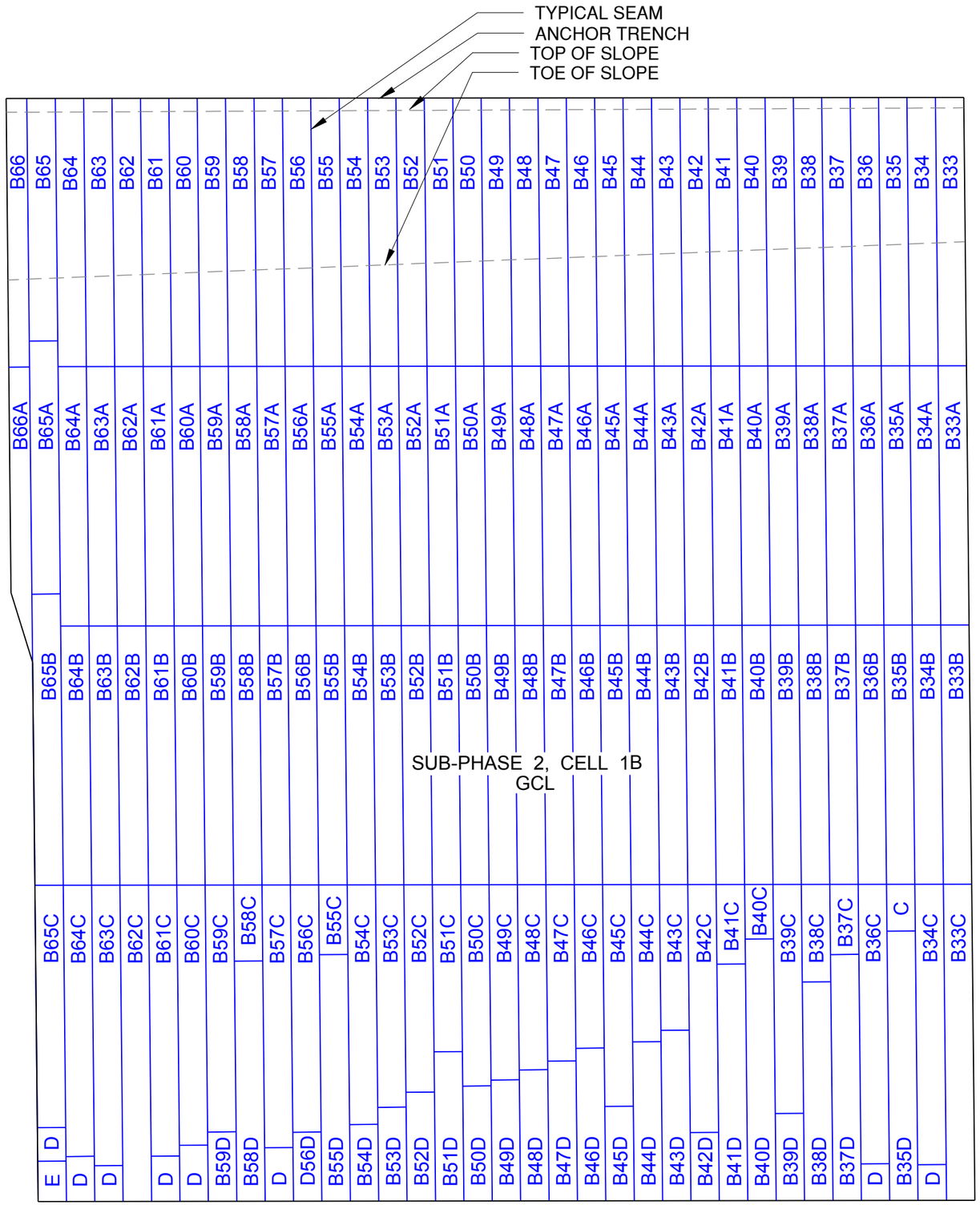
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FIELD DENSITY TEST LOCATIONS

FIGURE 4



LEGEND

B66 GCL PANEL LAYOUT (APPROXIMATE LOCATION)

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SUNDANCE WEST SURFACE WASTE MANAGEMENT FACILITY

SUB-PHASE 2
LAND DISPOSAL CELL 1B
CQA REPORT FIGURES

LEA COUNTY, NEW MEXICO

KEY PLAN

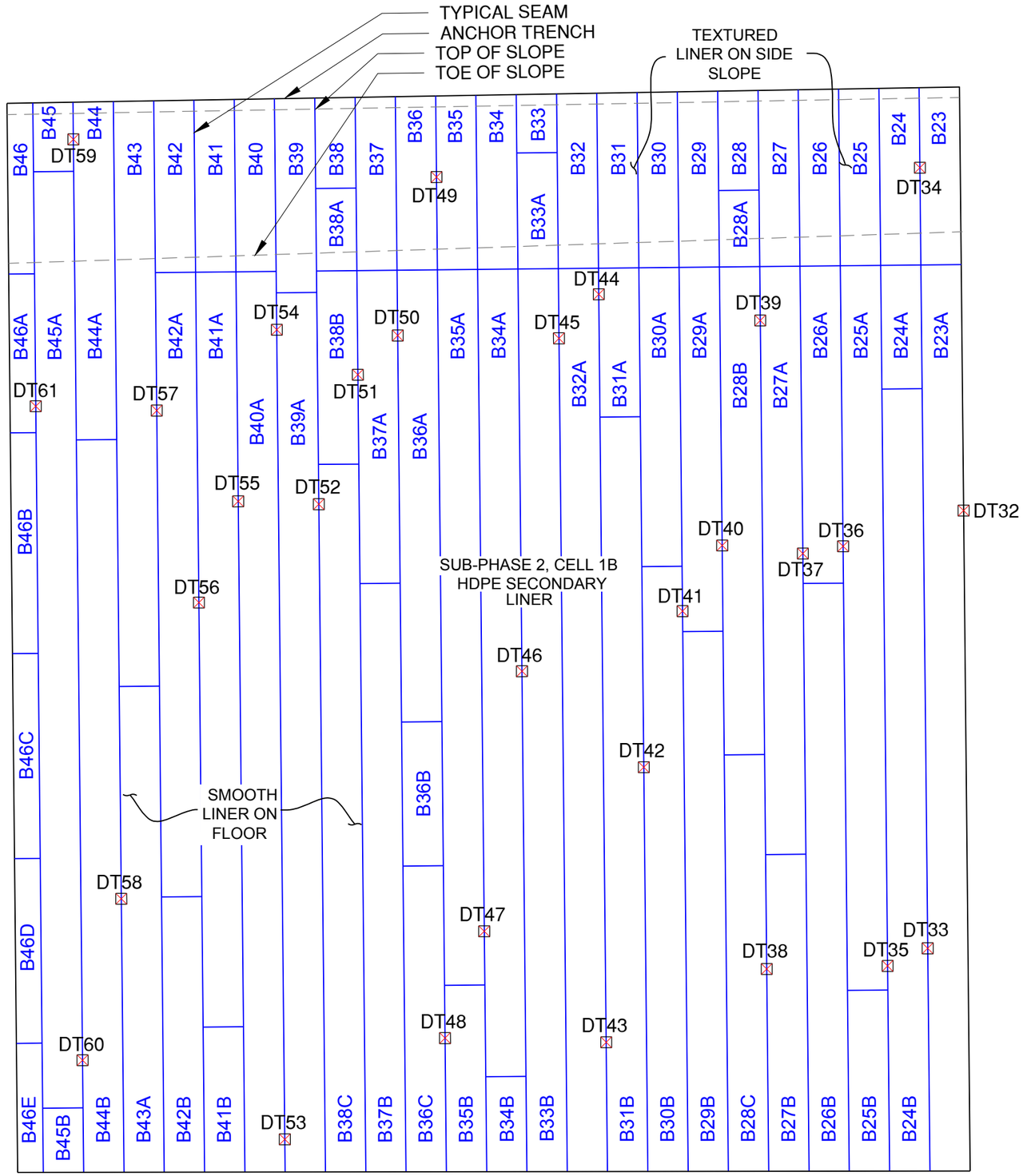
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-	01/31/2019	REPORT ISSUE

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GCL PANEL LAYOUT

FIGURE 5

FILE NAME: X:\2017\0111.17\02_DSGN\02_DWG\050_CIVIL\03-a_LandDisp_expanded\Cell 1B CQA Figures\ACAD\FIG-5 GCL Panel Layout 01.29.2019.dwg LAYOUT NAME: FIGURE 5 PRINTED: Tuesday, March 12, 2019 - 3:49pm USER: DNavarro



LEGEND

B23	HDPE PANEL LAYOUT (APPROXIMATE LOCATION)
DT32	DESTRUCTIVE TEST (APPROXIMATE LOCATION)

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SUNDANCE WEST SURFACE WASTE MANAGEMENT FACILITY

SUB-PHASE 2
LAND DISPOSAL CELL 1B
CQA REPORT FIGURES

LEA COUNTY, NEW MEXICO

KEY PLAN

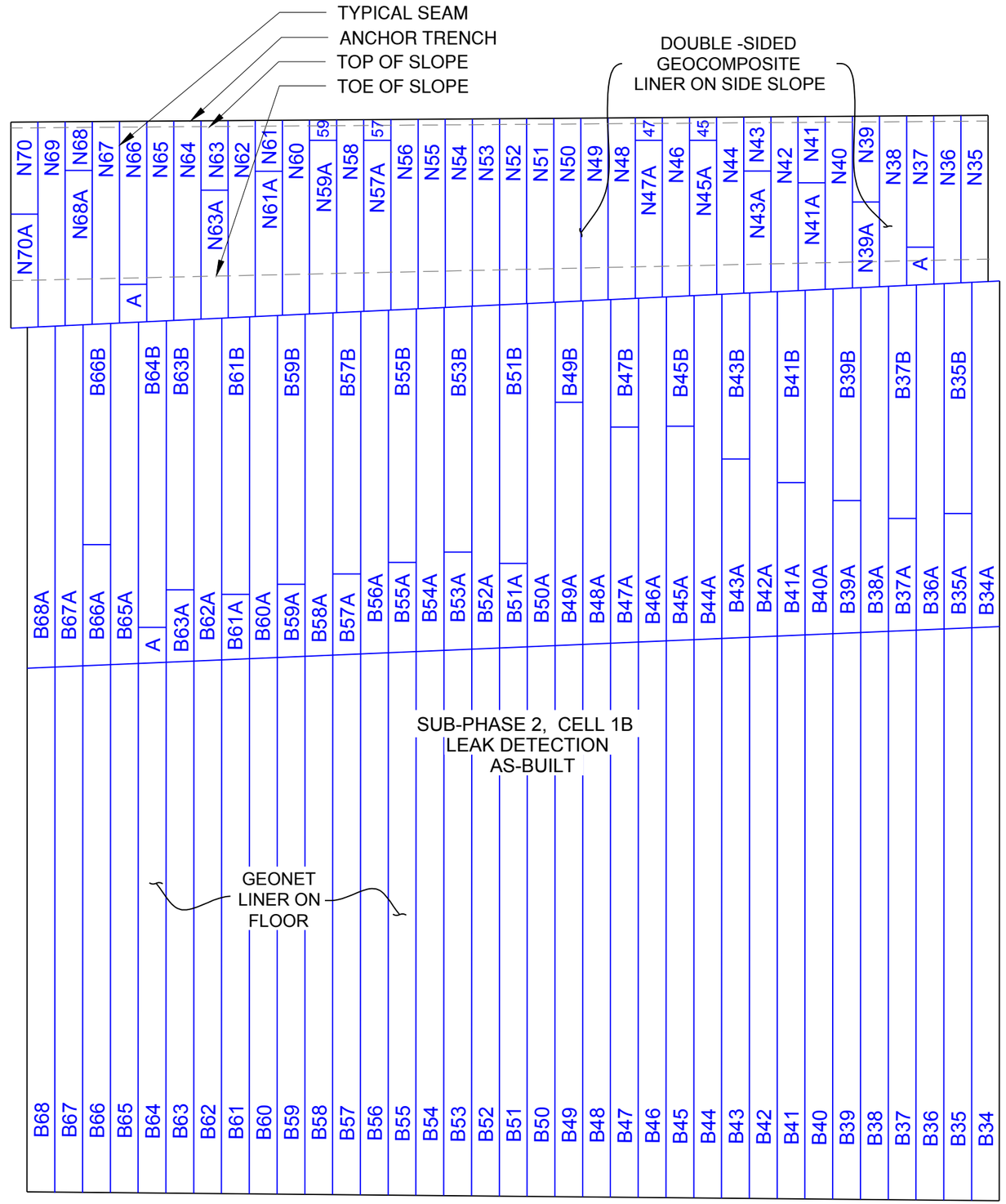
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-	01/31/2019	REPORT ISSUE

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60-MIL SECONDARY LINER PANEL LAYOUT

FIGURE 6

FILE NAME: X:\2017\01111.17\02_DSGN\02_DWG\050_CIVIL\03-a_LandDisp_expanded\Cell 1B CQA Figures\ACAD\FIG-6 60Mil Secondary Liner Panel Layout 01.29.2019.dwg LAYOUT NAME: FIGURE 6 PRINTED: Tuesday, March 12, 2019 - 3:51pm USER: DNavarro



LEGEND

B35B	GEONET PANEL LAYOUT (APPROXIMATE LOCATION)
N35	DOUBLE-SIDED GEOCOMPOSITE (APPROXIMATE LOCATION)

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SUNDANCE WEST SURFACE WASTE MANAGEMENT FACILITY

SUB-PHASE 2
LAND DISPOSAL CELL 1B
CQA REPORT FIGURES

LEA COUNTY, NEW MEXICO

KEY PLAN

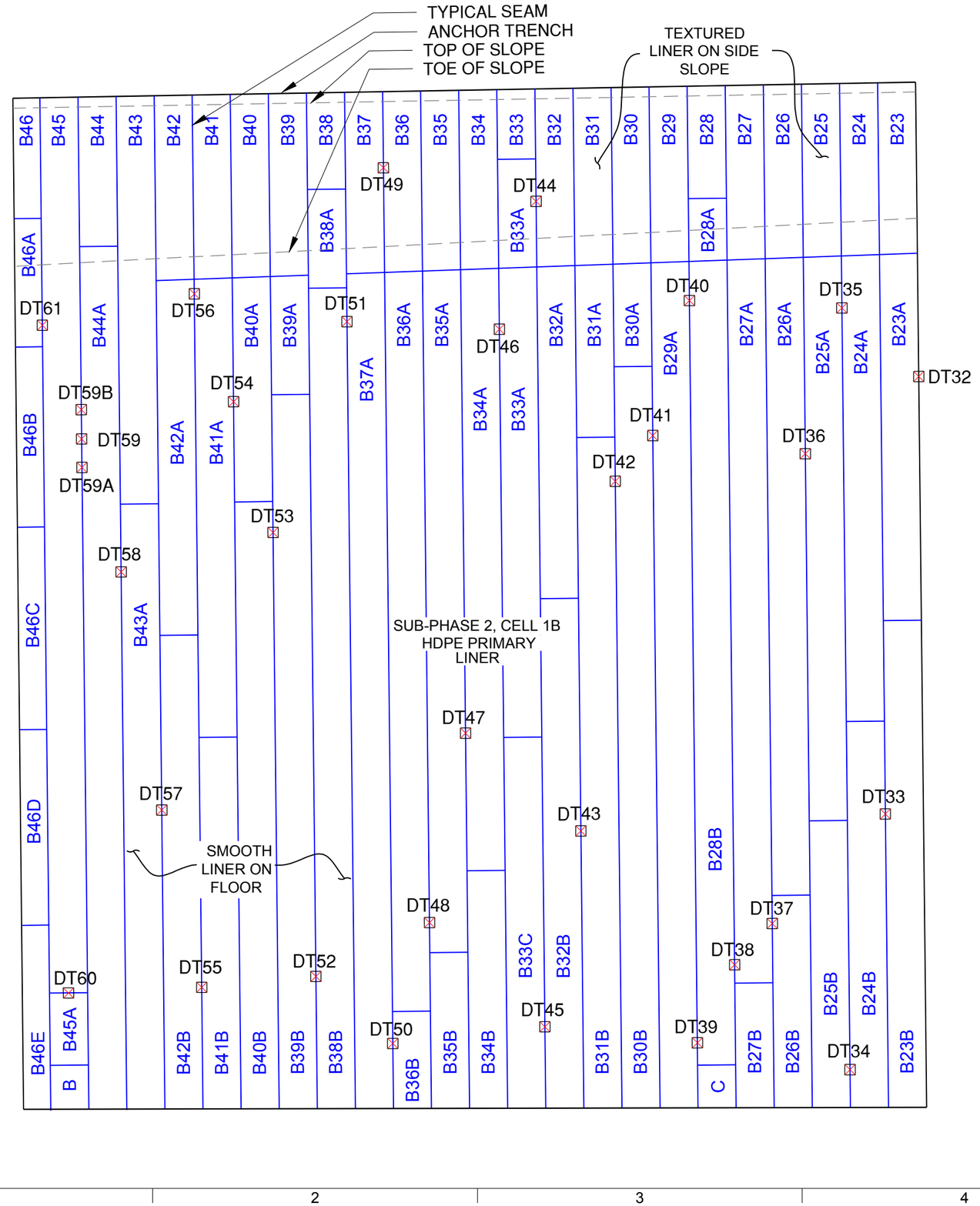
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-	01/31/2019	REPORT ISSUE

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GEOSYNTHETIC LEAK DETECTION LAYER AS-BUILT

FIGURE 7

FILE NAME: X:\2017\0111.17\02_DSGN\02_DWG\050_CIVIL\03-a_LandDisp_expandedCell 1B CQA Figures\ACAD\FIG-7 Geonet Panel Layout 01.29.2019.dwg LAYOUT NAME: FIGURE 7 PRINTED: Tuesday, March 12, 2019 - 3:46pm USER: DNavarro



LEGEND

B23	HDPE PANEL LAYOUT (APPROXIMATE LOCATION)
DT40	DESTRUCTIVE TEST (APPROXIMATE LOCATION)

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SUNDANCE WEST SURFACE WASTE MANAGEMENT FACILITY

SUB-PHASE 2
LAND DISPOSAL CELL 1B
CQA REPORT FIGURES

LEA COUNTY, NEW MEXICO

KEY PLAN

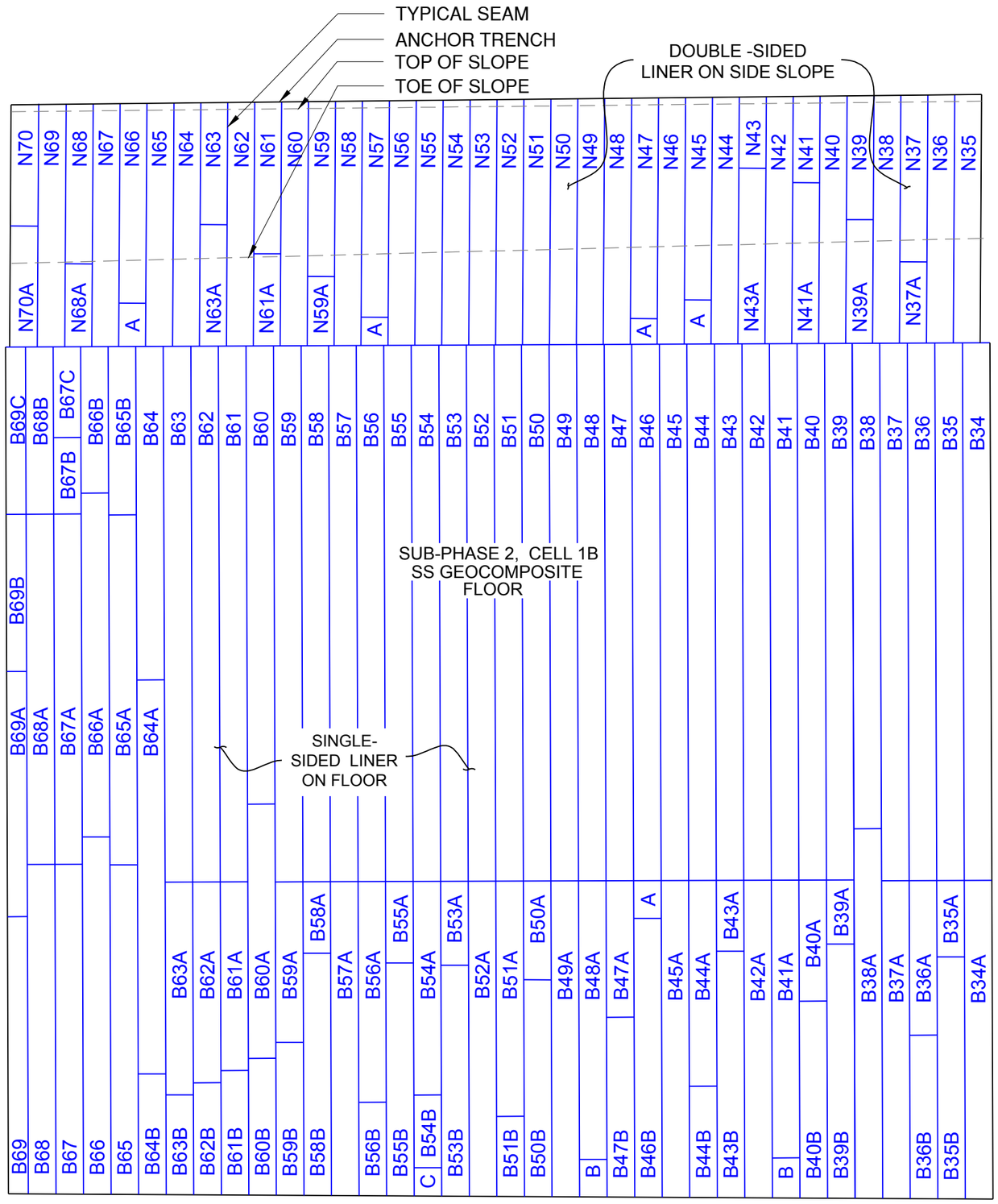
NO	DATE	DESCRIPTION
-	01/31/2019	REPORT ISSUE

ISSUING OFFICE: RIO RANCHO PROJECT NO: 0530.18

60-MIL PRIMARY LINER PANEL LAYOUT

FIGURE 8

FILE NAME: X:\2017\01111.17\02_DSGN\02_DWG\050_CIVIL\03-a_LandDisp_expanded\Cell 1B CQA Figures\ACAD\FIG-8 60MM Primary Liner Panel Layout 01.29.2019.dwg LAYOUT NAME: FIGURE 8 PRINTED: Tuesday, March 12, 2019 - 3:55pm USER: DNavarro



LEGEND

N35	DOUBLE-SIDED GEOCOMPOSITE PANEL LAYOUT (APPROXIMATE LOCATION)
B35	SINGLE-SIDED GEOCOMPOSITE PANEL LAYOUT (APPROXIMATE LOCATION)

GORDON ENVIRONMENTAL PSC

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SUNDANCE WEST SURFACE WASTE MANAGEMENT FACILITY

SUB-PHASE 2
LAND DISPOSAL CELL 1B
CQA REPORT FIGURES

LEA COUNTY, NEW MEXICO

KEY PLAN

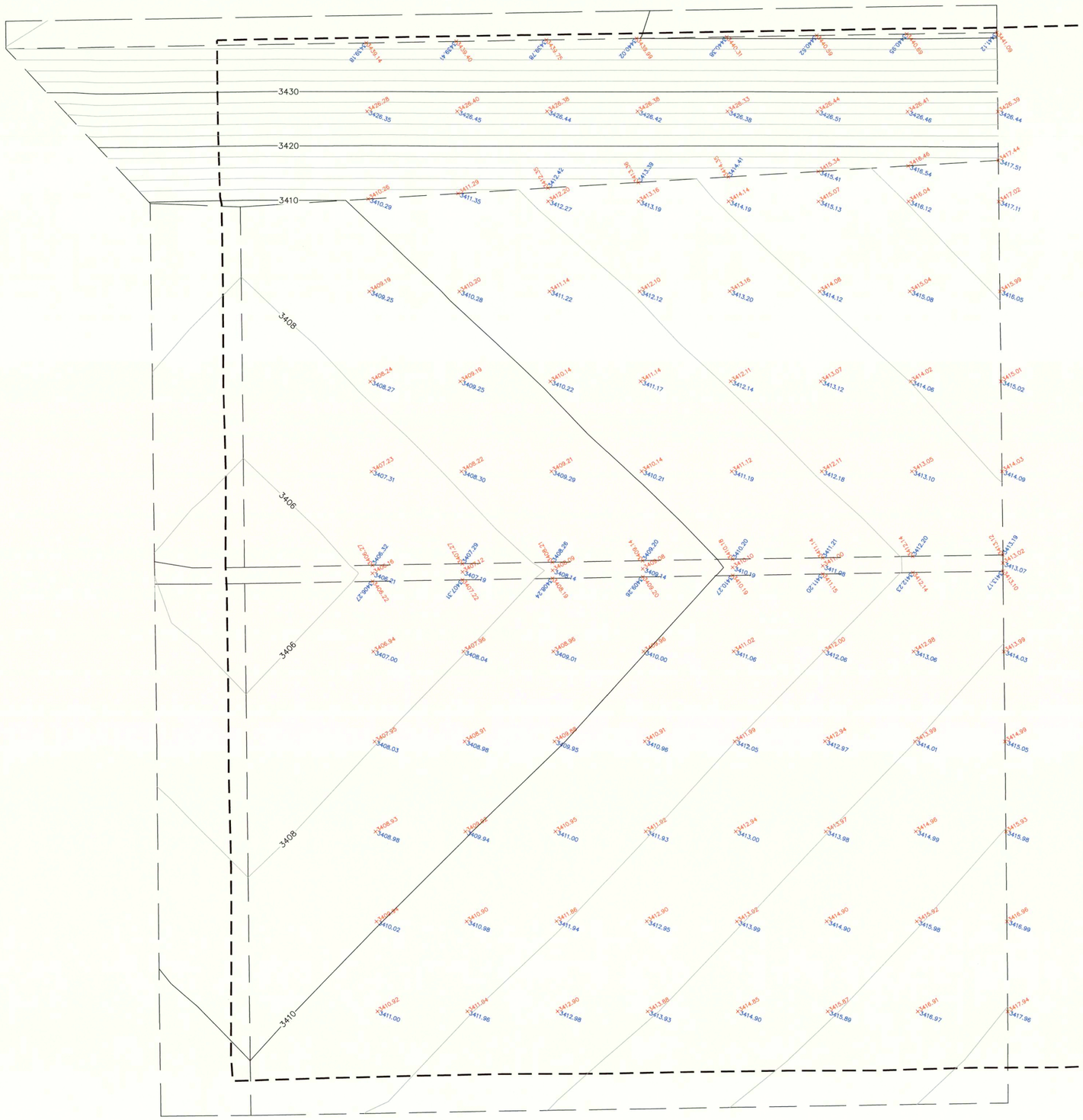
NO	DATE	DESCRIPTION
-	01/31/2019	REPORT ISSUE

ISSUING OFFICE: RIO RANCHO PROJECT NO: 0530.18

GEOSYNTHETIC CUSHION/ DRAINAGE LAYOUT AS-BUILT

FIGURE 9

FILE NAME: X:\2017\0111.17\02_DSGN\02_DWG\050_CIVIL\03-a_LandDisp_expanded\Cell 1B CQA Figures\ACAD\FIG-9 Geocomposite Liner Panel Layout 01.29.2019.dwg LAYOUT NAME: FIGURE 9 PRINTED: Tuesday, March 12, 2019 - 4:00pm USER: DNavarro



LEGEND

5180	= DESIGN CONTOUR
– – –	= ASBUILT LINER LIMIT
—— ——	= DESIGN FEATURE LINE
3400.00	= DESIGN OPS LAYER
3400.00	= ASBUILT OPS LAYER



I HEREBY CERTIFY THAT ON THIS DATE 02-05-19, AN OPERATIONS LAYER AS-BUILT SURVEY WAS PERFORMED ON THE SUNDANCE LANDFILL IN EUNICE, NM UNDER MY DIRECT SUPERVISION. I FURTHER CERTIFY THAT ALL OBSERVED OPERATIONS LAYER AS-BUILT ELEVATIONS ARE TRUE AND ACCURATE.



GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

REV.	DATE	BY

18213 E WARNER ROAD
BLDG A SUITE 5
GILBERT, AZ 85296
PHONE: (480) 414-4121
FAX: (888) 870-6203
EMAIL: 3dsurvey@s3-az.com

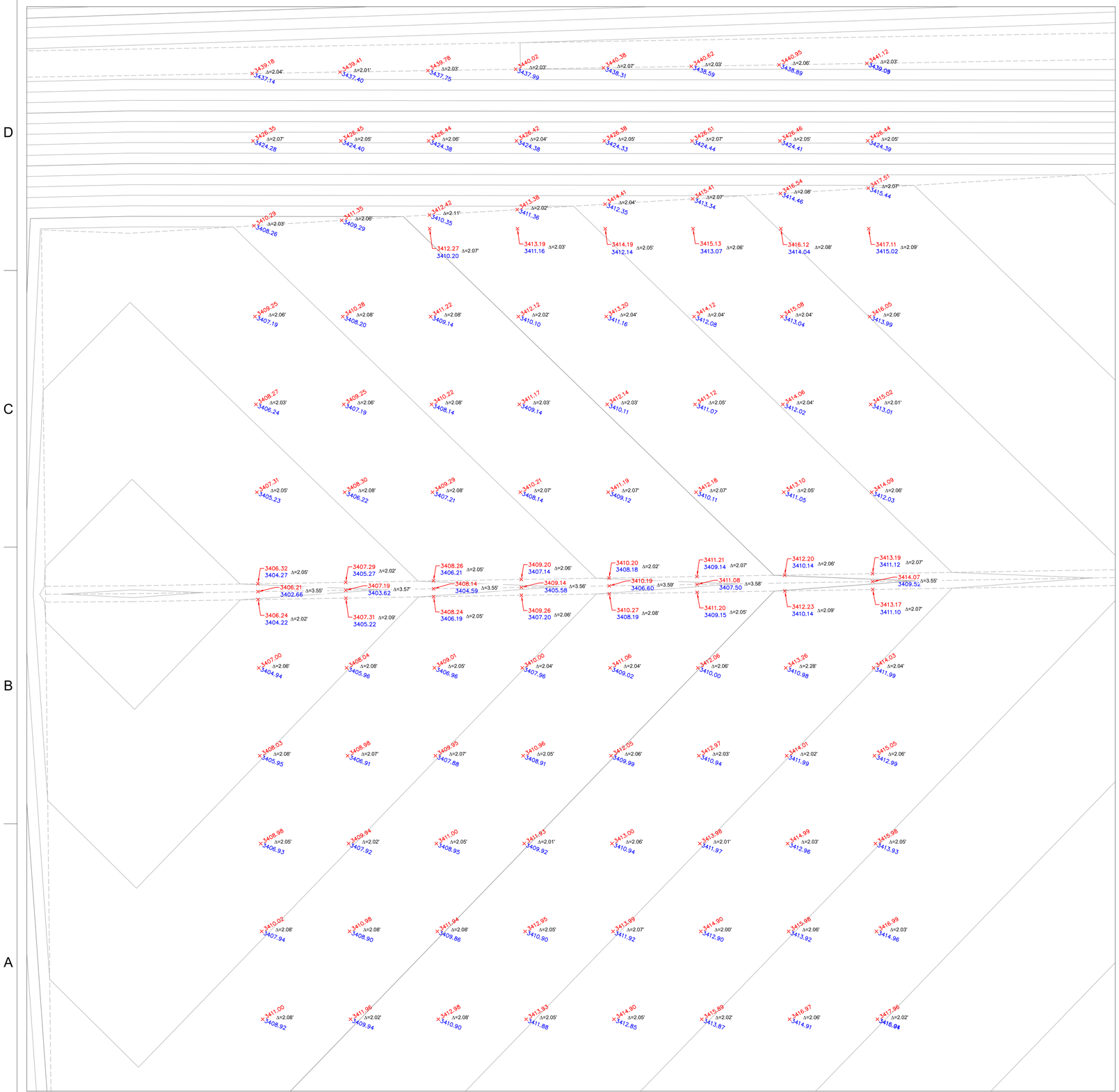
DRAWN: JB
CHECKED: GR
DATE: 2/13/19
DWG: -

SUNDANCE LANDFILL
EUNICE, NM
CELL 1B OPS LAYER ASBUILT EXHIBIT

PROJECT NO.
18_120EW

SHEET NUMBER
1
1 OF 1

FIGURE 10



LEGEND

———	=	CONTOUR LINE
----------	=	FEATURE LINE
3400.00	=	AS-BUILT PSL ELEVATION
Δ=2.00'	=	AS-BUILT PSL THICKNESS
3400.00	=	AS-BUILT SUBGRADE ELEVATION

N

0 20' 40' 80'

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SUNDANCE WEST SURFACE WASTE MANAGEMENT FACILITY

SUB-PHASE 2
CELL 1B
CQA REPORT FIGURES

LEA COUNTY, NEW MEXICO

KEY PLAN

NO	DATE	DESCRIPTION
1		
-	04/10/2019	REPORT ISSUE

ISSUING OFFICE: RIO RANCHO PROJECT NO: 0530.18

CELL 1B PSL AS-BUILT THICKNESS

FIGURE 11

FILE NAME: X:\2018\0530.18\06_POST_CONSTR\01_CLOSEOUT\CQA Report Cell 1B\FIGURES\Figure 11 - CAD\Figure 11 - PSL Depth Verification.dwg LAYOUT NAME: FIGURE 11 PRINTED: Monday, April 29, 2019 - 10:06am USER: DRobillard

FIELD LOG AND PHOTOGRAPHS

Daily Summary Reports

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

December 20, 2018

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather			Site Conditions		Day	
☒ Clear	☐ Snow	☐ Warm	☒ Clear	☐ Dusty	☐ Monday	☒ Thursday
☐ Overcast	☐ Foggy	☐ Hot	☐ Muddy	☐ _____	☐ Tuesday	☐ Friday
☐ Rain	☒ Cold	☒ Partly Cloudy	Temperature Range 30-54		☐ Wednesday	☐ Saturday____

Persons Contacted/Present at Site: Enviroworks LLC. - Chris Sheerer; Gordon/PSC – Don Gray.

Work Observed/In-Progress: PSL was placed to maximum extents without infringing upon the future installation of the Leachate Collection System. Enviroworks continues to compact and dress sideslopes to design grade. Gordon/PSC performed 24 density tests along the floor of Cell 1B, and 10 density tests along the compacted anchor trenches for Cell 1A. All passed ≥90% of the required RSP.

Items Discussed/Observations: Gordon/PSC observed initial placement and spoke with Enviroworks field personnel regarding proper installation techniques. Leachate line will be delayed due to a manufacturing delay in the production of pipe.

Equipment: 3-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1-CAT water wagon; 1 Cat vibratory roller.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

December 21, 2018

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather			Site Conditions		Day	
☒ Clear	☐ Snow	☐ Warm	☒ Clear	☐ Dusty	☐ Monday	☐ Thursday
☐ Overcast	☐ Foggy	☐ Hot	☐ Muddy	☐ _____	☐ Tuesday	☒ Friday
☐ Rain	☒ Cold	☒ Partly Cloudy	Temperature Range 30-54		☐ Wednesday	☐ Saturday____

Persons Contacted/Present at Site: Enviroworks LLC. - Chris Sheerer and Billy Burke; Gordon/PSC – Don Gray.

Work Observed/In-Progress: PSL is placed to maximum extents without infringing upon the installation of the Leachate Collection System. Enviroworks continues to compact and dress sideslopes to design grades.

Items Discussed/Observations: Gordon/PSC observed initial placement and spoke with Enviroworks field personnel regarding proper installation techniques. Leachate line will be delayed due to a manufacturing delay in the production of pipe.

Equipment: 3-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1-CAT water wagon; 1 Cat vibratory roller.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 03, 2019

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather			Site Conditions		Day	
☒ Clear	☐ Snow	☐ Warm	☒ Clear	☐ Dusty	☐ Monday	☒ Thursday
☐ Overcast	☐ Foggy	☐ Hot	☐ Muddy	☐ _____	☐ Tuesday	☐ Friday
☐ Rain	☒ Cold	☐ Partly Cloudy	Temperature Range 23-50		☐ Wednesday	☐ Saturday____

Persons Contacted/Present at Site: Enviroworks LLC. – Chris, Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC – Don Gray.

Work Observed/In-Progress: PSL is placed to maximum extents without infringing upon the installation of the Leachate Collection System. Enviroworks continues to compact and dress sideslopes to design grade. Gordon/PSC performed 4 density tests along the slope of the north berm. All test passed their required ≥90% of RSP. Southwest Liner Systems cleaned the tie-in to Cell 1A and staged material for lining activities on Jan 04.

Items Discussed/Observations: Gordon/PSC observed initial placement and spoke with Enviroworks field personnel regarding proper installation techniques. Leachate line will be delayed due to a manufacturing delay in the production of pipe.

Equipment: 3-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1-CAT water wagon; 1 Cat vibratory roller.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

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\\Data1\Projects\2018\0530.18\05_CONSTR\01_REPT\Daily Reports\Cell 1B\2019-01-03 Field Observation Report DG 01-03-2019.docm

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 04, 2019

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather
☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☒ Cold ☐ Partly Cloudy

Site Conditions
☒ Clear ☐ Dusty
☐ Muddy ☐ _____
Temperature Range 27-64

Day
☐ Monday ☐ Thursday
☐ Tuesday ☒ Friday
☐ Wednesday ☐ Saturday____

Persons Contacted/Present at Site: Enviroworks LLC. – Chris, Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC – Don Gray and Braden Belliveau.

Work Observed/In-Progress: PSL is placed to maximum extents without infringing upon the installation of the Leachate Collection System. Enviroworks continues to compact and dress sideslopes to design grade. Gordon/PSC observed placement of GCL and FML to panels 40 and 28 respectively.

Items Discussed/Observations:

Equipment: 3-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1-CAT water wagon; 1 Cat vibratory roller, 1-extended reach forklift and all associated lining equipment.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 05, 2019

FROM: Braden Belliveau

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather			Site Conditions		Day	
☒ Clear	☐ Snow	☐ Warm	☒ Clear	☐ Dusty	☐ Monday	☐ Thursday
☐ Overcast	☐ Foggy	☐ Hot	☐ Muddy	☐ _____	☐ Tuesday	☐ Friday
☐ Rain	☒ Cold	☐ Partly Cloudy	Temperature Range 21-68		☐ Wednesday	☒ Saturday

Persons Contacted/Present at Site: Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC –Braden Belliveau.

Work Observed/In-Progress: Gordon/PSC observed placement of GCL and FML to panels 51 and 35 respectively.

Items Discussed/Observations:

Equipment: 3-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1-CAT water wagon; 1 Cat vibratory roller, 1-extended reach forklift and all associated lining equipment.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 06, 2019

FROM: Braden Belliveau

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather
☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☒ Cold ☐ Partly Cloudy

Site Conditions
☒ Clear ☐ Dusty
☐ Muddy ☐ _____
Temperature Range 21-68

Day
☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☐ Saturday
☒ Sunday

Persons Contacted/Present at Site: Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC –Braden Belliveau.

Work Observed/In-Progress: Southwest Liner Systems called a halt to work upon arrival at the site due to morning rain and expected high winds beginning at 1100.

Items Discussed/Observations:

Equipment: 3-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1-CAT water wagon; 1 Cat vibratory roller, 1-extended reach forklift and all associated lining equipment.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 07, 2019

FROM: Braden Belliveau

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather			Site Conditions		Day	
☒ Clear	☐ Snow	☒ Warm	☒ Clear	☐ Dusty	☒ Monday	☐ Thursday
☐ Overcast	☐ Foggy	☐ Hot	☐ Muddy	☐ _____	☐ Tuesday	☐ Friday
☐ Rain	☐ Cold	☐ Partly Cloudy	Temperature Range 39-64		☐ Wednesday	☐ Saturday____

Persons Contacted/Present at Site: Enviroworks LLC. – Chris, Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC – Braden Belliveau.

Work Observed/In-Progress: Enviroworks began to piece together the leachate collection pipe using butt-fusion welding.

Items Discussed/Observations: Gordon/PSC observed placement of geotextile in the leachate trench. Gordon/PSC spoke with Enviroworks field personnel regarding proper installation techniques.

Equipment: 3-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1-CAT water wagon; 1 Cat vibratory roller.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 08, 2019

FROM: Braden Belliveau

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather			Site Conditions		Day	
☐ Clear	☐ Snow	☒ Warm	☒ Clear	☐ Dusty	☐ Monday	☐ Thursday
☐ Overcast	☐ Foggy	☐ Hot	☐ Muddy	☐ _____	☒ Tuesday	☐ Friday
☐ Rain	☐ Cold	☒ Partly Cloudy	Temperature Range 39-53		☐ Wednesday	☐ Saturday

Persons Contacted/Present at Site: Enviroworks LLC. – Chris, Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC – Carl King.

Work Observed/In-Progress: Enviroworks places the leachate collection pipe in the trench and backfills the trench with 6 inches of gravel. The grade of the pipe is confirmed to be 2% before backfilling. Enviroworks begins fine grading of Cell 1A.

Items Discussed/Observations: Gordon/PSC observed placement of the leachate collection pipe in the leachate trench. Gordon/PSC spoke with Enviroworks field personnel regarding proper installation techniques. Southwest placed plastic liner and a pump in remaining uncovered leachate trench in preparation for any potential rain event.

Equipment: 3-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1-CAT water wagon; 1 Cat vibratory roller.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

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GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 09, 2019

FROM: Braden Belliveau

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather			Site Conditions		Day	
☐ Clear	☐ Snow	☒ Warm	☒ Clear	☐ Dusty	☐ Monday	☐ Thursday
☐ Overcast	☐ Foggy	☐ Hot	☐ Muddy	☐ _____	☐ Tuesday	☐ Friday
☐ Rain	☐ Cold	☒ Partly Cloudy	Temperature Range 31-51		☒ Wednesday	☐ Saturday

Persons Contacted/Present at Site: Enviroworks LLC. – Chris, Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC – Carl King.

Work Observed/In-Progress: Enviroworks and Southwest cut the liner on the west side of Ponds 1-6, in preparation for the installation of Ponds 7-10. The cut liner was buried in an anchor trench at freeboard grade. Southwest Liner Systems placed Primary Liner to panel B24. Enviroworks continues grading of western half of Cell 1A.

Items Discussed/Observations:

Equipment: 3-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1-CAT Water-wagon; 1 Cat vibratory roller.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐ A/E ☐ Contractor ☐ Consultants ☐ _____ ☐ _____ ☒ File

\\Data1\Projects\2018\0530.18\05_CONSTR\01_REPT\Daily Reports\Cell 1B\2019-01-09 Field Observation Report DG 01-09-2019.docm

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 10, 2019

FROM: Braden Belliveau

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather			Site Conditions		Day	
☐ Clear	☐ Snow	☒ Warm	☒ Clear	☐ Dusty	☐ Monday	☒ Thursday
☐ Overcast	☐ Foggy	☐ Hot	☐ Muddy	☐ _____	☐ Tuesday	☐ Friday
☐ Rain	☐ Cold	☐ Partly Cloudy	Temperature Range 35-62		☐ Wednesday	☐ Saturday

Persons Contacted/Present at Site: Enviroworks LLC. – Chris, Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC – Braden Belliveau.

Work Observed/In-Progress: Enviroworks and Southwest cut the liner on the west side of Ponds 1-6, in preparation for the installation of Ponds 7-10. The cut liner was buried in an anchor trench. Southwest Liner Systems placed Primary FML to panel B30B, and Geonet to panel B58. Enviroworks continues grading of western half of Cell 1A.

Items Discussed/Observations: None.

Equipment: 3-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1-CAT Water-wagon; 1 Cat vibratory roller.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐ A/E ☐ Contractor ☐ Consultants ☐ _____ ☐ _____ ☒ File

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GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 11, 2019

FROM: Braden Belliveau

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather			Site Conditions		Day	
☐ Clear	☐ Snow	☒ Warm	☒ Clear	☐ Dusty	☐ Monday	☐ Thursday
☐ Overcast	☐ Foggy	☐ Hot	☐ Muddy	☐ _____	☐ Tuesday	☒ Friday
☐ Rain	☐ Cold	☐ Partly Cloudy	Temperature Range 35-60		☐ Wednesday	☐ Saturday

Persons Contacted/Present at Site: Enviroworks LLC. – Chris, Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC – Braden Belliveau.

Work Observed/In-Progress: Southwest Liner Systems placed Geonet to panel B62, and Geotextile to panel N64. Enviroworks continues grading of western half of Cell 1A PSL.

Items Discussed/Observations: None

Equipment: 3-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1-CAT Water-wagon; 1 Cat vibratory roller.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐ A/E ☐ Contractor ☐ Consultants ☐ _____ ☐ _____ ☒ File

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 12, 2019

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather
☐ Clear ☐ Snow ☐ Warm
☒ Overcast ☐ Foggy ☐ Hot
☐ Rain ☒ Cold ☐ Partly Cloudy

Site Conditions
☒ Clear ☐ Dusty
☐ Muddy ☐ _____
Temperature Range 32-52

Day
☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☒ Saturday
☐ Sunday

Persons Contacted/Present at Site: Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC –Don Gray.

Work Observed/In-Progress: Southwest Liner Systems installed four runs of primary liner, from panel 31 to panel 35. High winds prevented additional work.

Items Discussed/Observations:

Equipment: 2-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1 Water Truck; 1 Cat vibratory roller, 1-extended reach forklift and all associated lining equipment.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 13, 2019

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather
☐ Clear ☐ Snow ☐ Warm
☒ Overcast ☐ Foggy ☐ Hot
☐ Rain ☒ Cold ☐ Partly Cloudy

Site Conditions
☒ Clear ☐ Dusty
☐ Muddy ☐ _____
Temperature Range 29-46

Day
☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☐ Saturday
☒ Sunday

Persons Contacted/Present at Site: Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC –Don Gray.

Work Observed/In-Progress: Southwest Liner Systems installed six runs of primary liner, from panel B36 to panel B41B. This completes the primary liner to the end of currently installed Cell 1B. An additional 60' of liner will be installed the next week to complete the cell.

Items Discussed/Observations:

Equipment: 2-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1 Water Truck; 1 Cat vibratory roller, 1-extended reach forklift and all associated lining equipment.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

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GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 14, 2019

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather
☐ Clear ☐ Snow ☐ Warm
☒ Overcast ☐ Foggy ☐ Hot
☐ Rain ☒ Cold ☐ Partly Cloudy

Site Conditions
☒ Clear ☐ Dusty
☐ Muddy ☐ _____
Temperature Range 34-41

Day
☒ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☐ Saturday
☐ Sunday

Persons Contacted/Present at Site: Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC –Don Gray.

Work Observed/In-Progress: Southwest Liner Systems installed goecomposite on the north sidedslope, and 10 runs along the floor of the cell running east to west.

Items Discussed/Observations:

Equipment: 2-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1 Water Truck; 1 Cat vibratory roller, 1-extended reach forklift and all associated lining equipment.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

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GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 15, 2019

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather
☐ Clear ☐ Snow ☐ Warm
☒ Overcast ☐ Foggy ☐ Hot
☐ Rain ☒ Cold ☐ Partly Cloudy

Site Conditions
☒ Clear ☐ Dusty
☐ Muddy ☐ _____
Temperature Range 35-57

Day
☐ Monday ☐ Thursday
☒ Tuesday ☐ Friday
☐ Wednesday ☐ Saturday
☐ Sunday

Persons Contacted/Present at Site: Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC –Don Gray.

Work Observed/In-Progress: Southwest Liner Systems installed GCL and secondary liner to the end of Cell 1B.

Items Discussed/Observations:

Equipment: 2-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1 Water Truck; 1 Cat vibratory roller, 1-extended reach forklift and all associated lining equipment.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

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GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 16, 2019

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather
☒ Clear ☐ Snow ☒ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☐ Cold ☐ Partly Cloudy

Site Conditions
☒ Clear ☐ Dusty
☐ Muddy ☐ _____
Temperature Range 37-68

Day
☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☒ Wednesday ☐ Saturday
☐ Sunday

Persons Contacted/Present at Site: Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC –Don Gray.

Work Observed/In-Progress: Southwest Liner Systems finalized installation of the geonet in the leak detection layer to the end of Cell 1B.

Items Discussed/Observations:

Equipment: 2-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1 Water Truck; 1 Cat vibratory roller, 1-extended reach forklift and all associated lining equipment.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

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GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 17, 2019

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather
☒ Clear ☐ Snow ☒ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☐ Cold ☐ Partly Cloudy

Site Conditions
☒ Clear ☐ Dusty
☐ Muddy ☐ _____
Temperature Range 39-68

Day
☐ Monday ☒ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☐ Saturday
☐ Sunday

Persons Contacted/Present at Site: Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC –Don Gray.

Work Observed/In-Progress: Southwest Liner Systems finalized installation of the primary FML to the end of Cell 1B.

Items Discussed/Observations:

Equipment: 2-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1 Water Truck; 1 Cat vibratory roller, 1-extended reach forklift and all associated lining equipment.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 22, 2019

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather
☒ Clear ☐ Snow ☒ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☐ Cold ☐ Partly Cloudy

Site Conditions
☒ Clear ☐ Dusty
☐ Muddy ☒ Windy_____
Temperature Range 32-66

Day
☐ Monday ☐ Thursday
☒ Tuesday ☐ Friday
☐ Wednesday ☐ Saturday
☐ Sunday

Persons Contacted/Present at Site: Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC –Don Gray.

Work Observed/In-Progress: Southwest Liner Systems finalized installation of the Geosynthetic Cushion/Drainage Layer along the north slope. Enviroworks placing of PSL as a continuation of the previously constructed Cell 1A.

Items Discussed/Observations:

Equipment: 2-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1 Water Truck; 1 Cat vibratory roller, 1-extended reach forklift and all associated lining equipment.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 23, 2019

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather
☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☒ Cold ☐ Partly Cloudy

Site Conditions
☒ Clear ☐ Dusty
☐ Muddy ☒ Windy_____
Temperature Range 17-52

Day
☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☒ Wednesday ☐ Saturday
☐ Sunday

Persons Contacted/Present at Site: Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC –Don Gray.

Work Observed/In-Progress: Southwest Liner Systems finalized installation of the Geosynthetic Cushion/Drainage Layer along the floor. Lining activities for Cell 1B are complete. Enviroworks placing of PSL as a continuation of the previously constructed Cell 1A.

Items Discussed/Observations:

Equipment: 2-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1 Water Truck; 1 Cat vibratory roller, 1-extended reach forklift and all associated lining equipment.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 24, 2019

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather
☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☒ Cold ☐ Partly Cloudy

Site Conditions
☒ Clear ☐ Dusty
☐ Muddy ☒ Windy_____
Temperature Range 17-52

Day
☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☒ Wednesday ☐ Saturday
☐ Sunday

Persons Contacted/Present at Site: Southwest Liner Systems – Lorenzo Zazpe, Gordon/PSC –Don Gray.

Work Observed/In-Progress: Southwest Liner Systems finalized installation of the Geosynthetic Cushion/Drainage Layer along the floor. Lining activities for Cell 1B are complete. Enviroworks placing of PSL as a continuation of the previously constructed Cell 1A.

Items Discussed/Observations:

Equipment: 2-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1 Water Truck; 1 Cat vibratory roller, 1-extended reach forklift and all associated lining equipment.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 29, 2019

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather
☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☒ Cold ☐ Partly Cloudy

Site Conditions
☒ Clear ☐ Dusty
☐ Muddy ☐ Windy_____
Temperature Range 23-43

Day
☐ Monday ☐ Thursday
☒ Tuesday ☐ Friday
☐ Wednesday ☐ Saturday
☐ Sunday

Persons Contacted/Present at Site: Southwest Liner Systems – Lorenzo Zazpe, Enviroworks – Billy Burke, Gordon/PSC –Don Gray.

Work Observed/In-Progress: Enviroworks placing of PSL as a continuation of the previously constructed Cell 1A. Southwest Liner installed the stormwater flap material along the west end of Cell 1B and west end of Cells 1A and 1B.

Items Discussed/Observations: Enviroworks to rebuild an entrance road over the newly installed storm flap. Instructed them to ensure 3' of material was placed over the storm flap.

Equipment: 2-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; 1-140M Cat grader; 1 Water Truck; 1 Cat vibratory roller, 1-extended reach forklift and all associated lining equipment.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

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GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

January 30, 2019

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather
☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☒ Cold ☐ Partly Cloudy

Site Conditions
☒ Clear ☐ Dusty
☐ Muddy ☐ Windy_____
Temperature Range 25-52

Day
☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☒ Wednesday ☐ Saturday
☐ Sunday

Persons Contacted/Present at Site: Enviroworks – Billy Burke, Gordon/PSC –Don Gray.

Work Observed/In-Progress: Enviroworks placing of PSL as a continuation of the previously constructed Cell 1A.

Items Discussed/Observations:

Equipment: 2-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; and 1-140M Cat grader.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

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GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

February 01, 2019

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather
☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☒ Cold ☐ Partly Cloudy

Site Conditions
☒ Clear ☐ Dusty
☐ Muddy ☐ Windy_____
Temperature Range 32-68

Day
☐ Monday ☐ Thursday
☐ Tuesday ☒ Friday
☐ Wednesday ☐ Saturday
☐ Sunday

Persons Contacted/Present at Site: Enviroworks – Billy Burke, Gordon/PSC –Don Gray.

Work Observed/In-Progress: Enviroworks continued placement of PSL and installed the Geotextile material in the Leachate Collection trench.

Items Discussed/Observations:

Equipment: 2-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; and 1-140M Cat grader.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

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GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

February 02, 2019

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather
☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☒ Cold ☐ Partly Cloudy

Site Conditions
☒ Clear ☐ Dusty
☐ Muddy ☐ Windy_____
Temperature Range 32-68

Day
☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☒ Saturday
☐ Sunday

Persons Contacted/Present at Site: Enviroworks – Billy Burke, Gordon/PSC –Don Gray.

Work Observed/In-Progress: Enviroworks continued placement of PSL, began welding of the HDPE pipe used as the Leachate Collection Pipe, and began placing select aggregate as bedding material for the pipe.

Items Discussed/Observations:

Equipment: 2-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; and 1-140M Cat grader.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

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GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

February 03, 2019

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather			Site Conditions		Day	
☒ Clear	☐ Snow	☒ Warm	☒ Clear	☐ Dusty	☐ Monday	☐ Thursday
☐ Overcast	☐ Foggy	☐ Hot	☐ Muddy	☐ Windy_____	☐ Tuesday	☐ Friday
☐ Rain	☐ Cold	☐ Partly Cloudy	Temperature Range 41-68		☐ Wednesday	☐ Saturday
						☒ Sunday

Persons Contacted/Present at Site: Enviroworks – Billy Burke, Gordon/PSC –Don Gray.

Work Observed/In-Progress: Enviroworks continued placement of PSL and finalized installation of the Leachate Collection System. The Leachate Cleanout line header wall was waterproofed with a specialized material pre-approved by the engineer.

Items Discussed/Observations:

Equipment: 2-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; and 1-140M Cat grader.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

\\Data1\Projects\2018\0530.18\05_CONSTR\01_REPT\Daily Reports\Cell 1B\2019-02-03 Field Observation Report DG .docm

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD OBSERVATION REPORT

February 07, 2019

FROM: Don Gray

PROJECT NAME: Sundance West Phase 2, Cell 1A

PROJECT NO.: 01053018.02

Weather
☒ Clear ☐ Snow ☒ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☐ Cold ☐ Partly Cloudy

Site Conditions
☒ Clear ☐ Dusty
☐ Muddy ☒ Windy
Temperature Range 28-64

Day
☐ Monday ☒ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☐ Saturday
☐ Sunday

Persons Contacted/Present at Site: Enviroworks – Chris Sheerer, Southwest Liner Systems – Lorenzo Zazpe, Joe Carrillo – Sundance West, Inc., Gordon/PSC –Don Gray.

Work Observed/In-Progress: Enviroworks did final grading atop the north and west berms and cleaned up the transition of PSL to the berms at the request of Joe Carrillo.

Items Discussed/Observations: Chris Sheerer, Lorenzo Zazpe, Joe Carrillo, and Don Gray met for a final inspection of both Cells 1A and 1B. All parties were satisfied with construction and signed the Final Completion Form.

Equipment: 2-Cat 740B articulating dump truck, 1-Komatsu PC 490LC excavator, 1-D6T Cat dozer; and 1-140M Cat grader.

Requested Revisions or Interpretations: None.

Items to Verify: None.

Information or Action Required: None.
☐ Attachments:

Copies: ☐ Owner ☐A/E ☐ Contractor ☐ Consultants ☐_____ ☐ _____ ☒ File

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FIELD LOG AND PHOTOGRAPHS

Project Photographs

Project Photographs



9-17-18 Clearing and Grubbing of project area. Northwest view.



9-19-18 Unused tanks to be removed from the project area. North view.

Project Photographs



9-23-18 Area of deep roots cleared. West view.



10-01-18 Area cleared, staked, and ready for berm construction. Southwest view.

Project Photographs



10-9-18 Excavation and berm construction from above. East view.



10-23-18 Excavation and berm construction from above. East view.

Project Photographs



10-25-18 Landfill excavation, berm and perimeter drainage construction. Southwest view.



10-31-18 Berm construction density test in progress.

Project Photographs

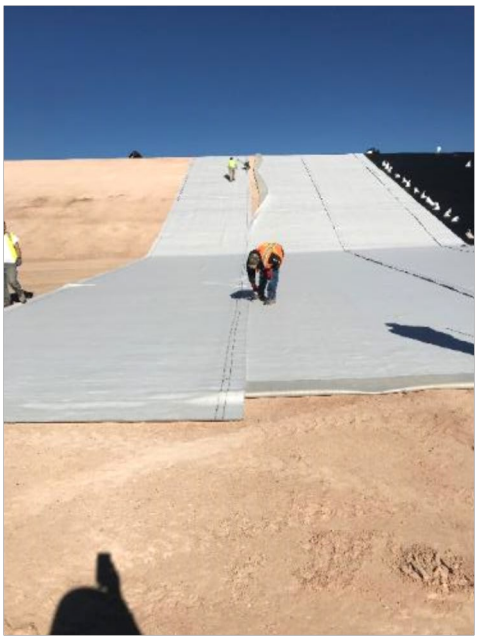


11-05-18 Southern berm construction nearing completion. West view.



12-20-18 Density test in progress, Cell 1B floor.

Project Photographs



01-04-19 Placement of GCL panels for Cell 1B. North view.

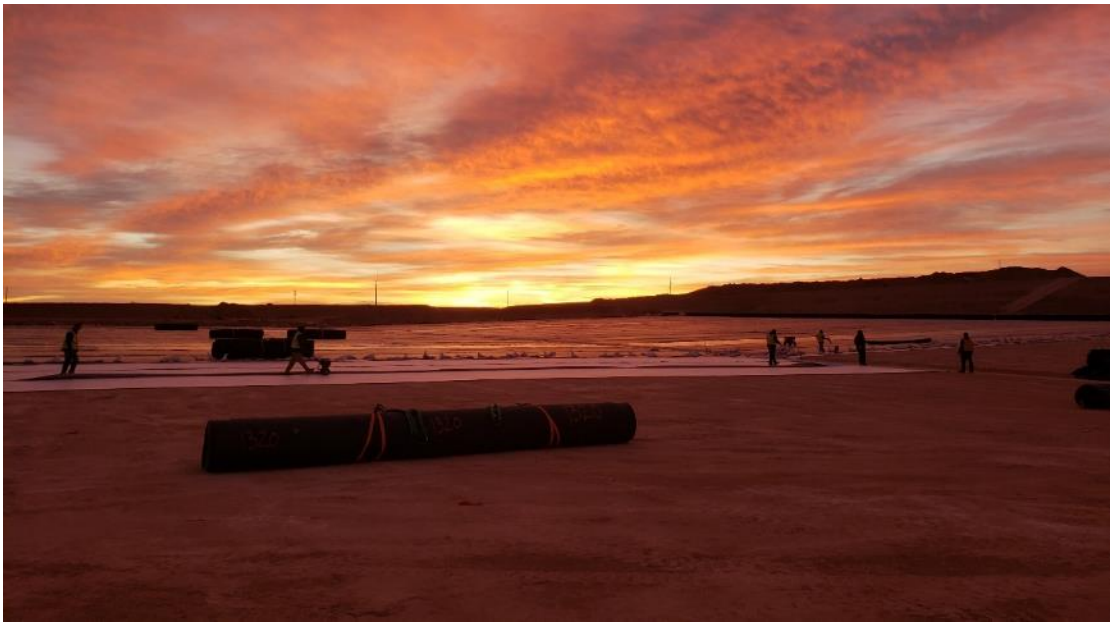


01-04-19 Textured FML on slope and smooth FML panel(s) installed atop the GCL. Southeast view.

Project Photographs



01-04-19 Smooth FML panel marked with a destructive test cut. Air pressure test in progress.



01-08-19 Installed GCL on cell floor. Free bentonite application in process. East view.

Project Photographs



01-08-19 On-site destructive test in progress.



01-08-19 South edge of liner system installed prior to primary to secondary liner sealing. West view.

Project Photographs



01-08-19 End of day progress. Additional plastic placed in leachate trench to prevent subgrade from damage in the event of precipitation. Northwest view.



01-09-19 Use of zip ties to seam the geocompostie in the leak detection layer.

Project Photographs

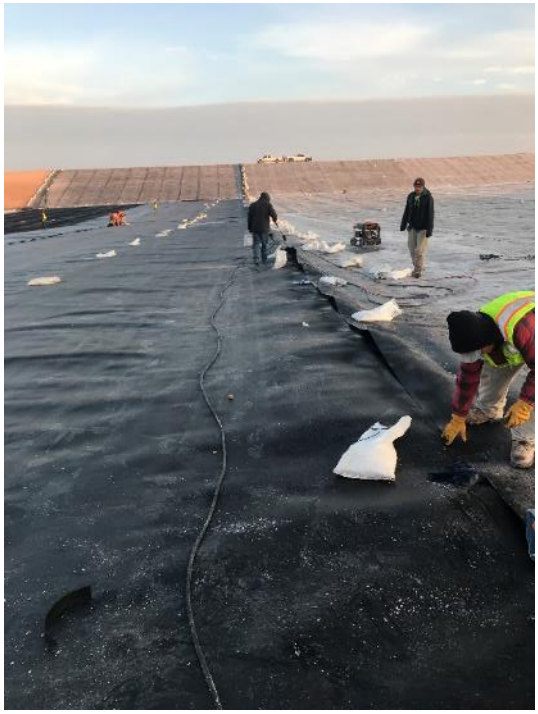


01-12-19 Geonet installed on the cell floor as part of the leak detection system. Southeast view.



01-12-19 Installation of primary liner textured FML atop the leak detection layer on the north sideslope. Northeast view.

Project Photographs



01-13-19 Heating/drying of previously deployed liner to ensure a quality weld is performed. North view.



01-13-19 Wedge welding in progress of primary and secondary liners, south edge. Northeast view.

Project Photographs



01-14-19 Installation of geocomposite for the Geosynthetic Cushion/Drainage Layer. North view.



01-15-19 Liner system installation progress. North view.

Project Photographs



01-15-19 End of cell termination trench to eliminate the potential for water migration underneath the liner system. North view.



01-16-19 Installation of primary liner at the west end of Cell 1B. North view.

Project Photographs

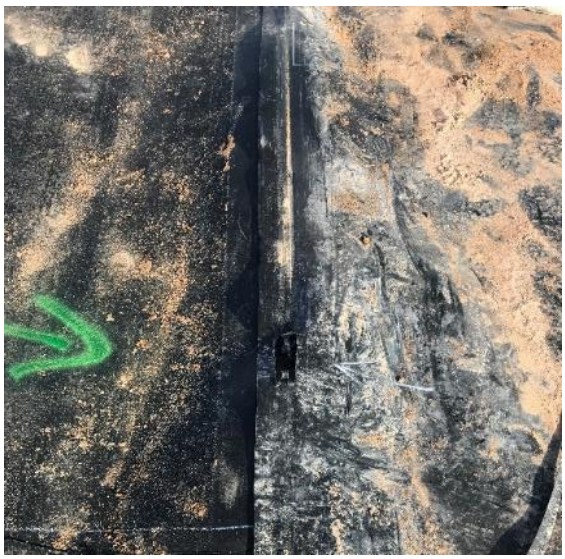


01-16-19 Wedge welding in process.



01-16-19 Air pressure testing of wedge “two-track” welding in process.

Project Photographs



01-16-19 Wedge welding “burn-out” marked for repair.



01-16-19 Installation of liner system in the east edge of cell termination trench. North view.

Project Photographs

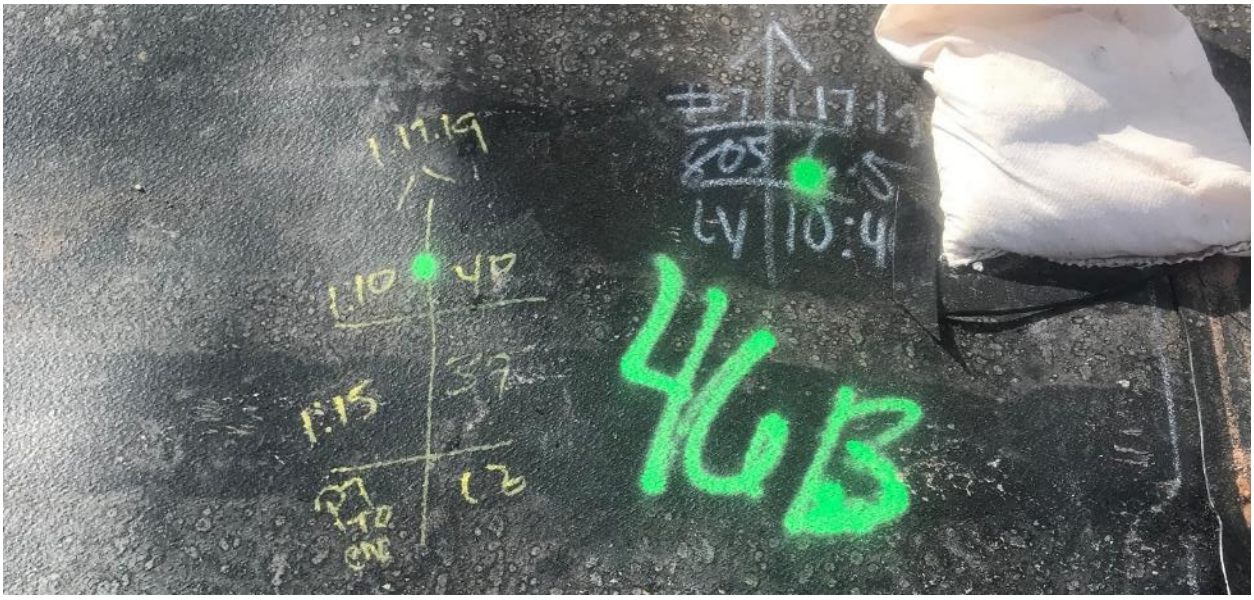


01-17-19 Fusion of primary and secondary liner components in the end of cell termination ditch. South view.

Project Photographs



01-17-19 Patch, extrusion welded in place. Vacuum testing complete and marked.



01-17-19 Installed liner marked with, welding record, air pressure test record, and panel number.

Project Photographs



01-17-19 Destructive test cut, marked, and ready for repair.



01-22-19 Secondary, leak detection zone, and primary liner installed to end of cell. Rolls of geosynthetics for the Geosynthetic Cushion/Drainage Layer staged for deployment the following day. Northeast view.

Project Photographs



01-23-19 End of cell termination ditch backfilled and compacted. North view.



01-23-19 Valve and connector for leak detection pipe, pre-installation.

Project Photographs



01-23-19 Leak detection pipe installed at the western edge of Cell 1B. Pipe to receive ball valve and valve box.

Project Photographs



01-24-19 Installation of rebar for the header wall at the east end of the Landfill.

Project Photographs



01-24-19 Header wall forms complete and ready for concrete pour.



01-24-19 Monolithic pour in process.

Project Photographs



01-29-19 Installation of storm flap on both Cells 1A and 1B. West view.



01-29-19 Plywood installed on south edge of landfill. West view.

Project Photographs



01-30-19 Liner system synthetics complete. PSL placement in progress. North view.



01-30-19 Placement of PSL in process. Person observing for excessive wrinkles in the liner or objectional material in PSL. South view.

Project Photographs



02-01-19 Valve box in place for leak detection pipe.



02-01-19 Geotextile material placed in the Leachate Collection trench. West view.

Project Photographs



02-01-19 Leachate line connection to Cell 1A.



02-01-19 Installation of pre-approved aggregate bedding layer in Leachate Collection trench. East view.

Project Photographs



02-02-19 Bedding layer aggregate installed.



02-02-19 HDPE Leachate Collection pipe fused and ready for connection to Cell 1A.

Project Photographs



02-02-19 HDPE Leachate Collection pipe welding in process.



02-02-19 Leachate header wall complete. North view.

Project Photographs



02-03-19 Leachate Collection pipe termination at west end of Cell 1B.

Project Photographs



02-03-19 Leachate pipe header wall primed and ready for waterproofing material.

Project Photographs



02-03-19 Leachate pipe header wall completed, including waterproofing material. East view.



02-03-19 Leachate pipe header wall completed with soils graded finalized. North view.

Project Photographs



02-03-19 Leachate Collection system piping, west stormwater berm, and PSL placement complete. East view.

APPENDIX A

Geotechnical Soil Testing

A.1. Moisture / Density Relationships

Soils / Aggregates

Report Date: September 26, 2018

Client		Project	
Name:	ParkHill Smith & Cooper	**Name:**	(18-519-02102) Sundance West Cell 1A
Address:	4222 85th Street Lubbock, TX 79423	**Address:**	Eunice, NM
Attention:	Don Gray	**Phase:**	**Task:**
PO Number:		**Manager:**	Roberto Balderrama
Sample Date:	9/19/2018 by Client	**Lab/Ref. #:**	2102-02L
Source:	Onsite stockpile	**Description:**	Field description: Brown fine clean sand ASTM D2487 lab description: Poorly graded sand with silt, Fine grain, No PI

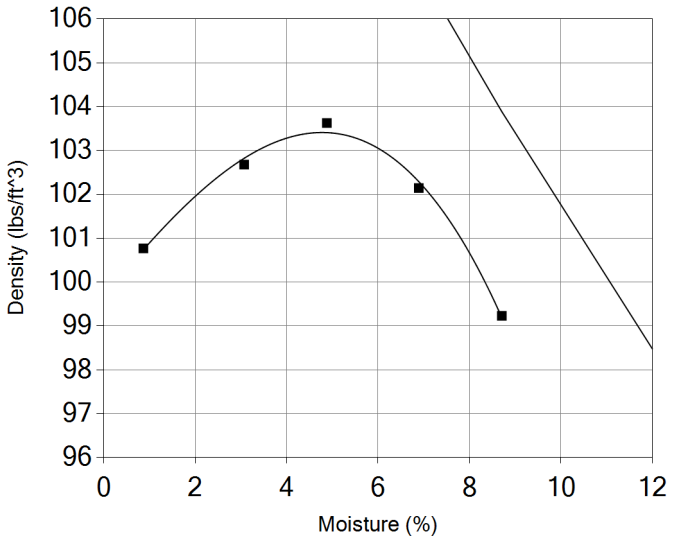
Type of Specification: No project specification was provided.

Sieve Analysis: (ASTM C117-13/C136-14)

200 Wash Procedure: A

Sieve Size	Passing	Specification Min	Specification Max
#4	100%		
#8	100%		
#10	100%		
#16	100%		
#30	100%		
#40	100%		
#50	95%		
#60	87%		
#100	38%		
#200	6.1%		

Fineness Modulus: 0.67



Plasticity Index (ASTM D4318-10) PI Air Dried.

Preparation Method: Dry **Liquid Limit Method:** A

Soil Classification (ASTM D2487-11) SP-SM

		Specification Min	Specification Max
Liquid Limit:	NV		
Plastic Limit:	NV		
Plasticity Index:	NP		

Moisture Density Relationship: (ASTM D698-12) Method: A

Preparation Method: Dry **Rammer Type:** Manual

Specific Gravity: 1.95 Assumed

Maximum Density (lbs/ft^3): 103.4

Optimum Moisture (%): 4.8

Remarks: Material is sandy / non-plastic. Sample slides in bowl; would not roll, flattens.

Distribution: Don Gray

Reviewed By: Roberto Balderrama

This report relates only to the items inspected/tested and shall not be reproduced, except in full, without prior written consent

Amec Foster Wheeler Environment & Infrastructure, Inc. - 1104 Main Street Eunice, NM 88231 phone: (575) 394-0424 fax: (505) 821-7371

Soils / Aggregates

Report Date: September 26, 2018

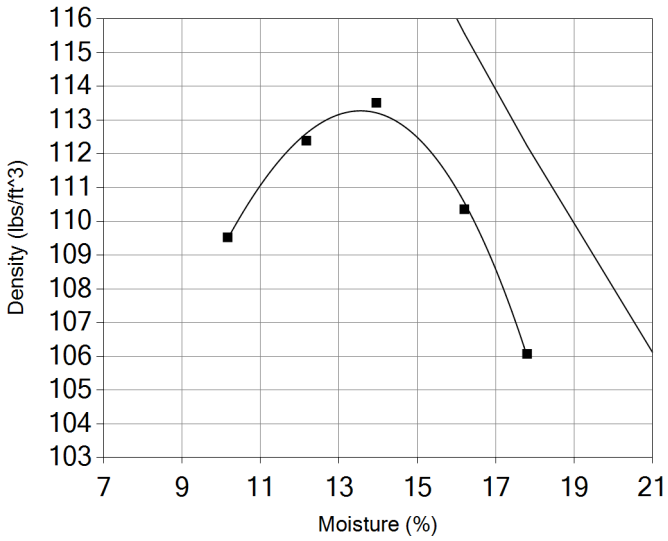
Client		Project	
Name:	ParkHill Smith & Cooper	**Name:**	(18-519-02102) Sundance West Cell 1A
Address:	4222 85th Street Lubbock, TX 79423	**Address:**	Eunice, NM
Attention:	Don Gray	**Phase:**	**Task:**
PO Number:		**Manager:**	Roberto Balderrama
Sample Date:	9/19/2018 by Client	**Lab/Ref. #:**	2102-01L
Source:	Onsite stockpile	**Description:**	Field description: Tan fine silty sand w/ small friable caliche ASTM D2487 lab description: Silty sand, Coarse to Fine grain, No PI

Type of Specification: No project specification was provided.

Sieve Analysis: (ASTM C117-13/C136-14)

200 Wash Procedure: A

Sieve Size	Passing	Specification Min	Specification Max
3/4in.	100%		
1/2in.	99%		
3/8in.	99%		
#4	99%		
#8	98%		
#10	97%		
#16	96%		
#30	94%		
#40	92%		
#50	88%		
#100	53%		
#200	24%		



Plasticity Index (ASTM D4318-10) PI Air Dried.

Preparation Method: Dry **Liquid Limit Method:** A

Soil Classification (ASTM D2487-11) SM

		Specification Min	Specification Max
Liquid Limit:	NV		
Plastic Limit:	NV		
Plasticity Index:	NP		

Moisture Density Relationship: (ASTM D698-12) Method: B

Preparation Method: Dry **Rammer Type:** Manual

Specific Gravity: 2.651 Assumed

Maximum Density (lbs/ft^3): 113.3

Optimum Moisture (%): 13.6

Remarks: Material is sandy / non-plastic. Sample slides in bowl; would not roll, flattens.

Distribution: Don Gray

Reviewed By: Roberto Balderrama

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Amec Foster Wheeler Environment & Infrastructure, Inc. - 1104 Main Street Eunice, NM 88231 phone: (575) 394-0424 fax: (505) 821-7371

Soils / Aggregates

Report Date: September 26, 2018

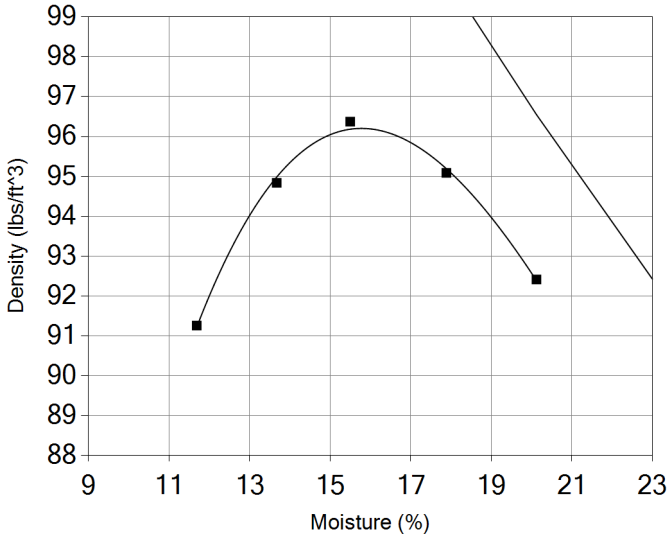
Client		Project	
Name:	ParkHill Smith & Cooper	**Name:**	(18-519-02102) Sundance West Cell 1A
Address:	4222 85th Street Lubbock, TX 79423	**Address:**	Eunice, NM
Attention:	Don Gray	**Phase:**	**Task:**
PO Number:		**Manager:**	Roberto Balderrama
Sample Date:	9/19/2018 by Client	**Lab/Ref. #:**	2102-03L
Source:	Onsite stockpile	**Description:**	Field description: Reddish tan silty sand w/ friable caliche ASTM D2487 lab description: Silty sand, Fine grain, No PI

Type of Specification: No project specification was provided.

Sieve Analysis: (ASTM C117-13/C136-14)

200 Wash Procedure: A

Sieve Size	Passing	Specification Min	Specification Max
1/2in.	100%		
3/8in.	100%		
#4	99%		
#8	89%		
#10	86%		
#16	77%		
#30	68%		
#40	64%		
#50	57%		
#100	34%		
#200	18%		



Plasticity Index (ASTM D4318-10) PI Air Dried.

