20102-RP-0001

CONSTRUCTION QUALITY ASSURANCE
FINAL REPORT
ON-SITE DISPOSAL FACILITY
PHASE II CELL 2

2061

REVISION 0
DECEMBER 1998
VOLUME IV

United States Department of Energy
Fernald Environmental Management Project
Fernald, Ohio

prepared by

GeoSyntec Consultants
1100 Lake Hearn Drive, NE, Suite 200
Atlanta, Georgia 30342

under

Fluor Daniel Fernald
Subcontract 95PS005028

000001

BEST
AVAILABLE
COPY

APPENDIX H:

MANUFACTURER'S QUALITY CONTROL DOCUMENTATION

OSDF Phase II Cell 2
FDF / Manufacturers Submittals
Contractor / Installers Submittals

2061

OSDF Phase II Cell 2

2061

FDF / Manufacturers Submittals

Att[illegible]ent "A"

SUPPLIER DOCUMENT SUBMITTAL

FDFPROJECT NO: 20102	CONTRACT NO: 2317	SUBMITTAL NO: 015	REV: 0	DATE: 9-8-98	PAGE 1 OF 13

FROM: GSE Lining Technology, Inc.

SIGNATURE: _____

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY: _____

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION (17)		
QTY.	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
1	GSE-2317-015	0						X			X	Strap information; delivery		X	N/A	X		
												schedules; production and testing						
												schedule (historic); GCL deliveries						

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS
Jim Jenkins, FDF, Engineering, Approver	64						
Dan Bodine, GeoSyntec	38						
Jim Turner, FDF, QA	64						
Chuck Van Arsdale, FDF, Engineering	64						
Rick Holbrook, FDF, Procurement	64						

RECEIVED SEP 08 1998 @ 1645

RECEIVED BY: Dan Bodine (SIGN/DATE AND RETURN A COPY TO ECDC, MS52-7) DATE: 9-8-98 NO COMMENTS: X COMMENTS ATTACHED ____

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: REVISE AND RESUBMIT AS CFC OR INF
C - REVISE AND RESUBMIT

000005

FS-F-4955-RV1 (06/18/98)

FERMCO OU2

GSE-2317-015 R/0

p. 2 of 13

GSE®

Aug 17 7 20 AM '98

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 770
800-435-2008
281-230-8690
fax: 281/230-2525

Postit Fax Note R7673	Date 8-14-98	# of pages 1

To J. Turner

Fax# 513-648-4528

From Melody Adams

Phone# 281-230-8690

August 14, 1998

Jim Turner
Fluor Daniel – Fernald Project
P.O. Box 538704
Cincinnati, Ohio 45253-8704

RE: ***Requested Roll and Sling Information***
Fernald Project

Mr. Turner,

You had requested some information on gemembrane roll dimensions and specifications on the slings used with our geomembrane. The roll information for 60 mil GSE HyperFrictionFlex (the material being supplied to this project) is as follows:

Roll Diameter:	~23 in.
Roll Weight:	~3300 lb.
Roll Width:	~24 ft.

The strap specifications are as follows:

Description:	EN-1-602 x 10 ft. (with six (6) inch eye one end)
Specification:	two (2) inch wide yellow polyester
Tensile Strength:	13,600 lb.
Rating Capacity:	3,800 lb. in a choker hitch

This information corresponds only to the straps (slings) that are used for the FrictionFlex® (spray-on texture) products as supplied from GSE. If you have any questions concerning this information please give me a call at **(281) 230-8690.**

Best Regards,

Melody A. Adams
Technical Support Engineer

GSE

GSE Lining Technology, Inc.

L 2061

FERMCO OU2

~~AUG 10 2 56 PM '98~~

GSE-237-015 R-0

p. 3 of 13

August 10, 1998

Fluor Daniel Fernald
7400 Willey Road
Fernald, Ohio 45253-8704

Attn: Rick Holbrook

RE: Revised Delivery Schedule for FERMCO Project
GSE MR7920-01, Project No. C1269

The following is a revised delivery schedule based on the original quantities listed in Table 6P. The geotextile will not be released for shipment until the QC documents have been provided to Jim Turner which should be Tuesday (8/11/98). A schedule for the geotextiel will be provided at that time.

Quantities per Truck

- Geomembrane

1. 12 rolls per truck (~102,000 sf)
2. Weight per roll approximately 3,500 lb.
3. Width and length per roll, 23.87' × 355'.

- GCL, Cetco's Bentomat

1. 15 rolls per truck (~33,750 sf)
2. Weight per roll approximately 3,350 lb.
3. Width and length per roll, 15' × 150'.

- Geotextile, 861 (8 oz/yd^2)

1. 65 rolls per truck (~292,000 sf)
2. Weight per roll approximately 275 lb.
3. Width and length per roll, 300' × 15'.

