GAI-LAP
Initial: CVZ #:0.13
DATE: 05/13/2014

May 13, 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 nine (9) HDPE seam samples.

PROJECT NAME: JED Cell 10 DATE REPORTED: **May 13, 2014**

REFERENCE TRI JOB NO.: G140403

DATE RECEIVED: May 13, 2014

SAMPLES SENT BY: Brantley Engineering

SAMPLE IDENTIFICATIONS:

SAMPLE ID	*TRI-CA CONTROL NUMBER*
1. DS-46 P113/ 114	97727
2. DS-47 P116/ 117	97728
3. DS-48 P117/ 118	97729
4. DS-49 P124/ 127	97730
5. DS-50 P130/ 131	97731
6. DS-51 P131/ 132	97732
7. DS-52 P111/ 139	97733
8. DX-2 110/ EX	97734
9. DX-3 125/ EX	97735

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 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. ***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.

6 Pages Total

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TABLE 1.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Brantley Engineering, LLC**
PROJECT: **JED Cell 10**
DATE REC'D: **13-May-14**

MATERIAL: **HDPE SEAM**
SEAM TYPE: **Fusion Weld**
TRI JOB #: **G140403**

QC'd By: Maria Espitia
TEST METHOD: ASTM D6392
DATE REPORT: 13-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)
DS-46	**97727**	161	> 50%	BRK		1 Outside	162	0	SE1	
P113/ 114		160	> 50%	BRK		2 Outside	155	0	SE1	
		164	> 50%	BRK		3 Outside	151	0	SE1	
		164	> 50%	BRK		4 Outside	145	0	SE1	
		164	> 50%	BRK		5 Outside	146	0	SE1	
						AVG:	**152**			91
						STD. DEV.	**7**			
						1 Inside	159	0	SE1	
						2 Inside	154	0	SE1	
						3 Inside	140	0	SE1	
						4 Inside	149	0	SE1	
						5 Inside	145	0	SE1	
	AVG.	**163**			120	**AVG:**	**149**			91
	STD. DEV.	**2**				STD. DEV.	**8**			
DS-47	**97728**	157	> 50%	BRK		1 Outside	111	0	SE1	
P116/ 117		157	> 50%	BRK		2 Outside	114	0	SE1	
		154	> 50%	BRK		3 Outside	111	0	SE1	
		159	> 50%	BRK		4 Outside	111	0	SE1	
		156	> 50%	BRK		5 Outside	111	0	SE1	
						AVG:	**112**			91
						STD. DEV.	**1**			
						1 Inside	114	0	SE1	
						2 Inside	109	0	SE1	
						3 Inside	112	0	SE1	
						4 Inside	109	0	SE1	
						5 Inside	111	0	SE1	
	AVG:	**157**			120	**AVG:**	**111**			91
	STD. DEV.	**2**				STD. DEV.	**2**			

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)

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TABLE 2.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Brantley Engineering, LLC**
PROJECT: **JED Cell 10**
DATE REC'D: **13-May-14**

MATERIAL: **HDPE SEAM**
SEAM TYPE: **Fusion Weld**
TRI JOB #: **G140403**

QC'd By: Maria Espitia
TEST METHOD: ASTM D6392
DATE REPORT: 13-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)
DS-48	**97729**	154	> 50%	BRK		1 Outside	115	0	SE1	
P117/ 118		154	> 50%	BRK		2 Outside	111	0	SE1	
		154	> 50%	BRK		3 Outside	106	0	SE1	
		157	> 50%	BRK		4 Outside	106	0	SE1	
		156	> 50%	BRK		5 Outside	113	0	SE1	
						AVG:	**110**			91
						STD. DEV.	**4**			
						1 Inside	113	0	SE1	
						2 Inside	115	0	SE1	
						3 Inside	109	0	SE1	
						4 Inside	124	0	SE1	
						5 Inside	119	0	SE1	
	AVG.	**155**			120	**AVG:**	**116**			91
	STD. DEV.	**1**				STD. DEV.	**6**			
DS-49	**97730**	157	> 50%	BRK		1 Outside	115	0	SE1	
P124/ 127		157	> 50%	BRK		2 Outside	144	0	SE1	
		156	> 50%	BRK		3 Outside	103	0	SE1	
		157	> 50%	BRK		4 Outside	134	0	SE1	
		159	> 50%	BRK		5 Outside	134	0	SE1	
						AVG:	**126**			91
						STD. DEV.	**17**			
						1 Inside	121	0	SE1	
						2 Inside	132	0	SE1	
						3 Inside	130	0	SE1	
						4 Inside	122	0	SE1	
						5 Inside	140	0	SE1	
	AVG:	**157**			120	**AVG:**	**129**			91
	STD. DEV.	**1**				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 2)

GAI-LAP

TABLE 3.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: ***Brantley Engineering, LLC***
PROJECT: ***JED Cell 10***
DATE REC'D: ***13-May-14***

