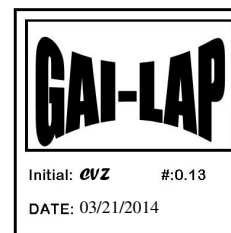


March 21, 2014

Allan Brantley  
**Brantley Engineering, LLC.**  
 13933 Tree Loft Road  
 Milton, GA 30004



**Re: FINAL LABORATORY TEST REPORT**

Dear Mr. Brantley:

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

Enclosed is the **final** laboratory report for the conformance testing of five (5) 60mil HDPE Microspike Geomembrane samples.

**PROJECT NAME:** Jed Cell 10

**DATE REPORTED:** March 21, 2014

**REFERENCE TRI JOB NO.:** G140236

**DATE RECEIVED:** March 17, 2014

**SAMPLES SENT BY:** AGRU, SC

**SAMPLE IDENTIFICATIONS:**

**SAMPLE ID**

**TRI CONTROL NUMBER**

1. R#G14C104050 L#H8240200	96906
2. R#G14C105059 L#H8240200	96907
3. R#G14C106080 L#H8240208	96908
4. R#G14C107091 L#H8240208	96909
5. R#G14C105067 L#H8240208	96910

**TESTS REQUIRED / PERFORMED:**

**TEST METHOD**

**DESCRIPTION**

1. ASTM D5994	Thickness
2. ASTM D1505	Density
3. ASTM D6639	Tensile Properties
4. ASTM D1603	Carbon Black Content
5. ASTM D5596	Carbon Black Dispersion

**TEST RESULTS:** The test results are summarized in the attached Tables 1 to 5.

Respectfully,

**TRI Environmental, Inc. - California**

Maria Espitia  
 Quality Assurance

Carmelo V. Zantua  
 Technical Director

*Signatures are on file*

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

**6 Pages Total**

**TABLE 1.**  
**MATERIAL PROPERTIES**  
 CLIENT: Brantley Engineering, LLC.  
 PROJECT: Jed Cell 10

Date Received: 3/17/2014  
 Date Reported: 3/21/2014  
 Client Sample ID: **R#G14C104050 L#H8240200**  
 Material Description: **60mil HDPE Microspike Geomembrane**

QC'd By: *Maria Espitia*  
 TRI Job No.: **G140236**  
 TRI Control No.: **96906**

SPECIMENS											Avg.	Std. Dev.	Min	Max	Proj. Specs.
1	2	3	4	5	6	7	8	9	10						
METHOD	DESCRIPTION														
ASTM D5994	Thickness (mils) <i>Apparatus: Dead-weight dial micrometer with gauge points tapered at an angle of 60° +/- 2° to the horizontal with the tip rounded to a radius of 0.8+/-0.1 mm(0.031+/-0.004 in), with a specified force of 0.56+/-0.05 N (2+/-0.2 oz)</i> <i>Loading Time: 5 sec Specimen Size: 4" x 4"</i>														60 nominal 54 min.
	66	65	63	63	64	62	62	62	62	61	63	2	61	66	
ASTM D1505	Density (grams/ cm. <sup>3</sup> ) <b>0.9427 0.9419 0.9432</b>										0.9426	0.0007	0.9419	0.9432	.94 min.
ASTM D6693 Type IV	Tensile Properties: <i>Test Specimens: Type IV, Width of narrow section:0.25in, Length of narrow section:1.3in, Width Overall:0.75in, Length Overall: 4.5in Conditioning: Conducted test in standard laboratory atmosphere of 23+/-2<sup>o</sup> C (73.4+/-3.6<sup>o</sup> F), and 50+/-5% relative humidity. Rate of Separation: 2"/min</i> Tensile Strength at Yield (lbs/ in.-width) <i>MD 149 148 147 141 153</i> <i>TD 167 155 161 155 161</i> Tensile Strength at Break (lbs/ in.- width) <i>MD 209 193 210 200 197</i> <i>TD 188 176 180 188 190</i> Elongation at Yield (percent, %) <i>MD 16 19 17 18 18</i> <i>TD 12 15 13 13 15</i> Elongation at Break (percent, %) <i>MD 424 441 466 469 406</i> <i>TD 529 514 520 556 558</i> <i>Gauge Length = 2.0 in.</i>														
											148	4	141	153	126 min.
											160	5	155	167	
											202	7	193	210	90 min.
											184	6	176	190	
											18	1	16	19	12 min.
											14	1	12	15	
											441	27	406	469	100 min.
											535	20	514	558	
ASTM D1603	Carbon Black Content (percent, %) <b>2.33 2.14</b>										2.23	0.14	2.14	2.33	2-3
ASTM D5596	Carbon Black Dispersion (category rating per reference chart PCN: 12-455960-38)										10 out of 10 in Category 1				9 of 10 in Cat. 1 or 2 All in Cat. 1,2, or 3
	1	1	1	1	1	1	1	1	1	1					