Preparation Method: Dry **Liquid Limit Method:** A

Soil Classification (ASTM D2487-11) SM

		Specification Min	Specification Max
Liquid Limit:	NV		
Plastic Limit:	NV		
Plasticity Index:	NP		

Moisture Density Relationship: (ASTM D698-12) Method: B

Preparation Method: Dry **Rammer Type:** Mechanical

Specific Gravity: 2.251
Assumed

Maximum Density (lbs/ft^3): 96.2

Optimum Moisture (%): 15.8

Remarks:

Distribution: Don Gray

Reviewed By: Roberto Balderrama

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APPENDIX A

Geotechnical Soil Testing

A.2. Subgrade (Cell 1B Floor) Test Results

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd., Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD COMPACTION TESTING FORM

PROJECT NAME: Cell 1B
OWNER: Sundance West
PROJECT LOCATION: Sundance West

LOCATION: Floor
PROJECT NO.: 01053018
PAGE NO.: 1

TESTING INSTRUMENT: Instrotek 3500

TECHNICIAN: DG

SOIL TYPE	DESCRIPTION	REF STD PROCTOR		90% (PCF)	OPTIMAL MOISTURE
A-psl	Brown fine clean sand	103.4 pcf	90% optimum	93.1	4.8 % Moisture
B	Tan silty sand	113.3 pcf	90% optimum	102.0	13.6 % Moisture
C-14' depth	Reddish tan silty sand w/caliche	96.2 pcf	90% optimum	86.6	15.8 % Moisture
D	**Averages:**	**104.3**		**93.9**	

Soil Type	TEST NUMBER	% RSP	DRY DENSITY (PCF)	% MOISTURE	DATE COMPLETED	NOTES
D	1	96.3%	100.4	8.3	12/20/2019	
D	2	96.0%	100.1	7.5	12/20/2019	
B	3	91.6%	103.8	11.5	12/20/2019	
B	4	99.8%	113.1	7.7	12/20/2019	
B	5	90.0%	102.0	10.3	12/20/2019	
B	6	93.4%	105.8	7.3	12/20/2019	
B	7	95.7%	108.4	8..2	12/20/2019	
B	8	95.9%	108.6	8.3	12/20/2019	
B	9	96.6%	109.4	6.4	12/20/2019	
B	10	97.0%	109.9	9.7	12/20/2019	
B	11	89.6%	101.5	7.5	12/20/2019	
B	12	96.6%	109.5	10.6	12/20/2019	
B	13	92.8%	105.1	5.3	12/20/2019	
B	14	89.6%	101.5	9.2	12/20/2019	
B	15	98.5%	111.6	13.9	12/20/2019	
B	16	93.0%	105.4	9.2	12/20/2019	
B	17	91.5%	103.7	9.5	12/20/2019	
B	18	91.4%	103.6	15.4	12/20/2019	
B	19	96.0%	108.8	7.5	12/20/2019	
B	20	94.1%	106.6	9.2	12/20/2019	
B	21	90.6%	102.6	13.4	12/20/2019	
B	22	100.4%	113.8	6.9	12/20/2019	
B	23	94.5%	107.1	6.5	12/20/2019	
D	24	95.9%	100.0	12.6	12/20/2019	

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Rio Rancho, New Mexico 87124
505.867.6990

FIELD COMPACTION TESTING FORM

PROJECT NAME: Cell 1B
OWNER: Sundance West
PROJECT LOCATION: Sundance West
LOCATION: North Sidewall
PROJECT NO.: 01053018
PAGE NO.: 2

TESTING INSTRUMENT: Instrotek 3500
TECHNICIAN: DG

SOIL TYPE	DESCRIPTION	REF STD PROCTOR		90% (PCF)	OPTIMAL MOISTURE
A-psl	Brown fine clean sand	103.4 pcf	90% optimum	93.1	4.8 % Moisture
B	Tan silty sand	113.3 pcf	90% optimum	102.0	13.6 % Moisture
C-14' depth	Reddish tan silty sand w/caliche	96.2 pcf	90% optimum	86.6	15.8 % Moisture
D	**Averages:**	**104.3**		**93.9**	

Soil Type	TEST NUMBER	% RSP	DRY DENSITY (PCF)	% MOISTURE	DATE COMPLETED	NOTES
B	1B	100.3%	113.6	8.7	1/3/2019	
B	2B	100.4%	113.7	10.0	1/3/2019	
B	3B	95.0%	107.6	8.7	1/3/2019	
B	4B	90.0%	102.0	5.9	1/3/2019	

APPENDIX A

Geotechnical Soil Testing

A.3. Berm Density Testing Results

333 Rio Rancho Blvd., Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD COMPACTION TESTING FORM

PROJECT NAME: Cell 1A
OWNER: Sundance West
PROJECT LOCATION: Sundance West

LOCATION: Berm
PROJECT NO.: 01053018
PAGE NO.: 1

TESTING INSTRUMENT: Instrotek 3500

TECHNICIAN: DG

SOIL TYPE	DESCRIPTION	REF STD PROCTOR		90% (PCF)	OPTIMAL MOISTURE
A-psl	Brown fine clean sand	103.4 pcf	90% optimum	93.1	4.8 % Moisture
B	Tan silty sand	113.3 pcf	90% optimum	102.0	13.6 % Moisture
C-14' depth	Reddish tan silty sand w/caliche	96.2 pcf	90% optimum	86.6	15.8 % Moisture
D	**Averages:**	**104.3**		**93.9**	

Soil Type	TEST NUMBER	% RSP	DRY DENSITY (PCF)	% MOISTURE	DATE COMPLETED	NOTES
B	S1-1	90%	102.2	5.3	9/27/2018	
B	S1-2	99%	112.5	8.1	9/27/2018	
D	S1-3	96%	100.4	3.9	9/27/2018	
B	S1-4	94%	106.9	3.4	9/27/2018	
B	S1-5	89%	100.8	1.7	9/27/2018	
B	S1-6	93%	105.4	5.6	9/27/2018	
B	E1-1	95%	107.2	6.6	9/27/2018	
B	E1-2	99%	112.1	6.2	9/27/2018	
B	E1-3	95%	107.8	5.7	9/27/2018	
B	E1-4	97%	110.2	13.2	9/27/2018	
B	E1-5	98%	110.6	5.6	9/27/2018	
B	E1-6	96%	109.0	9.9	9/27/2018	
D	E1-2	95%	99.0	8.2	10/2/2018	
B	E2-2	91%	102.7	6.3	10/2/2018	
B	E3-2	96%	108.5	10.8	10/2/2018	
D	E4-2	95%	99.6	9.1	10/2/2018	
B	E5-2	91%	102.7	4.6	10/2/2018	
D	E6-2	96%	100.0	5.9	10/2/2018	
B	S1-2	99%	112.1	5.9	10/3/2018	
B	S2-2	97%	110.0	4.6	10/3/2018	
D	S3-2	97%	100.7	5.5	10/3/2018	
D	S4-2	96%	100.5	4.9	10/3/2018	
B	S5-2	90%	102.0	5.0	10/3/2018	
B	S6-2	90%	101.7	4.5	10/3/2018	
B	E1-3	92%	104.2	6.2	10/3/2018	
B	E2-3	94%	106.5	5.7	10/3/2018	
B	E3-3	89%	100.6	6.3	10/3/2018	
B	E4-3	90%	102.2	5.3	10/3/2018	
D	E5-3	97%	101.0	6.3	10/3/2018	
D	E6-3	97%	101.4	4.1	10/3/2018	
B	E1-4	94%	106.9	7.0	10/3/2018	
B	E2-4	95%	107.5	4.4	10/3/2018	
B	E3-4	92%	103.9	5.5	10/3/2018	
B	E4-4	92%	104.0	4.9	10/3/2018	

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FIELD COMPACTION TESTING FORM

PROJECT NAME: Cell 1A
OWNER: Sundance West
PROJECT LOCATION: Sundance West

LOCATION: Berm
PROJECT NO.: 01053018
PAGE NO.: 2

TESTING INSTRUMENT: Instrotek 3500

TECHNICIAN: DG

SOIL TYPE	DESCRIPTION	REF STD PROCTOR		90% (PCF)	OPTIMAL MOISTURE
A-psl	Brown fine clean sand	103.4 pcf	90% optimum	93.1	4.8 % Moisture
B	Tan silty sand	113.3 pcf	90% optimum	102.0	13.6 % Moisture
C-14' depth	Reddish tan silty sand w/caliche	96.2 pcf	90% optimum	86.6	15.8 % Moisture
D	**Averages:**	**104.3**		**93.9**	

Soil Type	TEST NUMBER	% RSP	DRY DENSITY (PCF)	% MOISTURE	DATE COMPLETED	NOTES
B	E5-4	91%	103.0	3.6		
D	E5-4	97%	101.4	5.2		
D	E1-5	94%	98.1	4.1		
B	E2-5	94%	106.4	9.2		
B	E3-5	97%	109.4	7.0		
B	E4-5	90%	102.4	7.7		
B	E5-5	91%	103.1	5.1		
D	E6-5	96%	100.0	4.7		
D	E1-6	96%	100.2	3.8		
B	E2-6	95%	107.6	8.8		
B	E3-6	91%	103.3	7.0		
B	E4-6	95%	107.4	7.2		
B	E5-6	90%	101.6	5.1		
B	E6-6	90%	101.8	4.8		
B	S1-3	93%	105.9	6.5		
D	S2-3	96%	100.3	5.5		
B	S3-3	90%	102.1	4.4		
B	S4-3	91%	102.6	3.8		
B	S5-3	92%	104.1	5.3		
D	S6-3	95%	99.6	4.2		
B	N1-1	94%	106.8	5.2		
B	N1-2	92%	104.5	5.8		
B	N1-3	95%	107.6	5.9		
B	N1-4	90%	102.4	5.8		
B	N1-5	95%	107.5	4.4		
B	N1-6	90%	101.8	4.0		
B	S1-4	96%	108.8	6.4		
D	S2-4	95%	98.8	5.9		
B	S3-4	88%	99.7	5.3		
B	S4-4	92%	104.4	3.7		
B	S5-4	92%	103.8	5.6		
B	S6-4	91%	102.7	3.5		

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Rio Rancho, New Mexico 87124
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FIELD COMPACTION TESTING FORM

PROJECT NAME: Cell 1A
OWNER: Sundance West
PROJECT LOCATION: Sundance West

LOCATION: Berm
PROJECT NO.: 01053018
PAGE NO.: 3

TESTING INSTRUMENT: Instrotek 3500

TECHNICIAN: DG

SOIL TYPE	DESCRIPTION	REF STD PROCTOR		90% (PCF)	OPTIMAL MOISTURE
A-psl	Brown fine clean sand	103.4 pcf	90% optimum	93.1	4.8 % Moisture
B	Tan silty sand	113.3 pcf	90% optimum	102.0	13.6 % Moisture
C-14' depth	Reddish tan silty sand w/caliche	96.2 pcf	90% optimum	86.6	15.8 % Moisture
D	**Averages:**	**104.3**		**93.9**	

Soil Type	TEST NUMBER	% RSP	DRY DENSITY (PCF)	% MOISTURE	DATE COMPLETED	NOTES
B	N1-2	90%	101.8	3.6	10/9/2018	
B	N2-2	92%	104.7	3.9	10/9/2018	
B	N3-2	92%	104.5	5.8	10/9/2018	
D	N4-2	96%	100.0	3.5	10/9/2018	
B	N5-2	91%	103.6	4.5	10/9/2018	
B	N6-2	96%	108.6	5.6	10/9/2018	
B	E1-7	98%	111.4	6.5	10/10/2018	
B	E2-7	96%	108.8	7.6	10/10/2018	
B	E3-7	93%	105.7	4.4	10/10/2018	
B	E4-7	95%	107.9	5.8	10/10/2018	
B	E5-7	93%	105.4	4.9	10/10/2018	
B	E6-7	97%	109.7	3.8	10/10/2018	
B	S1-5	94%	106.4	3.9	10/10/2018	
B	S2-5	93%	105.5	2.8	10/10/2018	
B	S3-5	93%	105.0	3.2	10/10/2018	
B	S4-5	94%	106.3	4.8	10/10/2018	
B	S5-5	91%	102.8	15.4	10/15/2018	
D	S6-5	96%	100.2	12.2	10/15/2018	
B	S1-6	92%	104.5	15.3	10/15/2018	
B	S2-6	93%	104.9	13.4	10/15/2018	
B	S3-6	96%	108.7	13.9	10/15/2018	
B	S4-6	98%	110.6	10.9	10/15/2018	
B	S5-6	90%	101.9	13.6	10/15/2018	
B	S6-6	90%	101.9	13.8	10/15/2018	
D	E1-8	96%	100.0	12.8	10/15/2018	
D	E2-8	95%	99.5	14.6	10/15/2018	
B	E3-8	95%	107.8	15.2	10/15/2018	
B	E4-8	94%	107.0	14.4	10/15/2018	
B	E5-8	98%	110.6	9.1	10/15/2018	
B	E6-8	96%	108.3	9.9	10/15/2018	

333 Rio Rancho Blvd., Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD COMPACTION TESTING FORM

PROJECT NAME: Cell 1A
OWNER: Sundance West
PROJECT LOCATION: Sundance West

LOCATION: Berm
PROJECT NO.: 01053018
PAGE NO.: 4

TESTING INSTRUMENT: Instrotek 3500

TECHNICIAN: DG

SOIL TYPE	DESCRIPTION	REF STD PROCTOR		90% (PCF)	OPTIMAL MOISTURE
A-psl	Brown fine clean sand	103.4 pcf	90% optimum	93.1	4.8 % Moisture
B	Tan silty sand	113.3 pcf	90% optimum	102.0	13.6 % Moisture
C-14' depth	Reddish tan silty sand w/caliche	96.2 pcf	90% optimum	86.6	15.8 % Moisture
D	**Averages:**	**104.3**		**93.9**	

Soil Type	TEST NUMBER	% RSP	DRY DENSITY (PCF)	% MOISTURE	DATE COMPLETED	NOTES
D	N1-3	96%	100.1	10.0	10/16/2018	
D	N2-3	96%	100.5	9.8	10/16/2018	
B	N3-3	90%	101.7	9.1	10/16/2018	
B	N4-3	91%	102.9	9.9	10/16/2018	
B	N5-3	92%	104.3	10.8	10/16/2018	
B	N6-3	90%	102.0	11.9	10/16/2018	
B	N1-4	95%	107.7	10.3	10/16/2018	
B	N2-4	91%	102.6	15.1	10/16/2018	
B	N3-4	92%	104.4	3.9	10/16/2018	
B	N4-4	91%	102.6	10.6	10/16/2018	
B	N5-4	91%	103.1	13.1	10/16/2018	
B	N6-4	90%	102.5	11.5	10/16/2018	
B	E1-9	96%	108.8	8.8	10/16/2018	
B	E2-9	99%	112.0	14.5	10/16/2018	
B	E3-9	92%	104.4	10.7	10/16/2018	
B	E4-9	99%	112.1	8.8	10/16/2018	
B	E5-9	91%	103.5	5.5	10/16/2018	
D	E6-9	96%	100.0	11.0	10/16/2018	
B	E1-10	98%	111.3	8.6	10/16/2018	
B	E2-10	99%	112.0	14.5	10/16/2018	
B	E3-10	97%	110.1	9.8	10/16/2018	
B	E4-10	99%	112.6	8.5	10/16/2018	
B	E5-10	92%	103.9	5.5	10/16/2018	
D	E6-10	95%	99.0	12.8	10/16/2018	
B	S1-7	98%	111.2	8.5	10/16/2018	
B	S2-7	99%	112.5	3.1	10/16/2018	
B	S3-7	98%	111.1	7.3	10/16/2018	
B	S4-7	98%	110.9	7.8	10/16/2018	
B	S5-7	98%	110.7	6.5	10/16/2018	
B	S6-7	92%	104.4	3.2	10/16/2018	

333 Rio Rancho Blvd., Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD COMPACTION TESTING FORM

PROJECT NAME: Cell 1A
OWNER: Sundance West
PROJECT LOCATION: Sundance West

LOCATION: Berm
PROJECT NO.: 01053018
PAGE NO.: 5

TESTING INSTRUMENT: Instrotek 3500

TECHNICIAN: DG

SOIL TYPE	DESCRIPTION	REF STD PROCTOR		90% (PCF)	OPTIMAL MOISTURE
A-psl	Brown fine clean sand	103.4 pcf	90% optimum	93.1	4.8 % Moisture
B	Tan silty sand	113.3 pcf	90% optimum	102.0	13.6 % Moisture
C-14' depth	Reddish tan silty sand w/caliche	96.2 pcf	90% optimum	86.6	15.8 % Moisture
D	**Averages:**	**104.3**		**93.9**	

Soil Type	TEST NUMBER	% RSP	DRY DENSITY (PCF)	% MOISTURE	DATE COMPLETED	NOTES
D	S1-8	97%	101.2	6.1	10/16/2018	
B	S2-8	93%	105.1	2.7	10/16/2018	
B	S3-8	97%	110.0	7.1	10/16/2018	
B	S4-8	99%	111.8	8.1	10/16/2018	
B	S5-8	98%	111.3	6.2	10/16/2018	
D	S6-8	97%	101.2	3.4	10/16/2018	
B	N1-5	90%	102.2	5.1	10/17/2018	
B	N2-5	90%	102.1	8.6	10/17/2018	
B	N3-5	93%	105.1	8.5	10/17/2018	
B	N4-5	94%	106.3	4.1	10/17/2018	
B	N5-5	96%	108.3	4.7	10/17/2018	
B	N6-5	97%	110.3	6.7	10/17/2018	
B	S1-9	96%	108.4	7.0	10/17/2018	
B	S2-9	99%	112.0	8.5	10/17/2018	
B	S3-9	94%	106.4	12.3	10/17/2018	
D	S4-9	95%	99.1	9.4	10/17/2018	Mostly Caliche
D	S5-9	95%	99.4	9.9	10/17/2018	Mostly Caliche
D	S6-9	95%	98.7	9.3	10/17/2018	Mostly Caliche
B	N1-6	98%	110.5	4.8	10/17/2018	
B	N2-6	97%	109.6	7.3	10/17/2018	
B	N3-6	90%	102.5	8.8	10/17/2018	
B	N4-6	99%	112.4	9.0	10/17/2018	
B	N5-6	92%	104.1	8.3	10/17/2018	
B	N6-6	90%	102.3	5.8	10/17/2018	
B	N1-7	94%	106.2	18.0	10/23/2018	
D	N2-7	93%	97.0	12.5	10/23/2018	Caliche/Clay
B	N3-7	91%	103.4	13.0	10/23/2018	
B	N4-7	91%	103.6	13.8	10/23/2018	
B	N5-7	91%	103.2	13.3	10/23/2018	
B	N6-7	90%	101.8	14.4	10/23/2018	

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FIELD COMPACTION TESTING FORM

PROJECT NAME: Cell 1A
OWNER: Sundance West
PROJECT LOCATION: Sundance West

LOCATION: Berm
PROJECT NO.: 01053018
PAGE NO.: 6

TESTING INSTRUMENT: Instrotek 3500

TECHNICIAN: DG

SOIL TYPE	DESCRIPTION	REF STD PROCTOR		90% (PCF)	OPTIMAL MOISTURE
A-psl	Brown fine clean sand	103.4 pcf	90% optimum	93.1	4.8 % Moisture
B	Tan silty sand	113.3 pcf	90% optimum	102.0	13.6 % Moisture
C-14' depth	Reddish tan silty sand w/caliche	96.2 pcf	90% optimum	86.6	15.8 % Moisture
D	**Averages:**	**104.3**		**93.9**	

Soil Type	TEST NUMBER	% RSP	DRY DENSITY (PCF)	% MOISTURE	DATE COMPLETED	NOTES
B	N1-8	97%	109.7	17.6	10/23/2018	
B	N2-8	91%	102.6	13.2	10/23/2018	
B	N3-8	92%	103.9	12.5	10/23/2018	
B	N4-8	92%	104.7	13.3	10/23/2018	
B	N5-8	92%	104.1	13.3	10/23/2018	
B	N6-8	95%	107.3	12.9	10/23/2018	
B	N1-9	98%	111.5	13.9	10/30/2018	
B	N2-9	92%	104.3	12.6	10/30/2018	
B	N3-9	99%	112.6	10.2	10/30/2018	
D	N4-9	93%	97.0	10.4	10/30/2018	
B	N5-9	99%	111.8	14.4	10/30/2018	
B	N6-9	94%	106.4	6.3	10/30/2018	
B	N1-10	99%	112.5	13.7	10/30/2018	
B	N2-10	94%	106.7	13.2	10/30/2018	
B	N3-10	98%	111.6	10.6	10/30/2018	
D	N4-10	92%	96.1	11.2	10/30/2018	
B	N5-10	99%	112.3	13.7	10/30/2018	
B	N6-10	97%	109.5	7.1	10/30/2018	
B	N7-1	99%	112.5	12.0	10/31/2018	Subgrade
D	N8-1	97%	101.2	8.8	10/31/2018	Subgrade
B	N9-1	94%	106.4	4.2	10/31/2018	Subgrade
B	N10-1	92%	104.1	11.3	11/9/2018	Subgrade
D	N11-1	94%	98.4	8.5	11/9/2018	Subgrade
D	N12-1	93%	96.7	9.4	11/9/2018	Subgrade
D	W1-1	94%	98.0	11.6	11/9/2018	Subgrade
B	W2-1	90%	101.7	3.3	10/31/2018	Subgrade
B	W3-1	90%	102.1	4.9	10/31/2018	Subgrade
B	W4-1	96%	109.2	12.1	10/31/2018	Subgrade
B	W5-1	94%	107.0	5.8	10/31/2018	Subgrade
D	W6-1	94%	98.0	3.5	10/31/2018	Subgrade

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FIELD COMPACTION TESTING FORM

PROJECT NAME: Cell 1A
OWNER: Sundance West
PROJECT LOCATION: Sundance West

LOCATION: Berm
PROJECT NO.: 01053018
PAGE NO.: 7

TESTING INSTRUMENT: Instrotek 3500

TECHNICIAN: DG

SOIL TYPE	DESCRIPTION	REF STD PROCTOR		90% (PCF)	OPTIMAL MOISTURE
A-psl	Brown fine clean sand	103.4 pcf	90% optimum	93.1	4.8 % Moisture
B	Tan silty sand	113.3 pcf	90% optimum	102.0	13.6 % Moisture
C-14' depth	Reddish tan silty sand w/caliche	96.2 pcf	90% optimum	86.6	15.8 % Moisture
D	**Averages:**	**104.3**		**93.9**	

Soil Type	TEST NUMBER	% RSP	DRY DENSITY (PCF)	% MOISTURE	DATE COMPLETED	NOTES
B	N7-2	99%	112.1	10.3	11/1/2018	
D	N8-2	94%	98.0	7.8	11/1/2018	Clay/Sand w/light caliche
D	N9-2	91%	95.4	9.9	11/1/2018	Clay/Sand w/light caliche
D	N10-2	96%	100.1	8.6	11/5/2018	
D	N11-2	97%	101.0	13.7	11/5/2018	
D	N12-2	94%	98.5	7.5	11/5/2018	
B	N1-11	92%	104.1	8.6	11/1/2018	
B	N2-11	95%	107.7	7.4	11/1/2018	
B	N3-11	90%	102.2	5.7	11/1/2018	
D	N4-11	97%	100.7	9.7	11/1/2018	
B	N5-11	91%	102.8	6.4	11/1/2018	
D	N6-11	96%	100.2	11.2	11/1/2018	
D	S7-1	97%	100.9	13.5	11/20/2018	Basegrade
B	S8-1	90%	101.5	9.4	11/20/2018	Basegrade
B	S9-1	93%	105.0	6.4	11/20/2018	Basegrade
B	S10-1	90%	101.6	6.1	11/5/2018	Basegrade
B	S11-1	94%	106.3	2.4	11/5/2018	Basegrade
B	S12-1	95%	107.6	6.3	11/5/2018	Basegrade
B	N7-3	92%	104.2	8.6	11/13/2018	
B	N8-3	91%	102.7	5.7	11/13/2018	
D	N9-3	97%	101.4	6.2	11/13/2018	
B	N10-3	96%	108.8	8.1	11/13/2018	
B	N11-3	94%	107.0	4.7	11/13/2018	
B	N12-3	91%	103.4	4.6	11/13/2018	
B	W1-1	90%	101.6	7.8	11/7/2018	
B	W2-1	91%	103.4	8.6	11/7/2018	
B	W3-1	90%	102.0	7.4	11/7/2018	
B	W4-1	96%	108.8	7.5	11/7/2018	
D	W5-1	96%	100.4	8.7	11/7/2018	
D	W6-1	96%	100.0	9.6	11/7/2018	

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FIELD COMPACTION TESTING FORM

PROJECT NAME: Cell 1A
OWNER: Sundance West
PROJECT LOCATION: Sundance West

LOCATION: Berm
PROJECT NO.: 01053018
PAGE NO.: 8

TESTING INSTRUMENT: Instrotek 3500

TECHNICIAN: DG

SOIL TYPE	DESCRIPTION	REF STD PROCTOR		90% (PCF)	OPTIMAL MOISTURE
A-psl	Brown fine clean sand	103.4 pcf	90% optimum	93.1	4.8 % Moisture
B	Tan silty sand	113.3 pcf	90% optimum	102.0	13.6 % Moisture
C-14' depth	Reddish tan silty sand w/caliche	96.2 pcf	90% optimum	86.6	15.8 % Moisture
D	**Averages:**	**104.3**		**93.9**	

Soil Type	TEST NUMBER	% RSP	DRY DENSITY (PCF)	% MOISTURE	DATE COMPLETED	NOTES
D	W1-3	97%	100.9	11.4	11/13/2018	
B	W2-3	91%	103.5	6.9	11/13/2018	
B	W3-3	91%	103.5	8.8	11/13/2018	
B	W4-3	92%	104.8	8.7	11/13/2018	
B	W5-3	92%	104.6	6.1	11/13/2018	
D	W6-3	97%	101.3	6.6	11/13/2018	
B	W1-4	92%	104.6	7.2	11/13/2018	
B	W2-4	96%	108.9	5.9	11/13/2018	
B	W3-4	91%	102.8	5.9	11/13/2018	
B	W4-4	95%	108.2	9.1	11/20/2018	
B	W5-4	95%	107.7	6.3	11/20/2018	
B	W6-4	92%	104.6	8.8	11/20/2018	
B	W1-5	94%	106.6	7.1	11/13/2018	
B	W2-5	96%	108.9	5.6	11/13/2018	
B	W3-5	91%	102.8	6.2	11/13/2018	
B	W4-5	94%	106.9	9.0	11/20/2018	
D	W5-5	97%	101.2	11.3	11/20/2018	
B	W6-5	91%	103.5	9.9	11/20/2018	
D	S7-2	96%	100.0	13.1	11/20/2018	
B	S8-2	93%	105.9	9.0	11/20/2018	
B	S9-2	90%	101.5	7.0	11/20/2018	
B	S10-2	93%	104.9	9.1	11/15/2018	
D	S11-2	97%	100.9	9.1	11/15/2018	
B	S12-2	90%	102.2	7.3	11/15/2018	
B	S7-3	94%	106.6	8.2	11/26/2018	
B	S8-3	99%	111.8	4.1	11/26/2018	
D	S9-3	97%	100.8	6.4	11/26/2018	
B	S10-3	91%	103.5	9.2	11/15/2018	
D	S11-3	97%	101.4	8.8	11/15/2018	
D	S12-3	97%	100.8	7.9	11/15/2018	

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FIELD COMPACTION TESTING FORM

PROJECT NAME: Cell 1A
OWNER: Sundance West
PROJECT LOCATION: Sundance West

LOCATION: Berm
PROJECT NO.: 01053018
PAGE NO.: 9

TESTING INSTRUMENT: Instrotek 3500

TECHNICIAN: DG

SOIL TYPE	DESCRIPTION	REF STD PROCTOR		90% (PCF)	OPTIMAL MOISTURE
A-psl	Brown fine clean sand	103.4 pcf	90% optimum	93.1	4.8 % Moisture
B	Tan silty sand	113.3 pcf	90% optimum	102.0	13.6 % Moisture
C-14' depth	Reddish tan silty sand w/caliche	96.2 pcf	90% optimum	86.6	15.8 % Moisture
D	**Averages:**	**104.3**		**93.9**	

Soil Type	TEST NUMBER	% RSP	DRY DENSITY (PCF)	% MOISTURE	DATE COMPLETED	NOTES
B	N7-4	90%	101.5	7.0	11/20/2018	
B	N8-4	95%	107.5	7.5	11/20/2018	
B	N9-4	93%	105.6	4.5	11/20/2018	
B	N10-4	96%	108.5	10.4	11/20/2018	
B	N11-4	94%	106.2	9.1	11/20/2018	
B	N12-4	90%	102.5	8.0	11/20/2018	
B	N7-5	91%	103.1	6.9	11/20/2018	
B	N8-5	95%	107.8	6.9	11/20/2018	
B	N9-5	91%	103.2	4.6	11/20/2018	
B	N10-5	95%	107.9	9.6	11/20/2018	
B	N11-5	93%	105.2	9.5	11/20/2018	
B	N12-5	92%	104.3	7.0	11/20/2018	
B	S7-4	97%	110.0	8.0	11/26/2018	
B	S8-4	96%	108.9	4.6	11/26/2018	
B	S9-4	95%	107.2	6.7	11/26/2018	
D	S10-4	97%	101.3	10.9	11/20/2018	
B	S11-4	92%	104.1	8.4	11/20/2018	
B	S12-4	90%	101.8	10.8	11/20/2018	
D	S7-5	96%	100.0	16.2	11/27/2018	
B	S8-5	97%	109.4	10.3	11/27/2018	
B	S9-5	92%	104.7	9.5	11/27/2018	
B	S10-5	91%	103.6	10.2	11/20/2018	
B	S11-5	93%	105.7	9.0	11/20/2018	
B	S12-5	92%	104.0	10.4	11/20/2018	
B	W1-6	96%	108.5	8.6	11/20/2018	
B	W2-6	94%	106.1	6.3	11/20/2018	
B	W3-6	94%	106.7	8.2	11/20/2018	
B	W4-6	97%	109.4	9.1	11/20/2018	
B	W5-6	95%	108.2	8.8	11/20/2018	
B	W6-6	95%	107.7	9.9	11/20/2018	

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FIELD COMPACTION TESTING FORM

PROJECT NAME: Cell 1A
OWNER: Sundance West
PROJECT LOCATION: Sundance West
LOCATION: Berm
PROJECT NO.: 01053018
PAGE NO.: 10

TESTING INSTRUMENT: Instrotek 3500
TECHNICIAN: DG

SOIL TYPE	DESCRIPTION	REF STD PROCTOR		90% (PCF)	OPTIMAL MOISTURE
A-psl	Brown fine clean sand	103.4 pcf	90% optimum	93.1	4.8 % Moisture
B	Tan silty sand	113.3 pcf	90% optimum	102.0	13.6 % Moisture
C-14' depth	Reddish tan silty sand w/caliche	96.2 pcf	90% optimum	86.6	15.8 % Moisture
D	**Averages:**	**104.3**		**93.9**	

Soil Type	TEST NUMBER	% RSP	DRY DENSITY (PCF)	% MOISTURE	DATE COMPLETED	NOTES
D	S7-6	97%	101.3	16.0	11/27/2018	
B	S8-6	95%	107.9	9.3	11/27/2018	
B	S9-6	92%	104.5	9.3	11/27/2018	
B	S10-6	91%	102.8	4.5	11/26/2018	
B	S11-6	93%	105.9	9.8	11/26/2018	
D	S12-6	97%	100.8	7.1	11/26/2018	
B	S7-7	91%	102.6	9.1	11/28/2018	
B	S8-7	92%	104.8	8.3	11/28/2018	
B	S9-7	91%	103.0	7.0	11/28/2018	
B	S10-7	91%	102.7	4.3	11/26/2018	
B	S11-7	91%	103.4	9.9	11/26/2018	
D	S12-7	95%	98.6	7.7	11/26/2018	
D	W1-7	97%	101.3	12.5	11/27/2018	
B	W2-7	94%	106.1	14.5	11/27/2018	
B	W3-7	96%	108.3	6.0	11/27/2018	
B	W4-7	95%	107.7	8.8	11/27/2018	
B	W5-7	88%	100.2	12.2	11/27/2018	
B	W6-7	93%	105.3	6.9	11/27/2018	
B	W1-8	93%	105.1	14.0	11/27/2018	
B	W2-8	90%	102.1	12.6	11/27/2018	
B	W3-8	90%	102.2	6.1	11/27/2018	
B	W4-8	95%	108.2	8.7	11/27/2018	
B	W5-8	91%	102.8	11.8	11/27/2018	
D	W6-8	96%	100.4	7.0	11/27/2018	
B	N7-6	95%	107.6	7.3	11/26/2018	
B	N8-6	93%	105.3	6.6	11/26/2018	
B	N9-6	96%	109.3	5.2	11/26/2018	
B	N10-6	96%	108.3	5.6	11/26/2018	
B	N11-6	92%	104.5	4.6	11/26/2018	
B	N12-6	90%	101.5	4.7	11/26/2018	

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FIELD COMPACTION TESTING FORM

PROJECT NAME: Cell 1A
OWNER: Sundance West
PROJECT LOCATION: Sundance West

LOCATION: Berm
PROJECT NO.: 01053018
PAGE NO.: 11

TESTING INSTRUMENT: Instrotek 3500

TECHNICIAN: DG

SOIL TYPE	DESCRIPTION	REF STD PROCTOR		90% (PCF)	OPTIMAL MOISTURE
A-psl	Brown fine clean sand	103.4 pcf	90% optimum	93.1	4.8 % Moisture
B	Tan silty sand	113.3 pcf	90% optimum	102.0	13.6 % Moisture
C-14' depth	Reddish tan silty sand w/caliche	96.2 pcf	90% optimum	86.6	15.8 % Moisture
D	**Averages:**	**104.3**		**93.9**	

Soil Type	TEST NUMBER	% RSP	DRY DENSITY (PCF)	% MOISTURE	DATE COMPLETED	NOTES
B	N7-7	97%	109.8	7.2	11/26/2018	
B	N8-7	91%	103.6	6.7	11/26/2018	
B	N9-7	99%	111.9	5.0	11/26/2018	
B	N10-7	92%	104.8	5.8	11/26/2018	
D	N11-7	96%	100.0	4.8	11/26/2018	
D	N12-7	95%	98.6	4.8	11/26/2018	
B	N7-8	90%	102.0	4.1	11/26/2018	
B	N8-8	93%	105.8	3.8	11/26/2018	
B	N9-8	92%	104.7	5.5	11/26/2018	
D	N10-8	97%	100.7	5.1	11/26/2018	
B	N11-8	90%	102.3	4.2	11/26/2018	
B	N12-8	91%	103.5	5.3	11/26/2018	
B	S7-8	93%	105.1	8.9	11/29/2018	
B	S8-8	93%	105.1	7.6	11/29/2018	
D	S9-8	96%	100.1	4.7	11/29/2018	
D	S10-8	96%	100.1	3.9	11/26/2018	
D	S11-8	96%	100.2	4.2	11/26/2018	
B	S12-8	94%	106.3	5.3	11/26/2018	
D	S7-9	96%	100.1	8.2	11/30/2018	
B	S8-9	90%	102.5	6.3	11/30/2018	
B	S9-9	91%	102.7	7.2	11/30/2018	
B	S10-9	91%	103.5	9.9	11/27/2018	
B	S11-9	90%	102.5	13.5	11/27/2018	
D	S12-9	96%	100.5	14.6	11/27/2018	
B	N7-9	90%	102.2	10.5	11/27/2018	
D	N8-9	97%	100.7	5.4	11/27/2018	
D	N9-9	97%	100.7	12.3	11/27/2018	
B	N10-9	90%	101.5	5.8	11/27/2018	
B	N11-9	94%	106.1	9.8	11/27/2018	
B	N12-9	92%	104.2	8.2	11/27/2018	

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Rio Rancho, New Mexico 87124
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FIELD COMPACTION TESTING FORM

PROJECT NAME: Cell 1A
OWNER: Sundance West
PROJECT LOCATION: Sundance West

LOCATION: Berm
PROJECT NO.: 01053018
PAGE NO.: 12

TESTING INSTRUMENT: Instrotek 3500

TECHNICIAN: DG

SOIL TYPE	DESCRIPTION	REF STD PROCTOR		90% (PCF)	OPTIMAL MOISTURE
A-psl	Brown fine clean sand	103.4 pcf	90% optimum	93.1	4.8 % Moisture
B	Tan silty sand	113.3 pcf	90% optimum	102.0	13.6 % Moisture
C-14' depth	Reddish tan silty sand w/caliche	96.2 pcf	90% optimum	86.6	15.8 % Moisture
D	**Averages:**	**104.3**		**93.9**	

Soil Type	TEST NUMBER	% RSP	DRY DENSITY (PCF)	% MOISTURE	DATE COMPLETED	NOTES
B	W1-9	91%	103.5	7.9	11/28/2018	
D	W2-9	97%	100.8	9.8	11/28/2018	
B	W3-9	91%	102.7	7.6	11/28/2018	
D	W4-9	97%	100.9	8.9	11/28/2018	
B	W5-9	91%	102.7	8.0	11/28/2018	
D	W6-9	96%	100.5	11.4	11/28/2018	
B	W1-10	92%	104.3	8.7	11/28/2018	
B	W2-10	90%	102.1	10.2	11/28/2018	
D	W3-10	96%	100.1	8.9	11/28/2018	
D	W4-10	97%	101.1	7.4	11/28/2018	
B	W5-10	94%	106.0	7.6	11/28/2018	
D	W6-10	96%	100.2	9.9	11/28/2018	
B	S7-10	90%	102.5	6.8	12/5/2018	
B	S8-10	93%	105.5	8.8	12/5/2018	
B	S9-10	91%	103.5	6.6	12/5/2018	
D	S10-10	97%	101.2	8.8	11/28/2018	
B	S11-10	90%	101.9	11.4	11/28/2018	
B	S12-10	90%	101.7	10.1	11/28/2018	
B	N7-10	97%	109.4	6.2	11/30/2018	
B	N8-10	93%	105.7	7.7	11/30/2018	
B	N9-10	93%	105.2	7.9	11/30/2018	
B	N10-10	99%	111.7	5.4	11/30/2018	
B	N11-10	95%	107.7	4.8	11/30/2018	
B	N12-10	96%	108.9	6.2	11/30/2018	
D	N7-11	96%	100.2	9.1	12/3/2018	
B	N8-11	93%	105.4	7.8	12/3/2018	
D	N9-11	97%	101.3	5.2	12/3/2018	
D	N10-11	96%	100.6	8.5	12/3/2018	
B	N11-11	91%	102.7	7.9	12/3/2018	
B	N12-11	93%	105.2	7.5	12/3/2018	

333 Rio Rancho Blvd., Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FIELD COMPACTION TESTING FORM

PROJECT NAME: Cell 1A
OWNER: Sundance West
PROJECT LOCATION: Sundance West

LOCATION: Berm/Anchor Trench
PROJECT NO.: 01053018
PAGE NO.: 13

TESTING INSTRUMENT: Instrotek 3500

TECHNICIAN: DG

SOIL TYPE	DESCRIPTION	REF STD PROCTOR		90% (PCF)	OPTIMAL MOISTURE
A-psl	Brown fine clean sand	103.4 pcf	90% optimum	93.1	4.8 % Moisture
B	Tan silty sand	113.3 pcf	90% optimum	102.0	13.6 % Moisture
C-14' depth	Reddish tan silty sand w/caliche	96.2 pcf	90% optimum	86.6	15.8 % Moisture
D	**Averages:**	**104.3**		**93.9**	

Soil Type	TEST NUMBER	% RSP	DRY DENSITY (PCF)	% MOISTURE	DATE COMPLETED	NOTES
B	W7-11	91%	103.3	9.9	12/5/2018	
B	W8-11	94%	106.6	7.7	12/5/2018	
B	W9-11	93%	104.9	7.0	12/5/2018	
B	W10-11	94%	106.1	6.3	12/5/2018	
D	W11-11	97%	101.0	8.7	12/5/2018	
D	W12-11	96%	100.0	10.3	12/5/2018	
D	S7-11	97%	100.9	11.4	12/5/2018	
B	S8-11	91%	103.5	6.9	12/5/2018	
B	S9-11	91%	103.4	8.8	12/5/2018	
B	S10-11	92%	104.8	8.7	12/5/2018	
B	S11-11	92%	104.6	6.1	12/5/2018	
D	S12-11	97%	101.3	6.6	12/5/2018	
D	East AT 1	93%	96.7	11.6	12/20/2018	
D	East AT 2	96%	100.0	12.6	12/20/2018	
D	East AT 3	91%	94.6	12.0	12/20/2018	
D	East AT 4	96%	100.6	11.0	12/20/2018	
D	East AT 5	94%	98.5	12.1	12/20/2018	
D	East AT 6	94%	98.2	10.7	12/20/2018	
D	North AT 1	90%	94.1	9.0	12/20/2018	
D	North AT 2	92%	96.0	11.7	12/20/2018	
D	North AT 3	92%	95.8	10.7	12/20/2018	
D	North AT 4	91%	94.6	9.3	12/20/2018	

APPENDIX B

Material Manufacturer Certification and Conformance Testing Results

B.1. GCL Certifications

Report Date
9/12/2018

BentoLiner Manufacturing Certification

Sales Order: 85199

Customer: Southwest Liner Systems, Inc.

Project: SWLS/Sundance West Phase 2, Landfill Cell 1A

Product Type: BLI-075-06N-03S-D-30 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

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

Sales Order SO-085199
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS/Sundance West Phase 2, Landfill Cell 1A

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length	
502318790	BLI-075-06N-03S-D-30	28091003	15.50	2025665961	2025644927	1082818C	150.00	
502318794	BLI-075-06N-03S-D-30	28091003	15.50	2025665961	2025644927	1082818C	150.00	Conformance
502318795	BLI-075-06N-03S-D-30	28091003	15.50	2025665961	2025644927	1082818C	150.00	
502318796	BLI-075-06N-03S-D-30	28091003	15.50	2025665961	2025644927	1082818C	150.00	
502318797	BLI-075-06N-03S-D-30	28091003	15.50	2025665961	2025579815	1082818C	150.00	
502318798	BLI-075-06N-03S-D-30	28091003	15.50	2025665961	2025579815	1082818C	150.00	
502318799	BLI-075-06N-03S-D-30	28091003	15.50	2025665544	2025579815	1082818C	150.00	
502318800	BLI-075-06N-03S-D-30	28091003	15.50	2025665544	2025579815	1082818C	150.00	
502318801	BLI-075-06N-03S-D-30	28091003	15.50	2025665544	2025579815	1082818C	150.00	
502318802	BLI-075-06N-03S-D-30	28091003	15.50	2025665544	2025579815	1082818C	150.00	
502318803	BLI-075-06N-03S-D-30	28091003	15.50	2025665544	2025579815	1082818C	150.00	
502318804	BLI-075-06N-03S-D-30	28091003	15.50	2025665544	2025579815	1082818C	150.00	
502318805	BLI-075-06N-03S-D-30	28091003	15.50	2025665544	2025579815	1082818C	150.00	
502318806	BLI-075-06N-03S-D-30	28091003	15.50	2025665544	2025579815	1082818C	150.00	
502318807	BLI-075-06N-03S-D-30	28091003	15.50	2025665544	2025579815	1082818C	150.00	
502318808	BLI-075-06N-03S-D-30	28091003	15.50	2025665546	2025579815	1082818C	150.00	
502318809	BLI-075-06N-03S-D-30	28091003	15.50	2025665546	2025579815	1082818C	150.00	
502318810	BLI-075-06N-03S-D-30	28091003	15.50	2025665546	2025579815	1082818C	150.00	
502318811	BLI-075-06N-03S-D-30	28091003	15.50	2025665546	2025579815	1082818C	150.00	
502318812	BLI-075-06N-03S-D-30	28091003	15.50	2025665546	2025579815	1082818C	150.00	
502318813	BLI-075-06N-03S-D-30	28091003	15.50	2025665546	2025579815	1082818C	150.00	
502318814	BLI-075-06N-03S-D-30	28091003	15.50	2025665546	2025579815	1082818C	150.00	
502318815	BLI-075-06N-03S-D-30	28091003	15.50	2025665546	2025579815	1082818C	150.00	
502318816	BLI-075-06N-03S-D-30	28091003	15.50	2025665546	2025579815	1082818C	150.00	
502318817	BLI-075-06N-03S-D-30	28091003	15.50	2025665546	2025579815	1082818C	150.00	
502318818	BLI-075-06N-03S-D-30	28091003	15.50	2025665953	2025579815	1082818C	150.00	
502318819	BLI-075-06N-03S-D-30	28091003	15.50	2025665953	2025579815	1082818C	150.00	
502318820	BLI-075-06N-03S-D-30	28091003	15.50	2025665953	2025579815	1082818D	150.00	
502318821	BLI-075-06N-03S-D-30	28091003	15.50	2025665953	2025579815	1082818D	150.00	
502318822	BLI-075-06N-03S-D-30	28091003	15.50	2025665953	2025579815	1082818D	106.00	
502318823	BLI-075-06N-03S-D-30	28091003	15.50	2025665953	2025617281	1082818D	150.00	
502318824	BLI-075-06N-03S-D-30	28091003	15.50	2025665953	2025617281	1082818D	150.00	
502318825	BLI-075-06N-03S-D-30	28091003	15.50	2025665953	2025617281	1082818D	150.00	
502318826	BLI-075-06N-03S-D-30	28091003	15.50	2025665953	2025617281	1082818D	150.00	
502318827	BLI-075-06N-03S-D-30	28091003	15.50	2025665953	2025617281	1082818D	150.00	
502318828	BLI-075-06N-03S-D-30	28091003	15.50	2025665542	2025617281	1082818D	150.00	
502318829	BLI-075-06N-03S-D-30	28091003	15.50	2025665542	2025617281	1082818D	150.00	
502318830	BLI-075-06N-03S-D-30	28091003	15.50	2025665542	2025617281	1082818D	150.00	
502318831	BLI-075-06N-03S-D-30	28091003	15.50	2025665542	2025617281	1082818D	150.00	
502318832	BLI-075-06N-03S-D-30	28091003	15.50	2025665542	2025617281	1082818D	150.00	
502318833	BLI-075-06N-03S-D-30	28091003	15.50	2025665542	2025617281	1082818D	150.00	
502318834	BLI-075-06N-03S-D-30	28091003	15.50	2025665542	2025617281	1082818D	150.00	

Roll Allocation List

Sales Order SO-085199
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS/Sundance West Phase 2, Landfill Cell 1A

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length	
502318835	BLI-075-06N-03S-D-30	28091003	15.50	2025665542	2025617281	1082818D	150.00	
502318836	BLI-075-06N-03S-D-30	28091003	15.50	2025665542	2025617281	1082818D	150.00	
502318837	BLI-075-06N-03S-D-30	28091003	15.50	2025665958	2025617281	1082818D	150.00	
502318838	BLI-075-06N-03S-D-30	28091003	15.50	2025665958	2025617281	1082818D	150.00	
502318839	BLI-075-06N-03S-D-30	28091003	15.50	2025665958	2025617281	1082818D	150.00	
502318840	BLI-075-06N-03S-D-30	28091003	15.50	2025665958	2025617281	1082818D	150.00	
502318841	BLI-075-06N-03S-D-30	28091003	15.50	2025665958	2025617281	1082818D	150.00	
502318842	BLI-075-06N-03S-D-30	28091003	15.50	2025665958	2025617281	1082818D	150.00	
502318843	BLI-075-06N-03S-D-30	28091003	15.50	2025665958	2025617281	1082818D	150.00	
502318844	BLI-075-06N-03S-D-30	28091003	15.50	2025665958	2025617281	1082818D	150.00	
502318845	BLI-075-06N-03S-D-30	28091003	15.50	2025665958	2025617281	1082818D	150.00	Conformance
502318846	BLI-075-06N-03S-D-30	28091003	15.50	2025667749	2025617281	1082818D	150.00	
502318847	BLI-075-06N-03S-D-30	28091003	15.50	2025667749	2025617281	1082818D	150.00	
502318848	BLI-075-06N-03S-D-30	28091003	15.50	2025667749	2025617281	1082818D	150.00	
502318849	BLI-075-06N-03S-D-30	28091003	15.50	2025667749	2025617281	1082818D	150.00	
502318850	BLI-075-06N-03S-D-30	28091003	15.50	2025667749	2025617281	1082818D	150.00	
502318851	BLI-075-06N-03S-D-30	28091003	15.50	2025667749	2025644928	1083118A	150.00	
502318852	BLI-075-06N-03S-D-30	28091003	15.50	2025667749	2025644928	1083118A	150.00	
502318853	BLI-075-06N-03S-D-30	28091003	15.50	2025667749	2025644928	1083118A	150.00	
502318854	BLI-075-06N-03S-D-30	28091003	15.50	2025665960	2025644928	1083118A	150.00	
502318855	BLI-075-06N-03S-D-30	28091003	15.50	2025665960	2025644928	1083118A	150.00	
502318856	BLI-075-06N-03S-D-30	28091003	15.50	2025665960	2025644928	1083118A	150.00	
502318857	BLI-075-06N-03S-D-30	28091003	15.50	2025665960	2025644928	1083118A	150.00	
502318858	BLI-075-06N-03S-D-30	28091003	15.50	2025665960	2025644928	1083118A	150.00	
502318859	BLI-075-06N-03S-D-30	28091003	15.50	2025665960	2025644928	1083118A	150.00	
502318860	BLI-075-06N-03S-D-30	28091003	15.50	2025665960	2025644928	1083118A	150.00	
502318861	BLI-075-06N-03S-D-30	28091003	15.50	2025665960	2025644928	1083118A	150.00	
502318862	BLI-075-06N-03S-D-30	28091003	15.50	2025665960	2025644928	1083118A	150.00	
502318863	BLI-075-06N-03S-D-30	28091003	15.50	2025665959	2025644928	1083118A	150.00	
502318864	BLI-075-06N-03S-D-30	28091003	15.50	2025665959	2025644928	1083118A	150.00	
502318865	BLI-075-06N-03S-D-30	28091003	15.50	2025665959	2025644928	1083118A	150.00	
502318866	BLI-075-06N-03S-D-30	28091003	15.50	2025665959	2025644928	1083118A	150.00	
502318867	BLI-075-06N-03S-D-30	28091003	15.50	2025665959	2025644928	1083118A	150.00	
502318868	BLI-075-06N-03S-D-30	28091003	15.50	2025665959	2025644928	1083118A	150.00	
502318869	BLI-075-06N-03S-D-30	28091003	15.50	2025665959	2025644928	1083118A	150.00	
502318870	BLI-075-06N-03S-D-30	28091003	15.50	2025665959	2025617279	1083118A	150.00	
502318871	BLI-075-06N-03S-D-30	28091003	15.50	2025665959	2025617279	1083118A	150.00	
502318873	BLI-075-06N-03S-D-30	28091003	15.50	2025665965	2025617279	1083118A	150.00	
502318874	BLI-075-06N-03S-D-30	28091003	15.50	2025665965	2025617279	1083118A	150.00	
502318875	BLI-075-06N-03S-D-30	28091003	15.50	2025665965	2025617279	1083118A	150.00	
502318876	BLI-075-06N-03S-D-30	28091003	15.50	2025665965	2025617279	1083118A	150.00	
502318877	BLI-075-06N-03S-D-30	28091003	15.50	2025665965	2025617279	1083118A	150.00	

Roll Allocation List

Sales Order SO-085199
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS/Sundance West Phase 2, Landfill Cell 1A

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length	
502318878	BLI-075-06N-03S-D-30	28091003	15.50	2025665965	2025617279	1083118B	150.00	
502318879	BLI-075-06N-03S-D-30	28091003	15.50	2025665965	2025617279	1083118B	150.00	
502318880	BLI-075-06N-03S-D-30	28091103	15.50	2025665965	2025617279	1083118B	150.00	
502318881	BLI-075-06N-03S-D-30	28091103	15.50	2025665965	2025617279	1083118B	150.00	
502318882	BLI-075-06N-03S-D-30	28091103	15.50	2025665952	2025617279	1083118B	150.00	
502318883	BLI-075-06N-03S-D-30	28091103	15.50	2025665952	2025617279	1083118B	150.00	
502318884	BLI-075-06N-03S-D-30	28091103	15.50	2025665952	2025617279	1083118B	150.00	
502318885	BLI-075-06N-03S-D-30	28091103	15.50	2025665952	2025617279	1083118B	150.00	
502318886	BLI-075-06N-03S-D-30	28091103	15.50	2025665952	2025617279	1083118B	150.00	
502318887	BLI-075-06N-03S-D-30	28091103	15.50	2025665952	2025617279	1083118B	150.00	
502318888	BLI-075-06N-03S-D-30	28091103	15.50	2025665952	2025617279	1083118B	150.00	
502318889	BLI-075-06N-03S-D-30	28091103	15.50	2025665952	2025617279	1083118B	150.00	
502318890	BLI-075-06N-03S-D-30	28091103	15.50	2025665952	2025617279	1083118B	150.00	Conformance
502318891	BLI-075-06N-03S-D-30	28091103	15.50	2025665954	2025617279	1083118B	150.00	
502318892	BLI-075-06N-03S-D-30	28091103	15.50	2025665954	2025617279	1083118B	150.00	
502318893	BLI-075-06N-03S-D-30	28091103	15.50	2025665954	2025617279	1083118B	150.00	
502318894	BLI-075-06N-03S-D-30	28091103	15.50	2025665954	2025617279	1083118B	150.00	
502318895	BLI-075-06N-03S-D-30	28091103	15.50	2025665954	2025629250	1083118B	150.00	
502318896	BLI-075-06N-03S-D-30	28091103	15.50	2025665954	2025629250	1083118B	150.00	
502318897	BLI-075-06N-03S-D-30	28091103	15.50	2025665954	2025629250	1083118B	150.00	
502318898	BLI-075-06N-03S-D-30	28091103	15.50	2025665954	2025629250	1083118B	150.00	
502318899	BLI-075-06N-03S-D-30	28091103	15.50	2025665954	2025629250	1083118B	150.00	
502318901	BLI-075-06N-03S-D-30	28091103	15.50	2025627154	2025629250	1083118B	150.00	
502318902	BLI-075-06N-03S-D-30	28091103	15.50	2025627154	2025629250	1083118B	150.00	
502318903	BLI-075-06N-03S-D-30	28091103	15.50	2025627154	2025629250	1083118B	150.00	
502318904	BLI-075-06N-03S-D-30	28091103	15.50	2025627154	2025629250	1083118B	150.00	
502318905	BLI-075-06N-03S-D-30	28091103	15.50	2025627154	2025629250	1083118B	150.00	
502318906	BLI-075-06N-03S-D-30	28091103	15.50	2025627154	2025629250	1083118B	150.00	
502318907	BLI-075-06N-03S-D-30	28091103	15.50	2025627154	2025629250	1083118B	150.00	
502318908	BLI-075-06N-03S-D-30	28091103	15.50	2025627154	2025629250	1083118B	150.00	
502318909	BLI-075-06N-03S-D-30	28091103	15.50	2025627138	2025629250	1083118C	150.00	
502318910	BLI-075-06N-03S-D-30	28091103	15.50	2025627138	2025629250	1083118C	150.00	
502318911	BLI-075-06N-03S-D-30	28091103	15.50	2025627138	2025629250	1083118C	150.00	
502318912	BLI-075-06N-03S-D-30	28091103	15.50	2025627138	2025629250	1083118C	150.00	
502318913	BLI-075-06N-03S-D-30	28091103	15.50	2025627138	2025629250	1083118C	150.00	
502318914	BLI-075-06N-03S-D-30	28091103	15.50	2025627138	2025629250	1083118C	150.00	
502318915	BLI-075-06N-03S-D-30	28091103	15.50	2025627138	2025629250	1083118C	150.00	
502318916	BLI-075-06N-03S-D-30	28091103	15.50	2025627138	2025629250	1083118C	150.00	
502318917	BLI-075-06N-03S-D-30	28091103	15.50	2025627138	2025629250	1083118C	150.00	
502318918	BLI-075-06N-03S-D-30	28091103	15.50	2025627131	2025629250	1083118C	150.00	
502318919	BLI-075-06N-03S-D-30	28091103	15.50	2025627131	2025629250	1083118C	150.00	
502318920	BLI-075-06N-03S-D-30	28091103	15.50	2025627131	2025620501	1083118C	150.00	

Roll Allocation List

Sales Order SO-085199
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS/Sundance West Phase 2, Landfill Cell 1A

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length	
502318921	BLI-075-06N-03S-D-30	28091103	15.50	2025627131	2025620501	1083118C	150.00	
502318922	BLI-075-06N-03S-D-30	28091103	15.50	2025627131	2025620501	1083118C	150.00	
502318923	BLI-075-06N-03S-D-30	28091103	15.50	2025627131	2025620501	1083118C	150.00	
502318924	BLI-075-06N-03S-D-30	28091103	15.50	2025627131	2025620501	1083118C	82.00	
502318926	BLI-075-06N-03S-D-30	28091103	15.50	2025627131	2025620501	1083118C	150.00	
502318927	BLI-075-06N-03S-D-30	28091103	15.50	2025627131	2025620501	1083118C	150.00	
502318928	BLI-075-06N-03S-D-30	28091103	15.50	2025627145	2025620501	1083118C	142.00	
502318930	BLI-075-06N-03S-D-30	28091103	15.50	2025627145	2025620501	1083118C	150.00	
502318931	BLI-075-06N-03S-D-30	28091103	15.50	2025627145	2025620501	1083118C	114.00	
502318932	BLI-075-06N-03S-D-30	28091103	15.50	2025627145	2025620501	1083118C	150.00	
502318933	BLI-075-06N-03S-D-30	28091103	15.50	2025627145	2025620501	1083118C	150.00	Conformance
502318934	BLI-075-06N-03S-D-30	28091103	15.50	2025627145	2025620501	1083118C	150.00	
502318935	BLI-075-06N-03S-D-30	28091103	15.50	2025627145	2025620501	1083118C	150.00	
502318936	BLI-075-06N-03S-D-30	28091103	15.50	2025627145	2025620501	1083118C	150.00	
502318937	BLI-075-06N-03S-D-30	28091103	15.50	2025627145	2025620501	1083118D	150.00	
502318938	BLI-075-06N-03S-D-30	28091103	15.50	2025582839	2025620501	1083118D	114.00	
502318939	BLI-075-06N-03S-D-30	28091103	15.50	2025582839	2025620501	1083118D	150.00	
502318940	BLI-075-06N-03S-D-30	28091103	15.50	2025582839	2025620501	1083118D	150.00	
502318941	BLI-075-06N-03S-D-30	28091103	15.50	2025582839	2025620501	1083118D	150.00	
502318945	BLI-075-06N-03S-D-30	28091103	15.50	2025582839	2025620501	1083118D	150.00	
502318946	BLI-075-06N-03S-D-30	28091103	15.50	2025627144	2025620501	1083118D	150.00	
502318947	BLI-075-06N-03S-D-30	28091103	15.50	2025627144	2025620501	1083118D	150.00	
502318948	BLI-075-06N-03S-D-30	28091103	15.50	2025627144	2025620501	1083118D	150.00	
502318949	BLI-075-06N-03S-D-30	28091103	15.50	2025627144	2025620501	1083118D	150.00	
502318950	BLI-075-06N-03S-D-30	28091103	15.50	2025627144	2025620501	1083118D	150.00	
502318951	BLI-075-06N-03S-D-30	28091103	15.50	2025627144	2025620501	1083118D	150.00	
502318952	BLI-075-06N-03S-D-30	28091103	15.50	2025627144	2025620501	1083118D	150.00	
502318953	BLI-075-06N-03S-D-30	28091103	15.50	2025627144	2025620501	1083118D	150.00	
502318954	BLI-075-06N-03S-D-30	28091103	15.50	2025627144	2025620501	1083118D	150.00	
502318955	BLI-075-06N-03S-D-30	28091103	15.50	2025627143	2025620501	1083118D	150.00	
502318956	BLI-075-06N-03S-D-30	28091103	15.50	2025627143	2025629252	1083118D	150.00	
502318957	BLI-075-06N-03S-D-30	28091103	15.50	2025627143	2025629252	1083118D	150.00	
502318958	BLI-075-06N-03S-D-30	28091103	15.50	2025627143	2025629252	1083118D	150.00	
502318959	BLI-075-06N-03S-D-30	28091103	15.50	2025627143	2025629252	1083118D	150.00	
502318960	BLI-075-06N-03S-D-30	28091103	15.50	2025627143	2025629252	1083118D	150.00	
502318961	BLI-075-06N-03S-D-30	28091103	15.50	2025627143	2025629252	1083118D	150.00	
502318962	BLI-075-06N-03S-D-30	28091103	15.50	2025627143	2025629252	1083118D	150.00	
502318963	BLI-075-06N-03S-D-30	28091103	15.50	2025627143	2025629252	1083118D	150.00	
502318964	BLI-075-06N-03S-D-30	28091103	15.50	2025627162	2025629252	1083118D	150.00	
502318965	BLI-075-06N-03S-D-30	28091103	15.50	2025627162	2025629252	1083118D	150.00	
502318966	BLI-075-06N-03S-D-30	28091103	15.50	2025627162	2025629252	1083118D	96.00	
502318967	BLI-075-06N-03S-D-30	28091103	15.50	2025627162	2025629252	1083118D	150.00	

Roll Allocation List

Sales Order SO-085199
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS/Sundance West Phase 2, Landfill Cell 1A

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length
502318968	BLI-075-06N-03S-D-30	28091103	15.50	2025627162	2025629252	1083118D	150.00
502318969	BLI-075-06N-03S-D-30	28091103	15.50	2025627162	2025629252	1083118D	96.00

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Sep/12/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085199	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-30	

Roll Number	ASTM D4632 Grab Strength (lbs)	Puncture Resistance ASTM D4833 (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf) GCL mass	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)	ASTM D4643 Moisture Content (%) GCL moisture content
502318790	168	105	45	35.9	9.3	1.00	0.82	31.5	11.9	13.8	10.7
502318794	168	105	45	35.9	9.3	1.00	0.82	31.5	11.9	13.8	10.7
502318795	209	105	60	49.9	12.0	0.91	0.83	31.5	11.9	13.8	9.8
502318796	209	105	60	49.9	12.0	0.91	0.83	31.5	11.9	13.8	9.8
502318797	209	105	60	49.9	12.0	0.91	0.83	31.5	11.9	13.8	9.8
502318798	209	105	60	49.9	12.0	0.91	0.83	31.5	11.9	13.8	9.8
502318799	209	105	60	49.9	12.0	0.91	0.83	31.5	11.9	13.8	9.8
502318800	209	105	60	49.9	12.0	0.91	0.83	31.5	11.9	13.8	9.8
502318801	209	105	60	49.9	12.0	0.91	0.83	31.5	11.9	13.8	9.8
502318802	209	105	60	49.9	12.0	0.91	0.83	31.5	11.9	13.8	9.8
502318803	209	105	60	49.9	12.0	0.91	0.83	31.5	11.9	13.8	9.8
502318804	209	105	60	49.9	12.0	0.91	0.83	31.5	11.9	13.8	9.8
502318805	209	105	60	49.9	12.0	0.91	0.83	31.5	11.9	13.8	9.8
502318806	209	105	60	49.9	12.0	0.91	0.83	31.5	11.9	13.8	9.8
502318807	209	105	60	49.9	12.0	0.91	0.83	31.5	11.9	13.8	9.8
502318808	209	105	60	49.9	12.0	0.91	0.83	31.5	11.9	13.8	9.8
502318809	209	105	60	49.9	12.0	0.91	0.83	31.5	11.9	13.8	9.8
502318810	209	105	60	49.9	12.0	0.91	0.83	31.5	11.9	13.8	9.8
502318811	155	105	46	45.0	8.8	0.91	0.84	31.5	11.9	13.8	10.3
502318812	155	105	46	45.0	8.8	0.91	0.84	31.5	11.9	13.8	10.3
502318813	155	105	46	45.0	8.8	0.91	0.84	31.5	11.9	13.8	10.3
502318814	155	105	46	45.0	8.8	0.91	0.84	31.5	11.9	13.8	10.3
502318815	155	105	46	45.0	8.8	0.91	0.84	31.5	11.9	13.8	10.3
502318816	155	105	46	45.0	8.8	0.91	0.84	31.5	11.9	13.8	10.3
502318817	155	105	46	45.0	8.8	0.91	0.84	31.5	11.9	13.8	10.3
502318818	155	105	46	45.0	8.8	0.91	0.84	31.5	11.9	13.8	10.3
502318819	155	105	46	45.0	8.8	0.91	0.84	31.5	11.9	13.8	10.3
502318820	155	105	46	45.0	8.8	0.91	0.84	33.5	10.0	12.8	10.3
502318821	155	105	46	45.0	8.8	0.91	0.84	33.5	10.0	12.8	10.3
502318822	155	105	46	45.0	8.8	0.91	0.84	33.5	10.0	12.8	10.3
502318823	155	105	46	45.0	8.8	0.91	0.84	33.5	10.0	12.8	10.3
502318824	155	105	46	45.0	8.8	0.91	0.84	33.5	10.0	12.8	10.3
502318825	155	105	46	45.0	8.8	0.91	0.84	33.5	10.0	12.8	10.3
502318826	155	105	46	45.0	8.8	0.91	0.84	33.5	10.0	12.8	10.3

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Sep/12/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085199	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-30	

Roll Number	ASTM D4632 Grab Strength (lbs)	Puncture Resistance ASTM D4833 (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf) GCL mass	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)	ASTM D4643 Moisture Content (%) GCL moisture content
502318827	180	105	50	49.8	9.3	0.91	0.83	33.5	10.0	12.8	10.3
502318828	180	105	50	49.8	9.3	0.91	0.83	33.5	10.0	12.8	10.3
502318829	180	105	50	49.8	9.3	0.91	0.83	33.5	10.0	12.8	10.3
502318830	180	105	50	49.8	9.3	0.91	0.83	33.5	10.0	12.8	10.3
502318831	180	105	50	49.8	9.3	0.91	0.83	33.5	10.0	12.8	10.3
502318832	180	105	50	49.8	9.3	0.91	0.83	33.5	10.0	12.8	10.3
502318833	180	105	50	49.8	9.3	0.91	0.83	33.5	10.0	12.8	10.3
502318834	180	105	50	49.8	9.3	0.91	0.83	33.5	10.0	12.8	10.3
502318835	180	105	50	49.8	9.3	0.91	0.83	33.5	10.0	12.8	10.3
502318836	180	105	50	49.8	9.3	0.91	0.83	33.5	10.0	12.8	10.3
502318837	180	105	50	49.8	9.3	0.91	0.83	33.5	10.0	12.8	10.3
502318838	180	105	50	49.8	9.3	0.91	0.83	33.5	10.0	12.8	10.3
502318839	180	105	50	49.8	9.3	0.91	0.83	33.5	10.0	12.8	10.3
502318840	180	105	50	49.8	9.3	0.91	0.83	33.5	10.0	12.8	10.3
502318841	180	105	50	49.8	9.3	0.91	0.83	33.5	10.0	12.8	10.3
502318842	180	105	50	49.8	9.3	0.91	0.83	33.5	10.0	12.8	10.3
502318843	165	105	49	43.6	9.5	0.87	0.80	33.5	10.0	12.8	10.1
502318844	165	105	49	43.6	9.5	0.87	0.80	33.5	10.0	12.8	10.1
502318845	165	105	49	43.6	9.5	0.87	0.80	33.5	10.0	12.8	10.1
502318846	165	105	49	43.6	9.5	0.87	0.80	33.5	10.0	12.8	10.1
502318847	165	105	49	43.6	9.5	0.87	0.80	33.5	10.0	12.8	10.1
502318848	165	105	49	43.6	9.5	0.87	0.80	33.5	10.0	12.8	10.1
502318849	165	105	49	43.6	9.5	0.87	0.80	33.5	10.0	12.8	10.1
502318850	165	105	49	43.6	9.5	0.87	0.80	33.5	10.0	12.8	10.1
502318851	165	105	49	43.6	9.5	0.87	0.80	35.0	10.1	14.4	10.1
502318852	165	105	49	43.6	9.5	0.87	0.80	35.0	10.1	14.4	10.1
502318853	165	105	49	43.6	9.5	0.87	0.80	35.0	10.1	14.4	10.1
502318854	165	105	49	43.6	9.5	0.87	0.80	35.0	10.1	14.4	10.1
502318855	165	105	49	43.6	9.5	0.87	0.80	35.0	10.1	14.4	10.1
502318856	165	105	49	43.6	9.5	0.87	0.80	35.0	10.1	14.4	10.1
502318857	165	105	49	43.6	9.5	0.87	0.80	35.0	10.1	14.4	10.1
502318858	165	105	49	43.6	9.5	0.87	0.80	35.0	10.1	14.4	10.1
502318859	183	105	42	42.8	7.4	0.86	0.79	35.0	10.1	14.4	10.9
502318860	183	105	42	42.8	7.4	0.86	0.79	35.0	10.1	14.4	10.9

GSE Environmental, LLC

ROLL TEST DATA REPORT

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Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085199	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-30	

Roll Number	ASTM D4632 Grab Strength (lbs)	Puncture Resistance ASTM D4833 (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf) GCL mass	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)	ASTM D4643 Moisture Content (%) GCL moisture content
502318861	183	105	42	42.8	7.4	0.86	0.79	35.0	10.1	14.4	10.9
502318862	183	105	42	42.8	7.4	0.86	0.79	35.0	10.1	14.4	10.9
502318863	183	105	42	42.8	7.4	0.86	0.79	35.0	10.1	14.4	10.9
502318864	183	105	42	42.8	7.4	0.86	0.79	35.0	10.1	14.4	10.9
502318865	183	105	42	42.8	7.4	0.86	0.79	35.0	10.1	14.4	10.9
502318866	183	105	42	42.8	7.4	0.86	0.79	35.0	10.1	14.4	10.9
502318867	183	105	42	42.8	7.4	0.86	0.79	35.0	10.1	14.4	10.9
502318868	183	105	42	42.8	7.4	0.86	0.79	35.0	10.1	14.4	10.9
502318869	183	105	42	42.8	7.4	0.86	0.79	35.0	10.1	14.4	10.9
502318870	183	105	42	42.8	7.4	0.86	0.79	35.0	10.1	14.4	10.9
502318871	183	105	42	42.8	7.4	0.86	0.79	35.0	10.1	14.4	10.9
502318873	183	105	42	42.8	7.4	0.86	0.79	35.0	10.1	14.4	10.9
502318874	183	105	42	42.8	7.4	0.86	0.79	35.0	10.1	14.4	10.9
502318875	173	114	56	47.7	11.3	0.92	0.85	35.0	10.1	14.4	10.6
502318876	173	114	56	47.7	11.3	0.92	0.85	35.0	10.1	14.4	10.6
502318877	173	114	56	47.7	11.3	0.92	0.85	35.0	10.1	14.4	10.6
502318878	173	114	56	47.7	11.3	0.92	0.85	37.5	10.6	14.4	10.6
502318879	173	114	56	47.7	11.3	0.92	0.85	37.5	10.6	14.4	10.6
502318880	173	114	56	47.7	11.3	0.92	0.85	37.5	10.6	14.4	10.6
502318881	173	114	56	47.7	11.3	0.92	0.85	37.5	10.6	14.4	10.6
502318882	173	114	56	47.7	11.3	0.92	0.85	37.5	10.6	14.4	10.6
502318883	173	114	56	47.7	11.3	0.92	0.85	37.5	10.6	14.4	10.6
502318884	173	114	56	47.7	11.3	0.92	0.85	37.5	10.6	14.4	10.6
502318885	173	114	56	47.7	11.3	0.92	0.85	37.5	10.6	14.4	10.6
502318886	173	114	56	47.7	11.3	0.92	0.85	37.5	10.6	14.4	10.6
502318887	173	114	56	47.7	11.3	0.92	0.85	37.5	10.6	14.4	10.6
502318888	173	114	56	47.7	11.3	0.92	0.85	37.5	10.6	14.4	10.6
502318889	173	114	56	47.7	11.3	0.92	0.85	37.5	10.6	14.4	10.6
502318890	173	114	56	47.7	11.3	0.92	0.85	37.5	10.6	14.4	10.6
502318891	197	114	50	49.2	10.0	0.90	0.83	37.5	10.6	14.4	10.0
502318892	197	114	50	49.2	10.0	0.90	0.83	37.5	10.6	14.4	10.0
502318893	197	114	50	49.2	10.0	0.90	0.83	37.5	10.6	14.4	10.0
502318894	197	114	50	49.2	10.0	0.90	0.83	37.5	10.6	14.4	10.0
502318895	197	114	50	49.2	10.0	0.90	0.83	37.5	10.6	14.4	10.0

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ROLL TEST DATA REPORT

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Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085199	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-30	

Roll Number	ASTM D4632 Grab Strength (lbs)	Puncture Resistance ASTM D4833 (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf) GCL mass	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)	ASTM D4643 Moisture Content (%) GCL moisture content
502318896	197	114	50	49.2	10.0	0.90	0.83	37.5	10.6	14.4	10.0
502318897	197	114	50	49.2	10.0	0.90	0.83	37.5	10.6	14.4	10.0
502318898	197	114	50	49.2	10.0	0.90	0.83	37.5	10.6	14.4	10.0
502318899	197	114	50	49.2	10.0	0.90	0.83	37.5	10.6	14.4	10.0
502318901	197	114	50	49.2	10.0	0.90	0.83	37.5	10.6	14.4	10.0
502318902	197	114	50	49.2	10.0	0.90	0.83	37.5	10.6	14.4	10.0
502318903	197	114	50	49.2	10.0	0.90	0.83	37.5	10.6	14.4	10.0
502318904	197	114	50	49.2	10.0	0.90	0.83	37.5	10.6	14.4	10.0
502318905	197	114	50	49.2	10.0	0.90	0.83	37.5	10.6	14.4	10.0
502318906	197	114	50	49.2	10.0	0.90	0.83	37.5	10.6	14.4	10.0
502318907	178	114	42	46.1	8.8	0.85	0.77	37.5	10.6	14.4	10.0
502318908	178	114	42	46.1	8.8	0.85	0.77	37.5	10.6	14.4	10.0
502318909	178	114	42	46.1	8.8	0.85	0.77	36.5	10.1	14.2	10.0
502318910	178	114	42	46.1	8.8	0.85	0.77	36.5	10.1	14.2	10.0
502318911	178	114	42	46.1	8.8	0.85	0.77	36.5	10.1	14.2	10.0
502318912	178	114	42	46.1	8.8	0.85	0.77	36.5	10.1	14.2	10.0
502318913	178	114	42	46.1	8.8	0.85	0.77	36.5	10.1	14.2	10.0
502318914	178	114	42	46.1	8.8	0.85	0.77	36.5	10.1	14.2	10.0
502318915	178	114	42	46.1	8.8	0.85	0.77	36.5	10.1	14.2	10.0
502318916	178	114	42	46.1	8.8	0.85	0.77	36.5	10.1	14.2	10.0
502318917	178	114	42	46.1	8.8	0.85	0.77	36.5	10.1	14.2	10.0
502318918	110	114	62	43.3	12.6	0.89	0.82	36.5	10.1	14.2	9.6
502318919	110	114	62	43.3	12.6	0.89	0.82	36.5	10.1	14.2	9.6
502318920	110	114	62	43.3	12.6	0.89	0.82	36.5	10.1	14.2	9.6
502318921	110	114	62	43.3	12.6	0.89	0.82	36.5	10.1	14.2	9.6
502318922	110	114	62	43.3	12.6	0.89	0.82	36.5	10.1	14.2	9.6
502318923	110	114	62	43.3	12.6	0.89	0.82	36.5	10.1	14.2	9.6
502318924	110	114	62	43.3	12.6	0.89	0.82	36.5	10.1	14.2	9.6
502318926	110	114	62	43.3	12.6	0.89	0.82	36.5	10.1	14.2	9.6
502318927	110	114	62	43.3	12.6	0.89	0.82	36.5	10.1	14.2	9.6
502318928	110	114	62	43.3	12.6	0.89	0.82	36.5	10.1	14.2	9.6
502318930	110	114	62	43.3	12.6	0.89	0.82	36.5	10.1	14.2	9.6
502318931	110	114	62	43.3	12.6	0.89	0.82	36.5	10.1	14.2	9.6
502318932	110	114	62	43.3	12.6	0.89	0.82	36.5	10.1	14.2	9.6

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Sep/12/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085199	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-30	

Roll Number	ASTM D4632 Grab Strength (lbs)	Puncture Resistance ASTM D4833 (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf) GCL mass	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)	ASTM D4643 Moisture Content (%) GCL moisture content
502318933	110	114	62	43.3	12.6	0.89	0.82	36.5	10.1	14.2	9.6
502318934	186	114	55	45.5	11.1	0.89	0.82	36.5	10.1	14.2	9.8
502318935	186	114	55	45.5	11.1	0.89	0.82	36.5	10.1	14.2	9.8
502318936	186	114	55	45.5	11.1	0.89	0.82	36.5	10.1	14.2	9.8
502318937	186	114	55	45.5	11.1	0.89	0.82	38.0	10.3	13.8	9.8
502318938	186	114	55	45.5	11.1	0.89	0.82	38.0	10.3	13.8	9.8
502318939	186	114	55	45.5	11.1	0.89	0.82	38.0	10.3	13.8	9.8
502318940	186	114	55	45.5	11.1	0.89	0.82	38.0	10.3	13.8	9.8
502318941	186	114	55	45.5	11.1	0.89	0.82	38.0	10.3	13.8	9.8
502318945	186	114	55	45.5	11.1	0.89	0.82	38.0	10.3	13.8	9.8
502318946	186	114	55	45.5	11.1	0.89	0.82	38.0	10.3	13.8	9.8
502318947	186	114	55	45.5	11.1	0.89	0.82	38.0	10.3	13.8	9.8
502318948	186	114	55	45.5	11.1	0.89	0.82	38.0	10.3	13.8	9.8
502318949	186	114	55	45.5	11.1	0.89	0.82	38.0	10.3	13.8	9.8
502318950	209	114	37	36.3	7.5	0.90	0.82	38.0	10.3	13.8	10.6
502318951	209	114	37	36.3	7.5	0.90	0.82	38.0	10.3	13.8	10.6
502318952	209	114	37	36.3	7.5	0.90	0.82	38.0	10.3	13.8	10.6
502318953	209	114	37	36.3	7.5	0.90	0.82	38.0	10.3	13.8	10.6
502318954	209	114	37	36.3	7.5	0.90	0.82	38.0	10.3	13.8	10.6
502318955	209	114	37	36.3	7.5	0.90	0.82	38.0	10.3	13.8	10.6
502318956	209	114	37	36.3	7.5	0.90	0.82	38.0	10.3	13.8	10.6
502318957	209	114	37	36.3	7.5	0.90	0.82	38.0	10.3	13.8	10.6
502318958	209	114	37	36.3	7.5	0.90	0.82	38.0	10.3	13.8	10.6
502318959	209	114	37	36.3	7.5	0.90	0.82	38.0	10.3	13.8	10.6
502318960	209	114	37	36.3	7.5	0.90	0.82	38.0	10.3	13.8	10.6
502318961	209	114	37	36.3	7.5	0.90	0.82	38.0	10.3	13.8	10.6
502318962	209	114	37	36.3	7.5	0.90	0.82	38.0	10.3	13.8	10.6
502318963	209	114	37	36.3	7.5	0.90	0.82	38.0	10.3	13.8	10.6
502318964	209	114	37	36.3	7.5	0.90	0.82	38.0	10.3	13.8	10.6
502318965	209	114	37	36.3	7.5	0.90	0.82	38.0	10.3	13.8	10.6
502318966	115	114	45	36.0	9.0	0.96	0.88	38.0	10.3	13.8	10.9
502318967	115	114	45	36.0	9.0	0.96	0.88	38.0	10.3	13.8	10.9
502318968	115	114	45	36.0	9.0	0.96	0.88	38.0	10.3	13.8	10.9

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Sep/12/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085199	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-30	

Roll Number	ASTM D4632 Grab Strength (lbs)	Puncture Resistance ASTM D4833 (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf) GCL mass	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)	ASTM D4643 Moisture Content (%) GCL moisture content
502318969	115	114	45	36.0	9.0	0.96	0.88	38.0	10.3	13.8	10.9

Laboratory Manager

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GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: 12-Sep-2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
85199	Southwest Liner Systems, Inc.	SWLS/Sundance West Phase 2, Landfill Cell 1A	BLI-GEO-NW-0605	

Roll Number	Mass per Unit Area ASTM D5261 (oz/yd²)
2025665542	7.84
2025665544	8.33
2025665546	8.33
2025665953	7.04
2025665958	7.60
2025665959	7.60
2025665960	7.33
2025665961	7.33
2025667749	7.66
2025582839	7.27
2025627131	8.03
2025627138	7.54
2025627143	7.25
2025627144	7.25
2025627145	7.25
2025627154	7.04
2025627162	8.03
2025665952	7.04
2025665954	7.04
2025665965	7.66

Laboratory Manager Mauricio Ossa

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: 12-Sep-2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
85199	Southwest Liner Systems, Inc.	SWLS/Sundance West Phase 2, Landfill Cell 1A	BLI-GEO-WS-0305	

Roll Number	Mass per Unit Area ASTM D5261 (oz/yd^2)
2025579815	3.28
2025617279	3.28
2025617281	3.28
2025620501	3.33
2025629250	3.28
2025629252	3.28
2025644927	3.26
2025644928	3.26

Laboratory Manager Mauricio Ossa

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2018

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
B0003954051	**08-28-18**	**1082818B**	**9.2**	**0.23**	**5.79**	**12.4**	**108**	**31**	**990**
B0003956966	**08-29-18**	**1082818C**	**11.5**	**0.25**	**3.37**	**12.8**	**110**	**32**	**988**

AUGUST		% 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
No. of CARS	M AVG	**8.84**	**0.18**	**4.16**	**13.91**	**107.72**	**30.49**	**959.34**
65	STD DEV	**0.90**	**0.33**	**1.92**	**1.01**	**4.80**	**1.89**	**62.45**

YTD		% 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
No. of CARS	M AVG	**8.89**	**0.29**	**4.15**	**13.61**	**109.85**	**31.09**	**959.18**
474	STD DEV	**0.92**	**0.53**	**1.99**	**1.13**	**5.37**	**1.84**	**72.06**

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

For any questions contact.
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(Shannon.Pollmiller@halliburton.com

Prepared by: TO
08/29/18

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2018

PRODUCT : NATIONAL® 30

SHIPPED FROM: **BENTONITE PERFORMANCE MINERALS LLC**
554 US HWY 212
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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**
B0003956968	**08-30-18**	**1082818D**	**9.2**	**0.19**	**8.10**	**12.6**	**110**	**31**	**979**

AUGUST		% 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**
No. of CARS **66**	M AVG	**8.84**	**0.18**	**4.21**	**13.89**	**107.75**	**30.50**	**959.61**
	STD DEV	**0.90**	**0.33**	**1.96**	**1.02**	**4.77**	**1.88**	**62.06**

YTD		% 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**
No. of CARS **475**	M AVG	**8.89**	**0.29**	**4.16**	**13.61**	**109.85**	**31.09**	**959.22**
	STD DEV	**0.92**	**0.53**	**1.99**	**1.13**	**5.37**	**1.84**	**72.00**

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SHIPPED TO: **GSE CLAY LINING TECHNOLOGY, Co.**
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Prepared by: TO
08/30/18

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2018

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
B0003956971	**08-31-18**	**1083118A**	**9.6**	**0.32**	**4.13**	**14.0**	**116**	**31**	**982**
B0003956972	**08-31-18**	**1083118B**	**9.4**	**0.08**	**1.63**	**14.2**	**110**	**29**	**981**

SEPTEMBER		% 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
No. of CARS	M AVG	**9.43**	**1.44**	**2.98**	**14.47**	**107.45**	**31.86**	**942.18**
15	STD DEV	**0.45**	**2.07**	**1.34**	**2.03**	**4.87**	**2.20**	**91.87**

YTD		% 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
No. of CARS	M AVG	**8.92**	**0.35**	**4.08**	**13.67**	**109.69**	**31.11**	**957.65**
493	STD DEV	**0.91**	**0.71**	**1.99**	**1.22**	**5.41**	**1.86**	**73.29**

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Prepared by: TO
09/11/18

GSE BENTOLINER

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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**
B0003956973	**09-01-18**	**1083118C**	**9.3**	**0.14**	**3.65**	**13.4**	**106**	**35**	**1012**

SEPTEMBER		% 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**
No. of CARS **1**	M AVG	**9.30**	**0.14**	**3.65**	**13.40**	**106.00**	**35.00**	**1012.00**
	STD DEV	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

YTD		% 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**
No. of CARS **479**	M AVG	**8.90**	**0.30**	**4.13**	**13.64**	**109.78**	**31.09**	**958.39**
	STD DEV	**0.91**	**0.55**	**2.00**	**1.16**	**5.41**	**1.85**	**72.32**

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Prepared by: TO
09/01/18

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2018

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**
B0003956974	**09-01-18**	**1083118D**	**9.0**	**0.08**	**1.60**	**12.0**	**110**	**33**	**975**

SEPTEMBER		% 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**
No. of CARS **2**	M AVG	**9.15**	**0.11**	**2.63**	**12.70**	**108.00**	**34.00**	**993.50**
	STD DEV	**0.15**	**0.03**	**1.03**	**0.70**	**2.00**	**1.00**	**18.50**

YTD		% 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**
No. of CARS **480**	M AVG	**8.90**	**0.30**	**4.12**	**13.63**	**109.78**	**31.09**	**958.42**
	STD DEV	**0.91**	**0.55**	**2.00**	**1.16**	**5.40**	**1.85**	**72.26**

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Prepared by: TO
09/01/18

4/10/2018

GSE ENVIRONMENTAL™

Geotextile Durability GRI-GCL3

Roll #21270936 BLI-GEO-WS-0305 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	120.9	120.9
2	103.7	113.4
3	126.1	94.2
4	135.6	90.2
5	128.5	100.4
Avg.	123.0	103.8
SD	12.0	13.0
Strength Retained (%) 84.4		

Roll #2025327556 BLI-GEO-NW-0605 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	33.6	32
2	34.6	34.9
3	35.8	40.8
4	34.2	43.4
5	40.2	37.5
Avg.	35.7	37.7
SD	2.7	4.5
Strength Retained (%) 105.7		

Roll #21250897 BLI-GEO-WS-0305 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	118.8	110.8
2	117.8	118
3	111.8	94
4	100.8	116.7
5	123.8	129.6
Avg.	114.6	113.8
SD	8.8	13.0
Strength Retained (%) 99.3		

Roll #2025297591 BLI-GEO-NW-0605 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	33.8	43.3
2	34.1	31.8
3	26.2	35
4	37.1	33.9
5	43.7	42.1
Avg.	35.0	37.2
SD	6.3	5.2
Strength Retained (%) 106.4		

Roll #21250895 BLI-GEO-WS-0305 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	128.3	110.9
2	128.1	122.2
3	126.9	118.7
4	107.7	113.0
5	115.9	77.8
Avg.	121.4	108.5
SD	9.2	17.7
Strength Retained (%) 89.4		

Roll #2025310781 BLI-GEO-NW-0605 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	41.4	33.9
2	31.7	36.9
3	34.7	41.2
4	37.7	34.1
5	41.5	38.2
Avg.	37.4	36.9
SD	4.3	3.0
Strength Retained (%) 98.6		

Roll #21270903 BLI-GEO-WS-0305 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	88.8	138.2
2	118.9	105.4
3	122.4	123.5
4	123.4	124.2
5	135.4	108.2
Avg.	117.8	119.9
SD	17.4	13.4
Strength Retained (%) 101.8		

Roll #2025297652 BLI-GEO-NW-0605 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	37.3	36.4
2	32.5	37
3	37.7	34.7
4	40.8	36.3
5	38.6	43.1
Avg.	37.4	37.5
SD	3.0	3.2
Strength Retained (%) 100.3		

Roll #21270903 BLI-GEO-WS-0305 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	127.8	133.8
2	143	135.4
3	134.1	135.9
4	132.8	140.3
5	136.4	132.3
Avg.	134.8	135.5
SD	5.6	3.0
Strength Retained (%) 100.5		

Roll #2025307690 BLI-GEO-NW-0605 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	45	42.2
2	34.6	52.4
3	26.4	37.2
4	29.4	27.1
5	35.2	32.2
Avg.	34.1	38.2
SD	7.1	9.7
Strength Retained (%) 112.0		

Roll #21280871 BLI-GEO-WS-0305 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	168.5	136.4
2	134.2	127.7
3	130.6	117.9
4	132.5	139.1
5	134.7	125
Avg.	140.1	129.2
SD	16.0	8.6
Strength Retained (%) 92.2		

Roll #2025276623 BLI-GEO-NW-0605 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	31.5	29.6
2	30.1	30.9
3	24.2	38.1
4	41	30.3
5	38.2	38.8
Avg.	33.0	33.5
SD	6.7	4.5
Strength Retained (%) 101.6		

Roll #21250933 BLI-GEO-WS-0305 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	173.7	141
2	114	133.4
3	153.5	124.8
4	135.5	140.5
5	139.2	122.4
Avg.	143.2	132.4
SD	22.2	8.6
Strength Retained (%) 92.5		

Roll #2025272404 BLI-GEO-NW-0605 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	50.3	36
2	45.6	46.1
3	40.2	30.5
4	32.4	37.1
5	31.7	53.4
Avg.	40.0	40.6
SD	8.1	9.1
Strength Retained (%) 101.4		

Roll #21201970 BLI-GEO-WS-0305 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	139.1	141.8
2	142	140.8
3	130.1	128.5
4	136.9	136.6
5	182.3	143.9
Avg.	146.1	138.3
SD	20.7	6.1
Strength Retained (%) 94.7		

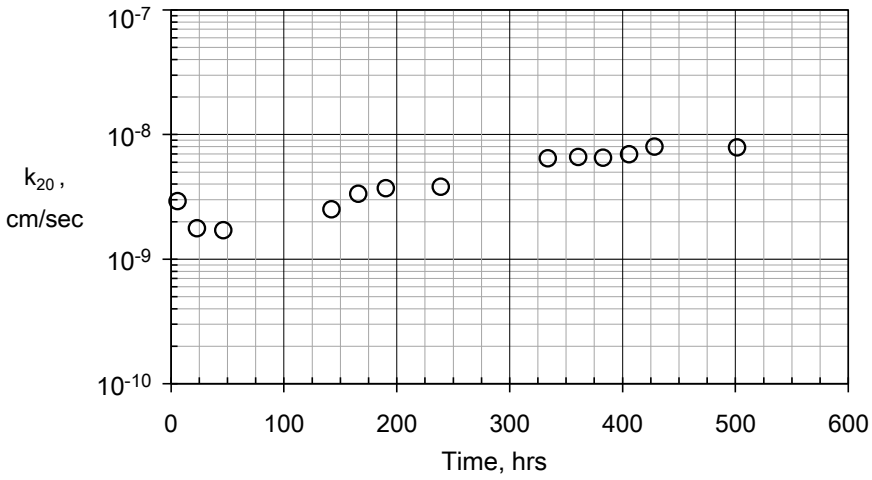
Roll #2025324973 BLI-GEO-NW-0605 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	34.4	27.3
2	34	32.8
3	29.2	42.1
4	29.4	22.9
5	24.3	34.8
Avg.	30.3	32.0
SD	4.1	7.3
Strength Retained (%) 105.7		

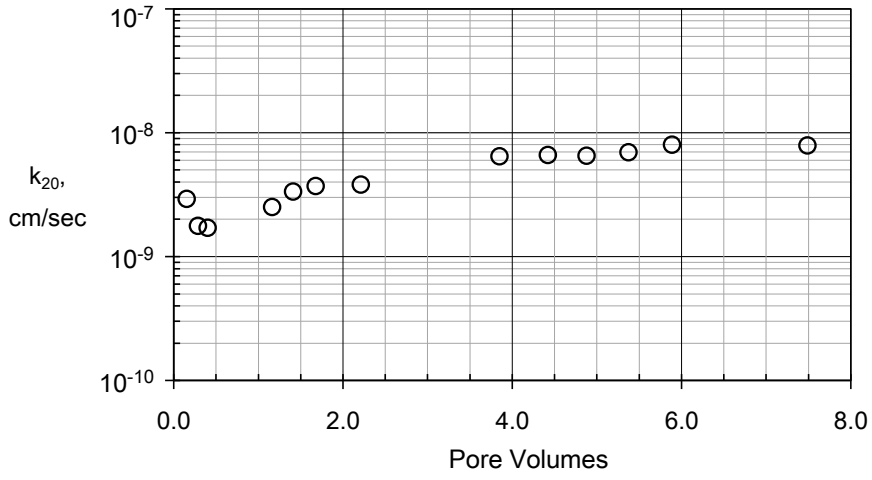
Don Cunningham
Lab Technician III

GCL Compatibility Test (ASTM D6766 Scenario I Method C)

Client: GSE
Project: Yearly Testing
Sample ID: Lot 1042017C
Product Type: BPM National Bentonite

TRI Log #: 28340
Test Start Date: 6/13/2017





Initial Conditions

Sample Diameter (in)	4.00
Sample Height (in)	-
Moisture Content (%)	10.4
pH	8.6
EC (mS)	1.6

Notes:

Final Conditions

Sample Diameter (in)	4.00
Sample Height (in)	0.19
Moisture Content (%)	97.7
G_s (assumed)	2.65
Porosity, n	0.72
1 Pore Volume (cc)	28.6
Effective Confining Stress at the Efluent End (psi)	5.0
Average Effective Confining Stress (psi)	4.0
Total Back-Pressure (psi)	75.0
pH	6.9
EC (mS)	12.3

Notes:

Description of test liquid:
0.1 M Calcium Chloride Solution

Termination Criteria:
GRI-GCL3 - Outflow-to-inflow hydrauilc conductity within 25%

Results(1)

Hydraulic Conductivity, k_{20}(2) (cm/s)	7.6×10^{-9}
Flux, q_t (m^3/m^2)/s	2.2×10^{-8}
Hydraulic Gradient, i (m/m)	561.0

(1): Average values obtained from the last 3 readings.