- Geotextile, 1071 (10 oz/yd^2)

1. 55 rolls per truck (~247,500 sf)
2. Weight per roll approximately 350 lb.
3. Width and length per roll, 300' × 15'.

- Geotextile, 1701 (16 oz/yd^2)

1. 30 rolls per truck (~ 135,000 sf)
2. Weight per roll approximately 550 lb.
3. Width and length per roll, 300' × 15'.

Release and Shipment Schedule

1. First Shipment
- First ~200,000 sf released by Fluor Daniel, Aug. 7th
- Estimated Time of Arrival, Aug. 13th

2. Second Shipment
- Direct Shear testing by Geo-Syntec complete, Aug. 12th
- Second ~100,000 sf released by Fluor Daniel, Aug. 13th
- Estimated Time of Arrival, Aug. 16th

3. Third Shipment
- Direct Shear testing by Geo-Syntec complete, Aug. 14th
- Third ~100,000 sf released by Fluor Daniel, Aug. 17th
- Estimated Time of Arrival, Aug. 20th

4. Fourth Shipment
- Direct Shear testing by Geo-Syntec complete, Aug. 17th
- Fourth ~100,000 sf released by Fluor Daniel, Aug. 18th
- Estimated Time of Arrival, Aug. 21st

5. Fifth Shipment
- Direct Shear testing by Geo-Syntec complete, Aug. 19th
- Fifth ~100,000 sf released by Fluor Daniel, Aug. 20th
- Estimated Time of Arrival, Aug. 24th

6. Sixth Shipment
- All Direct Shear testing by Geo-Syntec complete, Aug. 24th
- Final release of remaining ~15,000 sf GCL and ~235,000 sf of geomembrane by Fluor Daniel, Aug. 25th
- Estimated Time of Arrival, Aug. 28th

Please advise me of if the above is correct and acceptable.

Regards,

Eric Reed

Eric Reed
Technical Representative
GSE Corporate Engineering and Technical Support

2061 GSE 2317-015 R/4
p. 5 of 13

GSE

DEALER SALES

DATE: 4 AUGUST, 1998

NUMBER OF PAGES INCLUDING COVER SHEET 3

TO: RICK HOLBROOK
FLUOR DANIEL FERNALD
PHONE:
FAX: 513/648-5767

CC:

FROM: ERIC REED
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE RD.
HOUSTON, TX 77073
PHONE: 800/435-2008
FAX: 281/230-8684
E-MAIL: ERICR@GSEWORLD.COM

REMARKS: ☒ URGENT ☐ FOR YOUR REVIEW ☐ REPLY ASAP ☒ PLEASE COMMENT

Rick, I apologize for not getting this to you yesterday. Attached is the revised schedule for the material. Please let me know as soon as you can if we are shipping the geotextile per this schedule. The geotextile is scheduled now to be on-site Aug. 6th.

notch constant tensile load
Single Point Samples had not been sent over
25 Aug 98-

GSE

GSE Lining Technology, Inc.

GSE-2317-015 R/
p. 6 of 13

August 4, 1998

Fluor Daniel Fernald
7400 Willey Road
Fernald, Ohio 45253-8704

Attn: Rick Holbrook

RE: Delivery Schedule for FERMCO Project
GSE MR7920-01, Project No. C1269

Based on our conversation the material will be released based upon passing conformance tests from Geo-Syntec (~100,000 sf). The following is a summary of the expected release dates of the geomembrane and GCL. Also the estimated delivery times, weights and square footage of material per truck (Flatbed) are listed. The geotextile can be released per the original schedule provided the conformance testing has been done since there will be no Direct Shear testing performed on this material. If required, the geotextile can be shipped according to the same schedule as the geomembrane and GCL. The quantities for the geotextile will be per the original schedule unless otherwise noted.

Quantities per Truck

- Geomembrane

1. 12 rolls per truck (~102,000 sf)
2. Weight per roll approximately 3,500 lb.
3. Width and length per roll, 23.87' × 355'.

- GCL, Cetco's Bentomat

1. 15 rolls per truck (~33,750 sf)
2. Weight per roll approximately 3,350 lb.
3. Width and length per roll, 15' × 150'.

- Geotextile, 861 (8 oz/yd^2)

1. 65 rolls per truck (~292,000 sf)
2. Weight per roll approximately 275 lb.
3. Width and length per roll, 300' × 15'.

- Geotextile, 1071 (10 oz/yd^2)

1. 55 rolls per truck (~247,500 sf)
2. Weight per roll approximately 350 lb.
3. Width and length per roll, 300' × 15'.

- Geotextile, 1701 (16 oz/yd^2)

1. 30 rolls per truck (~ 135,000 sf)
2. Weight per roll approximately 550 lb.
3. Width and length per roll, 300' × 15'.

