FINAL REPORT

Evaluation of DBoot, Inc. Product Performance

(TRI References: 2400-55-09, 20222 and E20223)

Mr. Don Snethun
DBoot Inc.
Box 123
Buck Lake, AB, TOC OTO
Dbootinc.gmail.com

June 21, 2016

Don Snethun

DBoot Inc.

Box 123

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Dbootinc.gmail.com

FINAL REPORT: Evaluation of DBoot, Inc. Product Performance.

(TRI References: 2400-55-09, 20222 and E20223)

Dear Mr. Snethun,

TRI Environmental, Inc. (TRI) is pleased to present this final report on the evaluation of a DBoot, Inc. boot sleeve product. TRI understands this is a new product and TRI's research was performed to characterize the product's suitability for applications in waste containment piping systems. In this regard, the following product characteristics were evaluated.

- Methane Permeability: Methane has a very small molecular structure and represents a worst-case vapor challenge to the product. It served as a general way to measure the product as a vapor barrier lining material.

- Chemical Resistance: Chemical resistance to synthetic municipal solid waste leachate was measured to determine resistance to changes in product properties, and associated performance, when exposed to aggressive solutions.

- Weld-ability Assessment: Samples of DBoot product were thermally welded to both HDPE and LLDPE geomembrane materials in order to assess the seam properties of the resulting bonds.

The product tested was received by DBoot for testing, was observed to be of a low density polyolefin composition (proprietary formulation). It was characterized by a measured density of 0.88 g/cm3 and a melt index (190/2.16) of 24.2 g/10 min.

The following sections describe the testing in detail and present the results. All chemical resistance test results may be found in the appendix to this report.

<u>Methane Permeability</u>

Methane permeability was measured in accordance with ASTM D1434, Procedure V, Standard Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting. In this test, the sample is mounted in a gas transmission cell so as to form a sealed semibarrier between two chambers. One chamber contains the test gas at a specific high pressure, and the other chamber, at a lower pressure, receives the permeating gas. In Procedure V the lower pressure chamber is maintained near atmospheric pressure and the transmission of the gas through the test specimen is indicated by a change in volume. The test results are presented below.

Laboratory Test Results		
Sample thickness (cm)	Methane Permeability (cm^3*cm)/(cm^2*s*atm))	Methane Permeability (cm^3*cm)/(cm^2*s*Pa)
0.223	3.71E-08	3.66E-13
0.219	4.95E-08	4.88E-13
Average	**4.33E-08**	**4.27E-13**

<u>Chemical Resistance</u>

In anticipation of using the DBoot product for MSW landfill applications, a chemical resistance test was performed in accordance with ASTM D5747, Standard Practice for Tests to Evaluate the Chemical Resistance of Geomembranes to Liquids, and SW 846 EPA Method 9090A, Compatibility Test for Wastes and Membrane Liners. The objective was to determine the resistance of the product to changes caused by exposure to leachate. Changes in physical and mechanical properties were measured after exposure to the leachate at 23^{o}C and 50^{o}C for 30, 60, 90 and 120 days following the exposure regimen specified standards.

The leachate used was a synthetic leachate representing an aggressive MSW leachate solution. All sample exposures were conducted in sealed tanks constructed from glass or stainless steel. A detailed characterization of the leachate may be found in the appendix with all generated test results.

The following table lists tests performed on the product.

Table 3. Tests performed on the product

Test or Physical Property	Method	Number of replicate specimens
Dimensions and weight	EPA 9090A	1
Volatiles and Extractables	EPA SW 870, Appendix III	2
Tensile Properties	ASTM D 638 (D6693)	3
2% Secant Modulus	ASTM D 882	3
Tear Strength	ASTM D 1004	3
Puncture Resistance	ASTM D 4833	2

The results indicated that while changes in certain measured mechanical properties were noted, they were not observed to be consistent throughout the exposure periods. The effects of product variability and experimental factors could not be ruled out as causes for observed changes. The data, considered together, did not suggest that observed changes were caused by the test exposures, and that the DBoot product was resistant to the MSW leachate as exposed by this test regimen.