(2): Hydraulic Conductivity, k, corrected to 20°C

Jeffrey A. Kuhn, Ph.D, P.E., 8/8/2017

Quality Review / Date

Tested by: Shawn O'Connor

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

TRI ENVIRONMENTAL, INC.
9063 BEE CAVES RD. – AUSTIN, TX 78733 – USA | PH: 800.880.TEST OR 512.263.2101

Reading #	Time (hr)	Pore Volumes	Gradient, i (m/m)	k_{20} (cm/s)	Q_{in} / Q_{out}	pH	EC (mS)
1	5.8	0.2	657.6	2.93E-09	4.00	- -	- -
2	22.9	0.3	653.2	1.77E-09	1.75	- -	- -
3	46.3	0.4	647.2	1.71E-09	0.75	- -	- -
4	142.1	1.2	613.2	2.51E-09	0.95	- -	- -
5	165.8	1.4	602.4	3.35E-09	1.00	- -	- -
6	190.3	1.7	590.4	3.71E-09	0.93	- -	- -
7	238.9	2.2	566.4	3.82E-09	0.93	- -	- -
8	333.8	3.8	493.8	6.46E-09	0.97	7.69	8.6
9	360.7	4.4	642.3	6.61E-09	0.91	- -	- -
10	382.7	4.9	621.9	6.53E-09	0.96	- -	- -
11	405.8	5.4	600.0	6.96E-09	0.96	- -	- -
12	428.3	5.9	576.7	8.01E-09	0.90	- -	- -
13	501.4	7.5	506.3	7.90E-09	0.98	6.93	12.3

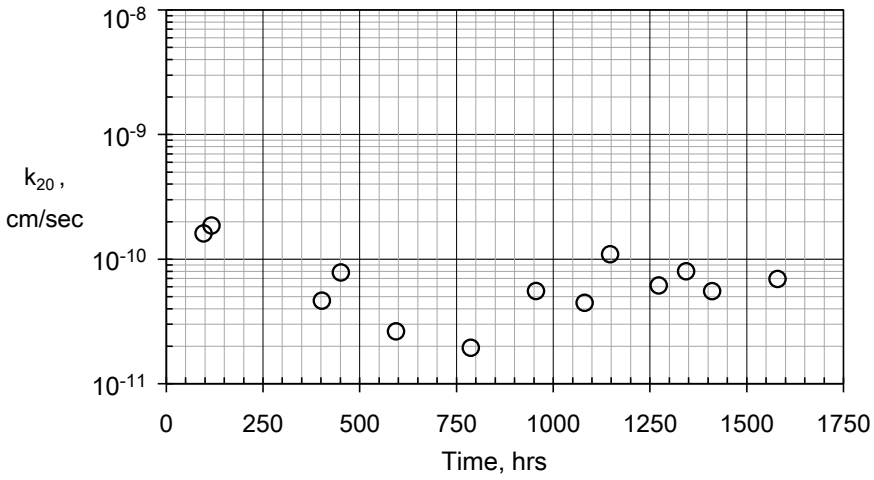
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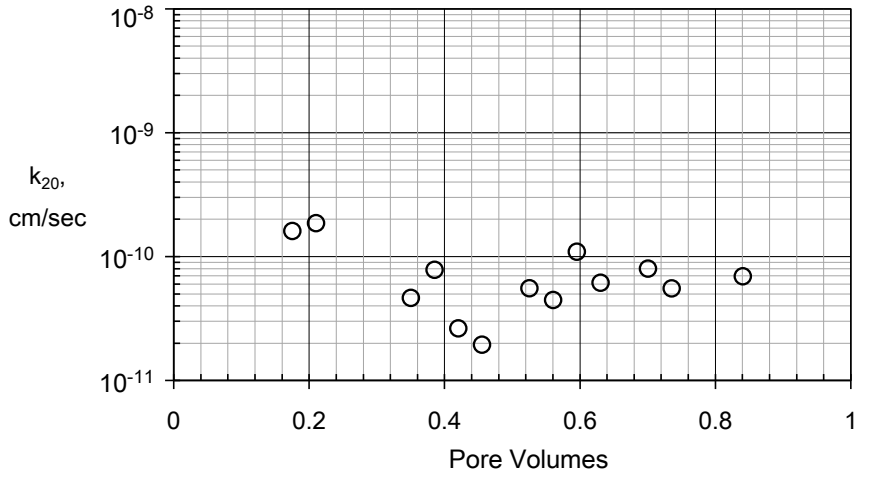
TRI ENVIRONMENTAL, INC.
9063 BEE CAVES RD. – AUSTIN, TX 78733 – USA | PH: 800.880.TEST OR 512.263.2101

GCL Compatibility Test (ASTM D6766 Scenario I Method C)

Client: GSE
Project: Yearly Testing
Sample ID: Lot 1042017C
Product Type: BPM National Bentonite

TRI Log #: 28340
Test Start Date: 5/31/2017





Initial Conditions

Sample Diameter (in)	4.00
Sample Height (in)	-
Moisture Content (%)	10.4
pH	8.6
EC (mS)	1.6

Notes:

Final Conditions

Sample Diameter (in)	4.00
Sample Height (in)	0.13
Moisture Content (%)	62.3
G_s (assumed)	2.65
Porosity, n	0.58
1 Pore Volume (cc)	15.6
Effective Confining Stress at the Efluent End (psi)	72.5
Average Effective Confining Stress (psi)	71.5
Total Back-Pressure (psi)	30.0
pH	7.5
EC (mS)	2.4

Notes:

Description of test liquid:
0.1 M Calcium Chloride Solution

Termination Criteria:
GRI-GCL3 - Outflow-to-inflow hydrauilc conductity within 25%

Results(1)

Hydraulic Conductivity, k_{20}(2) (cm/s)	6.8×10^{-11}
Flux, q_t (m^3/m^2)/s	3.3×10^{-10}
Hydraulic Gradient, i (m/m)	1411.3

(1): Average values obtained from the last 3 readings.

(2): Hydraulic Conductivity, k, corrected to 20°C

Jeffrey A. Kuhn, Ph.D, P.E., 8/8/2017

Quality Review / Date

Tested by: Shawn O'Connor

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Reading #	Time (hr)	Pore Volumes	Gradient, i (m/m)	k_{20} (cm/s)	Q_{in} / Q_{out}	pH	EC (mS)
1	96.4	0.18	1443.2	1.61E-10	1.67	- -	- -
2	116.9	0.21	1441.6	1.86E-10	1.00	- -	- -
3	402.1	0.35	1435.3	4.64E-11	1.33	- -	- -
4	451.2	0.39	1433.3	7.82E-11	1.00	- -	- -
5	593.7	0.42	1431.8	2.63E-11	1.00	- -	- -
6	786.9	0.46	1430.0	1.95E-11	1.00	- -	- -
7	955.3	0.53	1425.5	5.55E-11	0.67	- -	- -
8	1081.0	0.56	1422.7	4.47E-11	0.50	- -	- -
9	1147	0.60	1417.6	1.10E-10	1.00	- -	- -
10	1272	0.63	1416.9	6.15E-11	0.33	- -	- -
11	1343	0.70	1414.4	8.00E-11	2.00	- -	- -
12	1410	0.74	1412.8	5.54E-11	1.00	- -	- -
13	1580	0.84	1406.7	6.94E-11	1.00	7.54	2.4

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

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Report Date
11/21/2018

BentoLiner Manufacturing Certification

Sales Order: 85886

Customer: Southwest Liner Systems, Inc.

Project: SWLS / Sundance West Surface Waste Facillity

Product Type: BLI-075-06N-03S-D-30 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

GSE Environmental, LLC

Roll Allocation List

TRI, TX
Conformance 1/100,000 sf, min 1/lot, 1'xRW
One additional 2'xRW for friction test

Sales Order SO-085886
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS / Sundance West Landfill Cell 1B

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length	
502322549	BLI-075-06N-03S-D-30	28111903	15.50	2025771600	2025662189	1110518C	150.00	
502322550	BLI-075-06N-03S-D-30	28111903	15.50	2025771608	2025662189	1110518C	150.00	
502322551	BLI-075-06N-03S-D-30	28111903	15.50	2025771608	2025662189	1110518C	150.00	
502322552	BLI-075-06N-03S-D-30	28111903	15.50	2025771608	2025662189	1110518C	150.00	
502322553	BLI-075-06N-03S-D-30	28111903	15.50	2025771608	2025662189	1110518C	150.00	
502322554	BLI-075-06N-03S-D-30	28111903	15.50	2025771608	2025662189	1110518C	150.00	
502322555	BLI-075-06N-03S-D-30	28111903	15.50	2025771608	2025662189	1110518C	150.00	
502322556	BLI-075-06N-03S-D-30	28111903	15.50	2025771608	2025662189	1110518C	150.00	
502322557	BLI-075-06N-03S-D-30	28111903	15.50	2025771608	2025662189	1110518C	150.00	conformance
502322558	BLI-075-06N-03S-D-30	28111903	15.50	2025771608	2025714313	1110518D	150.00	
502322559	BLI-075-06N-03S-D-30	28111903	15.50	2025771612	2025714313	1110518D	150.00	
502322560	BLI-075-06N-03S-D-30	28111903	15.50	2025771612	2025714313	1110518D	150.00	
502322561	BLI-075-06N-03S-D-30	28111903	15.50	2025771612	2025714313	1110518D	150.00	
502322562	BLI-075-06N-03S-D-30	28111903	15.50	2025771612	2025714313	1110518D	150.00	
502322563	BLI-075-06N-03S-D-30	28111903	15.50	2025771612	2025714313	1110518D	150.00	
502322564	BLI-075-06N-03S-D-30	28111903	15.50	2025771612	2025714313	1110518D	150.00	
502322565	BLI-075-06N-03S-D-30	28111903	15.50	2025771612	2025714313	1110518D	150.00	
502322566	BLI-075-06N-03S-D-30	28111903	15.50	2025771612	2025714313	1110518D	150.00	
502322567	BLI-075-06N-03S-D-30	28111903	15.50	2025771612	2025714313	1110518D	150.00	
502322568	BLI-075-06N-03S-D-30	28111903	15.50	2025771588	2025714313	1110518D	150.00	
502322569	BLI-075-06N-03S-D-30	28111903	15.50	2025771588	2025714313	1110518D	150.00	
502322570	BLI-075-06N-03S-D-30	28111903	15.50	2025771588	2025714313	1110518D	150.00	
502322571	BLI-075-06N-03S-D-30	28111903	15.50	2025771588	2025714313	1110518D	150.00	
502322572	BLI-075-06N-03S-D-30	28111903	15.50	2025771588	2025714313	1110518D	150.00	
502322573	BLI-075-06N-03S-D-30	28111903	15.50	2025771588	2025714313	1110518D	150.00	friction test
502322574	BLI-075-06N-03S-D-30	28111903	15.50	2025771588	2025714313	1110518D	150.00	
502322575	BLI-075-06N-03S-D-30	28111903	15.50	2025771588	2025714313	1110518D	150.00	
502322576	BLI-075-06N-03S-D-30	28111903	15.50	2025771588	2025714313	1110518D	150.00	
502322577	BLI-075-06N-03S-D-30	28111903	15.50	2025771597	2025714313	1110518D	150.00	
502322578	BLI-075-06N-03S-D-30	28111903	15.50	2025771597	2025714313	1110518D	150.00	
502322579	BLI-075-06N-03S-D-30	28111903	15.50	2025771597	2025714313	1110518D	150.00	
502322580	BLI-075-06N-03S-D-30	28111903	15.50	2025771597	2025714313	1110518D	150.00	
502322581	BLI-075-06N-03S-D-30	28111903	15.50	2025771597	2025713163	1110518D	150.00	
502322582	BLI-075-06N-03S-D-30	28111903	15.50	2025771597	2025713163	1110518D	150.00	
502322583	BLI-075-06N-03S-D-30	28111903	15.50	2025771597	2025713163	1110518D	150.00	
502322584	BLI-075-06N-03S-D-30	28111903	15.50	2025771597	2025713163	1110518D	150.00	
502322585	BLI-075-06N-03S-D-30	28111903	15.50	2025771597	2025713163	1110518D	150.00	
502322586	BLI-075-06N-03S-D-30	28111903	15.50	2025771569	2025713163	1110518D	150.00	
502322587	BLI-075-06N-03S-D-30	28111903	15.50	2025771569	2025713163	1110518D	150.00	
502322588	BLI-075-06N-03S-D-30	28111903	15.50	2025771569	2025713163	1110818A	150.00	
502322589	BLI-075-06N-03S-D-30	28111903	15.50	2025771569	2025713163	1110818A	150.00	
502322590	BLI-075-06N-03S-D-30	28111903	15.50	2025771569	2025713163	1110818A	150.00	

Roll Allocation List

Sales Order SO-085886
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS / Sundance West Landfill Cell 1B

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length	
502322591	BLI-075-06N-03S-D-30	28111903	15.50	2025771569	2025713163	1110818A	150.00	
502322592	BLI-075-06N-03S-D-30	28111903	15.50	2025771569	2025713163	1110818A	150.00	
502322593	BLI-075-06N-03S-D-30	28111903	15.50	2025771569	2025713163	1110818A	150.00	
502322594	BLI-075-06N-03S-D-30	28111903	15.50	2025771569	2025713163	1110818A	150.00	
502322595	BLI-075-06N-03S-D-30	28111903	15.50	2025771569	2025713163	1110818A	150.00	
502322596	BLI-075-06N-03S-D-30	28111903	15.50	2025771606	2025713163	1110818A	150.00	
502322597	BLI-075-06N-03S-D-30	25111903	15.50	2025771606	2025713163	1110818A	150.00	conformance
502322599	BLI-075-06N-03S-D-30	25111903	15.50	2025771606	2025713163	1110818A	150.00	
502322600	BLI-075-06N-03S-D-30	25111903	15.50	2025771606	2025713163	1110818A	150.00	
502322601	BLI-075-06N-03S-D-30	25111903	15.50	2025771606	2025713163	1110818A	150.00	
502322602	BLI-075-06N-03S-D-30	25111903	15.50	2025771606	2025713163	1110818A	150.00	
502322603	BLI-075-06N-03S-D-30	25111903	15.50	2025771606	2025713163	1110818A	150.00	
502322604	BLI-075-06N-03S-D-30	25111903	15.50	2025771606	2025713163	1110818A	150.00	
502322605	BLI-075-06N-03S-D-30	25111903	15.50	2025771606	2025713163	1110818A	150.00	
502322606	BLI-075-06N-03S-D-30	25111903	15.50	2025771556	2025713163	1110818A	150.00	
502322607	BLI-075-06N-03S-D-30	25111903	15.50	2025771556	2025644922	1110818A	150.00	
502322608	BLI-075-06N-03S-D-30	25111903	15.50	2025771556	2025644922	1110818A	150.00	
502322609	BLI-075-06N-03S-D-30	25111903	15.50	2025771556	2025644922	1110818A	150.00	
502322610	BLI-075-06N-03S-D-30	25111903	15.50	2025771556	2025644922	1110818A	150.00	
502322611	BLI-075-06N-03S-D-30	25111903	15.50	2025771556	2025644922	1110818A	150.00	
502322612	BLI-075-06N-03S-D-30	25111903	15.50	2025771556	2025644922	1110818A	150.00	
502322613	BLI-075-06N-03S-D-30	25111903	15.50	2025771556	2025644922	1110818A	150.00	
502322614	BLI-075-06N-03S-D-30	25111903	15.50	2025771556	2025644922	1110818A	150.00	
502322615	BLI-075-06N-03S-D-30	25111903	15.50	2025771580	2025644922	1110818A	150.00	
502322616	BLI-075-06N-03S-D-30	25111903	15.50	2025771580	2025644922	1110818A	150.00	
502322617	BLI-075-06N-03S-D-30	25111903	15.50	2025771580	2025644922	1110818A	150.00	
502322618	BLI-075-06N-03S-D-30	25111903	15.50	2025771580	2025644922	1110818A	150.00	
502322619	BLI-075-06N-03S-D-30	25111903	15.50	2025771580	2025644922	1110818B	150.00	
502322620	BLI-075-06N-03S-D-30	25111903	15.50	2025771580	2025644922	1110818B	150.00	
502322621	BLI-075-06N-03S-D-30	25111903	15.50	2025771580	2025644922	1110818B	150.00	
502322622	BLI-075-06N-03S-D-30	25111903	15.50	2025771580	2025644922	1110818B	150.00	
502322623	BLI-075-06N-03S-D-30	25111903	15.50	2025771580	2025644922	1110818B	150.00	
502322624	BLI-075-06N-03S-D-30	25111903	15.50	2025771590	2025644922	1110818B	150.00	
502322625	BLI-075-06N-03S-D-30	25111903	15.50	2025771590	2025644922	1110818B	150.00	
502322626	BLI-075-06N-03S-D-30	25111903	15.50	2025771590	2025644922	1110818B	150.00	
502322627	BLI-075-06N-03S-D-30	25111903	15.50	2025771590	2025644922	1110818B	150.00	
502322628	BLI-075-06N-03S-D-30	25111903	15.50	2025771590	2025644922	1110818B	150.00	
502322629	BLI-075-06N-03S-D-30	25111903	15.50	2025771590	2025644922	1110818B	150.00	
502322630	BLI-075-06N-03S-D-30	25111903	15.50	2025771590	2025644922	1110818B	150.00	
502322631	BLI-075-06N-03S-D-30	25111903	15.50	2025771590	2025644922	1110818B	150.00	
502322632	BLI-075-06N-03S-D-30	25111903	15.50	2025771590	2025709576	1110818B	150.00	
502322633	BLI-075-06N-03S-D-30	25111903	15.50	2025771604	2025709576	1110818B	150.00	

Roll Allocation List

Sales Order SO-085886
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS / Sundance West Landfill Cell 1B

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length	
502322634	BLI-075-06N-03S-D-30	25111903	15.50	2025771604	2025709576	1110818B	150.00	
502322635	BLI-075-06N-03S-D-30	25111903	15.50	2025771604	2025709576	1110818B	150.00	
502322636	BLI-075-06N-03S-D-30	28112003	15.50	2025771604	2025709576	1110818B	150.00	
502322637	BLI-075-06N-03S-D-30	28112003	15.50	2025771604	2025709576	1110818B	150.00	
502322638	BLI-075-06N-03S-D-30	28112003	15.50	2025771604	2025709576	1110818B	150.00	
502322639	BLI-075-06N-03S-D-30	28112003	15.50	2025771604	2025709576	1110818B	150.00	
502322640	BLI-075-06N-03S-D-30	28112003	15.50	2025771604	2025709576	1110818B	150.00	
502322641	BLI-075-06N-03S-D-30	28112003	15.50	2025771604	2025709576	1110818B	150.00	
502322642	BLI-075-06N-03S-D-30	28112003	15.50	2025771604	2025709576	1110818B	150.00	
502322643	BLI-075-06N-03S-D-30	28112003	15.50	2025771598	2025709576	1110818B	150.00	
502322644	BLI-075-06N-03S-D-30	28112003	15.50	2025771598	2025709576	1110818B	150.00	
502322645	BLI-075-06N-03S-D-30	28112003	15.50	2025771598	2025709576	1110818B	150.00	conformance
502322646	BLI-075-06N-03S-D-30	28112003	15.50	2025771598	2025709576	1110818B	150.00	
502322647	BLI-075-06N-03S-D-30	28112003	15.50	2025771598	2025709576	1110818B	150.00	
502322648	BLI-075-06N-03S-D-30	28112003	15.50	2025771598	2025709576	1110818B	150.00	
502322649	BLI-075-06N-03S-D-30	28112003	15.50	2025771598	2025709576	1110818B	150.00	
502322650	BLI-075-06N-03S-D-30	28112003	15.50	2025771598	2025709576	1110818B	150.00	
502322651	BLI-075-06N-03S-D-30	28112003	15.50	2025771598	2025709576	1110818B	150.00	
502322652	BLI-075-06N-03S-D-30	28112003	15.50	2025771591	2025709576	1110818C	150.00	
502322653	BLI-075-06N-03S-D-30	28112003	15.50	2025771591	2025709576	1110818C	150.00	
502322654	BLI-075-06N-03S-D-30	28112003	15.50	2025771591	2025709576	1110818C	150.00	
502322655	BLI-075-06N-03S-D-30	28112003	15.50	2025771591	2025709576	1110818C	150.00	
502322656	BLI-075-06N-03S-D-30	28112003	15.50	2025771591	2025709576	1110818C	150.00	
502322657	BLI-075-06N-03S-D-30	28112003	15.50	2025771591	2025709576	1110818C	150.00	
502322658	BLI-075-06N-03S-D-30	28112003	15.50	2025771591	2025713164	1110818C	150.00	
502322659	BLI-075-06N-03S-D-30	28112003	15.50	2025771591	2025713164	1110818C	150.00	
502322660	BLI-075-06N-03S-D-30	28112003	15.50	2025771591	2025713164	1110818C	150.00	
502322661	BLI-075-06N-03S-D-30	28112003	15.50	2025771575	2025713164	1110818C	150.00	
502322662	BLI-075-06N-03S-D-30	28112003	15.50	2025771575	2025713164	1110818C	150.00	
502322663	BLI-075-06N-03S-D-30	28112003	15.50	2025771575	2025713164	1110818C	150.00	
502322664	BLI-075-06N-03S-D-30	28112003	15.50	2025771575	2025713164	1110818C	150.00	
502322665	BLI-075-06N-03S-D-30	28112003	15.50	2025771575	2025713164	1110818C	150.00	
502322666	BLI-075-06N-03S-D-30	28112003	15.50	2025771575	2025713164	1110818C	150.00	
502322667	BLI-075-06N-03S-D-30	28112003	15.50	2025771575	2025713164	1110818C	150.00	
502322668	BLI-075-06N-03S-D-30	28112003	15.50	2025771575	2025713164	1110818C	150.00	
502322669	BLI-075-06N-03S-D-30	28112003	15.50	2025771575	2025713164	1110818C	150.00	
502322670	BLI-075-06N-03S-D-30	28112003	15.50	2025771568	2025713164	1110818C	150.00	
502322671	BLI-075-06N-03S-D-30	28112003	15.50	2025771568	2025713164	1110818C	150.00	

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Nov/21/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085886	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-30	

Roll Number	ASTM D4632 Grab Strength (lbs)	Puncture Resistance ASTM D4833 (lbs) GCLPuncture Strength	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf) GCL mass	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)	ASTM D4643 Moisture Content (%) GCL Moisture Content
502322549	179	123	54	43.2	11.2	0.88	0.80	34.5	10.1	14.0	10.0
502322550	179	123	54	43.2	11.2	0.88	0.80	34.5	10.1	14.0	10.0
502322551	179	123	54	43.2	11.2	0.88	0.80	34.5	10.1	14.0	10.0
502322552	179	123	54	43.2	11.2	0.88	0.80	34.5	10.1	14.0	10.0
502322553	179	123	54	43.2	11.2	0.88	0.80	34.5	10.1	14.0	10.0
502322554	179	123	54	43.2	11.2	0.88	0.80	34.5	10.1	14.0	10.0
502322555	179	123	54	43.2	11.2	0.88	0.80	34.5	10.1	14.0	10.0
502322556	179	123	54	43.2	11.2	0.88	0.80	34.5	10.1	14.0	10.0
502322557	179	123	54	43.2	11.2	0.88	0.80	34.5	10.1	14.0	10.0
502322558	179	123	43	43.2	8.7	0.90	0.82	36.0	10.2	12.6	10.1
502322559	179	123	43	43.2	8.7	0.90	0.82	36.0	10.2	12.6	10.1
502322560	179	123	43	43.2	8.7	0.90	0.82	36.0	10.2	12.6	10.1
502322561	179	123	43	43.2	8.7	0.90	0.82	36.0	10.2	12.6	10.1
502322562	179	123	43	43.2	8.7	0.90	0.82	36.0	10.2	12.6	10.1
502322563	179	123	43	43.2	8.7	0.90	0.82	36.0	10.2	12.6	10.1
502322564	179	123	43	43.2	8.7	0.90	0.82	36.0	10.2	12.6	10.1
502322565	179	123	43	43.2	8.7	0.90	0.82	36.0	10.2	12.6	10.1
502322566	179	123	43	43.2	8.7	0.90	0.82	36.0	10.2	12.6	10.1
502322567	179	123	43	43.2	8.7	0.90	0.82	36.0	10.2	12.6	10.1
502322568	179	123	43	43.2	8.7	0.90	0.82	36.0	10.2	12.6	10.1
502322569	179	123	43	43.2	8.7	0.90	0.82	36.0	10.2	12.6	10.1
502322570	179	123	43	43.2	8.7	0.90	0.82	36.0	10.2	12.6	10.1
502322571	179	123	43	43.2	8.7	0.90	0.82	36.0	10.2	12.6	10.1
502322572	179	123	43	43.2	8.7	0.90	0.82	36.0	10.2	12.6	10.1
502322573	179	123	43	43.2	8.7	0.90	0.82	36.0	10.2	12.6	10.1
502322574	195	123	46	46.9	9.5	0.88	0.80	36.0	10.1	12.6	9.8
502322575	195	123	46	46.9	9.5	0.88	0.80	36.0	10.1	12.6	9.8
502322576	195	123	46	46.9	9.5	0.88	0.80	36.0	10.1	12.6	9.8
502322577	195	123	46	46.9	9.5	0.88	0.80	36.0	10.1	12.6	9.8
502322578	195	123	46	46.9	9.5	0.88	0.80	36.0	10.1	12.6	9.8
502322579	195	123	46	46.9	9.5	0.88	0.80	36.0	10.1	12.6	9.8
502322580	195	123	46	46.9	9.5	0.88	0.80	36.0	10.1	12.6	9.8
502322581	195	123	46	46.9	9.5	0.88	0.80	36.0	10.1	12.6	9.8
502322582	195	123	46	46.9	9.5	0.88	0.80	36.0	10.1	12.6	9.8

GSE Environmental, LLC

ROLL TEST DATA REPORT

Report Date: Nov/21/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085886	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-30	

Roll Number	ASTM D4632 Grab Strength (lbs)	Puncture Resistance ASTM D4833 (lbs) GCLPuncture Strength	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf) GCL mass	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)	ASTM D4643 Moisture Content (%) GCL Moisture Content
502322583	195	123	46	46.9	9.5	0.88	0.80	36.0	10.1	12.6	9.8
502322584	195	123	46	46.9	9.5	0.88	0.80	36.0	10.1	12.6	9.8
502322585	195	123	46	46.9	9.5	0.88	0.80	36.0	10.1	12.6	9.8
502322586	195	123	46	46.9	9.5	0.88	0.80	36.0	10.1	12.6	9.8
502322587	195	123	46	46.9	9.5	0.88	0.80	36.0	10.1	12.6	9.8
502322588	195	123	46	46.9	9.5	0.88	0.80	36.0	10.1	14.8	9.8
502322589	195	123	46	46.9	9.5	0.88	0.80	36.0	10.1	14.8	9.8
502322590	166	123	61	40.3	12.2	0.92	0.84	36.0	10.4	14.8	10.1
502322591	166	123	61	40.3	12.2	0.92	0.84	36.0	10.4	14.8	10.1
502322592	166	123	61	40.3	12.2	0.92	0.84	36.0	10.4	14.8	10.1
502322593	166	123	61	40.3	12.2	0.92	0.84	36.0	10.4	14.8	10.1
502322594	166	123	61	40.3	12.2	0.92	0.84	36.0	10.4	14.8	10.1
502322595	166	123	61	40.3	12.2	0.92	0.84	36.0	10.4	14.8	10.1
502322596	166	123	61	40.3	12.2	0.92	0.84	36.0	10.4	14.8	10.1
502322597	166	123	61	40.3	12.2	0.92	0.84	36.0	10.4	14.8	10.1
502322599	198	123	60	48.4	11.5	0.90	0.82	36.0	11.0	14.8	11.0
502322600	198	123	60	48.4	11.5	0.90	0.82	36.0	11.0	14.8	11.0
502322601	198	123	60	48.4	11.5	0.90	0.82	36.0	11.0	14.8	11.0
502322602	198	123	60	48.4	11.5	0.90	0.82	36.0	11.0	14.8	11.0
502322603	198	123	60	48.4	11.5	0.90	0.82	36.0	11.0	14.8	11.0
502322604	198	123	60	48.4	11.5	0.90	0.82	36.0	11.0	14.8	11.0
502322605	198	123	60	48.4	11.5	0.90	0.82	36.0	11.0	14.8	11.0
502322606	198	123	60	48.4	11.5	0.90	0.82	36.0	11.0	14.8	11.0
502322607	198	123	60	48.4	11.5	0.90	0.82	36.0	11.0	14.8	11.0
502322608	198	123	60	48.4	11.5	0.90	0.82	36.0	11.0	14.8	11.0
502322609	198	123	60	48.4	11.5	0.90	0.82	36.0	11.0	14.8	11.0
502322610	198	123	60	48.4	11.5	0.90	0.82	36.0	11.0	14.8	11.0
502322611	198	123	60	48.4	11.5	0.90	0.82	36.0	11.0	14.8	11.0
502322612	198	123	60	48.4	11.5	0.90	0.82	36.0	11.0	14.8	11.0
502322613	198	123	60	48.4	11.5	0.90	0.82	36.0	11.0	14.8	11.0
502322614	152	123	49	46.0	8.9	0.96	0.88	36.0	11.5	14.8	11.3
502322615	152	123	49	46.0	8.9	0.96	0.88	36.0	11.5	14.8	11.3
502322616	152	123	49	46.0	8.9	0.96	0.88	36.0	11.5	14.8	11.3
502322617	152	123	49	46.0	8.9	0.96	0.88	36.0	11.5	14.8	11.3

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Nov/21/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085886	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-30	

Roll Number	ASTM D4632 Grab Strength (lbs)	Puncture Resistance ASTM D4833 (lbs) GCLPuncture Strength	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf) GCL mass	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)	ASTM D4643 Moisture Content (%) GCL Moisture Content
502322618	152	123	49	46.0	8.9	0.96	0.88	36.0	11.5	14.8	11.3
502322619	152	123	49	46.0	8.9	0.96	0.88	37.0	11.5	13.4	11.3
502322620	152	123	49	46.0	8.9	0.96	0.88	37.0	11.5	13.4	11.3
502322621	152	123	49	46.0	8.9	0.96	0.88	37.0	11.5	13.4	11.3
502322622	152	123	49	46.0	8.9	0.96	0.88	37.0	11.5	13.4	11.3
502322623	152	123	49	46.0	8.9	0.96	0.88	37.0	11.5	13.4	11.3
502322624	152	123	49	46.0	8.9	0.96	0.88	37.0	11.5	13.4	11.3
502322625	152	123	49	46.0	8.9	0.96	0.88	37.0	11.5	13.4	11.3
502322626	152	123	49	46.0	8.9	0.96	0.88	37.0	11.5	13.4	11.3
502322627	152	123	49	46.0	8.9	0.96	0.88	37.0	11.5	13.4	11.3
502322628	152	123	49	46.0	8.9	0.96	0.88	37.0	11.5	13.4	11.3
502322629	152	123	49	46.0	8.9	0.96	0.88	37.0	11.5	13.4	11.3
502322630	181	111	48	43.2	7.5	0.88	0.80	37.0	10.7	13.4	10.8
502322631	181	111	48	43.2	7.5	0.88	0.80	37.0	10.7	13.4	10.8
502322632	181	111	48	43.2	7.5	0.88	0.80	37.0	10.7	13.4	10.8
502322633	181	111	48	43.2	7.5	0.88	0.80	37.0	10.7	13.4	10.8
502322634	181	111	48	43.2	7.5	0.88	0.80	37.0	10.7	13.4	10.8
502322635	181	111	48	43.2	7.5	0.88	0.80	37.0	10.7	13.4	10.8
502322636	181	111	48	43.2	7.5	0.88	0.80	37.0	10.7	13.4	10.8
502322637	181	111	48	43.2	7.5	0.88	0.80	37.0	10.7	13.4	10.8
502322638	181	111	48	43.2	7.5	0.88	0.80	37.0	10.7	13.4	10.8
502322639	181	111	48	43.2	7.5	0.88	0.80	37.0	10.7	13.4	10.8
502322640	181	111	48	43.2	7.5	0.88	0.80	37.0	10.7	13.4	10.8
502322641	181	111	48	43.2	7.5	0.88	0.80	37.0	10.7	13.4	10.8
502322642	181	111	48	43.2	7.5	0.88	0.80	37.0	10.7	13.4	10.8
502322643	181	111	48	43.2	7.5	0.88	0.80	37.0	10.7	13.4	10.8
502322644	181	111	48	43.2	7.5	0.88	0.80	37.0	10.7	13.4	10.8
502322645	181	111	48	43.2	7.5	0.88	0.80	37.0	10.5	13.4	10.8
502322646	203	111	56	48.8	9.9	0.90	0.83	37.0	10.5	13.4	10.6
502322647	203	111	56	48.8	9.9	0.90	0.83	37.0	10.5	13.4	10.6
502322648	203	111	56	48.8	9.9	0.90	0.83	37.0	10.5	13.4	10.6
502322649	203	111	56	48.8	9.9	0.90	0.83	37.0	10.5	13.4	10.6
502322650	203	111	56	48.8	9.9	0.90	0.83	37.0	10.5	13.4	10.6
502322651	203	111	56	48.8	9.9	0.90	0.83	34.5	10.5	14.0	10.6

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Nov/21/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085886	Southwest Liner Systems, Inc.	Eunice NM US	BLI-075-06N-03S-D-30	

Roll Number	ASTM D4632 Grab Strength (lbs)	Puncture Resistance ASTM D4833 (lbs) GCLPuncture Strength	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf) GCL mass	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)	ASTM D4643 Moisture Content (%) GCL Moisture Content
502322652	203	111	56	48.8	9.9	0.90	0.83	34.5	10.5	14.0	10.6
502322653	203	111	56	48.8	9.9	0.90	0.83	34.5	10.5	14.0	10.6
502322654	203	111	56	48.8	9.9	0.90	0.83	34.5	10.5	14.0	10.6
502322655	203	111	56	48.8	9.9	0.90	0.83	34.5	10.5	14.0	10.6
502322656	203	111	56	48.8	9.9	0.90	0.83	34.5	10.5	14.0	10.6
502322657	203	111	56	48.8	9.9	0.90	0.83	34.5	10.5	14.0	10.6
502322658	203	111	56	48.8	9.9	0.90	0.83	34.5	10.5	14.0	10.6
502322659	203	111	56	48.8	9.9	0.90	0.83	34.5	10.5	14.0	10.6
502322660	203	111	56	48.8	9.9	0.90	0.83	34.5	10.5	14.0	10.6
502322661	203	111	56	48.8	9.9	0.90	0.83	34.5	10.5	14.0	10.6
502322662	147	111	59	41.3	9.9	0.86	0.79	34.5	10.0	14.0	9.9
502322663	147	111	59	41.3	9.9	0.86	0.79	34.5	10.0	14.0	9.9
502322664	147	111	59	41.3	9.9	0.86	0.79	34.5	10.0	14.0	9.9
502322665	147	111	59	41.3	9.9	0.86	0.79	34.5	10.0	14.0	9.9
502322666	162	111	52	42.7	8.7	0.91	0.84	34.5	10.0	14.0	9.9
502322667	162	111	52	42.7	8.7	0.91	0.84	34.5	10.0	14.0	9.9
502322668	162	111	52	42.7	8.7	0.91	0.84	34.5	10.0	14.0	9.9
502322669	162	111	52	42.7	8.7	0.91	0.84	34.5	10.0	14.0	9.9
502322670	162	111	52	42.7	8.7	0.91	0.84	34.5	10.0	14.0	9.9
502322671	162	111	52	42.7	8.7	0.91	0.84	34.5	10.0	14.0	9.9

Laboratory Manager

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GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: 21-Nov-2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
85886	Southwest Liner Systems, Inc.	SWLS / Sundance West Surface Waste Facillity	BLI-GEO-NW-0605	

Roll Number	Mass per Unit Area ASTM D5261 (oz/yd²)
2025171580	7.44
2025771556	7.72
2025771568	7.41
2025771569	7.41
2025771575	7.07
2025771580	7.44
2025771588	7.76
2025771590	7.76
2025771591	7.67
2025771597	7.60
2025771598	7.60
2025771600	8.51
2025771604	7.61
2025771606	7.61
2025771608	7.78
2025771612	7.44
2025771556	7.72

Laboratory Manager Mauricio Ossa

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: 21-Nov-2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
85886	Southwest Liner Systems, Inc.	SWLS / Sundance West Surface Waste Facility	BLI-GEO-WS-0305	

Roll Number	Mass per Unit Area ASTM D5261 (oz/yd²)
2025644922	3.20
2025662189	3.22
2025709576	3.28
2025713163	3.24
2025713164	3.24
2025714313	3.28

Laboratory Manager Mauricio Ossa

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2018

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
B0004014138	**11-06-18**	**1110518B**	**9.1**	**0.32**	**3.33**	**13.6**	**110**	**33**	**996**
B0004014139	**11-06-18**	**1110518C**	**10.2**	**0.34**	**1.87**	**13.8**	**110**	**32**	**1000**

NOVEMBER		% 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
No. of CARS	M AVG	**9.05**	**0.46**	**4.43**	**13.58**	**111.29**	**33.19**	**993.29**
29	STD DEV	**0.80**	**0.27**	**2.07**	**0.53**	**2.47**	**1.40**	**36.15**

YTD		% 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
No. of CARS	M AVG	**9.01**	**0.38**	**4.11**	**13.63**	**109.75**	**31.33**	**964.05**
626	STD DEV	**0.93**	**0.68**	**1.94**	**1.15**	**5.03**	**1.88**	**70.01**

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

Attn: **Bob Stadler (rstadler@gseworld.com)**
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CC: Thomas Anderson
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Prepared by: TO
11/20/18

GSE BENTOLINER

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PRODUCT : NATIONAL® 30

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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
B0004014140	**11-07-18**	**1110518D**	**10.6**	**0.37**	**1.60**	**14.0**	**114**	**33**	**1013**

NOVEMBER		% 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
No. of CARS **11**	M AVG	**9.29**	**0.30**	**5.06**	**13.77**	**111.23**	**32.77**	**992.62**
	STD DEV	**0.79**	**0.19**	**2.33**	**0.49**	**1.85**	**1.42**	**14.18**

YTD		% 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
No. of CARS **608**	M AVG	**9.02**	**0.38**	**4.11**	**13.63**	**109.70**	**31.28**	**963.26**
	STD DEV	**0.93**	**0.68**	**1.95**	**1.16**	**5.07**	**1.86**	**70.36**

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Prepared by: TO
11/07/18

GSE BENTOLINER

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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**
B0004014141	**11-08-18**	**1110818A**	**8.8**	**0.44**	**6.13**	**12.6**	**112**	**34**	**979**

NOVEMBER		% 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**
No. of CARS **12**	M AVG	**9.26**	**0.31**	**5.13**	**13.69**	**111.29**	**32.86**	**991.64**
	STD DEV	**0.77**	**0.19**	**2.26**	**0.56**	**1.79**	**1.41**	**14.10**

YTD		% 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**
No. of CARS **609**	M AVG	**9.02**	**0.38**	**4.12**	**13.63**	**109.71**	**31.28**	**963.29**
	STD DEV	**0.93**	**0.68**	**1.95**	**1.16**	**5.07**	**1.87**	**70.31**

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11/08/18

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2018

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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
B0004014142	**11-08-18**	**1110818B**	**8.9**	**0.45**	**2.30**	**13.4**	**110**	**33**	**973**

NOVEMBER		% 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
No. of CARS	M AVG	**9.23**	**0.32**	**4.94**	**13.67**	**111.20**	**32.87**	**990.40**
13	STD DEV	**0.75**	**0.18**	**2.30**	**0.54**	**1.76**	**1.36**	**14.40**

YTD		% 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
No. of CARS	M AVG	**9.02**	**0.38**	**4.11**	**13.63**	**109.71**	**31.28**	**963.30**
610	STD DEV	**0.93**	**0.68**	**1.95**	**1.16**	**5.07**	**1.87**	**70.26**

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Prepared by: TO
11/09/18

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2018

PRODUCT : NATIONAL® 30

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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
B0004014145	**11-09-18**	**1110818C**	**8.6**	**0.77**	**3.37**	**13.6**	**106**	**32**	**960**

NOVEMBER		% 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
No. of CARS	M AVG	**9.19**	**0.35**	**4.85**	**13.66**	**110.88**	**32.81**	**988.50**
14	STD DEV	**0.74**	**0.21**	**2.26**	**0.53**	**2.12**	**1.33**	**15.76**

YTD		% 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
No. of CARS	M AVG	**9.02**	**0.38**	**4.11**	**13.63**	**109.70**	**31.28**	**963.29**
611	STD DEV	**0.93**	**0.68**	**1.94**	**1.16**	**5.06**	**1.86**	**70.21**

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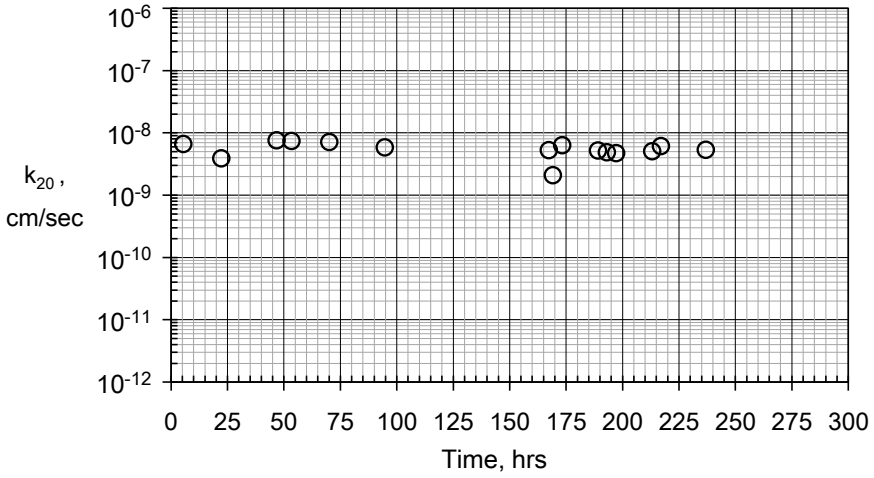
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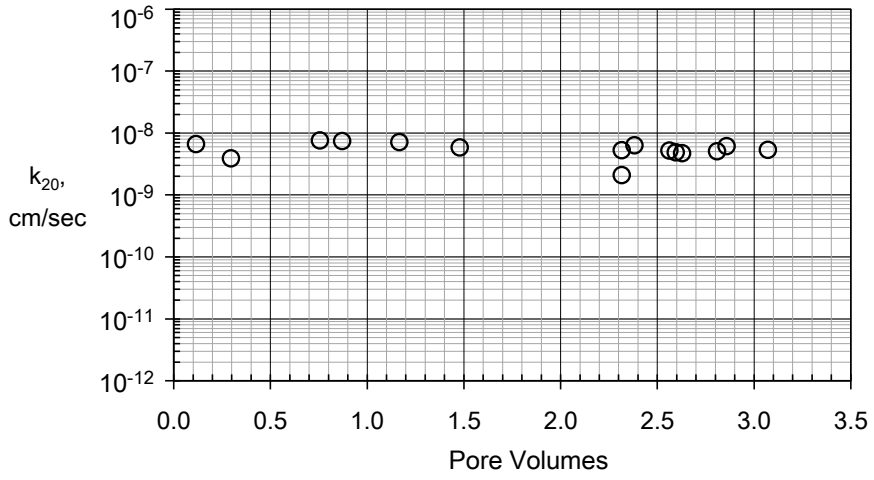
Prepared by: TO
11/09/18

GCL Compatibility Test (ASTM D6766 Scenario I Method C)

Client: Solmax-GSE
Project: Yearly Testing
Sample ID: Lot 1080318B
Product Type: Bentonite, Loose

TRI Log #: 40026





Initial Conditions

Sample Diameter (in)	3.99
Sample Height (in)	0.22
Moisture Content (%)	9.1
pH	7.1
EC (mS)	18

Final Conditions

Sample Diameter (in)	3.99
Sample Height (in)	0.22
Moisture Content (%)	97.0
G_s (assumed)	2.65
Porosity, n	0.75
1 Pore Volume (cc)	33.2
Effective Confining Stress at the Effluent End (psi)	5.0
Average Effective Confining Stress (psi)	4.0
Total Back-Pressure (psi)	75.0
pH	6.8
EC (mS)	9.4

Notes:

Description of test liquid:
0.1 M Calcium Chloride Solution

Termination Criteria:
GRI-GCL3 - Outflow-to-inflow hydrauilc conductity within 25%

Results(1)

Hydraulic Conductivity, k_{20}(2) (cm/s)	5.5×10^{-9}
Flux, q_t (m^3/m^2)/s	1.3×10^{-8}
Hydraulic Gradient, i (m/m)	411.8

(1): Average values obtained from the last 3 readings.

(2): Hydraulic Conductivity, k, corrected to 20°C

Jeffrey A. Kuhn, Ph.D, P.E., 11/19/2018

Quality Review / Date

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

TRI ENVIRONMENTAL, INC.
9063 BEE CAVES RD. – AUSTIN, TX 78733 – USA | PH: 800.880.TEST OR 512.263.2101

Reading #	Time (hr)	Pore Volumes	Gradient, i (m/m)	k_{20} (cm/s)	Q_{in} / Q_{out}	pH	EC (mS)
1	5.4	0.1	528.4	6.65E-09	1.40	- -	- -
2	22.2	0.3	521.3	3.91E-09	1.10	- -	- -
3	46.7	0.8	502.2	7.61E-09	0.93	- -	- -
4	53.3	0.9	497.3	7.43E-09	0.87	- -	- -
5	70.1	1.2	485.2	7.16E-09	0.95	- -	- -
6	94.7	1.5	471.1	5.86E-09	0.83	- -	- -
7	167.3	2.3	436.1	5.29E-09	0.93	- -	- -
8	169.1	2.3	435.9	2.10E-09	0.00	- -	- -
9	173.3	2.4	433.5	6.35E-09	1.33	- -	- -
10	189.1	2.6	426.3	5.22E-09	1.00	- -	- -
11	193.0	2.6	424.6	4.89E-09	0.67	- -	- -
12	197.1	2.6	422.9	4.74E-09	0.67	- -	- -
13	213.1	2.8	416.1	5.08E-09	1.10	- -	- -
14	217.0	2.9	414.0	6.15E-09	1.00	- -	- -
15	236.9	3.1	405.2	5.36E-09	0.93	6.8	9.43

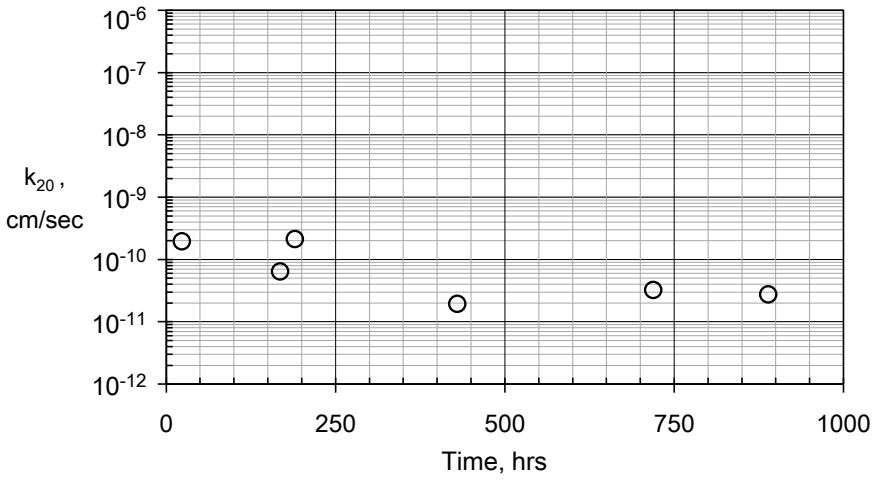
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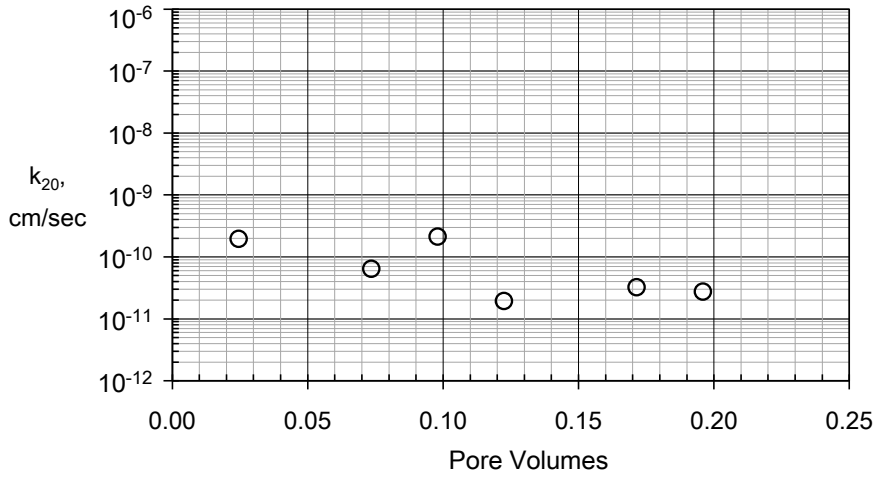
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GCL Compatibility Test (ASTM D6766 Scenario I Method C)

Client: Solmax-GSE
Project: Yearly Testing
Sample ID: Lot 1080318B
Product Type: Bentonite, Loose

TRI Log #: 40026





Initial Conditions

Sample Diameter (in)	3.99
Sample Height (in)	0.22
Moisture Content (%)	9.1
pH	7.1
EC (mS)	18

Notes:

Final Conditions

Sample Diameter (in)	3.99
Sample Height (in)	0.16
Moisture Content (%)	17.6
G_s (assumed)	2.65
Porosity, n	0.66
1 Pore Volume (cc)	22.3
Effective Confining Stress at the Effluent End (psi)	72.5
Average Effective Confining Stress (psi)	71.5
Total Back-Pressure (psi)	30.0
pH	8.4
EC (mS)	*

*Insufficient effluent volume for EC measurement.

Description of test liquid:
0.1 M Calcium Chloride Solution

Termination Criteria:
GRI-GCL3 - Outflow-to-inflow hydrauilc conductity within 25%

Results(1)

Hydraulic Conductivity, k_{20}(2) (cm/s)	2.6×10^{-11}
Flux, q_t (m^3/m^2)/s	1.0×10^{-10}
Hydraulic Gradient, i (m/m)	928.8

(1): Average values obtained from the last 3 readings.

(2): Hydraulic Conductivity, k, corrected to 20°C

Jeffrey A. Kuhn, Ph.D, P.E., 11/7/2018

Quality Review / Date

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Reading #	Time (hr)	Pore Volumes	Gradient, i (m/m)	k_{20} (cm/s)	Q_{in} / Q_{out}	pH	EC (mS)
1	23.0	0.02	935.6	1.96E-10	1.00	- -	- -
2	168.1	0.07	933.1	6.44E-11	1.00	- -	- -
3	189.8	0.10	932.0	2.13E-10	1.00	- -	- -
4	429.7	0.12	930.8	1.94E-11	1.00	- -	- -
5	719.0	0.17	928.4	3.25E-11	1.00	- -	- -
6	888.8	0.20	927.3	2.76E-11	1.00	8.4	-

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TRI ENVIRONMENTAL, INC.
9063 BEE CAVES RD. – AUSTIN, TX 78733 – USA | PH: 800.880.TEST OR 512.263.2101

4/10/2018

GSE ENVIRONMENTAL™

Geotextile Durability GRI-GCL3

Roll #21270936 BLI-GEO-WS-0305 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	120.9	120.9
2	103.7	113.4
3	126.1	94.2
4	135.6	90.2
5	128.5	100.4
Avg.	123.0	103.8
SD	12.0	13.0
Strength Retained (%) 84.4		

Roll #2025327556 BLI-GEO-NW-0605 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	33.6	32
2	34.6	34.9
3	35.8	40.8
4	34.2	43.4
5	40.2	37.5
Avg.	35.7	37.7
SD	2.7	4.5
Strength Retained (%) 105.7		

Roll #21250897 BLI-GEO-WS-0305 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	118.8	110.8
2	117.8	118
3	111.8	94
4	100.8	116.7
5	123.8	129.6
Avg.	114.6	113.8
SD	8.8	13.0
Strength Retained (%) 99.3		

Roll #2025297591 BLI-GEO-NW-0605 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	33.8	43.3
2	34.1	31.8
3	26.2	35
4	37.1	33.9
5	43.7	42.1
Avg.	35.0	37.2
SD	6.3	5.2
Strength Retained (%) 106.4		

Roll #21250895 BLI-GEO-WS-0305 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	128.3	110.9
2	128.1	122.2
3	126.9	118.7
4	107.7	113.0
5	115.9	77.8
Avg.	121.4	108.5
SD	9.2	17.7
Strength Retained (%) 89.4		

Roll #2025310781 BLI-GEO-NW-0605 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	41.4	33.9
2	31.7	36.9
3	34.7	41.2
4	37.7	34.1
5	41.5	38.2
Avg.	37.4	36.9
SD	4.3	3.0
Strength Retained (%) 98.6		

Roll #21270903 BLI-GEO-WS-0305 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	88.8	138.2
2	118.9	105.4
3	122.4	123.5
4	123.4	124.2
5	135.4	108.2
Avg.	117.8	119.9
SD	17.4	13.4
Strength Retained (%) 101.8		

Roll #2025297652 BLI-GEO-NW-0605 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	37.3	36.4
2	32.5	37
3	37.7	34.7
4	40.8	36.3
5	38.6	43.1
Avg.	37.4	37.5
SD	3.0	3.2
Strength Retained (%) 100.3		

Roll #21270903 BLI-GEO-WS-0305 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	127.8	133.8
2	143	135.4
3	134.1	135.9
4	132.8	140.3
5	136.4	132.3
Avg.	134.8	135.5
SD	5.6	3.0
Strength Retained (%) 100.5		

Roll #2025307690 BLI-GEO-NW-0605 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	45	42.2
2	34.6	52.4
3	26.4	37.2
4	29.4	27.1
5	35.2	32.2
Avg.	34.1	38.2
SD	7.1	9.7
Strength Retained (%) 112.0		

Roll #21280871 BLI-GEO-WS-0305 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	168.5	136.4
2	134.2	127.7
3	130.6	117.9
4	132.5	139.1
5	134.7	125
Avg.	140.1	129.2
SD	16.0	8.6
Strength Retained (%) 92.2		

Roll #2025276623 BLI-GEO-NW-0605 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	31.5	29.6
2	30.1	30.9
3	24.2	38.1
4	41	30.3
5	38.2	38.8
Avg.	33.0	33.5
SD	6.7	4.5
Strength Retained (%) 101.6		

Roll #21250933 BLI-GEO-WS-0305 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	173.7	141
2	114	133.4
3	153.5	124.8
4	135.5	140.5
5	139.2	122.4
Avg.	143.2	132.4
SD	22.2	8.6
Strength Retained (%) 92.5		

Roll #2025272404 BLI-GEO-NW-0605 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	50.3	36
2	45.6	46.1
3	40.2	30.5
4	32.4	37.1
5	31.7	53.4
Avg.	40.0	40.6
SD	8.1	9.1
Strength Retained (%) 101.4		

Roll #21201970 BLI-GEO-WS-0305 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	139.1	141.8
2	142	140.8
3	130.1	128.5
4	136.9	136.6
5	182.3	143.9
Avg.	146.1	138.3
SD	20.7	6.1
Strength Retained (%) 94.7		

Roll #2025324973 BLI-GEO-NW-0605 ASTM D 6768 - MD		
	Unexposed (lb/in)	50 Days @ 60°C (lb/in)
1	34.4	27.3
2	34	32.8
3	29.2	42.1
4	29.4	22.9
5	24.3	34.8
Avg.	30.3	32.0
SD	4.1	7.3
Strength Retained (%) 105.7		

Don Cunningham
Lab Technician III

Large Scale Direct Shear Report

Project Name: SWLS / Sundance West Landfill Cell 1B Periodic Internal Shear Report Sales Order No. 85886

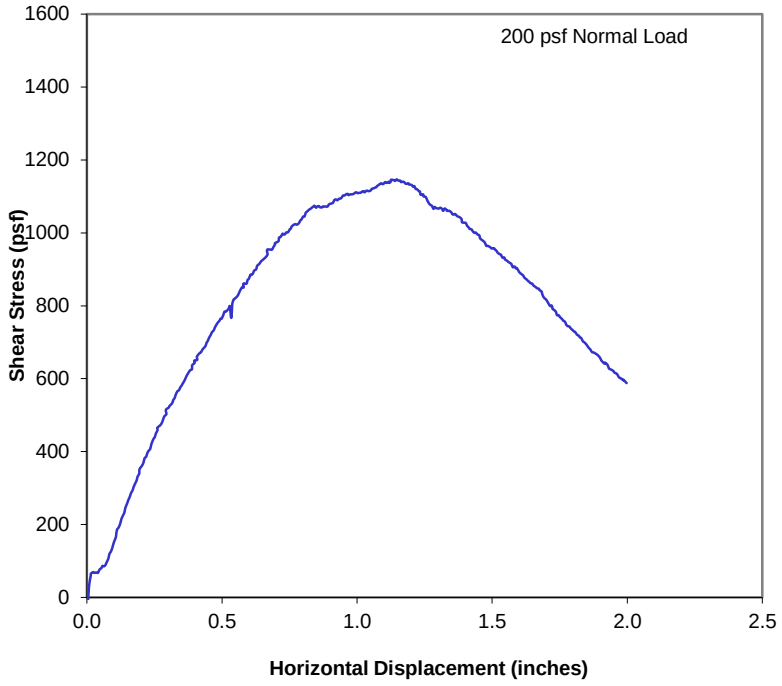
Profile: Testing Date: 9/19/2018

Internal Shear of BentoLiner NSL, Roll #502319246 Lot #28091303
BLI-075-06N-03S-D-30

DISPLACEMENT vs SHEAR STRESS

Normal Stress (psf)	*Peak Stress (psf)*	*L.D. Stress (psf)*
200	1147	588

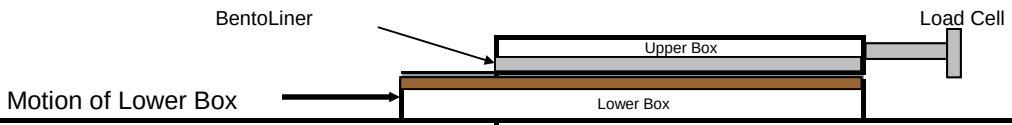
The GCL slipped against the gripper plate with a peak shear stress of 1147 psf. The was no internal failure of the GCL.



TESTING INFORMATION:

1. Tests were conducted in general accordance with ASTM 6243.
2. Tests were conducted with the profile immersed in tap water.
3. The GCL was hydrated for 24 hours at 200 psf before the start of shearing.
4. Testing Speed: 0.04 in/min
5. Large Displacement (LD): 2.0 inches
6. The 200 psf normal load was applied with a dead weight load.

TEST ORIENTATION



SHEAR DEVICE INFORMATION:

1. Manufactured by GeoSyntec Consultants
2. Upper box dimensions: 12" x 12" x 3"
3. Lower box dimensions: 12" x 16" x 3"
4. Large Displacement: Up to 4"

APPENDIX B

Material Manufacturer Certification and Conformance Testing Results

B.2. GCL Conformance Testing Results

Report Date
12/3/2018

Quality Assurance Laboratory Test Results

Project: SWLS / Sundance West Surface Waste Facillity
Sales Order: 85886
Product: BLI-075-06N-03S-D-30 BentoLiner NSL

Required Testing: ASTM D5887 - Standard Test Method for Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter

Frequency: 1/270,000 sf

Effective Stress: 5 psi

Daily Lot	Roll Number	Production Date	Index Flux ($m^3/m^2/sec$)	Hydraulic Conductivity (cm/sec)
28111903	502322549	11/19/2018	3.54E-09	1.42E-09
28112003	502322637	11/20/2018	1.59E-09	7.17E-10

Approved By:	Chuck Taylor
Date Approved:	12/3/2018

December 4, 2018

Mail To:

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

email: swls.md@gmail.com

Bill To:

<= Same (P.O. # SW1819)

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 Phase 2 Landfill - Cell 1A**
TRI Job Reference Number:	43096
Material(s) Tested:	Three, Solmax GSE BentoLiner NSL GCLs
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,

Richard S. Lacey*, P.E.
Senior Engineer
Geosynthetic Services Division
www.GeosyntheticTesting.com

Lead GCL Technical Contact - Jeffrey A. Kuhn, Ph.D., P.E., jkuhn@tri-env.com, 512-952-1212

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.

GCL TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE BentoLiner NSL GCL
Sample Identification: 502322557
TRI Log #: 43096

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)	0.78	0.83	0.97	0.84	0.89						**0.86**	0.07	0.75 min
Moisture Content (%)	10.0	10.0	9.9	9.9	9.6						**9.9**	0.2	
Bentonite - Swell Index (ASTM D5890)													
Swell index (mL/2g)		29									**29**		24 min
Note: Bentonite sample tested is taken from finished GCL product.													
Bentonite - Fluid Loss (ASTM D5891)													
Slurry temperature at test intiation:		25.4	° C		Slurry temperature at test completion:				21.4	° C			
Fluid Loss (mL)		12.0									**12.0**		18 max
Note: Bentonite sample tested is taken from finished GCL product.													

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.

GCL TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE BentoLiner NSL GCL
Sample Identification: 502322597
TRI Log #: 43096

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)	0.82	0.85	0.93	0.85	0.89						**0.87**	0.04	0.75 min
Moisture Content (%)	9.0	9.1	9.0	8.9	8.5						**8.9**	0.2	
Bentonite - Swell Index (ASTM D5890)													
Swell index (mL/2g)		28									**28**		24 min
Note: Bentonite sample tested is taken from finished GCL product.													
Bentonite - Fluid Loss (ASTM D5891)													
Slurry temperature at test intiation:		25.0 ° C			Slurry temperature at test completion:				21.5 ° C				
Fluid Loss (mL)		12.2									**12.2**		18 max
Note: Bentonite sample tested is taken from finished GCL product.													

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.

GCL TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE BentoLiner NSL GCL
Sample Identification: 502322645
TRI Log #: 43096

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Bentonite - Mass/Unit Area (ASTM D5993, result @ 0% M.C.)													
Bentonite mass/unit area (lbs/ft^2)	0.81	0.83	0.91	0.75	0.79						**0.82**	0.06	0.75 min
Moisture Content (%)	10.4	10.6	10.5	10.7	10.1						**10.5**	0.2	
Bentonite - Swell Index (ASTM D5890)													
Swell index (mL/2g)		29									**29**		24 min
Note: Bentonite sample tested is taken from finished GCL product.													
Bentonite - Fluid Loss (ASTM D5891)													
Slurry temperature at test intiation:		25.7 ° C			Slurry temperature at test completion:				21.7 ° C				
Fluid Loss (mL)		13.2									**13.2**		18 max
Note: Bentonite sample tested is taken from finished GCL product.													

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

GSE Roll Allocation

Order SO-085886
Customer Southwest Liner Systems, Inc.
Project Name Sundance West Surface Waste Facillity

Roll#	Resin Lot	Product Code	Mfg Date	Length
103216946	18G1310	HDS-060AE-BBB-B-00	11/10/2018	560
103216947	18G1310	HDS-060AE-BBB-B-00	11/10/2018	560
103216948	18G1310	HDS-060AE-BBB-B-00	11/10/2018	560
103216949	18G1310	HDS-060AE-BBB-B-00	11/10/2018	560
103216950	18G1310	HDS-060AE-BBB-B-00	11/10/2018	560
103216952	18G1310	HDS-060AE-BBB-B-00	11/10/2018	560
103216953	18G1310	HDS-060AE-BBB-B-00	11/10/2018	560
103216954	18G1310	HDS-060AE-BBB-B-00	11/10/2018	560
103216956	18G1310	HDS-060AE-BBB-B-00	11/11/2018	560
103216957	18G1310	HDS-060AE-BBB-B-00	11/11/2018	560
103216958	18G1310	HDS-060AE-BBB-B-00	11/11/2018	560
103216959	18G1310	HDS-060AE-BBB-B-00	11/11/2018	560
103216960	18G1310	HDS-060AE-BBB-B-00	11/11/2018	560
103216961	18G1310	HDS-060AE-BBB-B-00	11/11/2018	560
103216962	18G1310	HDS-060AE-BBB-B-00	11/11/2018	560
103216964	18G1310	HDS-060AE-BBB-B-00	11/11/2018	560
103216965	18G1310	HDS-060AE-BBB-B-00	11/11/2018	560
103216966	18G1310	HDS-060AE-BBB-B-00	11/11/2018	560
103216967	18G1310	HDS-060AE-BBB-B-00	11/11/2018	560
103216968	18G1310	HDS-060AE-BBB-B-00	11/11/2018	560
103216969	18G1310	HDS-060AE-BBB-B-00	11/12/2018	560
103216970	18G1310	HDS-060AE-BBB-B-00	11/12/2018	560
103216971	18G1310	HDS-060AE-BBB-B-00	11/12/2018	560
103216972	18G1311	HDS-060AE-BBB-B-00	11/12/2018	560
103216973	18G1311	HDS-060AE-BBB-B-00	11/12/2018	560
103216974	18G1311	HDS-060AE-BBB-B-00	11/12/2018	560
103216975	18G1311	HDS-060AE-BBB-B-00	11/12/2018	560
103216976	18G1311	HDS-060AE-BBB-B-00	11/12/2018	560
103216981	18G1311	HDS-060AE-BBB-B-00	11/14/2018	560
103216982	18G1311	HDS-060AE-BBB-B-00	11/14/2018	560
103216983	18G1311	HDS-060AE-BBB-B-00	11/14/2018	560

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Nov/15/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085886	Southwest Liner Systems, Inc.	Eunice NM US	HDS-060AE-BBB-B-00	

Roll Number	Average Thickness ASTM D5199 (mils)	Minimum Thickness ASTM D5199 (mils)	Yield Strength ASTM D6693 (ppi) MD	Yield Strength ASTM D6693 (ppi) TD	Yield Elongation ASTM D6693 (%) MD	Yield Elongation ASTM D6693 (%) TD	Break Strength ASTM D6693 (ppi) MD	Break Strength ASTM D6693 (ppi) TD	Break Elongation ASTM D6693 (%) MD	Break Elongation ASTM D6693 (%) TD	Tear Resistance ASTM D1004 (lbs) MD	Tear Resistance ASTM D1004 (lbs) TD	Puncture Resistance ASTM D4833 (lbs)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Carbon Black Dispersion ASTM D5596 (Views in Cat1-Cat2)
103216946	63	59	137	146	18	18	269	269	710	732	49	46	149	0.946	2.4	10
103216947	63	60	150	144	18	18	332	312	939	840	49	45	147	0.945	2.4	10
103216948	62	60	150	144	18	18	332	312	939	840	49	45	147	0.945	2.4	10
103216949	61	58	150	144	18	18	332	312	939	840	49	45	147	0.945	2.3	10
103216950	60	55	137	146	17	18	268	300	769	833	49	46	150	0.945	2.3	10
103216952	60	58	137	146	17	18	268	300	769	833	49	46	150	0.945	2.4	10
103216953	61	58	137	146	17	18	268	300	769	833	49	46	150	0.945	2.4	10
103216954	62	60	151	154	17	17	285	289	780	828	50	48	151	0.945	2.4	10
103216956	63	60	151	154	17	17	285	289	780	828	50	48	151	0.945	2.4	10
103216957	63	60	151	154	17	17	285	289	780	828	50	48	151	0.945	2.3	10
103216958	63	59	159	151	18	18	316	299	863	786	51	49	153	0.945	2.3	10
103216959	62	59	159	151	18	18	316	299	863	786	51	49	153	0.944	2.3	10
103216960	64	61	159	151	18	18	316	299	863	786	51	49	153	0.944	2.3	10
103216961	64	61	140	143	19	18	305	317	846	903	46	48	143	0.944	2.3	10
103216962	64	62	140	143	19	18	305	317	846	903	46	48	143	0.944	2.3	10
103216964	64	62	140	143	19	18	305	317	846	903	46	48	143	0.944	2.3	10
103216965	63	57	144	136	17	17	266	285	782	871	48	45	147	0.944	2.3	10
103216966	61	58	144	136	17	17	266	285	782	871	48	45	147	0.944	2.2	10
103216967	60	57	144	136	17	17	266	285	782	871	48	45	147	0.944	2.2	10
103216968	61	57	145	148	18	18	265	278	734	794	50	47	146	0.944	2.2	10
103216969	61	57	145	148	18	18	265	278	734	794	50	47	146	0.944	2.2	10
103216970	61	57	145	148	18	18	265	278	734	794	50	47	146	0.945	2.2	10
103216971	61	58	147	156	18	18	259	307	707	843	51	50	150	0.945	2.2	10
103216972	62	59	147	156	18	18	259	307	707	843	51	50	150	0.945	2.4	10
103216973	62	59	147	156	18	18	259	307	707	843	51	50	150	0.945	2.4	10
103216974	62	58	142	151	18	18	258	283	720	814	48	45	146	0.945	2.2	10
103216975	62	58	142	151	18	18	258	283	720	814	48	45	146	0.945	2.2	10
103216976	62	58	142	151	18	18	258	283	720	814	48	45	146	0.945	2.4	10
103216981	62	58	142	151	18	18	258	283	720	814	48	45	146	0.945	2.4	10
103216982	61	58	144	153	18	18	260	286	724	820	47	46	147	0.944	2.5	10

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Nov/15/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085886	Southwest Liner Systems, Inc.	Eunice NM US	HDS-060AE-BBB-B-00	

Roll Number	Average Thickness ASTM D5199 (mils)	Minimum Thickness ASTM D5199 (mils)	Yield Strength ASTM D6693 (ppi) MD	Yield Strength ASTM D6693 (ppi) TD	Yield Elongation ASTM D6693 (%) MD	Yield Elongation ASTM D6693 (%) TD	Break Strength ASTM D6693 (ppi) MD	Break Strength ASTM D6693 (ppi) TD	Break Elongation ASTM D6693 (%) MD	Break Elongation ASTM D6693 (%) TD	Tear Resistance ASTM D1004 (lbs) MD	Tear Resistance ASTM D1004 (lbs) TD	Puncture Resistance ASTM D4833 (lbs)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Carbon Black Dispersion ASTM D5596 (Views in Cat1-Cat2)
103216983	62	59	144	153	18	18	260	286	724	820	47	46	147	0.944	2.5	10

Laboratory Manager

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Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS
201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT TX 77978
PHONE:(888)FPCUSA3

Certificate of Analysis

(CONFIDENTIAL)

CUSTOMER:GSE ENVIRONMENTAL, LLC
UP TRACK 14732 WESTFIELD
19103 GUNDLE ROAD
HOUSTON TX 77070
PRODUCT :HL3812
RAILCAR FPAX218033
CLEANING/INSPECTION NO: 218033072718

S/O NO : ETAB008
CUSTOMER PO : 03-514204
DATE SHIPPED: 11/02/18
LOT NO : 18G1310
WEIGHT (LB) : 197,500.00
CUSTID:FT03112 SPIDE3

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index,g/10min	ASTM D1238	.070
HLMI, g/10 min.	ASTM D1238	11.2
Density, g/cm3	ASTM D1505	.9371

Notes:
Notes: Additive levels were tested and meet the min specification for this lot As a result Standard OIT (by ASTM D3895) is greater than 120 mins (nominal values not tested on every lot). As a result, High Pres sure OI T (by ASTM D5885) is greater than 1000 mins.

Linda Kao

QC SUPERVISOR: LINDA KAO

Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS

201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT TX 77978
PHONE:(888)FPCUSA3

Certificate of Analysis

(CONFIDENTIAL)

CUSTOMER:GSE ENVIRONMENTAL, LLC
UP TRACK 14732 WESTFIELD
19103 GUNDLE ROAD
HOUSTON TX 77070
PRODUCT :HL3812
RAILCAR FPAX218019
CLEANING/INSPECTION NO: 218019072718

S/O NO : ETAB005
CUSTOMER PO : 03-514204
DATE SHIPPED: 11/02/18
LOT NO : 18G1311
WEIGHT (LB) : 197,700.00
CUSTID:FT03112 SPIDE3

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index,g/10min	ASTM D1238	.070
HLMI, g/10 min.	ASTM D1238	11.3
Density, g/cm3	ASTM D1505	.9372

Notes:
Notes: Additive levels were tested and meet the min specification for this lot As a result Standard OIT (by ASTM D3895) is greater than 120 mins (nominal values not tested on every lot). As a result, High Pres sure OI T (by ASTM D5885) is greater than 1000 mins.

Linda Kao

QC SUPERVISOR: LINDA KAO

Report Date
11/15/2018

SOLMAX GSE

Quality Assurance Laboratory Test Results

Job Name: SWLS / Sundance West Surface Waste Facillity
Sales Order: 85886

Required Testing: ASTM D 1238, 190 / 2.16 -- Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer

Frequency:

Specification: ≤ 1.0 g/10 minutes

Product Code	Lot Number	Result
HDS-060AE-BBB-B-00	18G1310	0.07
HDS-060AE-BBB-B-00	18G1311	0.07

Approved by:	Lana Hickman
Date:	November 14, 2018

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.

Report Date
11/15/2018

Quality Assurance Laboratory Test Results

Job Name: SWLS / Sundance West Surface Waste Facillity
Sales Order: 85886

Required Testing: ASTM D 3895 -- Standard Test Method for Oxidative Induction Time of Polyolefins by Differential Scanning Calorimetry
ASTM D 5397 -- Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test

Specification: D 3895 - > 100 Minutes
D 5397 - > 500 Hours

Frequency: 1/200,000 lbs.

Product Code	Resin Lot Number	Test Results
HDS-060AE-BBB-B-00	18G1310	PASS
HDS-060AE-BBB-B-00	18G1311	PASS

Approved By:	Lana Hickman
Date Approved:	November 15, 2018

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.

Report Date
11/15/2018

SOLMAX GSE

Quality Assurance Laboratory Test Results

Job Name: SWLS / Sundance West Surface Waste Facillity
SO Number: 85886

The table below summarizes additive performance of GSE Houston products as perceived by OIT retention after UV and Oven Aging per GRI Test Method GM13:

		Oven Aging @ 85° C (ASTM D 5721)				UV Resistance per GRI GM11			
		90 days per ASTM D 5885				1600 hours UV Aging per ASTM D 5885			
Product Type	**Formulation**	Initial HP OIT (min)	Final HP OIT (min)	Retained (%)	GRI Criteria (%)	Initial HP OIT (min)	Final HP OIT (min)	Retained (%)	GRI Criteria (%)
HDPE Geomembrane	Formosa HL3812	744	674	90	80	744	700	95	50

Approved By: Lana Hickman
Date: November 15, 2018

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.

