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SCS ENGINEERS

December 19, 2014
File No. 04214002.04

Mr. David Bosch
Tacoma-Pierce County Health Department
3629 South D Street
Tacoma, Washington 98418

Subject: **Documentation Report for Repair of South Slope Cover System, Hidden Valley Landfill, Puyallup, Washington**

Dear David:

On behalf of Pierce County Recycling, Composting and Disposal LLC, dba LRI (LRI), this report provides documentation of the Hidden Valley Landfill cover repair which was conducted in conformance with the Cover Repair Work Plan dated September 16, 2013. The repair was conducted between May 12 and June 3, 2014 on the south slope of the landfill within the Southwest Closure Area.

1 INTRODUCTION

Cover Repair Overview

The Southwest Closure Area was constructed in 1992. The cover system for the Southwest Closure Area consists of the following layers of materials from top to bottom:

- Vegetative Soil (14-inches)
- Non-woven geotextile filter (6-ounce/sq. yard)
- Gravel Drainage Layer (12-inches)
- 40 mil Very Low Density Polyethylene (VLDPE) Geomembrane
- Foundation (bedding) Layer (4-inches)
- Foundation Soil Layer (12-inches)

This area of the landfill does not include a bottom liner.

The cover system repair consisted of the removal of approximately 2,175 cubic yards(CY) of vegetative cover soils (on top of the geomembrane), removal of approximately 40 CY of foundation soils (below the geomembrane) and regrading to reestablish surface drainage, installation of approximately 6,215 SF of geomembrane, installation of approximately 6,835 SF of geonet composite in lieu of a gravel drainage layer, installation of approximately 3,000 SF of geotextile filter, and replacement of the vegetative soils. The landfill cap repair was constructed to provide continuous coverage and surface drainage within the cover system.

Cover soils removed from the repair area were stockpiled onsite and re-used as much as possible. Soils and waste materials removed from below the liner were hauled to the onsite transfer station using a dump truck. Prior to re-use, all deleterious materials were removed from the existing soils. Additional soils and aggregates were provided by Corliss Resources and approved by LRI and the SCS Engineer prior to placement.

Drawings showing the approximate excavation of the repair area are included in Attachment A, and a photo-log of repair activities is included in Attachment B.

Background

An area of suspected subsurface oxidation was originally identified by differential settlement sometime in the late 1990's. The area was repaired, and subsequently repaired a second time in 2006 after a sinkhole redeveloped. The sinkhole began to slowly re-form in 2008 and eventually become about 70 feet long by 40 feet wide by 4 to 6 feet deep. Then in March 2010, a second sink hole about 15 feet in diameter rapidly developed. The sinkholes were located approximately 60 to 70 feet apart and roughly parallel to the south perimeter of the landfill.

The sinkholes are interpreted to be the result of subsurface oxidation events(s) that caused consolidation of the waste and created void space. Both sinkholes were backfilled in April 2010 with low-permeability glacial till soil and covered with reinforced plastic that was secured in place with soil and sand bags. Diagrams showing the locations of the sinkholes and the work area are included in Attachment A.

The development of the sinkhole in 2008 coincided with off-site excavation at the Corliss Resources Puyallup Plant, which further exposed the slope immediately south of the property boundary. The cut slope of the adjacent gravel pit appears to be the route of oxygen intrusion into the landfill. Therefore, a recommendation was made to cover the slope with a low-permeability soil or other oxygen barrier. After discussions with Pierce County, Corliss, and the Tacoma-Pierce County Health Department (TPCHD), it was agreed that Corliss would install a soil barrier of their own design and LRI would observe the performance to see if it was effective and resistant to erosion.

The soil barrier was installed during July 2010. The soil barrier construction consisted of removing approximately 2 feet of gravelly soil from the bank surface and replacing it with approximately 2 feet of silty clay soil. The soil was placed in lifts using an excavator and a bulldozer. The finished grade was track-walked parallel to the slope with a bulldozer for compaction. The landfill perimeter fence was temporarily removed to allow soil placement at the top of the slope. The slope was hydroseeded with a mulch/grass seed mixture in September 2010.

In addition to the soil barrier, a portion of the gas collection and control system (GCCS) was taken off-line in September 2009. The disconnected wells included N-42, N-43, N-54, N-60, N-60A, N-61, and N-62. Also in September 2009, three temporary monitoring probes (LFG-1, LFG-2, and LFG-3) were installed near the settlement area to investigate subsurface conditions and to serve as additional monitoring locations. An analysis of the GCCS found the system was over-drawing and providing too much vacuum to the well-field. The system blowers were

subsequently modified until the blower/flare station could be replaced in 2010 and 2011. SCS also began monthly maintenance activities to keep the GCCS operating as designed and minimize the potential to draw air into the waste mass in order to starve the subsurface area of oxygen.

The south slope and sinkhole repair area was monitored for stabilization, slope erosion, and odors beginning in 2010. The inspections included weekly visual inspections by LRI personnel and monthly inspections by SCS personnel. Monthly monitoring and inspections consisted of visual inspection and the use of a Landtec GEM 2000 for Methane (CH_4), Carbon Dioxide (CO_2), Oxygen (O_2) and relative pressure measurements.

In addition to the monthly monitoring, SCS periodically monitored the temporary probes and surrounding landfill gas (LFG) collection wells for Carbon Monoxide (CO) and down temperature. Carbon Monoxide measurements were taken using Draeger Gas Monitoring Tubes and downhole temperatures were measured using an Oakton Temp JKT connected to a type K thermocouple. Results from the periodic monitoring events are included in the Work Plan and in quarterly and annual; monitoring reports.

Prior to the start of the repair work, CO measurements were not indicative of ongoing combustion and down-hole temperature measurements were not elevated above typical municipal solid waste (MSW) landfill levels.

2 PROJECT ROLES AND RESPONSIBILITIES

Pierce County Recycling, Composting and Disposal, dba LRI

LRI is the Owner and operator (Owner) of the Hidden Valley Landfill and transfer station. For the repair of the cover system, LRI provided equipment and staff to assist with the moving of geotextile rolls and the sourcing of soils and aggregates for use in the cover system.

SCS Engineers

SCS Engineers is the Engineer of Record (Engineer) and CQA representative for repair of the cover system. SCS prepared the work plan, including technical specifications and CQA guidelines, implemented a comprehensive CQA Program, provided field-engineering services during construction, and prepared this construction report.

Glacier Construction Services, Inc.

Glacier Construction Services, Inc. was the general contractor (Contractor) for the construction project. Glacier was responsible for the excavation, grading and repair of the landfill cover system.

Northwest Linings and Geotextile Products, Inc.

Northwest Linings and Geotextile Products, Inc. (NWL) was a subcontractor to Glacier Construction, and was responsible for the supply and installation of geomembrane and geonet-composite products (Installer).

Texas Research International, Inc.

Texas Research International, Inc. (TRI) was contracted to provide laboratory testing of geomembrane seam samples.

3 EARTHWORK

Earthwork components for the cover system repair consisted of the following:

- Soil Excavation
- Foundation Soil Layer
- Bedding Layer
- Drain Rock
- Vegetative Soil Layer

Soil Excavation

Approximately 2,175 CY of soil were excavated from above the existing geomembrane liner to expose approximately 6,215 SF of cover to be repaired. Excavation of the work area was completed in three phases; one phase for each of the two sinkholes (east and west), and a third phase to reestablish surface drainage. Each sinkhole was exposed separately. Removed soils were stockpiled on the cover adjacent cover to the work area. Care was taken during excavation to minimize damage to the existing cover system and disturb as little area as possible.

To reestablish site drainage, a 155-foot long trapezoidal ditch was installed. Ditch slopes extended from the east side of the west sinkhole to the southeast, past the east sinkhole and into the perimeter collection channel (existing) near gas extraction well N-62. The existing geomembrane was cut and folded back to allow for excavation of the trapezoidal channel with 1 horizontal to 1 vertical side slopes (1H:1V). The drainage ditch was sloped at a minimum of 2 percent (ft/ft) from the low point of the west sinkhole to the perimeter channel. Over excavation of approximately 40 CY from below the existing geomembrane was performed to reestablish surface drainage and allow adequate thickness for placement of a foundation and bedding layer below the geomembrane. Excavated soil and waste debris was delivered to the transfer station for proper disposal.

During soil excavation operations, the CQA representative verified the following:

- Verified large rocks were removed from the completed foundation and bedding layer soils.

- Verified excavated soils were stockpiled in designated areas and all deleterious materials were removed prior to placement.
- Measured work area for approximate excavation volume(s).
- Inspected excavation side slopes for stability and safety.
- Assisted in the location of subsurface utilities and other underground infrastructure.
- Verified as-built survey of the excavation was performed.

Foundation Soil Layer

Once excavation of each of the work areas was completed, the excavations were graded to ensure proper cover drainage. Grades were checked using a laser level. Minimal fill soils (<2 CY) were required to grade the west sinkhole, and approximately 10 CY of material were used to fill a depression at the edge of the east sinkhole. A minimum of 12-inches of foundation soil was placed above the waste. Compaction of the soil foundation layer was performed by tamping with the excavator bucket to a firm unyielding state.

During foundation soil placement, the CQA representative verified the following:

- Inspected compaction of foundation soil to an unyielding state using a soil probe.
- Verified large rocks were removed from the completed foundation soils.
- Verified minimum grades and slopes were maintained.
- Verified materials were placed and compacted to the specified lift thickness.
- Verified surfaces were smooth finished prior to placement of the bedding layer.

Bedding Layer

Following grading and compaction of the foundation soil layer, a 4-inch thick bedding layer was placed to protect the overlying geomembrane. Corliss Resources provided approximately 40 CY of medium to coarse grained sand for the bedding layer.

During bedding layer placement, the CQA representative verified the following:

- Verified soils were placed in a manner that did not damage underlying layers.
- Verified that large rocks and other deleterious materials were removed from underlying foundation soil prior to placement of bedding layer.
- Verified soils were placed in a single uniform 4-inch (minimum) thickness.
- Verified soils did not exhibit vertical deflection when force was applied to the surface.

Drain Rock

Drain rock was used to fill the drainage ditch between the west sinkhole and the perimeter channel following installation of geosynthetics. The drain rock was filled to an approximate depth of 2-feet. Prior to placement of the drain rock, all geosynthetics were installed and approved by the CQA representative. Drain rock consisted of 2-inch minus washed rounded rock provided by Corliss Resources.

During drain rock placement, the CQA representative verified the following:

- Verified materials were placed in a manner that did not damage underlying geomembrane and geonet composite.
- Verified materials delivered to the site meet the specifications outlined in the work plan and large rocks and other deleterious materials were not present.
- Verified testing data for underlying layers was received prior to placement.