Seam Evaluation(s)

In order to assess the weld-ability of the DBoot product, TRI constructed thermal welded seams using the edges of the DBoot product and geomembrane materials. The resulting seams were tested in general accordance with ASTM D6392, Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods. Per this test procedure, seams were measured for both peel and shear properties.

Seams with component geomembrane of HDPE and LLDPE were assessed. Of key interest here was the seam strengths achieved as both the LLDPE and HDPE materials had higher material strengths than did the DBoot. Thus, achieving a substantial parent material retention was desired.

The following table presents test results with comparisons to various potential specifications.

<table>
<tr><th>Seamed to:</th><th>Peel
(ppi)</th><th>% DBoot
Parent Material</th><th>Shear
(ppi)</th><th>% DBoot
Parent Material</th></tr>
<tr><td>w/HDPE (ext)</td><td>85</td><td>96</td><td>85</td><td>96</td></tr>
<tr><td>w/HDPE (dtfw) – side A</td><td>67*</td><td>76</td><td rowspan="2">86</td><td rowspan="2">98</td></tr>
<tr><td>w/HDPE (dtfw) – side B</td><td>89</td><td>101</td></tr>
<tr><td>w/LLDPE (ext)</td><td>82</td><td>93</td><td>84</td><td>95</td></tr>
<tr><td>w/LLDPE (dtfw)
Side A</td><td>72</td><td>82</td><td rowspan="2">82</td><td rowspan="2">93</td></tr>
<tr><td>w/LLDPE (dtfw)
Side B</td><td>77</td><td>87</td></tr>
</table>

*includes some non-FTB, 100 peel values.

Seams were found to be robust. As the weaker of the two component materials, each seam failed in the DBOOT component, unless 100% peel was observed. Still, most seams exhibited film-tear-bond without peeling and it is evident that successful thermal welding may be accomplished with proper equipment and rained welding personnel.

As the DBoot material will govern the maximum seam strength when film-tear-bond is achieved, required seam strength for the DBoot material may be considered as a function of measured material tensile strength. That is, a possible seam specification for DBoot may be as follows.

Suggested Seam Specification for DBoot Seams (seamed to non-reinforced geomembrane materials).

> *"DBoot thermally welded seams must be tested in accordance with ASTM D6392 and shall achieve a peel strength equal to or greater than 70% of DBoot parent material in peel and 80% of DBoot parent material in shear, with 100% film-tear-bond or non-AD breaks."*

Details of all destructive seam test results, including all specimen measurements, may be found in the appendix

Conclusion

TRI/Environmental, Inc. is pleased to have been selected to participate in this project. We trust that the information provided in this report meets your requirements for technical documentation of this product assessment. Please do not hesitate to call if we can provide any further information (1-800-880-8378). is pleased to have been selected to participate in this project. We trust that the information provided in this report meets your requirements for technical documentation of this testing program. Please do not hesitate to call if we can provide any further information (1-800-880-8378).

Respectfully submitted,

Sam R. Allen

Sam R. Allen
Vice President
512-263-2101, ext. 138
SAllen@tri-env.com

Appendix

FINAL REPORT: Evaluation of DBoot, Inc. Product Performance.

(TRI References: 2400-55-09, 20222 and E20223)

Chemical Resistance Report
(with leachate characteristics report)

Seam Test Report

A Final Report:

Chemical Resistance Testing of Dboot

ASTM D 5747
EPA Method 9090A

June 2016

Submitted to:

Dboot, Inc.
Box 123
Buck Lake, Ab. T0C 0T0
Attn: **Don Snethun**

Submitted by:

TRI/Environmental, Inc.
9063 Bee Caves Rd.
Austin, Texas 78733

April 18, 2016

Don Snethun
Dboot, Inc.
Box 123
Buck Lake, Ab. T0C 0T0

Dear Mr. Snethun:

TRI/Environmental, Inc. (TRI) is pleased to present this Final Report for a chemical compatibility study performed in general accordance with ASTM D 5747 and EPA Method 9090A.

