



September 6, 2024

Ms. Rosa Romero
Environmental Bureau Chief
Oil Conservation Division
NM Energy, Minerals and Natural Resources Department
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

Re: OWL Landfill Services, LLC Engineering Certification Report:
Landfill Cell 5 A/B Construction (01705322)

Dear Ms. Romero:

This submittal is provided as engineering certification for the construction of Landfill Cell 5 A/B at OWL Landfill Services, LLC (OWL), located in Lea County, New Mexico. Specifically, this Certification Report demonstrates the double containment liner and leak detection system for Cell 5 A/B have been installed in compliance with the following applicable documents and regulatory requirements:

- Approved Construction Quality Assurance (CQA) Plan October 2016.
- Construction Plans and Project Technical Specifications for Landfill Cell 5 A/B Construction, OWL Landfill Services, LLC.
- New Mexico Energy, Minerals and Natural Resources Department Regulations (19.15.36.1-19.15.36.20).
- Approved Permit and Permit Conditions (August 2017).
- Geosynthetic Research Institute (GRI) and American Society of Testing Materials (ASTM) and Industry Standards.

We appreciate the opportunity to work with the OCD regarding the construction quality assurance for the construction of Cell 5 A/B at OWL Landfill Services, LLC. Please contact us with your questions and comments regarding this Engineering Certification Report. (tkrueger@parkhill.com; 325.227.0111)

Sincerely,

PARKHILL

By

A handwritten signature in black ink, appearing to read "TSK", written over a horizontal line.

Tyler S. Krueger, PE
Project Engineer

TSK/sw/pp
Enclosures

cc: Zach Ramos – OWL Landfill Services, LLC
Dr. Richardson, PhD, PE, BCEE, New Mexico Tech

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ENGINEERING CERTIFICATION REPORT LANDFILL CELL 5 A/B CONSTRUCTION

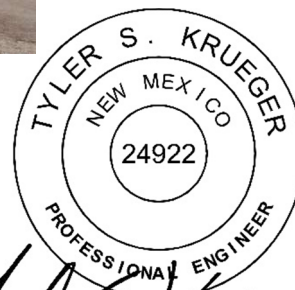
OWL Landfill Services, LLC

Lea County, New Mexico



Submitted to:
New Mexico Oil Conservation Division
Environmental Bureau
1220 South St. Francis Dr. #3
Santa Fe, New Mexico 87505

Prepared for:
OWL Landfill Services, LLC
Lea County, New Mexico



[Handwritten Signature]
09/06/2024

July | 2024
Parkhill Project # 01705322

TABLE OF CONTENTS

1.0 INTRODUCTION	1
1.1 EMNRD OCD NOTIFICATION	1
1.2 PROJECT DESCRIPTION	1
1.3 PROJECT OVERVIEW	1
1.4 REPORT ORGANIZATION	3
1.5 QUALIFICATIONS	3
1.5.3 Mr. Tyler S. Krueger, PE, Engineer-Of-Record, Site CQA Engineer/ Manager	3
1.5.4 Mr. Mike Armendariz, RPR, CPS, Site CQA Manager	3
2.0 LANDFILL CELL 5 A/B CONSTRUCTION	3
2.1 SUMMARY	3
2.2 SUBGRADE PREPARATION	4
2.2.1 Clearing, Grubbing, And Mass Excavation	4
2.2.2 Coordinate System	5
2.2.3 Subgrade And Berm Compaction	5
2.2.4 Subgrade Acceptance	5
2.3 GEOSYNTHETIC CLAY LINER	6
2.3.1 Geosynthetic Clay Liner Product	6
2.3.2 Geosynthetic Clay Liner Installation	6
2.3.3 Geosynthetic Clay Liner Testing	6
2331 Geosynthetic Clay Liner Manufacturing Quality Control (MQC) and Manufacturing Quality Assurance (MQA)	6
2332 Conformance Testing	7
2333 Construction Quality Control (CQC) for Geosynthetic Clay Liner	7
2334 Construction Quality Assurance (CQA) for Geosynthetic Clay Liner	7
2.3.4 Geosynthetic Clay Liner Deployment Records	7
2.4 60-MIL SECONDARY FLEXIBLE MEMBRANE LINER	8
2.4.1 Flexible Membrane Liner Product	8
2.4.2 Flexible Membrane Liner Installation	8
2.4.3 Flexible Membrane Liner Testing	8
2431 Manufacturer's Quality Control (MQC)	8
2432 Manufacturer's Quality Assurance (MQA)	9
2433 Conformance Testing	9
2434 Construction Quality Control (CQC)	10
2435 Construction Quality Assurance (CQA)	11
2436 Seam Testing	11
2.4.4 FML Deployment Records	11

Parkhill

2.5 LEAK-DETECTION ZONE	12
2.5.1 Leak-Detection Zone Product	12
2.5.2 Leak-Detection Zone Material Installation	12
2.5.3 Leak-Detection Zone Testing	13
2531 Manufacturer's Quality Control (MQC)	13
2532 Manufacturer's Quality Assurance (MQA)	13
2533 Conformance Testing	13
2534 Construction Quality Control (CQC)	14
2535 Construction Quality Assurance (CQA)	14
2.5.4 Leak Detection Zone Deployment Records	14
2.6 60-MIL PRIMARY FLEXIBLE MEMBRANE LINER	14
2.6.1 Flexible Membrane Liner Product	15
2.6.2 Flexible Membrane Liner Installation	15
2.6.3 Flexible Membrane Liner Testing	15
2631 Manufacturer's Quality Control (MQC)	15
2632 Manufacturer's Quality Assurance (MQA)	15
2633 Conformance Testing	16
2634 Construction Quality Control (CQC)	17
2635 Construction Quality Assurance (CQA)	17
2636 Seam Testing	17
2.6.4 FML Deployment Records	18
2.7 GEOSYNTHETIC CUSHION/DRAINAGE LAYER	19
2.7.1 Geosynthetic Cushion/Drainage Layer Product	19
2.7.2 Geosynthetic Cushion/Drainage Layer Material Installation	19
2.7.3 Geosynthetic Cushion/Drainage Layer Testing	19
2731 Manufacturer's Quality Control (MQC)	19
2732 Manufacturer's Quality Assurance (MQA)	19
2733 Conformance Testing	20
2734 Construction Quality Control (CQC)	20
2735 Construction Quality Assurance (CQA)	20
2.7.4 Geosynthetic Cushion/Drainage Layer Deployment Records	21
2.8 LEACHATE COLLECTION SYSTEM	21
2.9 PROTECTIVE SOIL LAYER	21
2.10 FUTURE LINER TIE-IN DETAILS, STORMWATER AND LINER	
PROTECTION BERM	21
3.0 ENGINEERING CERTIFICATION	20

TABLES

TABLE 1:	PRIMARY CONSTRUCTION ACTIVITIES	1
TABLE 2:	PARKHILL CQA ACTIVITIES	2
TABLE 3:	4X, CONSTRUCTION ACTIVITIES.....	4
TABLE 4:	SOUTHWEST LINING SYSTEMS, CONSTRUCTION ACTIVITIES	4
TABLE 5:	SURVEYING SUPPORT ACTIVITIES	5
TABLE 6:	SOLMAX BENTOLINER NSL GCL – MQC/MQA TESTING	7
TABLE 7:	SOLMAX BENTOLINER NSL GCL – CONFORMANCE TESTING	7
TABLE 8:	SOLMAX HDPE FML – MQA TESTING.....	9
TABLE 9:	SOLMAX HDPE FML – CONFORMANCE TESTING.....	9
TABLE 10:	HDPE FML DEPLOYMENT CQA DOCUMENTATION.....	11
TABLE 11:	SOLMAX GEOCOMPOSITE AND GEONET – MQC TESTING	13
TABLE 12:	SOLMAX GEONET – CONFORMANCE TESTING	13
TABLE 13:	SOLMAX HDPE FML – MQC TESTING.....	15
TABLE 14:	SOLMAX HDPE FML – CONFORMANCE TESTING.....	16
TABLE 15:	HDPE PRIMARY FML DEPLOYMENT CQA DOCUMENTATION	17
TABLE 16:	SOLMAX GEOCOMPOSITE – MQC TESTING.....	19
TABLE 17:	SOLMAX GEOCOMPOSITE – CONFORMANCE TESTING.....	19

FIGURES

FIGURE 1:	OWL LANDFILL SERVICES – SITE LOCATION MAP
FIGURE 2:	OWL LANDFILL SERVICES – SUBGRADE DESIGN GRADES
FIGURE 3:	OWL LANDFILL SERVICES – SUBGRADE AS-BUILT GRADES
FIGURE 4:	OWL LANDFILL SERVICES – FIELD DENSITY TEST LOCATIONS
FIGURE 5:	OWL LANDFILL SERVICES – GCL PANEL LAYOUT
FIGURE 6:	OWL LANDFILL SERVICES – 60-MIL SECONDARY LINER PANEL LAYOUT
FIGURE 7:	OWL LANDFILL SERVICES – GEOSYNTHETIC LEAK DETECTION LAYER AS-BUILT
FIGURE 8:	OWL LANDFILL SERVICES – 60-MIL PRIMARY LINER PANEL LAYOUT
FIGURE 9:	OWL LANDFILL SERVICES – GEOSYNTHETIC CUSHION/DRAINAGE PANEL LAYOUT
FIGURE 10:	OWL LANDFILL SERVICES – TOP OF PSL AS-BUILT GRADES
FIGURE 11:	OWL LANDFILL SERVICES – PSL AS-BUILT THICKNESS
FIGURE 12:	OWL LANDFILL SERVICES – LEACHATE PIPE AND EDGE OF LINER AS-BUILT

FIELD LOGS AND PHOTOGRAPHS

1	DAILY SUMMARY REPORTS
2	PROJECT PHOTOGRAPHS

APPENDICES

APPENDIX A	GEOTECHNICAL SOILS TESTING
A1	MOISTURE/DENSITY RELATIONSHIPS
A2	SUBGRADE (CELL 5 A/B FLOOR) TEST RESULTS
A3	BERM DENSITY TEST RESULTS
A4	ANCHOR TRENCH DENSITY TEST RESULTS
A5	PSL HYDRAULIC CONDUCTIVITY
A6	PSL GRAIN SIZE DISTRIBUTION TEST RESULTS

**APPENDIX B MATERIAL MANUFACTURER CERTIFICATION
AND CONFORMANCE TESTING RESULTS**

B1	GCL CERTIFICATIONS
B2	GCL CONFORMANCE TESTING RESULTS
B3	FML CERTIFICATIONS
B4	FML CONFORMANCE TESTING RESULTS
B5	GEONET CERTIFICATIONS
B6	GEONET CONFORMANCE TESTING RESULTS
B7	GEOCOMPOSITE CERTIFICATIONS
B8	GEOCOMPOSITE TEST RESULTS

APPENDIX C CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C1	GCL INVENTORY CONTROL LOG
C2	GEONET INVENTORY CONTROL LOG
C3	FML INVENTORY CONTROL LOG
C4	GEOCOMPOSITE INVENTORY CONTROL LOG
C5	LEACHATE PIPE AND RISER PIPE INVENTORY CONTROL LOG
C6	GCL DEPLOYMENT LOG
C7	SECONDARY FML DEPLOYMENT LOG
C8	SECONDARY AND PRIMARY FML PRE-WELD QUALIFICATION TEST LOGS
C9	SECONDARY FML SEAMING LOG
C10	SECONDARY FML SEAM PRESSURE TEST LOG
C11	FML SEAM FIELD DESTRUCTIVE TEST RECORDS
C12	GEONET DEPLOYMENT LOG
C13	PRIMARY FML DEPLOYMENT LOG
C14	PRIMARY FML SEAMING LOG
C15	PRIMARY FML SEAM PRESSURE TEST LOG
C16	FML SEAM VACUUM TEST AND DEFECT-REPAIR LOG
C17	GEOCOMPOSITE DEPLOYMENT LOG
C18	DEMTECH TENSIONMETER CALIBRATION CERTIFICATE

**APPENDIX D INDEPENDENT QUALITY ASSURANCE LABORATORY FML
DESTRUCTIVE TESTING RESULTS**

D1	SECONDARY LINER DESTRUCTIVE TEST
D2	PRIMARY LINER DESTRUCTIVE TEST

APPENDIX E LEAK DETECTION SYSTEM CERTIFICATIONS

E1	LEACHATE PIPE AND RISER PIPE PARTS CERTIFICATION
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APPENDIX F EMNRD CORRESPONDENCE

CONFORMATION OF COMPLIANCE: OWL LANDFILL SERVICES,
INC. SURFACE WASTE MANAGEMENT FACILITY; CONSTRUCTION
UPDATE.

APPENDIX G RESUMÉS

G1	TYLER S. KRUEGER, PE, PROJECT ENGINEER, SITE CQA ENGINEER/MANAGER
G2	MATT KINSLEY, PE, SENIOR PROJECT MANAGER
G3	MAX WHITE, RPR, CONSTRUCTION PHASE SERVICES, SITE CQA MANAGER

1.0 INTRODUCTION

This Engineering Certification Report describes the Construction Quality Assurance (CQA) activities and procedures applied during the construction of Landfill Cell 5 A/B at OWL Landfill Services, LLC (OWL) located in Lea County, New Mexico. The CQA activities performed document shows Cell 5 A/B was constructed in accordance with the approved Construction Plans, Project Technical Specifications, 2016 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 5 A/B construction included in this Report in **Appendix F.1**. Site development activities and landfill clearing initially began on May 2023 with initial landfill perimeter berm construction continuing into July 2023. This Engineering Certification Report satisfies the requirements of the applicable Permit Conditions.

1.2 Project Description

The OWL Landfill is located approximately 1.5 miles east of the intersection of Delaware Basin Road and NM Highway 128 at mile marker 31, as shown on the Site Location Map (**Figure 1**). Mass excavation was performed by 4X with the excavation of soils, placement, and compaction of perimeter berm soils and subgrade fine grading and compaction, and anchor trench excavation, backfill, and compaction performed from May 1, 2023, through June 5, 2023. 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 Mustang Extreme Environmental Services (MEES) from June 21, 2023, through July 11, 2023. Leachate system installation and protective soil layer (PSL) placement were performed by 4X from July 19, 2023, through July 30, 2023.

1.3 Project Overview

Landfill Cell 5 A/B was constructed at Oilfield Water Logistics Services, LLC, (OWL), located in Lea County, New Mexico. Parkhill developed Cell 5 A/B, Project Technical Specifications, and the CQA Plan (October 2016); and performed on-site CQA activities. Primary construction activities for Cell 5 A/B are as listed in **Table 1**.

TABLE 1 - Primary Construction Activities

Activity #	Construction Activity
1	Mass Excavation.
2	Construction of perimeter berm.
3	Fine grading.
4	Compaction.
5	Installation of Geosynthetic Clay Liner (GCL).
6	Installation of the Secondary Flexible Membrane Liner (FML).
7	Installation of geonet and geocomposite leak detection system.
8	Installation of primary Flexible Membrane Liner (FML).
9	Installation of geocomposite cushion/drainage layer.
10	Installation of leachate collection system.
11	Installation of Protective Soil Layer (PSL).
12	Construction of landfill stormwater management system.

Mass excavation, placement and compaction of structural fill soils for the perimeter berm, and fine grading and compaction to the design base grades were completed by 4X under observation and soil density testing of Parkhill, Site CQA Engineer, (**Figure 2**). Upon review and approval of the subgrade by the Parkhill Site CQA Engineer and the geosynthetic installation contractor, the Parkhill Site CQA Engineer or manager was on-site during geosynthetics installation to observe, inspect, and record GCL, secondary FML (HDPE), geosynthetic leak detection (geonet and geocomposite), primary FML (HDPE), geosynthetic cushion/drainage (geocomposite), leachate collection system, protective soils (PSL), and rain flap stormwater management system (HDPE) installation procedures. The purpose of the CQA work is to document that construction activities performed at OWL comply with the Cell 5 A/B Construction Plans, Project Technical Specifications, 2016 CQA Plan, Geosynthetic Research Institute (GRI) and American Society of Testing Materials (ASTM) Industry Standards, and EMNRD OCD regulatory requirements. The OWL Cell 5 A/B Construction Plans, Project Technical Specifications, 2016 CQA Plan, field observations, and tests were used to provide quantitative criteria with which to evaluate construction.

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

TABLE 2 – Parkhill CQA Activities	
Activity #	Parkhill CQA Activity
1	Collect select on-site soils to perform laboratory moisture/density tests, hydraulic conductivity tests, and grain size analyses.
2	Review surveying results to confirm that the subgrade met design elevations and slope.
3	Provide field density testing of compacted berm soil fill and subgrade soils.
4	Review manufacturer's quality assurance and manufacturer's quality control testing results for geosynthetics.
5	Review conformance testing results for FML, GCL, geonet, and geocomposite.
6	Inspect delivered FML, GCL, geonet, 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 5 A/B at OWL. 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

Mr. Tyler S. Krueger, PE, Engineer of Record, Site CQA Engineer/Manager

Mr. Tyler Krueger is a Site CQA Engineer/Manager for the OWL Cell 5 A/B project. He serves as the Site CQA Engineer/Manager for Parkhill, and is trained and certified on field instrumentation, industry standards, health and safety, etc. Krueger is a professional engineer and has served as a Site CQA Engineer/Manager at various Subtitle D municipal solid waste landfills. Mr. Krueger's duties included assessment and equivalency evaluation and calculations for liner and leak detection system components in compliance with Construction Plans, CQA Plan, and Project Technical Specifications. The current resumé for Mr. Krueger is included in the **Appendix G Resumés**.

Mr. Matt Kinsley, PE, Senior Project Manager

Mr. Matt Kinsley is a Professional Engineer with Parkhill's Environmental Sector. His focus is on landfill operations, design, and construction. He has developed, expanded, and operated over 25 landfills from Phoenix to Philadelphia. Through Matt's diverse engineering design and operational experience, he has provided valuable insight. Mr. Kinsley's current resumé is included in **Appendix G Resumés**.

Mr. Max White, RPR, Construction Phase Services, Site CQA Manager

Mr. Max White is the CQA manager for OWL Cell 5 A/B. He serves as the Site CQA Manager for Parkhill and is trained and certified in field instrumentation, industry standards, health and safety, etc. His 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. View Mr. White's resumé in **Appendix G Resumés**.

2.0 LANDFILL CELL 5 A/B CONSTRUCTION

2.1 Summary

The OWL Landfill is an existing facility located in Lea County, New Mexico, and is complemented with process equipment, administrative offices, drying pads, evaporation ponds, and additional landfill cells. The total double lined project area of Cell 5 A/B, is approximately 7.41 acres in size as shown on the Subgrade Design Grades (**Figure 2**).

Mass excavation, berm construction, and fine-grading were conducted by 4X; and MEES 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 Environmental, while documentation and quality assurance were performed by Parkhill. **Tables 3** and **4** summarize these construction activities.

4X of Mansfield, Texas, performed the construction activities listed in **Table 3**.

TABLE 3 – 4X Construction Activities	
Activity #	4X Construction Activity
1	Mass excavation to overall design grades.
2	Installation of perimeter berm.
3	Fine grading of the cell floor, transition zone, and berm.
4	Compaction of the landfill cell, surrounding areas, and berm.
5	Construction of the Site stormwater management system and Site protection berm.
6	Installation of leachate collection system (HDPE pipe, drainage aggregate, and geocomposite).
7	Installation of protective soil layer.
8	Excavation, backfill, and compaction of liner anchor trenches.

Mustang Extreme Environmental Services (MEES) of Midland, Texas, performed the construction activities listed in **Table 4**.

TABLE 4 – MEES Construction Activities	
Activity #	MEES Construction Activity
1	Installation of Geosynthetic Clay Liner (GCL).
2	Installation of 60-mil secondary HDPE FML.
3	Installation of HDPE geonet and geocomposite material (leak detection 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 West Texas Consultants (WTC). WTC 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
WTC Surveying	Final grades of the Landfill Cell 5 A/B. Top of all berm surrounding the project. Leachate extraction line. 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

4X 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 berm located on the north was constructed to the design grades shown

on the Construction Plans. Once design grades were attained and density testing was complete, WTC performed record certification surveys to document that the subgrade, berm elevations, and slopes met design requirements shown on the Construction Plans and as set forth in the Project Technical Specifications and 2016 CQA Plan.

2.2.2 Coordinate System

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 WTC for use during construction and testing.

2.2.3 Subgrade and Berm Compaction

During excavation, a perimeter berm was constructed to contain Cell 5 A/B on the permanent north perimeter 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** were completed, 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 3500 Xplorer®, requiring 27 tests for the ±7.41-acre footprint of Cell 5 A/B, and approximately five tests for berm construction (**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 5 A/B floor and north sidewall, and **Appendix A.3** for Cell 5 A/B perimeter berm. **Appendix A.4** shows the testing results for the anchor trench. Moisture/density relationships are given in **Appendix A**. The type of soil encountered and stockpiled produced a composite soil that was placed for initial berm construction. As the project continued, berm was constructed either from the stockpile composite or direct placement from subgrade excavation. The maximum density references are labeled in **Appendix A.2**, **A.3** and **A.4**.

2.2.4 Subgrade Acceptance

Upon completion of subgrade construction, Cell 5 A/B was surveyed by WTC. The topography of the subgrade was then verified and accepted by the Parkhill 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.

Parkhill Site CQA Engineer/Manager and MEES 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. Parkhill CQA Engineer/Manager and 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. 4X provided continual moisture conditioning and rolling of the subgrade ahead of the liner installation as requested by MEES' FIS and Parkhill Site CQA Engineer/Manager.

2.3 Geosynthetic Clay Liner

In accordance with the Construction Plans, Project Technical Specifications, and 2016 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 341,930 ft² of Bentoliner NSL, the reinforced GCL material manufactured by Solmax, was used in the construction of Cell 5 A/B. 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 Solmax Bentoliner NSL GCL.

2.3.2 Geosynthetic Clay Liner Installation

The guidelines specified in the Project Technical Specifications, 2016 CQA Plan, Construction Plans, and industry standards for GCL installation procedures were strictly followed during lining of Cell 5 A/B. Each roll of GCL was carefully transported from the contractor's staging area to Cell 5 A/B using a rubber-tired forklift, as verified by the Parkhill Site CQA Engineer/Manager. As each roll was moved, the manufacturer's identification label was removed and submitted to the Parkhill Site CQA Engineer/Manager for documentation in the *GCL Deployment Log* (**Appendix C.6**) and the GCL Layout Drawing (**Figure 5**). These labels were compared with the shipping invoice to verify that the GCL delivered to OWL 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 inches on the longitudinal seams and twelve inches on the end seams as specified in the Project Technical Specifications and 2016 CQA Plan. Free bentonite was applied on each longitudinal and perpendicular seam at a minimum of 0.25-pounds per linear foot of seam. Material placement was observed by the Parkhill Site CQA Engineer/Manager and FIS for potential damage due to handling or installation.

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 OWL.

TABLE 6 – Solmax 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 D4643
Nonwoven and Woven Geotextile Encapsulating Bentonite	ASTM Method
Grab strength	ASTM D4632
Mass per unit area	ASTM D5261

GCL quality control certification and GCL property values and testing frequencies for the on-site material delivered to OWL 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. TRI or Parkhill 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 per 100,000 ft² of GCL installed to verify that the GCL delivered to OWL met the minimum properties listed in the Project Technical Specifications and 2016 CQA Plan. Approximately 341,930 ft² of GCL material was deployed within the Landfill Cell 5 A/B, requiring a minimum of four samples. Four samples were tested by TRI for the properties listed in **Table 7**; as specified in the Project Technical Specifications and 2016 CQA Plan.

TABLE 7 - Solmax Bentoliner NSL GCL - Conformance Testing	
Bentoliner NSL GCL Property	ASTM Method
Mass per unit area	ASTM D5993
Index Flux	ASTM D5887
Bentonite- Fluid Loss	ASTM D5891
Bentonite - Swell Index	ASTM D5890

Conformance test results were reviewed by the Parkhill CQA Engineer and accepted in accordance with Project Technical Specifications and 2016 CQA Plan. The conformance test results indicate that the GCL meets the minimum property requirements specified in the Project Technical Specifications and 2016 CQA Plan. The conformance test results for the four samples are included in **Appendix B.2**.

2.3.3.3 Construction Quality Control (CQC) for Geosynthetic Clay Liner

CQC procedures specified in the Project Technical Specifications and 2016 CQA Plan were strictly followed to provide a method to measure and regulate the quality of GCL installation. Parkhill 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 Project Technical Specifications and 2016 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

Parkhill Site CQA Engineer/Manager and the FIS inspected each roll of GCL transported to Cell 5 A/B from the staging area. 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 OWL corresponded with GCL subjected to manufacturers' quality control and quality assurance testing (see Sections 2.3.3.1.).

Parkhill 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-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 2016 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. GCL installation was not accepted until the deployment records (**Appendix C.6**), manufacturer's certification reports (**Appendix B.1**), and conformance test results (**Appendix B.2**) were submitted to and approved by Parkhill Site CQA Engineer. Cell 5 A/B GCL Layout is shown on **Figure 5**. Daily Summary Reports and documentation of GCL panel placement were recorded

throughout each construction day. Copies of 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

Secondary FML was installed in direct contact above the GCL in accordance with the Engineering Design Drawings, Project Specifications, and 2016 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

FML utilized in Cell 5 A/B construction was 60-mil, high-density polyethylene (HDPE), manufactured by Solmax. Textured FML was designated for the berm/side slopes and smooth FML was designated for the cell floor lining of Cell 5 A/B and was delivered to OWL in rolls 22.5-feet wide by 560-feet long and 520-feet long for smooth and textured liner, respectively. FML was stored in the contractor's staging area and in accordance with the Project Technical Specifications and the 2016 CQA Plan. The stored FML was not stacked more than 2 rolls high. Parkhill Site CQA Engineer/Manager compared roll identification labels with shipping invoices to verify that FML delivered to OWL corresponded with FML subjected to manufacturer's quality control and quality assurance testing (Section 2.4.3).

2.4.2 Flexible Membrane Liner Installation

FML installation activities were performed in accordance with the guidelines specified in the Construction Plans, Project Technical Specifications and 2016 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 5 A/B 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 Parkhill Site CQA Engineer/Manager and then compared with the shipping invoices to verify that the FML delivered to OWL corresponds with FML subjected to manufacturer's quality control and quality assurance testing. FML being deployed was documented in the *Secondary FML Deployment Log* (**Appendix C.7**) and the Secondary 60-Mil Liner Panel Layout Drawing (**Figure 6**).

After each FML panel had been deployed, adjoining panels were positioned with a four- to six-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 45 degrees to the line of prevailing base grade slope on the Cell 5 A/B floor, and parallel to the Cell 5 A/B side slopes, per Project Technical Specifications and 2016 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 FML delivered to OWL 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 MQA testing, specific performance and characterization properties were evaluated on random samples collected from the manufactured FML rolls prior to their delivery to OWL as listed in **Table 8**.

TABLE 8 - Solmax 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
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 Parkhill Site CQA Engineer and confirmed against Project Technical Specifications and 2016 CQA Plan requirements. MQA testing results met the requirements set forth in Project Technical Specifications and 2016 CQA Plan.

2.4.3.3 Conformance Testing

Conformance sampling for FML material was performed by TRI, Austin, Texas. TRI or Parkhill 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 per 100,000 ft² of FML installed to verify that the FML delivered to OWL met the minimum properties listed in Project Technical Specifications and 2016 CQA Plan. Approximately 348,360 ft² of HDPE Secondary FML was installed in the Landfill; requiring a minimum of four conformance samples. A total of ten samples of 60 mil HDPE FML were tested by TRI for conformance.

TRI tested the ten FML samples for the properties listed in **Table 9**; as specified in Project Technical Specifications and 2016 CQA Plan.

TABLE 9 - Solmax HDPE FML - Conformance Testing	
60-mil HDPE (Smooth/Textured) FML Property	ASTM Method
Thickness	ASTM D5994
Density	ASTM D1505
Tensile Properties	ASTM D6693 and ASTM D 6693, Modified
Tear Resistance	ASTM D1004, Modified
Carbon Black Content	ASTM D6693, Modified 4218
Carbon Black Dispersion	ASTM D5596
Puncture Strength	ASTM D4833

Conformance test results were reviewed by Parkhill Site CQA Engineer and accepted in accordance with Project Technical Specifications and 2016 CQA Plan. Conformance test results indicated that the FML met the minimum property requirements specified in Project Technical Specifications and 2016 CQA Plan. Conformance testing results for the ten samples are included in **Appendix B.4**.

2.4.3.4 Construction Quality Control (CQC)

Quality control procedures specified in Project Technical Specifications, 2016 CQA Plan, and industry standards were strictly followed 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 Project Technical Specifications, 2016 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. Trial welds were a minimum of ten feet in length for fusion welders and a minimum of three 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 (MEES's tensiometer calibration certificate is provided in **Appendix C.18**) and testing was performed in the presence of Parkhill Site CQA Engineer/Manager. If the results of the trial weld testing did not comply with Project Technical Specifications and 2016 CQA Plan, the welder was not permitted to continue seaming until the deficiencies were corrected and an additional trial weld was performed which passed the field-testing requirements. Trial weld documentation is included in **Appendix C.8**.

Seam testing protocol for Cell 5 A/B 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.

Parkhill Site CQA Engineer/Manager and FIS observed FML placement activities to verify that the deployment and seaming procedures were performed in accordance with Project Technical Specifications and 2016 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)

Parkhill 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. Parkhill Site CQA Engineer/Manager inspected seamed and non-seamed areas of the FML for wrinkles, defects, holes, blisters, etc. After each panel was deployed, Parkhill 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 Project Technical Specifications and 2016 CQA Plan, the field seam verification program consisted of both destructive and non-destructive testing. Sampling and field-testing were performed by FML installer (MEES) in the presence of Parkhill 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 Project Technical Specifications and 2016 CQA Plan, a minimum of one destructive test for every 500 linear feet of welded seam (an average taken throughout the entire project) was performed on the FML. Records of the FML weld-seam lengths are included in **Appendix C.9**.

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 for laboratory testing. The third sample segment was retained by Parkhill Site CQA Engineer/Manager and delivered to OWL to be archived in the facility operating record. Results of the field destructive tests are provided in **Appendix C.11**; and the independent quality assurance laboratory test results are included in **Appendix D.1**. The field destructive test results, and the independent quality assurance laboratory test results were reviewed by Parkhill Site CQA Engineer/Manager for conformance with Project Technical Specifications and 2016 CQA Plan. All peel and shear test results met the requirements of Project Technical Specifications and 2016 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 that was extrusion-welded and vacuum box tested. An additional patch was extrusion welded over the repaired area and vacuum box tested. Vacuum box testing was performed on all extrusion-welded portions of seams and patches. Test results are documented on the Secondary FML Seam Pressure Test Log (**Appendix C.10**) and *FML Seam Vacuum Test and Defect-Repair Log* (**Appendix C.16**). Seams and repairs were required to pass the non-destructive testing specifications outlined in Project Technical Specifications, GRI test method GM-6, and 2016 CQA Plan before being accepted by the Parkhill 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 FML deployed in Cell 5 A/B 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.7
Secondary and Primary FML Pre-Weld Qualification Test Record	Appendix C.8
Secondary FML Seaming Log	Appendix C.9
Secondary FML Seam Pressure Test Log	Appendix C.10
FML Seam Field Destructive Test Log	Appendix C.11
FML Seam Vacuum Test and Defect-Repair Log	Appendix C.16
Demtech Tensiometer Calibration Certification	Appendix C.18

FML installation was accepted after the data listed in **Table 10** was submitted to, reviewed by, and approved by Parkhill Site CQA Engineer. Cell 5 A/B As-Built Secondary FML Panel Layout is included as **Figure 6**. Daily Summary Reports were completed after each construction day, and photo documentation recorded FML placement activity on landfill floor and side slopes. 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 2016 CQA Plan. This zone consists of a double-sided geocomposite for side slopes 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

Geocomposite utilized in Cell 5 A/B construction is a 200-mil, high-density polyethylene (HDPE) encapsulated by nonwoven geotextile manufactured by Solmax. Geonet utilized in Cell 5 A/B construction is a 200-mil high-density polyethylene (HDPE) manufactured by Solmax. 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 288 feet long for geocomposite and 15 feet wide by 290 feet long for geonet. Rolls were staged along the western perimeter of Cell 5 A/B to provide easy access, and to minimize handling of the material. In accordance with CQA Plan and Project Specifications, material was not stacked more than two rolls high. Labels were compared with shipping invoice to verify that the materials received corresponded with materials subjected to manufacturer's quality control/manufacturer's 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

Leak detection zone material installation activities were performed in accordance with guidelines stipulated in 2016 CQA Plan, Project Specifications, the engineering design Drawings, and industry standards for handling and placement. Each roll was carefully moved from staging area to Cell 5 A/B using a rubber-tired extendable forklift. The forklift was not permitted on Secondary FML, and the material was placed by hand. Upon deployment, each roll label was removed and submitted to Parkhill Site CQA Engineer/Manager and panel location documented (see **Figure 7**).

After each panel had been placed, adjoining panels were positioned with a four- to six-inch overlap. The overlap distance is required for proper attachment using zip ties placed at five feet six inches longitudinally and end-to-end seams respectively. Geotextile encapsulating the geonet core of the geocomposite was 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 side slopes.

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 **Appendices B.5 and B.7**.

2.5.3.2 Manufacturer's Quality Assurance (MQA)

As required by Project Technical Specifications and 2016 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 – Solmax 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

Geocomposite and geonet quality control certifications, property values, and testing frequencies for the on-site material delivered to OWL are provided in **Appendix B.5 and B.7**.

2.5.3.3 Conformance Testing

Conformance sampling for the geocomposite and geonet material was performed by TRI, Austin, Texas. TRI or Parkhill 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 per 100,000 ft² of material installed to verify that the geocomposite and geonet delivered to the OWL met the minimum properties listed in the Project Technical Specifications and 2016 CQA Plan. Approximately 56,492 ft² of geocomposite and approximately 281,097 ft² of geonet material was installed in the Cell 5 A/B leak detection layer requiring a minimum of one geocomposite and three geonet samples. TRI tested six geocomposite and eight geonet conformance samples for the properties listed in **Table 12**, as specified in Project Technical Specifications and 2016 CQA Plan.

Table 12 – Solmax 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.8** provides the independent quality assurance laboratory test results. The results were reviewed by Parkhill CQA Engineer and compared with Project Technical Specifications and 2016 CQA Plan for geonet. The properties of the geocomposite and geonet meet or exceed Project Technical Specifications and 2016 CQA Plan requirements.

2.5.3.4 Construction Quality Control (CQC)

Quality control procedures specified in the project documents were strictly followed 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 Parkhill Site CQA Engineer/Manager and FIS observed placement activities to verify that deployment and seaming procedures were performed in accordance with CQA Plan and Project Specifications.

2.5.3.5 Construction Quality Assurance (CQA)

Parkhill 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. Parkhill Site CQA Engineer/Manager inspected all seamed and non-seamed areas of the material for wrinkles, defects, etc. After each panel was deployed, Parkhill 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 leak detection zone material deployment was required prior to approval and acceptance. Deployment documentation for the materials deployed in Cell 5 A/B are provided in **Appendices C.12** and **C.17**.

Leak detection zone material installation was accepted after the above-listed data was submitted to, reviewed, and approved by Parkhill CQA Engineer. Leak Detection Zone Panel As-Built for Cell 5 A/B is included as **Figure 7**. Daily Summary Reports were logged during each construction day and photographs were taken showing the panel placement activity. Daily Summary Reports and project photographs are provided in the **Field Logs** and **Photographs** Section.

2.6 60-MIL PRIMARY FLEXIBLE MEMBRANE LINER

Primary FML was installed in direct contact above leak detection zone materials in accordance with the Construction Plans, Project Technical Specifications, and 2016 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

Primary FML utilized in Cell 5 A/B construction was 60-mil high-density polyethylene (HDPE) manufactured by Solmax. Smooth FML was designated for the floor and textured FML was designated for the side slopes of Cell 5 A/B. The material was delivered to OWL in rolls 22.5-feet wide with by 560-feet long for the smooth and 520-feet long for the textured FML. FML was stored in contractor's staging area and in accordance with Project Technical Specifications and 2016 CQA Plan. The stored FML was not stacked more than two rolls high. Parkhill Site CQA Engineer/Manager compared roll identification labels with shipping invoices to verify that the FML delivered to OWL corresponded with FML subjected to manufacturer's quality control and quality assurance testing (Section 2.6.3).

2.6.2 Flexible Membrane Liner Installation

FML installation activities were performed in accordance with the guidelines specified in Construction Plans, Project Technical Specifications, and 2016 CQA Plan; and industry standards for FML handling, placement, and testing. Each roll of FML was carefully moved from contractor's staging area at the west end of OWL using a rubber-tired forklift; and FML was not placed in standing water or deployed during rainfall. The forklift was not allowed on 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 roll identification label was removed and submitted to Parkhill Site CQA Engineer/Manager and were compared with the shipping invoices to verify that the FML delivered to OWL corresponded with FML subjected to manufacturer's quality control and quality assurance testing. FML being deployed was documented in Primary FML Deployment Log (**Appendix C.13**) and Cell 5 A/B 60-Mil Primary Liner Panel Layout Drawing (**Figure 8**). After each FML panel had been deployed, adjoining panels were positioned with a four- to six-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 45 degrees to the line of prevailing base grade slope on the Cell 5 A/B floor, and parallel to the Cell 5 A/B side slopes, per the Project Technical Specifications and 2016 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 OWL 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 OWL as listed in **Table 13**.

TABLE 13 - Solmax 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
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 Parkhill Site CQA Engineer and confirmed against Project Technical Specifications and 2016 CQA Plan requirements. MQA testing results met the requirements set forth in Project Technical Specifications and 2016 CQA Plan.

2.6.3.3 Conformance Testing

Conformance sampling for FML material was performed by TRI, Austin, Texas. TRI or Parkhill 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 per 100,000 ft² of FML installed to verify that the FML delivered to the OWL met the minimum properties listed in Project Technical Specifications and 2016 CQA Plan. Approximately 357,744 ft² of primary HDPE FML were installed during Cell 5 A/B construction requiring a minimum of four HDPE FML conformance samples. Ten samples of HDPE FML were tested by TRI for conformance.

TRI tested the FML samples for the properties listed in **Table 14**, as specified in Project Technical Specifications and 2016 CQA Plan.

TABLE 14 – Solmax 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
Carbon Black Content	ASTM D4218
Carbon Black Dispersion	ASTM D5596
Puncture Strength	ASTM D4833

Conformance test results were reviewed by Parkhill Site CQA Engineer and accepted in accordance with Project Technical Specifications and 2016 CQA Plan. Conformance test results indicated that the FML met the minimum property requirements specified in Project Technical

Specifications and 2016 CQA Plan. Conformance testing results for the ten samples are included in **Appendix B.4**.

2.6.3.4 Construction Quality Control (CQC)

Quality control procedures specified in Project Technical Specifications, 2016 CQA Plan; and industry standards were strictly followed 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 deployment and seaming procedures were performed in accordance with Project Technical Specifications, 2016 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. Trial welds were a minimum of ten feet in length for fusion welders; and a minimum of three 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 (MEES's tensiometer calibration certificate is provided in **Appendix C.18**) and testing was performed in the presence of Parkhill Site CQA Engineer/Manager. If results of trial weld testing did not comply with Project Technical Specifications and 2016 CQA Plan, the welder was not permitted to continue seaming until the deficiencies were corrected and an additional trial weld was performed which passed the field-testing requirements. Primary trial weld documentation is included in **Appendix C.8**.

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.

Parkhill Site CQA Engineer/Manager and FIS observed FML placement activities to verify that deployment and seaming procedures were performed in accordance with Project Technical Specifications and 2016 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)

Parkhill 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. Parkhill Site CQA Engineer/Manager inspected seamed and non-seamed areas of the FML for wrinkles, defects, holes, blisters, etc. After each panel was deployed, Parkhill 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 Project Technical Specifications and 2016 CQA Plan, the field seam verification program consisted of both destructive and non-destructive testing. Sampling and field-testing were performed by the FML installer (MEES) in the presence of Parkhill Site CQA Engineer/Manager. In addition to field-testing, destructive samples were sent to an independent quality assurance laboratory for peel and shear strength testing.

A. Destructive Seam Testing

In accordance with Project Technical Specifications and 2016 CQA Plan, a minimum of one destructive test for every 500 linear feet of welded seam (an average taken throughout the entire

project) was performed on the FML. Records of the FML weld-seam lengths are included in **Appendix C.9**.

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 for laboratory testing. The third sample segment was retained by Parkhill Site CQA Engineer/Manager and delivered to OWL to be archived in the facility operating record. Results of the field destructive tests are provided in **Appendix C.11**; and the independent quality assurance laboratory test results are included in **Appendix D.2**. The field destructive test results and the independent quality assurance laboratory test results were reviewed by Parkhill Site CQA Engineer/Manager for conformance with Project Technical Specifications and 2016 CQA Plan. All peel and shear test results met the requirements of Project Technical Specifications and 2016 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.15**) and the FML Seam Vacuum Test and Defect-Repair Log (**Appendix C.16**). Seams and repairs were required to pass the non-destructive testing specifications outlined in Project Technical Specifications, GRI Test Method GM-6, and 2016 CQA Plan before being accepted by Parkhill 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 5 A/B 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.8
Primary FML Deployment Log	Appendix C.13
Primary FML Seaming Log	Appendix C.14
Primary FML Seam Pressure Test Log	Appendix C.15
FML Seam Vacuum Test and Defect-Repair Log	Appendix C.16
Demtech Tensiometer Calibration Certification	Appendix C.18

FML installation was accepted after the data listed in **Table 15** was submitted to, reviewed by, and approved by Parkhill Site CQA Engineer. Cell 5 A/B 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 Cell 5 A/B floor and side slopes.

2.7 GEOSYNTHETIC CUSHION/DRAINAGE LAYER

Geosynthetic Cushion/Drainage Layer was installed directly above the primary FML in accordance with engineering design Drawings, Project Specifications, and 2016 CQA Plan. This layer consists of a double-sided geocomposite for the side slopes 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

Geocomposite utilized in Cell 5 A/B 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 Solmax. Cushion/drainage layer material is specified to encompass the entire double-lined system and was 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 5 A/B to provide easy access and to minimize handling of the material. In accordance with CQA Plan and Project Specifications, material was not stacked more than two rolls high. Labels were compared with 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

Cushion/Drainage Layer material installation activities were performed in accordance with the guidelines stipulated in 2016 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 5 A/B using a rubber-tired extendable forklift. The forklift was not permitted on primary FML, and the material was placed by hand. Upon deployment, each roll label was removed and submitted to Parkhill Site CQA Engineer/Manager and panel location documented (see **Figure 9**).

After each panel had been placed, adjoining panels were positioned with a four- to six-inch overlap. The overlap distance is required for proper attachment using zip ties placed at five feet six 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 side slopes.

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.7**.

2.7.3.2 Manufacturer's Quality Assurance (MQA)

As required by Project Technical Specifications and 2016 CQA Plan, the manufacturer performed the Geocomposite property testing listed in **Table 16** prior to delivery of the materials to the Site.

TABLE 16 – Solmax Geocomposite - MQC Testing	
Geocomposite Property	ASTM Method
Thickness	ASTM D5199
Density	ASTM D792
Carbon Black Content	ASTM D4218
Tensile Strength	ASTM D7179
Peel Strength	ASTM D7005
Mass Per Unit Area	ASTM D5261
Transmissivity (loaded)	ASTM D4716

Geocomposite quality control certifications, property values, and testing frequencies for on-site material delivered to OWL are provided in **Appendix B.8**.

2.7.3.3 Conformance Testing

Conformance sampling for the geocomposite material was performed by TRI, Austin, Texas. TRI or Parkhill 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 per 100,000 ft² installed to verify that the geocomposite delivered to the OWL met the minimum properties listed in the Project Technical Specifications and 2016 CQA Plan. Approximately 53,723 ft² of double-sided geocomposite and approximately 308,212 ft² of single-sided geocomposite material was installed in Cell 5 A/B requiring a minimum of one double-sided geocomposite and four single-sided geocomposite samples. TRI tested six single-sided and eight double-sided geocomposite conformance sample for the properties listed in **Table 17**; as specified in Project Technical Specifications and 2016 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.8. provides independent quality assurance laboratory test results. The results were reviewed by Parkhill CQA Engineer and compared with Project Technical Specifications and 2016 CQA Plan for Geocomposite. The properties of the geocomposite meet or exceed Project Technical Specifications and 2016 CQA Plan requirements.

2.7.3.4 Construction Quality Control (CQC)

Quality control procedures specified in the project documents were strictly followed 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 side slopes.

Both the Parkhill Site CQA Engineer/Manager and FIS observed placement activities to verify that deployment and seaming procedures were performed in accordance with the CQA Plan and Project Specifications.

2.7.3.5 Construction Quality Assurance (CQA)

Parkhill Site CQA Engineer/Manager and FIM visually inspected all material for manufacturing and installation defects. No manufacturing flaws were observed in the installed geocomposite. Parkhill Site CQA Engineer/Manager inspected all seamed and non-seamed areas of the geocomposite for

wrinkles, defects, etc. After each panel was deployed, Parkhill 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 cushion/drainage layer material deployment was required prior to approval and acceptance. CQA documentation for geocomposite deployed in Cell 3 A/B is provided in **Appendix C.17**.

Drainage/cushion layer material installation was accepted after above-listed data was submitted to, reviewed, and approved by Parkhill CQA Officer. Geosynthetic cushion/drainage layer panel as-built for Cell 3 A/B is included as **Figure 9**. Daily summary reports were logged during each construction day and photographs were taken showing geocomposite placement activity. Daily summary reports and project photographs are provided in **Field Logs** and **Photographs** Section. Upon installation of Drainage/cushion layer, anchor trench was backfilled and compacted to Design Specifications (**Appendix A.4**).

2.8 LEACHATE COLLECTION SYSTEM

Upon completion of liner system installation, and confirming that all repairs were adequately addressed, 4X began installation of the leachate collection system which included placement of aggregate, pipe, and geocomposite.

Parkhill observed placement of the leachate collection system ensure the methods and material used during construction did not damage the installed liner system.

2.9 PROTECTIVE SOIL LAYER

Upon completion of liner system installation, and after confirming that all repairs were adequately addressed, 4X began placing a minimum two-foot thickness of PSL on the cell floor and side slope. Material for the PSL is comprised of on-site soil material pre-qualified by Parkhill Site CQA Engineer/Manager.

Parkhill observed 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 August 2, 2023 conducted by WTC (**Figure 10**). The survey indicates that a minimum of two feet of PSL was placed over the top of the cell floor and side slope liner systems.

2.10 FUTURE LINER TIE-IN DETAILS, STORMWATER AND LINER PROTECTION BERM

Future liner tie-in will be to Cell 6 A/B directly to the west, Cell 5 B directly to the south, and Cell 4 B east of Cell 5 B. The design for the stormwater and liner protection berm constructed in the perimeter transition zones of Cell 5 A/B, as shown on **Figure 2**, serves the intended purpose to control stormwater run-on and to protect the installed liner system.

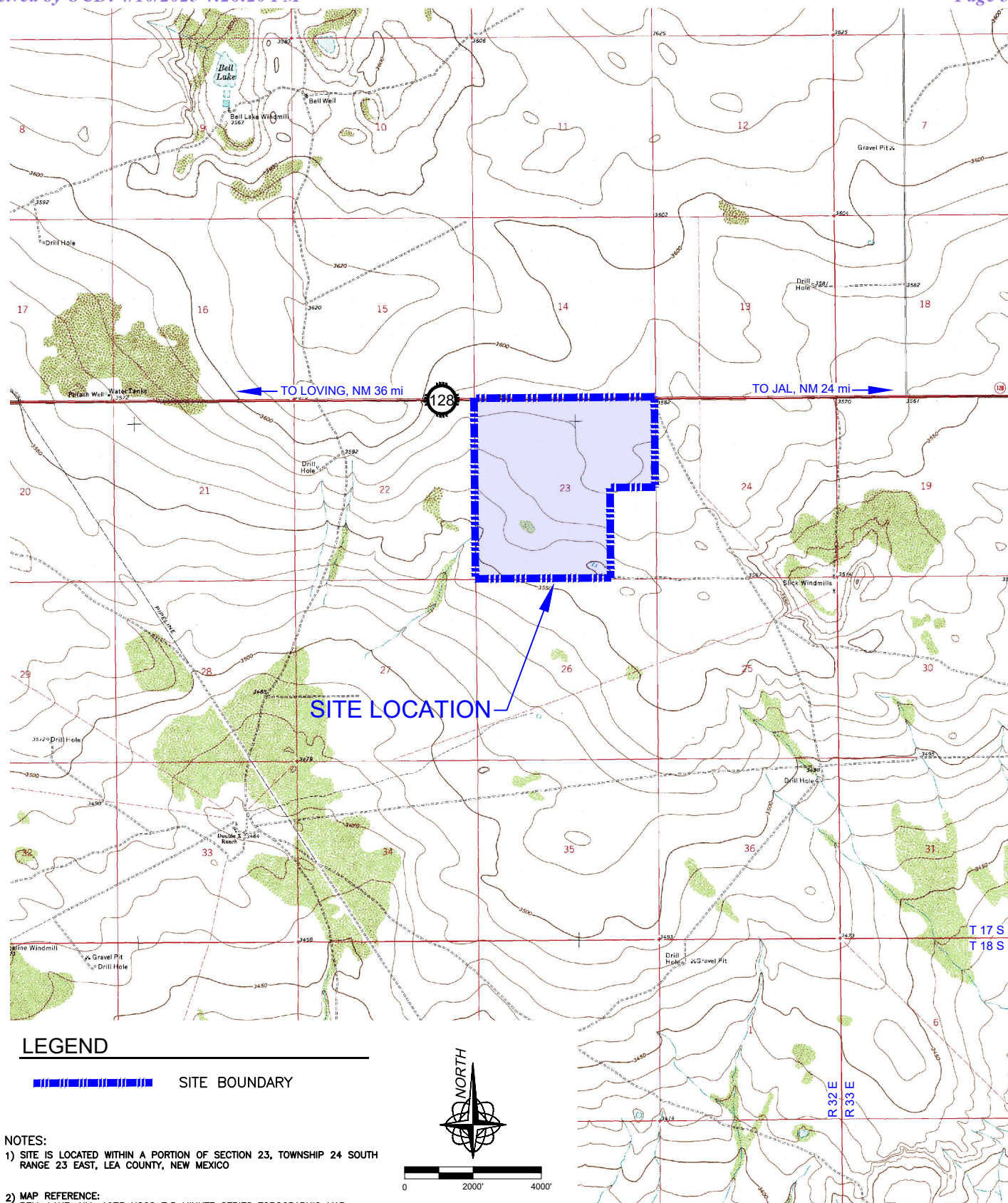
Contractor constructed the stormwater and liner protection berm by placing soil along the floor and side slope of the cell until design grades were achieved. The stormwater and liner protection berm as-built is shown on **Figure 3**.

3.0 ENGINEERING CERTIFICATION

This Engineering Certification Report demonstrates that the composite liner and leak detection system for Cell 5 A/B has been installed in accordance with New Mexico Energy, Minerals, and Natural Resources Department Regulations (19.15.36.11 – 19.15.36.112 NMAC). This Certification is sealed by Tyler S. Krueger, a New Mexico Professional Engineer with extensive applicable experience with waste engineering and geosynthetic liner systems (**Appendix G**).

FIGURES

- Figure 1 OWL Landfill Services – Site Location Map
- Figure 2 OWL Landfill Services – Subgrade Design Grades
- Figure 3 OWL Landfill Services – Subgrade As-Built Locations
- Figure 4 OWL Landfill Services – Field Density Test Locations
- Figure 5 OWL Landfill Services – GCL Panel Layout
- Figure 6 OWL Landfill Services – 60 Mil Secondary Liner Panel Layout
- Figure 7 OWL Landfill Services – Geosynthetic Leak Detection Layer As-Built
- Figure 8 OWL Landfill Services – 60 Mil Primary Liner Panel Layout
- Figure 9 OWL Landfill Services – Geosynthetic Cushion/Drainage Panel Layout
- Figure 10 OWL Landfill Services – PSL As-Built Thickness
- Figure 11 OWL Landfill Services – Top of Pipe Surveyed Elevations



OWL LANDFILL SERVICES ENGINEERING CERTIFICATION REPORT

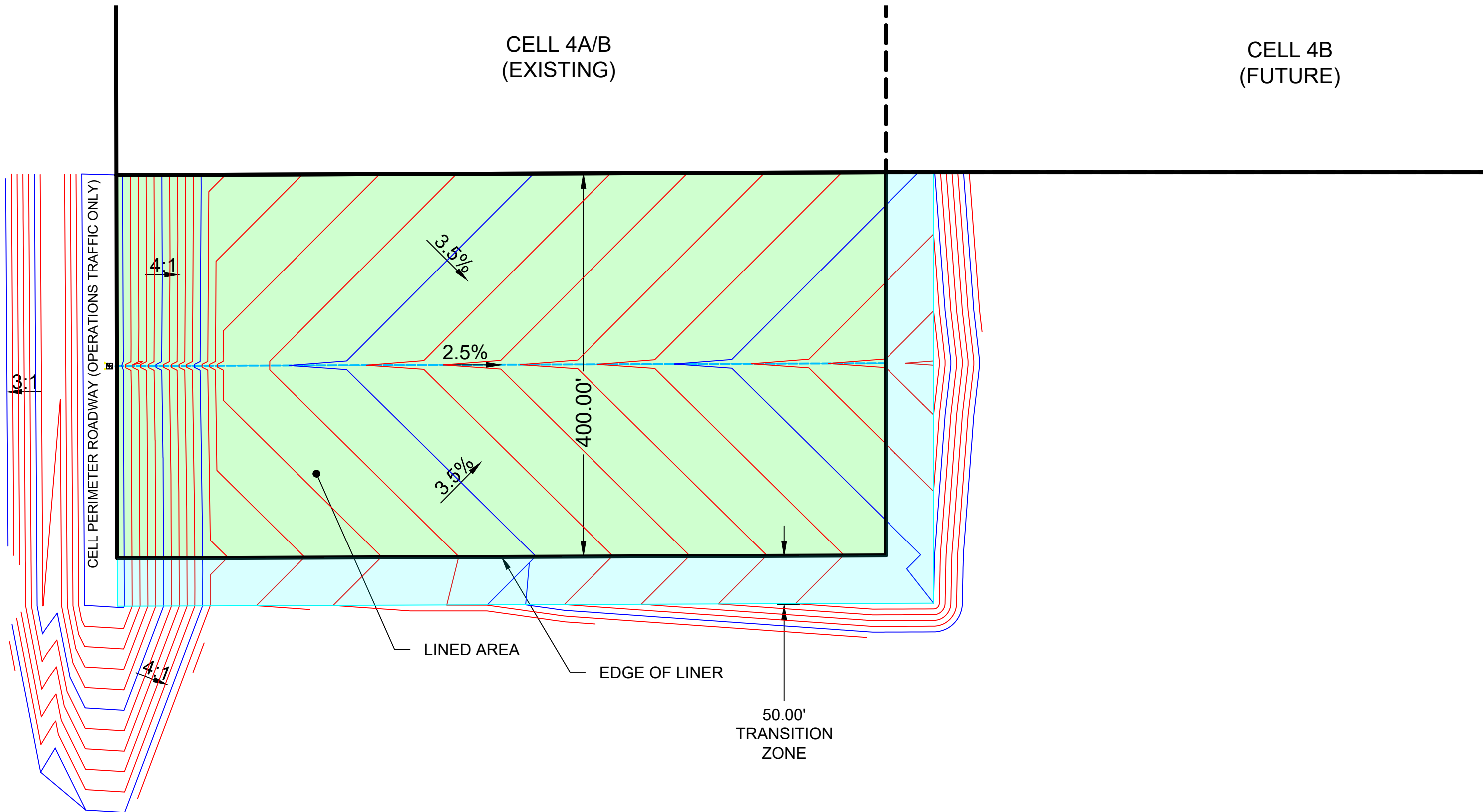
OILFIELD WATER LOGISTICS
JAL, NEW MEXICO
LEA COUNTY, NEW MEXICO

Parkhill

Parkhill.com

SITE LOCATION MAP

Issue: 00
Date: 08/28/2023
Project No: 7053.22
Sheet: FIGURE 1



OWL LANDFILL SERVICES
CELL 5A/B ENGINEERING CERTIFICATION REPORT
OILFIELD WATER LOGISTICS
JAL, NEW MEXICO
LEA COUNTY, NEW MEXICO



Parkhill

[Parkhill.com](https://www.parkhill.com)

SUBGRADE DESIGN GRADES

Issue: 00

Date: 08/28/2023

Project No: 7053.22

Sheet: FIGURE 2

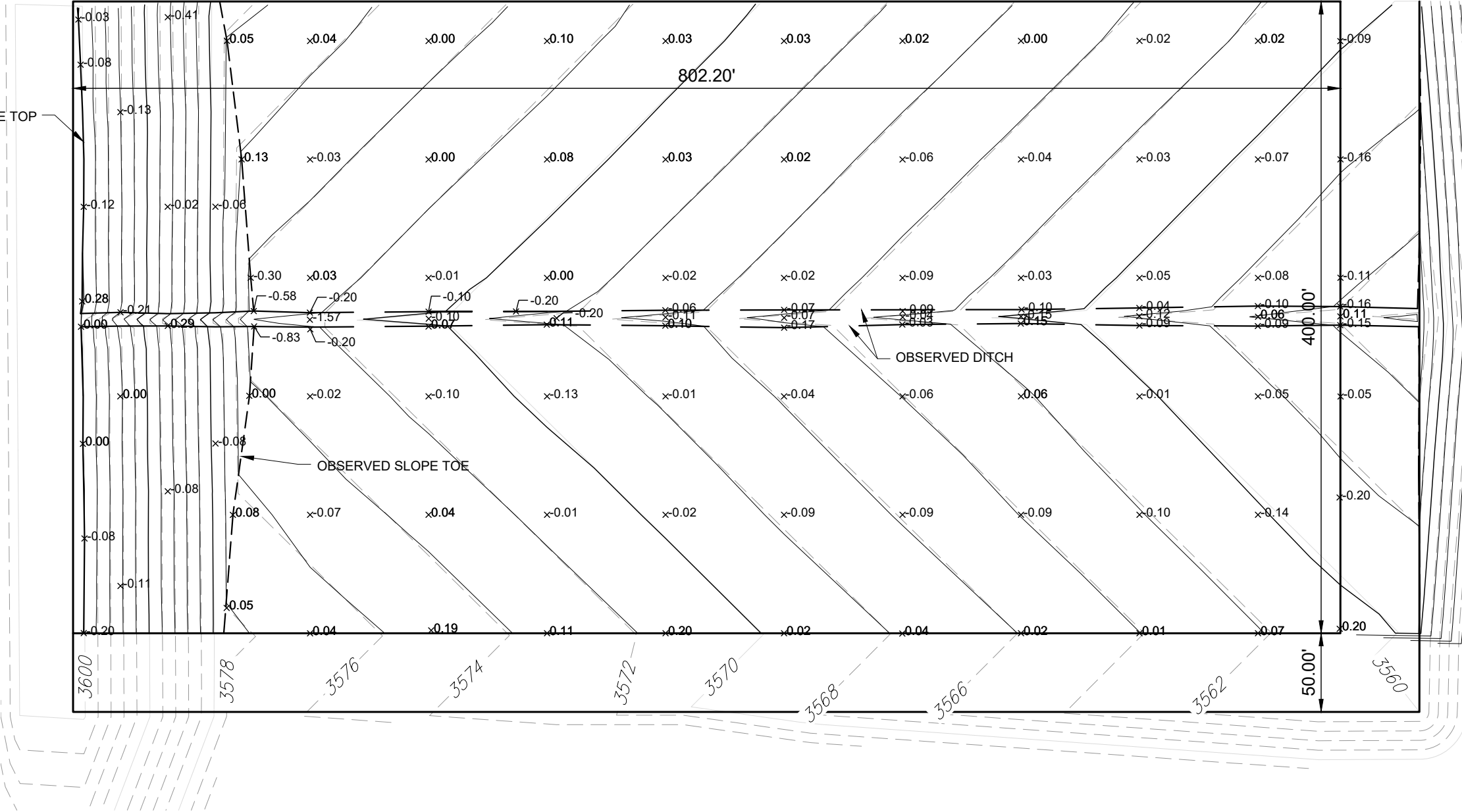
NOTES:

1. BASIS OF BEARING, COORDINATES AND DISTANCES ARE A LAMBERT CONICAL PROJECTION OF THE TEXAS COORDINATE SYSTEM, STATE PLANE GRID, NAD 83, NEW MEXICO EAST, WITH A CONVERGENCE ANGLE OF -000° 53' 22.66" AND A COMBINED SCALE FACTOR OF 1.000244819075, BASED ON CONTROL POINT "206" LOCATED AT COORDINATES: N: 438531.77'; E: 783105.77'.

3. CONTOUR INTERVAL 2 FOOT NORTH AMERICAN VERTICAL DATUM 1988

LEGEND

- CELL 5AB BOUNDARY
- OBSERVED SLOPE TOE
- OBSERVED SLOPE TOP
- EXISTING MAJOR/MINOR CONTOUR LINE
- PROPOSED MAJOR/MINOR CONTOUR LINE



North arrow pointing North (N) and East (E). Scale bar showing 0 to 100 feet. Text: SCALE: 1" = 100'

WTC
ENGINEERS | SURVEYORS

WEST TEXAS CONSULTANTS, INC.
ENGINEERS PLANNERS SURVEYORS
405 S.W. 1st. Street
Andrews, TX 79714
(432) 523-2181
TEXAS REGISTERED ENGINEERING FIRM F-2746
TEXAS REGISTERED SURVEYOR FIRM #100792-00

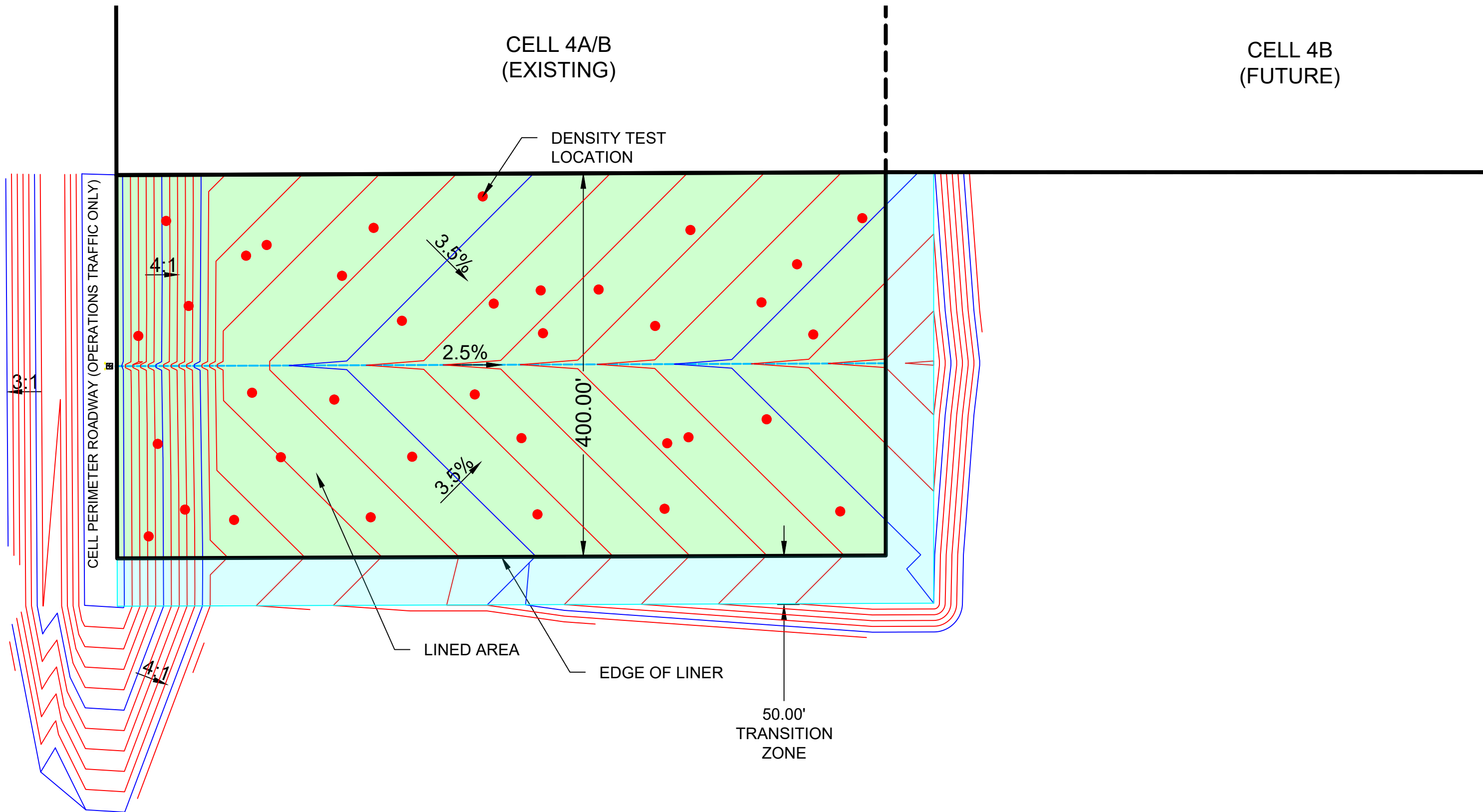
James C. Tompkins
JAMES C. TOMPKINS, N.M. P.L.S. No.27177
06/14/2023
SURVEY DATE: 06/12/2023

OWL NDBL SWMF
CELL 5AB

VERIFICATION SURVEY

DESIGN	DRAWN	DATE	PROJECT NO.	SCALE	SHEET #
N/A	OV	6/14/23	55999	N/A	1

X:\Projects\Construction Surveying\55999-Partial_Owl_Cell_5AB_Construction_Las_Co_NM\Drawings\CELL_5AB_VERIFICATION.dwg



OWL LANDFILL SERVICES
CELL 5A/B ENGINEERING CERTIFICATION REPORT
OILFIELD WATER LOGISTICS
JAL, NEW MEXICO
LEA COUNTY, NEW MEXICO



Parkhill

[Parkhill.com](https://www.parkhill.com)

**FIELD DENSITY
TEST LOCATIONS**

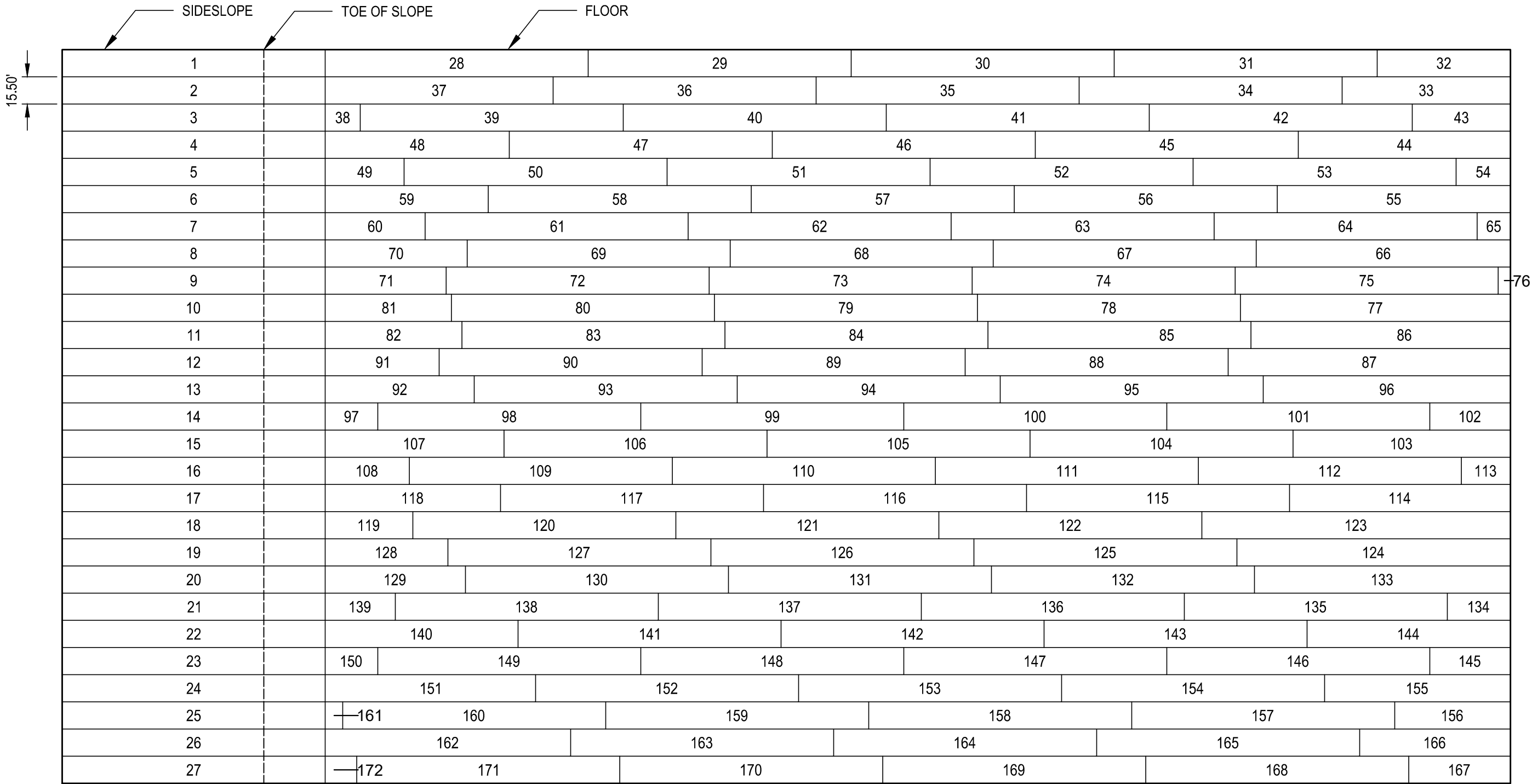
Issue: 00

Date: 08/28/2023

Project No: 7053.22

Sheet: FIGURE 4

\\PROJECTS-DFS\PROJECTS\2022\7053.22\03_DSGN\01_DWG\050_CIVIL\02_CONTENT\CELL 5AB\COALINER_PANEL_LAYOUTS_GCL.DWG, 8/31/2023 12:07:54 PM, ncrwley



OWL LANDFILL SERVICES

CELL 5AB CQA REPORT

Oilfield Water Logistics
Jal, New Mexico
Lea County, New Mexico

Released to Imaging: 4/22/2025 11:48:01 AM

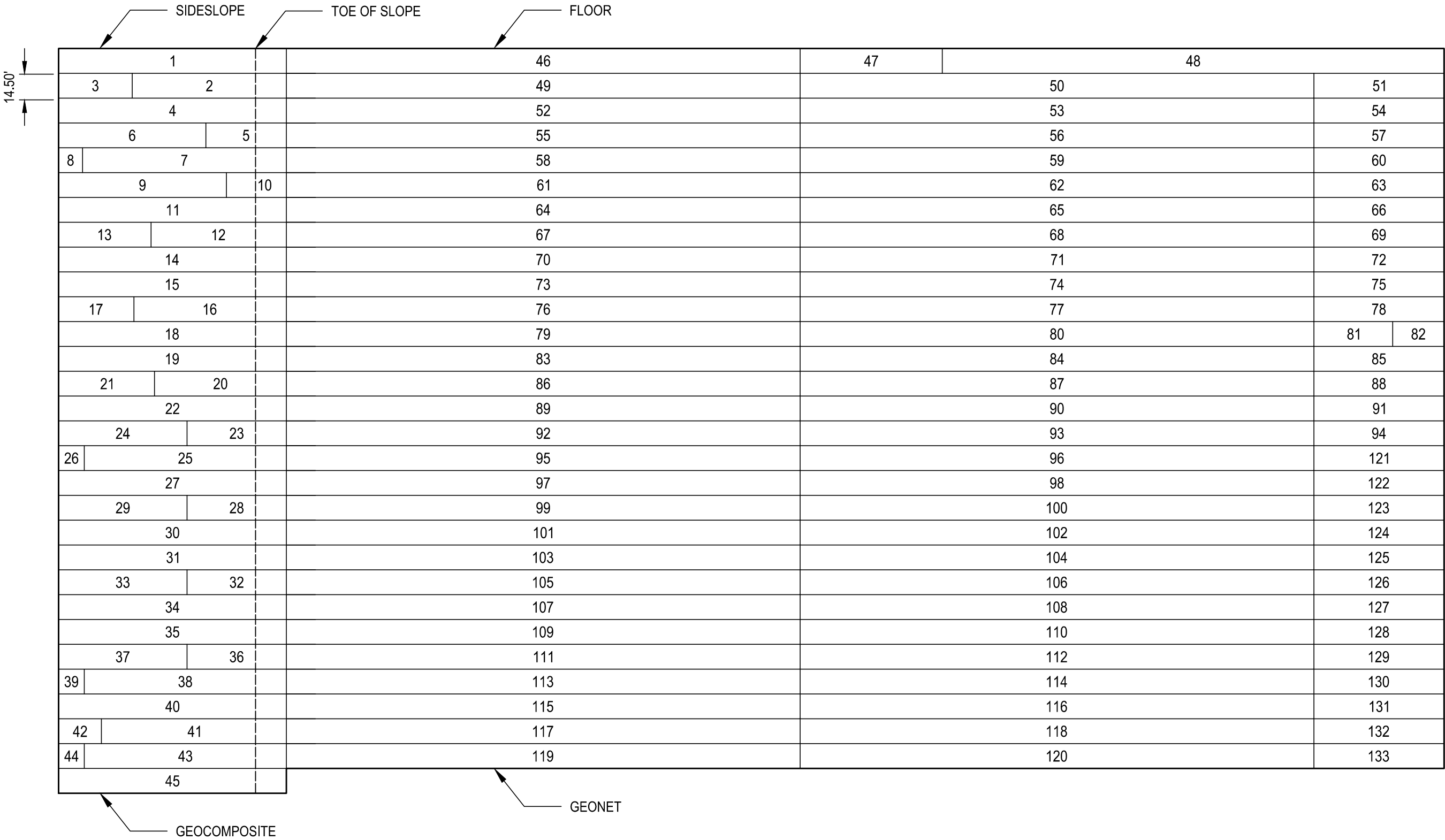


Parkhill.com

GCL PANEL LAYOUT

Issue: 08/28/2023
Date: 7053.22
Project No: Figure 5
Sheet:

\\PROJECTS-DFS\PROJECTS\2022\7053.22\03_DSGN\01_DWG\050_CIVIL\02_CONTENT\CELL_5AB\COALINER_PANEL_LAYOUTS_LEAKDETECTION.DWG, 2/13/2025 5:31:48 PM, ncrawley



OWL LANDFILL SERVICES CELL 5AB CQA REPORT

Oilfield Water Logistics
Jal, New Mexico
Lea County, New Mexico

Released to Imaging: 4/22/2025 11:48:01 AM

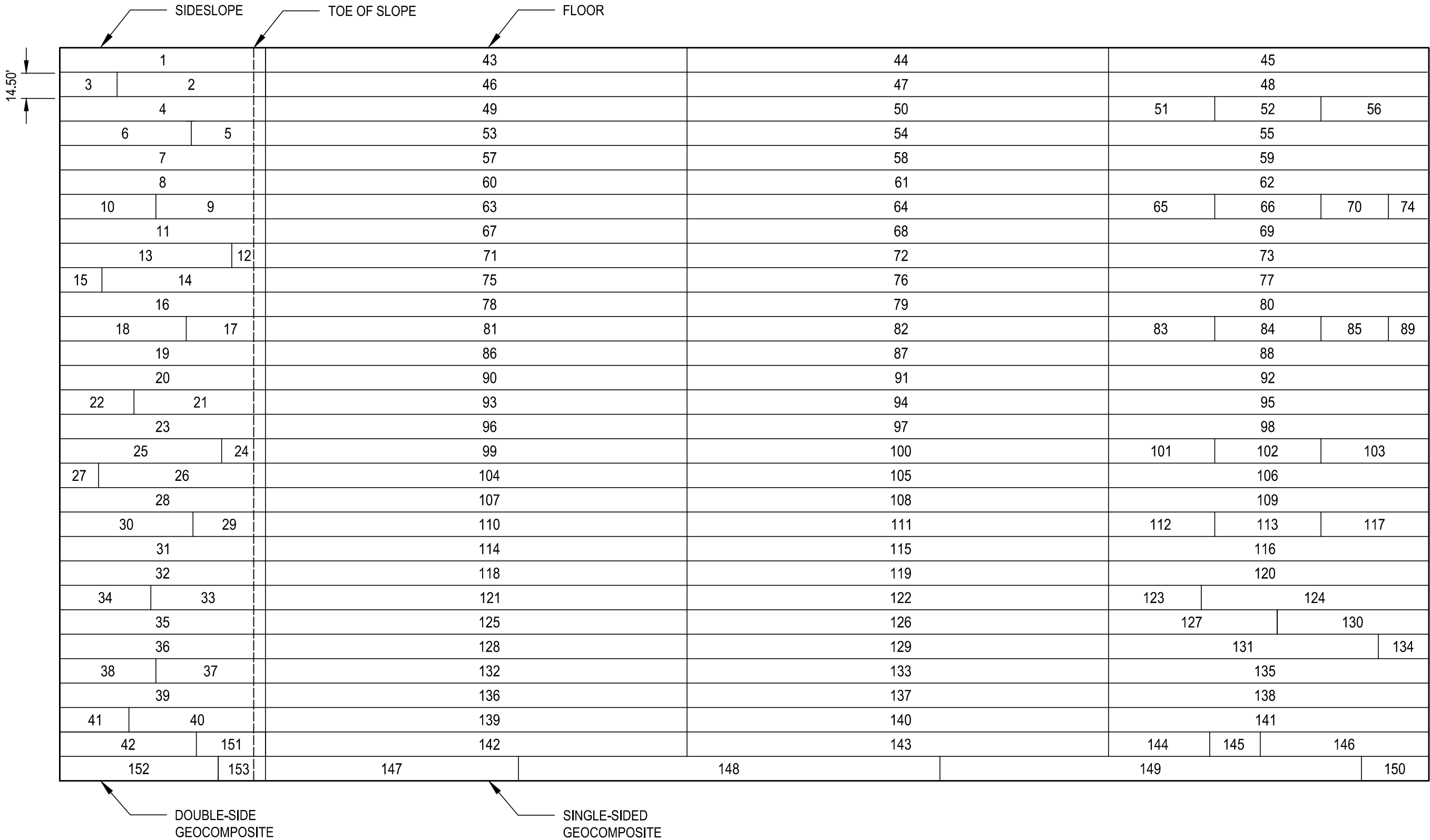
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GEOSYNTHETIC LEAK DETECTION LAYOUT

Issue: 08/28/2023
Date: 7053.22
Project No: Figure 7
Sheet:

\\PROJECTS-DFS\PROJECTS\2022\7053.22\03_DSGN\01_DWG\050_CIVIL\02_CONTENT\CELL 5AB\COALINER_PANEL_LAYOUTS_DRAINAGE.DWG, 2/14/2025 11:41:41 AM, notawley



OWL LANDFILL SERVICES
CELL 5AB CQA REPORT

Oilfield Water Logistics
Jal, New Mexico
Lea County, New Mexico

Released to Imaging: 4/22/2025 11:48:01 AM

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GEOSYNTHETIC CUSHION /
DRAINAGE PANEL LAYOUT

Issue:
Date: 08/28/2023
Project No: 7053.22
Sheet: Figure 9

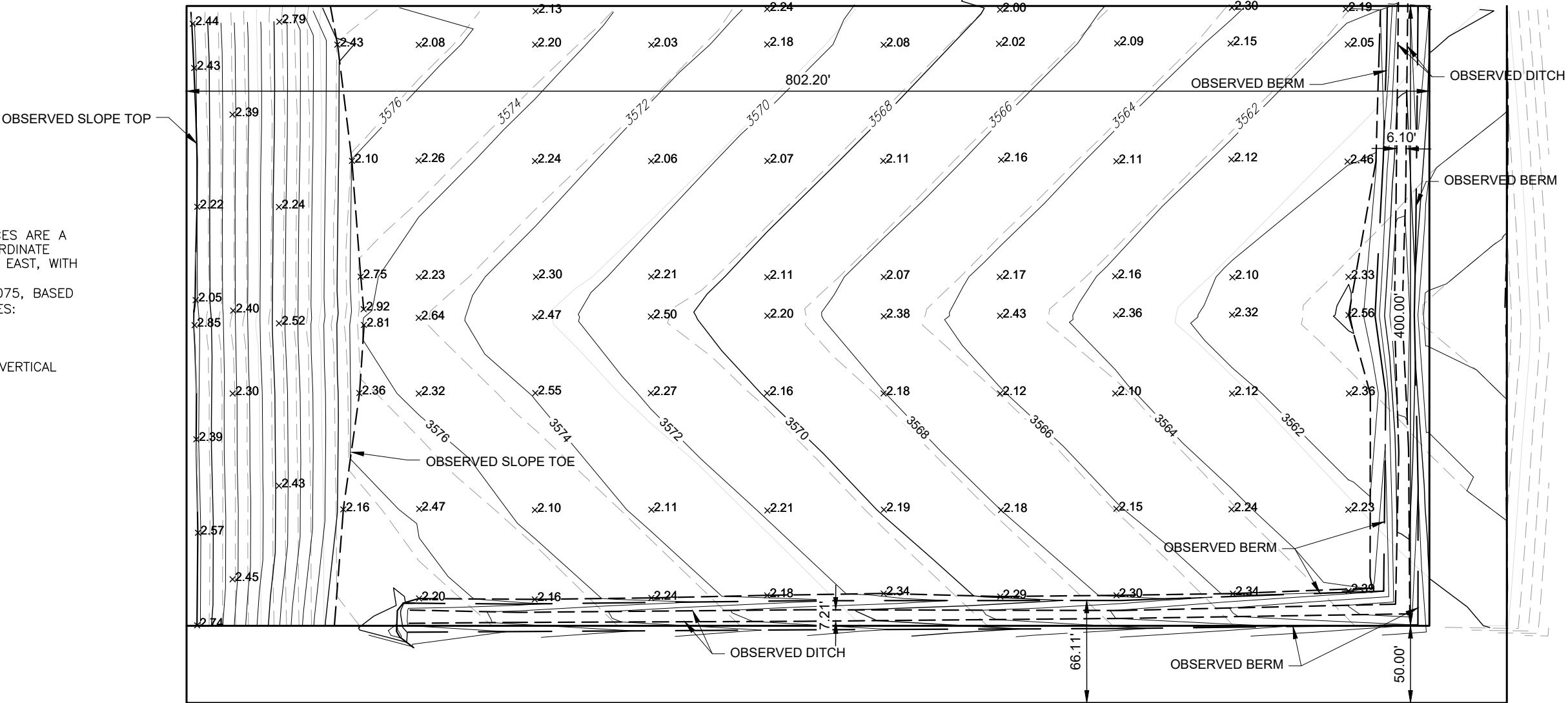
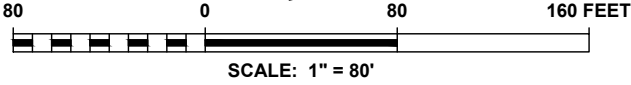
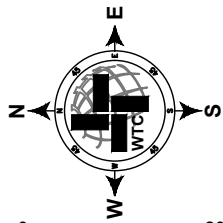
NOTES:

1. BASIS OF BEARING, COORDINATES AND DISTANCES ARE A LAMBERT CONICAL PROJECTION OF THE TEXAS COORDINATE SYSTEM, STATE PLANE GRID, NAD 83, NEW MEXICO EAST, WITH A CONVERGENCE ANGLE OF -000° 53' 22.66" AND A COMBINED SCALE FACTOR OF 1.000244819075, BASED ON CONTROL POINT "206" LOCATED AT COORDINATES: N: 438531.77'; E: 783105.77'.

3. CONTOUR INTERVAL 2 FOOT NORTH AMERICAN VERTICAL DATUM 1988

LEGEND

- CELL 5AB BOUNDARY
- OBSERVED SLOPE TOE
- OBSERVED SLOPE TOP
- PROTECTIVE SOIL LAYER MAJOR/MINOR CONTOUR LINE
- SUBGRADE MAJOR/MINOR CONTOUR LINE



WEST TEXAS CONSULTANTS, INC.
ENGINEERS PLANNERS SURVEYORS
405 S.W. 1st. Street
Andrews, TX 79714
(432) 523-2181
TEXAS REGISTERED ENGINEERING FIRM F-2746
TEXAS REGISTERED SURVEYOR FIRM #100792-00



James C. Tompkins
JAMES C. TOMPKINS, N.M. P.L.S. No.27177

08/02/2023

SURVEY DATE: 08/02/2023

OWL NDBL SWMF
CELL 5AB

PROTECTIVE SOIL LAYER VERIFICATION
SURVEY

DESIGN	DRAWN	DATE	PROJECT NO.	SCALE	SHEET #
N/A	OV	8/2/23	55999	N/A	1

Parkhill

Top of Pipe Surveyed Elevations

PROJECT NAME:	OWL Landfill	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	Surveyor	West Texas Consultants
PROJECT LOCATION:	Lea County, New Mexico, Cell 5AB	SHEET NUMBER:	1

Point Number	Northing	Easting	Elevation
1197	439353.81	784417	3556.2
1198	439359.738	784417	3556.4
1199	439376.334	784417	3556.9
1200	439416.487	784417	3557.9
1201	439416.507	784417	3557.9
1202	439456.618	784416	3558.8
1203	439496.754	784416	3559.8
1204	439536.794	784416	3560.8
1205	439576.979	784416	3561.8
1206	439617.08	784415	3562.9
1207	439657.204	784415	3564.0
1208	439697.304	784416	3564.9
1209	439737.394	784415	3565.8
1210	439777.519	784415	3566.8
1211	439817.616	784415	3567.8
1212	439857.715	784415	3568.9
1213	439897.825	784415	3569.9
1214	439937.848	784415	3570.8
1215	439978.042	784414	3571.7
1216	440015.932	784415	3572.6
1217	440055.03	784414	3581.8
1218	440094.045	784414	3591.5

Notes:

1. The survey data displayed on this table was recorded by West Texas Consultants and provided to Parkhill.
2. Basis of bearing, coordinates and distances are a lambert conical projection of the Texas Coordinate System State Plane Grid, NAD 83, New Mexico East, With a convergence Angle of -000 53' 22.66" and a combined scale factor of 1.000244819075, Based on Control Point "206" located at coordinates: N: 438531.77' ; E: 783105.77'

FIELD LOGS AND PHOTOGRAPHS

Daily Summary Reports



213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505 867.6990

FIELD OBSERVATION REPORT

TO: F.I.R.

FROM: Max Whit

PROJECT NAME: OWL - C-115

PROJECT NO.: 01-7053-22

DATE: 5/9/23

TIME: 8:00 a.m.

EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
Temperature Range 56-95

Day

☒ Monday ☐ Thursday
☒ Tuesday ☐ Friday
☐ Wednesday ☐

Persons Contacted/Present at Site:

Pete Dooga - 4X, Matt Kingsley -
4X - 1 Excavator, 2 Dozers, 1 Water truck, 1 V.b. Roller, 2 Dump Trucks -

Work Observed/In-Progress:

Contractor has started excavation of future cell 5.
Protective Gully Soil has been stockpiled from surface. Material being moved
to process, place, compact for North Berm of cell -

Items Discussed/Observations:

Parkhill on site to observe construction &
check density control of fill / placement on Northern berm - Lift #1
Total of 9 taken all above 90% minimum. Required -

Materials Delivered to Site:

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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

\\Data1\Projects\2016 0101.16\02_DSGN\04_REPT\01_NM_PERMIT\VOL_2\11.4_CQA_Dec2017\LCLF-Att.11.4.C-CQA_FieldObservationRpt.docm

Albino

Albuquerque

Amador

Austin

E. Paso

Frisco

Las Cruces

Lubbock

Madrid

team-psc.com



213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505.867.6990

FIELD OBSERVATION REPORT

TO: *File*

FROM: *Max White*

PROJECT NAME: *OWL - Cell 5*

PROJECT NO.: *01-7053-22*

DATE: *5/11/23*

TIME: *8:00am.*

EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
Temperature Range *54-90*

Day

☐ Monday ☒ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☐

Persons Contacted/Present at Site: *Pete Douga - 4X -*
4X - 1 Excavator, 2 Drivers, 1-H₂O, 1-Vib Roller, 2 Pump Trucks -

Work Observed/In-Progress: *Contractor continues excavation of cell 5 -*
Materials being processed, Placed in 9" Lifts @ North Bore of Cell.

Items Discussed/Observations: *- Packfill on site - observe construction Activity -*
- Run Quality Control Densities on North Bore of cell -
for Lifts, 2, 3 & 4 - 12 tests taken - All Passed -

Materials Delivered to Site:

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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



213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505.867.6930

FIELD OBSERVATION REPORT

TO: Filer -
FROM: MAX White
PROJECT NAME: OWL - C-115
PROJECT NO.: 01-7053-22

DATE: 5/16/2023 TIME: 6:00 a.m. EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☐ Cold ☒ Pt. Cloudy

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐ 65-85
Temperature Range

Day

☐ Monday ☐ Thursday
☒ Tuesday ☐ Friday
☐ Wednesday ☐

Persons Contacted/Present at Site: Prt. Doug - 4X
4X - 1-Excavator, 2 Dozer, 1-H2O, 1-Wb Roller, 2 - Dump Trucks -

Work Observed/In-Progress: Contractor continuous excavation of cell 5
materials being placed, processed, compacted in 9" lifts @ North Berm -

Items Discussed/Observations: Parkhill on site - observe construction activity
- Conduct Quality Control Density Testing of fill on North Berm -
For Lifts - 5, 6, 7 & 8 13 tests taken - All Passed -

Materials Delivered to Site:

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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



213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505 867 6990

FIELD OBSERVATION REPORT

TO: *F:1-*
FROM: *Max Whit-*
PROJECT NAME: *OWL-C-115*
PROJECT NO.: *01-7053-22*

DATE: *5/18/23*

TIME: *8:00 Am.*

EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
Temperature Range *65-85*

Day

☐ Monday ☒ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☐

Persons Contacted/Present at Site: *Pri. Doug - 4X*
4X - 1 Excavator, 2 Dozers, 1-H₂O, 1-Vib. Roller, 2-Dump Trucks

Work Observed/In-Progress: *Contractor continuing excavation of C-115*
- Continue placement at North Berm -

Items Discussed/Observations: *- Parkhill on site observe const. activity -*
conduct Q.C. Density Testing on fill @ North Berm -
for Lfts 9, 10, 11 10 tests taken All passed -

Materials Delivered to Site:

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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



213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505 867 6990

FIELD OBSERVATION REPORT

TO: *Fila*
FROM: *MAX Wharton*
PROJECT NAME: *OWL C-115*
PROJECT NO.: *01-7053-22*

DATE: *5/20/23*

TIME: *9:00 a.m.*

EST. % COMPLETE:

Weather

☐ Clear ☐ Snow ☐ Warm
☒ Overcast ☐ Foggy ☐ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☐ Clear ☐ Dusty
☒ Muddy ☐
Temperature Range *55-75°*

Day

☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☒ *Saturday*

± 0.50" Rain Last Night

Persons Contacted/Present at Site:

Porta Douga - 4X
4X - 1 Excavator, 2 - Dozers - 1 H₂O, 1 - v. b. R. 1/2, 2 - Dump Trucks
↓
DIP - Bucken *Bucken*

Work Observed/In-Progress:

Contractor continues excavation of Cell 5
- Continuous placing, processing lifts e North Berm -

Items Discussed/Observations:

- Parkhill on site - observe const. activity -
conduct G.C. Density Testing on fill e North Berm.
Test Lifts 12, 13, + 14 - 9 tests taken - All passed -

Materials Delivered to Site:

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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



215 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505.867.6990

FIELD OBSERVATION REPORT

TO: *F.I.R.*
FROM: *MAX White*
PROJECT NAME: *OWL-C.115*
PROJECT NO.: *01-7053-22*

DATE: *5/22/23*

TIME: *6:00 AM.*

EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
Temperature Range *65-89*

Day

☒ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☐

Persons Contacted/Present at Site: *Pete Dougan - 4X*
4X - 1-Excavator, 1-Digger, 1-H2O, 2-Dump Trucks -

Work Observed/In-Progress: *Contractor continues excavation of Cell 5*
- Material Placed in fill for North Berm -

Items Discussed/Observations: *Parkhill on site -*
conduct Q.C. Testing on fill Lifts e North Berm -
Test Lifts 15 & 16 6 tests taken all Passed -

Materials Delivered to Site:

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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

Data1 Projects 2016 0101 16 02 DSGN 04 REPT 01 NM PERMIT VOL 2 II 4 CQA Dec2017 LCLF-Air II 4 C-CQA FieldObservationRpt.docm

Altamirano, Alvarado, Arredondo, Austin, E. Paso, Fresno, Las Cruces, Lubbock, Madrid, McPherson



213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505 867 6900

FIELD OBSERVATION REPORT

TO: F.I.
FROM: MAX Whittle
PROJECT NAME: OWL - C.I. 5
PROJECT NO.: 01-7053-22

DATE: 5/24/23

TIME: 6:00 AM

EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
Temperature Range 63-87

Day

☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☒ Wednesday ☐

Persons Contacted/Present at Site: Pto. Duga - 4K, Hunter Watson
4K - 1 Excavator, 1 Dozer, 1 H&D, 2 - Dump Trucks

Work Observed/In-Progress: Contractor continues excavation of fill 5
Fill material placed, processed, compacted - North Berm -

Items Discussed/Observations: - Parkhill - Conduct Q.C. testing on fill @ North Berm -
Test Lifts 17 & 18 - Gravel - all passed
- Progress Meeting @ 12:00 today -
Materials Delivered to Site:

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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



213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505.867.6990

FIELD OBSERVATION REPORT

TO: *F:1v*
FROM: *MAX Whitte*
PROJECT NAME: *OWL - Cell 5*
PROJECT NO.: *01-9053-22*

DATE: *5/31/23*

TIME: *8:00*

EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☒ Overcast ☐ Foggy ☐ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
Temperature Range *64-89*

Day

☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☒ Wednesday ☐

Persons Contacted/Present at Site: *Pete Dougan - 4X*
4X - 1 Excavator, 1-Digger, 1-H2O, 2-Dump Trucks -

Work Observed/In-Progress: *Contractor fine grading/processing/compacting Cell 5 floor. And North Berm. Cleaning off eds. exist Cell 4 -*

Items Discussed/Observations: *Parkhill. Conduct Q.C. Density Testing on final Lift of North Berm + Subgrade of cell floor -*
36 tests on Floor + 4 tests North Berm - All Pass -

Materials Delivered to Site:

Requested Revisions or Interpretations:

Items to Verify:

Contractor Reported Rain Late PM. today -
Information or Action Required: *N. Delays -*

☐ Attachments

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

FIELD OBSERVATION REPORT

TO: *F.I.U.*
FROM: *Max Whitte*
PROJECT NAME: *OWL-C-115*
PROJECT NO.: *01-7053-22*

DATE: 6/19/23

TIME: 9:00 AM

EST. % COMPLETE:

Weather

☒ Clear	☐ Snow	☐ Warm
☐ Overcast	☐ Foggy	☒ Hot
☐ Rain	☐ Cold	☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐ _____
Temperature Range

Day

☒ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☐ _____

Persons Contacted/Present at Site: Mustang Liner Crew on site -
360/375 or SF GCL on site - 155 Rolls - From Last Week -
3-Truck Concrete - An. ⁷⁹Rolls, Composite. 2-Rolls -
Work Observed/In-Progress: Liner crew on site - 4 total
No Deployment Today -

Items Discussed/Observations

Materials Delivered to Site:

3 - Truck Mount - ~~7~~ Rolls. 2 R.I.B. Compressor -
155 R.I.B. BCL -

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:☐ Attachments

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



213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505 867 6990

FIELD OBSERVATION REPORT

TO: *Fila*
FROM: *max wh.4*
PROJECT NAME: *OWL - C-115*
PROJECT NO.: *01-7053-22*

DATE: *4/10/23*

TIME:

EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☒ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
Temperature Range *75-101*

Day

☐ Monday ☐ Thursday
☒ Tuesday ☐ Friday
☐ Wednesday ☐

Persons Contacted/Present at Site: *Koal Ranch - Mustang Ext. total 12 man crew on site*

1-Sky track, 3-Bobcats -
Work Observed/In-Progress: *Mustang on site - Stage CCL to LAA Area for horse -*
Fill Sandbags, Prep Work & Existing Line Tie in.
No Deployment today

Items Discussed/Observations: *- QL for Line Installation -*
Layout: Basics -

Materials Delivered to Site: *- None Delivered today -*

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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

Data1\Projects\2016 0101.16 02_DSGN 04 REPT 01_NM PERMIT VOL 2 IL4 CQA Dec2017 LCLF-An IL4 C-CQA FieldObservationRpt.docm

Altamir Alan Alvarez Aparicio Austin El Paso Fresno Los Gatos Lincoln Miami Tempe psc.com



215 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505 857 6900

FIELD OBSERVATION REPORT

TO: F-6
FROM: MAX WH.+
PROJECT NAME: OWL - C.115
PROJECT NO.: 01-7053-22

DATE: 6/21/23

TIME:

EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☒ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
Temperature Range: 90-107

Day

☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☒ Wednesday ☐

Persons Contacted/Present at Site: Kozel Road - Mustang Extreme Total crew 14
4x. Water + gravel wheel

Work Observed/In-Progress: Mustang on site. Deploy Panels 1 + 27 GCL -
Deploy Panels Textured 60 mil FML Panels - 1 to 18 -
Clean off existing seam east slope -

Items Discussed/Observations: Locate + Mark Dewatering T-pts 1 to 6 -
Air Testing of Completed Seams. All Pass

Materials Delivered to Site: 27 Rolls Single Sd. Geonet -
18 Rolls - 60 mil Textured -
26 Rolls - 60 mil Smooth

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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

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Author: Approved: Approved: Author: L.Piso: H.Scho: Las Cruces: J.L. G. V. and: J.L. G. V. and:

Parkhill

APPROVAL/ AUTHORIZATION TO PROCEED

TO:

FROM: Max WhitePROJECT NAME: OWL Cell 5PROJECT NO.: 01-7053DATE: 6/21/23

The following liner system surface is deemed acceptable on a visual inspection by Liner Contractor Representative:

LAYER: 1. Subgrade ✓
 2. Geosynthetic Clay Liner (GCL) ✓
 3. HDPE Geomembrane (FML) ✓
 4. Protective Soil Layer (PSL) _____

LOCATION: GCL Panels 1 to 27
Sec. FML Panels 1 to 14

REMARKS: North Slope -

Authorized By:

Viersavanh Souphasouk
 (Liner Contractor Representative)

V. Souphasouk
 (Authorized Signature)

6/21/23
 (Date)

Accepted By:

Max White
 (CQA Manager)

Max White
 (Authorized Signature)

6/21/23
 (Date)

☐ Attachments

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

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FIELD OBSERVATION REPORT

TO: *File -*

FROM: Max Whitt

PROJECT NAME: PWL-20115

PROJECT NO.: 01-7053-22

DATE: 6/22/23

TIME:

EST. % COMPLETE:

Weather

☒ Clear	☐ Snow	☐ Warm
☐ Overcast	☐ Foggy	☒ Hot
☐ Rain	☐ Cold	☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐ _____
Temperature Range 4

Day

☐ Monday ☒ Thursday
☐ Tuesday ☐ Friday
☒ Wednesday ☐

Persons Contacted/Present at Site: KOSA/Ranch Mustang Extrem - Trial 14
4X - 1 man - H₂O + Steel Wheel

Work Observed/In-Progress: Mustang on site Display Panels 28 to 92 - GCL
Display FML - Smooth Panels 19 to 30 -

Two into existing beam - East side in
Items Discussed/Observations: Corate + Mark by T. 7/16
Air Test Completed Beam all passed

Materials Delivered to Site: 17 - Rolls FML - (50x12 cm each)
77 - Rolls Geomem / Geocomposite

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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

Parkhill

APPROVAL/ AUTHORIZATION TO PROCEED

TO:

FROM:

PROJECT NAME:

PROJECT NO.:

DATE:

MAX White

CWL C115

01-7053-22

6/22/23

The following liner system surface is deemed acceptable on a visual inspection by Liner Contractor Representative:

LAYER:

1. Subgrade

2. Geosynthetic Clay Liner (GCL)

3. HDPE Geomembrane (FML)

4. Protective Soil Layer (PSL)

✓
✓
✓

LOCATION:

GCL Panels 24 to 32

Sec FML Panels 19 to 30

REMARKS:

Start East tie to West on Floor

Authorized By:

Vienavand Serephand
(Liner Contractor Representative)

V. Serephand
(Authorized Signature)

6/22/23
(Date)

Accepted By:

Max White
(CQA Manager)

Max White
(Authorized Signature)

6/22/23
(Date)

☐ Attachments

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

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FIELD OBSERVATION REPORT

TO: *F. J. L.*

FROM: *MAX WHEAT*

PROJECT NAME: OWL-C-115

PROJECT NO.: 01-7053 22

DATE: 6/23/73

TIME:

EST. % COMPLETE:

Weather

☒ Clear	☐ Snow	☒ Warm
☐ Overcast	☐ Foggy	☒ Hot
☐ Rain	☐ Cold	☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐ _____
Temperature Range 90-107

Day

☐ Monday ☒ Thursday
☐ Tuesday ☒ Friday
☐ Wednesday ☐

Persons Contacted/Present at Site: Royal Ranch - Mustang Extensive on site Total Perch 16
4k' man. H2O & steel wheel

Work Observed/In-Progress: MUSTANG on 91st Deploy Panels 43 to 156 GCL on Col 1) Floor
Deploy FMC - Panels Secondary 31 to 40 -

UKA + 1st test Drought Tests 1 to 16 + Field test sent to Lab.

Items Discussed/Observations: A/c 7-97 (comp) and same -
- STAR + R. PAULS 11-10

Materials Delivered to Site: *No Deliveries today -*

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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

Parkhill

APPROVAL/ AUTHORIZATION TO PROCEED

TO:

FROM: Max WhitePROJECT NAME: SWL - Cell 5PROJECT NO.: 01-7053-22DATE: 6/23/23

The following liner system surface is deemed acceptable on a visual inspection by Liner Contractor Representative:

LAYER: 1. Subgrade ✓
 2. Geosynthetic Clay Liner (GCL) ✓
 3. HDPE Geomembrane (FML) ✓
 4. Protective Soil Layer (PSL) _____

LOCATION: GCL Panels 83 to 156
Sec. FML Panels - 31 to 49

REMARKS: _____

Authorized By:

Vienavari Sornphrak
 (Liner Contractor Representative)

V. Sornphrak
 (Authorized Signature)

6/23/23
 (Date)

Accepted By:

Max White
 (CQA Manager)

Max White
 (Authorized Signature)

6/23/23
 (Date)

☐ Attachments

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

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213 S. Camino del Pueblo
Bernalillo, New Mexico 87001
505 867 6900

FIELD OBSERVATION REPORT

TO: F.I.O.
FROM: MAX WHIT
PROJECT NAME: OWL-2115
PROJECT NO.: 01-7053-22

DATE: 4/24/23

TIME:

EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☒ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
Temperature Range 70 to 107

Day

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

Persons Contacted/Present at Site: Kusal Reach Mustang Extramural Site - 15
4X - Dust (minor)

Work Observed/In Progress: Mustangs on site Deploy Panels 157 to 172 GCL on Floor Complete
Deploy FML Panels Secondary 49 to 66

Locate & Test Damaged Truss 17 to 32
Items Discussed/Observations: A.L. Test Completed GCLMS
Continue Repairs 19 to 46
Verification of Repairs - 1 to 2

Materials Delivered to Site: N.A.

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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

Parkhill

APPROVAL/ AUTHORIZATION TO PROCEED

TO: F
FROM: Max Whay
PROJECT NAME: OWL Cell 5
PROJECT NO.: 01-7053-22
DATE: 6/24/23

The following liner system surface is deemed acceptable on a visual inspection by Liner Contractor Representative:

- LAYER:
- 1. Subgrade ☒
 - 2. Geosynthetic Clay Liner (GCL) ☒
 - 3. HDPE Geomembrane (FML) ☒
 - 4. Protective Soil Layer (PSL) ☐

LOCATION: GCL Panels 157 to 172 - Complete
Sec. FML Panels 49 to 60 - Complete

REMARKS:

Authorized By: Vicente Sorephwak
(Liner Contractor Representative)
V. Sorephwak
(Authorized Signature)
6/24/23
(Date)

Accepted By: _____
(CQA Manager)
My M. H. H.
(Authorized Signature)
6/24/23
(Date)

☐ Attachments

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

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213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505 867 6990

FIELD OBSERVATION REPORT

TO: *Fila*
FROM: *MAX Whitt*
PROJECT NAME: *OWL - C-115*
PROJECT NO.: *01-7053-12*

DATE: *4/26/23* TIME: EST. % COMPLETE:

Weather			Site Conditions		Day	
☒ Clear	☐ Snow	☐ Warm	☒ Clear	☐ Dusty	☒ Monday	☐ Thursday
☐ Overcast	☐ Foggy	☐ Hot	☐ Muddy	☐	☐ Tuesday	☐ Friday
☐ Rain	☐ Cold	☐	Temperature Range <i>40-107</i>		☐ Wednesday	☐

Persons Contacted/Present at Site: *Royal Ranch - Mustang Extreme - on site - 15 man crew*
4x 1 man - dust control -

Work Observed/In-Progress: *Mustang on site - Continue And Complete R.C. of*
Secondary FML Liner - Repairs 49 to 92 - / UAC tests OK -
Deployment Leak Detection Layer - Panels Composite Double Sided
Items Discussed/Observations: *Panels 1 + 23 -*
Work Deployment delayed due to Equip. Failure -

Materials Delivered to Site:

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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

Parkhill

APPROVAL/ AUTHORIZATION TO PROCEED

TO:

FROM:

PROJECT NAME:

PROJECT NO.:

DATE:

Max White

OWL-0115

01-7053-22

6/26/23

The following liner system surface is deemed acceptable on a visual inspection by Liner Contractor Representative:

LAYER:

1. Subgrade

2. Geosynthetic Clay Liner (GCL)

3. HDPE Geomembrane (FML)

4. Protective Soil Layer (PSL) Leak Detection

LOCATION:

Leak Detection Geomembrane Panels 1 to North Slope
Leak Detection Geomembrane Panels Cell

REMARKS:

Authorized By:

(Liner Contractor Representative)

(Authorized Signature)

(Date)

Accepted By:

(CQA Manager)

(Authorized Signature)

(Date)

☐ Attachments

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

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213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505 867 6990

FIELD OBSERVATION REPORT

TO: *Fila*
FROM: *Max Whit*
PROJECT NAME: *OWL Cell 5*
PROJECT NO.: *01-7063-22*

DATE: *6/29/23* TIME: EST. % COMPLETE:

<u>Weather</u>			<u>Site Conditions</u>		<u>Day</u>	
☒ Clear	☐ Snow	☐ Warm	☒ Clear	☐ Dusty	☐ Monday	☐ Thursday
☐ Overcast	☐ Foggy	☒ Hot	☐ Muddy	☐ _____	☒ Tuesday	☐ Friday
☐ Rain	☐ Cold	☐ _____	Temperature Range <i>60</i>		☐ Wednesday	☐ _____

Persons Contacted/Present at Site: *Mustang on Site - 14 Mon -*
4x 1 max. dust control

Work Observed/In-Progress: *Mustang - Continuous Deployment Look detection layer -*
Double Sided Circumposite - North Slope Panels 24 to 45
Geonet on Cell floor Panels 46 to 75

Items Discussed/Observations:

Materials Delivered to Site:

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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



213 S. Camino del Pueblo
Bernalillo, New Mexico 87001
505 967 6990

FIELD OBSERVATION REPORT

TO: *File*
FROM: *BEN EVANS*
PROJECT NAME: *OWIL COR #5*
PROJECT NO.: *01-2063-22*

DATE: *6/28/23* TIME: EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☒ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
Temperature Range *100°*

Day

☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☒ Wednesday ☐

Persons Contacted/Present at Site: *MUSTANG ENVIRONMENTAL, 10 LABORERS*
Supervisor VIN
9 LABORERS / 1 Independent WATER TRUCK OPERATOR

Work Observed/In-Progress:
CREWS BEGAN INSTALLING 2-SIDED FENCE PRIMARY GO ON SLOPES N. SIDE
P-1 TO P-17 TEXTURED

Items Discussed/Observations:
START UPS FOR WELDERS

Materials Delivered to Site

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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

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Adobe Acrobat Reader DC



213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505 867 6990

FIELD OBSERVATION REPORT

TO: *File*
FROM: *Ben EVANS*
PROJECT NAME: *OWC cell #5*
PROJECT NO.: *01-7003-22*

DATE: *6/29/23* TIME: *6:00 AM / 6:30 PM* EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☒ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
Temperature Range *100*

Day

☐ Monday ☒ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☐

Persons Contacted/Present at Site: *Vin w/ MUSTANG Enviro*

Work Observed/In-Progress:

*Crews Resumed Placing Geo Net starting w/
0031 x 14.5*

Items Discussed/Observations:

Materials Delivered to Site:

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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



2135 Camino del Pueblo
Bernalillo, New Mexico 87001
505 867 6990

FIELD OBSERVATION REPORT

TO: *File*
FROM: *BEN EVANS*
PROJECT NAME: *OWL cells*
PROJECT NO.: *01-7063-22*

DATE: *6/30/23* TIME: *6:00am - 5:30pm* EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☒ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
Temperature Range *44*

Day

☐ Monday ☐ Thursday
☐ Tuesday ☒ Friday
☐ Wednesday ☐

Persons Contacted/Present at Site: *VIN / KASOL MUSTANG ENVIRONMENTAL*

Work Observed/In-Progress: *Began installation of smooth geomembrane liner
Panel 18 to 25
Crews welded seams / Tied to existing E. Liner.*

Items Discussed/Observations: *STAFF UPS*

Materials Delivered to Site:

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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



213 S. Camino del Pueblo
Bernalillo, New Mexico 87001
505 867 6990

FIELD OBSERVATION REPORT

TO: *File*
FROM: *BEN EVANS*
PROJECT NAME: *OWC CELL #5*
PROJECT NO.: *01-7063-22*

DATE: *7/1/23* TIME: *6:00 - 5:00 PM* EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☒ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
Temperature Range *109*

Day

☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☒ SAT

Persons Contacted/Present at Site: *Vin / KASAL MUSTANG Enviro*

Work Observed/In-Progress: *Installation of 200 mil 10' x 2' sided composite at N. End. 4th Layer*
Crane placed panels. Seamed and secured.

Items Discussed/Observations: *After all in. composite placed. Crews appear to be short approximately 122' Vin stated they may have additional at yard*

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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



213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505.867.6930

FIELD OBSERVATION REPORT

TO: *File*
FROM: *Ben EVANS*
PROJECT NAME: *owl cell #5*
PROJECT NO.: *01-7043-22*

DATE: *7/3/23* TIME: *6:00 AM 5:00 PM* EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☒ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☒ Dusty
☐ Muddy ☐
Temperature Range *100°*

Day

☒ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☐

Persons Contacted/Present at Site:

Vin/KASOL

Work Observed/In-Progress:

*Crews resumed placing Geomiric Structure
At Bottom of cell starting w/ No panel p26*

Items Discussed/Observations:

Start ups

Materials Delivered to Site:

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

Copies ☐ Owner ☐ A/E ☐ Contractor ☐ Consultants ☐ ☐ ☐ File



213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505.867.6930

FIELD OBSERVATION REPORT

TO:

FROM: *Max W. H. T.*PROJECT NAME: *OWL-C-115*PROJECT NO.: *01-7063-22*DATE: *7/5/23*

TIME:

EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☒ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
 Temperature Range *70-105*

Day

☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☒ Wednesday ☐

Persons Contacted/Present at Site:

*Mustang Environmental 118 - Max + Taliaferro -
 Rosal Ranch -*

Work Observed/In Progress:

4/2-4.51 - Continue Deployment FMC - Panels Primary

*Identify & Test D. Tags of Liner - 22 to 30 - Air Test Summary - Passed to 35
 Items Discussed/Observations: Repairs to Liner 19 to 24*

Materials Delivered to Site:

None

Requested Revisions or Interpretations:

Items to Verify:

*Far South End of Liner - @ Leachate Trench -
 Mod to CR - GEL for possible water damage from Rain on
 Late Monday Night - 7/3/23 -*

Information or Action Required:

☐ Attachments

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



213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505.867.6990

FIELD OBSERVATION REPORT

TO:
FROM: *MAX White*
PROJECT NAME: *OWL-C-115*
PROJECT NO.: *01-7063-22*

DATE: *7/6/13* TIME: EST. % COMPLETE:

Weather	Site Conditions	Day
☒ Clear	☒ Clear	☐ Monday
☐ Overcast	☐ Dusty	☐ Tuesday
☐ Rain	☐ Muddy	☐ Wednesday
☐ Snow	Temperature Range <i>90-100</i>	☒ Thursday
☐ Warm		☐ Friday
☒ Hot		
☐ Cold		

Persons Contacted/Present at Site: *Mustang Environmental - 11 crew members*
4X-1 for Dust control

Work Observed/In-Progress: *Continue Repairs to Primary FML including*
Var. Testing of Repairs -
Removed 30' of Hydrated GCL @ Panel 102 & Replaced with
Items Discussed/Observations: *New Repair Panel #1 -*
Make Repairs to Secondary FML & Primary FML moved back &
allow GCL Removal & Replacement -
Materials Delivered to Site: *Installation of Single Sided Geocomposites*
on all Floor Panels - 43 to 66

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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



213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505 867 6990

FIELD OBSERVATION REPORT

TO:

FROM: *Max Whoto*PROJECT NAME: *OWL - C-115*PROJECT NO.: *01-7043-22*DATE: *7/7/13*

TIME:

EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☒ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
 Temperature Range *75-90°F*

Day

☐ Monday ☒ Thursday
☐ Tuesday ☒ Friday
☐ Wednesday ☐

Persons Contacted/Present at Site: *Mustang Environmental Health members*
Kosal Beach

Work Observed/In-Progress: *Continue Deployment of Single Sided Acromposite*
on cell Floor. Panels 6-7 to 116.

Items Discussed/Observations:

Materials Delivered to Site:

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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

Datal Projects 2016 0101 16 02 DSGN 04 REPT 01 NM PERMIT VOL 2 H4 CQA Dec2017 CLE-Arch H4 CQA FieldObservationRpt.docm

FILED APPROPRIATE APPROPRIATE APPROPRIATE APPROPRIATE APPROPRIATE APPROPRIATE APPROPRIATE APPROPRIATE APPROPRIATE



213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505 867 6990

FIELD OBSERVATION REPORT

TO:

FROM: *Max White*PROJECT NAME: *OWL-C-115*PROJECT NO.: *01-7063.22*DATE: *7/6/23*

TIME:

EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☒ Overcast ☐ Foggy ☐ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
 Temperature Range *70-95*

Day

☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☒ *Saturday*

Persons Contacted/Present at Site: *MUSTANG Environmental / 11 environmental*
Koski Ranch -

4x - 1 H2O + P. + P. on site
 Work Observed/In-Progress: *- Deploy Primary FIML - Panels 52 to Panel 54*
FIML - 60 mil Deployment Complete - Repairs, Vac. Testing,
Pressure Testing. F FIML Deployment Complete. West Edge of C-115

Items Discussed/Observations *Cut & trimmed with Secondary and Primary edges*
5.0' wide along Edg. from North to South Edge of
Cell.
P. + D. verify Quantity of Linear Limits with GPS -

Materials Delivered to Site:

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ AttachmentsCopies: ☐ Owner ☐ A/E ☐ Contractor ☐ Consultants ☐ ☐ ☐ File



213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505.867.6990

FIELD OBSERVATION REPORT

TO:

FROM: *Max White*PROJECT NAME: *OWL-C-115*PROJECT NO.: *01-9063-22*DATE: *7/10/23*

TIME:

EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
 Temperature Range *75-110*

Day

☒ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☐

Persons Contacted/Present at Site: *Mustang Environmental - 11 crew members*
4x 1 Hq & 1 Dust Control

Work Observed/In Progress: *Deploy Single Sided Geocomposite on Cell Floor*
Panels 114 to 150 - All complete - Deploy Double Sided Geocomposite
on North Side Panels 151 to 153 - All complete -

Items Discussed/Observations: *General Cleanup/6005-A Liner inventory stacked*
on site - Place material along west Liner edge of
Cell to protect Liner Damage -

Materials Delivered to Site:

- Rock for Liner Patch Piping Delivered

Requested Revisions or Interpretations:

Items to Verify: *Pan flap will be installed until 4X complete*
3' Extension Berm. Liner crew will come back to complete.

Information or Action Required:

☐ Attachments

Copies ☐ Owner ☐ A/E ☐ Contractor ☐ Consultants ☐ ☐ ☐ File



FIELD OBSERVATION REPORT

TO:
FROM: *MAX White*
PROJECT NAME: *OWL G115*
PROJECT NO.: *01-7013-22*

DATE: *7/11/23* TIME: EST. % COMPLETE:

Weather			Site Conditions		Day	
☒ Clear	☐ Snow	☐ Warm	☒ Clear	☐ Dusty	☐ Monday	☐ Thursday
☐ Overcast	☐ Foggy	☐ Hot	☐ Muddy	☐ _____	☒ Tuesday	☐ Friday
☐ Rain	☐ Cold	☐ _____	Temperature Range <i>40 to 100</i>		☐ Wednesday	☐ _____

Persons Contacted/Present at Site: *MUSTANG Environmental - 11 crew members -*
4X-1 H2O for Dust Control

Work Observed/In-Progress: *MUSTANG Crew prep. south edge of G115*
and weld beam along south edge between Primary and Secondary LGS
mil FML. This created the Leak Detection Area of the Liner
system. Weld in the 34" Leak Detection Piping -

Items Discussed/Observations:

Materials Delivered to Site: *Lakehate Rock to Stackpile -*

Requested Revisions or Interpretations:

Items to Verify:

Information or Action Required:

☐ Attachments

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



213 S. Camino del Pueblo
Bernalillo, New Mexico 87004
505.967.6990

FIELD OBSERVATION REPORT

TO:

FROM: *Max White*PROJECT NAME: *OWL Cell 15*PROJECT NO.: *01-7063-22*DATE: *7/11/23*

TIME:

EST. % COMPLETE:

Weather

☒ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☒ Hot
☐ Rain ☐ Cold ☐

Site Conditions

☒ Clear ☐ Dusty
☐ Muddy ☐
 Temperature Range *90 to 104*

Day

☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☒ Wednesday ☐

Persons Contacted/Present at Site: *4X - on site - 3 man crew - Pto Dough - auger -
 1- Excavation, 2- D. Trucks, 1- Dozer, 1- H2O truck*

Work Observed/In-Progress: *4X - started Placement of Protective Course
 Soil on Cell floor - West X2. Earthen Berm & Trench for
 Rain Flap has been completed. 4X to start 6" Leachate piping
 Items Discussed/Observations: *installation on 20th. -**

Waiting for Mustang to Weld Rain Flap to Liner to Complete -
 Materials Delivered to Site:

Requested Revisions or Interpretations:

Items to Verify: *- Tyler to Set up Survey for Next Work to collect
 Flow Line Elevation points of 6" Leachate Piping & 2' thick areas
 Verification of protective course placement.*
 Information or Action Required:

☐ Attachments

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

FIELD LOGS AND PHOTOGRAPHS

Project Photograph

Parkhill



2023-05-11 Excavation of Cell 5AB.



2023-06-20: Completed Subgrade

Parkhill



2023-06-21: GCL Deployment on Slope



2023-06-21: Secondary HDPE Deployment on Slope

Parkhill



2023-06-21: Welding of Secondary HDPE



2023-06-22: GCL Deployment on Floor

Parkhill



2023-06-22: Secondary HDPE Deployment on Floor



2023-06-24: Secondary HDPE Welding on Floor

Parkhill



2023-06-26: Repair of Secondary HDPE at T-intersection



2023-06-26: Geocomposite Deployment on Slope

Parkhill



2023-06-28: Primary HDPE Deployment on Slope



2023-07-06: Completed Deployment of Primary HDPE

Parkhill



7/10/2023 12:35

2023-07-10: Deployment of Geocomposite



7/19/2023 13:40

2023-07-19: PSL Deployment

Parkhill



2023-08-02: PSL Completion



2023-08-02: Leachate Access Structure

APPENDIX A: GEOTECHNICAL SOILS TESTING

A.1 Moisture/Density Relationships



September 27, 2023

Parkhill
333 Rio Rancho Blvd NE
Suite 400
Rio Rancho, NM 87124

Job No.:3-21116
Lab No.: 5607

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: **OWL 1, Sample B**

DATE SAMPLED: **August 31, 2023**

MOISTURE-DENSITY RELATIONSHIP ASTM-D-698

Maximum Density	118.8	pcf
Optimum Moisture	10.7	percent

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 10	100
No. 40	96
No. 80	45
No. 200	16.0

Submitted by:

GEO-TEST, INC.

Tim Byres, SET

cc: Tzack@parkhill.com

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

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

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

Soils / Aggregates



Report Date: April 23, 2019

Client

Name: ParkHill Smith & Cooper
Address: 4222 85th Street Lubbock, TX 79423
Attention: Don Gray
PO Number:
Sample Date: 4/17/2019 by Client
Source: Onsite native, blend of -5' and -8' over-ex

Project

Name: (19-519-02232) OWL PSC #56018
Address: Jal, NM
Phase: **Task:**
Manager: Roberto Balderrama
Lab/Ref. #: 2232-02L
Description: Field description: Tan/white silty sand with caliche
 ASTM D2487 lab description: Poorly graded gravel with silt and sand, Coarse to Fine grain, No PI

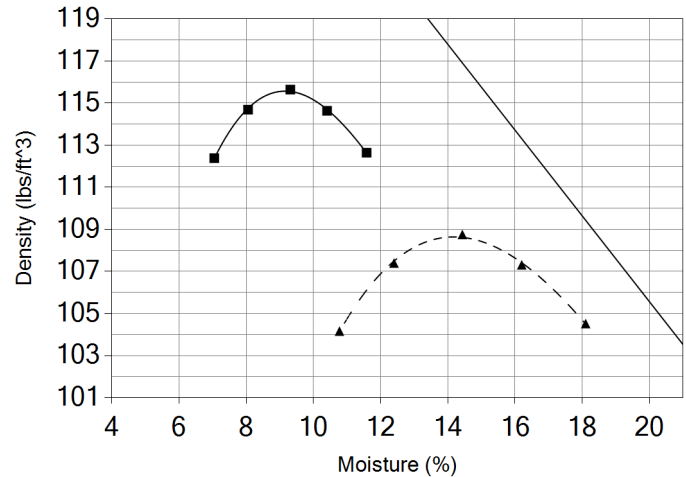
Type of Specification: No project specification was provided.

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

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	4in.	100%		
	3in.	98%		
	2in.	90%		
	1 1/2in.	83%		
	1in.	70%		
	3/4in.	62%		
	1/2in.	50%		
	3/8in.	44%		
	#4	32%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	#8	25%		
	#10	23%		
	#16	20%		
	#30	17%		
	#40	16%		
	#50	14%		
	#100	9%		
	#200	5.3%		

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

Preparation Method: Dry Liquid Limit Method: A

Soil Classification (ASTM D2487-11) GP-GM

Specification

	<u>Min</u>	<u>Max</u>
Liquid Limit:	NV	
Plastic Limit:	NV	
Plasticity Index:	NP	

Correction Soil Containing Oversize Particles (ASTM D4718-15)**Moisture Density Relationship: (ASTM D698-12) Method: C**

Preparation Method: Dry Rammer Type: Mechanical

Specific Gravity: 2.551 Coarse Specific Gravity: 2.065
Assumed

Maximum Density (lbs/ft³): 108.6 Rock Corrected: 115.6

Optimum Moisture (%): 14.2 Rock Corrected: 9.2

Remarks:

Distribution: Carl King, 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

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

Soils / Aggregates

wood.

Report Date: October 11, 2019

Client

Name: ParkHill Smith & Cooper
Address: 4222 85th Street Lubbock, TX 79423
Attention: Carl King P.E.
PO Number: 560.19.001.01
Sample Date: 10/4/2019 by Client / Contractor (Constructor's Inc.)
Source: Landfill berm material (current processed)

Project

Name: (19-519-02368) Owl Landfill Services
Address: Hobbs, NM
Phase: **Task:**
Manager: Hugo Carreon
Lab/Ref. #: 2368-01L
Description: Tan Poorly Graded Gravel (durable caliche) w/Silt and Sand (Job 560-19), No PI

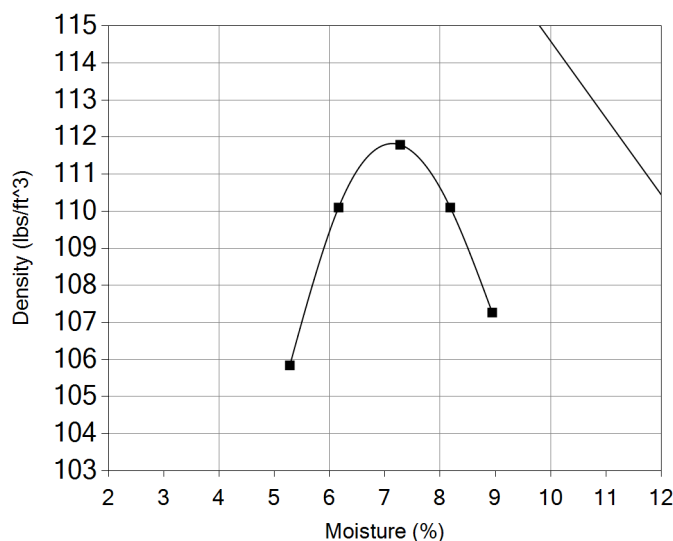
Type of Specification: No project specification was provided.

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

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	4in.	100%		
	3in.	96%		
	2in.	84%		
	1 1/2in.	73%		
	1in.	56%		
	3/4in.	49%		
	1/2in.	41%		
	3/8in.	36%		
	#4	28%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	#8	24%		
	#10	24%		
	#16	22%		
	#30	20%		
	#40	19%		
	#50	17%		
	#100	11%		
	#200	6.8%		

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

Preparation Method: Dry Liquid Limit Method: A

Soil Classification (ASTM D2487-11) GP-GM

Specification

	<u>Min</u>	<u>Max</u>
Liquid Limit:	31	
Plastic Limit:	NV	
Plasticity Index:	NP	

Correction Soil Containing Oversize Particles (ASTM D4718-15)Moisture Density Relationship: (ASTM D698-12) Method: C

Preparation Method: Moist Rammer Type: Manual

Specific Gravity: 2.251 Coarse Specific Gravity: 1.973

Rock Corrected Maximum Density (lbs/ft³): 111.8

Rock Corrected Optimum Moisture (%): 7.1

Remarks: Material would not roll, flattens. Sandy non-plastic.

Distribution: Don Gray, Carl King P.E.

Reviewed By: Hugo Carreon

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

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

Soils / Aggregates



Report Date: April 18, 2019

Client

Name: ParkHill Smith & Cooper
Address: 4222 85th Street Lubbock, TX 79423
Attention: Don Gray
PO Number:
Sample Date: 4/17/2019 by Client
Source: Onsite native

Project

Name: (19-519-02232) OWL PSC #56018
Address: Jal, NM
Phase: **Task:**
Manager: Roberto Balderrama
Lab/Ref. #: 2232-01L
Description: Field description: Red silty sand ASTM D2487 lab description: Silty sand, Fine grain, No PI

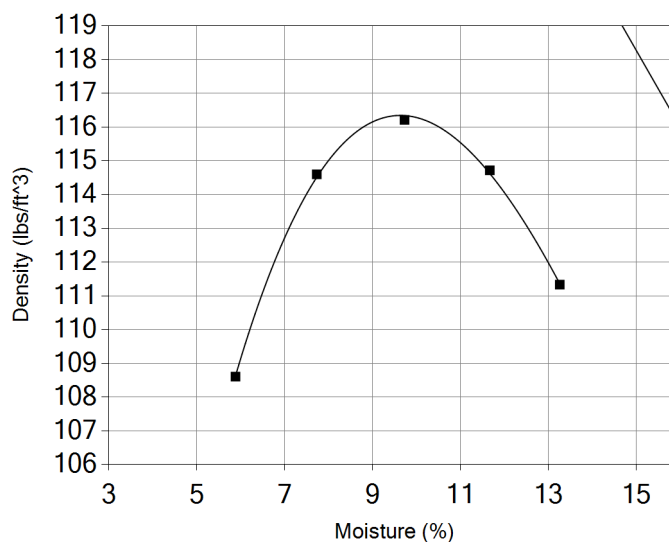
Type of Specification: No project specification was provided.

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

200 Wash Procedure: A

Specification

<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
#4	100%		
#8	100%		
#10	100%		
#16	100%		
#30	100%		
#40	98%		
#50	88%		
#100	42%		
#200	15%		

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

Preparation Method: Dry Liquid Limit Method: A

Soil Classification (ASTM D2487-11) SM

Specification

	<u>Min</u>	<u>Max</u>
Liquid Limit:	NV	
Plastic Limit:	NV	
Plasticity Index:	NP	

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

Preparation Method: Dry Rammer Type: Mechanical

Specific Gravity: 2.651
AssumedMaximum Density (lbs/ft³): 116.3

Optimum Moisture (%): 9.6

Remarks:

Distribution: Wood

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

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

APPENDIX A: GEOTECHNICAL SOILS TESTING

A.2 Subgrade (Cell 5 A/B Floor) Test Results



FIELD COMPACTION TESTING FORM

PROJECT NAME:	OWL Landfill Cell 5AB	LOCATION:	Landfill Subgrade
OWNER:	Oilfield Water Logistics	PROJECT NO.:	7053.22
PROJECT LOCATION:	Lea County, New Mexico	PAGE NO.:	1
TESTING INSTRUMENT: IntroTek 3500 Xplorer®		TECHNICIAN: Max White	

SOIL CLASSIFICATION	DESCRIPTION	REF STD PROCTOR	90% (PCF)	OPTIMAL MOISTURE
A	GP-GM	Caliche	108.6 pcf 90% optimum	97.7 14.2 % Moisture
B	GP-GM	Poorly Graded Gravel w/ Silt and Sand	111.8 pcf 90% optimum	100.6 7.1 % Moisture
C	SM	Silty Sand	116.3 pcf 90% optimum	104.7 9.6 % Moisture

Soil Type	TEST NUMBER	% RSP	DRY DENS GITY (PCF)	% MOISTURE	DATE COMPLETED	NOTES
A	1	90.7%	98.5	4.9%	5/31/23	FLOOR
A	2	100.5%	109.1	6.1%	5/31/23	FLOOR
A	3	98.3%	106.7	5.6%	5/31/23	FLOOR
A	4	101.0%	109.7	4.0%	5/31/23	FLOOR
A	5	94.5%	102.6	4.2%	5/31/23	FLOOR
A	6	98.7%	107.2	5.6%	5/31/23	FLOOR
A	7	95.7%	103.9	5.7%	5/31/23	FLOOR
A	8	95.0%	103.2	9.5%	5/31/23	FLOOR
A	9	94.9%	103.1	4.4%	5/31/23	FLOOR
A	10	93.2%	101.2	4.1%	5/31/23	FLOOR
A	11	96.3%	104.6	5.4%	5/31/23	FLOOR
A	12	96.9%	105.2	5.7%	5/31/23	FLOOR
A	13	93.4%	101.4	6.8%	5/31/23	FLOOR
A	14	90.4%	98.2	4.4%	5/31/23	FLOOR
A	15	93.2%	101.2	3.6%	5/31/23	FLOOR
A	16	94.4%	102.5	3.9%	5/31/23	FLOOR
A	17	93.9%	102.0	5.2%	5/31/23	FLOOR
A	18	91.7%	99.6	7.1%	5/31/23	FLOOR
A	19	91.1%	98.9	4.9%	5/31/23	FLOOR
A	20	92.4%	100.4	4.1%	5/31/23	FLOOR
A	21	92.2%	100.1	5.0%	5/31/23	FLOOR
A	22	92.2%	100.1	7.2%	5/31/23	FLOOR
A	23	100.9%	109.6	5.9%	5/31/23	FLOOR
A	24	110.7%	120.2	7.0%	5/31/23	FLOOR
A	25	97.0%	105.3	4.5%	5/31/23	FLOOR
A	26	93.0%	101.0	9.7%	5/31/23	FLOOR
A	27	99.6%	108.2	6.3%	5/31/23	FLOOR
A	28	101.8%	110.6	6.9%	5/31/23	FLOOR
A	29	90.2%	98.0	8.0%	5/31/23	FLOOR
A	30	97.1%	105.5	6.2%	5/31/23	FLOOR
A	31	103.8%	112.7	6.1%	5/31/23	SLOPE
A	32	91.1%	98.9	4.6%	5/31/23	SLOPE
A	33	94.4%	102.5	3.4%	5/31/23	SLOPE
A	34	95.3%	103.5	5.8%	5/31/23	SLOPE
A	35	90.1%	97.8	5.7%	5/31/23	SLOPE
A	36	92.4%	100.4	6.5%	5/31/23	SLOPE

APPENDIX A: GEOTECHNICAL SOILS TESTING

A.3 Berm Density Test Results



FIELD COMPACTION TESTING FORM

PROJECT NAME:	OWL Landfill Cell 5AB	LOCATION:	Landfill North Berm
OWNER:	Oilfield Water Logistics	PROJECT NO.:	7053.22
PROJECT LOCATION:	Lea County, New Mexico	PAGE NO.:	1
TESTING INSTRUMENT: IntroTek 3500 Xplorer®		TECHNICIAN: Max White	

SOIL CLASSIFICATION	DESCRIPTION	REF STD PROCTOR	90% (PCF)	OPTIMAL MOISTURE
A GP-GM	Caliche	108.6 pcf 90% optimum	97.7	14.2 % Moisture
B GP-GM	Poorly Graded Gravel w/ Silt and Sand	111.8 pcf 90% optimum	100.6	7.1 % Moisture
C SM	Silty Sand	116.3 pcf 90% optimum	104.7	9.6 % Moisture

Soil Type	TEST NUMBER	% RSP	DRY DENS GITY (PCF)	% MOISTURE	DATE COMPLETED	NOTES
A	1	99.9%	108.5	9.2%	5/9/23	LIFT 1
A	2	100.6%	109.2	7.7%	5/9/23	LIFT 1
A	3	100.1%	108.7	10.0%	5/9/23	LIFT 1
A	4	101.1%	109.8	6.0%	5/9/23	LIFT 1
A	5	98.8%	107.3	7.8%	5/9/23	LIFT 1
A	6	95.9%	104.2	7.6%	5/9/23	LIFT 1
A	7	100.0%	108.6	7.7%	5/9/23	LIFT 1
A	8	105.5%	114.6	8.0%	5/9/23	LIFT 1
A	9	94.0%	102.1	6.5%	5/9/23	LIFT 1
A	10	98.5%	107.0	7.0%	5/11/23	LIFT 3
A	11	93.0%	101.0	8.6%	5/11/23	LIFT 2
A	12	95.8%	104.0	7.7%	5/11/23	LIFT 3
A	13	101.4%	110.1	6.7%	5/11/23	LIFT 2
A	14	101.7%	110.4	7.0%	5/11/23	LIFT 3
A	15	102.3%	111.1	4.4%	5/11/23	LIFT 3
A	16	97.1%	105.5	5.8%	5/11/23	LIFT 2
A	17	99.2%	107.7	5.7%	5/11/23	LIFT 2
A	18	98.3%	106.7	4.9%	5/11/23	LIFT 4
A	19	97.1%	105.4	5.7%	5/11/23	LIFT 4
A	20	90.6%	98.4	6.2%	5/11/23	LIFT 4
A	21	93.0%	101.0	6.9%	5/11/23	LIFT 4
A	22	96.7%	105.0	6.7%	5/16/23	LIFT 5
A	23	98.4%	106.9	7.3%	5/16/23	LIFT 5
A	24	99.6%	108.2	7.9%	5/16/23	LIFT 5
A	25	98.3%	106.7	7.0%	5/16/23	LIFT 5
A	26	96.1%	104.4	7.6%	5/16/23	LIFT 6
A	27	94.3%	102.4	6.1%	5/16/23	LIFT 6
A	28	101.4%	110.1	5.0%	5/16/23	LIFT 6
A	29	97.8%	106.2	9.1%	5/16/23	LIFT 8
A	30	95.0%	103.2	8.0%	5/16/23	LIFT 7
A	31	97.5%	105.9	7.7%	5/16/23	LIFT 8
A	32	95.7%	103.9	7.2%	5/16/23	LIFT 7
A	33	101.3%	110.0	4.9%	5/16/23	LIFT 8
A	34	108.7%	118.1	3.5%	5/16/23	LIFT 7
A	35	99.7%	108.3	6.3%	5/18/23	LIFT 9
A	36	98.2%	106.6	7.3%	5/18/23	LIFT 9
A	37	93.5%	101.5	10.1%	5/18/23	LIFT 9
A	38	94.3%	102.4	9.4%	5/18/23	LIFT 10
A	39	99.4%	107.9	7.5%	5/18/23	LIFT 10
A	40	98.9%	107.4	5.6%	5/18/23	LIFT 10
A	41	96.4%	104.7	6.9%	5/18/23	LIFT 11
A	42	104.0%	112.9	5.6%	5/18/23	LIFT 11
A	43	94.7%	102.8	5.3%	5/18/23	LIFT 11
A	44	99.2%	107.7	6.6%	5/18/23	LIFT 11

\\projects-dfs\projects\2022\7053.22\05_CONSTR\01_REPT\05_Cell 5AB Cert Report\01_Working_Copies\01_Appendix-A_Soil-Densities\A_2_A_3_A_4_DensityTestingResults_Landfill_Floor-Slope_5AB



FIELD COMPACTION TESTING FORM

PROJECT NAME:	OWL Landfill Cell 5AB
OWNER:	Oilfield Water Logistics
PROJECT LOCATION:	Lea County, New Mexico

LOCATION: Landfill North Berm
PROJECT NO.: 7053.22
PAGE NO.: 1

TESTING INSTRUMENT: IntroTek 3500 Xplorer®

TECHNICIAN: Max White

SOIL CLASSIFICATION		DESCRIPTION	REF STD PROCTOR		90% (PCF)	OPTIMAL MOISTURE
A	GP-GM	Caliche	108.6 pcf	90% optimum	97.7	14.2 % Moisture
B	GP-GM	Poorly Graded Gravel w/ Silt and Sand	111.8 pcf	90% optimum	100.6	7.1 % Moisture
C	SM	Silty Sand	116.3 pcf	90% optimum	104.7	9.6 % Moisture

[illegible]

APPENDIX A: GEOTECHNICAL SOILS TESTING

A.4 Anchor Trench Density Test Results



FIELD COMPACTION TESTING FORM

PROJECT NAME:	OWL Landfill Cell 5AB
OWNER:	Oilfield Water Logistics
PROJECT LOCATION:	Lea County, New Mexico

LOCATION: Landfill Anchor Trench
PROJECT NO.: 7053.22
PAGE NO.: 1

TESTING INSTRUMENT: IntroTek 3500 Xplorer®

TECHNICIAN: Max White

SOIL CLASSIFICATION		DESCRIPTION	REF STD PROCTOR		90% (PCF)	OPTIMAL MOISTURE
A	GP-GM	Caliche	108.6 pcf	90% optimum	97.7	14.2 % Moisture
B	GP-GM	Poorly Graded Gravel w/ Silt and Sand	111.8 pcf	90% optimum	100.6	7.1 % Moisture
C	SM	Silty Sand	116.3 pcf	90% optimum	104.7	9.6 % Moisture

[illegible]

APPENDIX A: GEOTECHNICAL SOILS TESTING

A.5 PSL Hydraulic Conductivity

Rigid Wall Falling-Head Remold Permeability



Project:	Owl NDBL Landfill (01705322.00)
Job #:	3-21116
Lab #:	5615
Location:	Owl 3, Sample A, Delivered on 8/31/23
Soil Description:	Sand
Remolded to:	Remolded to 85% of D-698 (118.8@10.7%)

Aparatus Weight Empty:	257.5	grams	Weight of Sample:	404.9	grams
Aparatus Weight + Soil:	662.4	grams	Weight of Sample:	0.892637	lb
Mold Diameter:	6.413	cm	Mold Area:	32.30073	cm ²
Pipe Diameter:	1.27	cm	Pipe Area:	1.266769	cm ²
Length of Sample	6.99	cm	Area Factor:	0.039218	
Pressure Head Applied:	0	cm	Volume of Sample:	225.7821	cm ³
Can #:			Volume of Sample:	0.007973	ft ³
Wet Weight:	225.3	grams	Unit Weight:	112.0	lb/ft³
Dry Weight:	203.4	grams	Moisture Content:	10.8	%
			Dry Unit Weight:	101.1	lb/ft³

	Trial 1	Trial 2	Trial 3
Time			
Hour	0	0	0
Minute	1	1	1
Second	35	36	36
Total (hr)	0.026389	0.026667	0.026667
h_0	65	65	65
h_1	10	10	10
$Head_0$	71.99 cm	71.99 cm	71.99 cm
$Head_1$	16.99 cm	16.99 cm	16.99 cm
K_s (cm/hour)	15.00 cm/hr	14.84 cm/hr	14.84 cm/hr
K_s (cm/sec)	4.17E-03 cm/s	4.12E-03 cm/s	4.12E-03 cm/s

Saturated Hydraulic Conductivity, K_s : **14.90 cm/hr**

Saturated Hydraulic Conductivity, K_s : **4.14E-03 cm/s**

Rigid Wall Falling-Head Remold Permeability



Project:	Owl NDBL Landfill (01705322.00)
Job #:	3-21116
Lab #:	5607
Location:	Owl 1, Sample B Delivered on 8/31/23
Soil Description:	Sand
Remolded to:	Remolded to 85% of D-698 (118.8@10.7%)

Aparatus Weight Empty:	257.5	grams	Weight of Sample:	405.4	grams
Aparatus Weight + Soil:	662.9	grams	Weight of Sample:	0.893739	lb
Mold Diameter:	6.413	cm	Mold Area:	32.30073	cm ²
Pipe Diameter:	1.27	cm	Pipe Area:	1.266769	cm ²
Length of Sample	6.99	cm	Area Factor:	0.039218	
Pressure Head Applied:	0	cm	Volume of Sample:	225.7821	cm ³
Can #:			Volume of Sample:	0.007973	ft ³
Wet Weight:	229.2	grams	Unit Weight:	112.1	lb/ft³
Dry Weight:	206.8	grams	Moisture Content:	10.8	%
			Dry Unit Weight:	101.1	lb/ft³

Time	Trial 1	Trial 2	Trial 3
Hour	0	0	0
Minute	1	1	1
Second	36	36	38
Total (hr)	0.026667	0.026667	0.027222
h_0	65	65	65
h_1	10	10	10
Head ₀	71.99 cm	71.99 cm	71.99 cm
Head ₁	16.99 cm	16.99 cm	16.99 cm
Ks (cm/hour)	14.84 cm/hr	14.84 cm/hr	14.54 cm/hr
Ks (cm/sec)	4.12E-03 cm/s	4.12E-03 cm/s	4.04E-03 cm/s

Saturated Hydraulic Conductivity, K_s : **14.74 cm/hr**

Saturated Hydraulic Conductivity, K_s : **4.10E-03 cm/s**

Rigid Wall Falling-Head Remold Permeability



Project:	Owl NDBL Landfill (01705322.00)
Job #:	3-21116
Lab #:	5611
Location:	Owl 2, Sample B, Delivered on 8/31/23
Soil Description:	Sand
Remolded to:	Remolded to 85% of D-698 (118.8@10.7%)

Aparatus Weight Empty:	257.6	grams	Weight of Sample:	405.6	grams
Aparatus Weight + Soil:	663.2	grams	Weight of Sample:	0.89418	lb
Mold Diameter:	6.413	cm	Mold Area:	32.30073	cm ²
Pipe Diameter:	1.27	cm	Pipe Area:	1.266769	cm ²
Length of Sample	6.99	cm	Area Factor:	0.039218	
Pressure Head Applied:	0	cm	Volume of Sample:	225.7821	cm ³
Can #:			Volume of Sample:	0.007973	ft ³
Wet Weight:	218.0	grams	Unit Weight:	112.1	lb/ft³
Dry Weight:	196.7	grams	Moisture Content:	10.8	%
			Dry Unit Weight:	101.2	lb/ft³

Time	Trial 1	Trial 2	Trial 3
Hour	0	0	0
Minute	2	2	2
Second	2	8	5
Total (hr)	0.033889	0.035556	0.034722
h_0	65	65	65
h_1	10	10	10
$Head_0$	71.99	71.99	71.99
$Head_1$	16.99	16.99	16.99
Ks (cm/hour)	11.68	11.13	11.40
Ks (cm/sec)	3.24E-03	3.09E-03	3.17E-03

Saturated Hydraulic Conductivity, K_s : **11.40 cm/hr**

Saturated Hydraulic Conductivity, K_s : **3.17E-03 cm/s**

APPENDIX A: GEOTECHNICAL SOILS TESTING

A.6 PSL Grain Size Distribution Test Results



September 27, 2023

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Job No.:3-21116
Lab No.: 5606

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: OWL 1, Sample A

DATE SAMPLED: August 31, 2023

SIEVE ANALYSIS	
Sieve Size	Percent Passing
No. 10	100
No. 40	96
No. 80	48
No. 200	21.0

Submitted by:

GEO-TEST, INC.