GSE Roll Allocation

Order SO-085199
Customer Southwest Liner Systems, Inc.
Project Name SWLS-Sundance West Phase 2 Landfill Cell 1A

Roll#	Resin Lot	Product Code	Mfg Date	Length
108197865	18F1260	HDS-060AE-BBB-B-00	8/24/2018	560
108197871	18F1260	HDS-060AE-BBB-B-00	8/24/2018	560
108197872	18F1260	HDS-060AE-BBB-B-00	8/24/2018	560
108197873	18F1260	HDS-060AE-BBB-B-00	8/24/2018	560
108197874	18F1260	HDS-060AE-BBB-B-00	8/24/2018	560
108197875	18F1260	HDS-060AE-BBB-B-00	8/25/2018	560
108197876	18F1260	HDS-060AE-BBB-B-00	8/25/2018	560
108197877	18F1260	HDS-060AE-BBB-B-00	8/25/2018	560
108197878	18F1260	HDS-060AE-BBB-B-00	8/25/2018	560
108197879	18F1260	HDS-060AE-BBB-B-00	8/25/2018	560
108197880	18F1260	HDS-060AE-BBB-B-00	8/25/2018	560
108197881	18F1260	HDS-060AE-BBB-B-00	8/25/2018	560
108197882	18F1260	HDS-060AE-BBB-B-00	8/25/2018	560
108197883	18F1260	HDS-060AE-BBB-B-00	8/25/2018	560
108197884	18F1260	HDS-060AE-BBB-B-00	8/25/2018	560
108197885	18F1260	HDS-060AE-BBB-B-00	8/25/2018	560
108197886	18F1260	HDS-060AE-BBB-B-00	8/25/2018	560
108197887	18F1260	HDS-060AE-BBB-B-00	8/25/2018	560
108197888	18F1260	HDS-060AE-BBB-B-00	8/25/2018	560
108197889	18F1260	HDS-060AE-BBB-B-00	8/25/2018	560
108197890	18F1260	HDS-060AE-BBB-B-00	8/25/2018	560
108197891	18F1260	HDS-060AE-BBB-B-00	8/25/2018	560
108197892	18F1260	HDS-060AE-BBB-B-00	8/26/2018	560
108197893	18F1260	HDS-060AE-BBB-B-00	8/26/2018	560
108197894	18F1260	HDS-060AE-BBB-B-00	8/26/2018	560
108197895	18F1260	HDS-060AE-BBB-B-00	8/26/2018	560
108197896	18F1260	HDS-060AE-BBB-B-00	8/26/2018	560
108197897	18F1260	HDS-060AE-BBB-B-00	8/26/2018	560
108197898	18F1260	HDS-060AE-BBB-B-00	8/26/2018	560
108197899	18F1260	HDS-060AE-BBB-B-00	8/26/2018	560
108197900	18F1260	HDS-060AE-BBB-B-00	8/26/2018	560
108197901	18F1260	HDS-060AE-BBB-B-00	8/26/2018	560
108197902	18F1260	HDS-060AE-BBB-B-00	8/26/2018	560
108197903	18F1260	HDS-060AE-BBB-B-00	8/26/2018	560
108197904	18F1260	HDS-060AE-BBB-B-00	8/26/2018	560
108197905	18F1260	HDS-060AE-BBB-B-00	8/26/2018	560
108197906	18F1260	HDS-060AE-BBB-B-00	8/26/2018	560
108197907	18F1260	HDS-060AE-BBB-B-00	8/26/2018	560
108197908	18F1260	HDS-060AE-BBB-B-00	8/26/2018	560
108197909	18F1260	HDS-060AE-BBB-B-00	8/27/2018	560
108197910	18G1147	HDS-060AE-BBB-B-00	8/27/2018	560
108197911	18G1147	HDS-060AE-BBB-B-00	8/27/2018	560
108197912	18G1147	HDS-060AE-BBB-B-00	8/27/2018	560
108197913	18G1147	HDS-060AE-BBB-B-00	8/27/2018	560
108197917	18G1147	HDS-060AE-BBB-B-00	8/27/2018	560

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Aug/28/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085199	Southwest Liner Systems, Inc.	Eunice NM US	HDS-060AE-BBB-B-00	

Roll Number	Average Thickness ASTM D5199 (mils)	Minimum Thickness ASTM D5199 (mils)	Yield Strength ASTM D6693 (ppi) MD	Yield Strength ASTM D6693 (ppi) TD	Yield Elongation ASTM D6693 (%) MD	Yield Elongation ASTM D6693 (%) TD	Break Strength ASTM D6693 (ppi) MD	Break Strength ASTM D6693 (ppi) TD	Break Elongation ASTM D6693 (%) MD	Break Elongation ASTM D6693 (%) TD	Tear Resistance ASTM D1004 (lbs) MD	Tear Resistance ASTM D1004 (lbs) TD	Puncture Resistance ASTM D4833 (lbs)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Carbon Black Dispersion ASTM D5596 (Views in Cat1-Cat2)
108197865	60	56	143	147	17	18	301	296	828	837	50	47	147	0.944	2.5	10
108197871	62	59	139	149	17	18	302	316	857	887	49	46	150	0.944	2.6	10
108197872	61	59	137	143	17	18	280	286	824	842	48	45	143	0.944	2.4	10
108197873	61	59	137	143	17	18	280	286	824	842	48	45	143	0.944	2.4	10
108197874	61	59	137	143	17	18	280	286	824	842	48	45	143	0.944	2.4	10
108197875	61	59	139	145	17	18	282	300	823	878	49	46	149	0.944	2.4	10
108197876	61	56	139	145	17	18	282	300	823	878	49	46	149	0.944	2.4	10
108197877	61	58	139	145	17	18	282	300	823	878	49	46	149	0.944	2.4	10
108197878	61	57	149	152	18	18	287	304	777	860	51	47	151	0.941	2.7	10
108197879	61	57	149	152	18	18	287	304	777	860	51	47	151	0.941	2.7	10
108197880	61	59	149	152	18	18	287	304	777	860	51	47	151	0.941	2.7	10
108197881	60	58	144	151	18	18	297	294	801	883	52	50	151	0.941	2.7	10
108197882	61	59	144	151	18	18	297	294	801	883	52	50	151	0.943	2.7	10
108197883	61	58	144	151	18	18	297	294	801	883	52	50	151	0.943	2.7	10
108197884	61	59	152	159	18	18	299	315	797	885	52	49	152	0.943	2.4	10
108197885	62	60	152	159	18	18	299	315	797	885	52	49	152	0.943	2.4	10
108197886	62	59	152	159	18	18	299	315	797	885	52	49	152	0.943	2.4	10
108197887	61	59	138	140	18	18	269	281	774	778	50	49	146	0.943	2.4	10
108197888	61	59	138	140	18	18	269	281	774	778	50	49	146	0.943	2.3	10
108197889	61	59	138	140	18	18	269	281	774	778	50	49	146	0.943	2.3	10
108197890	61	59	136	137	17	18	286	269	827	755	49	49	146	0.943	2.6	10
108197891	61	59	136	137	17	18	286	269	827	755	49	49	146	0.943	2.6	10
108197892	61	59	136	137	17	18	286	269	827	755	49	49	146	0.944	2.5	10
108197893	63	61	146	141	18	17	289	244	725	831	47	48	145	0.944	2.3	10
108197894	63	61	146	141	18	17	289	244	725	831	47	48	145	0.944	2.3	10
108197895	61	59	146	141	18	17	289	244	725	831	47	48	145	0.944	2.7	10
108197896	61	59	144	146	18	18	294	297	793	853	48	50	149	0.944	2.7	10
108197897	61	60	144	146	18	18	294	297	793	853	48	50	149	0.944	2.7	10
108197898	61	59	144	146	18	18	294	297	793	853	48	50	149	0.944	2.4	10
108197899	61	60	152	158	18	18	282	303	759	865	51	49	150	0.944	2.4	10
108197900	61	58	152	158	18	18	282	303	759	865	51	49	150	0.944	2.7	10
108197901	62	60	152	158	18	18	282	303	759	865	51	49	150	0.944	2.7	10
108197902	61	59	140	149	18	18	274	302	752	857	49	51	153	0.945	2.6	10
108197903	62	59	140	149	18	18	274	302	752	857	49	51	153	0.945	2.6	10

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Aug/28/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085199	Southwest Liner Systems, Inc.	Eunice NM US	HDS-060AE-BBB-B-00	

Roll Number	Average Thickness ASTM D5199 (mils)	Minimum Thickness ASTM D5199 (mils)	Yield Strength ASTM D6693 (ppi) MD	Yield Strength ASTM D6693 (ppi) TD	Yield Elongation ASTM D6693 (%) MD	Yield Elongation ASTM D6693 (%) TD	Break Strength ASTM D6693 (ppi) MD	Break Strength ASTM D6693 (ppi) TD	Break Elongation ASTM D6693 (%) MD	Break Elongation ASTM D6693 (%) TD	Tear Resistance ASTM D1004 (lbs) MD	Tear Resistance ASTM D1004 (lbs) TD	Puncture Resistance ASTM D4833 (lbs)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Carbon Black Dispersion ASTM D5596 (Views in Cat1-Cat2)
108197904	61	57	140	149	18	18	274	302	752	857	49	51	153	0.945	2.6	10
108197905	61	60	150	154	18	18	266	275	749	788	49	50	153	0.945	2.6	10
108197906	62	60	150	154	18	18	266	275	749	788	49	50	153	0.945	2.4	10
108197907	61	60	150	154	18	18	266	275	749	788	49	50	153	0.945	2.4	10
108197908	62	59	155	154	17	18	279	263	799	723	50	51	149	0.945	2.5	10
108197909	61	59	155	154	17	18	279	263	799	723	50	51	149	0.945	2.5	10
108197910	61	58	155	154	17	18	279	263	799	723	50	51	149	0.945	2.3	10
108197911	61	60	152	151	18	17	280	261	779	757	50	48	188	0.945	2.3	10
108197912	62	58	152	151	18	17	280	261	779	757	50	48	188	0.944	2.6	10
108197913	61	58	152	151	18	17	280	261	779	757	50	48	188	0.944	2.6	10
108197917	61	59	145	152	18	18	296	317	804	907	50	48	153	0.944	2.6	10

Laboratory Manager

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Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS

201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT TX 77978
PHONE:(888)FPCUSA3

Certificate of Analysis

(CONFIDENTIAL)

CUSTOMER:GSE ENVIRONMENTAL, LLC
UP TRACK 14732 WESTFIELD
19103 GUNDLE ROAD
HOUSTON TX 77070
PRODUCT :HL3812
RAILCAR FPAX980353
CLEANING/INSPECTION NO: 980353062218

S/O NO : ET6A842
CUSTOMER PO : 03-513116
DATE SHIPPED: 7/27/18
LOT NO : 18F1260
WEIGHT (LB) : 195,600.00
CUSTID:FT03112 SPIDE3

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index,g/10min	ASTM D1238	.069
HLMI, g/10 min.	ASTM D1238	11.4
Density, g/cm3	ASTM D1505	.9366

Notes:
Notes: Additive levels were tested and meet the min specification for this lot As a result Standard OIT (by ASTM D3895) is greater than 120 mins (nominal values not tested on every lot). As a result, High Pres sure OI T (by ASTM D5885) is greater than 1000 mins.

Linda Kao

QC SUPERVISOR: LINDA KAO

Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS
201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT TX 77978
PHONE:(888)FPCUSA3

Certificate of Analysis

(CONFIDENTIAL)

CUSTOMER:GSE ENVIRONMENTAL, LLC
UP TRACK 14732 WESTFIELD
19103 GUNDLE ROAD
HOUSTON TX 77070
PRODUCT :HL3812
RAILCAR FPAX215190
CLEANING/INSPECTION NO: 215190071218

S/O NO : ET6A857
CUSTOMER PO : 03-513116
DATE SHIPPED: 7/31/18
LOT NO : 18G1147
WEIGHT (LB) : 198,150.00
CUSTID:FT03112 SPIDE3

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index,g/10min	ASTM D1238	.065
HLMI, g/10 min.	ASTM D1238	10.5
Density, g/cm3	ASTM D1505	.9363

Notes:
Notes: Additive levels were tested and meet the min specification for this lot As a result Standard OIT (by ASTM D3895) is greater than 120 mins (nominal values not tested on every lot). As a result, High Pres sure OI T (by ASTM D5885) is greater than 1000 mins.

Linda Kao

QC SUPERVISOR: LINDA KAO

SOLMAX GSE

Report Date
8/28/2018

Quality Assurance Laboratory Test Results

Job Name: SWLS- Sundance West Phase 2 Landfill Cell 1A
Sales Order: 85199

Required Testing: ASTM D 3895 -- Standard Test Method for Oxidative Induction Time of Polyolefins by Differential Scanning Calorimetry
ASTM D 5397 -- Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test

Specification: D 3895 - > 100 Minutes
D 5397 - > 500 Hours

Frequency: 1/200,000 lbs.

Product Code	Resin Lot Number	Test Results
HDS-060AE-BBB-B-00	18F1260	PASS
HDS-060AE-BBB-B-00	18G1147	PASS

Approved By:	Lana Hickman
Date Approved:	August 28, 2018

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.

Report Date
8/28/2018

Quality Assurance Laboratory Test Results

Job Name: SWLS- Sundance West Phase 2 Landfill Cell 1A
SO Number: 85199

The table below summarizes additive performance of GSE Houston products as perceived by OIT retention after UV and Oven Aging per GRI Test Method GM13:

		Oven Aging @ 85° C (ASTM D 5721)				UV Resistance per GRI GM11			
		90 days per ASTM D 5885				1600 hours UV Aging per ASTM D 5885			
Product Type	**Formulation**	Initial HP OIT (min)	Final HP OIT (min)	Retained (%)	GRI Criteria (%)	Initial HP OIT (min)	Final HP OIT (min)	Retained (%)	GRI Criteria (%)
HDPE Geomembrane	Formosa HL3812	744	674	90	80	744	700	95	50

Approved By: Lana Hickman
Date: August 28, 2018

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.

GSE Roll Allocation

Order SO-085886
Customer Southwest Liner Systems, Inc.
Project Name Sundance West Landfill Cell 1B

Roll#	Resin Lot	Product Code	Mfg Date	Length
102191760	18G1354	HDT-060GE-BBB-B-W0	11/20/2018	520
108198926	18G1325	HDT-060GE-BBB-B-W0	11/19/2018	520
108198927	18G1325	HDT-060GE-BBB-B-W0	11/19/2018	520
108198928	18G1325	HDT-060GE-BBB-B-W0	11/19/2018	520
108198929	18G1325	HDT-060GE-BBB-B-W0	11/19/2018	520
108198934	18G1325	HDT-060GE-BBB-B-W0	11/19/2018	520
108198935	18G1325	HDT-060GE-BBB-B-W0	11/19/2018	520
108198936	18G1325	HDT-060GE-BBB-B-W0	11/19/2018	520
108198937	18G1325	HDT-060GE-BBB-B-W0	11/20/2018	520
108198938	18G1325	HDT-060GE-BBB-B-W0	11/20/2018	520
108198939	18G1325	HDT-060GE-BBB-B-W0	11/20/2018	520
108198940	18G1325	HDT-060GE-BBB-B-W0	11/20/2018	520
108198941	18G1325	HDT-060GE-BBB-B-W0	11/20/2018	520

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Nov/21/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085886	Southwest Liner Systems, Inc.	Eunice NM US	HDT-060GE-BBB-B-W0	

Roll Number	Average Thickness ASTM D5994 (mils)	Minimum Thickness ASTM D5994 (mils)	Yield Strength ASTM D6693 (ppi) MD	Yield Strength ASTM D6693 (ppi) TD	Yield Elongation ASTM D6693 (%) MD	Yield Elongation ASTM D6693 (%) TD	Break Strength ASTM D6693 (ppi) MD	Break Strength ASTM D6693 (ppi) TD	Break Elongation ASTM D6693 (%) MD	Break Elongation ASTM D6693 (%) TD	Tear Resistance ASTM D1004 (lbs) MD	Tear Resistance ASTM D1004 (lbs) TD	Puncture Resistance ASTM D4833 (lbs)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Carbon Black Dispersion ASTM D5596 (Views in Cat1-Cat2)	Asperity Height ASTM D7466 (mils) A Side	Asperity Height ASTM D7466 (mils) B Side
102191760	59	56	148	154	17	17	200	169	574	529	52	51	141	0.945	2.7	10	22	24
108198926	59	55	157	156	18	18	144	198	401	542	52	54	151	0.944	2.2	10	23	23
108198927	58	53	152	151	18	18	199	167	529	442	55	51	153	0.944	2.2	10	23	23
108198928	58	53	152	151	18	18	199	167	529	442	55	51	153	0.944	2.2	10	23	23
108198929	58	52	152	151	18	18	199	167	529	442	55	51	153	0.944	2.2	10	20	25
108198934	58	51	145	158	18	17	196	176	527	510	55	52	155	0.944	2.3	10	20	26
108198935	58	51	150	149	18	17	187	166	451	479	54	52	155	0.945	2.4	10	24	26
108198936	57	52	150	149	18	17	187	166	451	479	54	52	155	0.945	2.4	10	24	26
108198937	58	52	150	149	18	17	187	166	451	479	54	52	155	0.945	2.4	10	23	25
108198938	58	51	150	149	18	17	187	166	451	479	54	52	155	0.945	2.4	10	23	25
108198939	58	52	166	168	18	17	206	173	522	449	57	53	156	0.945	2.4	10	22	23
108198940	58	52	166	168	18	17	206	173	522	449	57	53	156	0.945	2.4	10	22	23
108198941	57	52	166	168	18	17	206	173	522	449	57	53	156	0.945	2.4	10	23	22

Laboratory Manager



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Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS

201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT TX 77978
PHONE:(888)FPCUSA3

Certificate of Analysis

(CONFIDENTIAL)

CUSTOMER:GSE ENVIRONMENTAL, LLC
UP TRACK 14732 WESTFIELD
19103 GUNDLE ROAD
HOUSTON TX 77070
PRODUCT :HL3812
RAILCAR FPAX200168
CLEANING/INSPECTION NO: 200168073118

S/O NO : ETAB006
CUSTOMER PO : 03-514204
DATE SHIPPED: 11/02/18
LOT NO : 18G1354
WEIGHT (LB) : 198,150.00
CUSTID:FT03112 SPIDE3

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index,g/10min	ASTM D1238	.080
HLMI, g/10 min.	ASTM D1238	12.3
Density, g/cm3	ASTM D1505	.9374

Notes:
Notes: Additive levels were tested and meet the min specification for this lot As a result Standard OIT (by ASTM D3895) is greater than 120 mins (nominal values not tested on every lot). As a result, High Pres sure OI T (by ASTM D5885) is greater than 1000 mins.

Linda Kao

QC SUPERVISOR: LINDA KAO

Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS
201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT TX 77978
PHONE:(888)FPCUSA3

Certificate of Analysis

(CONFIDENTIAL)

CUSTOMER:GSE ENVIRONMENTAL, LLC
UP TRACK 14732 WESTFIELD
19103 GUNDLE ROAD
HOUSTON TX 77070
PRODUCT :HL3812
RAILCAR FPAX201014
CLEANING/INSPECTION NO: 201014072818

S/O NO : ETAA041
CUSTOMER PO : 03-513918
DATE SHIPPED: 10/23/18
LOT NO : 18G1325
WEIGHT (LB) : 196,950.00
CUSTID:FT03112 SPIDE3

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index,g/10min	ASTM D1238	.060
HLMI, g/10 min.	ASTM D1238	10.3
Density, g/cm3	ASTM D1505	.9372

Notes:
Notes: Additive levels were tested and meet the min specification for this lot As a result Standard OIT (by ASTM D3895) is greater than 120 mins (nominal values not tested on every lot). As a result, High Pres sure OI T (by ASTM D5885) is greater than 1000 mins.

Linda Kao

QC SUPERVISOR: LINDA KAO

Report Date
11/21/2018

SOLMAX GSE

Quality Assurance Laboratory Test Results

Job Name: SWLS / Sundance West Surface Waste Facillity
Sales Order: 85886

Required Testing: ASTM D 1238, 190 / 2.16 -- Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer

Frequency:

Specification: ≤ 1.0 g/10 minutes

Product Code	Lot Number	Result
HDT-060GE-BBB-B-W0	18G1354	0.08
HDT-060GE-BBB-B-W0	18G1325	0.06

Approved by:	Lana Hickman
Date:	November 21, 2018

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Report Date
11/21/2018

Quality Assurance Laboratory Test Results

Job Name: SWLS / Sundance West Surface Waste Facillity
Sales Order: 85886

Required Testing: ASTM D 3895 -- Standard Test Method for Oxidative Induction Time of Polyolefins by Differential Scanning Calorimetry
ASTM D 5397 -- Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test

Specification: D 3895 - > 100 Minutes
D 5397 - > 500 Hours

Frequency: 1/200,000 lbs.

Product Code	Resin Lot Number	Test Results
HDT-060GE-BBB-W0	18G1354	PASS
HDT-060GE-BBB-W0	18G1325	PASS

Approved By:	Lana Hickman
Date Approved:	November 21, 2018

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.

Report Date
11/21/2018

SOLMAX GSE

Quality Assurance Laboratory Test Results

Job Name: SWLS / Sundance West Surface Waste Facillity
SO Number: 85886

The table below summarizes additive performance of GSE Houston products as perceived by OIT retention after UV and Oven Aging per GRI Test Method GM13:

		Oven Aging @ 85° C (ASTM D 5721)				UV Resistance per GRI GM11			
		90 days per ASTM D 5885				1600 hours UV Aging per ASTM D 5885			
Product Type	**Formulation**	Initial HP OIT (min)	Final HP OIT (min)	Retained (%)	GRI Criteria (%)	Initial HP OIT (min)	Final HP OIT (min)	Retained (%)	GRI Criteria (%)
HDPE Geomembrane	Formosa HL3812	744	674	90	80	744	700	95	50

Approved By: Lana Hickman
Date: November 21, 2018

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GSE Roll Allocation

Order SO-085199
Customer Southwest Liner Systems, Inc.
Project Name Sundance West Phase 2, Landfill Cell 1A

Roll#	Resin Lot	Product Code	Mfg Date	Length
102191310	18G1299	HDT-060GE-BBB-B-W0	10/25/2018	520
102191311	18G1299	HDT-060GE-BBB-B-W0	10/25/2018	520
102191312	18G1299	HDT-060GE-BBB-B-W0	10/25/2018	520
102191313	18G1299	HDT-060GE-BBB-B-W0	10/26/2018	520
102191314	18G1299	HDT-060GE-BBB-B-W0	10/26/2018	520
102191315	18G1299	HDT-060GE-BBB-B-W0	10/26/2018	520
102191316	18G1299	HDT-060GE-BBB-B-W0	10/26/2018	520
102191317	18G1299	HDT-060GE-BBB-B-W0	10/26/2018	520
102191318	18G1276	HDT-060GE-BBB-B-W0	10/26/2018	520
102191319	18G1276	HDT-060GE-BBB-B-W0	10/26/2018	520
102191320	18G1276	HDT-060GE-BBB-B-W0	10/26/2018	520
104192270	18G1188	HDT-060GE-BBB-B-W0	10/18/2018	520
104192271	18G1188	HDT-060GE-BBB-B-W0	10/18/2018	520
104192272	18G1188	HDT-060GE-BBB-B-W0	10/18/2018	520
104192273	18G1188	HDT-060GE-BBB-B-W0	10/19/2018	520
104192274	18G1188	HDT-060GE-BBB-B-W0	10/19/2018	520
104192275	18G1188	HDT-060GE-BBB-B-W0	10/19/2018	520
104192277	18G1188	HDT-060GE-BBB-B-W0	10/19/2018	520
104192279	18G1188	HDT-060GE-BBB-B-W0	10/19/2018	520

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Oct/29/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085199	Southwest Liner Systems, Inc.	Eunice NM US	HDT-060GE-BBB-B-W0	

Roll Number	Average Thickness ASTM D5994 (mils)	Minimum Thickness ASTM D5994 (mils)	Yield Strength ASTM D6693 (ppi) MD	Yield Strength ASTM D6693 (ppi) TD	Yield Elongation ASTM D6693 (%) MD	Yield Elongation ASTM D6693 (%) TD	Break Strength ASTM D6693 (ppi) MD	Break Strength ASTM D6693 (ppi) TD	Break Elongation ASTM D6693 (%) MD	Break Elongation ASTM D6693 (%) TD	Tear Resistance ASTM D1004 (lbs) MD	Tear Resistance ASTM D1004 (lbs) TD	Puncture Resistance ASTM D4833 (lbs)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Carbon Black Dispersion ASTM D5596 (Views in Cat1-Cat2)	Asperity Height ASTM D7466 (mils) A Side	Asperity Height ASTM D7466 (mils) B Side
102191310	58	57	157	159	18	17	200	165	529	474	55	52	144	0.945	2.4	10	26	23
102191311	60	55	157	159	18	17	200	165	529	474	55	52	144	0.945	2.4	10	26	23
102191312	60	54	157	159	18	17	200	165	529	474	55	52	144	0.945	2.4	10	26	23
102191313	59	58	157	159	18	17	200	165	529	474	55	52	144	0.945	2.4	10	26	23
102191314	59	57	158	160	17	17	200	131	543	242	55	52	154	0.945	2.2	10	26	23
102191315	60	56	158	160	17	17	200	131	543	242	55	52	154	0.945	2.2	10	26	23
102191316	61	61	158	160	17	17	200	131	543	242	55	52	154	0.945	2.2	10	27	24
102191317	61	60	158	160	17	17	200	131	543	242	55	52	154	0.945	2.2	10	27	24
102191318	59	54	164	165	17	17	207	176	572	514	54	56	142	0.942	2.2	10	26	24
102191319	58	55	164	165	17	17	207	176	572	514	54	56	142	0.942	2.2	10	26	24
102191320	58	51	164	165	17	17	207	176	572	514	54	56	142	0.942	2.2	10	26	24
104192270	66	56	160	159	18	18	223	192	577	514	55	51	153	0.944	2.2	10	22	22
104192271	59	54	138	139	18	17	206	173	589	550	48	47	143	0.944	2.3	10	22	22
104192272	61	57	145	145	17	18	201	186	559	550	49	47	142	0.944	2.3	10	22	22
104192273	62	56	152	152	17	17	227	182	645	510	51	49	152	0.944	2.4	10	22	21
104192274	58	52	150	152	18	18	201	183	525	507	53	51	153	0.944	2.4	10	22	21
104192275	61	57	143	143	18	18	183	215	524	702	48	49	143	0.944	2.5	10	25	21
104192277	59	55	143	143	18	18	183	215	524	702	48	49	143	0.944	2.5	10	25	21
104192279	59	55	147	146	17	18	187	193	529	573	48	50	143	0.944	2.5	10	22	20

Laboratory Manager

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Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS

201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT TX 77978
PHONE:(888)FPCUSA3

Certificate of Analysis

(CONFIDENTIAL)

CUSTOMER:GSE ENVIRONMENTAL, LLC
UP TRACK 14732 WESTFIELD
19103 GUNDLE ROAD
HOUSTON TX 77070
PRODUCT :HL3812
RAILCAR GPLX075830
CLEANING/INSPECTION NO: 075830072618

S/O NO : ETAA034
CUSTOMER PO : 03-513918
DATE SHIPPED: 10/17/18
LOT NO : 18G1299
WEIGHT (LB) : 197,250.00
CUSTID:FT03112 SPIDE3

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index,g/10min	ASTM D1238	.080
HLMI, g/10 min.	ASTM D1238	12.1
Density, g/cm3	ASTM D1505	.9378

Notes:
Notes: Additive levels were tested and meet the min specification for this lot As a result Standard OIT (by ASTM D3895) is greater than 120 mins (nominal values not tested on every lot). As a result, High Pres sure OI T (by ASTM D5885) is greater than 1000 mins.

Linda Kao

QC SUPERVISOR: LINDA KAO

Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS
201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT TX 77978
PHONE:(888)FPCUSA3

Certificate of Analysis

(CONFIDENTIAL)

CUSTOMER:GSE ENVIRONMENTAL, LLC
UP TRACK 14732 WESTFIELD
19103 GUNDLE ROAD
HOUSTON TX 77070
PRODUCT :HL3812
RAILCAR FPAX200802
CLEANING/INSPECTION NO: 200802072418

S/O NO : ET8A888
CUSTOMER PO : 03-513624
DATE SHIPPED: 9/24/18
LOT NO : 18G1276
WEIGHT (LB) : 197,550.00
CUSTID:FT03112 SPIDE3

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index,g/10min	ASTM D1238	.070
HLMI, g/10 min.	ASTM D1238	11.5
Density, g/cm3	ASTM D1505	.9364

Notes:
Notes: Additive levels were tested and meet the min specification for this lot As a result Standard OIT (by ASTM D3895) is greater than 120 mins (nominal values not tested on every lot). As a result, High Pres sure OI T (by ASTM D5885) is greater than 1000 mins.

Linda Kao

QC SUPERVISOR: LINDA KAO

Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS
201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT TX 77978
PHONE:(888)FPCUSA3

Certificate of Analysis

(CONFIDENTIAL)

CUSTOMER:GSE ENVIRONMENTAL, LLC
UP TRACK 14732 WESTFIELD
19103 GUNDLE ROAD
HOUSTON TX 77070
PRODUCT :HL3812
RAILCAR FURX873412
CLEANING/INSPECTION NO: 873412071618

S/O NO : ET8A868
CUSTOMER PO : 03-513624
DATE SHIPPED: 9/03/18
LOT NO : 18G1188
WEIGHT (LB) : 196,750.00
CUSTID:FT03112 SPIDE3

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index,g/10min	ASTM D1238	.070
HLMI, g/10 min.	ASTM D1238	10.8
Density, g/cm3	ASTM D1505	.9370

Notes:
Notes: Additive levels were tested and meet the min specification for this lot As a result Standard OIT (by ASTM D3895) is greater than 120 mins (nominal values not tested on every lot). As a result, High Pres sure OI T (by ASTM D5885) is greater than 1000 mins.

Linda Kao

QC SUPERVISOR: LINDA KAO

SOLMAX GSE

Report Date
10/29/2018

Quality Assurance Laboratory Test Results

Job Name: SWLS/Sundance West Phase 2, Landfill Cell 1A
Sales Order: 85199

Required Testing: ASTM D 3895 -- Standard Test Method for Oxidative Induction Time of Polyolefins by Differential Scanning Calorimetry
ASTM D 5397 -- Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test

Specification: D 3895 - > 100 Minutes
D 5397 - > 500 Hours

Frequency: 1/200,000 lbs.

Product Code	Resin Lot Number	Test Results
HDT-060GE-BBB-B-W0	18G1299	PASS
HDT-060GE-BBB-B-W0	18G1276	PASS
HDT-060GE-BBB-B-W0	18G1188	PASS

Approved By:	Lana Hickman
Date Approved:	October 29, 2018

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Report Date
10/29/2018

SOLMAX GSE

Quality Assurance Laboratory Test Results

Job Name: SWLS/Sundance West Phase 2, Landfill Cell 1A
SO Number: 85199

The table below summarizes additive performance of GSE Houston products as perceived by OIT retention after UV and Oven Aging per GRI Test Method GM13:

		Oven Aging @ 85° C (ASTM D 5721)				UV Resistance per GRI GM11			
		90 days per ASTM D 5885				1600 hours UV Aging per ASTM D 5885			
Product Type	**Formulation**	Initial HP OIT (min)	Final HP OIT (min)	Retained (%)	GRI Criteria (%)	Initial HP OIT (min)	Final HP OIT (min)	Retained (%)	GRI Criteria (%)
HDPE Geomembrane	Formosa HL3812	744	674	90	80	744	700	95	50

Approved By: Lana Hickman
Date: October 29, 2018

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.

APPENDIX B

Material Manufacturer Certification and Conformance Testing Results

B.4. FML Conformance Testing Results

September 14, 2018

Mail To:

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

email: swls.md@gmail.com

Bill To:

<= Same (P.O. # SW1819)

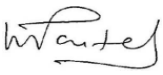
Dear Mr. Decarlo:

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 Phase 2 Landfill - Cell 1A**
TRI Job Reference Number:	40709
Material(s) Tested:	Seven, Solmax GSE 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

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.

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE 60 mil Smooth HDPE Geomembrane
Sample Identification: 108197872
TRI Log #: 40709

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	62.0	61.6	63.4	60.0	59.4	62.0	62.0	64.4	63.0	**62.0**	1.5	60 min ave
											59.4	<< min	54 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.945	0.945	0.945								**0.945**	0.000	0.94 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.53	2.54									**2.54**	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)	145	152	152	151	153						**151**	3	126 min
TD Yield Strength (ppi)	163	162	165	162	163						**163**	1	126 min
MD Break Strength (ppi)	278	267	308	231	267						**270**	28	228 min
TD Break Strength (ppi)	300	321	321	330	313						**317**	11	228 min
MD Yield Elongation (%)	19	20	20	20	20						**20**	0	12 min
TD Yield Elongation (%)	18	19	19	16	19						**18**	1	12 min
MD Break Elongation (%)	766	724	820	650	730						**738**	62	700 min
TD Break Elongation (%)	821	882	877	896	838						**863**	32	700 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	52	52	52	52	52	50	50	50	52	51	**51**	1	42 min
TD Tear Strength (lbs)	48	49	48	49	47	48	48	48	48	49	**48**	1	42 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	145	137	135	134	134						**137**	4	108 min

MD Machine Direction TD Transverse Direction

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

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE 60 mil Smooth HDPE Geomembrane
Sample Identification: 108197880
TRI Log #: 40709

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)	61.2	60.7	59.1	60.3	60.8	63.1	62.3	61.3	59.5	60.0	**60.8**	1.2	60 min ave
											59.1	<< min	54 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.945	0.945	0.945								**0.945**	0.000	0.94 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.47	2.47									**2.47**	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)	147	153	150	156	155						**152**	4	126 min
TD Yield Strength (ppi)	157	157	159	165	157						**159**	3	126 min
MD Break Strength (ppi)	281	290	284	307	304						**293**	12	228 min
TD Break Strength (ppi)	284	278	296	274	301						**287**	12	228 min
MD Yield Elongation (%)	19	19	19	21	19						**19**	1	12 min
TD Yield Elongation (%)	18	18	18	17	19						**18**	1	12 min
MD Break Elongation (%)	775	780	792	834	821						**800**	26	700 min
TD Break Elongation (%)	824	809	840	766	862						**820**	36	700 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	50	53	52	50	51	49	49	50	49	51	**51**	1	42 min
TD Tear Strength (lbs)	50	47	47	49	48	47	47	50	47	46	**48**	1	42 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	135	133	133	132	131						**133**	2	108 min

MD Machine Direction TD Transverse Direction

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

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE 60 mil Smooth HDPE Geomembrane
Sample Identification: 108197887
TRI Log #: 40709

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)	61.6	63.0	61.0	60.7	61.6	61.0	63.0	60.8	60.6	60.4	**61.4**	0.9	60 min ave
											60.4	<< min	54 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.944	0.944	0.945								**0.944**	0.001	0.94 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.51	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
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)	147	142	146	153	147						**147**	4	126 min
TD Yield Strength (ppi)	167	161	161	162	157						**162**	4	126 min
MD Break Strength (ppi)	255	293	293	312	292						**289**	21	228 min
TD Break Strength (ppi)	301	298	289	299	297						**297**	5	228 min
MD Yield Elongation (%)	20	19	19	22	19						**20**	1	12 min
TD Yield Elongation (%)	18	19	19	16	21						**19**	2	12 min
MD Break Elongation (%)	670	775	773	794	771						**757**	49	700 min
TD Break Elongation (%)	819	840	805	831	841						**827**	15	700 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	50	53	51	53	51	50	53	50	51	52	**51**	1	42 min
TD Tear Strength (lbs)	48	49	49	49	48	47	48	48	50	50	**48**	1	42 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	142	141	132	135	133						**137**	4	108 min

MD Machine Direction TD Transverse Direction

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

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE 60 mil Smooth HDPE Geomembrane
Sample Identification: 108197894
TRI Log #: 40709

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)	62.5	61.7	63.7	62.1	62.0	62.2	59.2	61.0	59.2	60.5	**61.4**	1.4	60 min ave
											59.2	<< min	54 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.945	0.945	0.945								**0.945**	0.000	0.94 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.40	2.44									**2.42**	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
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)	146	156	154	157	155						**154**	4	126 min
TD Yield Strength (ppi)	165	160	161	154	153						**159**	5	126 min
MD Break Strength (ppi)	289	307	273	279	306						**291**	15	228 min
TD Break Strength (ppi)	319	286	314	281	263						**293**	24	228 min
MD Yield Elongation (%)	19	21	19	21	17						**19**	2	12 min
TD Yield Elongation (%)	18	19	18	17	20						**18**	1	12 min
MD Break Elongation (%)	813	819	749	762	833						**795**	37	700 min
TD Break Elongation (%)	903	825	887	815	760						**838**	58	700 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	52	51	51	51	52	50	50	49	52	51	**51**	1	42 min
TD Tear Strength (lbs)	47	48	48	49	48	46	47	47	47	47	**47**	1	42 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	131	129	127	127	127						**128**	2	108 min

MD Machine Direction TD Transverse Direction

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

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE 60 mil Smooth HDPE Geomembrane
Sample Identification: 108197901
TRI Log #: 40709

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)	62.2	62.2	63.5	62.6	62.3	61.7	63.3	63.5	61.7	63.0	**62.6**	0.7	60 min ave
											61.7	<< min	54 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.945	0.945	0.945								**0.945**	0.000	0.94 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.63	2.62									**2.63**	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)	154	156	156	152	156						**155**	2	126 min
TD Yield Strength (ppi)	159	162	159	157	161						**160**	2	126 min
MD Break Strength (ppi)	313	315	275	265	321						**298**	26	228 min
TD Break Strength (ppi)	310	306	262	304	303						**297**	20	228 min
MD Yield Elongation (%)	19	18	20	21	18						**19**	1	12 min
TD Yield Elongation (%)	18	22	18	17	20						**19**	2	12 min
MD Break Elongation (%)	793	797	708	709	824						**766**	54	700 min
TD Break Elongation (%)	846	830	720	834	811						**808**	51	700 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	51	52	51	51	52	51	50	51	52	51	**51**	1	42 min
TD Tear Strength (lbs)	48	49	48	48	48	48	49	47	49	47	**48**	1	42 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	134	132	131	131	130						**132**	1	108 min

MD Machine Direction TD Transverse Direction

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

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE 60 mil Smooth HDPE Geomembrane
Sample Identification: 108197908
TRI Log #: 40709

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)	62.6	61.5	64.4	60.7	62.2	62.5	63.1	61.3	61.0	62.2	**62.2**	1.1	60 min ave
											60.7	<< min	54 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.945	0.945	0.945								**0.945**	0.000	0.94 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)	154	159	153	151	152						**154**	3	126 min
TD Yield Strength (ppi)	160	158	155	154	156						**157**	2	126 min
MD Break Strength (ppi)	301	275	307	281	273						**287**	16	228 min
TD Break Strength (ppi)	296	309	304	271	301						**296**	15	228 min
MD Yield Elongation (%)	20	18	18	19	16						**18**	1	12 min
TD Yield Elongation (%)	18	20	16	17	19						**18**	2	12 min
MD Break Elongation (%)	806	726	845	786	759						**784**	45	700 min
TD Break Elongation (%)	830	892	871	790	846						**846**	39	700 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	50	50	49	51	50	50	51	49	50	50	**50**	1	42 min
TD Tear Strength (lbs)	47	48	48	48	48	47	47	47	47	47	**48**	1	42 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	129	131	130	130	130						**130**	1	108 min

MD Machine Direction TD Transverse Direction

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GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE 60 mil Smooth HDPE Geomembrane
Sample Identification: 108197917
TRI Log #: 40709

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)	61.4	61.3	60.7	60.0	63.4	62.0	63.7	63.1	62.2	60.6	**61.8**	1.3	60 min ave
											60.0	<< min	54 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.945	0.945	0.945								**0.945**	0.000	0.94 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.40	2.36									**2.38**	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
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)	159	151	156	150	144						**152**	6	126 min
TD Yield Strength (ppi)	158	159	154	156	158						**157**	2	126 min
MD Break Strength (ppi)	300	279	316	308	277						**296**	17	228 min
TD Break Strength (ppi)	290	302	289	273	300						**291**	12	228 min
MD Yield Elongation (%)	20	19	19	23	19						**20**	2	12 min
TD Yield Elongation (%)	18	20	17	18	22						**19**	2	12 min
MD Break Elongation (%)	771	741	812	816	744						**777**	36	700 min
TD Break Elongation (%)	809	830	804	764	812						**804**	24	700 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	49	49	51	50	51	50	50	49	50	49	**50**	1	42 min
TD Tear Strength (lbs)	47	48	47	49	48	47	47	46	47	47	**47**	1	42 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	129	128	128	128	127						**128**	1	108 min

MD Machine Direction TD Transverse Direction

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November 8, 2018

Mail To:

Mark Decarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo NM 87004

email: swls.md@gmail.com

Bill To:

<= Same (P.O. # SW1819)

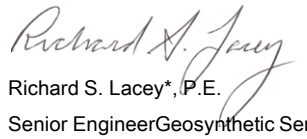
Dear Mr DeCarlo:

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 Phase 2 Landfill - Cell 1A**
TRI Job Reference Number:	42279
Material(s) Tested:	One, Solmax GSE 60 mil Textured HDPE Geomembranes
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,



Richard S. Lacey*, P.E.
Senior EngineerGeosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file

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GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE 60 mil Textured HDPE Geomembrane
Sample Identification: 104192271
TRI Log #: 42279

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
													57 min ave
Thickness (mils)	66	64	60	67	61	64	67	66	63	66	**64**	3	54, 8 of 10
											60	<< min	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	2.35	2.40									**2.38**	0.04	2.0 - 3.0
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)	141	134	146	149	144						**143**	6	126 min
TD Yield Strength (ppi)	145	155	137	143	146						**145**	6	126 min
MD Break Strength (ppi)	215	180	206	209	182						**198**	16	90 min
TD Break Strength (ppi)	198	200	150	179	49						**155**	63	90 min
MD Yield Elongation (%)	16	17	19	19	19						**18**	1	12 min
TD Yield Elongation (%)	16	16	18	17	19						**17**	1	12 min
MD Break Elongation (%)	595	547	579	553	515						**558**	31	100 min
TD Break Elongation (%)	588	561	482	528	161						**464**	174	100 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	128	127	119	122	119						**123**	4	90 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	49	50	48	49	50	50	48	53	48	48	**49**	2	42 min
TD Tear Strength (lbs)	50	45	45	48	45	45	44	45	48	43	**46**	2	42 min

MD Machine Direction TD Transverse Direction

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

November 7, 2018

Mail To:

Mark Decarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo NM 87004

email: swls.md@gmail.com

Bill To:

<= Same (P.O. # SW1819)

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 Phase 2 Landfill - Cell 1A**
TRI Job Reference Number:	42586
Material(s) Tested:	Two, Solmax GSE 60 mil Textured HDPE Geomembranes
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,

Jarrett A. Nelson
Technical Director
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file

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.

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE 60 mil Textured HDPE Geomembrane
Sample Identification: 102191310
TRI Log #: 42586

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
													57 min ave
Thickness (mils)	62	63	62	63	64	62	64	64	62	63	**63**	1	54 min 8 of 10
											62	<< min	51 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.945	0.945	0.945								**0.945**	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.05	2.13									**2.09**	0.06	2.0 - 3.0
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)	161	159	162	160	168						**162**	4	126 min
TD Yield Strength (ppi)	156	161	167	162	162						**162**	4	126 min
MD Break Strength (ppi)	173	183	122	119	164						**152**	30	90 min
TD Break Strength (ppi)	143	200	142	155	207						**169**	32	90 min
MD Yield Elongation (%)	16	16	16	16	16						**16**	0	12 min
TD Yield Elongation (%)	18	21	18	20	18						**19**	1	12 min
MD Break Elongation (%)	507	545	191	129	479						**370**	195	100 min
TD Break Elongation (%)	399	540	99	383	533						**391**	179	100 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	138	143	142	145	143						**142**	2	90 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	47	50	53	50	55	53	53	54	53	56	**52**	3	42 min
TD Tear Strength (lbs)	53	54	53	49	60	57	59	54	55	56	**55**	3	42 min

MD Machine Direction TD Transverse Direction

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

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE 60 mil Textured HDPE Geomembrane
Sample Identification: 102191318
TRI Log #: 42586

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
													57 min ave
Thickness (mils)	60	64	61	64	65	62	62	60	62	66	**63**	2	54 min 8 of 10
											60	<< min	51 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	2.21	2.23									**2.22**	0.01	2.0 - 3.0
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)	175	171	170	168	158						**168**	6	126 min
TD Yield Strength (ppi)	150	170	167	162	170						**164**	8	126 min
MD Break Strength (ppi)	191	195	133	184	127						**166**	33	90 min
TD Break Strength (ppi)	214	212	207	161	194						**198**	22	90 min
MD Yield Elongation (%)	17	17	16	17	16						**17**	1	12 min
TD Yield Elongation (%)	15	18	19	17	17						**17**	1	12 min
MD Break Elongation (%)	507	539	224	501	64						**367**	212	100 min
TD Break Elongation (%)	585	517	559	418	492						**514**	65	100 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	141	139	144	144	138						**142**	3	90 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	51	55	53	52	54	52	53	54	55	55	**53**	1	42 min
TD Tear Strength (lbs)	61	56	55	54	58	57	56	54	54	54	**56**	2	42 min

MD Machine Direction TD Transverse Direction

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December 6, 2018

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 Evaporated Brine Pond 7-10**
TRI Job Reference Number:	43004
Material(s) Tested:	Four, Solmax GSE 60 mil Smooth HDPE Geomembranes
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,

Richard S. Lacey*, P.E.
Senior Engineer
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file

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GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance Evaporated Brine Pond 7-10

Material: Solmax GSE 60 mil Smooth HDPE Geomembrane
Sample Identification: 103216946
TRI Log #: 43004

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D 5199)												
Thickness (mils)	61.5	62.7	61.2	64.1	62.1	62.1	60.8	61.2	64.3	64.1	**62.4** **60.8**	1.3 << min
Density (ASTM D 1505)												
Density (g/cm3)	0.944	0.944	0.944								**0.944**	0.000
Carbon Black Content (ASTM D 1603, mod.)												
% Carbon Black	2.38	2.40									**2.39**	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)	145	145	140	148	147						**145**	3
TD Yield Strength (ppi)	154	152	153	148	145						**150**	4
MD Break Strength (ppi)	284	302	281	288	292						**289**	8
TD Break Strength (ppi)	306	305	300	286	296						**299**	8
MD Yield Elongation (%)	20	22	22	24	21						**22**	1
TD Yield Elongation (%)	19	19	19	21	19						**19**	1
MD Break Elongation (%)	772	799	776	758	773						**776**	15
TD Break Elongation (%)	848	826	815	811	834						**827**	15
Tear Resistance (ASTM D 1004)												
MD Tear Strength (lbs)	49	51	50	52	48	50	50	51	49	53	**50**	1
TD Tear Strength (lbs)	46	49	47	48	48	48	48	48	48	47	**48**	1
Puncture Resistance (ASTM D 4833)												
Puncture Strength (lbs)	144	141	137	135	133						**138**	4

MD Machine Direction TD Transverse Direction

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

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance Evaporated Brine Pond 7-10

Material: Solmax GSE 60 mil Smooth HDPE Geomembrane
Sample Identification: 103216962
TRI Log #: 43004

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D 5199)												
Thickness (mils)	61.1	61.3	60.7	61.0	60.5	60.3	60.4	60.6	61.5	59.6	**60.7**	0.6
											59.6	<< min
Density (ASTM D 1505)												
Density (g/cm3)	0.945	0.945	0.945								**0.945**	0.000
Carbon Black Content (ASTM D 1603, mod.)												
% Carbon Black	2.29	2.30									**2.30**	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)	140	141	133	134	134						**136**	4
TD Yield Strength (ppi)	148	146	150	147	146						**147**	2
MD Break Strength (ppi)	285	281	268	271	272						**275**	7
TD Break Strength (ppi)	287	275	273	278	284						**279**	6
MD Yield Elongation (%)	19	23	23	23	22						**22**	2
TD Yield Elongation (%)	18	20	21	20	19						**20**	1
MD Break Elongation (%)	788	779	770	764	768						**774**	10
TD Break Elongation (%)	832	820	803	825	836						**823**	13
Tear Resistance (ASTM D 1004)												
MD Tear Strength (lbs)	49	48	49	49	48	50	50	49	50	47	**49**	1
TD Tear Strength (lbs)	47	46	46	45	45	46	47	46	45	44	**46**	1
Puncture Resistance (ASTM D 4833)												
Puncture Strength (lbs)	133	131	134	132	131						**132**	1

MD Machine Direction TD Transverse Direction

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

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance Evaporated Brine Pond 7-10

Material: Solmax GSE 60 mil Smooth HDPE Geomembrane
Sample Identification: 103216970
TRI Log #: 43004

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D 5199)												
Thickness (mils)	62.8	61.9	61.2	60.5	60.1	60.6	60.0	60.9	61.0	61.2	**61.0**	0.8
											60.0	<< min
Density (ASTM D 1505)												
Density (g/cm3)	0.944	0.944	0.944								**0.944**	0.000
Carbon Black Content (ASTM D 1603, mod.)												
% Carbon Black	2.33	2.32									**2.33**	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)	138	134	130	138	138						**136**	4
TD Yield Strength (ppi)	148	144	139	143	141						**143**	3
MD Break Strength (ppi)	285	257	274	287	298						**280**	16
TD Break Strength (ppi)	292	295	292	304	304						**297**	6
MD Yield Elongation (%)	21	25	23	22	20						**22**	2
TD Yield Elongation (%)	19	20	22	21	20						**20**	1
MD Break Elongation (%)	817	755	820	808	832						**806**	30
TD Break Elongation (%)	858	887	887	885	879						**879**	12
Tear Resistance (ASTM D 1004)												
MD Tear Strength (lbs)	48	47	50	47	47	49	48	47	47	47	**48**	1
TD Tear Strength (lbs)	45	44	47	46	44	47	46	46	46	45	**46**	1
Puncture Resistance (ASTM D 4833)												
Puncture Strength (lbs)	135	134	130	128	128						**131**	4

MD Machine Direction TD Transverse Direction

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

GEOMEMBRANE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance Evaporated Brine Pond 7-10

Material: Solmax GSE 60 mil Smooth HDPE Geomembrane
Sample Identification: 103216976
TRI Log #: 43004

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D 5199)												
Thickness (mils)	63.3	62.7	60.7	61.3	60.5	59.7	60.8	60.4	60.2	62.2	**61.2**	1.2
											59.7	<< min
Density (ASTM D 1505)												
Density (g/cm3)	0.945	0.945	0.945								**0.945**	0.000
Carbon Black Content (ASTM D 1603, mod.)												
% Carbon Black	2.38	2.37									**2.38**	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)	142	138	139	131	131						**136**	5
TD Yield Strength (ppi)	139	149	147	139	139						**143**	5
MD Break Strength (ppi)	291	281	290	283	262						**281**	12
TD Break Strength (ppi)	283	309	288	290	285						**291**	10
MD Yield Elongation (%)	22	19	22	22	20						**21**	1
TD Yield Elongation (%)	17	18	19	19	18						**18**	1
MD Break Elongation (%)	815	797	825	829	768						**807**	25
TD Break Elongation (%)	861	898	847	882	867						**871**	20
Tear Resistance (ASTM D 1004)												
MD Tear Strength (lbs)	48	50	48	48	47	48	50	47	48	49	**48**	1
TD Tear Strength (lbs)	46	46	46	46	43	44	45	42	44	45	**45**	1
Puncture Resistance (ASTM D 4833)												
Puncture Strength (lbs)	131	129	125	123	123						**126**	3

MD Machine Direction TD Transverse Direction

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

APPENDIX B

Material Manufacturer Certification and Conformance Testing Results

B.5. Geonet Certifications

Roll Allocation List

Sales Order SO-085199
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS/Sundance West Phase 2, Landfill Cell 1A

Serial number	Item Number	Resin Lot	Manufacturing date	Length
131553538	GNS-200E-00-00-E-00	CB118H0203	9/28/2018	330.00
131553539	GNS-200E-00-00-E-00	CB118H0203	9/28/2018	330.00
131553540	GNS-200E-00-00-E-00	CB118H0203	9/28/2018	330.00
131553541	GNS-200E-00-00-E-00	CB118H0203	9/28/2018	330.00
131553542	GNS-200E-00-00-E-00	CB118H0203	9/28/2018	330.00
131553543	GNS-200E-00-00-E-00	CB118H0203	9/28/2018	330.00
131553544	GNS-200E-00-00-E-00	CB118H0203	9/28/2018	330.00
131553545	GNS-200E-00-00-E-00	CB118H0203	9/28/2018	330.00
131553546	GNS-200E-00-00-E-00	CB118H0203	9/28/2018	330.00
131553547	GNS-200E-00-00-E-00	CB118H0203	9/28/2018	330.00
131553565	GNS-200E-00-00-E-00	CB118H0203	9/28/2018	330.00
131553566	GNS-200E-00-00-E-00	CB118H0203	9/28/2018	330.00
131553567	GNS-200E-00-00-E-00	CB118H0203	9/28/2018	330.00
131553568	GNS-200E-00-00-E-00	CB118H0203	9/28/2018	330.00
131553569	GNS-200E-00-00-E-00	CB118H0203	9/28/2018	330.00
131553741	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553742	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553743	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553744	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553745	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553746	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553747	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553748	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553749	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553750	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553751	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553752	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553753	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553754	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553755	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553756	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553757	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553758	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553759	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553760	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553761	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553762	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553763	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553764	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553765	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553766	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553767	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553768	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553769	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553770	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553771	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553772	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553773	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553774	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553775	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553776	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553777	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553778	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553779	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553780	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00
131553781	GNS-200E-00-00-E-00	CB118H2701	9/30/2018	330.00

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Oct/2/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085199	Southwest Liner Systems, Inc.	Eunice NM US	GNS-200E-00-00-E-00	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (ppi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Geonet Mass per Unit Area ASTM D5261 (lbs/ft²)
131553538	226	65	0.956	2.3	0.177
131553539	226	65	0.956	2.3	0.177
131553540	226	65	0.956	2.3	0.177
131553541	226	65	0.956	2.3	0.177
131553542	226	65	0.956	2.3	0.177
131553543	226	65	0.956	2.3	0.177
131553544	226	65	0.956	2.3	0.177
131553545	226	65	0.956	2.3	0.177
131553546	226	65	0.956	2.3	0.177
131553547	226	65	0.956	2.3	0.177
131553565	219	68	0.952	2.3	0.176
131553566	228	62	0.956	2.3	0.178
131553567	228	62	0.956	2.3	0.178
131553568	228	62	0.956	2.3	0.178
131553569	228	62	0.956	2.3	0.178
131553741	228	63	0.960	2.6	0.182
131553742	227	58	0.962	2.7	0.177
131553743	227	58	0.962	2.7	0.177
131553744	227	58	0.962	2.7	0.177
131553745	227	58	0.962	2.7	0.177
131553746	227	58	0.962	2.7	0.177
131553747	227	58	0.962	2.7	0.177
131553748	227	58	0.962	2.7	0.177
131553749	227	58	0.962	2.7	0.177
131553750	227	58	0.962	2.7	0.177
131553751	227	58	0.962	2.7	0.177
131553752	226	64	0.962	2.7	0.177
131553753	226	64	0.962	2.7	0.177
131553754	226	64	0.962	2.7	0.177
131553755	226	64	0.962	2.7	0.177
131553756	226	64	0.962	2.7	0.177
131553757	226	64	0.962	2.7	0.177
131553758	226	64	0.962	2.7	0.177
131553759	226	64	0.962	2.7	0.177

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Oct/2/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085199	Southwest Liner Systems, Inc.	Eunice NM US	GNS-200E-00-00-E-00	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (ppi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Geonet Mass per Unit Area ASTM D5261 (lbs/ft²)
131553760	226	64	0.962	2.7	0.177
131553761	226	64	0.962	2.7	0.177
131553762	228	65	0.961	2.6	0.176
131553763	228	65	0.961	2.6	0.176
131553764	228	65	0.961	2.6	0.176
131553765	228	65	0.961	2.6	0.176
131553766	228	65	0.961	2.6	0.176
131553767	228	65	0.961	2.6	0.176
131553768	228	65	0.961	2.6	0.176
131553769	228	65	0.961	2.6	0.176
131553770	228	65	0.961	2.6	0.176
131553771	228	65	0.961	2.6	0.176
131553772	227	62	0.957	2.3	0.220
131553773	227	62	0.957	2.3	0.220
131553774	227	62	0.957	2.3	0.220
131553775	227	62	0.957	2.3	0.220
131553776	227	62	0.957	2.3	0.220
131553777	227	62	0.957	2.3	0.220
131553778	227	62	0.957	2.3	0.220
131553779	227	62	0.957	2.3	0.220
131553780	227	62	0.957	2.3	0.220
131553781	227	62	0.957	2.3	0.220

Laboratory Manager _____

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Equistar Chemicals, LP
One Houston Center
1221 McKinney
Houston TX 77010

Certificate Of Analysis

Certificate of Analysis Contact:

Ship-To Address:
GSE ENVIRONMENTAL LLC
1245 EASTLAND AVE
KINGSTREE SC 29556
UNITED STATES

Product Name	: PETROTHENE LR732001	**Customer Order No.**	: 03-513370
Batch Number	: CB118H0203	**Customer Number**	: 151477
Vehicle Number	: CITX200390	**Date Shipped**	: August 08, 2018
Estimated Quantity	: 214,550 LBS	**Equistar Order No.**	: 5181425 000010
Material Number	: 16838	**Delivery Item No.**	: 8101135739 000010

Test Description	Test Result	Unit of Measure	
Vehicle ID	CITX200390		
Vehicle Type	HOPPER CAR H		
Density, Extrudate @ 23C	0.9533	g/cm3	STM 011
Melt Index, 2160g @ 190C	0.34	g/10 min.	STM 002

Delivery Number:

Cust/PO Number:

Print Date: August 08, 2018 BSSIMMO1

Data reported was generated in an approved Quality Assurance Lab.

This information is available 24 hours a day at https://lyb.customerxpress.com/
Questions ? Call Customer Service: 888-777-0232

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Equistar Chemicals, LP
One Houston Center
1221 McKinney
Houston TX 77010

Certificate Of Analysis

Certificate of Analysis Contact:

Ship-To Address:
GSE ENVIRONMENTAL LLC
1245 EASTLAND AVE
KINGSTREE SC 29556
UNITED STATES

Product Name	: PETROTHENE LR732001	**Customer Order No.**	: 03-513370
Batch Number	: CB118H2701	**Customer Number**	: 151477
Vehicle Number	: CITX200367	**Date Shipped**	: August 28, 2018
Estimated Quantity	: 214,000 LBS	**Equistar Order No.**	: 5216507 000010
Material Number	: 16838	**Delivery Item No.**	: 8101185260 000010

Test Description	Test Result	Unit of Measure	
Vehicle ID	CITX200367		
Vehicle Type	HOPPER CAR H		
Density, Extrudate @ 23C	0.9521	g/cm3	STM 011
Melt Index, 2160g @ 190C	0.28	g/10 min.	STM 002

Delivery Number:

Cust/PO Number:

Print Date: August 29, 2018 BSSIMMO1

Data reported was generated in an approved Quality Assurance Lab.

This information is available 24 hours a day at https://lyb.customerxpress.com/
Questions ? Call Customer Service: 888-777-0232

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Report Date
10/2/2018

Quality Assurance Laboratory Test Results

Job Name: SWLS/Sundance West Phase 2 Landfill Cell 1A
Sales Order: 85199

Required Testing: ASTM D 1238, 190 / 2.16 -- Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer

Frequency: 1/50,000 sf

Specification: ≤ 1.0 g/10 minutes

Product Code	Roll Number	Result
GNS-200E-00-00-E-00	131553538	0.37
GNS-200E-00-00-E-00	131553565	0.35
GNS-200E-00-00-E-00	131553741	0.34
GNS-200E-00-00-E-00	131553751	0.40
GNS-200E-00-00-E-00	131553761	0.40
GNS-200E-00-00-E-00	131553771	0.34
GNS-200E-00-00-E-00	131553781	0.35

Approved by:	Barbara McCrea
Date:	October 2, 2018

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GSE ENVIRONMENTAL™ GSE Environmental, LLC.

Transmissivity Report

ASTM D4716

Roll No. 131553538

ROLL IDENTIFICATION

Roll Number	131553538
Product Name	GNS-200E-00-00-E-00
Production Date	9/28/2018

CUSTOMER INFORMATION

Order Number	85199
Customer Name	Southwest Liner Systems, Inc.
Project Name	SWLS/Sundance West Phase 2, Landfill Cell 1A
Location	Eunice NM

Pressure (psf)	*Gradient*	*Net/Composite*	*Transmissivity Results* (m^2/sec)	(gal/min/ft)	*Seat Time (min)*	*Boundary*
10,000	0.10	Net	4.16E-03	20.10	15	SS Plates

GSE QC APPROVED

GSE Roll Allocation

Order SO-085199

Customer Southwest Liner Systems, Inc.

Project Name Sundance West Phase 2, Landfill Cell 1A

TRI AUSTIN

1/100,000 sf min 1/lot 1 ft x RW

Total sf on job 277,200 sf

Roll#	Resin Lot	Product Code	Mfg Date	Length	Pick up
131553538	CB118H0203	GNS-200E-00-00-E-00	9/28/2018	330	10/3
131553539	CB118H0203	GNS-200E-00-00-E-00	9/28/2018	330	
131553540	CB118H0203	GNS-200E-00-00-E-00	9/28/2018	330	
131553541	CB118H0203	GNS-200E-00-00-E-00	9/28/2018	330	
131553542	CB118H0203	GNS-200E-00-00-E-00	9/28/2018	330	
131553543	CB118H0203	GNS-200E-00-00-E-00	9/28/2018	330	
131553544	CB118H0203	GNS-200E-00-00-E-00	9/28/2018	330	
131553545	CB118H0203	GNS-200E-00-00-E-00	9/28/2018	330	
131553546	CB118H0203	GNS-200E-00-00-E-00	9/28/2018	330	
131553547	CB118H0203	GNS-200E-00-00-E-00	9/28/2018	330	
131553565	CB118H0203	GNS-200E-00-00-E-00	9/28/2018	330	
131553566	CB118H0203	GNS-200E-00-00-E-00	9/28/2018	330	
131553567	CB118H0203	GNS-200E-00-00-E-00	9/28/2018	330	
131553568	CB118H0203	GNS-200E-00-00-E-00	9/28/2018	330	
131553569	CB118H0203	GNS-200E-00-00-E-00	9/28/2018	330	
131553741	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	10/3
131553742	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553743	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553744	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553745	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553746	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553747	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553748	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553749	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553750	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553751	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553752	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553753	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553754	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553755	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553756	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553757	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553758	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553759	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553760	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553761	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	10/3
131553762	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553763	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553764	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553765	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553766	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553767	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553768	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553769	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553770	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553771	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553772	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553773	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553774	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553775	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553776	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553777	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553778	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553779	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553780	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	
131553781	CB118H2701	GNS-200E-00-00-E-00	9/30/2018	330	10/3

Roll Allocation List

Sales Order SO-085886
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS / Sundance West Landfill Cell 1B

Serial number	Item Number	Resin Lot	Manufacturing date	Length
131558931	GNS-200E-00-00-E-00	18J1170	12/3/2018	330.00
131558932	GNS-200E-00-00-E-00	18J1170	12/3/2018	330.00
131558933	GNS-200E-00-00-E-00	18J1170	12/3/2018	330.00
131558934	GNS-200E-00-00-E-00	18J1170	12/3/2018	330.00
131559140	GNS-200E-00-00-E-00	18J1170	12/7/2018	330.00
131559147	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559151	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559152	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559153	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559154	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559155	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559156	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559157	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559158	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559159	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559160	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559161	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559162	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559163	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559164	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559165	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559166	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559167	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559168	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559169	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559170	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559171	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559172	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559173	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559174	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559175	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559176	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559177	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559178	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559179	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559180	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559181	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559182	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559183	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559184	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559185	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559186	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559187	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559188	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559189	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559190	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559191	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559192	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559193	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00
131559194	GNS-200E-00-00-E-00	18J1183	12/9/2018	330.00

GSE Environmental, LLC

ROLL TEST DATA REPORT

Report Date: Dec/11/2018

Sales Order No.	*Customer Name*	*Project Location*	*Product Name*	*BOL Number*
SO-085886	Southwest Liner Systems, Inc.	Eunice NM US	GNS-200E-00-00-E-00	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (ppi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Geonet Mass per Unit Area ASTM D5261 (lbs/ft²)
131558931	215	66	0.954	2.5	0.212
131558932	220	66	0.958	2.4	0.180
131558933	220	66	0.958	2.4	0.180
131558934	220	66	0.958	2.4	0.180
131559140	208	55	0.959	2.6	0.161
131559147	208	55	0.959	2.6	0.161
131559151	219	67	0.967	2.6	0.175
131559152	218	76	0.956	2.6	0.170
131559153	218	76	0.956	2.6	0.170
131559154	218	76	0.956	2.6	0.170
131559155	218	76	0.956	2.6	0.170
131559156	218	76	0.956	2.6	0.170
131559157	218	76	0.956	2.6	0.170
131559158	218	76	0.956	2.6	0.170
131559159	218	76	0.956	2.6	0.170
131559160	218	76	0.956	2.6	0.170
131559161	218	76	0.956	2.6	0.170
131559162	217	65	0.959	2.6	0.169
131559163	217	65	0.959	2.6	0.169
131559164	217	65	0.959	2.6	0.169
131559165	217	65	0.959	2.6	0.169
131559166	217	65	0.959	2.6	0.169
131559167	217	65	0.959	2.6	0.169
131559168	217	65	0.959	2.6	0.169
131559169	217	65	0.959	2.6	0.169
131559170	217	65	0.959	2.6	0.169
131559171	217	65	0.959	2.6	0.169
131559172	217	60	0.952	2.4	0.161
131559173	217	60	0.952	2.4	0.161
131559174	217	60	0.952	2.4	0.161
131559175	217	60	0.952	2.4	0.161
131559176	217	60	0.952	2.4	0.161
131559177	217	60	0.952	2.4	0.161
131559178	217	60	0.952	2.4	0.161

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Dec/11/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085886	Southwest Liner Systems, Inc.	Eunice NM US	GNS-200E-00-00-E-00	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (ppi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Geonet Mass per Unit Area ASTM D5261 (lbs/ft²)
131559179	217	60	0.952	2.4	0.161
131559180	217	60	0.952	2.4	0.161
131559181	217	60	0.952	2.4	0.161
131559182	215	60	0.968	2.5	0.161
131559183	215	60	0.968	2.5	0.161
131559184	215	60	0.968	2.5	0.161
131559185	215	60	0.968	2.5	0.161
131559186	215	60	0.968	2.5	0.161
131559187	215	60	0.968	2.5	0.161
131559188	215	60	0.968	2.5	0.161
131559189	215	60	0.968	2.5	0.161
131559190	215	60	0.968	2.5	0.161
131559191	215	60	0.968	2.5	0.161
131559192	217	65	0.971	2.4	0.178
131559193	217	65	0.971	2.4	0.178
131559194	217	65	0.971	2.4	0.178

Laboratory Manager

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Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS
201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT TX 77978
PHONE:(888)FPCUSA3

Certificate of Analysis

(CONFIDENTIAL)

CUSTOMER:GSE ENVIRONMENTAL LLC
1245 EASTLAND AVE
KINGSTREE SC 29556
PRODUCT :HB5502B
RAILCAR FPAX214394

S/O NO : ETAA638
CUSTOMER PO : 03-513922
DATE SHIPPED: 10/21/18
LOT NO : 18J1170
WEIGHT (LB) : 198,350.00
CUSTID:FT03112 SPIDE3

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index,g/10min	ASTM D1238	.37
Density, g/cm3	ASTM D1505	.9540

Linda Kao

QC SUPERVISOR: LINDA KAO

Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS
201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT TX 77978
PHONE:(888)FPCUSA3

Certificate of Analysis

(CONFIDENTIAL)

CUSTOMER:GSE ENVIRONMENTAL LLC
1245 EASTLAND AVE
KINGSTREE SC 29556
PRODUCT :HB5502B
RAILCAR FURX873428

S/O NO : ETAA639
CUSTOMER PO : 03-513922
DATE SHIPPED: 10/21/18
LOT NO : 18J1183
WEIGHT (LB) : 197,900.00
CUSTID:FT03112 SPIDE3

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index,g/10min	ASTM D1238	.33
Density, g/cm3	ASTM D1505	.9541

Linda Kao

QC SUPERVISOR: LINDA KAO

Report Date
12/12/2018

Quality Assurance Laboratory Test Results

Job Name: SWLS/ Sundance West Landfill Cell 1B
Sales Order: 85886

Required Testing: ASTM D 1238, 190 / 2.16 -- Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer

Frequency: 1/resin lot

Specification: ≤ 1.0 g/10 minutes

Product Code	Resin Number	Result
GNS-200E-00-00-E-00	18J1170	0.31
GNS-200E-00-00-E-00	18J1183	0.30

Approved by:	Barbara McCrea
Date:	December 12, 2018

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GSE ENVIRONMENTAL™ GSE Environmental, LLC.

Transmissivity Report

ASTM D4716

Roll No. 131558931

ROLL IDENTIFICATION

Roll Number	131558931
Product Name	GNS-200E-00-00-E-00
Production Date	12/3/2018

CUSTOMER INFORMATION

Order Number	85886
Customer Name	Southwest Liner Systems, Inc.
Project Name	SWLS/Sundance West Landfill Cell 1B
Location	Eunice NM US

Pressure (psf)	***Gradient***	***Net/Composite***	***Transmissivity Results*** (m^2/sec)	***(gal/min/ft)***	***Seat Time (min)***	***Boundary***
10,000	0.10	Net	2.78E-03	13.43	15	SS Plates

GSE QC APPROVED

GSE ENVIRONMENTAL™ GSE Environmental, LLC.

Transmissivity Report

ASTM D4716

Roll No. 131559151

ROLL IDENTIFICATION

Roll Number	131559151
Product Name	GNS-200E-00-00-E-00
Production Date	12/9/2018

CUSTOMER INFORMATION

Order Number	85886
Customer Name	Southwest Liner Systems, Inc.
Project Name	SWLS/Sundance West Landfill Cell 1B
Location	Eunice NM US

Pressure (psf)	***Gradient***	***Net/Composite***	***Transmissivity Results*** (m^2/sec)	***(gal/min/ft)***	***Seat Time (min)***	***Boundary***
10,000	0.10	Net	5.66E-03	27.34	15	SS Plates

GSE QC APPROVED

GSE Roll Allocation

Order SO-085886

Customer Southwest Liner Systems, Inc.

Project Name Sundance West Landfill Cell 1B

TRI/AUSTIN

1/100,000 sf, min 1/lot, 1ft x RW

ONE 2 ft x RW for friction test

Roll#	Resin Lot	Product Code	Mfg Date	Length	Sent
131558931	18J1170	GNS-200E-00-00-E-00	12/3/2018	330	12/11
131558932	18J1170	GNS-200E-00-00-E-00	12/3/2018	330	
131558933	18J1170	GNS-200E-00-00-E-00	12/3/2018	330	
131558934	18J1170	GNS-200E-00-00-E-00	12/3/2018	330	
131559140	18J1170	GNS-200E-00-00-E-00	12/7/2018	330	
131559147	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	12/11
131559151	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559152	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559153	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559154	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559155	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559156	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559157	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559158	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559159	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559160	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559161	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559162	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559163	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559164	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559165	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559166	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559167	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559168	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559169	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559170	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	12/11
131559171	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559172	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559173	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559174	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559175	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559176	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559177	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559178	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559179	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559180	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559181	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559182	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559183	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559184	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559185	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559186	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559187	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559188	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559189	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559190	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	12/11
131559191	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559192	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559193	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	
131559194	18J1183	GNS-200E-00-00-E-00	12/9/2018	330	

APPENDIX B

Material Manufacturer Certification and Conformance Testing Results

B.6. Geonet Conformance Testing Results

October 24, 2018

Mail To:

Mark DeCarlo
Southwest Liner Systems
301 Calle Industrial
Bernalillo NM 87004

email: swls.md@gmail.com

Bill To:

<= Same (P.O. # SW1819)

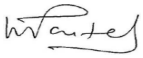
Dear Mr DeCarlo:

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 Phase 2 Landfill - Cell 1A**
TRI Job Reference Number:	41754
Material(s) Tested:	Four, GSE 200 mil Geonet
Test(s) Requested:	Thickness (ASTM D 1777) - GN Mass/Unit Area (ASTM D 3776) - GN Density (ASTM D 1505) - GN Carbon Black Content (ASTM D 1603, mod.) - GN Melt Flow (ASTM D 1238) - GN Wide Width Tensile (ASTM D 4595) - GN

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

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GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: GSE 200 mil Geonet
Sample Identification: 131553538
TRI Log #: 41754

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)	221	224	222	225	222	227	223	222	231	234	**225**	5	200 min
Thickness (mm)	5.61	5.69	5.63	5.71	5.63	5.77	5.66	5.65	5.88	5.95	**5.72**	0.11	
											5.61	<< min	
Mass/Unit Area (ASTM D 3776, Option C)													
5" diameter circle (grams)	10.26	10.96	10.19	11.10	11.23	11.64	10.8	10.8	11.26	11.11	**10.93**	0.45	
Mass/Unit Area (lb/sq.ft)	0.17	0.18	0.16	0.18	0.18	0.19	0.17	0.17	0.18	0.18	**0.18**	0.01	0.16 min
Mass/Unit Area (g/m2)	810	865	804	876	886	919	852	851	889	877	**863**	35	
Density (ASTM D 1505)													
Density (g/cm3)	0.954	0.954	0.954								**0.954**	0.000	0.94 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.68	2.73									**2.71**	0.04	2.0 - 3.0
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.24										**0.24**		≤1.0

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GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: GSE 200 mil Geonet
Sample Identification: 131553538
TRI Log #: 41754

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.
Wide Width Tensile Properties (ASTM D 4595)												
MD Specimen Width (inches)	8											
MD Specimen Width (mm)	203											
MD Ultimate Strength (lbs)	526	463	479	457	426	449					**467**	34
MD Ultimate Strength (N)	2340	2060	2134	2035	1895	2000					**2077**	151
MD Ultimate Strength (ppi)	65.7	57.9	59.9	57.2	53.2	56.2					**58.3**	4.2
MD Ultimate Strength (kN/m)	11.5	10.1	10.5	10.0	9.33	9.84					**10.2**	0.7
MD Strength @ 2% Strain (lbs)	202	149	181	155	150	153					**165**	22
MD Strength @ 2% Strain (N)	899	661	805	689	669	679					**734**	97
MD Strength @ 2% Strain (ppi)	25.3	18.6	22.6	19.4	18.8	19.1					**20.6**	2.7
MD Strength at 2% Strain (kN/m)	4.43	3.25	3.96	3.39	3.29	3.34					**3.61**	0.48
MD Strength @ 5% Strain (lbs)	334	254	300	269	241	262					**277**	34
MD Strength @ 5% Strain (N)	1488	1129	1333	1198	1072	1164					**1231**	153
MD Strength @ 5% Strain (ppi)	41.8	31.7	37.4	33.7	30.1	32.7					**34.6**	4.3
MD Strength at 5% Strain (kN/m)	7.32	5.56	6.56	5.90	5.28	5.73					**6.06**	0.76
MD Strength @ 10% Strain (lbs)	430	330	390	357	319	344					**362**	41
MD Strength @ 10% Strain (N)	1913	1469	1733	1587	1418	1532					**1609**	185
MD Strength @ 10% Strain (ppi)	53.7	41.3	48.7	44.6	39.8	43.0					**45.2**	5.2
MD Strength at 10% Strain (kN/m)	9.42	7.23	8.53	7.81	6.98	7.54					**7.92**	0.91
MD Break Elongation (%)	23.6	394	25.5	26.2	30.3	27.2					**87.7**	149.8
TD Specimen Width (in)	8											
TD Specimen Width (mm)	203											
TD Ultimate Strength (lbs)	221	227	255	261	239	235					**240**	16
TD Ultimate Strength (N)	982	1012	1134	1162	1064	1046					**1066**	70
TD Ultimate Strength (ppi)	27.6	28.4	31.8	32.7	29.9	29.4					**30.0**	2.0
TD Ultimate Strength (kN/m)	4.83	4.98	5.58	5.72	5.24	5.15					**5.25**	0.34
TD Strength @ 2% Strain (lbs)	20.8	19.7	21.0	19.5	17.3	20.0					**19.7**	1.3
TD Strength @ 2% Strain (N)	92.4	87.8	93.5	86.8	76.8	89.0					**87.7**	6.0
TD Strength @ 2% Strain (ppi)	2.60	2.47	2.63	2.44	2.16	2.50					**2.46**	0.17
TD Strength at 2% Strain (kN/m)	0.45	0.43	0.46	0.43	0.38	0.44					**0.43**	0.03
TD Strength @ 5% Strain (lbs)	38.3	38.5	40.4	35.9	35.0	38.0					**37.7**	1.9
TD Strength @ 5% Strain (N)	170	171	180	160	156	169					**168**	9
TD Strength @ 5% Strain (ppi)	4.78	4.81	5.04	4.49	4.37	4.75					**4.71**	0.24
TD Strength at 5% Strain (kN/m)	0.84	0.84	0.88	0.79	0.77	0.83					**0.82**	0.04
TD Strength @ 10% Strain (lbs)	55.1	58.6	61.4	55.0	53.7	57.8					**56.9**	2.9
TD Strength @ 10% Strain (N)	245	261	273	245	239	257					**253**	13
TD Strength @ 10% Strain (ppi)	6.89	7.33	7.68	6.88	6.71	7.23					**7.12**	0.36
TD Strength at 10% Strain (kN/m)	1.21	1.28	1.35	1.20	1.17	1.27					**1.25**	0.06
TD Break Elongation (%)	163	108	161	207	202	191					**172**	37

MD Machine Direction TD Transverse Direction

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GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: GSE 200 mil Geonet
Sample Identification: 131553741
TRI Log #: 41754

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)	225	222	220	229	219	219	233	231	227	229	**225**	5	200 min
Thickness (mm)	5.71	5.63	5.59	5.81	5.57	5.55	5.93	5.86	5.77	5.83	**5.72**	0.13	
											5.55	<< min	
Mass/Unit Area (ASTM D 3776, Option C)													
5" diameter circle (grams)	10.56	10.49	10.07	10.11	9.88	11.10	11.3	10.7	10.91	11.12	**10.62**	0.49	
Mass/Unit Area (lb/sq.ft)	0.17	0.17	0.16	0.16	0.16	0.18	0.18	0.17	0.18	0.18	**0.17**	0.01	0.16 min
Mass/Unit Area (g/m2)	834	828	795	798	780	876	893	841	861	878	**838**	39	
Density (ASTM D 1505)													
Density (g/cm3)	0.953	0.953	0.953								**0.953**	0.000	0.94 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.40	2.38									**2.39**	0.01	2.0 - 3.0
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.14										**0.14**		≤1.0

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GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: GSE 200 mil Geonet
Sample Identification: 131553741
TRI Log #: 41754

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.
Wide Width Tensile Properties (ASTM D 4595)												
MD Specimen Width (inches)	8											
MD Specimen Width (mm)	203											
MD Ultimate Strength (lbs)	445	440	464	477	466	513					**467**	26
MD Ultimate Strength (N)	1978	1959	2066	2124	2072	2282					**2080**	116
MD Ultimate Strength (ppi)	55.6	55.0	58.0	59.7	58.2	64.1					**58.4**	3.3
MD Ultimate Strength (kN/m)	9.74	9.64	10.2	10.5	10.2	11.2					**10.2**	0.6
MD Strength @ 2% Strain (lbs)	168	155	167	162	164	168					**164**	5
MD Strength @ 2% Strain (N)	746	690	742	719	731	749					**729**	22
MD Strength @ 2% Strain (ppi)	21.0	19.4	20.8	20.2	20.5	21.0					**20.5**	0.6
MD Strength at 2% Strain (kN/m)	3.67	3.40	3.65	3.54	3.60	3.69					**3.59**	0.11
MD Strength @ 5% Strain (lbs)	283	267	298	281	273	289					**282**	11
MD Strength @ 5% Strain (N)	1259	1190	1327	1252	1215	1286					**1255**	49
MD Strength @ 5% Strain (ppi)	35.4	33.4	37.3	35.2	34.1	36.1					**35.3**	1.4
MD Strength at 5% Strain (kN/m)	6.20	5.86	6.53	6.16	5.98	6.33					**6.18**	0.24
MD Strength @ 10% Strain (lbs)	359	343	387	372	356	381					**366**	17
MD Strength @ 10% Strain (N)	1600	1526	1722	1657	1585	1694					**1631**	73
MD Strength @ 10% Strain (ppi)	44.9	42.9	48.4	46.5	44.5	47.6					**45.8**	2.1
MD Strength at 10% Strain (kN/m)	7.87	7.51	8.47	8.15	7.80	8.33					**8.02**	0.36
MD Break Elongation (%)	182	272	224	28.5	178	368					**209**	113
TD Specimen Width (in)	8											
TD Specimen Width (mm)	203											
TD Ultimate Strength (lbs)	247	234	234	262	249	250					**246**	11
TD Ultimate Strength (N)	1100	1040	1041	1167	1110	1111					**1095**	48
TD Ultimate Strength (ppi)	30.9	29.2	29.2	32.8	31.2	31.2					**30.8**	1.4
TD Ultimate Strength (kN/m)	5.41	5.12	5.12	5.74	5.46	5.47					**5.39**	0.24
TD Strength @ 2% Strain (lbs)	24.1	22.1	20.7	18.9	27.7	20.8					**22.4**	3.1
TD Strength @ 2% Strain (N)	107	98.4	92.1	84.1	123	92.7					**100**	14
TD Strength @ 2% Strain (ppi)	3.01	2.76	2.59	2.36	3.47	2.60					**2.80**	0.39
TD Strength at 2% Strain (kN/m)	0.53	0.48	0.45	0.41	0.61	0.46					**0.49**	0.07
TD Strength @ 5% Strain (lbs)	46.3	40.8	39.2	37.1	52.4	40.4					**42.7**	5.6
TD Strength @ 5% Strain (N)	206	182	175	165	233	180					**190**	25
TD Strength @ 5% Strain (ppi)	5.79	5.11	4.90	4.64	6.54	5.05					**5.34**	0.70
TD Strength at 5% Strain (kN/m)	1.01	0.89	0.86	0.81	1.15	0.88					**0.94**	0.12
TD Strength @ 10% Strain (lbs)	61.7	60.5	51.3	56.9	75.8	60.1					**61.0**	8.2
TD Strength @ 10% Strain (N)	274	269	228	253	337	267					**272**	36
TD Strength @ 10% Strain (ppi)	7.71	7.56	6.41	7.11	9.48	7.51					**7.63**	1.02
TD Strength at 10% Strain (kN/m)	1.35	1.32	1.12	1.25	1.66	1.32					**1.34**	0.18
TD Break Elongation (%)	164	113	128	175	191	154					**154**	29

MD Machine Direction TD Transverse Direction

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GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: GSE 200 mil Geonet
Sample Identification: 131553761
TRI Log #: 41754

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)	234	225	228	235	231	229	222	222	222	220	**227**	5	200 min
Thickness (mm)	5.94	5.71	5.80	5.96	5.87	5.83	5.63	5.64	5.65	5.59	**5.76**	0.14	
											5.59	<< min	
Mass/Unit Area (ASTM D 3776, Option C)													
5" diameter circle (grams)	11.47	10.11	10.02	10.38	11.58	11.28	10.7	10.4	10.92	10.21	**10.71**	0.58	
Mass/Unit Area (lb/sq.ft)	0.19	0.16	0.16	0.17	0.19	0.18	0.17	0.17	0.18	0.16	**0.17**	0.01	0.16 min
Mass/Unit Area (g/m2)	905	798	791	819	914	890	842	823	862	806	**845**	45	
Density (ASTM D 1505)													
Density (g/cm3)	0.952	0.952	0.952								**0.952**	0.000	0.94 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.29	2.32									**2.31**	0.02	2.0 - 3.0
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.23										**0.23**		≤1.0

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GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: GSE 200 mil Geonet
Sample Identification: 131553761
TRI Log #: 41754

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Wide Width Tensile Properties (ASTM D 4595)												
MD Specimen Width (inches)	8											
MD Specimen Width (mm)	203											
MD Ultimate Strength (lbs)	427	483	473	478	529	530					**487**	39
MD Ultimate Strength (N)	1901	2149	2104	2129	2355	2359					**2166**	173
MD Ultimate Strength (ppi)	53.4	60.4	59.1	59.8	66.2	66.3					**60.9**	4.8
MD Ultimate Strength (kN/m)	9.36	10.6	10.4	10.5	11.6	11.6					**10.7**	0.8
MD Strength @ 2% Strain (lbs)	162	172	157	156	182	200					**171**	17
MD Strength @ 2% Strain (N)	721	764	699	692	811	890					**763**	77
MD Strength @ 2% Strain (ppi)	20.2	21.5	19.6	19.5	22.8	25.0					**21.4**	2.2
MD Strength at 2% Strain (kN/m)	3.55	3.76	3.44	3.41	3.99	4.38					**3.75**	0.38
MD Strength @ 5% Strain (lbs)	275	296	274	261	308	335					**292**	27
MD Strength @ 5% Strain (N)	1223	1317	1219	1163	1370	1492					**1298**	121
MD Strength @ 5% Strain (ppi)	34.4	37.0	34.3	32.7	38.5	41.9					**36.4**	3.4
MD Strength at 5% Strain (kN/m)	6.02	6.48	6.00	5.73	6.74	7.34					**6.39**	0.60
MD Strength @ 10% Strain (lbs)	350	385	361	342	411	433					**380**	36
MD Strength @ 10% Strain (N)	1558	1713	1605	1522	1828	1925					**1692**	160
MD Strength @ 10% Strain (ppi)	43.8	48.1	45.1	42.7	51.3	54.1					**47.5**	4.5
MD Strength at 10% Strain (kN/m)	7.67	8.43	7.90	7.49	9.00	9.47					**8.33**	0.79
MD Break Elongation (%)	25.9	25.2	282	380	340	25.1					**180**	172
TD Specimen Width (in)	8											
TD Specimen Width (mm)	203											
TD Ultimate Strength (lbs)	240	247	251	248	222	227					**239**	12
TD Ultimate Strength (N)	1069	1097	1115	1105	986	1012					**1064**	53
TD Ultimate Strength (ppi)	30.0	30.8	31.3	31.0	27.7	28.4					**29.9**	1.5
TD Ultimate Strength (kN/m)	5.26	5.40	5.49	5.44	4.85	4.98					**5.24**	0.26
TD Strength @ 2% Strain (lbs)	17.0	20.0	19.4	21.2	17.4	16.8					**18.7**	1.8
TD Strength @ 2% Strain (N)	76	89	86	94	78	75					**83**	8
TD Strength @ 2% Strain (ppi)	2.13	2.51	2.42	2.65	2.18	2.11					**2.33**	0.23
TD Strength at 2% Strain (kN/m)	0.37	0.44	0.42	0.46	0.38	0.37					**0.41**	0.04
TD Strength @ 5% Strain (lbs)	35.1	41.4	35.9	40.7	32.5	33.0					**36.4**	3.8
TD Strength @ 5% Strain (N)	156	184	160	181	144	147					**162**	17
TD Strength @ 5% Strain (ppi)	4.38	5.18	4.48	5.09	4.06	4.13					**4.55**	0.48
TD Strength at 5% Strain (kN/m)	0.77	0.91	0.79	0.89	0.71	0.72					**0.80**	0.08
TD Strength @ 10% Strain (lbs)	54.4	63.0	48.8	61.7	48.1	50.3					**54.4**	6.6
TD Strength @ 10% Strain (N)	242	280	217	275	214	224					**242**	29
TD Strength @ 10% Strain (ppi)	6.80	7.87	6.10	7.72	6.02	6.28					**6.80**	0.82
TD Strength at 10% Strain (kN/m)	1.19	1.38	1.07	1.35	1.05	1.10					**1.19**	0.14
TD Break Elongation (%)	225	217	179	170	173	174					**189**	24

MD Machine Direction TD Transverse Direction

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GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: GSE 200 mil Geonet
Sample Identification: 131553781
TRI Log #: 41754

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)	223	216	227	223	229	235	233	220	220	216	**224**	7	200 min
Thickness (mm)	5.65	5.50	5.75	5.67	5.81	5.96	5.91	5.58	5.58	5.47	**5.69**	0.17	
											5.47	<< min	
Mass/Unit Area (ASTM D 3776, Option C)													
5" diameter circle (grams)	10.41	10.30	11.08	10.30	10.48	10.29	10.9	11.3	10.54	10.78	**10.64**	0.36	
Mass/Unit Area (lb/sq.ft)	0.17	0.17	0.18	0.17	0.17	0.17	0.18	0.18	0.17	0.17	**0.17**	0.01	0.16 min
Mass/Unit Area (g/m2)	822	813	875	813	827	812	861	894	832	851	**840**	29	
Density (ASTM D 1505)													
Density (g/cm3)	0.952	0.952	0.952								**0.952**	0.000	0.94 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.63	2.66									**2.65**	0.02	2.0 - 3.0
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.26										**0.26**		≤1.0

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GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: GSE 200 mil Geonet
Sample Identification: 131553781
TRI Log #: 41754

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Wide Width Tensile Properties (ASTM D 4595)												
MD Specimen Width (inches)	8											
MD Specimen Width (mm)	203											
MD Ultimate Strength (lbs)	464	445	458	468	476	496					**468**	17
MD Ultimate Strength (N)	2066	1982	2038	2083	2120	2208					**2083**	77
MD Ultimate Strength (ppi)	58.0	55.7	57.3	58.5	59.6	62.0					**58.5**	2.2
MD Ultimate Strength (kN/m)	10.2	9.75	10.0	10.3	10.4	10.9					**10.3**	0.4
MD Strength @ 2% Strain (lbs)	158	157	171	152	153	182					**162**	12
MD Strength @ 2% Strain (N)	704	701	763	677	682	811					**723**	53
MD Strength @ 2% Strain (ppi)	19.8	19.7	21.4	19.0	19.2	22.8					**20.3**	1.5
MD Strength at 2% Strain (kN/m)	3.47	3.45	3.75	3.33	3.36	3.99					**3.56**	0.26
MD Strength @ 5% Strain (lbs)	281	277	289	271	272	304					**282**	13
MD Strength @ 5% Strain (N)	1250	1231	1286	1208	1210	1355					**1257**	56
MD Strength @ 5% Strain (ppi)	35.1	34.6	36.1	33.9	34.0	38.1					**35.3**	1.6
MD Strength at 5% Strain (kN/m)	6.15	6.06	6.33	5.94	5.96	6.67					**6.18**	0.28
MD Strength @ 10% Strain (lbs)	361	364	371	362	361	398					**369**	14
MD Strength @ 10% Strain (N)	1606	1620	1649	1612	1605	1771					**1644**	64
MD Strength @ 10% Strain (ppi)	45.1	45.5	46.3	45.3	45.1	49.7					**46.2**	1.8
MD Strength at 10% Strain (kN/m)	7.91	7.97	8.12	7.93	7.90	8.71					**8.09**	0.32
MD Break Elongation (%)	397	25.2	28.4	28.1	30.7	24.9					**89.1**	151.1
TD Specimen Width (in)	8											
TD Specimen Width (mm)	203											
TD Ultimate Strength (lbs)	238	236	227	227	256	215					**233**	14
TD Ultimate Strength (N)	1058	1051	1009	1011	1141	956					**1038**	62
TD Ultimate Strength (ppi)	29.7	29.5	28.3	28.4	32.1	26.9					**29.1**	1.8
TD Ultimate Strength (kN/m)	5.21	5.17	4.96	4.97	5.62	4.71					**5.11**	0.31
TD Strength @ 2% Strain (lbs)	18.6	17.4	21.5	15.6	17.9	18.5					**18.2**	1.9
TD Strength @ 2% Strain (N)	82.9	77.3	95.8	69.6	79.5	82.1					**81.2**	8.6
TD Strength @ 2% Strain (ppi)	2.33	2.17	2.69	1.95	2.23	2.31					**2.28**	0.24
TD Strength at 2% Strain (kN/m)	0.41	0.38	0.47	0.34	0.39	0.40					**0.40**	0.04
TD Strength @ 5% Strain (lbs)	38.2	32.6	43.2	29.9	36.5	36.8					**36.2**	4.6
TD Strength @ 5% Strain (N)	170	145	192	133	162	164					**161**	21
TD Strength @ 5% Strain (ppi)	4.77	4.07	5.40	3.73	4.56	4.60					**4.52**	0.58
TD Strength at 5% Strain (kN/m)	0.84	0.71	0.95	0.65	0.80	0.81					**0.79**	0.10
TD Strength @ 10% Strain (lbs)	58.9	48.7	64.4	45.1	57.2	56.0					**55.0**	7.0
TD Strength @ 10% Strain (N)	262	217	287	201	254	249					**245**	31
TD Strength @ 10% Strain (ppi)	7.36	6.09	8.06	5.64	7.15	7.00					**6.88**	0.88
TD Strength at 10% Strain (kN/m)	1.29	1.07	1.41	0.99	1.25	1.23					**1.21**	0.15
TD Break Elongation (%)	163	133	140	199	143	130					**151**	26

MD Machine Direction TD Transverse Direction

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APPENDIX B

Material Manufacturer Certification and Conformance Testing Results

B.7. Geotextile Certifications

GSE Roll Allocation

Order : SO-085199
Customer : Southwest Liner Systems, Inc.
Project Name : SWLS/Sundance West Phase 2, Landfill Cell 1A

Roll#	Product Code	Mfg Date	Length
2024872579	GEO-100E-EBC-E-005	3/16/2017	300
2024874181	GEO-100E-EBC-E-005	3/16/2017	300
2025468016	GEO-100E-EBC-E-005	4/23/2018	300
2025704014	GEO-100E-EBC-E-005	9/20/2018	300

SOLMAX GSE

ROLL TEST DATA REPORT

Report Date: Sep/26/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085199	Southwest Liner Systems, Inc.	Arcadia, FL	GEO-100E-EBC-E-005	

GSE QC APPROVED

ROLL #	ASTM D4751 A0S (mm)	ASTM D6241 CBR PUNCTURE (lbs)	Mass per Unit Area ASTM D5261 (oz/yd²)	ASTM D4632 Elongation @ Break (%) MD	ASTM D4632 Grab Strength (lbs) MD	ASTM D4533 Trapezoidoal Tear (lbs) MD	ASTM D4491 Permeability (cm/sec)	ASTM D4491 Permittivity (sec-1)	Water Flow D4491 gpm/ft2	ASTM D4632 Elongation @ Break (%) TD	ASTM D4632 Grab Strength (lbs) TD	ASTM D4533 Trapezoidoal Tear (lbs) TD
2024872579	0.125	1111	10.21	76	422	144	0.313	1.34	99	97	410	157
2024874181	0.125	1111	11.89	84	519	161	0.313	1.34	99	103	536	169
2025468016	0.125	1192	11.15	88	404	147	0.301	1.21	90	91	469	172
2025704014	0.150	883	10.59	70	355	142	0.339	1.31	97	102	378	131

Laboratory Supervisor: Lana Hickman

This test report shall not be reproduced, except in full, without written approval of the Laboratory.