TRI is very pleased to be of service to Dboot. Please call me if you have any questions or require any additional information.

Respectfully submitted,

Jarrett A. Nelson

Jarrett A. Nelson
Technical Director
Geosynthetic Services Division

APPENDIX A:

EPA METHOD 9090A TEST RESULTS

Dboot

Dimensions

TRI LOG NUMBER: E2400-55-09

EPA METHOD 9090A TEST RESULTS

Dboot

TRI LOG NUMBER: E2400-55-09

NOTE ON TEST RESULTS

This section includes generated test data provided in both tabular and graphical form. Each graph is represented by a series of "I" beam plots. Each "I" beam represents a single test population and illustrates the high and low value as the end points, and the mean as a central box on the beam. The initial "I" beam represents the baseline or unexposed test specimens.

FOREWORD

The testing reported herein is based upon accepted industry practice as well as the test method listed. TRI/Environmental Inc. (TRI) neither accepts responsibility for nor makes claim as to the final use and purpose of the materials tested.

Tests were performed under laboratory conditions and not under actual usage conditions. TRI can give no conclusions as to the serviceability, life expectancy or general durability of the products tested when used in a lining and/or leachate collection system.

1.0 INTRODUCTION

This report describes the work performed by TRI/Environmental, Inc. (TRI) to determine the chemical compatibility of one Dboot product with one waste leachate. The objective was to determine the resistance of the product to changes caused by exposure to leachate. Changes in physical and mechanical properties were measured after exposure to the leachate at 23^{o}C and 50^{o}C for 30, 60, 90 and 120 days following the exposure regimen specified in ASTM D 5747 and United States Environmental Protection Agency (EPA) Method 9090A.

All materials were received and tested under TRI log number E2400-55-09. Methods, results and discussion are provided in the sections which follow. Test results are provided in the Tables of Results which accompany this report.

2.0 METHODS

2.1 Materials

Table 1 describes the product selected for evaluation in this chemical compatibility study.

Table 1. List of products evaluated in chemical compatibility study

Geosynthetic	Source
Dboot	Dboot, Inc.

2.2 Leachate

The leachate was a synthetic MSW leachate.

2.3 Exposure Conditions

Sample coupons were exposed to the waste leachate following the specifications of AST D 5747 and EPA Method 9090A as they relate to exposure to waste fluids. The tanks used for these exposures were maintained at 23 +/-2^{o}C and 50 +/- 2^{o}C throughout the 120-day exposure period. Sealed tanks were constructed from glass or stainless steel.

2.4 Testing Procedures

The following table lists tests performed on the product.

Table 3. Tests performed on the product

Test or Physical Property	Method	Number of replicate specimens
Dimensions and weight	EPA 9090A	1
Volatiles and Extractables	EPA SW 870, Appendix III	2
Tensile Properties	ASTM D 638	3
2% Secant Modulus	ASTM D 882	3
Tear Strength	ASTM D 1004	3
Puncture Resistance	ASTM D 4833	2

Note that tensile properties were determined in accordance with ASTM D638 procedures as modified by GRI GM-13, which gives specific methods for testing HDPE geomembranes. The tensile tests were performed on a screw-type tensile testing machine. The Type IV die was used. Load measurements were made by a strain-gage bridge load cell. Elongation was determined by crosshead movement as recorded by Bluehill 2 Instron data acquisition software. The rate of grip separation was 2 inches per minute. Gauge length ratios of 1.3 inches for yield values, and 2.0 inches for break values were used to calculate elongation from grip movement. The parameters reported for ASTM D638 testing included: tensile stress at yield, tensile strength at break, elongation at yield and elongation at break.

3.0 RESULTS AND DISCUSSION

Test results are presented in the Tables of Test Results (raw data) and selected graphical presentations are presented in Appendix A.