Vegetative Soil Layer

Excavated soils were used to construct the anti-erosional / vegetative soil layer. Soils were placed in a minimum of 14-inch thickness to return the work area to match surrounding grades. Placement of soils was completed using an excavator, and finished by track-walking perpendicular to the slope to minimize erosion.

During vegetative soil placement, the CQA representative verified the following:

- Verified testing data for the underlying layer was received prior to placement.
- Verified geonet-composite and non-woven geotextile were tied into existing separation fabric to prevent soil dams within the geonet-composite.
- Verified large rocks and other deleterious materials were removed prior to placement and grading.
- Verified soils were placed in a manner that did not damage underlying layers.
- Verified minimum thickness of placed soils was achieved.

4 GEOSYNTHETICS

The goal of the geosynthetics CQA program was to verify that the materials delivered to the site conformed to the technical specifications, and that proper construction techniques and procedures were used in accordance with the work plan. The Engineer and CQA representative verified installation quality by monitoring on-site testing performed by the Installer, performing independent testing, and visual inspections of the Installer's work.

The following types of geosynthetics were utilized for this project:

- High Density Polyethylene (HDPE) geomembrane, double sided textured surface, 60-mil thickness
- Geotextile Filter, 8-ounce per square yard, non-woven
- Geonet-Composite, 8-ounce & 16-ounce non-woven geotextiles on opposite sides of a 330-mil geonet

Geomembrane

Approximately 6,215 SF of black 60-mil HDPE 460ST-1000 texture geomembrane, manufactured by Solmax, was installed over the foundation and bedding soils as described previously. Only textured geomembrane was used for the cover repair. The geomembrane

consisted of one roll, measuring approximately 22-feet by 560-feet. Manufacturers' quality control (MQC) and conformance test results were reviewed prior to installation of the geomembrane. The geomembrane met the specifications listed in Table 1. Product information is included in Attachment C.

Table 1.
Geomembrane Acceptance Criteria

Test	Test Designation	Units	Type of Criterion	Acceptable Value
Carbon Black Content	ASTM D 1603	% by weight	Range	2 – 3
Carbon Black Dispersion	ASTM D 5596	N/A	Range	Category 1, 2, 3
Density	ASTM D 1505	Grams/ ml	Minimum	0.932
Tear Resistance	ASTM D 1004	lb	Minimum	42
Puncture Resistance	ASTM D 4833	lb	Minimum	90
Tensile Strength at Yield	ASTM D 6693	ppi	Minimum	126
Tensile Strength at Break	ASTM D 6693	ppi	Minimum	90
Yield Elongation	ASTM D 6693	%	Minimum	12
Break elongation	ASTM D 6693	%	Minimum	100
Thickness	ASTM D 5994	mils	Minimum Average	57

Notes:
Minimum test frequency is one per 100,000 square feet.
Values are from Tables 1a and 2a of GRI GM 13 Standards.
Carbon Black Dispersion; 9 of 10 views in Category 1 or 2; and 1 in Category 3.
Tensile properties performed in both machine and cross direction.

Prior to installation, the CQA representative and the Installer verified that the area to be covered by the geomembrane was prepared in accordance with the specifications in the work plan. Following visual inspection the surface(s) the CQA representative, Installer, and Contractor completed a written inspection form. Copies of the subgrade inspection and acceptance forms are contained in Attachment D.

Geomembrane panels were deployed from a spreader bar attached to an excavator, and placed by pulling into place by hand. Panels were placed lengthwise oriented up-down slope, and shingled to promote drainage to the southeast. Adjacent panels were overlapped a minimum of 4-inches prior to welding using an extrusion welder.

A total of four (4) destructive seam tests were performed; see Attachment D for results. Peel and sheer testing was performed by TRI. All destructive samples passed in both field and laboratory testing with the exception of destructive sample DS#4. Due to an equipment failure, field tests were only able to be performed on two coupons (one peel, one sheer), instead of the required 6 (three peel, three sheer). An additional two tests were cut from the sample by the Installer for testing, but were not standard test sizes. The Installer elected to have the sample sent for testing as the field results were passing specifications. DS#4 passed laboratory testing and no further action was required. Copies of laboratory test results are contained in Attachment D.

During geomembrane panel placement and seaming, the CQA representative performed the following:

- Verified the underlying surface did not contain stones or other objects that could damage the geomembrane, or excessively soft areas that would not properly support the geomembrane
- Developed a numbering system to identify panel numbers, field seams, destructive test locations, and repairs
- Maintained a panel layout drawing showing panel numbers, seam numbers, test location, and repair locations (see Attachment D)
- Inspected the geomembrane sheet surface and marked areas requiring repair due to defects in workmanship or materials
- Verified repairs were made in accordance with the specifications in the work plan
- Verified geomembrane was not dragged across abrasive surfaces
- Verified equipment used on the geomembrane did not leak fuel
- Verified trial welds were performed in accordance with the specifications in the work plan (see Attachment D)
- Observed trial welding operations and verified installer quantitatively tested each trial weld for peel and shear strength
- Verified seam grinding was completed less than 30 minutes before seam welding, and the upper sheet was beveled
- Verified contact surfaces of the sheets were clean, fee of dirt, dust, grease, debris, and moisture prior to seaming
- Verified procedures used to hold panels temporarily together did not damage the panels and did not prevent installation
- Verified non-destructive testing was performed on all seams and repairs (see Attachment D)
- Marked and observed field testing of destructive test samples (see Attachment D)

Geonet Composite

Approximately 6,835 SF of black 300-mil TN 330-2-8/16 geonet composite, manufactured by Skaps Industries, was installed following the installation of the geomembrane. The geonet composite consisted of fours rolls, measuring approximately 15-feet by 310-feet. The geonet met the specifications listed in Table 2. Product information is included in Attachment E.

Table 2.
Geonet Composite Acceptance Criteria

Conformance Test Required ASTM Designation	ASTM Designation	Units	Type of Criterion	Acceptable Value
Ply Adhesion	ASTM D-413	lb./in.	Minimum	1.0
Carbon Black	ASTM D-1603	%	Minimum	2.0
Density	ASTM D-1505	g/cm^3	Minimum	0.94
Thickness	ASTM D-5199	Mils.	Range	330+-30
Tensile Strength	ASTM D-5035	lb./in	Minimum	75
Geotextile Component				
Fabric Weight	ASTM D-5261	oz/yd^2	Minimum	8.0/16.0
Grab Strength	ASTM D-4632	lbs.	Minimum	220/390
Puncture Resistance	ASTM D-4833	lbs.	Minimum	120/240
Water Flow Rate	ASTM D-4491	gpm/ft^2	Minimum	95/45
Apparent Opening Size	ASTM D-4751	US Sieve Size	Minimum	80/100
Permittivity	ASTM D-4491	sec^{-1}	Minimum	1.20/0.50

Notes:
Values are based on discussions with acceptable manufacturers and represent production values at time of manufacturing.

The geonet composite was installed over the geomembrane liner to provide drainage and prevent damage from the overlying soil layer(s). The geonet composite was deployed using a spreader bar attached to an excavator. Seaming of the geonet composite was accomplished by using nylon ties spaced a maximum of 5 feet apart. In addition, the geotextile component of the geonet composite was heat seamed to provide additional strength and to prevent intrusion from overlying soils.

During geonet composite placement and seaming, the CQA representative performed the following work:

- Inspected the geonet composite for defects in workmanship or materials and for the presence of potentially harmful foreign objects (e.g. needles).
- Verified repairs were made in accordance with manufacturer's recommendations and industry standards.
- Verified seams were overlapped and joined in accordance with the technical specifications and manufacturer's instructions.
- Observed the geonet composite after installation
- Verified the geonet composite was deployed, placed, and seamed in a manner that did not damage underlying materials.

Geotextile Filter Installation

Approximately 3,000 SF of 6-oz./yd^2 separation geotextile was installed. Prior to installation of the geotextile, quality control and conformance test results were reviewed. The geotextile filter met the project specifications listed in Table 3. Product information is included in Attachment F.

Table 3.
Geotextile Filter Acceptance Criteria

Conformance Test Required	ASTM Designation	Minimum Test Frequency	Units	Type of Criterion	Acceptable Value
Apparent Opening Size	ASTM D-4751	1/100,000 SF	mm	Maximum	0.21
Grab Tensile Strength	ASTM D-4632	1/100,000 SF	lb.	Maximum	160
Break Elongation	ASTM D-4632	1/100,000 SF	%	Maximum	50
Mass per Unit Area (weight)	ASTM D-5261	1/100,000 SF	oz./yd^2	Minimum	6.0
Permittivity	ASTM D-4491	1/100,000 SF	gals/min/ft2	Minimum	1.6
CBR Puncture Resistance	ASTM D-6241	1/100,000 SF	lb.	Minimum	450
Trapezoidal tear	ASTM D-4533	1/100,000 SF	lb.	Minimum	65
Water Flow Rate	ASTM D-449	1/100,000 SF	gpm/ft^2	Minimum	125

Notes:
Values are based on discussions with acceptable manufacturers and represent production values at time of manufacturing.

The geotextile was installed to tie the geonet composite into the existing cover system separation geotextile. The geotextile was installed to ensure that as overlying soils were placed, a soil dam did not form in the geonet composite or existing drainage layer materials. The geotextile was placed between the two layers and heat seamed to the respective layers. Where possible, the existing separation geotextile was tied into the geonet composite directly. In addition, the geotextile was installed over the drain rock described above.

During geotextile placement and installation, CQA representative performed the following:

- Observed excavation and cleaning of the existing geotextile(s) and drainage layer.
- Verified that the existing drainage layer was not obstructed by soils or other deleterious materials.
- Verified that geotextiles were deployed and seamed in a manner that did not damage underlying layers.

5 MISCELLANEOUS SITE WORK

This section describes work performed and the CQA activities and procedures used for miscellaneous site improvements including landfill gas extraction well abandonment and surveying.

Landfill Gas Extraction Well Abandonment

During excavation of the west sinkhole, landfill gas extraction well N-61 was damaged at the well head. As the well had not been connected to the landfill gas collection and control system since 2009, the decision to abandon the well was made by the Engineer and CQA representative. To abandon the well, the well casing was excavated and cut below the upper bentonite well seal, approximately 2 feet below the geomembrane. The 3-inch diameter PVC well casing was backfilled with hydrated bentonite hole plug. After the casing was grouted, the well casing was capped and the upper bentonite seal was replaced.

Abandonment of the extraction well was completed prior to placement and installation of the geomembrane. Abandonment of the well was completed under the supervision of a Professional Engineer (PE) registered in Washington State. Documentation of the well abandonment is included in Attachment G.

