## West Vancouver Freight Access Project

## Project 03 Terminal 5

Vanexco Cap Construction Certification Report

August 2010



Prepared for: **Port of Vancouver** 3103 NW Lower River Road Vancouver, Washington 98660-1027



Prepared by: HDR Engineering, Inc. 1001 SW Fifth Ave, Suite 1800 Portland, Oregon 97204



## TABLE OF CONTENTS

1.0	Introduction	1
2.0	Background	1
3.0	Construction Narrative	2
4.0	Conclusions	3
5.0	References	5
		-

### **APPENDIX**

Appendix A	Ecology Approval of Final Request for Review and Approval of Disturbance of Landfills on Former Alcoa/Evergreen Properties
Appendix B	Construction Submittal 122.2 – QAQC Forms, As Built Drawings and Documents, and Project Specific Certificate
Appendix C	Letters As-Built Drawings

## 1.0 Introduction

As part of the West Vancouver Freight Access Project, the Port of Vancouver (Port) constructed a two-mile rail loop at Terminal 5 in 2010. This project extends west from Gateway Avenue to the edge of the contiguous Evergreen property and consists of a storage track, a car preparation track, and loop lead track (Figure 1). Construction of the loop lead track required disturbance of two areas protected under a restrictive covenant administered by the Washington Department of Ecology (Ecology): Spent Pot Liner (SPL) Landfill Area and Vanexco Cap (Figure 1).

Prior to construction the Port coordinated with Ecology to design a replacement cap for each site. In October 2009, Ecology approved the final design of the replacement caps (Appendix A). This report documents the construction of the Vanexco Cap at Terminal 5 at the Port of Vancouver as required by the Ecology, and certifies that construction was in accordance with the plans, specifications, and Construction Quality Assurance (CQA) plan. Documentation of asbuilt drawings, test results, daily reports, and acceptance forms for the base grades and liner are included in Appendix B and C.

## 2.0 Background

The floor slab of the former Vanexco rod mill, now called the Vanexco cap, protects the underlying soils and substructures from exposure to precipitation. These soils and substructures are likely contaminated with PCBs and petroleum hydrocarbons (TPH). Although the concrete foundation cap has been scarified, it may still have sections that have PCB concentrations above regulatory limits.

The Port performed sampling and analysis of the concrete and soils in April 2009 to ensure appropriate management of these soils during the construction of the rail and associated laydown area (PBS 2009). The results of this investigation showed that petroleum hydrocarbon and PCB contamination was found in soil samples from eight of the 12 borings. None of the concrete samples had PCB concentrations above the 1 mg/kg Model Toxic Control Act (MTCA) Method A cleanup level for unrestricted land use. Petroleum hydrocarbon and PCB concentrations were the highest in the soil sample from 9 to 10 feet below ground surface. High petroleum hydrocarbon concentrations were found in boring samples located near the edge of the Vanexco Cap. The Port prepared a Contaminated Media Management Plan to ensure safe and compliant management of these soils during construction (HDR 2009a).

The Vanexco Cap was remediated under Consent Decree 95-2-03268-4 (Ecology 1995) between Ecology and Alcoa. The Consent Decree required the long-term maintenance of a cap initially designated as the building floor (constructed of asphalt and/or concrete) and the roof was to be maintained to prevent ponding of precipitation. To facilitate the sale of the property, the Rod Mill building was demolished. The new surface (either sand or asphalt) above the asphalt/concrete floor was regraded to promote positive drainage away from the cap (i.e., the floor) in accordance with the Consent Decree.

During construction approximately 49,600 square feet of concrete slab would be removed and approximately 9,200 cubic yards of soil and 900 cubic yards of concrete would be removed below the concrete slab. The Port proposed to mitigate the cap removal by placing an impermeable high-density polyethylene (HDPE) liner beneath the new railroad track. The HDPE liner would be sloped southward away from the current building to ensure water does not percolate into the subsoil beneath the Vanexco Cap. It would include a drainage system to remove water from the liner's surface.

This final construction design was submitted to Ecology in October 2009 (HDR 2009c) and subsequently approved by Ecology (Appendix A) prior to construction.

## 3.0 Construction Narrative

The proposed construction of the cap was reviewed in the Pre-Construction meeting held on February 16, 2010 with the General Contractor, Rotschy Inc., Port, City of Vancouver (COV), and HDR staff. Construction of the replacement cap was completed in February 2010. Approved submittals (Submittal 122) related to the materials of construction and construction methods are listed in Table 1 and are included in Appendix B.

Table 1: Approved Submittals for Vanexco Cap Construction

Submittal
Geomembrane Panel Placement Log
Geomembrane Trial Weld Log
Geomembrane Destructive Test Log
Geomembrane Non-Destructive Test Log/Repair
Construction Field Notes
Geomembrane Certification
Geomembrane Roll Allocation and Roll Test Data Report
ASTM D 5397 – Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test
ASTM D 3895 – Standard Test Method for Oxidative Induction Time of Polyolefins by Differential Scanning Calorimetry
Certificate of Analysis – Marlex Polyethylene K306 Bulk
Geocomposite Certifications
Geocomposite Roll Allocation and Roll Test Data Report
Geotextile Certifications
Geotextile Roll Allocation and Roll Test Data Report
Geotextile Certificate of Compliance
Geotextile Certificate of Analysis
Certification of Acceptance of Subgrade
Certification of Material Acceptance of Propex Lot #1
Certification of Material Acceptance of GSE Lots #1-3
Certification of Material Installation of Panels
Certification of Material Joints
Certification of Placement of Adjacent Liner Components
Certification of Raw and Fabricated Material – Propex 1701 Nonwoven Cushion Geotextile
Certification of Raw and Fabricated Material – GSE 60 mil HDPE Liner
Certification of Raw and Fabricated Material – GSE Fabrinet HF
Geomembrane Limited Warranty – 60 mil HDPE
As built Drawings
Geomembrane Test Results

A minor modification to plans and specifications to accommodate conditions in the field was proposed and approved by the COV, Port, and HDR. This modification is provided in the asbuilts in Appendix C and included:

 Request for Information (RFI) 60 noted that the saw cut line along the edge of the removed concrete slab was not linear as originally anticipated due to the presence of rebar and the poor condition of the slab. As a result the proposed airfield type expansion joint material could not be used in jagged areas. In areas where the saw cut line was jagged or varied the contractor filled the voids with concrete to create a flush surface and placed asphalt over the seams to seal the interface between the old and new concrete.

Construction was observed by the HDR Construction Quality Assurance Monitor (CQAM). Construction consisted of the following elements and met the construction specifications:

- Subgrade material placement and compaction to meet the construction specification of 94% compaction. This specification was verified by the COV.
- 60-mil HDPE material conforming to requirements for polyethylene membrane as listed in Geosynthetic Research Institute GM-13 (hydraulic conductivity of liner material not to exceed 10<sup>-7</sup> cm/sec) was placed. Testing results are in Appendix B and conformed to requirements.
- Geonet geocomposite was placed directly over the HDPE membrane to facilitate drainage and prevent the development of hydraulic head on the liner. Testing results are in Appendix B and conformed to requirements.
- Protective soil cover (minimum thickness 2 feet) was placed over the liner.

### 4.0 Conclusions

Construction of the Vanexco Cap was observed by HDR CQAM. The equipment used in construction met the specified requirements, and materials delivered to the site were in good condition. Based on the CQAM construction observations and the results of material testing, the final Vanexco Cap was constructed in accordance with the design criteria, plans, and specifications, with the exception of the modifications noted in Section 3. The constructed Vanexco Cap meets the design requirements as approved by Ecology.

Kurt Reichelt, P.E. HDR Project Manager



West Vancouver Freight Access Project, Project 03 Terminal 5 Vanexco Cap Construction Report



### 5.0 References

(Ecology) Washington State Department of Ecology

1995 Consent Decree No. 95-2-03268-4. Washington State Department of Ecology, Olympia, Washington

HDR Engineering, Inc.

- 2009a. Contaminated Media Management Plan, Terminal 5, Port of Vancouver, Washington. July 31, 2009. Portland, Oregon.
- 2009b. Final Request for Review and Approval of Disturbance of Landfills on Former Alcoa/Evergreen Properties. October 15, 2009. Portland, Oregon.

#### PBS

2009 Environmental Investigation, Port of Vancouver, Alcoa Vanexco Cap Area. May 2009. Portland, Oregon.

## **APPENDIX A**

## Ecology Approval of Final Request for Review and Approval of Disturbance of Landfills on Former Alcoa/Evergreen Properties



STATE OF WASHINGTON

#### DEPARTMENT OF ECOLOGY

PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000 711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

October 21, 2009

Ms. Patty Boyden Director of Environmental Services Port of Vancouver 3103 NW Lower River Rd. Vancouver, WA 98660



Re: Review of Terminal 5 Rail Improvement Engineering.

Dear Ms. Boyden:

Ecology has reviewed the October 15, 2009 Terminal 5 Improvements - Final Request for Review and Approval of Disturbance of Landfills on Former Alcoa/Evergreen Properties work plan for the former Alcoa/Evergreen smelter facility. The site is located on the former Alcoa/Evergreen aluminum smelter west of Vancouver, WA. The Terminal 5 rail improvements consist of a two-mile rail loop that will traverse four of five covered areas on the site. These affected areas are known as: Vanexco Cap, Ingot Cap, North and North2 landfills, and Spent Potliner NPL site cap. Ecology received and commented on the draft work plan on July 15, 2009 by e-mail. The final work plan is the result of the July review.

The October 15, 2009 Final Request for Review and Approval of Disturbance of Landfills on Former Alcoa/Evergreen Properties is approved as submitted in the October 15 document. The revised document fulfills the requirements of the MTCA consent decrees that regulate the four areas. The Port of Vancouver is approved to begin work at the site once local permits are final.

We look forward to visiting the site once construction has begun. If you have any questions regarding the approval of the work plan, please contact me in Lacey (360) 407-6949 or psky461@ecy.wa.gov.

Sincerely,

Paul Skyllingstad Industrial Section

Cc: B. Morson - HDR M. Stiffler - Alcoa

## **APPENDIX B**

## Construction Submittal 122.2 QAQC Forms, As Built Drawings and Documents, and Project Specific Certificate Letters

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## Terminal 5 Unit Train Improvements Project #3

## **Geomembrane Cap System**

# QA/QC

## **As-Built Documents**

## **As-Built Drawing**

## **Project Specific Certificate Letters**

#### QA QC Forms



### **Quality Assurance Forms**

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### Quality Assurance Forms

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### **Quality Assurance Forms**

- 1

#### **GSE Trial Weld Log**

Project Name:	TERM. 5
Location:	VANCOUNTR
Job Number:	
Q.A. Technician:	B. LIGHTLE

ατοά		>	
Site Manager:	AS	SLAR	
Material:	60 MIL	TEX	HDPE
Shoot Thickness:	60mi	L	
Smooth:	Toxlure	od:X	

	Frial No	Date of Trust	Time of Frint	Technicians ID Number	Machine	Ambient Temo	Wedge Mass	Speed Proheat	Peel	Poel poi	Poel ppl	Peel ppi	Shear opl	Shear ppi	Shear ppi	Shear ppl	FTB Y/N	Pass Fad
	1	2·13·1Û	12:20	CK	(	480	845 <sup>°</sup>	5.0	130 136	126 139	135 145	<u>137</u> 135	176	181	187	187	Y	P
	2	2. <i>15</i> .10	8:45	СК	_(	44 °	\$15°	5.0	143 149	174	171 170	]]]]  ]]Z	218	216	2]4	218	_Y	£
CX1.	3	215.10	10,45	RC	4	46°	5000	15000	132	1.26	1.28	<u>190</u>	18Ø	185	180	182		
	7	2-13-10	12:45	CK	]	490	845	S.D	izs 114	1-19 1-16	1-1-]  -3%	148 104	i9Z.	190	188	j:¶ _	Y	<u>د</u> ز
	5	Z-16 <i>1</i> 0	2:40	CK	1	<u>57</u> °	8X5_	\$.0	139 135	146 141_,	138 134	190 197	763	<i>7:53</i>	160	<u>/s?</u>	У	2
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	7	2/11/10	8:30	RK	3	42°	850°	5.V	110 102	1 <b>15</b> 101	113 1705	111 101	137	<u>194</u>	185	777	4	P
	8	'Z-{7K	1:01	RK	3	ଽୖ	ଞ୍ଚ	5.D	155	145	163 146	146 148	1.84	/ 87	/88	186	Y	P
	9	2-17-10	1:15	ĊK	•	σĽ	845	60	158 141	156	157	158 162	176	178	186	i97.	Y	P

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### Quality Assurance Forms

o GSE Trial Welc	d Log
Project Name: TERMINALS OKT OF VAN	Slto Managor: AJ. BLAIN
Location: VANCOUNTR WA	Matorial: <u>HDPE</u>
Job Numbor:	Shoet Thicknoss: 60 Mil
Q.A. Technician: B, LIGHTLE	Smooth: Toxtured:/X

Trial	Date of	Tinto of	Tochnicians	Machino	Ambient	Wedge	Speed	Peel	Peet	Peel	Peel	Shear onl	Shear opi	Shear ppi	Shear onl	FTB Y/N	Pass Fail
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11	2,18,10	12:15	CK	1	53°	8450	5.0	743 147	141	71/4 141_	146 143	188	186	181	779	Y	P
12	2-18-10	1:30	.++	БТJ	53°	<i>.5</i> 0°	500°	<b>1</b> 21	127	128	<u> </u> 3Z	783	783	189	181	Y	P
13	2.18.10	1:30	BC.	et5	53°	500'	500	127	125	12.3	119	176	179	180	195	4	p
1.1	2.10.10	1100		e 11	5-70	1720 <sup>0</sup>	6m <sup>D</sup>	122	126	127	721	182	<u>1</u> 8[	188	175	4	P
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## **Geomembranes Installation Quality Assurance Manual**

**Quality Assurance Forms** 

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# Geomembranes Installation Quality Assurance Manual

Quality Assurance Forms

GSE Destructive Test Log	me: フェスminit Site Manager: ハ. アンム・スト Fusion (ppi) Extrusion (ppi)	VANCOUVER WA. Port Material: HDPE Min. Peel a) Min. Peel	er: Sheet Thickness: $O_{W1}$ Min. Shear $P_{O}$ Min. Shear	nician: る. し、らルアンモ Smooth: Textured: X	e Seam Technician Machine Location Peel Peel Peel Peel Peel Peel Peel Shear Shear Shear Shear Shear FTB Pass/ ed Number ID Number τy∞ε.ve. Location ppi ppi ppi ppi ppi ppi ppi ppi ppi pp	37.38 CR Fight were ere 172/39/30/122/140/20/22/148/197/201/V D	146-48 CZ Free west 14 14 14 14 14 14 14 14 14 14 14 11 14 201 18 18 18	\[         \lap{A}         \]     \[         \lap{A}     \			
	Project Name: 752n	Location: VANCOUN	Job Number:	Q.A. Technician: 🝝	Samole Date Seam No. Welded Number	8 2.17 37.38	9 218 Herry	10 218 5253			

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**Quality Assurance Forms** 

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Project Na	ame:	RAM IN AL	, <i>S</i> "		Sit	e Manager.	4J. BLER
Location:	(4	2655' CE	ANCOUNE	સ્	Ma	terial:	1-500
Job Numt					ъ	eet Thicknes	SS: 60MIL TEX
Q.A. Tect	:unician:	311 115	H.C.				
Seam	Test	Technician 10 Number	Test Type	Air Press	sure Test aci fiaich	Test Result	Repair Locations
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17:18				s x	35		
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19-20	•••••			32	32		
[9 . 2	216-10			31	3 î		ET €)  '→ W
12.02	0.11.10			32	3		But SEAM
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23.22				25	32		
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#### Field Notes

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#### Geomembrane Material Certs

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## The Pioneer Of Geosynthetics

#### **GSE HD Textured Geomembrane**

GSE HD Textured is a co-extruded textured high density polyethylene (HDPE) geomembrane available on one or both sides. It is manufactured from the highest quality resin specifically formulated for flexible geomembranes. This product is used in applications that require increased frictional resistance, excellent chemical resistance and endurance properties.

Product Specifications		These p	rodu	ct sp	ecilio	atio	ns meet oi	r exc	eed (	GRI G	M13.
TESTED PROPERTY	TEST METHOD	FREQUENCY	,	MI	NIA	1UN	A AVERA	GE	VAL	UE	
			-00		- 10		60 mil			-100	mile
Thickness, (minimum average) mil (mm) Lowest individual reading (-10%)	ASTM D 5994	every roll	30 (0 27 (0	.75) .69)	40 ( 36 (	.00) .91)	60 (1.50) 54 (1.40)	80 ( 72 (	.00) .80)	100 ( 90 ()	2.50) .30)
Density, g/cm³	ASTM D 1505	200,000 lb	0.	4	0.	4	0.94	0.	4	0.	4
Tensile Properties (each direction)	ASTM D 6693, Type IV	20,000 lb									
Strength at Break, Ib/in-width (N/mm)	Dumbeil, 2 ipm		66 (	1)	75	3)	115 (20)	155	27)	230	40)
Strength at Yield, lb/in-width (N/mm)			68 (	1)	90	15)	132 (23)	177	31)	225	39)
Elongation at Break, %	G.L. 2.0 in (51 mm)		10	D	1	0	100	](	0	1	0
Elongation at Yield, %	G.L. 1.3 in (33 mm)		1		1		12	1	È	1	2
Tear Resistance, lb (N)	ASTM D 1004	45,000 lb	24 (	06)	32 (	42)	45 (200)	60 (	66)	75 (	33)
Puncture Resistance, lb (N)	ASTM D 4833	45,000 lb	65 (	89)	95 (	22)	130 (578)	160	711)	190	845)
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lb	2.0	3.0	2.0	3.0	2.0 - 3.0	2.0	3.0	2.0	3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lb	No	e <sup>(1)</sup>	No	e <sup>(1)</sup>	Note <sup>(1)</sup>	No	e <sup>(1)</sup>	No	e <sup>ft)</sup>
Asperity Height, mil (mm)	ASTM D 7466	second roll	16 ((	40)	18 (	.45)	18 (0.45)	18 (	45)	18 (	.45)
Notched Constant Tensile Load <sup>(2)</sup> , hr	ASTM D 5397, Appendix	200,000 lb	1,0	ю	1,0	90	1,000	1,0	D0	1,0	00
Oxidative Induction Time, min	ASTM D 3895, 200° C; O <sub>2</sub> , 1 atm	200,000 lb	>1	ю	>1	10	>140	>1	10	>1	40
	TYPICAL	ROLL DIMEN	SIO	NS							
Roll Length <sup>(3)</sup> , ft (m)	Double-Sided Textured		830	253)	700	213)	520 (158)	400	122)	330	101)
	Single-Sided Textured		840	256)	650	198)	428-(120)	320	(98)	250	(76)
Roll Width <sup>(3)</sup> , ft (m)			22.5	6.9)	22.5	6.9)	22.5 (6.9)	22.5	(6.9)	22.5	(6.9)
Roll Area, ft² (m²)	Double-Sided Textured		18,	75	15,	50	11,700	9,0	00	7,4	25
			(1,7	85)	(1,4	53)	(1,087)	(8	6)	(6	0)
	Single-Sided Textured		18, (1,7	00 55)	14, (1.	25 59)		7, (6	00 9)	5,0 (5)	25 3}
	1			1 ( )				r ''	·	•-	

NOTES:

• <sup>(0)</sup>Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

• <sup>12</sup>NCTL for GSE HD Textured is conducted on representative smooth membrane samples.

 ${}^{00}\text{Roll}$  lengths and widths have a tolerance of  $\pm$  1%.

• GSE HD Textured Double-Sided is available in rolls weighing approximately 4,000 lb (1,800 kg) and Single-Sided weighing approximately 3,000 lb (1,360 kg).

• All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.

• \*Modified.