MATERIAL: ***HDPE SEAM***
SEAM TYPE: ***Fusion Weld***
TRI JOB #: ***G140403***

QC'd By: Maria Espitia
TEST METHOD: ASTM D6392
DATE REPORT: 13-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)
DS-50	**97731**	157	> 50%	BRK		1 Outside	112	0	SE1	
P130/ 131		152	> 50%	BRK		2 Outside	104	0	SE1	
		151	> 50%	BRK		3 Outside	115	0	SE1	
		158	> 50%	BRK		4 Outside	113	0	SE1	
		162	> 50%	BRK		5 Outside	113	0	SE1	
						AVG:	**111**			91
						STD. DEV.	**4**			
						1 Inside	108	0	SE1	
						2 Inside	103	0	SE1	
						3 Inside	113	0	SE1	
						4 Inside	108	0	SE1	
						5 Inside	116	0	SE1	
	AVG.	**156**			120	**AVG:**	**109**			91
	STD. DEV.	**5**				STD. DEV.	**5**			
DS-51	**97732**	163	> 50%	BRK		1 Outside	117	0	SE1	
P131/ 132		158	> 50%	BRK		2 Outside	116	0	SE1	
		155	> 50%	BRK		3 Outside	121	0	SE1	
		161	> 50%	BRK		4 Outside	113	0	SE1	
		159	> 50%	BRK		5 Outside	126	0	SE1	
						AVG:	**118**			91
						STD. DEV.	**5**			
						1 Inside	114	0	SE1	
						2 Inside	119	0	SE1	
						3 Inside	127	0	SE1	
						4 Inside	122	0	SE1	
						5 Inside	117	0	SE1	
	AVG:	**159**			120	**AVG:**	**120**			91
	STD. DEV.	**3**				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 3)

GAI-LAP

TABLE 4.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Brantley Engineering, LLC**
PROJECT: **JED Cell 10**
DATE REC'D: **13-May-14**

MATERIAL: **HDPE SEAM**
SEAM TYPE: **Fusion Weld**
TRI JOB #: **G140403**

QC'd By: Maria Espitia
TEST METHOD: ASTM D6392
DATE REPORT: 13-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)
DS-52	**97733**	151	> 50%	BRK		1 Outside	101	0	SE1	
P111/ 139		151	> 50%	BRK		2 Outside	111	0	SE1	
		150	> 50%	BRK		3 Outside	113	0	SE1	
Fusion		152	> 50%	BRK		4 Outside	110	0	SE1	
		155	> 50%	BRK		5 Outside	115	0	SE1	
						AVG:	**110**			91
						STD. DEV.	**6**			
						1 Inside	110	0	SE1	
						2 Inside	110	0	SE1	
						3 Inside	107	0	SE1	
						4 Inside	120	0	SE1	
						5 Inside	110	0	SE1	
	AVG.	**152**			120	**AVG:**	**111**			91
	STD. DEV.	**2**				STD. DEV.	**5**			
DX-2	**97734**	150	> 50%	BRK		1 Outside	165	0	SE3	
110/ EX		159	> 50%	BRK		2 Outside	161	0	SE3	
		152	> 50%	BRK		3 Outside	142	0	SE3	
Extrusion		159	> 50%	BRK		4 Outside	150	0	SE3	
		164	> 50%	BRK		5 Outside	153	0	SE3	
						AVG:	**154**			78
						STD. DEV.	**9**			
						1 Inside	N/A			
						2 Inside				
						3 Inside				
						4 Inside				
						5 Inside				
	AVG:	**157**			120	**AVG:**				
	STD. DEV.	**6**				STD. DEV.				

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)

GAI-LAP

TABLE 5.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: ***Brantley Engineering, LLC***
PROJECT: ***JED Cell 10***
DATE REC'D: ***13-May-14***

MATERIAL: ***HDPE SEAM***
SEAM TYPE: ***Extrusion***
TRI JOB #: ***G140403***

QC'd By: Maria Espitia
TEST METHOD: ASTM D6392
DATE REPORT: 13-May-14

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min				
		SHEAR EVALUATION				***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)*
DX-3	**97735**	162	> 50%	BRK		1 Outside	172	0	SE3	
125/ EX		154	> 50%	BRK		2 Outside	176	0	SE3	
		158	> 50%	BRK		3 Outside	172	0	SE3	
		159	> 50%	BRK		4 Outside	164	0	SE3	
		161	> 50%	BRK		5 Outside	172	0	SE3	
						AVG:	**171**			78
						STD. DEV.	**5**			
						1 Inside	N/A			
						2 Inside				
						3 Inside				
						4 Inside				
						5 Inside				
	AVG.	**159**			120	**AVG:**				
	STD. DEV.	**3**				STD. DEV.				

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)