Surveying

A survey of the excavated area and drainage ditch was performed to support construction activities and document the as-built conditions of the repairs. The survey was completed by Environmental Information Logistics, LLC (EIL), 1406 12th Street, Suite 104, Hood River, Oregon 97031. Survey records were used to create the drawings provided in Attachment A.

6 STATEMENT OF COMPLIANCE

A CQA program was implemented by SCS during repair of the south slope cover system at the Hidden Valley Landfill. The CQA program, which included the observation and testing of the constructed components of the cover system, documentation of the work completed in accordance with the work plan and design intent of the original cover system. No significant modifications to the CQA testing program were required for this project.

If you have any questions or comments regarding the information or conclusions presented above, please do not hesitate to contact SCS Engineers.

Sincerely,

Kevin Lakey, LHG, PE
Vice President
SCS ENGINEERS

Sam Adlington, EIT
Staff Engineer
SCS ENGINEERS

Attachments:

Attachment A: Figures
Attachment B: Photographs
Attachment C: Geomembrane Quality Control Data
Attachment D: Geomembrane Installation Data
Attachment E: Geonet Composite Quality Control Data
Attachment F: Geotextile Quality Control Data
Attachment G: Landfill Gas Well Abandonment

cc: Mohsen Kourdehar, Ecology
Andy Comstock, TPCHD
Rick Johnston, Pierce County
George Duvendack, LRI
Jerry Reid, Glacier Construction Services

Attachment A

Figures

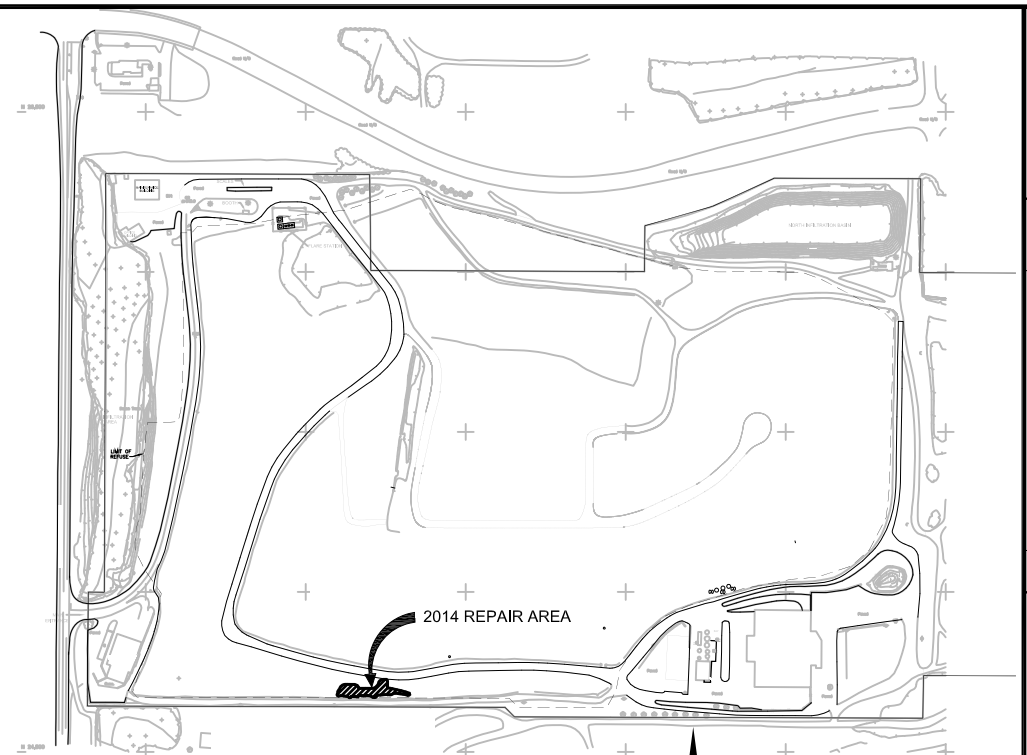
LEGEND

- GP-14 — LANDFILL GAS MONITORING PROBE
- N41 — LANDFILL GAS EXTRACTION WELL
- CS-3 — LANDFILL GAS CONDENSATE KNOCK-OUT
- LANDFILL GAS FLOW CONTROL VALVE

N37A
N38
6"Ø LFG HEADER PIPE
N41
CS-3
CONDENSATE
RECIRCULATION LINES
N54
N42
N43
6"Ø LFG HEADER PIPE
ACCESS ROADWAY
APPROXIMATE LIMIT OF
COVER REPAIR AREA
LFG-3
APPROXIMATE LIMIT OF
SOUTHWEST CLOSURE AREA
N58
N59
N60
LFG-2
N61
N62
LFG-1
N60A
GP-14
MAINTENANCE ROADWAY
PROPERTY BOUNDARY
500
490
480

0 20 40
SCALE IN FEET

SITE PLAN
SCALE: 1" = 40'



LOCATION MAP
SCALE: 1" = 600'

NO.	REVISION	DATE

SHEET TITLE: 2014 REPAIR AREA

PROJECT TITLE: HIDDEN VALLEY LANDFILL
PIERCE COUNTY, WASHINGTON

Pierce County
Recycling, Composting
and Disposal, LLC dba
LRI

SCS ENGINEERS
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A-CAD FILE:	FIG 1 2014 Repair Area
DSN. BY:	KGL
PROJ. NO.	042140002.04
DWN. BY:	LEL
CHK. BY:	KGL
APP. BY:	KGL

DATE: DECEMBER 2014

SCALE: AS SHOWN

FIGURE NO.
1

Attachment B

Photographs

2010, April 16, viewing east.

2011, July 15, viewing east.

2012, May 23, viewing east.

2013, October 16, viewing east.

2014, March 4, viewing east.

2014, May 12, viewing west. Removal of temporary plastic cover.

2014, May 12. Initial removal of cover soils, east sinkhole.

2014, May 13. Continuing removal of cover soils, east sinkhole.

2014, May 13. East sinkhole.

2014, May 13. Initial excavation at west sinkhole.

2014, May 14. Excavation at west sinkhole; viewing east.

2014, May 14. Excavation at west sinkhole; viewing west.

2014, May 15. Excavation at west sinkhole.

2014, May 15. Backfill placement at east sinkhole.

2014, May 16. Geomembrane placement; east sinkhole

2014, May 16. Geomembrane placement; west sinkhole

2014, May 16. Geonet composite installation; east sinkhole

2014, May 16. Geonet composite installation; west sinkhole

2014, May 22. Additional excavation to re-establish drainage.

2014, May 29. Additional excavation to re-establish drainage.

2014, May 30. Site Overview.

2014, May 30. Preparing subgrade for geomembrane placement.

2014, May 30. Geomembrane installation.

2014, May 30. Geomembrane installation.

2014, June 2. Placement of drain rock within surface drainage feature.

2014, June 2. Placement of geotextile filter over drain rock.

2014, June 3. Placement of cover soil.

2014, June 3. Placement of cover soil.

Attachment C

Geomembrane Quality Control Data

LIST OF GEOMEMBRANE ROLLS

SOLMAX

Solmax, 2801 Boul. Marie-Victorin, Varennes, Qc, Canada, J3X 1P7
Tél.: 1-450-929-1234 • Fax.: 1-450-929-2547 • www.solmax.com

Solmax ACCEPTED/ACCEPTED Chantal Gagnon Quality Department

Project Name : MARMATH, ND

Project Number : C-4507

Reference Number : 106163

Invoice Number : 213006

Roll Number	Product Code	Resin Lot Number	Manufactured Date	Resin Melt Index 190/2.16 g/10 min D1238	Resin Density g/cc D1505	OIT Spec Result min D3895	HPOIT Spec Result min D5885	ESCR SP-NCTL Spec Roll Tested hours D5397
5-00732	Solmax 460T-1000	H8232084	18-Jun-13	0.09	0.937	*100* > 120		*>400* 5-00689 CERTIFIED
5-00733	Solmax 460T-1000	H8232084	18-Jun-13	0.09	0.937	*100* > 120		*>400* 5-00689 CERTIFIED
5-00734	Solmax 460T-1000	H8232084	18-Jun-13	0.09	0.937	*100* > 120		*>400* 5-00689 CERTIFIED
5-00737	Solmax 460T-1000	H8232084	18-Jun-13	0.09	0.937	*100* > 120		*>400* 5-00689 CERTIFIED
5-00738	Solmax 460T-1000	H8232084	18-Jun-13	0.09	0.937	*100* > 120		*>400* 5-00689 CERTIFIED
5-00739	Solmax 460T-1000	H8232084	19-Jun-13	0.09	0.937	*100* > 120		*>400* 5-00689 CERTIFIED
5-00746	Solmax 460T-1000	H8232084	19-Jun-13	0.09	0.937	*100* > 120		*>400* 5-00689 CERTIFIED
5-00748	Solmax 460T-1000	H8232084	19-Jun-13	0.09	0.937	*100* > 120		*>400* 5-00689 CERTIFIED
5-00755	Solmax 460T-1000	H8232083	19-Jun-13	0.08	0.937	*100* > 120		*>400* 2-72432 CERTIFIED
5-00757	Solmax 460T-1000	H8232083	20-Jun-13	0.08	0.937	*100* > 120		*>400* 2-72432 CERTIFIED
5-00759	Solmax 460T-1000	H8232083	20-Jun-13	0.08	0.937	*100* > 120		*>400* 2-72432 CERTIFIED

Quantity (rolls) : **11**

SOLMAX

MANUFACTURING QUALITY CONTROL

Test Results - Rolls

Solmax, 2801 Boul. Marie-Victorin, Varennes, Qc, Canada, J3X 1P7
Tél.: 1-450-929-1234 • Fax.: 1-450-929-2547 • www.solmax.com

