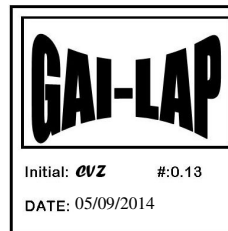




May 9, 2014

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 seam testing of eleven (11) HDPE seam samples.

PROJECT NAME: JED Cell 10

DATE REPORTED: May 9, 2014

REFERENCE TRI JOB NO.: G140394

DATE RECEIVED: May 7, 2014

SAMPLES SENT BY: Brantley Engineering

SAMPLE IDENTIFICATIONS:

SAMPLE ID

1. DS35 87/ 88
2. DS36 90/ 92
3. DS37 92/ 94
4. DS38 93/ 96
5. DS39 96/ 98
6. DS40 98/ 100
7. DS41 100/ 101
8. DS42 102/ 104
9. DS43 104/ 106
10. DS44 107/ 108
11. DS45 108/ 110

TRI-CA CONTROL NUMBER

- 97661
- 97662
- 97663
- 97664
- 97665
- 97666
- 97667
- 97668
- 97669
- 97670
- 97671

TESTS REQUIRED / PERFORMED:

TEST METHOD

1. ASTM D6392
2. ASTM D6392

DESCRIPTION

- Shear Bond Strength
- Peel Bond Adhesion

TEST RESULTS: The test results are summarized in the attached Tables 1 to 6.

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. **Failed seam samples are kept for two (2) years and good seam samples are disposed of after two (2) weeks.** On the other hand, should you need us to keep them at a longer period, please advise us in writing.

7 Pages Total



TABLE 1.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Brantley Engineering, LLC**
PROJECT: **JED Cell 10**
DATE REC'D: **9-May-14**

MATERIAL: **HDPE SEAM**
SEAM TYPE: **Fusion Weld**
TRI JOB #: **G140394**

QC'd By: *Maria Espitia*
TEST METHOD: **ASTM D6392**
DATE REPORT: **9-May-14**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min						
SAMPLE ID	TRI CONTROL #	SHEAR EVALUATION				PEEL EVALUATION						
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)		
DS-35 P87/ 89	97661	170	> 50%	BRK		1 Outside	119	0	SE1			
		167	> 50%	BRK		2 Outside	134	0	SE1			
		167	> 50%	BRK		3 Outside	123	0	SE1			
		170	> 50%	BRK		4 Outside	128	0	SE1			
		169	> 50%	BRK		5 Outside	125	0	SE1			
		AVG:				126	91					
		STD. DEV.				6						
		1 Inside	116	0		SE1						
		2 Inside	127	0		SE1						
		3 Inside	117	0		SE1						
		4 Inside	125	0		SE1						
		5 Inside	112	0		SE1						
AVG.		169	120			AVG:	119	91				
STD. DEV.		2				STD. DEV.	6					
DS- 36 P90/ 92	97662	157	> 50%	BRK		1 Outside	113	0	SE1			
		158	> 50%	BRK		2 Outside	117	0	SE1			
		157	> 50%	BRK		3 Outside	113	0	SE1			
		163	> 50%	BRK		4 Outside	115	0	SE1			
		161	> 50%	BRK		5 Outside	114	0	SE1			
		AVG:				114	91					
		STD. DEV.				2						
		1 Inside	111	0		SE1						
		2 Inside	110	0		SE1						
		3 Inside	111	0		SE1						
		4 Inside	113	0		SE1						
		5 Inside	117	0		SE1						
AVG:		159	120			AVG:	112	91				
STD. DEV.		3				STD. DEV.	3					

BREAK DESCRIPTION (ASTM D6392 FUSION):

AD ADHESION FAILURE.
BRK BREAK IN SHEETING.
SE1 BREAK AT OUTER EDGE OF SEAM.
SE2 BREAK AT INNER EDGE OF SEAM.
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
SIP SEPARATION IN THE PLANE OF THE SHEET.