Tim Byres, SET

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September 27, 2023

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Job No.:3-21116
Lab No.: 5608

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: OWL 1, Sample C

DATE SAMPLED: August 31, 2023

SIEVE ANALYSIS	
Sieve Size	Percent Passing
No. 10	100
No. 40	96
No. 80	47
No. 200	20.5

Submitted by:

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Job No.:3-21116
Lab No.: 5609

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: OWL 1, Sample D

DATE SAMPLED: August 31, 2023

SIEVE ANALYSIS	
Sieve Size	Percent Passing
No. 10	100
No. 40	96
No. 80	48
No. 200	20.6

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September 27, 2023

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Job No.:3-21116
Lab No.: 5610

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: **OWL 2, Sample A**

DATE SAMPLED: **August 31, 2023**

SIEVE ANALYSIS	
Sieve Size	Percent Passing
3/4"	100
1/2"	99
3/8"	99
No. 4	99
No. 10	99
No. 40	95
No. 80	47
No. 200	21.8

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Job No.:3-21116
Lab No.: 5611

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: OWL 2, Sample B

DATE SAMPLED: August 31, 2023

SIEVE ANALYSIS	
Sieve Size	Percent Passing
No. 10	100
No. 40	96
No. 80	49
No. 200	22.0

Submitted by:

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Job No.:3-21116
Lab No.: 5612

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: OWL 2, Sample C

DATE SAMPLED: August 31, 2023

SIEVE ANALYSIS	
Sieve Size	Percent Passing
No. 10	100
No. 40	96
No. 80	48
No. 200	22.3

Submitted by:

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Job No.:3-21116
Lab No.: 5613

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: OWL 2, Sample D

DATE SAMPLED: August 31, 2023

SIEVE ANALYSIS	
Sieve Size	Percent Passing
No. 4	100
No. 10	99
No. 40	95
No. 80	46
No. 200	17.4

Submitted by:

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Job No.:3-21116
Lab No.: 5614

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: OWL 2, Sample E

DATE SAMPLED: August 31, 2023

SIEVE ANALYSIS	
Sieve Size	Percent Passing
No. 10	100
No. 40	96
No. 80	46
No. 200	18.3

Submitted by:

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Job No.:3-21116
Lab No.: 5615

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: OWL 3, Sample A

DATE SAMPLED: August 31, 2023

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 10	100
No. 40	96
No. 80	46
No. 200	15.7

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September 27, 2023

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Job No.:3-21116
Lab No.: 5616

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: OWL 3, Sample B

DATE SAMPLED: August 31, 2023

SIEVE ANALYSIS	
Sieve Size	Percent Passing
3/8"	100
No. 4	99
No. 10	99
No. 40	96
No. 80	47
No. 200	18.5

Submitted by:

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Job No.:3-21116
Lab No.: 5617

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: OWL 3, Sample C

DATE SAMPLED: August 31, 2023

SIEVE ANALYSIS	
Sieve Size	Percent Passing
1/2"	100
3/8"	99
No. 4	99
No. 10	99
No. 40	95
No. 80	47
No. 200	16.7

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Job No.:3-21116
Lab No.: 5618

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: OWL 3, Sample D

DATE SAMPLED: August 31, 2023

SIEVE ANALYSIS	
Sieve Size	Percent Passing
No. 10	100
No. 40	96
No. 80	47
No. 200	16.4

Submitted by:

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Job No.:3-21116
Lab No.: 5619

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: OWL 4, Sample A

DATE SAMPLED: August 31, 2023

SIEVE ANALYSIS	
Sieve Size	Percent Passing
No. 10	100
No. 40	96
No. 80	47
No. 200	18.4

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Job No.:3-21116
Lab No.: 5620

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: OWL 4, Sample B

DATE SAMPLED: August 31, 2023

SIEVE ANALYSIS	
Sieve Size	Percent Passing
No. 10	100
No. 40	96
No. 80	49
No. 200	17.9

Submitted by:

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SANTA FE,
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FAX (505) 471-2245

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

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



September 27, 2023

Parkhill
333 Rio Rancho Blvd NE
Suite 400
Rio Rancho, NM 87124

Job No.:3-21116
Lab No.: 5621

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: OWL 4, Sample C

DATE SAMPLED: August 31, 2023

SIEVE ANALYSIS	
Sieve Size	Percent Passing
No. 10	100
No. 40	96
No. 80	46
No. 200	18.4

Submitted by:

GEO-TEST, INC.

Tim Byres, SET

cc: Tzack@parkhill.com

GEO-TEST, INC.
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September 27, 2023

Parkhill
333 Rio Rancho Blvd NE
Suite 400
Rio Rancho, NM 87124

Job No.:3-21116
Lab No.: 5622

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: OWL 4, Sample D

DATE SAMPLED: August 31, 2023

SIEVE ANALYSIS	
Sieve Size	Percent Passing
No. 10	100
No. 40	96
No. 80	47
No. 200	19.0

Submitted by:

GEO-TEST, INC.

Tim Byres, SET

cc: Tzack@parkhill.com

GEO-TEST, INC.
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September 27, 2023

Parkhill
333 Rio Rancho Blvd NE
Suite 400
Rio Rancho, NM 87124

Job No.:3-21116
Lab No.: 5623

PROJECT: **OWL NDBL Landfill**

LOCATION OF SAMPLE: OWL 4, Sample E

DATE SAMPLED: August 31, 2023

SIEVE ANALYSIS	
Sieve Size	Percent Passing
No. 10	100
No. 40	96
No. 80	47
No. 200	19.0

Submitted by:

GEO-TEST, INC.

Tim Byres, SET

cc: Tzack@parkhill.com

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APPENDIX B: MATERIAL MANUFACTURER CERTIFICATION AND COMFORMANCE TESTING RESULTS

B.1 GCL Certifications



MANUFACTURING QUALITY CONTROL



PROJECT NUMBER: 310992

SALES ORDER: SO-095200

PACKING SLIP NUMBER: Pre-SO-095200-1

PROJECT NAME: Northern Delaware Basin Landfill

ROLL NUMBER	MANUFACT. DATE	BENTONITE LOT NUMBER	TOP LAYER 1	BOTTOM LAYER 1
Product Code : 1109263-42295-1 <u>Bentoliner 0.75 lbs/ft² - 3.66 kg/m², NS, Peel 35</u> TRI Austin Pickup - Aerttrail Robinson 1 ft x RW, 1/100,000 sf, min 1/Lot One bag (500 gr) of loose bentonite				
0242-396174	2023-06-02	1052223C	2027490246	F3WE02494-018
0242-396175	2023-06-02	1052223C	2027490246	F3WE02494-018
0242-396176	2023-06-02	1052223C	2027490246	F3WE02494-018
0242-396177	2023-06-02	1052223C	2027490246	F3WE00932-006
0242-396178	2023-06-02	1052223C	2027490246	F3WE00932-006
0242-396179	2023-06-02	1052223C	2027490246	F3WE00932-006
0242-396180	2023-06-02	1052223C	2027490246	F3WE00932-006
0242-396181	2023-06-02	1052223C	2027490246	F3WE00932-006
0242-396182	2023-06-02	1052223C	2027490246	F3WE00932-006
0242-396183	2023-06-02	1052223C	2027490246	F3WE00932-006
0242-396184	2023-06-02	1052223C	2027469916	F3WE00932-006
0242-396185	2023-06-02	1052223C	2027469916	F3WE00932-006
0242-396186	2023-06-02	1052223C	2027469916	F3WE00932-006
0242-396187	2023-06-02	1052223C	2027469916	F3WE00932-006
0242-396188	2023-06-02	1052223C	2027469916	F3WE00932-006
0242-396189	2023-06-02	1052223C	2027469916	F3WE00932-006
0242-396190	2023-06-02	1052223C	2027469916	F3WE00932-006

1' conformance

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

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Solmax Geosynthetics LLC

19103 GUNDLE RD,, HOUSTON, TX, UNITED STATES, 77073

SOLMAX.COM

6 Jun 2023



MANUFACTURING QUALITY CONTROL



PROJECT NUMBER: 310992

SALES ORDER: SO-095200

PACKING SLIP NUMBER: Pre-SO-095200-1

PROJECT NAME: Northern Delaware Basin Landfill

0242-396191	2023-06-02	1052223C	2027469916	F3WE00932-006	500 g. bentonite
0242-396192	2023-06-02	1052223C	2027469916	F3WE00932-006	
0242-396193	2023-06-02	1052223C	2027469916	F3WE00932-006	
0242-396194	2023-06-02	1052223C	2027469916	F3WE00932-006	
0242-396195	2023-06-02	1052223C	2027469912	F3WE00932-006	
0242-396196	2023-06-02	1052223C	2027469912	F3WE00932-006	
0242-396197	2023-06-02	1052223D	2027469912	F3WE00932-006	
0242-396198	2023-06-02	1052223D	2027469912	F3WE00932-006	
0242-396199	2023-06-02	1052223D	2027469912	F3WE00932-006	
0242-396200	2023-06-02	1052223D	2027469912	F3WE00932-006	
0242-396201	2023-06-02	1052223D	2027469912	F3WE00932-006	
0242-396202	2023-06-02	1052223D	2027469912	F3WE01677-020	
0242-396203	2023-06-02	1052223D	2027469912	F3WE01677-020	
0242-396204	2023-06-02	1052223D	2027469912	F3WE01677-020	
0242-396205	2023-06-02	1052223D	2027490256	F3WE01677-020	
0242-396206	2023-06-02	1052223D	2027490256	F3WE01677-020	
0242-396207	2023-06-02	1052223D	2027490256	F3WE01677-020	
0242-396208	2023-06-02	1052223D	2027490256	F3WE01677-020	
0242-396209	2023-06-02	1052223D	2027490256	F3WE01677-020	
0242-396210	2023-06-02	1052223D	2027490256	F3WE01677-020	
0242-396211	2023-06-02	1052223D	2027490256	F3WE01677-020	
0242-396212	2023-06-02	1052223D	2027490256	F3WE01677-020	
0242-396213	2023-06-02	1052223D	2027490256	F3WE01677-020	
0242-396214	2023-06-02	1052223D	2027490256	F3WE01677-020	
0242-396215	2023-06-02	1052223D	2027469928	F3WE01677-020	
0242-396216	2023-06-02	1052223D	2027469928	F3WE01677-020	
0242-396217	2023-06-02	1052223D	2027469928	F3WE01677-020	

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6 Jun 2023



MANUFACTURING QUALITY CONTROL



PROJECT NUMBER: 310992

SALES ORDER: SO-095200

PACKING SLIP NUMBER: Pre-SO-095200-1

PROJECT NAME: Northern Delaware Basin Landfill

0242-396218	2023-06-02	1052223D	2027469928	F3WE01677-020	1' conformance
0242-396219	2023-06-02	1052223D	2027469928	F3WE01677-020	
0242-396220	2023-06-02	1052223D	2027469928	F3WE01677-020	
0242-396221	2023-06-02	1052223D	2027469928	F3WE01677-020	
0242-396222	2023-06-02	1052223D	2027469928	F3WE01677-020	
0242-396223	2023-06-02	1052223D	2027469928	F3WE01677-020	
0242-396224	2023-06-02	1052223D	2027469928	F3WE01677-020	
0242-396225	2023-06-02	1052323A	2027469946	F3WE01677-020	
0242-396226	2023-06-02	1052323A	2027469946	F3WE01677-020	
0242-396227	2023-06-02	1052323A	2027469946	F3WE02350-017	
0242-396228	2023-06-02	1052323A	2027469946	F3WE02350-017	
0242-396229	2023-06-02	1052323A	2027469946	F3WE02350-017	
0242-396230	2023-06-02	1052323A	2027469946	F3WE02350-017	
0242-396231	2023-06-02	1052323A	2027469946	F3WE02350-017	
0242-396232	2023-06-02	1052323A	2027469946	F3WE02350-017	
0242-396233	2023-06-02	1052323A	2027469946	F3WE02350-017	
0242-396234	2023-06-02	1052323A	2027469946	F3WE02350-017	
0242-396235	2023-06-02	1052323A	2027490254	F3WE02350-017	
0242-396236	2023-06-02	1052323A	2027490254	F3WE02350-017	
0242-396237	2023-06-02	1052323A	2027490254	F3WE02350-017	
0242-396238	2023-06-02	1052323A	2027490254	F3WE02350-017	
0242-396239	2023-06-02	1052323A	2027490254	F3WE02350-017	
0242-396240	2023-06-02	1052323A	2027490254	F3WE02350-017	
0242-396241	2023-06-02	1052323A	2027490254	F3WE02350-017	
0242-396242	2023-06-02	1052323A	2027490254	F3WE02350-017	
0242-396243	2023-06-02	1052323A	2027490254	F3WE02350-017	
0242-396244	2023-06-02	1052323A	2027490254	F3WE02350-017	

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6 Jun 2023



MANUFACTURING QUALITY CONTROL



PROJECT NUMBER: 310992

SALES ORDER: SO-095200

PACKING SLIP NUMBER: Pre-SO-095200-1

PROJECT NAME: Northern Delaware Basin Landfill

0242-396245	2023-06-02	1052323A	2027490238	F3WE02350-017	1' conformance
0242-396246	2023-06-02	1052323A	2027490238	F3WE02350-017	
0242-396247	2023-06-02	1052323A	2027490238	F3WE02350-017	
0242-396248	2023-06-02	1052323A	2027490238	F3WE02350-017	
0242-396249	2023-06-02	1052323A	2027490238	F3WE02350-017	
0242-396250	2023-06-02	1052323A	2027490238	F3WE02350-017	
0242-396251	2023-06-02	1052323A	2027490238	F3WE02350-017	
0242-396252	2023-06-02	1052323A	2027490238	F3WE01858-005	
0242-396253	2023-06-02	1052323A	2027490238	F3WE01858-005	
0242-396254	2023-06-03	1052323A	2027490238	F3WE01858-005	
0242-396255	2023-06-03	1052323A	2027490238	F3WE01858-005	
0242-396256	2023-06-05	1052323B	2027490262	F3WE01858-005	
0242-396257	2023-06-05	1052323B	2027490262	F3WE01858-005	
0242-396258	2023-06-05	1052323B	2027490262	F3WE01858-005	
0242-396259	2023-06-05	1052323B	2027490262	F3WE01858-005	
0242-396260	2023-06-05	1052323B	2027490262	F3WE01858-005	
0242-396261	2023-06-05	1052323B	2027490262	F3WE01858-005	
0242-396262	2023-06-05	1052323B	2027490262	F3WE01858-005	
0242-396263	2023-06-05	1052323B	2027490262	F3WE01858-005	
0242-396264	2023-06-05	1052323B	2027490262	F3WE01858-005	
0242-396265	2023-06-05	1052323B	2027490262	F3WE01858-005	
0242-396266	2023-06-05	1052323B	2027469947	F3WE01858-005	
0242-396267	2023-06-05	1052323B	2027469947	F3WE01858-005	
0242-396268	2023-06-05	1052323B	2027469947	F3WE01858-005	
0242-396269	2023-06-05	1052323B	2027469947	F3WE01858-005	
0242-396270	2023-06-05	1052323B	2027469947	F3WE01858-005	
0242-396271	2023-06-05	1052323B	2027469947	F3WE01858-005	

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6 Jun 2023



MANUFACTURING QUALITY CONTROL



PROJECT NUMBER: 310992

SALES ORDER: SO-095200

PACKING SLIP NUMBER: Pre-SO-095200-1

PROJECT NAME: Northern Delaware Basin Landfill

0242-396272	2023-06-05	1052323B	2027469947	F3WE01858-005	
0242-396273	2023-06-05	1052323B	2027469947	F3WE01858-005	
0242-396274	2023-06-05	1052323B	2027469947	F3WE01858-005	
0242-396275	2023-06-05	1052323B	2027469947	F3WE01858-005	
0242-396276	2023-06-05	1052323B	2027490243	F3WE01858-005	
0242-396277	2023-06-05	1052323B	2027490243	FJWE07529-014	
0242-396278	2023-06-05	1052323B	2027490243	FJWE07529-014	
0242-396279	2023-06-05	1052323B	2027490243	FJWE07529-014	
0242-396280	2023-06-05	1052323B	2027490243	FJWE07529-014	
0242-396281	2023-06-05	1052323B	2027490243	FJWE07529-014	
0242-396283	2023-06-05	1052323C	2027490243	FJWE07529-014	
0242-396284	2023-06-05	1052323C	2027490243	FJWE07529-014	
0242-396285	2023-06-05	1052323C	2027490243	FJWE07529-014	
0242-396286	2023-06-05	1052323C	2027481903	FJWE07529-014	
0242-396287	2023-06-05	1052323C	2027481903	FJWE07529-014	
0242-396288	2023-06-05	1052323C	2027481903	FJWE07529-014	
0242-396289	2023-06-05	1052323C	2027481903	FJWE07529-014	
0242-396290	2023-06-05	1052323C	2027481903	FJWE07529-014	
0242-396291	2023-06-05	1052323C	2027481903	FJWE07529-014	
0242-396292	2023-06-05	1052323C	2027481903	FJWE07529-014	
0242-396293	2023-06-05	1052323C	2027481903	FJWE07529-014	
0242-396294	2023-06-05	1052323C	2027481903	FJWE07529-014	
0242-396295	2023-06-05	1052323C	2027481903	FJWE07529-014	
0242-396296	2023-06-05	1052323C	2027490236	FJWE07529-014	
0242-396297	2023-06-05	1052323C	2027490236	FJWE07529-014	
0242-396298	2023-06-05	1052323C	2027490236	FJWE07529-014	
0242-396299	2023-06-05	1052323C	2027490236	FJWE07529-014	

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6 Jun 2023



MANUFACTURING QUALITY CONTROL



PROJECT NUMBER: 310992

SALES ORDER: SO-095200

PACKING SLIP NUMBER: Pre-SO-095200-1

PROJECT NAME: Northern Delaware Basin Landfill

0242-396300	2023-06-05	1052323C	2027490236	FJWE07529-014	1' conformance
0242-396301	2023-06-05	1052323C	2027490236	FJWE07529-014	
0242-396302	2023-06-05	1052323C	2027490236	FJWE08948-001	
0242-396303	2023-06-05	1052323C	2027490236	FJWE08948-001	
0242-396304	2023-06-05	1052323C	2027490236	FJWE08948-001	
0242-396305	2023-06-05	1052323C	2027490236	FJWE08948-001	
0242-396306	2023-06-05	1052323C	2027490264	FJWE08948-001	
0242-396307	2023-06-05	1052323C	2027490264	FJWE08948-001	
0242-396308	2023-06-05	1052323C	2027490264	FJWE08948-001	
0242-396309	2023-06-05	1052323C	2027490264	FJWE08948-001	
0242-396310	2023-06-05	1052323C	2027490264	FJWE08948-001	
0242-396311	2023-06-05	1052323C	2027490264	FJWE08948-001	
0242-396312	2023-06-05	1052323C	2027490264	FJWE08948-001	
0242-396313	2023-06-05	1052323D	2027490264	FJWE08948-001	
0242-396314	2023-06-05	1052323D	2027490264	FJWE08948-001	
0242-396315	2023-06-05	1052323D	2027490264	FJWE08948-001	
0242-396316	2023-06-05	1052323D	2027490264	FJWE08948-001	
0242-396317	2023-06-05	1052323D	2027481895	FJWE08948-001	
0242-396318	2023-06-05	1052323D	2027481895	FJWE08948-001	
0242-396319	2023-06-05	1052323D	2027481895	FJWE08948-001	
0242-396320	2023-06-05	1052323D	2027481895	FJWE08948-001	
0242-396321	2023-06-05	1052323D	2027481895	FJWE08948-001	
0242-396322	2023-06-05	1052323D	2027481895	FJWE08948-001	
0242-396323	2023-06-05	1052323D	2027481895	FJWE08948-001	
0242-396324	2023-06-05	1052323D	2027481895	FJWE08948-001	
0242-396325	2023-06-05	1052323D	2027481895	FJWE08948-001	
0242-396326	2023-06-05	1052323D	2027481895	FJWE08948-001	

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SOLMAX.COM

6 Jun 2023



MANUFACTURING QUALITY CONTROL



PROJECT NUMBER:310992

SALES ORDER:SO-095200

PACKING SLIP NUMBER:Pre-SO-095200-1

PROJECT NAME: Northern Delaware Basin Landfill

0242-396327	2023-06-05	1052323D	2027481894	FJWE08948-001
0242-396328	2023-06-05	1052323D	2027481894	F3WE01149-008
0242-396329	2023-06-05	1052323D	2027481894	F3WE01149-008
0242-396330	2023-06-05	1052323D	2027481894	F3WE01149-008
0242-396331	2023-06-05	1052323D	2027481894	F3WE01149-008
0242-396332	2023-06-05	1052323D	2027481894	F3WE01149-008

QUANTITY (ROLLS): 158

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6 Jun 2023



MANUFACTURING QUALITY CONTROL

TEST RESULTS

PROJECT NUMBER:310992

SALES ORDER:SO-095200

PACKING SLIP NUMBER:Pre-SO-095200-1

PROJECT NAME : Northern Delaware Basin Landfill

PRODUCT: 1109263-42295-1
Bentoliner 0.75 lbs/ft² - 3.66 kg/m², NS, Peel 35

					Rolls	
Test	Property	Direction	Test Method	Frequency	Unit	
	1 Bentonite Mass (0% moisture)		ASTM D5993	40,000 ft²	lbs/ft²	
	2 Peel Strength (min.avg.)	MD	ASTM D4632	40,000 ft²	lbf	
	3 Peel Strength (min.avg.)	MD	ASTM D6496	40,000 ft²	lbf/in	
	4 Tensile Strength MD (min. avg.)	MD	ASTM D6768	40,000 ft²	lbf/in	
	5 Grab Strength (min. avg)	MD	ASTM D4632	40,000 ft²	lbf	
	6 Puncture Resistance (min. avg.)		ASTM D4833	200,000 ft²	lbf	
	7 Moisture Content (Max.)		ASTM D5993	40,000 ft²	%	
	8 Finished Good Mass (0% moisture)		ASTM D5993	40,000 ft²	lbs/ft²	

Test	1	2	3	4	5	6	7	8
SPECIFICATIONS	0.75	35	5.3	30	90	90	12	0.81
0242-396174	0.94	67.0	13.9	52	176	125	10.4	1.01
0242-396175	0.94	67.0	13.9	52	176	125	10.4	1.01
0242-396176	0.94	67.0	13.9	52	176	125	10.4	1.01
0242-396177	0.94	67.0	13.9	52	176	125	10.4	1.01
0242-396178	0.94	67.0	13.9	52	176	125	10.4	1.01
0242-396179	0.94	67.0	13.9	52	176	125	10.4	1.01
0242-396180	0.94	67.0	13.9	52	176	125	10.4	1.01
0242-396181	0.94	67.0	13.9	52	176	125	10.4	1.01
0242-396182	0.94	67.0	13.9	52	176	125	10.4	1.01
0242-396183	0.83	49.0	10.3	53	159	125	11.4	0.91
0242-396184	0.83	49.0	10.3	53	159	125	11.4	0.91
0242-396185	0.83	49.0	10.3	53	159	125	11.4	0.91
0242-396186	0.83	49.0	10.3	53	159	125	11.4	0.91
0242-396187	0.83	49.0	10.3	53	159	125	11.4	0.91
0242-396188	0.83	49.0	10.3	53	159	125	11.4	0.91
0242-396189	0.83	49.0	10.3	53	159	125	11.4	0.91
0242-396190	0.83	49.0	10.3	53	159	125	11.4	0.91
0242-396191	0.83	49.0	10.3	53	159	125	11.4	0.91
0242-396192	0.83	49.0	10.3	53	159	125	11.4	0.91
0242-396193	0.83	49.0	10.3	53	159	125	11.4	0.91

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Solmax Geosynthetics LLC
19103 GUNDLE RD,, HOUSTON, TX, UNITED STATES, 77073

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MANUFACTURING QUALITY CONTROL



TEST RESULTS

PROJECT NUMBER:310992

SALES ORDER:SO-095200

PACKING SLIP NUMBER:Pre-SO-095200-1

PROJECT NAME : Northern Delaware Basin Landfill

Test	1	2	3	4	5	6	7	8
0242-396194	0.83	49.0	10.3	53	159	125	11.4	0.91
0242-396195	0.83	49.0	10.3	53	159	125	11.4	0.91
0242-396196	0.83	49.0	10.3	53	159	125	11.4	0.91
0242-396197	0.83	49.0	10.3	53	159	125	11.4	0.91
0242-396198	0.83	49.0	10.3	53	159	125	11.4	0.91
0242-396199	0.79	65.0	12.8	54	165	125	10.2	0.86
0242-396200	0.79	65.0	12.8	54	165	125	10.2	0.86
0242-396201	0.79	65.0	12.8	54	165	125	10.2	0.86
0242-396202	0.79	65.0	12.8	54	165	125	10.2	0.86
0242-396203	0.79	65.0	12.8	54	165	125	10.2	0.86
0242-396204	0.79	65.0	12.8	54	165	125	10.2	0.86
0242-396205	0.79	65.0	12.8	54	165	125	10.2	0.86
0242-396206	0.79	65.0	12.8	54	165	125	10.2	0.86
0242-396207	0.79	65.0	12.8	54	165	125	10.2	0.86
0242-396208	0.79	65.0	12.8	54	165	125	10.2	0.86
0242-396209	0.79	65.0	12.8	54	165	125	10.2	0.86
0242-396210	0.79	65.0	12.8	54	165	125	10.2	0.86
0242-396211	0.79	65.0	12.8	54	165	125	10.2	0.86
0242-396212	0.79	65.0	12.8	54	165	125	10.2	0.86
0242-396213	0.79	65.0	12.8	54	165	125	10.2	0.86
0242-396214	0.79	65.0	12.8	54	165	125	10.2	0.86
0242-396215	0.82	52.0	12.3	48	194	125	10.3	0.89
0242-396216	0.82	52.0	12.3	48	194	125	10.3	0.89
0242-396217	0.82	52.0	12.3	48	194	125	10.3	0.89
0242-396218	0.82	52.0	12.3	48	194	125	10.3	0.89
0242-396219	0.82	52.0	12.3	48	194	125	10.3	0.89
0242-396220	0.82	52.0	12.3	48	194	125	10.3	0.89
0242-396221	0.82	52.0	12.3	48	194	125	10.3	0.89
0242-396222	0.82	52.0	12.3	48	194	125	10.3	0.89
0242-396223	0.82	52.0	12.3	48	194	125	10.3	0.89
0242-396224	0.82	52.0	12.3	48	194	125	10.3	0.89
0242-396225	0.82	52.0	12.3	48	194	125	10.3	0.89
0242-396226	0.82	52.0	12.3	48	194	125	10.3	0.89
0242-396227	0.82	52.0	12.3	48	194	125	10.3	0.89
0242-396228	0.82	52.0	12.3	48	194	125	10.3	0.89

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MANUFACTURING QUALITY CONTROL

TEST RESULTS

PROJECT NUMBER:310992

SALES ORDER:SO-095200

PACKING SLIP NUMBER:Pre-SO-095200-1

PROJECT NAME : Northern Delaware Basin Landfill

Test	1	2	3	4	5	6	7	8
0242-396229	0.82	52.0	12.3	48	194	125	10.3	0.89
0242-396230	0.82	52.0	12.3	48	194	125	10.3	0.89
0242-396231	0.86	58.0	11.0	51	199	125	10.1	0.93
0242-396232	0.86	58.0	11.0	51	199	125	10.1	0.93
0242-396233	0.86	58.0	11.0	51	199	125	10.1	0.93
0242-396234	0.86	58.0	11.0	51	199	125	10.1	0.93
0242-396235	0.86	58.0	11.0	51	199	125	10.1	0.93
0242-396236	0.86	58.0	11.0	51	199	125	10.1	0.93
0242-396237	0.86	58.0	11.0	51	199	125	10.1	0.93
0242-396238	0.86	58.0	11.0	51	199	125	10.1	0.93
0242-396239	0.86	58.0	11.0	51	199	125	10.1	0.93
0242-396240	0.86	58.0	11.0	51	199	125	10.1	0.93
0242-396241	0.86	58.0	11.0	51	199	125	10.1	0.93
0242-396242	0.86	58.0	11.0	51	199	125	10.1	0.93
0242-396243	0.86	58.0	11.0	51	199	125	10.1	0.93
0242-396244	0.86	58.0	11.0	51	199	125	10.1	0.93
0242-396245	0.86	58.0	11.0	51	199	125	10.1	0.93
0242-396246	0.86	58.0	11.0	51	199	125	10.1	0.93
0242-396247	0.83	53.0	11.5	50	177	132	10.3	0.91
0242-396248	0.83	53.0	11.5	50	177	132	10.3	0.91
0242-396249	0.83	53.0	11.5	50	177	132	10.3	0.91
0242-396250	0.83	53.0	11.5	50	177	132	10.3	0.91
0242-396251	0.83	53.0	11.5	50	177	132	10.3	0.91
0242-396252	0.83	53.0	11.5	50	177	132	10.3	0.91
0242-396253	0.83	53.0	11.5	50	177	132	10.3	0.91
0242-396254	0.83	53.0	11.5	50	177	132	10.3	0.91
0242-396255	0.83	53.0	11.5	50	177	132	10.3	0.91
0242-396256	0.83	53.0	11.5	50	177	132	10.3	0.91
0242-396257	0.83	53.0	11.5	50	177	132	10.3	0.91
0242-396258	0.83	53.0	11.5	50	177	132	10.3	0.91
0242-396259	0.83	53.0	11.5	50	177	132	10.3	0.91
0242-396260	0.83	53.0	11.5	50	177	132	10.3	0.91
0242-396261	0.83	53.0	11.5	50	177	132	10.3	0.91
0242-396262	0.83	53.0	11.5	50	177	132	10.3	0.91
0242-396263	0.83	74.0	13.5	46	152	132	10.4	0.91

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MANUFACTURING QUALITY CONTROL



TEST RESULTS

PROJECT NUMBER:310992

SALES ORDER:SO-095200

PACKING SLIP NUMBER:Pre-SO-095200-1

PROJECT NAME : Northern Delaware Basin Landfill

Test	1	2	3	4	5	6	7	8
0242-396264	0.83	74.0	13.5	46	152	132	10.4	0.91
0242-396265	0.83	74.0	13.5	46	152	132	10.4	0.91
0242-396266	0.83	74.0	13.5	46	152	132	10.4	0.91
0242-396267	0.83	74.0	13.5	46	152	132	10.4	0.91
0242-396268	0.83	74.0	13.5	46	152	132	10.4	0.91
0242-396269	0.83	74.0	13.5	46	152	132	10.4	0.91
0242-396270	0.83	74.0	13.5	46	152	132	10.4	0.91
0242-396271	0.83	74.0	13.5	46	152	132	10.4	0.91
0242-396272	0.83	74.0	13.5	46	152	132	10.4	0.91
0242-396273	0.83	74.0	13.5	46	152	132	10.4	0.91
0242-396274	0.83	74.0	13.5	46	152	132	10.4	0.91
0242-396275	0.83	74.0	13.5	46	152	132	10.4	0.91
0242-396276	0.83	74.0	13.5	46	152	132	10.4	0.91
0242-396277	0.83	74.0	13.5	46	152	132	10.4	0.91
0242-396278	0.83	74.0	13.5	46	152	132	10.4	0.91
0242-396279	0.82	65.0	12.6	52	171	132	9.3	0.89
0242-396280	0.82	65.0	12.6	52	171	132	9.3	0.89
0242-396281	0.82	65.0	12.6	52	171	132	9.3	0.89
0242-396283	0.82	65.0	12.6	52	171	132	9.3	0.89
0242-396284	0.82	65.0	12.6	52	171	132	9.3	0.89
0242-396285	0.82	65.0	12.6	52	171	132	9.3	0.89
0242-396286	0.82	65.0	12.6	52	171	132	9.3	0.89
0242-396287	0.82	65.0	12.6	52	171	132	9.3	0.89
0242-396288	0.82	65.0	12.6	52	171	132	9.3	0.89
0242-396289	0.82	65.0	12.6	52	171	132	9.3	0.89
0242-396290	0.82	65.0	12.6	52	171	132	9.3	0.89
0242-396291	0.82	65.0	12.6	52	171	132	9.3	0.89
0242-396292	0.82	65.0	12.6	52	171	132	9.3	0.89
0242-396293	0.82	65.0	12.6	52	171	132	9.3	0.89
0242-396294	0.82	65.0	12.6	52	171	132	9.3	0.89
0242-396295	0.82	46.0	9.5	53	187	132	11.0	0.89
0242-396296	0.82	46.0	9.5	53	187	132	11.0	0.89
0242-396297	0.82	46.0	9.5	53	187	132	11.0	0.89
0242-396298	0.82	46.0	9.5	53	187	132	11.0	0.89
0242-396299	0.82	46.0	9.5	53	187	132	11.0	0.89

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MANUFACTURING QUALITY CONTROL

TEST RESULTS

PROJECT NUMBER:310992

SALES ORDER:SO-095200

PACKING SLIP NUMBER:Pre-SO-095200-1

PROJECT NAME : Northern Delaware Basin Landfill

Test	1	2	3	4	5	6	7	8
0242-396300	0.82	46.0	9.5	53	187	132	11.0	0.89
0242-396301	0.82	46.0	9.5	53	187	132	11.0	0.89
0242-396302	0.82	46.0	9.5	53	187	132	11.0	0.89
0242-396303	0.82	46.0	9.5	53	187	132	11.0	0.89
0242-396304	0.82	46.0	9.5	53	187	132	11.0	0.89
0242-396305	0.82	46.0	9.5	53	187	132	11.0	0.89
0242-396306	0.82	46.0	9.5	53	187	132	11.0	0.89
0242-396307	0.82	46.0	9.5	53	187	132	11.0	0.89
0242-396308	0.82	46.0	9.5	53	187	132	11.0	0.89
0242-396309	0.82	46.0	9.5	53	187	132	11.0	0.89
0242-396310	0.82	46.0	9.5	53	187	132	11.0	0.89
0242-396311	0.79	63.0	12.5	53	167	132	11.0	0.86
0242-396312	0.79	63.0	12.5	53	167	132	11.0	0.86
0242-396313	0.79	63.0	12.5	53	167	132	11.0	0.86
0242-396314	0.79	63.0	12.5	53	167	132	11.0	0.86
0242-396315	0.79	63.0	12.5	53	167	132	11.0	0.86
0242-396316	0.79	63.0	12.5	53	167	132	11.0	0.86
0242-396317	0.79	63.0	12.5	53	167	132	11.0	0.86
0242-396318	0.79	63.0	12.5	53	167	132	11.0	0.86
0242-396319	0.79	63.0	12.5	53	167	132	11.0	0.86
0242-396320	0.79	63.0	12.5	53	167	132	11.0	0.86
0242-396321	0.79	63.0	12.5	53	167	132	11.0	0.86
0242-396322	0.79	63.0	12.5	53	167	132	11.0	0.86
0242-396323	0.79	63.0	12.5	53	167	132	11.0	0.86
0242-396324	0.79	63.0	12.5	53	167	132	11.0	0.86
0242-396325	0.79	63.0	12.5	53	167	132	11.0	0.86
0242-396326	0.79	63.0	12.5	53	167	132	11.0	0.86
0242-396327	0.80	72.0	14.7	66	233	132	9.6	0.88
0242-396328	0.80	72.0	14.7	66	233	132	9.6	0.88
0242-396329	0.80	72.0	14.7	66	233	132	9.6	0.88
0242-396330	0.80	72.0	14.7	66	233	132	9.6	0.88
0242-396331	0.80	72.0	14.7	66	233	132	9.6	0.88
0242-396332	0.80	72.0	14.7	66	233	132	9.6	0.88

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MANUFACTURING QUALITY CONTROL



TEST RESULTS

PROJECT NUMBER:310992

SALES ORDER:SO-095200

PACKING SLIP NUMBER:Pre-SO-095200-1

PROJECT NAME : Northern Delaware Basin Landfill

PRODUCT: 1109263-42295-1

Bentoliner 0.75 lbs/ft² - 3.66 kg/m², NS, Peel 35

Test	Property	Direction	Test Method	Frequency	Unit
1	Swell Index (min.)		ASTM D5890	100,000 lb	ml/2 g
2	Moisture Content (max.)		ASTM D4643	100,000 lb	%
3	Fluid Loss (max.)		ASTM D5891	100,000 lb	ml

Test	1	2	3
Specification	24	12	18
1052223C	30.0	10.4	15
1052223D	30.0	10.9	14
1052323A	29.0	10.4	15
1052323B	30.0	10.6	13
1052323C	32.0	11.6	13
1052323D	31.0	10.7	13

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MANUFACTURING QUALITY CONTROL



TEST RESULTS

PROJECT NUMBER:310992

SALES ORDER:SO-095200

PACKING SLIP NUMBER:Pre-SO-095200-1

PROJECT NAME : Northern Delaware Basin Landfill

Test	Property	Direction					Test Method	Frequency	Unit
1	Mass per Unit Area (min. avg.)						ASTM D5261	200,000 ft²	oz/yd²
2	Strength (MD)								lbf
3	Strength (CMD)								lbf
4	Elongation (MD)								%
5	Elongation (CMD)								%
Test	1	2	3	4	5				
Specification	6	22	22	100	100				
2027469912	7.0	104	140	148	139				
2027469916	7.5	99	193	142	157				
2027469928	6.6	106	176	154	147				
2027469946	7.4	96	129	146	152				
2027469947	7.4	96	129	146	152				
2027481894	8.3	120	239	160	155				
2027481895	8.3	120	239	160	155				
2027481903	6.9	97	116	139	113				
2027490236	7.4	69	94	131	105				
2027490238	7.4	69	94	131	105				
2027490243	7.0	65	115	141	124				
2027490246	8.0	74	144	144	124				
2027490254	7.1	80	157	143	149				
2027490256	7.1	80	157	143	149				
2027490262	8.4	99	175	160	150				
2027490264	6.8	91	146	158	142				

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MANUFACTURING QUALITY CONTROL



TEST RESULTS

PROJECT NUMBER: 310992

SALES ORDER: SO-095200

PACKING SLIP NUMBER: Pre-SO-095200-1

PROJECT NAME : Northern Delaware Basin Landfill

Test	Property	Direction	Test Method	Frequency	Unit
1	Mass per Unit Area (min. avg.)		ASTM D5261	200,000 ft²	oz/yd²
	Grab Tensile Properties (min. avg)		ASTM D4632	200,000 ft²	
2	Strength (MD)				lbf
3	Strength (CMD)				lbf
4	Elongation (MD)				%
5	Elongation (CMD)				%

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GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2023
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
B0004875014	05-23-23	1052223C	9.2	0.02	3.36	12.8	114	32	977

MAY No. of CARS	M AVG	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	0 FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN	DATE
40	STD DEV	9.45 0.46	0.51 2.06	3.43 1.36	12.97 0.80	113.50 2.27	32.45 1.22	921.50 41.81	05-*

YTD No. of CARS	M AVG	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	0 FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN
260	STD DEV	9.49 0.53	0.17 0.96	3.82 1.60	14.08 1.26	112.94 3.04	31.03 1.77	886.49 47.74

SOLD TO: Solmax
19103 Gundle RD
Houston, TX 77073

For any questions contact.
Q.A. SUPERVISOR
Tucker Goodvin

Attn: rstadler@solmax.com
chofer@solmax.com
ctaylor@solmax.com

SHIPPED TO: Solmax
3150 FIRST AVENUE
SPEARFISH, SD 57783

Prepared by: TO
05/23/23

CC:
File

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2023
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
B0004875015	05-23-23	1052223D	9.6	0.01	2.60	12.6	116	34	914

MAY No. of CARS	M AVG	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	0 FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN	DATE
42	STD DEV	9.45	0.49	3.38	12.96	113.62	32.45	920.71	05-*
		0.45	2.02	1.34	0.79	2.28	1.24	41.00	

YTD No. of CARS	M AVG	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	0 FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN
262	STD DEV	9.49	0.16	3.81	14.07	112.97	31.05	886.63
		0.53	0.95	1.60	1.26	3.04	1.77	47.59

SOLD TO: Solmax
19103 Gundle RD
Houston, TX 77073

For any questions contact.
Q.A. SUPERVISOR
Tucker Goodvin

Attn: rstadler@solmax.com
chofer@solmax.com
ctaylor@solmax.com

SHIPPED TO: Solmax
3150 FIRST AVENUE
SPEARFISH, SD 57783

Prepared by: TO
05/23/23

CC:
File

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2023
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
B0004875016	05-23-23	1052323A	9.7	0.03	3.94	12.0	112	31	956

MAY No. of CARS	M AVG STD DEV	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	0 FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN	DATE 05-*
43		9.45 0.45	0.48 1.99	3.40 1.33	12.93 0.79	113.58 2.26	32.42 1.24	921.53 40.87	

YTD No. of CARS	M AVG STD DEV	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	0 FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN
263		9.49 0.53	0.16 0.95	3.81 1.60	14.06 1.27	112.96 3.04	31.05 1.77	886.89 47.69

SOLD TO: Solmax
19103 Gundle RD
Houston, TX 77073

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SHIPPED TO: Solmax
3150 FIRST AVENUE
SPEARFISH, SD 57783

Prepared by: TO
05/24/23

CC:
File

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2023
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
B0004875018	05-23-23	1052323B	9.7	0.03	2.99	12.4	114	33	968

MAY No. of CARS	M AVG	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	0 FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN	DATE 05-*
44	STD DEV	9.46 0.44	0.47 1.97	3.39 1.32	12.92 0.79	113.59 2.24	32.43 1.23	922.59 40.99	

YTD No. of CARS	M AVG	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	0 FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN
264	STD DEV	9.49 0.53	0.16 0.95	3.81 1.59	14.06 1.27	112.97 3.03	31.05 1.77	887.20 47.86

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Houston, TX 77073

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ctaylor@solmax.com

SHIPPED TO: Solmax
3150 FIRST AVENUE
SPEARFISH, SD 57783

Prepared by: TO
05/24/23

CC:
File

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2023
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
B0004875019	05-24-23	1052323C	9.1	0.02	4.13	13.0	118	34	912

MAY No. of CARS	M AVG	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	0 FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN	DATE 05-*
50	STD DEV	9.43 0.49	0.41 1.86	3.29 1.35	12.93 0.75	113.72 2.23	32.44 1.25	922.60 39.25	

YTD No. of CARS	M AVG	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	0 FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN
270	STD DEV	9.48 0.54	0.16 0.94	3.78 1.60	14.03 1.26	113.00 3.02	31.08 1.77	887.98 47.73

SOLD TO: Solmax
19103 Gundle RD
Houston, TX 77073

For any questions contact.
Q.A. SUPERVISOR
Tucker Goodvin

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chofer@solmax.com
ctaylor@solmax.com

SHIPPED TO: Solmax
3150 FIRST AVENUE
SPEARFISH, SD 57783

Prepared by: TO
05/26/23

CC:
File

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2023
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
B0004875020	05-24-23	1052323D	9.8	0.03	2.54	12.8	114	34	922

MAY No. of CARS	M AVG STD DEV	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	0 FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN	DATE 05-*
50		9.43 0.49	0.41 1.86	3.29 1.35	12.93 0.75	113.72 2.23	32.44 1.25	922.60 39.25	

YTD No. of CARS	M AVG STD DEV	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	0 FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN
270		9.48 0.54	0.16 0.94	3.78 1.60	14.03 1.26	113.00 3.02	31.08 1.77	887.98 47.73

SOLD TO: Solmax
19103 Gundle RD
Houston, TX 77073

For any questions contact.
Q.A. SUPERVISOR
Tucker Goodvin

Attn: rstadler@solmax.com
chofer@solmax.com
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SHIPPED TO: Solmax
3150 FIRST AVENUE
SPEARFISH, SD 57783

Prepared by: TO
05/26/23

CC:
File

APPENDIX B: MATERIAL MANUFACTURER CERTIFICATION AND COMFORMANCE TESTING RESULTS

B.2 GCL Conformance Testing Results

**TESTING, RESEARCH, CONSULTING AND FIELD SERVICES**

Austin, TX - USA | CA - USA | SC - USA | Gold Coast - Australia | Suzhou - China | Sao Paulo, Brazil | Johannesburg - Africa

July 12, 2023

Mail To:**James Campbell**
Mustang Extreme Environmental Services**Bill To:**

<= Same

jcampbell@mustangextreme.com

Greetings,

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: **Northern Delaware Basin LF**

TRI Job Reference Number: 23-002160

Material(s) Tested: Four Solmax Bentoliner NS GCLs

Test(s) Requested:

Mass Per Unit Area (ASTM D5993)
Bentonite - Fluid Loss (ASTM D5891)
Bentonite - Swell Index (ASTM D5890)
Index Flux (ASTM D5887)

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Mansukh Patel'.

Mansukh Patel, Ph.D.

Geosynthetic Services Division

page 1 of 5

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

TRI ENVIRONMENTAL, INC.

9063 Bee Caves Rd. - Austin, TX 78733 - USA | PH: 800.880.TEST OR 512.263.2101



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

Austin, TX - USA | CA - USA | SC - USA | Gold Coast - Australia | Suzhou - China | Sao Paulo, Brazil | Johannesburg - Africa

GCL TEST RESULTS

TRI Client: Mustang Extreme Environmental Services
Project: Northern Delaware Basin LF

Material: GCL

Sample Identification: 0242-396175

TRI Log #: 23-002160

PARAMETER	TEST REPLICATE NUMBER					MEAN	STD. DEV.
	1	2	3	4	5		
Bentonite - Mass/Unit Area (ASTM D5993, result @ 0% M.C.)							
Mass/unit area (lbs/ft ²)							
GCL (ω = 0%)	0.89	0.89	0.93	0.84	0.87	0.88	0.03
Non-Bentonite Components	0.063	(Assumed Material-Specific Value)					
Bentonite (ω = 0%)	0.82	0.83	0.86	0.77	0.81	0.82	0.03
Moisture Content (%)	11.0	11.0	11.1	11.1	11.1	11.0	0.1
Bentonite - Fluid Loss (ASTM D5891)							
Slurry temperature at test initiation:	24.3	° C		Slurry temperature at test completion:	21.9	° C	
Fluid Loss (mL)	15.0						15.0
Note: Bentonite sample tested is taken from finished GCL product.							
Bentonite - Swell Index (ASTM D5890)							
Swell index (mL/2g)	33						33
Note: Bentonite sample tested is taken from finished GCL product.							
Index Flux (ASTM D5887)							
Index Flux (m³/m²/sec)	2.8E-09						2.8E-09
Hydraulic Conductivity (cm/sec)	1.0E-09						1.0E-09



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

Austin, TX - USA | CA - USA | SC - USA | Gold Coast - Australia | Suzhou - China | Sao Paulo, Brazil | Johannesburg - Africa

GCL TEST RESULTS

TRI Client: Mustang Extreme Environmental Services
Project: Northern Delaware Basin LF

Material: GCL

Sample Identification: 0242-396219

TRI Log #: 23-002160

PARAMETER	TEST REPLICATE NUMBER					MEAN	STD. DEV.
	1	2	3	4	5		
Bentonite - Mass/Unit Area (ASTM D5993, result @ 0% M.C.)							
Mass/unit area (lbs/ft ²)							
GCL (ω = 0%)	1.03	1.00	0.99	0.91	0.93	0.97	0.05
Non-Bentonite Components	0.063	(Assumed Material-Specific Value)					
Bentonite (ω = 0%)	0.96	0.94	0.93	0.85	0.87	0.91	0.05
Moisture Content (%)	11.2	11.0	12.0	12.2	11.1	11.5	0.5
Bentonite - Fluid Loss (ASTM D5891)							
Slurry temperature at test initiation:	24.9	° C		Slurry temperature at test completion:	21.4	° C	
Fluid Loss (mL)	14.8						14.8
Note: Bentonite sample tested is taken from finished GCL product.							
Bentonite - Swell Index (ASTM D5890)							
Swell index (mL/2g)	31						31
Note: Bentonite sample tested is taken from finished GCL product.							
Index Flux (ASTM D5887)							
Index Flux (m ³ /m ² /sec)	2.6E-09						2.6E-09
Hydraulic Conductivity (cm/sec)	1.0E-09						1.0E-09



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

Austin, TX - USA | CA - USA | SC - USA | Gold Coast - Australia | Suzhou - China | Sao Paulo, Brazil | Johannesburg - Africa

GCL TEST RESULTS

TRI Client: Mustang Extreme Environmental Services
Project: Northern Delaware Basin LF

Material: GCL

Sample Identification: 0242-396263

TRI Log #: 23-002160

PARAMETER	TEST REPLICATE NUMBER					MEAN	STD. DEV.
	1	2	3	4	5		
Bentonite - Mass/Unit Area (ASTM D5993, result @ 0% M.C.)							
Mass/unit area (lbs/ft ²)							
GCL (ω = 0%)	1.04	0.89	0.78	0.85	0.90	0.89	0.10
Non-Bentonite Components	0.063	(Assumed Material-Specific Value)					
Bentonite (ω = 0%)	0.98	0.83	0.71	0.79	0.84	0.83	0.10
Moisture Content (%)	9.5	11.4	13.2	13.3	12.4	12.0	1.6
Bentonite - Fluid Loss (ASTM D5891)							
Slurry temperature at test initiation:	25.4	° C		Slurry temperature at test completion:	21.9	° C	
Fluid Loss (mL)	14.4						14.4
Note: Bentonite sample tested is taken from finished GCL product.							
Bentonite - Swell Index (ASTM D5890)							
Swell index (mL/2g)	33						33
Note: Bentonite sample tested is taken from finished GCL product.							
Index Flux (ASTM D5887)							
Index Flux (m³/m²/sec)	3.3E-09						3.3E-09
Hydraulic Conductivity (cm/sec)	1.2E-09						1.2E-09



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

Austin, TX - USA | CA - USA | SC - USA | Gold Coast - Australia | Suzhou - China | Sao Paulo, Brazil | Johannesburg - Africa

GCL TEST RESULTS

TRI Client: Mustang Extreme Environmental Services
Project: Northern Delaware Basin LF

Material: GCL

Sample Identification: 0242-396307

TRI Log #: 23-002160

PARAMETER	TEST REPLICATE NUMBER					MEAN	STD. DEV.
	1	2	3	4	5		
Bentonite - Mass/Unit Area (ASTM D5993, result @ 0% M.C.)							
Mass/unit area (lbs/ft ²)							
GCL (ω = 0%)	0.99	0.86	0.94	0.85	0.93	0.91	0.06
Non-Bentonite Components	0.063	(Assumed Material-Specific Value)					
Bentonite (ω = 0%)	0.92	0.80	0.88	0.79	0.86	0.85	0.06
Moisture Content (%)	10.9	11.0	11.0	11.5	11.1	11.1	0.2
Bentonite - Fluid Loss (ASTM D5891)							
Slurry temperature at test initiation:	24.3	° C		Slurry temperature at test completion:	21.1	° C	
Fluid Loss (mL)	14.2					14.2	
Note: Bentonite sample tested is taken from finished GCL product.							
Bentonite - Swell Index (ASTM D5890)							
Swell index (mL/2g)	33					33	
Note: Bentonite sample tested is taken from finished GCL product.							
Index Flux (ASTM D5887)							
Index Flux (m³/m²/sec)	1.5E-09					1.5E-09	
Hydraulic Conductivity (cm/sec)	6.2E-10					6.2E-10	

APPENDIX B: MATERIAL MANUFACTURER CERTIFICATION AND COMFORMANCE TESTING RESULTS

B.3 FML Certifications



Product: 60-HD-11-BLK-BLK-GRI-STD-24.00
Project : Northern Delaware Basin Landfill, NM
Customer: Mustang Extreme Env Services
Cust PO: 311001

QC'd By: *Mallesh Patel*
Date: June 22, 2023

We hereby certify the following test results for the above referenced product/project :

Count	Roll Number	Area (sq ft)	Gross Weight (lb)	Thick	Thick	Asperity Height (mil)	Tensile at Yield (ppi)	Elong at Yield (%)	Tensile at Break (ppi)	Elong at Break (%)	Tear Resistance (lb)		Punct Resist (lb)	Density (g/cc)	Carbon Black (%)	CB Disp (Views in Cat 1 or 2)	Resin OIT (Minute)	Resin Lot #					
				ness MAV (mil)	ness MIN (mil)																		
				ASTM D 5994	ASTM D 5994																		
				Side A	Side B	MD	TD	MD	TD	MD	TD	MD	TD										
01	3111019364	12,000.00	3912	58	57	21	25	148	158	19	17	190	189	556	600	52	53	144	0.948	2.5	10	237	23C1232
02	3111019365	12,000.00	3942	58	57	21	22	146	154	16	15	196	174	562	516	49	54	142	0.949	2.6	10	237	23C1232
03	3111019366	12,000.00	3904	59	55	19	21	146	154	16	15	196	174	562	516	49	54	142	0.949	2.6	10	237	23C1232
04	3111019367	12,000.00	3898	60	56	19	20	146	154	16	15	196	174	562	516	49	54	142	0.949	2.6	10	237	23C1232
05	3111019370	12,000.00	3830	60	56	20	22	150	152	17	16	186	169	524	519	49	54	142	0.949	2.5	10	237	23C1232
06	3111019371	12,000.00	3906	59	57	21	23	150	152	17	16	186	169	524	519	49	54	142	0.949	2.5	10	237	23C1232
07	3111019372	12,000.00	3910	58	55	20	22	150	152	17	16	186	169	524	519	49	54	142	0.949	2.5	10	237	23C1232
08	3111019373	12,000.00	3888	59	56	22	23	150	152	17	16	186	169	524	519	49	54	142	0.949	2.5	10	237	23C1232
09	3111019374	12,000.00	3890	58	56	22	24	150	152	17	16	186	169	524	519	49	54	142	0.949	2.5	10	237	23C1232
10	3111019375	12,000.00	3870	59	56	22	22	153	153	18	16	192	166	525	500	51	53	142	0.948	2.4	10	237	23C1232



Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS

201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT

TX 77978

PHONE: (888) FPCUSA3

Certificate of Analysis (CONFIDENTIAL)

CUSTOMER: SKAPS INC.
571 INDUSTRIAL PARKWAY
COMMERCE GA 30529
PRODUCT : HL3812
RAILCAR TILX622221
CLEANING/INSPECTION NO: 622221032023

S/O NO : E34A697
CUSTOMER PO : 30131230071
DATE SHIPPED: 5/16/23
LOT NO : 23C1232
WEIGHT (LB) : 196,100.00
CUSTID: FT04342 SPIDM1
DATE OF PROD: 3/20/23

Test	Method	Spec Min	Spec Max	Actual
elt Index, g/10min	ASTM D1238	0	.1	.081
LMI, g/10 min.	ASTM D1238	9	15	12.0
ensity, g/cm3	ASTM D1505	.935	.939	.9371

Linda Kao

QC SUPERVISOR



Product: 60-HD-00-BLK-BLK-AVG-STD-24.00
Project : Northern Delaware Basin Landfill, NM
Customer: Mustang Extreme Env Services
Cust PO: 311001

QC'd By: *Waleesh Patel*
Date: June 22, 2023

We hereby certify the following test results for the above referenced product/project :

Count	Roll Number	Area (sq ft)	Gross Weight (lb)	Thick ness	Thick ness	Tensile at Yield (ppi)	Elong at Yield (%)	Tensile at Break (ppi)	Elong at Break (%)	Tear Resistance (lb)	Punct Resist (lb)	Density (g/cc)	Carbon Black (%)	CB Disp (Views in Cat 1 or 2)	Resin OT (Minute)	Resin Lot #					
				MAV (mil)	MIN (mil)																
				ASTM D 5199	ASTM D 5199																
				MD	TD	MD	TD	MD	TD	MD	TD	ASTM D 4833	ASTM D 1505	ASTM D 4218	ASTM D 5596	ASTM D 3895					
01	3112020082	12,960.00	4062	62	61	148	157	18	17	277	296	790	884	50	52	150	0.947	2.4	10	237	23C1232
02	3112020083	12,960.00	4076	63	62	153	158	19	17	287	295	838	855	48	51	145	0.946	2.6	10	237	23C1232
03	3112020084	12,960.00	4090	62	60	153	158	19	17	287	295	838	855	48	51	145	0.946	2.6	10	237	23C1232
04	3112020085	12,960.00	4048	63	62	153	158	19	17	287	295	838	855	48	51	145	0.946	2.6	10	237	23C1232
05	3112020086	12,960.00	4024	62	61	153	158	19	17	287	295	838	855	48	51	145	0.946	2.6	10	237	23C1232
06	3112020087	12,960.00	4032	62	61	144	157	20	17	265	303	787	933	48	51	145	0.946	2.6	10	237	23C1232
07	3112020088	12,960.00	4010	62	61	144	157	20	17	265	303	787	933	48	51	145	0.946	2.6	10	237	23C1232
08	3112020089	12,960.00	4006	61	59	144	157	20	17	265	303	787	933	48	51	145	0.946	2.6	10	237	23C1232
09	3112020090	12,960.00	3994	61	61	144	157	20	17	265	303	787	933	48	51	145	0.946	2.6	10	237	23C1232
10	3112020091	12,960.00	3994	61	59	144	157	20	17	265	303	787	933	48	51	145	0.946	2.6	10	237	23C1232
11	3112020092	12,960.00	3976	61	60	148	161	20	18	289	292	845	908	49	52	145	0.948	2.5	10	237	23C1232
12	3112020093	12,960.00	3994	62	61	148	161	20	18	289	292	845	908	49	52	145	0.948	2.5	10	237	23C1232



Product: 60-HD-00-BLK-BLK-AVG-STD-24.00
 Project : Northern Delaware Basin Landfill, NM
 Customer: Mustang Extreme Env Services
 Cust PO: 311001

QC'd By: *Waleesh Patel*
 Date: June 22, 2023

We hereby certify the following test results for the above referenced product/project :

Count	Roll Number	Area (sq ft)	Gross Weight (lb)	Thick ness	Thick ness	Tensile at Yield (psi)	Elong at Yield (%)	Tensile at Break (psi)	Elong at Break (%)	Tear Resistance (lb)	Punct Resist (lb)	Density (g/cc)	Carbon Black (%)	CB Disp (Views in Cat 1 or 2)	Resin OIT (Minute)	Resin Lot #					
				MAV (mil)	MIN (mil)																
				ASTM D 5199	ASTM D 5199	ASTM D 6693 MD	ASTM D 6693 TD	ASTM D 6693 MD	ASTM D 6693 TD	ASTM D 1004 MD	ASTM D 1004 TD	ASTM D 4833	ASTM D 1505	ASTM D 4218	ASTM D 5596		ASTM D 3895				
13	3112020094	12,960.00	3992	61	61	148	161	20	18	289	292	845	908	49	52	145	0.948	2.5	10	237	23C1232
14	3112020095	12,960.00	3974	61	61	148	161	20	18	289	292	845	908	49	52	145	0.948	2.5	10	237	23C1232
15	3112020096	12,960.00	3972	62	61	151	155	18	18	285	276	799	878	49	52	145	0.948	2.6	10	237	23C1232
16	3112020097	12,960.00	3930	60	59	151	155	18	18	285	276	799	878	49	52	145	0.948	2.6	10	237	23C1232
17	3112020098	12,960.00	3942	61	60	151	155	18	18	285	276	799	878	49	52	145	0.948	2.6	10	237	23C1232
18	3112020100	12,960.00	3,940	61	59	151	155	18	18	285	276	799	878	49	52	145	0.948	2.6	10	237	23C1232
19	3112020101	12,960.00	3,964	61	59	147	159	19	17	287	294	844	926	49	51	148	0.949	2.6	10	237	23C1232
20	3112020102	12,960.00	3,928	61	59	147	159	19	17	287	294	844	926	49	51	148	0.949	2.6	10	237	23C1232
21	3112020103	12,960.00	3,944	61	61	147	159	19	17	287	294	844	926	49	51	148	0.949	2.6	10	237	23C1232
22	3112020104	12,960.00	3,956	61	59	147	159	19	17	287	294	844	926	49	51	148	0.949	2.6	10	237	23C1232
23	3112020105	12,960.00	3,952	61	60	146	154	19	18	276	302	810	934	49	51	148	0.949	2.6	10	237	23C1232
24	3112020106	12,960.00	3,978	61	58	146	154	19	18	276	302	810	934	49	51	148	0.949	2.6	10	237	23C1232

DCN: SKAPS LOG 014

SKAPS Industries

Phone: 706-336-7000



Product: 60-HD-00-BLK-BLK-AVG-STD-24.00
Project : Northern Delaware Basin Landfill, NM
Customer: Mustang Extreme Env Services
Cust PO: 311001

QC'd By: *Waleesh Patel*
Date: June 22, 2023

We hereby certify the following test results for the above referenced product/project :

Count	Roll Number	Area (sq ft)	Gross Weight (lb)	Thick ness	Thick ness	Tensile at Yield (ppi)	Elong at Yield (%)	Tensile at Break (ppi)	Elong at Break (%)	Tear Resistance (lb)	Punct Resist (lb)	Density (g/cc)	Carbon Black (%)	CB Disp (Views in Cat 1 or 2)	Resin	Resin Lot #					
				MAV (mil)	MIN (mil)										OT (Minute)						
				ASTM D 5199	ASTM D 5199										ASTM D 6693 MD		ASTM D 6693 TD	ASTM D 6693 MD	ASTM D 6693 TD	ASTM D 1004 MD	ASTM D 1004 TD
25	3112020107	12,960.00	3,934	61	58	146	154	19	18	276	302	810	934	49	51	148	0.949	2.6	10	237	23C1232
26	3112020108	12,960.00	3,964	61	60	146	154	19	18	276	302	810	934	49	51	148	0.949	2.6	10	237	23C1232
27	3112020109	12,960.00	3,920	60	59	146	154	19	18	276	302	810	934	49	51	148	0.949	2.6	10	237	23C1232
28	3112020110	12,960.00	3,894	61	59	153	154	18	17	278	255	794	776	48	51	145	0.948	2.5	10	237	23C1232
29	3112020111	12,960.00	3,920	61	59	153	154	18	17	278	255	794	776	48	51	145	0.948	2.5	10	237	23C1232
30	3112020112	12,960.00	3,912	60	58	153	154	18	17	278	255	794	776	48	51	145	0.948	2.5	10	237	23C1232
31	3112020113	12,960.00	3,918	61	60	153	154	18	17	278	255	794	776	48	51	145	0.948	2.5	10	235	23C1230
32	3112020114	12,960.00	3,930	61	59	148	156	18	18	278	274	807	843	48	51	145	0.948	2.5	10	235	23C1230
33	3112020115	12,960.00	3,922	60	59	148	156	18	18	278	274	807	843	48	51	145	0.948	2.5	10	235	23C1230
34	3112020116	12,960.00	3,930	62	60	148	156	18	18	278	274	807	843	48	51	145	0.948	2.5	10	235	23C1230
35	3112020117	12,960.00	3,936	60	59	148	156	18	18	278	274	807	843	48	51	145	0.948	2.5	10	235	23C1230
36	3112020118	12,960.00	3,946	61	60	148	156	18	18	278	274	807	843	48	51	145	0.948	2.5	10	235	23C1230



Product: 60-HD-00-BLK-BLK-AVG-STD-24.00
Project : Northern Delaware Basin Landfill, NM
Customer: Mustang Extreme Env Services
Cust PO: 311001

QC'd By: *Mallesh Patel*
Date: June 22, 2023

We hereby certify the following test results for the above referenced product/project :

Count	Roll Number	Area (sq ft)	Gross Weight (lb)	Thick	Thick	Tensile at Yield (ppi)	Elong at Yield (%)	Tensile at Break (ppi)	Elong at Break (%)	Tear Resistance (lb)	Punct Resist (lb)	Density (g/cc)	Carbon Black (%)	CB Disp (Views in Cat 1 or 2)	Resin OIT (Minute)	Resin Lot #					
				ness MAV (mil)	ness MIN (mil)																
				ASTM D 5199	ASTM D 5199	ASTM D 6693 MD	ASTM D 6693 TD	ASTM D 6693 MD	ASTM D 6693 TD	ASTM D 6693 MD	ASTM D 6693 TD	ASTM D 1004 MD	ASTM D 1004 TD	ASTM D 4833	ASTM D 1505		ASTM D 4218	ASTM D 5596	ASTM D 3895		
				MD	TD	MD	TD	MD	TD	MD	TD	MD	TD								
37	3112020119	12,960.00	3,926	60	59	154	156	19	18	274	299	800	922	48	50	146	0.948	2.6	10	235	23C1230
38	3112020120	12,960.00	3,936	61	60	154	156	19	18	274	299	800	922	48	50	146	0.948	2.6	10	235	23C1230
39	3112020121	12,960.00	3,938	60	59	154	156	19	18	274	299	800	922	48	50	146	0.948	2.6	10	235	23C1230
40	3112020122	12,960.00	3,934	61	60	154	156	19	18	274	299	800	922	48	50	146	0.948	2.6	10	235	23C1230
41	3112020123	12,960.00	4,064	60	59	146	156	19	18	288	294	848	915	48	50	146	0.948	2.7	10	235	23C1230
42	3112020124	12,960.00	3,904	61	59	146	156	19	18	288	294	848	915	48	50	146	0.948	2.7	10	235	23C1230
43	3112020125	12,960.00	3,888	61	59	146	156	19	18	288	294	848	915	48	50	146	0.948	2.7	10	235	23C1230
44	3112020126	12,960.00	3,896	61	59	146	156	19	18	288	294	848	915	48	50	146	0.948	2.7	10	235	23C1230
45	3112020127	12,960.00	3,904	61	60	146	156	19	18	288	294	848	915	48	50	146	0.948	2.7	10	235	23C1230
46	3112020128	12,960.00	3,892	60	59	143	149	20	18	273	286	817	897	49	51	149	0.949	2.5	10	235	23C1230
47	3112020129	12,960.00	3,900	60	58	143	149	20	18	273	286	817	897	49	51	149	0.949	2.5	10	235	23C1230
48	3112020130	12,960.00	3,906	60	59	143	149	20	18	273	286	817	897	49	51	149	0.949	2.5	10	235	23C1230



Product: 60-HD-00-BLK-BLK-AVG-STD-24.00
Project : Northern Delaware Basin Landfill, NM
Customer: Mustang Extreme Env Services
Cust PO: 311001

QC'd By: *Mallesh Patel*
Date: June 22, 2023

We hereby certify the following test results for the above referenced product/project :

Count	Roll Number	Area (sq ft)	Gross Weight (lb)	Thick	Thick	Tensile at Yield (ppi)	Elong at Yield (%)	Tensile at Break (ppi)	Elong at Break (%)	Tear Resistance (lb)	Punct Resist (lb)	Density (g/cc)	Carbon Black (%)	CB Disp (Views in Cat 1 or 2)	Resin OIT (Minute)	Resin Lot #					
				ness MAV (mil)	ness MIN (mil)																
				ASTM D 5199	ASTM D 5199	ASTM D 6693	ASTM D 6693	ASTM D 6693	ASTM D 6693	ASTM D 1004	ASTM D 4833	ASTM D 1505	ASTM D 4218	ASTM D 5596	ASTM D 3895						
				MD	TD	MD	TD	MD	TD	MD	TD										
49	3112020133	12,960.00	3,900	60	59	142	155	18	18	270	294	798	902	49	51	149	0.949	2.5	10	235	23C1230
50	3112020134	12,960.00	3,906	60	59	142	155	18	18	270	294	798	902	49	51	149	0.949	2.5	10	235	23C1230
51	3112020135	12,960.00	3,948	61	60	142	155	18	18	270	294	798	902	49	51	149	0.949	2.5	10	235	23C1230
52	3112020136	12,960.00	3,921	61	60	142	155	18	18	270	294	798	902	49	51	149	0.949	2.5	10	235	23C1230
53	3112020137	12,960.00	3,972	62	61	142	155	18	18	270	294	798	902	49	51	149	0.949	2.5	10	235	23C1230



Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS

201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT

TX 77978

PHONE: (888) FPCUSA3

Certificate of Analysis
(CONFIDENTIAL)

CUSTOMER: SKAPS INC.
571 INDUSTRIAL PARKWAY
COMMERCE GA 30529
PRODUCT : HL3812
RAILCAR TILX622221
CLEANING/INSPECTION NO: 622221032023

S/O NO : E34A697
CUSTOMER PO : 30131230071
DATE SHIPPED: 5/16/23
LOT NO : 23C1232
WEIGHT (LB) : 196,100.00
CUSTID: FT04342 SPIDM1
DATE OF PROD: 3/20/23

Test	Method	Spec Min	Spec Max	Actual
elt Index, g/10min	ASTM D1238	0	.1	.081
LMI, g/10 min.	ASTM D1238	9	15	12.0
ensity, g/cm3	ASTM D1505	.935	.939	.9371

Linda Kao

QC SUPERVISOR



Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS

01 FORMOSA DRIVE
PO BOX 700
POINT COMFORT

TX 77978

PHONE: (888) FPCUSA3

Certificate of Analysis (CONFIDENTIAL)

CUSTOMER: SKAPS INC.
571 INDUSTRIAL PARKWAY
COMMERCE GA 30529
PRODUCT : HL3812
RAILCAR ACFX041112
CLEANING/INSPECTION NO: 041112032023

S/O NO : E34A696
CUSTOMER PO : 30131230071
DATE SHIPPED: 5/16/23
LOT NO : 23C1230
WEIGHT (LB) : 178,700.00
CUSTID: FT04342 SPIDM1
DATE OF PROD: 3/20/23

Test	Method	Spec Min	Spec Max	Actual
elt Index, g/10min	ASTM D1238	0	.1	.073
LMI, g/10 min.	ASTM D1238	9	15	11.7
ensity, g/cm3	ASTM D1505	.935	.939	.9373

Linda Kao

QC SUPERVISOR



Product: 60-HD-11-BLK-BLK-GRI-STD-24.00
 Project : Northern Delaware Basin Landfill, NM
 Customer: Mustang Extreme Env Services
 Cust PO: 311001

QC'd By: *W. Allesh Patel*
 Date: June 22, 2023

We hereby certify the following test results for the above referenced product/project :

Count	Roll Number	Area (sq ft)	Gross Weight (lb)	Thick ness MAV (mil)	Thick ness MIN (mil)	Asperity Height (mil)	Tensile at Yield (ppi)	Elong at Yield (%)	Tensile at Break (ppi)	Elong at Break (%)	Tear Resistance (lb)	Punct Resist (lb)	Density (g/cc)	Carbon Black (%)	CB Disp (Views in Cat 1 or 2)	Resin OT (Minute)	Resin Lot #						
				ASTM D 5994	ASTM D 5994																		
				Side A	Side B	ASTM D 7466	ASTM D 6693	ASTM D 6693	ASTM D 6693	ASTM D 1004	ASTM D 4833	ASTM D 1505	ASTM D 4218	ASTM D 5596	ASTM D 3895								
01	3111019364	12,000.00	3912	58	57	21	25	148	158	19	17	190	189	556	600	52	53	144	0.948	2.5	10	237	23C1232
02	3111019365	12,000.00	3942	58	57	21	22	146	154	16	15	196	174	562	516	49	54	142	0.949	2.6	10	237	23C1232
03	3111019366	12,000.00	3904	59	55	19	21	146	154	16	15	196	174	562	516	49	54	142	0.949	2.6	10	237	23C1232
04	3111019367	12,000.00	3898	60	56	19	20	146	154	16	15	196	174	562	516	49	54	142	0.949	2.6	10	237	23C1232
05	3111019370	12,000.00	3830	60	56	20	22	150	152	17	16	186	169	524	519	49	54	142	0.949	2.5	10	237	23C1232
06	3111019371	12,000.00	3906	59	57	21	23	150	152	17	16	186	169	524	519	49	54	142	0.949	2.5	10	237	23C1232
07	3111019372	12,000.00	3910	58	55	20	22	150	152	17	16	186	169	524	519	49	54	142	0.949	2.5	10	237	23C1232
08	3111019373	12,000.00	3888	59	56	22	23	150	152	17	16	186	169	524	519	49	54	142	0.949	2.5	10	237	23C1232
09	3111019374	12,000.00	3890	58	56	22	24	150	152	17	16	186	169	524	519	49	54	142	0.949	2.5	10	237	23C1232
10	3111019375	12,000.00	3870	59	56	22	22	153	153	18	16	192	166	525	500	51	53	142	0.948	2.4	10	237	23C1232



Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS

201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT

TX 77978

PHONE: (888) FPCUSA3

Certificate of Analysis (CONFIDENTIAL)

CUSTOMER: SKAPS INC.
571 INDUSTRIAL PARKWAY
COMMERCE GA 30529
PRODUCT : HL3812
RAILCAR TILX622221
CLEANING/INSPECTION NO: 622221032023

S/O NO : E34A697
CUSTOMER PO : 30131230071
DATE SHIPPED: 5/16/23
LOT NO : 23C1232
WEIGHT (LB) : 196,100.00
CUSTID: FT04342 SPIDM1
DATE OF PROD: 3/20/23

Test	Method	Spec Min	Spec Max	Actual
elt Index, g/10min	ASTM D1238	0	.1	.081
LMI, g/10 min.	ASTM D1238	9	15	12.0
ensity, g/cm3	ASTM D1505	.935	.939	.9371

Linda Kas

QC SUPERVISOR

APPENDIX B: MATERIAL MANUFACTURER CERTIFICATION AND COMFORMANCE TESTING RESULTS

B.4 FML Conformance Testing Results



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

Austin, TX - USA | CA - USA | SC - USA | Gold Coast - Australia | Suzhou - China | Sao Paulo, Brazil | Johannesburg - Africa

July 10, 2023

Mail To:**James Campbell**
Mustang Extreme Environmental Services**Bill To:**

<= Same

email: jcampbell@mustangextreme.com

Dear Mr. Campbell

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:	Northern Delaware Basin LF
TRI Job Reference Number:	23-002390
Material(s) Tested:	Eight, Skaps 60 mil Smooth HDPE Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D5199) Density (ASTM D1505) Carbon Black Content (ASTM D1603, mod.) Carbon Dispersion (ASTM D5596) Tensile Properties (ASTM D6693) Tear Resistance (ASTM D1004)

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Mansukh Patel'.

