GAI-LAP
Initial: CVZ #:0.13
DATE: 05/27/2014

May 27, 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 eight (8) HDPE seam samples.

PROJECT NAME: JED Cell 10 DATE REPORTED: **May 27, 2014**

REFERENCE TRI JOB NO.: G140454

DATE RECEIVED: May 24, 2014

SAMPLES SENT BY: Brantley Engineering

SAMPLE IDENTIFICATIONS:

SAMPLE ID	*TRI-CA CONTROL NUMBER*
1. DSP-41 P128/ 129	97961
2. DSP-42 P129/ 130	97962
3. DSP-43 P130/ 132	97963
4. DSP-44 P140/ 142	97964
5. DSP-45 P142/ 143	97965
6. DSP-46 P143/ 144	97966
7. DSP-47 P147/ 148	97967
8. DSP-48 P150/ 149	97968

TESTS REQUIRED / PERFORMED:

TEST METHOD	*DESCRIPTION*
1. ASTM D6392	Shear Bond Strength
2. ASTM D6392	Peel Bond Adhesion

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

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.

5 Pages Total

GAI-LAP

TABLE 1.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: ***Brantley Engineering, LLC***
PROJECT: ***JED Cell 10***
DATE REC'D: ***24-May-14***

MATERIAL: ***HDPE SEAM***
SEAM TYPE: ***Fusion Weld***
TRI JOB #: ***G140454***

QC'd By: Maria Espitia
TEST METHOD: ASTM D6392
DATE REPORT: 27-May-14

Crosshead Speed: 2 in/min		SHEAR EVALUATION				Crosshead Speed: 2 in/min	PEEL EVALUATION			
SAMPLE ID	TRI CONTROL #	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)
DSP-41	**97961**	168	> 50%	BRK		1 Outside	128	0	SE1	
P128/ 129		164	> 50%	BRK		2 Outside	130	0	SE1	
		167	> 50%	BRK		3 Outside	126	0	SE1	
		168	> 50%	BRK		4 Outside	134	0	SE1	
		163	> 50%	BRK		5 Outside	127	0	SE1	
						AVG:	**129**			91
						STD. DEV.	**3**			
						1 Inside	109	0	SE1	
						2 Inside	108	0	SE1	
						3 Inside	127	0	SE1	
						4 Inside	122	0	SE1	
						5 Inside	105	0	SE1	
	AVG.	**166**			120	**AVG:**	**114**			91
	STD. DEV.	**2**				STD. DEV.	**10**			
DSP-42	**97962**	161	> 50%	BRK		1 Outside	123	0	SE1	
P129/ 130		164	> 50%	BRK		2 Outside	121	0	SE1	
		160	> 50%	BRK		3 Outside	124	0	SE1	
		160	> 50%	BRK		4 Outside	134	0	SE1	
		157	> 50%	BRK		5 Outside	117	0	SE1	
						AVG:	**124**			91
						STD. DEV.	**6**			
						1 Inside	121	0	SE1	
						2 Inside	120	0	SE1	
						3 Inside	132	0	SE1	
						4 Inside	112	0	SE1	
						5 Inside	128	0	SE1	
	AVG:	**160**			120	**AVG:**	**123**			91
	STD. DEV.	**3**				STD. DEV.	**8**			

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)

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.

GAI-LAP

TABLE 2.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Brantley Engineering, LLC**
PROJECT: **JED Cell 10**
DATE REC'D: **24-May-14**

MATERIAL: **HDPE SEAM**
SEAM TYPE: **Fusion Weld**
TRI JOB #: **G140454**

QC'd By: Maria Espitia
TEST METHOD: ASTM D6392
DATE REPORT: 27-May-14

Crosshead Speed: 2 in/min		SHEAR EVALUATION				Crosshead Speed: 2 in/min	PEEL EVALUATION			
SAMPLE ID	TRI CONTROL #	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)
DSP-43	**97963**	158	> 50%	BRK		1 Outside	121	0	SE1	
P130/ 132		159	> 50%	BRK		2 Outside	125	0	SE1	
		155	> 50%	BRK		3 Outside	130	0	SE1	
		155	> 50%	BRK		4 Outside	121	0	SE1	
		151	> 50%	BRK		5 Outside	127	0	SE1	
						AVG:	**125**			91
						STD. DEV.	**4**			
						1 Inside	126	0	SE1	
						2 Inside	128	0	SE1	
						3 Inside	127	0	SE1	
						4 Inside	125	0	SE1	
						5 Inside	127	0	SE1	
	AVG.	**156**			120	**AVG:**	**127**			91
	STD. DEV.	**3**				STD. DEV.	**1**			
DSP-44	**97964**	153	> 50%	BRK		1 Outside	122	0	SE1	
P140/ 142		156	> 50%	BRK		2 Outside	113	0	SE1	
		152	> 50%	BRK		3 Outside	116	0	SE1	
		154	> 50%	BRK		4 Outside	119	0	SE1	
		151	> 50%	BRK		5 Outside	120	0	SE1	
						AVG:	**118**			91
						STD. DEV.	**4**			
						1 Inside	113	0	SE1	
						2 Inside	114	0	SE1	
						3 Inside	125	0	SE1	
						4 Inside	111	0	SE1	
						5 Inside	122	0	SE1	
	AVG:	**153**			120	**AVG:**	**117**			91
	STD. DEV.	**2**				STD. DEV.	**6**			