In considering these results, it must be determined through engineering judgment whether observed differences in the value of test results measured before and after immersion are due to product variability, unidentified factors relating to the test procedure, or leachate interaction with the products. Any significant chemical interaction with leachate would be expected to result in degradation trends which are consistent across the various properties being evaluated, and not isolated to one set of test results only.

Also of critical importance is the issue of product variability. A range of physical and mechanical index test values covering 5% or more of the average is not uncommon. This can be traced to variability inherent in the product, and the randomness associated with the onset of failure under the specified testing conditions. However, in chemical compatibility testing the statistical sampling of a broad range of manufactured product is not possible. Therefore, the small size of the sample population tested at each time point must be taken into consideration. The criteria to be applied in evaluating data measured before and after leachate immersion should be that property changes, if observed, are consistent and so great that product variability and experimental factors can be ruled out.

In this report, standard deviations (STD) are reported for most measurements involving three or more replicate specimens. In statistics, the standard deviation is defined as root of the mean squared deviations of individual test results about the mean value. The standard deviation is a quantitative measure of variability within a group of measurements.

One related measure of variability observed within a sample set, relative to the magnitude of the mean value itself, is the *coefficient of variation or variance* (COV). The coefficient of variance is defined as the standard deviation divided by the mean associated with a group of specimens, and may be expressed as a percentage. The COV provides an indication of what proportion of the mean value may be attributable to random experimental factors or product variability. It is useful to consider apparent changes in property values against the criterion of COV since observed changes which fall below the COV may not be significant. This approach was used in preparing the tables below.

The term *range* refers to the difference between the extreme highest and lowest points within a group of measured values. Considering range as a percentage of the mean values provides another measure of variability within a dataset.

In the table below, the high and low extremes for percentage change in some of the measured mean values are listed. These may be compared against COV and range as a percentage of mean from the baseline sample group. The high and low percentage changes are the extremes from data measured at 30, 60, 90 and 120 days.

Baseline COV and Range of Percent Change Results

Test	Baseline COV (%)	Baseline Range as % of Mean	High Observed % Change	Low Observed % Change
Stress at yield (MD)	1	1	6	-6
Stress at break (MD)	5	9	7	-8
Elongation at yield (MD)	1.4	2.7	14.2	1.5
Elongation at break (MD)	6	11	4	-5
2% Secant modulus (MD)	1	2	15	-8
Tear strength (MD)	3.4	6.4	6.9	-18.2
Puncture resistance	3.1	5.3	11.5	-3.8

4.0 SUMMARY

While changes in certain measured mechanical properties were noted, they were not observed to be consistent throughout the exposure periods. The effects of product variability and experimental factors could not be ruled out as causes for observed changes. The data, considered together, do not suggest that observed changes were caused by the test exposures.

TRI/Environmental, Inc. is pleased to have been selected to participate in this project. We trust that the information provided in this report meets your requirements for technical documentation of this chemical compatibility study. Please do not hesitate to call if we can provide any further information (1-800-880-8378).

Respectfully submitted,

Jarrett A. Nelson

Jarrett A. Nelson
Technical Director
Geosynthetic Services Division

TRI GEOSYNTHETICS SERVICES DIVISION
PaDEP Leachate Analysis
Testing performed by TRI/Environmental, Inc.