EXTRUSION:

AD1 ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.
AD2 ADHESION FAILURE.
AD-WLD BREAK THROUGH THE FILLET.
SE1 BREAK AT BOTTOM EDGE OF SEAM.
SE2 BREAK AT TOP EDGE OF SEAM.
SE3 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)
BRK1 BREAK IN BOTTOM SHEETING.
BRK2 BREAK IN TOP SHEETING.
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
HT BREAK AT EDGE OF HOT TACK
SIP SEPARATION IN THE PLANE OF THE SHEET.

(End of Table 1)

(Sheet 1 of 1)

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



TABLE 2.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Brantley Engineering, LLC**
PROJECT: **JED Cell 10**
DATE REC'D: **9-May-14**

MATERIAL: **HDPE SEAM**
SEAM TYPE: **Fusion Weld**
TRI JOB #: **G140394**

QC'd By: *Maria Espitia*
TEST METHOD: **ASTM D6392**
DATE REPORT: **9-May-14**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min				
SAMPLE ID	TRI CONTROL #	SHEAR EVALUATION				PEEL EVALUATION				
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)
DS-37 P92/ 94	97663	159	> 50%	BRK		1 Outside	123	0	SE1	
		158	> 50%	BRK		2 Outside	116	0	SE1	
		156	> 50%	BRK		3 Outside	112	0	SE1	
		161	> 50%	BRK		4 Outside	111	0	SE1	
		159	> 50%	BRK		5 Outside	111	0	SE1	
						AVG:	115			91
						STD. DEV.	5			
						1 Inside	131	0	SE1	
						2 Inside	116	0	SE1	
						3 Inside	119	0	SE1	
						4 Inside	122	0	SE1	
						5 Inside	118	0	SE1	
		AVG:				120	121			91
		STD. DEV.				2	6			
DS-38 P93/ 96	97664	157	> 50%	BRK		1 Outside	137	0	SE1	
		157	> 50%	BRK		2 Outside	122	0	SE1	
		157	> 50%	BRK		3 Outside	121	0	SE1	
		161	> 50%	BRK		4 Outside	128	0	SE1	
		157	> 50%	BRK		5 Outside	117	0	SE1	
						AVG:	125			91
						STD. DEV.	8			
						1 Inside	140	0	SE1	
						2 Inside	134	0	SE1	
						3 Inside	129	0	SE1	
						4 Inside	121	0	SE1	
						5 Inside	129	0	SE1	
		AVG:				120	131			91
		STD. DEV.				2	7			

BREAK DESCRIPTION (ASTM D6392 FUSION):

AD ADHESION FAILURE.
BRK BREAK IN SHEETING.
SE1 BREAK AT OUTER EDGE OF SEAM.
SE2 BREAK AT INNER EDGE OF SEAM.
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
SIP SEPARATION IN THE PLANE OF THE SHEET.

EXTRUSION:

AD1 ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.
AD2 ADHESION FAILURE.
AD-WLD BREAK THROUGH THE FILLET.
SE1 BREAK AT BOTTOM EDGE OF SEAM.
SE2 BREAK AT TOP EDGE OF SEAM.
SE3 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)
BRK1 BREAK IN BOTTOM SHEETING.
BRK2 BREAK IN TOP SHEETING.
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
HT BREAK AT EDGE OF HOT TACK
SIP SEPARATION IN THE PLANE OF THE SHEET.

(End of Table 2)

(Sheet 1 of 1)

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

Maria Espitia

QC'd By: John J. J. J.
TEST METHOD: ASTM D6392
DATE REPORT: 9-May-14

BREAK DESCRIPTION (ASTM D6392 FUSION):		EXTRUSION:	
AD	ADHESION FAILURE.	AD1	ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.
BRK	BREAK IN SHEETING.	AD2	ADHESION FAILURE.
SE1	BREAK AT OUTER EDGE OF SEAM.	AD-WLD	BREAK THROUGH THE FILLET.
SE2	BREAK AT INNER EDGE OF SEAM.	SE1	BREAK AT BOTTOM EDGE OF SEAM.
AD-BRK	BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.	SE2	BREAK AT TOP EDGE OF SEAM.
SIP	SEPARATION IN THE PLANE OF THE SHEET.	SE3	BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)
		BRK1	BREAK IN BOTTOM SHEETING.
		BRK2	BREAK IN TOP SHEETING.
		AD-BRK	BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
		HT	BREAK AT EDGE OF HOT TACK
		SIP	SEPARATION IN THE PLANE OF THE SHEET.