(End of Table 1)

(Sheet 1 of 1)

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LEGENDS:  
 MD - MACHINE DIRECTION  
 TD- TRANSVERSE DIRECTION

1160 North Gilbert Street, Anaheim, CA 92801, [www.precisionlabs.net](http://www.precisionlabs.net)  
 Precision Geosynthetic Laboratories International dba TRI Environmental, Inc.

**TABLE 2.**  
**MATERIAL PROPERTIES**  
 CLIENT: Brantley Engineering, LLC.  
 PROJECT: Jed Cell 10

Date Received: 3/17/2014  
 Date Reported: 3/21/2014  
 Client Sample ID: **R#G14C105059 L#H8240200**  
 Material Description: **60mil HDPE Microspike Geomembrane**

QC'd By: *Maria Espitia*  
 TRI Job No.: **G140236**  
 TRI Control No.: **96907**

SPECIMENS											Avg.	Std. Dev.	Min	Max	Proj. Specs.
	1	2	3	4	5	6	7	8	9	10					
<b>METHOD</b>	<b>DESCRIPTION</b>														
ASTM D5994	Thickness (mils) <i>Apparatus: Dead-weight dial micrometer with gauge points tapered at an angle of 60° +/- 2° to the horizontal with the tip rounded to a radius of 0.8+/-0.1 mm(0.031+/-0.004 in), with a specified force of 0.56+/-0.05 N (2+/-0.2 oz)</i> <i>Loading Time: 5 sec Specimen Size: 4" x 4"</i>														60 nominal 54 min.
	62	62	62	61	60	60	65	63	62	62	62	1	60	65	
ASTM D1505	Density (grams/ cm. <sup>3</sup> )										0.9433	0.0006	0.9426	0.9439	.94 min.
	0.9439	0.9434	0.9426												
ASTM D6693 Type IV	<b>Tensile Properties:</b> <i>Test Specimens: Type IV, Width of narrow section:0.25in, Length of narrow section:1.3in, Width Overall:0.75in, Length Overall: 4.5in Conditioning: Conducted test in standard laboratory atmosphere of 23+/-2° C (73.4+/-3.6° F), and 50+/-5% relative humidity. Rate of Separation: 2"/min</i>														
	Tensile Strength at Yield (lbs/ in.-width)														126 min.
	MD	164	141	149	161	153					154	9	141	164	
	TD	182	141	167	154	162					161	15	141	182	
	Tensile Strength at Break (lbs/ in.- width)														90 min.
	MD	248	193	200	226	234					220	23	193	248	
	TD	206	177	203	180	222					198	19	177	222	
	Elongation at Yield (percent, %)														12 min.
	MD	16	14	17	17	16					16	1	14	17	
	TD	13	13	12	15	15					14	1	12	15	
	Elongation at Break (percent, %) <i>Gauge Length = 2.0 in.</i>														100 min.
	MD	386	490	425	378	419					420	44	378	490	
	TD	558	519	568	510	603					551	38	510	603	
ASTM D1603	Carbon Black Content (percent, %)										2.27	0.03	2.25	2.29	2-3
	2.29	2.25													
ASTM D5596	Carbon Black Dispersion (category rating per reference chart PCN: 12-455960-38)										10 out of 10 in Category 1				9 of 10 in Cat. 1 or 2 All in Cat. 1,2, or 3
	1	1	1	1	1	1	1	1	1	1					

(End of Table 2)

(Sheet 1 of 1)

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**TABLE 3.**  
**MATERIAL PROPERTIES**  
 CLIENT: Brantley Engineering, LLC.  
 PROJECT: Jed Cell 10

Date Received: 3/17/2014  
 Date Reported: 3/21/2014  
 Client Sample ID: **R#G14C106080 L#H8240208**  
 Material Description: **60mil HDPE Microspike Geomembrane**

QC'd By: *Maria Espitia*  
 TRI Job No.: **G140236**  
 TRI Control No.: **96908**