000010

Release and Shipment Schedule

1. First Shipment
- Direct Shear testing by Geo-Syntec complete, Aug. 5th
- Initial 100,000 sf released by Fluor Daniel, Aug 6th
- Estimated Time of Arrival, Aug. 10th

2. Second Shipment
- Direct Shear testing by Geo-Syntec complete, Aug. 10th
- Second 100,000 sf released by Fluor Daniel, Aug. 11th
- Estimated Time of Arrival, Aug. 14th

3. Third Shipment
- Direct Shear testing by Geo-Syntec complete, Aug. 12th
- Third 100,000 sf released by Fluor Daniel, Aug. 13th
- Estimated Time of Arrival, Aug. 16th

4. Fourth Shipment
- Direct Shear testing by Geo-Syntec complete, Aug. 14th
- Fourth 100,000 sf released by Fluor Daniel, Aug. 17th
- Estimated Time of Arrival, Aug. 20th

5. Fifth Shipment
- Direct Shear testing by Geo-Syntec complete, Aug. 17th
- Fifth 100,00 sf released by Fluor Daniel, Aug. 18th
- Estimated Time of Arrival, Aug. 21st

6. Sixth Shipment
- Direct Shear testing by Geo-Syntec complete, Aug. 19th
- Sixth 100,00 sf released by Fluor Daniel, Aug. 20th
- Estimated Time of Arrival, Aug. 24th

7. Seventh Shipment
- All Direct Shear testing by Geo-Syntec complete, Aug. 24th
- Final release of remaining ~15,000 sf GCL and 215,000 sf of geomembrane by Fluor Daniel, Aug. 25th
- Estimated Time of Arrival, Aug. 28th

Please advise me of if the above is correct and acceptable.

Regards,

Eric Reed

Eric Reed
Technical Representative
GSE Corporate Engineering and Technical Support

GSE Lining Technology, Inc.

GSE-2317-015 R-0

p. 8 of 13

July 13, 1998

Fluor Daniel Fernald
7400 Willey Road
Fernald, OH 45030

Attn: Rick Holbrook

RE: Production and Testing Schedule for the Fernald/Fermco Project
GSE MR7920-01, Project No. C1269

Based on our recent conversations, the attached testing schedule and the following information is being provided.

1. Geomembrane Schedule - Moved from 7/9/98 to 7/12/98 due to prior commitments. The actual start date was 7/11/98.
2. GCL Schedule - CETCO will begin production of the Bentomat ST on Thursday 7/16/98 with completion on 7/17/98.
3. Geotextile Schedule - The geotextile is scheduled to be on-site per the schedule provided by Fluor Daniel. Delivery of the material prior to the delivery date of 8/3/98 is currently being determined.
4. Geomembrane Samples - Samples of the geomembrane for direct shear will start shipping to Vector Engineering and Geo-Syntec today (7/13/98) for delivery on or before Fri. (7/17/98). All geomembrane samples will be at the above laboratories by this Friday (7/17/98).
5. GCL Samples - Samples of the GCL for direct shear testing will ship on Thursday (7/16/98) for delivery on 7/17/98. The GCL samples will be sent starting 7/16/98 to Vector, Precision and Geo-Syntec. All the GCL samples will be delivered by Saturday (7/18/98)

We look forward to a successful project and should any of the above change, GSE will notify Fluor Daniel immediately. Should you have any questions or need more information, please contact me at 281/230-2591.

Regards,

Eric Reed

Eric Reed
Technical Representative
GSE Corporate Engineering & Technical Support

cc: Tonya Switalski - GSE Account Manager
Chuck Hornaday- CETCO Group Manager

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
234 Gordon Street • Fairmount, GA 30139 • USA
(706) 337-5316 • Fax (706) 337-7334

2061

GSE-2317-015R-0
p. 9 of 13

* FAX COVER SHEET *

DATE: 9-4-98 FAX# 513 648-5767

TO: Jim Turner

FROM: Sudy Hall

OF PAGES: 3 (WITH COVER SHEET)

REMARKS:

A Wholly Owned Subsidiary of AMCOL International
Printed on recycled paper.