Solmax ACCEPTED/ACCEPTÉ Chantal Gagnon Quality Department

Project Name MARMATH, ND

Project Number : C-4507

Reference Number : 106163

Invoice Number : 213006

Product Solmax 460T-1000

Properties		Thickness ave / min.	Geo-membrane Density	Carbon Black Content	Carbon Black Dispersion	Tensile Yield Strength	Tensile Yield Elong.	Tensile Break Strength	Tensile Break Elong.	Tear Resist.	Puncture Resist.	Dimension. Stability	Asperity Height in / out
Unit		mils	g/cc	%	Cat. 1 and 2	ppi	%	ppi	%	lbs	lbs	%	mils
Test Method		D5994	D1505/D792	D4218	D5596	D6693				D1004	D4833	D1204	D7466
Frequency		Each roll	1/2 ro	1/2 ro	1/6 ro	1/2 ro				1/6 ro	1/6 ro	1/6 ro	Each roll
Specification		57 / 51	≥ 0.940	2.0 - 3.0	Cat. 1 _ Cat. 2	132	13	132	150	45	120	± 2	15
5-00732	MD	57 / 55	0.946	2.28	10 /10	179.6	14.8	227	556	55.3	164.3	0.26	21.1 / 30.1
	XD				Views	182.0	15.7	185	389	63.0		0.08	
5-00733	MD	59 / 57	0.946	2.28	10 /10	179.6	14.8	227	556	55.3	164.3	0.26	24.5 / 22.8
	XD				Views	182.0	15.7	185	389	63.0		0.08	
5-00734	MD	61 / 58	0.946	2.58	10 /10	179.6	14.8	227	556	55.3	164.3	0.26	21.3 / 24.6
	XD				Views	182.0	15.7	185	389	63.0		0.08	
5-00737	MD	61 / 57	0.950	2.72	10 /10	171.1	16.3	265	650	53.8	166.6	0.26	16.5 / 22.3
	XD				Views	184.1	14.9	217	570	60.0		0.08	
5-00738	MD	59 / 54	0.950	2.72	10 /10	171.1	16.3	265	650	53.8	166.6	0.26	16.5 / 24.4
	XD				Views	184.1	14.9	217	570	60.0		0.08	
5-00739	MD	59 / 57	0.950	2.71	10 /10	170.3	16.4	222	548	53.8	166.6	0.26	16.5 / 29.6
	XD				Views	177.3	14.3	179	344	60.0		0.08	
5-00746	MD	58 / 56	0.947	2.68	10 /10	172.0	16.5	242	598	53.6	165.4	0.26	16.8 / 19.0
	XD				Views	173.0	14.5	202	529	58.6		0.08	
5-00748	MD	59 / 55	0.947	2.36	10 /10	162.0	17.0	227	552	52.5	156.1	-0.37	16.5 / 16.8
	XD				Views	170.9	15.1	208	572	54.9		0.01	
5-00755	MD	59 / 56	0.947	2.40	10 /10	166.4	16.1	227	560	51.4	162.5	-0.39	17.1 / 18.3
	XD				Views	166.3	15.1	208	541	54.8		0.06	
5-00757	MD	59 / 54	0.949	2.98	10 /10	171.5	16.5	232	565	52.9	162.0	-0.51	16.8 / 18.0
	XD				Views	174.0	15.7	188	470	57.0		0.09	
5-00759	MD	59 / 57	0.949	2.19	10 /10	164.4	16.3	262	660	52.9	162.0	-0.51	16.7 / 17.0
	XD				Views	160.5	15.4	235	630	57.0		0.09	

CoA Date: 05/10/2013

Certificate of Analysis

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

Recipient: Giguere
Fax:

Delivery #: 88648988
PO #: 110259-0
Weight: 190200 LB
Ship Date: 05/10/2013
Package: BULK
Mode: Hopper Car
Car #: CHVX898234
Seal No: 309437

Product:
MARLEX POLYETHYLENE K306 BULK
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: H8232084

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.090	g/10mi
HLMI Flow Rate	ASTM D1238	10.60	g/10mi
Density	D1505 or D4883	0.9370	g/cm3
Production Date		04/28/2013	

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

Troy Griffin
Quality Systems Coordinator

For CoA questions contact Customer Service Representative at 800-231-1212

Page 1 of 1

SOLMAX

TECHNICAL DATA SHEET

Solmax HDPE Smooth - Imperial Values

Solmax International Inc., 2801 Boul. Marie-Victorin, Varennes, Qc, Canada, J3X 1P7
Tel.: (450) 929-1234 Fax: (450) 929-2550 www.solmax.com

PROPERTY	TEST METHOD	FREQUENCY(1)	UNIT Imperial	Solmax 420-1000	Solmax 430-1000	Solmax 440-1000	Solmax 460-1000	Solmax 480-1000	Solmax 500-1000	Solmax 520-1000
SPECIFICATIONS										
Thickness (min. avg.)	ASTM D-5199	Every roll	mils	20.0	30.0	40.0	60.0	80.0	100.0	120.0
Thickness (min.)	ASTM D-5199	Every roll	mils	18.0	27.0	36.0	54.0	72.0	90.0	108.0
Resin Density	ASTM D-1505	1/Batch	g/cc	> 0.932	> 0.932	> 0.932	> 0.932	> 0.932	> 0.932	> 0.932
Melt Index - 190/2.16 (max.)	ASTM D-1238	1/Batch	g/10 min	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Sheet Density (8)	ASTM D-1505	Every 2 rolls	g/cc	≥ 0.940	≥ 0.940	≥ 0.940	≥ 0.940	≥ 0.940	≥ 0.940	≥ 0.940
Carbon Black Content (9)	ASTM D-4218	Every 2 rolls	%	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D-5596	Every 6 rolls	Category	Cat. 1 & Cat. 2	Cat. 1 & Cat. 2	Cat. 1 & Cat. 2	Cat. 1 & Cat. 2	Cat. 1 & Cat. 2	Cat. 1 & Cat. 2	Cat. 1 & Cat. 2
OIT - standard (avg.)	ASTM D-3895	1/Batch	min	100	100	100	100	100	100	100
Tensile Properties (min. avg) (2)	ASTM D-6693	Every 2 rolls								
Strength at Yield			ppi	40	66	84	130	177	210	252
Elongation at Yield			%	12	13	13	13	13	12	12
Strength at Break			ppi	76	122	162	243	326	380	456
Elongation at Break			%	600	700	700	700	700	700	700
Tear Resistance (min. avg.)	ASTM D-1004	Every 6 rolls	lbf	13	21	28	42	57	70	84
Puncture Resistance (min. avg.)	ASTM D-4833	Every 6 rolls	lbf	36	60	80	122	155	180	216
Dimensional Stability	ASTM D-1204	Every 6 rolls	%	± 2	± 2	± 2	± 2	± 2	± 2	± 2
Stress Crack Resistance (SP-NCTL)	ASTM D-5397	1/Batch	hr	400	400	400	400	400	400	400
Oven Aging - % retained after 90 days	ASTM D-5721	Per formulation								
HP OIT (min. avg.)	ASTM D-5885		%	80	80	80	80	80	80	80
UV Resistance - % retained after 1600 hr	GRI-GM-11	Per formulation								
HP-OIT (min. avg.)	ASTM D-5885		%	50	50	50	50	50	50	50
SUPPLY SPECIFICATIONS	(Roll dimensions may vary ±1%)									
Roll Dimension - Width	-		ft	22.3	22.3	22.3	22.3	22.3	22.3	22.3
Roll Dimension - Length	-		ft	1,400	1,000	780	520	400	320	265
Area (Surface/Roll)	-		sf	31,220	20,494	17,394	11,596	8,920	7,136	5,910

NOTES

1. Testing frequency based on standard roll dimensions and one batch is approximately 180,000 lbs (or one railcar).
2. Machine Direction (MD) and Cross Machine Direction (XMD or TD) average values should be on the basis of 5 specimens each direction.
8. Correlation table is available for ASTM D792 vs ASTM D1505. Both methods give the same results.
9. Correlation table is available for ASTM D1603 vs ASTM D4218. Both methods give the same results.

* All values are nominal test results, except when specified as minimum or maximum.
* The information contained herein is provided for reference purposes only and is not intended as a warranty of guarantee. Final determination of suitability for use contemplated is the sole responsability of the user. SOLMAX assumes no liability in connection with the use of this information.

SOLMAX

TECHNICAL DATA SHEET

Solmax HDPE Textured - Imperial Values

Solmax International Inc., 2801 Boul. Marie-Victorin, Varennes, Qc, Canada, J3X 1P7
Tel.: (450) 929-1234 Fax: (450) 929-2550 www.solmax.com

PROPERTY	TEST METHOD	FREQUENCY(1)	UNIT Imperial	Solmax 430T-1000	Solmax 440T-1000	Solmax 460T-1000	Solmax 480T-1000	Solmax 500T-1000	Solmax 520T-1000
SPECIFICATIONS									
Thickness (min. avg.)	ASTM D-5994	Every roll	mils	29.0	38.0	57.0	76.0	95.0	114.0
Lowest individual for 8 out of 10 values			mils	27.0	36.0	54.0	72.0	90.0	108.0
Lowest individual for 10 out of 10 values			mils	26.0	34.0	51.0	68.0	85.0	102.0
Asperity Height (min. avg.) (3)	ASTM D-7466	Every roll	mils	10	15	15	15	15	15
Resin Density	ASTM D-1505	1/Batch	g/cc	> 0.932	> 0.932	> 0.932	> 0.932	> 0.932	> 0.932
Melt Index - 190/2.16 (max.)	ASTM D-1238	1/Batch	g/10 min	1.0	1.0	1.0	1.0	1.0	1.0
Sheet Density (8)	ASTM D-1505	Every 2 rolls	g/cc	≥ 0.940	≥ 0.940	≥ 0.940	≥ 0.940	≥ 0.940	≥ 0.940
Carbon Black Content (9)	ASTM D-4218	Every 2 rolls	%	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D-5596	Every 6 rolls	Category	Cat. 1 & Cat. 2	Cat. 1 & Cat. 2	Cat. 1 & Cat. 2	Cat. 1 & Cat. 2	Cat. 1 & Cat. 2	Cat. 1 / Cat. 2
OIT - standard (avg.)	ASTM D-3895	1/Batch	min	100	100	100	100	100	100
Tensile Properties (min. avg) (2)	ASTM D-6693	Every 2 rolls							
Strength at Yield			ppi	66	88	132	176	210	252
Elongation at Yield			%	12	12	13	13	12	13
Strength at Break			ppi	66	88	132	167	150	252
Elongation at Break			%	150	150	150	150	100	150
Tear Resistance (min. avg.)	ASTM D-1004	Every 6 rolls	lbf	23	30	45	60	70	84
Puncture Resistance (min. avg.)	ASTM D-4833	Every 6 rolls	lbf	60	90	120	150	150	180
Dimensional Stability	ASTM D-1204	Every 6 rolls	%	± 2	± 2	± 2	± 2	± 2	± 2
Stress Crack Resistance (SP-NCTL)	ASTM D-5397	1/Batch	hr	400	400	400	400	400	400
Oven Aging - % retained after 90 days	ASTM D-5721	Per formulation							
HP OIT (min. avg.)	ASTM D-5885		%	80	80	80	80	80	80
UV Resistance - % retained after 1600 hr	GRI-GM-11	Per formulation							
HP-OIT (min. avg.)	ASTM D-5885		%	50	50	50	50	50	50
SUPPLY SPECIFICATIONS	(Roll dimensions may vary ±1%)								
Roll Dimension - Width	-		ft	22.3	22.3	22.3	22.0	22.0	22.0
Roll Dimension - Length	-		ft	1,000	780	540	420	320	265
Area (Surface/Roll)	-		sf	22,300	17,394	12,042	9,240	7,040	5,830

NOTES

1. Testing frequency based on standard roll dimensions and one batch is approximately 180,000 lbs (or one railcar).
2. Machine Direction (MD) and Cross Machine Direction (XMD or TD) average values should be on the basis of 5 specimens each direction.
3. Of 10 readings; 8 out of 10 must be >7 mils (0.18 mm), and lowest individual reading must be >5 mils (0.13 mm). ASTM D7466 is identical to GRI-GM12.
8. Correlation table is available for ASTM D792 vs ASTM D1505. Both methods give the same results.
9. Correlation table is available for ASTM D1603 vs ASTM D4218. Both methods give the same results.