1245 Eastland Avenue
Kingstree, SC 29556
Phone 843-382-4603
Fax 843-382-4604

Date: September 26, 2018

Project: 85199 SWLS/Sundance West Phase 2, Landfill Cell 1A

Ref: Ultraviolet (UV) Resistance

To Whom It May Concern:

The resistance of nonwoven needle punched geotextiles to ultraviolet light depends primarily on antioxident and carbon black package mixed with resin to prepare a formulation for fiber extrusion. As long as this formulation remains the same the UV resistance of a geotextiles does not change. Therefore, UV testing is performed only once per resin formulation, according to ASTM Test Method D4355 and results are included on GSE geotextile specification sheet. Currently, all GSE geotextiles meet or exceed a value of 70% strength retained after 500 hours of UV exposure. GSE will meet or exceed this value for the referenced project.

Although GSE geotextiles are manufactured using one of the best available antioxident packages, we recommend covering the geotextiles within 30 days of exposure to direct Sunlight. This period does not include time during which geotextiles rolls remain on site covered in black shrink-wrap. Our recommendation is based on UV performance data published in technical literature indicating geotextile strength can decrease sharply after prolonged exposure to Sunlight.

Mauricio Ossa
Geosynthetics Manager

APPENDIX B

Material Manufacturer Certification and Conformance Testing Results

B.8. Geotextile Conformance Testing Results

October 23, 2018

Mail To:

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

email: swls.md@gmail.com

Bill To:

<= Same

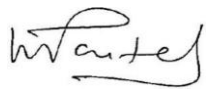
Dear Mr. Decarlo:

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 Phase 2 Landfill - Cell 1A**
TRI Job Reference Number:	41719
Material(s) Tested:	Three, Solmax GSE 10 oz Nonwoven Geotextiles
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

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

GEOTEXTILE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE 10 oz Nonwoven Geotextile
Sample Identification: 2024872579
TRI Log #: 41719

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)	117	116	105	84	81	87	91	90	93	86	**95** **81**	13 << min	
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	5.15	5.01	4.91	4.73	4.94	4.62	4.47	4.78	4.79	4.32	**4.77**	0.25	
Mass/Unit Area (oz/sq.yd)	11.98	11.65	11.42	11.00	11.49	10.75	10.40	11.12	11.14	10.05	**11.10**	0.58	9.1 min
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	417	446	435	487	518	384	433	507	362	458	**445**	50	230 min
TD - Tensile Strength (lbs)	496	355	542	572	540	580	521	452	416	481	**496**	71	230 min
MD - Elong. @ Max. Load (%)	69	79	73	73	77	63	83	87	63	66	**73**	8	50 min
TD - Elong. @ Max. Load (%)	89	127	92	86	94	89	85	91	119	85	**96**	15	50 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	220	206	209	260	222						**224**	22	120 min
Trapezoidal Tear (ASTM D 4533)													
MD - Tear Strength (lbs)	132	145	165	157	170	142	130	125	131	121	**142**	17	90 min
TD - Tear Strength (lbs)	161	178	184	168	176	169	178	150	190	176	**173**	12	90 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): 49													
Burst Strength (psi)	830	670	730	690	660	770	650	620	820	690	**713** **Tare Not Subtracted**	72	520 min
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.103	0.104	0.120	0.114	0.102						**0.109**	0.008	
Sieve No.	140	140	100	100	140						**140**		80 max

MD Machine Direction TD Transverse Direction

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GEOTEXTILE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE 10 oz Nonwoven Geotextile
Sample Identification: 2025468016
TRI Log #: 41719

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)	74	85	93	94	88	87	83	96	86	86	**87**	6	
											74	<< min	
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	4.36	4.66	4.78	4.73	5.26	4.82	4.22	4.96	5.18	4.61	**4.76**	0.33	
Mass/Unit Area (oz/sq.yd)	10.14	10.84	11.12	11.00	12.23	11.21	9.82	11.54	12.05	10.72	**11.07**	0.76	9.1 min
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	342	415	391	386	454	408	385	376	323	360	**384**	37	230 min
TD - Tensile Strength (lbs)	496	513	501	477	523	442	512	570	493	404	**493**	45	230 min
MD - Elong. @ Max. Load (%)	79	94	95	88	86	73	94	89	81	87	**87**	7	50 min
TD - Elong. @ Max. Load (%)	95	86	84	88	100	85	96	87	76	105	**90**	9	50 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	222	236	164	207	148						**195**	38	120 min
Trapezoidal Tear (ASTM D 4533)													
MD - Tear Strength (lbs)	119	145	161	135	131	151	161	131	137	160	**143**	15	90 min
TD - Tear Strength (lbs)	175	188	214	209	184	178	135	207	200	205	**190**	24	90 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): 49													
Burst Strength (psi)	640	590	720	590	560	580	510	620	650	560	**602**	58	520 min
											Tare Not Subtracted		
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.105	0.108	0.092	0.111	0.089						**0.101**	0.010	
Sieve No.	140	140	140	100	140						**140**		80 max

MD Machine Direction TD Transverse Direction

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GEOTEXTILE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE 10 oz Nonwoven Geotextile
Sample Identification: 2025704014
TRI Log #: 41719

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)	92	99	101	97	100	98	100	94	98	99	**98**	3	
											92	<< min	
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	4.74	4.70	3.89	4.23	4.51	4.79	4.34	4.27	4.44	5.12	**4.50**	0.35	
Mass/Unit Area (oz/sq.yd)	11.03	10.93	9.05	9.84	10.49	11.14	10.09	9.93	10.33	11.91	**10.47**	0.81	9.1 min
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	327	382	394	375	514	402	362	287	336	469	**385**	67	230 min
TD - Tensile Strength (lbs)	332	316	305	318	342	437	418	423	407	370	**367**	50	230 min
MD - Elong. @ Max. Load (%)	70	79	93	89	65	75	81	74	81	67	**77**	9	50 min
TD - Elong. @ Max. Load (%)	126	101	91	85	95	97	100	91	91	144	**102**	19	50 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	152	168	216	188	208						**186**	27	120 min
Trapezoidal Tear (ASTM D 4533)													
MD - Tear Strength (lbs)	115	136	126	183	146	121	121	135	132	116	**133**	20	90 min
TD - Tear Strength (lbs)	144	154	148	111	145	166	138	133	154	164	**146**	16	90 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): 49													
Burst Strength (psi)	640	590	540	540	550	540	570	600	600	670	**584**	45	520 min
											Tare Not Subtracted		
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.094	0.110	0.122	0.126	0.112						**0.113**	0.012	
Sieve No.	140	100	100	100	100						**100**		80 max

MD Machine Direction TD Transverse Direction

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APPENDIX B

Material Manufacturer Certification and Conformance Testing Results

B.9. Geocomposite Certifications

Roll Allocation List

Sales Order SO-086207
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS - Sundance West Landfill Cell 1B (Add-on)

Serial number	Item Number	Resin Lot	Top	Manufacturing date	Length
131561286	FS1-200E-10-00-FA-0N	18J1285	130510238	1/4/2019	288.00
131561287	FS1-200E-10-00-FA-0N	18J1285	130510238	1/4/2019	288.00
131561288	FS1-200E-10-00-FA-0N	18J1285	130510238	1/4/2019	288.00
131561289	FS1-200E-10-00-FA-0N	18J1285	130510241	1/4/2019	288.00
131561290	FS1-200E-10-00-FA-0N	18J1285	130510241	1/4/2019	265.00

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Jan/14/2019

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-086207	Southwest Liner Systems, Inc.	Eunice NM US	FS1-200E-10-00-FA-0N	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (ppi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Ply Adhesion Average ASTM D7005 (ppi) Side A	Geonet Mass per Unit Area ASTM D5261 (lbs/ft²)
131561286	225	66	0.967	2.3	3.4	0.193
131561287	225	61	0.966	2.2	4.8	0.184
131561288	225	61	0.966	2.2	4.8	0.184
131561289	225	61	0.966	2.2	4.8	0.184
131561290	225	61	0.966	2.2	4.8	0.184

Laboratory Manager

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GSE Environmental, LLC

ROLL TEST DATA REPORT

Report Date : Jan/14/2019

Sales Order No.	*Customer Name*	*Project Location*	*Product Name*	*BOL Number*
SO-086207	Southwest Liner Systems, Inc.	Eunice , NM US	FBR-100E-EBN-E-00	

Roll Number	Mass per Unit Area ASTM D5261 (oz/yd²)	ASTM D4491 Water Flow Rate (gpm/ft²)	ASTM D4491 Permittivity (sec-1)	ASTM D4751 AOS (mm)	ASTM D4632 Grab Strength (lbs) MD	ASTM D4632 Grab Strength (lbs) TD	ASTM D4632 Grab Elongation (%) MD	ASTM D4632 Grab Elongation (%) TD	ASTM D4533 Trapezoidal Tear (lbs) MD	ASTM D4533 Trapezoidal Tear (lbs) TD	Puncture Resistance ASTM D4833 (lbs)	ASTM D6241 CBR Puncture (lbs)
130510238	10.9	124	1.70	0.150	276	354	114	140	255	203	192	928
130510241	11.0	121	1.60	0.150	322	417	125	170	176	221	170	873

Laboratory Manager _____

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Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS
201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT TX 77978
PHONE:(888)FPCUSA3

Certificate of Analysis

(CONFIDENTIAL)

CUSTOMER:GSE ENVIRONMENTAL LLC
1245 EASTLAND AVE
KINGSTREE SC 29556
PRODUCT :HB5502B
RAILCAR FPAX980156
CLEANING/INSPECTION NO: 980156102418

S/O NO : ETAB096
CUSTOMER PO : 03-514241
DATE SHIPPED: 11/30/18
LOT NO : 18J1285
WEIGHT (LB) : 195,200.00
CUSTID:FT03112 SPIDE3

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index,g/10min	ASTM D1238	.34
Density, g/cm3	ASTM D1505	.9548

Linda Kao

QC SUPERVISOR: LINDA KAO

Report Date
1/14/2019

Quality Assurance Laboratory Test Results

Job Name: SWLS-Sundance West Landfill Cell 1B (Add-on)
Sales Order: 86207

Required Testing: ASTM D 1238, 190 / 2.16 -- Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer

Frequency: 1/resin lot

Specification: ≤ 1.0 g/10 minutes

Product Code	Roll Number	Result
FS1-200E-10-00-FA-0N	131561286	0.41

Approved by: Barbara McCrea
Date: January 14, 2019

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.

1245 Eastland Avenue
Kingstree, SC 29556
Phone 843-382-4603
Fax 843-382-4604

Date: January 14, 2019

Project: # 86207

Ref: Ultraviolet (UV) Resistance

To Whom It May Concern:

The resistance of nonwoven needle punched geotextiles to ultraviolet light depends primarily on antioxident and carbon black package mixed with resin to prepare a formulation for fiber extrusion. As long as this formulation remains the same the UV resistance of a geotextiles does not change. Therefore, UV testing is performed only once per resin formulation, according to ASTM Test Method D4355 and results are included on GSE geotextile specification sheet. Currently, all GSE geotextiles meet or exceed a value of 70% strength retained after 500 hours of UV exposure. GSE will meet or exceed this value for the referenced project.

Although GSE geotextiles are manufactured using one of the best available antioxident packages, we recommend covering the geotextiles within 30 days of exposure to direct Sunlight. This period does not include time during which geotextiles rolls remain on site covered in black shrink-wrap. Our recommendation is based on UV performance data published in technical literature indicating geotextile strength can decrease sharply after prolonged exposure to Sunlight.

Mauricio Ossa
Director of Global Quality

GSE ENVIRONMENTAL™ GSE Environmental, LLC.

Transmissivity Report

ASTM D4716

Roll No. 131561286

ROLL IDENTIFICATION

Roll Number	131561286
Product Name	FS1-200E-10-00-FA-0N
Production Date	1/4/2019

CUSTOMER INFORMATION

Order Number	86207
Customer Name	Southwest Liner Systems, Inc.
Project Name	SWLS-Sundance West Landfill 1B (Add-on)
Location	Eunice NM US

Pressure (psf)	*Gradient*	*Net/Composite*	*Transmissivity Results* (m^2/sec)	(gal/min/ft)	*Seat Time (min)*	*Boundary*
10,000	0.10	Composite	2.31E-03	11.16	15	SS Plates
10,000	0.10	Net	3.32E-03	16.04	15	SS Plates

GSE QC APPROVED

GSE Roll Allocation

Order SO-086207
Customer Southwest Liner Systems, Inc.
Project Name SWLS - Sundance West Landfill Cell 1B (Add-on)

TRI/AUSTIN
1/100,000 sf, min 1/lot.
Geonet 1 ft x 1 ft coupon.
Geotextile 3 ft x rw.
Geocomposite 2 ft x 2 ft coupon.
(1) additional 2 ft x rw for friction test.

Roll#	Resin Lot	Product Code	Mfg Date	Length	Pick up
131561286-IF	18J1285	FS1-200E-10-00-FA-0N	1/4/2019	288	**1/11**
131561287	18J1285	FS1-200E-10-00-FA-0N	1/4/2019	288	
131561288	18J1285	FS1-200E-10-00-FA-0N	1/4/2019	288	
131561289	18J1285	FS1-200E-10-00-FA-0N	1/4/2019	288	
131561290	18J1285	FS1-200E-10-00-FA-0N	1/4/2019	265	

Roll Allocation List

Sales Order SO-085886
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS / Sundance West Landfill Cell 1B

Serial number	Item Number	Resin Lot	Top	Manufacturing date	Length
131558754	FS1-200E-10-00-FA-0N	18I1001	130510228	12/1/2018	288.00
131558755	FS1-200E-10-00-FA-0N	18I1001	130510228	12/1/2018	288.00
131558756	FS1-200E-10-00-FA-0N	18I1001	130510222	12/1/2018	288.00
131558757	FS1-200E-10-00-FA-0N	18I1001	130510222	12/1/2018	288.00
131558758	FS1-200E-10-00-FA-0N	18I1001	130510222	12/1/2018	288.00
131558759	FS1-200E-10-00-FA-0N	18I1001	130510240	12/1/2018	288.00
131558760	FS1-200E-10-00-FA-0N	18I1001	130510237	12/1/2018	288.00
131558761	FS1-200E-10-00-FA-0N	18I1001	130510237	12/1/2018	288.00
131558762	FS1-200E-10-00-FA-0N	18I1001	130510237	12/1/2018	288.00
131558763	FS1-200E-10-00-FA-0N	18I1001	130510237	12/1/2018	288.00
131558764	FS1-200E-10-00-FA-0N	18I1001	130510225	12/1/2018	288.00
131558765	FS1-200E-10-00-FA-0N	18I1001	130510225	12/1/2018	288.00
131558766	FS1-200E-10-00-FA-0N	18I1001	130510225	12/1/2018	288.00
131558767	FS1-200E-10-00-FA-0N	18I1001	130510227	12/1/2018	288.00
131558768	FS1-200E-10-00-FA-0N	18I1001	130510227	12/1/2018	288.00
131558769	FS1-200E-10-00-FA-0N	18I1001	130510227	12/1/2018	288.00
131558770	FS1-200E-10-00-FA-0N	18I1001	130510227	12/1/2018	288.00
131558772	FS1-200E-10-00-FA-0N	18I1001	130510233	12/1/2018	288.00
131558773	FS1-200E-10-00-FA-0N	18I1001	130510233	12/1/2018	288.00
131558774	FS1-200E-10-00-FA-0N	18I1001	130510226	12/1/2018	288.00
131558775	FS1-200E-10-00-FA-0N	18I1001	130510226	12/1/2018	288.00
131558776	FS1-200E-10-00-FA-0N	18I1001	130510226	12/1/2018	288.00
131558777	FS1-200E-10-00-FA-0N	18I1001	130510226	12/1/2018	288.00
131558778	FS1-200E-10-00-FA-0N	18I1001	130510216	12/1/2018	288.00
131558779	FS1-200E-10-00-FA-0N	18I1001	130510216	12/1/2018	288.00
131558780	FS1-200E-10-00-FA-0N	18I1001	130510216	12/1/2018	288.00
131558781	FS1-200E-10-00-FA-0N	18I1001	130510216	12/1/2018	288.00
131558782	FS1-200E-10-00-FA-0N	18I1001	130510217	12/1/2018	288.00
131558783	FS1-200E-10-00-FA-0N	18I1001	130510217	12/1/2018	288.00
131558784	FS1-200E-10-00-FA-0N	18I1001	130510217	12/1/2018	288.00
131558785	FS1-200E-10-00-FA-0N	18I1001	130510219	12/1/2018	288.00
131558786	FS1-200E-10-00-FA-0N	18I1001	130510219	12/1/2018	288.00
131558787	FS1-200E-10-00-FA-0N	18I1001	130510219	12/1/2018	288.00
131558788	FS1-200E-10-00-FA-0N	18I1001	130510219	12/1/2018	288.00
131558789	FS1-200E-10-00-FA-0N	18I1001	130510218	12/1/2018	288.00
131558790	FS1-200E-10-00-FA-0N	18I1001	130510218	12/1/2018	288.00
131558791	FS1-200E-10-00-FA-0N	18I1001	130510218	12/1/2018	288.00
131558939	FS1-200E-10-00-FA-0N	18J1170	130510242	12/3/2018	288.00

GSE Environmental, LLC

ROLL TEST DATA REPORT

Report Date: Dec/4/2018

Sales Order No.	*Customer Name*	*Project Location*	*Product Name*	*BOL Number*
SO-085886	Southwest Liner Systems, Inc.	Eunice NM US	FS1-200E-10-00-FA-0N	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (ppi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Ply Adhesion Average ASTM D7005 (ppi) Side A	Geonet Mass per Unit Area ASTM D5261 (lbs/ft²)
131558754	209	52	0.953	2.7	5.0	0.163
131558755	201	78	0.956	2.4	5.2	0.160
131558756	201	78	0.956	2.4	5.2	0.160
131558757	201	78	0.956	2.4	5.2	0.160
131558758	201	78	0.956	2.4	5.2	0.160
131558759	201	78	0.956	2.4	5.2	0.160
131558760	201	78	0.956	2.4	5.2	0.160
131558761	201	78	0.956	2.4	5.2	0.160
131558762	201	78	0.956	2.4	5.2	0.160
131558763	201	78	0.956	2.4	5.2	0.160
131558764	201	78	0.956	2.4	5.2	0.160
131558765	201	78	0.956	2.4	5.2	0.160
131558766	201	51	0.964	2.6	3.2	0.168
131558767	201	51	0.964	2.6	3.2	0.168
131558768	201	51	0.964	2.6	3.2	0.168
131558769	201	51	0.964	2.6	3.2	0.168
131558770	201	51	0.964	2.6	3.2	0.168
131558772	201	51	0.964	2.6	3.2	0.168
131558773	201	51	0.964	2.6	3.2	0.168
131558774	201	51	0.964	2.6	3.2	0.168
131558775	201	51	0.964	2.6	3.2	0.168
131558776	201	51	0.964	2.6	3.2	0.168
131558777	201	51	0.964	2.6	3.2	0.168
131558778	207	55	0.965	2.6	4.3	0.160
131558779	207	55	0.965	2.6	4.3	0.160
131558780	207	55	0.965	2.6	4.3	0.160
131558781	207	55	0.965	2.6	4.3	0.160
131558782	207	55	0.965	2.6	4.3	0.160
131558783	207	55	0.965	2.6	4.3	0.160
131558784	207	55	0.965	2.6	4.3	0.160
131558785	207	55	0.965	2.6	4.3	0.160
131558786	207	55	0.965	2.6	4.3	0.160
131558787	207	55	0.965	2.6	4.3	0.160
131558788	207	55	0.965	2.6	4.3	0.160

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Dec/4/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085886	Southwest Liner Systems, Inc.	Eunice NM US	FS1-200E-10-00-FA-0N	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (ppi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Ply Adhesion Average ASTM D7005 (ppi) Side A	Geonet Mass per Unit Area ASTM D5261 (lbs/ft²)
131558789	207	57	0.966	2.6	4.6	0.160
131558790	207	57	0.966	2.6	4.6	0.160
131558791	207	57	0.966	2.6	4.6	0.160
131558939	220	75	0.958	2.4	2.6	0.181

Laboratory Manager 

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GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date : Dec/4/2018

Sales Order No.	***Customer Name***	***Project Location***	***Product Name***	***BOL Number***
SO-085886	Southwest Liner Systems, Inc.	Eunice , NM US	FBR-100E-EBN-E-00	

Roll Number	Mass per Unit Area ASTM D5261 (oz/yd²)	ASTM D4491 Water Flow Rate (gpm/ft²)	ASTM D4491 Permittivity (sec-1)	ASTM D4751 AOS (mm)	ASTM D4632 Grab Strength (lbs) MD	ASTM D4632 Grab Strength (lbs) TD	ASTM D4632 Grab Elongation (%) MD	ASTM D4632 Grab Elongation (%) TD	ASTM D4533 Trapezoidal Tear (lbs) MD	ASTM D4533 Trapezoidal Tear (lbs) TD	Puncture Resistance ASTM D4833 (lbs)	ASTM D6241 CBR Puncture (lbs)
130510216	11.9	143	1.90	0.150	364	399	123	140	170	226	210	1025
130510217	11.9	143	1.90	0.150	364	399	123	140	170	226	210	1025
130510218	11.9	143	1.90	0.150	364	399	123	140	170	226	210	1025
130510219	11.9	143	1.90	0.150	364	399	123	140	170	226	210	1025
130510222	11.9	120	1.60	0.150	326	457	139	138	191	270	216	1053
130510225	11.9	120	1.60	0.150	326	457	139	138	191	270	216	1053
130510226	11.9	120	1.60	0.150	326	457	139	138	191	270	216	1053
130510227	11.9	120	1.60	0.150	326	457	139	138	191	270	216	1053
130510228	11.9	120	1.60	0.150	326	457	139	138	191	270	216	1053
130510233	10.7	146	1.90	0.150	320	289	129	132	215	324	199	965
130510237	10.9	124	1.70	0.150	276	354	114	140	255	203	192	928
130510240	11.0	121	1.60	0.150	322	417	125	170	176	221	170	873
130510242	11.0	121	1.60	0.150	322	417	125	170	176	221	170	873

Laboratory Manager _____

This test report shall not be reproduced, except in full, without written approval of the laboratory.

Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS
201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT TX 77978
PHONE:(888)FPCUSA3

Certificate of Analysis

(CONFIDENTIAL)

CUSTOMER:GSE ENVIRONMENTAL LLC
1245 EASTLAND AVE
KINGSTREE SC 29556
PRODUCT :HB5502B
RAILCAR UTCX046664
CLEANING/INSPECTION NO: 046664083118

S/O NO : ETAA058
CUSTOMER PO : 03-513922
DATE SHIPPED: 10/18/18
LOT NO : 18I1001
WEIGHT (LB) : 190,650.00
CUSTID:FT03112 SPIDE3

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index,g/10min	ASTM D1238	.32
Density, g/cm3	ASTM D1505	.9542

Linda Kao

QC SUPERVISOR: LINDA KAO

Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS
201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT TX 77978
PHONE:(888)FPCUSA3

Certificate of Analysis

(CONFIDENTIAL)

CUSTOMER:GSE ENVIRONMENTAL LLC
1245 EASTLAND AVE
KINGSTREE SC 29556
PRODUCT :HB5502B
RAILCAR FPAX214394

S/O NO : ETAA638
CUSTOMER PO : 03-513922
DATE SHIPPED: 10/21/18
LOT NO : 18J1170
WEIGHT (LB) : 198,350.00
CUSTID:FT03112 SPIDE3

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index,g/10min	ASTM D1238	.37
Density, g/cm3	ASTM D1505	.9540

Linda Kao

QC SUPERVISOR: LINDA KAO

Report Date
12/4/2018

Quality Assurance Laboratory Test Results

Job Name: SWLS/Sundance West Landfill Cell 1B
Sales Order: 85886

Required Testing: ASTM D 1238, 190 / 2.16 -- Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer

Frequency: 1/resin lot

Specification: ≤ 1.0 g/10 minutes

Product Code	Resin Lot	Result
FS1-200E-10-00-FA-0N	18I1001	0.31
FS1-200E-10-00-FA-0N	18J1170	0.29

Approved by:	Barbara McCrea
Date:	December 4, 2018

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.

1245 Eastland Avenue
Kingstree, SC 29556
Phone 843-382-4603
Fax 843-382-4604

Date: December 4, 2018

Project: # 85886

Ref: Ultraviolet (UV) Resistance

To Whom It May Concern:

The resistance of nonwoven needle punched geotextiles to ultraviolet light depends primarily on antioxident and carbon black package mixed with resin to prepare a formulation for fiber extrusion. As long as this formulation remains the same the UV resistance of a geotextiles does not change. Therefore, UV testing is performed only once per resin formulation, according to ASTM Test Method D4355 and results are included on GSE geotextile specification sheet. Currently, all GSE geotextiles meet or exceed a value of 70% strength retained after 500 hours of UV exposure. GSE will meet or exceed this value for the referenced project.

Although GSE geotextiles are manufactured using one of the best available antioxident packages, we recommend covering the geotextiles within 30 days of exposure to direct Sunlight. This period does not include time during which geotextiles rolls remain on site covered in black shrink-wrap. Our recommendation is based on UV performance data published in technical literature indicating geotextile strength can decrease sharply after prolonged exposure to Sunlight.

Mauricio Ossa
Director of Global Quality

GSE ENVIRONMENTAL™ GSE Environmental, LLC.

Transmissivity Report

ASTM D4716

Roll No. 131558754

ROLL IDENTIFICATION

Roll Number	131558754
Product Name	FS1-200E-10-00-FA-0N
Production Date	12/1/2018

CUSTOMER INFORMATION

Order Number	85886
Customer Name	Southwest Liner Systems, Inc.
Project Name	SWLS/Sundance West Landfill Cell 1B
Location	Eunice NM US

Pressure (psf)	*Gradient*	*Net/Composite*	*Transmissivity Results* (m^2/sec)	(gal/min/ft)	*Seat Time (min)*	*Boundary*
10,000	0.10	Composite	2.31E-03	11.16	15	SS Plates
10,000	0.10	Net	4.08E-03	19.71	15	SS Plates

GSE QC APPROVED

GSE Environmental, LLC.

Transmissivity Report

ASTM D4716

Roll No. 131558939

ROLL IDENTIFICATION

Roll Number	131558939
Product Name	FS1-200E-10-00-FA-0N
Production Date	12/3/2018

CUSTOMER INFORMATION

Order Number	85886
Customer Name	Southwest Liner Systems, Inc.
Project Name	SWLS/Sundance West Landfill Cell 1B
Location	Eunice NM US

Pressure (psf)	*Gradient*	*Net/Composite*	*Transmissivity Results* (m^2/sec)	(gal/min/ft)	*Seat Time (min)*	*Boundary*
10,000	0.10	Composite	1.86E-03	8.99	15	SS Plates
10,000	0.10	Net	2.78E-03	13.43	15	SS Plates

GSE QC APPROVED

GSE Roll Allocation

Order SO-085886
Customer Southwest Liner Systems, Inc.
Project Name Sundance West Landfill Cell 1B

TRI/AUSTIN
1/100,000 sf, min 1/lot.
Geonet 1 ft x 1 ft coupons.
Geotextile 3 ft x rw.
Geocomposite 2 ft x 2 ft coupons.
1- 2 ft x rw for friction test.

Roll#	Resin Lot	Product Code	Mfg Date	Length	Pick up
131558754	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	12/4
131558755	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558756	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558757	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558758	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558759	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558760	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558761	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558762	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558763	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558764	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558765	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558766	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558767	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558768	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558769	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558770	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558772	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558773	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558774	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558775	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558776	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558777	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	12/4
131558778	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558779	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558780	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558781	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558782	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558783	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558784	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558785	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558786	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558787	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558788	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558789	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558790	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558791	18I1001	FS1-200E-10-00-FA-0N	12/1/2018	288	
131558939	18J1170	FS1-200E-10-00-FA-0N	12/3/2018	288	12/4

Roll Allocation List

Sales Order SO-085886
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS / Sundance West Landfill Cell 1B

Serial number	Item Number	Resin Lot	Top	Bottom	Manufacturing date	Length
131558801	FS2-225E-10-10-E-0N	18I1001	130510220	130510232	12/1/2018	200.00
131558802	FS2-225E-10-10-E-0N	18I1001	130510220	130510232	12/1/2018	200.00
131558803	FS2-225E-10-10-E-0N	18I1001	130510220	130510232	12/1/2018	200.00
131558804	FS2-225E-10-10-E-0N	18I1001	130510220	130510232	12/1/2018	200.00
131558805	FS2-225E-10-10-E-0N	18I1001	130510220	130510232	12/1/2018	200.00
131558806	FS2-225E-10-10-E-0N	18I1001	130510220	130510232	12/1/2018	200.00
131558807	FS2-225E-10-10-E-0N	18I1001	130510221	130510223	12/1/2018	200.00
131558808	FS2-225E-10-10-E-0N	18I1001	130510221	130510223	12/1/2018	200.00
131558809	FS2-225E-10-10-E-0N	18I1001	130510221	130510223	12/1/2018	200.00
131558810	FS2-225E-10-10-E-0N	18I1001	130510221	130510223	12/1/2018	200.00
131558811	FS2-225E-10-10-E-0N	18I1001	130510221	130510223	12/1/2018	200.00
131558812	FS2-225E-10-10-E-0N	18I1001	130510221	130510223	12/1/2018	200.00
131558813	FS2-225E-10-10-E-0N	18I1001	130510235	130510230	12/1/2018	200.00
131558814	FS2-225E-10-10-E-0N	18I1001	130510235	130510230	12/1/2018	200.00
131558815	FS2-225E-10-10-E-0N	18I1001	130510235	130510214	12/1/2018	200.00
131558816	FS2-225E-10-10-E-0N	18I1001	130510235	130510214	12/1/2018	200.00
131558817	FS2-225E-10-10-E-0N	18I1001	130510229	130510214	12/1/2018	200.00
131558818	FS2-225E-10-10-E-0N	18I1001	130510229	130510214	12/1/2018	200.00
131558819	FS2-225E-10-10-E-0N	18I1001	130510229	130510214	12/2/2018	200.00
131558820	FS2-225E-10-10-E-0N	18I1001	130510229	130510215	12/2/2018	200.00
131558821	FS2-225E-10-10-E-0N	18I1001	130510229	130510215	12/2/2018	200.00
131558822	FS2-225E-10-10-E-0N	18I1001	130510213	130510215	12/2/2018	200.00
131558823	FS2-225E-10-10-E-0N	18I1001	130510213	130510215	12/2/2018	200.00
131558824	FS2-225E-10-10-E-0N	18I1001	130510213	130510215	12/2/2018	200.00
131558825	FS2-225E-10-10-E-0N	18I1001	130510213	130510215	12/2/2018	200.00
131558826	FS2-225E-10-10-E-0N	18I1001	130510213	130510244	12/2/2018	200.00
131558827	FS2-225E-10-10-E-0N	18I1001	130510211	130510244	12/2/2018	200.00
131558828	FS2-225E-10-10-E-0N	18I1001	130510211	130510244	12/2/2018	200.00
131558829	FS2-225E-10-10-E-0N	18I1001	130510211	130510231	12/2/2018	200.00
131558830	FS2-225E-10-10-E-0N	18I1001	130510211	130510231	12/2/2018	200.00
131558831	FS2-225E-10-10-E-0N	18I1001	130510211	130510231	12/2/2018	200.00
131558832	FS2-225E-10-10-E-0N	18I1001	130510211	130510209	12/2/2018	200.00
131558833	FS2-225E-10-10-E-0N	18I1001	130510212	130510209	12/2/2018	200.00
131558834	FS2-225E-10-10-E-0N	18I1001	130510212	130510209	12/2/2018	200.00
131558835	FS2-225E-10-10-E-0N	18I1001	130510212	130510209	12/2/2018	200.00
131558836	FS2-225E-10-10-E-0N	18I1001	130510212	130510209	12/2/2018	200.00
131558837	FS2-225E-10-10-E-0N	18I1001	130510212	130510236	12/2/2018	200.00
131558838	FS2-225E-10-10-E-0N	18I1001	130510212	130510236	12/2/2018	200.00
131558839	FS2-225E-10-10-E-0N	18I1001	130510210	130510236	12/2/2018	200.00
131558840	FS2-225E-10-10-E-0N	18I1001	130510210	130510236	12/2/2018	200.00
131558841	FS2-225E-10-10-E-0N	18I1001	130510210	130510236	12/2/2018	200.00
131558842	FS2-225E-10-10-E-0N	18I1001	130510210	130510236	12/2/2018	200.00
131558843	FS2-225E-10-10-E-0N	18I1001	130510210	130510224	12/2/2018	200.00
131558844	FS2-225E-10-10-E-0N	18I1001	130510210	130510224	12/2/2018	200.00
131558845	FS2-225E-10-10-E-0N	18I1001	130510243	130510224	12/2/2018	200.00
131558846	FS2-225E-10-10-E-0N	18I1001	130510243	130510224	12/2/2018	200.00
131558847	FS2-225E-10-10-E-0N	18I1001	130510243	130510224	12/2/2018	200.00
131558848	FS2-225E-10-10-E-0N	18I1001	130510243	130510234	12/2/2018	200.00
131558849	FS2-225E-10-10-E-0N	18I1001	130510239	130510234	12/2/2018	200.00
131558850	FS2-225E-10-10-E-0N	18I1001	130510239	130510234	12/2/2018	200.00
131558851	FS2-225E-10-10-E-0N	18I1001	130510239	130510234	12/2/2018	200.00
131558852	FS2-225E-10-10-E-0N	18I1001	130510239	130510234	12/2/2018	200.00
131558853	FS2-225E-10-10-E-0N	18I1001	130510239	130510241	12/2/2018	200.00
131558854	FS2-225E-10-10-E-0N	18I1001	130510242	130510241	12/2/2018	200.00
131558855	FS2-225E-10-10-E-0N	18I1001	130510242	130510241	12/2/2018	200.00
131558856	FS2-225E-10-10-E-0N	18I1001	130510242	130510241	12/2/2018	200.00

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Dec/3/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085886	Southwest Liner Systems, Inc.	Eunice NM US	FS2-225E-10-10-E-0N	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (ppi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Ply Adhesion Average ASTM D7005 (ppi) Side A	Ply Adhesion Average ASTM D7005 (ppi) Side B	Geonet Mass per Unit Area ASTM D5261 (lbs/ft²)
131558801	230	70	0.966	2.6	6.3	5.9	0.193
131558802	232	70	0.962	2.5	4.0	4.0	0.190
131558803	232	70	0.962	2.5	4.0	4.0	0.190
131558804	232	70	0.962	2.5	4.0	4.0	0.190
131558805	232	70	0.962	2.5	4.0	4.0	0.190
131558806	232	70	0.962	2.5	4.0	4.0	0.190
131558807	232	70	0.962	2.5	4.0	4.0	0.190
131558808	232	70	0.962	2.5	4.0	4.0	0.190
131558809	232	70	0.962	2.5	4.0	4.0	0.190
131558810	232	70	0.962	2.5	4.0	4.0	0.190
131558811	232	70	0.962	2.5	4.0	4.0	0.190
131558812	232	70	0.962	2.5	4.0	4.0	0.190
131558813	227	66	0.963	2.5	3.4	3.6	0.184
131558814	227	66	0.963	2.5	3.4	3.6	0.184
131558815	227	66	0.963	2.5	3.4	3.6	0.184
131558816	227	66	0.963	2.5	3.4	3.6	0.184
131558817	227	66	0.963	2.5	3.4	3.6	0.184
131558818	227	66	0.963	2.5	3.4	3.6	0.184
131558819	227	66	0.963	2.5	3.4	3.6	0.184
131558820	227	66	0.963	2.5	3.4	3.6	0.184
131558821	227	66	0.963	2.5	3.4	3.6	0.184
131558822	227	66	0.963	2.5	3.4	3.6	0.184
131558823	227	66	0.963	2.5	3.4	3.6	0.184
131558824	230	68	0.957	2.5	3.5	3.8	0.186
131558825	230	68	0.957	2.5	3.5	3.8	0.186
131558826	230	68	0.957	2.5	3.5	3.8	0.186
131558827	230	68	0.957	2.5	3.5	3.8	0.186
131558828	230	68	0.957	2.5	3.5	3.8	0.186
131558829	230	68	0.957	2.5	3.5	3.8	0.186
131558830	230	68	0.957	2.5	3.5	3.8	0.186
131558831	230	68	0.957	2.5	3.5	3.8	0.186
131558832	230	68	0.957	2.5	3.5	3.8	0.186
131558833	230	68	0.957	2.5	3.5	3.8	0.186
131558834	230	68	0.957	2.5	3.5	3.8	0.186

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Dec/3/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085886	Southwest Liner Systems, Inc.	Eunice NM US	FS2-225E-10-10-E-0N	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (ppi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Ply Adhesion Average ASTM D7005 (ppi) Side A	Ply Adhesion Average ASTM D7005 (ppi) Side B	Geonet Mass per Unit Area ASTM D5261 (lbs/ft²)
131558835	232	68	0.960	2.4	4.3	4.8	0.186
131558836	232	68	0.960	2.4	4.3	4.8	0.186
131558837	232	68	0.960	2.4	4.3	4.8	0.186
131558838	232	68	0.960	2.4	4.3	4.8	0.186
131558839	232	68	0.960	2.4	4.3	4.8	0.186
131558840	232	68	0.960	2.4	4.3	4.8	0.186
131558841	232	68	0.960	2.4	4.3	4.8	0.186
131558842	232	68	0.960	2.4	4.3	4.8	0.186
131558843	232	68	0.960	2.4	4.3	4.8	0.186
131558844	232	68	0.960	2.4	4.3	4.8	0.186
131558845	232	68	0.960	2.4	4.3	4.8	0.186
131558846	228	70	0.961	2.6	3.5	4.1	0.191
131558847	228	70	0.961	2.6	3.5	4.1	0.191
131558848	228	70	0.961	2.6	3.5	4.1	0.191
131558849	228	70	0.961	2.6	3.5	4.1	0.191
131558850	228	70	0.961	2.6	3.5	4.1	0.191
131558851	228	70	0.961	2.6	3.5	4.1	0.191
131558852	228	70	0.961	2.6	3.5	4.1	0.191
131558853	228	70	0.961	2.6	3.5	4.1	0.191
131558854	228	70	0.961	2.6	3.5	4.1	0.191
131558855	228	70	0.961	2.6	3.5	4.1	0.191
131558856	228	70	0.961	2.6	3.5	4.1	0.191

Laboratory Manager

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GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date : Dec/3/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085886	Southwest Liner Systems, Inc.	Eunice , NM US	FBR-100E-EBN-E-00	

Roll Number	Mass per Unit Area ASTM D5261 (oz/yd²)	ASTM D4491 Water Flow Rate (gpm/ft²)	ASTM D4491 Permittivity (sec-1)	ASTM D4751 AOS (mm)	ASTM D4632 Grab Strength (lbs) MD	ASTM D4632 Grab Strength (lbs) TD	ASTM D4632 Grab Elongation (%) MD	ASTM D4632 Grab Elongation (%) TD	ASTM D4533 Trapezoidal Tear (lbs) MD	ASTM D4533 Trapezoidal Tear (lbs) TD	Puncture Resistance ASTM D4833 (lbs)	ASTM D6241 CBR Puncture (lbs)
130510209	10.7	123	1.70	0.150	328	418	130	125	167	368	208	1028
130510210	11.3	115	1.50	0.150	335	383	133	148	228	357	210	1047
130510211	11.3	115	1.50	0.150	335	383	133	148	228	357	210	1047
130510212	11.3	115	1.50	0.150	335	383	133	148	228	357	210	1047
130510213	11.3	115	1.50	0.150	335	383	133	148	228	357	210	1047
130510214	11.3	115	1.50	0.150	335	383	133	148	228	357	210	1047
130510215	11.8	143	1.90	0.150	364	399	123	140	170	226	210	1025
130510220	11.9	125	1.70	0.150	345	419	127	148	167	234	219	1102
130510221	11.9	125	1.70	0.150	345	419	127	148	167	234	219	1102
130510223	11.9	125	1.70	0.150	345	419	127	148	167	234	219	1102
130510224	11.9	125	1.70	0.150	345	419	127	148	167	234	219	1102
130510229	11.9	120	1.60	0.150	326	457	139	138	191	270	216	1053
130510230	10.7	146	1.90	0.150	320	289	129	132	215	324	199	965
130510231	10.7	146	1.90	0.150	320	289	129	132	215	324	199	965
130510232	10.7	146	1.90	0.150	320	289	129	132	215	324	199	965
130510234	10.7	146	1.90	0.150	320	289	129	132	215	324	199	965
130510235	10.9	124	1.70	0.150	276	354	114	140	255	203	192	928
130510236	10.9	124	1.70	0.150	276	354	114	140	255	203	192	928
130510239	10.9	124	1.70	0.150	276	354	114	140	255	203	192	928
130510241	11.0	121	1.60	0.150	322	417	125	170	176	221	170	873
130510242	11.0	121	1.60	0.150	322	417	125	170	176	221	170	873
130510243	11.0	121	1.60	0.150	322	417	125	170	176	221	170	873
130510244	11.0	121	1.60	0.150	322	417	125	170	176	221	170	873

Laboratory Manager 

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Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS
201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT TX 77978
PHONE:(888)FPCUSA3

Certificate of Analysis

(CONFIDENTIAL)

CUSTOMER:GSE ENVIRONMENTAL LLC
1245 EASTLAND AVE
KINGSTREE SC 29556
PRODUCT :HB5502B
RAILCAR UTCX046664
CLEANING/INSPECTION NO: 046664083118

S/O NO : ETAA058
CUSTOMER PO : 03-513922
DATE SHIPPED: 10/18/18
LOT NO : 18I1001
WEIGHT (LB) : 190,650.00
CUSTID:FT03112 SPIDE3

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index,g/10min	ASTM D1238	.32
Density, g/cm3	ASTM D1505	.9542

Linda Kao

QC SUPERVISOR: LINDA KAO

Report Date
12/3/2018

Quality Assurance Laboratory Test Results

Job Name: SWLS/Sundance West Landfill Cell 1B
Sales Order: 85886

Required Testing: ASTM D 1238, 190 / 2.16 -- Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer

Frequency: 1/resin lot

Specification: ≤ 1.0 g/10 minutes

Product Code	Resin Lot	Result
FS2-225E-10-10-E-0N	18I1001	0.32

Approved by:	Barbara McCrea
Date:	December 3, 2018

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.

1245 Eastland Avenue
Kingstree, SC 29556
Phone 843-382-4603
Fax 843-382-4604

Date: December 3, 2018

Project: # 85886

Ref: Ultraviolet (UV) Resistance

To Whom It May Concern:

The resistance of nonwoven needle punched geotextiles to ultraviolet light depends primarily on antioxident and carbon black package mixed with resin to prepare a formulation for fiber extrusion. As long as this formulation remains the same the UV resistance of a geotextiles does not change. Therefore, UV testing is performed only once per resin formulation, according to ASTM Test Method D4355 and results are included on GSE geotextile specification sheet. Currently, all GSE geotextiles meet or exceed a value of 70% strength retained after 500 hours of UV exposure. GSE will meet or exceed this value for the referenced project.

Although GSE geotextiles are manufactured using one of the best available antioxident packages, we recommend covering the geotextiles within 30 days of exposure to direct Sunlight. This period does not include time during which geotextiles rolls remain on site covered in black shrink-wrap. Our recommendation is based on UV performance data published in technical literature indicating geotextile strength can decrease sharply after prolonged exposure to Sunlight.

Mauricio Ossa
Director of Global Quality

GSE ENVIRONMENTAL™ GSE Environmental, LLC.

Transmissivity Report

ASTM D4716

Roll No. 131558801

ROLL IDENTIFICATION

Roll Number	131558801
Product Name	FS2-225E-10-10-E-0N
Production Date	12/1/2018

CUSTOMER INFORMATION

Order Number	85886
Customer Name	Southwest Liner Systems, Inc.
Project Name	SWLS/Sundance West Landfill Cell 1B
Location	Eunice NM US

Pressure (psf)	*Gradient*	*Net/Composite*	*Transmissivity Results* (m^2/sec)	(gal/min/ft)	*Seat Time (min)*	*Boundary*
10,000	0.10	Composite	2.14E-04	1.03	15	SS Plates
10,000	0.10	Net	5.81E-03	28.07	15	SS Plates

GSE QC APPROVED

GSE Roll Allocation

Order SO-085886
Customer Southwest Liner Systems, Inc.
Project Name Sundance West Landfill Cell 1B

TRI/AUSTIN
1/100,000 sf, min 1/lot.
Geonet 1 ft x 1 ft coupons.
Geotextile 3 ft x rw.
Geocomposite 2 ft x 2ft coupons. 1-additional 2 ft x rw for friction test.

Roll#	Resin Lot	Product Code	Mfg Date	Length	Pick up
131558801-C&S	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	Pending
131558802	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	
131558803	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	
131558804	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	
131558805	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	
131558806	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	
131558807	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	
131558808	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	
131558809	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	
131558810	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	
131558811	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	
131558812	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	
131558813	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	
131558814	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	
131558815	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	
131558816	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	
131558817	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	
131558818	18I1001	FS2-225E-10-10-E-0N	12/1/2018	200	
131558819	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558820	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558821	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558822	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558823	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558824	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558825	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558826	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558827	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558828	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558829	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558830	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558831	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558832	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558833	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558834	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	Pending
131558835	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558836	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558837	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558838	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558839	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558840	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558841	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558842	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558843	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558844	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558845	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	
131558846	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200	

131558847	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200
131558848	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200
131558849	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200
131558850	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200
131558851	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200
131558852	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200
131558853	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200
131558854	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200
131558855	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200
131558856	18I1001	FS2-225E-10-10-E-0N	12/2/2018	200

Roll Allocation List

Sales Order SO-085199
Customer Name Southwest Liner Systems, Inc.
Project Name SWLS/Sundance West Phase 2, Landfill Cell 1A

Serial number	Item Number	Resin Lot	Bottom	Manufacturing date	Length
131553677	FS1-200E-10-00-FA-00	CB118H2701	2025703176	9/29/2018	288.00
131553678	FS1-200E-10-00-FA-00	CB118H2701	2025703172	9/29/2018	288.00
131553679	FS1-200E-10-00-FA-00	CB118H2701	2025703172	9/29/2018	288.00
131553680	FS1-200E-10-00-FA-00	CB118H2701	2025703172	9/29/2018	288.00
131553681	FS1-200E-10-00-FA-00	CB118H2701	2025703090	9/29/2018	288.00
131553682	FS1-200E-10-00-FA-00	CB118H2701	2025703090	9/29/2018	288.00
131553683	FS1-200E-10-00-FA-00	CB118H2701	2025703090	9/29/2018	288.00
131553684	FS1-200E-10-00-FA-00	CB118H2701	2025703165	9/29/2018	288.00
131553685	FS1-200E-10-00-FA-00	CB118H2701	2025703165	9/29/2018	288.00
131553686	FS1-200E-10-00-FA-00	CB118H2701	2025703165	9/29/2018	288.00
131553687	FS1-200E-10-00-FA-00	CB118H2701	2025703133	9/29/2018	200.00
131553688	FS1-200E-10-00-FA-00	CB118H2701	2025703133	9/29/2018	288.00
131553689	FS1-200E-10-00-FA-00	CB118H2701	2025703133	9/29/2018	288.00
131553690	FS1-200E-10-00-FA-00	CB118H2701	2025703166	9/29/2018	288.00
131553691	FS1-200E-10-00-FA-00	CB118H2701	2025703166	9/29/2018	288.00
131553692	FS1-200E-10-00-FA-00	CB118H2701	2025703160	9/29/2018	288.00
131553693	FS1-200E-10-00-FA-00	CB118H2701	2025703160	9/29/2018	288.00
131553694	FS1-200E-10-00-FA-00	CB118H2701	2025703160	9/29/2018	288.00
131553695	FS1-200E-10-00-FA-00	CB118H2701	2025703156	9/29/2018	288.00
131553696	FS1-200E-10-00-FA-00	CB118H2701	2025703156	9/29/2018	288.00
131553697	FS1-200E-10-00-FA-00	CB118H2701	2025703156	9/29/2018	288.00
131553698	FS1-200E-10-00-FA-00	CB118H2701	2025703127	9/29/2018	288.00
131553699	FS1-200E-10-00-FA-00	CB118H2701	2025703127	9/29/2018	288.00
131553700	FS1-200E-10-00-FA-00	CB118H2701	2025703127	9/29/2018	288.00
131553701	FS1-200E-10-00-FA-00	CB118H2701	2025703177	9/29/2018	288.00
131553702	FS1-200E-10-00-FA-00	CB118H2701	2025703177	9/29/2018	288.00
131553703	FS1-200E-10-00-FA-00	CB118H2701	2025703177	9/29/2018	288.00
131553704	FS1-200E-10-00-FA-00	CB118H2701	2025703122	9/29/2018	288.00
131553705	FS1-200E-10-00-FA-00	CB118H2701	2025703122	9/29/2018	288.00
131553706	FS1-200E-10-00-FA-00	CB118H2701	2025703122	9/30/2018	288.00
131553707	FS1-200E-10-00-FA-00	CB118H2701	2025703170	9/30/2018	288.00
131553708	FS1-200E-10-00-FA-00	CB118H2701	2025703170	9/30/2018	288.00
131553709	FS1-200E-10-00-FA-00	CB118H2701	2025703170	9/30/2018	288.00
131553710	FS1-200E-10-00-FA-00	CB118H2701	2025703164	9/30/2018	288.00
131553711	FS1-200E-10-00-FA-00	CB118H2701	2025703164	9/30/2018	288.00
131553712	FS1-200E-10-00-FA-00	CB118H2701	2025703164	9/30/2018	288.00
131553713	FS1-200E-10-00-FA-00	CB118H2701	2025703180	9/30/2018	288.00
131553714	FS1-200E-10-00-FA-00	CB118H2701	2025703180	9/30/2018	288.00
131553715	FS1-200E-10-00-FA-00	CB118H2701	2025703180	9/30/2018	288.00
131553716	FS1-200E-10-00-FA-00	CB118H2701	2025703178	9/30/2018	288.00
131553717	FS1-200E-10-00-FA-00	CB118H2701	2025703178	9/30/2018	288.00
131553718	FS1-200E-10-00-FA-00	CB118H2701	2025703181	9/30/2018	288.00
131553719	FS1-200E-10-00-FA-00	CB118H2701	2025703181	9/30/2018	288.00
131553720	FS1-200E-10-00-FA-00	CB118H2701	2025703181	9/30/2018	288.00
131553721	FS1-200E-10-00-FA-00	CB118H2701	2025703118	9/30/2018	288.00
131553722	FS1-200E-10-00-FA-00	CB118H2701	2025703118	9/30/2018	288.00
131553723	FS1-200E-10-00-FA-00	CB118H2701	2025703118	9/30/2018	288.00
131553724	FS1-200E-10-00-FA-00	CB118H2701	2025703117	9/30/2018	288.00
131553725	FS1-200E-10-00-FA-00	CB118H2701	2025703117	9/30/2018	288.00
131553726	FS1-200E-10-00-FA-00	CB118H2701	2025703117	9/30/2018	288.00
131553727	FS1-200E-10-00-FA-00	CB118H2701	2025703155	9/30/2018	288.00
131553728	FS1-200E-10-00-FA-00	CB118H2701	2025703155	9/30/2018	288.00
131553729	FS1-200E-10-00-FA-00	CB118H2701	2025703155	9/30/2018	288.00
131553730	FS1-200E-10-00-FA-00	CB118H2701	2025703159	9/30/2018	288.00
131553731	FS1-200E-10-00-FA-00	CB118H2701	2025703159	9/30/2018	288.00
131553732	FS1-200E-10-00-FA-00	CB118H2701	2025703159	9/30/2018	288.00
131553733	FS1-200E-10-00-FA-00	CB118H2701	2025703167	9/30/2018	288.00
131553734	FS1-200E-10-00-FA-00	CB118H2701	2025703167	9/30/2018	288.00
131553735	FS1-200E-10-00-FA-00	CB118H2701	2025703167	9/30/2018	288.00
131553736	FS1-200E-10-00-FA-00	CB118H2701	2025703111	9/30/2018	288.00
131553737	FS1-200E-10-00-FA-00	CB118H2701	2025703111	9/30/2018	288.00
131553738	FS1-200E-10-00-FA-00	CB118H2701	2025703111	9/30/2018	288.00
131553739	FS1-200E-10-00-FA-00	CB118H2701	2025703168	9/30/2018	288.00
131553740	FS1-200E-10-00-FA-00	CB118H2701	2025703168	9/30/2018	288.00

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Oct/2/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085199	Southwest Liner Systems, Inc.	Eunice NM US	FS1-200E-10-00-FA-00	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (ppi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Ply Adhesion Average ASTM D7005 (ppi) Side A	Geonet Mass per Unit Area ASTM D5261 (lbs/ft²)
131553677	222	56	0.952	2.5	2.3	0.163
131553678	218	59	0.958	2.5	2.8	0.164
131553679	218	59	0.958	2.5	2.8	0.164
131553680	218	59	0.958	2.5	2.8	0.164
131553681	218	59	0.958	2.5	2.8	0.164
131553682	218	59	0.958	2.5	2.8	0.164
131553683	218	59	0.958	2.5	2.8	0.164
131553684	218	59	0.958	2.5	2.8	0.164
131553685	218	59	0.958	2.5	2.8	0.164
131553686	218	59	0.958	2.5	2.8	0.164
131553687	218	59	0.958	2.5	2.8	0.164
131553688	218	59	0.958	2.5	2.8	0.164
131553689	219	61	0.965	2.6	2.9	0.166
131553690	219	61	0.965	2.6	2.9	0.166
131553691	219	61	0.965	2.6	2.9	0.166
131553692	219	61	0.965	2.6	2.9	0.166
131553693	219	61	0.965	2.6	2.9	0.166
131553694	219	61	0.965	2.6	2.9	0.166
131553695	219	61	0.965	2.6	2.9	0.166
131553696	219	61	0.965	2.6	2.9	0.166
131553697	219	61	0.965	2.6	2.9	0.166
131553698	219	61	0.965	2.6	2.9	0.166
131553699	219	61	0.965	2.6	2.9	0.166
131553700	218	62	0.966	2.5	1.6	0.170
131553701	218	62	0.966	2.5	1.6	0.170
131553702	218	62	0.966	2.5	1.6	0.170
131553703	218	62	0.966	2.5	1.6	0.170
131553704	218	62	0.966	2.5	1.6	0.170
131553705	218	62	0.966	2.5	1.6	0.170
131553706	218	62	0.966	2.5	1.6	0.170
131553707	218	62	0.966	2.5	1.6	0.170
131553708	218	62	0.966	2.5	1.6	0.170
131553709	218	62	0.966	2.5	1.6	0.170
131553710	218	62	0.966	2.5	1.6	0.170

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Oct/2/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085199	Southwest Liner Systems, Inc.	Eunice NM US	FS1-200E-10-00-FA-00	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (ppi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Ply Adhesion Average ASTM D7005 (ppi) Side A	Geonet Mass per Unit Area ASTM D5261 (lbs/ft²)
131553711	218	62	0.966	2.5	2.6	0.170
131553712	217	62	0.963	2.3	2.6	0.160
131553713	217	62	0.963	2.3	2.6	0.160
131553714	217	62	0.963	2.3	2.6	0.160
131553715	217	62	0.963	2.3	2.6	0.160
131553716	217	62	0.963	2.3	2.6	0.160
131553717	217	62	0.963	2.3	2.6	0.160
131553718	217	62	0.963	2.3	2.6	0.160
131553719	217	62	0.963	2.3	2.6	0.160
131553720	217	62	0.963	2.3	2.6	0.160
131553721	217	62	0.963	2.3	2.6	0.160
131553722	217	62	0.963	2.3	2.6	0.160
131553723	220	59	0.963	2.6	2.6	0.168
131553724	220	59	0.963	2.6	2.6	0.168
131553725	220	59	0.963	2.6	2.6	0.168
131553726	220	59	0.963	2.6	2.6	0.168
131553727	220	59	0.963	2.6	2.6	0.168
131553728	220	59	0.963	2.6	2.6	0.168
131553729	220	59	0.963	2.6	2.6	0.168
131553730	220	59	0.963	2.6	2.6	0.168
131553731	220	59	0.963	2.6	2.6	0.168
131553732	220	59	0.963	2.6	2.6	0.168
131553733	228	64	0.955	2.5	3.0	0.176
131553734	228	64	0.955	2.5	3.0	0.176
131553735	228	64	0.955	2.5	3.0	0.176
131553736	228	64	0.955	2.5	3.0	0.176
131553737	228	64	0.955	2.5	3.0	0.176
131553738	228	64	0.955	2.5	3.0	0.176
131553739	228	64	0.955	2.5	3.0	0.176
131553740	228	64	0.955	2.5	3.0	0.176

Laboratory Manager

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GSE Lining Technology, LLC.

ROLL TEST DATA REPORT

Report Date: Oct/02/2018

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-085199	Southwest Liner Systems, Inc.	Eunice NM US	FBR-100E-EBC-E-005	

GSE QC APPROVED

ROLL #	ASTM D4751 A0S (mm)	Mass per Unit Area ASTM D5261 (oz/yd²)	ASTM D4632 Elongation @ Break (%) MD	ASTM D4632 Grab Strength (lbs) MD	ASTM D4533 Trapezoidoal Tear (lbs) MD	ASTM D4491 Permittivity (sec-1)	ASTM D4833 Puncture Resistance (lbs)	Water Flow D4491 gpm/ft2	ASTM D4632 Elongation @ Break (%) TD	ASTM D4632 Grab Strength (lbs) TD	ASTM D4533 Trapezoidoal Tear (lbs) TD
2025703090	0.125	12.3	78	448	151	1.44	235	106	94	467	176
2025703111	0.150	11.0	83	373	127	1.73	189	127	93	431	152
2025703117	0.150	10.3	77	373	155	1.71	196	126	88	399	177
2025703118	0.150	10.3	77	373	155	1.71	196	126	88	399	177
2025703122	0.150	10.6	73	352	148	1.65	196	122	88	439	185
2025703127	0.150	10.6	73	352	148	1.65	196	122	88	439	185
2025703133	0.125	11.8	77	373	129	1.26	210	93	86	450	153
2025703155	0.125	10.1	86	375	130	1.46	185	108	94	394	199
2025703156	0.125	10.1	86	375	130	1.46	185	108	94	394	199
2025703159	0.150	10.7	81	375	138	1.35	186	100	94	424	168
2025703160	0.150	10.7	81	375	138	1.35	186	100	94	424	168
2025703164	0.125	10.9	83	347	134	1.38	182	102	96	441	146
2025703165	0.125	10.9	83	347	134	1.38	182	102	96	441	146
2025703166	0.125	10.9	83	347	134	1.38	182	102	96	441	146
2025703167	0.125	10.9	83	347	134	1.38	182	102	96	441	146
2025703168	0.125	10.9	83	347	134	1.38	182	102	96	441	146
2025703170	0.125	12.1	85	415	139	1.28	231	95	92	492	158
2025703172	0.125	12.1	85	415	139	1.28	231	95	92	492	158
2025703176	0.125	11.4	82	389	127	1.31	200	97	95	463	157
2025703177	0.125	11.4	82	389	127	1.31	200	97	95	463	157
2025703178	0.125	11.4	82	389	127	1.31	200	97	95	463	157
2025703180	0.125	11.4	82	389	127	1.31	200	97	95	463	157
2025703181	0.125	11.4	82	389	127	1.31	200	97	95	463	157

Laboratory Supervisor: Thomas Harrelson

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Equistar Chemicals, LP
One Houston Center
1221 McKinney
Houston TX 77010

Certificate Of Analysis

Certificate of Analysis Contact:

Ship-To Address:
GSE ENVIRONMENTAL LLC
1245 EASTLAND AVE
KINGSTREE SC 29556
UNITED STATES

Product Name	: PETROTHENE LR732001	**Customer Order No.**	: 03-513370
Batch Number	: CB118H2701	**Customer Number**	: 151477
Vehicle Number	: CITX200367	**Date Shipped**	: August 28, 2018
Estimated Quantity	: 214,000 LBS	**Equistar Order No.**	: 5216507 000010
Material Number	: 16838	**Delivery Item No.**	: 8101185260 000010

Test Description	Test Result	Unit of Measure	
Vehicle ID	CITX200367		
Vehicle Type	HOPPER CAR H		
Density, Extrudate @ 23C	0.9521	g/cm3	STM 011
Melt Index, 2160g @ 190C	0.28	g/10 min.	STM 002

Delivery Number:

Cust/PO Number:

Print Date: August 29, 2018 BSSIMMO1

Data reported was generated in an approved Quality Assurance Lab.

This information is available 24 hours a day at https://lyb.customerxpress.com/
Questions ? Call Customer Service: 888-777-0232

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Report Date
10/2/2018

Quality Assurance Laboratory Test Results

Job Name: SWLS/Sundance West Phase 2 Landfill Cell 1A
Sales Order: 85199

Required Testing: ASTM D 1238, 190 / 2.16 -- Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer

Frequency: 1/50,000 sf

Specification: ≤ 1.0 g/10 minutes

Product Code	Roll Number	Result
FS1-200E-10-00-FA-00	131553677	0.30
FS1-200E-10-00-FA-00	131553688	0.26
FS1-200E-10-00-FA-00	131553699	0.31
FS1-200E-10-00-FA-00	131553710	0.37
FS1-200E-10-00-FA-00	131553721	0.28
FS1-200E-10-00-FA-00	131553732	0.23

Approved by:	Barbara McCrea
Date:	October 2, 2018

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1245 Eastland Avenue
Kingstree, SC 29556
Phone 843-382-4603
Fax 843-382-4604

Date: October 2, 2018

Project: # 85199

Ref: Ultraviolet (UV) Resistance

To Whom It May Concern:

The resistance of nonwoven needle punched geotextiles to ultraviolet light depends primarily on antioxident and carbon black package mixed with resin to prepare a formulation for fiber extrusion. As long as this formulation remains the same the UV resistance of a geotextiles does not change. Therefore, UV testing is performed only once per resin formulation, according to ASTM Test Method D4355 and results are included on GSE geotextile specification sheet. Currently, all GSE geotextiles meet or exceed a value of 70% strength retained after 500 hours of UV exposure. GSE will meet or exceed this value for the referenced project.

Although GSE geotextiles are manufactured using one of the best available antioxident packages, we recommend covering the geotextiles within 30 days of exposure to direct Sunlight. This period does not include time during which geotextiles rolls remain on site covered in black shrink-wrap. Our recommendation is based on UV performance data published in technical literature indicating geotextile strength can decrease sharply after prolonged exposure to Sunlight.

Mauricio Ossa
Director of Global Quality

GSE Environmental, LLC.