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## **GSE Roll Allocation**

Order61037CustomerACF West, Inc.SiteTerminal 5 Cap Port of Vancouver

Roll#	Resin Lot	Product Code	Description	Mfg. Date	Length
108150113	8290671	HDT-060AE-BBB-B-W0	HDT060AW00	12/15/2009	520
108150116	8290671	HDT-060AE-BBB-B-W0	HDT060AW00	12/15/2009	520
108150120	8290685	HDT-060AE-BBB-B-W0	HDT060AW00	12/22/2009	520
108150122	8290685	HDT-060AE-BBB-B-W0	HDT060AW00	12/22/2009	520
108150123	8290685	HDT-060AE-BBB-B-W0	HDT060AW00	12/22/2009	520
108150124	8290685	HDT-060AE-BBB-B-W0	HDT060AW00	12/22/2009	520
108150125	8290685	HDT-060AE-BBB-B-W0	HDT060AW00	12/22/2009	520
108150126	8290685	HDT-060AE-BBB-B-W0	HDT060AW00	12/22/2009	520
108150127	8290685	HDT-060AE-BBB-B-W0	HDT060AW00	12/23/2009	520
108150128	8290685	HDT-060AE-BBB-B-W0	HDT060AW00	12/23/2009	520
108150129	8290685	HDT-060AE-BBB-8-W0	HDT060AW00	12/23/2009	520
108150130	8290685	HDT-060AE-BBB-B-W0	HDT060AW00	12/23/2009	520

Lining Technology, Inc
ESE

**Roll Test Data Report** 

Sales Order No.	٩	roject N	umber			Custome	r Name			Project Loc	ation		Product N	ame	658		Report Date	
61037						ACF We	st, Inc.			Vancouver,	WA		HDT-060A	E-BBB-B-V	on the second		1/29/2010	
	ASTM D S	166				VELW DES	1.Type IV / D6693				ASTW D	1001	FFRF O MLSY	ASTM D ISOS	5TM D 421W1683	ASTM D \$\$96	GRI GM I	
	Average	Minimum	TD Strength	MD Strength	TD Strongth	MD Strength	TD Elongation	MD Elongation	TD Elangation	MD Elongation	TD Tear	MD Tcar	Puncture		Carbon Black	Carbon Black	Aspenity Height	Asperity Height
	Theboese	Thickness	(ii) Yield	(ii) Yield	(a) Break	(a) Break	(g) Yield	(a) Yield	(a) Break	(ii) Break	Reststance	Revistance	Revistance	Density	Content	Dispersion	Side A	Side B
	(mils)	(mils)	(idd)	(144)	(jdd)	(idd)	لان ج	<b>e</b>	لته م	<u>ت</u> بن	(this)	(lhs)	(sqt)	(talee)	لارچا	Views in Carl - Cal2	(milis)	(mile)
Roll No.	energy rea	- #				C)	icry dits				ty Luna	th	every 4th	eveny 4th	title strates	every 4th	every 2nd	
108150113	60	55	172	162	174	192	15	18	459	474	61	60	152	0.945	2.32	10	26	27
108150116	61	2	172	162	174	192	15	18	459	474	61	60	152	0.945	2.32	10	27	27
108150120	61	57	163	155	186	195	17	17	534	517	58	59	152	0.946	2.48	10	26	28
108150122	61	55	161	160	174	194	16	18	393	469	58	59	153	0.946	2.66	10	25	28
108150123	61	57	161	160	174	194	16	18	393	469	58	59	153	0.946	2.66	10	25	28
108150124	61	56	161	160	174	194	16	18	393	469	58	59	153	0.946	2.66	10	25	28
108150125	80	57	168	165	167	203	15	16	405	501	58	59	150	0.946	2.56	10	25	28
108150126	61	56	168	165	167	203	15	16	405	501	58	59	150	0.946	2.56	10	25	28
108150127	62	58	168	165	167	203	15	16	405	501	58	59	150	0.946	2.56	10	26	26
108150128	61	57	168	165	167	203	15	16	405	501	58	59	150	0.946	2.56	10	26	26
108150129	83	58	173	166	199	203	16	18	501	483	59	51	156	0.945	2.65	10	25	25
108150130	61	57	173	166	199	203	16	18	501	483	59	51	156	0.945	2.65	10	25	25

Laboratory Manager:

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GSE-8.2.4-029 Rev - 03/05

19103 Gundle Road - Houston, Texas 77073

Page 1 of 1



## **Quality Assurance Laboratory Test Results**

Job Name: Sales Order:	Terminal 5 Cap Port 61037	of Vancouver
Required Testing:	ASTM D 5397 - Star of Polyolefin Geome	ndard Test Method for Evaluation of Stress Crack Resistance mbranes Using Notched Constant Tensile Load Test
Custom Frequency:	1/Resin Lot	
Custom Criteria:	1000 hours	
Product Code	Resin Lot Number	

FIGURE	Resin Lot Number	Test Results
HDT-060AE-BBB-B-W0	8290671	PASS
HDT-060AE-BBB-B-W0	8290685	PASS

Approved By:Debra GortemillerDate Approved:January 29, 2010

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## **Quality Assurance Laboratory Test Results**

Job Name: Sales Order:	Terminal 5 Cap Port of Vancouver 61037
Required Testing:	ASTM D 3895 Standard Test Method for Oxidative Induction Time of Polyolefins by Differential Scanning Calorimetry
Custom Frequency:	1/200,000 lbs.
Custom Criteria:	140 Minutes

Product Code	Resin Lot Number	Test Results
HDT-060AE-BBB-B-W0	8290671	PASS
HDT-060AE-BBB-B-W0	8290685	PASS

Approved By:Debra GortemillerDate Approved:January 29, 2010

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### **Quality Assurance Laboratory Test Results**

Job Name:	Terminal 5 Cap Port of Vancouver
SO Number:	61037

The table below summarizes additive performance of GSE Houston products as perceived by OIT retention after Oven and UV Aging per GRI Test Method GM13:

		Oven Aging @ 85° C (ASTM D 5721)				UV Resistance per GRI GM11			
		90 days per ASTM D 5885				1600 hours UV Aging per ASTM D 5885			
		Initial	Final		GRI	Initial	Final		GRI
		HP OIT	HP OIT	Retained	Criteria	HP OIT	HP OIT	Retained	Criteria
Product Type	Formulation	(min)	(min)	(%)	(%)	(min)	(min)	· (%)	(%)
HDPE Geomembrane	Chevron Phillips Marlex® K306 + Carbon Black	697	661	94	80	697	565	81	50

Approved By:Debra GortemillerDate:January 29, 2010


# **Certificate of Analysis**

Shipped To: CHEVRON PHILLIPS CHEM. CO LP: GSE 19103 GUNDLE ROAD WESTFIELD TX 77090 USA Recipient: UP TRACK 14732 Phouangsavanh Fax: CPC Delivery #: 87945747 PO #: 46822 Weight: 189500 LB Ship Date: 10/27/2009 Package: BULK Mode: Hopper Car Car #: CHVX890373 Seal No: 271119

Product: MARLEX POLYETHYLENE K306 BULK

### Lot Number: 8290671

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.1	g/10mi g/10mi
Density Production Date	D1505 or D4883	0.937 09/01/2009	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP. However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

Thay Differ

Troy Griffin Quality Systems Coordinator

For CoA questions contact Customer Service Representative at 800-231-1212



## **Certificate of Analysis**

Shipped To: CHEVRON PHILLIPS CHEM. CO LP: GSE 19103 GUNDLE ROAD WESTFIELD TX 77090 USA Recipient: UP TRACK 14732 Phouangsavanh Fax: CPC Delivery #: 87952348 PO #: 03-060547 Weight: 188900 LB Ship Date: 11/06/2009 Package: BULK Mode: Hopper Car Car #: PSPX009173 Seal No: 270689

Product: MARLEX POLYETHYLENE K306 BULK

### Lot Number: 8290685

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.1	a/10mi
HLMI Flow Rate	ASTM D1238	11.4	a/10mi
Density	D1505 or D4883	0,936	a/cm3
Production Date		09/04/2009	3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP. However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

Thay Diff

Troy Griffin Quality Systems Coordinator

For CoA questions contact Customer Service Representative at 800-231-1212

Geocomposite Material Certs



# The Pioneer Of Geosynthetics

## **GSE FabriNet HF Geocomposite**

GSE FabriNet HF geocomposite consists of a 250 mil thick GSE HyperNet HF geonet heat-laminated on one or both sides with a GSE nonwoven needlepunched geotextile. The geotextile is available in mass per unit area range of 6 oz/yd<sup>2</sup> (200 g/m<sup>2</sup>) to 16 oz/yd<sup>2</sup> (540 g/m<sup>2</sup>). The geocomposite is designed and formulated to perform drainage function under a range of anticipated site loads, gradients and boundary conditions.

## **Product Specifications**

TESTED PROPERTY	TEST METHOD	FREQUENCY	M	INIMU	M <u>AVERAGE</u> V	/ALUE <sup>()</sup>	)
Geocomposite				-4 <del>74</del> 2	8 oz/yď	-10-0	<del>=/;d}</del>
Transmissivity <sup>29</sup> , gai/min/ft (m²/sec)	ASTM D 4716	1/540,000 ft <sup>2</sup>					
Double-Sided Composite			2.41 (5	k 10⁴)	2.41 (5 x 10⁴)	1,45 (3	x 10⁴)
Single-Sided Composite			7.24 (1.5	x 10³)	7.24 (1.5 x 10 <sup>-3</sup> )	4.83 (1	к 10³)
Ply Adhesion, lb/in (g/cm)	ASTM D 7005	1/50,000 ft <sup>2</sup>	1.0 (	78)	1.0 (178)	1.0 (	78)
Geonet Core <sup>(3)</sup> - GSE HyperNe	t HF						
Transmissivity <sup>22</sup> , gal/min/ft (m <sup>2</sup> /sec)	ASTM D 4716		14.49 (	x 10³)	14.49 (3 x 10 <sup>3</sup> )	14.49 (:	x 10 <sup>-1</sup> )
Density, g/cm³	ASTM D 1505	1/50,000 ft <sup>2</sup>	0.9	4	0,94	0.9	4
Tensile Strength (MD), Ib/in (N/mm)	ASTM D 5035/7179	1/50,000 ft <sup>2</sup>	55 (	.6)	55 (9.6)	55 (	.6)
Carbon Black Content, %	ASTM D 1603*/4218	1/50,000 ft <sup>2</sup>	2	>	2,0	2.	)
Geotextile <sup>(3,4)</sup>							
Mass per Unit Area, oz/yd²(g/m²)	ASTM D 5261	1/90,000 ft <sup>2</sup>	6 (2	))	8 (270)	10 (	35)
Grab Tensile, Ib (N)	ASTM D 4632	1/90,000 ft <sup>2</sup>	160 (	(10)	220 (975)	260 (1	155)
Puncture Strength, lb (N)	ASTM D 4833	1/90,000 ft <sup>2</sup>	90 (1	95)	120 (525)	165 (	25)
AOS, US sieve (mm)	ASTM D 4751	1/540,000 ft <sup>2</sup>	70 (0	212)	80 (0.180)	100 (0	150)
Permittivity, (sec <sup>-2</sup> )	ASTM D 4491	1/540,000 ft <sup>2</sup>	1.	;	1.3	1.	)
Flow Rate, gpm/ft² (lpm/m²)	ASTM D 4491	1/540,000 ft <sup>3</sup>	110 (4	480)	95 (3,865)	75 (3	050)
UV Resistance, % retained	ASTM D 4355 (after 500 hours)	once per formulation	7		70	7	
	NOMIN/	AL ROLL DIME	NSION	S			
Geonet Core Thickness, mil (mm)	ASTM D 5199	1/50,000 ft <sup>2</sup>	250	6.3)	250 (6.3)	250	6.3)
Roll Width <sup>®</sup> , ft (m)			15 (	.5)	15 (4.5)	15 (	.5)
Roll Length <sup>®</sup> , ft (m)	Double-Sided Composite		230 (	'0.1)	230 (70.1)	210 (	4.0)
	Single-Sided Composite		260 (	9.2)	260 (79.2)	250 (	6.2)
Roll Area, ft² (m²)	Double-Sided Composite		3,450	321)	3,450 (321)	3,150	293)
	Single-Sided Composite		3,900	362)	3,900 (362)	3,750	348)

NOTES:

• "AOS in mm is a maximum value.

• "Gradient of 0.1, normal load of 10,000 psf, water at 70'F between steel plates for 15 minutes. Contact GSE for performance transmissivity value for use in design.

• "Component properties prior to lamination.

• <sup>14</sup>Refer to geotextile product data sheet for additional specifications.

• <sup>15</sup>Roll widths and lengths have a tolerance of ±1%.

\*Modified.

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## GSE FabriNet HF Geocomposite

GSE FabriNet HF geocomposite consists of a 250 mil thick GSE HyperNet HF geonet heat-laminated on one or both sides with a GSE nonwoven needlepunched geotextile. The geotextile is available in mass per unit area range of 6  $oz/yd^2$  (200 g/m<sup>2</sup>) to 16  $oz/yd^2$  (540 g/m<sup>2</sup>). The geocomposite is designed and formulated to perform drainage function under a range of anticipated site loads, gradients and boundary conditions.

## **Product Specifications**

TESTED PROPERTY	TEST METHOD	FREQUENCY	M	INIMU	M AVERAGE V	ALUE <sup>(I)</sup>
Geocomposite				<u>-474</u> 2	8 oz/yd²	- <del>10-o=/yd</del> -
Transmissivity <sup>21</sup> , gai/min/ft (m²/sec)	ASTMD 4716	1/540,000 ft <sup>2</sup>				
Double-Sided Composite			2.41 (5	(10 <sup>4</sup> )	2,41 (5 x 10 <sup>-4</sup> )	1.45 (3 x 10⁴)
Single-Sided Composite			7.24 (1.	x 10')	7.24 (1.5 x 10')	4.83 (1 x 10°)
Ply Adhesion, lb/in (g/cm)	ASTMD 7005	1/50,000 ft <sup>2</sup>	1.0 (	78)	1.0 (178)	1.0 ( 78)
Geonet Core <sup>(3)</sup> - GSE HyperNe	t HF					
Transmissivity <sup>29</sup> , gal/min/ft (m²/sec)	ASTM D 4716		14,49 (	x 10')	14,49 (3 x 10 <sup>-3</sup> )	14.49 (1 x 10³)
Density, g/cm³	ASTM D 1505	1/50,000 ft <sup>3</sup>	0.9	4	0.94	0.:4
Tensile Strength (MD), lb/In (N/mm)	ASTM D 5035/7179	1/50,000 ft <sup>3</sup>	55 (	.6)	55 (9.6)	55 ( ).6)
Carbon Black Content, %	ASTM D 1603*/4218	1/50,000 ft <sup>2</sup>	2.	)	2.0	2.0
Geotextile <sup>(3,4)</sup>						
Mass per Unit Area, oz/yd²(g/m²)	ASTM D 5261	1/90,000 ft <sup>3</sup>	6 (2	)0)	8 (270)	10 (135)
Grab Tensile, lb (N)	ASTM D 4632	1/90,000 ft <sup>2</sup>	160 (	/10)	220 (975)	260 (1 155)
Puncture Strength, lb (N)	ASTM D 4833	1/90,000 ft <sup>2</sup>	90 (3	95)	120 (525)	165 ( 25)
AOS, US sieve (mm)	ASTM D 4751	1/540,000 ft <sup>3</sup>	70 (0	212}	80 (0,180)	100 (0 150)
Permittivity, (sec²)	ASTM D 4491	1/540,000 ft <sup>2</sup>	1.	;	1.3	1.0
Flow Rate, gpm/ft² (lpm/m²)	ASTM D 4491	1/540,000 ft <sup>2</sup>	110 (4	480)	95 (3,865)	75 (3 )50)
UV Resistance, % retained	ASTM D 4355 (after 500 hours)	once per formulation	7		70	7
	NOMIN	AL ROLL DIME	NSION	5		
Geonet Core Thickness, mil (mm)	ASTM D 5199	1/50,000 ft <sup>2</sup>	250	6.3)	250 (6.3)	250 6.3)
Roll Width <sup>ø</sup> , ft (m)			15 (	.5)	15 (4.5)	15 (1.5)
Roll Length <sup>®</sup> , ft (m)	Double-Sided Composite		230 (	0.1)	230 (70.1)	210 (64.0)
	Single-Sided Composite		260 (	9.2)	260 (79.2)	250 (*6.2)
Roll Area, ft' (m')	Double-Sided Composite		3,450	321)	3,450 (321)	3,150 (293)
	Single-Sided Composite		3,900	362)	3,900 (362)	3,750 (348)

NOTES:

 $\bullet$  "AOS in mm is a maximum value.

• "Gradient of 0.1, normal load of 10,000 psf, water at 70°F between steel plates for 15 minutes. Contact GSE for performance transmissivity value for use in design.

• <sup>39</sup>Component properties prior to lamination.

• <sup>(4)</sup>Refer to geotextile product data sheet for additional specifications.

• <sup>35</sup>Roll widths and lengths have a tolerance of ±1%.

• \*Modified.

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# **GSE Roll Allocation**

Order61038CustomerACF West, Inc.SiteTerminal 5 Cap Port of Vancouver

Roll#	Resin Lot	Product Code	Description	Mfg. Date	Length
131334278	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/9/2010	210
131334279	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/9/2010	210
131334280	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/9/2010	210
131334281	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/9/2010	210
131334282	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/9/2010	210
131334283	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/9/2010	210
131334284	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/9/2010	210
131334285	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/9/2010	210
131334286	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/9/2010	210
131334287	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/9/2010	210
131334288	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/9/2010	210
131334289	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/9/2010	210
131334290	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/9/2010	210
131334291	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/9/2010	210
131334292	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/9/2010	210
131334293	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334294	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334295	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334296	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334297	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334298	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334299	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334300	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334301	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334302	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334307	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334308	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334309	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334310	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334311	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334312	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334313	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334314	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334315	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210

GSE 8.2.4-020 Rev - - 02/03

Thursday, February 11, 2010

Page 1 of 2

Order61038CustomerACF West, Inc.SiteTerminal 5 Cap Port of Vancouver

Roll#	Resin Lot	Product Code	Description	Mfg. Date	Length
131334316	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334317	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334318	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334319	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210
131334320	C100107A02	FS2-250E-08-08-E-	FS2-250E-08-08-E-00	2/10/2010	210

GSE 8.2.4-020 Rev - - 02/03 Thursday, February 11, 2010

Page 2 of 2

## **Geocomposite Traceability**

Customer ACF West, Inc. Location Vancouver, WA

*Job Name* Terminal 5 Cap Port of *Order* 61038

Roll_No	Product	Resin Lot	Top Geo	<b>Bottom Geo</b>
131334278	FS2-250E-08-08-E-00	C100107A02	130356377	130356379
131334279	FS2-250E-08-08-E-00	C100107A02	130356377	130356379
131334280	FS2-250E-08-08-E-00	C100107A02	130356377	130356379
131334281	FS2-250E-08-08-E-00	C100107A02	130356377	130356379
131334282	FS2-250E-08-08-E-00	C100107A02	130356377	130356379
131334283	FS2-250E-08-08-E-00	C100107A02	130356377	130356379
131334284	FS2-250E-08-08-E-00	C100107A02	130356377	130356379
131334285	FS2-250E-08-08-E-00	C100107A02	130356374	130356376
131334286	FS2-250E-08-08-E-00	C100107A02	130356374	130356376
131334287	FS2-250E-08-08-E-00	C100107A02	130356374	130356376
131334288	FS2-250E-08-08-E-00	C100107A02	130356374	130356376
131334289	FS2-250E-08-08-E-00	C100107A02	130356374	130356376
131334290	FS2-250E-08-08-E-00	C100107A02	130356374	130356376
131334291	FS2-250E-08-08-E-00	C100107A02	130356372	130356376
131334292	FS2-250E-08-08-E-00	C100107A02	130356372	130356380
131334293	FS2-250E-08-08-E-00	C100107A02	130356372	130356380
131334294	FS2-250E-08-08-E-00	C100107A02	130356372	130356380
131334295	FS2-250E-08-08-E-00	C100107A02	130356373	130356380
131334296	FS2-250E-08-08-E-00	C100107A02	130356373	130356380
131334297	FS2-250E-08-08-E-00	C100107A02	130356373	130356380
131334298	FS2-250E-08-08-E-00	C100107A02	130356378	130356380
131334299	FS2-250E-08-08-E-00	C100107A02	130356378	130356380
131334300	FS2-250E-08-08-E-00	C100107A02	130356378	130356380
131334301	FS2-250E-08-08-E-00	C100107A02	130356378	130356380
131334302	FS2-250E-08-08-E-00	C100107A02	130356378	130356380
131334307	FS2-250E-08-08-E-00	C100107A02	130356375	130356371
131334308	FS2-250E-08-08-E-00	C100107A02	130356375	130356371
131334309	FS2-250E-08-08-E-00	C100107A02	130356375	130356371
131334310	FS2-250E-08-08-E-00	C100107A02	130356375	130356371
131334311	FS2-250E-08-08-E-00	C100107A02	130356375	130356371
131334312	FS2-250E-08-08-E-00	C100107A02	130356375	130356371
131334313	FS2-250E-08-08-E-00	C100107A02	130356375	130356371
131334314	FS2-250E-08-08-E-00	C100107A02	130356367	130356381
131334315	FS2-250E-08-08-E-00	C100107A02	130356367	130356381