PACKING LIST

GSE-2317-015 R-0
p. 10 of 13

COLLOID ENVIRONMENTAL TECH CO
1350 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087493
ORDER DATE: 7/02/98
SHIP DATE:. 9/03/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
030-BENTOMAT ST		SFT	SF	199830030	00007659	150.0	15.0	2250.0	3097
030-BENTOMAT ST		SFT	SF	199830030	00007665	150.0	15.0	2250.0	3070
030-BENTOMAT ST		SFT	SF	199830030	00007685	150.0	15.0	2250.0	3156
030-BENTOMAT ST		SFT	SF	199830030	00007693	150.0	15.0	2250.0	3185
030-BENTOMAT ST		SFT	SF	199830030	00007696	150.0	15.0	2250.0	3180
-BENTOMAT ST		SFT	SF	199830030	00007705	150.0	15.0	2250.0	3034
030-BENTOMAT ST		SFT	SF	199830030	00007710	150.0	15.0	2250.0	3007
030-BENTOMAT ST		SFT	SF	199830030	00007717	150.0	15.0	2250.0	3140
030-BENTOMAT ST		SFT	SF	199830030	00007720	150.0	15.0	2250.0	3046
030-BENTOMAT ST		SFT	SF	199830030	00007725	150.0	15.0	2250.0	3181
030-BENTOMAT ST		SFT	SF	199830030	00007740	150.0	15.0	2250.0	3077
030-BENTOMAT ST		SFT	SF	199830030	00007741	150.0	15.0	2250.0	3079
030-BENTOMAT ST		SFT	SF	199830030	00007748	150.0	15.0	2250.0	3058
030-BENTOMAT ST		SFT	SF	199830030	00007749	150.0	15.0	2250.0	3071

ORDER TOTALS.....	31500.0	43381.
TOTAL ITEMS..... 14		

14 Bags

PACKING LIST

GSE-2317-Ø15 R-Ø
p. 11 of 13

2061

COLLOID ENVIRONMENTAL TECH CO
1250 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087489
ORDER DATE: 7/02/98
SHIP DATE:. 9/03/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT, GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
030-BENTOMAT ST	SFT SF	199830030	00007642	150.0	15.0	2250.0	3098
030-BENTOMAT ST	SFT SF	199830030	00007825	150.0	15.0	2250.0	3081
030-BENTOMAT ST	SFT SF	199830030	00007826	150.0	15.0	2250.0	3081
030-BENTOMAT ST	SFT SF	199830030	00007827	150.0	15.0	2250.0	3096
030-BENTOMAT ST	SFT SF	199830030	00007842	150.0	15.0	2250.0	3034
030-BENTOMAT ST	SFT SF	199830030	00007843	150.0	15.0	2250.0	3014
030-BENTOMAT ST	SFT SF	199830030	00007854	150.0	15.0	2250.0	3049
030-BENTOMAT ST	SFT SF	199830030	00007856	150.0	15.0	2250.0	3079
030-BENTOMAT ST	SFT SF	199830030	00007857	150.0	15.0	2250.0	3078
030-BENTOMAT ST	SFT SF	199830030	00007863	150.0	15.0	2250.0	3050
030-BENTOMAT ST	SFT SF	199830030	00007892	150.0	15.0	2250.0	3090
030-BENTOMAT ST	SFT SF	199830030	00007894	150.0	15.0	2250.0	3060
030-BENTOMAT ST	SFT SF	199830030	00007895	150.0	15.0	2250.0	3055
030-BENTOMAT ST	SFT SF	199830030	00007896	150.0	15.0	2250.0	3032

ORDER TOTALS.....	31500.0	42897.
TOTAL ITEMS..... 14		

14 Bags

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
234 Gordon Street • Fairmount, GA 30139 • USA
(706) 337-5316 • Fax (706) 337-7334

GSE-2317-015 R-0
p. 12 of 13

* FAX COVER SHEET *

DATE: 9-3-98 FAX# 513 618 5267

TO: Jim Turner

FROM: Judy Hall

OF PAGES: 2 (WITH COVER SHEET)

REMARKS:

SEP 3 12 13 PM '98
FERMCO OU2

A Wholly Owned Subsidiary of AMCOL International
Printed on recycled paper

PACKING LIST

GSE-2317-015 R-0
p. 13 of 13

COLLOID ENVIRONMENTAL TECH CO
1350 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087490
ORDER DATE: 7/02/98
SHIP DATE:. 9/02/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

2061

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
030-BENTOMAT ST		SFT	SF	199830030	00007702	150.0	15.0	2250.0	3096
030-BENTOMAT ST		SFT	SF	199830030	00007703	150.0	15.0	2250.0	3143
030-BENTOMAT ST		SFT	SF	199830030	00007707	150.0	15.0	2250.0	3092
030 BENTOMAT ST		SFT	SF	199830030	00007708	150.0	15.0	2250.0	3100
030-BENTOMAT ST		SFT	SF	199830030	00007737	150.0	15.0	2250.0	3093
030-BENTOMAT ST		SFT	SF	199830030	00007844	150.0	15.0	2250.0	3014
030-BENTOMAT ST		SFT	SF	199830030	00007845	150.0	15.0	2250.0	2908
030-BENTOMAT ST		SFT	SF	199830030	00007858	150.0	15.0	2250.0	3015
030-BENTOMAT ST		SFT	SF	199830030	00007870	150.0	15.0	2250.0	3049
030-BENTOMAT ST		SFT	SF	199830030	00007872	150.0	15.0	2250.0	3023
030-BENTOMAT ST		SFT	SF	199830030	00007874	150.0	15.0	2250.0	3027
030-BENTOMAT ST		SFT	SF	199830030	00007880	150.0	15.0	2250.0	3014
030-BENTOMAT ST		SFT	SF	199830030	00007893	150.0	15.0	2250.0	3065
030-BENTOMAT ST		SFT	SF	199830030	00007897	150.0	15.0	2250.0	3082

ORDER TOTALS..... 31500.0 42721.