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SOLMAX

TECHNICAL DATA SHEET

Solmax HDPE Single-Sided Textured - Imperial Values

Solmax International Inc., 2801 Boul. Marie-Victorin, Varennes, Qc, Canada, J3X 1P7
Tel.: (450) 929-1234 Fax: (450) 929-2550 www.solmax.com

PROPERTY	TEST METHOD	FREQUENCY(1)	UNIT Imperial	Solmax 430ST-1000	Solmax 440ST-1000	Solmax 460ST-1000	Solmax 480ST-1000	Solmax 500ST-1000	Solmax 520ST-1000
SPECIFICATIONS									
Thickness (min. avg.)	ASTM D-5994	Every roll	mils	28.5	38.0	57.0	76.0	95.0	114.0
Lowest individual for 8 out of 10 values			mils	27.0	36.0	54.0	72.0	90.0	108.0
Lowest individual for 10 out of 10 values			mils	26.0	34.0	51.0	68.0	85.0	102.0
Asperity Height (min. avg.) (3)	ASTM D-7466	Every roll	mils	10	15	15	15	15	15
Resin Density	ASTM D-1505	1/Batch	g/cc	> 0.932	> 0.932	> 0.932	> 0.932	> 0.932	> 0.932
Melt Index - 190/2.16 (max.)	ASTM D-1238	1/Batch	g/10 min	1.0	1.0	1.0	1.0	1.0	1.0
Sheet Density (8)	ASTM D-1505	Every 2 rolls	g/cc	≥ 0.940	≥ 0.940	≥ 0.940	≥ 0.940	≥ 0.940	≥ 0.940
Carbon Black Content (9)	ASTM D-4218	Every 2 rolls	%	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D-5596	Every 6 rolls	Category	Cat. 1 & Cat. 2	Cat. 1 & Cat. 2	Cat. 1 & Cat. 2	Cat. 1 & Cat. 2	Cat. 1 & Cat. 2	Cat. 1 / Cat. 2
OIT - standard (avg.)	ASTM D-3895	1/Batch	min	100	100	100	100	100	100
Tensile Properties (min. avg) (2)	ASTM D-6693	Every 2 rolls							
Strength at Yield			ppi	63	88	132	176	210	252
Elongation at Yield			%	12	13	13	13	12	13
Strength at Break			ppi	46	88	132	167	150	252
Elongation at Break			%	100	150	150	150	100	150
Tear Resistance (min. avg.)	ASTM D-1004	Every 6 rolls	lbf	21	30	45	60	70	84
Puncture Resistance (min. avg.)	ASTM D-4833	Every 6 rolls	lbf	45	90	120	150	150	180
Dimensional Stability	ASTM D-1204	Every 6 rolls	%	± 2	± 2	± 2	± 2	± 2	± 2
Stress Crack Resistance (SP-NCTL)	ASTM D-5397	1/Batch	hr	400	400	400	400	400	400
Oven Aging - % retained after 90 days	ASTM D-5721	Per formulation							
HP OIT (min. avg.)	ASTM D-5885		%	80	80	80	80	80	80
UV Resistance - % retained after 1600 hr	GRI-GM-11	Per formulation							
HP-OIT (min. avg.)	ASTM D-5885		%	50	50	50	50	50	50
SUPPLY SPECIFICATIONS	(Roll dimensions may vary ±1%)								
Roll Dimension - Width	-		ft	22.3	22.3	22.3	22.0	22.0	22.0
Roll Dimension - Length	-		ft	1,000	780	560	440	320	265
Area (Surface/Roll)	-		sf	22,300	17,394	12,488	9,680	7,040	5,830

NOTES

1. Testing frequency based on standard roll dimensions and one batch is approximately 180,000 lbs (or one railcar).
2. Machine Direction (MD) and Cross Machine Direction (XMD or TD) average values should be on the basis of 5 specimens each direction.
3. Of 10 readings; 8 out of 10 must be >7 mils (0.18 mm), and lowest individual reading must be >5 mils (0.13 mm). ASTM D7466 is identical to GRI-GM12.
8. Correlation table is available for ASTM D792 vs ASTM D1505. Both methods give the same results.
9. Correlation table is available for ASTM D1603 vs ASTM D4218. Both methods give the same results.

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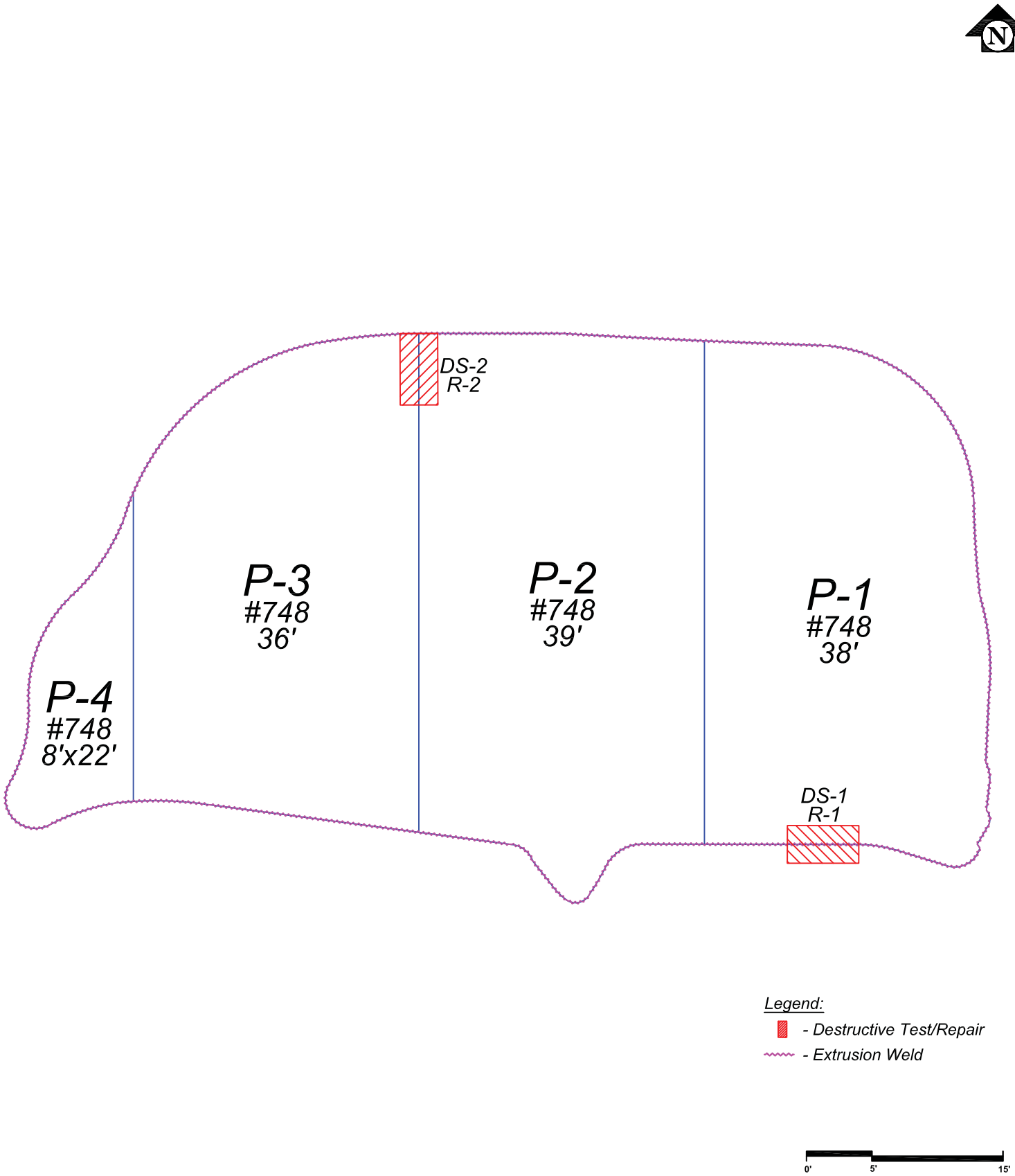
Attachment D

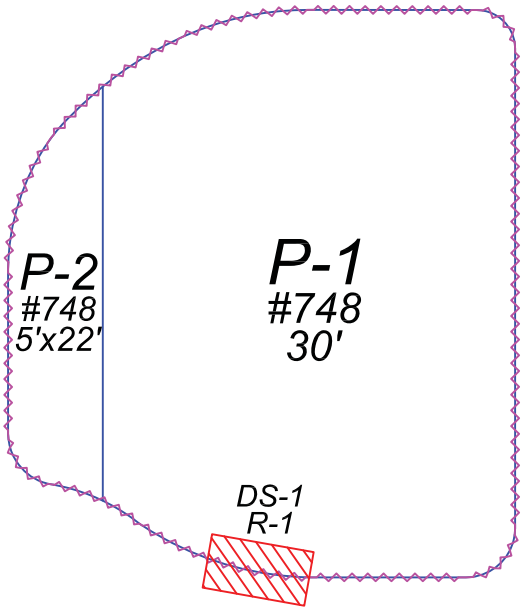
Geomembrane Installation Data



Hidden Valley Landfill - Repair 1

As-built 60-mil textured HDPE liner Panel Layout

SHEET NO.	DETAIL	NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc.	JOB NAME:	Hidden Valley Landfill - Repairs		
1 of 3		www.northwestlinings.com	JOB NO.	T14099		
		21000 77TH AVE. SOUTH KENT, WA. 98032 (253) 872-0244 (253) 872-0245 FAX	DATE:	6 17 14	CHECKED:	KL
			BY:	TS	SCALE:	AS SHOWN



Legend:

- *Destructive Test/Repair*
- *Extrusion Weld*

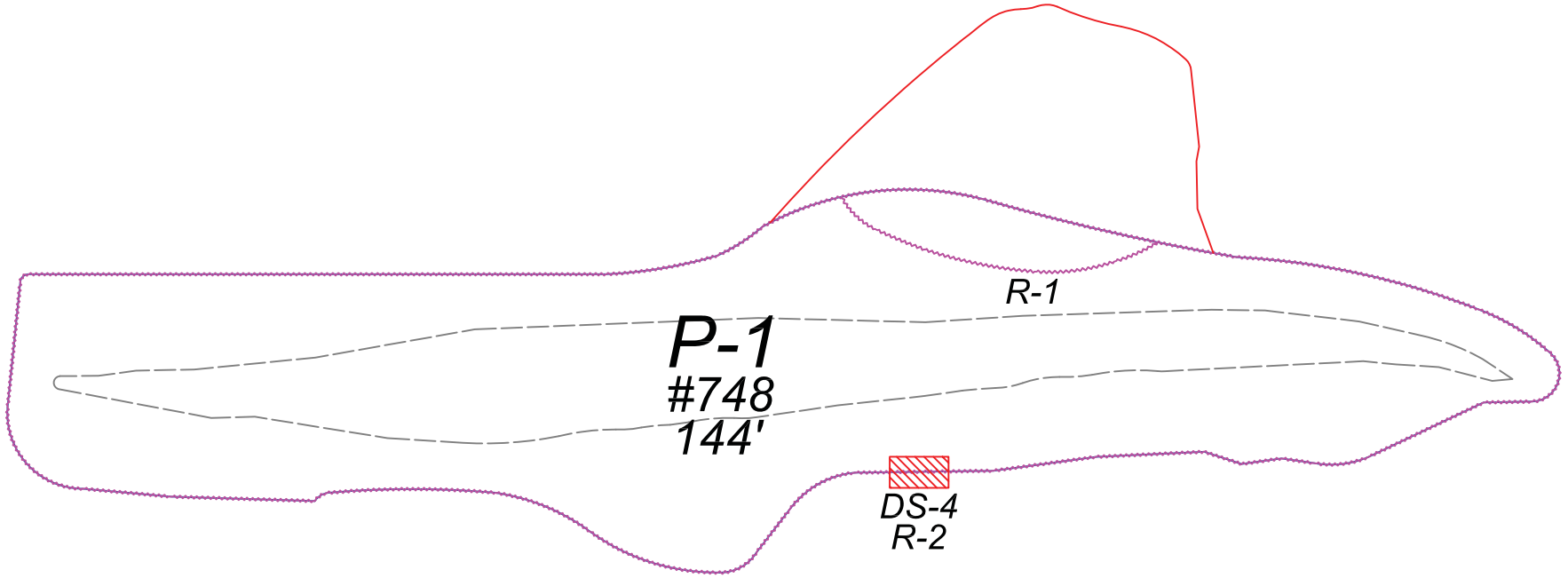
0' 5' 15'

Hidden Valley Landfill - Repair 2

As-built 60-mil textured HDPE liner Panel Layout

SHEET NO.	DETAIL	NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc.
2 of 3		www.northwestlinings.com 21000 77TH AVE. SOUTH KENT, WA. 98032 (253) 872-0244 (253) 872-0245 FAX

JOB NAME:	Hidden Valley Landfill - Repairs		
JOB NO.	T 1 4 0 9 9		
DATE:	6 17 14	CHECKED:	KL
BY:	TS	SCALE:	AS SHOWN



Legend:
- Destructive Test/Repair
- Extrusion Weld

0' 15' 30'

Hidden Valley Landfill - Repair 3

As-built 60-mil textured HDPE liner Panel Layout

SHEET NO.	3 of 3		
DETAIL			
NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc. www.northwestlinings.com 21000 77TH AVE. SOUTH KENT, WA. 98032 (253) 872-0244 (253) 872-0245 FAX			
JOB NAME:	Hidden Valley Landfill - Repairs		
JOB NO.	T14099		
DATE:	6 17 14	CHECKED:	KL
BY:	TS	SCALE:	AS SHOWN

NORTHWEST LININGS &
GEOTEXTILE PRODUCTS, Inc.
"Helping to Protect the Environment"
21000 77th Avenue South
Kent, WA 98032
(253) 872-0244 / (800) 729-6954
FAX: (253) 872-0245

Date: 5/16/2014
Job #: T14099

Panel Placement Form

Project Name:	HIDDEN VALLEY LF	**Supervisor:**	R ARELLANO / R CRUZ
Project Location:	PUYALLUP WA	**Engineer:**	JERRY R
Project Description:	REPAIRS 1,2,&3	**Contractor:**	GLACIER CONST.
Project Manager:	KA	**Contact:**	JERRY R

Material: 60-MIL HDPE TEXT.

Date	Panel #	Length	Width	Roll Number	Panel Location / Comment
5/16/14	1	38'	22.3	748	S-N
5/16/14	2	39'	22.3	748	S-N
5/16/14	3	36'	22.3	748	S-N
5/16/14	4	22'	8'	748	AT WEST END
5/16/14	1	30'	22.3	748	S-N
5/16/14	2	22'	5'	748	AT WEST END
5/30/14	1	144'	22.3	748	

Notes: _____

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"Helping to Protect the Environment"
21000 77th Avenue South
Kent, WA 98032
(253) 872-0244 / (800) 729-6954
FAX: (253) 872-0245

Date: 5/16/2014
Job #: T14099

Geomembrane Fusion Weld Trial Log

Project Name: HIDDEN VALLEY LF
Project Location: PUYALLUP WA
Project Description: REPAIRS 1,2,&3
Project Manager: KA

Supervisor: R ARELLANO / R CRUZ
Engineer: JERRY R
Contractor: GLACIER CONSTRUCTION
Contact: JERRY R

Material: 60-MIL HDPE TEXT.

			Wedge Welder		Extruder		Track Peel Values			Tensile Value		
Date/ Time	Seamer Intials	Machine Number	Wedge Temp	Nip Roller Speed	Barrel Temp	Preheat Temp	In-side	Out-side	Pass/ Fail	LBS/Inch	Rate	Pass/ Fail
5/16/2014 AM	RT	373			500	440		105	Pass	176	2 F/M	Pass
								109	Pass	184	2 F/M	Pass
Comments: 60-MIL HDPE TEXT.					Ambient Temp:	55		107	Pass	98	2 F/M	Pass
5/16/2014 PM	RT/JM	373			500	430		116	Pass	166	2 F/M	Pass
								127	Pass	157	2 F/M	Pass
Comments: 60-MIL HDPE TEXT.					Ambient Temp:	65		117	Pass	163	2 F/M	Pass
5/30/2014 11:37AM	MCV	507			500	500	123	117	Pass	156		Pass
							127		Pass	155		Pass
Comments: 60-MIL HDPE SM.					Ambient Temp:					145		Pass
Comments:					Ambient Temp:							
Comments:					Ambient Temp:							
Comments:					Ambient Temp:							
Comments:					Ambient Temp:							
Comments:					Ambient Temp:							

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"Helping to Protect the Environment"
21000 77th Avenue South
Kent, WA 98032
(253) 872-0244 / (800) 729-6954
FAX: (253) 872-0245

Date: 5/16/2014
Job #: T14099

Panel Seaming Form

Project Name:	HIDDEN VALLEY LF	**Supervisor:**	R ARELLANO / R CRUZ
Project Location:	PUYALLUP WA	**Engineer:**	JERRY R
Project Description:	REPAIRS 1,2,&3	**Contractor:**	GLACIER CONST.
Project Manager:	KA	**Contact:**	JERRY R

Material: **60-MIL HDPE TEXT.**

Date/ Time	Seam Number	Panel Number	Seam Length	Seamer Initials	Machine Number	Machine Temp	Ambient Temp	Weather / Comments
5/16/14 AM	1	P-3/P-2	37'	RT	373	500	60	P/C,S-N
5/16/14 AM	2	P-2/P-1	38'	RT	373	500	60	P/C,S-N
5/16/14 AM	3	P-1/P-4	24'	RT	373	500	60	P/C,S-N
5/16/14 PM	1	P-1/P-2	24'	RT	373	500	65	P/C,N-S
5/30/14 12:45PM	1	1&EXISTING	313'	MCV	507	500	500	PERIMETER EXTRUSION WELD

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NORTHWEST LININGS &
GEOTEXTILE PRODUCTS, Inc.
"Helping to Protect the Environment"
21000 77th Avenue South
Kent, WA 98032
(253) 872-0244 / (800) 729-6954
FAX: (253) 872-0245

Date: 5/16/2014
Job #: T14099

Destructive Testing Form

Project Name: HIDDEN VALLEY LF
Project Location: PUYALLUP WA
Project Description: REPAIRS 1,2,&3
Project Manager: KA

Supervisor: R ARELLANO / R CRUZ
Engineer: JERRY R
Contractor: GLACIER CONST.
Contact: JERRY R

Material: 60-MIL HDPE TEXT.

					Track Peel Values			Tensile Value			Lab	
Date/ Time	Seam #	Sample I.D.	Tester Initials	Machine Number	In-side	Out-side	Pass/ Fail	LBS/Inch	Rate	Pass/ Fail	Pass / Fail	Peel/ Tensile
5/16/2014 PM	P-1/E-L	DS-1				108	Pass	157	2 F/M	Pass		
						106	Pass	158	2 F/M	Pass		
Comments: 60-MIL HDPE TEXT.						82	Pass	150	2 F/M	Pass		
5/16/2014 PM	P-2/P-3	DS-2				100	Pass	166	2 F/M	Pass		
						102	Pass	157	2 F/M	Pass		
Comments: 60-MIL HDPE TEXT.						114	Pass	163	2 F/M	Pass		
5/16/2014 PM	P-2/E-L	DS-1				103	Pass	134	2 F/M	Pass		
						104	Pass	128	2 F/M	Pass		
Comments: 60-MIL HDPE TEXT.						90	Pass	135	2 F/M	Pass		
5/30/2014 2:30PM	1<EXISTING	DS-4	RC	747	69		Pass		72	Pass		
					91		Pass		72	Pass		
Comments: 60-MIL HDPE TEXT.					80		Pass		72	Pass		
Comments:												
Comments:												
Comments:												
Comments:												

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GEOTEXTILE PRODUCTS, Inc.
"Helping to Protect the Environment"
21000 77th Avenue South
Kent, WA 98032
(253) 872-0244 / (800) 729-6954
FAX: (253) 872-0245

Date: 5/16/2014
Job #: T14099

Repair Report

Project Name:	HIDDEN VALLEY LF	**Supervisor:**	R ARELLANO / R CRUZ
Project Location:	PUYALLUP WA	**Engineer:**	JERRY R
Project Description:	REPAIRS 1,2,&3	**Contractor:**	GLACIER CONST.
Project Manager:	KA	**Contact:**	JERRY R