GSE 8.2.4-019 Rev - - 02/03

Thursday, February 11, 2010

Page 1 of 2

Roll_No	Product	Resin Lot	Top Geo	<b>Bottom Geo</b>
131334316	FS2-250E-08-08-E-00	C100107A02	130356367	130356381
131334317	FS2-250E-08-08-E-00	C100107A02	130356367	130356381
131334318	FS2-250E-08-08-E-00	C100107A02	130356367	130356381
131334319	FS2-250E-08-08-E-00	C100107A02	130356367	130356381
131334320	FS2-250E-08-08-E-00	C100107A02	130356367	130356353

GSE 8.2.4-019 Rev - - 02/03 Thursday, February 11, 2010

Page 2 of 2

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# Roll Test Data Report

	Lining T	echnolo	gy. Inc				1		a down mm -			
Sales Order No.		đ	roject Nu	ımber		ustomer.	Name	Project L	ocation	Product Name	65k	Report Date
61038					4	ACF West,	Inc.	Vancouve	er, WA	FS2-250E-08-08-E-00	Repercies/	2/11/2010
	A 9918 U MTSA	21, M 6, 11, 2 M E	1218/D1451	'M D 1505		GRI GC7- / 45	T.M D7085					
	Average G	conci Tensile Ca.	rbon Black	Perc	4 Strength	Peel Strength	Peel Strength	Peel Strength				
	Thickness	Strongth	Content L	Density Side .	4 - MinimumSik	le B - Minimur Si	de A - Average S	ide B - Average				
	(mils)	(jdd)	ن م ان	(Sicc)	(jdd)	()dd)	(144)	(jdd)				
Roll Na.	every 14th	every 14th e	wory lath cw	iery 14th		cvery /	411					
131334278	263	76	2.5 0	.959	2.09	2.77	2.37	3.10				
131334279	255	72	2.5 0	0.954	1.66	1.86	1.85	2.15				
131334280	255	72	2.5 C	).954	1.66	1.86	1.85	2.15				
131334281 121224260	797 797	28	0 C 7 C	0.954	1.66 1.66	1.86	1.85	21.2 31.5				
131334282 124224282	CC7	2 8	0.7 0.7 1.0	0.854	1.00	1.80	1,05	61.2 31.0				
131334203	200 255	2 2	2 C C C C C C C C C C C C C C C C C C C	1050	1.00	1.00	 185	2413				
131334285	255	72	2.5 0	.954	1.66	1.86	1.85	2.15				
131334286	255	72	2.5 0	).954	1.66	1.86	1.85	2.15				
131334287	255	72	2.5 0	).954	1.66	1.86	1.85	2.15				
131334288	255	72	2.5 0	).954	1.66	1.86	1.85	2.15				
131334289	255	72	2.5 0	1.954	1.66	1.86	1.85	2.15				
131334290	255	72	2.5 0	0.954	1.66	1.86	1.85	2.15				
131334291	255	72	2.5 0	1.954	1.66	1.86	1.85	2.15				
131334292	255	72	2.5 0	).954	1.66	1.86	1.85	2.15				
131334293	256	72	2.5 0	0.957	5.11	3.42	5.57	3.76				
131334294	256	72	2.5 0	0.957	5.11	3.42	5.57	3.76				
131334295	256	72	2.5 0	0.957	5.11	3.42	5.57	3.76				
131334296	256	72	2.5 0	0.957	5.11	3.42	5.57	3.76				
131334297	256	72	2.5 0	0.957	5.11	3.42	5.57	3.76				
131334298	256	12	2.5 	0.957	5.11	3,42	5.57	3.76				
131334299	256	2	2.5 C	0.957	5.11	3.42	5.57	3.76				
131334300	256	21	2.5	0.957	5.11	3.42	5.57	3.76				
131334301	256	72	2.5	0.957	5.11	3.42	5.57	3.76				
131334302	256	22	2.5 C	0.957	5.11	3.42	5.57	3.76				
131334307	257	73	2.4 0	0.954	2.22	1.96	2.51	2.24				
131334308	264	78	2.5 C	0.950	2.66	2.31	2.85	2.54				
131334309	264	78	2.5 C	0.950	2.66	2.31	2.85	2.54				
131334310	264	78	2.5 C	0.950	2.66	2.31	2.85	2.54				
131334311	264	78	2.5 C	0.950	2.66	2.31	2.85	2.54				
131334312	264	78	2.5 C	0.950	2.66	2.31	2.85	2.54				
131334313	264	78	2.5 C	0.950	2.66	2.31	2.85	2.54				

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# **Roll Test Data Report**

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	Lining 1	Technol	<u>ogy, In</u>	ы Л			'					
Sales Order No.			Project [	Vumber		Customer	Name	Project Location	Product Name	65k	Report Dute	
61038						ACF West	, Inc.	Vancouver, WA	FS2-250E-08-08-E-00	are and	2/11/2010	
	ASTM D 5199	4 62.12 O WLSY	vi (/8/25 ()	SBSI Q WLSY		GRI GC7+ / AS	TM D7005					I
	Average	Geones Tensile	Carbon Black		Peel Strength	Peel Strength	Peel Strength	Peel Strength				
	Thickness	Strength	Cantent	Density St	lde A - Minimur'	Side B - Minimur S.	ide A - Average Si	ide B - Average				
	(mils)	(jdd)	ية <u>ا</u>	( <i>K</i> /cc)	(idd)	(jdd)	(idd)	(PPi)				
Roll No.	every little	every latti	every 14th	every 14th		every t	414					
131334314	264	78	2.5	0.950	2.66	2.31	2.85	2.54				
131334315	264	78	2.5	0.950	2.66	2.31	2.85	2.54				
131334316	264	78	2.5	0.950	2.66	2.31	2.85	2.54				
131334317	264	78	2.5	0.950	2.66	2.31	2.85	2.54				
131334318	264	78	2.5	0.950	2.66	2.31	2.85	2.54				
131334319	264	78	2.5	0.950	2.66	2.31	2.85	2.54				
131334320	264	78	2.5	0.950	2.66	2.31	2.85	2.54				

Laboratory Manager:

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201001259 <sup>2</sup>

# **Roll Test Data Report**

								THE PARTY OF THE P				
<i>Sales Order No</i> 61038		Project	Number	<i>Customer</i> ACF West	- <i>Name</i> t, Inc.		<i>Project Lo</i> Vancouver,	cation , WA	. –	<i>Product Nam</i> FBR-080E-EB	<i>е</i> 3С-Е-00	Repo
	VELW 1	16++ Q	IS14 D 4751	EEB† Q WLSV	T WLSV	EESt (		LSY	ZE9F O W_		1925 U MLSV	
	Average Sample	_	Apparant	Puncture	Trap Tcar	Trap Tear	Grab Elongation G.	'rub Elongation	Grab Strength	Grab Strength	Mass per	
	Flow Rate	Permittivity	Opening Size	Resistance	Strength CD	Strength MD	CD	đМ	CD	ШV	Unit Area	
	(gallon/min/ft2)	(I-20S)	( <i>uuu</i> )	(tps)	(lbs)	(tps)	(54)	(6%)	(ths)	(tbs)	(25//20)	
Roll No.			overy roll	every 4th	(Lava)	414	;	5	very 4th		creary diff	
130356353	129	1.70	0.180	139	137	117	127	110	297	255	8.5	
130356367	129	1.70	0.180	143	125	110	129	95	311	249	8.7	
130356371	129	1.70	0.180	128	178	119	127	115	288	238	8.3	
130356372	106	1.40	0.180	138	170	116	124	115	270	224	8.7	
130356373	106	1.40	0.180	138	170	116	124	115	270	224	8.7	
130356374	106	1.40	0.180	138	170	116	124	115	270	224	8.7	
130356375	106	1.40	0.180	138	170	116	124	115	270	224	8.7	
130356376	106	1.40	0.180	137	162	122	130	117	289	224	8.4	
130356377	106	1.40	0.180	137	162	122	130	117	289	224	8.4	
130356378	106	1.40	0.180	137	162	122	130	117	289	224	8.4	

Laboratory Manager:

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GSE-8.2.4-029 Rev - 03/05

124

0.180 0.180

1.40 1.40

106

0.180

1.40

8.9 9.9

228 228

116

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GeoTextile Material Certs



### The Pioneer Of Geosynthetics S I N C E 1 9 7 2

## **GSE Nonwoven Geotextile**

**Product Specifications** 

GSE Nonwoven Geotextile is a family of polypropylene, staple fiber, needlepunched geotextiles. The geotextile is manufactured using an advanced manufacturing and quality system, to produce the most uniform and consistent nonwoven needlepunched geotextile currently available in the industry. GSE combines a fiber selection and approval system with in-line quality control and a state-of-the-art laboratory to ensure that every roll shipped meets customer specifications and for various applications.

Product Specifications	These product s	pecifications meet	or ex	cee	d GR	l GT	12, 0	GRI	GT1.	3 ani	d AA	SHT	O M288
TESTED PROPERTY	TEST METHO	<b>D FREQUENCY</b>	<b>,</b>		MI	NIM	IUM	۱A۱	/ER/	AGE	E VA	<b>I'LUI</b>	E
					- NI	ЩÇ.	N	NO.	<u></u>	410	N	<u> </u>	NW16
AASHTO M288 Class									>	ł	>	1	>>>1
Mass per Unit Area, oz/yd² (g/m²)	ASTM D 5261	90,000 ft <sup>2</sup>	()	5)	(2	0)	(2	0)	(3	) 5)	1 (4	2 5)	16 (540)
Grab Tensile Strength, lb (N)	ASTM D 4632	90,000 ft <sup>2</sup>	1 (5	0 0)	1 (7	0 0)	2 (9	0 5)	2 (1,	0 55)	3.	0 20)	390 (1,735)
Grab Elongation, %	ASTM D 4632	90,000 ft <sup>2</sup>	5	þ	5	D		D	5		5	þ	50
Puncture Strength, Ib (N)	ASTM D 4833	90,000 ft <sup>2</sup>	(2	) 5)	9 (3	) 15)	1 (5	0 5)	1 (7	5 5)	1 (8	0 5)	240 (1,055)
Trapezoidal Tear Strength, ib (N)	ASTM D 4533	90,000 ft²	(2	) 0)	(2	5 0)	(3	D 5)	1 (4	0 5)	1 (5	5 5)	150 (665)
Apparent Opening Size, Sieve No. (mm)	) ASTM D 4751	540,000 ft²	(0.2	) 12)	(0.	) 12)	(0.	) 80)	1 (0.	0 50)	1 (0,	0 50)	100 (0.150)
Permittivity, sec <sup>-1</sup>	ASTM D 4491	540,000 ft <sup>2</sup>	1.	10	1	50	1.	80	1.	0	0	10	0.60
Water Flow Rate, gpm/ft² (l/min/m²)	ASTM D 4491	540,000 ft <sup>2</sup>	1 (5,4	5 95)	1 (4,	0 80)	9 (3,0	5 65)	7 (3,0	50)	6 (2,4	) 40)	45 (1,830)
UV Resistance (% retained after 500 hours)	ASTM D 4355	per formulation	7	þ	7	D	,	D	7	þ	7	þ	70
	NOM	INAL ROLL DI	MEN	NSI (	ONS	1				_			
Roll Length <sup>®</sup> , ft (m)			6 (1	0 2)	8 (2	i0 i9)	6 (1	10 2)	5 (1	0 2)	4	00 22)	300 (91)
Roll Width", ft (m)			1 (4	5 5}	(4	5 5)	(4	5 5)	(4	5 5)	(4	5 5)	15 (4.5)
Roll Area, ft² (m²)			9,0 (8	00 6)	12 (1,	750 85)	9,0 (8	00 6)	7,9 (6)	00 8)	6,1 (5	00 7)	4,500 (418)

NOTES:

• The property values listed are in weaker principal direction. All values listed are Minimum Average Values except apparent opening size in

mm and UV resistance. Apparent opening size (mm) is a Maximum Value. UV is a typical value.

"Roll lengths and widths have a tolerance of ±1%.

NORTH AMERICA 800.435.2008 281.443.8564 · EUROPE & AFRICA 49.40.767420 · ASIA PACIFIC 68.2.937.0091 · SOUTH AMERICA 56.2.595.4200 · MIDDLE EAST 20.23.828.8888

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Product Data Shee

# **GSE Roll Allocation**

*Order* 61038 *Customer* ACF West, Inc.

Site Terminal 5 Cap Port of Vancouver

Roll#	<b>Product Code</b>	Description	Mfg. Date	Length
130358359	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358360	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358361	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358362	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358363	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358364	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358365	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358366	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358367	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358368	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358369	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358370	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358371	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358372	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358373	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358374	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358375	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358376	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358377	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358378	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358379	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358380	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358381	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358382	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358383	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358384	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358385	GEO-160E-EBC-E-00	NW16	2/2/2010	300
130358386	GEO-160E-EBC-E-00	NW16	2/2/2010	300

GSE 8.2.4-020 Rev - - 02/03 Thursday, February 04, 2010

Page 1 of 1

GSB	ining Tech	nology,	Inc			-	Roll	Test	Data I	Report	<b>14</b> -			
Sales Order N	o. Pr	oject Nun	nber		Customer	Name			Project Loc	ation		Product Name	638	Report Date
61038					ACF Wes	t, Inc.			Vancouver,	WA		GEO-160E-EBC-E-00	UC	2/4/2010
	a mter	1611	ASTM D 4751	98/E A MTZA	5 ASTM D 4833	THLISY	£657 (		I WT2A	D 4632		1925 A MT8A		
	Average Sample		Apparent	Mullen Burst	Puncture	Trap Tear	Trap Tear	Grab Elongation	Grah Elongation	Grab Strength	Grab Strongth	Maxes per		
	Flow Rate	Permittivity	Opening Size	Strength	Reytstance	Strength CD	Strength MD	9	ΟW	9	đМ	Unit Arca		
	(galloniminijt2)	(Zec-1)	(mm)	(bxd)	(thxt)	(sql)	(thst)	(a)	رتانيا	(Ibs)	(thst)	( <i>Tpáy</i> :20)		
Roll No.	every 12	20th	there roll	every 20th	every: 20th	- KUMA	20th		dana .	20th		every 20th		
130358359	57	0.80	0.150	772	277	338	274	130	118	641	518	17.2		
130358360	57	0.80	0.150	772	277	338	274	130	118	641	518	17.2		
130358361	57	0.80	0.150	772	277	338	274	130	118	641	518	17.2		
130358362	57	0.80	0.150	772	277	338	274	130	118	641	518	17.2		
130358363	57	0.80	0.150	772	277	338	274	130	118	641	518	17.2		
130358364	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358365	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358366	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358367	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358368	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358369	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358370	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358371	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358372	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358373	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358374	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358375	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358376	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358377	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358378	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358379	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358380	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358381	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358382	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358383	57	0.80	0.150	846	247	381	243	130	112	710	531	16.9		
130358384	57	0.80	0.150	788	249	332	251	134	114	653	504	16.3		
130358385	57	0.80	0.150	788	249	332	251	134	114	533	504	16.3		
130358386	57	0.80	0.150	788	249	332	251	134	114	653	504	16.3		
Laboratory Man	ager. 🔶	- au											ESE ESE	-8 2 4-029 Rev 03/05
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Page 1 of 1

Kingstree Lab - US

# PRODUCT DATA SHEET GEOTEX®1701

**GEOTEX 1701** is a polypropylene, staple fiber, needlepunched nonwoven geotextile produced by Propex, and will meet the following Minimum Average Roll Values (MARV) when tested in accordance with the methods listed below. The fibers are needled to form a stable network that retains dimensional stability relative to each other. The geotextile is resistant to ultraviolet degradation and to biological and chemical environments normally found in soils.

GEOTEX 1701 conforms to the property values listed below.<sup>1</sup> Propex performs internal Manufacturing Quality Control (MQC) tests that have been accredited by the Geosynthetic Accreditation Institute -Laboratory Accreditation Program (GAI-LAP).

		M/	NRV2
PROPERTY	TEST METHOD	ENGLISH	METRIC
Physical			
Mass/Unit Area	ASTM D-5261	16.0 oz/yd <sup>2</sup>	542 g/m <sup>2</sup>
Thickness	ASTM D-5199	165 mils	4.2 mm
Mechanical			Annual
Tensile Strength (Grab)	ASTM D-4632	390 lbs	1736 N
Elongation	ASTM D-4632	50%	50%
Puncture	ASTM D-4833	250 lbs	1112 N
Mullen Burst	ASTM D-3786	800 psl	5515 kPa
Trapezoldal Tear	ASTM D-4533	155 lbs	690 N
Endurance			
UV Resistance	ASTM D-4355	70%	70%
Hydraulic			•
Apparent Opening Size (AOS) <sup>3</sup>	ASTM D-4751	100 US Std. Sleve	0.150 mm
Permittivity	ASTM D-4491	0.7 sec-1	0.7 sec-1
Permeability	ASTM D-4491	0.27 cm/sec	0.27 cm/sec
Water Flow Rate	ASTM D-4491	50 gpm/ft <sup>2</sup>	2037 l/min/m <sup>2</sup>
Roll Sizes		15 ft x 300 ft	4.57 m x 91.5 m

NOTES:

 The property values listed above are effective 08/2006 and are subject to change without notice.
 Values shown are in weaker principal direction. Minimum average roll values (MARV) are calculated as the typical minus two standard deviations. Statistically, it yields a 97.7% degree of confidence that ny samples taken from quality assurance testing will exceed the value reported.

3. Maximum average roll value.



GEOSYNTHETICS

Propex inc. 6025 Lee Highway, Suite 425 PO Box 22788 Chattanooga, TN 37422

PH: 423 899 0444 PH: 800 621 1273 FAX: 423 899 7619 www.propexinc.com

Geolex\*, Landlok\*, Pyramal\*, X3\*, SuperGro\*, Petromat\*, Petrolac\*, Pro-Guard\* and PetroGrid\* are registered trademarks of Proper Inc

ABORDA, LANGIN, FY HAMAN, AS, SUPERION, FEDOMEN, PURPOSE, OR ARISING FROM PROVISION OF SAMPLES, A COURSE OF DEALING OR USAGE OF TRADE.