Mansukh Patel
Laboratory Manager
Geosynthetic Services Division



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

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GEOMEMBRANE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services

Project: Northern Delaware Basin LF

Material: Skaps 60 mil Smooth HDPE Geomembrane

Sample Identification: 3112020082

TRI Log #: 23-002390

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D5199)												
Thickness (mils)	63	64	63	62	64	64	64	64	63	63	63 62	0.8 << min
Density (ASTM D1505)												
Density (g/cm3)	0.949	0.949	0.949								0.949	0.000
Carbon Black Content (ASTM D1603, mod.)												
% Carbon Black	2.57	2.58									2.58	0.01
Carbon Black Dispersion (ASTM D5596)												
Rating - 1st field view	1	1	1	1	1							
Rating - 2nd field view	1	1	1	1	1							
Tensile Properties (ASTM D6693, 2 ipm strain rate)												
MD Yield Strength (ppi)	160	162	158	159	157						159	2
TD Yield Strength (ppi)	179	175	174	174	176						176	2
MD Break Strength (ppi)	275	296	254	301	314						288	24
TD Break Strength (ppi)	316	169	316	212	285						260	66
MD Yield Elongation (%)	22	22	23	22	22						22	0
TD Yield Elongation (%)	22	21	20	23	21						21	1
MD Break Elongation (%)	755	800	717	829	854						791	55
TD Break Elongation (%)	896	485	908	647	828						753	182
Tear Resistance (ASTM D1004)												
MD Tear Strength (lbs)	51	51	51	52	52	50	51	50	50	50	51	1
TD Tear Strength (lbs)	53	54	53	53	54	52	53	53	54	55	53	1
MD Machine Direction	TD Transverse Direction											



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

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GEOMEMBRANE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services
Project: Northern Delaware Basin LF

Material: Skaps 60 mil Smooth HDPE Geomembrane

Sample Identification: 3112020089

TRI Log #: 23-002390

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D5199)												
Thickness (mils)	63	61	62	62	58	62	61	61	62	62	61 58	1.3 << min
Density (ASTM D1505)												
Density (g/cm3)	0.949	0.949	0.949								0.949	0.000
Carbon Black Content (ASTM D1603, mod.)												
% Carbon Black	2.61	2.57									2.59	0.03
Carbon Black Dispersion (ASTM D5596)												
Rating - 1st field view	1	1	1	1	1							
Rating - 2nd field view	1	1	1	1	1							
Tensile Properties (ASTM D6693, 2 ipm strain rate)												
MD Yield Strength (ppi)	162	166	159	166	163						163	3
TD Yield Strength (ppi)	166	169	171	171	169						169	2
MD Break Strength (ppi)	292	307	315	328	279						304	19
TD Break Strength (ppi)	295	319	307	324	303						310	12
MD Yield Elongation (%)	22	23	23	23	22						23	1
TD Yield Elongation (%)	21	21	20	21	20						21	1
MD Break Elongation (%)	787	807	863	866	757						816	48
TD Break Elongation (%)	842	903	859	903	852						872	29
Tear Resistance (ASTM D1004)												
MD Tear Strength (lbs)	50	50	49	48	48	50	51	50	50	50	50	1
TD Tear Strength (lbs)	52	53	53	51	52	53	54	54	53	54	53	1
MD Machine Direction	TD Transverse Direction											



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

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GEOMEMBRANE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services

Project: Northern Delaware Basin LF

Material: Skaps 60 mil Smooth HDPE Geomembrane

Sample Identification: 3112020097

TRI Log #: 23-002390

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D5199)												
Thickness (mils)	61	63	62	61	64	61	60	60	61	61	61 60	1.1 << min
Density (ASTM D1505)												
Density (g/cm3)	0.950	0.950	0.950								0.950	0.000
Carbon Black Content (ASTM D1603, mod.)												
% Carbon Black	2.60	2.64									2.62	0.03
Carbon Black Dispersion (ASTM D5596)												
Rating - 1st field view	1	1	1	1	1							
Rating - 2nd field view	1	1	1	1	1							
Tensile Properties (ASTM D6693, 2 ipm strain rate)												
MD Yield Strength (ppi)	161	161	153	156	156						157 161	4 2
TD Yield Strength (ppi)	162	163	157	161	161							
MD Break Strength (ppi)	298	300	278	292	207						275 292	39 15
TD Break Strength (ppi)	279	302	272	307	298							
MD Yield Elongation (%)	22	23	21	22	22						22 22	1 2
TD Yield Elongation (%)	21	25	20	22	23							
MD Break Elongation (%)	820	821	791	818	592						768 864	99 43
TD Break Elongation (%)	819	897	817	908	877							
Tear Resistance (ASTM D1004)												
MD Tear Strength (lbs)	50	50	50	49	52	50	50	49	49	49	50 52	1 1
TD Tear Strength (lbs)	52	53	52	51	51	53	53	52	52	52		
MD Machine Direction	TD Transverse Direction											



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

Austin, TX - USA | CA - USA | SC - USA | Gold Coast - Australia | Suzhou - China | Sao Paulo, Brazil | Johannesburg - Africa

GEOMEMBRANE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services

Project: Northern Delaware Basin LF

Material: Skaps 60 mil Smooth HDPE Geomembrane

Sample Identification: 3112020105

TRI Log #: 23-002390

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D5199)												
Thickness (mils)	61	64	60	62	61	62	63	61	61	61	61 60	1.2 << min
Density (ASTM D1505)												
Density (g/cm3)	0.947	0.947	0.947								0.947	0.000
Carbon Black Content (ASTM D1603, mod.)												
% Carbon Black	2.45	2.43									2.44	0.01
Carbon Black Dispersion (ASTM D5596)												
Rating - 1st field view	1	1	1	1	1							
Rating - 2nd field view	1	1	1	1	1							
Tensile Properties (ASTM D6693, 2 ipm strain rate)												
MD Yield Strength (ppi)	158	165	160	159	157						160	3
TD Yield Strength (ppi)	167	170	170	171	162						168	4
MD Break Strength (ppi)	304	295	290	258	290						287	17
TD Break Strength (ppi)	303	262	295	312	318						298	22
MD Yield Elongation (%)	20	21	20	20	21						20	1
TD Yield Elongation (%)	22	23	21	20	21						21	1
MD Break Elongation (%)	861	807	809	735	815						805	45
TD Break Elongation (%)	880	764	852	881	908						857	56
Tear Resistance (ASTM D1004)												
MD Tear Strength (lbs)	49	51	51	50	51	50	50	50	50	50	50	0
TD Tear Strength (lbs)	52	53	53	54	53	52	51	52	52	54	53	1
MD Machine Direction	TD Transverse Direction											



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GEOMEMBRANE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services

Project: Northern Delaware Basin LF

Material: Skaps 60 mil Smooth HDPE Geomembrane

Sample Identification: 3112020113

TRI Log #: 23-002390

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D5199)												
Thickness (mils)	62	62	61	61	61	61	60	60	61	62	61 60	0.8 << min
Density (ASTM D1505)												
Density (g/cm3)	0.948	0.948	0.948								0.948	0.000
Carbon Black Content (ASTM D1603, mod.)												
% Carbon Black	2.54	2.54									2.54	0.00
Carbon Black Dispersion (ASTM D5596)												
Rating - 1st field view	1	1	1	1	1							
Rating - 2nd field view	1	1	1	1	1							
Tensile Properties (ASTM D6693, 2 ipm strain rate)												
MD Yield Strength (ppi)	162	168	165	165	160						164	3
TD Yield Strength (ppi)	166	170	165	162	164						165	3
MD Break Strength (ppi)	297	273	294	314	293						294	15
TD Break Strength (ppi)	274	262	278	295	300						282	16
MD Yield Elongation (%)	24	21	21	21	23						22	1
TD Yield Elongation (%)	19	22	19	20	20						20	1
MD Break Elongation (%)	817	741	809	845	809						804	38
TD Break Elongation (%)	780	746	790	822	838						795	36
Tear Resistance (ASTM D1004)												
MD Tear Strength (lbs)	51	51	48	50	48	49	49	50	50	50	50	1
TD Tear Strength (lbs)	53	53	52	49	54	51	53	53	52	52	52	1
MD Machine Direction	TD Transverse Direction											



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GEOMEMBRANE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services

Project: Northern Delaware Basin LF

Material: Skaps 60 mil Smooth HDPE Geomembrane

Sample Identification: 3112020120

TRI Log #: 23-002390

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D5199)												
Thickness (mils)	60	60	60	61	60	61	61	61	61	61	61 60	0.5 << min
Density (ASTM D1505)												
Density (g/cm3)	0.948	0.948	0.948								0.948	0.000
Carbon Black Content (ASTM D1603, mod.)												
% Carbon Black	2.53	2.54									2.54	0.01
Carbon Black Dispersion (ASTM D5596)												
Rating - 1st field view	1	1	1	1	1							
Rating - 2nd field view	1	1	1	1	1							
Tensile Properties (ASTM D6693, 2 ipm strain rate)												
MD Yield Strength (ppi)	155	161	157	153	153						156	3
TD Yield Strength (ppi)	162	166	168	172	170						168	4
MD Break Strength (ppi)	282	290	302	266	272						282	14
TD Break Strength (ppi)	313	288	314	329	314						312	15
MD Yield Elongation (%)	23	21	21	21	23						22	1
TD Yield Elongation (%)	21	22	21	21	19						21	1
MD Break Elongation (%)	798	794	834	761	762						790	30
TD Break Elongation (%)	882	818	875	904	883						872	32
Tear Resistance (ASTM D1004)												
MD Tear Strength (lbs)	50	49	49	50	50	49	49	51	51	50	50	1
TD Tear Strength (lbs)	52	52	52	53	52	52	54	53	53	53	53	1
MD Machine Direction	TD Transverse Direction											



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GEOMEMBRANE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services
Project: Northern Delaware Basin LF

Material: Skaps 60 mil Smooth HDPE Geomembrane

Sample Identification: 3112020128

TRI Log #: 23-002390

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D5199)												
Thickness (mils)	62	61	61	60	60	61	59	60	60	63	61 59	1.1 << min
Density (ASTM D1505)												
Density (g/cm3)	0.948	0.948	0.948								0.948	0.000
Carbon Black Content (ASTM D1603, mod.)												
% Carbon Black	2.47	2.45									2.46	0.01
Carbon Black Dispersion (ASTM D5596)												
Rating - 1st field view	1	1	1	1	1							
Rating - 2nd field view	1	1	1	1	1							
Tensile Properties (ASTM D6693, 2 ipm strain rate)												
MD Yield Strength (ppi)	155	156	156	156	154						155	1
TD Yield Strength (ppi)	165	170	168	171	167						168	2
MD Break Strength (ppi)	314	287	285	292	298						295	12
TD Break Strength (ppi)	270	325	310	271	311						297	25
MD Yield Elongation (%)	22	22	22	22	23						22	0
TD Yield Elongation (%)	21	21	20	20	22						21	1
MD Break Elongation (%)	872	793	783	799	813						812	35
TD Break Elongation (%)	784	908	871	767	876						841	62
Tear Resistance (ASTM D1004)												
MD Tear Strength (lbs)	50	50	50	50	50	48	48	50	49	50	50	1
TD Tear Strength (lbs)	52	53	51	52	52	51	52	53	53	52	52	1
MD Machine Direction	TD Transverse Direction											



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GEOMEMBRANE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services
Project: Northern Delaware Basin LF

Material: Skaps 60 mil Smooth HDPE Geomembrane

Sample Identification: 3112020137

TRI Log #: 23-002390

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D5199)												
Thickness (mils)	61	61	61	61	62	61	62	62	62	62	61 61	0.6 << min
Density (ASTM D1505)												
Density (g/cm3)	0.948	0.948	0.949								0.948	0.001
Carbon Black Content (ASTM D1603, mod.)												
% Carbon Black	2.48	2.46									2.47	0.01
Carbon Black Dispersion (ASTM D5596)												
Rating - 1st field view	1	1	1	1	1							
Rating - 2nd field view	1	1	1	1	1							
Tensile Properties (ASTM D6693, 2 ipm strain rate)												
MD Yield Strength (ppi)	165	166	165	165	167						166	1
TD Yield Strength (ppi)	164	173	167	164	162						166	4
MD Break Strength (ppi)	289	279	277	276	308						286	13
TD Break Strength (ppi)	294	283	276	310	317						296	17
MD Yield Elongation (%)	22	21	21	22	21						21	1
TD Yield Elongation (%)	21	22	19	19	23						21	2
MD Break Elongation (%)	794	766	766	771	848						789	35
TD Break Elongation (%)	865	805	807	894	920						858	51
Tear Resistance (ASTM D1004)												
MD Tear Strength (lbs)	50	48	48	51	51	50	50	50	49	51	50	1
TD Tear Strength (lbs)	51	52	54	52	50	53	54	54	53	53	53	1
MD Machine Direction	TD Transverse Direction											



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July 13, 2023

Mail To:**James Campbell**
Mustang Extreme Environmental Services**Bill To:**

<= Same

email: jcampbell@mustangextreme.com

Dear Mr. Campbell:

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:	New Mexico Regional
TRI Job Reference Number:	23-002522
Material(s) Tested:	One, Solmax 60 mil Textured HDPE Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D5994) Density (ASTM D1505) Carbon Black Content (ASTM D4218) Carbon Dispersion (ASTM D5596) Tensile Properties (ASTM D6693) Puncture Strength (ASTM D4833) Tear Resistance (ASTM D1004)

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Mansukh Patel'.

Mansukh Patel
Laboratory Manager
Geosynthetic Services Division



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GEOMEMBRANE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services
Project: New Mexico Regional

Material: Solmax 60 mil Textured HDPE Geomembrane

Sample Identification: 0102-210505

TRI Log #: 23-002522

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D5994)												
Thickness (mils)	63	64	65	64	63	62	63	62	69	69	64 62	3 << min
Density (ASTM D1505)												
Density (g/cm3)	0.949	0.949	0.949								0.949	0.000
Carbon Black Content (ASTM D4218)												
% Carbon Black	2.80	2.51									2.66	0.21
Carbon Black Dispersion (ASTM D5596)												
Rating - 1st field view	1	1	1	1	1							
Rating - 2nd field view	1	1	1	1	1							
Tensile Properties (ASTM D6693, 2 ipm strain rate)												
MD Yield Strength (ppi)	167	170	168	163	167						167	3
TD Yield Strength (ppi)	175	171	171	175	172						173	2
MD Break Strength (ppi)	225	215	183	233	228						217	20
TD Break Strength (ppi)	198	209	133	159	189						178	31
MD Yield Elongation (%)	20	20	20	18	19						19	1
TD Yield Elongation (%)	18	20	17	19	16						18	2
MD Break Elongation (%)	571	547	437	609	579						549	66
TD Break Elongation (%)	561	617	308	452	523						492	119
Puncture Resistance (ASTM D4833)												
Puncture Strength (lbs)	149	151	146	149	146						148	2
Tear Resistance (ASTM D1004)												
MD Tear Strength (lbs)	55	57	55	54	59	58	56	60	62	58	57	3
TD Tear Strength (lbs)	58	57	57	56	57	61	61	63	60	62	59	2
MD Machine Direction	TD Transverse Direction											

APPENDIX B: MATERIAL MANUFACTURER CERTIFICATION AND COMFORMANCE TESTING RESULTS

B.5 Geonet Certifications



July 17, 2024

Customer: Mustang Extreme Environmental Services
Customer P.O.#: 311001
Project: Northern Delaware Basin Landfill, NM
Product: TN 220

We hereby certify that the TN 220 drainage geonet, meets or exceeds the project requirements as stated in the specifications. The properties listed in this section are:

Property	Test Method	Unit	Value	Qualifier
Geonet				
Mass per Unit Area	ASTM D 5261	lbs/ft ²	0.160	MAV ³
Thickness	ASTM D 5199	mil	200	MAV ³
Carbon Black	ASTM D 4218	%	2.0	MAV
Tensile Strength	ASTM D 7179	lbs/in	55	MAV
Melt Flow	ASTM D 1238 ²	g/10 min	1.0	Maximum
Density	ASTM D 1505	g/cm ³	0.940	MAV
Transmissivity ¹	ASTM D 4716	m ² /sec	2.0 x 10 ⁻³	MAV

Notes:

1. Transmissivity measured using water at $21 \pm 2^{\circ} \text{C}$ ($70 \pm 4^{\circ} \text{F}$) with a gradient of 0.1 and a confining pressure of 10,000 psf between steel plates after 15 minutes.
2. Condition 190/2.16
3. Minimum average value

Quality Approval



 Product: TN 220 Project : Northern Delaware Basin Landfill, NM We hereby certify the following test results for the above referenced product/project :							
Geonet Roll Number	Geonet						
	Resin Lot Number	Density (gm/cc)	Mass Per Unit Area (lb/ft ²)	Thickness (mils)	Carbon Black (%)	Tensile Strength MD (lb/in)	Transmissivity (m ² /sec)
131601030001	BPTX 367413	0.9516	0.171	218	2.61	63	3 x 10 ⁻³
131601030002	BPTX 367413	0.9516					
131601030003	BPTX 367413	0.9516					
131601030004	BPTX 367413	0.9516					
131601030005	BPTX 367413	0.9516					
131601030006	BPTX 367413	0.9516					
131601030007	BPTX 367413	0.9516					
131601030008	BPTX 367413	0.9516					
131601030009	BPTX 367413	0.9516					
131601030010	BPTX 367413	0.9515	0.174	211	2.46	58	
131601030011	BPTX 367413	0.9515					
131601030012	BPTX 367413	0.9515					
131601030013	BPTX 367413	0.9515					
131601030014	BPTX 367413	0.9515					
131601030015	BPTX 367413	0.9515					
131601030016	BPTX 367413	0.9515					
131601030017	BPTX 367413	0.9515					
131601030018	BPTX 367413	0.9515					
131601030019	BPTX 367413	0.9515					
131601030020	BPTX 367413	0.9518	0.172	220	2.49	60	
131601030021	BPTX 367413	0.9518					
131601030022	BPTX 367413	0.9518					
131601030023	BPTX 367413	0.9518					
131601030024	BPTX 367413	0.9518					



Product: TN 220
Project : Northern Delaware Basin Landfill, NM

We hereby certify the following test results for the above referenced product/project :

Geonet Roll Number	Geonet						
	Resin Lot Number	Density (gm/cc)	Mass Per Unit Area (lb/ft ²)	Thickness (mils)	Carbon Black (%)	Tensile Strength MD (lb/in)	Transmissivity (m ² /sec)
131601030025	BPTX 367413	0.9518					
131601030026	BPTX 367413	0.9518					
131601030027	BPTX 367413	0.9518					
131601030028	BPTX 367413	0.9518					
131601030029	BPTX 367413	0.9518					
131601030030	BPTX 367413	0.9519	0.173	216	2.48	62	
131601030031	BPTX 367413	0.9519					
131601030032	BPTX 367413	0.9519					
131601030033	BPTX 367413	0.9519					
131601030034	BPTX 367413	0.9519					
131601030035	BPTX 367413	0.9519					
131601030036	BPTX 367413	0.9519					
131601030037	BPTX 367413	0.9519					
131601030038	BPTX 367413	0.9519					
131601030039	BPTX 367413	0.9519					
131601030040	BPTX 367413	0.9514	0.164	215	2.40	59	
131601030041	BPTX 367413	0.9514					
131601030042	BPTX 367413	0.9514					
131601030043	BPTX 367413	0.9514					
131601030044	BPTX 367413	0.9514					
131601030045	BPTX 367413	0.9514					
131601030046	BPTX 367413	0.9514					
131601030047	BPTX 367413	0.9514					
131601030048	BPTX 367413	0.9514					



Product: TN 220
Project : Northern Delaware Basin Landfill, NM

We hereby certify the following test results for the above referenced product/project :

Geonet Roll Number	Geonet						
	Resin Lot Number	Density (gm/cc)	Mass Per Unit Area (lb/ft ²)	Thickness (mils)	Carbon Black (%)	Tensile Strength MD (lb/in)	Transmissivity (m ² /sec)
131601030049	BPTX 367413	0.9514					
131601030050	BPTX 367413	0.9517	0.170	221	2.53	61	3.39 x 10 ⁻³
131601030051	BPTX 367413	0.9517					
131601030052	BPTX 367413	0.9517					
131601030053	BPTX 367413	0.9517					
131601030054	BPTX 367413	0.9517					
131601030055	BPTX 367413	0.9517					
131601030056	BPTX 367413	0.9517					
131601030057	BPTX 367413	0.9517					
131601030058	BPTX 367413	0.9517					
131601030059	BPTX 367413	0.9517					
131601030060	BPTX 367413	0.9514	0.166	213	2.62	61	
131601030061	BPTX 367413	0.9514					
131601030062	BPTX 367413	0.9514					
131601030063	BPTX 367413	0.9514					
131601030064	BPTX 367413	0.9514					
131601030065	BPTX 367413	0.9514					
131601030066	BPTX 367413	0.9514					
131601030067	BPTX 367413	0.9514					
131601030068	BPTX 367413	0.9514					
131601030069	BPTX 367413	0.9514					
131601030070	BPTX 367413	0.9519	0.168	210	2.38	62	
131601030071	BPTX 367413	0.9519					
131601030072	BPTX 367413	0.9519					



Product: TN 220
Project : Northern Delaware Basin Landfill, NM

We hereby certify the following test results for the above referenced product/project :

Geonet Roll Number	Geonet						
	Resin Lot Number	Density (gm/cc)	Mass Per Unit Area (lb/ft ²)	Thickness (mils)	Carbon Black (%)	Tensile Strength MD (lb/in)	Transmissivity (m ² /sec)
131601030073	BPTX 367413	0.9519					
131601030074	BPTX 367413	0.9519					
131601030075	BPTX 367413	0.9519					
131601030076	BPTX 367413	0.9519					
131601030077	BPTX 367413	0.9519					
131601030078	BPTX 367413	0.9519					
131601030079	BPTX 367413	0.9519					



POLYETHYLENE RESIN CERTIFICATION

Customer Name : Mustang Extreme Environmental Services
Project Name : Northern Delaware Basin Landfill, NM
Geocomposite Manufacturer : SKAPS Industries
Geocomposite Production Plant : Commerce, GA
Geocomposite Brand Name : TN 220

We hereby certify the following test results for the above referenced product/project:

Resin Manufacturer	Resin Lot Number	Property	Test Method	Units	Resin Manufacturer Value	Tested Value*
Global Plastics	BPTX 367413	Density	ASTM D1505	gm/cc	0.9480	0.9469
		Melt flow Index	ASTM D1238 ^(a)	gm/10 min	0.25	0.15

(a) Condition 190/2.16

* Data from SKAPS Quality Control

APPENDIX B: MATERIAL MANUFACTURER CERTIFICATION AND COMFORMANCE TESTING RESULTS

B.6 Geonet Conformance Testing Results



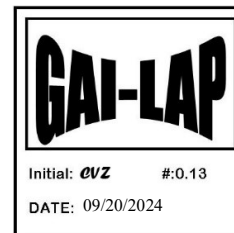
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September 20, 2024

Patricia Zabaleta
Mustang Extreme
 5049 Edwards Ranch Road, Suite 200
 Forth Worth, TX 76710

Re: FINAL LABORATORY TEST REPORT



Dear Patricia Zabaleta:

Thank you for consulting TRI California for your material testing needs.

Enclosed is the **final** laboratory report for the Conformance testing of four (4) SKAPS Geonet TN220.

PROJECT NAME: Northern Delaware Basin Landfill

DATE REPORTED: September 20, 2024

REFERENCE TRI JOB NO.: CA241094

DATE RECEIVED: September 16, 2024

SAMPLE SENT BY: SKAPS, GA

TEST PERFORMED AT: TRI-CA Facility (see the complete contact info and address below), except otherwise noted.

SAMPLE IDENTIFICATIONS:

SAMPLE ID	TRI CONTROL NUMBER
R#0131601030001	183931
R#0131601030020	183932
R#0131601030040	183933
R#0131601030060	183934

TESTS REQUIRED / PERFORMED:

TEST METHOD	DESCRIPTION
1. ASTM D5199	Thickness
2. ASTM D3776	Mass Per Unit Area
3. ASTM D1603	Carbon Black Content
4. ASTM D1238	Melt Flow
5. ASTM D7179	Tensile Strength

TEST RESULTS: The test results are summarized in the attached Tables 1 to 4.

Note: The general conditioning and testing of the material samples identified in this report were performed within the range of the laboratory environmental conditions; i.e., 20-24°C and 45-65% RH. Otherwise, the actual environmental conditions are indicated in the respective test method reported.

Respectfully,

TRI Environmental, Inc. - California

Maria Espitia

Maria Espitia
 Quality Assurance

Chad Blackwell

Chad Blackwell
 TRI-CA Director

Signatures are on file

attached laboratory test results are considered indicative only of the quality/property of samples/specimens that were actually tested. The designated test methods employed are based on the generally It shall be noted that the sample(s) tested per this report is(are) believed to be true representative(s) of the material produced under the designation stated herein. In addition, the accepted and current industry standards/practices. TRI neither accepts responsibility for nor makes claims to the intended final use and purpose of the material. The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent entities duly authorized by the respective client, or the client itself. It is our policy to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and its corresponding electronic file for seven (7) years. **Retained conformance samples are disposed of after one (1) month.** On the other hand, should you need us to keep them for a longer period, please advise us in writing.

5 Pages Total (including this sheet)



1970 S. Santa Cruz Street, Anaheim, CA 92805, www.precisionlabs.net, Tel No.: 714-520-9631
 TRI Environmental, Inc. dba Precision Geosynthetic Laboratories International, Inc



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TABLE 1.

MATERIAL PROPERTIES

CLIENT: Mustang Extreme

PROJECT: Northern Delaware Basin Landfill

Date Received: **9/16/2024**

Date Reported: **9/20/2024**

Client Sample ID: **R#0131601030001**

Material Description: **SKAPS TN220 Geonet**

QC'd By: *Maria Espitia*

TRI Job No.: **CA241094**

TRI Control No.: **183931**

SPECIMENS											Avg.	Std. Dev.	Min	Max	Proj. Specs.
1	2	3	4	5	6	7	8	9	10						
METHOD	DESCRIPTION														
ASTM D5199	Thickness (mils) <i>Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPa or 0.29psi). Loading time: 5sec Specimen Size: 4" x 4"</i>														
	242	246	247	248	251	253	249	244	247	241	247	4	241	253	
ASTM D1238	Melt Flow Index (grams/ 10 minutes) <i>Condition FR-190/2.16. Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190 °C and 2.16kg load.</i>														
Procedure A	0.1610	0.1614	0.1624								0.1616	0.0007	0.1610	0.1624	
ASTM D1603	Carbon Black Content (percent) <i>2.61 2.59</i>														
	2.61	2.59									2.60	0.01	2.59	2.61	
ASTM D3776	Mass per Unit Area (lbs/ ft. ²) <i>Test Specimen Size: 4" x 8"</i> <i>Test was conducted as directed in OPTION C. Tests were made in the standard atmosphere of 20+/-1 °C (70+/-2 °F)</i>														
	0.19	0.19	0.19								0.19	0.00	0.19	0.19	
ASTM D7179	Geonet Breaking Force (lbs/in) <i>Test was performed as directed by D7179, dry condition. Instron Tensile Testing Machine with hydraulic action grips. Machine is set for 12 in./min. Constant rate of extension with initial gauge length of 4in. Specimen Size= 4"x8"</i>														
MD	60	77	56	62	78						66	10	56	78	

(End of Table 1)

(Sheet 1 of 1)

By accepting the data and results presented on this report, the Client agrees to limit the liability of TRI Environmental, Inc. from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless TRI Environmental, Inc. from and against all liabilities in excess of the aforementioned limit.

LEGENDS:

MD - MACHINE DIRECTION

TD - TRANSVERSE DIRECTION

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TABLE 2.
MATERIAL PROPERTIES
CLIENT: Mustang Extreme
PROJECT: Northern Delaware Basin Landfill

Date Received: **9/16/2024**
 Date Reported: **9/20/2024**
 Client Sample ID: **R#0131601030020**
 Material Description: **SKAPS TN220 Geonet**

QC'd By: *Maria Espitia*
 TRI Job No.: **CA241094**
 TRI Control No.: **183932**

SPECIMENS											Avg.	Std. Dev.	Min	Max	Proj. Specs.
1	2	3	4	5	6	7	8	9	10						
METHOD	DESCRIPTION														
ASTM D5199	Thickness (mils) <i>Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi). Loading time: 5sec Specimen Size: 4" x 4"</i>														
	245	250	255	247	246	256	252	252	247	244	249	4	244	256	
ASTM D1238	Melt Flow Index (grams/ 10 minutes) <i>Condition FR-190/2.16. Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190 °C and 2.16kg load.</i>														
Procedure A	0.1758	0.1703	0.1734								0.1732	0.0028	0.1703	0.1758	
ASTM D1603	Carbon Black Content (percent) <i>2.47 2.42</i>														
	2.47	2.42									2.45	0.04	2.42	2.47	
ASTM D3776	Mass per Unit Area (lbs/ ft. ²) <i>Test Specimen Size: 4" x 8"</i>														
	<i>Test was conducted as directed in OPTION C. Tests were made in the standard atmosphere of 20+/-1 °C (70+/-2 °F)</i>														
	0.19	0.19	0.19								0.19	0.00	0.19	0.19	
ASTM D7179	Geonet Breaking Force (lbs/in) <i>Test was performed as directed by D7179, dry condition. Instron Tensile Testing Machine with hydraulic action grips. Machine is set for 12 in./min. Constant rate of extension with initial gauge length of 4in. Specimen Size= 4"x8"</i>														
	MD	65	58	54	55	78					62	10	54	78	

(End of Table 2)

(Sheet 1 of 1)

By accepting the data and results presented on this report, the Client agrees to limit the liability of TRI Environmental, Inc. from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless TRI Environmental, Inc. from and against all liabilities in excess of the aforementioned limit.

LEGENDS:
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TABLE 3.
MATERIAL PROPERTIES
CLIENT: Mustang Extreme
PROJECT: Northern Delaware Basin Landfill

Date Received: **9/16/2024**
 Date Reported: **9/20/2024**
 Client Sample ID: **R#0131601030040**
 Material Description: **SKAPS TN220 Geonet**

QC'd By: *Maria Espitia*
 TRI Job No.: **CA241094**
 TRI Control No.: **183933**

SPECIMENS											Avg.	Std. Dev.	Min	Max	Proj. Specs.
1	2	3	4	5	6	7	8	9	10						
METHOD	DESCRIPTION														
ASTM D5199	Thickness (mils)														
	Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).														
	Loading time: 5sec Specimen Size: 4" x 4"														
	247	250	254	250	249	245	246	251	251	248	249	3	245	254	
ASTM D1238	Melt Flow Index (grams/ 10 minutes)														
Procedure A	Condition FR-190/2.16. Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190 °C and 2.16kg load.														
	0.1530	0.1561	0.1543								0.1545	0.0016	0.1530	0.1561	
ASTM D1603	Carbon Black Content (percent)														
	2.50	2.51									2.50	0.01	2.50	2.51	
ASTM D3776	Mass per Unit Area (lbs/ ft. ²) Test Specimen Size: 4" x 8"														
	Test was conducted as directed in OPTION C. Tests were made in the standard atmosphere of 20+/-1 °C (70+/-2 °F)														
	0.20	0.19	0.19								0.19	0.00	0.19	0.20	
ASTM D7179	Geonet Breaking Force (lbs/in)														
	Test was performed as directed by D7179, dry condition. Instron Tensile Testing Machine with hydraulic action grips.														
	Machine is set for 12 in./min. Constant rate of extension with initial gauge length of 4in. Specimen Size= 4"x8"														
MD	74	77	60	59	59						66	9	59	77	

(End of Table 3)

(Sheet 1 of 1)

By accepting the data and results presented on this report, the Client agrees to limit the liability of TRI Environmental, Inc. from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless TRI Environmental, Inc. from and against all liabilities in excess of the aforementioned limit.

LEGENDS:
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TABLE 4.

MATERIAL PROPERTIES

CLIENT: Mustang Extreme

PROJECT: Northern Delaware Basin Landfill

Date Received: **9/16/2024**
 Date Reported: **9/20/2024**
 Client Sample ID: **R#0131601030060**
 Material Description: **SKAPS TN220 Geonet**

QC'd By: *Maria Espitia*
 TRI Job No.: **CA241094**
 TRI Control No.: **183934**

SPECIMENS											Avg.	Std. Dev.	Min	Max	Proj. Specs.
1	2	3	4	5	6	7	8	9	10						
METHOD	DESCRIPTION														
ASTM D5199	Thickness (mils)														
	Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).														
	Loading time: 5sec Specimen Size: 4" x 4"														
	247	250	251	251	248	247	247	250	248	248	249	2	247	251	
ASTM D1238	Melt Flow Index (grams/ 10 minutes)														
Procedure A	Condition FR-190/2.16. Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190 °C and 2.16kg load.														
	0.1569	0.1581	0.1575								0.1575	0.0006	0.1569	0.1581	
ASTM D1603	Carbon Black Content (percent)														
	2.48	2.48									2.48	0.01	2.48	2.48	
ASTM D3776	Mass per Unit Area (lbs/ ft. ²) Test Specimen Size: 4" x 8"														
	Test was conducted as directed in OPTION C. Tests were made in the standard atmosphere of 20+/-1 °C (70+/-2 °F)														
	0.19	0.19	0.19								0.19	0.00	0.19	0.19	
ASTM D7179	Geonet Breaking Force (lbs/in)														
	Test was performed as directed by D7179, dry condition. Instron Tensile Testing Machine with hydraulic action grips.														
	Machine is set for 12 in./min. Constant rate of extension with initial gauge length of 4in. Specimen Size= 4"x8"														
MD	74	69	53	57	67						64	9	53	74	

(End of Table 4)

(Sheet 1 of 1)

By accepting the data and results presented on this report, the Client agrees to limit the liability of TRI Environmental, Inc. from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless TRI Environmental, Inc. from and against all liabilities in excess of the aforementioned limit.

LEGENDS:
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APPENDIX B: MATERIAL MANUFACTURER CERTIFICATION AND COMFORMANCE TESTING RESULTS

B.7 Geocomposite Certifications



July 17, 2024

Customer: Mustang Extreme Environmental Services
Customer P.O.#: 311001
Project: Northern Delaware Basin Landfill, NM
Product: TN 220-1-10

We hereby certify that the TN 220-1-10 drainage geocomposite, meets or exceeds the project requirements as stated in the specifications. The properties listed in this section are:

Property	Test Method	Unit	Value	Qualifier
Geonet³				
Mass per Unit Area	ASTM D 5261	lbs/ft ²	0.160	MAV ⁶
Thickness	ASTM D 5199	mil	200	MAV ⁶
Carbon Black	ASTM D 4218	%	2.0	Range
Tensile Strength	ASTM D 7179	lbs/in	55	MAV
Melt Flow	ASTM D 1238 ²	g/10 min	1.0	Maximum
Density	ASTM D 1505	g/cm ³	0.94	MAV
Transmissivity ^{1a}	ASTM D 4716	m ² /sec	1.0 x 10 ⁻³	MAV
Composite				
Ply Adhesion	ASTM D 7005	lb/in	1.0	MAV
Transmissivity ^{1b}	ASTM D 4716	m ² /sec	9.0 x 10 ⁻⁴	MAV
Geotextile^{3 & 4}				
Fabric Weight	ASTM D 5261	oz/yd ²	9.1	MARV ⁵
Grab Strength	ASTM D 4632	lbs	270	MARV
Grab Elongation	ASTM D 4632	%	50	MARV
Trap Tear Strength	ASTM D 4533	lbs	100	MARV
CBR Puncture	ASTM D 6241	lbs	725	MARV
Water Flow Rate	ASTM D 4491	gpm/ft ²	0.94	MARV
Permittivity	ASTM D 4491	sec ⁻¹	0.3	MARV
AOS	ASTM D 4751	US Sieve	100	MaxARV
UV Resistance (Certify Only)	ASTM D 4355	%/hrs	70/500	MARV

Notes:

- 1a. Transmissivity measured using water at $21 \pm 2^{\circ} \text{C}$ ($70 \pm 4^{\circ} \text{F}$) with a gradient of 0.1 and a confining pressure of 10,000 psf between steel plates after 15 minutes.
- 1b. Transmissivity measured using water at $21 \pm 2^{\circ} \text{C}$ ($70 \pm 4^{\circ} \text{F}$) with a gradient of 0.1 and a confining pressure of 10,000 psf between steel plates after 15 minutes.
2. Condition 190/2.16
3. Geotextile and Geonet properties are prior to lamination.
4. Geotextile data is provided by the supplier.
5. MARV is statistically defined as mean minus two standard deviations and it is the value which is exceeded by 97.5% of all the test data.
6. Minimum average value

Quality Approval





Product: TN 220-1-10
Project : Northern Delaware Basin Landfill, NM

We hereby certify the following test results for the above referenced product/project :

Geocomposite			Geonet						
Roll Number	Ply Adhesion (lb/in) Side "A"	Transmissivity (m ² /sec)	Resin Lot Number	Density (g/cm ³)	Mass Per Unit Area (lb/ft ²)	Thickness (mils)	Carbon Black (%)	Tensile Strength MD (lb/in)	Transmissivity (m ² /sec)
131601010001	3.10	1.53 x 10 ⁻³	BPTX 367413	0.9517	0.178	265	2.42	60	2.94 x 10 ⁻³
131601010002			BPTX 367413	0.9517					
131601010003			BPTX 367413	0.9517					
131601010004			BPTX 367413	0.9517					
131601010005			BPTX 367413	0.9517					
131601010006			BPTX 367413	0.9517					
131601010007			BPTX 367413	0.9517					
131601010008			BPTX 367413	0.9517					
131601010009			BPTX 367413	0.9517					
131601010010			BPTX 367413	0.9517					
131601010011			BPTX 367413	0.9517					
131601010012			BPTX 367413	0.9517					
131601010013			BPTX 367413	0.9517					
131601010014			BPTX 367413	0.9517					
131601010015	1.85		BPTX 367413	0.9515	0.177	272	2.42	58	
131601010016			BPTX 367413	0.9515					
131601010017			BPTX 367413	0.9515					
131601010018			BPTX 367413	0.9515					
131601010019			BPTX 367413	0.9515					
131601010020			BPTX 367413	0.9515					
131601010021			BPTX 367413	0.9515					
131601010022			BPTX 367413	0.9515					
131601010023			BPTX 367413	0.9515					
131601010024			BPTX 367413	0.9515					



Product: TN 220-1-10
Project : Northern Delaware Basin Landfill, NM

We hereby certify the following test results for the above referenced product/project :

Geocomposite			Geonet						
Roll Number	Ply Adhesion (lb/in) Side "A"	Transmissivity (m ² /sec)	Resin Lot Number	Density (g/cm ³)	Mass Per Unit Area (lb/ft ²)	Thickness (mils)	Carbon Black (%)	Tensile Strength MD (lb/in)	Transmissivity (m ² /sec)
131601010025			BPTX 367413	0.9515					
131601010026			BPTX 367413	0.9515					
131601010027			BPTX 367413	0.9515					
131601010028			BPTX 367413	0.9515					
131601010029			BPTX 367413	0.9515					
131601010030	2.16		BPTX 367413	0.9519	0.180	263	2.44	56	
131601010031			BPTX 367413	0.9519					
131601010032			BPTX 367413	0.9519					
131601010033			BPTX 367413	0.9519					
131601010034			BPTX 367413	0.9519					
131601010035			BPTX 367413	0.9519					
131601010036			BPTX 367413	0.9519					
131601010037			BPTX 367413	0.9519					
131601010038			BPTX 367413	0.9519					
131601010039			BPTX 367413	0.9519					
131601010040			BPTX 367413	0.9519					
131601010041			BPTX 367413	0.9519					
131601010042			BPTX 367413	0.9519					
131601010043			BPTX 367413	0.9519					
131601010044			BPTX 367413	0.9519					
131601010045	2.17		BPTX 367413	0.9516	0.174	269	2.54	61	
131601010046			BPTX 367413	0.9516					
131601010047			BPTX 367413	0.9516					
131601010048			BPTX 367413	0.9516					



Product: TN 220-1-10
Project : Northern Delaware Basin Landfill, NM

We hereby certify the following test results for the above referenced product/project :

Geocomposite			Geonet						
Roll Number	Ply Adhesion (lb/in) Side "A"	Transmissivity (m ² /sec)	Resin Lot Number	Density (g/cm ³)	Mass Per Unit Area (lb/ft ²)	Thickness (mils)	Carbon Black (%)	Tensile Strength MD (lb/in)	Transmissivity (m ² /sec)
131601010049			BPTX 367413	0.9516					
131601010050			BPTX 367413	0.9516					
131601010051			BPTX 367413	0.9516					
131601010052			BPTX 367413	0.9516					
131601010053			BPTX 367413	0.9516					
131601010054			BPTX 367413	0.9516					
131601010055			BPTX 367413	0.9516					
131601010056			BPTX 367413	0.9516					
131601010057			BPTX 367413	0.9516					
131601010058			BPTX 367413	0.9516					
131601010059			BPTX 367413	0.9516					
131601010060	2.77	1.21 x 10 ⁻³	BPTX 367413	0.9514	0.184	266	2.52	59	3.42 x 10 ⁻³
131601010061			BPTX 367413	0.9514					
131601010062			BPTX 367413	0.9514					
131601010063			BPTX 367413	0.9514					
131601010064			BPTX 367413	0.9514					
131601010065			BPTX 367413	0.9514					
131601010066			BPTX 367413	0.9514					
131601010067			BPTX 367413	0.9514					
131601010068			BPTX 367413	0.9514					
131601010069			BPTX 367413	0.9514					
131601010070			BPTX 367413	0.9514					
131601010071			BPTX 367413	0.9514					
131601010072			BPTX 367413	0.9514					



Product: TN 220-1-10
Project : Northern Delaware Basin Landfill, NM

We hereby certify the following test results for the above referenced product/project :

Geocomposite			Geonet						
Roll Number	Ply Adhesion (lb/in) Side "A"	Transmissivity (m ² /sec)	Resin Lot Number	Density (g/cm ³)	Mass Per Unit Area (lb/ft ²)	Thickness (mils)	Carbon Black (%)	Tensile Strength MD (lb/in)	Transmissivity (m ² /sec)
131601010073			BPTX 367413	0.9514					
131601010074			BPTX 367413	0.9514					
131601010075	2.28		BPTX 367413	0.9518	0.176	262	2.51	57	
131601010076			BPTX 367413	0.9518					
131601010077			BPTX 367413	0.9518					
131601010078			BPTX 367413	0.9518					
131601010079			BPTX 367413	0.9518					
131601010080			BPTX 367413	0.9518					
131601010081			BPTX 367413	0.9518					
131601010082			BPTX 367413	0.9518					
131601010083			BPTX 367413	0.9518					
131601010084			BPTX 367413	0.9518					
131601010085			BPTX 367413	0.9518					
131601010086			BPTX 367413	0.9518					
131601010087			BPTX 367413	0.9518					
131601010088			BPTX 367413	0.9518					
131601010089			BPTX 367413	0.9518					
131601010090	2.63		BPTX 367413	0.9515	0.175	265	2.59	60	
131601010091			BPTX 367413	0.9515					
131601010092			BPTX 367413	0.9515					
131601010093			BPTX 367413	0.9515					
131601010094			BPTX 367413	0.9515					
131601010095			BPTX 367413	0.9515					
131601010096			BPTX 367413	0.9515					



Product: TN 220-1-10
Project : Northern Delaware Basin Landfill, NM

We hereby certify the following test results for the above referenced product/project :

Geocomposite			Geonet						
Roll Number	Ply Adhesion (lb/in) Side "A"	Transmissivity (m ² /sec)	Resin Lot Number	Density (g/cm ³)	Mass Per Unit Area (lb/ft ²)	Thickness (mils)	Carbon Black (%)	Tensile Strength MD (lb/in)	Transmissivity (m ² /sec)
131601010097			BPTX 367413	0.9515					
131601010098			BPTX 367413	0.9515					



POLYETHYLENE RESIN CERTIFICATION

Customer Name : Mustang Extreme Environmental Services
Project Name : Northern Delaware Basin Landfill, NM
Geocomposite Manufacturer : SKAPS Industries
Geocomposite Production Plant : Commerce, GA
Geocomposite Brand Name : TN 220-1-10

We hereby certify the following test results for the above referenced product/project:

Resin Manufacturer	Resin Lot Number	Property	Test Method	Units	Resin Manufacturer Value	Tested Value*
Global Plastics	BPTX 367413	Density	ASTM D1505	g/cm ³	0.9480	0.9469
		Melt flow Index	ASTM D1238 ^(a)	g/10 min	0.25	0.15

(a) Condition 190/2.16

* Data from SKAPS Quality Control



Product: TN 220-1-10
Project : Northern Delaware Basin Landfill, NM

Geotextile Certification

We hereby certify the following test results for the above referenced product/project :

GEOCOMP ROLL#	FABRIC SIDE	WEIGHT oz/yd ²	GRAB lbs. (MD)	GRAB ELG % (MD)	GRAB lbs. (XMD)	GRAB ELG % (XMD)	TRAP lbs. (MD)	TRAP lbs. (XMD)	CBR PUNCTURE lbs	AOS us sieve	WATER- FLOW gpm/ft ²	PERM- ITY sec ⁻¹
131601010001	Side A	10.23	285	80	290	81	107	126	830	100	78	1.04
131601010030	Side A	10.52	279	73	287	83	105	133	837	100	78	1.04
131601010060	Side A	10.52	279	73	287	83	105	133	837	100	78	1.04
131601010090	Side A	10.60	282	71	292	86	110	123	856	100	78	1.04



July 17, 2024

Customer: Mustang Extreme Environmental Services
Customer P.O.#: 311001
Project: Northern Delaware Basin Landfill, NM
Product: TN 220-2-10

We hereby certify that the TN 220-2-10 drainage geocomposite, meets or exceeds the project requirements as stated in the specifications. The properties listed in this section are:

Property	Test Method	Unit	Value	Qualifier
Geonet³				
Mass per Unit Area	ASTM D 5261	lbs/ft ²	0.160	MAV ⁶
Thickness	ASTM D 5199	mil	200	MAV ⁶
Carbon Black	ASTM D 4218	%	2.0	Range
Tensile Strength	ASTM D 7179	lbs/in	55	MAV
Melt Flow	ASTM D 1238 ²	g/10 min	1.0	Maximum
Density	ASTM D 1505	g/cm ³	0.94	MAV
Transmissivity ^{1a}	ASTM D 4716	m ² /sec	1.0 x 10 ⁻³	MAV
Composite				
Ply Adhesion	ASTM D 7005	lb/in	1.0	MAV
Transmissivity ^{1b}	ASTM D 4716	m ² /sec	1.0 x 10 ⁻⁴	MAV
Geotextile^{3 & 4}				
Fabric Weight	ASTM D 5261	oz/yd ²	9.1	MARV ⁵
Grab Strength	ASTM D 4632	lbs	270	MARV
Grab Elongation	ASTM D 4632	%	50	MARV
Trap Tear Strength	ASTM D 4533	lbs	100	MARV
CBR Puncture	ASTM D 6241	lbs	725	MARV
Water Flow Rate	ASTM D 4491	gpm/ft ²	75	MARV
Permittivity	ASTM D 4491	sec ⁻¹	0.9	MARV
AOS	ASTM D 4751	US Sieve	100	MaxARV
UV Resistance (Certify Only)	ASTM D 4355	%/hrs	70/500	MARV

Notes:

- 1a. Transmissivity measured using water at $21 \pm 2^{\circ}\text{C}$ ($70 \pm 4^{\circ}\text{F}$) with a gradient of 0.1 and a confining pressure of 10,000 psf between steel plates after 15 minutes.
- 1b. Transmissivity measured using water at $21 \pm 2^{\circ}\text{C}$ ($70 \pm 4^{\circ}\text{F}$) with a gradient of 0.1 and a confining pressure of 10,000 psf between steel plates after 15 minutes.
2. Condition 190/2.16
3. Geotextile and Geonet properties are prior to lamination.
4. Geotextile data is provided by the supplier.
5. MARV is statistically defined as mean minus two standard deviations and it is the value which is exceeded by 97.5% of all the test data.
6. Minium average value

Quality Approval

Malkesh Patel





Product: TN 220-2-10
Project : Northern Delaware Basin Landfill, NM

We hereby certify the following test results for the above referenced product/project :

Geocomposite				Geonet						
Roll Number	Ply Adhesion (lb/in)		Transmissivity (m ² /sec)	Resin Lot Number	Density (g/cm ³)	Mass Per Unit Area (lb/ft ²)	Thickness (mils)	Carbon Black (%)	Tensile Strength MD (lb/in)	Transmissivity (m ² /sec)
	Side "A"	Side "B"								
131601020001	3.29	2.45	1.79 x 10 ⁻⁴	BPTX 367413	0.9515	0.186	215	2.58	56	3.13 x 10 ⁻³
131601020002				BPTX 367413	0.9515					
131601020003				BPTX 367413	0.9515					
131601020004				BPTX 367413	0.9515					
131601020005				BPTX 367413	0.9515					
131601020006				BPTX 367413	0.9515					
131601020007				BPTX 367413	0.9515					
131601020008				BPTX 367413	0.9515					
131601020009				BPTX 367413	0.9515					
131601020010				BPTX 367413	0.9515					
131601020011				BPTX 367413	0.9515					
131601020012				BPTX 367413	0.9515					
131601020013				BPTX 367413	0.9515					
131601020014				BPTX 367413	0.9515					
131601020015	2.22	3.51		BPTX 367413	0.9518	0.179	221	2.56	59	
131601020016				BPTX 367413	0.9518					
131601020017				BPTX 367413	0.9518					
131601020018				BPTX 367413	0.9518					
131601020019				BPTX 367413	0.9518					
131601020020				BPTX 367413	0.9518					
131601020021				BPTX 367413	0.9518					
131601020022				BPTX 367413	0.9518					
131601020023				BPTX 367413	0.9518					
131601020024				BPTX 367413	0.9518					



Product: TN 220-2-10
Project : Northern Delaware Basin Landfill, NM

We hereby certify the following test results for the above referenced product/project :

Geocomposite				Geonet						
Roll Number	Ply Adhesion (lb/in)		Transmissivity (m ² /sec)	Resin Lot Number	Density (g/cm ³)	Mass Per Unit Area (lb/ft ²)	Thickness (mils)	Carbon Black (%)	Tensile Strength MD (lb/in)	Transmissivity (m ² /sec)
	Side "A"	Side "B"								
131601020025				BPTX 367413	0.9518					
131601020026				BPTX 367413	0.9518					
131601020027				BPTX 367413	0.9518					
131601020028				BPTX 367413	0.9518					
131601020029				BPTX 367413	0.9518					
131601020030	1.95	2.36		BPTX 367413	0.9517	0.188	218	2.42	55	
131601020031				BPTX 367413	0.9517					
131601020032				BPTX 367413	0.9517					
131601020033				BPTX 367413	0.9517					
131601020034				BPTX 367413	0.9517					
131601020035				BPTX 367413	0.9517					
131601020036				BPTX 367413	0.9517					
131601020037				BPTX 367413	0.9517					
131601020038				BPTX 367413	0.9517					
131601020039				BPTX 367413	0.9517					
131601020040				BPTX 367413	0.9517					
131601020041				BPTX 367413	0.9517					



POLYETHYLENE RESIN CERTIFICATION

Customer Name : Mustang Extreme Environmental Services
Project Name : Northern Delaware Basin Landfill, NM
Geocomposite Manufacturer : SKAPS Industries
Geocomposite Production Plant : Commerce, GA
Geocomposite Brand Name : TN 220-2-10

We hereby certify the following test results for the above referenced product/project:

Resin Manufacturer	Resin Lot Number	Property	Test Method	Units	Resin Manufacturer Value	Tested Value*
Global Plastics	BPTX 367413	Density	ASTM D1505	g/cm ³	0.9480	0.9469
		Melt flow Index	ASTM D1238 ^(a)	g/10 min	0.25	0.15

(a) Condition 190/2.16

* Data from SKAPS Quality Control



Product: TN 220-2-10
Project : Northern Delaware Basin Landfill, NM

Geotextile Certification

We hereby certify the following test results for the above referenced product/project :

GEOCOMP ROLL#	FABRIC SIDE	WEIGHT oz/yd ²	GRAB lbs. (MD)	GRAB ELG % (MD)	GRAB lbs. (XMD)	GRAB ELG % (XMD)	TRAP lbs. (MD)	TRAP lbs. (XMD)	CBR PUNCTURE lbs	AOS us sieve	WATER- FLOW gpm/ft ²	PERM- ITY sec ⁻¹
131601020001	Side A	10.20	282	71	282	88	113	133	838	100	79	1.05
	Side B	10.49	277	78	288	85	108	127	837	100	79	1.05
131601020030	Side A	10.49	277	78	288	85	108	127	837	100	79	1.05
	Side B	10.49	277	78	288	85	108	127	837	100	79	1.05

APPENDIX B: MATERIAL MANUFACTURER CERTIFICATION AND COMFORMANCE TESTING RESULTS

B.8 Geocomposite Test Results



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

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July 10, 2023

Mail To:

James Campbell
Mustang Extreme Environmental Services

Bill To:

<= Same

email: jcampbell@mustangextreme.com

Dear Mr. Campbell

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: Northern Delaware Basin LF

TRI Job Reference Number: 23-001903

Material(s) Tested: Two, SKAPS Industries T220-2-10 Double Sided Geocomposite(s)

Test(s) Requested: Transmissivity (ASTM D4716) - GC
Peel Strength (ASTM D7005) - GC
Thickness (ASTM D5199) - GN
Mass/Unit Area (ASTM D5261) - GN
Density (ASTM D1505) - GN
Carbon Content (ASTM D4218) - GN
Tensile Properties (ASTM D7179, 12 ipm strain rate) - GN
Melt Flow Index (ASTM D1238, Method A, 190°C / 2.16 kg) - GN
Mass/Unit Area (ASTM D5261) - GT
Grab Tensile (ASTM D4632) - GT
CBR Puncture Strength (ASTM D6241) - GT
Trapezoidal Tear (ASTM D4533) - GT
Apparent Opening Size (ASTM D 4751) - GT
Permittivity (ASTM D4491) - GT

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Mansukh Patel'.

Mansukh Patel
Laboratory Manager
Geosynthetic Services Division



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

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GEOCOMPOSITE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services

Project: Northern Delaware Basin LF

Material: SKAPS Industries T220-2-10 Double Sided Geocomposite

Sample Identification: 0131601020001

TRI Log #: 23-001903

PARAMETER											TEST REPLICATE NUMBER										MEAN	STD. DEV.		
											1	2	3	4	5	6	7	8	9	10				
Hydraulic Transmissivity (ASTM D4716)																								
Direction Tested: Machine Direction																								
Normal Load (psf):											10,000													
Hydraulic Gradient:											0.1													
Test Length (in)											12													
Test Width (in)											12													
Plate / Sample / Plate											Plate Inflow													



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GEOCOMPOSITE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services

Project: Northern Delaware Basin LF

Material: SKAPS Industries T220-2-10 Double Sided Geocomposite

Sample Identification: 0131601020001

TRI Log #: 23-001903

GEOTEXTILE - SIDE A

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Mass/Unit Area (ASTM D5261)												
5" diameter Circle - Mass (g)	4.87	4.72	4.29	4.40	4.94	5.12	4.34	4.43	4.51	4.31	4.59	0.30
Mass/Unit Area (oz/sq.yd)	11.33	10.98	9.98	10.23	11.49	11.91	10.09	10.30	10.49	10.03	10.68	0.69
Grab Tensile Properties (ASTM D4632)												
MD - Tensile Strength (lbs)	412	263	315	301	317	357	266	277	256	314	308	48
TD - Tensile Strength (lbs)	342	383	339	390	364	291	338	360	373	334	351	29
MD - Elong. @ Max. Load (%)	77	70	75	72	77	71	74	77	69	78	74	3
TD - Elong. @ Max. Load (%)	95	104	104	97	89	80	88	93	97	97	95	7
CBR Puncture Strength (ASTM D6241)												
Puncture Resistance (lbs)	1242	1046	1063	923	1020	856	953	1135	974	969	1018	111
Trapezoidal Tear (ASTM D4533)												
MD - Tear Strength (lbs)	116	133	124	105	130	105	115	130	134	162	125	17
TD - Tear Strength (lbs)	166	176	152	172	206	180	151	182	182	174	174	16
Apparent Opening Size (ASTM D4751)												
Opening Size Diameter (mm)	0.154	0.149	0.148	0.157	0.164						0.154	0.007
Sieve No.	70	100	100	70	70						70	
Permittivity (ASTM D4491,Method C)												
Thickness (mil)	158	159	171	159	150	157	157	154	171	168	160	7
Thickness (mm)	4.00	4.04	4.34	4.03	3.81	4.00	3.98	3.92	4.35	4.26	4.07	0.18
Permittivity (Sec-1)	1.46	1.19	1.10	1.24	1.46	1.29	1.22	1.30	1.08	1.26	1.26	0.13
Permittivity (GPM/ft2)	109.2	89.0	82.3	92.8	109.2	96.5	91.3	97.2	80.8	94.2	94.2	9.6
Flow rate (LPM/m2)	4450	3627	3352	3779	4450	3932	3718	3962	3292	3840	3840	390
Permittivity (cm/sec)	0.584	0.481	0.477	0.500	0.557	0.515	0.486	0.510	0.469	0.537	0.512	0.038
MD Machine Direction	TD Transverse Direction											



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GEOCOMPOSITE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services

Project: Northern Delaware Basin LF

Material: SKAPS Industries T220-2-10 Double Sided Geocomposite

Sample Identification: 0131601020001

TRI Log #: 23-001903

GEOTEXTILE - SIDE B

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Mass/Unit Area (ASTM D5261)												
5" diameter Circle - Mass (g)	4.89	4.89	4.85	4.45	4.21	4.34	4.26	4.99	5.31	4.98	4.72	0.37
Mass/Unit Area (oz/sq.yd)	11.37	11.37	11.28	10.35	9.79	10.09	9.91	11.61	12.35	11.58	10.97	0.87
Grab Tensile Properties (ASTM D4632)												
MD - Tensile Strength (lbs)	344	401	334	353	306	345	366	352	379	387	357	28
TD - Tensile Strength (lbs)	323	352	343	292	259	324	337	345	284	338	320	31
MD - Elong. @ Max. Load (%)	97	101	89	89	99	103	96	97	93	97	96	4
TD - Elong. @ Max. Load (%)	78	82	83	81	65	81	77	82	63	76	77	7
CBR Puncture Strength (ASTM D6241)												
Puncture Resistance (lbs)	1243	1055	1086	1017	1005	1081	989	1064	1118	956	1062	81
Trapezoidal Tear (ASTM D4533)												
MD - Tear Strength (lbs)	110	122	151	115	113	140	107	109	145	114	123	16
TD - Tear Strength (lbs)	145	142	146	150	189	164	180	139	152	158	157	17
Apparent Opening Size (ASTM D4751)												
Opening Size Diameter (mm)	0.150	0.150	0.153	0.164	0.158						0.155	0.006
Sieve No.	70	70	70	70	70						70	
Permittivity (ASTM D4491,Method C)												
Thickness (mil)	178	176	161	156	149	167	165	181	178	200	171	15
Thickness (mm)	4.51	4.48	4.09	3.96	3.79	4.24	4.20	4.61	4.51	5.09	4.35	0.37
Permittivity (Sec-1)	1.13	1.13	1.39	1.47	1.38	1.39	1.27	0.94	1.02	0.78	1.19	0.23
Permittivity (GPM/ft2)	84.5	84.5	104.0	110.0	103.2	104.0	95.0	70.3	76.3	58.3	89.0	17.0
Flow rate (LPM/m2)	3444	3444	4236	4480	4206	4236	3871	2865	3109	2377	3627	695
Permittivity (cm/sec)	0.510	0.506	0.569	0.582	0.523	0.589	0.533	0.433	0.460	0.397	0.510	0.064
MD Machine Direction	TD Transverse Direction											



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GEOCOMPOSITE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services

Project: Northern Delaware Basin LF

Material: SKAPS Industries T220-2-10 Double Sided Geocomposite

Sample Identification: 0131601020035

TRI Log #: 23-001903

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Peel Strength (ASTM D7005)												
A - MD Average Peel Strength (ppi)	0.89	1.25	1.35	1.38	4.71						1.92	1.57
A - MD Average Peel Strength (g/in)	405	568	613	627	2138						870	715
B - MD Average Peel Strength (ppi)	5.39	3.57	0.85	4.15	3.17						3.43	1.67
B - MD Average Peel Strength (g/in)	2447	1621	386	1884	1439						1555	756
Note: A and B represent a randomly assigned top and bottom of the sample												
Thickness (ASTM D5199)												
GEONET COMPONENT												
Thickness (mils)	224	223	228	228	227	229	233	235	232	231	229	4
											223	<< min
Mass/Unit Area (ASTM D5261)												
GEONET COMPONENT												
5" diameter Circle - Mass (g)	9.26	9.12	9.48	9.33	9.72	9.43	9.94	10.18	9.80	9.65		
Mass/unit area (lbs./sq.ft)	0.15	0.15	0.15	0.15	0.16	0.15	0.16	0.16	0.16	0.16	0.16	0.01
Density (ASTM D1505)												
GEONET COMPONENT												
Density (g/cm3)	0.953	0.953	0.953								0.953	0.000
Carbon Black Content (ASTM D4218)												
GEONET COMPONENT												
% Carbon Black	2.22	2.27									2.25	0.04
Melt Flow Index (ASTM D1238, Method A, 190°C / 2.16 kg)												
GEONET COMPONENT												
Melt Flow Index (g/10 min)	0.33	0.36									0.35	
Tensile Properties (ASTM D7179, 12 ipm strain rate)												
GEONET COMPONENT												
MD Max. Strength (ppi)	54	53	53	60	63						57	5
MD Elong. @ Max. Strength (%)	26	26	25	23	23						24	2
MD Machine Direction	TD Transverse Direction											



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GEOCOMPOSITE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services

Project: Northern Delaware Basin LF

Material: SKAPS Industries T220-2-10 Double Sided Geocomposite

Sample Identification: 0131601020035

TRI Log #: 23-001903

GEOTEXTILE - SIDE A

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Mass/Unit Area (ASTM D5261)												
5" diameter Circle - Mass (g)	4.75	4.94	4.56	4.58	4.46	4.61	4.55	4.44	4.76	4.87	4.65	0.17
Mass/Unit Area (oz/sq.yd)	11.05	11.49	10.61	10.65	10.37	10.72	10.58	10.33	11.07	11.33	10.82	0.39
Grab Tensile Properties (ASTM D4632)												
MD - Tensile Strength (lbs)	301	277	249	296	310	295	278	293	302	301	290	18
TD - Tensile Strength (lbs)	333	392	421	370	329	337	307	355	360	297	350	38
MD - Elong. @ Max. Load (%)	73	71	73	74	80	81	71	75	75	76	75	3
TD - Elong. @ Max. Load (%)	90	93	96	93	98	98	88	93	93	87	93	4
CBR Puncture Strength (ASTM D6241)												
Puncture Resistance (lbs)	1128	1088	1000	1011	1026	840	849	1077	1061	937	1002	98
Trapezoidal Tear (ASTM D4533)												
MD - Tear Strength (lbs)	130	162	135	127	111	134	136	142	99	125	130	17
TD - Tear Strength (lbs)	125	158	223	150	177	149	199	182	176	151	169	28
MD Machine Direction	TD Transverse Direction											



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GEOCOMPOSITE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services

Project: Northern Delaware Basin LF

Material: SKAPS Industries T220-2-10 Double Sided Geocomposite

Sample Identification: 0131601020035

TRI Log #: 23-001903

GEOTEXTILE - SIDE B

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Mass/Unit Area (ASTM D5261)												
5" diameter Circle - Mass (g)	4.53	4.75	4.65	4.90	4.24	5.33	4.20	4.30	4.72	4.88	4.65	0.35
Mass/Unit Area (oz/sq.yd)	10.54	11.05	10.82	11.40	9.86	12.40	9.77	10.00	10.98	11.35	10.82	0.81
Grab Tensile Properties (ASTM D4632)												
MD - Tensile Strength (lbs)	368	281	299	293	269	393	272	283	315	284	306	42
TD - Tensile Strength (lbs)	349	354	386	357	305	331	376	341	348	284	343	31
MD - Elong. @ Max. Load (%)	75	77	75	75	76	72	73	74	73	73	74	2
TD - Elong. @ Max. Load (%)	98	93	99	93	93	90	98	92	93	104	95	4
CBR Puncture Strength (ASTM D6241)												
Puncture Resistance (lbs)	1114	1190	1054	945	894	970	961	999	1119	914	1016	99
Trapezoidal Tear (ASTM D4533)												
MD - Tear Strength (lbs)	100	137	116	117	134	124	204	99	149	129	131	30
TD - Tear Strength (lbs)	137	219	168	204	182	169	193	143	171	157	174	26
MD Machine Direction	TD Transverse Direction											



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July 18, 2023

Mail To:

James Campbell
Mustang Extreme Environmental Services

email: jcampbell@mustangextreme.com
ccemail: roetherm@wseinc.com

Dear Mr. Campbell

Bill To:

<= Same

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

Project:	Northern Delaware Basin LF
TRI Job Reference Number:	23-001899
Material(s) Tested:	Four, SKAPS Industries TN220-1-10 Single Sided Geocomposite(s)
Test(s) Requested:	Transmissivity (ASTM D4716) - GC Peel Strength (ASTM D7005) - GC Thickness (ASTM D5199) - GN Mass/Unit Area (ASTM D5261) - GN Density (ASTM D1505) - GN Carbon Content (ASTM D4218) - GN Tensile Properties (ASTM D7179, 12 ipm strain rate) - GN Melt Flow Index (ASTM D1238, Method A, 190°C / 2.16 kg) - GN Mass/Unit Area (ASTM D5261) - GT Grab Tensile (ASTM D4632) - GT CBR Puncture Strength (ASTM D6241) - GT Trapezoidal Tear (ASTM D4533) - GT Apparent Opening Size (ASTM D 4751) - GT Permittivity (ASTM D4491) - GT

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Mansukh Patel'.