TOTAL ITEMS..... 14

14 Bags

000016

GSE-2311-017 rlp
p. 2 of 2

GSE®

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
281-443-8564
Fax: 281-875-6010

Quality Assurance Laboratory Test Results

Test:	NCTL-Single Point ASTM D 5397
Job Name:	Fluor Daniel Fernald / Fermco
MR Number:	C1269
Job Number:	7920-01

Roll Number	Lot Number	Requirement	Result
AJ5175FF	Y-45934	> 500 hrs	Pass
AK4200FF	Z-45473	> 500 hrs	Pass
AK4250FF	Z-40476	> 500 hrs	Pass

← Not repea

frequency 1/400,000 minimum

Test on Roll AJ 175 FF is on a one roll lot that was not supposed to be shipped to this site. I cannot see how it can represent the other ≈ 900,000 ft² of GML. Recommend 1 additional test from lot Z-40477 (Rolls AK4275 - AK4296) or lot Z-45448 (Rolls AK 2527, AK 2525, AK 2550, AK 2553, AK 2554) onsite yes

TAG Rolls until Test complete.

R. Bolton

000017

2061

GSE-2317-014 R/Ø
p. 2 of 2

GSE®

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
281-443-8564
Fax 281-875-6010

Quality Assurance Laboratory Test Results

Test:	NCTL-Single Point ASTM D 5397
Job Name:	Fluor Daniel Fernald / Fermco
MR Number:	C1269
Job Number:	7920-01

Roll Number	Lot Number	Requirement	Result
AJ5175FF	Y-45934	> 500 hrs	Pass
AK4200FF	Z-45473	> 500 hrs	Pass
AK4250FF	Z-40476	> 500 hrs	Pass

11/5/98
• NCR WRITTEN TO ADDRESS GEOSYNTEC'S COMMENTS

000018

GSE™
GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
713-443-8564
Fax: 713-875-4010

Quality Assurance Laboratory Test Results

Test: Brittleness Temperature of Plastics and Elastomers by Impact ASTM D746
Criteria: -60° C
Job Name: Fluor Daniel Fernald/Fermco
MR Number: 7920-01
Job Number: C1269

Roll Number	Resin Lot Number	Status
AK4197FF	Z-45473	Pass
AK4275FF	Z-40477	Pass
AK2553FF	Z-45448	Pass
AK4262FF	Z-40476	Pass

KBT

Resin Lot Z-~~45473~~ 40476 EBT has ~~508,439.0~~ ft² Need two tests per spec requirement of one test per 400,000 ft² (Part 2.03-B.7 of 02770P).

For environmental lining solutions . . . the world comes to GSE™
A Gundle/SLT Environmental, Inc. Company

Attachment "A"

SUPPLIER DOCUMENT SUBMITTAL

FDFPROJECT NO: 20102	CONTRACT NO: 2317	SUBMITTAL NO: 014	REV: 0	DATE: 9-8-98	PAGE 1 OF 2

FROM: GSE Lining Technology, Inc.

SIGNATURE: _____

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY: _____

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION (17)		
QTY.	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
1	GSE-2317-014	0						X			X	QA Laboratory Test Results -	X		02770P, Para. 2.03.B.7		X	
												NCTL-Single Point (ASTM D 5397)						

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS
Jim Jenkins, FDF, Engineering, Approver	64						
Dan Bodine, GeoSyntec	38						
Jim Turner, FDF, QA	64						
Chuck Van Arsdale, FDF, Engineering	64						

RECEIVED SEP 08 1998 DOB 10:45

RECEIVED BY: Dan Bodine (SIGN/DATE AND RETURN A COPY TO ECDC, MS52-7) DATE: 9 Sept 98 NO COMMENTS: ____ COMMENTS ATTACHED X OVER

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: REVISE AND RESUBMIT AS CFC OR INF
C - REVISE AND RESUBMIT

020020

2061

FS-F-4955-RV1 (06/18/98)

GSE-2311-017 rlp
p. 2 of 2

GSE®

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
281-443-8564
Fax: 281-875-6010

Quality Assurance Laboratory Test Results

Test:	NCTL-Single Point ASTM D 5397
Job Name:	Fluor Daniel Fernald / Fermco
MR Number:	C1269
Job Number:	7920-01

Roll Number	Lot Number	Requirement	Result
AJ5175FF	Y-45934	> 500 hrs	Pass
AK4200FF	Z-45473	> 500 hrs	Pass
AK4250FF	Z-40476	> 500 hrs	Pass

Not repres

frequency 1/400,000 minimum

Test on Roll AJ5175FF is on a one roll lot that was not supposed to be shipped to this site. I cannot see how it can represent the other ≈ 900,000 ft² of GML. Recommend 1 additional test from lots 2-40477 (Rolls AK4275 - AK4296) or lot 2-45448 (Rolls AK2527, AK2525, AK2550, AK2553, AK2554) onsite yes

TAG Rolls until Test complete.