<b>PR</b> PE	K Cer	tificate	of Compliance	C C C	Chad Judkins Quality Manager
<b>BOL:</b> 80471589	M	: 1004461	1701 15ftx300ft blk GEOTEX	Sty	rle: 1701
<b>BOL date:</b> 12/07/2009				Customer Conta	ict:
Sales Order: 369052	Customer	: Northwest Geo: 8951 S.E. 76th PORTLAND OF	synthetics, Inc Drive R 97206	Customer P	<b>0</b> : 35715
It is certified that the material refer * Meets the minimum average roll * Was tested as prescribed by app	enced above: values (MARV) listed b proved test methods.	elow.			
Property Mass/I Init Area	Test method	Units	English	Metric Units	Metric
MD Elong @ Break	ASTM D-4632	02.yuz %	10.00	gpm/nZ	542.40 50.00
MD Tensile @ Break	ASTM D-4632	<u></u> .	390.00	Z	1735.50
MD Irap lear	ASTM D-4533	<u>ය</u> ද	155.00	Z	689.75
XMD Tensile @ Break XMD Tensile @ Break	ASTM D-4632 ASTM D-4632	१ <del>ट</del>	300 00	% V	50.00 1725 ED
XMD Trap Tear	ASTM D-4533	<u>ہ</u> د	155.00	2 Z	689.75
AOS (mm)	ASTM D-4751	шш	0.15	mm	0.15
CBR	ASTM D-6241	മ	1125.0	z	5006.25
Mullen Burst	ASTM D-3786	psi	800.00	kPa	5515.76
Permeability Domitticity	ASIM 0-4491	cm/s	0.270000	cm/sec	0.27000
Pupeture	ASTM D-4491 ASTM D-4833	l/sec	0.70000	sec-1	0.70
Thickness	ASTM D-5199	⊒ E	165	N millimeters	06.2111
Water Flow Rate	ASTM D-4491	gpm/sf	50.00000	l/min/m2	2037.29
This publication should not be con: does not warrant its accuracy of cc suitability of the information and th data sheet for the product, or such express or implied, including withou dealing or usage of trade.	strued as engineering a mpleteness. The ultim e products for the conte other written warranty ut limitation, warranties	advice. While info late customer and emplated and act as may be agree	mation contained in this publication is a laser of the products should assume s ual use. The only warranty made by Pr d by Propex and individual customers. y or fitness for a particular purpose, or	accurate to the best of our sole responsibility for the fu ropex for its products is se Propex specifically disclai arising from provision of s	' knowledge, Propex nal determination of the t forth in our product ims all other warranties, amples, a course of
Por Contraction of the second s	bex Operating Compar	ny, LLC, 6025 Le	e Hwy, Suite 425, PO Box 22788, Ch (800)-621-1273	lattanooga, TN 37422, US	. <b>- - -</b>

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# **Certificate of Analysis**

1701 15ftx300ft blk GEOTEX

MV 1004461

BOL: 80471589

**Quality Manager** רי זם יתר זוי )) ))

Cust PO: 035715 style 1701

		AOS (mm)	CBR	Mass/Unit Area	MD Elong @ Break	MD Tensile @ Break	MD Trap Tear	Mullen Burst	Permeability	Permittivity	Puncture
units MM LB	MM LB	8		OSY	%	LB B	ГВ	PSI	2M	1/S	9
ASTM Test D-4751 D-6241	D-4751 D-6241	D-6241		D-5261	D-4632	D-4632	D-4533	D-3786	D-4491	D-4491	D-4833
2213188 0.13 1345.0	0.13 1345.0	1345.0		17.82	86	488.45	182.95	860.00	0.418750	0.803500	277.19
2213188 0.13 1345.0	0.13 1345.0	1345.0		17.82	86	488.45	182.95	860.00	0.418750	0.803500	277.19
<sup>+</sup> 2213188 0.15 1478.9	0.15 1478.9	1478.9		18.86	95	479.46	195.92	845.71	0.525750	0.932500	288.09
· 2213188 0.15 1478.9	0.15 1478.9	1478.9		18.86	95	479.46	195.92	845.71	0.525750	0.932500	288.09
2213188 0.15 1478.9	0.15 1478.9	1478.9		18.86	95	479.46	195.92	845.71	0.525750	0.932500	288.09
2213188 0.15 1478.9	0.15 1478.9	1478.9	1	18.86	95	479.46	195.92	845.71	0.525750	0.932500	288.09
2213188 0.15 1478.9 1	0.15 1478.9 1	1478.9 1	-	8.86	95	479.46	195.92	845.71	0.525750	0.932500	288.09
2213188 0.15 1478.9 1	0.15 1478.9 1	1478.9 1	-	8.86	95	479.46	195.92	845.71	0.525750	0.932500	288.09
2213188 0.15 1478.9 1	0.15 1478.9 1	1478.9 1	<del></del>	8.86	95	479.46	195.92	845.71	0.525750	0.932500	288.09
* 2213188 0.15 1478.9 20	0.15 1478.9 20	1478.9 20	ัง	0.62	<b>9</b> 6	512.25	198.49	845.71	0.525750	0.932500	288.09
* 2213188 <b>0.15 1478.9 2</b> (	0.15 1478.9 20	1478.9 20	й	0.62	<b>9</b> 6	512.25	198.49	845.71	0.525750	0.932500	288.09
2215374 0.11 1501.1 1	0.11 1501.1 1	1501.1 1	7	6.12	83	390.56	157.81	861.43	0.583000	1.179000	274.94
2215374 0.11 1501.1 16	0.11 1501.1 16	1501.1 16	ŧ	6.12	8	390.56	157.81	861.43	0.583000	1.179000	274.94
· 2215374 0.11 1501.1 16	0.11 1501.1 16	1501.1 16	16	12	83	390.56	157.81	861.43	0.583000	1.179000	274.94
2215374 0.11 1501.1 20.	0.11 1501.1 20.	1501.1 20.	20.	07	83	565.75	187.72	861.43	0.583000	1.179000	274.94
2215374 0.11 1501.1 20.	0.11 1501.1 20.	1501.1 20.	20.	07	68	565.75	187.72	861.43	0.583000	1.179000	274.94
· 2215551 0.13 1594.0 16.	0.13 1594.0 16.	1594.0 16.	<b>1</b> 0.	29	84	415.07	164.99	800.00	0.361000	0.710000	301.39
2215551 0.13 1594.0 16.	0.13 1594.0 16.	1594.0 16.	16.	29	84	415.07	164.99	800.00	0.361000	0.710000	301.39
2215551 0.13 1594.0 16.	0.13 1594.0 16.	1594.0 16.	16.	29	84	415.07	164.99	800.00	0.361000	0.710000	301.39
2215551 0.13 1594.0 16	0.13 1594.0 16	1594.0 16	16	29	84	415.07	164.99	800.00	0.361000	0.710000	301.39
2215551 0.13 1594.0 16	0.13 1594.0 16	1594.0 16	<del>1</del> 6	.29	8	415.07	164.99	800.00	0.361000	0.710000	301.39
2215551 0.13 1594.0 10	0.13 1594.0 10	1594.0 16	Ť	5.29	84	415.07	164.99	800.00	0.361000	0.710000	301.39
2215551 0.13 1594.0 16	0.13 1594.0 16	1594.0 16	16	29	84	415.07	164.99	800.00	0.361000	0.710000	301.39
2215551 0.13 1594.0 16	0.13 1594.0 16	1594.0 16	16	.29	8	415.07	164.99	800.00	0.361000	0.710000	301.39
2215551 0.13 1594.0 16	0.13 1594.0 16	1594.0 16	¥	6.29	8	415.07	164.99	800.00	0.361000	0.710000	301.39
2215551 0.13 1594.0 10	0.13 1594.0 10	1594.0 1(	Ť	6.29	<b>2</b> 2	415.07	164.99	800.00	0.361000	0.710000	301.39
2215551 0.13 1594.0 1	0.13 1594.0 1	1594.0 1	<del>~</del>	6.29	<b>2</b> 8	415.07	164.99	800.00	0.361000	0.710000	301.39
2215551 0.13 1594.0 1	0.13 1594.0 1	1594.0 1	-	17.68	94	419.19	155.05	800.00	0.361000	0.710000	301.39
2215551 0.13 1314.3	0.13 1314.3	1314.3		16.53	92	437.33	168.06	834.29	0.485750	0.874500	291.80
2215551 0.13 1314.3	0.13 1314.3	1314.3		16.53	92	437.33	168.06	834.29	0.485750	0.874500	291.80
2215551 0.13 1314.3	0.13 1314.3	1314.3		16.53	92	437.33	168.06	834.29	0.485750	0.874500	291.80
2215551 0.13 1314.3	0.13 1314.3	1314.3		16.53	92	437.33	168.06	834.29	0.485750	0.874500	291.80

1. Data listed above was determined in accordance with standard test methods, frequencies and procedures defined internally by plant and product type Rolls tested on this shipment are identified with an astenisk(\*)
 HU# is handling unit and is terminology for roll number and "production order" equates to lot number.

Our enterprise resource planning system generates sequential handling unit and production

order designations independent of the manufacturing facility producing the product.

Therefore, handling unit numbers may not be in sequential order within a production order.

Propex Operating Company, LLC, 6025 Lee Hwy, Suite 425, PO Box 22788 Chattanooga TN 37422

Page 1 of 4

		PEX	8	Certific	ate of	Analysis	C.	Quality	ur .n. Manager
BOL:	80471589	M	1004461	1701 15fbx30	Oft bik GEO	ТЕХ	style 1701 Cust P	O: 035715	
HU#/Rolls		Thickness	Water Flow Ra	<sup>ite</sup> XMD Elong @ Break	XMD Tensile @ Break	XMD Trap Tear			
Shipped	units	MIL	GMF	%	LB	ГВ			
	ASTM Test	D-5199	D-4491	D-4632	D-4632	D-4533			
2020484688	2213188	224	59.325000	106	549.24	246.00			
2020484689	2213188	224	59.325000	106	549.24	246.00			
2020484695	* 2213188	240	68.875000	123	534.34	237.95			
2020484697	* 2213188	240	68.875000	123	534.34	237.95			
2020484699	2213188	240	68.875000	123	534.34	237.95			
2020484700	2213188	240	68.875000	123	534.34	237.95			
2020484701	2213188	240	68.875000	123	534.34	237.95			
2020484/02 2020484703	2213188	240	68.875000 60.875000	123	534.34	237.95			
2020464/03	* 2242400	240 240	000270-02	123	524.25	237.95			
2020484706	* 2243488	240 240	00.075000	200 200	003.80	293.89 202 80			
2020549931	* 2215374	241	87 075000	8	000.0U	233.53 232.52			
2020549932	* 2215374	211	87 075000		508.28	222.33 227 53			
2020549934	* 2215374	211	87.075000	100	508.38	222.33 222 53			
2020552215	2215374	211	87.075000	93	756.85	268 72			
2020552217	2215374	211	87.075000	<b>9</b> 3	756.85	268.72			
2020552322	* 2215551	222	50.700000	103	497.14	215.49			
2020552323	2215551	222	50.700000	103	497.14	215.49			
2020552324	2215551	222	50.700000	103	497.14	215.49			
2020552325	2215551	222	50.700000	103	497.14	215.49			
2020552326	2215551	222	50.700000	103	497.14	215.49			
2020552327	2215551	222	50.700000	103	497.14	215.49			
2020552328	2215551		50.700000	103	497.14	215.49			
2020552329	2215551		50.700000	103	497.14	215.49			
2020552330 20205522334	7215551 2245555		50.700000	103	497.14	215.49			
20205522351	1000122	777 777	50.70000	103	497.14	215.49 215.40			
2020552333	* 2215551	222	50 70000	<u>8</u>	431,14 640 44	213.43 236 03			
2020552414	2215551	205	64.575000	95	579.06	255.03			
2020552415	2215551	205	64.575000	95	90 673	265.67			
2020552416	2215551	205	64.575000	95	579.06	265.67			
2020552417	2215551	205	64.575000	95	579.06	265.67			
1 Data lie	stad above v	vae determinod	secondaria di	+ brobacto dfin a	<u> </u>	-	•		
2. Rolls te	sted on this	shipment are it	In accountance dentified with a	e wiuri stariuaru i an asterisk(*)	lest memous, II	equencies and procedures den	ined internally by plant and pro	oduct type	
3. HU# is	handling un	it and is termind	ology for roll n	umber and "proc	Juction order" e	equates to lot number.			
Our enter	prise resour	ce planning sys	stern generate	s sequential han	Idling unit and I	production			
order des	ignations inc	dependent of th	e manufacturi	ing facility produc	cing the produc	۲			
	s, nanoung u nemting Co:		ay not be in se	equential order w	ithin a producti	on order.		ď	age 2 of 4
	heidury w	IIIpaily, LLC, UL	JZD LEE UWY,	OUILE 423, FO D	0X 22/ 00 UIAI	tanooga IN 31422			)

BOL: 80471589

# **Certificate of Analysis**

**Quality Manager** ר זני מי יו

1701 15ftx300ft blk GEOTEX MV 1004461

Cust PO: 035715 style 1701

HU#/Rolls		AOS (mm)	CBR	Mass/Unit Area	MD Elong @ Break	MD Tensile @ Break	MD Trap Tear	Mullen Burst	Permeability	Permittivity	Puncture
Shipped	units	MM	LB	OSY	%	LB LB	สา	ISI	2M	1/S	B
	ASTM Test	D-4751	D-6241	D-5261	D-4632	D-4632	D-4533	D-3786	D-4491	D-4491	D-4833
2020552418	2215551	0.13	1314.3	16.53	92	437.33	168.06	834 29	0 485750	0 874500	201 80
2020552419	2215551	0.13	1314.3	16.53	92	437.33	168.06	834 29	0.485750	0.014300	001.00
2020552420	* 2215551	0.13	1314.3	16.07	106	455.97	166 98	834.29	0.485750	0.874500	201 00
2020552423	* 2215551	0.13	1314.3	16.07	106	455.97	166.98	834.29	0.485750	0.874500	291.80

1. Data listed above was determined in accordance with standard test methods, frequencies and procedures defined internally by plant and product type Rolls tested on this shipment are identified with an asterisk(\*)
 HU# is handling unit and is terminology for roll number and "production order" equates to lot number.

Our enterprise resource planning system generates sequential handling unit and production

order designations independent of the manufacturing facility producing the product.

Therefore, handling unit numbers may not be in sequential order within a production order. Propex Operating Company, LLC, 6025 Lee Hwy, Suite 425, PO Box 22788 Chattanooga TN 37422

Page 3 of 4



# **Certificate of Analysis**

**Quality Manager** ר זני יוי יוי E N

Cust PO: 035715

style 1701

01 15ftx300ft blk GEOTEX
1004461 17(
M
80471589
BOL:

HU#/Rolls		Thickness	Water Flow Rate	e XMD Elong @ Break	XMD Tensile @ Break	XMD Trap Tear
Shipped	units	MIL	GMF	%	LB	ГВ
	ASTM Test	D-5199	D-4491	D-4632	D-4632	D-4533
2020552418	2215551	205	64.575000	95	579.06	265.67
2020552419	2215551	205	64.575000	95	579.06	265.67
2020552420	* 2215551	205	64.575000	102	593.06	250.94
2020552423	* 2215551	205	64.575000	102	593.06	250.94

. Data listed above was determined in accordance with standard test methods, frequencies and procedures defined internally by plant and product type Rolls tested on this shipment are identified with an astenisk(\*)
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Page 4 of 4

Therefore, handling unit numbers may not be in sequential order within a production order. Propex Operating Company, LLC, 6025 Lee Hwy, Suite 425, PO Box 22788 Chattanooga TN 37422

Project Cert Forms

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TE	RMINAL 5 UNIT T PROJECT	RAIN IMPROVEM	ENTS
	FOR THE PORT C	OF VANCOUVER, N	NA
			Contification
(Circle Material Type	)	OBGRADE - Daily (	Gertification
REPORT NO.:	#01	DATE:	February 13, 2010
	. Engine Mant and		
AREAREFERENCED	: From West end	anchor trench to	220 LF East,
from North to Sout	h limits	V <sup>-1</sup> 11/17	
LINER PANEL NUMBI	ERS INSTALLED OV	ER REFERENCED	AREA THIS DATE:
	~ .		
	<u>P1</u>	thru P7	- Vildmanaa
WE THE UNDERSIG	SNED CERTIFY TH	AT WE HAVE INS	SPECTED THE ENTIRE
SURFACE, AND HAVI	E REVIEWED THE A	PPROPRIATE SPE	CIAL PROVISIONS AND
RELATED SHOP DR	AWINGS FOR MAT	FERIAL AND PLAC	ement, and find all
CONDITIONS ACCE	EPTABLE FOR F	PLACEMENT OF	THE [60-MIL HDPE
GEOMEMBRANE, GE	ONET/GEOTEXTILI	E DRAINAGE COM	POSITE, GEOTEXTILES,
CUSHION GEOTEXTI	LE, TRIAXIAL GEO	GRID].	
NE SPECIFICALLY T	AKE THE FOLLOW	ING EXCEPTIONS	TO THE ACCEPTANCE
OF THE SUBGRADE	ON THIS DATE:		
Noto: All overations	aball be approved	by Owner or Engine	
Geomembrane Liner I	stallation)	by Owner or Engine	er phor to ou-mill HDPE
0 .			
-m/	Jeff Boys - ACF West (	Construction Co. Inc.	
//INSTACLER SI		sonsituenon co., me.	
	GNATURE	<u>sonstruction</u> co., me.	
V ()		<u></u>	
· · · · · ·		<u></u>	

	ECT NO. XXXXXXX	
FOR THE POF	RT OF VANCOUVE	R, WA
CERTIFICATION OF ACCEPTANCE ( (Circle Material Type)	<u> JF SUBGRADE</u> - Dai	ly Certification
(en ele material Type)		
		Echrusov 15 2010
REFORT NO	DATE	replucity 15, 2010
AREA REFERENCED: 220 LF from	West end anchor	trench to 350 LF East,
from North to South limits		
LINER PANEL NUMBERS INSTALLED	OVER REFERENCI	ED AREA THIS DATE:
	P8 thru P17	
WE THE UNDERSIGNED CERTIFY	THAT WE HAVE	INSPECTED THE ENTIRE
SURFACE, AND HAVE REVIEWED T	HE APPROPRIATE S	PECIAL PROVISIONS AND
RELATED SHOP DRAWINGS FOR	MATERIAL AND PL	ACEMENT. AND FIND ALL
CONDITIONS ACCEPTABLE FOR	R PLACEMENT (	OF THE [60-MIL HDPE
GEOMEMBRANE. GEONET/GEOTE>	TILE DRAINAGE CO	OMPOSITE, GEOTEXTILES,
CUSHION GEOTEXTILE, TRIAXIAL C	GEOGRID].	
WE SPECIFICALLY TAKE THE FOL	LOWING EXCEPTIO	NS TO THE ACCEPTANCE
OF THE SUBGRADE ON THIS DATE:		
(Note: All exceptions shall be appro	ved by Owner or En	gineer prior to 60-mil HDPE
(Note: All exceptions shall be appro Geomembrane Liner Installation)	ved by Owner or En	gineer prior to 60-mil HDPE
(Note: All exceptions shall be appro Geomembrane Liner Installation)	ved by Owner or En	gineer prior to 60-mil HDPE
(Note: All exceptions shall be appro Geomembrane Liner Installation)	ved by Owner or En	gineer prior to 60-mil HDPE
(Note: All exceptions shall be appro Geomembrane Liner Installation)	ved by Owner or En	gineer prior to 60-mil HDPE
(Note: All exceptions shall be appro Geomembrane Liner Installation)	ved by Owner or En <u>Vest Constructi</u> on Co., Ir	gineer prior to 60-mil HDPE
(Note: All exceptions shall be appro Geomembrane Liner Installation)	ved by Owner or En <u>Vest Constructi</u> on Co., Ii	gineer prior to 60-mil HDPE
(Note: All exceptions shall be appro Geomembrane Liner Installation)	ved by Owner or En <u>Vest Constructi</u> on Co., It	gineer prior to 60-mil HDPE

REPORT NO.:	#03	DATE:	February 16, 201
AREA REFEREN	CED: 350 LF from We	est end anchor tre	nch to 418 LF East,
from North to S	South limits		
LINER PANEL NU	JMBERS INSTALLED O	VER REFERENCED	AREA THIS DATE:
	P18	3 thru P21	
		·····	
WE THE UNDE	RSIGNED CERTIFY T	HAT WE HAVE IN	SPECTED THE ENTIRE
SURFACE, AND	HAVE REVIEWED THE	APPROPRIATE SPE	CIAL PROVISIONS AND
RELATED SHOP	DRAWINGS FOR MA	TERIAL AND PLAC	EMENT, AND FIND AL
CONDITIONS /	ACCEPTABLE FOR	PLACEMENT OF	THE [60-MIL HDPI
GEOMEMBRANE	E, GEONET/GEOTEXTIL	E DRAINAGE COM	POSITE, GEOTEXTILES
CUSHION GEOT	EXTILE, TRIAXIAL GEC	)GRID].	
CUSHION GEOT	EXTILE, TRIAXIAL GEC	<i>GRID</i> ]. WING EXCEPTIONS	TO THE ACCEPTANC
CUSHION GEOT WE SPECIFICAL OF THE SUBGR/	EXTILE, TRIAXIAL GEC LY TAKE THE FOLLON ADE ON THIS DATE:	<i>GRID</i> ]. WING EXCEPTIONS	TO THE ACCEPTANCE
<i>CUSHION GEOT</i> WE SPECIFICAL OF THE SUBGR/	EXTILE, TRIAXIAL GEC LY TAKE THE FOLLON ADE ON THIS DATE:	<i>GRID</i> ]. WING EXCEPTIONS	TO THE ACCEPTANC
CUSHION GEOT WE SPECIFICAL OF THE SUBGR/	EXTILE, TRIAXIAL GEC LY TAKE THE FOLLON ADE ON THIS DATE:	<i>GRID</i> ]. WING EXCEPTIONS	TO THE ACCEPTANCI
CUSHION GEOT WE SPECIFICAL OF THE SUBGR/	EXTILE, TRIAXIAL GEC LY TAKE THE FOLLON ADE ON THIS DATE:	<i>GRID</i> ]. WING EXCEPTIONS	TO THE ACCEPTANCE
CUSHION GEOT	EXTILE, TRIAXIAL GEO	OGRID]. WING EXCEPTIONS	TO THE ACCEPTANCE
CUSHION GEOT	EXTILE, TRIAXIAL GEO	OGRID]. WING EXCEPTIONS	TO THE ACCEPTANCE
CUSHION GEOT	EXTILE, TRIAXIAL GEC LY TAKE THE FOLLON ADE ON THIS DATE:	OGRID]. WING EXCEPTIONS	TO THE ACCEPTANCI
CUSHION GEOT WE SPECIFICAL OF THE SUBGR/ (Note: All excep Geomembrane Li	EXTILE, TRIAXIAL GEC LY TAKE THE FOLLON ADE ON THIS DATE: tions shall be approved ner installation)	<i>GRID</i> ]. WING EXCEPTIONS	TO THE ACCEPTANC
CUSHION GEOT WE SPECIFICAL OF THE SUBGR/ (Note: All excep Geomembrane Li	EXTILE, TRIAXIAL GEC	OGRID]. WING EXCEPTIONS	TO THE ACCEPTANC
CUSHION GEOT WE SPECIFICAL OF THE SUBGR/ (Note: All excep Geomembrane Li	EXTILE, TRIAXIAL GEC	OGRID]. WING EXCEPTIONS	TO THE ACCEPTANCI
CUSHION GEOT WE SPECIFICAL OF THE SUBGR/ (Note: All excep Geomembrane Li	EXTILE, TRIAXIAL GEO	<i>OGRID</i> ]. WING EXCEPTIONS	TO THE ACCEPTANC
CUSHION GEOT	EXTILE, TRIAXIAL GEO LY TAKE THE FOLLON ADE ON THIS DATE: tions shall be approved ner installation)	bGRID].	TO THE ACCEPTANCI
CUSHION GEOT WE SPECIFICAL OF THE SUBGR/ (Note: All excep Geomembrane Li	EXTILE, TRIAXIAL GEC LY TAKE THE FOLLON ADE ON THIS DATE: tions shall be approved ner Installation)	OGRID]. WING EXCEPTIONS	TO THE ACCEPTANC
CUSHION GEOT WE SPECIFICAL OF THE SUBGRA (Note: All excep Geomembrane Li	EXTILE, TRIAXIAL GEC LY TAKE THE FOLLON ADE ON THIS DATE: tions shall be approved ner installation)	OGRID]. WING EXCEPTIONS	TO THE ACCEPTANCI
CUSHION GEOT WE SPECIFICAL OF THE SUBGRA (Note: All excep Geomembrane Li	EXTILE, TRIAXIAL GEO LY TAKE THE FOLLON ADE ON THIS DATE: tions shall be approved ner Installation)	OGRID]. WING EXCEPTIONS	TO THE ACCEPTANCE
CUSHION GEOT WE SPECIFICAL OF THE SUBGRA (Note: All excep Geomembrane Li	EXTILE, TRIAXIAL GEO LY TAKE THE FOLLON ADE ON THIS DATE: tions shall be approved ner installation) Jeff Boys - ACF West ER SIGNATURE	OGRID]. WING EXCEPTIONS by Owner or Engin	TO THE ACCEPTANCI