Mansukh Patel
Laboratory Manager
Geosynthetic Services Division



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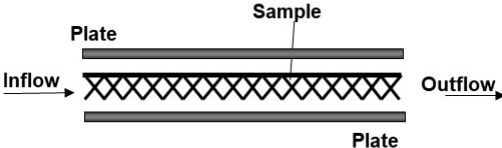
GEOCOMPOSITE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services
Project: Northern Delaware Basin LF

Material: SKAPS Industries TN220-1-10 Single Sided Geocomposite

Sample Identification: 0131601010002

TRI Log #: 23-001899

PARAMETER											TEST REPLICATE NUMBER											MEAN	STD. DEV.	
											1	2	3	4	5	6	7	8	9	10				
Hydraulic Transmissivity (ASTM D4716)																								
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)											766 764 759 838 838 834													
Time (s)											10.38 10.42 10.44 10.33 10.37 10.37													
Flow Rate (GPM/ft width)											1.18 1.17 1.16 1.29 1.28 1.28													
Transmissivity (m^2/s)											2.44E-03 2.42E-03 2.40E-03 2.67E-03 2.66E-03 2.64E-03												1.23	0.06
Test Temp (C)											19.9 20.1												2.54E-03	1.30E-04
Temp. Corr. Factor											1.006 1.001													
Peel Strength (ASTM D7005)																								
MD Average Peel Strength (ppi)											4.66 4.24 5.86 1.61 1.57												3.59	1.92
MD Average Peel Strength (g/in)											2116 1925 2660 731 713												1629	871
Thickness (ASTM D5199)																								
											GEONET COMPONENT													
Thickness (mils)											245 245 249 248 243 241 230 231 225 223												238	10
																							223	<< min
Mass/Unit Area (ASTM D5261)																								
											GEONET COMPONENT													
5" diameter Circle - Mass (g)											9.85 9.97 10.70 10.54 11.80 11.70 12.34 12.16 11.72 11.56													
Mass/unit area (lbs./sq.ft)											0.16 0.16 0.17 0.17 0.19 0.19 0.20 0.20 0.19 0.19												0.18	0.01
Density (ASTM D1505)																								
											GEONET COMPONENT													
Density (g/cm3)											0.953 0.953 0.953												0.953	0.000
Carbon Black Content (ASTM D4218)																								
											GEONET COMPONENT													
% Carbon Black											2.29 2.29												2.29	0.00
Melt Flow Index (ASTM D1238, Method A, 190°C / 2.16 kg)																								
											GEONET COMPONENT													
Melt Flow Index (g/10 min)											0.35 0.35												0.35	
Tensile Properties (ASTM D7179, 12 ipm strain rate)																								
											GEONET COMPONENT													
MD Max. Strength (ppi)											76 73 76 60 54												68	10
MD Elong. @ Max. Strength (%)											20 18 22 20 24												21	2
MD Machine Direction																								



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GEOCOMPOSITE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services
Project: Northern Delaware Basin LF

Material: SKAPS Industries TN220-1-10 Single Sided Geocomposite

Sample Identification: 0131601010002

TRI Log #: 23-001899

GEOTEXTILE COMPONENT

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Mass/Unit Area (ASTM D5261)												
5" diameter Circle - Mass (g)	4.07	4.63	4.81	5.14	5.17	4.52	4.36	4.74	4.51	4.53	4.65	0.34
Mass/Unit Area (oz/sq.yd)	9.47	10.77	11.19	11.96	12.03	10.51	10.14	11.03	10.49	10.54	10.81	0.78
Grab Tensile Properties (ASTM D4632)												
MD - Tensile Strength (lbs)	243	284	261	290	378	231	286	262	269	333	284	43
TD - Tensile Strength (lbs)	360	390	383	343	300	339	331	368	386	334	353	29
MD - Elong. @ Max. Load (%)	72	72	77	81	77	73	77	72	74	71	75	3
TD - Elong. @ Max. Load (%)	95	101	94	94	95	103	91	95	95	95	96	4
CBR Puncture Strength (ASTM D6241)												
Puncture Resistance (lbs)	994	966	1004	1005	913	943	1077	945	1146	848	984	84
Trapezoidal Tear (ASTM D4533)												
MD - Tear Strength (lbs)	116	112	104	119	148	107	117	117	122	144	121	15
TD - Tear Strength (lbs)	167	160	191	163	170	178	162	138	164	147	164	15
Apparent Opening Size (ASTM D4751)												
Opening Size Diameter (mm)	0.145	0.152	0.159	0.166	0.148						0.154	0.009
Sieve No.	100	70	70	70	100						70	
Permittivity (ASTM D4491,Method C)												
Thickness (mil)	180	157	147	157	176	178	162	174	149	139	162	15
Thickness (mm)	4.56	3.99	3.73	3.99	4.48	4.52	4.11	4.42	3.77	3.52	4.11	0.37
Permittivity (Sec-1)	1.09	1.31	1.55	1.51	1.07	1.06	1.23	1.09	1.40	1.52	1.28	0.20
Permittivity (GPM/ft2)	81.5	98.0	115.9	112.9	80.0	79.3	92.0	81.5	104.7	113.7	96.0	15.1
Flow rate (LPM/m2)	3322	3992	4724	4602	3261	3231	3749	3322	4267	4633	3910	614
Permittivity (cm/sec)	0.497	0.522	0.578	0.603	0.479	0.479	0.506	0.482	0.528	0.535	0.521	0.042
MD Machine Direction	TD Transverse Direction											



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GEOCOMPOSITE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services
Project: Northern Delaware Basin LF

Material: SKAPS Industries TN220-1-10 Single Sided Geocomposite

Sample Identification: 0131601010030

TRI Log #: 23-001899

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Peel Strength (ASTM D7005)												
MD Average Peel Strength (ppi)	6.06	2.45	3.14	4.06	4.61						4.06	1.39
MD Average Peel Strength (g/in)	2751	1112	1426	1843	2093						1845	632
Thickness (ASTM D5199)												
GEONET COMPONENT												
Thickness (mils)	243	242	241	242	226	229	227	226	222	221	232	9
											221	<< min
Mass/Unit Area (ASTM D5261)												
GEONET COMPONENT												
5" diameter Circle - Mass (g)	9.04	9.22	9.23	9.50	9.62	9.38	11.00	10.67	10.87	10.81		
Mass/unit area (lbs./sq.ft)	0.15	0.15	0.15	0.15	0.16	0.15	0.18	0.17	0.18	0.18	0.16	0.01
Density (ASTM D1505)												
GEONET COMPONENT												
Density (g/cm3)	0.954	0.954	0.954								0.954	0.000
Carbon Black Content (ASTM D4218)												
GEONET COMPONENT												
% Carbon Black	2.30	2.29									2.30	0.01
Melt Flow Index (ASTM D1238, Method A, 190°C / 2.16 kg)												
GEONET COMPONENT												
Melt Flow Index (g/10 min)	0.32	0.32									0.32	
Tensile Properties (ASTM D7179, 12 ipm strain rate)												
GEONET COMPONENT												
MD Max. Strength (ppi)	56	52	58	64	73						60	8
MD Elong. @ Max. Strength (%)	27	24	23	24	20						23	2
MD Machine Direction												



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GEOCOMPOSITE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services

Project: Northern Delaware Basin LF

Material: SKAPS Industries TN220-1-10 Single Sided Geocomposite

Sample Identification: 0131601010030

TRI Log #: 23-001899

GEOTEXTILE COMPONENT

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Mass/Unit Area (ASTM D5261)												
5" diameter Circle - Mass (g)	4.92	4.76	4.77	5.12	4.61	4.16	4.55	4.58	5.02	4.58	4.71	0.28
Mass/Unit Area (oz/sq.yd)	11.44	11.07	11.10	11.91	10.72	9.68	10.58	10.65	11.68	10.65	10.95	0.64
Grab Tensile Properties (ASTM D4632)												
MD - Tensile Strength (lbs)	325	266	310	336	318	322	320	317	304	338	316	20
TD - Tensile Strength (lbs)	351	367	320	364	346	320	324	373	401	366	353	26
MD - Elong. @ Max. Load (%)	69	73	77	81	79	77	80	81	74	74	76	4
TD - Elong. @ Max. Load (%)	103	93	87	95	96	98	91	91	95	94	94	4
CBR Puncture Strength (ASTM D6241)												
Puncture Resistance (lbs)	979	853	1067	967	819	928	1116	1096	1122	1002	995	107
Trapezoidal Tear (ASTM D4533)												
MD - Tear Strength (lbs)	153	113	136	143	101	132	122	119	115	122	126	16
TD - Tear Strength (lbs)	189	204	186	163	208	186	169	152	181	138	178	22
MD Machine Direction	TD Transverse Direction											



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GEOCOMPOSITE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services
Project: Northern Delaware Basin LF

Material: SKAPS Industries TN220-1-10 Single Sided Geocomposite

Sample Identification: 0131601010058

TRI Log #: 23-001899

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Peel Strength (ASTM D7005)												
MD Average Peel Strength (ppi)	4.96	1.86	6.51	2.25	5.29						4.17	2.02
MD Average Peel Strength (g/in)	2252	844	2956	1022	2402						1895	919
Thickness (ASTM D5199)												
GEONET COMPONENT												
Thickness (mils)	243	247	246	246	249	244	242	245	240	240	244	3
											240	<< min
Mass/Unit Area (ASTM D5261)												
GEONET COMPONENT												
5" diameter Circle - Mass (g)	11.38	11.15	11.84	11.62	11.91	11.82	11.95	11.90	11.57	11.51		
Mass/unit area (lbs./sq.ft)	0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.00
Density (ASTM D1505)												
GEONET COMPONENT												
Density (g/cm3)	0.953	0.953	0.953								0.953	0.000
Carbon Black Content (ASTM D4218)												
GEONET COMPONENT												
% Carbon Black	2.30	2.27									2.29	0.02
Melt Flow Index (ASTM D1238, Method A, 190°C / 2.16 kg)												
GEONET COMPONENT												
Melt Flow Index (g/10 min)	0.31	0.31									0.31	
Tensile Properties (ASTM D7179, 12 ipm strain rate)												
GEONET COMPONENT												
MD Max. Strength (ppi)	78	80	80	76	70						77	4
MD Elong. @ Max. Strength (%)	20	21	20	19	21						20	1
MD Machine Direction	TD Transverse Direction											



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GEOCOMPOSITE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services

Project: Northern Delaware Basin LF

Material: SKAPS Industries TN220-1-10 Single Sided Geocomposite

Sample Identification: 0131601010058

TRI Log #: 23-001899

GEOTEXTILE COMPONENT

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Mass/Unit Area (ASTM D5261)												
5" diameter Circle - Mass (g)	5.49	4.87	4.39	4.88	3.95	4.84	4.36	4.20	4.73	5.04	4.68	0.45
Mass/Unit Area (oz/sq.yd)	12.77	11.33	10.21	11.35	9.19	11.26	10.14	9.77	11.00	11.72	10.87	1.05
Grab Tensile Properties (ASTM D4632)												
MD - Tensile Strength (lbs)	349	313	308	306	256	302	309	277	321	276	302	26
TD - Tensile Strength (lbs)	348	369	353	380	352	324	390	363	343	314	354	23
MD - Elong. @ Max. Load (%)	70	79	75	78	80	62	75	71	75	76	74	5
TD - Elong. @ Max. Load (%)	95	101	87	97	103	93	104	94	103	91	97	6
CBR Puncture Strength (ASTM D6241)												
Puncture Resistance (lbs)	916	1108	988	930	943	857	978	1046	993	967	972	70
Trapezoidal Tear (ASTM D4533)												
MD - Tear Strength (lbs)	126	114	140	116	136	151	119	110	110	101	122	16
TD - Tear Strength (lbs)	182	135	184	186	138	141	137	184	183	152	162	23
MD Machine Direction	TD Transverse Direction											



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GEOCOMPOSITE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services
Project: Northern Delaware Basin LF

Material: SKAPS Industries TN220-1-10 Single Sided Geocomposite

Sample Identification: 0131601010086

TRI Log #: 23-001899

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Peel Strength (ASTM D7005)												
MD Average Peel Strength (ppi)	3.50	5.03	1.43	6.13	4.28						4.07	1.77
MD Average Peel Strength (g/in)	1589	2284	649	2783	1943						1850	803
Thickness (ASTM D5199)												
GEONET COMPONENT												
Thickness (mils)	239	239	245	247	245	240	233	232	226	228	237	7
											226	<< min
Mass/Unit Area (ASTM D5261)												
GEONET COMPONENT												
5" diameter Circle - Mass (g)	10.38	9.43	9.26	10.26	11.24	11.31	11.91	11.82	11.49	12.16		
Mass/unit area (lbs./sq.ft)	0.17	0.15	0.15	0.17	0.18	0.18	0.19	0.19	0.19	0.20	0.18	0.02
Density (ASTM D1505)												
GEONET COMPONENT												
Density (g/cm3)	0.953	0.953	0.953								0.953	0.000
Carbon Black Content (ASTM D4218)												
GEONET COMPONENT												
% Carbon Black	2.14	2.21									2.18	0.05
Melt Flow Index (ASTM D1238, Method A, 190°C / 2.16 kg)												
GEONET COMPONENT												
Melt Flow Index (g/10 min)	0.32	0.33									0.33	
Tensile Properties (ASTM D7179, 12 ipm strain rate)												
GEONET COMPONENT												
MD Max. Strength (ppi)	71	78	75	66	49						68	11
MD Elong. @ Max. Strength (%)	17	18	20	22	25						20	3
MD Machine Direction												



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GEOCOMPOSITE TEST RESULTS

TRI Client: Mustang Extreme Environmental Services

Project: Northern Delaware Basin LF

Material: SKAPS Industries TN220-1-10 Single Sided Geocomposite

Sample Identification: 0131601010086

TRI Log #: 23-001899

GEOTEXTILE

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Mass/Unit Area (ASTM D5261)												
5" diameter Circle - Mass (g)	4.93	4.77	4.75	4.91	4.71	4.20	4.64	4.51	4.41	4.73	4.66	0.23
Mass/Unit Area (oz/sq.yd)	11.47	11.10	11.05	11.42	10.96	9.77	10.79	10.49	10.26	11.00	10.83	0.53
Grab Tensile Properties (ASTM D4632)												
MD - Tensile Strength (lbs)	318	320	314	324	280	299	260	262	294	335	301	26
TD - Tensile Strength (lbs)	348	361	345	371	292	323	370	341	397	329	348	29
MD - Elong. @ Max. Load (%)	76	73	77	81	72	74	79	68	73	73	74	4
TD - Elong. @ Max. Load (%)	93	93	93	99	105	96	97	91	101	100	97	5
CBR Puncture Strength (ASTM D6241)												
Puncture Resistance (lbs)	934	973	942	1119	1006	848	1076	1060	1088	1062	1011	86
Trapezoidal Tear (ASTM D4533)												
MD - Tear Strength (lbs)	116	148	144	135	125	133	126	127	131	127	131	9
TD - Tear Strength (lbs)	178	171	140	205	149	136	167	148	147	157	160	21
MD Machine Direction	TD Transverse Direction											

APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.1 GCL Inventory Control Log

Parkhill

GCL INVENTORY CONTROL LOG

PROJECT NAME:	OWL Landfill	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico, Cell 5AB	SHEET NUMBER:	1
MATERIAL TYPE:	GCL	DATE OF INVENTORY:	See Below
MATERIAL IDENTIFICATION:	1109263-35011-6, Bentoliner 0.75lbs/ft ² , NS, Peel 35	INVENTORY MONITOR:	TBA
MATERIAL MANUFACTURER:	Solmax/GSE	UNLOADING METHOD:	Forklift and Sling

	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	0242-396174	1052223C	150	15.5	2,325	Y		6/14/2023
2	0242-396175	1052223C	150	15.5	2,325	Y	Y	6/14/2023
3	0242-396176	1052223C	150	15.5	2,325	Y		6/14/2023
4	0242-396177	1052223C	150	15.5	2,325	Y		6/14/2023
5	0242-396178	1052223C	150	15.5	2,325	Y		6/14/2023
6	0242-396179	1052223C	150	15.5	2,325	Y		6/14/2023
7	0242-396180	1052223C	150	15.5	2,325	Y		6/14/2023
8	0242-396181	1052223C	150	15.5	2,325	Y		6/14/2023
9	0242-396182	1052223C	150	15.5	2,325	Y		6/14/2023
10	0242-396183	1052223C	150	15.5	2,325	Y		6/14/2023
11	0242-396184	1052223C	150	15.5	2,325	Y		6/14/2023
12	0242-396185	1052223C	150	15.5	2,325	Y		6/14/2023
13	0242-396186	1052223C	150	15.5	2,325	Y		6/14/2023
14	0242-396187	1052223C	150	15.5	2,325	Y		6/14/2023
15	0242-396188	1052223C	150	15.5	2,325	Y		6/14/2023
16	0242-396189	1052223C	150	15.5	2,325	Y		6/14/2023
17	0242-396190	1052223C	150	15.5	2,325	Y		6/14/2023
18	0242-396191	1052223C	150	15.5	2,325	Y		6/14/2023
19	0242-396192	1052223C	150	15.5	2,325	Y		6/14/2023
20	0242-396193	1052223C	150	15.5	2,325	Y		6/14/2023
21	0242-396194	1052223C	150	15.5	2,325	Y		6/14/2023
22	0242-396195	1052223C	150	15.5	2,325	Y		6/14/2023
23	0242-396196	1052223C	150	15.5	2,325	Y		6/14/2023
24	0242-396197	1052223D	150	15.5	2,325	Y		6/14/2023
25	0242-396198	1052223D	150	15.5	2,325	Y		6/14/2023
26	0242-396199	1052223D	150	15.5	2,325	Y		6/14/2023
27	0242-396200	1052223D	150	15.5	2,325	Y		6/14/2023
28	0242-396201	1052223D	150	15.5	2,325	Y		6/14/2023
29	0242-396202	1052223D	150	15.5	2,325	Y		6/14/2023
30	0242-396203	1052223D	150	15.5	2,325	Y		6/14/2023
31	0242-396204	1052223D	150	15.5	2,325	Y		6/14/2023
32	0242-396205	1052223D	150	15.5	2,325	Y		6/14/2023
33	0242-396206	1052223D	150	15.5	2,325	Y		6/14/2023
34	0242-396207	1052223D	150	15.5	2,325	Y		6/14/2023
35	0242-396208	1052223D	150	15.5	2,325	Y		6/14/2023
36	0242-396209	1052223D	150	15.5	2,325	Y		6/14/2023
37	0242-396210	1052223D	150	15.5	2,325	Y		6/14/2023
38	0242-396211	1052223D	150	15.5	2,325	Y		6/14/2023
39	0242-396212	1052223D	150	15.5	2,325	Y		6/14/2023
40	0242-396213	1052223D	150	15.5	2,325	Y		6/14/2023

Parkhill

GCL INVENTORY CONTROL LOG

PROJECT NAME:	OWL Landfill	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico, Cell 5AB	SHEET NUMBER:	2
MATERIAL TYPE:	GCL	DATE OF INVENTORY:	See Below
MATERIAL IDENTIFICATION:	1109263-35011-6, Bentoliner 0.75lbs/ft ² , NS, Peel 35	INVENTORY MONITOR:	TBA
MATERIAL MANUFACTURER:	Solmax/GSE	UNLOADING METHOD:	Forklift and Sling

	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)			
41	0242-396214	1052223D	150	15.5	2,325	Y		6/14/2023
42	0242-396215	1052223D	150	15.5	2,325	Y		6/14/2023
43	0242-396216	1052223D	150	15.5	2,325	Y		6/14/2023
44	0242-396217	1052223D	150	15.5	2,325	Y		6/14/2023
45	0242-396218	1052223D	150	15.5	2,325	Y		6/14/2023
46	0242-396219	1052223D	150	15.5	2,325	Y	Y	6/14/2023
47	0242-396220	1052223D	150	15.5	2,325	Y		6/14/2023
48	0242-396221	1052223D	150	15.5	2,325	Y		6/14/2023
49	0242-396222	1052223D	150	15.5	2,325	Y		6/14/2023
50	0242-396223	1052223D	150	15.5	2,325	Y		6/14/2023
51	0242-396224	1052223D	150	15.5	2,325	Y		6/14/2023
52	0242-396225	1052323A	150	15.5	2,325	Y		6/14/2023
53	0242-396226	1052323A	150	15.5	2,325	Y		6/14/2023
54	0242-396227	1052323A	150	15.5	2,325	Y		6/14/2023
55	0242-396228	1052323A	150	15.5	2,325	Y		6/14/2023
56	0242-396229	1052323A	150	15.5	2,325	Y		6/14/2023
57	0242-396230	1052323A	150	15.5	2,325	Y		6/14/2023
58	0242-396231	1052323A	150	15.5	2,325	Y		6/14/2023
59	0242-396232	1052323A	150	15.5	2,325	Y		6/14/2023
60	0242-396233	1052323A	150	15.5	2,325	Y		6/14/2023
61	0242-396234	1052323A	150	15.5	2,325	Y		6/14/2023
62	0242-396235	1052323A	150	15.5	2,325	Y		6/14/2023
63	0242-396236	1052323A	150	15.5	2,325	Y		6/14/2023
64	0242-396237	1052323A	150	15.5	2,325	Y		6/14/2023
65	0242-396238	1052323A	150	15.5	2,325	Y		6/14/2023
66	0242-396239	1052323A	150	15.5	2,325	Y		6/14/2023
67	0242-396240	1052323A	150	15.5	2,325	Y		6/14/2023
68	0242-396241	1052323A	150	15.5	2,325	Y		6/14/2023
69	0242-396242	1052323A	150	15.5	2,325	Y		6/14/2023
70	0242-396243	1052323A	150	15.5	2,325	Y		6/14/2023
71	0242-396244	1052323A	150	15.5	2,325	Y		6/14/2023
72	0242-396245	1052323A	150	15.5	2,325	Y		6/14/2023
73	0242-396246	1052323A	150	15.5	2,325	Y		6/14/2023
74	0242-396247	1052323A	150	15.5	2,325	Y		6/14/2023
75	0242-396248	1052323A	150	15.5	2,325	Y		6/14/2023
76	0242-396249	1052323A	150	15.5	2,325	Y		6/14/2023
77	0242-396250	1052323A	150	15.5	2,325	Y		6/14/2023
78	0242-396251	1052323A	150	15.5	2,325	Y		6/14/2023
79	0242-396252	1052323A	150	15.5	2,325	Y		6/14/2023
80	0242-396253	1052323A	150	15.5	2,325	Y		6/14/2023

Parkhill

GCL INVENTORY CONTROL LOG

PROJECT NAME:	OWL Landfill	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico, Cell 5AB	SHEET NUMBER:	3
MATERIAL TYPE:	GCL	DATE OF INVENTORY:	See Below
MATERIAL IDENTIFICATION:	1109263-35011-6, Bentoliner 0.75lbs/ft ² , NS, Peel 35	INVENTORY MONITOR:	TBA
MATERIAL MANUFACTURER:	Solmax/GSE	UNLOADING METHOD:	Forklift and Sling

	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)			
81	0242-396254	1052323A	150	15.5	2,325	Y		6/14/2023
82	0242-396255	1052323A	150	15.5	2,325	Y		6/14/2023
83	0242-396256	1052323B	150	15.5	2,325	Y		6/14/2023
84	0242-396257	1052323B	150	15.5	2,325	Y		6/14/2023
85	0242-396258	1052323B	150	15.5	2,325	Y		6/14/2023
86	0242-396259	1052323B	150	15.5	2,325	Y		6/14/2023
87	0242-396260	1052323B	150	15.5	2,325	Y		6/14/2023
88	0242-396261	1052323B	150	15.5	2,325	Y		6/14/2023
89	0242-396262	1052323B	150	15.5	2,325	Y		6/14/2023
90	0242-396263	1052323B	150	15.5	2,325	Y	Y	6/14/2023
91	0242-396264	1052323B	150	15.5	2,325	Y		6/14/2023
92	0242-396265	1052323B	150	15.5	2,325	Y		6/14/2023
93	0242-396266	1052323B	150	15.5	2,325	Y		6/14/2023
94	0242-396267	1052323B	150	15.5	2,325	Y		6/14/2023
95	0242-396268	1052323B	150	15.5	2,325	Y		6/14/2023
96	0242-396269	1052323B	150	15.5	2,325	Y		6/14/2023
97	0242-396270	1052323B	150	15.5	2,325	Y		6/14/2023
98	0242-396271	1052323B	150	15.5	2,325	Y		6/14/2023
99	0242-396272	1052323B	150	15.5	2,325	Y		6/14/2023
100	0242-396273	1052323B	150	15.5	2,325	Y		6/14/2023
101	0242-396274	1052323B	150	15.5	2,325	Y		6/14/2023
102	0242-396275	1052323B	150	15.5	2,325	Y		6/15/2023
103	0242-396276	1052323B	150	15.5	2,325	Y		6/15/2023
104	0242-396277	1052323B	150	15.5	2,325	Y		6/15/2023
105	0242-396278	1052323B	150	15.5	2,325	Y		6/15/2023
106	0242-396279	1052323B	150	15.5	2,325	Y		6/15/2023
107	0242-396280	1052323B	150	15.5	2,325	Y		6/15/2023
108	0242-396281	1052323B	150	15.5	2,325	Y		6/15/2023
109	0242-396283	1052323C	150	15.5	2,325	Y		6/15/2023
110	0242-396284	1052323C	150	15.5	2,325	Y		6/15/2023
111	0242-396285	1052323C	150	15.5	2,325	Y		6/15/2023
112	0242-396286	1052323C	150	15.5	2,325	Y		6/15/2023
113	0242-396287	1052323C	150	15.5	2,325	Y		6/15/2023
114	0242-396288	1052323C	150	15.5	2,325	Y		6/15/2023
115	0242-396289	1052323C	150	15.5	2,325	Y		6/15/2023
116	0242-396290	1052323C	150	15.5	2,325	Y		6/15/2023
117	0242-396291	1052323C	150	15.5	2,325	Y		6/15/2023
118	0242-396292	1052323C	150	15.5	2,325	Y		6/15/2023
119	0242-396293	1052323C	150	15.5	2,325	Y		6/15/2023
120	0242-396294	1052323C	150	15.5	2,325	Y		6/15/2023

Parkhill

GCL INVENTORY CONTROL LOG

PROJECT NAME:	OWL Landfill	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico, Cell 5AB	SHEET NUMBER:	4
MATERIAL TYPE:	GCL	DATE OF INVENTORY:	See Below
MATERIAL IDENTIFICATION:	1109263-35011-6, Bentoliner 0.75lbs/ft ² , NS, Peel 35	INVENTORY MONITOR:	TBA
MATERIAL MANUFACTURER:	Solmax/GSE	UNLOADING METHOD:	Forklift and Sling

	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)			
121	0242-396295	1052323C	150	15.5	2,325	Y		6/15/2023
122	0242-396296	1052323C	150	15.5	2,325	Y		6/15/2023
123	0242-396297	1052323C	150	15.5	2,325	Y		6/15/2023
124	0242-396298	1052323C	150	15.5	2,325	Y		6/15/2023
125	0242-396299	1052323C	150	15.5	2,325	Y		6/15/2023
126	0242-396300	1052323C	150	15.5	2,325	Y		6/15/2023
127	0242-396301	1052323C	150	15.5	2,325	Y		6/15/2023
128	0242-396302	1052323C	150	15.5	2,325	Y		6/15/2023
129	0242-396303	1052323C	150	15.5	2,325	Y		6/15/2023
130	0242-396304	1052323C	150	15.5	2,325	Y		6/15/2023
131	0242-396305	1052323C	150	15.5	2,325	Y		6/15/2023
132	0242-396306	1052323C	150	15.5	2,325	Y		6/15/2023
133	0242-396307	1052323C	150	15.5	2,325	Y	Y	6/15/2023
134	0242-396308	1052323C	150	15.5	2,325	Y		6/15/2023
135	0242-396309	1052323C	150	15.5	2,325	Y		6/15/2023
136	0242-396310	1052323C	150	15.5	2,325	Y		6/15/2023
137	0242-396311	1052323C	150	15.5	2,325	Y		6/15/2023
138	0242-396312	1052323C	150	15.5	2,325	Y		6/15/2023
139	0242-396313	1052323D	150	15.5	2,325	Y		6/15/2023
140	0242-396314	1052323D	150	15.5	2,325	Y		6/15/2023
141	0242-396315	1052323D	150	15.5	2,325	Y		6/15/2023
142	0242-396316	1052323D	150	15.5	2,325	Y		6/15/2023
143	0242-396317	1052323D	150	15.5	2,325	Y		6/15/2023
144	0242-396318	1052323D	150	15.5	2,325	Y		6/15/2023
145	0242-396319	1052323D	150	15.5	2,325	Y		6/15/2023
146	0242-396320	1052323D	150	15.5	2,325	Y		6/15/2023
147	0242-396321	1052323D	150	15.5	2,325	Y		6/15/2023
148	0242-396322	1052323D	150	15.5	2,325	Y		6/15/2023
149	0242-396323	1052323D	150	15.5	2,325	Y		6/15/2023
150	0242-396324	1052323D	150	15.5	2,325	Y		6/15/2023
151	0242-396325	1052323D	150	15.5	2,325	Y		6/15/2023
152	0242-396326	1052323D	150	15.5	2,325	Y		6/15/2023
153	0242-396327	1052323D	150	15.5	2,325	Y		6/15/2023
154	0242-396328	1052323D	150	15.5	2,325	Y		6/15/2023
155	0242-396329	1052323D	150	15.5	2,325	Y		6/15/2023
156	0242-396330	1052323D	150	15.5	2,325	Y		6/15/2023
157	0242-396331	1052323D	150	15.5	2,325	Y		6/15/2023
158	0242-396332	1052323D	150	15.5	2,325	Y		6/15/2023

APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.2 Geonet Inventory Control Log

Parkhill

GEONET INVENTORY CONTROL LOG

PROJECT NAME:	OWL Landfill	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	1
MATERIAL TYPE:	Geonet	DATE OF INVENTORY:	See Below
MATERIAL IDENTIFICATION:	1106474-10668-4,HyperNet 200 mil	INVENTORY MONITOR:	TBA
MATERIAL MANUFACTURER:	Solmax/GSE	UNLOADING METHOD:	Forklift and Sling

	ROLL NUMBER	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE OF INVENTORY
			LENGTH (FT)	WIDTH (FT)	THICKNESS OF WEIGHT			
1	131601030001	BPTX 367413	330	15.0	200mil	Y	Y	7/17/2023
2	131601030002	BPTX 367413	330	15.0	200mil	Y		7/17/2023
3	131601030003	BPTX 367413	330	15.0	200mil	Y		7/17/2023
4	131601030004	BPTX 367413	330	15.0	200mil	Y		7/17/2023
5	131601030005	BPTX 367413	330	15.0	200mil	Y		7/17/2023
6	131601030006	BPTX 367413	330	15.0	200mil	Y		7/17/2023
7	131601030007	BPTX 367413	330	15.0	200mil	Y		7/17/2023
8	131601030008	BPTX 367413	330	15.0	200mil	Y		7/17/2023
9	131601030009	BPTX 367413	330	15.0	200mil	Y		7/17/2023
10	131601030010	BPTX 367413	330	15.0	200mil	Y	Y	7/17/2023
11	131601030011	BPTX 367413	330	15.0	200mil	Y		7/17/2023
12	131601030012	BPTX 367413	330	15.0	200mil	Y		7/17/2023
13	131601030013	BPTX 367413	330	15.0	200mil	Y		7/17/2023
14	131601030014	BPTX 367413	330	15.0	200mil	Y		7/17/2023
15	131601030015	BPTX 367413	330	15.0	200mil	Y		7/17/2023
16	131601030016	BPTX 367413	330	15.0	200mil	Y		7/17/2023
17	131601030017	BPTX 367413	330	15.0	200mil	Y		7/17/2023
18	131601030018	BPTX 367413	330	15.0	200mil	Y		7/17/2023
19	131601030019	BPTX 367413	330	15.0	200mil	Y		7/17/2023
20	131601030020	BPTX 367413	330	15.0	200mil	Y	Y	7/17/2023
21	131601030021	BPTX 367413	330	15.0	200mil	Y		7/17/2023
22	131601030022	BPTX 367413	330	15.0	200mil	Y		7/17/2023
23	131601030023	BPTX 367413	330	15.0	200mil	Y		7/17/2023
24	131601030024	BPTX 367413	330	15.0	200mil	Y		7/17/2023
25	131601030025	BPTX 367413	330	15.0	200mil	Y		7/17/2023
26	131601030026	BPTX 367413	330	15.0	200mil	Y		7/17/2023
27	131601030027	BPTX 367413	330	15.0	200mil	Y		7/17/2023
28	131601030028	BPTX 367413	330	15.0	200mil	Y		7/17/2023
29	131601030029	BPTX 367413	330	15.0	200mil	Y		7/17/2023
30	131601030030	BPTX 367413	330	15.0	200mil	Y	Y	7/17/2023
31	131601030031	BPTX 367413	330	15.0	200mil	Y		7/17/2023
32	131601030032	BPTX 367413	330	15.0	200mil	Y		7/17/2023
33	131601030033	BPTX 367413	330	15.0	200mil	Y		7/17/2023
34	131601030034	BPTX 367413	330	15.0	200mil	Y		7/17/2023
35	131601030035	BPTX 367413	330	15.0	200mil	Y		7/17/2023
36	131601030036	BPTX 367413	330	15.0	200mil	Y		7/17/2023
37	131601030037	BPTX 367413	330	15.0	200mil	Y		7/17/2023
38	131601030038	BPTX 367413	330	15.0	200mil	Y		7/17/2023
39	131601030039	BPTX 367413	330	15.0	200mil	Y		7/17/2023
40	131601030040	BPTX 367413	330	15.0	200mil	Y	Y	7/17/2023

Parkhill

GEONET INVENTORY CONTROL LOG

PROJECT NAME:	OWL Landfill	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	2
MATERIAL TYPE:	Geonet	DATE OF INVENTORY:	See Below
MATERIAL IDENTIFICATION:	1106474-10668-4,HyperNet 200 mil	INVENTORY MONITOR:	TBA
MATERIAL MANUFACTURER:	Solmax/GSE	UNLOADING METHOD:	Forklift and Sling

	ROLL NUMBER	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE OF INVENTORY
			LENGTH (FT)	WIDTH (FT)	THICKNESS OF WEIGHT			
41	131601030041	BPTX 367413	330	15.0	200mil	Y		7/17/2023
42	131601030042	BPTX 367413	330	15.0	200mil	Y		7/17/2023
43	131601030043	BPTX 367413	330	15.0	200mil	Y		7/17/2023
44	131601030044	BPTX 367413	330	15.0	200mil	Y		7/17/2023
45	131601030045	BPTX 367413	330	15.0	200mil	Y		7/17/2023
46	131601030046	BPTX 367413	330	15.0	200mil	Y		7/17/2023
47	131601030047	BPTX 367413	330	15.0	200mil	Y		7/17/2023
48	131601030048	BPTX 367413	330	15.0	200mil	Y		7/17/2023
49	131601030049	BPTX 367413	330	15.0	200mil	Y		7/17/2023
50	131601030050	BPTX 367413	330	15.0	200mil	Y	Y	7/17/2023
51	131601030051	BPTX 367413	330	15.0	200mil	Y		7/17/2023
52	131601030052	BPTX 367413	330	15.0	200mil	Y		7/17/2023
53	131601030053	BPTX 367413	330	15.0	200mil	Y		7/17/2023
54	131601030054	BPTX 367413	330	15.0	200mil	Y		7/17/2023
55	131601030055	BPTX 367413	330	15.0	200mil	Y		7/17/2023
56	131601030056	BPTX 367413	330	15.0	200mil	Y		7/17/2023
57	131601030057	BPTX 367413	330	15.0	200mil	Y		7/17/2023
58	131601030058	BPTX 367413	330	15.0	200mil	Y		7/17/2023
59	131601030059	BPTX 367413	330	15.0	200mil	Y		7/17/2023
60	131601030060	BPTX 367413	330	15.0	200mil	Y	Y	7/17/2023
61	131601030061	BPTX 367413	330	15.0	200mil	Y		7/17/2023
62	131601030062	BPTX 367413	330	15.0	200mil	Y		7/17/2023
63	131601030063	BPTX 367413	330	15.0	200mil	Y		7/17/2023
64	131601030064	BPTX 367413	330	15.0	200mil	Y		7/17/2023
65	131601030065	BPTX 367413	330	15.0	200mil	Y		7/17/2023
66	131601030066	BPTX 367413	330	15.0	200mil	Y		7/17/2023
67	131601030067	BPTX 367413	330	15.0	200mil	Y		7/17/2023
68	131601030068	BPTX 367413	330	15.0	200mil	Y		7/17/2023
69	131601030069	BPTX 367413	330	15.0	200mil	Y		7/17/2023
70	131601030070	BPTX 367413	330	15.0	200mil	Y	Y	7/17/2023
71	131601030071	BPTX 367413	330	15.0	200mil	Y		7/17/2023
72	131601030072	BPTX 367413	330	15.0	200mil	Y		7/17/2023
73	131601030073	BPTX 367413	330	15.0	200mil	Y		7/17/2023
74	131601030074	BPTX 367413	330	15.0	200mil	Y		7/17/2023
75	131601030075	BPTX 367413	330	15.0	200mil	Y		7/17/2023
76	131601030076	BPTX 367413	330	15.0	200mil	Y		7/17/2023
77	131601030077	BPTX 367413	330	15.0	200mil	Y		7/17/2023
78	131601030078	BPTX 367413	330	15.0	200mil	Y		7/17/2023
79	131601030079	BPTX 367413	330	15.0	200mil	Y		7/17/2023
80								

APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.3 FML Inventory Control Log

Parkhill

FML - SMOOTH - INVENTORY CONTROL LOG

PROJECT NAME:	OWL Landfill	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico, Cell 5AB	SHEET NUMBER:	1
MATERIAL TYPE:	Smooth FML	DATE OF INVENTORY:	See Below
MATERIAL IDENTIFICATION:	1101438, HDPE, 60 mil, Black Smooth	INVENTORY MONITOR:	TBA
MATERIAL MANUFACTURER:	Solmax/GSE	UNLOADING METHOD:	Forklift and Sling

	ROLL NUMBER	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE OF INVENTORY
			LENGTH (FT)	WIDTH (FT)	THICKNESS OF WEIGHT			
1	3112020082	23C1232	576	22.5	12,960	Y	Y	6/19/2023
2	3112020083	23C1232	576	22.5	12,960	Y		6/19/2023
3	3112020084	23C1232	576	22.5	12,960	Y		6/19/2023
4	3112020085	23C1232	576	22.5	12,960	Y		6/19/2023
5	3112020086	23C1232	576	22.5	12,960	Y		6/19/2023
6	3112020087	23C1232	576	22.5	12,960	Y		6/19/2023
7	3112020088	23C1232	576	22.5	12,960	Y		6/19/2023
8	3112020089	23C1232	576	22.5	12,960	Y	Y	6/19/2023
9	3112020090	23C1232	576	22.5	12,960	Y		6/19/2023
10	3112020091	23C1232	576	22.5	12,960	Y		6/19/2023
11	3112020092	23C1232	576	22.5	12,960	Y		6/19/2023
12	3112020093	23C1232	576	22.5	12,960	Y		6/19/2023
13	3112020094	23C1232	576	22.5	12,960	Y		6/19/2023
14	3112020095	23C1232	576	22.5	12,960	Y		6/19/2023
15	3112020096	23C1232	576	22.5	12,960	Y		6/19/2023
16	3112020097	23C1232	576	22.5	12,960	Y	Y	6/19/2023
17	3112020098	23C1232	576	22.5	12,960	Y		6/19/2023
18	3112020100	23C1232	576	22.5	12,960	Y		6/19/2023
19	3112020101	23C1232	576	22.5	12,960	Y		6/19/2023
20	3112020102	23C1232	576	22.5	12,960	Y		6/19/2023
21	3112020103	23C1232	576	22.5	12,960	Y		6/19/2023
22	3112020104	23C1232	576	22.5	12,960	Y		6/19/2023
23	3112020105	23C1232	576	22.5	12,960	Y	Y	6/19/2023
24	3112020106	23C1232	576	22.5	12,960	Y		6/19/2023
25	3112020107	23C1232	576	22.5	12,960	Y		6/19/2023
26	3112020108	23C1232	576	22.5	12,960	Y		6/19/2023
27	3112020109	23C1232	576	22.5	12,960	Y		6/19/2023
28	3112020110	23C1232	576	22.5	12,960	Y		6/19/2023
29	3112020111	23C1232	576	22.5	12,960	Y		6/19/2023
30	3112020112	23C1232	576	22.5	12,960	Y		6/19/2023
31	3112020113	23C1232	576	22.5	12,960	Y	Y	6/19/2023
32	3112020114	23C1232	576	22.5	12,960	Y		6/19/2023
33	3112020115	23C1232	576	22.5	12,960	Y		6/19/2023
34	3112020116	23C1232	576	22.5	12,960	Y		6/19/2023
35	3112020117	23C1230	576	22.5	12,960	Y		6/19/2023
36	3112020118	23C1230	576	22.5	12,960	Y		6/19/2023
37	3112020119	23C1230	576	22.5	12,960	Y		6/19/2023
38	3112020120	23C1230	576	22.5	12,960	Y	Y	6/19/2023
39	3112020121	23C1230	576	22.5	12,960	Y		6/19/2023
40	3112020122	23C1230	576	22.5	12,960	Y		6/19/2023



FML - SMOOTH - INVENTORY CONTROL LOG

PROJECT NAME:	OWL Landfill	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico, Cell 5AB	SHEET NUMBER:	2
MATERIAL TYPE:	Smooth FML	DATE OF INVENTORY:	See Below
MATERIAL IDENTIFICATION:	1101438, HDPE, 60 mil, Black Smooth	INVENTORY MONITOR:	TBA
MATERIAL MANUFACTURER:	Solmax/GSE	UNLOADING METHOD:	Forklift and Sling

	ROLL NUMBER	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE OF INVENTORY
			LENGTH (FT)	WIDTH (FT)	THICKNESS OF WEIGHT			
41	3112020123	23C1230	576	22.5	12,960	Y		6/19/2023
42	3112020124	23C1230	576	22.5	12,960	Y		6/19/2023
43	3112020125	23C1230	576	22.5	12,960	Y		6/19/2023
44	3112020126	23C1230	576	22.5	12,960	Y		6/19/2023
45	3112020127	23C1230	576	22.5	12,960	Y		6/19/2023
46	3112020128	23C1230	576	22.5	12,960	Y	Y	6/19/2023
47	3112020129	23C1230	576	22.5	12,960	Y		6/19/2023
48	3112020130	23C1230	576	22.5	12,960	Y		6/19/2023
49	3112020133	23C1230	576	22.5	12,960	Y		6/19/2023
50	3112020134	23C1230	576	22.5	12,960	Y		6/19/2023
51	3112020135	23C1230	576	22.5	12,960	Y		6/19/2023
52	3112020136	23C1230	576	22.5	12,960	Y		6/19/2023
53	3112020137	23C1230	576	22.5	12,960	Y	Y	6/19/2023
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FML - TEXTURED - INVENTORY CONTROL LOG

PROJECT NAME:	OWL Landfill	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico, Cell 5AB	SHEET NUMBER:	1
MATERIAL TYPE:	Smooth FML	DATE OF INVENTORY:	See Below
MATERIAL IDENTIFICATION:	1101438, HDPE, 60 mil, Black Textured	INVENTORY MONITOR:	TBA
MATERIAL MANUFACTURER:	Solmax/GSE	UNLOADING METHOD:	Forklift and Sling

	ROLL NUMBER	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE OF INVENTORY
			LENGTH (FT)	WIDTH (FT)	THICKNESS OF WEIGHT			
1	3111019364	23C1232	533	22.5	11,999	Y	Y	6/19/2023
2	3111019365	23C1232	533	22.5	11,999	Y		6/19/2023
3	3111019366	23C1232	533	22.5	11,999	Y		6/19/2023
4	3111019367	23C1232	533	22.5	11,999	Y		6/19/2023
5	3111019370	23C1232	533	22.5	11,999	Y		6/19/2023
6	3111019371	23C1232	533	22.5	11,999	Y		6/19/2023
7	3111019372	23C1232	533	22.5	11,999	Y		6/19/2023
8	3111019373	23C1232	533	22.5	11,999	Y		6/19/2023
9	3111019374	23C1232	533	22.5	11,999	Y		6/19/2023
10	3111019375	23C1232	533	22.5	11,999	Y		6/19/2023
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APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.4 Geocomposite Inventory Control Log



GEOCOMPOSITE INVENTORY CONTROL LOG

PROJECT NAME:	OWL Landfill	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico, Cell 5AB	SHEET NUMBER:	1
MATERIAL TYPE:	Geocomposite Double-Sided	DATE OF INVENTORY:	See Below
MATERIAL IDENTIFICATION:	1114746-35011-3, FabriNet 225 mil, Double-Sided, 10oz/yd ² , Nonwoven Cal.	INVENTORY MONITOR:	TBA
MATERIAL MANUFACTURER:	Solmax/GSE	UNLOADING METHOD:	Forklift and Sling

	ROLL NUMBER	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE OF INVENTORY
			LENGTH (FT)	WIDTH (FT)	THICKNESS OF WEIGHT			
1	0131601030001	BPTX 367413	232	14.75	225mil	Y		6/19/2023
2	0131601030002	BPTX 367413	232	14.75	225mil			6/19/2023
3	0131601030003	BPTX 367413	232	14.75	225mil			6/19/2023
4	0131601030004	BPTX 367413	232	14.75	225mil			6/19/2023
5	0131601030005	BPTX 367413	232	14.75	225mil			6/19/2023
6	0131601030006	BPTX 367413	232	14.75	225mil			6/19/2023
7	0131601030007	BPTX 367413	232	14.75	225mil			6/19/2023
8	0131601030008	BPTX 367413	232	14.75	225mil			6/19/2023
9	0131601030009	BPTX 367413	232	14.75	225mil			6/19/2023
10	0131601030010	BPTX 367413	232	14.75	225mil			6/19/2023
11	0131601030011	BPTX 367413	232	14.75	225mil			6/19/2023
12	0131601030012	BPTX 367413	232	14.75	225mil			6/19/2023
13	0131601030013	BPTX 367413	232	14.75	225mil			6/19/2023
14	0131601030014	BPTX 367413	232	14.75	225mil			6/19/2023
15	0131601030015	BPTX 367413	232	14.75	225mil	Y		6/19/2023
16	0131601030016	BPTX 367413	232	14.75	225mil			6/19/2023
17	0131601030017	BPTX 367413	232	14.75	225mil			6/19/2023
18	0131601030018	BPTX 367413	232	14.75	225mil			6/19/2023
19	0131601030019	BPTX 367413	232	14.75	225mil			6/19/2023
20	0131601030020	BPTX 367413	232	14.75	225mil			6/19/2023
21	0131601030021	BPTX 367413	232	14.75	225mil			6/19/2023
22	0131601030022	BPTX 367413	232	14.75	225mil			6/19/2023
23	0131601030023	BPTX 367413	232	14.75	225mil			6/19/2023
24	0131601030024	BPTX 367413	232	14.75	225mil			6/19/2023
25	0131601030025	BPTX 367413	232	14.75	225mil			6/19/2023
26	0131601030026	BPTX 367413	232	14.75	225mil			6/19/2023
27	0131601030027	BPTX 367413	232	14.75	225mil			6/19/2023
28	0131601030028	BPTX 367413	232	14.75	225mil			6/19/2023
29	0131601030029	BPTX 367413	232	14.75	225mil			6/19/2023
30	0131601030030	BPTX 367413	232	14.75	225mil			6/19/2023
31	0131601030031	BPTX 367413	232	14.75	225mil			6/19/2023
32	0131601030032	BPTX 367413	232	14.75	225mil			6/19/2023
33	0131601030033	BPTX 367413	232	14.75	225mil			6/19/2023
34	0131601030034	BPTX 367413	232	14.75	225mil			6/19/2023
35	0131601030035	BPTX 367413	232	14.75	225mil			6/19/2023
36	0131601030036	BPTX 367413	232	14.75	225mil			6/19/2023
37	0131601030037	BPTX 367413	232	14.75	225mil			6/19/2023
38	0131601030038	BPTX 367413	232	14.75	225mil			6/19/2023
39	0131601030039	BPTX 367413	232	14.75	225mil			6/19/2023
40	0131601030040	BPTX 367413	232	14.75	225mil			6/19/2023



GEOCOMPOSITE INVENTORY CONTROL LOG

PROJECT NAME:	OWL Landfill	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico, Cell 5AB	SHEET NUMBER:	1
MATERIAL TYPE:	Geocomposite Double-Sided	DATE OF INVENTORY:	See Below
MATERIAL IDENTIFICATION:	1114746-35011-3, FabriNet 225 mil, Double-Sided, 10oz/yd ² , Nonwoven Cal.	INVENTORY MONITOR:	TBA
MATERIAL MANUFACTURER:	Solmax/GSE	UNLOADING METHOD:	Forklift and Sling

	ROLL NUMBER	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE OF INVENTORY
			LENGTH (FT)	WIDTH (FT)	THICKNESS OF WEIGHT			
41	0131601030041	BPTX 367413	232	14.75	225mil			6/19/2023
42	0131601030042	BPTX 367413	232	14.75	225mil			6/19/2023
43	0131601030043	BPTX 367413	232	14.75	225mil			6/19/2023
44	0131601030044	BPTX 367413	232	14.75	225mil			6/19/2023
45	0131601030045	BPTX 367413	232	14.75	225mil			6/19/2023
46	0131601030046	BPTX 367413	232	14.75	225mil			6/19/2023
47	0131601030047	BPTX 367413	232	14.75	225mil			6/19/2023
48	0131601030048	BPTX 367413	232	14.75	225mil			6/19/2023
49	0131601030049	BPTX 367413	232	14.75	225mil			6/19/2023
50	0131601030050	BPTX 367413	232	14.75	225mil			6/19/2023
51	0131601030051	BPTX 367413	232	14.75	225mil			6/19/2023
52	0131601030052	BPTX 367413	232	14.75	225mil			6/19/2023
53	0131601030053	BPTX 367413	232	14.75	225mil			6/19/2023
54	0131601030054	BPTX 367413	232	14.75	225mil			6/19/2023
55	0131601030055	BPTX 367413	232	14.75	225mil			6/19/2023
56	0131601030056	BPTX 367413	232	14.75	225mil			6/19/2023
57	0131601030057	BPTX 367413	232	14.75	225mil			6/19/2023
58	0131601030058	BPTX 367413	232	14.75	225mil			6/19/2023
59	0131601030059	BPTX 367413	232	14.75	225mil			6/19/2023
60	0131601030060	BPTX 367413	232	14.75	225mil			6/19/2023
61	0131601030061	BPTX 367413	232	14.75	225mil			6/19/2023
62	0131601030062	BPTX 367413	232	14.75	225mil			6/19/2023
63	0131601030063	BPTX 367413	232	14.75	225mil			6/19/2023
64	0131601030064	BPTX 367413	232	14.75	225mil			6/19/2023
65	0131601030065	BPTX 367413	232	14.75	225mil			6/19/2023
66	0131601030066	BPTX 367413	232	14.75	225mil			6/19/2023
67	0131601030067	BPTX 367413	232	14.75	225mil			6/19/2023
68	0131601030068	BPTX 367413	232	14.75	225mil			6/19/2023
69	0131601030069	BPTX 367413	232	14.75	225mil			6/19/2023
70	0131601030070	BPTX 367413	232	14.75	225mil			6/19/2023
71	0131601030071	BPTX 367413	232	14.75	225mil			6/19/2023
72	0131601030072	BPTX 367413	232	14.75	225mil			6/19/2023
73	0131601030073	BPTX 367413	232	14.75	225mil			6/19/2023
74	0131601030074	BPTX 367413	232	14.75	225mil			6/19/2023
75	0131601030075	BPTX 367413	232	14.75	225mil			6/19/2023
76	0131601030076	BPTX 367413	232	14.75	225mil			6/19/2023
77	0131601030077	BPTX 367413	232	14.75	225mil			6/19/2023
78	0131601030078	BPTX 367413	232	14.75	225mil			6/19/2023
79	0131601030079	BPTX 367413	232	14.75	225mil			6/19/2023
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GEOCOMPOSITE INVENTORY CONTROL LOG

PROJECT NAME:	OWL Landfill	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico, Cell 5AB	SHEET NUMBER:	1
MATERIAL TYPE:	Geocomposite Single-Sided	DATE OF INVENTORY:	See Below
MATERIAL IDENTIFICATION:	1106338-35011-4, FabriNet 200 mil, Single-Sided, 10oz/yd ² , Nonwoven Cal.	INVENTORY MONITOR:	TBA
MATERIAL MANUFACTURER:	Solmax/GSE	UNLOADING METHOD:	Forklift and Sling

	ROLL NUMBER	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE OF INVENTORY
			LENGTH (FT)	WIDTH (FT)	THICKNESS OF WEIGHT			
1	0131601010001	BPTX 367413	288	14.75	200mil	Y		6/19/2023
2	0131601010002	BPTX 367413	288	14.75	200mil	Y	Y	6/19/2023
3	0131601010003	BPTX 367413	288	14.75	200mil	Y		6/19/2023
4	0131601010004	BPTX 367413	288	14.75	200mil	Y		6/19/2023
5	0131601010005	BPTX 367413	288	14.75	200mil	Y		6/19/2023
6	0131601010006	BPTX 367413	288	14.75	200mil	Y		6/19/2023
7	0131601010007	BPTX 367413	288	14.75	200mil	Y		6/19/2023
8	0131601010008	BPTX 367413	288	14.75	200mil	Y		6/19/2023
9	0131601010009	BPTX 367413	288	14.75	200mil	Y		6/19/2023
10	0131601010010	BPTX 367413	288	14.75	200mil	Y		6/19/2023
11	0131601010011	BPTX 367413	288	14.75	200mil	Y		6/19/2023
12	0131601010012	BPTX 367413	288	14.75	200mil	Y		6/19/2023
13	0131601010013	BPTX 367413	288	14.75	200mil	Y		6/19/2023
14	0131601010014	BPTX 367413	288	14.75	200mil	Y		6/19/2023
15	0131601010015	BPTX 367413	288	14.75	200mil	Y		6/19/2023
16	0131601010016	BPTX 367413	288	14.75	200mil	Y		6/19/2023
17	0131601010017	BPTX 367413	288	14.75	200mil	Y		6/19/2023
18	0131601010018	BPTX 367413	288	14.75	200mil	Y		6/19/2023
19	0131601010019	BPTX 367413	288	14.75	200mil	Y		6/19/2023
20	0131601010020	BPTX 367413	288	14.75	200mil	Y		6/19/2023
21	0131601010021	BPTX 367413	288	14.75	200mil	Y		6/19/2023
22	0131601010022	BPTX 367413	288	14.75	200mil	Y		6/19/2023
23	0131601010023	BPTX 367413	288	14.75	200mil	Y		6/19/2023
24	0131601010024	BPTX 367413	288	14.75	200mil	Y		6/19/2023
25	0131601010025	BPTX 367413	288	14.75	200mil	Y		6/19/2023
26	0131601010026	BPTX 367413	288	14.75	200mil	Y		6/19/2023
27	0131601010027	BPTX 367413	288	14.75	200mil	Y		6/19/2023
28	0131601010028	BPTX 367413	288	14.75	200mil	Y		6/19/2023
29	0131601010029	BPTX 367413	288	14.75	200mil	Y		6/19/2023
30	0131601010030	BPTX 367413	288	14.75	200mil	Y	Y	6/19/2023
31	0131601010031	BPTX 367413	288	14.75	200mil	Y		6/19/2023
32	0131601010032	BPTX 367413	288	14.75	200mil	Y		6/19/2023
33	0131601010033	BPTX 367413	288	14.75	200mil	Y		6/19/2023
34	0131601010034	BPTX 367413	288	14.75	200mil	Y		6/19/2023
35	0131601010035	BPTX 367413	288	14.75	200mil	Y		6/19/2023
36	0131601010036	BPTX 367413	288	14.75	200mil	Y		6/19/2023
37	0131601010037	BPTX 367413	288	14.75	200mil	Y		6/19/2023
38	0131601010038	BPTX 367413	288	14.75	200mil	Y		6/19/2023
39	0131601010039	BPTX 367413	288	14.75	200mil	Y		6/19/2023
40	0131601010040	BPTX 367414	288	14.75	200mil	Y		6/19/2023

Parkhill

GEOCOMPOSITE INVENTORY CONTROL LOG

PROJECT NAME:	OWL Landfill	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico, Cell 5AB	SHEET NUMBER:	1
MATERIAL TYPE:	Geocomposite Single-Sided	DATE OF INVENTORY:	See Below
MATERIAL IDENTIFICATION:	1106338-35011-4, FabriNet 200 mil, Single-Sided, 10oz/yd ² , Nonwoven Cal.	INVENTORY MONITOR:	TBA
MATERIAL MANUFACTURER:	Solmax/GSE	UNLOADING METHOD:	Forklift and Sling

	ROLL NUMBER	MATERIAL ID NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	DATE OF INVENTORY
			LENGTH (FT)	WIDTH (FT)	THICKNESS OF WEIGHT			
41	0131601010041	BPTX 367413	288	14.75	200mil	Y		6/19/2023
42	0131601010042	BPTX 367413	288	14.75	200mil	Y		6/19/2023
43	0131601010043	BPTX 367413	288	14.75	200mil	Y		6/19/2023
44	0131601010044	BPTX 367413	288	14.75	200mil	Y		6/19/2023
45	0131601010045	BPTX 367413	288	14.75	200mil	Y		6/19/2023
46	0131601010046	BPTX 367413	288	14.75	200mil	Y		6/19/2023
47	0131601010047	BPTX 367413	288	14.75	200mil	Y		6/19/2023
48	0131601010048	BPTX 367413	288	14.75	200mil	Y		6/19/2023
49	0131601010049	BPTX 367413	288	14.75	200mil	Y		6/19/2023
50	0131601010050	BPTX 367413	288	14.75	200mil	Y		6/19/2023
51	0131601010051	BPTX 367413	288	14.75	200mil	Y		6/19/2023
52	0131601010052	BPTX 367413	288	14.75	200mil	Y		6/19/2023
53	0131601010053	BPTX 367413	288	14.75	200mil	Y		6/19/2023
54	0131601010054	BPTX 367413	288	14.75	200mil	Y		6/19/2023
55	0131601010055	BPTX 367413	288	14.75	200mil	Y		6/19/2023
56	0131601010056	BPTX 367413	288	14.75	200mil	Y		6/19/2023
57	0131601010057	BPTX 367413	288	14.75	200mil	Y		6/19/2023
58	0131601010058	BPTX 367413	288	14.75	200mil	Y	Y	6/19/2023
59	0131601010059	BPTX 367413	288	14.75	200mil	Y		6/19/2023
60	0131601010060	BPTX 367413	288	14.75	200mil	Y		6/19/2023
61	0131601010061	BPTX 367413	288	14.75	200mil	Y		6/19/2023
62	0131601010062	BPTX 367413	288	14.75	200mil	Y		6/19/2023
63	0131601010063	BPTX 367413	288	14.75	200mil	Y		6/19/2023
64	0131601010064	BPTX 367413	288	14.75	200mil	Y		6/19/2023
65	0131601010065	BPTX 367413	288	14.75	200mil	Y		6/19/2023
66	0131601010066	BPTX 367413	288	14.75	200mil	Y		6/19/2023
67	0131601010067	BPTX 367413	288	14.75	200mil	Y		6/19/2023
68	0131601010068	BPTX 367413	288	14.75	200mil	Y		6/19/2023
69	0131601010069	BPTX 367413	288	14.75	200mil	Y		6/19/2023
70	0131601010070	BPTX 367413	288	14.75	200mil	Y		6/19/2023
71	0131601010071	BPTX 367413	288	14.75	200mil	Y		6/19/2023
72	0131601010072	BPTX 367413	288	14.75	200mil	Y		6/19/2023
73	0131601010073	BPTX 367413	288	14.75	200mil	Y		6/19/2023
74	0131601010074	BPTX 367413	288	14.75	200mil	Y		6/19/2023
75	0131601010075	BPTX 367413	288	14.75	200mil	Y		6/19/2023
76	0131601010076	BPTX 367413	288	14.75	200mil	Y		6/19/2023
77	0131601010077	BPTX 367413	288	14.75	200mil	Y		6/19/2023
78	0131601010078	BPTX 367413	288	14.75	200mil	Y		6/19/2023
79	0131601010079	BPTX 367413	288	14.75	200mil	Y		6/19/2023
80	0131601010080	BPTX 367414	288	14.75	200mil	Y		6/19/2023

APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.5 Leachate Pipe and Riser Pipe Inventory Control Log

LEACHATE COLLECTION AND RISER PIPE INVENTROY CONTROL LOG

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	1
MATERIAL TYPE	Pipe Inventory	DATE OF INVENTORY:	See Below
MATERIAL IDENTIFICATION:	See Below	INVENTORY MONITOR:	TBA
MATERIAL MANUFACTURER:	See Below	UNLOADING METHOD	Forklift and Sling

EQUIPMENT TYPE	QUANITY	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	TOTAL LENGTH (FT)	DATE OF INVENTORY
		LENGTH (FT)	DIAMETER (FT)	PIPE SDR			
Solid HDPE	22	40	0.5	14.0	Y	880	6/14/2023
End Cap	1	6	0.5	14.0	N	NA	6/14/2023
Tee	1	6	0.5	14.0	N	NA	6/14/2023
HDPE Blind Flange 6" Thick	1	6	0.5	14.0	N	NA	6/14/2023
Stainless Steel Rod 36"	1	NA	0.5	NA	N	3	6/14/2023
Stainless Steel Nuts	16	NA	0.5	NA	N	NA	6/14/2023
Stainless Steel Washers	16	NA	0.5	NA	N	NA	6/14/2023
Stainless Steel Backup Ring	1	NA	0.5	NA	N	NA	6/14/2023
Neoprene Gasket	1	NA	0.5	NA	N	NA	6/14/2023
6" Rubber Cap	1	NA	0.5	NA	N	NA	6/14/2023

APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.6 GCL Deployment Log

GCL DEPLOYMENT LOG					
PROJECT NAME:			PROJECT NUMBER:		
CLIENT:			CONTRACTOR:		
PROJECT LOCATION:			SHEET NUMBER:		
DEPLOYMENT LOCATION:			MONITOR:		
OWL Landfill Cell 5AB			7053.22		
Oilfield Water Logistics			Mustang Extreme		
Lea County, New Mexico			1		
Cell 5AB			MW		

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT ²)	DATE INSTALLED
1	6221	150	15.5	2,325	6/21/23
2	6265	150	15.5	2,325	6/21/23
3	6266	150	15.5	2,325	6/21/23
4	6236	150	15.5	2,325	6/21/23
5	6260	150	15.5	2,325	6/21/23
6	6222	150	15.5	2,325	6/21/23
7	6231	150	15.5	2,325	6/21/23
8	6237	150	15.5	2,325	6/21/23
9	6217	150	15.5	2,325	6/21/23
10	6213	150	15.5	2,325	6/21/23
11	6224	150	15.5	2,325	6/21/23
12	6218	150	15.5	2,325	6/21/23
13	6232	150	15.5	2,325	6/21/23
14	6238	150	15.5	2,325	6/21/23
15	6223	150	15.5	2,325	6/21/23
16	6214	150	15.5	2,325	6/21/23
17	6261	150	15.5	2,325	6/21/23
18	6251	150	15.5	2,325	6/21/23
19	6263	150	15.5	2,325	6/21/23
20	6215	150	15.5	2,325	6/21/23
21	6216	150	15.5	2,325	6/21/23
22	6252	150	15.5	2,325	6/21/23
23	6275	150	15.5	2,325	6/21/23
24	6247	150	15.5	2,325	6/21/23
25	6270	150	15.5	2,325	6/21/23
26	6248	150	15.5	2,325	6/21/23
27	6249	150	15.5	2,325	6/22/23
28	6253	150	15.5	2,325	6/22/23
29	6276	150	15.5	2,325	6/22/23
30	6246	150	15.5	2,325	6/22/23
31	6250	150	15.5	2,325	6/22/23
32	6254	63	15.5	977	6/22/23
33	6254	87	15.5	1,349	6/22/23
34	6271	150	15.5	2,325	6/22/23
35	6255	150	15.5	2,325	6/22/23
36	6273	150	15.5	2,325	6/22/23
37	6278	130	15.5	2,015	6/22/23
38	6278	20	15.5	310	6/22/23
39	6256	150	15.5	2,325	6/22/23
40	6272	150	15.5	2,325	6/22/23
TOTAL LINER PLACED (FT ²):				88,350	

GCL DEPLOYMENT LOG

PROJECT NAME:

OWL Landfill Cell 5AB

CLIENT:

Oilfield Water Logistics

PROJECT LOCATION:

Lea County, New Mexico

DEPLOYMENT LOCATION:

Cell 5AB

PROJECT NUMBER:

7053.22

CONTRACTOR:

Mustang Extreme

SHEET NUMBER:

2

MONITOR:

MW

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT²)	DATE INSTALLED
41	6277	150	15.5	2,325	6/22/23
42	6274	150	15.5	2,325	6/22/23
43	6227	50	15.5	775	6/22/23
44	6227	100	15.5	1,550	6/22/23
45	6197	150	15.5	2,325	6/22/23
46	6230	150	15.5	2,325	6/22/23
47	6269	150	15.5	2,325	6/22/23
48	6228	105	15.5	1,628	6/22/23
49	6228	45	15.5	698	6/22/23
50	6198	150	15.5	2,325	6/22/23
51	6264	150	15.5	2,325	6/22/23
52	6199	150	15.5	2,325	6/22/23
53	6204	150	15.5	2,325	6/22/23
54	6267	36	15.5	558	6/22/23
55	6267	114	15.5	1,767	6/22/23
56	6268	150	15.5	2,325	6/22/23
57	6205	150	15.5	2,325	6/22/23
58	6244	150	15.5	2,325	6/22/23
59	62339	93	15.5	1,442	6/22/23
60	6239	57	15.5	884	6/22/23
61	6284	150	15.5	2,325	6/22/23
62	6245	150	15.5	2,325	6/22/23
63	6240	150	15.5	2,325	6/22/23
64	6257	150	15.5	2,325	6/22/23
65	6308	30	15.5	465	6/22/23
66	6388	120	15.5	1,860	6/22/23
67	6320	150	15.5	2,325	6/22/23
68	6321	150	15.5	2,325	6/22/23
69	6319	150	15.5	2,325	6/22/23
70	6203	81	15.5	1,256	6/22/23
71	6203	69	15.5	1,070	6/22/23
72	6243	150	15.5	2,325	6/22/23
73	6229	150	15.5	2,325	6/22/23
74	6262	150	15.5	2,325	6/22/23
75	6226	150	15.5	2,325	6/22/23
76	6196	7	15.5	109	6/22/23
77	6196	143	15.5	2,217	6/22/23
78	6235	150	15.5	2,325	6/22/23
79	66259	150	15.5	2,325	6/22/23
80	6220	150	15.5	2,325	6/22/23
TOTAL LINER PLACED (FT²):				76,725	

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GCL DEPLOYMENT LOG

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	3
DEPLOYMENT LOCATION:	Cell 5AB	MONITOR:	MW

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT ²)	DATE INSTALLED
81	6258	72	15.5	1,116	6/22/23
82	6258	78	15.5	1,209	6/22/23
83	6234	150	15.5	2,325	6/23/23
84	6327	150	15.5	2,325	6/23/23
85	6316	150	15.5	2,325	6/23/23
86	6370	142	15.5	2,201	6/23/23
87	6311	150	15.5	2,325	6/23/23
88	6315	150	15.5	2,325	6/23/23
89	6328	150	15.5	2,325	6/23/23
90	6192	150	15.5	2,325	6/23/23
91	6314	65	15.5	1,008	6/23/23
92	6214	85	15.5	1,318	6/23/23
93	6318	150	15.5	2,325	6/23/23
94	6309	150	15.5	2,325	6/23/23
95	3606	150	15.5	2,325	6/23/23
96	6299	120	15.5	1,860	6/23/23
97	6299	30	15.5	465	6/23/23
98	6331	150	15.5	2,325	6/23/23
99	6325	150	15.5	2,325	6/23/23
100	6313	150	15.5	2,325	6/23/23
101	6298	150	15.5	2,325	6/23/23
102	6332	45	15.5	698	6/23/23
103	6332	105	15.5	1,628	6/23/23
104	6189	150	15.5	2,325	6/23/23
105	6312	150	15.5	2,325	6/23/23
106	6191	150	15.5	2,325	6/23/23
107	6317	102	15.5	1,581	6/23/23
108	6317	48	15.5	744	6/23/23
109	6326	150	15.5	2,325	6/23/23
110	6193	150	15.5	2,325	6/23/23
111	6190	150	15.5	2,325	6/23/23
112	6233	150	15.5	2,325	6/23/23
113	6241	25	15.5	388	6/23/23
114	6241	125	15.5	1,938	6/23/23
115	6285	150	15.5	2,325	6/23/23
116	6242	150	15.5	2,325	6/23/23
117	6219	150	15.5	2,325	6/23/23
118	6180	100	15.5	1,550	6/23/23
119	6180	50	15.5	775	6/23/23
120	6188	150	15.5	2,325	6/23/23
TOTAL LINER PLACED (FT²):				76,601	



333 Rio Rancho Blvd. NE, Suite 400
Rio Rancho, New Mexico 87124
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GCL DEPLOYMENT LOG

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	4
DEPLOYMENT LOCATION:	Cell 5AB	MONITOR:	MW

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT ²)	DATE INSTALLED
121	6187	150	15.5	2,325	6/22/23
122	6174	150	15.5	2,325	6/22/23
123	6212	150	15.5	2,325	6/23/23
124	6186	150	15.5	2,325	6/23/23
125	6179	150	15.5	2,325	6/23/23
126	6185	150	15.5	2,325	6/23/23
127	6207	150	15.5	2,325	6/23/23
128	6206	70	15.5	1,085	6/23/23
129	6206	80	15.5	1,240	6/23/23
130	6208	150	15.5	2,325	6/23/23
131	6184	150	15.5	2,325	6/23/23
132	6183	150	15.5	2,325	6/23/23
133	6178	135	15.5	2,093	6/23/23
134	6178	15	15.5	233	6/23/23
135	6296	150	15.5	2,325	6/23/23
136	6295	150	15.5	2,325	6/23/23
137	6307	150	15.5	2,325	6/23/23
138	6324	150	15.5	2,325	6/23/23
139	6297	40	15.5	620	6/23/23
140	6297	110	15.5	1,705	6/23/23
141	6330	150	15.5	2,325	6/23/23
142	6329	150	15.5	2,325	6/23/23
143	6300	150	15.5	2,325	6/23/23
144	6301	114	15.5	1,767	6/23/23
145	6301	36	15.5	558	6/23/23
146	6175	150	15.5	2,325	6/23/23
147	6210	150	15.5	2,325	6/23/23
148	6211	150	15.5	2,325	6/23/23
149	6176	150	15.5	2,325	6/23/23
150	6182	30	15.5	465	6/23/23
151	6182	120	15.5	1,860	6/23/23
152	6181	150	15.5	2,325	6/23/23
153	6177	150	15.5	2,325	6/23/23
154	6305	150	15.5	2,325	6/23/23
155	6304	90	15.5	1,395	6/23/23
156	6304	60	15.5	930	6/23/23
157	6306	150	15.5	2,325	6/24/23
158	6202	150	15.5	2,325	6/24/23
159	6195	150	15.5	2,325	6/24/23
160	6201	150	15.5	2,325	6/24/23
TOTAL LINER PLACED (FT ²):				79,050	

APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.7 Secondary FML Deployment Log



333 Rio Rancho Blvd. NE, Suite 400
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SECONDARY FML - DEPLOYMENT LOG

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	1
DEPLOYMENT LOCATION:	Secondary	MONITOR:	MW

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT ²)	DATE INSTALLED
1	9366	122	24	2,928	6/21/23
2	9366	122	24	2,928	6/21/23
3	9366	122	24	2,928	6/21/23
4	9366	122	24	2,928	6/21/23
5	9374	122	24	2,928	6/21/23
6	9374	122	24	2,928	6/21/23
7	9374	122	24	2,928	6/21/23
8	9374	122	24	2,928	6/21/23
9	9372	123	24	2,952	6/21/23
10	9372	125	24	3,000	6/21/23
11	9372	125	24	3,000	6/21/23
12	9372	125	24	3,000	6/21/23
13	9370	125	24	3,000	6/21/23
14	9370	125	24	3,000	6/21/23
15	9370	125	24	3,000	6/21/23
16	9370	125	24	3,000	6/21/23
17	9364	125	24	3,000	6/21/23
18	9364	125	24	3,000	6/22/23
19	0115	540	24	12,960	6/22/23
20	0116	540	24	12,960	6/22/23
21	0100	540	24	12,960	6/22/23
22	0121	540	24	12,960	6/22/23
23	0108	540	24	12,960	6/22/23
24	0126	540	24	12,960	6/22/23
25	0119	142	24	3,408	6/22/23
26	0119	142	24	3,408	6/22/23
27	0119	142	24	3,408	6/22/23
28	0120	142	24	3,408	6/22/23
29	0120	142	24	3,408	6/22/23
30	0120	142	24	3,408	6/22/23
31	0136	540	24	12,960	6/23/23
32	0127	540	24	12,960	6/23/23
33	0125	540	24	12,960	6/23/23
34	0129	540	24	12,960	6/23/23
35	0123	540	24	12,960	6/23/23
36	0117	540	24	12,960	6/23/23
37	0118	540	24	12,960	6/23/23
38	0134	540	24	12,960	6/23/23
39	0083	540	24	12,960	6/23/23
TOTAL LINER PLACED (FT ²):				268,224	



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505.867.6990

SECONDARY FML - DEPLOYMENT LOG

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	2
DEPLOYMENT LOCATION:	Secondary	MONITOR:	MW

[illegible]

APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.8 Secondary and Primary FML Pre-Weld Qualification Test Logs

Parkhill333 Rio Rancho Blvd., Suite 400
Rio Rancho, New Mexico 87124**FML TRIAL SEAMING TEST LOG**

PROJECT NAME:		OWL Landfill Cell 5AB	PROJECT NUMBER:		7053.22	FUSION	PROJECT SPECIFICATIONS					
OWNER:		Oilfield Water Logistics	CONTRACTOR:		Mustang Extreme		TEXTURED: PEEL	90	lbs/in	SHEAR	120	lbs/in
PROJECT LOCATION:		Lea County, New Mexico	SHEET NUMBER:		1	EXTRUSION	TEXTURED: PEEL	90	lbs/in	SHEAR	120	lbs/in
							TEXTURED: PEEL	78	lbs/in	SHEAR		lbs/in
							TEXTURED: PEEL	78	lbs/in	SHEAR		lbs/in

DATE	TIME	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		EXTRUSION WELDS		FIELD TEST RESULTS								COMMENTS
					Temperature	Speed	Barrel Temp	Pre-Heat Temp	PEEL #1	PEEL #2	PEEL #3	SHEAR					
6/21/23	0950	VS	NK	57	850	500			119	116	120	127	119	118	141	130	Smooth/Smooth
6/21/23	0950	VS	NK	57	850	500			98	120	130	118	108	150	137	141	Textured/Textured
6/21/23	1000	VS	LH	68	850	500			105	98	115	105	97	120	124	122	Smooth/Smooth
6/21/23	1000	VS	LH	68	850	500			119	121	117	118	120	130	150	129	Textured/Textured
6/21/23	1305	VS	NK	57	850	500			115	107	120	121	113	106	146	139	Smooth/Smooth
6/21/23	1302	VS	LH	68	850	500			106	109	115	107	110	119	133	151	Smooth/Smooth
6/22/23	1000	VS	NK	57	850	500			110	120	103	99	121	102	140	127	Smooth/Smooth
6/22/23	1009	VS	LH	68	850	500			100	125	114	125	107	115	131	140	Smooth/Smooth
6/22/23	1013	VS	E2	68	850	500			101	106	119	108	124	124	132	139	Smooth/Smooth
6/22/23	1305	VS	NK	57	850	500			113	119	108	100	125	106	141	130	Smooth/Smooth
6/22/23	1302	VS	LH	68	850	500			103	122	120	114	109	117	130	129	Smooth/Smooth
6/22/23	1304	VS	E2	68	850	500			121	109	105	120	113	110	138	126	Smooth/Smooth
6/22/23	1401	VS	NK	57	850	500			115	109	120	115	119	105	140	132	Smooth/Textured
6/22/23	1310	VS	LH	68	850	500			120	105	105	123	104	109	108	131	Smooth/Textured
6/23/23	0830	VS	SL	244	850	500			94		104		110		159	155	Smooth/Smooth
6/23/23	1325	VS	LH	68	850	500			120	111	116	110	119	114	119	153	Textured/Textured
6/23/23	1310	VS	NK	57	850	500			112	123	108	116	98	119	131	147	Smooth/Smooth
6/23/23	1410	VS	SL	244	850	500			118	130	110	117	110	115	152	134	Smooth/Smooth
6/23/23	1315	VS	NK	57	850	500			117	123	108	121	111	119	150	143	Smooth/Smooth
6/23/23	1323	VS	LH	68	850	500			109	111	106	117	105	123	155	130	Smooth/Textured
6/24/23	0830	VS	SL	244	850	500	550		121		125		125		150	150	Smooth/Smooth
6/24/23	0930	VS	NK	57	850	500			103	114	115	109	112	120	151	154	Smooth/Smooth
6/24/23	0935	VS	LH	68	850	500			125	119	118	124	119	122	140	150	Smooth/Smooth
6/24/23	1315	VS	LH	68	850	500			107	115	103	119	110	121	153	140	Smooth/Smooth
6/24/23	1320	VS	LH	68	850	500			111	108	103	110	106	112	143	132	Smooth/Textured
6/26/23	0732	VS	SL	244	850	500	550		109		117		109		150	137	Smooth/Smooth
6/26/23	0735	VS	LH	68	850	500	550		119		120		125		142	141	Smooth/Smooth
6/26/23	0739	VS	NK	57	850	500	550		101		124		114		128	139	Smooth/Smooth
6/26/23	0745	VS	LH	68	850	500	500		110		120		113		148	135	Smooth/Textured
6/26/23	1435	VS	SL	244	850	500			112		121		116		145	140	Smooth/Textured
6/28/23	0730	VS	NK	57	850	500			109	121	98	116	103	124	147	162	Textured/Textured
6/28/23	0732	VS	LH	68	850	500			120	124	118	95	99	109	160	152	Textured/Textured
6/28/23	0740	VS	NK	57	850	500			109	120	118	114	106	102	168	157	Textured/Textured
6/28/23	1250	VS	NK	57	850	500			120	105	104	126	113	114	151	149	Textured/Textured
6/28/23	1253	VS	LH	68	850	500			121	104	118	109	116	118	161	146	Textured/Textured