R. Bodin

000021

JAN-16-1900 00:55 P.02

Attachment "A"

SUPPLIER DOCUMENT SUBMITTAL

FDFPROJECT NO: 20102	CONTRACT NO: 2317	SUBMITTAL NO: 013	REV: 1	DATE: 9-1-98	PAGE 1 OF 5

FROM: GSE Lining Technology, Inc.

SIGNATURE:

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY:

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION (17)		
QTY.	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
1	GSE-2317-013	1						X		X		Geotextile Roll List (16 oz) and	X.		02714P, para. 1.04.B.1;		X	
												Supplemental Test Data (10 oz)			1.04.B.3; 2.02.B		X	

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS
Jim Jenkins, FDF, Engineering, Approver	64						
Dan Bodine, GeoSyntec	38						
Jim Turner, FDF, QA	64						
Chuck Van Arsdale, FDF, Engineering	64						

RECEIVED BY: [signature] DATE: 9/3/98 NO COMMENTS: ____ COMMENTS ATTACHED X

(SIGN/DATE AND RETURN A COPY TO ECDC, MS52-7)

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: REVISE AND RESUBMIT AS CFC OR INF
C - REVISE AND RESUBMIT

RECEIVED SEP 02 1998

20061

000022

FS-F-4955-RV1 (06/18/98)

GSE-2317-013 R/1
p. 2 of 45
JTT

Synthetic Industries
Performance Nonwovens Division

428 Rollins Industrial Blvd
Ringgold, GA 30736
Phone (706)-965-6300 Fax (706)-965-5981

FERMCO OU2
AUG 32 2 38 PM '98

FAX

COMPANY:

FAX NUMBER: 513-648-5767

ATTENTION Tim Turner

☐ FAXED _____

FROM: Sid Weiser
Technical Manager
cc: Eric Reed GSE

☐ MAILED _____ Date

SUBJECT:

☐ COPIED

DATE: 9-1-98

NO. OF PAGES 3
(INCLUDING COVER SHEET)

PLEASE ADVISE IF ALL PAGES INDICATED ABOVE ARE NOT RECEIVED

Tim,

The #05A, #49A, and #84A rolls are the only rolls that had machine and cross machine direction data. I had machine direction data only on the #5A, #53A and #90A rolls (As quoted in our phone conference call with Eric Reed-GSE) We do not have any AOS or Permittivity data on the three rolls.

The correct roll list is also attached.

If there are any questions call me @ 706-965-630

Thanks,

Sid

000023

9/1/98

ROLLNO	STYLE	BATCH_NO	WEIGHT osy	THICK mils	TENSMA lbs	TENSCR lbs	ELONGM %	ELONGC %	TTEARM lbs	TTEARC lbs	BURST psi	PUNCT lbs
5137305A	1071	50853	11.57	138.43	373.10	429.97	65.66	77.76	158.87	204.41	622.86	203.31
OK 5137349A	1071	50853	10.68	126.71	304.83	385.11	62.34	73.73	109.70	168.36	552.14	201.00
5137389A	1071	50853	10.44	121.86	309.47	410.51	66.83	74.04	129.83	170.11	552.86	198.77

Sid Weiser

Comments

1. Test data for Roll Nos. 5137305A and 5137389A cannot be accepted unless these rolls are to be shipped to the FDF site.

2. Need a letter from Synthetic Industries that "Sid Weiser" is the quality control manager or authorized to sign test data per Part 1.04B of Section 02714P.

Karen Bodin-Turkel
9/3/98

2061

GSF-2317-013 R/1

3 of 4 SFT

000024

GSE-2317-013 R1
p. 4 of 5 JFT

Roll List for Geotex 1701

Roll#	batch#
4118610A	40880
4118612A	40880
4118621A	40880
4118629A	40880
4118632A	40880
4118634A	40880
4118642A	40880
4118650A	40880
4118656A	40880
4118657A	40880
4118664A	40880
4118665A	40880
4118666A	40880
4118669A	40880
4118673A	40880

MQC DATA

MQC DATA

Comments:

1. Test data presented in Submittal No. 010 are not uniformly distributed to cover the range of rolls to be shipped to site.