Analysis: January 01-10, 2016

Analytes	LOQ (ug/L)	Blank (ug/L)	PaDEP Synthetic Leachate (ug/L)
Organics: SW 846 Methods 624, 625, 608			
Acenaphthene	10	ND	100
Acenaphthylene	25	ND	65
Anthracene	10	ND	50
Benzene	10	ND	825
Benzo(a)anthracene	10	ND	25
Benzo(a)pyrene	10	ND	64
Benzo(ghi)perylene	10	ND	44
Benzo(k)flouranthene	50	ND	41
3,4-benzofluoranthene	25	ND	37
Chrysene	10	ND	50
Dibenzo(a,h)anthracene	10	ND	44
Ethyl benzene	10	ND	2500
Fluoranthene	10	ND	48
Fluorene	10	ND	56
Indeno(1,2,3,c,d)pyrene	50	ND	60
Naphthalene	10	ND	311
Phenanthrene	10	ND	60
Pyrene	10	ND	44
Styrene	10	ND	175
Toluene	10	ND	16000
Xylenes	10	ND	250
PCBs	10	ND	ND
Aldrin	10	ND	ND
1,2-Dichlorobenzene	10	ND	1240
1,4-Dichlorobenzene	10	ND	750
Hexachlorobenzene	10	ND	325
Pentachlorobenzene	10	ND	165
Trichlorobenzene**	50	ND	170
Tetrachlorobenzene**	10	ND	160
2-chloronaphthalene	10	ND	110
Chlorobenzene	10	ND	19020
4,4-DDT	10	ND	ND
4,4-DDE	50	ND	ND
4,4-DDD	10	ND	ND

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TRI GEOSYNTHETICS SERVICES DIVISION
PaDEP Leachate Analysis
Testing performed by TRI/Environmental, Inc.

Analysis: January 01-10, 2016

Analytes	LOQ (ug/L)	Blank (ug/L)	PaDEP Synthetic Leachate (ug/L)
Organics: SW 846 Methods 624, 625, 608 (Continued)			
Heptane	10	ND	65
Hexane	10	ND	65
Octane	10	ND	75
Bromoform	10	ND	1250
Carbon tetrachloride	25	ND	550
Chlorodibromomethane	10	ND	40
Chloroethane	10	ND	1100
Chloroform	10	ND	6500
Dichlorobromomethane	10	ND	135
Dichlorodifluoromethane	30	ND	700
1,1-Dichloroethane	50	ND	11000
1,2-Dichloroethane	25	ND	17000
Dichloropropane	10	ND	125
cis-Dichloroethene	10	ND	300
trans-Dichloroethene	40	ND	650
Ethylene dichloride *12DCA	10	ND	ND
Hexachloroethane	10	ND	700
Methyl bromide	50	ND	150
Methyl chloride	10	ND	130
Methylene chloride	50	ND	13000
Tetrachloroethene	50	ND	750
Tetrachloroethane**	50	ND	700
1,1,1-Trichloroethane	10	ND	800
1,1,2-Trichloroethane	10	ND	600
Trichloroethene	10	ND	700
Trichlorofluoromethane	10	ND	80
Vinyl chloride	10	ND	190

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TRI GEOSYNTHETICS SERVICES DIVISION
PaDEP Leachate Analysis
Testing performed by TRI/Environmental, Inc.

Analysis: January 01-10, 2016			PaDEP
	LOQ	Blank	Synthetic Leachate
Analytes	(ug/L)	(ug/L)	(ug/L)
Organics: SW 846 Methods 624, 625, 608 (Continued)			
Acrolein	10	ND	340
Acrylonitrile	25	ND	50
Acetone	10	ND	15500
Amyl acetate	10	ND	80
Benzidine	10	ND	75
Butyl alcohol**	10	ND	250
Bis(2-chloroethoxy)methane	10	ND	30
Bis(2-chloroethoxy)ether	50	ND	80
Bis(2-chloroisopropyl)ether	25	ND	80
Bis(2-ethylhexyl)phthalate	10	ND	1000
4-bromophenyl phenyl ether	10	ND	70
Butyl benzyl phthalate	10	ND	250
cresol**	10	ND	440
Chlordane	10	ND	ND
alpha-BHC	50	ND	ND
beta-BHC	10	ND	ND
gamma-BHC	10	ND	ND
delta-BHC	10	ND	ND
Dieldrin	10	ND	ND
Dichlorobenzidine	10	ND	100
Diethyl phthalate	10	ND	40
Dibutyl phthalate	10	ND	70
Dimethyl phthalate	10	ND	70
Isobutyl alcohol	10	ND	12000
Isopropyl alcohol	10	ND	250
Methyl alcohol	10	ND	150
2-chloroethyl vinyl ether	10	ND	600
2-chlorophenol	50	ND	1200
Dichlorophenol**	10	ND	1200
Dimethyl phenol**	10	ND	60
Dinitro-o-cresol	10	ND	50
Dinitrophenol**	10	ND	60
Dinitrotoluene**	10	ND	100
Diphenylhydrazine	10	ND	50
Ethyl acetate	10	ND	120
Ethyl ether	10	ND	90
Ethyl alcohol	10	ND	26000
Endosulfan	10	ND	40
Endrin	10	ND	20