(Sheet 1 of 1)

1160 North Gilbert Street, Anaheim, CA 92801, www.precisionlabs.net
Precision Geosynthetic Laboratories International dba TRI Environmental, Inc.



TABLE 4.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Brantley Engineering, LLC**
PROJECT: **JED Cell 10**
DATE REC'D: **9-May-14**

MATERIAL: **HDPE SEAM**
SEAM TYPE: **Fusion Weld**
TRI JOB #: **G140394**

QC'd By: *Maria Espitia*
TEST METHOD: **ASTM D6392**
DATE REPORT: **9-May-14**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min						
SAMPLE ID	TRI CONTROL #	SHEAR EVALUATION				PEEL EVALUATION						
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)		
DS-41 P100/ 101	97667	174	> 50%	BRK		1 Outside	134	0	SE1			
		173	> 50%	BRK		2 Outside	142	0	SE1			
		173	> 50%	BRK		3 Outside	116	0	SE1			
		177	> 50%	BRK		4 Outside	123	0	SE1			
		175	> 50%	BRK		5 Outside	127	0	SE1			
		AVG:				128	91					
		STD. DEV.				10						
		1 Inside	131	0		SE1						
		2 Inside	132	0		SE1						
		3 Inside	120	0		SE1						
		4 Inside	134	0		SE1						
		5 Inside	131	0		SE1						
AVG.		174	120			AVG:	130	91				
STD. DEV.		2				STD. DEV.	6					
DS-42 P101/ 104	97668	160	> 50%	BRK		1 Outside	119	0	SE1			
		174	> 50%	BRK		2 Outside	130	0	SE1			
		175	> 50%	BRK		3 Outside	110	0	SE1			
		174	> 50%	BRK		4 Outside	111	0	SE1			
		175	> 50%	BRK		5 Outside	114	0	SE1			
		AVG:				117	91					
		STD. DEV.				8						
		1 Inside	112	0		SE1						
		2 Inside	115	0		SE1						
		3 Inside	105	0		SE1						
		4 Inside	113	0		SE1						
		5 Inside	106	0		SE1						
AVG:		172	120			AVG:	110	91				
STD. DEV.		7				STD. DEV.	4					

BREAK DESCRIPTION (ASTM D6392 FUSION):

AD ADHESION FAILURE.
BRK BREAK IN SHEETING.
SE1 BREAK AT OUTER EDGE OF SEAM.
SE2 BREAK AT INNER EDGE OF SEAM.
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
SIP SEPARATION IN THE PLANE OF THE SHEET.

EXTRUSION:

AD1 ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.
AD2 ADHESION FAILURE.
AD-WLD BREAK THROUGH THE FILLET.
SE1 BREAK AT BOTTOM EDGE OF SEAM.
SE2 BREAK AT TOP EDGE OF SEAM.
SE3 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)
BRK1 BREAK IN BOTTOM SHEETING.
BRK2 BREAK IN TOP SHEETING.
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
HT BREAK AT EDGE OF HOT TACK
SIP SEPARATION IN THE PLANE OF THE SHEET.

(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.



TABLE 5.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Brantley Engineering, LLC**
PROJECT: **JED Cell 10**
DATE REC'D: **9-May-14**