2. Need a letter authorizing Sid Weisser to sign test data.

Author: "Eric Reed" <ERICR@gseworld.com> at FE-INTERNET
Date: 8/31/1998 2:43 PM
Priority: Normal
Receipt Requested
TO: Jim Turner at FNST-05
CC: "GUNA/TONYAS"@gseworld.com at FE-INTERNET
Subject: Geotextile Roll SIzes

GSE-2317-013 Rev 1
p. 5 of 5

2061

Jim, I have heard from Sid Weiser at Synthetic Industries and he said the rolls to be shipped to your project are all 500 sq. yds or 4,500 sf. per roll. If you need anything else please let me know. This information will also be on the Shippers.

Attachment "A"

SUPPLIER DOCUMENT SUBMITTAL

FDFPROJECT NO: 20102	CONTRACT NO: 2317	SUBMITTAL NO: 013	REV: 0	DATE: 8-26-98	PAGE 1 OF 20

FROM: GSE Lining Technology, Inc.

SIGNATURE: _____

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY: _____

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION (17)		
QTY.	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
1	GSE-2317-013	0						X			X	GCL Shipment Roll List; GML	X		02714P, para. 2.01.A.2;			
												Shippers; Geotextile Certification			2.01.B; 2.02.B		X	
												Letters; Geosynthetic Shipment			02772P, para. 1.04.A.9			
												Schedule; Geotextile Roll List					X	

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS
Jim Jenkins, FDF, Engineering, Approver	64						
Dan Bodine, GeoSyntec	38						
Jim Turner, FDF, QA	64						
Chuck Van Arsdale, FDF, Engineering	64						
Rick Holbrook, FDF, Purchasing	64						

RECEIVED BY: [signature] DATE: 9/3/98 NO COMMENTS: ____ COMMENTS ATTACHED X

(SIGN/DATE AND RETURN A COPY TO ECDC, MS52-7)

Comments on Geotextile only transmitted.

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: REVISE AND RESUBMIT AS CFC OR INF
C - REVISE AND RESUBMIT

RECEIVED AUG 26 1998

FS-F-4955 (06/18/98)

GSE-2317-0.3 R/D
p. 8 of 720
JT

2061

SYNTHETIC INDUSTRIES
Construction • Civil Engineering Products Group

August 24, 1998

Karen Louie
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073

RE: **FERMCO, Ohio**

Synthetic Industries' GEOTEX® 861, 1071, and 1701 nonwoven geotextiles are comprised of the following compounds by unit weight:

Polypropylene Resin	95-99 %
Carbon Black	3-0.5 %
Other Processing Additives	2-0 %

02714P Part 2.01A2

In addition, these products are manufactured using no reclaimed polymer.

OK
KBT
9/1/98

Sincerely,

Eddie E. Cooper

Eddie E. Cooper
Engineering Assistant, Construction • Civil Engineering Products Group

Cc: Danny Campbell, Synthetic Industries

Synthetic Industries, Inc.
4019 Industry Drive • Chattanooga, Tennessee • 37416 • 37416 USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

000028

GSE-2317-013 R/0
p. 9 of 17 20
VFT

SYNTHETIC INDUSTRIES
Construction • Civil Engineering Products Group

August 24, 1998

02714 Part 1.04.B.

Karen Louie
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073

RE: **FERMCO, Ohio / "Needle-Free" Letter**
Synthetic Industries' GEOTEX® 361, 1071, and 1701 Nonwoven Geotextiles

Synthetic Industries goes to great measures to ensure that our nonwoven geotextiles are free from broken needles and/or other metal objects. We have two systems working in tandem to prevent any metallic items from being shipped to our customers.

The main method of detection is a 20-inch wide industrial-strength magnetic system mounted at the exits of each of our needlelooms. Spanning the entire width of the fabric, this system is designed to remove any needles and/or metal that could be in the geotextile. In place as a backup is a full-width electronic metal detection system. Should metal or broken needles get by the main system and pass under the metal detector, an audible alarm will alert the operator to check all geotextiles involved for metal contamination.

If there are any further concerns or questions, please do not hesitate to contact me.

Sincerely,

Eddie E. Cooper

Eddie E. Cooper
Engineering Assistant, Construction • Civil Engineering Products Group

Synthetic Industries, Inc.
4019 Industry Drive • Chattanooga, Tennessee • 37416 • 37416 USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

GSE-2317-013 N/O
p. 10 of 17
JCT

2061

SYNTHETIC INDUSTRIES
Construction • Civil Engineering Products Group

August 24, 1998

Karen Louie
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073

RE: FERMCO, Ohio / UV Resistance Statement
Synthetic Industries' GEOTEX® 861, 1071, and 1701 Nonwoven Geotextiles

Synthetic Industries' GEOTEX® 861, 1071, and 1701 nonwoven geotextiles all have minimum average roll value (MARV) UV resistance of 70 % strength retained after 500 hours exposure in accordance with ASTM D4355.

If there are any further questions, please do not hesitate to contact me.

Sincerely,

Eddie E. Cooper

Eddie E. Cooper
Engineering Assistant, Construction • Civil Engineering Products Group

This is MARV certification per Part 1-04 A.2 of Section 02714P.