Date	Repair ID#	Panel/ Seam#	Extruder Number	Operator Initials	Type of Repair/Detail/Location (I.E... DT Patch, Rock Hole, Burn Out, Failed Seam, ETC...)	V-Box Pass/Fail
5/16/14	1	P-1/E-L	373	RT	DS-1, 1'X3' PATCH TIE IN WITH E-L	Pass
5/16/14	2	P-2/P-3	373	RT	DS-2, 1'X3' PATCH AT N END	Pass
5/16/14	1	P-2/E-L	373	RT	DS-1, 1'X3' PATCH AT S END WITH- E-L	Pass
5/30/14	1	1	507	MCV	17' EXT WELD ON RELEASE CUT 5' FROM N END	Pass
5/30/14	2	1<EXISTING	507	MCV	3'X3' PATCH OVER DS-4, 10' FROM S BERM	Pass

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Date: 2014-05-20

Mail To:
Sam Adlington
SCS Engineers
2405 140 Ave., NE #107
Bellevue , WA , 98005

Bill To:

SCS Engineers
04214002.04

e-mail:
sadlington@scsengineers.com klakey@scsengineers.com

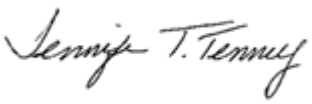
Dear Mr. Adlington,

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:	**HVL Cover Repair**
TRI Job Reference Number:	**13220**
Material(s) Tested:	(3) Single Extrusion Weld Seam(s)
Test(s) Requested:	SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

Codes:	
AD	Adhesion Failure (100% Peel)
BRK	Break in sheeting away from Seam edge.
SE	Break in sheeting at edge of seam.
AD-BRK	Break in sheeting after some adhesion failure - partial peel.
SIP	Separation in the plane of the sheet (leaving the bond intact).
FTB	Film tearing bond (all non "AD" failures).
NON-FTB	100% peel.

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



Jennifer Tenney
Project Manager
Geosynthetic Services Division
http://www.geosyntheticstestinc.com

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

DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS - SINGLE TRACK

TRI Client: SCS Engineers

Project: HVL Cover Repair

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 13220

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: DS-1 | Weld: Single Extrusion						
Side: Peel						**Peel**
Peel Strength (ppi)	106	113	109	100	104	**106**
Peel Incursion (%)	<5	<5	10	<5	<5	
Peel Locus Of Failure Code	SE	SE	AD-BRK	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						**Shear**
Shear Strength (ppi)	175	166	165	169	166	**168**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DS-2 | Weld: Single Extrusion						
Side: Peel						**Peel**
Peel Strength (ppi)	85	99	98	109	91	**96**
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	166	175	177	165	**170**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DS-3 | Weld: Single Extrusion						
Side: Peel						**Peel**
Peel Strength (ppi)	106	117	100	105	130	**112**
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	166	168	163	178	**169**
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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

Date: 2014-06-03

Mail To:

Sam Adlington
SCS Engineers
2405 140 Ave., NE #107
Bellevue , WA , 98005

e-mail:
sadlington@scsengineers.com klakey@scsengineers.com

Bill To:

SCS Engineers
4214002.04

Dear Mr. Adlington,

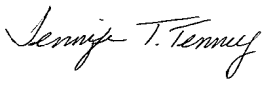
Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report for laboratory testing.

Project:	**HVL Cover Repair**
TRI Job Reference Number:	**13220**
Material(s) Tested:	(1) Single Extrusion Weld Seam(s)
Test(s) Requested:	SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

Codes	
AD	Adhesion failure (100% Peel)
BRK	Break in sheeting away from Seam edge
SE	Break in sheeting at edge of seam
AD-BRK	Break in sheeting after some adhesion failure - partial peel
SIP	Separation in the plane of the sheet (leaving the bond intact)
FTB	Film tearing bond (all non "AD" failures)
NON-FTB	100% peel

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

Sincerely,



Jennifer Tenney
Project Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

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

DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: SCS Engineers

Project: HVL Cover Repair

Material: 40 mil. LLDPE / 60mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: 13220

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: DS-4 | Weld: Single Extrusion						
Peel						**Peel**
Peel Strength (ppi)	85	83	84	93	86	**86**
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)	84	83	86	85	82	**84**
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.

Attachment E

Geonet Composite Quality Control Data

September 11, 2013
Northwest Linings & Geotextile Products, Inc.
P.O Box 1248, 21000 77th Ave South
Kent, WA, 98032

Ref. : Sheridan Cell 9 Phase II, WY
Customer P.O. # C-4570
Product : TN 330-2-8/16

We certify that the TN 330-2-8/16 drainage geocomposite, meets the project requirements as stated in the specifications. The properties listed in this section are:

Property	Test Method	Unit	Required Value		Qualifier
Geonet[3]					
Mass per Unit Area	ASTM D 5261	lbs/ft^2	0.300		Minimum
Thickness	ASTM D 5199	mil	330 +/- 30		Range
Carbon Black	ASTM D 4218	%	2.0		Minimum
Tensile Strength	ASTM D 5035	lbs/in	75		Minimum
Melt Flow	ASTM D 1238[2]	g/10 min	1.0		Maximum
Density	ASTM D 1505	g/cm^3	0.94		Minimum
Transmissivity[1]	ASTM D 4716	m2/sec	5.0 x 10^{-3}		Minimum
Composite					
Ply Adhesion	ASTM D 7005	lb/in	1.0		MARV[5]
Geotextile[3 & 4]					
Fabric Weight	ASTM D 5261	oz/yd^2	8.0	16.0	MARV
Grab Strength	ASTM D 4632	lbs	220	390	MARV
Grab Elongation	ASTM D 4632	%	50	50	MARV
Tear Strength	ASTM D 4533	lbs	90	150	MARV
Puncture Resistance	ASTM D 4833	lbs	120	240	MARV
Water Flow Rate	ASTM D 4491	gpm/ft^2	95	45	MARV
Permittivity	ASTM D 4491	sec^{-1}	1.26	0.57	MARV
AOS	ASTM D 4751	US Sieve	80	100	MaxARV
UV Resistance	ASTM D 4355	%/hrs	70/500	70/500	MARV

Notes:

1 Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °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.

Sincerely,

Nilay Patel

Nilay Patel
QA Manager

APPROVED 5 QA

Product : **TN 330-2-8/16**
Project : **Sheridan Cell 9 Phase II, WY**

We, the Geocomposite Manufacturer, hereby certify the following for the material delivered to the above referenced project :

Roll	Geocomposite Roll Number	Geonet Roll Number	Geotextile Roll Number		Ply Adhesion (lb/in)		Geocomposite Transmissivity (m^2/sec)
			Side A	Side B	Minimum	Average	
1	55291010001	55291010001 - N	5529.003	5529.217	1.53	3.43	
2	55291010002	55291010002 - N	5529.003	5529.217			
3	55291010003	55291010003 - N	5529.003	5529.217			
4	55291010004	55291010004 - N	5529.003	5529.213			
5	55291010005	55291010005 - N	5529.003	5529.213			
6	55291010006	55291010006 - N	5529.003	5529.213			
7	55291010007	55291010007 - N	5529.003	5529.215			
8	55291010008	55291010008 - N	5529.003	5529.215			
9	55291010009	55291010009 - N	5529.003	5529.215			
10	55291010010	55291010010 - N	5529.007	5529.203			
11	55291010011	55291010011 - N	5529.007	5529.203			
12	55291010012	55291010012 - N	5529.007	5529.203			
13	55291010013	55291010013 - N	5529.007	5529.238			
14	55291010014	55291010014 - N	5529.007	5529.238			
15	55291010015	55291010015 - N	5529.007	5529.238			
16	55291010016	55291010016 - N	5529.007	5529.212			
17	55291010017	55291010017 - N	5529.007	5529.212			
18	55291010018	55291010018 - N	5529.007	5529.212			
19	55291010019	55291010019 - N	5529.012	5529.204			
20	55291010020	55291010020 - N	5529.012	5529.204	1.30	2.58	
21	55291010021	55291010021 - N	5529.012	5529.204			
22	55291010022	55291010022 - N	5529.012	5529.237			
23	55291010023	55291010023 - N	5529.012	5529.237			
24	55291010024	55291010024 - N	5529.012	5529.237			
25	55291010025	55291010025 - N	5529.012	5529.211			
26	55291010026	55291010026 - N	5529.012	5529.211			
27	55291010027	55291010027 - N	5529.012	5529.211			

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

Product : **TN 330-2-8/16**
Project : **Sheridan Cell 9 Phase II, WY**

We, the Geonet Manufacturer, hereby certify the following for the material sent to the above referenced project :

Geonet Roll Number	Resin Lot Number	Geonet Density (gm/cc)	Mass Per Unit Area (lb/ft^2)	Thickness (mils)	Carbon Black (%)	Tensile Strength (MD) (lb/in)	Transmissivity (m^2/sec)
55291010001 - N	28612-3	0.9558	0.350	331	2.40	115	8.66×10^{-3}
55291010002 - N	28612-3	0.9558					
55291010003 - N	28612-3	0.9558					
55291010004 - N	28612-3	0.9558					
55291010005 - N	28612-3	0.9558					
55291010006 - N	28612-3	0.9558					
55291010007 - N	28612-3	0.9558					
55291010008 - N	28612-3	0.9558					
55291010009 - N	28612-3	0.9558					
55291010010 - N	28612-3	0.9558					
55291010011 - N	28612-3	0.9558					
55291010012 - N	28612-3	0.9558					
55291010013 - N	28612-3	0.9558					
55291010014 - N	28612-3	0.9558					
55291010015 - N	28612-3	0.9558					
55291010016 - N	28612-3	0.9558					
55291010017 - N	28612-3	0.9558					
55291010018 - N	28612-3	0.9558					
55291010019 - N	28612-3	0.9558					
55291010020 - N	28612-3	0.9558	0.343	320	2.67	108	
55291010021 - N	28612-3	0.9558					
55291010022 - N	28612-3	0.9558					
55291010023 - N	28612-3	0.9558					
55291010024 - N	28612-3	0.9558					
55291010025 - N	28612-3	0.9558					
55291010026 - N	28612-3	0.9558					
55291010027 - N	28612-3	0.9558					

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

Product : **TN 330-2-8/16**
Project : **Sheridan Cell 9 Phase II, WY**

We, the Geocomposite Manufacturer, hereby certify the following for the material delivered to the above referenced project :