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TRI GEOSYNTHETICS SERVICES DIVISION
PaDEP Leachate Analysis
Testing performed by TRI/Environmental, Inc.

Analysis: January 01-10, 2016 Analytes	LOQ (ug/L)	Blank (ug/L)	PaDEP Synthetic Leachate (ug/L)
Organics: SW 846 Methods 624, 625, 608 (Continued)			
Formaldehyde	10	ND	ND
Heptachlor	50	ND	ND
Hexachlorocyclopentadiene	10	ND	90
Haxachlorobutadiene	10	ND	600
Isophorone	10	ND	7000
Methyl ethyl ketone	10	ND	13000
Methyl isobutyl ketone	10	ND	700
Nitrophenol**	10	ND	30
N-nitrosodimethylamine	10	ND	130
N-nitrosodi-n-propylamine	10	ND	130
Nitrobenzene	10	ND	500
Pentachlorophenol	10	ND	400
Phenol	10	ND	16000
Pyridine	10	ND	600
Toluene	50	ND	1200
Toxophene	50	ND	200
Trichlorophenol**	10	ND	500
2,4,5-TP	10	ND	60
METALS (EPA Method 200 Series)			(mg/L)
Aluminum (202.1)	1	ND	20
Antimony (204.1)	1	ND	30
Arsenic (206.2)	1	ND	5
Barium (208.1)	1	ND	110
Beryllium (210.1)	1	ND	5
Boron (212.3)	1	ND	20
Cadmium (213.1)	1	ND	20
Chromium (218.1)	1	ND	20
Copper (220.1)	1	ND	15
Iron (236.1)	1	ND	700
Lead (239.1)	1	ND	20
Manganese (243.1)	1	ND	1100
Mercury (245.1)	1	ND	ND
Molybdenum (246.1)	1	ND	10
Nickel (249.1)	1	ND	ND
Silver (272.1)	1	ND	10
Selenium (270.2)	1	ND	ND
Tin (282.1)	1	ND	ND
Titanium (283.1)	1	ND	ND
Thallium (279.1)	1	ND	ND
Zinc (289.1)	1	ND	30
CONVENTIONALS (EPA Methods)			(mg/L)
Oil and Grease (413.1)	20	ND	600
Total petroleum hydrocarbons (418.1)	10	ND	10000
Ammonia-nitrogen (350.2)	50	ND	500
Cyanide (335.2)	15	ND	ND
Flouride (340.1-340.2)	15	ND	600
Chloride (325.3)	10	ND	9000
Nitrate (353.3)	1	ND	3
Nitrite (353.3)	1	ND	ND
Sulfate (375.4)	1	ND	300
TDS	1	ND	14000
pH	NA	ND	7.2

TRI GEOSYNTHETICS SERVICES DIVISION
PaDEP Leachate Analysis
Testing performed by TRI/Environmental, Inc.