SPECIMENS											Avg.	Std. Dev.	Min	Max	Proj. Specs.
	1	2	3	4	5	6	7	8	9	10					
<b>METHOD</b>	<b>DESCRIPTION</b>														
ASTM D5994	Thickness (mils) <i>Apparatus: Dead-weight dial micrometer with gauge points tapered at an angle of 60° +/- 2° to the horizontal with the tip rounded to a radius of 0.8+/-0.1 mm(0.031+/-0.004 in), with a specified force of 0.56+/-0.05 N (2+/-0.2 oz)</i> <i>Loading Time: 5 sec Specimen Size: 4" x 4"</i>														60 nominal 54 min.
	61	60	61	60	61	64	64	60	63	64	62	2	60	64	
ASTM D1505	Density (grams/ cm. <sup>3</sup> )										0.9433	0.0008	0.9425	0.9441	.94 min.
	0.9425	0.9433	0.9441												
ASTM D6693 Type IV	<b>Tensile Properties:</b> <i>Test Specimens: Type IV, Width of narrow section:0.25in, Length of narrow section:1.3in, Width Overall:0.75in, Length Overall: 4.5in Conditioning: Conducted test in standard laboratory atmosphere of 23+/-2° C (73.4+/-3.6° F), and 50+/-5% relative humidity. Rate of Separation: 2"/min</i>														
	Tensile Strength at Yield (lbs/ in.-width)														126 min.
	MD	149	144	149	151	150					149	3	144	151	
	TD	158	161	152	174	144					158	11	144	174	
	Tensile Strength at Break (lbs/ in.- width)														90 min.
	MD	206	197	218	216	225					212	11	197	225	
	TD	119	223	179	236	175					186	46	119	236	
	Elongation at Yield (percent, %)														12 min.
	MD	14	15	16	17	16					16	1	14	17	
	TD	15	14	13	12	16					14	2	12	16	
	Elongation at Break (percent, %) <i>Gauge Length = 2.0 in.</i>														100 min.
	MD	479	451	503	481	450					473	22	450	503	
	TD	218	606	524	650	500					500	169	218	650	
ASTM D1603	Carbon Black Content (percent, %)										2.29	0.02	2.27	2.30	2-3
	2.27	2.30													
ASTM D5596	Carbon Black Dispersion (category rating per reference chart PCN: 12-455960-38)										10 out of 10 in Category 1				9 of 10 in Cat. 1 or 2 All in Cat. 1,2, or 3
	1	1	1	1	1	1	1	1	1	1					

(End of Table 3)

(Sheet 1 of 1)

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**TABLE 4.**  
**MATERIAL PROPERTIES**  
**CLIENT: Brantley Engineering, LLC.**  
**PROJECT: Jed Cell 10**

Date Received: **3/17/2014**  
 Date Reported: **3/21/2014**  
 Client Sample ID: **R#G14C107091 L#H8240208**  
 Material Description: **60mil HDPE Microspike Geomembrane**

QC'd By: *Maria Espitia*  
 TRI Job No.: **G140236**  
 TRI Control No.: **96909**