Roll	Geocomposite Roll Number	Geonet Roll Number	Geotextile Roll Number		Ply Adhesion (lb/in)		Geocomposite Transmissivity (m^2/sec)
			Side A	Side B	Minimum	Average	
28	55291010028	55291010028 - N	5529.005	5529.219			
29	55291010029	55291010029 - N	5529.005	5529.219			
30	55291010030	55291010030 - N	5529.005	5529.219			
31	55291010031	55291010031 - N	5529.005	5529.232			
32	55291010032	55291010032 - N	5529.005	5529.232			
33	55291010033	55291010033 - N	5529.005	5529.232			
34	55291010034	55291010034 - N	5529.005	5529.207			
35	55291010035	55291010035 - N	5529.005	5529.207			
36	55291010036	55291010036 - N	5529.005	5529.207			
37	55291010037	55291010037 - N	5529.009	5529.233			
38	55291010038	55291010038 - N	5529.009	5529.233			
39	55291010039	55291010039 - N	5529.009	5529.233			
40	55291010040	55291010040 - N	5529.009	5529.205	1.29	2.51	
41	55291010041	55291010041 - N	5529.009	5529.205			
42	55291010042	55291010042 - N	5529.009	5529.205			
43	55291010043	55291010043 - N	5529.009	5529.235			
44	55291010044	55291010044 - N	5529.009	5529.235			
45	55291010045	55291010045 - N	5529.009	5529.235			
46	55291010046	55291010046 - N	5529.001	5529.240			
47	55291010047	55291010047 - N	5529.001	5529.240			
48	55291010048	55291010048 - N	5529.001	5529.240			
49	55291010049	55291010049 - N	5529.001	5529.223			
50	55291010050	55291010050 - N	5529.001	5529.223			
51	55291010051	55291010051 - N	5529.001	5529.223			
52	55291010052	55291010052 - N	5529.001	5529.206			
53	55291010053	55291010053 - N	5529.001	5529.206			
54	55291010054	55291010054 - N	5529.001	5529.206			

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Product : **TN 330-2-8/16**
Project : **Sheridan Cell 9 Phase II, WY**

We, the Geonet Manufacturer, hereby certify the following for the material sent to the above referenced project :

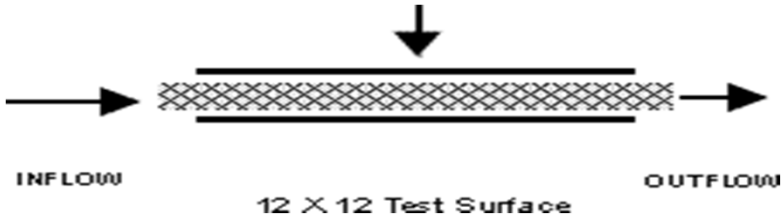
Geonet Roll Number	Resin Lot Number	Geonet Density (gm/cc)	Mass Per Unit Area (lb/ft^2)	Thickness (mils)	Carbon Black (%)	Tensile Strength (MD) (lb/in)	Transmissivity (m^2/sec)
55291010028 - N	28612-3	0.9558					
55291010029 - N	28612-3	0.9558					
55291010030 - N	28612-3	0.9558					
55291010031 - N	28612-3	0.9558					
55291010032 - N	28612-3	0.9558					
55291010033 - N	28612-3	0.9558					
55291010034 - N	28612-3	0.9558					
55291010035 - N	28612-3	0.9558					
55291010036 - N	28612-3	0.9558					
55291010037 - N	28612-3	0.9558					
55291010038 - N	28612-3	0.9558					
55291010039 - N	28612-3	0.9558					
55291010040 - N	28612-3	0.9558	0.345	322	2.72	111	
55291010041 - N	28612-3	0.9558					
55291010042 - N	28612-3	0.9558					
55291010043 - N	28612-3	0.9558					
55291010044 - N	28612-3	0.9558					
55291010045 - N	28612-3	0.9558					
55291010046 - N	28612-3	0.9558					
55291010047 - N	28612-3	0.9558					
55291010048 - N	28612-3	0.9558					
55291010049 - N	28612-3	0.9558					
55291010050 - N	28612-3	0.9558					8.36×10^{-3}
55291010051 - N	28612-3	0.9558					
55291010052 - N	28612-3	0.9558					
55291010053 - N	28612-3	0.9558					
55291010054 - N	28612-3	0.9558					

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

ASTM D 4716

Client:	Northwest Linings & Geotextile Products, Inc.	**Job #**	5529
Project:	Sheridan Cell 9 Phase II, WY		
Product:	TN 330-2-8/16		

Test Configuration:



Test Information:

Boundary Conditions:	Steel Plate Geonet Steel Plate	**Normal Load:** **Gradient:** **Seating Time:** **Flow Direction:**	10000 0.1 15 minutes MD

Test Results:

Roll No.	Pressure, psf	Gradient	Transmissivity, m^2/sec
			15 minutes
55291010001 - N	10000	0.1	8.66×10^{-3}
55291010050 - N			8.36×10^{-3}
55291010100 - N			8.45×10^{-3}

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

POLYETHYLENE RESIN CERTIFICATION

Customer Name : Northwest Linings & Geotextile Products, Inc.
Project Name : Sheridan Cell 9 Phase II, WY
Geocomposite Manufacturer : SKAPS Industries
Geocomposite Production Plant : Commerce, GA
Geocomposite Brand Name : TN 330-2-8/16

We, the Geonet Manufacturer, hereby certify the following for the material delivered to the above referenced project:

Resin Supplier	Resin Production Plant	Resin Brand Name	Resin Lot Number	Property	Test Method	Units	Resin Supplier Value	Tested Value*
New South Polymers, Inc	Chevron, TX	HDPE	28612-3	Density	ASTM D1505	gm / cc	0.9513	0.9510
				Melt flow Index	ASTM D1238[(a)]	gm / 10 min	0.35	0.34

(a) Condition 190/2.16
* Data from SKAPS Quality Control

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

Attachment F

Geotextile Quality Control Data

Crown Resources

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Geotextile Product Description Sheet

Style R060

R060 is a nonwoven geotextile produced by needlepunching synthetic staple fibers in a random network to form a high strength dimensionally stable fabric. The fibers are specially formulated to resist ultraviolet light deterioration, and are inert to commonly encountered soil chemicals. The fabric will not rot or mildew, is non-biodegradable, and is resistant to damage from insects and rodents. Polypropylene is stable within a ph range of 2 to 13. R060 conforms to the physical property values listed below:

Fabric Property	Test Method	Units	Minimum Average Roll Value
Grab Tensile	ASTM D 4632	lbs.	160 (.711kN)
Grab Elongation	ASTM D 4632	%	50
Trap Tear	ASTM D 4533	lbs.	60 (.267 kN)
CBR Puncture	ASTM D 6241	lbs	410 (1.82 kN)
Permittivity*	ASTM D 4491	1/sec	1.6
Water Flow*	ASTM D 4491	gpm/sqft	110 (4880 l/min/sm)
AOS	ASTM D 4751	U.S. Sieve	70 (.212 mm)
UV Resistance after 500 hrs.	ASTM D 4355	% Strength Retained	70
Packaging			
Roll Dimensions-Feet			12.5 x 360/15 x 300
Square Yards Per Roll			500
Estimated Roll Weight-Lbs.			195

* At time of manufacturing, handling may change these properties.

To the best of our knowledge, the information contained herein is accurate. However, Crown Resources cannot anticipate all conditions under which product information and our products, or the products of other manufacturers in combination with our products, may be used. We accept no responsibility for results obtained by the application of this information or the safety or suitability of our products either alone or in combination with other products. Final determination of the suitability of any information or material for the use contemplated, of its manner of use, and whether the suggested use infringes any patents is the sole responsibility of the user.

Attachment G

Landfill Gas Well Abandonment

ENGINEER'S FIELD REPORT

Project No.

SCS ENGINEERS

INSPECTOR: S. ADDINGTON	DATE: 5/30/2014	FIELD REPORT No.

Work in Progress: WELL ABANDONMENT N-60 AT HIDDEN VALLEY LANDFILL AS PART OF SOUTHWEST CLOSURE SINKHOLE REPAIR.

WEATHER: CLEAR ~ 60°F, NO RAIN PREDICTED

Time	Description	Action	Inform
0920	AS PART OF TRENCHING & GRADING FOR COVER SYSTEM DRAINAGE DITCH. WELL N-61 REQUIRED TO BE ABANDONED TO ALLOW FOR GRADING OF SIDE SLOPES.		
1030	CONFIRM NEED TO ABANDON WELL W/ KEVIN (SCS) APPROXIMATELY 6 BAGS OF BENTONITE REQUIRED TO GROUT WELL CASING & REPAIR UPPER SEAL. LEAVE SITE TO COLLECT MATERIALS: 6 BAGS BENTONITE CHIPS 1 3" Ø PVC CAP 5 GALLONS WATER.		
1130	ARRIVE BACK ONSITE. BEGIN WELL ABANDONMENT SEE ATTACHED LOG		
1250	ABANDONMENT COMPLETE		

Attachments:

Action Code:

V	-	Item to Verify	R	-	Respondent	QA	- Quality Assurance
I	-	Information Needed	E	-	Engineer		Consultant
CI	-	Cost Impact	EC	-	Earthwork Contractor	S	- Supplier
SI	-	Schedule Impact	GC	-	Geosynthetic Contractor		

Inspector's Signature _____

BORING LOG

SCS ENGINEERS
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PROJECT: HIDDEN VALLEY LF
HOLE #: N-61 ABANDONMENT
PROJECT LOCATION: PUYALLUP
DIAMETER: 3"Ø PVC
JOB NUMBER: 04214002.04
TOTAL DEPTH: ~20' BGS
GEOLOGIST/ENGINEER: S. ADLINGTON
DATE STARTED: 5/30/2014
DRILLER: N/A
DATE COMPLETED: 5/30/2014
DRILL RIG: N/A
SAMPLING DEVICE: N/A
DRILLING METHOD: N/A
PAGE: 2 OF: 2

DEPTH (ft)	LAB SAMPLE	COMPLETION DETAIL	SAMPLE #	BLOW COUNTS / FOOT	USCS SYMBOL	DESCRIPTION
0						FINAL COVER SURFACE AFTER REPAIR
2						GEOMEMBRANE
3						UPPER BENTONITE SEL
4						WELL CUT & CAPPED ~2' BELOW GEOMEMBRANE
10						3"Ø PVC CASING
13						HYDRATED BENTONITE CHIP BACKFILL (HYDRATED) 4 BAGS REQUIRED
20		XXX				APPROXIMAT WELL BOTTOM AS MEASURED 5/30/14

SAM ADLINGTON
SCS ENGINEERS
5-30-2014