Transmissivity Report

ASTM D4716

Roll No. 131553677

ROLL IDENTIFICATION

Roll Number	131553677
Product Name	FS1-200E-10-00-FA-00
Production Date	9/29/2018

CUSTOMER INFORMATION

Order Number	85199
Customer Name	Southwest Liner Systems, Inc.
Project Name	SWLS/Sundance West Phase 2, Landfill Cell 1A
Location	Eunice NM

Pressure (psf)	*Gradient*	*Net/Composite*	*Transmissivity Results* (m^2/sec)	(gal/min/ft)	*Seat Time (min)*	*Boundary*
10,000	0.10	Composite	1.82E-03	8.79	15	SS Plates
10,000	0.10	Net	4.70E-03	22.71	15	SS Plates

GSE QC APPROVED

GSE Roll Allocation

Order SO-085199
Customer Southwest Liner Systems, Inc.
Project Name Sundance West Phase 2, Landfill Cell 1A

TRI/AUSTIN
1/100,000 sf, min 1/lot
Geonet: 1 ft x 1 ft coupons
Geotextile: 3 ft x RW
Finished Geocomposite 2 ft x 2 ft coupons
Total sf on job 271,872 sf

Roll#	Resin Lot	Product Code	Mfg Date	Length	Pick up
131553677	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	10/3
131553678	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553679	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553680	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553681	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553682	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553683	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553684	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553685	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553686	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553687	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	200	
131553688	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553689	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553690	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553691	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553692	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553693	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553694	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553695	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553696	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553697	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553698	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553699	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	10/3
131553700	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553701	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553702	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553703	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553704	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553705	CB118H2701	FS1-200E-10-00-FA-00	9/29/2018	288	
131553706	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553707	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553708	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553709	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553710	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553711	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553712	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553713	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553714	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553715	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553716	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553717	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553718	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553719	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553720	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553721	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	10/3
131553722	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553723	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553724	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553725	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553726	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553727	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553728	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553729	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553730	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553731	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553732	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553733	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553734	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553735	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553736	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553737	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553738	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553739	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	
131553740	CB118H2701	FS1-200E-10-00-FA-00	9/30/2018	288	

APPENDIX B

Material Manufacturer Certification and Conformance Testing Results

B.10. Geocomposite Conformance Testing Results

April 23, 2019
April 24, 2019 Updated - Added Wide Width Tensile test results

Mail To:

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

email: swls.md@gmail.com

Bill To:

<= Same (PO# 1824)

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 Phase 2 Landfill Phase 2 - Cell 1B**
TRI Job Reference Number:	43551
Material(s) Tested:	Four, Solmax GSE GNS-200E-00-00-E-00 Geonet(s)
Test(s) Requested:	Density (ASTM D 1505) Carbon Black Content (ASTM D 1603, mod.) Thickness (ASTM D 1777) Mass/Unit Area (ASTM D 3776, Option C) Melt Flow Index (ASTM D 1238, 190/2.16) Wide Width Tensile Properties (ASTM D 4595)

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

Sincerely,

Jarrett A. Nelson
Technical Director
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file

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GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill Phase 2 - Cell 1B

Material: Solmax GSE GNS-200E-00-00-E-00 Geonet
Sample Identification: 131558931
TRI Log #: 43551

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Density (ASTM D 1505)												
Density (g/cm3)	0.958	0.958	0.958								**0.958**	0.000
Carbon Black Content (ASTM D 1603, mod.)												
% Carbon Black	2.63	2.60									**2.62**	0.02
Thickness (ASTM D 1777)												
Thickness (mils)	228	202	225	234	226	222	205	200	203	227	**217**	13
											200	<< min
Mass/Unit Area (ASTM D 3776, Option C)												
4 x 8 Rectangle - Mass (grams)	9.98	9.34	9.34	9.12	11.07	11.06	11.01	12.29	11.45	11.20		
Mass/unit area (lbs./sq.ft)	0.10	0.09	0.09	0.09	0.11	0.11	0.11	0.12	0.11	0.11	**0.10**	0.01
Melt Flow Index (ASTM D 1238, 190/2.16)												
Melt Flow Index (g/10 min)	0.407	0.410									**0.409**	
Wide Width Tensile Properties (ASTM D 4595)												
MD Specimen Width (inches)	8											
MD Specimen Width (mm)	203											
MD Ultimate Strength (lbs)	528	440	638	582	489	583					**544**	72
MD Ultimate Strength (ppi)	66.0	55.0	79.8	72.8	61.2	72.9					**67.9**	9
MD Ultimate Strength (kN/m)	11.6	9.6	14.0	12.8	10.7	12.8					**11.9**	2
MD Break Elongation (%)	24.3	297	19.8	23.9	30.2	19.4					**69.1**	112
TD Specimen Width (in)	8											
TD Specimen Width (mm)	203											
TD Ultimate Strength (lbs)	210	236	257	220	242	241					**234**	17
TD Ultimate Strength (ppi)	26.3	29.5	32.1	27.5	30.3	30.1					**29.3**	2
TD Ultimate Strength (kN/m)	4.61	5.17	5.63	4.81	5.30	5.27					**5.13**	0
TD Break Elongation (%)	181	204	115	191	132	116					**156**	40

MD Machine Direction TD Transverse Direction

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GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill Phase 2 - Cell 1B

Material: Solmax GSE GNS-200E-00-00-E-00 Geonet
Sample Identification: 131559147
TRI Log #: 43551

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Density (ASTM D 1505)												
Density (g/cm3)	0.958	0.958	0.958								**0.958**	0.000
Carbon Black Content (ASTM D 1603, mod.)												
% Carbon Black	2.57	2.60									**2.59**	0.02
Thickness (ASTM D 1777)												
Thickness (mils)	237	225	217	214	240	253	236	250	242	242	**236**	13
											214	<< min
Mass/Unit Area (ASTM D 3776, Option C)												
4 x 8 Rectangle - Mass (grams)	11.35	10.62	12.96	12.77	14.35	14.77	12.28	12.51	10.27	10.43		
Mass/unit area (lbs./sq.ft)	0.11	0.11	0.13	0.13	0.14	0.15	0.12	0.12	0.10	0.10	**0.12**	0.02
Melt Flow Index (ASTM D 1238, 190/2.16)												
Melt Flow Index (g/10 min)	0.409	0.409									**0.409**	
Wide Width Tensile Properties (ASTM D 4595)												
MD Specimen Width (inches)	8											
MD Specimen Width (mm)	203											
MD Ultimate Strength (lbs)	650	420	516	422	443	433					**481**	90
MD Ultimate Strength (ppi)	81	52	64	53	55	54					**60**	11
MD Ultimate Strength (kN/m)	14.2	9.2	11.3	9.3	9.7	9.5					**10.5**	2.0
MD Break Elongation (%)	28.0	32.0	25.9	29.8	38.5	28.1					**30.4**	4.5
TD Specimen Width (in)	8											
TD Specimen Width (mm)	203											
TD Ultimate Strength (lbs)	276	254	334	283	260	251					**276**	31
TD Ultimate Strength (ppi)	34.5	31.7	41.7	35.3	32.6	31.4					**34.5**	3.8
TD Ultimate Strength (kN/m)	6.05	5.56	7.30	6.19	5.70	5.50					**6.05**	0.67
TD Break Elongation (%)	124	97.3	128	92.7	120	149					**118**	21

MD Machine Direction TD Transverse Direction

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GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill Phase 2 - Cell 1B

Material: Solmax GSE GNS-200E-00-00-E-00 Geonet
Sample Identification: 131559170
TRI Log #: 43551

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Density (ASTM D 1505)												
Density (g/cm3)	0.958	0.958	0.958								**0.958**	0.000
Carbon Black Content (ASTM D 1603, mod.)												
% Carbon Black	2.50	2.53									**2.52**	0.02
Thickness (ASTM D 1777)												
Thickness (mils)	222	218	207	206	240	218	232	228	235	235	**224**	12
											206	<< min
Mass/Unit Area (ASTM D 3776, Option C)												
4 x 8 Rectangle - Mass (grams)	10.73	10.94	12.62	12.22	11.51	12.09	10.17	10.38	8.89	9.17		
Mass/unit area (lbs./sq.ft)	0.11	0.11	0.13	0.12	0.11	0.12	0.10	0.10	0.09	0.09	**0.11**	0.01
Melt Flow Index (ASTM D 1238, 190/2.16)												
Melt Flow Index (g/10 min)	0.406	0.397									**0.402**	
Wide Width Tensile Properties (ASTM D 4595)												
MD Specimen Width (inches)	8											
MD Specimen Width (mm)	203											
MD Ultimate Strength (lbs)	382	384	411	414	423	455					**412**	27
MD Ultimate Strength (ppi)	47.7	48.0	51.4	51.7	52.9	56.9					**51.4**	3.4
MD Ultimate Strength (kN/m)	8.36	8.41	9.00	9.06	9.26	9.97					**9.01**	0.60
MD Break Elongation (%)	20.2	23.5	23.4	156	21.7	22.8					**44.5**	54.5
TD Specimen Width (in)	8											
TD Specimen Width (mm)	203											
TD Ultimate Strength (lbs)	228	264	242	228	228	223					**235**	15
TD Ultimate Strength (ppi)	28.5	33.0	30.2	28.5	28.5	27.8					**29.4**	1.9
TD Ultimate Strength (kN/m)	4.99	5.77	5.29	5.00	4.99	4.88					**5.15**	0.33
TD Break Elongation (%)	90.2	139	129	144	125	167					**132**	25

MD Machine Direction TD Transverse Direction

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GEONET TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill Phase 2 - Cell 1B

Material: Solmax GSE GNS-200E-00-00-E-00 Geonet
Sample Identification: 131559190
TRI Log #: 43551

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Density (ASTM D 1505)												
Density (g/cm3)	0.958	0.958	0.958								**0.958**	0.000
Carbon Black Content (ASTM D 1603, mod.)												
% Carbon Black	2.55	2.58									**2.57**	0.02
Thickness (ASTM D 1777)												
Thickness (mils)	212	218	215	231	225	220	236	236	232	234	**226**	9
											212	<< min
Mass/Unit Area (ASTM D 3776, Option C)												
4 x 8 Rectangle - Mass (grams)	10.42	10.05	12.19	11.79	12.32	12.68	10.87	10.65	11.00	10.40		
Mass/unit area (lbs./sq.ft)	0.10	0.10	0.12	0.12	0.12	0.13	0.11	0.11	0.11	0.10	**0.11**	0.01
Melt Flow Index (ASTM D 1238, 190/2.16)												
Melt Flow Index (g/10 min)	0.416	0.405									**0.410**	
Wide Width Tensile Properties (ASTM D 4595)												
MD Specimen Width (inches)	8											
MD Specimen Width (mm)	203											
MD Ultimate Strength (lbs)	389	369	400	386	460	467					**412**	41
MD Ultimate Strength (ppi)	48.6	46.1	50.0	48.2	57.5	58.3					**51.5**	5.2
MD Ultimate Strength (kN/m)	8.51	8.07	8.77	8.45	10.07	10.22					**9.02**	0.90
MD Break Elongation (%)	24.0	26.1	31.9	27.3	45.0	25.8					**30.0**	7.8
TD Specimen Width (in)	8											
TD Specimen Width (mm)	203											
TD Ultimate Strength (lbs)	257	248	254	247	230	201					**239**	21
TD Ultimate Strength (ppi)	32.1	30.9	31.8	30.9	28.8	25.1					**29.9**	2.6
TD Ultimate Strength (kN/m)	5.62	5.42	5.57	5.40	5.05	4.40					**5.24**	0.46
TD Break Elongation (%)	288	119	152	135	143	88.4					**154**	69

MD Machine Direction TD Transverse Direction

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January 9, 2019

Mail To:

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

email: swls.md@gmail.com

Bill To:

<= Same (PO# 1824)

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 Landfill Phase 2 - Cell 1B**
TRI Job Reference Number:	43368
Material(s) Tested:	Two, Solmax GSE FS2-225E-10-10-E-00 Double Sided Geocomposite(s)
Test(s) Requested:	Transmissivity (ASTM D 4716) - GC Peel Strength (ASTM D 7005) - GC Density (ASTM D 1505) - GN Tensile Properties (ASTM D 7179, 12 ipm strain rate) - GN

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

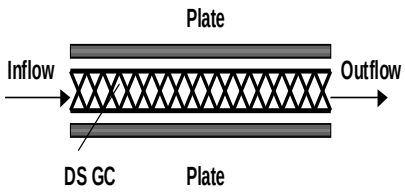
*Signature is on file

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GEOCOMPOSITE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Landfill Phase 2 - Cell 1B

Material: Solmax GSE FS2-225E-10-10-E-00 Double Sided Geocomposite
Sample Identification: 131558801
TRI Log #: 43368

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Hydraulic Transmissivity (ASTM D 4716)												
Direction Tested: Machine Direction												
Normal Load (psf): 10,000												
Hydraulic Gradient: 0.1												
Test Length (in) 12												
Test Width (in) 12												
Plate / Sample / Plate												
Seat Time (hours)	Specimen		1			2						
	Volume (cc)	613	612	6114	519	519	519					
	Time (s)	20.40	20.40	20.40	40.40	40.43	40.46					
0.25	Flow Rate (GPM/ft width)	0.47	0.47	4.71	0.20	0.20	0.20				**1.04**	1.80
	Transmissivity (m^2/s)	9.78E-04	9.77E-04	9.76E-03	4.17E-04	4.17E-04	4.17E-04				**2.16E-03**	3.73E-03
	Test Temp (C)		20.5			20.6						
	Temp. Corr. Factor		0.992			0.990						
Peel Strength (ASTM D 7005)												
A - MD Average Peel Strength (ppi)	4.32	2.07	6.09	3.54	5.37						**4.28**	1.57
A - MD Average Peel Strength (g/in)	1961	940	2765	1607	2438						**1942**	714
B - MD Average Peel Strength (ppi)	5.33	3.76	5.93	3.71	5.24						**4.79**	1.00
B - MD Average Peel Strength (g/in)	2420	1707	2692	1684	2379						**2176**	455
Note: A and B represent a randomly assigned top and bottom of the sample												
Thickness (ASTM D 5199)	GEONET COMPONENT											
Thickness (mils)	254	242	263	263	235	229	253	267	263	237	**250**	13.9
											229	<< min
Tensile Properties (ASTM D 7179, 12 ipm strain rate)	GEONET COMPONENT											
MD Max. Strength (ppi)	83	98	117	95	73						**93**	16
MD Elong. @ Max. Strength (%)	31	28	30	28	34						**30**	2



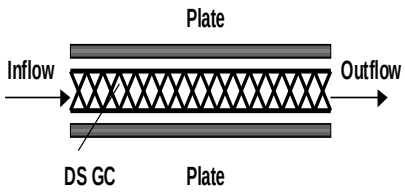
MD Machine Direction

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GEOCOMPOSITE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Landfill Phase 2 - Cell 1B

Material: Solmax GSE FS2-225E-10-10-E-00 Double Sided Geocomposite
Sample Identification: 131558834
TRI Log #: 43368

PARAMETER		TEST REPLICATE NUMBER										MEAN	STD. DEV.
		1	2	3	4	5	6	7	8	9	10		
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf):	10,000												
Hydraulic Gradient:	0.1												
Test Length (in)	12												
Test Width (in)	12												
Plate / Sample / Plate													
Seat Time (hours)	Specimen			1			2						
	Volume (cc)		507	505	504	504	501	501					
	Time (s)		30.50	30.43	30.46	20.36	20.37	20.37					
0.25	Flow Rate (GPM/ft width)		0.26	0.26	0.26	0.39	0.38	0.38				**0.32**	0.07
	Transmissivity (m^2/s)		5.37E-04	5.37E-04	5.34E-04	8.01E-04	7.95E-04	7.94E-04				**6.66E-04**	1.43E-04
	Test Temp (C)			20.8			20.8						
	Temp. Corr. Factor			0.986			0.986						
Peel Strength (ASTM D 7005)													
A - MD Average Peel Strength (ppi)		4.08	3.59	3.22	4.77	3.62						**3.86**	0.60
A - MD Average Peel Strength (g/in)		1852	1630	1462	2166	1643						**1751**	270
B - MD Average Peel Strength (ppi)		4.75	3.49	4.91	5.36	5.46						**4.79**	0.79
B - MD Average Peel Strength (g/in)		2157	1584	2229	2433	2479						**2176**	357
Thickness (ASTM D 5199)					GEONET COMPONENT								
Thickness (mils)		247	240	233	234	237	268	258	251	229	270	**247**	14.7
												229	<< min
Tensile Properties (ASTM D 7179, 12 ipm strain rate)					GEONET COMPONENT								
MD Max. Strength (ppi)		67	83	104	85	80						**84**	13
MD Elong. @ Max. Strength (%)		34	30	28	28	33						**31**	3



MD Machine Direction

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

January 7, 2019

Mail To:

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

email: swls.md@gmail.com

Bill To:

<= Same (PO# SW1819)

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 Phase 2 Landfill - Cell 1A**
TRI Job Reference Number:	43367
Material(s) Tested:	Three, Solmax GSE FS1-200E-10-00-FA-00 Single Sided Geocomposite
Test(s) Requested:	Transmissivity (ASTM D 4716) - GC Peel Strength (ASTM D 7005) - GC Density (ASTM D 1505) - GN Tensile Properties (ASTM D 7179, 12 ipm strain rate) - GN

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

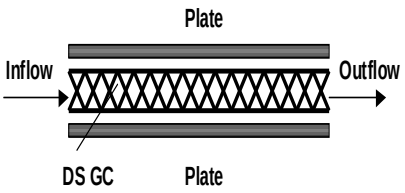
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GEOCOMPOSITE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE FS1-200E-10-00-FA-00 Single Sided Geocomposite
Sample Identification: 131558754
TRI Log #: 43367

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf): 10,000													
Hydraulic Gradient: 0.1													
Test Length (in) 12													
Test Width (in) 12													
Plate / Sample / Plate													
Seat Time (hours)	Specimen		1			2							
	Volume (cc)	509	508	506	782	781	780						
	Time (s)	10.40	10.40	10.43	10.37	10.43	10.46						
0.25	Flow Rate (GPM/ft width)	0.78	0.78	0.78	1.20	1.19	1.19				**0.99**	0.23	
	Transmissivity (m^2/s)	1.62E-03	1.62E-03	1.61E-03	2.49E-03	2.47E-03	2.46E-03				**2.05E-03**	4.70E-04	1x10^{-4} min
	Test Temp (C)		19.7			19.9							
	Temp. Corr. Factor		1.011			1.006							
Peel Strength (ASTM D 7005)													
A - MD Average Peel Strength (ppi)	5.67	4.79	7.06	5.19	2.12						**4.97**	1.81	1.0 min
A - MD Average Peel Strength (g/in)	2574	2175	3205	2356	962						**2255**	820	
Note: A and B represent a randomly assigned top and bottom of the sample													
Density (ASTM D 1505)					GEONET COMPONENT								
Density (g/cm3)	0.954	0.954	0.954								**0.954**	0.000	
Tensile Properties (ASTM D 7179, 12 ipm strain rate)					GEONET COMPONENT								
MD Max. Strength (ppi)	58	63	73	84	85						**72**	12	45 min
MD Elong. @ Max. Strength (%)	33	32	28	27	29						**30**	3	

MD Machine Direction

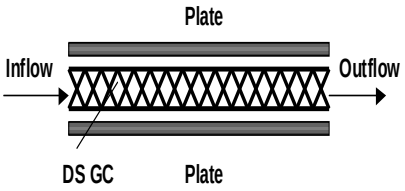


The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains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

GEOCOMPOSITE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE FS1-200E-10-00-FA-00 Single Sided Geocomposite
Sample Identification: 131558777
TRI Log #: 43367

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf): 10,000													
Hydraulic Gradient: 0.1													
Test Length (in) 12													
Test Width (in) 12													
Plate / Sample / Plate													
Seat Time (hours)	Specimen		1			2							
	Volume (cc)	561	561	559	767	764	764						
	Time (s)	10.53	10.50	10.53	10.46	10.40	10.40						
0.25	Flow Rate (GPM/ft width)	0.85	0.85	0.85	1.16	1.16	1.16				**1.00**	0.17	
	Transmissivity (m^2/s)	1.76E-03	1.76E-03	1.75E-03	2.40E-03	2.40E-03	2.40E-03				**2.08E-03**	3.55E-04	$1x10^{-4}$ min
	Test Temp (C)		20.0			20.3							
	Temp. Corr. Factor		1.004			0.997							
Peel Strength (ASTM D 7005)													
A - MD Average Peel Strength (ppi)	3.06	5.01	2.42	1.10	3.69						**3.06**	1.45	1.0 min
A - MD Average Peel Strength (g/in)	1389	2275	1099	499	1675						**1387**	660	
Note: A and B represent a randomly assigned top and bottom of the sample													
Density (ASTM D 1505)					GEONET COMPONENT								
Density (g/cm3)	0.954	0.954	0.954								**0.954**	0.000	
Tensile Properties (ASTM D 7179, 12 ipm strain rate)					GEONET COMPONENT								
MD Max. Strength (ppi)	58	64	68	72	88						**70**	11	45 min
MD Elong. @ Max. Strength (%)	29	29	31	27	29						**29**	1	



MD Machine Direction

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GEOCOMPOSITE TEST RESULTS
TRI Client: Southwest Liner Systems
Project: Sundance West Phase 2 Landfill - Cell 1A

Material: Solmax GSE FS1-200E-10-00-FA-00 Single Sided Geocomposite
Sample Identification: 131558939
TRI Log #: 43367

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf): 10,000													
Hydraulic Gradient: 0.1													
Test Length (in) 12													
Test Width (in) 12													
Plate / Sample / Plate													
Seat Time (hours)	Specimen		1			2							
	Volume (cc)	597	598	594	587	584	584						
	Time (s)	10.43	10.50	10.37	15.37	15.40	15.46						
0.25	Flow Rate (GPM/ft width)	0.90	0.90	0.90	0.60	0.60	0.59				**0.75**	0.17	
	Transmissivity (m^2/s)	1.87E-03	1.86E-03	1.87E-03	1.24E-03	1.23E-03	1.23E-03				**1.55E-03**	3.44E-04	1x10^{-4} min
	Test Temp (C)		20.4			20.5							
	Temp. Corr. Factor		0.995			0.992							
Peel Strength (ASTM D 7005)													
A - MD Average Peel Strength (ppi)	3.95	5.39	3.48	1.67	4.72						**3.84**	1.42	1.0 min
A - MD Average Peel Strength (g/in)	1793	2447	1580	758	2143						**1744**	643	
Note: A and B represent a randomly assigned top and bottom of the sample													
Density (ASTM D 1505)					GEONET COMPONENT								
Density (g/cm3)	0.954	0.954	0.954								**0.954**	0.000	
Tensile Properties (ASTM D 7179, 12 ipm strain rate)					GEONET COMPONENT								
MD Max. Strength (ppi)	53	57	69	66	62						**61**	6	45 min
MD Elong. @ Max. Strength (%)	27	29	28	31	29						**29**	2	

MD Machine Direction

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APPENDIX C

Cell 1B Liner Installation Documentation

C.1. GCL Inventory Control Log

333 Rio Rancho Blvd., Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

GCL INVENTORY CONTROL LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	1053018
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS
PROJECT LOCATION:	Euncie, New Mexico	**SHEET NUMBER:**	1
MATERIAL TYPE:	GCL	**DATE OF INVENTORY:**	See Below
MATERIAL IDENTIFICATION:	GSE Bentoliner NSL	**INVENTORY MONITOR:**	Don Gray
MATERIAL MANUFACTURER:	GSE	**UNLOADING METHOD:**	Forklift

	ROLL NUMBER	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE OF INVENTORY
			LENGTH (FT)	WIDTH (FT)	AREA (FT^2)			
1	502322549	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
2	502322550	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
3	502322551	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
4	502322552	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
5	502322553	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
6	502322554	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
7	502322555	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
8	502322556	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
9	502322557	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y	Y	1-3-19
10	502322558	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
11	502322559	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
12	502322560	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
13	502322561	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
14	502322562	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
15	502322563	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
16	502322564	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
17	502322565	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
18	502322566	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
19	502322567	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
20	502322568	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
21	502322569	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
22	502322570	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
23	502322571	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
24	502322572	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
25	502322573	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
26	502322574	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y	Y	1-3-19
27	502322575	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
28	502322576	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
29	502322577	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
30	502322578	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19

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Rio Rancho, New Mexico 87124
505.867.6990

GCL INVENTORY CONTROL LOG

PROJECT NAME:	Sundance West Landfill Cell 1A	**PROJECT NUMBER:**	1053018
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS
PROJECT LOCATION:	Euncie, New Mexico	**SHEET NUMBER:**	2
MATERIAL TYPE:	GCL	**DATE OF INVENTORY:**	See Below
MATERIAL IDENTIFICATION:	GSE Bentoliner NSL	**INVENTORY MONITOR:**	Don Gray
MATERIAL MANUFACTURER:	GSE	**UNLOADING METHOD:**	Forklift

	ROLL NUMBER	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE OF INVENTORY
			LENGTH (FT)	WIDTH (FT)	AREA (FT^2)			
1	502322579	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
2	502322580	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
3	502322581	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
4	502322582	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
5	502322583	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
6	502322584	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
7	502322585	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
8	502322586	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
9	502322587	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
10	502322588	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
11	502322589	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
12	502322590	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
13	502322591	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
14	502322592	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
15	502322593	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
16	502322594	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
17	502322595	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
18	502322596	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
19	502322597	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y	Y	1-3-19
20	502322599	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
21	502322600	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
22	502322601	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
23	502322602	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
24	502322603	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
25	502322604	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
26	502322605	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
27	502322606	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
28	502322607	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
29	502322608	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
30	502322609	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19

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GCL INVENTORY CONTROL LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	1053018
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS
PROJECT LOCATION:	Euncie, New Mexico	**SHEET NUMBER:**	3
MATERIAL TYPE:	GCL	**DATE OF INVENTORY:**	See Below
MATERIAL IDENTIFICATION:	GSE Bentoliner NSL	**INVENTORY MONITOR:**	Don Gray
MATERIAL MANUFACTURER:	GSE	**UNLOADING METHOD:**	Forklift

	ROLL NUMBER	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE OF INVENTORY
			LENGTH (FT)	WIDTH (FT)	AREA (FT^2)			
1	502322610	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
2	502322611	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
3	502322612	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
4	502322613	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
5	502322614	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
6	502322615	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
7	502322616	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
8	502322617	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
9	502322618	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
10	502322619	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
11	502322620	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
12	502322621	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
13	502322622	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
14	502322623	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
15	502322624	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
16	502322625	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
17	502322626	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
18	502322627	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
19	502322628	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
20	502322629	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
21	502322630	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
22	502322631	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
23	502322632	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
24	502322633	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
25	502322634	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
26	502322635	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
27	502322636	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
28	502322637	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
29	502322638	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
30	502322639	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19

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GCL INVENTORY CONTROL LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	1053018
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS
PROJECT LOCATION:	Euncie, New Mexico	**SHEET NUMBER:**	4
MATERIAL TYPE:	GCL	**DATE OF INVENTORY:**	See Below
MATERIAL IDENTIFICATION:	GSE Bentoliner NSL	**INVENTORY MONITOR:**	Don Gray
MATERIAL MANUFACTURER:	GSE	**UNLOADING METHOD:**	Forklift

	ROLL NUMBER	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE OF INVENTORY
			LENGTH (FT)	WIDTH (FT)	AREA (FT^2)			
1	502322640	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
2	502322641	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
3	502322642	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
4	502322643	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
5	502322644	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
6	502322645	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y	Y	1-3-19
7	502322646	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
8	502322647	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
9	502322671	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
10	502328867	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
11	502328871	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
12	502328879	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
13	502328880	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
14	502328882	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
15	502328883	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
16	502328886	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
17	502328887	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
18	502328888	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
19	502328911	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
20	502328917	BLI-075-06N-03S-D-30	150.0	15.5	2325.0	Y		1-3-19
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APPENDIX C

Cell 1B Liner Installation Documentation

C.2. Geonet Inventory Control Log

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GEONET INVENTORY CONTROL LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	1053018
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, New Mexico	**SHEET NUMBER:**	1
MATERIAL TYPE:	Geonet	**DATE OF INVENTORY:**	1-3-19
MATERIAL IDENTIFICATION:	GNS-200E-00-00-E-00	**INVENTORY MONITOR:**	Don Gray
MATERIAL MANUFACTURER:	GSE	**UNLOADING METHOD:**	Forklift

	ROLL NUMBER	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	REMARKS
			LENGTH (FT)	WIDTH (FT)	THICKNESS OR WEIGHT			
1	131553546	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
2	131553547	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
3	131553765	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
4	131558931	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y	Y	
5	131558932	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
6	131558933	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
7	131558934	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
8	131559140	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
9	131559147	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y	Y	
10	131559151	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
11	131559152	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
12	131559153	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
13	131559154	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
14	131559155	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
15	131559156	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
16	131559157	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
17	131559158	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
18	131559159	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
19	131559160	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
20	131559161	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
21	131559162	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
22	131559163	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
23	131559164	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
24	131559165	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
25	131559166	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
26	131559167	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
27	131559168	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
28	131559169	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
29	131559170	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y	Y	
30	131559171	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		

GORDON ENVIRONMENTAL PSC

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GEONET INVENTORY CONTROL LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	1053018
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, New Mexico	**SHEET NUMBER:**	2
MATERIAL TYPE:	Geonet	**DATE OF INVENTORY:**	1-3-19
MATERIAL IDENTIFICATION:	GNS-200E-00-00-E-00	**INVENTORY MONITOR:**	Don Gray
MATERIAL MANUFACTURER:	GSE	**UNLOADING METHOD:**	Forklift

	ROLL NUMBER	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	REMARKS
			LENGTH (FT)	WIDTH (FT)	THICKNESS OR WEIGHT			
1	131559172	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
2	131559173	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
3	131559174	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
4	131559175	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
5	131559176	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
6	131559177	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
7	131559178	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
8	131559179	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
9	131559180	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
10	131559181	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
11	131559182	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
12	131559183	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
13	131559184	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
14	131559185	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
15	131559186	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
16	131559187	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
17	131559188	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
18	131559189	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
19	131559190	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y	Y	
20	131559191	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
21	131559192	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
22	131559193	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
23	131559194	GNS-200E-00-00-E-00	330.0	14.5	200 Mil	Y		
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APPENDIX C

Cell 1B Liner Installation Documentation

C.3. FML Inventory Control Log

GORDON ENVIRONMENTAL PSC

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FML INVENTORY CONTROL LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West Inc.	**CONTRACTOR:**	SLS
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	1
MATERIAL TYPE:	Smooth FML	**DATE OF INVENTORY:**	See Below
MATERIAL IDENTIFICATION:	60 Mil	**INVENTORY MONITOR:**	Don Gray
MATERIAL MANUFACTURER:	GSE	**UNLOADING METHOD:**	Forklift and straps

	ROLL NO.	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE INVENTORIED
			LENGTH (FT)	WIDTH (FT)	THICKNESS OR WEIGHT			
1	103216946	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y	Y	1/3/2019
2	103216946	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
3	103216947	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
4	103216948	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
5	103216949	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
6	103216950	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
7	103216952	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
8	103216953	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
9	103216954	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
10	103216956	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
11	103216957	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
12	103216958	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
13	103216959	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
14	103216960	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
15	103216961	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
16	103216962	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y	Y	1/3/2019
17	103216964	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
18	103216965	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
19	103216966	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
20	103216967	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
21	103216968	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
22	103216969	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
23	103216970	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y	Y	1/3/2019
24	103216971	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
25	103216972	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
26	103216973	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
27	103216974	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
28	103216975	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
29	103216976	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y	Y	1/3/2019
30	103216981	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
31	103216982	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
32	103216983	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
33	103218943	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
34	108191760	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
35	108197872	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y	Y	1/3/2019
36	108197874	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
37	108197884	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
38	108197884	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019

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FML INVENTORY CONTROL LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West Inc.	**CONTRACTOR:**	SLS
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	2
MATERIAL TYPE:	Smooth FML	**DATE OF INVENTORY:**	See Below
MATERIAL IDENTIFICATION:	60 Mil	**INVENTORY MONITOR:**	Don Gray
MATERIAL MANUFACTURER:	GSE	**UNLOADING METHOD:**	Forklift and straps

	ROLL NO.	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE INVENTORIED
			LENGTH (FT)	WIDTH (FT)	THICKNESS OR WEIGHT			
1	108197891	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
2	108197899	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
3	108198926	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
4	108198927	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
5	108198928	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
6	108198929	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
7	108198934	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
8	108198935	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
9	108198935	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
10	108198936	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
11	108198937	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
12	108198938	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
13	108198939	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
14	108198940	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
15	108198941	HDS-060AE-BBB-B-00	560	22.5	60 Mil	Y		1/3/2019
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FML INVENTORY CONTROL LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West Inc.	**CONTRACTOR:**	SLS
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	3
MATERIAL TYPE:	Textured FML	**DATE OF INVENTORY:**	See Below
MATERIAL IDENTIFICATION:	60 Mil	**INVENTORY MONITOR:**	Don Gray
MATERIAL MANUFACTURER:	GSE	**UNLOADING METHOD:**	Forklift and straps

	ROLL NO.	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE INVENTORIED
			LENGTH (FT)	WIDTH (FT)	THICKNESS OR WEIGHT			
1	102191320	HDT-060GE-BBB-B-W0	520	22.5	60 Mil	Y		1/3/2019
2	104192272	HDT-060GE-BBB-B-W0	520	22.5	60 Mil	Y		1/3/2019
3	104192273	HDT-060GE-BBB-B-W0	520	22.5	60 Mil	Y		1/3/2019
4	104192275	HDT-060GE-BBB-B-W0	520	22.5	60 Mil	Y		1/3/2019
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APPENDIX C

Cell 1B Liner Installation Documentation

C.4. Geocomposite Inventory Control Log

333 Rio Rancho Blvd., Suite 400
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GEOCOMPOSITE INVENTORY CONTROL LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West Inc.	**CONTRACTOR:**	SLS
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	1
MATERIAL TYPE:	Geocomposite (Double -Sided)	**DATE OF INVENTORY:**	See Below
MATERIAL IDENTIFICATION:	Geocomposite	**INVENTORY MONITOR:**	Don Gray
MATERIAL MANUFACTURER:	GSE	**UNLOADING METHOD:**	Forklift and straps

	GSE MATERIAL IDENTIFICATION NO.	ROLL NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE INVENTORIED
			LENGTH (FT)	WIDTH (FT)	THICKNESS OR WEIGHT			
1	FS2-225E-10-10-E-ON	131558801	200	14.5	225-10-10	Y	Y	1/3/2019
2	FS2-225E-10-10-E-ON	131558802	200	14.5	225-10-10	Y		1/3/2019
3	FS2-225E-10-10-E-ON	131558803	200	14.5	225-10-10	Y		1/3/2019
4	FS2-225E-10-10-E-ON	131558804	200	14.5	225-10-10	Y		1/3/2019
5	FS2-225E-10-10-E-ON	131558805	200	14.5	225-10-10	Y		1/3/2019
6	FS2-225E-10-10-E-ON	131558806	200	14.5	225-10-10	Y		1/3/2019
7	FS2-225E-10-10-E-ON	131558807	200	14.5	225-10-10	Y		1/3/2019
8	FS2-225E-10-10-E-ON	131558808	200	14.5	225-10-10	Y		1/3/2019
9	FS2-225E-10-10-E-ON	131558809	200	14.5	225-10-10	Y		1/3/2019
10	FS2-225E-10-10-E-ON	131558810	200	14.5	225-10-10	Y		1/3/2019
11	FS2-225E-10-10-E-ON	131558811	200	14.5	225-10-10	Y		1/3/2019
12	FS2-225E-10-10-E-ON	131558811	200	14.5	225-10-10	Y		1/3/2019
13	FS2-225E-10-10-E-ON	131558813	200	14.5	225-10-10	Y		1/3/2019
14	FS2-225E-10-10-E-ON	131558814	200	14.5	225-10-10	Y		1/3/2019
15	FS2-225E-10-10-E-ON	131558815	200	14.5	225-10-10	Y		1/3/2019
16	FS2-225E-10-10-E-ON	131558816	200	14.5	225-10-10	Y		1/3/2019
17	FS2-225E-10-10-E-ON	131558817	200	14.5	225-10-10	Y		1/3/2019
18	FS2-225E-10-10-E-ON	131558819	200	14.5	225-10-10	Y		1/3/2019
19	FS2-225E-10-10-E-ON	131558820	200	14.5	225-10-10	Y		1/3/2019
20	FS2-225E-10-10-E-ON	131558821	200	14.5	225-10-10	Y		1/3/2019
21	FS2-225E-10-10-E-ON	131558822	200	14.5	225-10-10	Y		1/3/2019
22	FS2-225E-10-10-E-ON	131558823	200	14.5	225-10-10	Y		1/3/2019
23	FS2-225E-10-10-E-ON	131558824	200	14.5	225-10-10	Y		1/3/2019
24	FS2-225E-10-10-E-ON	131558825	200	14.5	225-10-10	Y		1/3/2019
25	FS2-225E-10-10-E-ON	131558826	200	14.5	225-10-10	Y		1/3/2019
26	FS2-225E-10-10-E-ON	131558827	200	14.5	225-10-10	Y		1/3/2019
27	FS2-225E-10-10-E-ON	131558828	200	14.5	225-10-10	Y		1/3/2019
28	FS2-225E-10-10-E-ON	131558829	200	14.5	225-10-10	Y		1/3/2019
29	FS2-225E-10-10-E-ON	131558830	200	14.5	225-10-10	Y		1/3/2019
30	FS2-225E-10-10-E-ON	131558831	200	14.5	225-10-10	Y		1/3/2019
31	FS2-225E-10-10-E-ON	131558832	200	14.5	225-10-10	Y		1/3/2019
32	FS2-225E-10-10-E-ON	131558833	200	14.5	225-10-10	Y		1/3/2019
33	FS2-225E-10-10-E-ON	131558834	200	14.5	225-10-10	Y	Y	1/3/2019
34	FS2-225E-10-10-E-ON	131558835	200	14.5	225-10-10	Y		1/3/2019
35	FS2-225E-10-10-E-ON	131558836	200	14.5	225-10-10	Y		1/3/2019
36	FS2-225E-10-10-E-ON	131558837	200	14.5	225-10-10	Y		1/3/2019
37	FS2-225E-10-10-E-ON	131558838	200	14.5	225-10-10	Y		1/3/2019
38	FS2-225E-10-10-E-ON	131558839	200	14.5	225-10-10	Y		1/3/2019

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GEOCOMPOSITE INVENTORY CONTROL LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West Inc.	**CONTRACTOR:**	SLS
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	2
MATERIAL TYPE:	Geocomposite (Double -Sided)	**DATE OF INVENTORY:**	See Below
MATERIAL IDENTIFICATION:	Geocomposite	**INVENTORY MONITOR:**	Don Gray
MATERIAL MANUFACTURER:	GSE	**UNLOADING METHOD:**	Forklift and straps

	GSE MATERIAL IDENTIFICATION NO.	ROLL NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE INVENTORIED
			LENGTH (FT)	WIDTH (FT)	THICKNESS OR WEIGHT			
1	FS2-225E-10-10-E-ON	131558840	200	14.5	225-10-10	Y		1/3/2019
2	FS2-225E-10-10-E-ON	131558842	200	14.5	225-10-10	Y		1/3/2019
3	FS2-225E-10-10-E-ON	131558843	200	14.5	225-10-10	Y		1/3/2019
4	FS2-225E-10-10-E-ON	131558844	200	14.5	225-10-10	Y		1/3/2019
5	FS2-225E-10-10-E-ON	131558845	200	14.5	225-10-10	Y		1/3/2019
6	FS2-225E-10-10-E-ON	131558846	200	14.5	225-10-10	Y		1/3/2019
7	FS2-225E-10-10-E-ON	131558847	200	14.5	225-10-10	Y		1/3/2019
8	FS2-225E-10-10-E-ON	131558848	200	14.5	225-10-10	Y		1/3/2019
9	FS2-225E-10-10-E-ON	131558849	200	14.5	225-10-10	Y		1/3/2019
10	FS2-225E-10-10-E-ON	131558850	200	14.5	225-10-10	Y		1/3/2019
11	FS2-225E-10-10-E-ON	131558851	200	14.5	225-10-10	Y		1/3/2019
12	FS2-225E-10-10-E-ON	131558852	200	14.5	225-10-10	Y		1/3/2019
13	FS2-225E-10-10-E-ON	131558853	200	14.5	225-10-10	Y		1/3/2019
14	FS2-225E-10-10-E-ON	131558854	200	14.5	225-10-10	Y		1/3/2019
15	FS2-225E-10-10-E-ON	131558855	200	14.5	225-10-10	Y		1/3/2019
16	FS2-225E-10-10-E-ON	131558856	200	14.5	225-10-10	Y		1/3/2019
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GEOCOMPOSITE INVENTORY CONTROL LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West Inc.	**CONTRACTOR:**	SLS
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	1
MATERIAL TYPE:	Geocomposite (Single-Sided)	**DATE OF INVENTORY:**	See Below
MATERIAL IDENTIFICATION:	Geocomposite	**INVENTORY MONITOR:**	Don Gray
MATERIAL MANUFACTURER:	GSE	**UNLOADING METHOD:**	Forklift and straps

	GSE MATERIAL IDENTIFICATION NO.	ROLL NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE INVENTORIED
			LENGTH (FT)	WIDTH (FT)	THICKNESS OR WEIGHT			
1	FS1-200E-10-00-FA-ON	131553704	200	14.5	200-10-00	Y		1/3/2019
2	FS1-200E-10-00-FA-ON	131553706	200	14.5	200-10-00	Y		1/3/2019
3	FS1-200E-10-00-FA-ON	131553707	200	14.5	200-10-00	Y		1/3/2019
4	FS1-200E-10-00-FA-ON	131553708	200	14.5	200-10-00	Y		1/3/2019
5	FS1-200E-10-00-FA-ON	131553712	200	14.5	200-10-00	Y		1/3/2019
6	FS1-200E-10-00-FA-ON	131558754	200	14.5	200-10-00	Y	Y	1/3/2019
7	FS1-200E-10-00-FA-ON	131558755	200	14.5	200-10-00	Y		1/3/2019
8	FS1-200E-10-00-FA-ON	131558756	200	14.5	200-10-00	Y		1/3/2019
9	FS1-200E-10-00-FA-ON	131558757	200	14.5	200-10-00	Y		1/3/2019
10	FS1-200E-10-00-FA-ON	131558758	200	14.5	200-10-00	Y		1/3/2019
11	FS1-200E-10-00-FA-ON	131558759	200	14.5	200-10-00	Y		1/3/2019
12	FS1-200E-10-00-FA-ON	131558760	200	14.5	200-10-00	Y		1/3/2019
13	FS1-200E-10-00-FA-ON	131558761	200	14.5	200-10-00	Y		1/3/2019
14	FS1-200E-10-00-FA-ON	131558762	200	14.5	200-10-00	Y		1/3/2019
15	FS1-200E-10-00-FA-ON	131558763	200	14.5	200-10-00	Y		1/3/2019
16	FS1-200E-10-00-FA-ON	131558764	200	14.5	200-10-00	Y		1/3/2019
17	FS1-200E-10-00-FA-ON	131558765	200	14.5	200-10-00	Y		1/3/2019
18	FS1-200E-10-00-FA-ON	131558766	200	14.5	200-10-00	Y		1/3/2019
19	FS1-200E-10-00-FA-ON	131558767	200	14.5	200-10-00	Y		1/3/2019
20	FS1-200E-10-00-FA-ON	131558768	200	14.5	200-10-00	Y		1/3/2019
21	FS1-200E-10-00-FA-ON	131558769	200	14.5	200-10-00	Y		1/3/2019
22	FS1-200E-10-00-FA-ON	131558770	200	14.5	200-10-00	Y		1/3/2019
23	FS1-200E-10-00-FA-ON	131558772	200	14.5	200-10-00	Y		1/3/2019
24	FS1-200E-10-00-FA-ON	131558773	200	14.5	200-10-00	Y		1/3/2019
25	FS1-200E-10-00-FA-ON	131558774	200	14.5	200-10-00	Y		1/3/2019
26	FS1-200E-10-00-FA-ON	131558775	200	14.5	200-10-00	Y		1/3/2019
27	FS1-200E-10-00-FA-ON	131558776	200	14.5	200-10-00	Y		1/3/2019
28	FS1-200E-10-00-FA-ON	131558777	200	14.5	200-10-00	Y	Y	1/3/2019
29	FS1-200E-10-00-FA-ON	131558778	200	14.5	200-10-00	Y		1/3/2019
30	FS1-200E-10-00-FA-ON	131558779	200	14.5	200-10-00	Y		1/3/2019
31	FS1-200E-10-00-FA-ON	131558780	200	14.5	200-10-00	Y		1/3/2019
32	FS1-200E-10-00-FA-ON	131558781	200	14.5	200-10-00	Y		1/3/2019
33	FS1-200E-10-00-FA-ON	131558782	200	14.5	200-10-00	Y		1/3/2019
34	FS1-200E-10-00-FA-ON	131558783	200	14.5	200-10-00	Y		1/3/2019
35	FS1-200E-10-00-FA-ON	131558784	200	14.5	200-10-00	Y		1/3/2019
36	FS1-200E-10-00-FA-ON	131558785	200	14.5	200-10-00	Y		1/3/2019
37	FS1-200E-10-00-FA-ON	131558786	200	14.5	200-10-00	Y		1/3/2019
38	FS1-200E-10-00-FA-ON	131558787	200	14.5	200-10-00	Y		1/3/2019

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GEOCOMPOSITE INVENTORY CONTROL LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West Inc.	**CONTRACTOR:**	SLS
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	2
MATERIAL TYPE:	Geocomposite (Single-Sided)	**DATE OF INVENTORY:**	See Below
MATERIAL IDENTIFICATION:	Geocomposite	**INVENTORY MONITOR:**	Don Gray
MATERIAL MANUFACTURER:	GSE	**UNLOADING METHOD:**	Forklift and straps

	GSE MATERIAL IDENTIFICATION NO.	ROLL NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE INVENTORIED
			LENGTH (FT)	WIDTH (FT)	THICKNESS OR WEIGHT			
1	FS1-200E-10-00-FA-ON	131558788	200	14.5	200-10-00	Y		1/3/2019
2	FS1-200E-10-00-FA-ON	131558789	200	14.5	200-10-00	Y		1/3/2019
3	FS1-200E-10-00-FA-ON	131558790	200	14.5	200-10-00	Y		1/3/2019
4	FS1-200E-10-00-FA-ON	131558791	200	14.5	200-10-00	Y		1/3/2019
5	FS1-200E-10-00-FA-ON	131558816	200	14.5	200-10-00	Y		1/3/2019
6	FS1-200E-10-00-FA-ON	131558826	200	14.5	200-10-00	Y		1/3/2019
7	FS1-200E-10-00-FA-ON	131558939	200	14.5	200-10-00	Y	Y	1/3/2019
8	FS1-200E-10-00-FA-ON	131561286	200	14.5	200-10-00	Y		1/3/2019
9	FS1-200E-10-00-FA-ON	131561287	200	14.5	200-10-00	Y		1/3/2019
10	FS1-200E-10-00-FA-ON	131561288	200	14.5	200-10-00	Y		1/3/2019
11	FS1-200E-10-00-FA-ON	131561289	200	14.5	200-10-00	Y		1/3/2019
12	FS1-200E-10-00-FA-ON	131561290	200	14.5	200-10-00	Y		1/3/2019
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APPENDIX C

Cell 1B Liner Installation Documentation

C.5. Geotextile Inventory Control Log

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GEOTEXTILE INVENTORY CONTROL LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	1053018
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS
PROJECT LOCATION:	Euncie, New Mexico	**SHEET NUMBER:**	1
MATERIAL TYPE:	Geotextile	**DATE OF INVENTORY:**	See Below
MATERIAL IDENTIFICATION:	Solmax GSE	**INVENTORY MONITOR:**	Don Gray
MATERIAL MANUFACTURER:	GSE	**UNLOADING METHOD:**	Forklift

	ROLL NUMBER	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE OF INVENTORY
			LENGTH (FT)	WIDTH (FT)	AREA (FT^2)			
1	2024872579	GEO-100E-EBC-E-005	300.0	15.0	45000.0	Y		3/16/2018
2	2024874181	GEO-100E-EBC-E-005	300.0	15.0	45000.0	Y		3/16/2018
3	2025468016	GEO-100E-EBC-E-005	300.0	15.0	45001.0	Y		4/23/2018
4	2025704014	GEO-100E-EBC-E-005	300.0	15.0	45002.0	Y		9/20/2018
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APPENDIX C

Cell 1B Liner Installation Documentation

C.6. Leachate Pipe and Riser Pipe Inventory Control Log

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LEACHATE COLLECTION AND RISER PIPE INVENTORY CONTROL LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	EW
PROJECT LOCATION:	Euncie, New Mexico	**SHEET NUMBER:**	1
MATERIAL TYPE:	Pipe Inventory	**DATE OF INVENTORY:**	See Below
MATERIAL IDENTIFICATION:	See Below	**INVENTORY MONITOR:**	Don Gray
MATERIAL MANUFACTURER:	See Below	**UNLOADING METHOD:**	Forklift

	TYPE	QUANTITY	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	TOTAL LENGTH	DATE OF INVENTORY
			LENGTH (FT)	DIAM. (IN)	PIPE SDR			
1	Solid HDPE	3	40.0	6.0	11.0	N	120	01/07/19
2	Perforated HDPE	24	40.0	6.0	11.0	N	960	01/07/19
3	End Cap	1	NA	6.0	11.0	N	NA	01/07/19
4	Tee	1	NA	6.0	11.0	N	NA	01/07/19
5	HDPE Blind Flange 1" Thick	1	NA	6.0	11.0	N	NA	01/07/19
6	Stainless Steel Bolts	8	NA	4.0	NA	N	NA	01/07/19
7	Stainless Steel Nuts	8	NA	0.8	NA	N	NA	01/07/19
8	Stainless Steel Flat Washers	16	NA	0.8	NA	N	NA	01/07/19
9	Stainless Steel Backup Ring	1	NA	4.0	7.0	N	NA	01/07/19
10	Neoprene Gasket	1	NA	4.0	7.0	N	NA	01/07/19
11	SCH 80 PVC Cap	1	NA	6.0	11.0	N	NA	01/07/19
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APPENDIX C

Cell 1B Liner Installation Documentation

C.7. GCL Deployment Log

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GCL DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	1

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
B33	502322623	150	15.5	2,325.0	1/4/2019
B34	502322624	150	15.5	2,325.0	1/4/2019
B35	502322622	150	15.5	2,325.0	1/4/2019
B33a	502322550	149	15.5	2,309.5	1/4/2019
B34a	502322618	148	15.5	2,294.0	1/4/2019
B35a	502322671	148	15.5	2,294.0	1/4/2019
B33b	502322625	149	15.5	2,309.5	1/4/2019
B34b	502322626	148	15.5	2,294.0	1/4/2019
B35b	502322551	149	15.5	2,309.5	1/4/2019
B33c	502322627	141	15.5	2,185.5	1/4/2019
B34d	502322627	9	15.5	139.5	1/4/2019
B34c	502322663	135	15.5	2,092.5	1/4/2019
B35c	502322663	12	15.5	186.0	1/4/2019
B35d	502322669	132	15.5	2,046.0	1/4/2019
B36	502322664	149	15.5	2,309.5	1/4/2019
B37	502322670	148	15.5	2,294.0	1/4/2019
B38	502322650	150	15.5	2,325.0	1/4/2019
B36a	502322552	149	15.5	2,309.5	1/4/2019
B37a	502322658	147	15.5	2,278.5	1/4/2019
B38a	502322656	149	15.5	2,309.5	1/4/2019
B36b	502322657	148	15.5	2,294.0	1/4/2019
B37b	502322655	148	15.5	2,294.0	1/4/2019
B38b	502322668	149	15.5	2,309.5	1/4/2019
B36c	502322662	126	15.5	1,953.0	1/4/2019
B36d	502322669	17	15.5	263.5	1/4/2019
B37c	502322662	23	15.5	356.5	1/4/2019
B37d	502322661	121	15.5	1,875.5	1/4/2019
B38c	502322661	26	15.5	403.0	1/4/2019
B38d	502322667	117	15.5	1,813.5	1/4/2019
B39	502322666	149	15.5	2,309.5	1/4/2019
B40	502322660	150	15.5	2,325.0	1/4/2019
B41	502322665	150	15.5	2,325.0	1/4/2019
B39a	502322659	150	15.5	2,325.0	1/4/2019
B40a	502322590	148	15.5	2,294.0	1/4/2019
B41a	502322573	149	15.5	2,309.5	1/4/2019
B39b	502322589	149	15.5	2,309.5	1/4/2019
B40b	502322572	149	15.5	2,309.5	1/4/2019
TOTAL LINER PLACED (FT^2):				73,330.5	

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GCL DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	2

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
B41b	502322597	150	15.5	2,325.0	1/4/2019
B39c	502322571	114	15.5	1,767.0	1/4/2019
B39d	502322667	32	15.5	496.0	1/4/2019
B40c	502322571	34	15.5	527.0	1/4/2019
B40d	502322577	109	15.5	1,689.5	1/4/2019
B41c	502322577	38	15.5	589.0	1/4/2019
B41d	502322595	104	15.5	1,612.0	1/4/2019
B42	502322596	150	15.5	2,325.0	1/5/2019
B43	502322576	150	15.5	2,325.0	1/5/2019
B44	502322592	150	15.5	2,325.0	1/5/2019
B42a	502322644	149	15.5	2,309.5	1/5/2019
B43a	502322646	149	15.5	2,309.5	1/5/2019
B44a	502322620	148	15.5	2,294.0	1/5/2019
B42b	502322578	149	15.5	2,309.5	1/5/2019
B43b	502322591	148	15.5	2,294.0	1/5/2019
B44b	502322619	149	15.5	2,309.5	1/5/2019
B42c	502322574	100	15.5	1,550.0	1/5/2019
B42d	502322595	43	15.5	666.5	1/5/2019
B43c	502322574	49	15.5	759.5	1/5/2019
B43d	502322649	95	15.5	1,472.5	1/5/2019
B44c	502322649	53	15.5	821.5	1/5/2019
B44d	502322645	91	15.5	1,410.5	1/5/2019
B45	502322570	148	15.5	2,294.0	1/5/2019
B46	502322628	149	15.5	2,309.5	1/5/2019
B47	502322647	150	15.5	2,325.0	1/5/2019
B45a	502322648	149	15.5	2,309.5	1/5/2019
B46a	502322621	149	15.5	2,309.5	1/5/2019
B47a	502322569	149	15.5	2,309.5	1/5/2019
B45b	502322584	149	15.5	2,309.5	1/5/2019
B46b	502322582	148	15.5	2,294.0	1/5/2019
B47b	502322643	149	15.5	2,309.5	1/5/2019
B45c	502322581	86	15.5	1,333.0	1/5/2019
B45d	502322645	58	15.5	899.0	1/5/2019
B46c	502322581	63	15.5	976.5	1/5/2019
B46d	502322583	81	15.5	1,255.5	1/5/2019
B47c	502322583	68	15.5	1,054.0	1/5/2019
B47d	502322587	77	15.5	1,193.5	1/5/2019
TOTAL LINER PLACED (FT^2):				63,968.5	

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GCL DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	3

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
B48	502322588	149	15.5	2,309.5	1/5/2019
B49	502322565	149	15.5	2,309.5	1/5/2019
B50	502322615	150	15.5	2,325.0	1/5/2019
B48a	502322641	149	15.5	2,309.5	1/5/2019
B49a	502322642	148	15.5	2,294.0	1/5/2019
B50a	502322640	149	15.5	2,309.5	1/5/2019
B48b	502322611	149	15.5	2,309.5	1/5/2019
B49b	502322609	148	15.5	2,294.0	1/5/2019
B50b	502322600	149	15.5	2,309.5	1/5/2019
B48c	502322610	71	15.5	1,100.5	1/5/2019
B48d	502322587	72	15.5	1,116.0	1/5/2019
B49c	502322610	76	15.5	1,178.0	1/5/2019
B49d	502322616	68	15.5	1,054.0	1/5/2019
B50c	502322616	81	15.5	1,255.5	1/5/2019
B50d	502322617	62	15.5	961.0	1/5/2019
B51	502322602	150	15.5	2,325.0	1/5/2019
B51a	502322613	148	15.5	2,294.0	1/5/2019
B51b	502322603	149	15.5	2,309.5	1/5/2019
B51c	502322614	57	15.5	883.5	1/5/2019
B51d	502322617	86	15.5	1,333.0	1/5/2019
B52	502322604	150	15.5	2,325.0	1/7/2019
B53	502322593	149	15.5	2,309.5	1/7/2019
B54	502322594	150	15.5	2,325.0	1/7/2019
B52a	502322612	149	15.5	2,309.5	1/7/2019
B53a	502322575	149	15.5	2,309.5	1/7/2019
B54a	502322607	149	15.5	2,309.5	1/7/2019
B52b	502322608	150	15.5	2,325.0	1/7/2019
B53b	502322605	149	15.5	2,309.5	1/7/2019
B54b	502322606	149	15.5	2,309.5	1/7/2019
B52c	502322614	89	15.5	1,379.5	1/7/2019
B52d	502322601	55	15.5	852.5	1/7/2019
B53c	502322601	93	15.5	1,441.5	1/7/2019
B53d	502322599	50	15.5	775.0	1/7/2019
B54c	502322599	98	15.5	1,519.0	1/7/2019
B54d	502322563	46	15.5	713.0	1/7/2019
B55	502322566	150	15.5	2,325.0	1/7/2019
B56	502322564	149	15.5	2,309.5	1/7/2019
TOTAL LINER PLACED (FT^2):				68,727.0	

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GCL DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	4

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
B57	502322567	149	15.5	2,309.5	1/7/2019
B55a	502322568	149	15.5	2,309.5	1/7/2019
B56a	502322631	149	15.5	2,309.5	1/7/2019
B57a	502322632	149	15.5	2,309.5	1/7/2019
B55b	502322630	148	15.5	2,294.0	1/7/2019
B56b	502322629	149	15.5	2,309.5	1/7/2019
B57b	502322636	150	15.5	2,325.0	1/7/2019
B55c	502322635	41	15.5	635.5	1/7/2019
B55d	502322563	103	15.5	1,596.5	1/7/2019
B56c	502322635	107	15.5	1,658.5	1/7/2019
B56d	502322654	37	15.5	573.5	1/7/2019
B57c	502322654	111	15.5	1,720.5	1/7/2019
B57d	502322639	33	15.5	511.5	1/7/2019
B58	502322653	150	15.5	2,325.0	1/7/2019
B58a	502322651	150	15.5	2,325.0	1/7/2019
B58b	502322652	150	15.5	2,325.0	1/7/2019
B58c	502322638	30	15.5	465.0	1/7/2019
B58d	502322639	116	15.5	1,798.0	1/7/2019
B59	502322633	150	15.5	2,325.0	1/8/2019
B60	502322637	149	15.5	2,309.5	1/8/2019
B61	502322634	150	15.5	2,325.0	1/8/2019
B59a	502322558	149	15.5	2,309.5	1/8/2019
B60a	502322561	149	15.5	2,309.5	1/8/2019
B61a	502322553	149	15.5	2,309.5	1/8/2019
B59b	502322560	149	15.5	2,309.5	1/8/2019
B60b	502322554	148	15.5	2,294.0	1/8/2019
B61b	502322559	149	15.5	2,309.5	1/8/2019
B59c	502322638	119	15.5	1,844.5	1/8/2019
B59d	502322585	26	15.5	403.0	1/8/2019
B60c	502322585	122	15.5	1,891.0	1/8/2019
B60d	502322579	22	15.5	341.0	1/8/2019
B61c	502322579	126	15.5	1,953.0	1/8/2019
B61d	502322586	18	15.5	279.0	1/8/2019
B62	502322580	149	15.5	2,309.5	1/16/2019
B63	502322562	149	15.5	2,309.5	1/16/2019
B64	502322555	150	15.5	2,325.0	1/16/2019
B62a	502328879	148	15.5	2,294.0	1/16/2019
TOTAL LINER PLACED (FT^2):				68,851.0	

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GCL DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	5

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
B63a	502322549	149	15.5	2,309.5	1/16/2019
B64a	502322557	145	15.5	2,247.5	1/16/2019
B62b	502322556	149	15.5	2,309.5	1/16/2019
B63b	502328883	149	15.5	2,309.5	1/16/2019
B64b	502328871	148	15.5	2,294.0	1/16/2019
B62c	502328888	142	15.5	2,201.0	1/16/2019
B63d	502328888	6	15.5	93.0	1/16/2019
B63c	502328887	138	15.5	2,139.0	1/16/2019
B64d	502328887	10	15.5	155.0	1/16/2019
B64c	502328886	140	15.5	2,170.0	1/16/2019
B65e	502328886	8	15.5	124.0	1/16/2019
B65	502322586	132	15.5	2,046.0	1/16/2019
B65a	502328867	148	15.5	2,294.0	1/16/2019
B66	502328911	149	7	1,043.0	1/16/2019
B66a	502328911	149	7	1,043.0	1/16/2019
B65b	502328917	148	15.5	2,294.0	1/16/2019
B65c	502328880	149	15.5	2,309.5	1/16/2019
B65d	502328882	10	15.5	155.0	1/16/2019
TOTAL LINER PLACED (FT^2):				29,536.5	

APPENDIX C

Cell 1B Liner Installation Documentation

C.8. Secondary FML Deployment Log

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FML DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Suncance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	1
DEPLOYMENT LOCATION:	Secondary	**MONITOR:**	DG

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
B23a	103216950	503	22.5	11,317.5	1/4/2019
B24a	103216950	56	22.5	1,260.0	1/4/2019
B24b	108197899	447	22.5	10,057.5	1/4/2019
B23	108198937	94	22.5	2,115.0	1/4/2019
B24	108198937	93	22.5	2,092.5	1/4/2019
B25b	108197899	108	22.5	2,430.0	1/4/2019
B25a	103216960	393	22.5	8,842.5	1/4/2019
B26a	103216960	164	22.5	3,690.0	1/4/2019
B26b	103216964	338	22.5	7,605.0	1/4/2019
B25	108198937	94	22.5	2,115.0	1/4/2019
B26	108198937	94	22.5	2,115.0	1/4/2019
B27b	103216964	23	22.5	517.5	1/4/2019
B27a	103216947	287	22.5	6,457.5	1/4/2019
B28c	103216947	271	22.5	6,097.5	1/4/2019
B28b	108197874	228	22.5	5,130.0	1/4/2019
B27	108198937	95	22.5	2,137.5	1/4/2019
B28a	108198937	46	22.5	1,035.0	1/4/2019
B28	108198934	53	22.5	1,192.5	1/4/2019
B29b	108197874	320	22.5	7,200.0	1/5/2019
B29a	103216962	177	22.5	3,982.5	1/5/2019
B30b	103216962	383	22.5	8,617.5	1/5/2019
B30a	103216959	113	22.5	2,542.5	1/5/2019
B29	108198934	97	22.5	2,182.5	1/5/2019
B30	108198934	98	22.5	2,205.0	1/5/2019
B31b	103216959	446	22.5	10,035.0	1/5/2019
B31a	103216973	50	22.5	1,125.0	1/5/2019
B32a	103216973	496	22.5	11,160.0	1/5/2019
B31	108198934	98	22.5	2,205.0	1/5/2019
B32	108198934	99	22.5	2,227.5	1/5/2019
B33b	103216971	490	22.5	11,025.0	1/5/2019
B34b	103216971	66	22.5	1,485.0	1/5/2019
B34a	103216958	426	22.5	9,585.0	1/5/2019
B33a	108198934	67	22.5	1,507.5	1/5/2019
B33	108198939	35	22.5	787.5	1/5/2019
B34	108198939	103	22.5	2,317.5	1/5/2019
B35b	103216958	134	22.5	3,015.0	1/5/2019
B35a	103216954	359	22.5	8,077.5	1/5/2019
TOTAL LINER PLACED (FT^2):				167,490.0	

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FML DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Suncance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	2
DEPLOYMENT LOCATION:	Secondary	**MONITOR:**	DG

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
B35	108198939	102	22.5	2,295.0	1/5/2019
B36c	103216954	200	22.5	4,500.0	1/7/2019
B36b	108197891	75	22.5	1,687.5	1/7/2019
B36a	103216948	217	22.5	4,882.5	1/7/2019
B37b	103216948	344	22.5	7,740.0	1/7/2019
B37a	108197872	148	22.5	3,330.0	1/7/2019
B36	108198939	104	22.5	2,340.0	1/7/2019
B37	108198939	106	22.5	2,385.0	1/7/2019
B38c	108197872	410	22.5	9,225.0	1/7/2019
B38b	103216957	83	22.5	1,867.5	1/7/2019
B39a	103216957	477	22.5	10,732.5	1/7/2019
B38a	108198939	61	22.5	1,372.5	1/7/2019
B38	108198936	47	22.5	1,057.5	1/7/2019
B39	108198936	116	22.5	2,610.0	1/7/2019
B40a	103216975	484	22.5	10,890.0	1/7/2019
B40	108198936	106	22.5	2,385.0	1/7/2019
B41b	103216975	72	22.5	1,620.0	1/8/2019
B41a	103216949	415	22.5	9,337.5	1/8/2019
B42b	103216949	145	22.5	3,262.5	1/8/2019
B42a	103216946	342	22.5	7,695.0	1/8/2019
B41	108198936	109	22.5	2,452.5	1/8/2019
B42	108198936	110	22.5	2,475.0	1/8/2019
B43a	108197884	319	22.5	7,177.5	1/16/2019
B43	102191320	273	22.5	6,142.5	1/16/2019
B44	102191320	150	22.5	3,375.0	1/16/2019
B44a	104192275	446	22.5	10,035.0	1/16/2019
B45	104192275	50	22.5	1,125.0	1/16/2019
B45a	104192273	510	22.5	11,475.0	1/16/2019
B45b	108198935	37	22.5	832.5	1/16/2019
B46	108198935	91	11	1,001.0	1/16/2019
B46a	108198935	101	11	1,111.0	1/16/2019
B46b	108198935	101	11	1,111.0	1/16/2019
B46c	108198935	102	11	1,122.0	1/16/2019
B46d	108198935	102	11	1,122.0	1/16/2019
B46e	108198935	102	11	1,122.0	1/16/2019
TOTAL LINER PLACED (FT^2):				142,894.0	

APPENDIX C

Cell 1B Liner Installation Documentation

C.9. Secondary and Primary FML Pre-Weld Qualification Test Logs

GORDON ENVIRONMENTAL PSC

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FML TRIAL SEAMING TEST LOG

PROJECT NAME: Sundance West Landfill Cell 1B
OWNER: Sundance West, Inc.
PROJECT LOCATION: Euncie, NM
PROJECT NUMBER: 01053018.00
CONTRACTOR: SLS, Inc.
SHEET NUMBER: 1

PROJECT SPECIFICATIONS

FUSION	TEXTURED:	PEEL	91 lbs/in	SHEAR	120 lbs/in
	SMOOTH:	PEEL	91 lbs/in	SHEAR	120 lbs/in
EXTRUSION	TEXTURED:	PEEL	78 lbs/in	SHEAR	120 lbs/in
	SMOOTH:	PEEL	78 lbs/in	SHEAR	120 lbs/in

DATE	TIME	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		EXTRUSION WELDS		PULL	FIELD TEST RESULTS				
					Temperature	Speed	Barrel Temp	Pre-Heat Temp		Test #1	Test #2	Test #3	Test #4	Test #5
1/4/2019	6:45 AM	GB	UM	1	805	6.5			P	144	152	148		
									P	133	165	155		
									S	210	211	209		
1/4/2019	6:55 AM	GB	DS	69	805	6.5			P	139	147	166		
									P	140	143	141		
									S	190	189	195		
1/4/2019	7:05 AM	GB	GZ	7	805	6.5			P	149	122	156		
									P	144	162	159		
									S	194	184	191		
1/4/2019	7:15 AM	GB	LY	1			510	410	P	135	115	110		
									S	177	168	175		
1/4/2019	1:00 PM	GB	UM	1	805	7.0			P	134	131	134		
									P	110	124	125		
									S	167	163	162		
1/4/2019	1:10 PM	GB	DS	69	805	7.5			P	124	108	129		
									P	123	122	125		
									S	158	164	166		
1/4/2019	1:20 PM	GB	GZ	7	805	7.5			P	136	123	138		
									P	131	126	129		
									S	160	158	161		
1/4/2019	1:30 PM	GB	LY	1			510	410	P	114	126	136		
									S	164	159	162		
1/5/2019	6:25 AM	GB	UM	1	805	6.5			P	154	128	130		
									P	128	142	140		
									S	173	185	181		

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FML TRIAL SEAMING TEST LOG

PROJECT NAME: Sundance West Landfill Cell 1B
OWNER: Sundance West, Inc.
PROJECT LOCATION: Euncie, NM
PROJECT NUMBER: 01053018.00
CONTRACTOR: SLS, Inc.
SHEET NUMBER: 2

PROJECT SPECIFICATIONS

FUSION	TEXTURED:	PEEL	91 lbs/in	SHEAR	120 lbs/in
	SMOOTH:	PEEL	91 lbs/in	SHEAR	120 lbs/in
EXTRUSION	TEXTURED:	PEEL	78 lbs/in	SHEAR	120 lbs/in
	SMOOTH:	PEEL	78 lbs/in	SHEAR	120 lbs/in

DATE	TIME	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		EXTRUSION WELDS		PULL	FIELD TEST RESULTS				
					Temperature	Speed	Barrel Temp	Pre-Heat Temp		Test #1	Test #2	Test #3	Test #4	Test #5
1/5/2019	6:35 AM	GB	DS	69	805	6.5			P	134	136	151		
									P	138	140	155		
									S	178	172	179		
1/5/2019	6:45 AM	GB	LY	7	805	6.5			P	137	145	154		
									P	144	131	138		
									S	181	189	187		
1/5/2019	6:55 AM	GB	GZ	8			520	415	P	138	115	100		
									S	181	180	186		
1/5/2019	12:00 PM	GB	UM	1	805	7.5			P	117	122	119		
									P	114	113	110		
									S	165	174	176		
1/5/2019	12:10 PM	GB	DS	69	805	7.5			P	143	116	111		
									P	121	136	112		
									S	163	165	163		
1/5/2019	12:20 PM	GB	LY	7	805	7.5			P	120	117	123		
									P	118	127	121		
									S	164	166	162		
1/5/2019	12:30 PM	GB	GZ	8			510	405	P	104	124	107		
									S	160	155	163		
1/7/2019	6:20 AM	GB	UM	1	805	6.5			P	146	125	133		
									P	135	143	140		
									S	172	168	170		
1/7/2019	6:30 AM	GB	DS	69	805	6.5			P	127	131	130		
									P	129	137	144		
									S	176	184	180		

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FML TRIAL SEAMING TEST LOG

PROJECT NAME: Sundance West Landfill Cell 1B
OWNER: Sundance West, Inc.
PROJECT LOCATION: Euncie, NM
PROJECT NUMBER: 01053018.00
CONTRACTOR: SLS, Inc.
SHEET NUMBER: 3

PROJECT SPECIFICATIONS

FUSION	TEXTURED:	PEEL	91 lbs/in	SHEAR	120 lbs/in
	SMOOTH:	PEEL	91 lbs/in	SHEAR	120 lbs/in
EXTRUSION	TEXTURED:	PEEL	78 lbs/in	SHEAR	120 lbs/in
	SMOOTH:	PEEL	78 lbs/in	SHEAR	120 lbs/in

DATE	TIME	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		EXTRUSION WELDS		PULL	FIELD TEST RESULTS				
					Temperature	Speed	Barrel Temp	Pre-Heat Temp		Test #1	Test #2	Test #3	Test #4	Test #5
1/7/2019	6:40 AM	GB	MM	7	805	6.5			P	137	148	142		
									P	131	137	129		
									S	171	173	174		
1/7/2019	6:50 AM	GB	LY	1			510	410	P	110	106	104		
									S	166	163	161		
1/7/2019	12:50 PM	GB	LY	1			510	410	P	110	117	129		
									S	147	143	149		
1/8/2019	6:05 AM	GB	UM	1	805	6.5			P	132	147	134		
									P	139	138	134		
									S	165	172	179		
1/8/2019	6:10 AM	GB	DS	69	805	6.5			P	133	128	129		
									P	131	140	132		
									S	170	171	172		
1/8/2019	6:20 AM	GB	GZ	7	805	6.5			P	139	137	147		
									P	131	141	132		
									S	176	168	188		
1/8/2019	6:30 AM	GB	MM	1			510	410	P	102	111	105		
									S	150	156	151		
1/9/2019	6:30 AM	GB	UM	1	805	6.5			P	127	133	141		
									P	151	139	142		
									S	181	189	190		
1/9/2019	6:40 AM	GB	DS	69	805	6.5			P	141	126	141		
									P	131	126	131		
									S	174	183	188		

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FML TRIAL SEAMING TEST LOG

PROJECT NAME: Sundance West Landfill Cell 1B
OWNER: Sundance West, Inc.
PROJECT LOCATION: Euncie, NM
PROJECT NUMBER: 01053018.00
CONTRACTOR: SLS, Inc.
SHEET NUMBER: 4

PROJECT SPECIFICATIONS

FUSION	TEXTURED:	PEEL	91 lbs/in	SHEAR	120 lbs/in
	SMOOTH:	PEEL	91 lbs/in	SHEAR	120 lbs/in
EXTRUSION	TEXTURED:	PEEL	78 lbs/in	SHEAR	120 lbs/in
	SMOOTH:	PEEL	78 lbs/in	SHEAR	120 lbs/in

DATE	TIME	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		EXTRUSION WELDS		PULL	FIELD TEST RESULTS				
					Temperature	Speed	Barrel Temp	Pre-Heat Temp		Test #1	Test #2	Test #3	Test #4	Test #5
1/9/2019	6:50 AM	GB	LY	7	805	6.5			P	142	143	136		
									P	125	124	145		
									S	181	178	175		
1/9/2019	7:00 AM	GB	GZ	1			515	410	P	120	110	127		
									S	177	180	181		
1/10/2019	6:20 AM	GB	UM	1	805	6.5			P	138	118	136		
									P	142	151	140		
									S	182	181	183		
1/10/2019	6:30 AM	GB	DS	69	805	6.5			P	141	146	145		
									P	137	133	140		
									S	180	186	188		
1/10/2019	6:40 AM	GB	MM	7	805	6.5			P	139	132	133		
									P	160	148	129		
									S	176	178	175		
1/10/2019	6:50 AM	GB	LY	3			515	410	P	103	99	113		
									S	166	168	171		
1/10/2019	12:55 PM	GB	UM	1	805	7.0			P	120	117	123		
									P	125	129	117		
									S	151	150	152		
1/10/2019	1:05 PM	GB	DS	69	805	7.0			P	122	123	124		
									P	124	120	120		
									S	144	148	151		
1/10/2019	1:15 PM	GB	MM	7	805	7.0			P	135	130	125		
									P	131	130	141		
									S	159	155	156		

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FML TRIAL SEAMING TEST LOG

PROJECT NAME: Sundance West Landfill Cell 1B
OWNER: Sundance West, Inc.
PROJECT LOCATION: Euncie, NM
PROJECT NUMBER: 01053018.00
CONTRACTOR: SLS, Inc.
SHEET NUMBER: 5

PROJECT SPECIFICATIONS

FUSION	TEXTURED:	PEEL	91 lbs/in	SHEAR	120 lbs/in
	SMOOTH:	PEEL	91 lbs/in	SHEAR	120 lbs/in
EXTRUSION	TEXTURED:	PEEL	78 lbs/in	SHEAR	120 lbs/in
	SMOOTH:	PEEL	78 lbs/in	SHEAR	120 lbs/in

DATE	TIME	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		EXTRUSION WELDS		PULL	FIELD TEST RESULTS				
					Temperature	Speed	Barrel Temp	Pre-Heat Temp		Test #1	Test #2	Test #3	Test #4	Test #5
1/10/2019	1:25 PM	GB	LY	3			515	410	P	113	126	127		
									S	147	149	148		
1/12/2019	6:25 AM	GB	UM	1	805	6.5			P	141	141	141		
									P	136	149	136		
									S	174	177	180		
1/12/2019	6:35 AM	GB	DS	69	805	6.5			P	147	150	133		
									P	137	139	132		
									S	170	175	182		
1/12/2019	6:45 AM	GB	GZ	7	805	6.0			P	144	134	146		
									P	137	142	149		
									S	170	172	172		
1/12/2019	6:55 AM	GB	MM	7			520	415	P	116	114	108		
									S	161	165	164		
1/12/2019	11:00 AM	GB	GZ	3			515	410	P	112	106	111		
									S	171	180	174		
1/12/2019	12:40 PM	GB	MM	2			520	410	P	121	118	112		
									S	159	164	162		
1/12/2019	12:50 PM	GB	GZ	3			515	410	P	109	122	114		
									S	165	162	168		
1/13/2019	6:30 AM	GB	UM	1	805	6.5			P	133	144	142		
									P	145	141	127		
									S	160	161	160		

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FML TRIAL SEAMING TEST LOG

PROJECT NAME: Sundance West Landfill Cell 1B
OWNER: Sundance West, Inc.
PROJECT LOCATION: Euncie, NM
PROJECT NUMBER: 01053018.00
CONTRACTOR: SLS, Inc.
SHEET NUMBER: 6

PROJECT SPECIFICATIONS

FUSION	TEXTURED:	PEEL	91 lbs/in	SHEAR	120 lbs/in
	SMOOTH:	PEEL	91 lbs/in	SHEAR	120 lbs/in
EXTRUSION	TEXTURED:	PEEL	78 lbs/in	SHEAR	120 lbs/in
	SMOOTH:	PEEL	78 lbs/in	SHEAR	120 lbs/in

DATE	TIME	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		EXTRUSION WELDS		PULL	FIELD TEST RESULTS				
					Temperature	Speed	Barrel Temp	Pre-Heat Temp		Test #1	Test #2	Test #3	Test #4	Test #5
1/13/2019	6:40 AM	GB	DS	69	805	6.5			P	140	131	139		
									P	135	140	132		
									S	172	180	182		
1/13/2019	6:50 AM	GB	LY	7	805	6.5			P	134	137	151		
									P	150	150	140		
									S	171	178	180		
1/13/2019	7:00 AM	GB	GZ	8			520	415	P	125	130	117		
									S	173	169	175		
1/13/2019	12:40 PM	GB	UM	1	805	7.0			P	121	118	129		
									P	128	124	117		
									S	169	174	171		
1/13/2019	12:50 PM	GB	GZ	8			520	415	P	129	131	115		
									S	162	172	171		
1/14/2019	6:30 AM	GB	LY	8			520	415	P	120	114	118		
									S	159	153	156		
1/16/2019	6:20 AM	GB	UM	1	805	6.5			P	131	129	129		
									P	135	127	125		
									S	160	163	167		
1/16/2019	6:30 AM	GB	DS	69	805	6.5			P	146	133	134		
									P	159	128	136		
									S	166	170	177		
1/16/2019	6:40 AM	GB	GZ	7	805	6.5			P	130	130	145		
									P	133	136	139		
									S	175	176	179		

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FML TRIAL SEAMING TEST LOG

PROJECT NAME: Sundance West Landfill Cell 1B
OWNER: Sundance West, Inc.
PROJECT LOCATION: Euncie, NM
PROJECT NUMBER: 01053018.00
CONTRACTOR: SLS, Inc.
SHEET NUMBER: 7

PROJECT SPECIFICATIONS

FUSION	TEXTURED:	PEEL	91 lbs/in	SHEAR	120 lbs/in
	SMOOTH:	PEEL	91 lbs/in	SHEAR	120 lbs/in
EXTRUSION	TEXTURED:	PEEL	78 lbs/in	SHEAR	120 lbs/in
	SMOOTH:	PEEL	78 lbs/in	SHEAR	120 lbs/in

DATE	TIME	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		EXTRUSION WELDS		PULL	FIELD TEST RESULTS				
					Temperature	Speed	Barrel Temp	Pre-Heat Temp		Test #1	Test #2	Test #3	Test #4	Test #5
1/16/2019	6:50 AM	GB	MM	8			520	415	P	117	103	116		
									S	169	166	168		
1/16/2019	12:50 PM	GB	UM	1	805	7.0			P	129	145	122		
									P	147	148	142		
									S	174	176	188		
1/16/2019	1:00 PM	GB	DS	69	805	7.5			P	124	137	125		
									P	127	136	128		
									S	157	161	162		
1/16/2019	1:10 PM	GB	GZ	7	805	7.0			P	143	137	147		
									P	142	145	146		
									S	173	171	174		
1/16/2019	1:20 PM	GB	MM	8			520	415	P	116	109	118		
									S	163	168	161		
1/17/2019	6:30 AM	GB	UM	1	805	6.5			P	160	143	165		
									P	169	162	157		
									S	224	210	209		
1/17/2019	6:50 AM	GB	LY	7	805	6.5			P	143	145	158		
									P	151	156	157		
									S	192	205	200		
1/17/2019	7:00 AM	GB	GZ	8			520	415	P	137	122	120		
									S	207	194	198		
1/17/2019	7:10 AM	GB	DS	69	805	6.5			P	131	140	147		
									P	136	135	149		
									S	182	190	187		

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FML TRIAL SEAMING TEST LOG

PROJECT NAME: Sundance West Landfill Cell 1B
OWNER: Sundance West, Inc.
PROJECT LOCATION: Euncie, NM
PROJECT NUMBER: 01053018.00
CONTRACTOR: SLS, Inc.
SHEET NUMBER: 8

PROJECT SPECIFICATIONS

FUSION	TEXTURED:	PEEL	91 lbs/in	SHEAR	120 lbs/in
	SMOOTH:	PEEL	91 lbs/in	SHEAR	120 lbs/in
EXTRUSION	TEXTURED:	PEEL	78 lbs/in	SHEAR	120 lbs/in
	SMOOTH:	PEEL	78 lbs/in	SHEAR	120 lbs/in

DATE	TIME	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		EXTRUSION WELDS		PULL	FIELD TEST RESULTS				
					Temperature	Speed	Barrel Temp	Pre-Heat Temp		Test #1	Test #2	Test #3	Test #4	Test #5
1/17/2019	12:50 PM	GB	UM	1	805	6.5			P	127	131	126		
									P	122	141	130		
									S	169	171	179		
1/17/2019	1:00 PM	GB	DS	69	805	7.0			P	139	146	144		
									P	135	132	128		
									S	161	168	165		
1/17/2019	1:10 PM	GB	LY	7	805	7.0			P	125	123	119		
									P	126	128	108		
									S	162	166	164		
1/17/2019	1:20 PM	GB	GZ	8			520	415	P	126	131	137		
									S	166	169	168		
1/17/2019	2:30 PM	GB	LY	3			520	410	P	131	120	115		
									S	161	168	162		

APPENDIX C

Cell 1B Liner Installation Documentation

C.10. Secondary FML Seaming Log

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FML SEAMING LOG

PROJECT NAME: Sundance West Landfill Cell 1B
OWNER: Sundance West, Inc.
PROJECT LOCATION: Eunice, NM
PROJECT NUMBER: 01053018.00
CONTRACTOR: SLS, Inc
SHEET NUMBER: 1

SEAMING LOCATION: Secondary

	DATE	PANEL #/PANEL #	APPROX. LENGTH WELDED	START TIME	SEAMER INITIALS	MACHINE #	TEMP SETTING	SPEED SETTING	DESTRUCTIVE TEST	MONITORED BY
1	1/4/2019	B22/22a/22b-B23/23a	597	8:25 AM	UM	1	805	6.5	SDT-32	BSB
2	1/4/2019	B23/B23a	22	9:00 AM	GZ	7	805	6.5		BSB
3	1/4/2019	B23/23a-B24/24a/24b	596	8:36 AM	DS	69	805	6.5	SDT-33 & 34	BSB
4	1/4/2019	B24-B24a	22	9:10 AM	GZ	7	805	6.5		BSB
5	1/4/2019	B24a-B24b	22	8:38 AM	GZ	7	805	6.5		BSB
6	1/4/2019	B24/24a/24b-B25/25a/25b	596	10:24 AM	GZ	7	805	6.5	SDT-35	BSB
7	1/4/2019	B25-B25a	22	10:25 AM	UM	1	805	6.5		BSB
8	1/4/2019	B25a-B25b	22	10:17 AM	GZ	7	805	6.5		BSB
9	1/4/2019	B25/25a/25b-B26/26a/26b	595	9:20 AM	DS	69	805	6.5	SDT-36	BSB
10	1/4/2019	B26-B26a	22	10:30 AM	UM	1	805	6.5		BSB
11	1/4/2019	B26a-B26b	22	10:40 AM	UM	1	805	6.5	SDT-57	BSB
12	1/4/2019	B26/26a/26b-B27/27a/27b	595	1:00 PM	UM	1	805	7.5	SDT-37	BSB
13	1/4/2019	B27-B27a	22	1:35 PM	GZ	7	805	7.0	SDT-58	BSB
14	1/4/2019	B27a-B27b	22	12:10 PM	DS	69	805	7.5	SDT-60	BSB
15	1/4/2019	B27/27a/27b-B28/28a/28b/28c	598	12:21 PM	DS	69	805	7.5	SDT-38 & 39	BSB
16	1/4/2019	B28-B28a	22	1:50 PM	GZ	7	805	7.0		BSB
17	1/4/2019	B28a-B28b	22	1:45 PM	GZ	7	805	7.0	SDT-59	BSB
18	1/4/2019	B28b-B28c	529	12:51 PM	DS	69	805	7.5		BSB
19	1/5/2019	B28/28a/28b/28c-B29/29a/29b	598	7:22 AM	UM	1	805	6.5	SDT-40	BSB
20	1/5/2019	B29-B29a	22	8:00 AM	LY	7	805	6.5		BSB
21	1/5/2019	B29a-B29b	22	7:40 AM	LY	7	805	6.5		BSB
22	1/5/2019	B29/29a/29b-B30/30a/30b	594	7:35 AM	DS	69	805	6.5	SDT-41	BSB
23	1/5/2019	B30-B30a	22	8:07 AM	LY	7	805	6.5		BSB
24	1/5/2019	B30a-B30b	22	7:48 AM	LY	7	805	6.5		BSB
25	1/5/2019	B30/30a/30b-B31/31a/31b	280	9:10 AM	UM	1	805	6.5	SDT-61	BSB

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FML SEAMING LOG

PROJECT NAME: Sundance West Landfill Cell 1B
OWNER: Sundance West, Inc.
PROJECT LOCATION: Eunice, NM
PROJECT NUMBER: 01053018.00
CONTRACTOR: SLS, Inc
SHEET NUMBER: 2

SEAMING LOCATION: Secondary

	DATE	PANEL #/PANEL #	APPROX. LENGTH WELDED	START TIME	SEAMER INITIALS	MACHINE #	TEMP SETTING	SPEED SETTING	DESTRUCTIVE TEST	MONITORED BY
1	1/5/2019	B31-B31a	22	9:35 AM	LY	7	805	6.5		BSB
2	1/5/2019	B31a-B31b	22	9:25 AM	LY	7	805	6.5		BSB
3	1/5/2019	B31/31a/31b-B32/B32a	595	9:22 AM	DS	69	805	6.5	SDT-43 & 44	BSB
4	1/5/2019	B32-B32a	22	9:44 AM	LY	7	805	6.5		BSB
5	1/5/2019	B32/32a-B33/33a	595	12:06 PM	UM	1	805	7.5	SDT-45	BSB
6	1/5/2019	B33-B33a	22	12:55 PM	LY	7	805	7.5		BSB
7	1/5/2019	B33/33a/33b-B34/34a/34b	595	12:26 PM	DS	69	805	7.5	SDT-46	BSB
8	1/5/2019	B34-B34a	22	12:45 PM	LY	1	805	7.5		BSB
9	1/5/2019	B34a-B34b	22	12:21 PM	DS	69	805	7.5		BSB
10	1/5/2019	B33a-B33b	22	12:40 PM	LY	7	805	7.5		BSB
11	1/5/2019	B34/34a/34b-B35/35a/35b	595	1:23 PM	LY	7	805	7.5	SDT-57	BSB
12	1/5/2019	B35-B35a	22	1:37 PM	UM	1	805	7.5		BSB
13	1/5/2019	B35a-B35b	22	1:15 PM	LY	7	805	7.5	SDT-58	BSB
14	1/7/2019	B35/35a/35b-B36/36a/36b/36c	596	7:25 AM	UM	1	805	6.5	SDT-60	BSB
15	1/7/2019	B36-B36a	22	8:05 AM	MM	7	805	6.5		BSB
16	1/7/2019	B36a-B36b	22	7:45 AM	MM	7	805	6.5		BSB
17	1/7/2019	B36b-B36c	22	7:32 AM	MM	7	805	6.5	SDT-59	BSB
18	1/7/2019	B36/36a/36b/36c-B37/37a/37b	529	7:40 AM	DS	69	805	6.5		BSB
19	1/7/2019	B37-B37a	22	8:12 AM	MM	79	805	6.5		BSB
20	1/7/2019	B37a-B37b	22	7:55 AM	MM	7	805	6.5		BSB
21	1/7/2019	B37/37a/37b-B38/38a/38b/38c	601	9:10 AM	UM	1	805	6.5	SDT-51	BSB
22	1/7/2019	B38-B38a	22	10:10 AM	MM	7	805	6.5		BSB
23	1/7/2019	B38a-B38b	22	9:58 AM	MM	7	805	6.5		BSB
24	1/7/2019	B38b-B38c	22	9:19 AM	MM	7	805	6.5		BSB
25	1/7/2019	B38/38a/38b/38c-B39/39a	280	9:37 AM	DS	69	805	6.5	SDT-61	BSB

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FML SEAMING LOG

PROJECT NAME: Sundance West Landfill Cell 1B
OWNER: Sundance West, Inc.
PROJECT LOCATION: Eunice, NM
PROJECT NUMBER: 01053018.00
CONTRACTOR: SLS, Inc
SHEET NUMBER: 3

SEAMING LOCATION: Secondary

	DATE	PANEL #/PANEL #	APPROX. LENGTH WELDED	START TIME	SEAMER INITIALS	MACHINE #	TEMP SETTING	SPEED SETTING	DESTRUCTIVE TEST	MONITORED BY
1	1/7/2019	B39-B39a	22	10:06 AM	MM	7	805	6.5		BSB
2	1/7/2019	B39a-B40a	22	10:25 AM	MM	7	805	6.5		BSB
3	1/7/2019	B40-B40a	22	10:52 AM	UM	1	805	6.5		BSB
4	1/7/2019	B40/40a-B39/39a	593	11:00 AM	UM	1	805	6.5	SDT-53 & 54	BSB
5	1/8/2019	B40/40a/40b-B41/41a/41b	596	7:20 AM	UM	1	805	6.5	SDT-55	BSB
6	1/8/2019	B41-B41a	22	7:50 AM	GZ	7	805	6.5		BSB
7	1/8/2019	B41a-B41b	22	7:10 AM	DS	69	805	6.5		BSB
8	1/8/2019	B41/41a/41b-B42/42a/42b	597	7:27 AM	DS	69	805	6.5	SDT-56	BSB
9	1/8/2019	B42-B42a	22	7:55 AM	GZ	7	805	6.5		BSB
10	1/8/2019	B42a-B42b	22	7:35 AM	GZ	7	805	6.5		BSB
11	1/16/2019	B42/42a/42b-B43/43a	592	7:58 AM	UM	1	805	6.5	SDT-57	DG
12	1/16/2019	B43-B43a	22	8:30 AM	GZ	7	805	6.5		DG
13	1/16/2019	B43/43a-B44/44a	44	8:15 AM	DS	69	805	6.5	SDT-58	DG
14	1/16/2019	B44a-B45a/45b	446	10:25 AM	UM	1	805	6.5	SDT-60	DG
15	1/16/2019	B45-B45a	22	10:00 AM	GZ	7	805	6.5		DG
16	1/16/2019	B45a-B45b	22	10:18 AM	UM	1	805	6.5		DG
17	1/16/2019	B44/44a-B45/45a	596	10:25 AM	UM	7	805	6.5	SDT-59	DG
18	1/16/2019	B45a/45b-B46c/46d/46e	529	12:53 PM	DS	69	805	6.5		DG
19	1/16/2019	B46-B46a	22	11:03 AM	DS	69	805	6.5		DG
20	1/16/2019	B46a-B46b	22	10:57 AM	DS	69	805	6.5		DG
21	1/16/2019	B46b-B46c	22	10:49 AM	DS	69	805	6.5		DG
22	1/16/2019	B46c-B46d	22	10:44 AM	DS	69	805	6.5		DG
23	1/16/2019	B46d-B46e	22	10:36 AM	DS	69	805	6.5		DG
24	1/16/2019	B44-B44a	22	8:50 AM	GZ	7	805	6.5		DG
25	1/16/2019	B45/45a-B46/46a/46b	280	12:56 PM	GZ	7	805	7.0	SDT-61	DG

APPENDIX C

Cell 1B Liner Installation Documentation

C.11. Secondary FML Seam Pressure Test Log

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FML SEAMING PRESSURE TEST LOG

PROJECT SPECIFICATIONS

PROJECT NAME:	Sundance West LFCell 1A	**PROJECT NUMBER:**	010153018	**MIN START PSI:**	35
OWNER:	Sundance West, Inc	**CONTRACTOR:**	SLS, Inc.	**TEST DURATION**	5:00
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	1	**MAX PSI DROP:**	3