TE	RMINAL 5 UNIT TH		ENTS
1		NO, XXXXXXX F VANCOUVER N	MΔ
CERTIFICATION OF A	CCEPTANCE OF S	<u>UBGRADE</u> - Daily (	Certification
(Circle Material Type)			
REPORT NO .:	#04	DATE:	February 17, 2010
AREA REFERENCED:	418 LF from Wes	t end anchor tre	nch to 682 LF East.
from North to South	<u>ı limits</u>	v.,	and a second
LINER PANEL NUMBE	RS INSTALLED OV	ER REFERENCED	AREA THIS DATE:
······································	P22	thru P39	an ar an
WE THE UNDERSIG	NED CERTIFY TH	AT WE HAVE IN	SPECTED THE ENTIRE
SURFACE, AND HAVE	REVIEWED THE A	PPROPRIATE SPE	CIAL PROVISIONS AND
RELATED SHOP DR.	AWINGS FOR MAT	ERIAL AND PLAC	EMENT, AND FIND ALL
CONDITIONS ACCE	PTABLE FOR F	LACEMENT OF	THE [60-MIL HDPE
GEOMEMBRANE, GE	ONET/GEOTEXTILE	E DRAINAGE COM	POSITE, GEOTEXTILES,
CUSHION GEOTEXTI	LE, TRIAXIAL GEOG	GRID].	
WE SPECIFICALLY T	AKE THE FOLLOW	ING EXCEPTIONS	TO THE ACCEPTANCE
OF THE SUBGRADE	ON THIS DATE:		
	····		
(Note: All exceptions	shall be approved	ov Owner or Engine	eer prior to 60-mil HDPE
Geomembrane Liner Ir	stallation)	,	,
0			
-m/	Jeff Boys - ACF West C	Construction Co., Inc.	
INSTACLER SI	GNATURE		
CONTRACTOR	SIGNATURE		

REPORT NO.:	#05	DATE:	February 18, 201
AREA REFERENCED	682 LF from We	est end anchor tre	nch to East limit,
from North to South	<u>ı limits</u>		er e
LINER PANEL NUMBE	ERS INSTALLED O	VER REFERENCED	AREA THIS DATE:
	P4(	) thru P57	
CONDITIONS ACCE GEOMEMBRANE, GE CUSHION GEOTEXTI	EPTABLE FOR CONET/GEOTEXTIL LE, TRIAXIAL GEO	PLACEMENT OF .E DRAINAGE COM OGRID].	THE [60-MIL HDP POSITE, GEOTEXTILES
CONDITIONS ACCE GEOMEMBRANE, GE CUSHION GEOTEXTI WE SPECIFICALLY T OF THE SUBGRADE	EPTABLE FOR CONET/GEOTEXTIL LE, TRIAXIAL GEO AKE THE FOLLON ON THIS DATE:	PLACEMENT OF .E DRAINAGE COM OGRID]. WING EXCEPTIONS	THE [60-MIL HDP POSITE, GEOTEXTILES
(Note: All exceptions Geomembrane Liner Ir	PTABLE FOR ONET/GEOTEXTIL LE, TRIAXIAL GEO AKE THE FOLLON ON THIS DATE: shall be approved nstallation)	PLACEMENT OF E DRAINAGE COM OGRID]. WING EXCEPTIONS	THE [60-MIL HDP POSITE, GEOTEXTILES TO THE ACCEPTANC

TERMINAL 5 UNIT TRAIN IMPROVEMENTS PROJECT NO. xxxxxxx
FOR THE PORT OF VANCOUVER, WA
CERTIFICATION OF MATERIAL ACCEPTANCE FROM SHIPPER
(Per shipment: each roll or container) (Circle Material Type)
REPORT NO.: #01 DATE: February 10, 2010
PANEL ROLL AND CONTAINER NUMBER REFERENCES Propex Lot #1
WE THE UNDERSIGNED ACCEPT THE 160-MU HDDE GEOMEMBRANE
WE THE UNDERSIGNED ACCEPT THE [00-WIL HDFL GEOWEWDRANE,
GEONET/GEOTEXTILE DRAINAGE COMPOSITE, GEOTEXTILES, COSHON
GEOTEXTILE, TRIAXIAL GEOGRIDJ FROM THE TRANSPORTER. THESE
MATERIALS WERE RECEIVED IN UNDAMAGED CONDITION BASED UPON OUR
VISUAL INSPECTION.
()
Jeff Boys - ACF West Construction Co., Inc.
// INSTALLER SIGNATURE
· v
CONTRACTOR SIGNATURE

1	TERMINAL 5 UNIT TRAIN IMPROVEMENTS
2	
3	FOR THE FORT OF VANCOUVER, WA
5	CERTIFICATION OF MATERIAL ACCEPTANCE FROM SHIPPER
6	(Per shipment; each roll or container) (Circle Material Type)
. 7	
8	$DEDORTNO = \#02 \qquad DATE = Eabruary 10,2010$
9 10	REPORTINO #02 DATE. Tebruary 10, 2010
11	PANEL, ROLL, AND CONTAINER NUMBER REFERENCES GSE_Lot #1
12	
13	
14	
16	WE THE UNDERSIGNED ACCEPT THE [60-MIL HDPE GEOMEMBRANE.
17	GEONET/GEOTEXTILE DRAINAGE COMPOSITE GEOTEXTILES CUSHION
18	GEOTEXTILE TRIAXIAL GEOGRID) FROM THE TRANSPORTER THESE
10	MATERIALS WERE RECEIVED IN UNDAMAGED CONDITION BASED UPON OUR
19	VICUAL INSPECTION
20	VISUAL INSPECTION.
21	
23	
24	
25	
26	Latt Dava ACE Wash Construction Co. Inc.
27	INSTALLER SIGNATURE
20	
30	
31	
32	CONTRACTOR SIGNATURE

r er sinpilient, edon	roll or container) (Circ	cle Material Type)	<u></u>
REPORT NO.:	#03	DATE:	February <u>12, 2010</u>
PANEL, ROLL, AND C	ONTAINER NUMBER	REFERENCES	GSE Lot #2
	BIGNED ACCEPT T	HE [60-MIL HD	PE GEOMEMBRANE,
GEONENGLOTEXTI GEOTEXTILE, TRIA MATERIALS WERE I	<i>XIAL GEOGRID</i> ] FI RECEIVED IN UNDAN	ROM THE TRAN MAGED CONDITIO	ISPORTER. THESE N BASED UPON OUR
ISUAL INSPECTION	l.		

	PROJECT N FOR THE PORT	O. XXXXXXX OF VANCOUVER	R, WA
CERTIFICATION OF	MATERIAL ACCEPTA	NCE FROM SHIPP	ER
Per shipment; each	roll or container) (Cir	cle Material Type)	
REPORT NO.:	#04	DATE:	February 15, 2 <u>010</u>
PANEL, ROLL, AND (	CONTAINER NUMBER	REFERENCES	GSE Lot #3
			eer en weer eftigt is die staat dat weer een eerste een die staat die staat die staat die staat die staat die s
NE THE UNDER GEONET/GEOTEXTI GEOTEXTILE, TRIA MATERIALS WERE VISUAL INSPECTION	BIGNED ACCEPT T LE DRAINAGE CO XIAL GEOGRID] F RECEIVED IN UNDAI I.	THE [60-MIL HD DMPOSITE, GEO ROM THE TRAN MAGED CONDITIC	DPE GEOMEMBRANE, TEXTILES, CUSHION NSPORTER. THESE DN BASED UPON OUR
TINSTALLER S	Jeff Boys - ACF West Co	o <u>nstructi</u> on Co., Inc.	
v			
CONTRACTO	R SIGNATURE		

	PROJECT N FOR THE PORT	O. xxxxxxx OF VANCOUVER	₹, WA
CERTIFICATION OF (Per shipment; eac	MATERIAL ACCEPTAI	NCE FROM SHIPP cle Material Type)	ER
REPORT NO.:	#05	DATE:	February 15, 201
PANEL, ROLL, AND	CONTAINER NUMBER	REFERENCES	GSE Lot #4
WE THE UNDER GEONET/GEOTEXT GEOTEXTILE, TRI MATERIALS WERE VISUAL INSPECTIC	RSIGNED ACCEPT T FILE DRAINAGE CO IAXIAL GEOGRID] FI RECEIVED IN UNDAN DN.	HE [60-MIL HL DMPOSITE, GEC ROM THE TRAI MAGED CONDITIC	DE GEOMEMBRANE DTEXTILES, CUSHION NSPORTER. THESE ON BASED UPON OUF
TINSTALLER	<b>7</b> Jeff Boys - ACF West Co SIGNATURE	<u>nstructi</u> on Co., Inc.	

TERMINAL 5 UNIT TRAIN IMPROVEMENTS PROJECT NO. xxxxxxx FOR THE PORT OF VANCOUVER, WA
<u>CERTIFICATE OF MATERIAL INSTALLATION</u> - Daily Certification (Circle Material Type)
REPORT NO.: #01 DATE: February 13, 2010
AREA REFERENCED:       From West end anchor trench to 220 LF East,         from North to South limits
LINER PANEL NUMBERS INSTALLED THIS DATE: P1 thru P7
WE THE UNDERSIGNED CERTIFY THAT THE [60-MIL HDPE GEOMEMBRANE, GEONET/GEOTEXTILE DRAINAGE COMPOSITE, GEOTEXTILES, CUSHION GEOTEXTILE, TRIAXIAL GEOGRID] WAS INSTALLED IN ACCORDANCE WITH THE APPLICABLE SPECIAL PROVISIONS AND WITH APPROVED SHOP DRAWINGS.
Jeff Boys - ACF West Construction Co., Inc. INSTACLER SIGNATURE

1	TERMINAL 5 UNIT TRAIN IMPROVEMENTS PROJECT NO. XXXXXXX
3	FOR THE PORT OF VANCOUVER, WA
4 5 6 7	<u>CERTIFICATE OF MATERIAL INSTALLATION</u> - Daily Certification (Circle Material Type)
8 9 10	REPORT NO.: #02 DATE: February 15, 2010
11	AREA REFERENCED: 220 LF from West end anchor trench to 350 LF East,
12 13	from North to South limits
14 15 16	LINER PANEL NUMBERS INSTALLED THIS DATE: P8 thru P17
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33	WE THE UNDERSIGNED CERTIFY THAT THE [60-MIL HDPE GEOMEMBRANE, GEONET/GEOTEXTILE DRAINAGE COMPOSITE, GEOTEXTILES, CUSHION GEOTEXTILE, TRIAXIAL GEOGRID] WAS INSTALLED IN ACCORDANCE WITH THE APPLICABLE SPECIAL PROVISIONS AND WITH APPROVED SHOP DRAWINGS.
34 35 36 37	CONTRACTOR SIGNATURE

1 2 3	TERMINAL 5 UNIT TRAIN IMPROVEMENTS PROJECT NO. xxxxxxx FOR THE PORT OF VANCOUVER, WA
4 5 6 7	<u>CERTIFICATE OF MATERIAL INSTALLATION</u> - Daily Certification (Circle Material Type)
8 9	REPORT NO.:#03 DATE:February 16, 2010
10 11 12	AREA REFERENCED: 350 LF from West end anchor trench to 418 LF East,
13 14	from North to South limits
15 16	LINER PANEL NUMBERS INSTALLED THIS DATE: P18 thru P21
17 18 19	
20 21 22 23 24 25	WE THE UNDERSIGNED CERTIFY THAT THE [60-MIL HDPE GEOMEMBRANE, GEONET/GEOTEXTILE DRAINAGE COMPOSITE, GEOTEXTILES, CUSHION GEOTEXTILE, TRIAXIAL GEOGRID] WAS INSTALLED IN ACCORDANCE WITH THE APPLICABLE SPECIAL PROVISIONS AND WITH APPROVED SHOP DRAWINGS.
26 27 28 29 30 31 32 33 34	Jeff Boys - ACF West Construction Co., Inc. INSTALLER SIGNATURE
35 36 37	CONTRACTOR SIGNATURE
1 2 3	TERMINAL 5 UNIT TRAIN IMPROVEMENTS PROJECT NO. xxxxxxx FOR THE PORT OF VANCOUVER, WA
--	--
4 5 6 7	<u>CERTIFICATE OF MATERIAL INSTALLATION</u> - Daily Certification (Circle Material Type)
8 9	REPORT NO.:#04 DATE:February 17, 2010
10 11 12	AREA REFERENCED: 418 LF from West end anchor trench to 682 LF East,
12	from North to South limits
14 15 16	LINER PANEL NUMBERS INSTALLED THIS DATE: P22 thru P39
17 18 19 20 21 22 22	WE THE UNDERSIGNED CERTIFY THAT THE [60-MIL HDPE GEOMEMBRANE, GEONET/GEOTEXTILE DRAINAGE COMPOSITE, GEOTEXTILES, CUSHION GEOTEXTILE TRIAXIAL GEOGRIDI WAS INSTALLED IN ACCORDANCE WITH THE
24 25 26 27 28 29	APPLICABLE SPECIAL PROVISIONS AND WITH APPROVED SHOP DRAWINGS.
30 31 32 33 34 35	Jeff Boys - ACF West Construction Co., Inc. INSTALLER SIGNATURE
30 37	

TE	RMINAL 5 UNIT T PROJECT FOR THE PORT C	RAIN IMPROVEM NO. xxxxxxx )F VANCOUVER, V	ENTS WA
<u>CERTIFICATE OF MA</u> (Circle Material Type)	TERIAL INSTALLAT	<u> FION</u> - Daily Certific	cation
REPORT NO.:	#05	DATE:	February 18, 2010
AREA REFERENCED	682 LF from We	st end anchor trei	nch to East limit,
from North to South	n limits		
LINER PANEL NUMBE	RS INSTALLED TH	IS DATE:	P40 thru P57
WE THE UNDERSIG GEONET/GEOTEXTIL GEOTEXTILE, TRIAX APPLICABLE SPECIA	NED CERTIFY TH E DRAINAGE ( AL GEOGRID] WAS L PROVISIONS ANI	IAT THE [60-MIL   COMPOSITE, GEO S INSTALLED IN AO D WITH APPROVED	HDPE GEOMEMBRANE, DTEXTILES, CUSHION CCORDANCE WITH THE SHOP DRAWINGS.
AINSTACLER SI	Jeff Boys - ACF West GNATURE	<u>Constructi</u> on Co., Inc.	
CONTRACTOR	RSIGNATURE		

1 2 3	TERMINAL 5 UNIT TRAIN IMPROVEMENTS PROJECT NO. xxxxxxx FOR THE PORT OF VANCOUVER, WA
4 5 6 7 8	<u>CERTIFICATION OF MATERIAL JOINTS</u> - Daily Certification Per Test (As Shop Drawings and as a Compiled Report at the end of Project) (Circle Material Type)
10	TEST REPORT NO.:
11 12 13	FIELD LOG NO.: N/A (See Attached QA/QC Docs)
14 15 16 17 18 19	LIST OF ALL DEFICIENCIES AND SUBSEQUENT REPAIRS, COPIES OF ALL FIELD AND FACTORY TESTS AND INSPECTION DATA INCLUDING RECORDS OF ALL NON-DESTRUCTIVE TESTING (Field Logs) AND REPAIRS ARE ATTACHED.
20 21 22 23 24 25 26 27 28 29 30 31 32 33	WE THE UNDERSIGNED CERTIFY THAT THE [60-MIL HDPE GEOMEMBRANE AND ITS JOINTS WERE INSPECTED AND TESTED FOR STRENGTH AND CONTINUITY, GEOTEXTILE SEAMS WERE INSPECTED FOR CONTINUITY] AND PASSED ALL INSPECTIONS AND TESTS. WHERE FAILING TESTS OR DEFICIENCIES OCCURRED, THE AREA OF FAILURE WAS IDENTIFIED IN ACCORDANCE WITH THE APPROVED QUALITY CONTROL PROGRAM FOR THE PROJECT AND REPAIRED. THE AREAS OF FAILING TESTS, DEFICIENCIES AND THE SUBSEQUENT RETESTS OR TESTS TO DELINEATE THE LIMITS OF FAILURE ARE IDENTIFIED IN THE ATTACHED SEAM TESTS AND INSPECTION DATA.
34 35 36 37 38 39 40 41 42 43	Jeff Boys - ACF West Construction Co., Inc. INSTALLER SIGNATURE

1 2 3	TERMINAL 5 UNIT TRAIN IMPROVEMENTS PROJECT NO. xxxxxxx FOR THE PORT OF VANCOUVER, WA
4 5 6 7 8	<u>CERTIFICATION OF MATERIAL JOINTS</u> - Daily Certification Per Test (As Shop Drawings and as a Compiled Report at the end of Project) (Circle Material Type)
10	TEST REPORT NO.: #02 DATE: February 15, 2010
11 12 12	FIELD LOG NO.: <u>N/A (See Attached QA/QC Docs)</u>
13 14 15	LIST OF ALL DEFICIENCIES AND SUBSEQUENT REPAIRS, COPIES OF ALL FIELD AND FACTORY TESTS AND INSPECTION DATA INCLUDING RECORDS OF ALL
16 17 18 19 20 21	NON-DESTRUCTIVE TESTING (Field Logs) AND REPAIRS ARE ATTACHED.
22	WE THE UNDERSIGNED CERTIFY THAT THE [60-MIL HDPE GEOMEMBRANE AND
23 24 25 26 27 28 29 30 31 32 33 34 25	ITS JOINTS WERE INSPECTED AND TESTED FOR STRENGTH AND CONTINUITY, GEOTEXTILE SEAMS WERE INSPECTED FOR CONTINUITY] AND PASSED ALL INSPECTIONS AND TESTS. WHERE FAILING TESTS OR DEFICIENCIES OCCURRED, THE AREA OF FAILURE WAS IDENTIFIED IN ACCORDANCE WITH THE APPROVED QUALITY CONTROL PROGRAM FOR THE PROJECT AND REPAIRED. THE AREAS OF FAILING TESTS, DEFICIENCIES AND THE SUBSEQUENT RETESTS OR TESTS TO DELINEATE THE LIMITS OF FAILURE ARE IDENTIFIED IN THE ATTACHED SEAM TESTS AND INSPECTION DATA.
35 36 37 38 39 40 41 42 43	Jeff Boys - ACF West Construction Co., Inc. INSTALLER SIGNATURE