QUALITY ASSURANCE REPORT

Analysis: January 01-10, 2016

Analytes	Blank (ug/L)	PaDEP Synthetic Leachate (ug/L)
Surrogate Recoveries		
1,2-Dichloroethane-d4	1.56	1.26
Toluene-d8	1	1.1
Bromofluorobenzene	1.17	0.84
Trifluorotoluene	1.2	1.06
2-Fluorophenol (Acid Surr)	1.1	1.12
Phenol-d6 (Acid Surr)	0.98	1.23
Nitrobenzene-d5 (BN Surr)	0.68	0.75
2-Fluorobiphenyl (BN Surr)	1.24	1.08
2,4,6-Tribomophenol (Acid Surr)	0.92	0.75
p-Terphenyl-d14 (BN Surr)	0.9	1.13

Compounds	Matrix Spike	Matrix Spike Dup
Phenol	0.17	0.21
2-Chlorophenol	0.3	0.88
1,4-Dichlorobenzene	0.26	1.33
N-Nitroso-Di-N-Propylamine	0.69	1.03
1,2,4-Trichlorobenzene	0.39	1
4-Chloro-3-Methylphenol	0.83	1.2
Acenaphthene	0.88	1
4-Nitrophenol	0.17	0.11
2,4-Dinitrotoluene	0.72	0.1
Pentachlorophenol	0.71	0.68
Pyrene	0.88	1.2
METALS		
Arsenic	0.898	0.89
Barium	0.98	0.967
Cadmium	0.92	0.95
Chromium	0.84	0.88
Lead	0.79	0.6
Mercury	0.941	0.56
Selenium	0.819	0.77
Silver		

Date: 2016-04-19

Mail To:

Don Snethun
Dboot, Inc.
Box 123
Buck Lake, AB. TOC 0T0

e-mail:

Bill To:

<= Same

Dear Mr. Snethun,

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: **Trial Welds**

TRI Job Reference Number: **20222**

Material(s) Tested: One, Heat Fusion Weld Seam(s)
One, 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,

Sam R. Allen

Sam Allen
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 or 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: Dboot, Inc.
Project: Trial Welds

Material: LLDPE to Dboot
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log #: 20222

PARAMETER	1	2	3	4	5	MEAN
	TEST REPLICATE NUMBER					
Sample ID: DS-1 | Weld: Single Extrusion						
Peel						**Peel**
Peel Strength (ppi)	76	93	74	93	75	82
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)	85	85	85	84	83	84
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DS-2 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	68	72	68	72	78	72
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)	74	82	69	80	78	77
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)	83	81	83	80	82	82
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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TESTING, RESEARCH, CONSULTING AND FIELD SERVICES
AUSTIN, TX - USA | ANAHEIM, CA - USA | ANDERSON, SC - USA | GOLD COAST - AUSTRALIA | SUZHOU - CHINA

Date: 2016-04-19

Mail To:	**Bill To:**
Don Snethun	**<= Same**
Dboot, Inc.	
Box 123	
Buck Lake, AB. TOC 0T0	

e-mail:

Dear Mr. Snethun,

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:	**Trial Welds**
TRI Job Reference Number:	**20222**
Material(s) Tested:	One, Heat Fusion Weld Seam(s) One, 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,

Sam Allen
Geosynthetic Services Division
www.GeosyntheticTesting.com

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

DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS
TRI Client: Dboot, Inc.
Project: Trial Welds

Material: HDPE to Dboot
SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)
TRI Log #: 20222

	TEST REPLICATE NUMBER					
PARAMETER	1	2	3	4	5	MEAN
Sample ID: DS-1 | Weld: Single Extrusion						
Peel						**Peel**
Peel Strength (ppi)	85	85	82	86	87	85
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)	85	85	83	86	84	85
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DS-2 | Weld: Heat Fusion						
Side: A						**Peel A**
Peel Strength (ppi)	48	79	66	80	64	67
Peel Incursion (%)	25	<5	100	<5	<5	
Peel Locus of Failure Code	AD-BRK	SE	AD	SE	SE	
Peel NSF Failure Code	FTB	FTB	NON-FTB	FTB	FTB	
Side: B						**Peel B**
Peel Strength (ppi)	83	92	84	97	88	89
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)	89	84	87	85	86	86
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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