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)

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 3.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Brantley Engineering, LLC**
PROJECT: **JED Cell 10**
DATE REC'D: **24-May-14**

MATERIAL: **HDPE SEAM**
SEAM TYPE: **Fusion Weld**
TRI JOB #: **G140454**

QC'd By: Maria Espitia
TEST METHOD: ASTM D6392
DATE REPORT: 27-May-14

Crosshead Speed: 2 in/min		SHEAR EVALUATION				Crosshead Speed: 2 in/min	PEEL EVALUATION			
SAMPLE ID	TRI CONTROL #	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)
DSP-45	**97965**	156	> 50%	BRK		1 Outside	116	0	SE1	
P142/ 143		158	> 50%	BRK		2 Outside	111	0	SE1	
		155	> 50%	BRK		3 Outside	112	0	SE1	
		155	> 50%	BRK		4 Outside	117	0	SE1	
		152	> 50%	BRK		5 Outside	123	0	SE1	
						AVG:	**116**			91
						STD. DEV.	**5**			
						1 Inside	125	0	SE1	
						2 Inside	115	0	SE1	
						3 Inside	111	0	SE1	
						4 Inside	111	0	SE1	
						5 Inside	119	0	SE1	
	AVG.	**155**			120	**AVG:**	**116**			91
	STD. DEV.	**2**				STD. DEV.	**6**			
DSP-46	**97966**	156	> 50%	BRK		1 Outside	117	0	SE1	
P143/ 144		154	> 50%	BRK		2 Outside	118	0	SE1	
		149	> 50%	BRK		3 Outside	114	0	SE1	
		149	> 50%	BRK		4 Outside	120	0	SE1	
		146	> 50%	BRK		5 Outside	122	0	SE1	
						AVG:	**118**			91
						STD. DEV.	**3**			
						1 Inside	118	0	SE1	
						2 Inside	115	0	SE1	
						3 Inside	114	0	SE1	
						4 Inside	120	0	SE1	
						5 Inside	111	0	SE1	
	AVG:	**151**			120	**AVG:**	**116**			91
	STD. DEV.	**4**				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 3)

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 4.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Brantley Engineering, LLC**
PROJECT: **JED Cell 10**
DATE REC'D: **24-May-14**

MATERIAL: **HDPE SEAM**
SEAM TYPE: **Fusion Weld**
TRI JOB #: **G140454**

QC'd By: Maria Espitia
TEST METHOD: ASTM D6392
DATE REPORT: 27-May-14

Crosshead Speed: 2 in/min		SHEAR EVALUATION				Crosshead Speed: 2 in/min	PEEL EVALUATION			
SAMPLE ID	TRI CONTROL #	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)
DSP-47	**97967**	167	> 50%	BRK		1 Outside	119	0	SE1	
P147/ 148		167	> 50%	BRK		2 Outside	116	0	SE1	
		162	> 50%	BRK		3 Outside	118	0	SE1	
		165	> 50%	BRK		4 Outside	116	0	SE1	
		160	> 50%	BRK		5 Outside	109	0	SE1	
						AVG:	**116**			91
						STD. DEV.	**4**			
						1 Inside	146	0	SE1	
						2 Inside	155	0	SE1	
						3 Inside	143	0	SE1	
						4 Inside	147	0	SE1	
						5 Inside	146	0	SE1	
	AVG.	**164**			120	**AVG:**	**147**			91
	STD. DEV.	**3**				STD. DEV.	**5**			
DSP-48	**97968**	151	> 50%	BRK		1 Outside	142	0	SE1	
P150/ 149		147	> 50%	BRK		2 Outside	152	0	SE1	
		147	> 50%	BRK		3 Outside	142	0	SE1	
		146	> 50%	BRK		4 Outside	147	0	SE1	
		139	> 50%	BRK		5 Outside	143	0	SE1	
						AVG:	**145**			91
						STD. DEV.	**4**			
						1 Inside	146	0	SE1	
						2 Inside	155	0	SE1	
						3 Inside	143	0	SE1	
						4 Inside	147	0	SE1	
						5 Inside	146	0	SE1	
	AVG:	**146**			120	**AVG:**	**147**			91
	STD. DEV.	**4**				STD. DEV.	**5**			

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)

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.