1 2 3	TERMINAL 5 UNIT TRAIN IMPROVEMENTS PROJECT NO. xxxxxxx FOR THE PORT OF VANCOUVER, WA
4 5 6 7 8	<u>CERTIFICATION OF MATERIAL JOINTS</u> - Daily Certification Per Test (As Shop Drawings and as a Compiled Report at the end of Project) (Circle Material Type)
10	TEST REPORT NO.: #03 DATE: February 16, 2010
11 12 13	FIELD LOG NO.: N/A (See Attached QA/QC Docs)
14 15	LIST OF ALL DEFICIENCIES AND SUBSEQUENT REPAIRS, COPIES OF ALL FIELD AND FACTORY TESTS AND INSPECTION DATA INCLUDING RECORDS OF ALL
16 17 18 19 20 21	NON-DESTRUCTIVE TESTING (Field Logs) AND REPAIRS ARE ATTACHED.
22 23 24 25 26 27 28 29 30 31 32 33 33 34	WE THE UNDERSIGNED CERTIFY THAT THE [60-MIL HDPE GEOMEMBRANE AND ITS JOINTS WERE INSPECTED AND TESTED FOR STRENGTH AND CONTINUITY, GEOTEXTILE SEAMS WERE INSPECTED FOR CONTINUITY] AND PASSED ALL INSPECTIONS AND TESTS. WHERE FAILING TESTS OR DEFICIENCIES OCCURRED, THE AREA OF FAILURE WAS IDENTIFIED IN ACCORDANCE WITH THE APPROVED QUALITY CONTROL PROGRAM FOR THE PROJECT AND REPAIRED. THE AREAS OF FAILING TESTS, DEFICIENCIES AND THE SUBSEQUENT RETESTS OR TESTS TO DELINEATE THE LIMITS OF FAILURE ARE IDENTIFIED IN THE ATTACHED SEAM TESTS AND INSPECTION DATA.
35 36 37 38 39 40 41	Jeff Boys - ACF West Construction Co., Inc. INSTALLER SIGNATURE
42 43	CONTRACTOR SIGNATURE

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1 2 3	TERMINAL 5 UNIT TRAIN IMPROVEMENTS PROJECT NO. xxxxxxx FOR THE PORT OF VANCOUVER, WA
4 5 6 7 8 9	<u>CERTIFICATION OF MATERIAL JOINTS</u> - Daily Certification Per Test (As Shop Drawings and as a Compiled Report at the end of Project) (Circle Material Type)
10	TEST REPORT NO.: #04 DATE: February 17, 2010
11 12 13	FIELD LOG NO.: N/A (See Attached QA/QC Docs)
14	LIST OF ALL DEFICIENCIES AND SUBSEQUENT REPAIRS, COPIES OF ALL FIELD
15	AND FACTORY TESTS AND INSPECTION DATA INCLUDING RECORDS OF ALL
16 17 18 19 20 21	NON-DESTRUCTIVE TESTING (Field Logs) AND REPAIRS ARE ATTACHED.
22	WE THE UNDERSIGNED CERTIFY THAT THE [60-MIL HDPE GEOMEMBRANE AND
23	ITS JOINTS WERE INSPECTED AND TESTED FOR STRENGTH AND CONTINUITY,
24	GEOTEXTILE SEAMS WERE INSPECTED FOR CONTINUITY] AND PASSED ALL
25	INSPECTIONS AND TESTS. WHERE FAILING TESTS OR DEFICIENCIES
26	OCCURRED, THE AREA OF FAILURE WAS IDENTIFIED IN ACCORDANCE WITH
27	THE APPROVED QUALITY CONTROL PROGRAM FOR THE PROJECT AND
28	REPAIRED. THE AREAS OF FAILING TESTS, DEFICIENCIES AND THE
29 30	SUBSEQUENT RETESTS OR TESTS TO DELINEATE THE LIMITS OF FAILURE ARE
31 32 33 34	IDENTIFIED IN THE ATTACHED SEAM TESTS AND INSPECTION DATA.
35 36 37 38 39 40	Jeff Boys - ACF West Construction Co., Inc. INSTALLER SIGNATURE
41 42 43	CONTRACTOR SIGNATURE

1	TERMINAL 5 UNIT TRAIN IMPROVEMENTS
2 3	FOR THE PORT OF VANCOUVER. WA
4	CERTIFICATION OF BLACEMENT OF AD LACENT LINED COMPONENTS
5 6 7	Daily Certifications; Per Material and Location (Circle Material Type)
8 9 10	REPORT NO.: #01 DATE: February 10, 2010
11 12	COMPONENT BEING PLACED: Propex 1701 Cushion Geotextile
13 14	SUBSTRATE: Sand - Native
14 15 16 17	LOCATION: Below panels P1 thru P18
18 19 20	WE THE UNDERSIGNED CERTIFY THAT THE [60-MIL HDPE GEOMEMBRANE, GEONET/GEOTEXTILE DRAINAGE COMPOSITE, GEOTEXTILES, CUSHION GEOTEXTILE, TRIAXIAL GEOGRID] WAS CAREFULLY PLACED UNDER MY DIRECT
21 22 23 24 25 26	SUPERVISION/OBSERVATION THIS DATE, AND WITHOUT KNOWINGLY DAMAGING ANY OF THE UNDERLYING OR ADJACENT SUBSTRATE.
27 28 29 30 31 32	Jeff Boys - ACF West Construction Co., Inc. INSTALLER SIGNATURE
34 35 36	CONTRACTOR SIGNATURE

1 2	TERMINAL 5 UNIT TRAIN IMPROVEMENTS
- 3 ⊿	FOR THE PORT OF VANCOUVER, WA
5 6 7	<u>CERTIFICATION OF PLACEMENT OF ADJACENT LINER COMPONENTS</u> – Daily Certifications; Per Material and Location (Circle Material Type)
8 9 10	REPORT NO.:#02DATE:February 16, 2010
11 12	COMPONENT BEING PLACED: GSE NW16 Cushion Geotextile
13 14	SUBSTRATE: Sand - Native
15 16 17	LOCATION: Below panels P18 thru P21
17 18 19 20	WE THE UNDERSIGNED CERTIFY THAT THE [60-MIL HDPE GEOMEMBRANE, GEONET/GEOTEXTILE DRAINAGE COMPOSITE, GEOTEXTILES, CUSHION GEOTEXTILE, TRIAXIAL GEOGRID] WAS CAREFULLY PLACED UNDER MY DIRECT
21 22 23 24 25	SUPERVISION/OBSERVATION THIS DATE, AND WITHOUT KNOWINGLY DAMAGING ANY OF THE UNDERLYING OR ADJACENT SUBSTRATE.
25 26 27 28 29 30 31	Jeff Boys - ACF West Construction Co., Inc.
32 33 34 35 36	CONTRACTOR SIGNATURE

1 2 3 4	TERMINAL 5 UNIT TRAIN IMPROVEMENTS PROJECT NO. xxxxxxx FOR THE PORT OF VANCOUVER, WA
5 6 7	<u>CERTIFICATION OF PLACEMENT OF ADJACENT LINER COMPONENTS</u> – Daily Certifications; Per Material and Location (Circle Material Type)
8 9 10	REPORT NO.: #03 DATE: February 16, 2010
10 11 12	COMPONENT BEING PLACED: GSE Fabrinet HF Geocomposite
13	SUBSTRATE: 60 mil HDPE Liner (Textured 2 sides)
14 15 16	LOCATION: Above panels P1 thru P13
17 18 19 20 21 22 23 24 25 26	WE THE UNDERSIGNED CERTIFY THAT THE [60-MIL HDPE GEOMEMBRANE, GEONET/GEOTEXTILE DRAINAGE COMPOSITE, GEOTEXTILES, CUSHION GEOTEXTILE, TRIAXIAL GEOGRID] WAS CAREFULLY PLACED UNDER MY DIRECT SUPERVISION/OBSERVATION THIS DATE, AND WITHOUT KNOWINGLY DAMAGING ANY OF THE UNDERLYING OR ADJACENT SUBSTRATE.
27 28 29 30 31 32 33 34	Jeff Boys - ACF West Construction Co., Inc. INSTALLER SIGNATURE
35 36	

1	TERMINAL 5 UNIT TRAIN IMPROVEMENTS
2	PROJECT NO. xxxxxxx
3	FOR THE PORT OF VANCOUVER, WA
4 5	CERTIFICATION OF PLACEMENT OF ADJACENT LINER COMPONENTS -
6	Daily Certifications; Per Material and Location (Circle Material Type)
7	
8	PEPOPT NO = #04 DATE Eabruary 47, 2010
9 10	REPORT NO.: DATE: Pebruary 17, 2010
11	COMPONENT BEING PLACED: GSE NW16 Cushion Geotextile
12	
13	SUBSTRATE: Sand - Native
14 15	LOCATION: Below panels P22 thru P57
16	
17	
18	WE THE UNDERSIGNED CERTIFY THAT THE [60-MIL HDPE GEOMEMBRANE,
19	GEONET/GEOTEXTILE DRAINAGE COMPOSITE, GEOTEXTILES, CUSHION
20	GEOTEXTILE, TRIAXIAL GEOGRID] WAS CAREFULLY PLACED UNDER MY DIRECT
21	SUPERVISION/OBSERVATION THIS DATE, AND WITHOUT KNOWINGLY DAMAGING
22	ANY OF THE UNDERLYING OR ADJACENT SUBSTRATE.
23	
24	
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28	$\Theta$
29	Jeff Boys - ACF West Construction Co., Inc.
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33	
34	CONTRACTOR SIGNATURE
35 36	
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1	TERMINAL 5 UNIT TRAIN IMPROVEMENTS
23	FOR THE PORT OF VANCOUVER, WA
4	, 
5	CERTIFICATION OF PLACEMENT OF ADJACENT LINER COMPONENTS -
7	Dany Certifications, Per Material and Location (Circle Material Type)
8	
9	REPORT NO.:#05 DATE: February 17, 2010
10	COMPONENT BEING PLACED: GSE Fabrinet HF Geocomposite
12	
13	SUBSTRATE: 60 mil HDPE Liner (Textured 2 sides)
14 15	LOCATION: Above panels P14 thru P21
16	
17 10	
10	WE THE UNDERSIGNED CERTIFY THAT THE [00-MIL HDPE GEOMEMBRANE,
19	GEONETIGEOTEXTILE DRAINAGE COMPOSITE, GEOTEXTILES, CUSHION
20	
22	ANY OF THE LINDERLYING OR ADJACENT SUBSTRATE
23	ANT OF THE ONDERETING OR ADDRAENT GODOTTATE.
24	
25	
26 27	
28	$\Theta$
29	Jeff Boys - ACF West Construction Co., Inc.
30 31	INSTALLER SIGNATURE
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33 24	
34 35	CONTRACTOR SIGNATORE
36	

1 2 3	TERMINAL 5 UNIT TRAIN IMPROVEMENTS PROJECT NO. xxxxxxx FOR THE PORT OF VANCOUVER, WA
4 5 6 7	<u>CERTIFICATION OF PLACEMENT OF ADJACENT LINER COMPONENTS</u> – Daily Certifications; Per Material and Location (Circle Material Type)
8 9 10	REPORT NO.: #06 DATE: February 18, 2010
11 12	COMPONENT BEING PLACED: GSE Fabrinet HF Geocomposite
13 14 15	LOCATION: Above panels P22 thru P38
16 17 18 19 20 21 22 23 24	WE THE UNDERSIGNED CERTIFY THAT THE [60-MIL HDPE GEOMEMBRANE, GEONET/GEOTEXTILE DRAINAGE COMPOSITE, GEOTEXTILES, CUSHION GEOTEXTILE, TRIAXIAL GEOGRID] WAS CAREFULLY PLACED UNDER MY DIRECT SUPERVISION/OBSERVATION THIS DATE, AND WITHOUT KNOWINGLY DAMAGING ANY OF THE UNDERLYING OR ADJACENT SUBSTRATE.
25 26 27 28 29 30 31 32 33 34 35 36	Jeff Boys - ACF West Construction Co., Inc. INSTALLER SIGNATURE CONTRACTOR SIGNATURE

1	TERMINAL 5 UNIT TRAIN IMPROVEMENTS								
2	PROJECT NO. xxxxxxx								
3	FOR THE PORT OF VANCOUVER, WA								
4 5	CERTIFICATION OF PLACEMENT OF AD JACENT LINER COMPONENTS -								
6	Daily Certifications; Per Material and Location (Circle Material Type)								
7									
8	DEDODT NO. #07 DATE Echanom 40.2040								
9 10	REPORT NO.: #07 DATE: Pebruary 19, 2010								
11	COMPONENT BEING PLACED: GSE Fabrinet HF Geocomposite								
12									
13	SUBSTRATE: 60 mil HDPE Liner (Textured 2 sides)								
14 15	LOCATION Above panels P39 thru P57								
16									
17									
18	WE THE UNDERSIGNED CERTIFY THAT THE [60-MIL HDPE GEOMEMBRANE,								
19	GEONET/GEOTEXTILE DRAINAGE COMPOSITE, GEOTEXTILES, CUSHION								
20	GEOTEXTILE, TRIAXIAL GEOGRID] WAS CAREFULLY PLACED UNDER MY DIRECT								
21	SUPERVISION/OBSERVATION THIS DATE, AND WITHOUT KNOWINGLY DAMAGING								
22	ANY OF THE UNDERLYING OR ADJACENT SUBSTRATE.								
23									
24									
25 26									
27									
28	$\left( \right) $								
29	Jeff Boys - ACF West Construction Co., Inc.								
31	INSTALLER SIGNATORE								
32									
33									
34 35	CUNTRACTOR SIGNATURE								
36									

1 2 3 4	TERMINAL 5 UNIT TRAIN IMPROVEMENTS PROJECT NO. xxxxxxx FOR THE PORT OF VANCOUVER, WA
5 6 7	<u>CERTIFICATION OF RAW AND FABRICATED MATERIAL</u> (To Accompany Each Shipment) (Circle Material Type)
8 9 10	DATE: February 10, 2010
11 12 13 14	under liner panels P1 thru P18       Lot #1       (roll #'s on certs provided)         (include lot and roll/papel numbers)
15 16 17	WE THE UNDERSIGNED CERTIFY THAT THE RAW MATERIAL AND FINISHED [60-
18 19	MIL HDPE GEOMEMBRANE, GEONET/GEOTEXTILE DRAINAGE COMPOSITE, GEOTEXTILES, CUSHION GEOTEXTILE, TRIAXIAL GEOGRID] FURNISHED FOR
20 21 22	APPLICABLE SPECIAL PROVISIONS FOR THE TERMINAL 5 UNIT TRAIN IMPROVEMENT PROJECT CONSTRUCTION.
23 24 25	
26 27 28	Bronov Inc
29 30 31 32	MANUFACTURER NAME
33 34 35	Jeff Boys - ACF West, Inc. MANUFACTURER SIGNATURE (Authorized Representative)
36 37 38	FABRICATOR NAME
39 40 41	
42 43 44 45	FABRICATOR SIGNATORE (Authorized Representative, if different from Manufacturer)

1 2 3	TERMINAL 5 UNIT TRAIN IMPROVEMENTS PROJECT NO. xxxxxxx FOR THE PORT OF VANCOUVER, WA
5 6 7	<u>CERTIFICATION OF RAW AND FABRICATED MATERIAL</u> (To Accompany Each Shipment) (Circle Material Type)
8 9 10	DATE: February 10, 2010
11 12	MATERIAL DESCRIPTION: <u>GSE 60 mil HDPE Liner (Tex. 2 sides) panels P1 thru P25</u>
13 14 15 16	Lot # 1 Roll #'s ending in 0113, 0125, 0126, 0127, 0130 (include lot and roll/panel numbers)
17 18 19 20 21 22	WE THE UNDERSIGNED CERTIFY THAT THE RAW MATERIAL AND FINISHED [60- MIL HDPE GEOMEMBRANE, GEONET/GEOTEXTILE DRAINAGE COMPOSITE, GEOTEXTILES, CUSHION GEOTEXTILE, TRIAXIAL GEOGRID] FURNISHED FOR THE TERMINAL 5 UNIT TRAIN IMPROVEMENT PROJECT COMPLY WITH APPLICABLE SPECIAL PROVISIONS FOR THE TERMINAL 5 UNIT TRAIN IMPROVEMENT PROJECT CONSTRUCTION.
23 24 25 26 27 28	
29	GSE Lining Technology, Inc.
30 31	
32 33	Jeff Boys - ACF West, Inc.
34 35	MANUFACTURER SIGNATURE (Authorized Representative)
36	N/A
37 38 39 40	FABRICATOR NAME
41 42 43 44 45	FABRICATOR SIGNATURE (Authorized Representative, if different from Manufacturer)

1 2 3	TERMINAL 5 UNIT TRAIN IMPROVEMENTS PROJECT NO. xxxxxxx FOR THE PORT OF VANCOUVER, WA
4 5 6 7	<u>CERTIFICATION OF RAW AND FABRICATED MATERIAL</u> (To Accompany Each Shipment) (Circle Material Type)
8 9 10 11	DATE: February 12, 2010 MATERIAL DESCRIPTION: GSE 60 mil HDRE Liner (Tex. 2 cideo) papalo R25 thru R57
11 12 13 14	Lot # 2 Roll #'s ending in 0116, 0122, 0123, 0124, 0128, 0129 (include lot and roll/panel numbers)
16 17 18 19 20 21	WE THE UNDERSIGNED CERTIFY THAT THE RAW MATERIAL AND FINISHED [60- MIL HDPE GEOMEMBRANE, GEONET/GEOTEXTILE DRAINAGE COMPOSITE, GEOTEXTILES, CUSHION GEOTEXTILE, TRIAXIAL GEOGRID] FURNISHED FOR THE TERMINAL 5 UNIT TRAIN IMPROVEMENT PROJECT COMPLY WITH APPLICABLE SPECIAL PROVISIONS FOR THE TERMINAL 5 UNIT TRAIN
22 23 24 25 26 27	
28 29 30 31	GSE Lining Technology, Inc. MANUFACTURER NAME
31 32 33 34 35	Jeff Boys - ACF West, Inc. MANUFACTURER SIGNATURE (Authorized Representative)
36 37 38 39	FABRICATOR NAME
40 41 42 43 44 45	FABRICATOR SIGNATURE (Authorized Representative, if different from Manufacturer)

1 2 3 4	TERMINAL 5 UNIT TRAIN IMPROVEMENTS PROJECT NO. xxxxxxx FOR THE PORT OF VANCOUVER, WA
5 6 7	<u>CERTIFICATION OF RAW AND FABRICATED MATERIAL</u> (To Accompany Each Shipment) (Circle Material Type)
8 9 10	DATE: February 15, 2010
11 12	MATERIAL DESCRIPTION: <u>GSE NW16 Nonwoven Cushion Geotextile placed</u>
13 14 15	under liner panels P19 thru P57 Lot #3 (roll #'s on certs provided) (include lot and roll/panel numbers)
16 17 18 19	WE THE UNDERSIGNED CERTIFY THAT THE RAW MATERIAL AND FINISHED [60- MIL HDPE GEOMEMBRANE, GEONET/GEOTEXTILE DRAINAGE COMPOSITE, GEOTEXTILES, CUSHION GEOTEXTILE, TRIAXIAL GEOGRID] FURNISHED FOR
20 21 22	THE TERMINAL 5 UNIT TRAIN IMPROVEMENT PROJECT COMPLY WITH APPLICABLE SPECIAL PROVISIONS FOR THE TERMINAL 5 UNIT TRAIN IMPROVEMENT PROJECT CONSTRUCTION.
23 24 25 26 27	
28 29	GSE Lining Technology, Inc.
30	MANUFACTURER NAME
31 32	$\Theta$
33 24	Jeff Boys - ACF West, Inc.
34 35	MANGFACTORER SIGNATORE (Authorized Representative)
36	N/A
38	FABRICATOR NAME
39 40	
40	
42 43 44 45	FABRICATOR SIGNATURE (Authorized Representative, if different from Manufacturer)

1 2 3	TERMINAL 5 UNIT TRAIN IMPROVEMENTS PROJECT NO. xxxxxxx FOR THE PORT OF VANCOUVER, WA
4 5 6 7	<u>CERTIFICATION OF RAW AND FABRICATED MATERIAL</u> (To Accompany Each Shipment) (Circle Material Type)
8 9 10	DATE: February 15, 2010
11 12	MATERIAL DESCRIPTION: GSE Fabrinet HF (8 oz. 2 sides) Geocomposite placed
13 14 15 16	over liner panels P1 thru P57 Lot #4 (roll #'s on certs provided) (include lot and roll/panel numbers)
17 18	WE THE UNDERSIGNED CERTIFY THAT THE RAW MATERIAL AND FINISHED [60-
19	GEOTEXTILES, CUSHION GEOTEXTILE TRIAXIAL GEOGRIDI FURNISHED FOR
20	THE TERMINAL 5 UNIT TRAIN IMPROVEMENT PROJECT COMPLY WITH
21	APPLICABLE SPECIAL PROVISIONS FOR THE TERMINAL 5 UNIT TRAIN
22	IMPROVEMENT PROJECT CONSTRUCTION.
23	
24	
25	
26 27	
28	
29	GSE Lining Technology, Inc.
30	MANUFACTURER NAME
31	
33	Jeff Boys - ACF West, Inc.
34 35	MANUFACTURER SIGNATURE (Authorized Representative)
36	N/A
37 38	FABRICATOR NAME
39 40 41	
42 43 44 45	FABRICATOR SIGNATURE (Authorized Representative, if different from Manufacturer)

# Installation Warranty



8951 SE 76th Drive, Portland, OR 97206 503-771-5115 800-878-5115 Fax: 877-668-8730

ATTN:

Hans Rostchy, Inc.