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

FML TRIAL SEAMING TEST LOG

				PROJECT SPECIFICATIONS							
PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22	FUSION	TEXTURED:	PEEL	90	lbs/in	SHEAR	120	lbs/in
OWNER:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme		TEXTURED:	PEEL	90	lbs/in	SHEAR	120	lbs/in
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	2	EXTRUSION	TEXTURED:	PEEL	78	lbs/in	SHEAR		lbs/in
					TEXTURED:	PEEL	78	lbs/in	SHEAR		lbs/in

[illegible]



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

FML TRIAL SEAMING TEST LOG

PROJECT SPECIFICATIONS

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22	FUSION	TEXTURED:	PEEL	90	lbs/in	SHEAR	120	lbs/in
OWNER:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme		TEXTURED:	PEEL	90	lbs/in	SHEAR	120	lbs/in
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	3	EXTRUSION	TEXTURED:	PEEL	78	lbs/in	SHEAR		lbs/in
					TEXTURED:	PEEL	78	lbs/in	SHEAR		lbs/in

[illegible]

APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.9 Secondary FML Seaming Log



333 Rio Rancho Blvd. NE, Suite 400
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SECONDARY FML - SEAMING LOG

PROJECT NAME: OWL Landfill Cell 5AB

OWNER: Oilfield Water Logistics

PROJECT LOCATION: Lea County, New Mexico

PROJECT NUMBER: 7053.22

CONTRACTOR: Mustang Extreme

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	6/21/23	1/2	122	1028	NK	57	850	500	1	MW
2	6/21/23	2/3	122	1033	LH	68	850	500		MW
3	6/21/23	3/4	122	1045	NK	57	850	500		MW
4	6/21/23	4/5	122	1050	LH	68	850	500	2	MW
5	6/21/23	5/6	122	1103	NK	57	850	500		MW
6	6/21/23	6/7	122	1103	LH	68	850	500		MW
7	6/21/23	7/8	123	1118	NK	57	850	500	3	MW
8	6/21/23	8/9	123	1122	LH	68	850	500		MW
9	6/21/23	9/10	125	1315	LH	68	850	500		MW
10	6/21/23	10/11	123	1320	NK	57	850	500	4	MW
11	6/21/23	11/12	123	1325	LH	68	850	500		MW
12	6/21/23	12/13	122	1335	NK	57	850	500		MW
13	6/21/23	13/14	122	1343	LH	68	850	500	5	MW
14	6/21/23	14/15	122	1350	NK	57	850	500		MW
15	6/21/23	15/16	122	1355	LH	68	850	500		MW
16	6/21/23	16/17	122	1410	LH	68	850	500	6	MW
17	6/21/23	17/18	122	1423	LH	68	850	500		MW
18	6/21/23	1/EX	122	1439	NK	57	850	500		MW
19	6/22/23	19/20	538	1042	NK	57	850	500	8	MW
20	6/22/23	20/21	538	1054	LH	68	850	500	9	MW
21	6/22/23	21/22	538	1100	EZ	02	850	500	10	MW
22	6/22/23	22/23	538	1330	NK	57	850	500	11	MW
23	6/22/23	23/24	538	1343	LH	68	850	500	12	MW
24	6/22/23	25/26	142	1350	EZ	02	850	500	13	MW
25	6/22/23	26/27	142	1408	EZ	02	850	500	14	MW



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

SECONDARY FML - SEAMING LOG

PROJECT NAME: OWL Landfill Cell 5AB

OWNER: Oilfield Water Logistics

PROJECT LOCATION: Lea County, New Mexico

PROJECT NUMBER: 7053.22

CONTRACTOR: Mustang Extreme

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	6/21/23	27/28	142	1428	EZ	02	850	500		MW
2	6/21/23	28/29	142	1431	NK	57	850	500	15	MW
3	6/21/23	29/30	142	1447	EZ	02	850	500	16	MW
4	6/21/23	1/19	24	1503	LH	68	850	500		MW
5	6/21/23	2/20	24	1506	LH	68	850	500		MW
6	6/21/23	3/21	24	1509	LH	68	850	500	7	MW
7	6/21/23	4/22	24	1512	LH	68	850	500		MW
8	6/21/23	5/23	24	1515	LH	68	850	500		MW
9	6/21/23	6/24	24	1518	LH	68	850	500		MW
10	6/21/23	19/25	24	1515	EZ	02	850	500		MW
11	6/21/23	20/26	24	1520	EZ	02	850	500		MW
12	6/21/23	21/27	24	1523	EZ	02	850	500		MW
13	6/21/23	22/28	24	1525	EZ	02	850	500		MW
14	6/21/23	23/29	24	1528	EZ	02	850	500		MW
15	6/21/23	24/30	24	1530	EZ	02	850	500		MW
16	6/21/23	25/EX	142	1525	NK	57	850	500		MW
17	6/21/23	19/EX A	30	1601	NK	57	850	500		MW
18	6/21/23	19/EX B	105	1607	NK	57	850	500		MW
19	6/22/23	19/EX C	111	1617	NK	57	850	500		MW
20	6/22/23	19/EX D	214	1628	NK	57	850	500		MW
21	6/22/23	19/EX E	78	1700	NK	57	850	500		MW
22	6/22/23	24/31	540	1333	NK	57	850	500	17	MW
23	6/22/23	31/32	540	1337	NK	57	850	500	18	MW
24	6/22/23	32/33	540	1350	NK	57	850	500	19	MW
25	6/22/23	34/35	540	1430	NK	57	850	500	21	MW



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

SECONDARY FML - SEAMING LOG

PROJECT NAME: OWL Landfill Cell 5AB

OWNER: Oilfield Water Logistics

PROJECT LOCATION: Lea County, New Mexico

PROJECT NUMBER: 7053.22

CONTRACTOR: Mustang Extreme

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	6/23/23	35/36	540	1440	LH	68	850	500	22	MW
2	6/23/23	36/37	540	1500	BK	02	850	500	23	MW
3	6/23/23	37/38	540	1528	SL	06	850	500	24	MW
4	6/23/23	38/39	540	1540	NK	57	850	500	25	MW
5	6/23/23	33/34	540	1414	SL	06	850	500	20	MW
6	6/23/23	30/40	143	1600	LH	68	850	500		MW
7	6/23/23	40/41	143	1613	BK	02	850	500		MW
8	6/23/23	41/42	143	1616	LH	68	850	500		MW
9	6/23/23	42/43	143	1632	LH	68	850	500		MW
10	6/23/23	43/44	143	1635	BK	02	850	500		MW
11	6/23/23	44/45	143	1631	SL	06	850	500		MW
12	6/23/23	45/46	143	1655	SL	06	850	500		MW
13	6/23/23	46/47	143	1705	BK	02	850	500		MW
14	6/23/23	49/48	143	1712	SL	06	850	500	30	MW
15	6/23/23	31/40	24	1715	NK	57	850	500		MW
16	6/23/23	32/41	24	1718	NK	57	850	500		MW
17	6/23/23	33/42	24	1721	NK	57	850	500		MW
18	6/23/23	34/43	24	1736	NK	57	850	500		MW
19	6/23/23	35/44	24	1739	NK	57	850	500		MW
20	6/23/23	36/45	24	1742	NK	57	850	500		MW
21	6/23/23	37/46	24	1745	NK	57	850	500		MW
22	6/23/23	38/47	24	1750	NK	57	850	500		MW
23	6/23/23	39/48	24	1755	NK	57	850	500		MW
24	6/23/23	7/31	24	1720	LH	68	850	500		MW
25	6/23/23	8/32	24	1723	LH	68	850	500		MW



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

SECONDARY FML - SEAMING LOG

PROJECT NAME: OWL Landfill Cell 5AB

OWNER: Oilfield Water Logistics

PROJECT LOCATION: Lea County, New Mexico

PROJECT NUMBER: 7053.22

CONTRACTOR: Mustang Extreme

SHEET NUMBER: 4

SEAMING LOCATION: Secondary

	DATE	PANEL #/PANEL #	APPROX. LENGTH WELDED	START TIME	SEAMER INITIALS	MACHINE #	TEMP SETTING	SPEED SETTING	DESTRUCTIVE TEST	MONITORED BY
1	6/23/23	9/33	24	1726	LH	68	850	500		MW
2	6/23/23	10/34	24	1729	LH	68	850	500		MW
3	6/23/23	11/35	24	1732	LH	68	850	500		MW
4	6/23/23	12/36	24	1735	LH	68	850	500		MW
5	6/23/23	13/37	24	1738	LH	68	850	500		MW
6	6/23/23	14/38	24	1741	LH	68	850	500		MW
7	6/23/23	15/39	24	1744	LH	68	850	500		MW
8	6/24/23	39/49	540	945	LH	68	850	500	26	MW
9	6/24/23	49/50	540	957	NK	57	850	500	27	MW
10	6/24/23	50/57	94	1427	LH	68	850	500	28	MW
11	6/24/23	48/51	143	1057	LH	68	850	500	31	MW
12	6/24/23	51/52	143	1108	NK	57	850	500	32	MW
13	6/24/23	49/51	24	1045	LH	68	850	500		MW
14	6/24/23	50/52	24	1051	LH	68	850	500		MW
15	6/24/23	16/49	24	1520	LH	68	850	500	29	MW
16	6/24/23	17/50	24	1523	LH	68	850	500		MW
17	6/24/23	55/56	12	1340	LH	68	850	500		MW
18	6/24/23	53/54	12	1124	LH	68	850	500		MW
19	6/24/23	52/53	90	1332	LH	68	850	500		MW
20	6/24/23	52/54	53	1328	LH	68	850	500		MW
21	6/24/23	50/54	42	1323	LH	68	850	500		MW
22	6/24/23	18/55	12	1526	LH	68	850	500		MW
23	6/24/23	50/55	103	1407	LH	68	850	500		MW
24	6/24/23	50/56	103	1415	LH	68	850	500		MW
25	6/24/23	57/58	12	1400	LH	68	850	500		MW



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

SECONDARY FML - SEAMING LOG

PROJECT NAME: OWL Landfill Cell 5AB**OWNER:** Oilfield Water Logistics**PROJECT LOCATION:** Lea County, New Mexico**PROJECT NUMBER:** 7053.22**CONTRACTOR:** Mustang Extreme**SHEET NUMBER:** 5**SEAMING LOCATION:** Secondary

	DATE	PANEL #/PANEL #	APPROX. LENGTH WELDED	START TIME	SEAMER INITIALS	MACHINE #	TEMP SETTING	SPEED SETTING	DESTRUCTIVE TEST	MONITORED BY
1	6/24/23	56/57	12	1353	LH	68	850	500		MW
2	6/24/23	50/58	98	1436	LH	68	850	500		MW
3	6/24/23	58/59	12	1449	LH	68	850	500		MW
4	6/24/23	50/59	48	1500	LH	68	850	500		MW
5	6/24/23	59/60	12	1454	LH	68	850	500		MW
6	6/24/23	50/60	45	1506	LH	68	850	500		MW
7	6/24/23	54/60	12	1450	LH	68	850	500		MW
8										
9										
10										
11										
12										
13										
14										
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16										
17										
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20										
21										
22										
23										
24										
25										

APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.10 Secondary FML Seam Pressure Test Log

SECONDARY FML - SEAMING PRESSURE TEST LOG

PROJECT NAME:

OWL Landfill Cell 5AB

OWNER:

Oilfield Water Logistics

PROJECT LOCATION:

Lea County, New Mexico

PROJECT NUMBER:

7053.22

CONTRACTOR:

Mustang Extreme

SHEET NUMBER:

1

PROJECT SPECIFICATIONS

MIN START PSI:

30

TEST DURATION:

5 minutes

MAX PSI DROP:

30

PRESSURE TEST LOCATION: Secondary

	DATE	PANEL #/PANEL #	TESTER	TIME		PRESSURE		MONITORED BY	PASS/FAIL
				START	FINISH	INITIAL	FINAL		
1	6/21/23	1/2	VC	1100	1105	35	35	MW	PASS
2	6/21/23	2/3	VC	1102	1107	35	35	MW	PASS
3	6/21/23	3/4	VC	1104	1109	35	35	MW	PASS
4	6/21/23	4/5	VC	1105	1110	35	35	MW	PASS
5	6/21/23	5/6	VC	1118	1123	35	35	MW	PASS
6	6/21/23	6/7	VC	1121	1600	35	35	MW	PASS
7	6/21/23	7/8	VC	1255	1300	35	35	MW	PASS
8	6/21/23	8/9	VC	1258	1303	35	35	MW	PASS
9	6/21/23	9/10	VC	1335	1340	35	35	MW	PASS
10	6/21/23	10/11	VC	1337	1342	35	35	MW	PASS
11	6/21/23	11/12	VC	1340	1345	35	35	MW	PASS
12	6/21/23	12/13	VC	1345	1350	35	35	MW	PASS
13	6/21/23	13/14	VC	1405	1410	35	35	MW	PASS
14	6/21/23	14/15	VC	1407	1412	35	35	MW	PASS
15	6/21/23	15/16	VC	1409	1700	35	35	MW	PASS
16	6/21/23	16/17	VC	1425	1703	35	35	MW	PASS
17	6/21/23	17/18 A	VC	1435	1440	35	35	MW	PASS
18	6/21/23	17/18 B	VC	1430	1435	35	35	MW	PASS
19	6/21/23	1/EX A	VC	1455	1500	35	35	MW	PASS
20	6/21/23	1/EX B	VC	1458	1503	35	35	MW	PASS
21	6/21/23	1/EX C	VC	1505	1510	35	35	MW	PASS
22	6/22/33	19/20	VC	1303	1308	35	35	MW	PASS
23	6/22/33	20/21	VC	1305	1310	35	35	MW	PASS
24	6/22/33	21/22 A	VC	1310	1315	35	35	MW	PASS
25	6/22/33	21/22 B	VC	1313	1318	35	35	MW	PASS
26	6/22/33	21/212 C	VC	1315	1320	35	35	MW	PASS
27	6/22/33	22/23	VC	1440	1445	35	35	MW	PASS
28	6/22/33	23/24	VC	1442	1447	35	35	MW	PASS
29	6/22/33	25/26	VC	1410	1415	35	35	MW	PASS
30	6/22/33	26/27	VC	1426	1431	35	35	MW	PASS
31	6/22/33	27/28	VC	1447	1452	35	35	MW	PASS
32	6/22/33	28/29	VC	1449	1454	35	35	MW	PASS
33	6/22/33	29/30 A	VC	1455	1500	35	35	MW	PASS
34	6/22/33	29/30 B	VC	1510	1515	35	35	MW	PASS
35	6/22/33	19/25	VC	1530	1535	35	35	MW	PASS
36	6/22/33	20/26	VC	1532	1537	35	35	MW	PASS
37	6/22/33	21/27	VC	1534	1539	35	35	MW	PASS
38	6/22/33	22/28	VC	1535	1540	35	35	MW	PASS
39	6/22/33	23/29	VC	1537	1542	35	35	MW	PASS
40	6/22/33	24/30	VC	1540	1545	35	35	MW	PASS
41	6/22/33	25/EX A	VC	1543	1548	35	35	MW	PASS
42	6/22/33	25/EX B	VC	1545	1550	35	35	MW	PASS
43	6/22/33	25/EX C	VC	1605	1610	35	35	MW	PASS
44	6/22/33	19/EX A	VC	1609	1614	35	35	MW	PASS
45	6/22/33	19/EX B	VC	1620	1625	35	35	MW	PASS
46	6/22/33	19/EX C	VC	1632	1637	35	35	MW	PASS
47	6/22/33	19/EX D	VC	1705	1710	35	35	MW	PASS
48	6/22/33	19/EX E	VC	1712	1717	35	35	MW	PASS
49									
50									



333 Rio Rancho Blvd., Suite 400
Rio Rancho, New Mexico 87124
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SECONDARY FML - SEAMING PRESSURE TEST LOG

PROJECT NAME: OWL Landfill Cell 5AB **PROJECT NUMBER:** 7053.22
OWNER: Oilfield Water Logistics **CONTRACTOR:** Mustang Extreme
PROJECT LOCATION: Lea County, New Mexico **SHEET NUMBER:** 2

PROJECT SPECIFICATIONS	
MIN START PSI:	30
TEST DURATION:	5 minutes
MAX PSI DROP:	30

PRESSURE TEST LOCATION: Secondary

	DATE	PANEL #/PANEL #	TESTER	TIME		PRESSURE		MONITORED BY	PASS/FAIL
				START	FINISH	INITIAL	FINAL		
1	6/23/23	24/31	VC	1430	1435	35	35	MW	PASS
2	6/23/23	31/32	VC	1432	1437	35	35	MW	PASS
3	6/23/23	32/33 B	VC	1400	1405	35	34	MW	PASS
4	6/23/23	33/34	VC	1515	1520	35	35	MW	PASS
5	6/23/23	34/35	VC	1540	1545	35	35	MW	PASS
6	6/23/23	35/36 A	VC	1555	1600	35	35	MW	PASS
7	6/23/23	36/37	VC	1605	1610	35	35	MW	PASS
8	6/23/23	37/38	VC	1618	1623	35	35	MW	PASS
9	6/23/23	38/39 A	VC	1703	1708	35	35	MW	PASS
10	6/23/23	35/36 B	VC	1600	1605	35	35	MW	PASS
11	6/23/23	35/36 C	VC	1602	1607	35	35	MW	PASS
12	6/23/23	30/40	VC	1616	1621	35	35	MW	PASS
13	6/23/23	40/41	VC	1632	1637	35	35	MW	PASS
14	6/23/23	41/42	VC	1634	1639	35	35	MW	PASS
15	6/23/23	42/43	VC	1655	1700	35	35	MW	PASS
16	6/23/23	43/44	VC	1658	1703	35	35	MW	PASS
17	6/23/23	44/45	VC	1700	1705	35	35	MW	PASS
18	6/23/23	45/46	VC	1715	1720	35	35	MW	PASS
19	6/23/23	46/47	VC	1720	1725	35	35	MW	PASS
20	6/23/23	47/48	VC	1725	1730	35	35	MW	PASS
21	6/23/23	38/39	VC	1705	1710	35	35	MW	PASS
22	6/23/23	39/48	VC	1802	1807	35	35	MW	PASS
23	6/23/23	38/47	VC	1800	1805	35	35	MW	PASS
24	6/23/23	37/46	VC	1752	1757	35	35	MW	PASS
25	6/23/23	36/45	VC	1750	1755	35	35	MW	PASS
26	6/23/23	35/44	VC	1749	1754	35	35	MW	PASS
27	6/23/23	34/43	VC	1745	1750	35	35	MW	PASS
28	6/23/23	33/42	VC	1732	1737	35	34	MW	PASS
29	6/23/23	32/41	VC	1730	1735	35	35	MW	PASS
30	6/23/23	31/40	VC	1728	1733	35	35	MW	PASS
31	6/24/23	7/31	VC	700	705	35	35	MW	PASS
32	6/24/23	8/32 A	VC	710	715	35	35	MW	PASS
33	6/24/23	9/33	VC	715	720	35	35	MW	PASS
34	6/24/23	8/32 B	VC	712	717	35	35	MW	PASS
35	6/24/23	10/34	VC	717	722	35	35	MW	PASS
36	6/24/23	11/35	VC	720	725	35	35	MW	PASS
37	6/24/23	12/36	VC	722	727	35	35	MW	PASS
38	6/24/23	13/37	VC	725	730	35	35	MW	PASS
39	6/24/23	14/38	VC	727	732	35	35	MW	PASS
40	6/24/23	15/39	VC	740	745	35	35	MW	PASS
41	6/24/23	39/49	VC	1050	1055	35	35	MW	PASS
42	6/24/23	48/51	VC	1140	1145	35	35	MW	PASS
43	6/24/23	49/51	VC	1102	1107	35	35	MW	PASS
44	6/24/23	51/52	VC	1145	1150	35	35	MW	PASS
45	6/24/23	50/52	VC	1104	1109	35	35	MW	PASS
46	6/24/23	52/53	VC	1350	1355	35	35	MW	PASS
47	6/24/23	53/54	VC	1302	1307	35	35	MW	PASS
48	6/24/23	52/54	VC	1337	1342	35	35	MW	PASS
49	6/24/23	50/54	VC	1335	1340	35	35	MW	PASS
50	6/24/23	50/55	VC	1417	1422	35	35	MW	PASS

SECONDARY FML - SEAMING PRESSURE TEST LOG

PROJECT NAME:

OWL Landfill Cell 5AB

OWNER:

Oilfield Water Logistics

PROJECT LOCATION:

Lea County, New Mexico

PROJECT NUMBER:

7053.22

CONTRACTOR:

Mustang Extreme

SHEET NUMBER:

3

PROJECT SPECIFICATIONS

MIN START PSI:

30

TEST DURATION:

5 minutes

MAX PSI DROP:

30

PRESSURE TEST LOCATION: Secondary

	DATE	PANEL #/PANEL #	TESTER	TIME		PRESSURE		MONITORED BY	PASS/FAIL
				START	FINISH	INITIAL	FINAL		
1	6/24/23	55/56	VC	1400	1405	35	35	MW	PASS
2	6/24/23	50/56 A	VC	1425	1430	35	35	MW	PASS
3	6/24/23	50/56 B	VC	1428	1433	35	34	MW	PASS
4	6/24/23	50/57 A	VC	1432	1437	35	35	MW	PASS
5	6/24/23	56/59	VC	1405	1410	35	35	MW	PASS
6	6/24/23	50/57 B	VC	1438	1443	35	35	MW	PASS
7	6/24/23	57/58	VC	1409	1414	35	35	MW	PASS
8	6/24/23	50/58	VC	1450	1455	35	35	MW	PASS
9	6/24/23	58/59	VC						NO TEST (CAPPED R#87)
10	6/24/23	50/59	VC	1508	1513	35	35	MW	PASS
11	6/24/23	59/60	VC	1500	1505	35	35	MW	PASS
12	6/24/23	50/60	VC	1512	1517	35	35	MW	PASS
13	6/24/23	54/60	VC	1510	1515	35	35	MW	PASS
14	6/24/23	11/49	VC	1525	1530	35	35	MW	PASS
15	6/24/23	17/50	VC	1539	1544	35	35	MW	PASS
16	6/24/23	18/55	VC	1540	1545	35	35	MW	PASS
17	6/24/23	50/60	VC	1512	1517	35	35	MW	PASS
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APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.11 FML Seam Field Destructive Test Records



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

SECONDARY FML - DESTRUCTIVE FIELD TEST RECORD

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22	FUSION	TEXTURED: PEEL	90	lbs/in	SHEAR	120	lbs/in
OWNER:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme		TEXTURED: PEEL	90	lbs/in	SHEAR	120	lbs/in
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	1	EXTRUSION	TEXTURED: PEEL	78	lbs/in	SHEAR		lbs/in
					TEXTURED: PEEL	78	lbs/in	SHEAR		lbs/in

SAMPLE NO.	SEAM	DATE	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		FIELD TEST RESULTS													COMMENTS		
						Temperature	Speed	PEEL #1		PEEL #2		PEEL #3		PEEL #4		PEEL #5		SHEAR					
1	1/2	6/21/23	VS	NK	57	850	500	104	112	105	113	102	111	109	114	104	105	163	165	162	163	160	
2	4/5	6/21/23	VS	LH	68	850	500	98	106	109	117	97	114	110	121	112	116	157	136	163	154	138	
3	7/8	6/21/23	VS	NK	57	850	500	102	109	103	115	101	123	106	109	119	118	145	144	133	104	137	
4	10/11	6/21/23	VS	NK	57	850	500	99	107	108	109	116	126	102	105	97	114	149	140	135	168	169	
5	13/14	6/21/23	VS	LH	68	850	500	105	108	107	116	100	115	104	112	108	111	133	144	134	145	168	
6	16/17	6/21/23	VS	LH	68	850	500	100	106	97	111	96	107	103	107	104	106	157	155	131	134	146	
7	3/21	6/21/23	VS	LH	68	850	500	129	133	112	125	110	120	115	116	119	124	151	151	158	135	142	
8	19/25	6/21/23	VS	NK	57	850	500	100	109	94	97	103	107	104	106	120	115	135	146	127	132	144	
9	20/21	6/21/23	VS	LH	68	850	500	96	99	94	95	115	119	104	107	118	105	136	144	137	136	152	
10	21/22	6/21/23	VS	EZ	02	850	500	101	124	105	103	99	110	109	103	102	101	132	127	132	157	156	
11	22/23	6/21/23	VS	NK	57	850	500	99	126	99	114	99	119	100	123	113	117	130	141	135	143	132	
12	23/24	6/21/23	VS	EZ	02	850	500	117	114	101	108	115	121	124	123	111	113	136	152	125	161	150	
13	25/26	6/21/23	VS	EZ	02	850	500	101	100	100	116	98	121	125	112	115	123	156	153	139	149	130	
14	26/27	6/21/23	VS	EZ	02	850	500	110	107	103	106	102	111	103	119	105	111	141	143	135	132	130	
15	28/29	6/21/23	VS	NK	57	850	500	121	114	118	101	105	119	127	119	102	98	149	134	147	140	138	
16	29/30	6/21/23	VS	EZ	02	850	500	112	108	123	114	107	118	122	101	115	113	131	134	145	136	137	
17	24/31	6/23/23	VS	NK	57	850	500	101	115	108	114	101	108	99	102	105	109	136	155	141	137	153	
18	31/32	6/23/23	VS	LH	68	850	500	95	104	98	119	101	122	114	127	101	121	153	153	131	151	153	
19	32/33	6/23/23	VS	BK	02	850	500	103	107	95	114	105	116	94	112	103	111	145	131	153	155	134	
20	33/34	6/23/23	VS	SL	06	850	500	106	117	91	99	96	105	98	107	102	114	138	149	135	151	147	
21	34/35	6/23/23	VS	NK	57	850	500	103	128	107	130	126	104	123	115	101	119	142	138	133	157	149	
22	35/36	6/23/23	VS	LH	68	850	500	110	124	98	129	118	97	107	124	105	122	136	136	142	135	129	
23	36/37	6/23/23	VS	BK	02	850	500	114	1011	105	109	98	113	96	107	107	124	133	148	145	138	152	
24	37/38	6/23/23	VS	SL	06	850	500	95	104	100	103	108	112	120	114	105	111	137	136	140	145	152	
25	38/39	6/23/23	VS	NK	57	850	500	102	119	112	105	107	116	103	104	107	113	144	155	133	156	147	
26	39/49	6/24/23	VS	LH	68	850	500	101	109	108	122	120	118	112	116	105	121	107	149	161	145	142	
27	49/50	6/24/23	VS	NK	57	850	500	117	110	123	118	115	100	122	127	118	119	104	136	142	151	150	
28	50/57	6/24/23	VS	LH	68	850	500	121	119	102	115	109	108	120	123	121	114	144	149	154	148	167	
29	16/49	6/24/23	VS	LH	68	850	500	118	117	123	121	119	117	115	123	120	110	131	136	142	140	147	
30	47/48	6/23/23	VS	SL	06	850	500	105	115	106	118	115	123	104	116	122	117	143	132	147	125	132	
31	48/51	6/24/2023	VS	LH	68	850	500	117	128	115	124	118	125	112	116	125	124	140	145	130	121	155	
32	51/52	6/24/2023	VS	NK	57	850	500	109	120	105	103	114	126	121	108	115	111	135	140	136	138	149	



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

PRIMARY FML - DESTRUCTIVE FIELD TEST RECORD

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22	FUSION	TEXTURED: PEEL	90	lbs/in	SHEAR	120	lbs/in
OWNER:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme		TEXTURED: PEEL	90	lbs/in	SHEAR	120	lbs/in
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:		EXTRUSION	TEXTURED: PEEL	78	lbs/in	SHEAR		lbs/in
					TEXTURED: PEEL	78	lbs/in	SHEAR		lbs/in

SAMPLE NO.	SEAM	DATE	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		FIELD TEST RESULTS													COMMENTS		
						Temperature	Speed	PEEL #1		PEEL #2		PEEL #3		PEEL #4		PEEL #5		SHEAR					
1	1/2	6/30/23	VS	NK	57	850	500	121	115	102	114	119	126	108	121	120	123	145	132	141	164	139	
2	4/5	6/30/23	VS	NK	57	850	500	105	115	105	113	117	121	118	107	104	112	144	135	132	139	127	
3	6/7	6/30/23	VS	LH	68	850	500	110	108	104	115	119	120	112	116	102	118	130	142	147	151	133	
4	10/11	6/30/23	VS	LH	68	850	500	112	109	116	105	123	113	114	118	103	109	132	131	146	150	137	
5	13/14	6/30/23	VS	NK	57	850	500	110	98	109	104	101	106	123	120	109	117	131	141	140	128	138	
6	16/17	6/30/23	VS	LH	68	850	500	116	114	105	107	117	116	123	121	115	114	145	146	153	139	161	
7	18/19	6/30/23	VS	NK	57	850	500	99	124	135	118	111	113	120	116	104	123	161	152	149	130	134	
8	19/20	6/30/23	VS	NA	902	850	500	112	114	117	105	105	109	102	122	114	116	166	150	134	146	131	
9	20/21	6/30/23	VS	LH	68	850	500	102	112	107	116	105	108	109	125	124	118	132	128	145	159	160	
10	21/26	7/3/23	VS	LH	68	850	500	110	125	103	124	109	118	118	117	106	120	145	154	143	130	149	
11	26/27	7/3/23	VS	VC	906	850	500	102	109	118	123	117	106	98	121	115	114	142	172	137	140	148	
12	27/28	7/3/23	VS	NK	57	850	500	104	104	125	107	121	110	109	120	122	120	135	135	165	140	132	
13	28/29	7/3/23	VS	LH	68	850	500	101	112	110	117	132	105	116	95	111	109	139	137	166	150	169	
14	29/30	7/3/23	VS	NK	57	850	500	97	101	113	104	120	105	112	98	114	115	153	156	135	140	163	
15	30/31	7/3/23	VS	LH	68	850	500	98	104	115	121	106	118	108	103	97	110	132	125	138	152	140	
16	31/32	7/3/23	VS	VC	906	850	500	102	106	98	141	127	125	116	119	98	116	155	145	130	133	143	
17	32/33	7/3/23	VS	NK	57	850	500	116	114	122	88	123	112	124	121	101	117	150	101	148	147	151	
18	22/23	6/28/23	VS	NK	57	850	500	102	122	106	88	99	108	124	115	101	118	133	134	141	157	142	
19	23/24	6/28/23	VS	NA	902	850	500	117	116	121	119	109	105	123	120	114	104	149	131	137	140	166	
20	25/34	7/3/23	VS	LH	68	850	500	95	115	94	115	118	106	105	109	121	105	129	136	139	145	143	
21	34/35	7/3/23	VS	LH	68	850	500	95	104	102	118	105	115	113	114	123	107	141	134	149	169	159	
22	34/42	7/5/23	VS	NK	57	850	500	123	121	108	105	119	124	126	116	128	115	138	15	134	144	140	
23	42/43	7/5/23	VS	NK	57	850	500	103	110	109	125	109	107	116	113	98	107	148	161	136	154	145	
24	43/44	7/5/23	VS	LH	68	850	500	110	112	121	105	108	117	105	119	106	102	132	141	156	164	130	
25	44/45	7/5/23	VS	NK	57	850	500	108	125	123	101	104	113	123	119	126	115	139	140	156	154	138	
26	45/46	7/5/23	VS	LH	68	850	500	99	102	117	108	122	114	120	118	107	115	145	136	170	142	133	
27	47/48	7/5/23	VS	VC	906	850	500	109	116	110	121	101	113	119	107	115	104	144	143	142	151	161	
28	49/50	7/5/23	VS	NK	57	850	500	95	104	108	117	111	102	127	120	114	106	131	131	145	166	126	
29	6/27	7/5/23	VS	NK	57	850	500	101	103	114	120	108	126	124	113	119	120	129	154	160	157	130	
30	17/46	7/5/23	VS	NK	57	850	500	102	115	109	98	97	104	114	110	122	121	136	132	154	145	170	
31	46/52	7/8/23	VS	NK	57	850	500	104	115	108	116	120	114	101	115	110	123	141	165	180	135	133	
32	54/46	7/8/23	VS	NK	57	850	500	110	119	117	125	101	110	119	120	127	118	150	159	163	146	151	

APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.12 Geonet Deployment Log



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

GEONET DEPLOYMENT LOG

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	1
DEPLOYMENT LOCATION:	Floor	MONITOR:	MW

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT ²)	DATE INSTALLED
*Panels 1-45 are double sided geocomposite and recorded in Table C.17 "Leak Detection - Geocomposite Deployment Log"					
46	0037	300	14.5	4,350	6/27/23
47	0028	83	14.5	1,204	6/27/23
48	0011	300	14.5	4,350	6/27/23
49	0045	300	14.5	4,350	6/27/23
50	0009	300	14.5	4,350	6/27/23
51	0028	80	14.5	1,160	6/27/23
52	0008	300	14.5	4,350	6/27/23
53	0004	300	14.5	4,350	6/27/23
54	0028	90	14.5	1,305	6/27/23
55	0002	300	14.5	4,350	6/27/23
56	0012	300	14.5	4,350	6/27/23
57	0005	63	14.5	914	6/27/23
58	0035	300	14.5	4,350	6/27/23
59	0094	300	14.5	4,350	6/27/23
60	0005	73	14.5	1,059	6/27/23
61	0003	300	14.5	4,350	6/27/23
62	0013	300	14.5	4,350	6/27/23
63	0005	80	14.5	1,160	6/27/23
64	0025	300	14.5	4,350	6/27/23
65	0023	300	14.5	4,350	6/27/23
66	0005	75	14.5	1,088	6/27/23
67	0026	300	14.5	4,350	6/27/23
68	0010	300	14.5	4,350	6/27/23
69	0044	45	14.5	653	6/27/23
70	0026	300	14.5	4,350	6/27/23
71	0036	300	14.5	4,350	6/27/23
72	0044	52	14.5	754	6/27/23
73	0006	300	14.5	4,350	6/27/23
74	0030	300	14.5	4,350	6/27/23
75	0044	77	14.5	1,117	6/27/23
76	0031	300	14.5	4,350	6/29/23
77	0046	300	14.5	4,350	6/29/23
78	0044	78	14.5	1,131	6/29/23
79	0018	300	14.5	4,350	6/29/23
80	0007	300	14.5	4,350	6/29/23
81	0044	44	14.5	638	6/29/23
82	0005	30	14.5	435	6/29/23
83	0039	300	14.5	4,350	6/29/23
84	0040	300	14.5	4,350	6/29/23
85	0029	76	14.5	1,102	6/29/23
TOTAL LINER PLACED (FT ²):				126,817	



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

GEONET DEPLOYMENT LOG

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	2
DEPLOYMENT LOCATION:	Floor	MONITOR:	MW

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT ²)	DATE INSTALLED
86	0041	300	14.5	4,350	6/29/23
87	0048	300	14.5	4,350	6/29/23
88	0029	78	14.5	1,131	6/29/23
89	0043	300	14.5	4,350	6/29/23
90	0050	300	14.5	4,350	6/29/23
91	0029	76	14.5	1,102	6/29/23
92	0042	300	14.5	4,350	6/29/23
93	0049	300	14.5	4,350	6/29/23
94	0029	74	14.5	1,073	6/29/23
95	0053	300	14.5	4,350	6/29/23
96	0052	300	14.5	4,350	6/29/23
97	0051	300	14.5	4,350	6/29/23
98	0036	300	14.5	4,350	6/29/23
99	0047	300	14.5	4,350	6/29/23
100	0056	300	14.5	4,350	6/29/23
101	0068	300	14.5	4,350	6/29/23
102	0022	300	14.5	4,350	6/29/23
103	0032	300	14.5	4,350	6/29/23
104	0063	300	14.5	4,350	6/29/23
105	0069	300	14.5	4,350	6/29/23
106	0075	300	14.5	4,350	6/29/23
107	0059	300	14.5	4,350	6/29/23
108	0072	300	14.5	4,350	6/29/23
109	0024	300	14.5	4,350	6/29/23
110	0077	300	14.5	4,350	6/29/23
111	0055	300	14.5	4,350	6/29/23
112	0061	300	14.5	4,350	6/29/23
113	0065	300	14.5	4,350	6/29/23
114	0058	300	14.5	4,350	6/29/23
115	0067	300	14.5	4,350	6/29/23
116	0071	300	14.5	4,350	6/29/23
117	0060	300	14.5	4,350	6/29/23
118	0076	300	14.5	4,350	6/29/23
119	0070	300	14.5	4,350	6/29/23
120	0066	300	14.5	4,350	6/29/23
121	0015	72	14.5	1,044	6/29/23
122	0015	66	14.5	957	6/29/23
123	0015	63	14.5	914	6/29/23
124	0015	33	14.5	479	6/29/23
125	0016	65	14.5	943	6/29/23
TOTAL LINER PLACED (FT ²):				146,842	



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

GEONET DEPLOYMENT LOG

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	3
DEPLOYMENT LOCATION:	Floor	MONITOR:	MW

[illegible]

APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.13 Primary FML Deployment Log



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

PRIMARY FML - DEPLOYMENT LOG

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	1
DEPLOYMENT LOCATION:	Primary	MONITOR:	MW

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT ²)	DATE INSTALLED
1	9375	120	24	2,880	6/28/23
2	9375	122	24	2,928	6/28/23
3	9375	122	24	2,928	6/28/23
4	9367	122	24	2,928	6/28/23
5	9367	122	24	2,928	6/28/23
6	9367	122	24	2,928	6/28/23
7	9367	122	24	2,928	6/28/23
8	9373	123	24	2,952	6/28/23
9	9373	123	24	2,952	6/28/23
10	9373	123	24	2,952	6/28/23
11	9373	123	24	2,952	6/28/23
12	9364	124	24	2,976	6/28/23
13	9364	124	24	2,976	6/28/23
14	9371	124	24	2,976	6/28/23
15	9371	124	24	2,976	6/28/23
16	9371	124	24	2,976	6/28/23
17	9371	124	24	2,976	6/28/23
18	0104	538	24	12,912	6/30/23
19	0113	538	24	12,912	6/30/23
20	0110	538	24	12,912	6/30/23
21	0111	538	24	12,912	6/30/23
22	0106	538	24	12,912	6/30/23
23	0106	150	24	3,600	6/30/23
24	0106	150	24	3,600	6/30/23
25	0088	150	24	3,600	6/30/23
26	0107	538	24	12,912	6/30/23
27	0089	538	24	12,912	7/3/23
28	0090	538	24	12,912	7/3/23
29	0087	538	24	12,912	7/3/23
30	0095	538	24	12,912	7/3/23
31	0094	538	24	12,912	7/3/23
32	0091	538	24	12,912	7/3/23
33	0086	538	24	12,912	7/3/23
34	0093	150	24	3,600	7/3/23
35	0093	150	24	3,600	7/3/23
36	0093	150	24	3,600	7/3/23
37	0092	150	24	3,600	7/3/23
38	0092	150	24	3,600	7/3/23
39	0092	150	24	3,600	7/3/23
40	0097	150	24	3,600	7/3/23
TOTAL LINER PLACED (FT ²):				253,968	



333 Rio Rancho Blvd. NE, Suite 400
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505.867.6990

FML DEPLOYMENT LOG

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	2
DEPLOYMENT LOCATION:	Primary	MONITOR:	MW

[illegible]

APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.14 Primary FML Seaming Log



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505.867.6990

PRIMARY FML - SEAMING LOG

PROJECT NAME: OWL Landfill Cell 5AB

OWNER: Oilfield Water Logistics

PROJECT LOCATION: Lea County, New Mexico

PROJECT NUMBER: 7053.22

CONTRACTOR: Mustang Extreme

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	6/28/23	1/2	120	833	NK	57	850	500	1	VS/BE
2	6/28/23	2/3	122	847	LH	68	850	500		VS/BE
3	6/28/23	3/4	122	908	LH	57	850	500		VS/BE
4	6/28/23	4/5	122	931	LH	68	850	500	2	VS/BE
5	6/28/23	5/6	122	940	NK	57	850	500		VS/BE
6	6/28/23	6/7	122	1005	LH	68	850	500	3	VS/BE
7	6/28/23	7/8	123	1020	NK	57	850	500		VS/BE
8	6/28/23	8/9	123	1036	LH	68	850	500		VS/BE
9	6/28/23	9/10	123	1058	NK	57	850	500		VS/BE
10	6/28/23	10/11	124	1305	LH	68	850	500	4	VS/BE
11	6/28/23	11/12	124	1310	NK	57	850	500		VS/BE
12	6/28/23	12/13	124	1317	LH	68	850	500		VS/BE
13	6/28/23	13/14	124	1345	NK	57	850	500	5	VS/BE
14	6/28/23	14/15	124	1400	NK	57	850	500		VS/BE
15	6/28/23	15/16	124	1406	LH	68	850	500		VS/BE
16	6/28/23	16/17	124	1430	LH	68	850	500	6	VS/BE
17	6/28/23	1/EX	120	1455	NK	57	850	500		VS/BE
18	6/30/23	18/EX	538	1448	NK	57	850	500		VS/BE
19	6/30/23	18/19	538	851	NK	57	850	500	7	VS/BE
20	6/30/23	19/20	538	920	NK	902	850	500	8	VS/BE
21	6/30/23	20/21	538	959	LH	68	850	500	9	VS/BE
22	6/30/23	22/23	150	1040	NK	857	850	500	18	VS/BE
23	6/30/23	23/24	150	1052	NK	902	850	500	19	VS/BE
24	6/30/23	24/25	150	1111	NK	902	850	500		VS/BE
25	6/30/23	18/22	24	1112	NK	57	850	500		VS/BE



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

PRIMARY FML - SEAMING LOG

PROJECT NAME: OWL Landfill Cell 5AB

OWNER: Oilfield Water Logistics

PROJECT LOCATION: Lea County, New Mexico

PROJECT NUMBER: 7053.22

CONTRACTOR: Mustang Extreme

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	6/30/23	22/EX	150	1408	NK	57	850	500		VS/BE
2	6/30/23	19/23	24	1121	NK	57	850	500		VS/BE
3	6/30/23	20/24	24	1112	NK	57	850	500		VS/BE
4	6/30/23	21/25	24	1127	NK	57	850	500		VS/BE
5	7/3/23	26/27	538	730	VC	06	850	500	11	VS/BE
6	7/3/23	27/28	538	800	NK	57	850	500	12	VS/BE
7	7/3/23	28/29	538	848	LH	68	850	500	13	VS/BE
8	7/3/23	29/30	538	926	NK	57	850	500	14	VS/BE
9	7/3/23	30/31	538	1035	LH	68	850	500	15	VS/BE
10	7/3/23	25/34	154	1431	LH	68	850	500	20	VS/BE
11	7/3/23	34/35	154	1450	LH	68	850	500	21	VS/BE
12	7/3/23	35/36	154	1455	NK	57	850	500		VS/BE
13	7/3/23	36/37	154	1509	LH	68	850	500		VS/BE
14	7/3/23	37/38	154	1517	NK	57	850	500		VS/BE
15	7/3/23	38/39	154	1527	LH	68	850	500		VS/BE
16	7/3/23	39/40	154	1538	NK	57	850	500		VS/BE
17	7/3/23	40/41	154	1605	NK	57	850	500		VS/BE
18	7/3/23	26/34	234	1557	LH	68	850	500		VS/BE
19	7/3/23	27/35	24	1600	LH	68	850	500		VS/BE
20	7/3/23	28/36	24	1603	LH	68	850	500		VS/BE
21	7/3/23	29/37	24	1606	LH	68	850	500		VS/BE
22	7/3/23	30/38	24	1609	LH	68	850	500		VS/BE
23	7/3/23	31/39	24	1612	LH	68	850	500		VS/BE
24	7/3/23	32/40	24	1615	LH	68	850	500		VS/BE
25	7/3/23	33/41	24	1618	LH	68	850	500		VS/BE



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

PRIMARY FML - SEAMING LOG

PROJECT NAME: OWL Landfill Cell 5AB

OWNER: Oilfield Water Logistics

PROJECT LOCATION: Lea County, New Mexico

PROJECT NUMBER: 7053.22

CONTRACTOR: Mustang Extreme

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	7/3/23	21/26	538	735	LH	68	850	500	10	VS/BE
2	7/3/23	31/32	538	1325	VC	06	850	500	16	VS/BE
3	7/3/23	32/33	538	1335	NK	57	850	500	17	VS/BE
4	7/5/23	33/42	538	735	NK	57	850	500	22	VS/MW
5	7/5/23	42/43	538	735	VC	06	850	500	23	VS/MW
6	7/5/23	43/44	538	753	LH	68	850	500	24	VS/MW
7	7/5/23	44/45	538	855	NK	57	850	500	25	VS/MW
8	7/5/23	45/46	538	908	LH	68	850	500	26	VS/MW
9	7/5/23	41/47	154	915	VC	06	850	500		VS/MW
10	7/5/23	47/48	154	945	VC	06	850	500	27	VS/MW
11	7/5/23	48/49	154	1007	VC	06	850	500		VS/MW
12	7/5/23	49/50	154	1003	NK	57	850	500	28	VS/MW
13	7/5/23	50/51	154	1035	VC	06	850	500		VS/MW
14	6/30/23	1/18	24	1124	LH	68	850	500		VS/BE
15	6/30/23	2/19	24	1127	LH	68	850	500		VS/BE
16	6/30/23	3/20	24	1130	LH	68	850	500		VS/BE
17	6/30/23	4/21	24	1133	LH	68	850	500		VS/BE
18	7/3/23	5/25	24	1100	NK	57	850	500		VS/BE
19	7/3/23	6/27	24	1103	NK	57	850	500	30	VS/BE
20	7/3/23	7/28	24	1106	NK	57	850	500		VS/BE
21	7/3/23	8/29	24	1109	NK	57	850	500		VS/BE
22	7/3/23	9/30	24	1112	NK	57	850	500		VS/BE
23	7/3/23	10/31	24	1116	NK	57	850	500		VS/BE
24	7/5/23	11/33	24	1116	LH	68	850	500		VS/MW
25	7/5/23	13/42	24	1119	LH	68	850	500		VS/MW



333 Rio Rancho Blvd. NE, Suite 400
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505.867.6990

PRIMARY FML - SEAMING LOG

PROJECT NAME: OWL Landfill Cell 5AB**OWNER:** Oilfield Water Logistics**PROJECT LOCATION:** Lea County, New Mexico**PROJECT NUMBER:** 7053.22**CONTRACTOR:** Mustang Extreme**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	7/5/23	14/43	24	1122	LH	68	850	500		VS/MW
2	7/5/23	15/44	24	1125	LH	68	850	500		VS/MW
3	7/5/23	16/45	24	1126	LH	68	850	500		VS/MW
4	7/5/23	17/45	24	1129	LH	68	850	500	30	VS/MW
5	7/5/23	42/47	24	1047	NK	57	850	500		VS/MW
6	7/5/23	43/48	24	1050	NK	57	850	500		VS/MW
7	7/5/23	44/49	24	1053	NK	57	850	500		VS/MW
8	7/5/23	45/50	24	1057	NK	57	850	500		VS/MW
9	7/5/23	46/51	24	1100	NK	57	850	500		VS/MW
10	7/5/23	11/32	24	1113	LH	68	850	500		VS/MW
11	7/8/23	17/52	19	757	NK	57	850	500		VS/MW
12	7/8/23	46/52	207	800	NK	57	850	500	31	VS/MW
13	7/8/23	46/53	226	850	NK	57	850	500	32	VS/MW
14	7/8/23	52/53	24	845	NK	57	850	500		VS/MW
15	7/8/23	46/54	108	935	NK	57	850	500		VS/MW
16	7/8/23	53/54	24	936	NK	57	850	500		VS/MW
17	7/8/23	51/54	154	946	NK	57	850	500		VS/MW
18										
19										
20										
21										
22										
23										
24										
25										

APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.15 Primary FML Seam Pressure Test Log

PRIMARY FML - SEAMING PRESSURE TEST LOG

PROJECT NAME:

OWNER:

PROJECT LOCATION:

OWL Landfill Cell 5AB

Oilfield Water Logistics

Lea County, New Mexico

PROJECT NUMBER:

CONTRACTOR:

SHEET NUMBER:

7053.22

Mustang Extreme

1

PROJECT SPECIFICATIONS

MIN START PSI:

TEST DURATION:

MAX PSI DROP:

30

5 minutes

30

PRESSURE TEST LOCATION: Primary

	DATE	PANEL #/PANEL #	TESTER	TIME		PRESSURE		MONITORED BY	PASS/FAIL
				START	FINISH	INITIAL	FINAL		
1	6/28/23	1/2	VC	855	900	35	34	BE	PASS
2	6/28/23	2/3	VC	900	905	35	35	BE	PASS
3	6/28/23	3/4	VC	902	907	35	35	BE	PASS
4	6/28/23	4/5	VC	1005	1010	35	35	BE	PASS
5	6/28/23	5/6	VC	1007	1012	35	35	BE	PASS
6	6/28/23	6/7	VC	1038	1043	35	35	BE	PASS
7	6/28/23	7/8	VC	1040	1045	35	35	BE	PASS
8	6/28/23	8/9	VC	1110	1115	35	35	BE	PASS
9	6/28/23	9/10	VC	1117	1122	35	35	BE	PASS
10	6/28/23	10/11	VC	1330	1335	35	35	BE	PASS
11	6/28/23	11/12	VC	1332	1337	35	35	BE	PASS
12	6/28/23	12/13	VC	1335	1340	35	35	BE	PASS
13	6/28/23	13/14	VC	1418	1423	35	34	BE	PASS
14	6/28/23	14/15	VC	1420	1425	35	35	BE	PASS
15	6/28/23	15/16	VC	1422	1427	35	35	BE	PASS
16	6/28/23	16/17	VC	1445	1450	35	35	BE	PASS
17	6/28/23	EX A	VC	1500	1505	35	35	BE	PASS
18	6/28/23	EX B	VC	1505	1510	35	35	BE	PASS
19	6/28/23	EX C	VC	1510	1515	35	35	BE	PASS
20	6/30/23	18/22	VC	1310	1315	35	35	BE	PASS
21	6/30/23	19/23	VC	1303	1308	35	35	BE	PASS
22	6/30/23	20/24	VC	1304	1309	35	35	BE	PASS
23	6/30/23	21/25	VC	1302	1307	35	35	BE	PASS
24	6/30/23	22/EX	VC	1408	1413	35	35	BE	PASS
25	6/30/23	22 A	VC	1411	1416	35	35	BE	PASS
26	6/30/23	22 B	VC	1413	1418	35	35	BE	PASS
27	6/30/23	22 C	VC	1415	1420	35	35	BE	PASS
28	6/30/23	18 A	VC	1448	1453	35	35	BE	PASS
29	6/30/23	18 B	VC	1451	1456	35	35	BE	PASS
30	6/30/23	18 C	VC	1519	1524	35	35	BE	PASS
31	6/30/23	18 D	VC	1521	1526	35	35	BE	PASS
32	6/30/23	18 E	VC	1534	1539	35	35	BE	PASS
33	7/3/23	26/27							
34	7/3/23	27/28	VC	920	925	35	35	BE	PASS
35	7/3/23	28/29	VC	1000	1005	35	35	BE	PASS
36	7/3/23	29/30	VC	1030	1035	35	35	BE	PASS
37	7/3/23	5/26	VC	1130	1135	35	35	BE	PASS
38	7/3/23	6/27	VC	1132	1137	35	35	BE	PASS
39	7/3/23	7/28 A	VC	1135	1140	35	35	BE	PASS
40	7/3/23	7/28 B	VC	1137	1142	35	35	BE	PASS
41	7/3/23	8/29 A	VC	1140	1145	35	35	BE	PASS
42	7/3/23	8/29 B	VC	1142	1147	35	35	BE	PASS
43	7/3/23	9/30 A	VC	1145	1150	35	35	BE	PASS
44	7/3/23	9/30 B	VC	1147	1152	35	35	BE	PASS
45	7/3/23	10/31 A	VC	1300	1305	35	35	BE	PASS
46	7/3/23	10/31 B	VC	1302	1307	35	35	BE	PASS
47	6/30/23	19/23	VC	1100	1105	35	35	BE	PASS
48	6/30/23	23/24	VC	1114	1119	35	34	BE	PASS
49	6/30/23	24/25	VC	1300	1305	35	35	BE	PASS
50									

PRIMARY FML - SEAMING PRESSURE TEST LOG

PROJECT NAME:

OWNER:

PROJECT LOCATION:

OWL Landfill Cell 5AB

Oilfield Water Logistics

Lea County, New Mexico

PROJECT NUMBER:

CONTRACTOR:

SHEET NUMBER:

7053.22

Mustang Extreme

2

PROJECT SPECIFICATIONS

MIN START PSI:

TEST DURATION:

MAX PSI DROP:

30

5 minutes

30

PRESSURE TEST LOCATION: Primary

	DATE	PANEL #/PANEL #	TESTER	TIME		PRESSURE		MONITORED BY	PASS/FAIL
				START	FINISH	INITIAL	FINAL		
1	7/3/23	25/34	VC	1512	1517	35	35	VC/BE	PASS
2	7/3/23	34/35	VC	1514	1519	35	35	VC/BE	PASS
3	7/3/23	35/36 A	VC	1516	1521	35	34	VC/BE	PASS
4	7/3/23	35/36 B	VC	1517	1522	35	35	VC/BE	PASS
5	7/3/23	35/36 C	VC	1518	1523	35	35	VC/BE	PASS
6	7/3/23	36/37	VC	1530	1535	35	35	VC/BE	PASS
7	7/3/23	37/38 A	VC	1535	1540	35	35	VC/BE	PASS
8	7/3/23	37/38 B	VC	1537	1542	35	35	VC/BE	PASS
9	7/3/23	37/38 C	VC	1533	1538	35	34	VC/BE	PASS
10	7/3/23	38/39	VC	1552	1557	35	35	VC/BE	PASS
11	7/3/23	39/40	VC	1557	1562	35	35	VC/BE	PASS
12	7/3/23	40/41	VC	1630	1635	35	35	VC/BE	PASS
13	7/3/23	26/34	VC	1608	1613	35	35	VC/BE	PASS
14	7/3/23	27/35	VC	1610	1615	35	35	VC/BE	PASS
15	7/3/23	28/36	VC	1615	1620	35	35	VC/BE	PASS
16	7/3/23	29/37	VC	1620	1625	35	35	VC/BE	PASS
17	7/3/23	30/38	VC	1622	1627	35	35	VC/BE	PASS
18	7/3/23	31/39	VC	1625	1630	35	35	VC/BE	PASS
19	7/3/23	32/40	VC	1627	1632	35	35	VC/BE	PASS
20	7/3/23	33/41	VC	1632	1637	35	35	VC/BE	PASS
21	6/30/23	18/19	VC	1000	1005	35	35	VC/BE	PASS
22	6/30/23	19/20	VC	1010	1015	35	35	VC/BE	PASS
23	6/30/23	20/21	VC	1335	1340	35	35	VC/BE	PASS
24	7/3/23	21/26	VC	915	920	35	35	VC/BE	PASS
25	7/3/23	26/27	VC	917	922	35	35	VC/BE	PASS
26	7/3/23	27/28	VC	920	925	35	35	VC/BE	PASS
27	7/3/23	28/29	VC	1000	1005	35	35	VC/BE	PASS
28	7/3/23	29/30	VC	1030	1035	35	35	VC/BE	PASS
29	7/3/23	30/31	VC	1445	1450	35	35	VC/BE	PASS
30	7/3/23	31/32	VC	1457	1462	35	35	VC/BE	PASS
31	6/30/23	1/18	VC	1325	1330	35	35	VC/BE	PASS
32	6/30/23	2/19	VC	1330	1335	35	35	VC/BE	PASS
33	6/30/23	3/20	VC	1332	1337	35	35	VC/BE	PASS
34	6/30/23	4/21	VC	1337	1342	35	35	VC/BE	PASS
35	6/30/23	18/22	VC	1310	1315	35	35	VC/BE	PASS
36	6/30/23	19/23	VC	1305	1310	35	35	VC/BE	PASS
37	6/30/23	20/24	VC	1304	1309	35	35	VC/BE	PASS
38	6/30/23	18/ B	VC	1327	1332	35	35	VC/BE	PASS
39	6/30/23	19/20 A	VC	947	952	35	35	VC/BE	PASS
40	6/30/23	19/20 B	VC	945	950	35	35	VC/BE	PASS
41	6/30/23	2/18	VC	1327	1332	35	35	VC/BE	PASS
42									
43									
44									
45									
46									
47									
48									
49									
50									

PRIMARY FML - SEAMING PRESSURE TEST LOG

PROJECT NAME:

OWNER:

PROJECT LOCATION:

OWL Landfill Cell 5AB

Oilfield Water Logistics

Lea County, New Mexico

PROJECT NUMBER:

CONTRACTOR:

SHEET NUMBER:

7053.22

Mustang Extreme

3

PROJECT SPECIFICATIONS

MIN START PSI:

TEST DURATION:

MAX PSI DROP:

30

5 minutes

30

PRESSURE TEST LOCATION: Primary

	DATE	PANEL #/PANEL #	TESTER	TIME		PRESSURE		MONITORED BY	PASS/FAIL
				START	FINISH	INITIAL	FINAL		
1	7/5/23	41/47	VC	1055	1060	35	35	VC/MW	PASS
2	7/5/23	42/47	VC	1100	1105	35	35	VC/MW	PASS
3	7/5/23	33/42 A	VC	1057	1103	35	35	VC/MW	PASS
4	7/5/23	47/48	VC	1103	1108	35	35	VC/MW	PASS
5	7/5/23	43/48	VC	1105	1110	35	35	VC/MW	PASS
6	7/5/23	42/43	VC	1105	1110	35	35	VC/MW	PASS
7	7/5/23	48/49	VC	1108	1113	35	35	VC/MW	PASS
8	7/5/23	44/49	VC	1112	1117	35	35	VC/MW	PASS
9	7/5/23	43/44	VC	1110	1115	35	35	VC/MW	PASS
10	7/5/23	49/50	VC	1115	1120	35	35	VC/MW	PASS
11	7/5/23	45/50	VC	1122	1127	35	35	VC/MW	PASS
12	7/5/23	44/45 A	VC	1117	1122	35	35	VC/MW	PASS
13	7/5/23	50/51 A	VC	1126	1131	35	35	VC/MW	PASS
14	7/5/23	50/51 B	VC	1127	1132	35	35	VC/MW	PASS
15	7/5/23	46/51	VC	1124	1129	35	35	VC/MW	PASS
16	7/5/23	45/46	VC	1120	1125	35	35	VC/MW	PASS
17	7/5/23	33/42 B	VC	1315	1320	35	35	VC/MW	PASS
18	7/5/23	33/42 C	VC	1317	1322	35	34	VC/MW	PASS
19	7/5/23	33/42 D	VC	1319	1324	35	35	VC/MW	PASS
20	7/5/23	33/42 E	VC	1340	1345	35	35	VC/MW	PASS
21	7/5/23	33/42 F	VC	1342	1347	35	34	VC/MW	PASS
22	7/5/23	33/42 G	VC	1352	1357	35	34	VC/MW	PASS
23	7/5/23	11/32	VC	1350	1355	35	35	VC/MW	PASS
24	7/5/23	12/33	VC	1355	1400	35	35	VC/MW	PASS
25	7/5/23	13/42	VC	1357	1403	35	35	VC/MW	PASS
26	7/5/23	14/43 A	VC	1405	1410	35	35	VC/MW	PASS
27	7/5/23	14/43 B	VC	1418	1423	35	35	VC/MW	PASS
28	7/5/23	15/44	VC	1412	1417	35	35	VC/MW	PASS
29	7/5/23	16/45	VC	1420	1425	35	35	VC/MW	PASS
30	7/5/23	17/46	VC	1424	1429	35	35	VC/MW	PASS
31	7/5/23	33/42 H	VC	1320	1325	35	34	VC/MW	PASS
32	7/5/23	33/42 I	VC	1319	1324	35	35	VC/MW	PASS
33	7/5/23	44/45 B	VC	1319	1324	35	35	VC/MW	PASS
34									
35	7/8/23	17/52	VC	810	815	35	35	VC/MW	PASS
36	7/8/23	46/52	VC	835	840	35	35	VC/MW	PASS
37	7/8/23	52/53	VC	850	855	35	35	VC/MW	PASS
38	7/8/23	46/53	VC	915	920	35	34	VC/MW	PASS
39	7/8/23	53/54	VC	935	940	35	35	VC/MW	PASS
40	7/8/23	46/54	VC	950	955	35	35	VC/MW	PASS
41	7/8/23	51/54	VC	1005	1010	35	35	VC/MW	PASS
42									
43									
44									
45									
46									
47									
48									
49									
50									

APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.16 FML Seam Vacuum Test and Defect-Repair Log



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Rio Rancho, New Mexico 87124
505.867.6990

SECONDARY FML - SEAM VACUUM TEST/REPAIR LOG

PROJECT NAME: OWL Landfill Cell 5AB PROJECT NUMBER: 7053.22
OWNER: Oilfield Water Logistics CONTRACTOR: Mustang Extreme
PROJECT LOCATION: Lea County, New Mexico SHEET NUMBER: 1

TEST/REPAIR LOCATION: MONITOR: VS/MW

	REPAIR DATE	PANEL	TYPE OF REPAIR	REPAIR TECH	NUMBER OF LEAKS	TESTING TECH ID	DATE ACCEPTED	COMMENTS
1	6/23/23	BO SEAM 29/30	BO	SL	0	VP	6/24/23	
2	6/23/23	29/30	DT 16	SL	0	VP	6/24/23	
3	6/23/23	28/29	DT 15	SL	0	VP	6/24/23	
4	6/23/23	26/27	DT 14	SL	0	VP	6/24/23	
5	6/23/23	25/26	DT 13	SL	0	VP	6/24/23	
6	6/23/23	25	PATCH	SL	0	VP	6/24/23	
7	6/23/23	25/EX	BO	SL	0	VP	6/24/23	
8	6/23/23	25/EX	BO	SL	0	VP	6/24/23	
9	6/23/23	19/25/EX	T SEAM	SL	0	VP	6/24/23	
10	6/23/23	19/20/25/26	INTERSECT	SL	0	VP	6/24/23	
11	6/23/23	20/21/26/27	INTERSECT	SL	0	VP	6/24/23	
12	6/23/23	21/22/27/28	INTERSECT	SL	0	VP	6/24/23	
13	6/23/23	22/23/28/29	INTERSECT	SL	0	VP	6/24/23	
14	6/23/23	23/24/29/30	INTERSECT	SL	0	VP	6/24/23	
15	6/23/23	23/24	DT 12	SL	0	VP	6/24/23	
16	6/23/23	22/23	DT 11	SL	0	VP	6/24/23	
17	6/23/23	21/22	DT 10	SL	0	VP	6/24/23	
18	6/23/23	21/22	BO	SL	0	VP	6/24/23	
19	6/24/23	38/39/47/48	INTERSECT	SL	0	VP	6/24/23	
20	6/24/23	37/38/46/47	INTERSECT	SL	0	VP	6/24/23	
21	6/24/23	46	PATCH	SL	0	VP	6/24/23	
22	6/24/23	36/37/45/46	INTERSECT	SL	0	VP	6/26/23	
23	6/24/23	35/36/44/45	INTERSECT	SL	0	VP	6/26/23	
24	6/24/23	34/35/43/44	INTERSECT	SL	0	VP	6/26/23	
25	6/24/23	43	PATCH	SL	0	VP	6/26/23	
26	6/24/23	33/34/42/43	DT 20	SL	0	VP	6/26/23	
27	6/24/23	32/33/41/42	INTERSECT	SL	0	VP	6/26/23	
28	6/24/23	31/32/40/41	INTERSECT	SL	0	VP	6/26/23	
29	6/24/23	24/31/30/40	INTERSECT	SL	0	VP	6/26/23	
30	6/24/23	24/31	DT 17	SL	0	VP	6/26/23	
31	6/24/23	31/32	DT 18	SL	0	VP	6/26/23	
32	6/24/23	32/33	DT 19	SL	0	VP	6/26/23	
33	6/24/23	34/35	DT 21	SL	0	VP	6/26/23	
34	6/24/23	35/36	DT 22	SL	0	VP	6/26/23	
35	6/24/23	36/37	DT 23	SL	0	VP	6/26/23	
36	6/24/23	37/38	DT 24	SL	0	VP	6/26/23	
37	6/24/23	38/39	DT 25	SL	0	VP	6/26/23	
38	6/24/23	39/50	DT 26	SL	0	VP	6/26/23	
39	6/24/23	49/50	DT 27	SL	0	VP	6/26/23	
40	6/24/23	39/49/44/51	INTERSECT	SL	0	VP	6/26/23	



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SECONDARY FML - SEAM VACUUM TEST/REPAIR LOG

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22
OWNER:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	2

TEST/REPAIR LOCATION:		MONITOR:	VS / MW
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	REPAIR DATE	PANEL	TYPE OF REPAIR	REPAIR TECH	NUMBER OF LEAKS	TESTING TECH ID	DATE ACCEPTED	COMMENTS
1	6/24/23	49/50/51/52	INTERSECT	SL	0	VP	6/26/23	
2	6/24/23	50/52/54	INTERSECT	SL	0	VP	6/26/23	
3	6/24/23	47/48	DT 30	SL	0	VP	6/26/23	
4	6/24/23	48/51	DT 31	SL	0	VP	6/26/23	
5	6/24/23	51/52	DT 32	SL	0	VP	6/26/23	
6	6/24/23	52/53/54	INTERSECT	SL	0	VP	6/26/23	
7	6/26/23	19/EX	BO	SL	0	VP	6/26/23	
8	6/26/23	19/EX	HOLE	SL	0	VP	6/26/23	
9	6/26/23	19/EX	HOLE	SL	0	VP	6/26/23	
10	6/26/23	19/20	DT 8	SL	0	VP	6/26/23	
11	6/26/23	20/21	DT 9	SL	0	VP	6/26/23	
12	6/26/23	19/EX	BO	SL	0	VP	6/26/23	
13	6/26/23	1/19/EX	T SEAM	SL	0	VP	6/26/23	
14	6/26/23	1/EX	BO	SL	0	VP	6/26/23	
15	6/26/23	1/2/19/20	INTERSECT	SL	0	VP	6/26/23	
16	6/26/23	1/2	DT 1	SL	0	VP	6/26/23	
17	6/26/23	2/3/20/21	INTERSECT	SL	0	VP	6/26/23	
18	6/26/23	3/4/21/23	INTERSECT	SL	0	VP	6/26/23	DT 7
19	6/26/23	4/5/22/23	INTERSECT	SL	0	VP	6/26/23	DT 2
20	6/26/23	5/6/23/24	INTERSECT	SL	0	VP	6/26/23	
21	6/26/23	6/7/24/31	INTERSECT	SL	0	VP	6/26/23	
22	6/26/23	7/8/31/32	INTERSECT	SL	0	VP	6/26/23	DT 3
23	6/26/23	8/32	BO	SL	0	VP	6/26/23	
24	6/26/23	8/9/32/33	INTERSECT	SL	0	VP	6/26/23	
25	6/26/23	9	HOLE	SL	0	VP	6/26/23	
26	6/26/23	9	HOLE	SL	0	VP	6/26/23	
27	6/26/23	9	HOLE	SL	0	VP	6/26/23	
28	6/26/23	9	HOLE	SL	0	VP	6/26/23	
29	6/26/23	9/10/33/34	INTERSECT	SL	0	VP	6/26/23	
30	6/26/23	10/11/34/35	INTERSECT	SL	0	VP	6/26/23	DT 4
31	6/26/23	11/12/35/36	INTERSECT	SL	0	VP	6/26/23	
32	6/26/23	36	HOLE	SL	0	VP	6/26/23	
33	6/26/23	12/13/36/37	INTERSECT	SL	0	VP	6/26/23	
34	6/26/23	13	HOLE	SL	0	VP	6/26/23	
35	6/26/23	13/14/37/38	INTERSECT	SL	0	VP	6/26/23	DT 5
36	6/26/23	38	HOLE	SL	0	VP	6/26/23	
37	6/26/23	14/15/38/39	INTERSECT	SL	0	VP	6/26/23	
38	6/26/23	15/16/39/49	INTERSECT	SL	0	VP	6/26/23	DT 29
39	6/26/23	16/17/49/50	INTERSECT	SL	0	VP	6/26/23	DT 6
40	6/26/23	19/18	BO	SL	0	VP	6/26/23	



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SECONDARY FML - SEAM VACUUM TEST/REPAIR LOG

PROJECT NAME:

OWL Landfill Cell 5AB

PROJECT NUMBER:

7053.22

OWNER:

Oilfield Water Logistics

CONTRACTOR:

Mustang Extreme

PROJECT LOCATION:

Lea County, New Mexico

SHEET NUMBER:

3

TEST/REPAIR LOCATION:

MONITOR:

VS / MW

	REPAIR DATE	PANEL	TYPE OF REPAIR	REPAIR TECH	NUMBER OF LEAKS	TESTING TECH ID	DATE ACCEPTED	COMMENTS
1	6/26/23	17/18/50/55	INTERSECT	SL	0	VP	6/26/23	
2	6/26/23	50/55/56	T SEAM	SL	0	VP	6/26/23	
3	6/26/23	50/56/57	T SEAM	SL	0	VP	6/26/23	
4	6/26/23	50/56/57	T SEAM	SL	0	VP	6/26/23	
5	6/26/23	50/57	BO	SL	0	VP	6/26/23	
6	6/26/23	50/57/58	T SEAM	SL	0	VP	6/26/23	
7	6/26/23	50/58/59/CAP	INTERSECT	SL	0	VP	6/26/23	DT 28, CAP 58/59
8	6/26/23	50/59/60	T SEAM	SL	0	VP	6/26/23	
9	6/26/23	50/54/60	T SEAM	SL	0	VP	6/26/23	
10	6/26/23	32/33	BO	SL	0	VP	6/26/23	
11	6/26/23	35/36	BO	SL	0	VP	6/26/23	
12	6/26/23	38/39	BO	SL	0	VP	6/26/23	
13								
14	7/6/23	42	REPAIR	SL	0	VP	7/6/23	Repair seam after GCL removal
15	7/6/23	42	REPAIR	SL	0	VP	7/6/23	
16								
17								
18								
19								
20								
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PRIMARY FML - SEAM VACUUM TEST/REPAIR LOG

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22
OWNER:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	1
TEST/REPAIR LOCATION:		MONITOR:	VS/MW

	REPAIR DATE	PANEL	TYPE OF REPAIR	REPAIR TECH	NUMBER OF LEAKS	TESTING TECH ID
1	6/30/23	1/EX	BO	C2	0	VP
2	6/30/23	1/EX	BO	C2	0	VP
3	6/30/23	1/2	DT 1	C2	0	VP
4	6/30/23	1/18/EX	T SEAM	C2	0	VP
5	6/30/23	1/18	BO	C2	0	VP
6	6/30/23	1/2/8/19	INTERSECT	C2	0	VP
7	6/30/23	2/3/19/20	INTERSECT	C2	0	VP
8	6/30/23	3/4/20/21	INTERSECT	C2	0	VP
9	6/30/23	4/5	DT 2	C2	0	VP
10	6/30/23	6/7	DT 3	C2	0	VP
11	6/30/23	10/11	DT 4	C2	0	VP
12	6/30/23	13/14	DT 5	C2	0	VP
13	6/30/23	14	PATCH	C2	0	VP
14	6/30/23	18/19	DT 7	C2	0	VP
15	6/30/23	19/20	DT 8	C2	0	VP
16	6/30/23	20/21	DT 9	C2	0	VP
17	6/30/23	16/17	DT 6	C2	0	VP
18	7/5/23	22/EX	BO	MM	0	VP
19	7/5/23	22/EX	BO	MM	0	VP
20	7/5/23	22/EX	T SEAM	MM	0	VP
21	7/5/23	18/23/EX	T SEAM	MM	0	VP
22	7/5/23	18/EX	T	LH	0	VP
23	7/5/23	18/EX	BO	LH	0	VP
24	7/5/23	18/EX	BO	LH	0	VP
25	7/5/23	18/EX	BO	LH	0	VP
26	7/5/23	18/EX	N FLAP	LH	0	VP
27	7/5/23	19/20	BO	LH	0	VP
28	7/5/23	19/20	N FLAP	LH	0	VP
29	7/5/23	21/26	DT 10	MM	0	VP
30	7/5/23	26/27	DT 11	MM	0	VP
31	7/5/23	27/28	DT 12	MM	0	VP
32	7/5/23	28/29	DT 13	MM	0	VP
33	7/5/23	29/30	DT 14	MM	0	VP
34	7/5/23	30/31/38/39	DT 15	MM	0	VP
35	7/5/23	18/19/22/23	INTERSECT	MM	0	VP
36	7/5/23	22/23	DT 18	MM	0	VP
37	7/5/23	19/20/23/24	INTERSECT	MM	0	VP
38	7/5/23	23/24	DT 19	MM	0	VP
39	7/5/23	23/24	N FLAP	MM	0	VP
40						