PRESSURE TEST LOCATION: Secondary

	DATE	PANEL #/PANEL #	TESTER	TIME		PRESSURE		MONITORED BY	PASS/FAIL
				START	FINISH	INITIAL	FINAL		
1	1/4/2019	B23a-B24a	CZ	9:42 AM	9:47 AM	40	40	BSB	PASS
2	1/4/2019	B23a-B24b	CZ	9:55 AM	10:00 AM	40	39	BSB	PASS
3	1/4/2019	B22a-B23a	CZ	10:33 AM	10:38 AM	40	40	BSB	PASS
4	1/4/2019	B22a/B22-B23/B23a	CZ	10:30 AM	10:35 AM	40	40	BSB	PASS
5	1/4/2019	B22-B23	CZ	11:15 AM	11:20 AM	39	38	BSB	PASS
6	1/4/2019	B22b-B23a	CZ	10:39 AM	10:44 AM	39	39	BSB	PASS
7	1/4/2019	B24a-B24b	CZ	8:58 AM	9:03 AM	40	40	BSB	PASS
8	1/4/2019	B23/23a-B24/24a	CZ	11:21 AM	11:26 AM	40	39	BSB	PASS
9	1/4/2019	B23-B23a	CZ	9:22 AM	9:27 AM	39	39	BSB	PASS
10	1/4/2019	B24-B24a	CZ	9:23 AM	9:28 AM	40	40	BSB	PASS
11	1/4/2019	B24b-B25/25a	CZ	2:21 PM	2:26 PM	40	40	BSB	PASS
12	1/4/2019	B25-B25a	CZ	11:29 AM	11:34 AM	40	40	BSB	PASS
13	1/4/2019	B25a-B25b	CZ	10:48 AM	10:53 AM	40	40	BSB	PASS
14	1/4/2019	B26-B26a	CZ	11:28 AM	11:33 AM	40	39	BSB	PASS
15	1/4/2019	B26a-B26b	CZ	11:45 AM	11:50 AM	40	40	BSB	PASS
16	1/4/2019	B23-B24	CZ	11:22 AM	11:27 AM	40	39	BSB	PASS
17	1/4/2019	B27-B27a	CZ	2:00 PM	2:05 PM	40	40	BSB	PASS
18	1/4/2019	B27a-B27b	CZ	2:14 PM	2:19 PM	40	40	BSB	PASS
19	1/4/2019	B28-B28a	CZ	2:07 PM	2:12 PM	40	39	BSB	PASS
20	1/4/2019	B28a-B28b	CZ	2:01 PM	2:06 PM	40	39	BSB	PASS
21	1/4/2019	B28b-B28c	CZ	2:13 PM	2:18 PM	40	39	BSB	PASS
22	1/4/2019	B26a-B26b	CZ	11:46 AM	11:51 AM	40	39	BSB	PASS
23	1/4/2019	B25/25a-B26/26a	CZ	11:55 AM	12:00 PM	40	40	BSB	PASS
24	1/4/2019	B26a/26b-B27a/27b	CZ	11:44 AM	11:49 AM	40	39	BSB	PASS
25	1/4/2019	B25/25a-B24/24a/24b	CZ	1:01 PM	1:06 PM	40	40	BSB	PASS
26	1/4/2019	B26/26a-B27/B27a	CZ	2:30 PM	2:35 PM	40	40	BSB	PASS
27	1/4/2019	B26/26b-B27a/27b	CZ	2:31 PM	2:36 PM	40	39	BSB	PASS
28	1/5/2019	B29-B29a	CZ	8:11 AM	8:16 AM	40	40	BSB	PASS
29	1/5/2019	B29a-B29b	CZ	8:19 AM	8:24 AM	40	39	BSB	PASS
30	1/5/2019	B30-B30a	CZ	8:12 AM	8:17 AM	40	39	BSB	PASS
31	1/5/2019	B30a-B30b	CZ	8:20 AM	8:25 AM	40	40	BSB	PASS
32	1/5/2019	B28/28a/28b-B27/27a	CZ	9:06 AM	9:11 AM	40	39	BSB	PASS
33	1/5/2019	B28b/28c-B27a/27b	CZ	8:54 AM	8:59 AM	40	39	BSB	PASS
34	1/5/2019	B29/29a-B30/30a/30b	CZ	9:15 AM	9:20 AM	40	40	BSB	PASS
35	1/5/2019	B29a/29b-B30a	CZ	8:55 AM	9:00 AM	40	40	BSB	PASS
36	1/5/2019	B31-B31a	CZ	9:58 AM	10:03 AM	40	40	BSB	PASS
37	1/5/2019	B31a-B31b	CZ	9:35 AM	9:40 AM	40	39	BSB	PASS
38	1/5/2019	B32-B32a	CZ	9:59 AM	10:04 AM	40	40	BSB	PASS
39	1/5/2019	B30b-B31b	CZ	10:47 AM	10:52 AM	40	40	BSB	PASS
40	1/5/2019	B30/30a/30b-B31/31a/31b	CZ	10:46 AM	10:51 AM	40	39	BSB	PASS
41	1/5/2019	B31b-B32a	CZ	11:08 AM	11:13 AM	38	38	BSB	PASS
42	1/5/2019	B31/31a/31b-B32/32a	CZ	11:00 AM	11:05 AM	40	39	BSB	PASS
43	1/5/2019	B33-B33a	CZ	1:05 PM	1:10 PM	39	38	BSB	PASS
44	1/5/2019	B33a-B33b	CZ	12:57 PM	1:02 PM	40	39	BSB	PASS
45	1/5/2019	B34-B34a	CZ	12:58 PM	1:03 PM	40	39	BSB	PASS
46	1/5/2019	B34a-B34b	CZ	12:37 PM	12:42 PM	39	38	BSB	PASS
47	1/5/2019	B32a-B33b	CZ	1:27 PM	1:32 PM	40	40	BSB	PASS
48	1/5/2019	B32/32a-B33/33a/33b	CZ	1:33 PM	1:38 PM	40	40	BSB	PASS
49	1/5/2019	B33/33a/33b-B34/34a	CZ	1:55 PM	2:00 PM	40	40	BSB	PASS
50	1/5/2019	B33b-B34a/34b	CZ	1:44 PM	1:49 PM	40	40	BSB	PASS
51	1/5/2019	B35-B35a	CZ	2:21 PM	2:26 PM	39	38	BSB	PASS
52	1/5/2019	B35a-B35b	CZ	2:14 PM	2:19 PM	40	39	BSB	PASS
53	1/5/2019	B35a/35b-B34a/34b	CZ	2:05 PM	2:10 PM	40	40	BSB	PASS
54	1/5/2019	B35/35a-B34/34a	CZ	2:50 PM	2:55 PM	40	40	BSB	PASS
55	1/7/2019	B36-B36a	CZ	8:50 AM	8:55 AM	40	40	BSB	PASS

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FML SEAMING PRESSURE TEST LOG

PROJECT SPECIFICATIONS

PROJECT NAME:	Sundance West LFCell 1B	**PROJECT NUMBER:**	010153018	**MIN START PSI:**	35
OWNER:	Sundance West, Inc	**CONTRACTOR:**	SLS, Inc.	**TEST DURATION**	5:00
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	2	**MAX PSI DROP:**	3

PRESSURE TEST LOCATION: Secondary

	DATE	PANEL #/PANEL #	TESTER	TIME		PRESSURE		MONITORED BY	PASS/FAIL
				START	FINISH	INITIAL	FINAL		
1	1/7/2019	B36a-B36b	CZ	8:38 AM	8:43 AM	40	39	BSB	PASS
2	1/7/2019	B36b-B36c	CZ	8:31 AM	8:36 AM	40	39	BSB	PASS
3	1/7/2019	B37-B37a	CZ	8:51 AM	8:56 AM	40	39	BSB	PASS
4	1/7/2019	B37a-B37b	CZ	8:40 AM	8:45 AM	40	37	BSB	PASS
5	1/7/2019	B38-B38a	CZ	10:20 AM	10:25 AM	39	39	BSB	PASS
6	1/7/2019	B38a-B38b	CZ	10:12 AM	10:17 AM	40	40	BSB	PASS
7	1/7/2019	B38b-B38c	CZ	10:45 AM	10:50 AM	40	40	BSB	PASS
8	1/7/2019	B39-B39a	CZ	10:13 AM	10:18 AM	40	40	BSB	PASS
9	1/7/2019	B40-B40a	CZ	12:41 PM	12:46 PM	40	40	BSB	PASS
10	1/7/2019	B35b-B36c	CZ	8:26 AM	8:31 AM	40	40	BSB	PASS
11	1/7/2019	B35/35a/35b-B36/36a/36b/36c	CZ	9:10 AM	9:15 AM	40	39	BSB	PASS
12	1/7/2019	B36c-B37b	CZ	8:20 AM	8:25 AM	40	40	BSB	PASS
13	1/7/2019	B36a/36b/36c-B37a/37b	CZ	9:27 AM	9:32 AM	40	40	BSB	PASS
14	1/7/2019	B36a-B37a	CZ	9:45 AM	9:50 AM	40	40	BSB	PASS
15	1/7/2019	B36-B37	CZ	9:50 AM	9:55 AM	40	40	BSB	PASS
16	1/7/2019	B37/37a-B38/38a/38b	CZ	10:44 AM	10:49 AM	40	40	BSB	PASS
17	1/7/2019	B37a/37b-B38b/38c	CZ	10:43 AM	10:48 AM	40	39	BSB	PASS
18	1/7/2019	B38/38a/38c-B39a/B39	CZ	11:12 AM	11:17 AM	40	40	BSB	PASS
19	1/7/2019	B38c-B39a	CZ	11:00 AM	11:05 AM	40	40	BSB	PASS
20	1/7/2019	B39a-B40a	CZ	11:25 AM	11:30 AM	40	40	BSB	PASS
21	1/7/2019	B39/39a-B40/40a	CZ	11:37 AM	11:42 AM	40	40	BSB	PASS
22	1/7/2019	B39a-B40a	CZ	12:55 PM	1:00 PM	40	40	BSB	PASS
23	1/8/2019	B41-B41a	CZ	8:15 AM	8:20 AM	40	39	BSB	PASS
24	1/8/2019	B41a-B41b	CZ	8:03 AM	8:08 AM	40	40	BSB	PASS
25	1/8/2019	B42-B42a	CZ	8:16 AM	8:21 AM	40	40	BSB	PASS
26	1/8/2019	B42a-B42b	CZ	8:07 AM	8:12 AM	40	40	BSB	PASS
27	1/8/2019	B40a-B41/41a	CZ	8:43 AM	8:48 AM	40	39	BSB	PASS
28	1/8/2019	B40/40a-B41/41a	CZ	9:04 AM	9:09 AM	40	40	BSB	PASS
29	1/8/2019	B41a/41b-B42a/42b	CZ	8:55 AM	9:00 AM	40	39	BSB	PASS
30	1/8/2019	B41a-B42a	CZ	9:12 AM	9:17 AM	40	40	BSB	PASS
31	1/8/2019	B41-B42	CZ	9:14 AM	9:19 AM	40	40	BSB	PASS
32	1/16/2019	B42a/42b-B43a	CZ	9:00 AM	9:05 AM	40	40	DG	PASS
33	1/16/2019	B43-B43a	CZ	9:07 AM	9:12 AM	40	40	DG	PASS
34	1/16/2019	B42a-B43	CZ	9:15 AM	9:20 AM	40	40	DG	PASS
35	1/16/2019	B42/42a-B43/43a	CZ	9:49 AM	9:54 AM	40	39	DG	PASS
36	1/16/2019	B44-B44a	CZ	9:18 AM	9:23 AM	40	40	DG	PASS
37	1/16/2019	B44-B45/45a	CZ	11:25 AM	11:30 AM	40	39	DG	PASS
38	1/16/2019	B44a-B45a	CZ	11:10 AM	11:15 AM	40	40	DG	PASS
39	1/16/2019	B45-B45a	CZ	10:26 AM	10:31 AM	40	39	DG	PASS
40	1/16/2019	B45a-B45b	CZ	1:00 PM	1:05 PM	40	40	DG	PASS
41	1/16/2019	B46-B46a	CZ	2:05 PM	2:10 PM	40	38	DG	PASS
42	1/16/2019	B46a-B46b	CZ	1:30 PM	1:35 PM	40	40	DG	PASS
43	1/16/2019	B46b-B46c	CZ	1:26 PM	1:31 PM	40	40	DG	PASS
44	1/16/2019	B46c-B46d	CZ	1:12 PM	1:17 PM	35	34	DG	PASS
45	1/16/2019	B46d-B46e	CZ	1:17 PM	1:22 PM	35	34	DG	PASS
46	1/16/2019	B44a-B45a/45b	CZ	11:17 AM	11:22 AM	40	39	DG	PASS
47	1/16/2019	B45a/45b-B46c/46d/46e	CZ	1:49 PM	1:54 PM	40	39	DG	PASS
48	1/16/2019	B45a-B46b	CZ	1:45 PM	1:50 PM	40	39	DG	PASS
49	1/16/2019	B45a-B46a	CZ	1:39 PM	1:44 PM	39	38	DG	PASS
50	1/16/2019	B45/45a-B46/46a	CZ	1:56 PM	2:01 PM	40	39	DG	PASS
51									
52									
53									
54									
55									

APPENDIX C

Cell 1B Liner Installation Documentation

C.12. FML Seam Field Destructive Test Records

333 Rio Rancho Blvd., Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FML DESTRUCTIVE FIELD TEST RECORD

PROJECT INFORMATION			
PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	1

PROJECT SPECIFICATIONS						
FUSION	TEXTURED:	PEEL	90	SHEAR	120
	SMOOTH:	PEEL	90	SHEAR	120
EXTRUSION	TEXTURED:	PEEL	78	SHEAR	120
	SMOOTH:	PEEL	78	SHEAR	120

DATE	DT #	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		EXTRUSION WELDS		PULL	FIELD TEST RESULTS					COMMENTS
					Temperature	Speed	Barrel Temp	Pre-Heat Temp		Test #1	Test #2	Test #3	Test #4	Test #5	
1/4/2019	SDT33	GB	DS	69	805	6.5	-	-	P	130	116	144	120	131	B23a/B24b
									P	125	128	128	131	129	125' N of S
									S	172	176	170	179	171	edge
1/4/2019	SDT32	GB	UM	1	805	6.5	-	-	P	120	132	119	121	130	B27a/B23a
									P	119	110	121	120	119	211' S of N
									S	165	171	168	174	171	AT
1/4/2019	SDT34	GB	DS	69	805	6.5	-	-	P	138	145	161	169	163	B23/B24
									P	148	153	155	177	166	33' S of N
									S	196	191	190	194	198	AT
1/4/2019	SDT35	GB	GZ	7	805	6.5	-	-	P	124	121	121	127	131	B24b/B25a
									P	123	120	120	121	120	465' S of N
									S	176	175	173	174	176	AT
1/4/2019	SDT36	GB	DS	69	805	6.5	-	-	P	138	114	121	130	129	B25a/B26a
									P	128	118	119	132	128	380' N of S
									S	180	173	176	174	175	edge
1/4/2019	SDT37	GB	UM	1	805	7.5	-	-	P	125	118	113	117	111	B26a/B27a
									P	131	130	121	122	120	240' S of N
									S	165	168	158	162	160	AT
1/4/2019	SDT38	GB	DS	69	805	7.5	-	-	P	127	115	106	124	126	B27b/B28b
									P	112	114	119	126	121	145' N of S
									S	158	160	155	161	162	edge
1/4/2019	SDT39	GB	DS	69	805	7.5	-	-	P	120	120	121	121	121	B27a/B28b
									P	119	121	122	119	114	104' S of N
									S	161	162	160	162	164	AT
1/5/2019	SDT40	GB	UM	1	805	6.5	-	-	P	125	125	127	134	113	B28b/B29a
									P	133	118	117	126	132	373' N of S
									S	165	166	164	180	171	edge
1/5/2019	SDT41	GB	DS	69	805	6.5	-	-	P	126	116	131	125	118	B29a/B30b
									P	115	130	122	114	116	336' N of S
									S	186	184	183	186	186	edge
1/5/2019	SDT42	GB	UM	1	805	6.5	-	-	P	127	123	114	111	110	B30b/B31b
									P	111	119	116	116	119	191' N of S
									S	170	176	174	175	175	edge

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FML DESTRUCTIVE FIELD TEST RECORD

PROJECT INFORMATION			
PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	2

PROJECT SPECIFICATIONS						
FUSION	TEXTURED:	PEEL	90	SHEAR	120
	SMOOTH:	PEEL	90	SHEAR	120
EXTRUSION	TEXTURED:	PEEL	78	SHEAR	120
	SMOOTH:	PEEL	78	SHEAR	120

DATE	DT #	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		EXTRUSION WELDS		PULL	FIELD TEST RESULTS					COMMENTS
					Temperature	Speed	Barrel Temp	Pre-Heat Temp		Test #1	Test #2	Test #3	Test #4	Test #5	
1/5/2019	SDT43	GB	DS	69	805	6.5	-	-	P	118	116	116	122	123	B31b/B32a
									P	114	115	112	118	119	84' N of S
									S	171	172	174	177	172	edge
1/5/2019	SDT44	GB	DS	69	805	6.5	-	-	P	116	115	120	116	120	B31a/B32a
									P	115	120	115	119	119	105' S of N
									S	167	164	168	170	172	AT
1/5/2019	SDT45	GB	UM	1	805	7.5	-	-	P	101	105	107	104	114	B32a/B33b
									P	118	110	105	108	110	469' N of S
									S	173	176	163	164	170	edge
1/5/2019	SDT46	GB	DS	69	805	7.5	-	-	P	110	107	105	107	112	B33b/B34a
									P	109	108	115	108	107	314' N of S
									S	163	166	171	168	169	edge
1/5/2019	SDT47	GB	LY	7	805	7.5	-	-	P	110	109	101	110	112	B34a/B35a
									P	115	105	106	109	107	182' N of S
									S	162	163	167	165	170	edge
1/7/2019	SDT48	GB	UM	1	805	6.5	-	-	P	138	135	129	125	127	B35b/B36c
									P	155	145	145	139	135	92' N of S
									S	171	176	170	179	181	edge
1/7/2019	SDT49	GB	UM	1	805	6.5	-	-	P	137	136	129	118	144	B35/B36
									P	134	137	142	139	143	526' N of S
									S	194	193	195	197	198	edge
1/7/2019	SDT50	GB	DS	69	805	6.5	-	-	P	129	120	127	133	119	B36a/B37a
									P	114	119	124	121	124	473' N of S
									S	176	177	170	178	174	edge
1/7/2019	SDT51	GB	UM	1	805	6.5	-	-	P	115	113	113	128	116	B37a/B38b
									P	118	114	114	119	112	436' N of S
									S	154	159	156	158	156	edge
1/7/2019	SDT52	GB	DS	69	805	6.5	-	-	P	128	112	134	121	124	B38c/B39a
									P	126	120	117	118	117	349' N of S
									S	166	160	163	165	162	edge
1/7/2019	SDT53	GB	MM	7	805	6.5	-	-	P	113	116	116	124	132	B39a/B40a
									P	114	125	128	110	113	9' N of S
									S	160	163	161	163	160	edge

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FML DESTRUCTIVE FIELD TEST RECORD

PROJECT INFORMATION			
PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	3

PROJECT SPECIFICATIONS						
FUSION	TEXTURED:	PEEL	90	SHEAR	120
	SMOOTH:	PEEL	90	SHEAR	120
EXTRUSION	TEXTURED:	PEEL	78	SHEAR	120
	SMOOTH:	PEEL	78	SHEAR	120

DATE	DT #	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		EXTRUSION WELDS		PULL	FIELD TEST RESULTS					COMMENTS
					Temperature	Speed	Barrel Temp	Pre-Heat Temp		Test #1	Test #2	Test #3	Test #4	Test #5	
									P	121	121	108	113	114	B39a/B40a
1/7/2019	SDT54	GB	UM	1	805	6.5	-	-	P	111	117	116	102	104	119' S of N
									S	146	148	146	150	148	AT
									P	118	125	118	129	130	B40a/B41a
1/8/2019	SDT55	GB	UM	1	805	6.5	-	-	P	127	131	136	123	126	73' N of S
									S	173	179	174	178	176	edge
									P	141	122	127	126	115	B41a/B42a
1/8/2019	SDT56	GB	DS	69	805	6.5	-	-	P	122	122	121	122	128	300' N of S
									S	173	179	179	181	180	edge
									P	122	119	123	137	113	B22b/B23a
1/9/2019	PDT32	GB	UM	1	805	6.5	-	-	P	111	105	135	123	133	381' N of S
									S	170	176	179	176	175	edge
									P	131	134	120	136	129	B23b/B24b
1/9/2019	PDT33	GB	DS	69	805	6.5	-	-	P	110	126	124	117	115	166' N of S
									S	166	171	165	170	171	edge
									P	115	120	136	128	124	B24b/B25b
1/10/2019	PDT34	GB	UM	1	805	6.5	-	-	P	121	122	112	121	127	32' N of S
									S	176	184	176	179	180	edge
									P	117	116	132	135	136	B24a/B25a
1/10/2019	PDT35	GB	UM	1	805	6.5	-	-	P	116	124	120	110	114	107' S of N
									S	175	178	175	168	171	AT
									P	122	125	131	124	126	B25a/B26a
1/10/2019	PDT36	GB	DS	69	805	6.5	-	-	P	133	121	134	119	115	349' N of S
									S	173	179	172	180	176	edge
									P	123	125	118	130	119	B26b/B27a
1/10/2019	PDT37	GB	MM	7	805	6.5	-	-	P	123	135	136	113	134	128' N of S
									S	169	177	179	184	178	edge
									P	121	110	112	112	119	B27a/B28b
1/10/2019	PDT38	GB	UM	1	805	6.5	-	-	P	121	114	115	111	119	102' N of S
									S	164	160	156	163	167	edge
									P	123	119	115	118	114	B28b/B29a
1/10/2019	PDT39	GB	DS	69	805	6.5	-	-	P	121	117	125	119	129	37' N of S
									S	160	163	158	161	162	edge

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FML DESTRUCTIVE FIELD TEST RECORD

PROJECT INFORMATION			
PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	4

PROJECT SPECIFICATIONS						
FUSION	TEXTURED:	PEEL	90	SHEAR	120
	SMOOTH:	PEEL	90	SHEAR	120
EXTRUSION	TEXTURED:	PEEL	78	SHEAR	120
	SMOOTH:	PEEL	78	SHEAR	120

DATE	DT #	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		EXTRUSION WELDS		PULL	FIELD TEST RESULTS					COMMENTS
					Temperature	Speed	Barrel Temp	Pre-Heat Temp		Test #1	Test #2	Test #3	Test #4	Test #5	
1/10/2019	PDT40	GB	DS	69	805	6.5	-	-	P	131	113	110	122	125	B29b/B29a
									P	111	121	119	117	136	105' S of N
									S	156	159	157	161	160	AT
1/10/2019	PDT41	GB	MM	7	805	6.5	-	-	P	133	120	118	125	115	B29a/B30b
									P	103	108	111	110	110	373' N of S
									S	150	158	152	156	159	edge
1/12/2019	PDT42	GB	UM	1	805	6.5	-	-	P	118	126	133	121	128	B30b/B31b
									P	129	136	129	131	127	39' S ofB31a
									S	174	178	176	177	175	/B31b-B30b
1/12/2019	PDT43	GB	DS	69	805	6.5	-	-	P	132	131	129	139	130	B32b/B31b
									P	119	153	122	119	117	190' N of S
									S	183	188	179	181	180	edge
1/12/2019	PDT44	GB	GZ	7	805	6.0	-	-	P	151	155	144	133	142	B32/B33a
									P	144	137	149	147	145	55' S of N
									S	188	197	198	193	191	AT
1/12/2019	PDT45	GB	GZ	7	805	6.0	-	-	P	142	121	118	120	112	B32b/B33b
									P	160	153	158	149	132	54' N of S
									S	190	175	184	182	180	edge
1/12/2019	PDT46	GB	UM	1	805	6.5	-	-	P	121	124	133	119	132	B33a/B34a
									P	139	132	137	142	146	450' N of S
									S	163	167	169	170	167	edge
1/12/2019	PDT47	GB	DS	69	805	6.5	-	-	P	118	133	119	116	118	B34a/B35a
									P	116	118	126	124	140	315' S of N
									S	161	169	167	173	170	AT
1/13/2019	PDT48	GB	UM	1	805	6.5	-	-	P	115	125	110	118	118	B35a/B36a
									P	135	143	132	145	143	163' N of S
									S	183	182	182	189	187	edge
1/13/2019	PDT50	GB	DS	69	805	6.5	-	-	P	122	135	162	137	129	B36b/B35a
									P	128	126	145	132	125	56' N of S
									S	188	192	187	186	187	edge
1/13/2019	PDT49	GB	DS	69	805	6.5	-	-	P	131	136	146	140	141	B36/B37
									P	154	165	149	167	168	50' S of N
									S	201	209	212	206	210	AT

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FML DESTRUCTIVE FIELD TEST RECORD

PROJECT INFORMATION			
PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	5

PROJECT SPECIFICATIONS						
FUSION	TEXTURED:	PEEL	90	SHEAR	120
	SMOOTH:	PEEL	90	SHEAR	120
EXTRUSION	TEXTURED:	PEEL	78	SHEAR	120
	SMOOTH:	PEEL	78	SHEAR	120

DATE	DT #	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		EXTRUSION WELDS		PULL	FIELD TEST RESULTS					COMMENTS
					Temperature	Speed	Barrel Temp	Pre-Heat Temp		Test #1	Test #2	Test #3	Test #4	Test #5	
1/13/2019	PDT51	GB	LY	7	805	6.5	-	-	P	135	137	134	134	134	B37a/B38b
									P	127	137	130	124	131	445' N of S
									S	172	178	174	178	177	edge
1/13/2019	PDT52	GB	UM	1	805	6.5	-	-	P	124	123	128	140	125	B38a/B39b
									P	127	133	128	143	131	420' S of N
									S	176	175	177	184	187	AT
1/13/2019	PDT53	GB	DS	69	805	6.5	-	-	P	114	110	110	119	130	B39b/B40b
									P	112	114	121	121	116	5' S of B40a
									S	167	166	167	168	169	/B40b-B39b
1/13/2019	PDT54	GB	LY	7	805	6.5	-	-	P	126	126	128	138	132	B40a/B41a
									P	111	117	112	113	114	180' S of N
									S	166	164	163	166	164	AT
1/16/2019	SDT57	GB	UM	1	805	6.5	-	-	P	114	117	125	135	127	B42a/B43
									P	121	121	126	119	113	215' S of N
									S	181	187	180	187	197	AT
1/16/2019	SDT58	GB	DS	69	805	6.5	-	-	P	147	149	139	137	142	B43a/B44a
									P	144	148	151	144	146	130' N of S
									S	188	190	182	191	186	edge
1/16/2019	SDT59	GB	GZ	7	805	6.5	-	-	P	136	132	155	144	138	B44/B45
									P	147	136	127	132	132	20' S of N
									S	179	173	176	175	171	AT
1/16/2019	SDT60	GB	UM	1	805	6.5	-	-	P	123	128	123	128	129	B44a/B45a
									P	128	129	127	127	121	75' N of S
									S	170	172	175	171	170	edge
1/16/2019	SDT61	GB	GZ	7	805	7.0	-	-	P	118	122	147	135	131	B45a/B46a
									P	146	135	123	128	138	413' N of S
									S	168	171	170	169	171	edge
1/17/2019	PDT56	GB	UM	1	805	6.5	-	-	P	123	116	108	136	107	B41a/B42a
									P	130	132	110	123	112	5' S of B41/
									S	158	161	160	163	162	B41a- B42/B42a
1/17/2019	PDT57	GB	DS	69	805	6.5	-	-	P	146	139	146	135	138	B42b/B43b
									P	130	138	144	153	152	167' N of S
									S	175	180	182	183	180	edge

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FML DESTRUCTIVE FIELD TEST RECORD

PROJECT INFORMATION			
PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	6

PROJECT SPECIFICATIONS						
FUSION	TEXTURED:	PEEL	90	SHEAR	120
	SMOOTH:	PEEL	90	SHEAR	120
EXTRUSION	TEXTURED:	PEEL	78	SHEAR	120
	SMOOTH:	PEEL	78	SHEAR	120

DATE	DT #	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		EXTRUSION WELDS		PULL	FIELD TEST RESULTS					COMMENTS
					Temperature	Speed	Barrel Temp	Pre-Heat Temp		Test #1	Test #2	Test #3	Test #4	Test #5	
1/17/2019	PDT58	GB	LY	7	805	6.5	-	-	P	131	143	139	144	131	B43a/B44b
									P	159	138	136	150	140	333' N of S
									S	177	180	183	180	181	edge
1/17/2019	PDT60	GB	UM	1	805	6.5	-	-	P	142	129	132	140	132	B45/B45a
									P	137	109	125	138	137	5' W of B45/
									S	149	156	148	157	156	B45a- B44a
1/17/2019	PDT59a	GB	UM	1	805	6.5	-	-	P	144	121	127	106	122	B44a/B45
									P	108	134	129	120	134	190' S of N
									S	171	172	168	173	170	AT
1/17/2019	PDT59b	GB	UM	1	805	6.5	-	-	P	117	133	124	139	132	B44a/B45
									P	109	123	125	143	119	210' S of N
									S	166	174	167	173	170	AT
1/17/2019	PDT61	GB	LY	7	805	6.5	-	-	P	130	122	131	134	134	B45/B46a
									P	135	114	137	112	133	475' N of S
									S	161	161	157	164	166	edge
1/17/2019	PDT55	GB	UM	1	805	6.5	-	-	P	130	103	124	132	126	B41b/B42b
									P	104	133	113	110	116	70' N of S
									S	150	157	157	162	159	edge

APPENDIX C

Cell 1B Liner Installation Documentation

C.13. Geonet Deployment Log

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GEONET DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Celll 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	1

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
B34	131559175	325	15.0	4,875.0	1/8/2019
B35	131559174	327	15.0	4,905.0	1/8/2019
B36	131559178	326	15.0	4,890.0	1/8/2019
B34a	131559163	174	15.0	2,610.0	1/8/2019
B35b	131559163	153	15.0	2,295.0	1/8/2019
B35a	131559151	21	15.0	315.0	1/8/2019
B36a	131559151	173	15.0	2,595.0	1/8/2019
B37	131559188	329	15.0	4,935.0	1/9/2019
B38	131559179	329	15.0	4,935.0	1/9/2019
B39	131559154	328	15.0	4,920.0	1/9/2019
B40	131559162	326	15.0	4,890.0	1/9/2019
B41	131559189	328	15.0	4,920.0	1/9/2019
B37b	131559151	133	15.0	1,995.0	1/9/2019
B37a	131559173	40	15.0	600.0	1/9/2019
B38a	131559173	169	15.0	2,535.0	1/9/2019
B39b	131559173	121	15.0	1,815.0	1/9/2019
B39a	131559152	49	15.0	735.0	1/9/2019
B40a	131559152	169	15.0	2,535.0	1/9/2019
B41b	131559152	111	15.0	1,665.0	1/9/2019
B41a	131559186	58	15.0	870.0	1/9/2019
B42	131559169	330	15.0	4,950.0	1/9/2019
B43	131559159	331	15.0	4,965.0	1/9/2019
B44	131559158	327	15.0	4,905.0	1/9/2019
B45	131559165	325	15.0	4,875.0	1/9/2019
B42a	131559186	168	15.0	2,520.0	1/9/2019
B43b	131559186	106	15.0	1,590.0	1/9/2019
B43a	131559156	60	15.0	900.0	1/9/2019
B44a	131559156	167	15.0	2,505.0	1/9/2019
B45b	131559156	97	15.0	1,455.0	1/9/2019
B45a	131559191	72	15.0	1,080.0	1/9/2019
B46	131559168	327	15.0	4,905.0	1/10/2019
B47	131559160	330	15.0	4,950.0	1/10/2019
B48	131559180	327	15.0	4,905.0	1/10/2019
B49	131559167	327	15.0	4,905.0	1/10/2019
B50	131559157	326	15.0	4,890.0	1/10/2019
B46a	131559191	166	15.0	2,490.0	1/10/2019
B47a	131559191	92	15.0	1,380.0	1/10/2019
TOTAL LINER PLACED (FT^2):				118,005.0	

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GEONET DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Celll 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	2

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
B47b	131559147	75	15	1,125.0	1/10/2019
B48a	131559147	163	15	2,445.0	1/10/2019
B49a	131559147	90	15	1,350.0	1/10/2019
B49b	131559166	75	15	1,125.0	1/10/2019
B50a	131559166	165	15	2,475.0	1/10/2019
B51	131553765	329	15	4,935.0	1/10/2019
B52	131559172	329	15	4,935.0	1/10/2019
B53	131559194	330	15	4,950.0	1/10/2019
B54	131558932	329	15	4,935.0	1/10/2019
B55	131559153	329	15	4,935.0	1/10/2019
B51b	131559166	88	15	1,320.0	1/10/2019
B51a	131559184	74	15	1,110.0	1/10/2019
B52a	131559184	158	15	2,370.0	1/10/2019
B53b	131559184	99	15	1,485.0	1/10/2019
B53a	131559185	64	15	960.0	1/10/2019
B54a	131559185	158	15	2,370.0	1/10/2019
B55b	131559185	105	15	1,575.0	1/10/2019
B55a	131559183	56	15	840.0	1/10/2019
B56	131559193	327	15	4,905.0	1/10/2019
B57	131559187	326	15	4,890.0	1/10/2019
B58	131559190	327	15	4,905.0	1/10/2019
B59	131559164	326	15	4,890.0	1/11/2019
B60	131558931	326	15	4,890.0	1/11/2019
B61	131553546	326	15	4,890.0	1/11/2019
B62	131559140	326	15	4,890.0	1/11/2019
B56a	131559183	158	15	2,370.0	1/11/2019
B57b	131559183	113	15	1,695.0	1/11/2019
B57a	131558934	45	15	675.0	1/11/2019
B58a	131558934	157	15	2,355.0	1/11/2019
B59b	131558934	120	15	1,800.0	1/11/2019
B59a	131559192	38	15	570.0	1/11/2019
B60a	131559192	158	15	2,370.0	1/11/2019
B61b	131559192	132	15	1,980.0	1/11/2019
B61a	131559182	26	15	390.0	1/11/2019
B62a	131559182	156	15	2,340.0	1/11/2019
B63	131559170	329	15	4,935.0	1/16/2019
B64	131559155	329	15	4,935.0	1/16/2019
TOTAL LINER PLACED (FT^2):				105,915.0	

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GEONET DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Celll 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	3

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
B65	131559161	329	15	4,935.0	1/16/2019
B66	131559171	328	15	4,920.0	1/16/2019
B67	131559177	329	15	4,935.0	1/16/2019
B68	131559181	329	11	3,619.0	1/16/2019
B63b	131553547	103	15	1,545.0	1/16/2019
B64b	131559182	144	15	2,160.0	1/16/2019
B63a	131558933	52	15	780.0	1/16/2019
B64a	131558933	12	15	180.0	1/16/2019
B65a	131558933	152	15	2,280.0	1/16/2019
B66b	131558933	111	15	1,665.0	1/16/2019
B66a	131559176	40	15	600.0	1/16/2019
B67a	131559176	149	15	2,235.0	1/16/2019
B68	131559176	151	11	1,661.0	1/16/2019
TOTAL LINER PLACED (FT^2):				31,515.0	

APPENDIX C

Cell 1B Liner Installation Documentation

C.14. Primary FML Deployment Log

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FML DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Suncance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	1
DEPLOYMENT LOCATION:	Primary	**MONITOR:**	DG

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
B23a	103216946	209	22.5	4,702.5	1/9/2019
B23b	103216956	296	22.5	6,660.0	1/9/2019
B24a	103216956	262	22.5	5,895.0	1/9/2019
B24b	103216970	242	22.5	5,445.0	1/9/2019
B23	104192272	90	22.5	2,025.0	1/9/2019
B24	104192272	91	22.5	2,047.5	1/9/2019
B25a	103216970	312	22.5	7,020.0	1/10/2019
B25b	103216969	188	22.5	4,230.0	1/10/2019
B26a	103216969	369	22.5	8,302.5	1/10/2019
B26b	103216966	130	22.5	2,925.0	1/10/2019
B27a	103216966	432	22.5	9,720.0	1/10/2019
B27b	103216965	69	22.5	1,552.5	1/10/2019
B25	104192272	93	22.5	2,092.5	1/10/2019
B26	104192272	94	22.5	2,115.0	1/10/2019
B27	104192272	94	22.5	2,115.0	1/10/2019
B28a	104192272	36	22.5	810.0	1/10/2019
B28	108198941	62	22.5	1,395.0	1/10/2019
B29	108198941	95	22.5	2,137.5	1/10/2019
B28b	103216965	491	22.5	11,047.5	1/10/2019
B28c	103216982	6	22.5	135.0	1/10/2019
B29a	103216982	496	22.5	11,160.0	1/10/2019
B30a	103216982	58	22.5	1,305.0	1/10/2019
B30b	103216952	441	22.5	9,922.5	1/10/2019
B31a	103216952	113	22.5	2,542.5	1/12/2019
B31b	103216961	381	22.5	8,572.5	1/12/2019
B32a	103216961	165	22.5	3,712.5	1/12/2019
B32b	103216983	330	22.5	7,425.0	1/12/2019
B33b	103216983	231	22.5	5,197.5	1/12/2019
B33c	103216967	264	22.5	5,940.0	1/12/2019
B30	108198941	97	22.5	2,182.5	1/12/2019
B31	108198941	97	22.5	2,182.5	1/12/2019
B32	108198941	100	22.5	2,250.0	1/12/2019
B33a	108198941	57	22.5	1,282.5	1/12/2019
B33	108198940	43	22.5	967.5	1/12/2019
B34	108198940	102	22.5	2,295.0	1/12/2019
TOTAL LINER PLACED (FT^2):				149,310.0	

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FML DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Suncance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	2
DEPLOYMENT LOCATION:	Primary	**MONITOR:**	DG

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
B35	108198940	103	22.5	2,317.5	1/12/2019
B34a	103216967	295	22.5	6,637.5	1/12/2019
B34b	103216976	201	22.5	4,522.5	1/12/2019
B35a	103216976	358	22.5	8,055.0	1/12/2019
B35b	103216968	133	22.5	2,992.5	1/12/2019
B36a	103216968	421	22.5	9,472.5	1/13/2019
B36b	103216981	67	22.5	1,507.5	1/13/2019
B37a	103216981	486	22.5	10,935.0	1/13/2019
B38b	103216974	486	22.5	10,935.0	1/13/2019
B36	108198940	104	22.5	2,340.0	1/13/2019
B37	108198940	106	22.5	2,385.0	1/13/2019
B38a	108198940	48	22.5	1,080.0	1/13/2019
B38	108198926	59	22.5	1,327.5	1/13/2019
B39	108198926	112	22.5	2,520.0	1/13/2019
B40	108198926	108	22.5	2,430.0	1/13/2019
B41	108198926	108	22.5	2,430.0	1/13/2019
B42	108198926	108	22.5	2,430.0	1/13/2019
B39a	103216974	73	22.5	1,642.5	1/13/2019
B39b	103216953	412	22.5	9,270.0	1/13/2019
B40a	103216953	148	22.5	3,330.0	1/13/2019
B40b	103216972	338	22.5	7,605.0	1/13/2019
B41a	103216972	221	22.5	4,972.5	1/13/2019
B41b	108197884	265	22.5	5,962.5	1/13/2019
B42a	108198935	174	22.5	3,915.0	1/17/2019
B42b	108198927	313	22.5	7,042.5	1/17/2019
B43	108198927	200	22.5	4,500.0	1/17/2019
B43a	108198928	393	22.5	8,842.5	1/17/2019
B44	108198928	91	22.5	2,047.5	1/17/2019
B44a	108198929	501	22.5	11,272.5	1/17/2019
B45	108198938	519	22.5	11,677.5	1/17/2019
B45a	102191760	61	22.5	1,372.5	1/17/2019
B45b	108198929	14	22.5	315.0	1/17/2019
B46	102191760	62	11.3	697.5	1/17/2019
B46a	102191760	65	11.3	731.3	1/17/2019
B46b	102191760	110	11.3	1,237.5	1/17/2019
B46c	102191760	115	11.3	1,293.8	1/17/2019
B46d	102191760	121	11.3	1,361.3	1/17/2019
B46e	102191760	121	11.3	1,361.3	1/17/2019
TOTAL LINER PLACED (FT^2):				164,767.5	

APPENDIX C

Cell 1B Liner Installation Documentation

C.15. Primary FML Seaming Log

333 Rio Rancho Blvd., Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FML SEAMING LOG

PROJECT NAME: Sundance West Landfill Cell 1B
OWNER: Sundance West, Inc.
PROJECT LOCATION: Eunice, NM
PROJECT NUMBER: 01053018.00
CONTRACTOR: SLS, Inc
SHEET NUMBER: 1

SEAMING LOCATION: Primary

	DATE	PANEL #/PANEL #	APPROX. LENGTH WELDED	START TIME	SEAMER INITIALS	MACHINE #	TEMP SETTING	SPEED SETTING	DESTRUCTIVE TEST	MONITORED BY
1	1/9/2019	B22/22a/22b/22c-B23/23a/23b	595	9:05 AM	UM	7	805	6.5	PDT-32	BSB
2	1/9/2019	B23-B23a	22	7:20 AM	LY	7	805	6.5		BSB
3	1/9/2019	B23a-B23b	22	6:54 AM	LY	7	805	6.5		BSB
4	1/9/2019	B23/23a/23b-B24/24a/24b	595	7:03 AM	DS	69	805	6.5	PDT-33	BSB
5	1/9/2019	B24-B24a	22	7:27 AM	LY	7	805	6.5		BSB
6	1/9/2019	B24a-B24b	22	7:03 AM	LY	7	805	6.5		BSB
7	1/10/2019	B24/24a/24b-B25/25a/25b	595	6:40 AM	UM	1	805	6.5	PDT-34 & 35	BSB
8	1/10/2019	B25-B25a	22	8:07 AM	UM	1	805	6.5		BSB
9	1/10/2019	B25a-B25b	22	6:55 AM	MM	7	805	6.5		BSB
10	1/10/2019	B25/25a/25b-B26/26a/26b	593	7:06 AM	DS	69	805	6.5	PDT-36	BSB
11	1/10/2019	B26-B26a	22	8:12 AM	UM	1	805	6.5		BSB
12	1/10/2019	B26a-B26b	22	7:15 AM	MM	7	805	6.5		BSB
13	1/10/2019	B26/26a/26b-B27/27a/27b	593	7:35 AM	MM	7	805	6.5	PDT-37	BSB
14	1/10/2019	B27-B27a	22	8:17 AM	UM	1	805	6.5		BSB
15	1/10/2019	B27a-B27b	22	7:30 AM	MM	7	805	6.5		BSB
16	1/10/2019	B27/27a/27b-B28/28a/28b/28c	595	8:55 AM	UM	1	805	6.5	PDT-38	BSB
17	1/10/2019	B28-B28a	22	9:22 AM	MM	7	805	6.5		BSB
18	1/10/2019	B28a-B28b	22	9:40 AM	MM	7	805	6.5		BSB
19	1/10/2019	B28b-B28c	22	8:50 AM	UM	1	805	6.5		BSB
20	1/10/2019	B28/28a/28b/28c-B29/29a	591	9:03 AM	DS	69	805	6.5	PDT-39 & 40	BSB
21	1/10/2019	B29-B29a	22	9:50 AM	MM	7	805	6.5		BSB
22	1/10/2019	B29/29a-B30a/30b	100	10:16 AM	MM	7	805	6.5	PDT-41	BSB
23	1/10/2019	B30a-B30b	22	9:54 AM	MM	7	805	6.5		BSB
24	1/12/2019	B29-B30	22	8:48 AM	UM	7	805	6.5		DG
25	1/12/2019	B30/30a/30b-B31a/31b	591	7:20 AM	UM	7	805	6.5	PDT-42	DG

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505.867.6990

FML SEAMING LOG

PROJECT NAME: Sundance West Landfill Cell 1B
OWNER: Sundance West, Inc.
PROJECT LOCATION: Eunice, NM
PROJECT NUMBER: 01053018.00
CONTRACTOR: SLS, Inc
SHEET NUMBER: 2

SEAMING LOCATION: Primary

	DATE	PANEL #/PANEL #	APPROX. LENGTH WELDED	START TIME	SEAMER INITIALS	MACHINE #	TEMP SETTING	SPEED SETTING	DESTRUCTIVE TEST	MONITORED BY
1	1/12/2019	B31-B31a	22	9:17 AM	UM	1	805	6.5		DG
2	1/12/2019	B31a-B31b	22	6:55 AM	GZ	7	805	6.5		DG
3	1/12/2019	B31/31a/31b-B32/32a/32b	595	7:38 AM	DS	69	805	6.5	PDT-43	DG
4	1/12/2019	B32-B32a	22	9:11 AM	DS	69	805	6.5		DG
5	1/12/2019	B32a-B32b	22	7:20 AM	GZ	7	805	6.5		DG
6	1/12/2019	B32/32a/32b-B33/33a/33b/33c	595	8:10 AM	GZ	7	805	6.5	PDT-44 & 45	DG
7	1/12/2019	B33-B33a	22	9:22 AM	DS	69	805	6.5		DG
8	1/12/2019	B33a-B33b	22	9:16 AM	DS	69	805	6.5		DG
9	1/12/2019	B33b-B33c	22	7:45 AM	GZ	7	805	6.5		DG
10	1/12/2019	B33/33a/33b/33c-B34/34a/34b	595	9:42 AM	UM	1	805	6.5	PDT-46	DG
11	1/12/2019	B34-B34a	22	9:50 AM	GZ	7	805	6.5		DG
12	1/12/2019	B34a-B33b	22	10:15 AM	GZ	7	805	6.5		DG
13	1/12/2019	B34/34a/34b-B35/35a/35b	598	9:53 AM	DS	69	805	6.5	PDT-47	DG
14	1/12/2019	B35-B35a	22	11:18 AM	DS	69	805	6.5		DG
15	1/12/2019	B35a-B35b	22	10:10 AM	GZ	7	805	6.5		DG
16	1/12/2019	B30-B30a	22	9:12 AM	UM	7	805	6.5		DG
17	1/12/2019	B30-B31	22	9:25 AM	UM	7	805	6.5		DG
18	1/13/2019	B35/35a/35b-B36/36a/36b	594	6:55 AM	UM	1	805	6.5	PDT-48 & 50	DG
19	1/13/2019	B36-B36a	22	8:28 AM	UM	1	805	6.5		DG
20	1/13/2019	B36a-B36b	22	6:53 AM	DS	69	805	6.5		DG
21	1/13/2019	B36/36a/36b-B37a/B37	592	7:10 AM	DS	69	805	6.5	PDT-49	DG
22	1/13/2019	B37-B37a	22	8:33 AM	DS	69	805	6.5		DG
23	1/13/2019	B37/37a-B38/38a	100	7:24 AM	LY	7	805	6.5	PDT-51	DG
24	1/13/2019	B38-B38a	22	8:42 AM	DS	69	805	6.5		DG
25	1/13/2019	B38a-B38b	22	8:36 AM	DS	69	805	6.5		DG

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FML SEAMING LOG

PROJECT NAME: Sundance West Landfill Cell 1B
OWNER: Sundance West, Inc.
PROJECT LOCATION: Eunice, NM
PROJECT NUMBER: 01053018.00
CONTRACTOR: SLS, Inc
SHEET NUMBER: 3

SEAMING LOCATION: Primary

	DATE	PANEL #/PANEL #	APPROX. LENGTH WELDED	START TIME	SEAMER INITIALS	MACHINE #	TEMP SETTING	SPEED SETTING	DESTRUCTIVE TEST	MONITORED BY
1	1/13/2019	B38/38a/38b-B39/39a/39b	597	9:18 AM	UM	1	805	6.5	PDT-52	DG
2	1/13/2019	B39-B39a	22	9:47 AM	LY	7	805	6.5		DG
3	1/13/2019	B39a-B39b	22	9:24 AM	LY	7	805	6.5		DG
4	1/13/2019	B39/39a/39b-B40/40a/40b	597	9:41 AM	DS	69	805	6.5	PDT-53	DG
5	1/13/2019	B40/40a/40b-B41/41a/41b	594	10:10 AM	LY	7	805	6.5	PDT-54	DG
6	1/13/2019	B41-B41a	22	11:07 AM	UM	1	805	6.5		DG
7	1/13/2019	B41a-B41b	22	10:05 AM	LY	7	805	6.5		DG
8	1/13/2019	B41-B42	22	11:13 AM	UM	1	805	6.5		DG
9	1/13/2019	B40-B40a	22	9:48 AM	LY	7	805	6.5		DG
10	1/13/2019	B40a-B4b	22	9:58 AM	LY	7	805	6.5		DG
11	1/13/2019	B23b to B41-B23a to B42b	396	12:45 PM	UM	1	805	6.5		DG
12	1/17/2019	B41a/41b-B42a/42b	486	8:00 AM	UM	1	805	6.5	PDT-55 & 56	DG
13	1/17/2019	B42a-B42b	22	8:10 AM	LY	7	805	6.5		DG
14	1/17/2019	B42-B42a	22	9:20 AM	UM	1	805	6.5		DG
15	1/17/2019	B42/42a/42b-B43/43a	595	8:19 AM	DS	69	805	6.5	PDT-57	DG
16	1/17/2019	B43-B43a	22	8:21 AM	LY	7	805	6.5		DG
17	1/17/2019	B43/43a-B44/44a	593	8:51 AM	LY	7	805	6.5	PDT-58	DG
18	1/17/2019	B46d-B46e	22	10:16 AM	DS	69	805	6.5		DG
19	1/17/2019	B44/B44a-B45/45a/45b	592	9:52 AM	UM	1	805	6.5	PDT-59A & B	DG
20	1/17/2019	B45-B45a	22	9:37 AM	UM	1	805	6.5	PDT-60	DG
21	1/17/2019	B45-B45b	22	9:47 AM	UM	1	805	6.5		DG
22	1/17/2019	B45b/45a/45-B46e/46d/46c	592	10:48 AM	DS	69	805	6.5	PDT-61	DG
23	1/17/2019	B46-B46a	22	10:37 AM	LY	7	805	6.5		DG
24	1/17/2019	B46a-B46b	22	10:40 AM	LY	7	805	6.5		DG
25	1/17/2019	B46b-B46c	22	10:44 AM	LY	7	805	6.5		DG

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FML SEAMING LOG

PROJECT NAME: Sundance West Landfill Cell 1B
OWNER: Sundance West, Inc.
PROJECT LOCATION: Eunice, NM
PROJECT NUMBER: 01053018.00
CONTRACTOR: SLS, Inc
SHEET NUMBER: 4

SEAMING LOCATION: Primary

	DATE	PANEL #/PANEL #	APPROX. LENGTH WELDED	START TIME	SEAMER INITIALS	MACHINE #	TEMP SETTING	SPEED SETTING	DESTRUCTIVE TEST	MONITORED BY
1	1/17/2019	B46c-B46d	22	10:20 AM	DS	69	805	6.5		DG
2	1/17/2019	B44-B44a	22	9:58 AM	DS	69	805	6.5		DG
3	1/17/2019	B45-B46/46a/46b	594	10:50 AM	LY	7	805	6.5		DG
4	1/17/2019	B45/45a-B46/46a	127	1:10 PM	LY	7	805	7		DG
5	1/17/2019	B41b to B46e-B41b to B46e	110	12:05 PM	UM	1	805	7		DG
6										
7										
8										
9										
10										
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25										

APPENDIX C

Cell 1B Liner Installation Documentation

C.16. Primary FML Seam Pressure Test Log

333 Rio Rancho Blvd., Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

FML SEAMING PRESSURE TEST LOG

PROJECT NAME: Sundance West LFCell 1B
OWNER: Sundance West, Inc
PROJECT LOCATION: Eunice, NM
PROJECT NUMBER: 010153018
CONTRACTOR: SLS, Inc.
SHEET NUMBER: 1

PROJECT SPECIFICATIONS
MIN START PSI: 35
TEST DURATION 5:00
MAX PSI DROP: 4

PRESSURE TEST LOCATION: Primary

	DATE	PANEL #/PANEL #	TESTER	TIME		PRESSURE		MONITORED BY	PASS/FAIL
				START	FINISH	INITIAL	FINAL		
1	1/9/2019	B23-B23a	CZ	9:12 AM	9:17 AM	35	34	BSB	PASS
2	1/9/2019	B23a-B23b	CZ	9:19 AM	9:24 AM	35	34	BSB	PASS
3	1/9/2019	B24-B24a	CZ	9:12 AM	9:17 AM	35	34	BSB	PASS
4	1/9/2019	B24a-B24b	CZ	9:20 AM	9:25 AM	35	35	BSB	PASS
5	1/9/2019	B22c-B23b	CZ	9:00 AM	9:05 AM	35	34	BSB	PASS
6	1/9/2019	B23/23a/23b-B24/24a/24b	CZ	9:01 AM	9:06 AM	35	34	BSB	PASS
7	1/9/2019	B22b-B23b	CZ	9:04 AM	9:09 AM	35	34	BSB	PASS
8	1/9/2019	B22/22a-B23	CZ	9:11 AM	9:16 AM	35	34	BSB	PASS
9	1/10/2019	B25-B25a	CZ	9:12 AM	9:17 AM	40	39	BSB	PASS
10	1/10/2019	B25a-B25b	CZ	7:44 AM	7:49 AM	40	40	BSB	PASS
11	1/10/2019	B26-B26a	CZ	9:19 AM	9:24 AM	40	40	BSB	PASS
12	1/10/2019	B26a-B26b	CZ	7:40 AM	7:45 AM	40	39	BSB	PASS
13	1/10/2019	B27-B27a	CZ	9:20 AM	9:25 AM	40	39	BSB	PASS
14	1/10/2019	B27a-B27b	CZ	7:50 AM	7:55 AM	40	40	BSB	PASS
15	1/10/2019	B24b-B25b	CZ	7:58 AM	8:03 AM	40	40	BSB	PASS
16	1/10/2019	B24a/24b-B25a/25b	CZ	8:35 AM	8:40 AM	40	39	BSB	PASS
17	1/10/2019	B28-B28a	CZ	9:46 AM	9:51 AM	40	39	BSB	PASS
18	1/10/2019	B28a-B28b	CZ	9:52 AM	9:57 AM	40	39	BSB	PASS
19	1/10/2019	B25a/25b-B26a/26b	CZ	9:06 AM	9:11 AM	40	40	BSB	PASS
20	1/10/2019	B25/25a-B26/26a	CZ	9:05 AM	9:10 AM	40	40	BSB	PASS
21	1/10/2019	B25-B25	CZ	9:13 AM	9:18 AM	40	40	BSB	PASS
22	1/10/2019	B26/26a-B27/27a	CZ	9:40 AM	9:45 AM	40	40	BSB	PASS
23	1/10/2019	B29-B29a	CZ	9:55 AM	10:00 AM	40	39	BSB	PASS
24	1/10/2019	B30a-B30b	GB	10:05 AM	10:10 AM	40	39	BSB	PASS
25	1/10/2019	B28b-B28c	CZ	10:17 AM	10:22 AM	35	35	BSB	PASS
26	1/10/2019	B26a/26b-B27a	CZ	9:00 AM	9:05 AM	40	40	BSB	PASS
27	1/10/2019	B26b-B27a	CZ	7:56 AM	8:01 AM	40	40	BSB	PASS
28	1/10/2019	B27a/27b-B28b/28c	CZ	10:20 AM	10:25 AM	30	30	BSB	PASS
29	1/10/2019	B27/27a-B28/28a/28b	GB	10:37 AM	10:42 AM	35	34	BSB	PASS
30	1/10/2019	B28/28a/28b/28c-B29/29a	GB	10:45 AM	10:50 AM	40	40	BSB	PASS
31	1/10/2019	B29a-B30a/30b	GB	11:39 AM	11:44 AM	30	30	BSB	PASS
32	1/10/2019	B29a-B30b	GB	11:35 AM	11:40 AM	35	34	BSB	PASS
33	1/12/2019	B30-B30a	CZ	10:20 AM	10:25 AM	40	39	DG	PASS
34	1/12/2019	B31-B31a	CZ	10:25 AM	10:30 AM	40	40	DG	PASS
35	1/12/2019	B31a-B31b	CZ	7:53 AM	7:58 AM	40	39	DG	PASS
36	1/12/2019	B32-B32a	CZ	10:37 AM	10:42 AM	40	40	DG	PASS
37	1/12/2019	B32a-B32b	CZ	7:54 AM	7:59 AM	40	40	DG	PASS
38	1/12/2019	B33-B33a	CZ	10:51 AM	10:56 AM	40	39	DG	PASS
39	1/12/2019	B33a-B33b	CZ	10:49 AM	10:54 AM	40	40	DG	PASS
40	1/12/2019	B33b-B33c	CZ	7:55 AM	8:00 AM	40	40	DG	PASS
41	1/12/2019	B34-B34a	CZ	10:50 AM	10:55 AM	40	40	DG	PASS
42	1/12/2019	B34a-B34b	CZ	11:12 AM	11:17 AM	38	38	DG	PASS
43	1/12/2019	B35-B35a	CZ	11:39 AM	11:44 AM	40	40	DG	PASS
44	1/12/2019	B35a-B35b	CZ	11:19 AM	11:24 AM	40	40	DG	PASS
45	1/12/2019	B30a/30b-B31a/31b	CZ	9:48 AM	9:53 AM	40	39	DG	PASS
46	1/12/2019	B30b-B31b	CZ	9:49 AM	9:54 AM	40	40	DG	PASS
47	1/12/2019	B31a/31b-B32a/32b	CZ	9:36 AM	9:41 AM	40	40	DG	PASS
48	1/12/2019	B31b-B32b	CZ	9:34 AM	9:39 AM	40	39	DG	PASS
49	1/12/2019	B31b-B32b	CZ	9:25 AM	9:30 AM	39	39	DG	PASS
50	1/12/2019	B32b-B33b	CZ	9:15 AM	9:20 AM	38	38	DG	PASS
51	1/12/2019	B32b-B33b	CZ	9:05 AM	9:10 AM	40	40	DG	PASS
52	1/12/2019	B32b-B33b	CZ	8:59 AM	9:04 AM	40	40	DG	PASS
53	1/12/2019	B32/32a/32b-B33/33a	CZ	10:00 AM	10:05 AM	40	39	DG	PASS
54	1/12/2019	B29-B30	CZ	10:19 AM	10:24 AM	40	39	DG	PASS
55	1/12/2019	B30-B31	CZ	10:26 AM	10:31 AM	40	39	DG	PASS

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FML SEAMING PRESSURE TEST LOG

PROJECT SPECIFICATIONS

PROJECT NAME:	Sundance West LFCell 1B	**PROJECT NUMBER:**	010153018	**MIN START PSI:**	35
OWNER:	Sundance West, Inc	**CONTRACTOR:**	SLS, Inc.	**TEST DURATION:**	5:00
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	2	**MAX PSI DROP:**	3

PRESSURE TEST LOCATION: Primary

	DATE	PANEL #/PANEL #	TESTER	TIME		PRESSURE		MONITORED BY	PASS/FAIL
				START	FINISH	INITIAL	FINAL		
1	1/12/2019	B31-B32	CZ	10:38 AM	10:43 AM	40	40	DG	PASS
2	1/12/2019	B33b/33c-B34a/34b	CZ	11:00 AM	11:05 AM	40	39	DG	PASS
3	1/12/2019	B33b-B34a	CZ	11:06 AM	11:11 AM	40	40	DG	PASS
4	1/12/2019	B33-B34	CZ	11:31 AM	11:36 AM	40	39	DG	PASS
5	1/12/2019	B34/34a-B35/35a	CZ	11:13 AM	11:18 AM	40	40	DG	PASS
6	1/12/2019	B34a-B35a	CZ	11:26 AM	11:31 AM	40	39	DG	PASS
7	1/12/2019	B34-B35	CZ	11:40 AM	11:45 AM	40	40	DG	PASS
8	1/13/2019	B36a-B36b	CZ	8:05 AM	8:10 AM	40	40	DG	PASS
9	1/13/2019	B37-B37a	CZ	9:17 AM	9:22 AM	40	40	DG	PASS
10	1/13/2019	B38-B38a	CZ	9:29 AM	9:34 AM	40	39	DG	PASS
11	1/13/2019	B38a-B38b	CZ	9:30 AM	9:35 AM	40	40	DG	PASS
12	1/13/2019	B39-B39a	CZ	9:43 AM	9:48 AM	40	40	DG	PASS
13	1/13/2019	B39a-B39b	CZ	10:25 AM	10:30 AM	40	39	DG	PASS
14	1/13/2019	B40-B40a	CZ	10:20 AM	10:25 AM	40	40	DG	PASS
15	1/13/2019	B40a-B40b	CZ	10:26 AM	10:31 AM	40	40	DG	PASS
16	1/13/2019	B41-B41a	CZ	11:37 AM	11:42 AM	40	40	DG	PASS
17	1/13/2019	B41a-B41b	CZ	10:40 AM	10:45 AM	40	39	DG	PASS
18	1/13/2019	B36b-B37a	CZ	8:06 AM	8:11 AM	40	40	DG	PASS
19	1/13/2019	B35a/35b-B36a/36b	CZ	8:13 AM	8:18 AM	40	40	DG	PASS
20	1/13/2019	B35a-B36a	CZ	8:55 AM	9:00 AM	40	40	DG	PASS
21	1/13/2019	B35-B36	CZ	8:58 AM	9:03 AM	40	40	DG	PASS
22	1/13/2019	B36-B36a	CZ	8:56 AM	9:01 AM	40	39	DG	PASS
23	1/13/2019	B36a/36b-B37a	CZ	9:10 AM	9:15 AM	40	40	DG	PASS
24	1/13/2019	B36-B37	CZ	9:11 AM	9:16 AM	40	39	DG	PASS
25	1/13/2019	B37/37a-B38/38a/38b	CZ	9:23 AM	9:28 AM	40	39	DG	PASS
26	1/13/2019	B37a-B38b	CZ	9:24 AM	9:29 AM	40	40	DG	PASS
27	1/13/2019	B38/38a/38b-B39/39a/39b	CZ	11:05 AM	11:10 AM	40	40	DG	PASS
28	1/13/2019	B38b-B39b	CZ	10:55 AM	11:00 AM	40	40	DG	PASS
29	1/13/2019	B39b-B40b	CZ	10:56 AM	11:01 AM	40	40	DG	PASS
30	1/13/2019	B39/39a/39b-B40/40a/40b	CZ	11:23 AM	11:28 AM	40	39	DG	PASS
31	1/13/2019	B40a/40b-B41a/41b	CZ	11:40 AM	11:45 AM	40	40	DG	PASS
32	1/13/2019	B40/40a-B41/41a	CZ	11:35 AM	11:40 AM	40	39	DG	PASS
33	1/13/2019	B41-B42	CZ	11:36 AM	11:41 AM	40	40	DG	PASS
34	1/13/2019	B23b to B41-B23a to B42b	CZ	1:50 PM	1:55 PM	40	38	DG	PASS
35	1/13/2019	B42a-B42b	CZ	9:11 AM	9:16 AM	40	39	DG	PASS
36	1/13/2019	B42-B42a	CZ	9:30 AM	9:35 AM	40	40	DG	PASS
37	1/13/2019	B41/41a/41b-B42a/42b	CZ	9:31 AM	9:36 AM	40	39	DG	PASS
38	1/17/2019	B42/42a/42b-B43/43a	CZ	10:09 AM	10:14 AM	40	39	DG	PASS
39	1/17/2019	B42-B43	CZ	10:10 AM	10:15 AM	40	40	DG	PASS
40	1/17/2019	B43a/43b-B44a	CZ	10:31 AM	10:36 AM	40	39	DG	PASS
41	1/17/2019	B43-B44	CZ	10:28 AM	10:33 AM	40	40	DG	PASS
42	1/17/2019	B44-B44a	CZ	10:30 AM	10:35 AM	40	40	DG	PASS
43	1/17/2019	B45-B45a	CZ	11:18 AM	11:23 AM	40	40	DG	PASS
44	1/17/2019	B45a-B45b	CZ	11:12 AM	11:17 AM	40	39	DG	PASS
45	1/17/2019	B44a-B45b	CZ	11:00 AM	11:05 AM	40	40	DG	PASS
46	1/17/2019	B44/44a-B45/45a	CZ	12:40 PM	12:45 PM	40	39	DG	PASS
47	1/17/2019	B46/46a/46b-B45	CZ	12:55 PM	1:00 PM	40	38	DG	PASS
48	1/17/2019	B46c/46d/46e-B45/45a/45b	CZ	11:28 AM	11:33 AM	40	39	DG	PASS
49	1/17/2019	B46-B46a	CZ	1:11 PM	1:16 PM	40	40	DG	PASS
50	1/17/2019	B46a-B46b	CZ	1:10 PM	1:15 PM	40	39	DG	PASS
51	1/17/2019	B46b-B46c	CZ	1:00 PM	1:05 PM	40	39	DG	PASS
52	1/17/2019	B46c-B46d	CZ	12:54 PM	12:59 PM	40	39	DG	PASS
53	1/17/2019	B46d-B46e	CZ	12:48 PM	12:53 PM	40	40	DG	PASS
54	1/17/2019	B46/46a-B46/46a	CZ	12:26 PM	12:31 PM	40	39	DG	PASS
55	1/17/2019	B43-B43a	CZ	9:13 AM	9:18 AM	40	39	DG	PASS

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FML SEAMING PRESSURE TEST LOG

PROJECT SPECIFICATIONS

PROJECT NAME: Sundance West LFCell 1B
PROJECT NUMBER: 010153018
MIN START PSI: 35
OWNER: Sundance West, Inc
CONTRACTOR: SLS, Inc.
TEST DURATION: 5:00
PROJECT LOCATION: Eunice, NM
SHEET NUMBER: 3
MAX PSI DROP: 3

PRESSURE TEST LOCATION: Primary

	DATE	PANEL #/PANEL #	TESTER	TIME		PRESSURE		MONITORED BY	PASS/FAIL
				START	FINISH	INITIAL	FINAL		
1	1/17/2019	B41b/B42b-B41b/B42b	CZ	1:41 PM	1:46 PM	40	39	DG	PASS
2	1/17/2019	B43a to B46e-B43a to B46e	CZ	1:42 PM	1:47 PM	40	39	DG	PASS
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APPENDIX C

Cell 1B Liner Installation Documentation

C.17. FML Seam Vacuum Test and Defect-Repair Log

GORDON ENVIRONMENTAL PSC

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FML SEAM VACUUM TEST/REPAIR LOG

PROJECT NAME: Sundance West LF Cell 1B
PROJECT NUMBER: 01053018.00
OWNER: Sundance West, Inc.
CONTRACTOR: SLS, Inc.
PROJECT LOCATION: Eunice, NM
SHEET NUMBER: 1

TEST/REPAIR LOCATION: Primary
MONITOR: DG

	REPAIR DATE	PANEL	TYPE OF REPAIR	REPAIR TECH	NUMBER OF LEAKS	TESTING TECH ID	DATE ACCEPTED	COMMENTS
1	1/4/2019	B22a-B23a	DT32	LY	0	TD	1/4/2019	
2	1/4/2019	B23a-B24b	DT33	LY	0	TD	1/4/2019	
3	1/4/2019	B23-B24	DT34	LY	0	TD	1/4/2019	
4	1/4/2019	B24a-B25a	DT35	LY	0	TD	1/4/2019	
5	1/4/2019	B25a-B26a	DT36	LY	0	TD	1/4/2019	
6	1/4/2019	B26a-B27a	DT37	LY	0	TD	1/4/2019	
7	1/4/2019	B22a/B22b-B23a	P	LY	0	TD	1/4/2019	
8	1/4/2019	B22/22a-B23	P	LY	0	TD	1/4/2019	
9	1/4/2019	B23/23a-B22a	P	LY	0	TD	1/4/2019	
10	1/4/2019	B22-B23	P	LY	0	TD	1/4/2019	
11	1/4/2019	B23/B24-B23a/24a	P	LY	0	TD	1/4/2019	
12	1/4/2019	B24/B25-B24a/B25a	P	LY	0	TD	1/4/2019	
13	1/4/2019	B25/B26-B25a/B26a	P	LY	0	TD	1/4/2019	
14	1/4/2019	B27b-B28b	DT38	LY	0	TD	1/4/2019	
15	1/4/2019	B25/25a-B24b	P	LY	0	TD	1/4/2019	
16	1/4/2019	B25/25a-B26b	P	LY	0	TD	1/4/2019	
17	1/4/2019	B26-B26a	P	LY	0	TD	1/4/2019	
18	1/4/2019	B27a/B27b-B26b	P	LY	0	TD	1/4/2019	
19	1/4/2019	B27a/B27b-B28c	P	LY	0	TD	1/4/2019	
20	1/4/2019	B26/26a-B27/27a	P	LY	0	TD	1/4/2019	
21	1/4/2019	B27/27a-B28/28a	P	LY	0	TD	1/4/2019	
22	1/4/2019	B26/26b-B25a	P	LY	0	TD	1/4/2019	
23	1/4/2019	B26a/26b-B27a	P	LY	0	TD	1/4/2019	
24	1/4/2019	B27a/27b-B26b	P	LY	0	TD	1/4/2019	
25	1/4/2019	B27a/27b-B28c	P	LY	0	TD	1/4/2019	
26	1/4/2019	B28/28a-B27	P	LY	0	TD	1/4/2019	
27	1/4/2019	B28b/B28c-B27a	P	LY	0	TD	1/4/2019	
28	1/4/2019	B27a-B28b	DT39	LY	0	TD	1/4/2019	
29	1/5/2019	B28b-B29a	DT40	GZ	0	TD	1/5/2019	
30	1/5/2019	B29a-B30b	DT41	GZ	0	TD	1/5/2019	
31	1/5/2019	B30b-B31b	DT42	GZ	0	TD	1/5/2019	
32	1/5/2019	B31b-B32a	DT43	GZ	0	TD	1/5/2019	
33	1/5/2019	B29/29a-B28b	P	GZ	0	TD	1/5/2019	
34	1/5/2019	B29/29a-B30b	P	GZ	0	TD	1/5/2019	
35	1/5/2019	B30a/30b-B29a	P	GZ	0	TD	1/5/2019	
36	1/5/2019	B30a/30b-B31b	P	GZ	0	TD	1/5/2019	
37	1/5/2019	B31a/31b-B30a	P	GZ	0	TD	1/5/2019	
38	1/5/2019	B31a/31b-B32a	P	GZ	0	TD	1/5/2019	
39	1/5/2019	B28a/28b-B29/29a	P	GZ	0	TD	1/5/2019	
40	1/5/2019	B28/28a-B29	P	GZ	0	TD	1/5/2019	
41	1/5/2019	B28b/28c-B29b	P	GZ	0	TD	1/5/2019	
42	1/5/2019	B29/29a-B30/30a	P	GZ	0	TD	1/5/2019	
43	1/5/2019	B30/30a-B31/31a	P	GZ	0	TD	1/5/2019	
44	1/5/2019	B31/31a-B32/32a	P	GZ	0	TD	1/5/2019	
45	1/5/2019	B31a-B32a	DT4	GZ	0	TD	1/5/2019	

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FML SEAM VACUUM TEST/REPAIR LOG

PROJECT NAME:	Sundance West LF Cell 1B	**PROJECT NUMBER:**	01053018.00
OWNER:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	2
TEST/REPAIR LOCATION:	Primary	**MONITOR:**	DG

	REPAIR DATE	PANEL	TYPE OF REPAIR	REPAIR TECH	NUMBER OF LEAKS	TESTING TECH ID	DATE ACCEPTED	COMMENTS
1	1/5/2019	B33/33a-B32	P	GZ	0	TD	1/5/2019	
2	1/5/2019	B33/33a-B34	P	GZ	0	TD	1/5/2019	
3	1/5/2019	B32/32a-B33a/33b	P	GZ	0	TD	1/5/2019	
4	1/5/2019	B33a/33b-B34/34a	P	GZ	0	TD	1/5/2019	
5	1/5/2019	B34/34a-B35/35a	P	GZ	0	TD	1/5/2019	
6	1/5/2019	B34a/34b-B33b	P	GZ	0	TD	1/5/2019	
7	1/5/2019	B34a/34b-B35a	P	GZ	0	TD	1/5/2019	
8	1/5/2019	B35/35a-B34b	P	GZ	0	TD	1/5/2019	
9	1/5/2019	B32a-B33b	DT45	GZ	0	TD	1/5/2019	
10	1/5/2019	B33b-B34a	DT46	GZ	0	TD	1/5/2019	
11	1/5/2019	B34a-B35a	DT47	GZ	0	TD	1/5/2019	
12	1/7/2019	B35-B36	DT49	LY	0	TD	1/7/2019	
13	1/7/2019	B35/B36-B35a/B36a	P	LY	0	TD	1/7/2019	
14	1/7/2019	B36a/B36b-B35a	P	LY	0	TD	1/7/2019	
15	1/7/2019	B36a/36b-B37b	P	LY	0	TD	1/7/2019	
16	1/7/2019	B36b/36c-B35a	P	LY	0	TD	1/7/2019	
17	1/7/2019	B36b/36c-B37b	P	LY	0	TD	1/7/2019	
18	1/7/2019	B35a/35b-B36c	P	LY	0	TD	1/7/2019	
19	1/7/2019	B35b-B36c	DT48	LY	0	TD	1/7/2019	
20	1/7/2019	B36c-B37b	P	LY	0	TD	1/7/2019	
21	1/7/2019	B37a/37b-B36a	P	LY	0	TD	1/7/2019	
22	1/7/2019	B37a/37b-B38c	P	LY	0	TD	1/7/2019	
23	1/7/2019	B36a-B37a	DT50	LY	0	TD	1/7/2019	
24	1/7/2019	B38/38a-B37	P	LY	0	TD	1/7/2019	
25	1/7/2019	B38/38a-B39	P	LY	0	TD	1/7/2019	
26	1/9/2019	B22b/B22c-B23b	P	GZ	0	TD	1/9/2019	
27	1/9/2019	B23a/23b-B22b	P	GZ	0	TD	1/9/2019	
28	1/9/2019	B23a/23b-B24b	P	GZ	0	TD	1/9/2019	
29	1/9/2019	B22a-B23a	DT32	GZ	0	TD	1/9/2019	
30	1/9/2019	B24/24a-B23b	P	GZ	0	TD	1/9/2019	
31	1/9/2019	B24b	P	GZ	0	TD	1/9/2019	
32	1/9/2019	B24b	P	GZ	0	TD	1/9/2019	
33	1/9/2019	B23b-B24b	DT33	GZ	0	TD	1/9/2019	
34	1/9/2019	B22/22a-B23	P	GZ	0	TD	1/9/2019	
35	1/9/2019	B22a/22b-B23/23a	P	GZ	0	TD	1/9/2019	
36	1/9/2019	B23/23a-B24/24a	P	GZ	0	TD	1/9/2019	
37	1/10/2019	B24b-B25b	DT34	LY	0	TD	1/10/2019	
38	1/10/2019	B25a/25b-B24b	P	LY	0	TD	1/10/2019	
39	1/10/2019	B25a/25b-26a	P	LY	0	TD	1/10/2019	
40	1/10/2019	B26a/26b-B25b	P	LY	0	TD	1/10/2019	
41	1/10/2019	B26a/26b-B27a	P	LY	0	TD	1/10/2019	
42	1/10/2019	B27a/27b-B26b	P	LY	0	TD	1/10/2019	
43	1/10/2019	B24a/24b-B25a	P	LY	0	TD	1/10/2019	
44	1/10/2019	B28a/28b-B29a	P	LY	0	TD	1/10/2019	
45	1/10/2019	B30a/30b-B29a	P	LY	0	TD	1/10/2019	

GORDON ENVIRONMENTAL PSC

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FML SEAM VACUUM TEST/REPAIR LOG

PROJECT NAME: Sundance West LF Cell 1B
PROJECT NUMBER: 01053018.00
OWNER: Sundance West, Inc.
CONTRACTOR: SLS, Inc.
PROJECT LOCATION: Eunice, NM
SHEET NUMBER: 3

TEST/REPAIR LOCATION: Primary
MONITOR: DG

	REPAIR DATE	PANEL	TYPE OF REPAIR	REPAIR TECH	NUMBER OF LEAKS	TESTING TECH ID	DATE ACCEPTED	COMMENTS
1	1/10/2019	B25a-B26a	DT36	LY	0	TD	1/10/2019	
2	1/10/2019	B24a-B25a	DT35	LY	0	TD	1/10/2019	
3	1/10/2019	B26a-B27a	P	LY	0	TD	1/10/2019	
4	1/10/2019	B26b-B27a	DT37	LY	0	TD	1/10/2019	
5	1/10/2019	B27a-B26b	P	LY	0	TD	1/10/2019	
6	1/10/2019	B27a-B28b	DT38	LY	0	TD	1/10/2019	
7	1/10/2019	B27a/27b-B28b	P	LY	0	TD	1/10/2019	
8	1/10/2019	B28b/28c-B27a	P	LY	0	TD	1/10/2019	
9	1/10/2019	B28b/28c-B29a	P	LY	0	TD	1/10/2019	
10	1/10/2019	B30a/30b-B29a	P	LY	0	TD	1/10/2019	
11	1/10/2019	B24/24a-B25/25a	P	LY	0	TD	1/10/2019	
12	1/10/2019	B25/25a-B26/26a	P	LY	0	TD	1/10/2019	
13	1/10/2019	B26/26a-B27/27a	P	LY	0	TD	1/10/2019	
14	1/10/2019	B27/27a-B28/28a	P	LY	0	TD	1/10/2019	
15	1/10/2019	B28/28a-B29	P	LY	0	TD	1/10/2019	
16	1/10/2019	B28a/28b-B29/29a	P	LY	0	TD	1/10/2019	
17	1/10/2019	B28b-B29a	DT39	LY	0	TD	1/10/2019	
18	1/10/2019	B28b-B29a	DT40	LY	0	TD	1/10/2019	
19	1/10/2019	B29a-B30b	DT41	LY	0	TD	1/10/2019	
20	1/12/2019	B30b-B31b	DT42	MM	0	TD	1/12/2019	
21	1/12/2019	B31b-B32b	DT43	MM	0	TD	1/12/2019	
22	1/12/2019	B32-B33	DT44	MM	0	TD	1/12/2019	
23	1/12/2019	B32b-B33b	DT45	MM	0	TD	1/12/2019	
24	1/12/2019	B33a-B34a	DT46	MM	0	TD	1/12/2019	
25	1/12/2019	B34a-B35a	DT47	MM	0	TD	1/12/2019	
26	1/12/2019	B30a/30b-B31a	P	MM	0	TD	1/12/2019	
27	1/12/2019	B31/B31a-B30b	P	MM	0	TD	1/12/2019	
28	1/12/2019	B31/31a-B32a	P	MM	0	TD	1/12/2019	
29	1/12/2019	B31b-B32b	P	MM	0	TD	1/12/2019	
30	1/12/2019	B31b-B32b	P	MM	0	TD	1/12/2019	
31	1/12/2019	B32b-B33b	P	MM	0	TD	1/12/2019	
32	1/12/2019	B32b-B33b	P	MM	0	TD	1/12/2019	
33	1/12/2019	B32a/32b-B31b	P	MM	0	TD	1/12/2019	
34	1/12/2019	B32a/32b-B33b	P	MM	0	TD	1/12/2019	
35	1/12/2019	B33a/33b-B32	P	MM	0	TD	1/12/2019	
36	1/12/2019	B33a/33b-B34	P	MM	0	TD	1/12/2019	
37	1/12/2019	B33b/33c-B32b	P	MM	0	TD	1/12/2019	
38	1/12/2019	B33b/33c-B34a	P	MM	0	TD	1/12/2019	
39	1/12/2019	B34a/34b-B33c	P	MM	0	TD	1/12/2019	
40	1/12/2019	B34a/34b-35a	P	MM	0	TD	1/12/2019	
41	1/12/2019	B35a/35b-B34b	P	MM	0	TD	1/12/2019	
42	1/12/2019	B32b-B33c	P	MM	0	TD	1/12/2019	
43	1/12/2019	B29/29a-B30/30a	P	MM	0	TD	1/12/2019	
44	1/12/2019	B30/30a-B31/31a	P	MM	0	TD	1/12/2019	
45	1/12/2019	B31/31a-B32/32a	P	MM	0	TD	1/12/2019	

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FML SEAM VACUUM TEST/REPAIR LOG

PROJECT NAME: Sundance West LF Cell 1B
PROJECT NUMBER: 01053018.00
OWNER: Sundance West, Inc.
CONTRACTOR: SLS, Inc.
PROJECT LOCATION: Eunice, NM
SHEET NUMBER: 4

TEST/REPAIR LOCATION: Primary
MONITOR: DG

	REPAIR DATE	PANEL	TYPE OF REPAIR	REPAIR TECH	NUMBER OF LEAKS	TESTING TECH ID	DATE ACCEPTED	COMMENTS
1	1/12/2019	B32/32a-B33a/33b	P	MM	0	TD	1/12/2019	
2	1/12/2019	B33a/33b-B34/34a	P	MM	0	TD	1/12/2019	
3	1/12/2019	B34/34a-B35/35a	P	MM	0	TD	1/12/2019	
4	1/13/2019	B36-B37	DT49	MM	0	TD	1/13/2019	
5	1/13/2019	B35a-B36a	DT48	MM	0	TD	1/13/2019	
6	1/13/2019	B36b-B37a	DT50	GZ	0	TD	1/13/2019	
7	1/13/2019	B37a-B38a	DT51	GZ	0	TD	1/13/2019	
8	1/13/2019	B38a-B39b	DT52	GZ	0	TD	1/13/2019	
9	1/13/2019	B39b-B40b	DT53	GZ	0	TD	1/13/2019	
10	1/13/2019	B40a-B41a	DT54	GZ	0	TD	1/13/2019	
11	1/13/2019	B36a/36b-B35b	P	GZ	0	TD	1/13/2019	
12	1/13/2019	B36a/36b-B37a	P	GZ	0	TD	1/13/2019	
13	1/13/2019	B35a/35b-B36a	P	GZ	0	TD	1/13/2019	
14	1/13/2019	B39/39a-B38b	P	GZ	0	TD	1/13/2019	
15	1/13/2019	B39/39a-B40a	P	GZ	0	TD	1/13/2019	
16	1/13/2019	B40a/40b-B39b	P	GZ	0	TD	1/13/2019	
17	1/13/2019	B40a/40b-B41a	P	GZ	0	TD	1/13/2019	
18	1/13/2019	B41a/41b-B40b	P	GZ	0	TD	1/13/2019	
19	1/13/2019	B35/35a-B36/36a	P	GZ	0	TD	1/13/2019	
20	1/13/2019	B36/36a-B37	P	GZ	0	TD	1/13/2019	
21	1/13/2019	B37/37a-B36a	P	GZ	0	TD	1/13/2019	
22	1/13/2019	B37/37a-B38/38a	P	GZ	0	TD	1/13/2019	
23	1/13/2019	B38/38a-B37	P	GZ	0	TD	1/13/2019	
24	1/13/2019	B38/38a-B39	P	GZ	0	TD	1/13/2019	
25	1/13/2019	B38a/38b-B39	P	GZ	0	TD	1/13/2019	
26	1/13/2019	B39/39a-B38b	P	GZ	0	TD	1/13/2019	
27	1/13/2019	B39/39a-B40a	P	GZ	0	TD	1/13/2019	
28	1/13/2019	B40/40a-B39	P	GZ	0	TD	1/13/2019	
29	1/13/2019	B40/40a-B41/41a	P	GZ	0	TD	1/13/2019	
30	1/14/2019	Sec. B22b/B23a, Pri. B22c/B23b	P	MM	0	TD	1/14/2019	
31	1/14/2019	B23a/B24b, B23b/B24b	T	MM	0	TD	1/14/2019	
32	1/14/2019	B24b/B25b, B24b/B25b	T	MM	0	TD	1/14/2019	
33	1/14/2019	B25b/B26b, B25b/B26b	T	MM	0	TD	1/14/2019	
34	1/14/2019	B26b/B27b-B26b/B27b	T	MM	0	TD	1/14/2019	
35	1/14/2019	B27b/B28c, B27b/B28c	T	MM	0	TD	1/14/2019	
36	1/14/2019	B28c/B29b, B28c/B29a	T	MM	0	TD	1/14/2019	
37	1/14/2019	B29b/B30b, B29a/B30b	T	MM	0	TD	1/14/2019	
38	1/14/2019	B30b/B31b, B30b/B31b	T	MM	0	TD	1/14/2019	
39	1/14/2019	B31b/B32a, B31b/B32b	T	MM	0	TD	1/14/2019	
40	1/14/2019	B32a/B33b, B32b/B33c	T	MM	0	TD	1/14/2019	
41	1/14/2019	B33b/B34b, B33c/B34b	T	MM	0	TD	1/14/2019	
42	1/14/2019	B34b/B35b, B34b/B35b	T	MM	0	TD	1/14/2019	
43	1/14/2019	B35b/B36c, B35b/B36b	T	MM	0	TD	1/14/2019	
44	1/14/2019	B36c/B37b, B36b/B37a	T	MM	0	TD	1/14/2019	
45	1/14/2019	B37b/B38c, B37a/B38b	T	MM	0	TD	1/14/2019	

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FML SEAM VACUUM TEST/REPAIR LOG

PROJECT NAME:	Sundance West LF Cell 1B	**PROJECT NUMBER:**	01053018.00
OWNER:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	5
TEST/REPAIR LOCATION:	Primary	**MONITOR:**	DG