# GEOMEMBRANE LIMITED WARRANTY 60 mil HDPE

Final Inspection	
Acceptance Date:	April 1, 2010
Beneficiary:	Port of Vancouver
Project:	Terminal 5 Unit Train Improvements, Project #3
Intended Use:	Contaminated Material Cap
Installer:	ACF West Construction Co., Inc.

ACF West Construction Co., Inc. warrants each 60 mil HDPE liner installed by our company to be free from defects resulting from installation for a period of 2 year from date of final inspection acceptance.

ACF West Construction Co., Inc. warrants each 60 mil HDPE liner supplied by our manufacturer to be free from defects in material and workmanship or from failure due to aging or weathering for a period of 20 years from date of final inspection acceptance.

This limited warranty does not include damages or defects in the lining material resulting from Acts of God (catastrophic events such as earthquakes, tornadoes, hurricanes, etc.). The term "normal use" does not include exposure of the liner fabric to materials or chemicals for which it has not been specifically tested or abuse by machinery or other equipment.

Sincerely,

Jeff Boys Vice President



#### **PRODUCT WARRANTY**

### **PRO RATA** LIMITED MATERIAL WARRANTY FOR GSE LINING TECHNOLOGY, LLC (U.S.A.)

Date:	4/16/10	Warranty No.:	61037
Purchaser Name:	Port of Vancouver	Project No.:	61037
Address:	3103 NW Lower River Road	Effective Date:	2/19/10
City, State:	Vancouver, WA. 98660	Project Name:	Terminal 5 Cap
Product Type/Desc	ription: GSE Geomembrane Products	Project Address:	Vancouver, WA.

GSE Lining Technology, LLC ("GSE") warrants each GSE product described above to be free from material manufacturing defects (as described by the contract's material specifications) and to be able to withstand normal weathering for a period of <u>twenty(20) years</u> from the date of sale. This limited warranty does not include damages or defects in the GSE product resulting from acts of God, casualty or catastrophe, including but not limited to: earthquakes, floods, piercing hail, tornadoes or force majeure. The term "normal use" does not include, among other things, the exposure of GSE's product to harmful chemicals, abuse by machinery, equipment or people; improper site preparation or placement of cover materials; excessive pressures or stresses from any source. This warranty is intended for commercial use only and is not in effect for the consumer as defined in the Magnuson-Moss Warranty Act.

Should defects or premature loss of use within the scope of this warranty occur, GSE will, at its option, repair or replace the GSE product on a pro rata basis at the current price in such manner as to charge the Purchaser only for that portion of the warranted life which has elapsed since the purchase of the product. GSE shall have the right to inspect and determine the cause of the alleged defect in the product and to take appropriate steps to repair or replace the product if a defect exists that is covered under this warranty.

Any claim for any alleged breach of this warranty must be made in writing, by certified mail or courier, to GSE Lining Technology, LLC, 19103 Gundle Road, Houston, TX 77073, with the words "Warranty Claim" clearly marked on the face of the envelope, within ten (10) days of Purchaser becoming aware of the alleged defect. Should the required notice not be given, the defect and all warranties are waived by the Purchaser, and Purchaser shall not have rights under this warranty. GSE shall not be obligated to perform any inspection or obligated to perform any repair or replacement under this warranty until the area is made available free from all obstructions, water, dirt, sludge, residuals and liquids of any kind. If after inspection it is determined that there is no claim under this warranty, Purchaser shall reimburse GSE for its costs associated with the site inspection.

In the event the exclusive remedy provided herein fails in its essential purpose, and in that event only, the Purchaser shall be entitled to a return of the purchase price for so much of the product as GSE determines to have violated the warranty provided herein. GSE shall not be liable for direct, indirect, special, consequential or incidental damages resulting from a breach of this warranty including, but not limited to: damages for loss of production, lost profits, personal injury or property damage. GSE shall not be obligated to reimburse Purchaser for any repairs, replacement, modifications or alterations made by Purchaser to GSE's product, unless GSE specifically authorized, in writing, said repairs, replacements, modifications or alterations in advance. GSE liability under this warranty shall in no event exceed the replacement cost of the product sold to the Purchaser for the particular installation in which it failed.

GSE neither assumes nor authorizes any person other than an officer of GSE to assume for it any other or additional liability in connection with the GSE product made on the basis of the Limited Warranty. GSE MAKES NO WARRANTY OF ANY KIND OTHER THAN THAT GIVEN HEREIN AND HEREBY DISCLAIMS ALL WARRANTIES, INCLUDING BOTH EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, AND BY ACCEPTING DELIVERY OF THE PRODUCT, PURCHASER WAIVES ALL OTHER POSSIBLE WARRANTIES. GSE'S WARRANTY BECOMES AN OBLIGATION OF GSE TO PERFORM UNDER THE WARRANTY ONLY UPON RECEIPT OF FINAL PAYMENT.

This warranty is extended to the Purchaser and is non-transferable and non-assignable, i.e. there are no third-party beneficiaries to this warranty.

PWGcomembrane5 R01/15/10

GSE and other trademarks in this document are registered trademarks of GSE Lining Technology, LLC in the United States and certain foreign countries.

As-Built Drawing

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			OT10	P54
P50	P51	P52	P53	P55
				P56
				P57



			FROM: Rotschy, Inc			DATE	2/16/2009	This se	ction to
Bort c	of Vanco	ouver USA	9410 NE 5200 AVE Vancouver, Washir	e ington 98665					pieted
TO. CONS	TRUCTION M	ANAGER	PROJECT: Terminal 5 Unit Tra	ain Improvements		Resubmitt Previous S	tal Submittal No	Submitt	I No.
3103 h Vancor	WV Lower Rive river Washing	er Road ton 98660	CP0144 This section to be completed by con	dramor.				0	
	8,	1	This section to be completed by com						
Bid Item Number(s)	Drawing Sheet No.	Specification	Description - Manufacturer's Specific Proc	Ty oduct*	ype"	Locat Supplier t	Manufacturer / Brand / WSDOT Pit #	Review Action	Notes
								-	
77	24		Vanexco geomembrane sample #1 test resu	Ults	r	N/A	A/A	*	
Contractor sh	tall submit 6	copies of each	t         • one component per line	** Type Codes: A - Source appro	oval on	y E - Cerl. of Col	mpliance Receive	i,	
attachment, a	and shall wr	ite bid item		B - Catalog CuVI	/Data St	heet F - Sample	7	-16-11	
number(s)) or	n each attac	ched page.		C - Mix Design D - QPL		G - Shop Draw H - Other	ungs مراجع		
Contractor certifi	es compliance	with Contract Docu	Jments.	Legend: Review Action			Review		
By: Hans Schm	eusser / TRI E	inviromental		1 No exceptions taken		listribution	Date	Initial	Date
COV Review Co	mments:			2 Note markings	<u> </u>	eviewed by: HUTC	~	<u>ب</u>	418/10
				3 Comments attached-		eviewed by:			
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				5 Submit WSDOT Pit #		OV, Construction	Ż	ANR	Olfecte
					<u> </u>	eturned to contractor	2		
Contractor	Pro	tiect File	Project Inspector M	Aatenals Lab Port of Vancouver		HDR inc			
	: 1								

SUBMITTAL TRANSMITTAL / SOURCE APPROVAL

.

Lipdated Jan 2009



February 16, 2010

Mail To:

Bill To:

Attn: Hans Schmeusser Rotschy, Inc. 9210 N E 62nd Avenue Vancouver, WA 98665 <= Same Project # : 9103

E-mail: hanss@rotschyinc.com

Dear Mr. Schmeusser:

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:	٦	Terminal 5 Rail Loop			
TRI Job Reference N	lu <b>m</b> ber I	E2339-77-01			
Material(s) Tested		1 Heat Fusion Weld Seam(s)			
Test(s) Requested	; (	SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)			
Codes					
AD	Adhesion failure (100	0% Peel)			
BRK	Break in sheeting aw	vay from Seam edge			
SE	Break in sheeting at	edge of seam			
AD-BRK	Break in sheeting aft	ter some adhesion failure - partial peel			
SIP Separation in the p		ane of the sheet (leaving the bond intact)			
FTB	Film tearing bond (al	II 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,

Jerny T. Tennuf

Jennifer Tenney Project Manager Geosynthetic Services Division www.GeosyntheticTesting.com



#### DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS TRI Client: Rotschy, Inc. Project: Terminal 5 Rail Loop

Material: 60 mll HDPE SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 64) TRI Log #: E2339-77-01

TEST REPLICA						NUMBER		
PA	RAMETER		1	2	3	4	5	MEAN
Sa	mple ID: 0	SE 60mil HDPE Li	ner	Panel:		dana amin'ny fisiana dia 600-2004. No ben'ny fisiana		
We	eld: F	leat Fusion		P7/P6				
								Peel A
	Peel Strength (ppi)		148	144	146	147	147	146
ج ہ	Peel Incursion (%)		<10	<10	<10	<10	<10	
Sid	Peel Locus of Failure Cor	ie	\$E	SE	\$E	\$E	SE	
	Peel NSF Failure Code		FTB	FTB	FTB	FTB	FTB	
								Peel B
	Peel Strength (ppi)		147	146	149	146	147	147
0 0	Peel Incursion (%)		<10	<10	<10	<10	<10	
Sid	Peel Locus of Failure Coo	ie	SE	SE	SE	SE	SE	
	Peel NSF Failure Code		FTB	FTB	FTB	FTB	FTB	
								Shear
	Shear Strength (ppi)		178	177	177	179	177	178
	Shear Elongation @ Brea	k (%)	>50	>60	>50	>50	>50	

The testing 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 for 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.

#### Rose, Gretchen

From: Sept:	Hans Schmeusser [hanss@rotschyinc.com]	
Sent.	Base Orthog	
10:	Rose, Gretchen	
Cc:	'Bennett Shoop'; 'Wineman, David K'	
Subject:	FW: Terminal 5 Rail Loop Seam Report	

Attachments:

771-Rotschy-Terminal5-60HDSeam.pdf; Jennifer Tenney.vcf; Submittal form 2009.xls

120



771-Rotschy-Termi Jennifer Submittal form nal5-60HDSeam... Tenney.vcf (198 B) 2009.xls (79 KB...

"Passing (per spec page F-84) geomembrane sample #1 test results

attached; thanks!

Hans Schmeusser Project Manager

O: 360.334.3128 F: 360. 334.3101 C: 360.608.5056

-----Original Message-----From: Jennifer Tenney [mailto:JTenney@tri-env.com] Sent: Tuesday, February 16, 2010 10:24 AM To: hanss@rotschyinc.com Subject: Terminal 5 Rail Loop Seam Report

Attached are your seam results.

Thanks Jen

Jennifer Tenney Project Manager TRI Environmental Inc. 9063 Bee Caves Rd Austin, TX 78733 ph: 800-880-8378 fax: 512-263-2558 email: jtenney@tri-env.com www.geosynthetictesting.com

CONSTRUCTON MANAGER     PROJECT: Ternial 5 Unit Train Improvements       313 NU Lower River Road     This section to be completed by contractor       Vancouver, Washington 96660     This section to be completed by contractor       Vancouver, Washington 96660     This section to be completed by contractor       Vancouver, Washington 96660     Tris section to be completed by contractor       Vancouver, Washington 96660     Fiskel       Ti     Description - Manufacturer's Specific Product       Vancoo     Fiskel       Vancoo     Fiskel       Vancoo     Fiskel       Ti     Vancoo			be complete by COV:	6 10
Bid tem Drawing Lumber(s) Specification Description - Manufacturer's Specific Product <sup>-</sup> The Vaneco Iner sample #2 and 3 test results - 66 Loci (MDR The Coduct - 60 Loci (MDR) The Coduct - 60 Lo	<u>ی</u>	Resubmittal Previous Submittal No.	Submittal No	
77       Vaneco       F.34       Vanecoo iner sample #2 and 3 test results       E6. Lei [ HDDE         71       Vaneco       F.34       Vanecoo iner sample #2 and 3 test results       E6. Lei [ HDDE         71       Vaneco       F.34       Vanecoo iner sample #2 and 3 test results       E6. Lei [ HDDE         72       Vaneco       F.34       Vaneco       Inerclait       Inerclait       Inerclait         73       Comments       Inerclait       Inerclait       Inerclait       Inerclait       Inerclait         74       Inerclait       Inerclait       Inerclait       Inerclait       Inerclait       Inerclait         74       Inerclait       Inerclait       Inerclait       Inerclait       Inerclait       Inerclait         77       Inerclait       Inerclait       Inerclait       Inerclait       Inerclait       Inerclait         77       Inerclait       Inerclait       Inerclait       Inerclait       Inerclait       Inerclait         77       Inerclait       Inerclait       Inerclait       Inerclait       Inerclait         77       Inerclait       Inerclait       Inerclait       Inerclait       Inerclait       Inerclait         77       Inerclait       Inerclait	Type** Code Local S	Manufacturer / Brand / WSDOT Pit	Review t≇ Action	Notes
77     Vaneco     F-Sta     Vanecco iner sample #2 and 3 test results     66 to to 1       1     Vaneco     iner sample #2 and 3 test results     66 to 1       1     0     0     0       1     0     0				
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Intractor shall submit 6 copies of each       * one component per line       * Type Codes:         Ichment, and shall write bid item       * Type Codes:       Ichment, and shall write bid item         Inber(s)) on each attached page.       * Type Codes:       Ichment, and shall write bid item         Inber(s)) on each attached page.       * Type Codes:       Ichment, and shall write bid item         Inber(s)) on each attached page.       Ichment action       Ichment, and shall write bid item         Information       Ichments       Ichment action       Ichment actions tak         Information       Ichments       Ichment actions tak       Ichment actions tak         Information       Ichment actions       Ichment actions tak       Ichment actions tak         Information       Ichment actions       Ichment actions tak       Ichment actions tak         Information       Ichment actions       Ichment actions tak       Ichment actions tak         Information       Ichment actions       Ichment actions       Ichment actions tak         Information       Ichment actions       Ichment actions       Ichment actions         Information       Ichment actions       Ichment actions       Ichment actions         Information       Ichment actions       Ichment actions       Ichment actions         Information <td></td> <td></td> <td></td> <td></td>				
Inder(s)) on each attached page. Inder(s)) on each attached page. Inactor certifies compliance with Contract Documents Hans Schmeusser / TRI Enviromental Hans Schmeusser / TRI Enviromental Review Comments: Review Comments: S Submit WSDOT F	Codes: A - Source approval only	E - Cert. of Compliance Reco	eived:	ſ
mber(s)) on each attached page. Itractor certifies compliance with Contract Documents Itactor certifies compliance with Contract Documents Hans Schmeusser / TRI Enviromental Review Comments: Comme	B - Catalog Cul/Data Sheet	: - Sample		
tractor certifies compliance with Contract Documents Hans Schmeusser / TRI Environmental I no exceptions tak Review Comments: C Note markings C Note markings C Note markings C Note markings C Note warkings	C - Mix Design D - QPL	5 - Shop Drawings 1 - Other	2/17/2010	
Hans Schmeusser / TRI Enviromental       1 No exceptions tak         / Review Comments:       2 Note markings         3 Comments:       3 Comments attach         4 Rejected       5 Submit WSDOT F	w Action	Review		
/ Review Comments: 2 Note markings 3 Comments attach Resubmit 4 Rejected 5 Submit WSDOT F	tions taken	Date	Initial	Date
3 Comments atlach Hesubmrt 4 Rejected 5 Submit WSDOT F	kings Reviewed b)	HDR	84 21	24/10
Resubmit 4 Rejected 5 Submit WSDOT F	Is atlached-			
5 Submit WSDOT F	mit Reviewed by	(suc)	and R	24/10
	/SDOT Pit # COV. Const	Iction	SOM PZ	25/10
	Returned to	ontractor		

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trpdated Jan 2009



February 17, 2010

Mail To: Attn: Hans Schmeusser Rotschy, Inc. 9210 N E 62nd Avenue Vancouver, WA 98665 Bill To:

<≕ Same Project # : 9103

E-mail hanss@rotschyinc.com

Dear Mr. Schmeusser

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		Terminal 5 Rail Loop						
TRI Job Reference	Number	E2339-78-09						
Material(s) Tested		2 Heat Fusion Weld Seam(s)						
Test(s) Requested		SAME DAY Peel and Shear (ASTM D 6392/GRł GM19/D 4437/NSF 54)						
Codes		ungan waarnen oor een wagemeer waarnen aan aan aan aan aan aan dig die dig die	and the second secon					
AD	Adhesion failure	(100% Peel)						
BRK	Break in sheatin	o away from Seam edge						

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 sheeling efter some adhesion failure - partial peel
SIP	Separation in the plane of the sheet (leaving the bond intact)
FTB	Film learing bond (all non "AD" failures)
NON-FTB	100% peel

If you have any questions or require any editional information, please call us at 1-800-880-8378

Sincerely,

Sennip Thennut

Jannifer Tennay Project Manager Geosynthetic Services Division www.GeosyntheticTesting.com



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TRI / Environmental, Inc. A Texas Research International Company

#### DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS TRI Client: Rotschy, Inc. Project: Terminal 5 Rail Loop

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54) TRI Log #: E2339-78-09

				TEST RE	PLICATE	NUMBER			PROJ.
PA	RAMETER		1	2	3	4	5	MEAN	SPEC,
Sa	mple ID:	DT-2		Panel:					
We	ld:	Heat Fusion		P13/P10					
								Peel A	
	Peel Strangth (ppi)		140	136	148	150	150	145	91 min
د که د	Peel Incursion (%)		<10	<10	<10	< 10	<10	-	
Ē	Peel Locus of Fadure C	Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	1	FTB	FTB	FTB	FTB	FTB		
								Peel 8	
	Peel Strength (ppi)		139	128	156	140	140	141	91 min
លាស	Peel Incursion (%)		<10	<10	<10	< 10	<10		-
2ġ	Peel Locus of Failure C	Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	1	FTB	FTB	FT8	FTB	FTB		
								Shear	_
	Shear Strength (ppi)		174	171	173	175	172	173	120 min
	Shear Elongation @ Bi	reak (%)	>50	>50	>50	>50	>50		
_									
Sa	mple ID:	DT-3		Panel:					
We	ld:	Heat Fusion		P16P/15					
								Peel A	22
	Peel Strength (ppi)		146	147	147	146	159	149	91 min
<u> </u>	Peel Incursion (%)		<10	<10	<10	<10	<10		
Ň	Peet Locus of Failure (	Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	2	FTB	FTB	FTB	FT8	FTB		
								Peel B	
~	Peel Strength (ppr)		134	140	137	133	141	137	91 min
<u>ب</u> ه	Peel Incursion (%)		<10	<10	<10	<10	<10		
ŝ	Peel Locus of Failure (	Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	•	FTB	FTB	FTB	FTB	FTB		
								Shear	
	Shear Strength (ppi)		167	156	167	167	168	167	120 min
	Shear Elongation @ B	reak (%)	>50	>50	>50	>50	>50		

The testing 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 mether accepts responsibility for nor makes claim as to the final use and purpose of the material

TRI observes and mentains client confidentiality - TRI limits reproduction of this report, except in full, without prior approval of TRI

## Rose, Gretchen

From:	Hans Schmeusser [hanss@rotschyinc.com]
Sent:	Wednesday, February 17, 2010 11:38 AM
To:	'Bennett Shoop', Lee, Steve; Rose, Gretchen; 'Wineman, David K'
Subject:	FW: Terminal 5 Seam Report
Attachmonto	790 Potestive Terminel COULD Construct ( The State of State of State

Attachments:

789-Rotschy-Terminal5-60HDSeam.pdf; Jennifer Tenney.vcf; Submittal form 2009.xls





789-Rolschy-Termi Jennifer Submittal form nal5-60HDSeam ... Tenney.vcf (198 B) 2009.xls (79 KB...

Passing liner samples (taken yesterday) test results attached. Thanks!

Hans Schmeusser Project Manager

0:360.334.3128 F: 360, 334,3101 C: 360.608.5056

-----Original Message-----From: Jennifer Tenney [mailto:)Tenney@tri-env.com] Sent: Wednesday, February 17, 2010 11:27 AM To: hanss@rotschyinc.com Subject: Terminal 5 Seam Report

Attached are your seam results.