DATE ACCEPTED	COMMENTS
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
6/30/23	VS/BE Monitor
7/6/23	
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7/6/23	
7/6/23	
7/6/23	
7/6/23	
7/6/23	
7/6/23	
7/6/23	
7/6/23	CAP
7/6/23	
7/6/23	CAP
7/6/23	
7/6/23	
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7/6/23	
7/6/23	
7/6/23	
7/6/23	
7/6/23	
7/6/23	
7/6/23	
7/6/23	CAP
7/6/23	

PRIMARY FML - SEAM VACUUM TEST/REPAIR LOG

PROJECT NAME:

OWL Landfill Cell 5AB

PROJECT NUMBER:

7053.22

OWNER:

Oilfield Water Logistics

CONTRACTOR:

Mustang Extreme

PROJECT LOCATION:

Lea County, New Mexico

SHEET NUMBER:

2

TEST/REPAIR LOCATION:

MONITOR:

VS/MW

	REPAIR DATE	PANEL	TYPE OF REPAIR	REPAIR TECH	NUMBER OF LEAKS	TESTING TECH ID	DATE ACCEPTED	COMMENTS
1	7/5/23	20/21/24/25	INTERSECT	MM	0	VP	7/6/23	
2	7/5/23	21/26/25/34	INTERSECT	MM	0	VP	7/6/23	
3	7/5/23	25/34	DT 20	MM	0	VP	7/6/23	
4	7/5/23	26/27/34/35	INTERSECT	MM	0	VP	7/6/23	
5	7/5/23	34/35	DT 21	MM	0	VP	7/6/23	
6	7/5/23	25/28/35/26	INTERSECT	MM	0	VP	7/6/23	
7	7/5/23	27/28	BO	MM	0	VP	7/6/23	
8	7/5/23	28/29/36/37	INTERSECT	MM	0	VP	7/6/23	
9	7/5/23	36/37	BO	MM	0	VP	7/6/23	
10	7/5/23	36/37	BO	MM	0	VP	7/6/23	
11	7/5/23	29/30/37/36	INTERSECT	MM	0	VP	7/6/23	
12	7/5/23	37/38	BO	MM	0	VP	7/6/23	
13	7/5/23	31/32/39/35	INTERSECT	MM	0	VP	7/6/23	
14	7/5/23	32/33/40/41	INTERSECT	MM	0	VP	7/6/23	
15	7/5/23	32/33	BO	MM	0	VP	7/6/23	
16	7/5/23	33/42/41/47	INTERSECT	JS	0	VP	7/6/23	
17	7/5/23	42/43/47/48	INTERSECT	JS	0	VP	7/6/23	
18	7/5/23	47/48	DT 27	JS	0	VP	7/6/23	
19	7/5/23	43/44/48/49	INTERSECT	JS	0	VP	7/6/23	
20	7/5/23	44/45/49/50	INTERSECT	JS	0	VP	7/6/23	
21	7/5/23	49/50	DT 28	JS	0	VP	7/6/23	
22	7/5/23	45/46/50/51	INTERSECT	JS	0	VP	7/6/23	
23	7/5/23	50/51	BO	JS	0	VP	7/6/23	
24	7/5/23	31/32	DT 16	MM	0	VP	7/6/23	
25	7/5/23	32/33	DT 17	MM	0	VP	7/6/23	
26	7/5/23	33/42	DT 22	JS	0	VP	7/6/23	
27	7/5/23	42/43	DT 23	JS	0	VP	7/6/23	
28	7/5/23	43/44	DT 24	JS	0	VP	7/6/23	
29	7/5/23	44/45	DT 25	JS	0	VP	7/6/23	
30	7/5/23	45/46	DT 26	JS	0	VP	7/6/23	
31	7/5/23	33/42	BO	JS	0	VP	7/6/23	A/B
32	7/5/23	33/42	BO	JS	0	VP	7/6/23	B/C
33	7/5/23	33/42	BO	JS	0	VP	7/6/23	C/D
34	7/5/23	33/42	BO	JS	0	VP	7/6/23	D/E
35	7/5/23	33/42	BO	JS	0	VP	7/6/23	E/F
36	7/5/23	33/42	BO	JS	0	VP	7/6/23	F/G
37	7/5/23	33/42	BO	JS	0	VP	7/6/23	G/H
38	7/5/23	45/21/15	INTERSECT	LH	0	VP	7/6/23	
39								
40								



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Rio Rancho, New Mexico 87124
505.867.6990

PRIMARY FML - SEAM VACUUM TEST/REPAIR LOG

PROJECT NAME:	<u>OWL Landfill Cell 5AB</u>	PROJECT NUMBER:	<u>7053.22</u>
OWNER:	<u>Oilfield Water Logistics</u>	CONTRACTOR:	<u>Mustang Extreme</u>
PROJECT LOCATION:	<u>Lea County, New Mexico</u>	SHEET NUMBER:	<u>3</u>
TEST/REPAIR LOCATION:	<u></u>	MONITOR:	<u>VS/MW</u>

	REPAIR DATE	PANEL	TYPE OF REPAIR	REPAIR TECH	NUMBER OF LEAKS	TESTING TECH ID	DATE ACCEPTED	COMMENTS
1	7/5/23	5/6/46/27	INTERSECT	LH	0	VP	7/6/23	
2	7/5/23	6/27	DT 29	LH	0	VP	7/6/23	
3	7/5/23	47/27/28	INTERSECT	LH	0	VP	7/6/23	
4	7/5/23	7/28	BO	LH	0	VP	7/6/23	
5	7/5/23	7/8/28/29	INTERSECT	LH	0	VP	7/6/23	
6	7/5/23	8/29	BO	LH	0	VP	7/6/23	
7	7/5/23	16/17/45/46	INTERSECT	JS	0	VP	7/6/23	
8	7/6/23	15/16/44/45	INTERSECT	JS	0	VP	7/6/23	
9	7/6/23	14/15/43/44	INTERSECT	JS	0	VP	7/6/23	
10	7/6/23	14/43	BO	JS	0	VP	7/6/23	
11	7/6/23	13/14/42/43	INTERSECT	JS	0	VP	7/6/23	
12	7/6/23	13/42	BO	JS	0	VP	7/6/23	
13	7/6/23	42	PATCH	JS	0	VP	7/6/23	
14	7/6/23	42	PATCH	JS	0	VP	7/6/23	
15	7/6/23	42	PATCH	JS	0	VP	7/6/23	
16	7/6/23	42	PATCH	JS	0	VP	7/6/23	
17	7/6/23	42	PATCH	JS	0	VP	7/6/23	
18	7/6/23	42	PATCH	JS	0	VP	7/6/23	
19	7/6/23	12/13/33/42	INTERSECT	JS	0	VP	7/6/23	
20	7/6/23	11/12/39/33	INTERSECT	JS	0	VP	7/6/23	
21	7/6/23	32	PATCH	JS	0	VP	7/6/23	
22	7/6/23	10/11/31/32	INTERSECT	LH	0	VP	7/6/23	
23	7/6/23	10/31	BO	LH	0	VP	7/6/23	
24	7/6/23	9/10/30/31	INTERSECT	LH	0	VP	7/6/23	
25	7/6/23	9/30	BO	LH	0	VP	7/6/23	
26	7/6/23	8/9/29/30	INTERSECT	LH	0	VP	7/6/23	
27	7/6/23	24/25	BO	LH	0	VP	7/6/23	
28	7/5/23	37/38	BO	MM	0	VP	7/6/23	
29	7/6/23	38	SEAM	LH	0	VP	7/6/23	Seam repair from GCL replacement
30	7/6/23	39	SEAM	LH	0	VP	7/6/23	
31								
32	7/8/23	17/46/52	DT 30	MM	0	VP	7/8/23	
33	7/8/23	46/52	BO	MM	0	VP	7/8/23	
34	7/8/23	46/52/53	DT 31	MM	0	VP	7/8/23	
35	7/8/23	46/53/54	DT 32	MM	0	VP	7/8/23	
36	7/8/23	46/51/54	INTERSECT	MM	0	VP	7/8/23	
37								
38								
39								
40								

APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.17 Geocomposite Deployment Log



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

LEAK DETECTION - GEOCOMPOSITE DEPLOYMENT LOG

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	1
DEPLOYMENT LOCATION:	Leak Detection - North Slope	MONITOR:	MW

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT ²)	DATE INSTALLED
1	0007	123	14.5	1,784	6/26/23
2	0007	77	14.5	1,117	6/26/23
3	0005	35	14.5	508	6/26/23
4	0005	123	14.5	1,784	6/26/23
5	0005	32	14.5	464	6/26/23
6	0013	91	14.5	1,320	6/26/23
7	0013	119	14.5	1,726	6/26/23
8	0028	14	14.5	203	6/26/23
9	0028	115	14.5	1,668	6/26/23
10	0029	12	14.5	174	6/26/23
11	0029	124	14.5	1,798	6/26/23
12	0029	60	14.5	870	6/26/23
13	0004	67	14.5	972	6/26/23
14	0004	130	14.5	1,885	6/26/23
15	0018	127	14.5	1,842	6/26/23
16	0018	73	14.5	1,059	6/26/23
17	0024	59	14.5	856	6/26/23
18	0024	129	14.5	1,871	6/26/23
19	0009	127	14.5	1,842	6/26/23
20	0009	73	14.5	1,059	6/26/23
21	0001	58	14.5	841	6/26/23
22	0001	131	14.5	1,900	6/26/23
23	0030	56	14.5	812	6/26/23
24	0010	78	14.5	1,131	6/26/23
25	0030	123	14.5	1,784	6/27/23
26	0024	11	14.5	160	6/27/23
27	0011	133	14.5	1,929	6/27/23
28	0011	67	14.5	972	6/27/23
29	0008	66	14.5	957	6/27/23
30	0008	134	14.5	1,943	6/27/23
31	0034	66	14.5	957	6/27/23
32	0034	134	14.5	1,943	6/27/23
33	0022	67	14.5	972	6/27/23
34	0022	133	14.5	1,929	6/27/23
35	0003	134	14.5	1,943	6/27/23
36	0003	66	14.5	957	6/27/23
37	0036	36	14.5	522	6/27/23
38	0036	126	14.5	1,827	6/27/23
39	0024	12	14.5	174	6/27/23
40	0015	134	14.5	1,943	6/27/23
TOTAL LINER PLACED (FT ²):				50,388	



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Rio Rancho, New Mexico 87124
505.867.6990

LEAK DETECTION - GEOCOMPOSITE DEPLOYMENT LOG

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	2
DEPLOYMENT LOCATION:	Leak Detection - North Slope	MONITOR:	MW

[illegible]



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GEOCOMPOSITE DEPLOYMENT LOG

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	1
DEPLOYMENT LOCATION:	Drainage Layer - Double Sided	MONITOR:	MW

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT ²)	DATE INSTALLED
1	0032	122	14.5	1,769	7/1/23
2	0032	87	14.5	1,262	7/1/23
3	0023	34	14.5	493	7/1/23
4	0023	122	14.5	1,769	7/1/23
5	0023	41	14.5	595	7/1/23
6	0026	78	14.5	1,131	7/1/23
7	0026	122	14.5	1,769	7/1/23
8	0025	122	14.5	1,769	7/1/23
9	0025	61	14.5	885	7/1/23
10	0035	57	14.5	827	7/1/23
11	0035	122	14.5	1,769	7/1/23
12	0035	21	14.5	305	7/1/23
13	0019	102	14.5	1,479	7/1/23
14	0019	98	14.5	1,421	7/1/23
15	0012	25	14.5	363	7/1/23
16	0012	124	14.5	1,798	7/1/23
17	0012	50	14.5	725	7/1/23
18	0016	75	14.5	1,088	7/1/23
19	0016	124	14.5	1,798	7/1/23
20	0002	127	14.5	1,842	7/1/23
21	0002	73	14.5	1,059	7/1/23
22	0038	44	14.5	638	7/1/23
23	0038	124	14.5	1,798	7/1/23
24	0038	28	14.5	406	7/1/23
25	0020	96	14.5	1,392	7/1/23
26	0020	104	14.5	1,508	7/1/23
27	0031	23	14.5	334	7/1/23
28	0031	129	14.5	1,871	7/1/23
29	0031	50	14.5	725	7/1/23
30	0014	79	14.5	1,146	7/1/23
31	0014	123	14.5	1,784	7/1/23
32	0017	123	14.5	1,784	7/1/23
33	0017	69	14.5	1,001	7/1/23
34	0037	54	14.5	783	7/1/23
35	0037	129	14.5	1,871	7/1/23
36	0006	129	14.5	1,871	7/1/23
37	0006	71	14.5	1,030	7/1/23
38	0030	57	14.5	827	7/1/23
39	0027	129	14.5	1,871	7/1/23
40	0027	71	14.5	1,030	7/1/23
TOTAL LINER PLACED (FT ²):				49,576	



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505.867.6990

GEOCOMPOSITE DEPLOYMENT LOG

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	2
DEPLOYMENT LOCATION:	Drainage Layer - Double Sided	MONITOR:	MW

[illegible]



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505.867.6990

GEOCOMPOSITE DEPLOYMENT LOG

PROJECT NAME:	OWL Landfill Cell 5AB	PROJECT NUMBER:	7053.22
CLIENT:	Oilfield Water Logistics	CONTRACTOR:	Mustang Extreme
PROJECT LOCATION:	Lea County, New Mexico	SHEET NUMBER:	1
DEPLOYMENT LOCATION:	Drainage Layer - Single Side	MONITOR:	MW

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT ²)	DATE INSTALLED
43	0053	250	14.5	3,625	7/6/23
44	0083	250	14.5	3,625	7/6/23
45	0092	190	14.5	2,755	7/6/23
46	0017	250	14.5	3,625	7/6/23
47	0062	250	14.5	3,625	7/6/23
48	0022	190	14.5	2,755	7/6/23
49	0013	250	14.5	3,625	7/6/23
50	0041	250	14.5	3,625	7/6/23
51	0022	60	14.5	870	7/6/23
52	0092	60	14.5	870	7/6/23
53	0061	250	14.5	3,625	7/6/23
54	0070	250	14.5	3,625	7/6/23
55	0018	190	14.5	2,755	7/6/23
56	0018	60	14.5	870	7/6/23
57	0040	250	14.5	3,625	7/6/23
58	0051	250	14.5	3,625	7/6/23
59	0005	190	14.5	2,755	7/6/23
60	0045	250	14.5	3,625	7/6/23
61	0023	250	14.5	3,625	7/6/23
62	0003	190	14.5	2,755	7/6/23
63	0082	250	14.5	3,625	7/6/23
64	0093	250	14.5	3,625	7/6/23
65	0005	60	14.5	870	7/6/23
66	0003	60	14.5	870	7/6/23
67	0073	250	14.5	3,625	7/7/23
68	0042	250	14.5	3,625	7/7/23
69	0035	200	14.5	2,900	7/7/23
70	0035	50	14.5	725	7/7/23
71	0064	250	14.5	3,625	7/7/23
72	0068	250	14.5	3,625	7/7/23
73	0001	190	14.5	2,755	7/7/23
74	0001	40	14.5	580	7/7/23
75	0005	250	14.5	3,625	7/7/23
76	0025	250	14.5	3,625	7/7/23
77	0009	190	14.5	2,755	7/7/23
78	0038	250	14.5	3,625	7/7/23
79	0094	250	14.5	3,625	7/7/23
80	0087	190	14.5	2,755	7/7/23
81	0098	250	14.5	3,625	7/7/23
82	0006	250	14.5	3,625	7/7/23
TOTAL LINER PLACED (FT ²):				117,595	

GEOCOMPOSITE DEPLOYMENT LOG

PROJECT NAME:OWL Landfill Cell 5AB

CLIENT:Oilfield Water Logistics

PROJECT LOCATION:Lea County, New Mexico

DEPLOYMENT LOCATION:Drainage Layer - Single Side

PROJECT NUMBER:7053.22

CONTRACTOR:Mustang Extreme

SHEET NUMBER:2

MONITOR:MW

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT²)	DATE INSTALLED
83	0082	55	14.5	798	7/7/23
84	0009	51	14.5	740	7/7/23
85	0001	33	14.5	479	7/7/23
86	0026	250	14.5	3,625	7/7/23
87	0003	250	14.5	3,625	7/7/23
88	0008	190	14.5	2,755	7/7/23
89	0008	45	14.5	653	7/7/23
90	0027	250	14.5	3,625	7/7/23
91	0030	250	14.5	3,625	7/7/23
92	0004	190	14.5	2,755	7/7/23
93	0054	250	14.5	3,625	7/7/23
94	0032	250	14.5	3,625	7/7/23
95	0090	190	14.5	2,755	7/7/23
96	0097	250	14.5	3,625	7/7/23
97	0079	250	14.5	3,625	7/7/23
98	0012	190	14.5	2,755	7/7/23
99	0091	250	14.5	3,625	7/7/23
100	0034	250	14.5	3,625	7/7/23
101	0012	60	14.5	870	7/7/23
102	0004	60	14.5	870	7/7/23
103	0090	60	14.5	870	7/7/23
104	0078	250	14.5	3,625	7/7/23
105	0072	250	14.5	3,625	7/7/23
106	0010	190	14.5	2,755	7/7/23
107	0007	250	14.5	3,625	7/7/23
108	0016	250	14.5	3,625	7/7/23
109	0052	190	14.5	2,755	7/7/23
110	0036	250	14.5	3,625	7/7/23
111	0006	250	14.5	3,625	7/7/23
112	0015	60	14.5	870	7/7/23
113	0052	60	14.5	870	7/7/23
114	0031	250	14.5	3,625	7/7/23
115	0021	250	14.5	3,625	7/7/23
116	0020	190	14.5	2,755	7/7/23
117	0020	60	14.5	870	7/7/23
118	0081	250	14.5	3,625	7/10/23
119	0033	250	14.5	3,625	7/10/23
120	0091	190	14.5	2,755	7/10/23
121	0029	250	14.5	3,625	7/10/23
122	0049	250	14.5	3,625	7/10/23
TOTAL LINER PLACED (FT²):				109,678	

APPENDIX C: CELL 5 A/B LINER INSTALLATION DOCUMENTATION

C.18 Demtech Tensionmeter Calibration Certificate

Services Inc.
DEMTECH[®]
CALIBRATION CERTIFICATE

Tensiometer Model:

Device Calibrated:

Range:

Model No:

Serial No:

Pro-Tester [T-0100/A or T-0100SE/A]

S-Type load cell

0 - 750 lbs. Tension

M2405-750#

622265901

Calibration Apparatus:

Pro-Cal unit, model TC-0100/A

A/D Module Model No:

A/D Module Serial No:

Channel No:

T-029

265901

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

4.677861

Scale:

3.329184

Applied Force lbs.

2
52
102
152
202
252
302

Cell Response:

2
52
102
152
202
252
302

Deviation Error:

0.00
0.00
0.00
0.00
0.00
0.00
0.00

Total Deviation Error (%):

0.00%

Temperature at time of calibration: 73 degrees F

Excitation 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.

Calibration Technician:

Signature:

Tahoe Taylor

Date:

03/07/22

APPENDIX D: INDEPENDENT QUALITY ASSURANCE LABORATORY FML DESTRUCTIVE TESTING RESULTS

D.1 Secondary Liner Destructive Test



Date: 2023-06-27

Mail To:
Robert Chandler
Mustang Extreme Enviromental Service
Midland , TX , 79706

Bill To:
Mustang Extreme Enviromental Service
PJ W051932

e-mail:rchandler@mustangextreme.com

Dear Mr. Chandler,

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: **NDBL Cell 5A**

TRI Job Reference Number: **78377**

Material(s) Tested: (16) 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,

Nicole Saucedo

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.

TRI ENVIRONMENTAL, INC.

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Page: 1 of 9



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

AUSTIN, TX - USA | ANAHEIM, CA - USA | ANDERSON, SC - USA | GOLD COAST - AUSTRALIA | SUZHOU - CHINA

DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL Cell 5A

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78377

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-1 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	128	122	117	137	128	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)	118	130	138	141	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	
Shear						Shear
Shear Strength (ppi)	170	178	169	174	176	173
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-2 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	130	116	116	121	128	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)	121	104	107	122	116	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	
Shear						Shear
Shear Strength (ppi)	149	146	154	156	156	152
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.

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TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

AUSTIN, TX - USA | ANAHEIM, CA - USA | ANDERSON, SC - USA | GOLD COAST - AUSTRALIA | SUZHOU - CHINA

DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL Cell 5A

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78377

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-3 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	122	122	116	112	113	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)	132	117	122	116	121	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)	141	147	158	167	168	156
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-4 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	126	124	126	126	133	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)	121	122	124	123	135	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)	147	151	157	162	163	156
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.

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Page: 3 of 9



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

AUSTIN, TX - USA | ANAHEIM, CA - USA | ANDERSON, SC - USA | GOLD COAST - AUSTRALIA | SUZHOU - CHINA

DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL Cell 5A

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78377

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-5 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	132	126	135	123	129	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)	123	120	116	124	118	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)	163	170	169	162	168	166
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-6 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	135	135	135	131	135	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	
Side: B						Peel B
Peel Strength (ppi)	129	126	123	134	116	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)	170	151	148	160	171	160
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 4 of 9



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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL Cell 5A

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78377

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-7 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	133	134	132	145	145	138
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	131	117	136	113	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)	162	166	165	164	171	166
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-8 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	117	115	119	117	115	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)	114	117	116	114	112	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	
Shear						Shear
Shear Strength (ppi)	168	167	167	171	154	165
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 5 of 9



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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL Cell 5A

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78377

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-9 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	122	122	114	121	118	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)	121	123	121	123	120	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)	152	154	165	140	159	154
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-10 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	118	119	115	111	116	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	
Side: B						Peel B
Peel Strength (ppi)	125	131	135	129	132	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	
Shear						Shear
Shear Strength (ppi)	141	163	148	152	163	153
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 6 of 9



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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL Cell 5A

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78377

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-11 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	145	136	144	140	145	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)	123	120	115	119	118	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)	159	150	155	149	159	154
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-12 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	124	120	116	121	118	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)	125	121	119	124	121	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)	152	156	158	150	151	153
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 7 of 9



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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL Cell 5A

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78377

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-13 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	115	108	106	121	127	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)	149	137	130	143	131	138
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	170	166	168	168	165
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-14 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	125	120	123	122	118	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)	133	129	144	142	133	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	
Shear						Shear
Shear Strength (ppi)	137	153	152	151	169	152
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL Cell 5A

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78377

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-15 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	121	121	121	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)	115	116	123	114	115	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)	144	150	152	151	160	151
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-16 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	119	128	122	121	119	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)	145	128	132	145	144	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	
Shear						Shear
Shear Strength (ppi)	151	141	164	157	166	156
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 9 of 9



Date: 2023-06-28

Mail To:
Robert Chandler
Mustang Extreme Enviromental Service

Midland , TX , 79706

Bill To:

Mustang Extreme Enviromental Service
PJ W051932

e-mail:rchandler@mustangextreme.com

Dear Mr. Chandler,

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: **NDBL Cell 5A**

TRI Job Reference Number: **78389**

Material(s) Tested: (16) 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,

Nicole Saucedo

Geosynthetic Services Division
<http://www.geosyntheticstestinc.com>

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Page: 1 of 9



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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL Cell 5A

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78389

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-17 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	124	117	118	117	113	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)	114	122	126	124	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)	168	172	168	166	169	169
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-18 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	130	125	93	116	117	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	
Side: B						Peel B
Peel Strength (ppi)	113	113	112	116	116	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	
Shear						Shear
Shear Strength (ppi)	171	174	167	168	167	169
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL Cell 5A

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78389

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-19 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	115	117	118	114	115	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	
Side: B						Peel B
Peel Strength (ppi)	115	117	113	123	115	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)	171	167	167	171	166	168
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-20 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	121	117	116	122	117	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)	124	120	123	119	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	
Shear						Shear
Shear Strength (ppi)	170	166	172	168	166	168
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 3 of 9



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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL Cell 5A

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78389

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-21 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	122	126	126	129	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)	146	118	119	126	115	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)	167	171	165	169	155	165
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-22 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	122	116	111	147	130	125
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)	115	124	111	112	112	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	
Shear						Shear
Shear Strength (ppi)	165	154	170	158	152	160
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL Cell 5A

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78389

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-23 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	135	124	121	118	125	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)	145	121	122	115	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	
Shear						Shear
Shear Strength (ppi)	173	171	169	171	172	171
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-24 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	135	129	133	122	130	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)	110	109	115	128	123	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)	165	165	165	168	165	166
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 5 of 9



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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL Cell 5A

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78389

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-25 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	146	133	139	130	140	138
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	128	127	134	125	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)	168	169	169	170	178	171
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-26 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	138	138	140	141	141	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)	142	142	146	141	151	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	
Shear						Shear
Shear Strength (ppi)	176	171	172	173	182	175
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL Cell 5A

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78389

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-27 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	139	131	131	130	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)	154	145	134	148	151	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)	142	158	162	148	171	156
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-28 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	127	137	129	130	126	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)	134	111	129	126	114	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)	163	160	170	165	167	165
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 7 of 9



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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL Cell 5A

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78389

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-29 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	136	136	137	140	139	138
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)	144	153	150	154	123	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)	173	173	168	168	169	170
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-30 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	149	148	147	149	167	152
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	125	123	119	124	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)	179	182	177	176	174	178
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL Cell 5A

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78389

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-31 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	130	113	142	129	124	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)	130	130	129	134	135	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	
Shear						Shear
Shear Strength (ppi)	171	171	167	172	168	170
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-32 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	125	128	121	126	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	
Side: B						Peel B
Peel Strength (ppi)	136	129	146	117	140	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)	166	165	165	167	171	167
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 9 of 9

APPENDIX D: INDEPENDENT QUALITY ASSURANCE LABORATORY FML DESTRUCTIVE TESTING RESULTS

D.2 Primary Liner Destructive Test



Date: 2023-07-06

Mail To:
Travis Clark
Mustang Extreme Enviromental Service

Bill To:
Mustang Extreme Enviromental Service

, ,

e-mail:
tclark@mustangextreme.com rchandler@mustangextreme.com

Dear Mr. Clark,

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: **NDBL**

TRI Job Reference Number: **78435**

Material(s) Tested: (29) 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,

sigfile

geolab

Geosynthetic Services Division
<http://www.geosyntheticstestinc.com>

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78435

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-1 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	132	123	119	121	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)	141	135	135	141	142	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	
Shear						Shear
Shear Strength (ppi)	173	168	173	173	178	173
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-2 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	132	128	126	126	129	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)	123	118	122	118	121	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)	174	173	174	174	178	175
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78435

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-3 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	123	125	142	126	119	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)	120	124	123	126	117	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)	177	173	175	176	159	172
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-4 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	132	135	129	129	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)	115	119	127	125	134	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)	173	165	171	172	176	171
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78435

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-5 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	120	121	117	116	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	
Side: B						Peel B
Peel Strength (ppi)	124	120	116	122	128	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)	175	170	173	175	179	174
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-6 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	124	131	139	131	141	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	
Side: B						Peel B
Peel Strength (ppi)	123	140	121	123	128	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)	175	169	175	175	178	174
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78435

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-7 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	127	124	112	113	117	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)	124	130	120	131	122	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)	167	168	165	167	172	168
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-8 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	116	117	138	129	131	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)	132	130	125	128	122	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)	166	166	166	166	169	167
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Environmental Service

Project: NDBL

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78435

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-9 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	121	128	123	128	127	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)	130	131	122	129	126	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)	170	167	160	168	167	166
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-10 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	140	153	140	131	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	
Side: B						Peel B
Peel Strength (ppi)	116	118	115	117	119	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)	166	170	167	167	170	168
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 6 of 16



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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78435

TEST REPLICATE NUMBER						
PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-11 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	129	116	123	115	133	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	127	101	112	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	
Shear						Shear
Shear Strength (ppi)	174	169	168	168	173	170
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-12 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	118	116	115	118	135	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)	127	135	122	124	128	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)	169	173	169	169	173	171
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 7 of 16



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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78435

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-13 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	131	133	131	124	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)	119	123	118	114	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)	166	171	168	166	170	168
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-14 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	120	127	119	117	125	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)	120	116	119	112	118	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)	170	174	169	170	174	171
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 8 of 16



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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78435

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-15 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	119	127	117	122	131	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	119	117	139	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	
Shear						Shear
Shear Strength (ppi)	166	164	161	167	174	166
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-16 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	137	130	132	132	140	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	
Side: B						Peel B
Peel Strength (ppi)	127	116	115	112	119	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)	167	164	168	167	172	168
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 9 of 16



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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78435

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-17 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	113	138	121	121	120	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)	135	140	131	133	136	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	
Shear						Shear
Shear Strength (ppi)	169	168	169	168	172	169
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-18 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	124	129	129	118	117	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)	132	110	112	119	119	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)	168	170	161	172	176	169
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 10 of 16



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TRI Client: Mustang Extreme Enviromental Service

Project: NDBL

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78435

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-19 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	125	133	128	118	129	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)	123	123	129	133	113	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)	169	172	171	171	176	172
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-20 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	130	129	127	126	145	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	
Side: B						Peel B
Peel Strength (ppi)	128	123	123	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)	164	167	168	167	171	167
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78435

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-21 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	123	124	123	127	127	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)	112	117	116	113	115	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	
Shear						Shear
Shear Strength (ppi)	160	165	165	166	169	165
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-22 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	114	121	118	119	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	
Side: B						Peel B
Peel Strength (ppi)	114	116	112	112	111	113
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)	167	173	169	168	172	170
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 12 of 16



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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78435

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-23 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	119	123	131	122	129	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)	137	149	133	132	123	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	
Shear						Shear
Shear Strength (ppi)	161	164	166	165	171	165
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-24 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	138	131	134	132	133	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	
Side: B						Peel B
Peel Strength (ppi)	117	121	115	120	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)	166	164	159	162	158	162
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 13 of 16



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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78435

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-25 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	123	138	123	124	133	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)	121	140	116	119	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)	166	167	168	168	173	168
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-26 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	123	126	123	133	131	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)	122	124	123	120	121	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)	166	163	166	166	171	166
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 14 of 16



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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78435

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-27 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	120	121	119	125	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)	124	117	119	127	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	
Shear						Shear
Shear Strength (ppi)	166	164	167	157	171	165
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-28 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	114	115	114	118	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	
Side: B						Peel B
Peel Strength (ppi)	125	121	118	121	131	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)	164	161	167	165	166	165
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Page: 15 of 16

**DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS****TRI Client: Mustang Extreme Enviromental Service****Project: NDBL****Material: 60 mil. HDPE****SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)****TRI Log#: 78435**

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Sample ID: DT-29 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	148	150	151	142	143	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)	142	137	135	140	142	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	
Shear						Shear
Shear Strength (ppi)	149	147	158	154	165	155
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.

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Page: 16 of 16



Date: 2023-07-12

Mail To:
Travis Clark
Mustang Extreme Enviromental Service

Bill To:
Mustang Extreme Enviromental Service

, ,

e-mail:
 tclark@mustangextreme.com rchandler@mustangextreme.com

Dear Mr. Clark,

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: **NDBL**

TRI Job Reference Number: **78496**

Material(s) Tested: (3) 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,

sigfile

geolab

Geosynthetic Services Division
<http://www.geosyntheticstestinc.com>

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Page: 1 of 3



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

AUSTIN, TX - USA | ANAHEIM, CA - USA | ANDERSON, SC - USA | GOLD COAST - AUSTRALIA | SUZHOU - CHINA

DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Mustang Extreme Enviromental Service

Project: NDBL

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 78496

TEST REPLICATE NUMBER

PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-30 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	137	145	134	144	144	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)	131	130	136	135	135	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)	163	169	165	168	167	166
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-31 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	116	110	111	113	114	113
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	119	111	113	122	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)	157	155	161	162	161	159
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.

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Page: 2 of 3

**DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS****TRI Client: Mustang Extreme Enviromental Service****Project: NDBL****Material: 60 mil. HDPE****SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)****TRI Log#: 78496**

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Sample ID: DT-32 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	137	137	134	142	140	138
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	117	117	116	118	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)	146	151	157	166	159	156
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.

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Page: 3 of 3

APPENDIX E: LEAK DETECTION SYSTEM CERTIFICATIONS

E.1 Leachate Pipe and Riser Pipe Parts Certification



SUBMITTAL DATA

PROJECT	Owl Landfill
LOCATION	Eunice, NM
PREPARED FOR	4X Construction
SUPPLIER	ISCO
ITEM DESCRIPTION	HDPE Pipe & Fittings and Ancillary Items

REVIEW COMMENTS:	

HIGH-DENSITY POLYETHYLENE PIPE

High density polyethylene (HDPE) pipe is an exceptional piping product well-suited for a broad range of demanding applications. Tough, resilient HDPE piping is widely used in municipal water and sewer applications, natural gas distribution, industrial process piping, fire water loops, mining/slurry handling systems and many more types of systems. With its strong, butt-fused joints and long-term ductility, HDPE pipe can be installed in numerous ways such as direct burial, slip-lining, pipe-bursting, and directional drilling. As a leading global distributor of HDPE piping systems and fusion equipment, along with fusion and fabrication services, ISCO Industries is your primary resource for all of your HDPE piping needs.

Consider some of these characteristics of HDPE Pipe:

- Economical
- Chemical/Corrosion Resistant
- Zero Leak-Rate
- Hydraulically Smooth
- Fatigue and Surge Resistant
- Long Design Life
- Tappable
- Easily Installed
- Small to Large Diameters
- Non-Toxic, Non-Tasting
- Lightweight
- Reliable
- Long-term strength and ductility
- Flexible and Coil-able
- Heat Fused
- Mechanically Joined (As Needed)
- Compatible with other systems
- Weather Resistant
- Impact Resistant
- Freeze Resistant
- Durable
- Abrasion Resistant
- Inert
- Self-Restrained Pipe (Monolithic)
- Listed and Approved

IMPORTANT STANDARDS FOR HIGH DENSITY POLYETHYLENE (HDPE) PIPE

As with any engineering material, there are numerous standards and codes by which HDPE pipe and fittings are produced, designed and installed. Principle among these are the applicable standards published by ASTM International (formerly known as the American Society for Testing and Materials). Other additional standards and/or codes such as AWWA, DOT, API or others may apply to specific installations or uses of HDPE pipe as well. What follows is a partial listing of some of the principle standards pertaining to HDPE piping within the North American market area.

TUBERÍA DE POLIETILENO DE ALTA DENSIDAD

La tubería de polietileno de alta densidad (HDPE) es un producto de tubería excepcional, bien adaptado a una amplia gama de aplicaciones exigentes. La tubería HDPE es fuerte y elástica y es ampliamente utilizada en aguas municipales y aplicaciones en alcantarillado, distribución de gas natural, tubería para procesamiento industriales, sistemas de agua contraincendios, sistemas de manejo de fangos / minería y muchos otros tipos de sistemas. Con sus uniones fuertes, fundidas a tope y ductilidad a largo plazo, la tubería HDPE puede instalarse de numerosas maneras tales como directamente enterrada, métodos de instalación sin zanja y perforación direccional. Como un distribuidor líder a nivel mundial de sistemas con tubería HDPE y equipos de fusión, junto con servicios de fusión y fabricación, ISCO Industries es su principal recurso para todas sus necesidades en cuanto a tubería HDPE.

Considere algunas de estas características de la tubería HDPE:

- Económica
- Resistente a químicos/ a la corrosión
- Cero porcentaje de fugas
- Hidráulicamente suave
- Resistente a la fatiga y a sobrecargas de presión.
- Larga vida útil
- Derivable
- Fácil de instalar
- De diámetros pequeños a grandes
- No tóxica, no degustable
- Liviana
- Confiable
- Resistencia y ductilidad a largo plazo
- Flexible y rebobinable
- Termo-fundida
- Unido mecánicamente (si sea necesario)
- Compatible con otros sistemas
- Resistente a la intemperie
- Resistente a golpes
- Resistente a la congelación
- Durable
- Resistente a la abrasión
- Inerte
- Tubería auto-restringible (monolítica)
- Listada y Aprobada

NORMAS IMPORTANTES PARA POLIETILENO DE ALTA DENSIDAD (HDPE)

Como con cualquier material de ingeniería, hay numerosas normas y códigos mediante los cuales la tubería y accesorios HDPE son elaborados, diseñados e instalados. Entre estos principios están las normas aplicables publicadas por ASTM International (anteriormente conocida como Sociedad Americana para el Ensayo de Materiales). Otras normas y/o códigos adicionales como AWWA, DOT, API y otros pueden también aplicarse a instalaciones o a usos específicos de la tubería HDPE. Lo que sigue es una lista parcial de algunas normas de principios pertinentes a la tubería HDPE en el área del mercado norteamericano

PIPE RESIN STANDARDS

ASTM D3350 - "Standard Specification for Polyethylene Plastics Pipe and Fitting Materials".

The quality of HDPE pipe starts with the resin from which it is produced. ASTM D3350 defines the basic physical property requirements of the polyethylene compound that is used to make the pipe or fittings.

ASTM F412 - "Standard Terminology Relating to Plastic Piping Systems".

ISO 4427-1 - "Plastics piping systems – Polyethylene (PE) pipes and fittings for water supply – Part 1: General". Specifies the general aspects of polyethylene (PE) piping systems (mains and service pipes) intended for the conveyance of water for human consumption, including raw water prior to treatment and water for general purposes. It also specifies the test parameters for the test methods to which it refers.

PIPE DIMENSIONS AND MANUFACTURING STANDARDS

ASTM F714 - "Standard Specification for Polyethylene (PE) Pipe (SDR-PR) Based on Outside Diameter". Pipe produced in accordance with this standard is used across a broad variety of municipal, industrial, and various water-related applications. This standard includes IPS, DIPS and metric sizing systems in nominal outside diameters from 3" - 54".

ASTM D2513 - "Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing and Fittings". Polyethylene pipe and other plastics for natural gas distribution are described in great detail in this standard.

ASTM D3035 - "Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter". Most HDPE water tubing (½" to 3") is made to the dimensions in this standard. This standard was revised to include IPS sizes up through nominal 65" outside diameter and DIPS sizes up through nominal 48" outside diameter for municipally oriented PE pipe applications or services.

ASTM F2619 - "Standard Specification for High Density Polyethylene (PE) Line Pipe". This standard includes HDPE pipe in sizes from ½" to 65" for various oil and gas producing applications such as oil, dry or wet gas, multiphase fluids and non-potable oil field water.

ASTM F3123 - "Standard Specification for Metric Outside Diameter Polyethylene (PE) Plastic Pipe (DR-PN)".

ISO 4427-2 - "Plastic piping systems – Polyethylene (PE) pipes and fittings for water supply – Part 2: Pipes". Specifies the pipes made from polyethylene (PE) intended for the conveyance of water for human consumption, including raw water prior to treatment and water for general purposes. It also specifies the test parameters for the test methods to which it refers.

REQUISITOS DE LA RESINA DE LA TUBERÍA

ASTM D3350 - "Especificación estándar para materiales de tubería y accesorios plásticos de polietileno". La calidad de la tubería HDPE empieza con la resina con la cual es elaborada. ASTM D3350 define los requisitos básicos de las propiedades físicas del compuesto de polietileno usado para hacer tubería y accesorios.

ASTM F412 - "Terminología Estándar Relacionada con los Sistemas de Tuberías de Plástico".

ISO 4427-1 - "Sistema de tuberías de plástico – Tuberías y fittings de Polietileno (PE) para suministro de agua – 1° Parte: General". Especifica los aspectos generales de los sistemas de canalización hechos de PE (Polietileno) [cañerías y tuberías de servicio] para sistemas destinados a la conducción de agua para el consumo humano, incluyendo el agua cruda antes del tratamiento y el agua para usos generales. También especifica los parámetros de ensayo para los métodos de prueba a que se refiere.

REQUISITOS DIMENSIONALES Y DE FABRICACIÓN DE LA TUBERÍA

ASTM F714 - "Especificación estándar para la tubería (SDR-PR) de polietileno (PE) basada en el diámetro exterior." Esta norma se usa para la mayoría de aplicaciones con tubería HDPE de gran diámetro (4 a 63 pulgadas) aparte de la tubería para gas.

ASTM D2513 - "Especificación estándar para tubería termoplástica de presión para gas, entubado y accesorios". La tubería de polietileno y de otros plásticos para la distribución de gas natural se describen con mucho detalle en esta norma"

ASTM D3035 - "Especificación estándar para la tubería (DR-PR) plástica de polietileno (PE) basándose en el diámetro exterior controlado". La mayoría de la tubería HDPE para agua (de 1/2 a 3 pulgadas) está hecha según dimensiones de esta norma. Si bien, se proveen tuberías de tamaños hasta 24 pulgadas, muy poca tubería de gran diámetro se hace según esta norma.

ASTM F2619 - "Especificación estándar para tubería de conducción de polietileno (PE) de alta densidad" Esta norma incluye la tubería HDPE con tamaños desde ½ a 65 pulgadas para varias aplicaciones de producción de crudo y gas tales como crudo, gas seco o húmedo, fluidos de fase múltiple y agua no-potable de campos petrolíferos.

ASTM F3123 - "Especificación estándar para tubería plástica de polietileno (PE) de diámetro exterior métrico"

ISO 4427-2 - "Sistema de tuberías de plástico – Tuberías y fittings de Polietileno (PE) para suministro de agua – 2° Parte: Tuberías". Especifica las tuberías hechas de PE (Polietileno) destinadas a la conducción de agua para el consumo humano, incluyendo el agua cruda antes del tratamiento y el agua para usos generales. También especifica los parámetros de ensayo para los métodos de prueba a que se refiere.

INSTALLATION STANDARDS

ASTM D2321 - "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications"

ASTM D2774 - "Standard Practice for Underground Installation of Thermoplastic Pressure Piping"

ASTM F585 - "Standard Practice for Insertion of Flexible Polyethylene Pipe into Existing Sewers"

ASTM F1668 - "Standard Guide for Construction Practices for Buried Plastic Pipe"

ASTM F1962 - "Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings"

ASTM F2164 - "Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure"

AMERICAN WATER WORKS ASSOCIATION STANDARDS

ANSI/AWWA C901 - "Polyethylene Pressure Pipe and Tubing, .5 in. (13 mm) Through 3 in. (76 mm) for Water Service"

ANSI/AWWA C906 - "Polyethylene Pipe and Fittings, 4 in. (100 mm) through 63 in. (1,575 mm) for Water Distribution"

PIPE JOINING & QUALIFICATION STANDARDS

ASTM F2620 - "Standard Practice for Heat Fusion of Polyethylene Pipe and Fittings"

ASTM D2657 - "Standard Practice of Heat Fusion Joining of Polyolefin Pipe and Fittings"

ASTM F1290 - "Standard Practice for Electrofusion Joining Polyolefin Pipe and Fittings"

ASTM F3190 - "Standard Practice for Heat Fusion Equipment (HFE) Operator Qualification on Polyethylene (PE) and Polyamide (PA) Pipe and Fittings"

ISO 21307 - "Plastic pipes and fittings – Butt fusion jointing procedures for polyethylene (PE) pipes and fittings used in the construction of gas and water distribution systems"

FITTING STANDARDS

ASTM D3261 - "Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing"

ASTM F1055 - "Standard Specification for Electrofusion Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing"

NORMAS DE INSTALACIÓN

ASTM D2321 – "Práctica estándar para la instalación subterránea de tubería termoplástica en alcantarillas u otras aplicaciones de flujo por gravedad"

ASTM D2774 – "Práctica estándar para la instalación subterránea de tubería termoplástica de presión"

ASTM F585 – "Práctica estándar para la inserción de tubería flexible en alcantarillas existentes"

ASTM F1668 – "Guía estándar de prácticas de construcción para tubería plástica enterrada"

ASTM F1962 – "Guía estándar para uso en perforación direccional de máxima horizontalidad para la colocación de tubería o conducto de polietileno debajo de obstáculos, incluidos cruces de ríos"

ASTM F2164 – "Práctica estándar para la prueba de fugas sobre el terreno de los sistemas presurizados con tubería de polietileno (PE) mediante presión hidrostática"

NORMAS DE LA ASOCIACIÓN AMERICANA DE DISTRIBUCIÓN DE AGUA

ANSI/AWWA C901-2005 - "Tubo y tubería de presión de polietileno, 0,5 pulgadas (13mm) hasta 3 pulgadas (76mm) para servicios de agua"

ANSI/AWWA C906-2006 - "Tubería y accesorios de polietileno, de 4 pulgadas (100mm) hasta 63 pulgadas (1.575mm) para distribución de agua"

ESTANDARES PARA LA CERTIFICACION DE TUBERIAS Y FUSIONES

ASTM F2620 - "Práctica estándar para la termo-fusión de tubería y accesorios de polietileno"

ASTM D2657 - "Práctica estándar para unión por termo-fusión de tubería y accesorios de polietileno"

ASTM F1290 - "Práctica estándar para unión por electro-fusión de tubería y accesorios de poliolefina"

ASTM F3190 - "Práctica Estándar para la Certificación del Operador de Equipos de Termo-Fusion (HFE) de Tuberías y Accesorios de Polietileno (PE) y Poliamida (PA)"

ISO 21307 – "Tuberías y Fittings Plásticos – Procedimiento de Unión a Tope para tuberías y fittings de polietileno (PE) usado en la construcción de sistemas para distribución de gas y agua"

NORMAS PARA ACCESORIOS

ASTM D3261 - "Especificación estándar para Polietileno de la Fusión de Calor del Extremo (PE) Accesorios de Plástico para Polietileno (PE) Tubo de Plástico y tubería"

ASTM F1055 - "Especificación estándar para la electro-fusión de accesorios para tubo y tubería de polietileno de diámetro externo controlado"

ASTM F1759 - "Standard Practice for Design of High Density Polyethylene (HDPE) Manholes for Subsurface Applications"

ASTM F2206 - "Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE) Plastic Pipe, Fittings, Sheet Stock, Plate Stock or Block Stock"

ASTM F2880 - "Standard Specification for Lap-Joint Type Flange Adapters for Polyethylene Pressure Pipe in Nominal Pipe Sizes 3/4 in. to 65 in."

ISO 4427-3 - "Plastic piping systems – Polyethylene (PE) pipes and fittings for water supply – Part 3: Fittings".

Specifies the general aspects of fittings made from PE for piping systems intended for the conveyance of water for human consumption, including raw water prior to treatment and water for general purposes. It also specifies the test parameters for the test methods to which it refers.

CANADIAN STANDARDS ASSOCIATION

CAN/CSA137 - "Thermoplastic Pressure Piping Compendium"

CSA Z662 - "Oil and Gas Pipeline Systems"

OTHER USEFUL REFERENCES

Handbook of Polyethylene Pipe, A publication of the Plastics Pipe Institute (www.plasticpipe.org)

AWWA M55, PE Pipe - Design and Installation, A Manual of Water Supply Practices published by the American Water Works Association

ISO 4427-5 - "Plastic piping systems – Polyethylene (PE) pipes and fittings for water supply – Part 5: Fitness for purpose of the system".

Specifies the characteristics of the fitness for purpose of assembled piping systems made from polyethylene (PE) intended for the conveyance of water for human consumption, including raw water prior to treatment and water for general purposes. It also specifies the test parameters for the test methods to which it refers.

ASTM F1759 - "Práctica estándar para el diseño de entradas a alcantarillas de polietileno de alta densidad (HDPE) para aplicaciones bajo superficie"

ASTM F2206 - "Especificación estándar para accesorios fabricados de tubería plástica de polietileno (PE) fundida a tope, accesorios, reservas de láminas de planchas y de bloques"

ASTM F2880 - "Especificación estándar para adaptadores de bridas tipo lap-joint para tubería de presión de polietileno en diámetros nominales, ¾" a 65"

ISO 4427-3 - "Sistema de tuberías de plástico – Tuberías y fittings de Polietileno (PE) para suministro de agua – 3° Parte: Fittings".

Especifica los aspectos generales de los accesorios hechos de PE (Polietileno) para sistemas de canalización destinados a la conducción de agua para el consumo humano, incluyendo el agua cruda antes del tratamiento y el agua para usos generales. También especifica los parámetros de ensayo para los métodos de prueba a que se refiere.

ASOCIACIÓN DE NORMAS CANADIENSES

CAN/CSA137 - "Compendio de tubería termoplástica de presión"

CSA Z662 - "Sistemas de Conducción de Tuberías para Oleoductos y Gasoductos"

OTRAS REFERENCIAS ÚTILES

Manual de tubería de polietileno, una publicación del instituto de tubería plástica (www.plasticpipe.org)

AWWA M55, Tubería PE - Diseño e instalación, un manual de prácticas de abastecimiento de agua publicado por la asociación americana de abastecimiento de agua.

ISO 4427-5 - "Sistema de tuberías de plástico – Tuberías y fittings de Polietileno (PE) para suministro de agua – 5° Parte: Adaptación según el propósito del sistema".

Especifica las características de la aptitud para el uso de los sistemas de tuberías ensambladas hechas de PE (Polietileno) destinados a la conducción de agua para el consumo humano, incluyendo el agua cruda antes del tratamiento y el agua para usos generales. También especifica los parámetros de ensayo para los métodos de prueba a que se refiere.

SPECIFICATIONS FOR HDPE PIPE

Polyethylene piping systems are defined or specified using two important criteria: the ASTM D3350 cell classification and the ASTM F412 thermoplastic piping material designation code. For many years, the ASTM D3350 cell classification consisted of a series of six digits followed by one letter, shown in Table 1. The six digits equate to the specified level of performance required in six separate physical properties defined within the standard. The final letter specifies the color or UV-resistance requirement. ASTM D3350 also includes a requirement for testing the resistance of the polyethylene compound to the oxidative effects of chlorine. The six digits and one letter are now supplemented by a chlorine resistance categorization. Taken together the D3350 cell classification establishes a minimum range of technical performance for the PE compound used to produce the pipe.

The F412 thermoplastic piping material designation code allows for simple identification of the most significant engineering properties of a PE pipe material. This code consists of an abbreviation for the basic material as defined within the ASTM standards. The standardized abbreviation for polyethylene is the term "PE". This basic polymer designation is then followed by a series of four digits. The first two digits relate directly to specific physical properties for the compound as defined within ASTM D3350. The last two digits are the long-term hydrostatic stress rating as recommended by the Hydrostatic Stress Board of the Plastic Pipe Institute in hundreds of psi. The long-term hydrostatic stress rating is the hydrostatic design basis (HDB) multiplied by the appropriate design factor (DF).

So the thermoplastic piping material designation code follows the form below.

PEXYZZ, the format of the thermoplastic material designation code for PE pipe

Where: **PE** indicates polyethylene

X is the characteristic density range for the compound used to make the pipe as defined within ASTM D3350

Y is the characteristic slow crack growth resistance range for the compound used to make the pipe as defined within ASTM D3350

ZZ is the long-term hydrostatic stress at 73°F, expressed in hundreds of psi

ESPECIFICACIONES PARA LA TUBERÍA HDPE

Los sistemas de tubería de polietileno se definen o especifican usando dos importantes criterios: La célula de clasificación de ASTM D3350 y el código de designación de material termoplástico para tubería ASTM F412. El ASTM D3350 consiste en una serie de seis dígitos seguidos por una letra. Los seis dígitos corresponden al nivel especificado del desempeño requerido en seis propiedades físicas separadas definidas dentro de la norma. La letra final especifica el color o la resistencia a los UV que se exige. Todo junto la célula de clasificación D3350 establece un margen mínimo de desempeño técnico para el compuesto de PE usado para elaborar la tubería

El código termoplástico F412 designado permite la simple identificación de las propiedades de ingeniería más significativas de la tubería de PE. Este código consiste en una abreviación del material básico según se lo define en las normas ASTM. La abreviación estandarizada para el polietileno es "PE". Esta designación básica del polímero es seguida de una serie de cuatro dígitos. Los primeros dos dígitos se relacionan directamente con propiedades físicas específicas del compuesto según lo definido en ASTM D3350. Los últimos dos dígitos representan la tasa de fatiga hidrostática a largo plazo según lo recomendado por la junta para la fatiga hidrostática del instituto de tubería plástica en cientos de PSI. La tasa de la fatiga hidrostática a largo plazo es igual a la base del diseño hidrostático (HDB) multiplicado por el factor de diseño apropiado (DF)

Así el código de designación del material de la tubería termoplástica sigue la forma indicada abajo:

PEXYZZ, El formato del material termoplástico código designación de tubos PE.

Donde: **PE** - significa polietileno

X - es el margen de la densidad característica del compuesto usado para hacer la tubería según lo definido en ASTM D3350

Y - es el margen de la resistencia al crecimiento lento de fisuras característico del compuesto usado para hacer la tubería según lo definido en ASTM D3350

ZZ - es la fatiga hidrostática a largo plazo a 230°F expresado en cientos de PSI

Historically, the market for PE pipe was dominated by essentially two primary thermoplastic material designation codes. These were PE2406 and PE3408. In 2005, changes were made to ASTM D3350 to allow for the identification and integration of much higher levels of technical performance in PE piping materials within the North American standards system. This resulted in a temporary proliferation of PE thermoplastic piping material designation codes. Today, we still have a fairly broad selection of material designation codes for PE piping systems throughout the marketplace. However, for all practical purposes, the market for PE pipe is characterized by the three common thermoplastics materials designation codes.

PE2708 - This piping product, commonly supplied as yellow colored products, is produced from a medium density compound as defined in the current version of D3350 and is widely used in natural gas distribution and some specialty applications.

PE3608 - This piping product is the legacy product resulting from the old PE3408 thermoplastic piping material designation code that was so widely specified and used prior to 2005. Today, products labeled PE3608 are rather uncommon due to higher performing PE4710 resins available at roughly the same price.

PE4710 - This piping product designation represents the culmination of years of technical research on polymer performance in PE piping and offers the designer or end-user exceptional levels of pipe system performance. For example, the PE4710 piping products support a higher long-term hydrostatic stress rating making the pressure rating for a given wall thickness of pipe 25% higher than a comparable PE3608 piping product. By the same token, these piping products exhibit a significantly higher resistance to slow crack growth. Given the exceedingly high physical performance of the PE4710 piping products, it is no surprise that they have replaced the older PE3408/PE3608 piping products since they meet or exceed all of the technical requirements.

PE100 - This piping product material meets the requirements for polyethylene piping systems as defined by the International Organization of Standardization (ISO). PE100 materials have proven to provide excellent creep rupture strength, resistance to rapid crack propagation, and stress crack resistance. PE100 is the primary polyethylene material used in global polyethylene piping applications not specified by ASTM materials.

Históricamente, el mercado de la tubería PE estaba dominado esencialmente por dos códigos principales de designación del material termoplástico. Estos eran PE2406 y PE3408. En el 2005, se hicieron cambios al ASTM D3350 para permitir, dentro del sistema de normas norteamericanas, la identificación e integración de niveles mucho más elevados de desempeño técnico en los materiales de PE. Esto dio como resultado una proliferación provisional de los códigos de designación del material de la tubería termoplástica de PE. Hoy, aún tenemos una muy amplia selección de códigos de designación de material para sistemas de tubería de PE por todo el mercado. Sin embargo, para efectos prácticos, el mercado de la tubería de PE está caracterizado por tres códigos de designación de material termoplástico de uso corriente.

PE2708 - Este producto para tubería comúnmente suministrado como productos de color amarillo es producido a partir de un compuesto de media densidad según lo definido en la versión actual del D3350 y es ampliamente usado en la distribución de gas natural y en algunas aplicaciones especializadas.

PE3608 - Este producto para tubería es un producto heredado y resultado del antiguo código PE3408 de designación del material de la tubería termoplástica que fue ampliamente especificado y usado antes del 2005. Hoy en día, los productos etiquetados PE3608 son bastante poco comunes debido a las resinas PE4710 de mayor rendimiento disponibles a aproximadamente el mismo precio.

PE4710 - Esta designación de producto para tubería representa la culminación de años de investigación técnica en desempeño del polímero en tubería de PE y ofrece al diseñador o al usuario final niveles excepcionales de desempeño de sistemas de tubería. Por ejemplo, los productos PE4710 para tubería soportan un régimen nominal más alto de fatiga hidrostática a largo plazo haciendo que la capacidad de presión para un espesor dado de pared sea 25% más elevada que un producto PE3608 para tubería comparable. De la misma manera, estos productos para tubería exhiben una resistencia significativamente más elevada al crecimiento lento de fisuras. Dado el rendimiento físico extremadamente alto de los productos de tubería PE4710, no es de sorprender que cumplan o superen todos los requisitos técnicos de los productos de tubería PE3408 o PE3608. Dado el rendimiento físico excesivamente alto de los productos de tubería PE4710, no es de sorprender que hayan reemplazado los productos de tubería PE3408 / PE3608 más antiguos ya que cumplen o superan todos los requisitos técnicos.

PE100 - Esta materia prima de tubería cumple con los requisitos para los sistemas de tubería de polietileno según lo definido por la Organización Internacional de Normalización (ISO). Los materiales PE100 han demostrado proporcionar una excelente resistencia a la rotura por fluencia, resistencia a la propagación rápida de grietas y resistencia a las fisuras por tensión. PE100 es el material primario de polietileno utilizado en aplicaciones de tuberías de polietileno global no especificadas por los materiales de ASTM.

Table 1 provides a summary of the different ASTM D 3350 cell classification for each of these materials based on these three primary thermoplastic piping material designation codes.

Table 1: Typical Cell Classification by Current Thermoplastic Piping Material Designation Code

Physical Property	ASTM Test Method	Units	PE2708		PE3608		PE4710	
			Cell Number	Typical Value	Cell Number	Typical Value	Cell Number	Typical Value
Density	D 1505	gr/cc	2	>0.925 - 0.940	3	>0.940 - 0.947	4	>0.947 - 0.955
Melt Index	D 1238	gr/10 min	3	<0.4 - 0.15	4	<0.15	4	<0.15
Flexural Modulus	D 790	psi	3	40,000 - <80,000	5	110,000 - <180,000	5	110,000 - <180,000
Tensile Strength	D 638	psi	3	2,600 - <3,000	4	3,000 - <3,500	4	3,000 - <3,500
							5	3,500 - <4,000
Resistance to Slow Crack Growth	F 1473	hours	7	500 minimum	6	100 minimum	7	500 minimum
Hydrostatic Design Basis, HDB	D 2837	psi	3	1250	4	1600	4	1600
UV Stabilizer	D 1603	%	E	Colored with UV Stabilizer	C	2% Min Carbon Black	C	2% Min Carbon Black

Notes:

1. The density provided is base resin density (without the influence of carbon black). Typical PE4710 HDPE pipe has a density of 0.956 to 0.964 with carbon black.
2. To be designated a PE4710, the pipe resin must meet certain supplementary requirements established by the Stress Board (HSB) of the Plastics Pipe Institute (PPI).
3. Tensile Strength cell numbers of 4 and 5 are both acceptable values for PE4710 materials.

Table 2: ASTM D3350 Chlorine Resistance Testing Categorization

Categorization	Test Stress 2.48 MPa (360 psi) Time (h)	Test Stress 2.76 MPa (400 psi) Time (h)	Test Stress 3.10 MPa (450 psi) Time (h)
CC0	Unspecified	Unspecified	Unspecified
CC1	2700	1900	1900
CC2	7400	5100	3400
CC3	16 200	11 100	7400

It should be noted that other PE thermoplastics piping material designation codes do exist and may be encountered in the market place occasionally. However, the three primary PE thermoplastic piping material designations codes of Table 1 represent the principle PE piping products in the market today. For more information regarding these other thermoplastic piping material designation codes, please contact your ISCO sales professional.

Table 3 below provides a simplification of Table 1 and illustrates the relative ease with which PE piping products may be specified. Using this approach allows the designer or specifier to accurately designate the appropriate PE piping product through the use a single thermoplastic piping material designation code and a relatively simple text string that establishes the physical property requirements for seven key performance properties.

The selected thermoplastic piping material designation code and minimum cell classification is then combined with the appropriate production and installation standards to effectively specify a tough, durable PE piping system. ISCO Industries can provide model specifications for a wide range of PE pipe applications. These model specifications are available at www.isco-pipe.com or by contacting your ISCO sales professional.

Table 3: Representative Minimum Cell Classification by Thermoplastic Piping Material Designation Code

Thermoplastic Piping Material Designation Code	Minimum Cell Classification Per ASTM D3350
PE2708	233373E
PE3608	345464C
PE4710	445474C

La tabla 1 da un resumen de la diferente clasificación de célula según ASTM D 3350 para cada uno de estos materiales basándose en los tres códigos principales de designación del material de la tubería termoplástica.

Tabla 1: Clasificación típica de la célula por el código actual de designación del material de la tubería termoplástica.

Propiedades físicas	Método de prueba ASTM	Unidades	PE2708		PE3608		PE4710	
			Número de célula	Valor típico	Número de célula	Valor típico	Número de célula	Valor típico
Densidad	D 1505	gr/cc	2	>0.925 - 0.940	3	>0.940 - 0.947	4	>0.947 - 0.955
Índice de fundición	D 1238	gr/10 min	3	<0.4 - 0.15	4	<0.15	4	<0.15
Módulo de flexión	D 790	psi	3	40,000 - <80,000	5	110,000 - <180,000	5	110,000 - <180,000
Resistencia a la tracción	D 638	psi	3	2,600 - <3,000	4	3,000 - <3,500	4	3,000 - <3,500
							5	3,500 - <4,000
Resistencia al crecimiento lento de fisuras	F 1473	hours	7	500 min	6	100 min	7	500 min
Base del diseño hidrostático, HDB	D 2837	psi	3	1250	4	1600	4	1600
Estabilizador UV	D 1603	%	E	Coloreado con estabilizador UV	C	2% mínimo carbon negro	C	2% mínimo carbon negro

Notas:

1. La densidad provista es la densidad de la resina base (sin la influencia del negro de carbón). La tubería HDPE PE4710 típica tiene una densidad de 0,956 a 0,964 con negro carbón.
2. Para ser designado como un PE4710, la resina del tubo debe cumplir ciertos requisitos suplementarios establecidos por la junta de la fatiga hidrostática (HSB) del instituto de tubería plástica (PPI).
3. La resistencia a la tracción de los números de célula 4 y 5 son ambos valores aceptables para los materiales de PE4710.

Tabla2: ASTM D3350 Cloro pruebas de resistencia categorización

Categorización	Prueba de esfuerzo 2.48 MPa (360 psi) Tiempo (h)	Prueba de esfuerzo 2.76 MPa (400 psi) Tiempo (h)	Prueba de esfuerzo 3.10 MPa (450 psi) Tiempo (h)
CC0	sin especificar	sin especificar	sin especificar
CC1	2700	1900	1900
CC2	7400	5100	3400
CC3	16 200	11 100	7400

Debe notarse que existen otros códigos de designación para el material de la tubería termoplástica de PE y de cuando en cuando pueden encontrarse en el mercado. Sin embargo, los tres códigos principales de designación del material de la tubería termoplástica de la tabla 1 representan el principio de los productos de la tubería PE en el mercado actual. Para más información referente a estos otros códigos de designación de material termoplástico para tubería, por favor póngase en contacto con profesional de ventas de ISCO.

La tabla 3 de abajo es una simplificación de la tabla 1 e ilustra la relativa facilidad con la cual los productos para tubería PE pueden ser especificados. El uso de esta aproximación permite al diseñador o al que especifica designar con precisión el producto apropiado para tubería PE mediante el uso de un simple código de designación de material de la tubería termoplástica y una cadena de texto relativamente simple que establece los requisitos de las propiedades físicas para siete claves de desempeño.

El código de designación del material de la tubería termoplástica y la clasificación mínima de célula se combinan luego con las normas apropiadas de producción e instalación para especificar eficazmente un sistema de tubería PE fuerte y durable. ISCO Industries puede proveer especificaciones modelos para una amplia gama de aplicaciones de tubería PE. Estas especificaciones modelo están disponibles en www.isco-pipe.com o al ponerse en contacto con su profesional de ventas de ISCO.

Tabla 3: Representante de Clasificación de la célula mínima por termoplástico tuberías de materiales Código Denominación

Termoplástico tuberías de materiales Código Denominación	Clasificación celular Mínimo Según ASTM D3350
PE2708	233373E
PE3608	345464C
PE4710	445474C

HDPE FITTINGS - MOLDED

There are two basic methods of creating most HDPE fittings, either by injection molding or fabricating from pipe or cylinders. Molded fittings are typically fully pressure rated, since the body of the molded fitting is reinforced with extra material around the OD at the bend, branch, or reduction to provide additional strength and maintain the intended pressure rating. The reinforcement terminates near the end of the molded fitting so that it has the same outside diameter of the pipe to facilitate welding. Fittings that are typically made by injection molding are 90 degree elbows, 45 degree elbows, tees, reducers, end caps and flange adapters. Molded fittings are typically available in 12" and smaller sizes due to processing and cost variables.

HDPE FITTINGS - FABRICATED

Like any other material, HDPE fabricated elbows and tees have a reduced pressure rating because the miter cut and weld create an effective oval at the welded intersection. Stress is increased during operation because of changes in flow direction. As the angle of the miter cut increases, the operating stress also increases along with the challenge of maintaining section alignment. Sweep bends that are forged from pipe have no cuts/welds, therefore have no derating.

In the early stages of the HDPE industry, a standard 25% derating for HDPE elbows was commonly used. With the advent of elbows made with larger miter angles (i.e. 3 segment 90/2 segment 45) and new resins, a more systematic approach was needed. The American Society of Mechanical Engineers offered an equation within the process piping code B31.3 that was incorporated by ISCO from 2003 to 2016. In section 304.2, equations 4a and 4b were used to determine pressure ratings of mitered elbows. For HDPE fittings, the pressure rating at that time was based on three criteria: the miter angle, the resin's material properties (Pipe Design Stress), and the wall thickness.

ISCO has taken the next step in the advancement of producing high-quality fabricated HDPE fittings. Our fabricated elbows, tees, reducing tees, and end caps are now produced and tested in accordance with ASTM F2206 - "Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene Plastic Pipe". ASTM F2206 places very specific requirements on fabricated fittings in two areas - the type of HDPE pipe, fittings, and plate or sheet stock used in the manufacturing of pressure-rated fabricated fittings; and the testing required for qualifying fabricated fittings.

ISCO only uses PE4710 HDPE materials per ASTM D3350 and HDPE pipe manufactured in accordance with ASTM D3035, ASTM F714, or ASTM F2619 to produce ASTM F2206 fabricated fittings. In addition, ISCO has contracted with accredited third-party agencies to conduct the short-term and elevated-temperature

ACCESORIOS PEAD - MOLDEADOS

Hay dos métodos básicos para elaborar la mayoría de accesorios HDPE, sea mediante moldeado por inyección o por fabricación a partir de tubería o cilindros. Los accesorios moldeados están normalmente categorizados para la presión máxima, ya que el cuerpo del accesorio moldeado es más grueso (material extra alrededor del diámetro externo, excepto en los extremos) que la tubería lo que proporciona una resistencia adicional y mantiene la capacidad de presión esperada. Los accesorios normalmente hechos mediante moldeado por inyección son los codos de 90°, codos de 45°, tees, reductores, tapas de extremo y adaptadores de brida. Los accesorios moldeados están normalmente disponibles en diámetros de 12" y hacia abajo por razones de costo y de procesamiento.

ACCESORIOS PEAD - FABRICADOS

Al igual que cualquier otro material, HDPE fabricados codos o tees fabricados tienen una capacidad de presión reducida porque el corte a inglete y la soldadura crean un óvalo eficaz en la intersección soldada. El esfuerzo aumenta durante la operación debido a los cambios de dirección del flujo. A medida que el ángulo de corte a inglete aumenta, la tensión operativa también aumenta junto con el reto de mantener la alineación de la sección. Las curvas de barrido que se forjan desde la tubería no tienen cortes / soldaduras, por lo tanto no tienen reducción de potencia.

En las etapas iniciales de la industria del HDPE (PEAD), una reducción estándar del 25% para codos en PEAD fue usado comúnmente. Con la aparición de codos hechos con mayores ángulos de inglete (ejemplo. 3 segmento 90/ 2 segmento 45) y de nuevas resinas, fue necesario un enfoque más sistemático. La sociedad The American Society of Engineers eléctricos ofreció una ecuación dentro de la norma B31.3 para procesamiento de tubería que fue incorporado por ISCO desde el 2003 al 2016. En la sección 304.2, las ecuaciones 4a y 4b se usaron para determinar las capacidades de presión de los codos de inglete. Para los accesorios de PEAD, la capacidad de presión en aquel momento se basaba en tres criterios: el ángulo de inglete, las propiedades del material de la resina (esfuerzo de diseño de tubería), y el espesor de la pared.

ISCO ha dado un paso adelante en el progreso de producción de accesorios de PEAD fabricados con alta calidad. Nuestros codos, tees rectas, tees reductoras, y tapas de extremo fabricados son ahora producidos y probados siguiendo la norma ASTM F2206 - "Especificación estándar para accesorios fabricados para la tubería plástica de polietileno de fusión a tope". La norma ASTM F2206 pone requisitos muy específicos sobre accesorios fabricados en dos áreas - en el tipo de tubería de PEAD, accesorios, y las reservas de plancha y láminas usadas en la fabricación de accesorios fabricados con presión nominal; y en las pruebas requeridas para la calificación de los accesorios fabricados.

ISCO usa solamente PE4710 materiales de PEAD según la norma ASTM D3350 y tubería de PEAD fabricada de acuerdo con las normas ASTM D3035, ASTM F714, ó ASTM F2619 para producir accesorios fabricados según la norma ASTM F2206. Además, ISCO ha firmado contratos con agencias de terceros acreditadas para realizar los ensayos requeridos para cumplir con la pruebas de diseño del estándar ASTM F2206- los ensayos a corto plazo y a presión elevada-temperatura mantenida.

sustained-pressure proof-of-design testing required to meet the ASTM F2206 standard.

ASTM F2206 also establishes the concept of Equivalent Dimension Ratio, or EDR, that simplifies the process of matching the required pressure rating of fabricated fittings using miter cut feedstock (elbows and straight line tees) to that of the pipe in which it will be joined. EDRs are determined for each fitting type and wall thickness by the collection of empirical data from the required ASTM F2206 pressure testing (see Table 6a and 6b for testing information). The EDR methodology provides HDPE piping system designers with a consistent means for specifying HDPE fabricated fittings. Note: Standard ISCO ASTM F2206 fabricated fittings are not manufactured with beveled ends on the inside diameter; however, this option is available upon request.

La norma ASTM F2206 establece también el concepto de Relación Dimensional Equivalente, o EDR (por sus siglas en inglés), que simplifica el proceso de emparejar capacidad de presión requerida de un accesorio fabricado con materia prima cortada en ángulo (codos y tees rectas) con la de la tubería a la cual irá unido. Los EDRs son determinados para cada tipo de accesorio y espesor. EDR es determinado para cada tipo de accesorio y espesor de pared mediante la recopilación de datos empíricos de las pruebas de presión requeridas por la norma ASTM F2206 (consulte la Tabla 6a y 6b para obtener información sobre las pruebas). La metodología EDR proporciona a los diseñadores de sistemas de tubería de PEAD unos medios consistentes para la especificación de accesorios fabricados en PEAD. Nota: Los accesorios ISCO estándar fabricados según la norma ASTM F2206 no se fabrican con extremos biselados en el diámetro interior; sin embargo, esta opción está disponible bajo pedido.

Table 4

Piping System DR	Feedstock DR	Fitting EDR	Fitting Pressure Rating (psi)
7	5	7	335
9	7	9	250
11	9	11	200
13.5	11	13.5	160
17	11	17	125
21	17	21	100
26	21	26	80
32.5	26	32.5	63

ISCO has not included HDPE fabricated crosses and lateral wyes within the ASTM F2206 offering. ISCO recommends that engineers considering the use of HDPE crosses and lateral wyes implement derating factors as shown in Table 7.

ISCO no ha incluido piezas en cruz ni piezas en Y laterales de PEAD fabricadas dentro de lo que ofrece la norma ASTM F2206. ISCO recomienda que los ingenieros consideren los factores de corrección de presión de las piezas HDPE laterales tipo "Ys" como se muestra en la Tabla 7.

DR, EDR, PRESSURE RATING, AND AVAILABLE SIZES

The chart below is representative of a pressure chart for each fitting page, where items in bold blue are considered standard in many sizes. Those in gray are considered non-standard and availability may be limited. Those not listed are not available for that fitting style.

DR, EDR, Presión de servicio y disponible

El siguiente cuadro es representativo de un gráfico de presión para cada página de adaptación, donde los elementos en negrita se consideran estándar en muchos tamaños. Los que están en gris son considerados no-estándar y la disponibilidad pueden ser limitados. Aquellos que no figuran no están disponibles para que el estilo apropiado.