SPECIMENS											Avg.	Std. Dev.	Min	Max	Proj. Specs.
	1	2	3	4	5	6	7	8	9	10					
<b>METHOD</b>	<b>DESCRIPTION</b>														
ASTM D5994	Thickness (mils) <i>Apparatus: Dead-weight dial micrometer with gauge points tapered at an angle of 60° +/- 2° to the horizontal with the tip rounded to a radius of 0.8+/-0.1 mm(0.031+/-0.004 in), with a specified force of 0.56+/-0.05 N (2+/-0.2 oz)</i> <i>Loading Time: 5 sec Specimen Size: 4" x 4"</i>														60 nominal 54 min.
	62	63	65	64	66	66	66	66	64	63	64	1	62	66	
ASTM D1505	Density (grams/ cm. <sup>3</sup> ) <b>0.9420 0.9439 0.9432</b>										0.9430	0.0010	0.9420	0.9439	.94 min.
ASTM D6693 Type IV	<b>Tensile Properties:</b> <i>Test Specimens: Type IV, Width of narrow section:0.25in, Length of narrow section:1.3in, Width Overall:0.75in, Length Overall: 4.5in Conditioning: Conducted test in standard laboratory atmosphere of 23+/-2° C (73.4+/-3.6° F), and 50+/-5% relative humidity. Rate of Separation: 2"/min</i> <b>Tensile Strength at Yield (lbs/ in.-width)</b> <i>MD 152 151 155 164 150</i> <i>TD 179 161 170 164 153</i> <b>Tensile Strength at Break (lbs/ in.- width)</b> <i>MD 203 210 209 213 225</i> <i>TD 188 200 218 220 191</i> <b>Elongation at Yield (percent, %)</b> <i>MD 19 17 16 17 17</i> <i>TD 12 13 14 13 16</i> <b>Elongation at Break (percent, %)</b> <i>Gauge Length = 2.0 in.</i> <i>MD 459 454 474 401 461</i> <i>TD 508 574 610 621 569</i>														126 min. 90 min. 12 min. 100 min.
											154 165	6 10	150 153	164 179	
											212 203	8 15	203 188	225 220	
											17 14	1 2	16 12	19 16	
											450 576	28 45	401 508	474 621	
ASTM D1603	Carbon Black Content (percent, %) <b>2.24 2.22</b>										2.23	0.02	2.22	2.24	2-3
ASTM D5596	Carbon Black Dispersion (category rating per reference chart PCN: 12-455960-38) <b>1 1 1 1 1 1 1 1 1 1</b>										10 out of 10 in Category 1				9 of 10 in Cat. 1 or 2 All in Cat. 1,2, or 3

(End of Table 4)

(Sheet 1 of 1)

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

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**TABLE 5.**  
**MATERIAL PROPERTIES**  
 CLIENT: Brantley Engineering, LLC.  
 PROJECT: Jed Cell 10

Date Received: 3/17/2014  
 Date Reported: 3/21/2014  
 Client Sample ID: **R#G14C105067 L#H8240208**  
 Material Description: **60mil HDPE Microspike Geomembrane**

QC'd By: *Maria Espitia*  
 TRI Job No.: **G140236**  
 TRI Control No.: **96910**

SPECIMENS											Avg.	Std. Dev.	Min	Max	Proj. Specs.
	1	2	3	4	5	6	7	8	9	10					
<b>METHOD</b>	<b>DESCRIPTION</b>														
ASTM D5994	Thickness (mils) <i>Apparatus: Dead-weight dial micrometer with gauge points tapered at an angle of 60° +/- 2° to the horizontal with the tip rounded to a radius of 0.8+/-0.1 mm(0.031+/-0.004 in), with a specified force of 0.56+/-0.05 N (2+/-0.2 oz)</i> <i>Loading Time: 5 sec Specimen Size: 4" x 4"</i>														60 nominal 54 min.
	61	62	61	61	62	64	63	63	64	61	62	1	61	64	
ASTM D1505	Density (grams/ cm. <sup>3</sup> ) <b>0.9433 0.9425 0.9441</b>										0.9433	0.0008	0.9425	0.9441	.94 min.
ASTM D6693 Type IV	<b>Tensile Properties:</b> <i>Test Specimens: Type IV, Width of narrow section:0.25in, Length of narrow section:1.3in, Width Overall:0.75in, Length Overall: 4.5in Conditioning: Conducted test in standard laboratory atmosphere of 23+/-2° C (73.4+/-3.6° F), and 50+/-5% relative humidity. Rate of Separation: 2"/min</i> Tensile Strength at Yield (lbs/ in.-width) <i>MD 143 141 142 147 131</i> <i>TD 152 154 158 157 147</i> Tensile Strength at Break (lbs/ in.- width) <i>MD 191 200 209 210 175</i> <i>TD 173 184 173 184 200</i> Elongation at Yield (percent, %) <i>MD 16 15 16 18 16</i> <i>TD 13 12 14 13 15</i> Elongation at Break (percent, %) <i>Gauge Length = 2.0 in.</i> <i>MD 476 461 493 483 443</i> <i>TD 503 530 523 536 589</i>														126 min. 90 min. 12 min. 100 min.
ASTM D1603	Carbon Black Content (percent, %) <b>2.21 2.05</b>										2.13	0.11	2.05	2.21	2-3
ASTM D5596	Carbon Black Dispersion (category rating per reference chart PCN: 12-455960-38) <b>1 1 1 1 1 1 1 1 1 1</b>										10 out of 10 in Category 1				9 of 10 in Cat. 1 or 2 All in Cat. 1,2, or 3

(End of Table 5)

(Sheet 1 of 1)

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

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