	REPAIR DATE	PANEL	TYPE OF REPAIR	REPAIR TECH	NUMBER OF LEAKS	TESTING TECH ID	DATE ACCEPTED	COMMENTS
1	1/14/2019	B38c/B39a, B38b/B39b	T	MM	0	TD	1/14/2019	
2	1/14/2019	B39a/B40a, B39b/B40b	T	MM	0	TD	1/14/2019	
3	1/14/2019	B40a/B41b, B40b/B41b	T	MM	0	TD	1/14/2019	
4	1/17/2019	B41b-B42b	DT55	GZ	0	TD	1/17/2019	
5	1/17/2019	B41a/41b-B42b	P	GZ	0	TD	1/17/2019	
6	1/17/2019	B42a/42b-B41a	P	GZ	0	TD	1/17/2019	
7	1/17/2019	B42a/42b-B43b	P	GZ	0	TD	1/17/2019	
8	1/17/2019	B41/41a-B42/42a	P	GZ	0	TD	1/17/2019	
9	1/17/2019	B42/42a-B43	P	GZ	0	TD	1/17/2019	
10	1/17/2019	B42-B43	P	GZ	0	TD	1/17/2019	
11	1/17/2019	B41a-B42a	DT56	GZ	0	TD	1/17/2019	
12	1/17/2019	B42b-B43b	DT57	GZ	0	TD	1/17/2019	
13	1/17/2019	B43b-B44a	DT58	GZ	0	TD	1/17/2019	
14	1/17/2019	B43a/43b-B42a	P	GZ	0	TD	1/17/2019	
15	1/17/2019	B43a/43b-B44a	P	GZ	0	TD	1/17/2019	
16	1/17/2019	B44/44a-B43	P	GZ	0	TD	1/17/2019	
17	1/17/2019	B44/44a-B45	P	GZ	0	TD	1/17/2019	
18	1/17/2019	B43-B44a	P	GZ	0	TD	1/17/2019	
19	1/17/2019	B44a-B45	DT59	GZ	0	TD	1/17/2019	
20	1/17/2019	B45-B45a	DT60	GZ	0	TD	1/17/2019	
21	1/17/2019	B45-B46a	DT61	GZ	0	TD	1/17/2019	
22	1/17/2019	B46/B46a-B45	P	GZ	0	TD	1/17/2019	
23	1/17/2019	B46a/46b-B45	P	GZ	0	TD	1/17/2019	
24	1/17/2019	B46b/46c-B45	P	GZ	0	TD	1/17/2019	
25	1/17/2019	B46c/46d-B45	P	GZ	0	TD	1/17/2019	
26	1/17/2019	B46d/46e-B45	P	GZ	0	TD	1/17/2019	
27	1/17/2019	B45/45a-B44a	P	GZ	0	TD	1/17/2019	
28	1/17/2019	B45/45a-B46e	P	GZ	0	TD	1/17/2019	
29	1/17/2019	B45a/45b-B44a	P	GZ	0	TD	1/17/2019	
30	1/17/2019	B45a/45b-B46e	P	GZ	0	TD	1/17/2019	
31	1/17/2019	B44a-B45a	P	GZ	0	TD	1/17/2019	
32	1/17/2019	B46/46a, B46a	T	GZ	0	TD	1/17/2019	
33	1/17/2019	B46a, B46/46a	T	GZ	0	TD	1/17/2019	
34	1/17/2019	B44a-B45	DT59a	GZ	0	TD	1/17/2019	
35	1/17/2019	B44a-B45	DT59b	GZ	0	TD	1/17/2019	
36	1/17/2019	B40a/B41b, B40b/B41b	P	GZ	0	TD	1/17/2019	
37	1/17/2019	B41b/B42b, B41b/B42b	T	GZ	0	TD	1/17/2019	
38	1/17/2019	B42b/B43a, B42b/B43a	P	GZ	0	TD	1/17/2019	
39	1/17/2019	B43a, B43a	P	GZ	0	TD	1/17/2019	
40	1/17/2019	B43a, B43a	P	GZ	0	TD	1/17/2019	
41	1/17/2019	B43a/B44a, B43a/B44a	T	GZ	0	TD	1/17/2019	
42	1/17/2019	B44a/B45b, B44a/B45b	T	GZ	0	TD	1/17/2019	
43	1/17/2019	B45b/B46e, B45b/B46e	T	GZ	0	TD	1/17/2019	
44	1/7/2019	B37a-B38a	DT51	LY	0	TD	1/7/2019	
45	1/7/2019	B38b/38c-B37a	P	LY	0	TD	1/7/2019	

GORDON PSC ENVIRONMENTAL

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FML SEAM VACUUM TEST/REPAIR LOG

PROJECT NAME: Sundance West LF Cell 1B
PROJECT NUMBER: 01053018.00
OWNER: Sundance West, Inc.
CONTRACTOR: SLS, Inc.
PROJECT LOCATION: Eunice, NM
SHEET NUMBER: 6

TEST/REPAIR LOCATION: Primary
MONITOR: DG

	REPAIR DATE	PANEL	TYPE OF REPAIR	REPAIR TECH	NUMBER OF LEAKS	TESTING TECH ID	DATE ACCEPTED	COMMENTS
1	1/7/2019	B38b/38c-B39a	P	LY	0	TD	1/7/2019	
2	1/7/2019	B38c-B39a	DT52	LY	0	TD	1/7/2019	
3	1/7/2019	B39a-B40a	P	LY	0	TD	1/7/2019	
4	1/7/2019	B39a-B40a	DT54	LY	0	TD	1/7/2019	
5	1/7/2019	B36/36a-B37/37a	P	LY	0	TD	1/7/2019	
6	1/7/2019	B37/37a-B38a/B38b	P	LY	0	TD	1/7/2019	
7	1/7/2019	B38a/38b-B39	P	LY	0	TD	1/7/2019	
8	1/7/2019	B39/39a-B38b	P	LY	0	TD	1/7/2019	
9	1/7/2019	B39/39a-B40a	P	LY	0	TD	1/7/2019	
10	1/7/2019	B40/40a-B39	P	LY	0	TD	1/7/2019	
11	1/7/2019	B39a-B40a	DT53	LY	0	TD	1/7/2019	
12	1/8/2019	B41a/B41b-B40a	P	MM	0	TD	1/8/2019	
13	1/8/2019	B41a/41b-B42b	P	MM	0	TD	1/8/2019	
14	1/8/2019	B42a/42b-B41a	P	MM	0	TD	1/8/2019	
15	1/8/2019	B41a-B42a	DT56	MM	0	TD	1/8/2019	
16	1/8/2019	B40a-B41a	DT55	MM	0	TD	1/8/2019	
17	1/8/2019	B41/B41a-B40a	P	MM	0	TD	1/8/2019	
18	1/8/2019	B41/41a-B42/42a	P	MM	0	TD	1/8/2019	
19	1/16/2019	B42a-B43	DT57	MM	0	TD	1/16/2019	
20	1/16/2019	B43a-B44a	DT58	MM	0	TD	1/16/2019	
21	1/16/2019	B44-B45	DT59	MM	0	TD	1/16/2019	
22	1/16/2019	B44a-B45a	DT60	MM	0	TD	1/16/2019	
23	1/16/2019	B45a-B46a	DT61	MM	0	TD	1/16/2019	
24	1/16/2019	B43/43a-B42a	P	MM	0	TD	1/16/2019	
25	1/16/2019	B43/43a-B45a	P	MM	0	TD	1/16/2019	
26	1/16/2019	B42/42a-B43	P	MM	0	TD	1/16/2019	
27	1/16/2019	B42a/42b-B43a	P	MM	0	TD	1/16/2019	
28	1/16/2019	B44/44a-B43	P	MM	0	TD	1/16/2019	
29	1/16/2019	B44/44a-B45a	P	MM	0	TD	1/16/2019	
30	1/16/2019	B45/45a-B44	P	MM	0	TD	1/16/2019	
31	1/16/2019	B45/45a-B46	P	MM	0	TD	1/16/2019	
32	1/16/2019	B44-B45a	P	MM	0	TD	1/16/2019	
33	1/16/2019	B46b/46c-B45a	P	MM	0	TD	1/16/2019	
34	1/16/2019	B46/46a-B45a	P	MM	0	TD	1/16/2019	
35	1/16/2019	B46a/46b-B45a	P	MM	0	TD	1/16/2019	
36	1/16/2019	B46c/B46d-B45a	P	MM	0	TD	1/16/2019	
37	1/16/2019	B46d/46e-B45a	P	MM	0	TD	1/16/2019	
38	1/16/2019	B45a/45b-B44a	P	MM	0	TD	1/16/2019	
39	1/16/2019	B45a/45b-B46e	P	MM	0	TD	1/16/2019	
40								
41								
42								
43								
44								
45								

APPENDIX C

Cell 1B Liner Installation Documentation

C.18. Geocomposite Deployment Log

GORDON ENVIRONMENTAL PSC

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GEOCOMPOSITE DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	1
MATERIAL TYPE:	Double-Sided - Secondary Slopes	**MONITOR:**	DG

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
N35	131558835	89	15	1,335.0	1/8/2019
N36	131558835	89	15	1,335.0	1/8/2019
N37a	131558835	21	15	315.0	1/8/2019
N37	131558842	70	15	1,050.0	1/8/2019
N38	131558842	90	15	1,350.0	1/8/2019
N39a	131558842	41	15	615.0	1/8/2019
N39	131558834	51	15	765.0	1/9/2019
N40	131558834	91	15	1,365.0	1/9/2019
N41a	131558834	57	15	855.0	1/9/2019
N41	131558809	37	15	555.0	1/9/2019
N42	131558809	92	15	1,380.0	1/9/2019
N43a	131558809	73	15	1,095.0	1/9/2019
N43	131558810	23	15	345.0	1/9/2019
N44	131558810	94	15	1,410.0	1/9/2019
N45a	131558810	85	15	1,275.0	1/9/2019
N45	131558845	12	15	180.0	1/9/2019
N46	131558845	95	15	1,425.0	1/9/2019
N47a	131558845	87	15	1,305.0	1/9/2019
N47	131558820	9	15	135.0	1/9/2019
N48	131558820	97	15	1,455.0	1/9/2019
N49	131558820	97	15	1,455.0	1/9/2019
N50	131558833	98	15	1,470.0	1/9/2019
N51	131558833	98	15	1,470.0	1/9/2019
N52	131558836	100	15	1,500.0	1/9/2019
N53	131558836	103	15	1,545.0	1/9/2019
N54	131558811	101	15	1,515.0	1/11/2019
N55	131558811	101	15	1,515.0	1/11/2019
N56	131558830	102	15	1,530.0	1/11/2019
N57a	131558830	98	15	1,470.0	1/11/2019
N57	131558849	5	15	75.0	1/11/2019
N58	131558849	103	15	1,545.0	1/11/2019
N59a	131558849	90	15	1,350.0	1/11/2019
N59	131558850	16	15	240.0	1/11/2019
N60	131558850	105	15	1,575.0	1/11/2019
N61	131558850	78	15	1,170.0	1/11/2019
N61a	131558825	29	15	435.0	1/11/2019
N62	131558825	106	15	1,590.0	1/11/2019
TOTAL LINER PLACED (FT^2):				40,995.0	

GORDON ENVIRONMENTAL PSC

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GEOCOMPOSITE DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	2
MATERIAL TYPE:	Double-Sided - Secondary Slopes	**MONITOR:**	DG

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
N63a	131558825	65	15	975.0	1/11/2019
N63	131558826	43	15	645.0	1/11/2019
N64	131558826	107	15	1,605.0	1/11/2019
N65	131558847	108	15	1,620.0	1/17/2019
N66	131558847	95	15	1,425.0	1/17/2019
N66a	131558854	15	15	225.0	1/17/2019
N67	131558854	109	15	1,635.0	1/17/2019
N68a	131558854	75	15	1,125.0	1/17/2019
N68	131558804	35	15	525.0	1/17/2019
N69	131558804	111	15	1,665.0	1/17/2019
N70	131558804	57	7	399.0	1/17/2019
N70a	131558804	57	7	399.0	1/17/2019

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GEOCOMPOSITE DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	1
MATERIAL TYPE:	Primary Double-Sided	**MONITOR:**	DG

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
N35	131558839	89	15	1,335.0	1/14/2019
N36	131558839	89	15	1,335.0	1/14/2019
N37a	131558839	20	15	300.0	1/14/2019
N37	131558856	71	15	1,065.0	1/14/2019
N38	131558856	89	15	1,335.0	1/14/2019
N39a	131558856	41	15	615.0	1/14/2019
N39	131558827	50	15	750.0	1/14/2019
N40	131558827	92	15	1,380.0	1/14/2019
N41a	131558827	60	15	900.0	1/14/2019
N41	131558837	33	15	495.0	1/14/2019
N42	131558837	94	15	1,410.0	1/14/2019
N43a	131558837	75	15	1,125.0	1/14/2019
N43	131558855	21	15	315.0	1/14/2019
N44	131558855	94	15	1,410.0	1/14/2019
N45	131558855	85	15	1,275.0	1/14/2019
N45a	131558853	11	15	165.0	1/14/2019
N46	131558853	96	15	1,440.0	1/14/2019
N47	131558853	95	15	1,425.0	1/14/2019
N47a	131558844	4	15	60.0	1/14/2019
N48	131558844	99	15	1,485.0	1/14/2019
N49	131558844	100	15	1,500.0	1/14/2019
N50	131558828	100	15	1,500.0	1/14/2019
N51	131558828	101	15	1,515.0	1/14/2019
N52	131558838	100	15	1,500.0	1/14/2019
N53	131558838	100	15	1,500.0	1/14/2019
TOTAL LINER PLACED (FT^2):				27,135.0	

GORDON ENVIRONMENTAL PSC

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GEOCOMPOSITE DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	1
MATERIAL TYPE:	Single-Sided - Primary Floor	**MONITOR:**	DG

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
B34	131558772	291	14.75	4,292.3	1/14/2019
B35	131553706	289	14.75	4,262.8	1/14/2019
B36	131553712	285	14.75	4,203.8	1/14/2019
B37	131553704	287	14.75	4,233.3	1/14/2019
B38	131553707	260	14.75	3,835.0	1/14/2019
B34a	131553708	212	14.75	3,127.0	1/14/2019
B35a	131553708	72	14.75	1,062.0	1/14/2019
B35b	131558765	142	14.75	2,094.5	1/14/2019
B36a	131558765	145	14.75	2,138.8	1/14/2019
B36b	131558783	69	14.75	1,017.8	1/14/2019
B37a	131558783	215	14.75	3,171.3	1/14/2019
B38a	131558939	243	14.75	3,584.3	1/14/2019
B39	131558780	288	14.75	4,248.0	1/14/2019
B40	131558786	290	14.75	4,277.5	1/14/2019
B41	131558769	288	14.75	4,248.0	1/14/2019
B42	131558777	290	14.75	4,277.5	1/14/2019
B43	131558784	288	14.75	4,248.0	1/14/2019
B39a	131558939	46	14.75	678.5	1/14/2019
B39b	131558754	165	14.75	2,433.8	1/14/2019
B40a	131558754	121	14.75	1,784.8	1/14/2019
B40b	131558782	86	14.75	1,268.5	1/14/2019
B41a	131558782	200	14.75	2,950.0	1/14/2019
B41b	131558781	8	14.75	118.0	1/14/2019
B42a	131558781	205	14.75	3,023.8	1/14/2019
B43a	131558781	73	14.75	1,076.8	1/14/2019
B43b	131558764	133	14.75	1,961.8	1/14/2019
B44	131558759	289	14.75	4,262.8	1/15/2019
B45	131558756	288	14.75	4,248.0	1/15/2019
B46	131558776	289	14.75	4,262.8	1/15/2019
B47	131558789	289	14.75	4,262.8	1/15/2019
B48	131558770	289	14.75	4,262.8	1/15/2019
B44a	131558764	156	14.75	2,301.0	1/15/2019
B44b	131558767	52	14.75	767.0	1/15/2019
B45a	131558767	204	14.75	3,009.0	1/15/2019
B46a	131558767	31	14.75	457.3	1/15/2019
B46b	131558766	173	14.75	2,551.8	1/15/2019
B47a	131558766	114	14.75	1,681.5	1/15/2019
TOTAL LINER PLACED (FT^2):				105,683.8	

GORDON ENVIRONMENTAL PSC

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GEOCOMPOSITE DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	2
MATERIAL TYPE:	Single-Sided - Primary Floor	**MONITOR:**	DG

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
N47b	131558773	90	14.75	1,327.5	1/15/2019
B48a	131558773	189	14.75	2,787.8	1/15/2019
B48b	131558761	5	14.75	73.8	1/15/2019
B49	131558778	288	14.75	4,248.0	1/15/2019
B50	131558788	289	14.75	4,262.8	1/15/2019
B51	131558768	288	14.75	4,248.0	1/15/2019
B52	131558775	288	14.75	4,248.0	1/15/2019
B53	131558762	288	14.75	4,248.0	1/15/2019
B49a	131558761	203	14.75	2,994.3	1/15/2019
B50a	131558761	80	14.75	1,180.0	1/15/2019
B50b	131558755	122	14.75	1,799.5	1/15/2019
B51a	131558755	164	14.75	2,419.0	1/15/2019
B51b	131558791	36	14.75	531.0	1/15/2019
B52a	131558791	199	14.75	2,935.3	1/15/2019
B53a	131558791	51	14.75	752.3	1/15/2019
B53b	131558790	148	14.75	2,183.0	1/15/2019
B54	131558785	288	14.75	4,248.0	1/15/2019
B55	131558774	289	14.75	4,262.8	1/15/2019
B56	131558763	291	14.75	4,292.3	1/15/2019
B57	131558787	290	14.75	4,277.5	1/15/2019
B58	131558779	289	14.75	4,262.8	1/15/2019
B54a	131558790	140	14.75	2,065.0	1/15/2019
B54b	131558826	51	15	765.0	1/15/2019
B54c	131558816	11	15	165.0	1/15/2019
B55a	131558816	50	15	750.0	1/15/2019
B55b	131558757	149	14.75	2,197.8	1/15/2019
B56a	131558757	139	14.75	2,050.3	1/15/2019
B56b	131558760	59	14.75	870.3	1/15/2019
B57a	131558760	197	14.75	2,905.8	1/15/2019
B58a	131558760	31	14.75	457.3	1/15/2019
B58b	131558758	166	14.75	2,448.5	1/15/2019
B59b	131558758	123	14.75	1,814.3	1/15/2019
B59	131561287	289	14.75	4,262.8	1/23/2019
B60	131561290	253	14.75	3,731.8	1/23/2019
B61	131561289	289	14.75	4,262.8	1/23/2019
B62	131561288	288	14.75	4,248.0	1/23/2019
B63	131561286	290	14.75	4,277.5	1/23/2019
TOTAL LINER PLACED (FT^2):				98,853.0	

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd., Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

GEOCOMPOSITE DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	3
MATERIAL TYPE:	Single-Sided - Primary Floor	**MONITOR:**	DG

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
B59a	131558801	73	15	1,095.0	1/23/2019
B60a	131558801	128	15	1,920.0	1/23/2019
B60b	131558802	104	15	1,560.0	1/23/2019
B61a	131558802	97	15	1,455.0	1/23/2019
B61b	131558832	99	15	1,485.0	1/23/2019
B62a	131558832	100	15	1,500.0	1/23/2019
B62b	131558813	93	15	1,395.0	1/23/2019
B63a	131558813	107	15	1,605.0	1/23/2019
B63b	131558829	87	15	1,305.0	1/23/2019
B64	131558819	189	15	2,835.0	1/23/2019
B64a	131558831	200	15	3,000.0	1/23/2019
B64b	131558829	90	15	1,350.0	1/23/2019
B65	131558814	199	15	2,985.0	1/23/2019
B66	131558822	207	15	3,105.0	1/23/2019
B67	131558840	199	15	2,985.0	1/23/2019
B68	131558806	198	15	2,970.0	1/23/2019
B65a	131558821	198	15	2,970.0	1/23/2019
B66a	131558805	199	15	2,985.0	1/23/2019
B67a	131558807	200	15	3,000.0	1/23/2019
B68a	131558851	198	15	2,970.0	1/23/2019
B65b	131558808	81	15	1,215.0	1/23/2019
B66b	131558808	74	15	1,110.0	1/23/2019
B67c	131558808	43	15	645.0	1/23/2019
B67b	131558817	38	15	570.0	1/23/2019
B68b	131558817	79	15	1,185.0	1/23/2019
B69c	131558817	81	7	567.0	1/23/2019
B69b	131558817	81	7	567.0	1/23/2019
B69a	131558811	160	7	1,120.0	1/23/2019
B69	131558811	160	7	1,120.0	1/23/2019
N54	131558824	101	15	1,515.0	1/14/2019
N55	131558824	100	15	1,500.0	1/14/2019
N56	131558846	105	15	1,575.0	1/14/2019
N57	131558846	102	15	1,530.0	1/14/2019
N57a	131558815	4	15	60.0	1/14/2019
N58	131558815	103	15	1,545.0	1/14/2019
N59	131558815	94	15	1,410.0	1/14/2019
N59a	131558823	11	15	165.0	1/14/2019
TOTAL LINER PLACED (FT^2):				61,874.0	

GORDON ENVIRONMENTAL PSC

333 Rio Rancho Blvd., Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

GEOCOMPOSITE DEPLOYMENT LOG

PROJECT NAME:	Sundance West Landfill Cell 1B	**PROJECT NUMBER:**	01053018.00
CLIENT:	Sundance West, Inc.	**CONTRACTOR:**	SLS, Inc.
PROJECT LOCATION:	Eunice, NM	**SHEET NUMBER:**	4
MATERIAL TYPE:	Single-Sided - Primary Floor	**MONITOR:**	DG

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
N60	131558823	104	15	1,560.0	1/14/2019
N61	131558823	86	15	1,290.0	1/14/2019
N61a	131558843	20	15	300.0	1/14/2019
N62	131558843	105	15	1,575.0	1/14/2019
N63	131558843	75	15	1,125.0	1/14/2019
N63a	131558816	31	15	465.0	1/14/2019
N64	131558816	107	15	1,605.0	1/14/2019
N65	131558848	108	15	1,620.0	1/22/2019
N66	131558848	95	15	1,425.0	1/22/2019
N66a	131558803	15	15	225.0	1/22/2019
N67	131558803	109	15	1,635.0	1/22/2019
N68	131558803	79	15	1,185.0	1/22/2019
N68a	131558852	33	15	495.0	1/22/2019
N69	131558852	112	15	1,680.0	1/22/2019
N70	131558852	57	7	399.0	1/22/2019
N70a	131558852	57	7	399.0	1/22/2019
TOTAL LINER PLACED (FT^2):				16,983.0	

APPENDIX C

Cell 1B Liner Installation Documentation

C.19. Geotextile Deployment Log

333 Rio Rancho Blvd., Suite 400
Rio Rancho, New Mexico 87124
505.867.6990

GEOTEXTILE DEPLOYMENT LOG

PROJECT NAME: Sundance West Landfill Cell 1B
CLIENT: Sundance West, Inc.
PROJECT LOCATION: Eunice, NM
PROJECT NUMBER: 01053018.00
CONTRACTOR: SLS, Inc.
SHEET NUMBER: 1

MATERIAL TYPE: Geotextile
MONITOR: DG

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
LP3	2024874181	300.0	15.0	4,500.0	2-2-19
LP4	2025464014	120.0	15.0	1,800.0	2-2-19

APPENDIX C

Cell 1B Liner Installation Documentation

C.20. Demtech Tensiometer Calibration Certificate

Demtech Services, Inc.

Placerville, California, USA

CALIBRATION CERTIFICATE

Tensiometer Model: Pro-Tester T-0100

Device Calibrated: S-Type load cell
Range: 0 - 750 lbs. Tension
Model No: M2405-750#
Serial No: **6070**

Calibration Apparatus:
Pro-Cal unit, model TC-0100/A

A/D Module Model No: T-029
A/D Module Serial No: **4914006070**
Channel No: N/A

Dead Weight:		Reference Cell:	
W1	2	R1	2
W2	152	R2	152
W3	302	R3	302

Indicator reading with no load: 0

Offset: **5.953869** Scale: **3.326866**

Applied Force lbs.	Cell Response	Deviation Error
2	2	0.00
52	52	0.00
102	102	0.00
152	152	0.00
202	202	0.00
252	252	0.00
302	302	0.00

Total Deviation Error (%): 0.00%

Temperature at time of calibration: 73 degrees F
Exitation Voltage: 5 V DC

This calibration conforms to the standards set by ASTM E4 and is traceable to NIST standards

Note: A/D Module and load cell above have been systems calibrated and are considered a matched pair. In general, calibrated A/D Modules and load cells are not interchangeable.

Technician: BF Date: 11/19/18

Demtech Services, Inc.

Placerville, California, USA

CALIBRATION CERTIFICATE

Tensiometer Model: Pro-Tester T-0100

Device Calibrated: S-Type load cell
Range: 0 - 750 lbs. Tension
Model No: M2405-750#
Serial No: **6063**

Calibration Apparatus:
Pro-Cal unit, model TC-0100/A

A/D Module Model No: T-029
A/D Module Serial No: **4914006063**
Channel No: N/A

Dead Weight:

W1	2
W2	152
W3	302

Reference Cell:

R1	2
R2	152
R3	302

Indicator reading with no load: 0

Offset: **1.524708** Scale: **3.322392**

Applied Force lbs.	Cell Response:	Deviation Error:
2	2	0.00
52	52	0.00
102	102	0.00
152	152	0.00
202	202	0.00
252	252	0.00
302	302	0.00

Total Deviation Error (%): 0.00%

Temperature at time of calibration: 73 degrees F
Exitation Voltage: 5 V DC

This calibration conforms to the standards set by ASTM E4 and is traceable to NIST standards

Note: A/D Module and load cell above have been systems calibrated and are considered a matched pair. In general, calibrated A/D Modules and load cells are not interchangeable.

Technician: BF Date: 11/19/18

APPENDIX D

Independent Laboratory FML Destructive Testing Results

D.1. Secondary Liner Destructive Test

Date: 2019-01-17

Mail To:
Mark Decarlo
Southwest Liner Systems, Inc
P.O. Box 1972
Bernalillo , NM , 87004

Bill To:

Southwest Liner Systems, Inc

e-mail:
mark@slsliner.com jzazpe.sls@gmail.com bigz6990@gmail.com

Dear Mr. Decarlo,

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

Project:	**Sundance LF Cell 1B Secondary**
TRI Job Reference Number:	**44051**
Material(s) Tested:	(5) Heat Fusion Weld Seam(s)
Test(s) Requested:	SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

Codes:	
AD	Adhesion Failure (100% Peel)
BRK	Break in sheeting away from Seam edge.
SE	Break in sheeting at edge of seam.
AD-BRK	Break in sheeting after some adhesion failure - partial peel.
SIP	Separation in the plane of the sheet (leaving the bond intact).
FTB	Film tearing bond (all non "AD" failures).
NON-FTB	100% peel.

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



Brian Anderson
Project Manager
Geosynthetic Services Division
http://www.geosyntheticstestinc.com

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.

DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance LF Cell 1B Secondary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 44051

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: SDT-57 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	130	127	128	126	125	**127**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	134	118	128	114	113	**121**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	163	165	163	163	165	**164**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: SDT-58 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	137	132	130	133	130	**132**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	141	145	138	137	142	**141**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	169	170	170	172	174	**171**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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.

DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance LF Cell 1B Secondary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 44051

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: SDT-59 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	143	143	146	143	143	**144**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	149	142	143	142	133	**142**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	179	177	182	182	180	**180**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: SDT-60 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	138	132	137	129	138	**135**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	135	150	132	130	125	**134**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	174	170	171	171	175	**172**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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.

DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance LF Cell 1B Secondary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 44051

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: SDT-61 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	149	139	157	136	139	**144**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	147	150	151	145	149	**148**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	178	176	176	175	181	**177**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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.

Date: 2019-01-10

Mail To:
Mark Decarlo
Southwest Liner Systems, Inc
P.O. Box 1972
Bernalillo , NM , 87004

Bill To:

Southwest Liner Systems, Inc

e-mail:
mark@slsliner.com jzazpe.sls@gmail.com bigz6990@gmail.com

Dear Mr. Decarlo,

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

Project:	**Sundance LF Cell 1B Secondary**
TRI Job Reference Number:	**43921**
Material(s) Tested:	(2) Heat Fusion Weld Seam(s)
Test(s) Requested:	SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

Codes:	
AD	Adhesion Failure (100% Peel)
BRK	Break in sheeting away from Seam edge.
SE	Break in sheeting at edge of seam.
AD-BRK	Break in sheeting after some adhesion failure - partial peel.
SIP	Separation in the plane of the sheet (leaving the bond intact).
FTB	Film tearing bond (all non "AD" failures).
NON-FTB	100% peel.

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



Brian Anderson
Project Manager
Geosynthetic Services Division
http://www.geosyntheticstestinc.com

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.

DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance LF Cell 1B Secondary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43921

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: SDT-55 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	113	120	121	117	120	**118**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	119	123	116	123	113	**119**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	154	155	152	149	151	**152**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: SDT-56 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	117	119	117	117	117	**117**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	119	118	117	115	114	**117**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	158	160	155	157	154	**157**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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.

Date: 2019-01-08

Mail To:
Mark Decarlo
Southwest Liner Systems, Inc
P.O. Box 1972
Bernalillo , NM , 87004

Bill To:

Southwest Liner Systems, Inc

e-mail:
mark@slsliner.com jzazpe.sls@gmail.com bigz6990@gmail.com

Dear Mr. Decarlo,

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

Project:	**Sundance LF Cell 1B Secondary**
TRI Job Reference Number:	**43894**
Material(s) Tested:	(15) Heat Fusion Weld Seam(s)
Test(s) Requested:	SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

Codes:	
AD	Adhesion Failure (100% Peel)
BRK	Break in sheeting away from Seam edge.
SE	Break in sheeting at edge of seam.
AD-BRK	Break in sheeting after some adhesion failure - partial peel.
SIP	Separation in the plane of the sheet (leaving the bond intact).
FTB	Film tearing bond (all non "AD" failures).
NON-FTB	100% peel.

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



Brian Anderson
Project Manager
Geosynthetic Services Division
http://www.geosyntheticstestinc.com

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance LF Cell 1B Secondary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43894

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: SDT-40 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	122	111	122	117	125	**119**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	115	119	121	120	120	**119**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	149	155	154	153	156	**153**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: SDT-41 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	121	118	122	117	116	**119**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	114	116	124	112	120	**117**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	149	152	151	153	155	**152**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance LF Cell 1B Secondary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43894

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: SDT-42 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	128	123	123	126	124	**125**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	120	120	127	119	122	**122**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	151	156	153	152	153	**153**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: SDT-43 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	116	121	120	117	112	**117**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	118	120	117	114	117	**117**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	156	154	153	155	153	**154**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance LF Cell 1B Secondary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43894

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: SDT-44 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	122	122	123	128	122	**123**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	120	122	116	115	121	**119**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	153	155	155	156	155	**155**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: SDT-45 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	116	116	112	116	114	**115**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	115	117	123	112	121	**118**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	156	152	157	153	153	**154**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance LF Cell 1B Secondary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43894

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: SDT-46 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	122	114	122	121	131	**122**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	123	113	118	119	117	**118**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	158	156	155	156	154	**156**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: SDT-47 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	128	125	123	121	128	**125**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	121	125	121	122	124	**123**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	155	157	157	156	155	**156**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance LF Cell 1B Secondary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43894

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: SDT-48 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	129	129	127	129	131	**129**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	118	137	143	124	142	**133**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	152	156	154	156	152	**154**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: SDT-49 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	147	144	137	132	143	**141**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	146	144	146	144	150	**146**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	184	182	181	180	179	**181**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance LF Cell 1B Secondary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43894

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: SDT-50 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	117	122	128	128	123	**124**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	116	118	134	133	136	**127**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	162	162	163	163	162	**162**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: SDT-51 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	125	139	136	122	121	**129**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	117	119	120	118	119	**119**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	162	162	168	161	168	**164**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance LF Cell 1B Secondary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43894

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: SDT-52 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	133	138	118	136	122	**129**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	127	124	126	123	130	**126**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	161	166	164	160	160	**162**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: SDT-53 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	112	124	125	119	113	**119**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	119	129	121	118	116	**121**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	156	157	154	153	155	**155**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance LF Cell 1B Secondary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43894

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: SDT-54 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	127	118	133	124	126	**126**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	117	118	122	113	116	**117**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	153	156	156	152	157	**155**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Date: 2019-01-07

Mail To:
Mark Decarlo
Southwest Liner Systems, Inc
P.O. Box 1972
Bernalillo , NM , 87004

Bill To:

Southwest Liner Systems, Inc

e-mail:
mark@slsliner.com jzazpe.sls@gmail.com bigz6990@gmail.com

Dear Mr. Decarlo,

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

Project:	**Sundance LF Cell 1B Secondary**
TRI Job Reference Number:	**43865**
Material(s) Tested:	(8) Heat Fusion Weld Seam(s)
Test(s) Requested:	SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

Codes:	
AD	Adhesion Failure (100% Peel)
BRK	Break in sheeting away from Seam edge.
SE	Break in sheeting at edge of seam.
AD-BRK	Break in sheeting after some adhesion failure - partial peel.
SIP	Separation in the plane of the sheet (leaving the bond intact).
FTB	Film tearing bond (all non "AD" failures).
NON-FTB	100% peel.

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



Brian Anderson
Project Manager
Geosynthetic Services Division
http://www.geosyntheticstestinc.com

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance LF Cell 1B Secondary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43865

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: SDT-32 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	120	124	124	126	126	**124**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	129	117	125	120	123	**123**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	152	155	156	157	156	**155**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: SDT-33 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	142	126	124	116	125	**127**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	127	115	115	115	118	**118**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	154	156	158	154	157	**156**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance LF Cell 1B Secondary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43865

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: SDT-34 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	145	143	145	136	142	**142**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	142	152	158	151	143	**149**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	180	184	184	188	188	**185**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: SDT-35 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	120	127	126	118	123	**123**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	124	128	127	136	130	**129**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	162	168	165	163	170	**166**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance LF Cell 1B Secondary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43865

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: SDT-36 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	146	123	127	126	129	**130**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	127	120	122	120	126	**123**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	165	165	167	161	164	**164**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: SDT-37 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	117	126	122	125	116	**121**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	115	126	118	127	116	**120**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	159	162	163	158	159	**160**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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.

DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance LF Cell 1B Secondary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43865

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: SDT-38 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	124	127	123	123	124	**124**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	127	124	124	118	126	**124**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	159	157	155	154	158	**157**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: SDT-39 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	119	127	121	124	123	**123**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	125	120	136	121	138	**128**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	164	165	161	164	163	**163**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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 D

Independent Laboratory FML Destructive Testing Results

D.2. Primary Liner Destructive Test

Date: 2019-01-10

Mail To:
Mark Decarlo
Southwest Liner Systems, Inc
P.O. Box 1972
Bernalillo , NM , 87004

Bill To:

Southwest Liner Systems, Inc

e-mail:
mark@slsliner.com jzazpe.sls@gmail.com bigz6990@gmail.com

Dear Mr. Decarlo,

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

Project:	**Sundance Cell 1B Primary**
TRI Job Reference Number:	**43923**
Material(s) Tested:	(2) Heat Fusion Weld Seam(s)
Test(s) Requested:	SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

Codes:	
AD	Adhesion Failure (100% Peel)
BRK	Break in sheeting away from Seam edge.
SE	Break in sheeting at edge of seam.
AD-BRK	Break in sheeting after some adhesion failure - partial peel.
SIP	Separation in the plane of the sheet (leaving the bond intact).
FTB	Film tearing bond (all non "AD" failures).
NON-FTB	100% peel.

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



Brian Anderson
Project Manager
Geosynthetic Services Division
http://www.geosyntheticstestinc.com

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.

DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance Cell 1B Primary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43923

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: PDT-32 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	128	127	127	128	124	**127**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	118	122	117	120	114	**118**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	156	156	155	156	159	**156**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: PDT-33 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	131	129	128	127	128	**129**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	124	123	121	120	123	**122**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	156	152	152	148	149	**151**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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.

Date: 2019-01-11

Mail To:
Mark Decarlo
Southwest Liner Systems, Inc
P.O. Box 1972
Bernalillo , NM , 87004

Bill To:

Southwest Liner Systems, Inc

e-mail:
mark@slsliner.com jzazpe.sls@gmail.com bigz6990@gmail.com

Dear Mr. Decarlo,

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

Project:	**Sundance Cell 1B Primary**
TRI Job Reference Number:	**43942**
Material(s) Tested:	(8) Heat Fusion Weld Seam(s)
Test(s) Requested:	SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

Codes:	
AD	Adhesion Failure (100% Peel)
BRK	Break in sheeting away from Seam edge.
SE	Break in sheeting at edge of seam.
AD-BRK	Break in sheeting after some adhesion failure - partial peel.
SIP	Separation in the plane of the sheet (leaving the bond intact).
FTB	Film tearing bond (all non "AD" failures).
NON-FTB	100% peel.

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



Brian Anderson
Project Manager
Geosynthetic Services Division
http://www.geosyntheticstestinc.com

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.

DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance Cell 1B Primary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43942

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: PDT-34 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	122	116	125	124	127	**123**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	122	129	125	133	134	**129**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	155	154	153	153	157	**154**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: PDT-35 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	127	123	129	126	127	**126**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	113	127	124	122	127	**123**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	153	154	156	154	151	**154**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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.

DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance Cell 1B Primary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43942

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: PDT-36 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	126	129	127	125	124	**126**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	124	119	121	116	122	**120**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	154	158	156	148	156	**154**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: PDT-37 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	121	125	120	125	126	**123**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	130	125	126	124	121	**125**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	149	155	154	154	158	**154**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance Cell 1B Primary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43942

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: PDT-38 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	119	116	111	112	111	**114**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	115	131	115	127	114	**120**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	151	155	154	154	158	**154**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: PDT-39 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	122	124	122	125	124	**123**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	126	127	127	129	130	**128**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	153	154	156	155	159	**155**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance Cell 1B Primary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 43942

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: PDT-40 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	125	121	127	123	123	**124**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	122	123	128	122	124	**124**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	157	155	160	156	158	**157**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: PDT-41 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	113	108	116	107	107	**110**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	117	117	121	130	119	**121**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	151	151	148	148	147	**149**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Date: 2019-01-15

Mail To:
Mark Decarlo
Southwest Liner Systems, Inc
P.O. Box 1972
Bernalillo , NM , 87004

Bill To:

Southwest Liner Systems, Inc

e-mail:
mark@slsliner.com jzazpe.sls@gmail.com bigz6990@gmail.com

Dear Mr. Decarlo,

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

Project:	**Sundance Cell 1B Primary**
TRI Job Reference Number:	**44001**
Material(s) Tested:	(6) Heat Fusion Weld Seam(s)
Test(s) Requested:	SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

Codes:	
AD	Adhesion Failure (100% Peel)
BRK	Break in sheeting away from Seam edge.
SE	Break in sheeting at edge of seam.
AD-BRK	Break in sheeting after some adhesion failure - partial peel.
SIP	Separation in the plane of the sheet (leaving the bond intact).
FTB	Film tearing bond (all non "AD" failures).
NON-FTB	100% peel.

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



Brian Anderson
Project Manager
Geosynthetic Services Division
http://www.geosyntheticstestinc.com

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance Cell 1B Primary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 44001

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: PDT-42 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	123	123	120	120	117	**121**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	124	125	127	132	134	**128**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	173	176	177	180	181	**177**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: PDT-43 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	117	135	118	116	120	**121**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	119	122	121	128	122	**122**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	153	154	157	157	156	**155**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance Cell 1B Primary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 44001

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: PDT-44 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	143	149	144	141	145	**144**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	145	147	146	145	140	**145**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	145	145	147	148	150	**147**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: PDT-45 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	112	129	118	119	125	**121**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	119	128	118	116	129	**122**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	151	155	155	152	154	**153**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance Cell 1B Primary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 44001

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: PDT-46 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	130	131	130	126	130	**129**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	122	120	119	125	119	**121**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	151	155	156	158	159	**156**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: PDT-47 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	131	128	134	125	133	**130**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	126	127	117	124	123	**123**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	149	153	155	154	152	**153**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Date: 2019-01-17

Mail To:
Mark Decarlo
Southwest Liner Systems, Inc
P.O. Box 1972
Bernalillo , NM , 87004

Bill To:

Southwest Liner Systems, Inc

e-mail:
mark@slsliner.com jzazpe.sls@gmail.com bigz6990@gmail.com

Dear Mr. Decarlo,

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

Project:	**Sundance Cell 1B Primary**
TRI Job Reference Number:	**44047**
Material(s) Tested:	(7) Heat Fusion Weld Seam(s)
Test(s) Requested:	SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

Codes:	
AD	Adhesion Failure (100% Peel)
BRK	Break in sheeting away from Seam edge.
SE	Break in sheeting at edge of seam.
AD-BRK	Break in sheeting after some adhesion failure - partial peel.
SIP	Separation in the plane of the sheet (leaving the bond intact).
FTB	Film tearing bond (all non "AD" failures).
NON-FTB	100% peel.

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



Brian Anderson
Project Manager
Geosynthetic Services Division
http://www.geosyntheticstestinc.com

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance Cell 1B Primary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 44047

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: PDT-48 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	124	125	122	123	125	**124**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	123	107	122	109	119	**116**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	152	155	153	150	153	**153**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: PDT-49 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	143	141	133	143	133	**139**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	147	155	141	144	158	**149**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	179	184	179	184	185	**182**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance Cell 1B Primary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 44047

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: PDT-50 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	126	130	127	121	127	**126**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	131	121	128	123	118	**124**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	156	158	158	158	159	**158**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: PDT-51 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	129	130	123	125	131	**128**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	125	125	121	123	126	**124**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	154	157	155	157	157	**156**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance Cell 1B Primary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 44047

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: PDT-52 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	132	119	131	129	117	**126**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	122	131	123	128	124	**126**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	153	157	154	153	157	**155**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: PDT-53 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	119	122	125	118	117	**120**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	122	122	119	121	122	**121**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	152	153	154	149	152	**152**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance Cell 1B Primary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 44047

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: PDT-54 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	130	136	131	114	121	**126**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	116	120	118	115	117	**117**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	152	158	153	152	154	**154**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Date: 2019-01-18

Mail To:
Mark Decarlo
Southwest Liner Systems, Inc
P.O. Box 1972
Bernalillo , NM , 87004

Bill To:

Southwest Liner Systems, Inc

e-mail:
mark@slsliner.com jzazpe.sls@gmail.com bigz6990@gmail.com

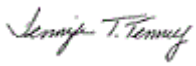
Dear Mr. Decarlo,

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

Project:	**Sundance Cell 1B Primary**
TRI Job Reference Number:	**44065**
Material(s) Tested:	(8) Heat Fusion Weld Seam(s)
Test(s) Requested:	SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

Codes:	
AD	Adhesion Failure (100% Peel)
BRK	Break in sheeting away from Seam edge.
SE	Break in sheeting at edge of seam.
AD-BRK	Break in sheeting after some adhesion failure - partial peel.
SIP	Separation in the plane of the sheet (leaving the bond intact).
FTB	Film tearing bond (all non "AD" failures).
NON-FTB	100% peel.

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



Jennifer Tenney
Project Manager
Geosynthetic Services Division
http://www.geosyntheticstestinc.com

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance Cell 1B Primary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 44065

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: PDT-55 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	134	139	140	133	132	**136**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	127	133	122	134	139	**131**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	171	169	172	168	169	**170**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: PDT-56 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	129	130	137	133	133	**132**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	119	137	126	130	121	**127**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	163	163	166	162	160	**163**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance Cell 1B Primary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 44065

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: PDT-57 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	150	145	146	141	143	**145**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	143	140	156	140	154	**147**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	182	187	180	180	182	**182**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: PDT-58 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	154	149	153	143	150	**150**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	146	160	142	152	151	**150**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	180	188	180	180	181	**182**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance Cell 1B Primary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 44065

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: PDT-59A | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	147	144	148	140	145	**145**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	141	144	136	145	142	**142**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	181	183	180	182	183	**182**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: PDT-59B | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	151	152	113	146	145	**141**
Peel Incursion (%)	<5	<5	20	<5	<5	
Peel Locus Of Failure Code	SE	SE	AD-BRK	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	140	146	149	161	138	**147**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	181	185	182	184	180	**182**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Southwest Liner Systems, Inc
Project: Sundance Cell 1B Primary

Material: 60 mil. HDPE
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log#: 44065

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: PDT-60 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	135	135	145	134	151	**140**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	138	132	138	133	143	**137**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	157	160	158	157	160	**158**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: PDT-61 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	145	149	152	143	145	**147**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	129	151	135	142	130	**137**
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	172	176	174	169	168	**172**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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APPENDIX E

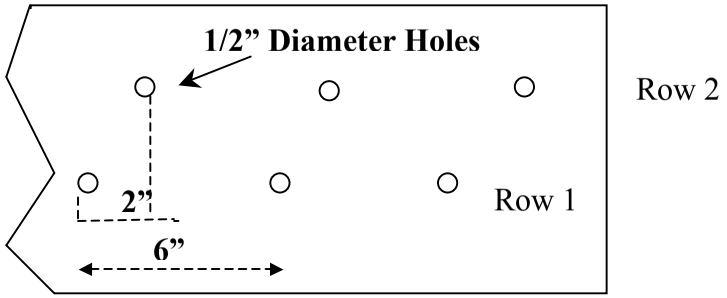
Leak Detection System Certifications

E.1. Leachate Pipe and Riser Pipe Parts Certification

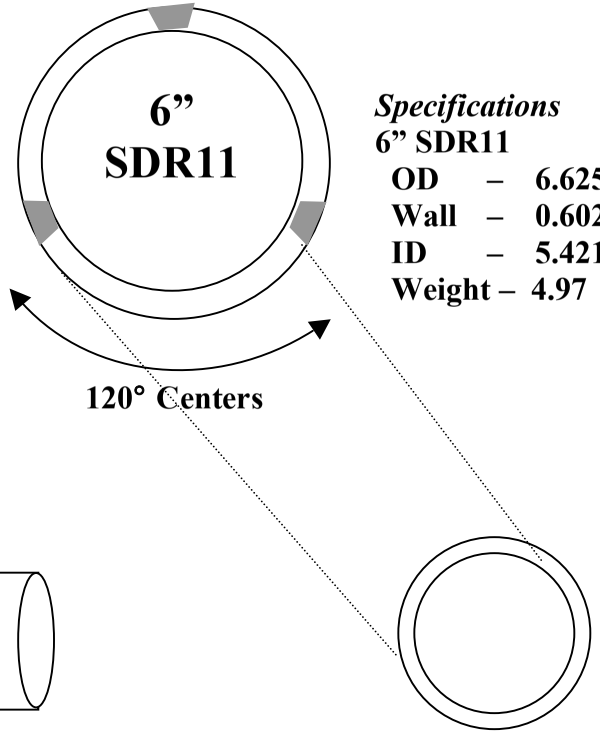
Customer Signature Approval_____

SECOR

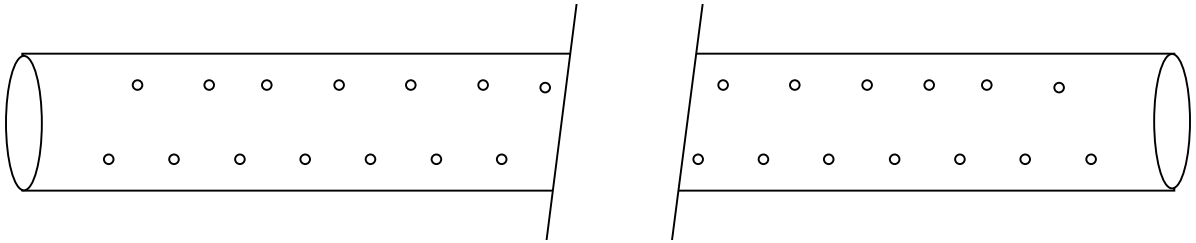
6” SDR11 1/2” HOLES x 3 rows 120° apart one row Spiraled to create a 2” offset



The third row will be 2” offset from row #1 & row #2



Specifications
6” SDR11
OD – 6.625”
Wall – 0.602”
ID – 5.421”
Weight – 4.97 lbs per foo



TITAN INDUSTRIES, INC.

East Hwy 30
Paxton, Nebraska 69155
800/658-4086

UNITED POLY SYSTEMS

W A T E R L I N E

Applications include:

- Municipal and Industrial
- Potable water - NSF
- Sewer Line - AWWA/F714
- Force Main Sewer- AWWA/F714
- Slip Lining/Pipe Bursting
- Etc.

- Product may be striped for different indicators:
  Blue stripe - Water or Potable
  Green stripe - Sewer
  Purple stripe - Reclaim Water
- IPS/DIPS-Gray Pipe with or without stripe also offered for slip lining, pipe bursting, etc. (Gray Pipe Cell Classification 445574E)
- Product is manufactured in IPS (iron pipe size) and DIPS (ductile iron pipe size 4" and up).
- United Poly Systems Pressure Pipe is used in oil and gas piping systems (D2513), industrial & mining, force main sewer (AWWA/F714), potable water (NSF), & landfill.
- The material requirements for PE pressure pipe shall meet or exceed ASTM Standard D 3350 requirements. Materials produced for water application shall meet or exceed ASTM D3035.

PE4710 Typical Physical Properties

*nominal values

Property	Typical Value	Units	Test Method
Density with minimum 2% carbon black	.960	g/cc	ASTM D 792 or 1505
High Load Melt Index	8.5	g/10 minutes	ASTM D 1238
Melt Index	0.08	g/10 minutes	ASTM D 1238
Flexural Modulus	110,000<160,000	Psi	ASTM D 790
Tensile Strength @ yield (2 in/min)	3600	Psi	ASTM D 638
Tensile Elongation @ Break	740%	%	ASTM D 638
Thermal expansion	1.0 x 10-4	in/in/°F	ASTM D 696
HDB 73.4° F (23°C)	1600	Psi	ASTM D 2837
HDB 140° F (60°C)	1000	Psi	ASTM D 2837
PENT	>500	Hrs	ASTM F1473
Brittleness Temperature	<-103°F (-75°C)	°F	ASTM D 746
Cell Classification	445574C(black only)		ASTM D 3350

***Nominal values are to be used as guidelines only; this is not a product specification and does not indicate minimum or maximum values.**

4707 E. Kearney, Springfield, MO 65803 • 417.708.9887 • www.unitedpolysystems.com

* Revised 9/15/2016

WL102 – IPS PIPE SIZES AND PRESSURE CLASS



WL PLASTICS
POLYETHYLENE PIPE
The Ideal Piping Solution

PE4710		PC[B], psi	335	320	250	200	160	150	140	125	110	100	80	65
IPS SIZE[A]	AVG OD, in	DR	7	7.3	9	11	13.5	14.3	15.5	17	19	21	26	32.5
		Min wall, in	0.150	0.144	0.117	0.095								
3/4	1.050	Avg ID[C], in	0.732	0.745	0.803	0.848								
		Weight, lb/ft	0.187	0.177	0.148	0.124								
		Min wall, in	0.188	0.180	0.146	0.120								
1	1.315	Avg ID[C], in	0.917	0.933	1.005	1.062								
		Weight, lb/ft	0.288	0.278	0.232	0.195								
		Min wall, in	0.237	0.227	0.184	0.151								
1 1/4	1.660	Avg ID[C], in	1.157	1.178	1.269	1.340								
		Weight, lb/ft	0.459	0.442	0.369	0.310								
		Min wall, in	0.271	0.260	0.211	0.173								
1 1/2	1.900	Avg ID[C], in	1.325	1.348	1.452	1.534								
		Weight, lb/ft	0.600	0.580	0.485	0.406								
		Min wall, in	0.339	0.325	0.264	0.216	0.176	0.166	0.153	0.140				
2	2.375	Avg ID[C], in	1.656	1.685	1.816	1.917	2.002	2.023	2.050	2.079				
		Weight, lb/ft	0.939	0.906	0.758	0.634	0.526	0.499	0.462	0.425				
		Min wall, in	0.411	0.394	0.319	0.261	0.213	0.201	0.185	0.169				
2 ½	2.875	Avg ID[C], in	2.004	2.040	2.198	2.321	2.424	2.449	2.482	2.516				
		Weight, lb/ft	1.377	1.329	1.109	0.928	0.771	0.731	0.677	0.622				
		Min wall, in	0.500	0.479	0.389	0.318	0.259	0.245	0.226	0.206	0.184	0.167		
3	3.500	Avg ID[C], in	2.440	2.484	2.676	2.825	2.950	2.981	3.021	3.064	3.109	3.147		
		Weight, lb/ft	2.040	1.968	1.646	1.376	1.141	1.084	1.006	0.923	0.830	0.757		
		Min wall, in	0.643	0.616	0.500	0.409	0.333	0.315	0.290	0.265	0.237	0.214	0.173	0.138
4	4.500	Avg ID[C], in	3.137	3.193	3.440	3.633	3.793	3.833	3.885	3.939	3.998	4.046	4.133	4.206
		Weight, lb/ft	3.372	3.253	2.720	2.275	1.887	1.793	1.660	1.526	1.374	1.247	1.018	0.819
		Min wall, in	0.795	0.762	0.618	0.506	0.412	0.389	0.359	0.327	0.293	0.265	0.214	0.171
5	5.563	Avg ID[C], in	3.878	3.947	4.253	4.491	4.689	4.738	4.802	4.869	4.942	5.001	5.109	5.200
		Weight, lb/ft	5.154	4.975	4.156	3.479	2.886	2.737	2.540	2.328	2.100	1.909	1.557	1.254
		Min wall, in	0.946	0.908	0.736	0.602	0.491	0.463	0.427	0.390	0.349	0.315	0.255	0.204
6	6.625	Avg ID[C], in	4.619	4.701	5.064	5.348	5.585	5.643	5.719	5.799	5.886	5.956	6.085	6.193
		Weight, lb/ft	7.305	7.059	5.894	4.930	4.095	3.879	3.599	3.307	2.978	2.703	2.209	1.781
		Min wall, in	1.232	1.182	0.958	0.784	0.639	0.603	0.556	0.507	0.454	0.411	0.332	0.265
8	8.625	Avg ID[C], in	6.013	6.120	6.593	6.963	7.271	7.346	7.445	7.549	7.663	7.754	7.922	8.062
		Weight, lb/ft	12.385	11.963	9.988	8.359	6.939	6.578	6.100	5.597	5.044	4.591	3.744	3.012
		Min wall, in	1.536	1.473	1.194	0.977	0.796	0.752	0.694	0.632	0.566	0.512	0.413	0.331
10	10.750	Avg ID[C], in	7.494	7.628	8.218	8.678	9.062	9.156	9.280	9.409	9.551	9.665	9.873	10.049
		Weight, lb/ft	19.245	18.581	15.515	12.983	10.774	10.224	9.490	8.695	7.838	7.128	5.805	4.689
		Min wall, in	1.821	1.747	1.417	1.159	0.944	0.892	0.823	0.750	0.671	0.607	0.490	0.392
12	12.750	Avg ID[C], in	8.889	9.047	9.747	10.293	10.748	10.860	11.006	11.160	11.327	11.463	11.710	11.918
		Weight, lb/ft	27.062	26.138	21.837	18.267	15.155	14.383	13.348	12.238	11.021	10.023	8.169	6.587
		Min wall, in	2.000	1.918	1.556	1.273	1.037	0.979	0.903	0.824	0.737	0.667	0.538	0.431
14	14.000	Avg ID[C], in	9.760	9.934	10.702	11.302	11.801	11.925	12.085	12.254	12.438	12.587	12.858	13.087
		Weight, lb/ft	32.635	31.511	26.329	22.030	18.279	17.334	16.082	14.763	13.292	12.093	9.848	7.952

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PE4710		PC[B], psi	335	320	250	200	160	150	140	125	110	100	80	65
IPS SIZE[A]	AVG OD, in	DR	7	7.3	9	11	13.5	14.3	15.5	17	19	21	26	32.5
		Min wall, in	2.286	2.192	1.778	1.455	1.185	1.119	1.032	0.941	0.842	0.762	0.615	0.492
16	16.000	Avg ID[C], in	11.154	11.353	12.231	12.916	13.487	13.628	13.812	14.005	14.215	14.385	14.695	14.956
		Weight, lb/ft	42.629	41.157	34.384	28.777	23.872	22.643	21.005	19.269	17.355	15.789	12.866	10.375
		Min wall, in	2.571	2.466	2.000	1.636	1.333	1.259	1.161	1.059	0.947	0.857	0.692	0.554
18	18.000	Avg ID[C], in	12.549	12.773	13.760	14.531	15.173	15.332	15.538	15.755	15.992	16.183	16.532	16.826
		Weight, lb/ft	53.940	52.089	43.513	36.403	30.210	28.660	26.584	24.395	21.959	19.977	16.286	13.142
		Min wall, in	2.857	2.740	2.222	1.818	1.481	1.399	1.290	1.176	1.053	0.952	0.769	0.615
20	20.000	Avg ID[C], in	13.943	14.192	15.289	16.145	16.859	17.035	17.265	17.506	17.768	17.981	18.369	18.695
		Weight, lb/ft	66.599	64.307	53.715	44.947	37.294	35.385	32.820	30.102	27.129	24.658	20.109	16.211
		Min wall, in	3.143	3.014	2.444	2.000	1.630	1.538	1.419	1.294	1.158	1.048	0.846	0.677
22	22.000	Avg ID[C], in	15.337	15.611	16.818	17.760	18.545	18.739	18.991	19.256	19.545	19.779	20.206	20.565
		Weight, lb/ft	80.591	77.812	64.991	54.391	45.149	42.793	39.712	36.433	32.818	29.858	24.335	19.629
		Min wall, in	3.429	3.288	2.667	2.182	1.778	1.678	1.548	1.412	1.263	1.143	0.923	0.738
24	24.000	Avg ID[C], in	16.731	17.030	18.347	19.375	20.231	20.442	20.717	21.007	21.322	21.577	22.043	22.434
		Weight, lb/ft	95.916	92.603	77.365	64.735	53.726	50.932	47.260	43.369	39.049	35.525	28.963	23.344
		Min wall, in	3.714	3.562	2.889	2.364	1.926	1.818	1.677	1.529	1.368	1.238	1.000	0.800
26	26.000	Avg ID[C], in	18.126	18.449	19.876	20.989	21.917	22.146	22.444	22.758	23.099	23.375	23.880	24.304
		Weight, lb/ft	114.714	110.769	92.535	77.440	64.261	60.929	56.532	51.856	46.701	42.486	34.648	27.940
		Min wall, in	4.000	3.836	3.111	2.545	2.074	1.958	1.806	1.647	1.474	1.333	1.077	0.862
28	28.000	Avg ID[C], in	19.520	19.868	21.404	22.604	23.603	23.849	24.170	24.508	24.876	25.173	25.717	26.174
		Weight, lb/ft	133.49	128.466	107.312	89.785	74.522	70.669	65.563	60.154	54.189	49.266	40.187	32.421
		Min wall, in			3.333	2.727	2.222	2.098	1.935	1.765	1.579	1.429	1.154	0.923
30	30.000	Avg ID[C], in			22.933	24.218	25.289	25.552	25.897	26.259	26.653	26.971	27.554	28.043
		Weight, lb/ft			123.183	103.076	85.543	81.130	75.264	69.068	62.196	56.585	46.135	37.196
		Min wall, in			3.556	2.909	2.370	2.238	2.065	1.882	1.684	1.524	1.231	0.985
32	32.000	Avg ID[C], in			24.462	25.833	26.975	27.256	27.623	28.009	28.429	28.770	29.391	29.913
		Weight, lb/ft			140.183	117.285	97.324	92.313	85.672	78.557	70.755	64.370	52.494	42.340
		Min wall, in			3.778	3.091	2.519	2.378	2.194	2.000	1.789	1.619	1.308	1.046
34	34.000	Avg ID[C], in			25.991	27.447	28.661	28.959	29.350	29.760	30.206	30.568	31.228	31.782
		Weight, lb/ft			158.244	132.411	109.905	104.218	96.714	88.700	79.865	72.657	59.264	47.773
		Min wall, in			4.000	3.273	2.667	2.517	2.323	2.118	1.895	1.714	1.385	1.108
36	36.000	Avg ID[C], in			27.520	29.062	30.347	30.663	31.076	31.511	31.983	32.366	33.065	33.652
		Weight, lb/ft			177.399	148.454	123.208	116.802	108.424	99.457	89.571	81.446	66.444	53.581
		Min wall, in				3.818	3.111	2.937	2.710	2.471	2.211	2.000	1.615	1.292
42	42.000	Avg ID[C], in				33.906	35.404	35.773	36.255	36.762	37.314	37.760	38.575	39.260
		Weight, lb/ft				202.039	167.675	159.005	147.568	135.372	121.925	110.874	90.393	72.893
		Min wall, in					3.556	3.357	3.097	2.824	2.526	2.286	1.846	1.477
48	48.000	Avg ID[C], in					40.461	40.883	41.435	42.014	42.644	43.154	44.086	44.869
		Weight, lb/ft					219.036	207.705	192.774	176.813	159.198	144.833	118.082	95.233
		Min wall, in							3.484	3.176	2.842	2.571	2.077	1.662
54	54.000	Avg ID[C], in							46.614	47.266	47.975	48.549	49.597	50.478
		Weight, lb/ft							243.921	223.713	201.502	183.253	149.464	120.556

CONTACT WL PLASTICS PLANT CUSTOMER SERVICE TO CONFIRM AVAILABILITY AND FOR SIZES AND DR'S NOT SHOWN. ***A***. Sizes below IPS 4" per ASTM D3035; Sizes IPS 4" and larger per ASTM F714. See WL106 Pipe Compound and WL116 Pipe Standards. ***B.*** See WL130 for FM Sizes and Ratings. Pressure class (PC) for water at 73°F. Ratings will vary for other fluids and temperatures. See WL118 Pressure Rating for more information. ***C.*** Calculated Avg ID = Avg OD – (2.12 x min wall), and is for estimating fluid flow. Pipe ID is approximate, not a specification dimension. ***D***. All dimensions in inches. ***E***. NSF-61 Certification for potable water service available upon request. ***F.*** See WL101 and WL124 for fusion, mechanical and electrofusion joining information. ***G.*** The information in this publication does not constitute a guarantee or warranty for piping installations and cannot be guaranteed because the conditions of use are beyond WL Plastics control. See WL125 Terms and Conditions of Sale. The user of this information assumes all risk associated with its use. Changes to this publication may occur from time to time without notice. Contact WL Plastics to determine if you have the most current edition.

APPENDIX F

EMNRD Correspondence

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

August 2, 2017

Mr. Charles W Fiedler, P.E.
Gordon Environmental/PSC
213 S. Camino del Pueblo
Bernalillo, NM 87004

Reference: Confirmation of Compliance
Sundance West, Inc. Surface Waste Management Facility
Construction Plans for the Landfill and Evaporation Ponds

Dear Mr. Fiedler:

The OCD received Construction Plans in accordance with Permit Condition 6.A on August 1, 2017 from Sundance West, Inc. for the development of specific components (i.e. the landfill and evaporation ponds) of the Sundance West Surface Waste Management Facility, NM-1-62. This condition requires the Permittee to "At least 30 days prior to the start of construction of the landfill, evaporation ponds, stabilization and solidification area, or process area the operator shall furnish OCD with a complete set of construction drawings including a major milestone schedule for construction. These construction drawings must substantially comply with the engineering design provided with the application and show the location of pond discharge for the purposes of identifying the location of the sacrificial liner. The major milestone schedule shall be updated throughout construction activities."

The Department has completed their review of the submitted documents relative to the construction of the landfill and evaporation components referenced in the permit documents and find them to be in substantial compliance with the engineering design provided in the approved application. Specifically, the evaporation pond design shows the pond discharges, identifying the location of required sacrificial liners in compliance with the Rule. This submittal also included a major milestone schedule for the proposed construction in compliance with the Condition.

Sundance West requested the Division confirm that the submitted construction drawings conform to 19.15.36.17. B.11 and 12 which specifies three (3) foot of freeboard and a limitation of ten (10) acres feet size of ponds. The design provided in the construction drawing show a cascading pond system through a series of weirs in each pond. The liner system, that complies with the rule, is extended beyond each pond to the perimeter berm approximately twenty feet beyond and surrounds the pond system. This perimeter berm provides both over spray protection and satisfies the 3-foot freeboard requirement. In addition, each pond is designed with a maximum 10-acre foot capacity. In reading 19.15.36.17 NMAC the rule was written in anticipation of pump system being utilized to move water from one pond to another which this design eliminates (ie. weirs). The Division confirms that this design complies with the intent of the Rule. Sundance West will comply with 19.15.36.17.C(5) concerning traps at each weir.

If you have any questions, please contact Jim Griswold, OCD Environmental Bureau Chief at (505) 476-3465 or by email at jim.griswold@state.nm.us. On behalf of the Oil Conservation Division, I wish to thank you and your staff for your cooperation during this review process.

Respectfully,

David Catanach,
Director

APPENDIX G

Resumés

G.1. Charles W. Fiedler, P.E., Associate, Gordon/PSC

CHARLES W. FIEDLER, P.E., LEED AP

Associate

Fields of Expertise

Environmental and Civil Engineering;
Solid Waste Facility Siting, Design, Permitting, Construction
Solid Waste Facility Community Involvement
Solid Waste Landfill Cell Design and Construction
Solid Waste Gatehouse and Maintenance Facilities
Solid Waste Municipal and Regional Planning
Oilfield Waste Processing and Disposal Facilities
Landfill Gas Collection System Design, Development, Permit
Landfill Gas Collection System Construction/Commissioning
Landfill Gas Beneficial Use; Composting System Design
Transfer/Collection Station and Material Recovery Facilities
Regulatory Compliance and Litigation Support
Expert Witness for Environmental Engineering Issues

- New Mexico Environment Department
- Texas Department of Health
- Texas Commission on Environmental Quality
- Texas Legislative Committees
- Texas State District Court
- Arkansas State District Court

Registrations

Professional Engineer: New Mexico 19731
Professional Engineer: Texas 52247
LEED Accredited Professional-USGBC-2009

Education

Bachelors of Science Civil Engineering
Texas A&M University, 1978
Master of Science Civil Engineering
Texas A&M University, 1982

Professional Summary

A proven record of expertise and leadership in the management of waste materials focused primarily on the design and development of containment systems for liquid and solid wastes. Significant experiences over the last 39 years bridging between the technical issues of a consultant's design and the practical implementation of that design in a landfill or pond. Routinely responsible for interacting between consultants, owners, employees and contractors, translating between different levels of technical competency in the successful implementation of the project. Highly motivated and creative problem solver. Natural ability to manage relationships with all levels of an organization, as well as with the project community. Experiences in both the public and private sector as the regulator and regulated entity.

Professional Affiliations

National Society of Professional Engineers
New Mexico Society of Professional Engineers
Solid Waste Association of North America
Landfill and Landfill Gas Divisions
SWANA-Roadrunner Chapter
National Solid Waste Management Association-NM Chapter
New Mexico Recycling Coalition
US Green Building Council-New Mexico Chapter

Select Project Experience

Sundance West
Lea County, NM 2015
Developed permit documents and plans for an OCD Part 36 Surface Waste Management Facility. This project includes a 124-acre landfill design that utilized a double composite liner composed of a Geosynthetic Clay Liner (GCL) overlain with a 60-mil HDPE Flexible Membrane Liner (FML), a 200-mil HDPE Geonet leak detection layer, a primary 60-mil HDPE FML, a 200-mil HDPE Geonet leachate collection layer and two feet of protective soil. Additionally, this facility included a produced water management facility composed of twelve, 2-acre ponds that were designed with a double composite liner composed of a secondary 60-mil HDPE FML overlain with a 200-mil Geonet leak detection layer and a primary 60-mil HDPE FML. Also designed for this facility was a 5-acre stabilization and solidification facility that included a double composite liner system that utilized the landfill liner configuration.

DNCS Environmental Services
Lea County, NM 2014
Developed permit documents and plans for an OCD Part 36 Surface Waste Management Facility. This project includes a 318-acre landfill design that utilized a double composite liner composed of a Geosynthetic Clay Liner (GCL) overlain with a 60-mil HDPE Flexible Membrane Liner (FML), a 200-mil HDPE Geonet leak detection layer, a primary 60-mil HDPE FML, a 200-mil HDPE Geonet leachate collection layer and two feet of protective soil. Additionally, this facility included a produced water management facility composed of twelve, 2-acre ponds that were designed with a double composite liner composed of a secondary 60-mil HDPE FML overlain with a 200-mil Geonet leak detection layer and a primary 60-mil HDPE FML. Also designed for this facility was a 5-acre stabilization and solidification facility that included a double composite liner system that utilized the landfill liner configuration.

Sandoval County Landfill
Rio Rancho, NM 2014
Developed plans, specifications and procurement documents for the construction of Cell 4C, 5B, 6B and 7, comprising 32.3 acres lined with a GCL/FML composite liner on a compacted subgrade that included a geonet drainage layer. Managed procurement to select a contractor. Oversaw construction that included the liner and a leachate collection system with sump and pump. Managed the CQA and compiled documentation required for approval by the State.

Camino Real Landfill
Sunland Park, NM 2014
Developed plans, specifications and procurement documents for Cell 9BA, a 5-acre GCL/FML composite lined excavation on a compacted subgrade. Managed procurement to select a contractor. Project was placed on hold by the Owner due to capital issues within the company.

Valencia Landfill and Recycling Facility
Valencia County, NM 2014
Developed plans, specifications and procurement documents for Cell 5A, a 6-acre GCL/FML composite lined excavation on a compacted subgrade. Managed procurement to select a contractor. Oversaw the construction that included the liner and the development of the leachate collection system. Managed the CQA and compiled the documentation required for approval by the State.

Lea County Landfill
Eunice, NM 2011
Developed plans, specifications and procurement documents for the construction of Cell 4, a 9.5-acre excavation with a GCL/FML composite liner on a compacted subgrade. Managed procurement to select a contractor. Oversaw construction that included the liner and a leachate collection system with sump and pump. Managed the CQA and compiled documentation required for approval by the State.

Camino Real Landfill
Sunland Park, NM 2010
Developed plans, specifications and procurement documents for Cell 10A, a 6-acre GCL/FML composite lined excavation on a compacted subgrade. Managed procurement to select a contractor. Oversaw the construction that included the liner and the extension of the leachate collection from the previous cells. Managed the CQA and compiled the documentation required for approval by the State.

City of Tucumcari Landfill
Tucumcari, NM 2010
Developed plans, specifications and procurement documents for Cell 2B, a 4-acre GCL/FML composite lined excavation on a compacted subgrade. Managed procurement to select a contractor. Oversaw the construction that included the liner and the installation of a leachate collection and temporary sump. Managed the CQA and compiled the documentation required for approval by the State.

Sandoval County Landfill
Rio Rancho, NM 2010
Developed plans, specifications and procurement documents for the construction of Cell 5A, a 10-acre excavation with a GCL/FML composite liner on a compacted subgrade. Managed procurement to select a contractor. Oversaw construction that included the liner and a leachate collection system with sump and pump. Managed the CQA and compiled documentation required for approval by the State.

City of Denton Landfill
Denton, Texas 2002 and 2004
Managed the design and construction of the second and third FML composite lined cells, including bidding, CQA, survey control, leachate recirculation and documentation. The liner system consisted of a compacted clay subgrade overlain with a 60-mil HDPE FML, a 200-mil HDPE Geonet and a two-foot protective soli layer.

Canyon Landfill
Canyon, Texas 1999
Engineer of record and principal designer for this 10-acre waste disposal cell containing a GCL/FML composite liner on a compacted subgrade. Developed plans, specifications and procurement documents. Managed procurement to select a contractor. Oversaw construction that included the liner and a leachate collection system with sump and pump. Managed the CQA and compiled documentation required for approval by the State.

West Texas Region Landfill
Lubbock, Texas 1997
Engineer of record and principal designer for this 1,200 acre disposal facility for the City of Lubbock, Texas. Challenges included how and where to start the active development of this large a facility to minimize impact on the surrounding landowners. Once successfully permitted, developed construction plans and specifications to construct the initial infrastructure including gate house/offices with scales, heavy equipment maintenance and crew facilities, access roads and initial 20-acre cell excavation and GCL/FML composite liner. The facilities cost $450,000 to design and $6.5 million to construct.

Covel Gardens Landfill
San Antonio, Texas 1992
Manager responsible for the design and development of the earthwork, composite lined cell, roads and environmental controls relating to the initial construction of this facility. This was the first composite lined municipal solid waste landfill cell in Texas, utilizing a 60-mil HDPE FML. Planned development, negotiated construction contracts, coordinated consultants, orchestrated community relations, formulated schedules and budgeted expenditures. Intimately involved in delicate negotiations with City officials. Developed a significant knowledge of the market conditions and influences, including the significant individuals involved. This $5 million project was completed ahead of schedule and within budget.

APPENDIX G

Resumés

G.2. Carl R. King, P.E., Senior Project Manager, Gordon/PSC Site CQA Engineer

CARL R. KING, P.E.

Senior Project Manager

Fields of Expertise

Solid Waste Facility Siting, Design, Permitting
Solid Waste Landill Cell Design and Construction
Solid Waste Landfill Site Characterization
Solid Waste Facility Remediation and Closure
Transfer/Collection Station and Material Recovery Facilities
Waste-to-Energy Facilities
Acquisition review
Construction Quality Assurance and Quality Control
Regulatory Compliance and Litigation Support

Education

Bachlor of Arts Engineering Management
Hiram College, Ohio 1980
Master of Science Environmental Engineering
Cleveland State University, Ohio 1984

Registrations

Professional Engineer: Texas 67157
Professional Engineer: Nebraska E-7584

Professional Summary

Mr. King is a Senior Project Manager with Gordon Environmental/PSC. He has over 47 years of experience in environmental, mechanical and civil engineering and is well versed with regulations and guidelines in a number of states. His responsibilities include landfill permitting and design, construction specification writing, compliance reporting, environmental construction management and construction quality assurance.

Select Project Experience

Mr. King provided design services and served as Construction Quality Assurance (CQA) Manager for Valencia Regional Landfill Cell 5B; Northeastern New Mexico Regional Landfill Unit 1B; City of Tucumcari Landfill Cell 3, in New Mexico. Implemented compliance efforts to new federal rules for waste disposal. Provided HELP model support and sized leachate collection piping for the Butterfield Station Landfill in Arizona, developed design details for assuring protection of composite liner components from piping penetrations, sized the excavation and requirements for the anticipated daily capacity, prepared specifications for utility extensions, developed criteria for maintenance and operational facilities, and developed traffic flow, road layouts and signage requirements. Design included channelization of runoff waters with discharge into an existing natural wash. The discharge capacities and velocities required a complicated settling basin and energy dissipation system before final release.

Directed the complete siting, permitting and detail design for a combined recycling center and transfer station serving the community of Fremont, Nebraska. Design included an integrated process conveyor with picking stations and an automatic unloading system to discharge and load bypass waste streams directly into 100 cubic yard capacity transfer trailers.

Provided compliance review to Subtitle D regulations criteria and developed the technical component of state implementation programs. Project locations included NE, MO, AZ, NY, TX, AR, LA, GA, and NM (Otero County and Taos Municipal landfills) and involved existing landfills, expansions, and new facility evaluations. Responsibilities included permit application preparation, consent decree negotiations, design criteria and details, economic evaluations, alternative evaluations, and multi-municipality teaming agreements.

Responsible for site selection, drainage plans, waste characterization determination, heat balances, and power production estimates for the licensed Volund waste-to-energy technology. Responsible for permitting processes, public hearing preparation and support and power sales agreements. Projects include Broward County, FL, and Dakota County, MN. Responsibilities expanded to include landfill gas (methane) to energy projects throughout the country. Selected and appointed to the Florida Department of Environmental Regulations Rule Development Committee Roundtable Board by the director of that agency.

Responsible for environmental and remedial projects involving design and construction management efforts for both new construction and corrective action efforts; regulatory agency interface and negotiations; risk assessments; remedial designs; contract administration and documentation; and field verification. Projects include Subtitle C and D composite liner designs, providing QAQC efforts and construction management for preparation of soil and synthetic liner evaluation reports.

Provide construction management implementation and engineer of record services for two cell expansions of the McCommas Road Landfill, Dallas, TX and new cell development of the Denton County Landfill, Denton, TX. Scope included final regulatory agency approvals; record design plans test report evaluations, and oversight of construction management and materials testing teams.

Provided engineer of record and material testing services for an expansion of a Subtitle D (hazardous materials) disposal cell of the Lone Mountain facility in Northwest OK.

Provide design and construction management implementation of the Hunter-Ferrell Road Municipal Landfill in Irving Texas. The multi phased expansion project included permit modifications and regulatory approvals through multiple agencies.

APPENDIX G

Resumés

G.3. Braden Bellivieu, EIT, Gordon/PSC Site CQA Engineer/Manager

BRADEN S. BELLIVEAU
Civil Engineer

Fields of Expertise

Environmental engineering, landfill liner QA/QC, landfill waste excavation monitoring, waste classification, environmental sampling and monitoring, landfill engineering design calculations, solid waste facility permitting, and soil mechanics

Certifications

Construction QA/QC Inspector for Geosynthetics and Compacted Clay Liners.

OSHA Hazardous Waste Site Operations and Emergency Response Training (40-Hour), 7/11/2017

Nuclear Gauge Safety Certification: 07/21/2016

Red Cross First Aid/CPR/AED, 2008

Education

B.S., Environmental Engineering, The State University of New York at Buffalo, 2016

A.A.S., Mathematics and Science, Niagara County Community College College, 2013

Professional Summary

Mr. Belliveau serves as Civil Engineer III for Gordon Environmental/PSC. His assignments focus on landfill excavation monitoring, environmental sampling (groundwater, landfill gas, soils), landfill engineering calculations, and Solid Waste Facility Permits and Regulatory compliance.

Select Project Experience

Landfill Excavation Monitoring, Albuquerque, New Mexico: Field representative for the construction underground utilities on the former Nazareth Landfill site. Responsibilities included methane and hydrogen sulfide monitoring, health and safety oversight, waste identification, and excavation observation during waste removal.

Geotechnical Analysis, Various Projects in New Mexico: Classification and determination engineering properties of soils to be used in landfill cell construction using ASTM test methods for soil classification, grain size analyses, and Standard Proctor moisture/density relationships.

Solid Waste Facility Permitting, Various Facilities in New Mexico: Participate in developing permit, and permit renewals and modifications for MSW, C&D, and special waste landfills; and related public notification requirements. Responsibilities include calculations demonstration compliance with NMED and other EPA regulations (i.e., erosion control, slope stability, tensile stresses), regulatory agency communications, research, and site visits.

Landfill Gas Monitoring and Control, Various Locations, New Mexico: Field Technician for the monitoring of the presence of landfill gas (LFG) at closed and active landfills throughout the state of New Mexico. Responsibilities include site inspection for surface expression of the presence of LFG, surface expressions of settling, slumping or erosion that has the potential to expose waste on the final cover, and lead to the potential release of LFG off of the landfill site.

Groundwater Sampling and Field Parameter Testing, Various Locations, New Mexico: Field Technician for groundwater sample collection for more multiple monitoring wells at project locations throughout the State of New Mexico. Use of dedicated and submersible pumps driven by air or electricity, as well as no-purge and low-impact discrete interval sampling devices, resulting in a unique familiarity with varying sample collection techniques. Field services include depth to water measurements, optimization of discharge flow rate, recording of field measurements, and preparation of chain-of-custody documentation. Inter- and/or intra-well statistical analyses performed as necessary to fulfill Permit and regulatory requirements.

Stormwater Pollution Prevention Plans and Spill Prevention Control and Countermeasure Plans, Various Locations, New Mexico: Preparation of stormwater pollution prevention (SWPPP) plans and spill prevention, control, and countermeasures (SPCC) plans for several airports and landfills in New Mexico.

Hydraulic Conductivity Testing and Determination: Hydraulic conductivity testing using multiple methods including slug testing, pump testing, constant and falling head methods, and estimation from grain size.

APPENDIX G

Resumés

G.4. Don Gray., Engineering Technician, Gordon/PSC Project Technologist

DON L GRAY
Engineering Technician

Fields of Expertise
Construction observation; geosynthetic liner applications and testing; field sampling; quality assurance and quality control; physical property testing; field analysis; Stormwater Pollution Prevention (SWPPP) Plans and Spill Prevention Control and Countermeasures (SPCC) Plans. Use of Drones as an emerging technology, groundwater monitoring; site characterization and plan development.

Certifications
OSHA Hazardous Waste Site Operations and Emergency Response Training (40-Hour), 2007.
Response Training (8-Hour refresher) 2008, 2009, 2015, 2016, 2017
Nuclear Gauge Safety Training: June 2007
HAZMAT Certification (DOT IATA) 2007, 2015.

Education
A.A.S., Engineering Design Technology
A.A., Liberal Arts
A.A., Technology Management and Training,
Central New Mexico Community College, 2007

Professional Summary
Mr. Gray serves as Engineering Technician for Gordon/PSC. His is also responsible for implementing the use of emerging technologies such as Drones for survey and environmental monitoring., CQA oversight for various Landfill construction projects with a focus on composite liner installation, and compliance reporting.

Select Project Experience
Landfill/Pond Liner CQA,:
Construction Quality Assurance and project oversight for the installation of over 115 acres of composite liner. Installation includes:

- pre-installation materials qualification
- subgrade density testing
- sieve analysis testing
- material quality assurance documentation
- installation observation
- repair record keeping.

He provided field CQA assisted with the compilation of the required Engineering Certification Report for each of the following projects:

- Sandoval County Landfill Cells 6A/4B and 5A
- Southwest Landfill Cell 4B
- Lea County Landfill Cell 3 and 5
- Final Cover for Roswell Unit 2, Clayton LF, Vaughn LF, Raton LF, Truth or Consequences LF, and Southwest Regional LF
- Camino Real Landfill Cell 10A
- Basin Disposal Pond 2
- Valencia Regional Landfill Cell 3

Landfill Gas Monitoring and Control, Various Locations, New Mexico: Field representative for methane monitoring as well as health and safety oversight.

Groundwater/Vadose Zone Monitoring Well Installations, Various Locations, New Mexico: Oversight for the installation of numerous exploratory and sample collection wells for groundwater and landfill gas. Performed drilling observation and logging of drill cuttings. Made determinations as to appropriate screen and well installation depths, performed initial post-installation monitoring. Prepared as-built documentation and Summary Reports as needed.

Groundwater Sampling and Field Parameter Testing, Various Locations, New Mexico: Field Technician for groundwater sample collection for monitoring wells at project locations throughout the State of New Mexico. Use of dedicated and submersible pumps driven by air or electricity, as well as hand and mechanical bailers, resulting in a unique familiarity with varying sample collection techniques. Field services include depth to water measurements, optimization of discharge flow rate, recording of field measurements, and preparation of chain-of-custody documentation. Inter- and/or intra-well statistical analyses performed as necessary to fulfill Permit and regulatory requirements.

Stormwater Pollution Prevention Plans and Spill Prevention Control and Countermeasure Plans, Various Locations, New Mexico: Preparation of stormwater pollution prevention (SWPPP) plans and spill prevention control and countermeasures (SPCC) plans for several airports and landfills in New Mexico.

Development of Drone Technology within the organization: Team lead on the development of implementing the use of Drone Technology within the organization. This included selection of equipment and software, development of all aspects associated with drone activites in the field, and processing of field data to produce output consistent with applicable standards.

Additional Professional Training
Remote Pilot Certificate for UAS September 2016
Developer/Holder of US Patent 13/774,038, and European Patent No. 13275041.5-1656 – “Foamed Glass Hydroponic Substrate