MATERIAL: **HDPE SEAM**
SEAM TYPE: **Fusion Weld**
TRI JOB #: **G140394**

QC'd By: *Maria Espitia*
TEST METHOD: **ASTM D6392**
DATE REPORT: **9-May-14**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min					
SAMPLE ID	TRI CONTROL #	SHEAR EVALUATION				PEEL EVALUATION					
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)	
DS-43 P104/ 106	97669	176	> 50%	BRK		1 Outside	138	0	SE1		
		174	> 50%	BRK		2 Outside	125	0	SE1		
		174	> 50%	BRK		3 Outside	125	0	SE1		
		175	> 50%	BRK		4 Outside	131	0	SE1		
		173	> 50%	BRK		5 Outside	126	0	SE1		
		AVG:					129		91		
		STD. DEV.					6				
						1 Inside	131	0	SE1		
						2 Inside	132	0	SE1		
						3 Inside	123	0	SE1		
						4 Inside	131	0	SE1		
						5 Inside	133	0	SE1		
AVG.		174	120			AVG:	130		91		
STD. DEV.		1				STD. DEV.	4				
DS-44 P107/ 108	97670	159	> 50%	BRK		1 Outside	123	0	SE1		
		158	> 50%	BRK		2 Outside	131	0	SE1		
		161	> 50%	BRK		3 Outside	109	0	SE1		
		156	> 50%	BRK		4 Outside	108	0	SE1		
		155	> 50%	BRK		5 Outside	112	0	SE1		
		AVG:					117		91		
		STD. DEV.					10				
						1 Inside	137	0	SE1		
						2 Inside	132	0	SE1		
						3 Inside	127	0	SE1		
						4 Inside	121	0	SE1		
						5 Inside	119	0	SE1		
AVG:		158	120			AVG:	127		91		
STD. DEV.		2				STD. DEV.	7				

BREAK DESCRIPTION (ASTM D6392 FUSION):

AD ADHESION FAILURE.
BRK BREAK IN SHEETING.
SE1 BREAK AT OUTER EDGE OF SEAM.
SE2 BREAK AT INNER EDGE OF SEAM.
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
SIP SEPARATION IN THE PLANE OF THE SHEET.

EXTRUSION:

AD1 ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.
AD2 ADHESION FAILURE.
AD-WLD BREAK THROUGH THE FILLET.
SE1 BREAK AT BOTTOM EDGE OF SEAM.
SE2 BREAK AT TOP EDGE OF SEAM.
SE3 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)
BRK1 BREAK IN BOTTOM SHEETING.
BRK2 BREAK IN TOP SHEETING.
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
HT BREAK AT EDGE OF HOT TACK
SIP SEPARATION IN THE PLANE OF THE SHEET.

(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.



TABLE 6.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Brantley Engineering, LLC**
PROJECT: **JED Cell 10**
DATE REC'D: **9-May-14**

MATERIAL: **HDPE SEAM**
SEAM TYPE: **Fusion Weld**
TRI JOB #: **G140394**

QC'd By: *Maria Espitia*
TEST METHOD: **ASTM D6392**
DATE REPORT: **9-May-14**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min					
SAMPLE ID	TRI CONTROL #	SHEAR EVALUATION				PEEL EVALUATION					
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)	
DS-45 P108/ 110	97671	157	> 50%	BRK		1 Outside	117	0	SE1		
		157	> 50%	BRK		2 Outside	116	0	SE1		
		156	> 50%	BRK		3 Outside	123	0	SE1		
		160	> 50%	BRK		4 Outside	112	0	SE1		
		159	> 50%	BRK		5 Outside	111	0	SE1		
						AVG:	116		91		
						STD. DEV.	5				
						1 Inside	116	0	SE1		
						2 Inside	115	0	SE1		
						3 Inside	108	0	SE1		
						4 Inside	112	0	SE1		
						5 Inside	115	0	SE1		
AVG.		158	120			AVG:	113		91		
STD. DEV.		2				STD. DEV.	3				

BREAK DESCRIPTION (ASTM D6392 FUSION):

AD ADHESION FAILURE.
BRK BREAK IN SHEETING.
SE1 BREAK AT OUTER EDGE OF SEAM.
SE2 BREAK AT INNER EDGE OF SEAM.
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
SIP SEPARATION IN THE PLANE OF THE SHEET.

EXTRUSION:

AD1 ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.
AD2 ADHESION FAILURE.
AD-WLD BREAK THROUGH THE FILLET.
SE1 BREAK AT BOTTOM EDGE OF SEAM.
SE2 BREAK AT TOP EDGE OF SEAM.
SE3 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)
BRK1 BREAK IN BOTTOM SHEETING.
BRK2 BREAK IN TOP SHEETING.
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
HT BREAK AT EDGE OF HOT TACK
SIP SEPARATION IN THE PLANE OF THE SHEET.

(End of Table 6)

(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.