Table 5

Feedstock DR	32.5	26	21	17	13.5	11	9	7
Pressure Rating	XX psi	XX psi	XX psi	XX psi	XX psi	XX psi	XX psi	XX psi
EDR	XX	XX	XX	XX	XX	XX	XX	XX

ISCO ASTM F2206 PRESSURE TESTING

The following table lists the fitting styles and sizing groups where ISCO has conducted pressure testing in accordance with ASTM F2206, Section 7.3 ("Elevated Sustained Pressure Test" and "Short Term Pressurization Testing"):

ISCO Prueba de Presión ASTM F2206

La siguiente tabla enumera los tipos de accesorios y los diversos diámetros donde ISCO ha realizado pruebas de presión de acuerdo con la norma ASTM F2206, Sección 7.3 ("Prueba de Presión Incrementada y Sostenida" y "Prueba de Presurización de Corta Duración"):

Table 6a

	ASTM F2206 Size Groups Grupos de Tamaño ASTM F2206		
Fitting Style Estilo de Accesorio	≤12"	>12"- <24"	≥24"
Elbows Codos	X	X	X
Tees Hierros en T	X	X	X
Reducing Tees Tees reductoras	X	X	X
End Caps Tapas del extremo	X	X	X

ASTM F2206 pressure testing was conducted with ISCO HDPE fabricated fittings during the months/years shown below:

La prueba de presión según ASTM F2206 se realizó con accesorios HDPE fabricados por ISCO durante los meses/años que se muestran a continuación:

Table 6b

	ASTM F2206 Size Groups Grupos de Tamaño ASTM F2206		
Required Test Prueba Requerida	≤12"	>12"- <24"	≥24"
Short Term Pressure Test Performed in Prueba de presión a corto plazo realizada en	Completed & Current Actualizado	Completed & Current Actualizado	Completed & Current Actualizado
Elevated Temperature / Sustained Pressure Test Performed in Prueba de temperatura elevada / presión sostenida realizada en	Completed & Current Actualizado	Completed & Current Actualizado	Completed & Current Actualizado

Table 7: Derating Factors for Non-ASTM F2206 Fabricating Fittings

For HDPE fittings made from pipe with no additional reinforcement

Crosses-Fabricated	Cruz - Fabricadas	DR	Derating Factor: Reducción de potencia factor
		7, 9, 11	0.60
		13.5 - 32.5	0.50
Lateral Wyes-Fabricated	YES laterales - Fabricadas	DR	Derating Factor: Reducción de potencia factor
		7, 9, 11	0.33
		13.5 - 32.5	0.33
Plastic Blind Flanges HDPE/PVC	Bridas ciegas plásticas HDPE/PVC • Las bridas ciegas están disponibles en espesores de 1 pulgada como estándar con capacidad de presión máxima de intervalos limitados. Están disponibles algunas opciones con espesores adicionales. Las bridas ciegas más grandes tienen probablemente una reducida capacidad - verifique los requisitos de la presión al momento del pedido.	DR	Derating Factor: Reducción de potencia factor
		7 - 32.5	*conditional
Cleanout Fittings HDPE	Accesorios HDPE de limpieza • Los accesorios de limpieza se usan en aplicaciones de flujo por gravedad y están diseñados solamente para evitar la intromisión en la tubería del entorno medio ambiental.	DR	Derating Factor: Reducción de potencia factor
		7 - 32.5	0

ISCO AND ASME B31 REQUIREMENTS

The American Society of Mechanical Engineers (ASME) was founded in 1880 as a way for engineers to address concerns within the United States’ vast industrial and mechanical expansion. Today, ASME has more than 100,000 members where many participate in committees producing and maintaining more than 600 codes, standards and technical journals in use by numerous industries in more than 100 countries.

ASME codes and standards relate to many different technical disciplines. The series of technical codes that discuss piping and pipelines is the ASME B31 Series. The B31 Series includes codes and standards covering everything from design and materials through fabrication, assembly, and testing of pressure piping systems for a host of applications including Power (B31.1), Fuel Gas (B31.2), Process (B31.3) and Pipeline Transportation (B31.4) among others.

Thermoplastic (HDPE) piping systems are referenced in two specific sections within the ASME B31 Series: B31.1 – Power Piping and B31.3 - Process Piping. B31.1 prescribes minimum requirements typically found in electric power generating stations and district heating and cooling systems. B31.3 contains requirements for piping used in petroleum refineries, chemical plants and related processing plants and terminals.

ISCO’s fabrication facilities currently use a fusing (bonding) procedure and fusion operators that meet the requirements of both ASME B31.1 and B31.3. The following provides a brief overview of the B31.1 and B31.3 rules as they apply to HDPE fabricators:

ASME B31.1

ASME B31.1 includes Mandatory Appendix N – Rules for Nonmetallic Piping and Piping Lined with Nonmetals. The qualification requirements for fusing (bonding) procedure specifications and personnel are given in Chapter N-V Fabrication, Assembly, and Erection, Section N-127 Bonding Plastic Joints. Qualification requirements and specific qualification tests are set out in N-127 and include:

Requisitos de ISCO y ASME B31

La Sociedad Americana de Ingenieros Mecánicos (ASME por sus siglas en inglés) fue fundada en 1880 como un modo para que los ingenieros aborden diversos temas en el marco de la vasta expansión industrial y mecánica en los Estados Unidos. Hoy, ASME tiene más de 100,000 miembros, donde muchos participan en comités que crean y mantienen más de 600 códigos, estándares y documentos técnicos que son usados por numerosas industrias en más de 100 países.

Los códigos y estándares ASME se utilizan en diversas disciplinas técnicas. La serie de códigos técnicos que tratan sobre tuberías y líneas de conducción es la serie ASME B31. La serie B31 incluye códigos y estándares que cubren temas desde el diseño y materiales durante la fabricación, ensamble, y las pruebas de los sistemas de tuberías a presión para un gran número de aplicaciones que incluyen Energía (B31.1), Gas combustible (B31.2), Proceso (B31.3) y Poliductos (B31.4) entre otros.

Los sistemas de tuberías termoplásticas (HDPE) se mencionan en dos secciones específicas dentro de la serie ASME B31:

B31.1 – Tuberías para uso en proyectos de Energía y B31.3 – Requerimiento de Tuberías. B31.1 - Prescribe los requisitos mínimos normalmente encontrados en estaciones generadoras de energía eléctrica y sistemas de calefacción & enfriamiento. B31.3 contiene los requisitos para tuberías utilizadas en refinerías de petróleo, plantas químicas y plantas terminales relacionadas.

Las instalaciones de fabricación de ISCO cuentan actualmente con un procedimiento de fusión (unión) y operadores que cumplen con los requisitos de las normas ASME B31.1 y B31.3. A continuación se ofrece un breve resumen de las normas B31.1 y B31.3 que se aplican a en la fabricación de productos HDPE:

ASME B31.1

ASME B31.1 incluye el Apéndice N obligatorio - Normas para Tuberías No Metálicas y para Tuberías Revestidas con No-Metales. Los requisitos exigidos para las especificaciones del procedimiento de fusión (unión) y para el personal se encuentran en el Capítulo N-V Fabricación, Ensamblaje y Montaje, Sección N-127 Uniones (Fusiones) de Plástico. Los requisitos de certificación y las pruebas específicas se mencionan en N-127 e incluyen:

Table 8

Test Method Método de Prueba	Material Parameters Parámetros del Material	Test Parameters Parámetros de la Prueba	Number Required Número requerido	Pass Aprobación
Hydrostatic Pressure Presión Hidrostática	NPS 4-inch or a minimum of 25% of the NPS of the largest piping component tested; test assembly shall contain one pipe-to-pipe joint and one pipe-to-fitting joint NPS de 4 pulgadas o un mínimo de 25% del NPS del diámetro de tubería más grande probado; la prueba debe contener una unión tubo con tubo y una unión tubo y accesorio	Maximum of either 150 psig or 1.5 times the pressure calculated per N-104.1.2(a) Máximo 150 psig o 1.5 veces la presión calculada según N-104.1.2 (a)	Once per operator Una por operador	Joints shall not leak or separate at the test pressure Las fusiones no deben tener fugas ni separarse durante la prueba de presión.
OR Alternativa				
Reverse Bend or Guided Side Bend Doblado Invertido o Doblado Lateral Guiado	NPS 4-inch or a minimum of 25% of the NPS of the largest piping component tested; test assembly shall contain one pipe-to-pipe joint and one pipe-to-fitting joint NPS de 4 pulgadas o un mínimo de 25% del NPS del diámetro de tubería más grande probado; la prueba debe contener una unión tubo con tubo y una unión tubo y accesorio	Test strips shall not break when bent a minimum of 90 degrees, at ambient temperature, over an inside bend radius of 1.5 times the NPS tested La probeta o muestra no se debe romper cuando se doble a 90 grados mínimo, a temperatura ambiente, en un radio de curvatura interna de 1.5 veces el NPS probado	Minimum of three coupons per operator Mínimo de tres muestras por operador	Test strips shall not break at required bend radius Las probeta o muestra no se debe romper en el radio de curvatura requerido

ASME B31.3

ASME B31.3 also requires that HDPE fusion procedures and operators (bonders) be qualified and specific details of this are found in Section A328 Bonding of Plastics. Section A328.1, Bonding Responsibility, states that each employer is responsible for the bonding done by personnel of his organization and ... shall conduct the required performance qualification tests to quality bonding procedure specifications (BPS) and bonders or bonding operators. Specifically, Section A328.2.5 outlines the qualification tests for the fusion procedure or BPS, and the performance of each fusion or bonding operator as:

ISCO has qualified our fusion procedure and operators per ASME B31.3, Section N-127.

ASME B31.3

ASME B31.3 también requiere que los procedimientos y operadores (soldadores) de fusión de HDPE estén certificados y los detalles específicos de esto se encuentran en la sección A328 Unión de Plásticos. La Sección A328.1, Responsabilidad de la Fusión, establece que cada empleador es responsable de la fusión realizada por el personal de su organización y ... este llevará a cabo las pruebas para la certificación de desempeño requeridas según las especificaciones del procedimiento de unión (fusión) de calidad (BPS) y los operadores de equipos semiautomáticos y automáticos. Concretamente, la Sección A328.2.5 describe las pruebas de certificación para el procedimiento de fusión ó BPS, y el desempeño de cada operador de fusión o unión como:

ISCO ha certificado nuestro procedimiento de fusión y operadores según la norma ASME B31.3, Sección N-127.

Table 9

Test Method Método de Prueba	Material Parameters Parámetros de Material	Test Parameters Parámetros de Prueba	Number Required Número Requerido	Pass Aprobación
Quick Burst in accordance with ASTM D1599 Prueba Destructiva de acuerdo a ASTM D1599	NPS 4-Inch or a minimum of 25% of the NPS of the largest piping component tested; test assembly shall contain at least one of each joint type identified in the BPS NPS de 4 pulgadas o un mínimo del 25% del NPS del diámetro más grande de tubería probado; la muestra de prueba debe contener al menos uno de cada tipo de unión (fusión) identificado en el BPS	Increase pressure within the assembly to induce failure between 60 seconds and 70 seconds Aumentar la presión dentro de la tubería para provocar la falla entre 60 segundos y 70 segundos	Once per procedure and/or operator Una vez por procedimiento y/o por operador	Failure initiates outside of the fusion weld La falla se inicia fuera de la soldadura por fusión
OR Alternativa				
Hydrostatic Hidrostático	NPS 4-Inch or a minimum of 25% of the NPS of the largest piping component tested; test assembly shall contain at least one of each joint type identified in the BPS NPS de 4 pulgadas o un mínimo del 25% del NPS del componente más grande de tubería probado; la muestra de prueba debe contener al menos uno de cada tipo de fusión identificado en el BPS	The test pressure shall be calculated per A328.2.5. Test duration shall not be less than 1 hour La presión de prueba se calculará según la norma A328.2.5. La duración de la prueba no será inferior a 1 hora	Once per procedure and/or operator Una vez por procedimiento y/o por operador	No leakage or separation of joints Sin fugas ni separación de las uniones

ISCO has conducted testing in accordance with Section A328.2 thus qualifying our fusion procedure and operators to ASME B31.3.

If your project includes HDPE materials specified to ASME B31.1 or B31.3, it should be a technical requirement that your HDPE supplier submit qualification-testing records. This is the only way to ensure your project truly meets ASME B31.1 or B31.3 requirements.

ISCO has qualified our procedures and operators in accordance with both ASME B31.1 and B31.3, and we are ready to fabricate best-in-class fittings and spools for your ASME B31 project.

ISCO ha realizado la prueba de acuerdo con la Sección A328.2, certificando así nuestro procedimiento de fusión y operadores según ASME B31.3.

Si su proyecto incluye materiales HDPE especificados según las normas ASME B31.1 o B31.3, debe ser una exigencia técnica que su proveedor de HDPE presente registros de pruebas-certificaciones. Esta es la única forma de garantizar que su proyecto realmente cumpla con los requisitos exigidos por la norma ASME B31.1 o B31.3.

ISCO ha certificado sus procedimientos y operadores de acuerdo con las normas ASME B31.1 y B31.3, y estamos listos para fabricar los mejores accesorios y estructuras para su proyecto ASME B31.

For reference only. Actual dimensions may vary.
Solo para referencia. Las dimensiones reales pueden variar.

IPS

ASTM
STANDARDS

ISCO®

PE4710 HDPE PIPE SIZES IPS AND LARGE DIAMETER METRIC

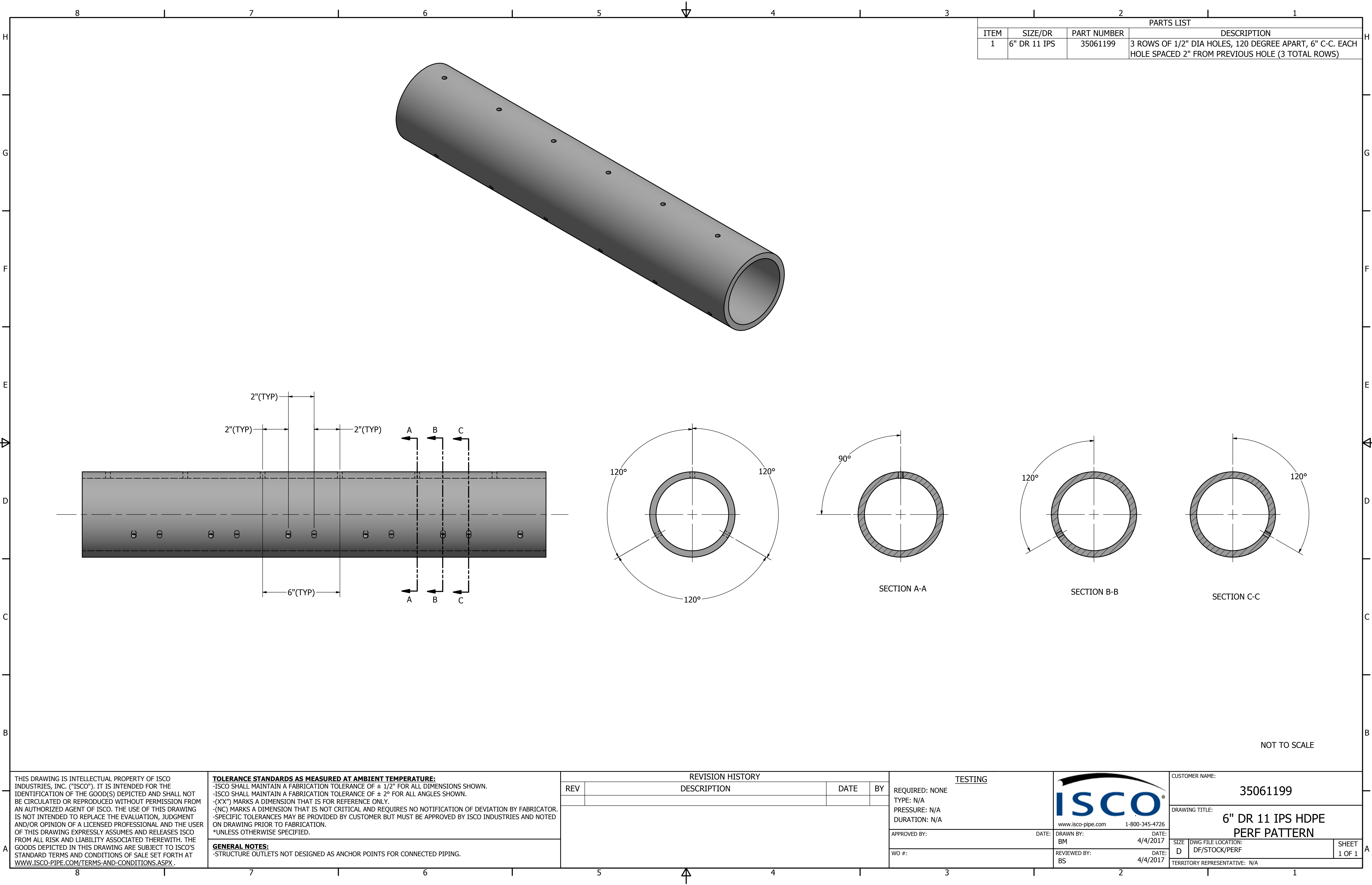
PE4710 Tamaños HDPE
tuberías IPS y Diámetro
Grande Métrico

DR		11			13.5			15.5		
PE4710 Pressure Rating Resistencia a la Presión		200 psi			160 psi			138 psi		
Nom. OD DE Nominal (in)	Actual OD DE Actual (in)	Min Wall Espesor Mini- mo de Pared (in)	Avg ID DI Promedio (in)	Weight Peso (lb/ft)	Min Wall Espesor Mini- mo de Pared (in)	Avg ID DI Promedio (in)	Weight Peso (lb/ft)	Min Wall Espesor Mini- mo de Pared (in)	Avg ID DI Promedio (in)	Weight Peso (lb/ft)
¾"	1.05	0.095	0.848	0.13	---	---	---	---	---	---
1"	1.315	0.12	1.062	0.2	---	---	---	---	---	---
1¼"	1.66	0.151	1.34	0.314	---	---	---	---	---	---
1½"	1.9	0.173	1.534	0.411	---	---	---	---	---	---
2"	2.375	0.216	1.917	0.642	0.176	2.002	0.534	0.153	2.05	0.47
3"	3.5	0.318	2.825	1.395	0.259	2.95	1.16	0.226	3.021	1.02
4"	4.5	0.409	3.633	2.31	0.333	3.793	1.92	0.29	3.885	1.687
5"	5.563	0.506	4.491	3.523	0.412	4.689	2.928	0.359	4.802	2.58
6"	6.625	0.602	5.348	4.93	0.491	5.585	4.152	0.427	5.719	3.656
8"	8.625	0.784	6.963	8.47	0.639	7.271	7.04	0.556	7.445	6.197
10"	10.75	0.977	8.678	13.16	0.796	9.062	10.932	0.694	9.28	9.626
12"	12.75	1.159	10.293	18.51	0.944	10.748	15.38	0.823	11.006	13.53
14"	14	1.273	11.302	22.32	1.037	11.801	18.54	0.903	12.085	16.31
16"	16	1.455	12.916	29.15	1.185	13.487	24.22	1.032	13.812	21.3
18"	18	1.636	14.531	36.89	1.333	15.173	30.651	1.161	15.538	26.95
20"	20	1.818	16.145	45.541	1.481	16.859	37.84	1.29	17.265	33.28
22"	22	2	17.76	55.105	1.63	18.545	45.79	1.419	18.991	39.712
24"	24	2.182	19.375	65.58	1.778	20.231	54.49	1.548	20.717	47.92
26"	26	2.364	20.989	77.44	1.926	21.917	64.261	1.677	22.444	56.532
28"	28	2.545	22.604	89.785	2.074	23.603	74.522	1.806	24.17	65.563
30"	30	2.727	24.218	103.076	2.222	25.289	85.543	1.935	25.897	75.264
32"	32	2.909	25.833	117.285	2.37	26.975	97.324	2.065	27.623	85.672
34"	34	3.091	27.447	132.411	2.519	28.661	109.905	2.194	29.35	96.714
36"	36	3.273	29.062	148.454	2.667	30.347	123.208	2.323	31.076	108.424
42"	42	3.818	33.906	202.039	3.111	35.404	167.675	2.71	36.255	147.568
48"	48	4.364	38.749	278.27	3.556	40.461	216.74	3.097	41.435	192.774
54"	54	4.909	43.59	352.14	4.00	45.75	286.94	3.484	46.614	243.921
1600mm/63"	62.99	---	---	---	4.667	53.107	390.58	4.065	54.383	340.15
1800mm	70.87	---	---	---	5.2*	60.1*	Call	---	---	---
2000mm	78.74	---	---	---	5.8*	66.8*	Call	---	---	---
2250mm	88.58	---	---	---	---	---	---	---	---	---
2500mm	98.43	---	---	---	---	---	---	---	---	---
2720mm	107.1	---	---	---	---	---	---	---	---	---
2800mm	110.2	---	---	---	---	---	---	---	---	---
3000mm	118.1	---	---	---	---	---	---	---	---	---
3500mm	137.8	---	---	---	---	---	---	---	---	---

- Pressures are based on using water at 23°C (73°F).
- Average inside diameter calculated using actual OD and minimum wall plus 6% for use in estimating fluid flows. Actual ID will vary.
- Other piping sizes or DR's may be available upon request.
- Standard Lengths:
 - 40' for 2"-24"
 - 50' for 26" and larger
 - Coils available for ¾ - 4" (6" by special order)

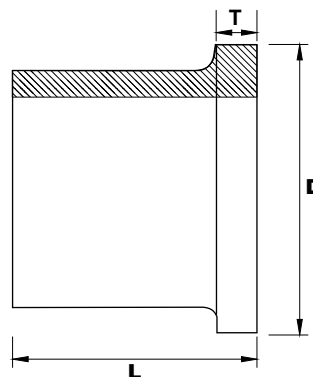
*DR 13.6

- Las presiones están basadas en el uso de agua a 23°C (73°F).
- El diámetro interno promedio calculado el diámetro externo real y la pared mínima más 6% para uso la estimación de flujos de fluidos. El diámetro interno real variará.
- Otros tamaños o DR de tubería pueden estar disponibles bajo pedido.
- Longitudes estándar
 - 40 pies para 2 - 24 pulgadas
 - 50 pies para 26 pulgadas o mayores
 - Bobinas disponibles para ¾ a 4 pulgadas (6 pulgadas para pedidos especiales)



FLANGE ADAPTER

Adaptador De Brida



DR	32.5	26	21	17	15.5	13.5	11	9	7
Pressure Rating Resistencia a la Presión	63 psi	80 psi	100 psi	125 psi	138 psi	160 psi	200 psi	250 psi	333 psi

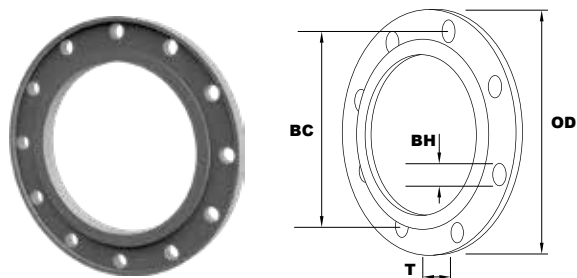
Nominal Size (in) Tamaño nominal	OD (in)	D (in)	L (in)	7	9	11	13.5	15.5	17	21	26	32.5
				T (in)	T (in)	T (in)	T (in)	T (in)	T (in)	T (in)	T (in)	T (in)
3/4	1.05	2	4	0.2	0.2	0.2	-	-	-	-	-	-
1	1.315	2.37	4	0.21	0.21	0.21	-	-	-	-	-	-
1-1/4	1.66	2.75	4	0.25	0.25	0.25	-	-	-	-	-	-
1-1/2	1.9	3.12	4	0.3	0.3	0.3	-	-	-	-	-	-
2	2.375	4	6	0.504	0.504	0.45	0.45	0.45	0.45	0.45	0.45	0.45
3	3.5	5	6	0.7	0.7	0.67	0.67	0.67	0.67	0.67	0.67	0.67
4	4.5	6.598	6	1.12	1.12	0.896	0.896	0.896	0.896	0.896	0.896	0.896
6	6.625	8.5	8	1.344	1.344	0.895	0.895	0.895	0.895	0.895	0.895	0.895
8	8.625	10.598	9	1.82	1.82	1.12	1.12	1.12	1.12	1.12	1.12	1.12
10	10.75	12.799	10.75	2.24	1.68	1.455	1.455	1.455	1.434	1.01	1.01	1.01
12	12.75	15.252	11	2.549	2.1	1.725	1.725	1.725	1.725	1.12	1.12	1.12
14	14	17.5	11	2.848	2.24	1.905	1.905	1.905	1.82	1.23	1.23	1.23
16	16	20	12	3.25	2.5	2.13	2.13	2.13	2.13	1.345	1.345	1.345
18	18	21.098	12	4.108	2.75	2.35	2.35	2.35	2.24	1.4	1.4	1.4
20	20	23.5	12	3.88	3.74	2.55	2.55	2.55	2.55	1.557	1.557	1.557
22	22	25.6	12	4.188	4.17	2.75	2.75	2.75	2.75	1.702	1.702	1.702
24	24	27.9	14	4.61	4.61	3.15	3.15	3.15	3	1.867	1.867	1.867
26	26	29.75	14	4.893	4.893	3.205	3.205	3.205	3.205	1.916	1.916	1.916
28	28	32	14	5.25	5.25	3.432	3.432	3.432	3.432	2.063	2.063	2.063
30	30	34	14	5.607	5.607	3.659	3.659	3.659	3.659	2.211	2.211	2.211
32	32	36.125	14	-	5.964	3.886	3.886	3.886	3.886	2.355	2.355	2.355
34	34	38.125	14	-	6.321	4.114	4.114	4.114	4.114	2.487	2.487	2.487
36	36	40.5	14	-	6.679	4.341	4.341	4.341	4.341	2.618	2.618	2.618
42	42	47.125	21	-	-	5.023	5.023	5.023	5.023	3.013	3.013	3.013
48	48	53.5	21	-	-	5.75	5.705	5.705	5.705	3.408	3.408	3.408
54	54	59.625	21	-	-	-	-	-	6.386	3.803	3.803	3.803
63	63	66.79	21	-	-	-	-	-	7.409	4.395	4.395	4.395

1. 20" DR 7 L = 12.75"; 22" DR 7 L = 13"; 36" DR 9 L = 16.5"

Description			Qty	Description			Qty
<u>2" Standard Zinc</u>				<u>2" XL Zinc</u>			
5/8-11 x 4	Stud Zinc		4	5/8-11 x 8	Stud Zinc		4
5/8-11	HeavyHex Nut Zinc		8	5/8-11	HeavyHex Nut Zinc		8
5/8	Flat washer Zinc		8	5/8	Flat washer Zinc		8
<u>3" Standard Zinc</u>				<u>3" XL Zinc</u>			
5/8-11 x 5	Stud Zinc		4	5/8-11 x 8	Stud Zinc		4
5/8-11	HeavyHex Nut Zinc		8	5/8-11	HeavyHex Nut Zinc		8
5/8	Flat washer Zinc		8	5/8	Flat washer Zinc		8
<u>4" Standard Zinc</u>				<u>4" XL Zinc</u>			
5/8-11 x 5-1/4	Stud Zinc		8	5/8-11 x 13-5/8	Stud Zinc		8
5/8-11	HeavyHex Nut Zinc		16	5/8-11	HeavyHex Nut Zinc		16
5/8	Flat washer Zinc		16	5/8	Flat washer Zinc		16
<u>6" Standard Zinc</u>				<u>6" XL Zinc</u>			
3/4-10 x 5-7/8	Stud Zinc		8	3/4-10 x 15-1/2	Stud Zinc		8
3/4-10	HeavyHex Nut Zinc		16	3/4-10	HeavyHex Nut Zinc		16
3/4	Flat washer Zinc		16	3/4	Flat washer Zinc		16
<u>8" Standard Zinc</u>				<u>8" XL Zinc</u>			
3/4-10 x 6-1/8	Stud Zinc		8	3/4-10 x 16-3/8	Stud Zinc		8
3/4-10	HeavyHex Nut Zinc		16	3/4-10	HeavyHex Nut Zinc		16
3/4	Flat washer Zinc		16	3/4	Flat washer Zinc		16
<u>10" Standard Zinc</u>				<u>10" XL Zinc</u>			
7/8-9 x 7-3/4	Stud Zinc		12	7/8-9 x 18-5/8	Stud Zinc		12
7/8-9	HeavyHex Nut Zinc		24	7/8-9	HeavyHex Nut Zinc		24
7/8	Flat washer Zinc		24	7/8	Flat washer Zinc		24
<u>12" Standard Zinc</u>				<u>12" XL Zinc</u>			
7/8-9 x 8-1/2	Stud Zinc		12	7/8-9 x 20-3/8	Stud Zinc		12
7/8-9	HeavyHex Nut Zinc		24	7/8-9	HeavyHex Nut Zinc		24
7/8	Flat washer Zinc		24	7/8	Flat washer Zinc		24
<u>14" Standard Zinc</u>				<u>14" XL Zinc</u>			
1-8 x 10-1/8	Stud Zinc		12	1-8 x 21-1/4	Stud Zinc		12
1-8	HeavyHex Nut Zinc		24	1-8	HeavyHex Nut Zinc		24
1	Flat washer Zinc		24	1	Flat washer Zinc		24
<u>16" Standard Zinc</u>				<u>16" XL Zinc</u>			
1-8 x 10-1/2	Stud Zinc		16	1-8 x 23-7/8	Stud Zinc		16
1-8	HeavyHex Nut Zinc		32	1-8	HeavyHex Nut Zinc		32
1	Flat washer Zinc		32	1	Flat washer Zinc		32
<u>18" Standard Zinc</u>				<u>18" XL Zinc</u>			
1-1/8 x 11	Stud Zinc		16	1-1/8 x 24-7/8	Stud Zinc		16
1-1/8	HeavyHex Nut Zinc		32	1-1/8	HeavyHex Nut Zinc		32
1-1/8	Flat washer Zinc		32	1-1/8	Flat washer Zinc		32

BACK-UP RING - DUCTILE IRON FOR USE WITH FLANGE ADAPTER

Anillo De Respaldo De Hierro Dúctil Para Uso Con El Adaptador De Brida



MATES TO FLANGES MADE TO THE FOLLOWING STANDARD: Se conecta a bridas hechas a las siguientes normas:			
Standard Estandar	Class Clase	Type Tipo	Size Range Rango de Tamaños
ASME/ANSI B16.5	150	-	1/2" - 24"
ASME/ANSI B16.47 Series A	150	-	26" - 60"
ASME/ANSI B16.1	125	-	All
AWWWA C 207	B, D, E (hub flanges) B, D, E (bridas de núcleo)	B, D, E (rings, blind flanges) B, D, E (anillos, brida ciega)	All
EN 1759-1 (BS, DIN, and UNE)	150	-	1/2" - 24"

Nominal Size (in)	Pipe OD (in)	DR	Pressure Rating (psi)	OD (in)	BC (in)	BH (in)	T (in)	Bolt # Perno #
3/4	1.05	7	335	3.88	2.75	0.625	0.5	4
1	1.315	7	335	4.25	3.13	0.625	0.56	4
1-1/4	1.66	7	335	4.63	3.5	0.625	0.63	4
1-1/2	1.9	7	335	5	3.88	0.625	0.69	4
2	2.375	7	335	6	4.75	0.75	0.75	4
		11	200	6	4.75	0.75	0.5	4
3	3.5	7	335	7.5	6	0.75	0.94	4
		11	200	7.5	6	0.75	0.53	4
4	4.5	7	335	9	7.5	0.75	0.94	8
		11	200	9	7.5	0.75	0.55	8
6	6.625	7	335	11	9.5	0.875	1	8
		11	200	11	9.5	0.875	0.63	8
8	8.625	7	335	13.5	11.75	0.875	1.12	8
		11	200	13.5	11.75	0.875	0.85	8
10	10.75	7	335	16	14.25	1	1.19	12
		11	200	16	14.25	1	0.98	12
12	12.75	7	335	19	17	1	1.5	12
		11	200	19	17	1	1.25	12
14	14	7	335	21	18.75	1.125	1.63	12
		11	200	21	18.75	1.125	1.38	12
16	16	7	335	23.5	21.25	1.125	1.88	16
		11	200	23.5	21.25	1.125	1.65	16
18	18	7	335	25	22.75	1.25	1.9	16
		11	200	25	22.75	1.25	1.67	16
20	20	7	335	27.5	25	1.25	2.125	20
		11	200	27.5	25	1.25	1.81	20
22	22	7	335	29.5	27.25	1.375	2.3	20
		11	200	29.5	27.25	1.375	2	20
24	24	7	335	32	29.5	1.375	2.5	20
		9	250	32	29.5	1.375	2.13	20
		11	200	32	29.5	1.375	2.17	20
		17	125	32	29.5	1.375	1.95	20

1. Standard surface treatment is painted primer. Optional surface treatments are available as galvanized, epoxy-coated, or powder-coated. Availabilities may be extended.

Nominal Size (in)	Pipe OD (in)	DR	Pressure Rating (psi)	OD (in)	BC (in)	BH (in)	T (in)	Bolt # Perno #
26	26	7	335	34.25	31.75	1.375	2.53	24
		11	200	34.25	31.75	1.375	2.38	24
		17	125	34.25	31.75	1.375	2	24
28	28	9	250	36.5	34	1.375	2.6	28
		11	200	36.5	34	1.375	2.5	28
		17	125	36.5	34	1.375	2.3	28
30	30	9	250	38.75	36	1.375	2.8	28
		11	200	38.75	36	1.375	2.6	28
		17	125	38.75	36	1.375	2.28	28
		26	80	38.75	36	1.375	2.06	28
32	32	9	250	41.75	38.5	1.63	3	28
		11	200	41.75	38.5	1.63	2.75	28
		26	80	41.75	38.5	1.63	2.12	28
34	34	11	200	43.75	40.5	1.63	2.93	32
		17	125	43.75	40.5	1.63	2.44	32
		26	80	43.75	40.5	1.63	2.14	32
36	36	9	250	46	42.75	1.63	3.8	32
		11	200	46	42.75	1.63	3.03	32
		17	125	46	42.75	1.63	2.75	32
		26	80	46	42.75	1.63	2.5	32
42	42	11	200	53	49.5	1.63	4.06	36
		13.5	160	53	49.5	1.63	3.66	36
		21	100	53	49.5	1.63	3	36
48	48	11	200	59.5	56	1.63	4.53	44
		17	125	59.5	56	1.63	3.94	44
		26	80	59.5	56	1.63	3.5	44
54	54	17	125	66.25	62.75	1.88	4	44
		26	80	66.25	62.75	1.88	3.75	44
63	63	17	125	73	69.25	1.88	3.15	52
		26	80	73	69.25	1.88	2.8	52

1. Tratamiento de la superficie Standard está pintado de imprimación. Tratamientos superficiales opcionales están disponibles como galvanizado, recubierto de polvo epoxi-recubiertos o. Disponibilidades podrán prorrogarse.

Flange Gaskets

125-150 LB. PIPE FLANGE GASKETS

125 - 150 LB. RING			125 - 150 LB. FULL FACE					
PIPE SIZE OLD STD. I.D.	NEW STD. ASA I.D. AND O.D.		PIPE SIZE OLD STD. I.D.	NEW STD. ASA I.D. AND O.D.		NO. HOLES	HOLE DIA.	BOLT CIRCLE
1/2	27/32	X 1-7/8	1/2	27/32	X 3-1/2	4	5/8	2-3/8
3/4	1-1/16	X 2-1/4	3/4	1-1/16	X 3-7/8	4	5/8	2-3/4
1	1-5/16	X 2-5/8	1	1-5/16	X 4-1/4	4	5/8	3-1/8
1-1/4	1-21/32	X 3	1-1/4	1-21/32	X 4-5/8	4	5/8	3-1/2
1-1/2	1-29/32	X 3-3/8	1-1/2	1-29/32	X 5	4	5/8	3-7/8
2	2-3/8	X 4-1/8	2	2-3/8	X 6	4	3/4	4-3/4
2-1/2	2-7/8	X 4-7/8	2-1/2	2-7/8	X 7	4	3/4	5-1/2
3	3-1/2	X 5-3/8	3	3-1/2	X 7-1/2	4	3/4	6
3-1/2	4	X 6-3/8	3-1/2	4	X 8-1/2	8	3/4	7
4	4-1/2	X 6-7/8	4	4-1/2	X 9	8	3/4	7-1/2
4-1/2	5	X 7	4-1/2	5	X 9-1/4	8	3/4	7-3/4
5	5-9/16	X 7-3/4	5	5-9/16	X 10	8	7/8	8-1/2
6	6-5/8	X 8-3/4	6	6-5/8	X 11	8	7/8	9-1/2
7	7-5/8	X 10	7	7-5/8	X 12-1/2	8	7/8	10-3/4
8	8-5/8	X 11	8	8-5/8	X 13-1/2	8	7/8	11-3/4
9	9-5/8	X 12-1/2	9	9-5/8	X 15	12	7/8	13-1/4
10	10-3/4	X 13-3/8	10	10-3/4	X 16	12	1	14-1/4
12	12-3/4	X 16-1/8	12	12-3/4	X 19	12	1	17
14	14	X 17-3/4	14	14	X 21	12	1 1/8	18-3/4
15	15	X 19	15	15	X 22-1/4	16	1 1/8	20
16	16	X 20-1/4	16	16	X 23-1/2	16	1 1/8	21-1/4
18	18	X 21-5/8	18	18	X 25	16	1 1/4	22-3/4
20	20	X 23-7/8	20	20	X 27-1/2	20	1 1/4	25
22	22	X 26	22	22	X 29-1/2	20	1 1/4	27-1/4
24	24	X 28-1/4	24	24	X 32	20	1 3/8	29-1/2
26	26	X 30-1/2	26	26	X 34-1/4	24	1 3/8	31-3/4
28	28	X 32-3/4	28	28	X 36-1/2	28	1 3/8	34
30	30	X 34-3/4	30	30	X 38-3/4	28	1 3/8	36
32	32	X 38	32	32	X 41-3/4	28	1 5/8	38-1/2
34	34	X 39	34	34	X 43-3/4	32	1 5/8	40-1/2
36	36	X 41-1/4	36	36	X 46	32	1 5/8	42-3/4
38	38	X 43-5/8	38	38	X 48-3/4	36	1 5/8	45-1/4
40	40	X 45-5/8	40	40	X 50-3/4	36	1 5/8	47-1/4
42	42	X 48	42	42	X 53	36	1 5/8	49-1/2
44	44	X 50-1/8	44	44	X 55-1/4	40	1 5/8	51-3/4
46	46	X 52-1/8	46	46	X 57-1/4	40	1 5/8	53-3/4
48	48	X 54-1/2	48	48	X 59-1/2	44	1 5/8	56

* UNLESS OTHERWISE SPECIFIED ON ORDER, OLD STANDARD SIZES WILL BE SUPPLIED

* UNLESS OTHERWISE SPECIFIED ON ORDER, OLD STANDARD SIZES WILL BE SUPPLIED

TYPE OF MATERIAL

BUNA-N (NITRILE) SHEET

BUTYL SHEET

CLOTH INSERTED SHEET

DARPAC COMPRESSED SHEET

EPDM (ETHYLENE PROPYLENE)

GRAPHITE SHEET (SUBJECT TO CARTON CHARGE)

HYPALON SHEET

NEOPRENE - 50 THRU 70 DURO

NEOPRENE DIAPHRAGM - DUCK INSERTED

RED RUBBER SHEET

SILICONE SHEET - 50 THRU 70 DURO

TAN PURE GUM

TETRABLUE SHEET PACKING

TETRAGLAS-T GASKET CLOTH

VEGETABLE FIBER SHEET (SUBJECT TO MINIMUM QUANTITY ORDER)

VITON (FLUOROELASTOMER)

WHITE FOOD GRADE RUBBER

WIRE INSERTED TETRAGLAS-T

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For International Orders: Phone: 276.773-2711 • Fax: 276-773-0208

Flange Gaskets

250-300 LB. PIPE FLANGE GASKETS

250 - 300 LB. RING			250 - 300 LB. FULL FACE					
PIPE SIZE OLD STD. I.D.	NEW STD. ASA I.D. AND O.D.		PIPE SIZE OLD STD. I.D.	NEW STD. ASA I.D. AND O.D.		NO. HOLES	HOLE DIA.	BOLT CIRCLE
1/2	27/32	X 2-1/8	1/2	27/32	X 3-3/4	4	5/8	2-5/8
3/4	1-1/16	X 2-5/8	3/4	1-1/16	X 4-5/8	4	3/4	3-1/4
1	1-5/16	X 2-7/8	1	1-5/16	X 4-7/8	4	3/4	3-1/2
1-1/4	1-21/32	X 3-1/4	1-1/4	1-21/32	X 5-1/4	4	3/4	3-7/8
1-1/2	1-29/32	X 3-3/4	1-1/2	1-29/32	X 6-1/8	4	3/4	4-1/2
2	2-3/8	X 4-3/4	2	2-3/8	X 6-1/2	8	7/8	5
2-1/2	2-7/8	X 5-1/8	2-1/2	2-7/8	X 7-1/2	8	7/8	5-7/8
3	3-1/2	X 5-7/8	3	3-1/2	X 8-1/4	8	7/8	6-5/8
3-1/2	4	X 6-1/2	3-1/2	4	X 9	8	7/8	7-1/4
4	4-1/2	X 7-1/8	4	4-1/2	X 10	8	7/8	7-7/8
4-1/2	5	X 7-5/8	4-1/2	5	X 10-1/2	8	7/8	8-1/2
5	5-9/16	X 8-1/2	5	5-9/16	X 11	8	7/8	9-1/4
6	6-5/8	X 9-7/8	6	6-5/8	X 12-1/2	12	7/8	10-5/8
7	7-5/8	X 10-7/8	7	7-5/8	X 14	12	7/8	11-7/8
8	8-5/8	X 12-1/8	8	8-5/8	X 15	12	1	13
9	9-5/8	X 12-7/8	9	9-5/8	X 16-1/4	12	1	14
10	10-3/4	X 14-1/4	10	10-3/4	X 17-1/2	16	1-1/8	15-1/4
12	12-3/4	X 16-5/8	12	12-3/4	X 20-1/2	16	1-1/4	17-3/4
14	14	X 19-1/8	14	14	X 23	20	1-1/4	20-1/4
16	16	X 21-1/4	16	16	X 25-1/2	20	1-3/8	22-1/2
18	18	X 23-1/4	18	18	X 28	24	1-3/8	24-3/4
20	20	X 25-3/4	20	20	X 30-1/2	24	1-3/8	27
22	22	X 27-3/4	22	22	X 33	24	1-3/8	29-1/4
24	24	X 30-1/2	24	24	X 36	24	1-5/8	32
26	26	X 32-7/8	26	26	X 38-1/4	28	1-5/8	34-1/2
28	28	X 35-3/8	28	28	X 40-3/4	28	1-5/8	37
30	30	X 37-1/2	30	30	X 43	28	1-7/8	39-1/4
32	32	X 38-5/8	32	32	X 45-1/4	28	1-7/8	41-1/2
34	34	X 41-5/8	34	34	X 47-1/2	28	1-7/8	43-1/2
36	36	X 44	36	36	X 50	32	2-1/8	46
38	38	X 46-1/8	38	38	X 52-1/4	32	2-1/8	48
40	40	X 48-3/4	40	40	X 54-1/4	36	2-1/8	50-1/4
42	42	X 50-3/4	42	42	X 57	36	2-1/8	52-3/4
44	44	X 53	44	44	X 59-1/4	36	2-1/8	55
46	46	X 55-1/4	46	46	X 61-1/2	40	2-1/8	57-1/4
48	48	X 58-3/4	48	48	X 65	40	2-1/8	60-3/4

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TYPE OF MATERIAL

BUNA-N (NITRILE) SHEET

BUTYL SHEET

CLOTH INSERTED SHEET

DARPAC COMPRESSED SHEET

EPDM (ETHYLENE PROPYLENE)

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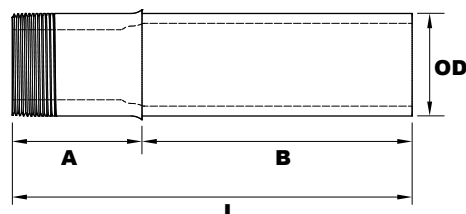
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TRANSITION FITTING HDPE TO MALE NPT THREADED METAL

Accesorio Transición HDPE A NPT Macho Roscado



DR	17	11	9	7
Pressure Rating Resistencia a la Presión	125 psi	200 psi	250 psi	333 psi

Nominal Size (in) Tamaño nominal	OD (in)	A (in)	B (in)	L (in)
1/2	0.84	1.6	6.4	8
3/4	1.05	1.8	6.2	8
1	1.315	2	6	8
1-1/4	1.66	2.6	5.4	8
1-1/2	1.9	2.6	5.4	8
2	2.375	3	5	8
3	3.5	4	4	8
4	4.5	4	8	12
6	6.625	5	8	13
8	8.625	7	8	15
10	10.75	8	8	16
12	12.75	9	9	18

1. Available in Brass, Carbon Steel (Epoxy Coated), 304 and 316 Stainless Steel

1. Disponible en bronce, acero al carbono recubierto con Epoxy y acero inoxidable 304 y 316.

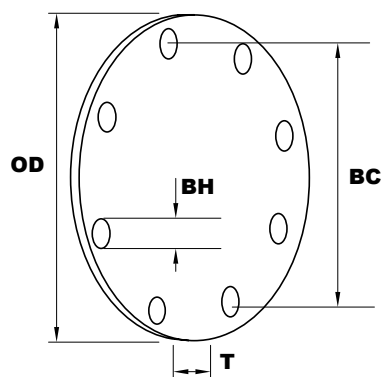
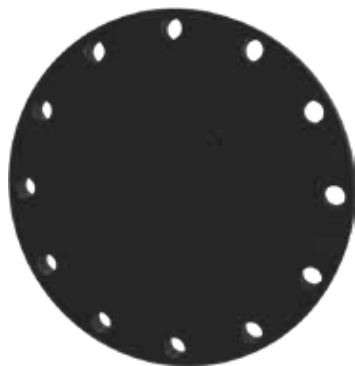


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**BLIND FLANGE
HDPE AND PVC****Brida Ciega De
HDPE Y PVC**

Nominal Size (in) Tamaño nominal	OD (in)	BC (in)	BH (in)	T (in)	Bolt # Perno #
3/4	3.875	2.75	0.625	1	4
1	4.25	3.13	0.625	1	4
1-1/4	4.625	3.5	0.625	1	4
1-1/2	5	3.88	0.625	1	4
2	6	4.75	0.750	1	4
3	7.5	6	0.750	1	4
4	9	7.5	0.750	1	8
6	11	9.5	0.875	1	8
8	13.5	11.75	0.875	1	8
10	16	14.25	1	1	12
12	19	17	1	1	12
14	21	18.75	1.125	1	12
16	23.5	21.25	1.125	1	16
18	25	22.75	1.25	1	16
20	27.5	25	1.25	1	20
22	29.5	27.25	1.375	1	20
24	32	29.5	1.375	1	20
26	34.25	31.75	1.375	1	24
28	36.5	34	1.375	1	28
30	38.75	36	1.375	1	28
32	41.75	38.5	1.625	1	28
36	46	42.75	1.625	1	32
40	50.75	47.25	1.625	1	36
42	53	49.5	1.625	1	36
48	59.5	56	1.625	1	44
54	66.25	62.75	1.875	1.5	44
63	73	69.25	1.875	1.5	52

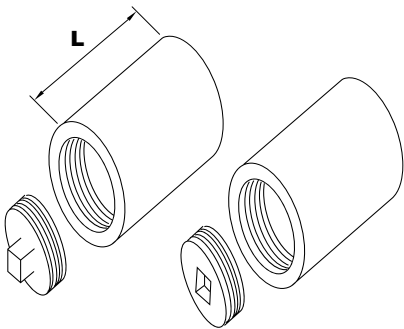
1. Bolt circle for IPS Blind Flanges are the same for DIPS Blind Flanges 24" and smaller.
2. HDPE and PVC Blinds are not rated for full pressure above 6".

1. La circunferencia de los pernos en las bridas ciegas ips es que el de las bridas ciegas dips de 24 pulgadas o menos.
2. Las bridas ciegas de hdpe y pvc por encima de 6 pulgadas no están categorizadas para presión máxima.

For reference only. Actual dimensions may vary.
Solo para referencia. Las dimensiones reales pueden variar.

CLEAN OUT
THREADED

Tapa De Limpieza



Nominal Size (in) Tamaño nominal	OD (in)	L (in)
2	2.375	6
3	3.5	6
4	4.5	6
6	6.625	6
8	8.625	6
10	10.75	6
12	12.75	6

- 1. Clean Out fittings are rated for gravity service only.
- 2. Male boss standard. Female boss available upon request.
- 3. Fusion end of fitting comes standard as DR11 wall thickness.

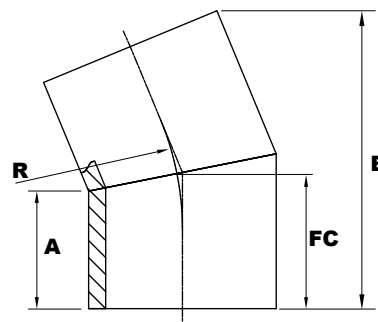
- 1. Los accesorios de limpieza están clasificados solo para servicios por gravedad.
- 2. Norma jefe masculino, jefa disponibles bajo petición.
- 3. Fusion end of fitting comes standard as DR11 wall thickness.

AWARD-WINNING: ISCO has been a frequent award-winner for the Plastics Pipe Institute's "Project of the Year" award. See the work that took home the prize year after year on our website.

RECONOCIMIENTO: ISCO ha sido un frecuente ganador del premio "Proyecto del Año" del Instituto de Tubos de Plástico (PPI siglas en inglés). Vea en nuestro sitio web los proyectos que ganaron el premio en los últimos años.

22.5° ELBOW FABRICATED TWO-SEGMENT MITERED BEND

Codo De 22.5° Fabricado De Dos Segmentos



Feedstock DR	32.5	26	21	17	13.5	11	9	7
Pressure Rating	50 psi	63 psi	80 psi	100 psi	125 psi	160 psi	200 psi	250 psi
EDR	41	32.5	26	21	17	13.5	11	9

Nominal Size (in) Tamaño nominal	OD (in)	A (in)	B (in)	FC (in)	R (in)
2	2.375	4	8.6044	4.2362	13.1274
3	3.5	4	9.0349	4.3481	13.6899
4	4.5	5	11.3415	5.4476	14.1899
6	6.625	6	14.0786	6.6589	15.2524
8	8.625	6.5	15.8059	7.3578	16.2524
10	10.75	6.5	16.6191	7.5692	17.3149
12	12.75	8	20.2703	9.2681	19.4461
14	14	8	20.7486	9.3924	21.0766
16	16	8	21.514	9.5913	24.0875
18	18	8	22.2793	9.7902	26.8471
20	20	8	23.0447	9.9891	30.1094
22	22	8	23.8101	10.188	32.9946
24	24	8	24.5754	10.3869	36.0055
26	26	14	36.8841	16.5859	39.0165
28	28	14	37.6494	16.7848	41.9017
30	30	14	38.4148	16.9837	44.9881
32	32	14	39.1802	17.1826	48.0493
36	36	14	40.7109	17.5804	54.0712
42	42	21	56.4742	25.1772	62.9783
48	48	21	58.7703	25.7739	72.0111
54	54	21	61.0664	26.3706	81.0439
63	63	21	64.5105	27.2657	85.5439

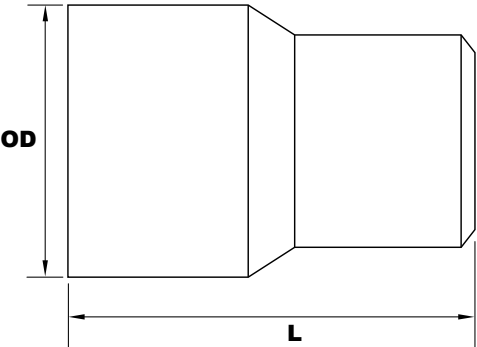
1. Some size/DR combinations may have limited availability.
2. EDR (Equivalent Dimensional Ratio) – The EDR specified is the DR of the piping system for which the fabricated fitting is intended to be butt fused.

1. Algunos Tamaño / DR Combinaciones puede tener disponibilidad limitada.
2. EDR (Ratio Dimensional Equivalente) - El EDR especificado es el DR del sistema de tuberías para que el accesorio fabricado pueda ser fusionado a tope.

For reference only. Actual dimensions may vary.
Solo para referencia. Las dimensiones reales pueden variar.

END CAP
MOLDED

Tapa De Extremo
Moleada



DR	17	11	9	7
Pressure Rating Resistencia a la Presión	125 psi	200 psi	250 psi	333 psi

Nominal Size (in) Tamaño nominal	OD (in)	DR (in)	L (in)
3/4	1.05	11	2.08
1	1.315	11	2.14
1-1/4	1.66	11	2.35
1-1/2	1.9	11	2.55
2	2.375	17	2.94
		11	2.94
		9	2.94
		7	2.94
3	3.5	17	7.33
		11	7.33
		9	7.33
		7	7.33
4	4.5	17	7.56
		11	7.56
		9	7.38
		7	7.38
6	6.625	17	6.19
		11	6.19
		9	10.52
		7	10.52
8	8.625	17	8
		11	8
		9	12.25
		7	12.25
10	10.75	17	10.05
		11	10.05
12	12.75	17	12.25
		11	12.25

1. Some end caps may have reduced section on end, shape varies.

1. Algunas tapas pueden tener una sección reducida en el extremo, la forma varía.

Valve and Meter Boxes / NDS Meter Box: Rectangular, 12 in Ht, 20...



NDS Meter Box:
Rectangular, 12 in Ht, 20 in
Wd, 25 3/4 in Lg, 3 in x 4 in
Pipe Size

Item 52XA19 Mfr. Model D1500-DIRB

☐ Compare

Product Details Catalog Page [2907](#)

Brand	NDS
Manufacturer Part Number	D1500-DIRB
Shape	Rectangular
Height	12 in
Width	20 in
Length	25-3/4 in
Pipe Size	3 in x 4 in
Color	Black
Body Material	Polyolefin
Product Type	Meter Box
UNSPSC	40141616
Country of Origin	USA (subject to change)

Shipping Weight **14.55 lbs**
[Ship Availability Terms](#)

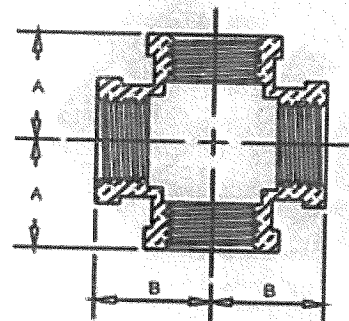
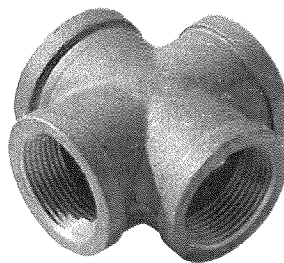
[Add to List](#)

DIMENSIONAL SPECIFICATIONS

LEADED IMPORT BRASS FITTINGS** 125 LB.

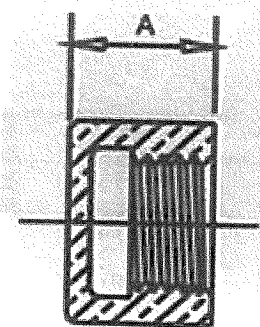
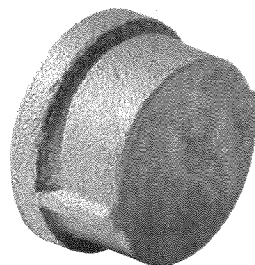
CROSS

Part #	Size (IN.)	Approx. Net WT. (LB.)	A	B
X110-02	1/8	0.13	0.54	0.54
X110-04	1/4	0.20	0.71	0.71
X110-06	3/8	0.29	0.82	0.82
X110-08	1/2	0.43	1.01	1.01
X110-12	3/4	0.68	1.18	1.18
X110-16	1	1.08	1.43	1.43
X110-20	1-1/4	1.70	1.69	1.69
X110-24	1-1/2	1.97	1.84	1.84
X110-32	2	2.52	2.12	2.12
X110-40	2-1/2	5.73	2.70	2.70



CAP

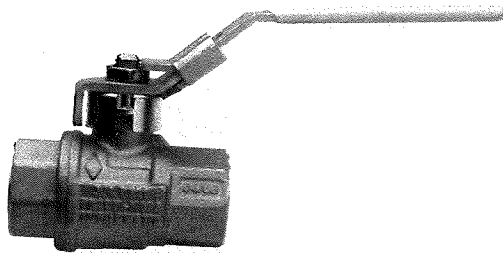
Part #	Size (IN.)	Approx. Net WT. (LB.)	A
X116-02	1/8	0.04	0.49
X116-04	1/4	0.07	0.59
X116-06	3/8	0.09	0.66
X116-08	1/2	0.13	0.78
X116-12	3/4	0.22	0.84
X116-16	1	0.40	1.00
X116-20	1-1/4	0.48	1.13
X116-24	1-1/2	0.72	1.16
X116-32	2	1.11	1.34
X116-40	2-1/2	1.75	1.72
X116-48	3	2.71	1.81
X116-64	4	3.76	2.09



** ⚠ WARNING: This product can expose you to Lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov. This product is not for use in potable water.

MERIT
BRASS
DIRECTING THE FLOW OF *Quality*

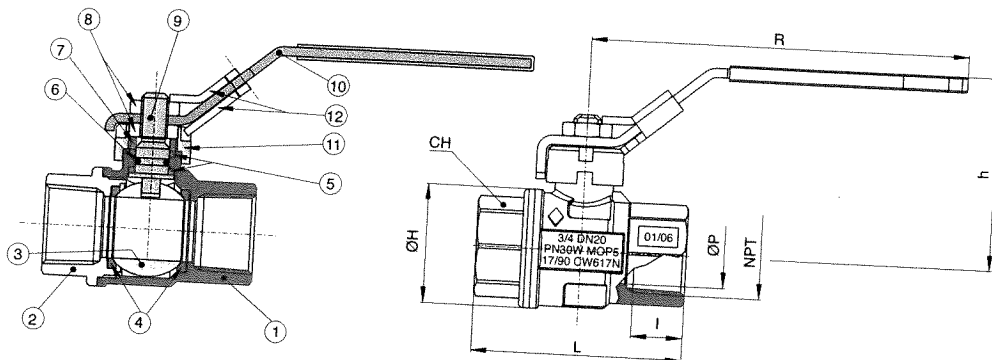
EURO-SFER



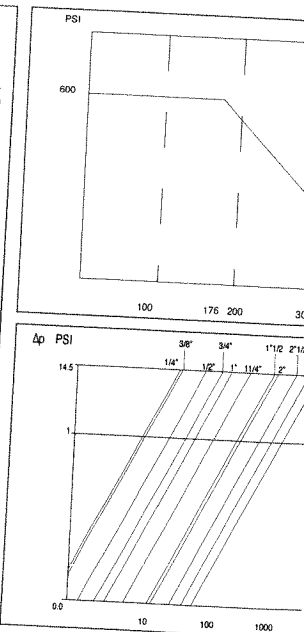
MEETS THE DESIGN CRITERIA OF MSS_SP_110.

SERIES 171L COMMERCIAL STYLE

- Brass ball valve, FNPT threaded, full port, with latch lock handle.
- Pressure rating 600 WOG-150 WSP.
- Temperature range -4°F to +366°F.
- Blow-out proof stem, chrome plated brass ball.
- P.T.F.E seats, seals, and thrust washer.
- Adjustable stem packing.
- 100% electronically tested in the open and closed position at 80 psi.
- Not to be used for drinking water.
- Valve to be used in fully open or fully closed position.
- ANSI B1.20.1 connections.
- 171L: LOCK HANDLE - size 1/4" to 4".
- 171LCR: CHROME PLATED - size 1/4" to 4".



The Buna O-ring is fitted to the stem of the valve as the best possible protection against potential gas leakage under extreme duty, or low pressure applications. A secondary P.T.F.E stem seal will also assure that the valve is suitable for use up to 366° F.



N POS	PART NAME	MATERIAL	N PCS
1	BODY	BRASS C37700	1
2	END CONNECTION	BRASS C37700	1
3	BALL	BRASS C37700	1
4	BALL SEAT	P.T.F.E	2
5	THRUST WASHER/STEM SEAL	P.T.F.E	2
6	O-RING	NBR	1
7	PACKING GLAND	BRASS C38500	1
8	NUT	STEEL CL 04	2
9	STEM	BRASS C38500	1
10	HANDLE	Fe DD11 UNI EN 10111	1
11	BUSH	ZAMA G Zn Al4 UNI EN 1774	1
12	LOCKING DEVICE	Fe DD11 UNI EN 10111	1

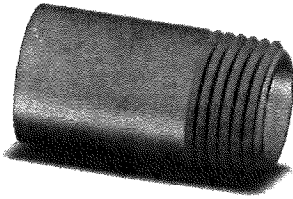
SIZE	ØP	I	L	ØH	CH	R	h	Cv	psi
1/4"	0.39	0.39	2.03	0.91	0.79	3.78	1.83	6.24	600
3/8"	0.39	0.41	2.03	0.91	0.79	3.78	1.83	6.94	600
1/2"	0.59	0.54	2.44	1.30	0.98	3.78	1.99	18.84	600
3/4"	0.79	0.55	2.72	1.54	1.22	4.84	2.48	34.10	600
1"	0.98	0.66	3.07	1.93	1.50	4.84	2.64	49.71	600
1 1/4"	1.26	0.68	3.43	2.32	1.89	5.94	3.15	102.89	600
1 1/2"	1.57	0.68	3.90	2.87	2.13	5.94	3.39	265.90	600
2"	1.95	0.70	4.31	3.39	2.64	6.30	3.82	306.36	600
2 1/2"	2.56	0.93	5.59	4.37	3.54	8.11	5.02	624.28	600
3"	3.15	1.02	6.46	5.35	4.13	8.11	5.45	1009.25	600
4"	3.94	1.09	7.60	6.54	5.12	10.28	6.56	1606.94	600

WARNING: This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.p65wa

BOND
H
BRO

Penn
MACHINE
Since 1931

ISO 9001 & PED Certified
Canadian Registered in all provinces



Pipe Nipple

Specification: ASTM A733

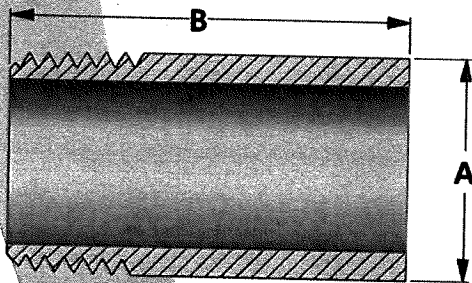
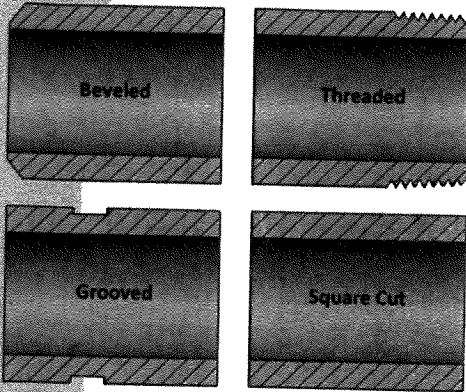
Threaded ends per ASME B1.20.1 • Beveled ends per ASME B16.25

Material: Available in a complete range of Carbon Steels, Stainless Steels, Alloy Steels and Non-ferrous metals certified to ASTM, ASME, and Military standards.

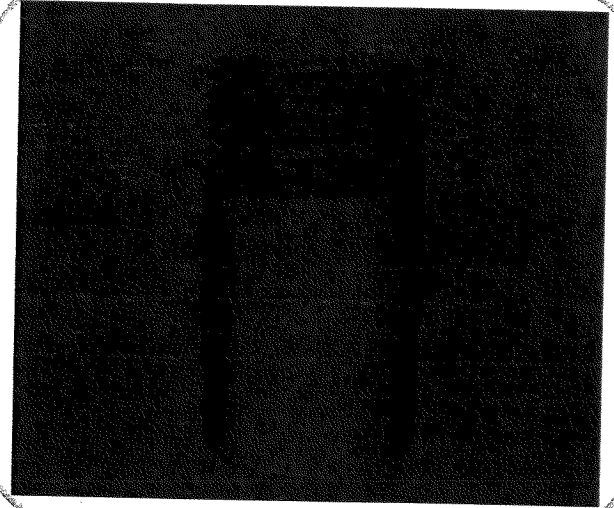
Sizes: 1/4"- 8" in S40/STD, S80/XH, S160 & XXH

Also available in special pipe schedules and custom lengths.
Lengths which are shorter than Close length are not recommended for pressure application.

End Preparations



Active
3D
Model



All dimensions are in inches • Weights are based on Carbon Steel

Pipe Size	A			B								
		Close	Short	Standard Lengths								
1/8	0.405	0.750	1.500	2.000	2.500	3.000	3.500	4.000	4.500	5.000	5.500	6.000
1/4	0.540	0.875	1.500	2.000	2.500	3.000	3.500	4.000	4.500	5.000	5.500	6.000
3/8	0.675	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500	5.000	5.500	6.000
1/2	0.840	1.125	1.500	2.000	2.500	3.000	3.500	4.000	4.500	5.000	5.500	6.000
3/4	1.050	1.375	1.500	2.000	2.500	3.000	3.500	4.000	4.500	5.000	5.500	6.000
1	1.315	1.500	2.000	---	2.500	3.000	3.500	4.000	4.500	5.000	5.500	6.000
1-1/4	1.660	1.625	2.000	---	2.500	3.000	3.500	4.000	4.500	5.000	5.500	6.000
1-1/2	1.900	1.750	2.000	---	2.500	3.000	3.500	4.000	4.500	5.000	5.500	6.000
2	2.375	2.000	2.500	---	---	3.000	3.500	4.000	4.500	5.000	5.500	6.000
2-1/2	2.875	2.500	3.000	---	---	---	3.500	4.000	4.500	5.000	5.500	6.000
3	3.500	2.625	3.000	---	---	---	---	4.000	4.500	5.000	5.500	6.000
3-1/2	4.000	2.750	4.000	---	---	---	---	4.000	4.500	5.000	5.500	6.000
4	4.500	2.875	4.000	---	---	---	---	---	4.500	5.000	5.500	6.000
5	5.563	3.000	4.500	---	---	---	---	---	4.500	5.000	5.500	6.000
6	6.625	3.125	4.500	---	---	---	---	---	---	5.000	5.500	6.000

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APPENDIX F: EMNRD CORRESPONDENCE

F.1 Conformation of Compliance: OWL Landfill Services, Inc. Surface Waste Management Facility; Construction Update.

Spenser Harvey

From: Tyler Krueger
Sent: Monday, June 5, 2023 4:10 PM
To: 'brad.a.jones@state.nm.us'
Subject: OWL NDBL SWMF Cell 5-AB

Good afternoon,

You should have received a letter from Dr. Richardson regarding his review of the Cell 5AB plans for OWL NDBL. Just wanted to reach out and let you know we are planning on beginning liner installation on June 15th pending delivery of liner materials.

Please feel free to call me at 806-473-3656 if you have any questions or need anything.

Thank you

Tyler Krueger, PE
Civil Engineer | Associate

Parkhill
806.473.3656 | TKrueger@Parkhill.com

Parkhill

APPENDIX G: RESUMÉS



Tyler Krueger^{PE}

Tyler Krueger, PE, is an Associate and Civil Engineer in Parkhill's Environmental Sector. His experience includes engineering design as well as construction and permitting services on municipal solid waste (MSW) landfills in Texas. Many of his projects have included groundwater compliance, annual volume, NMOC reporting, permit modifications, and permit applications for landfills. Additionally, he has experience in liner installation for multiple MSW landfills in Texas. He has also developed Site Operating Plans, Landfill Gas Management Plans, and Erosion Stability Plans. He is also a licensed Class A MSW Operator.

CONTACT

tkrueger@parkhill.com
806.473.3656

EDUCATION

Texas Tech University
Bachelor of Science,
Civil Engineering

LICENSES

Registered Professional Engineer
Texas No. 130015

EXPERIENCE

10 Years in Industry

EXPERIENCE

- | Brownfield MSWLF cell 2 Bidding, Construction Admin., Testing, RPR and Liner Evaluation Reporting
- | Brownfield Landfill Cell 2 Expansion
- | Denton Municipal Solid Waste Engineering Services Landfill Permit Amendment
- | Denton Landfill On-Call Engineering Project
- | Post Landfill Site Layout Revision
- | C.K. Disposal E&P Landfill
- | Delaware Basin E&P Landfill
- | Levelland Landfill Type IV Cell 2
- | Pecos City Landfill Site Life Evaluation
- | Pecos City Landfill ADC Authorization
- | Post Landfill Initial Development
- | Plainview Landfill Tier 2 Testing
- | City of Lamesa Landfill Cell 5 DBC
- | Plainview Landfill Sector 2A-2B Expansion
- | Levelland Landfill Type 4 Cell 3
- | Town of Pecos City Landfill Trench 6 & 7 - DBC
- | Big Spring Big Sandy Draw Landfill Litter Fence
- | Lamesa Landfill Permit Amendment



CONTACT

980.525.9426

EDUCATION

Valparaiso University

Bachelor of Science,
Civil Engineering

LICENSES

Registered Professional Engineer

Texas No. 135539

EXPERIENCE

33 Years in Industry

Matt Kingsley PE

Matt Kingsley, PE, Senior Civil Engineer with Parkhill's Environmental Sector. He is an professional in landfill and transfer station operations, design, and construction. He has operated and developed over 10 Transfer Stations across the United States, in both arid and sub-tropical climates. He has also developed, expanded, and operated over 25 landfills from Phoenix to Philadelphia. Through Matt's diverse engineering design and operational experience, he has provided valuable insight for many of our clients. This has recently included operations consulting to both Sandoval County and the City of Albuquerque, two of the largest waste generators in New Mexico. Matt conducted a multiple-week assessment of operations for the City of Albuquerque, including their landfill and three transfer stations. After preparing an extensive report and summary of key safety and operational findings, Matt was asked to present this to the City's public works director and his staff.

EXPERIENCE

- | Estancia Valley Solid Waste Authority Septage Lagoon with Liner
- | Albuquerque MSW Landfill Services
- | EVRLF-Landfill Engineering Services
- | Lea Land Landfill
- | Tucumcari-Landfill-Cell 4 design bid bld
- | Town of Clayton Landfill Monitoring
- | De Baca County Landfill Monitoring
- | Deming Butterfield Trail Landfill Monitoring
- | Deming Landfill Monitoring
- | Paseo de Vista Landfill
- | Lea County Landfill Environmental Compliance Services
- | Lea County SWA Cell 6 Landfill
- | Lea County Landfill Pavement Design
- | Raton Landfill Monitoring
- | T or C Landfill
- | Old Tucumcari Landfill Monitoring
- | City of Tucumcari Landfill Monitoring
- | Raton Landfill Monitoring
- | Lea County Landfill - Tier 2 Testing
- | Santa Rosa Landfill Monitoring
- | WM Rio Rancho Landfill Groundwater Monitoring



Max White

Max White is a member of Parkhill's CPS/CM Sector. He joined Parkhill in 1985 as a Resident Project Representative (RPR). Prior to joining Parkhill, Max was employed by Texas Tech University in the Office of Water Management. Since joining Parkhill, Max has provided on-site inspection services for all kinds of projects, including water and wastewater treatment plants, solid waste landfills, and streets and drainage improvements.

CONTACT

mwhite@parkhill.com
806.473.3533

EDUCATION

Texas Tech University
Bachelor of Science,
Mechanized Agriculture (Business Option)

LICENSES

Registered Irrigator
Texas No. 8164

EXPERIENCE

40 Years in Industry

EXPERIENCE

- | Brownfield MSWLF cell 2 Bidding, Construction Admin., Testing, RPR and Liner Evaluation Reporting
- | Brownfield Landfill Cell 2 Expansion
- | Lea County Landfill - Tier 2 Testing
- | Levelland Landfill Type I Cell 2
- | Post Landfill Initial Development
- | Plainview Landfill Tier 2 Testing
- | City of Lamesa Landfill Cell 5 DBC
- | C.K. Disposal E&P Landfill
- | Delaware Basin E&P Landfill
- | Big Spring / Howard County Big Sandy MSW Landfil - Ph 1 Planning Engineering and Construction
- | Big Spring-Howard County Big Sandy Draw Landfill Groundwater background Monitoring
- | Levelland Landfill Type IV Cell 2
- | Plainview Paving Improvements - Reconstruction of 13th, 15th, Skate Park Parking Lot, and Landfill Road
- | Greater El Paso Landfill Cells 11-14 Bid and Construction Administration

Sante Fe Main Office
Phone: (505) 476-3441

General Information
Phone: (505) 629-6116

Online Phone Directory
<https://www.emnrd.nm.gov/oed/contact-us>

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Action 450971

CONDITIONS

Operator: OWL LANDFILL SERVICES, LLC 3889 Maple Avenue Dallas, TX 75219	OGRID: 371820
	Action Number: 450971
	Action Type: [C-137] Non-Fee SWMF Submittal (SWMF NON-FEE SUBMITTAL)

CONDITIONS

Created By	Condition	Condition Date
joseph.kennedy	None	4/22/2025