Thanks Jen

Jennifer Tenney **Project Manager** TRI Environmental Inc. 9063 Bee Caves Rd Austin, TX 78733 ph: 800-880-8378 fax: 512-263-2558 email: jtenney@tri-env.com www.geosynthetictesting.com

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	section t ompleted OV:	nital No.	6		ž	 	 	 						 		010		6	2/2		23:	2		
	This be of by C	Subn		Review	Action	 	 		****				-	 	/ed:	2/18/2		Initial	SA		K	BULK	, ,	
	2/18/2009	ttal Submittal No		Manufacturer /	TIA I DOSA / DUBIG	N/A									ompliance Receiv	mngs	Review	Date				`) 		
JVAL	DATE	Previous				N/A									nly E - Cert. of C	G - Shop Dr G - Shop Dr H - Other		Distribution	Reviewed by 110 R	Reviewed by:	teviewed by Courd	20V. Canstruction	Returned to contractor	
				Type"	Loge	н	 	 							approval of	ign Stabulard			<u></u>					
INC INVIOUNTINC OCONO	c Znd Ave . Washington 98665	Unit Train Improvements	d by contractor			results									er line Type Codes A - Source		Legend: Review Action	1 No exceptions laken	2 Mote markings	3 Comments attached-	Resubmit 4 Rejected	5 Submit WSDOT Pit #		
	FROM, Relschy, In 9210 NE S2 Vancouver,	PROJECT. Terminal 5	CP0144 This section to be completed		Uescription - Manuracturer S Spec	Vanexco liner sample #4 and 5 lest r									one component pe		uments.							
	uver USA	ANAGER	r Road on 98660		Specification	F-84									copies of each	hed page.	with Contract Doci	nviromentai						į
	Vanco	UCTION M	Lower Rive ir, Washingt	Drawing	Sheet No.	Vaneco									submit 6	ach attac	compliance	sser / TRI E	nents:					6
	🖉 Port of	TO CONSTR	3103 NW Vancouve	Bid Item	NUMDER(S)	77									Contractor shall	number(s)) on e	Contractor certifies	By Hans Schmeus	COV Review Comn					

SUBMITTAL TRANSMITTAL / SOURCE APPROVAL

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بندانات أثرار

TRI / Environmental, Inc.

A Texas Research International Company

Februery 18, 2010

Mail To:

PO-0-000

Bill To:

Attn: Hans Schmeusser Rotschy, Inc. 9210 N E 62nd Avenue Vancouver, WA 98665 <= Same Project # : 9103 E-mail hanss@rotschyinc.com ccle-mail david wineman@hdrinc.com

Dear Mr. Schmeusser

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		Terminal 5 Rail Loop
TRI Job Referenc	æ Number	E2339-60-08
Material(s) Tester	- t	2 Heat Fusion Weld Seam(s)
Tesi(s) Requeste	d	SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)
Codes		ĸ₩₩₩₩₩₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽
AD	Adhesion fai	lure (100% Peel)
BRK	Break in she	eting eway 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 eny questions or require any additional information, please call us at 1-800-880-8378  $\ensuremath{\mathsf{--}}$ 

Sincerely,

Jenny Thenne

Jennifer Tenney Project Manager Geosynthetic Services Division www.GeosyntheticTesting.com



#### DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS TRI Client: Rotschy, Inc. Project: Terminal 5 Rail Loop

Material: 60 mil HDPE SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54) TRI Log #: E2339-80-08

				TEST REP	LICATE	NUMBER		1	PROJ.
PA	RAMETER		1	2	3	4	5	MEAN	SPEC.
Sa	mple ID: D'	r-4		Panel:					
W	ild: Hi	eat Fusion		P22/P20					
								Peel A	
	Peel Strength (pp.)		156	151	151	160	146	153	91 min
<u>ه</u>	Peel Incursion (%)		<10	< 10	<10	< 10	<10		
B	Peel Locus of Failure Code	e	SE	\$E	SE	SE	SE		
	Peel NSF Failure Code		FTB	FTB	FTB	FTB	FTB		
								Peel B	
	Peel Strength (ppi)		145	108	152	120	155	136	91 ៣:៣
۵ ۹	Peel Incursion (%)		< 10	50	<10	50	<10		
BS	Peel Locus of Failure Code	e	SE	AD-BRK	SE	AD-BRK	SE		
	Peel NSF Failure Code		FTB	FTB	FTB	FTO	FTB		
	Chang Strongh (200)		197	100	186	160	188	Shear 197	120 min
	Shear Strength (pps)	(21)	167	100	100	100	100		120 1101
	Shear Elongation @ Urea	(%)	>50	>50	>00	>50	>50		
Sa	mple ID: D	T-5		Panel:					
W	ald: H	eal Fusion		P27/P25					
								Peel A	
	Peel Strength (ppi)		154	153	151	153	153	153	91 min
è	Peel Incursion (%)		<10	< 10	<10	<10	<10		
š	Peel Locus of Failure Code	e	SE	SE	SE	SE	SE		
	Peel NSF Failure Code		FTB	FTB	FTB	FTB	FTB		
	Deal Characteric		147	149	160	140	150		01.000
ß	Peer Strength (ppi)		147	148	152	149	152	130	A1 1010
ę	Peel Incursion (%)		<10	<10	<10	<10	<10		
ŵ	Peel Locus of Failure Cod	e	SE	SE	SE	SE	SE		
	Peel NSF Failure Code		FT8	FTB	F16	FTB	FIB	Shear	
	Shear Strength (pp)		188	190	187	186	187	188	120 min
	Shear Floroation @ Breat	(%)	>50	>50	>50	>50	>50		
	onear cionganon le orean		- 00						

The leasing 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 for nor makes claim as to the final use and purpose of the material

TRI observes and maintains client confidentiality. TRI timits reproduction of this report, except in full, without prior approval of TRI

#### Rose, Gretchen

From: Sent:	Hans Schmeusser [hanss@rotschyinc.com] Thursday, February 18, 2010 2:09 PM
То:	Rose, Gretchen
Subject:	FW: Terminal 5 Rail Loop Seam Report

Attachments:

808-Rotschy-Terminal5-60HDSeam.pdf, Jennifer Tenney.vcf; Submittal form 2009.xls



808-Rotschy-Termi Jennifer Submittal form nal5-60HDSeam... Tenney.vcf (198 B) 2009.xls (79 KB...

 $\mathfrak{G}_{\mathbb{R}}$ 

Hans Schmeusser Project Manager

O: 360,334,3128 F: 360, 334,3101 C: 360,608,5056

-----Original Message-----From: Jennifer Tenney [mailto:JTenney@tri-env.com] Sent: Thursday, February 18, 2010 9:52 AM To: hanss@rotschyinc.com Cc: david.wineman@hdrinc.com Subject: Terminal 5 Rail Loop Seam Report

Attached are your seam results.

Thanks Jen

Jennifer Tenney Project Manager TRI Environmental Inc. 9063 Bee Caves Rd Austin, TX 78733 ph: 800-880-8378 fax: 512-263-2558 email: jtenney@tri-env.com www.geosynthetictesting.com

	8		FROM Rotschy, Inc			DATE	5/19/2005	This se	ction to
Port o	f Vалсо	uver USA	9210 NE 62nd Ave Vancouver, Washing	gton 98665				be cor	pleted
TO CONST	RUCTION M	ANAGER	PROJECT Terminal 5 Unit Trair	in Improvements		Previous	ttal Submittal No.	Submit	al No.
3103 N Vancou	W Lower Rive ver, Washing	er Road ton 98660	CP0144 This section to be completed by contr	tractor				~	4
Bid Item	Drawing	Canalian	Deservation Manufacturad's Cranific Dree	Ty Ty	ype"	I oral Sumuliar	Manufacturer / Brand / WSDOT Pit #	Review	Notes
NUMDER(S)	SUPECT INO.	Specification		DAUCE					2010-1
77	Vanexco	F-8.1	Sample # 6. 7. 8 - 40 ml 40 PB		r	N/A	N/A		
							<b>1</b>		
-									
Contractor she	all submit 6	copies of each	tone component per line	Type Codes: A - Source appr	inoval oni	iv E-Cert of Co	ompliance Receiv	ed:	
attactment, an number(s)) on	each attac	thed page.				G - Shop Drav G - Shop Drav H - Other		2/19/201	
Contractor certific	s compliance	: with Contract Doc	suments.	egend: Review Action			Review		
By Hans Schme	usser / TRI			1 No exceptions taken		istribution	Date	{nitial	Date
COV Review Cot	nments:			2 Note markings	<u> </u>	eviewed by HOR	-	S.R	2/23/10
				3 Comments attached-	_ <u>~</u>	evewed by:			
				4 Rejected	<u>«</u>	eviewed by (Dirg	2	R	2/24(1)
				5 Submit WSDO7 Pit #	<u>ة</u>	OV. Construction		T'WC	325/10
					ŭ	elumed to contractor		,	
	Pro	yect File	Project Inspector Ma	alerais Lab Port of Vancouve	Ŀ	HDR Inc			

SUBMITTAL TRANSMITTAL / SOURCE APPROVAL

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Updated Jun 2009


TRI / Environmental, Inc. A Texas Research International Company

February 19, 2010

Mail To:			Bill To:
Attn: Hans Schmeus	ser		<= Same
Rotschy, Inc.			Project # : 9103
9210 N.E. 62nd Avenu	Je		
Vancouver, WA 9866	5		
E-mail: hanss@rotsch	yinc.com		
cc e-mail: david.winen	nan@hdrinc.com		
Dear Mr. Schmeusser	:		
Thank you for consulti TRI is pleesed to subr	ing TRI/Environment nil this final report fo	tal, Inc. (TRI) for you or laboratory testing.	r geosynthetics testing needs.
Project:		Terminal 5 Rail Lo	ор
TRI Job Reference Nu	ımber:	E2339-82-06	
Material(s) Tested:		3 Heal Fusion Weld	Seam(s)
Test(s) Requested:		SAME DAY Peel an (ASTM D 6392/GRI	d Shear GM19/D 4437/NSF 54)
Codes			ՠֈֈֈֈֈ֎՟֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎
AD	Adhesion failure (10	00% Peel)	
BRK Break in sheeting a		way from Seam edg	e
SE	Break in sheeting a	t edge of seam	
AD-BRK	Break in sheeting a	fter some adhesion I	ailure - partiel peel
SIP	Separation in the pl	ane of the sheet (lea	iving the bond intact)
FTB	Film tearing bond (a	all non "AD" failures)	
NON-FIB	100% peel		

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Melicos Hunter

Melissa Hunter Project Manager Geosynthetic Services Division www.GeosyntheticTesting.com



### DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS TRI Client: Rotschy, Inc.

Project: Terminal 5 Rail Loop

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2339-82-06

			TEST REF	LICATE	NUMBER		PROJ.	
PARAMETER			1	2	3	4	5	MEAN SPEC.
Sample ID: DT-6		DT-6		Panel:				
Weld: Heat Fusion		Heat Fusion		P22/P20				
								Peel A
	Peel Strength (ppi)		157	147	157	150	149	152 91 min
e Þ	Peel Incursion (%)		<10	<10	<10	<10	<10	
Sid	Peel Locus of Failure Co	ode	SE	SE	SE	SE	SE	
	Peel NSF Failure Code		FTB	FTB	FTB	FTB	FTB	
								Peel B
~	Peel Strength (ppi)		146	144	144	147	150	146 91 min
<u>е</u>	Peel Incursion (%)		<10	<10	<10	<10	<10	
S.	Peel Locus of Failure Co	ode	SE	SE	SE	SE	SE	
	Peel NSF Failure Code		FTB	FTB	FTB	FTB	FTB	
								Shear
	Shear Strength (ppi)		176	175	176	178	179	177 120 min
	Shear Elongation @ Bre	eak (%)	>50	>50	>50	>50	>50	
			Dadal.					
281	mpie iD:	UI-7 Noot Cusia-		Panel:				
446	10:	neat Fusion		PZNEZO				Post A
	Peel Strength (pp)		151	154	152	150	151	152 91 min
4	Peel Incursion (%)		<10	<10	<10	<10	<10	
ğ	Peel Locus of Failure Co	ode	SE	SE	SE	SE	SE	
•••	Peel NSF Failure Code		FTB	FTB	FTB	FTB	FTB	
								Peel B
	Peel Strength (ppi)		149	150	146	150	152	149 91 min
е e	Peel Incursion (%)		<10	<10	<10	<10	<10	Anteriori (1990) (1990) (1990)
Sid	Peel Locus of Failure Co	ode	SE	SE	SE	SE	SE	
	Peel NSF Failure Code		FTB	FTB	FTB	FT8	FTB	
								Shear
	Shear Strength (ppi)		182	180	181	183	183	182 120 min
	Shear Elongation @ Bre	eak (%)	>50	>50	>50	>50	>50	

The testing 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 for 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: Rotschy, Inc.

Project: Terminal 5 Rail Loop

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2339-82-06

			TEST REPLICATE NUMBER				1	PROJ.	
PARAMETER			1	2	3	4	5	MEAN	SPEC.
Sa	mple ID:	DT-8	#211	Panel:					
We	eld:	Heat Fusion		P22/P20					
								Peel A	
~	Peel Strength (ppi)		151	149	148	150	154	150	ື 91 ກາກ
ē	Peel Incursion (%)		<10	<10	<10	<10	<10		29 20
Sid	Peel Locus of Failure	Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Cod	e	FTB	FTB	FTB	FTB	FTB		
								Peel B	
~	Peel Strength (ppi)		150	143	146	147	147	147	91 min
<u>e</u>	Peel Incursion (%)		<10	<10	<10	<10	<10		5 <b>5</b>
Sid	Peel Locus of Failure	Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Cod	le	FTB	FTB	FTB	FT8	FTB		
								Shear	
	Shear Strength (ppi)		185	184	185	185	184	185	120 min
	Shear Elongation @ E	Break (%)	>50	>50	>50	>50	>50		29
	Shear Elongation @ E	Break (%)	>50	>50	>50	>50	>50		

The testing 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 tasted TRI neither accepts responsibility for 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

## Rose, Gretchen

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lans Schmeusser [hanss@rotschyinc.com] riday, February 19, 2010 11:33 AM tose, Gretchen; 'Wineman, David K'; bennettshoop@yahoo.com W: Terminal 5 Rail Loop seam results

Attachments:

826-Rotschy-Terminal5-60HDSeam.pdf; Melissa Hunter.vcf; Submittal form 2009.xts





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Submittal form

826-Rotschy-Termi Melissa Hunter.vcf nal5-60HDSeam... (268 B)

2009.xls (79 KB... Liner sample #6, 7 & 8 test results; thanks!

Hans Schmeusser Project Manager

O: 360.334.3128 F: 360. 334.3101 C: 360.608.5056

-----Original Message-----From: Melissa Hunter [mailto:MHunter@tri-env.com] Sent: Friday, February 19, 2010 11:25 AM To: hanss@rotschyinc.com Subject: Terminal 5 Rail Loop seam results

Melissa C. Hunter Project Manager TRI/Environmental, Inc. 9063 Bee Caves Rd. Austin, TX 78733 ph: 800-880-8378 ext. 140 fax: 512-263-2558 e-mail: mhunter@tri-env.com www.geosynthetictesting.com

F Vancouver USA FRUCTION MANAGER M Lower River Road Uver, Washington 98660 Drawing Sheet No. Specification Desc Sheet No. F-8.4 Samp	9210 NE 62nd Ave Vancouver. Washingto PROJECT: Terminal 5 Unit Train I CP0144 This section to be completed by contrat	10666				
RUCTION MANAGER W Lower River Road ver. Washington 98660 Drawing Specification Desc Sheet No. Specification Desc Vanexco F-84 Sami	PROJECT: Terminal 5 Unit Train I CP0144 This section to be completed by contrat		L			ompleted OV:
Drawing Specification Desc Sheet No. Specification Desc Vanexco F-84 Sam		mprovements Xor:	Pre	submittal Vo vious Submittal No		I OS
Vanexco F-&4 Samy		Ϋ́		Manufacturer	/ Review	
Vanexco F-&4 Sam		2 		I DOUCH I DUBIO	ACTION ACTION	Noles
	אטערא איזערא איז אין אראפאסוס אטעראן		V/N	AN A	,	
					nt)atti iseenna	
I submit 6 copies of each	one component per line	Type Codes: A - Source appre	val only E - Cert	. of Compliance Ko	colvod:	
ld shail write bid item each attached page.		B - Catalog Cut/ C - Mix Design	Jala Sheel T - Sar G - Sho Hi - Oth	pie p Drawings	212212	010
s compliance with Contract Documents	S.	end: Review Action		Review		
usser / TRI	<b>'</b>	1 No exceptions laken	Distribution	Target Date	Initial	Date
nmonts:		2 Note markings	Reviewed by: H	)K	₹ V	2/24(10
		3 Comments attached-	Reviewed by:			
		Kesubmit 4 Rejected	Reviewed by:	reh	Ľ	6) Harles
		5 Submit WSDOT Pit *	COV. Construction		MUCS	S1252/2
			Returned to contract	or	,	

Lipdated Jun 2009

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	120 404	Ver

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TRI / Environmental, Inc. A Texas Research International Company

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February 22, 2010

Mall To:

Bill To:

Attn: Hans Schmeusser Rotschy, Inc. 9210 N.E. 62nd Avenue Vancouver, WA 98665 <= Same Project # : 9103

E-mail. hanss@rotschyinc.com cc e-mail. david wineman@hdrinc.com

Dear Mr. Schmeusser:

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	Terminal 5 Rail Loop	
TRI Job Reference N	lumber. E2339-83-03	
Material(s) Tesled:	2 Heat Fusion Weld Se	am(s)
Test(s) Requested	SAME DAY Peel and SI (ASTM D 6392/GRI GM	hear 119/D 4437/NSF 54)
Codes AD	Adhesion failure (100% Peel)	

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,

Jernige T. Tennug

Jennifer Tenney Project Manager Geosynthetic Services Division www.GeosyntheticTesting.com



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TRI / Environmental, Inc. A Texas Research International Company

#### DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS TRI Client: Rotschy, Inc.

Project: Terminal 5 Rail Loop

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2339-83-03

				TEST RE	PLICATE	NUMBER			PROJ.
PARAMETER		1	2	3	4	5	MEAN	SPEC.	
Sa	mple ID:	DT-9		Panel:					
We	ld:	Heat Fusion		P46/P48					
								Peel A	
	Peel Strength (ppi)		149	150	149	152	152	150	]91 min
e b	Peel Incursion (%)		<10	<10	<10	< 10	<10		
š	Peel Locus of Failure	e Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Co	de	FTB	FTB	FTB	FTB	F18		
								Peel B	-
m	Peel Strength (ppi)		144	140	144	140	148	143	91 min
å	Peel Incursion (%)		<10	<10	<10	<10	<10		
ທັ	Peel Locus of Failure	Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Co	de	FTB	FTB	FTB	FTB	FTB	ľ	
								Shear	<b>.</b>
	Snear Strength (ppi)	<b>D 1 1 1 1 1 1 1 1 1 1</b>	1//	175	178	178	175	<b>1</b>	<b>1</b> 20 min
	Shear Exongation @	вгеак (%)	>50	>50	>50	>50	>50		
Sample ID: DT-10		·····	Panel:						
We	ld:	Heat Fusion		P53/P52					
								Peel A	
	Peel Strength (ppi)		147	147	147	157	144	148	ື 91 ກາຄ
e P	Peel Incursion (%)		<10	<10	<10	<10	<10		
ŝ	Peel Locus of Failure	e Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Co	de	FTB	FTB	FTB	FTB	FTB		
								Peel B	
m	Peel Strength (ppi)		146	141	145	143	146	144	91 min
P	Peel Incursion (%)		<10	<10	<10	<10	<10		
ທັ	Peel Locus of Failure	e Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Co	de	FTB	FTB	FTB	FTB	FT8		
	Observe Otrassells (* - 3)		470	470		4.7.4	474	Shear	۹
	Snear Strength (ppi)	D1 (04)	1/3	1/2	169	174	1/1	172	120 min
	Shear Elongation @	pleak (%)	>50	>50	>50	>50	>50		

The lesting 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 for 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

## Rose, Gretchen

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- From: Hans Schmeusser [hanss@rotschyinc.com]
- Sent: Monday, February 22, 2010 9:34 AM
- To: 'Wineman, David K'; bennettshoop@yahoo.com; Rose, Gretchen
- Subject: FW: Terminal 5 Rail Loop

Attachments: 833-Rotschy-Terminal5-60HDSeam.pdf; Jennifer Tenney.vcf; Submittal form 2009.xls

# **APPENDIX C**

# **As-Built Drawings**











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