Need similar MARV certification for all other properties listed in Tables 02714P-1 through 02714P-3.

Synthetic Industries, Inc.
4019 Industry Drive • Chattanooga, Tennessee • 37416 • 37416 USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

KBT
9/3/98

7 oz Nonwoven

GSE-2317-013.R0
p. 16 of 17 20
JTT

861

Roll number	Batch
6050	093 60216
	284 60217
	285 60217
	288 60217
	294 60217
	298 60217
	309 60217
	321 60217
	351 60217
	352 60217
	353 60217
	354 60217
	381 60217
	382 60217
	384 60217
	385 60217
	400 60217
	403 60217
	405 60217
	406 60217
	408 60217
	409 60217
	410 60217
	412 60217
	413 60217
	415 60217
	416 60217
	417 60217
	418 60217
	419 60217
	420 60217
	421 60217
	423 60217
	424 60217
	425 60217
	426 60217
	427 60217
	428 60217
	429 60217
	430 60217
	431 60217
	432 60217
	433 60217
	434 60217
	435 60217
	436 60217
	437 60217
	438 60217
	439 60217
	440 60217
	441 60217
	443 60217

Roll number	Batch
6050	446 60217
	458 60217
	459 60217
	460 60217
	461 60217
	462 60217
	463 60217
	464 60217
	465 60217
	466 60217
	467 60217
	468 60217
	470 60217
	471 60217
	472 60217
	473 60217
	474 60217
	476 60217
	478 60217
	479 60217
	482 60217
	486 60217
	487 60217
	488 60217
	490 60217
	492 60217
	493 60217
	494 60217
	495 60217
	496 60217
	497 60217
	500 60217
	502 60217
	503 60217
	504 60217
	506 60217
	507 60217
	508 60217
	511 60217
	513 60217
	514 60217
	515 60217
	516 60217
	518 60217
	519 60217
	532 60217
	533 60217

Comments:

- No MQC Data on Batch 602
- Tests on Batch 60217 do cover the range of rolls to be chipped to the FDF site.

000031

2061 1071 KO oz Nonwoven GSE-2317-013 R/O p. 15 of 27 NO GOOD

Roll number	Batch
4105	092 40802
	109 40802
	136 40803
	163 40803

THESE ROLLS FROM BATCH ~~NO.~~ NO. 40802 and 40803 have been replaced by Rolls 468, 478, 480, and 494 from Batch No. 50853

~~[illegible]~~

KBT 9/3/98

Roll number	Batch
5137	243 50853
	244 50853
	245 50853
	246 50853
	262 50853
	263 50853
	264 50853
	265 50853
	268 50853
	274 50853
	286 50853
	289 50853
MLQC DATA	290 50853
	291 50853
	292 50853
	293 50853
	294 50853
	295 50853
	296 50853
	297 50853
	298 50853
	299 50853
MLQC DATA	300 50853
	301 50853
	302 50853
	303 50853
	304 50853
	306 50853
	307 50853
	308 50853
	310 50853
	311 50853
	312 50853
	313 50853
	314 50853
	315 50853
	316 50853
	317 50853
	318 50853
	319 50853
MLQC DATA	320 50853
	321 50853
	322 50853
	324 50853
	325 50853
	326 50853
	327 50853
	328 50853
	329 50853
	330 50853
	331 50853
	332 50853
	334 50853

Roll number	Batch
5137	335 50853
	336 50853
	338 50853
	339 50853
	340 50853
	341 50853
	342 50853
	343 50853
	344 50853
	345 50853
	346 50853
	347 50853
	348 50853
	349 50853
	354 50853
	355 50853
	356 50853
	357 50853
	358 50853
	359 50853
	360 50853
	361 50853
	362 50853
	363 50853
	364 50853
	365 50853
	366 50853
	367 50853
	368 50853
	369 50853
	370 50853
	375 50853
	376 50853
	377 50853
	378 50853
	379 50853
	381 50853
	382 50853
	383 50853
	384 50853
	385 50853
	387 50853
	392 50853
	393 50853
	394 50853
	395 50853
	396 50853
	397 50853
	398 50853
	399 50853
	400 50853
	401 50853
	402 50853

	Batch
	403 50853
	404 50853
	405 50853
	406 50853
	407 50853
	408 50853
	409 50853
	413 50853
	414 50853
	415 50853
	416 50853
	417 50853
	418 50853
	419 50853
	420 50853
	421 50853
	422 50853
	423 50853
	424 50853
	425 50853
	426 50853
	427 50853
	428 50853
	429 50853
	430 50853
	431 50853
	432 50853
	433 50853
	434 50853
	435 50853
	436 50853
	438 50853
	439 50853
	440 50853
	443 50853
	444 50853
	445 50853
	446 50853
	447 50853
	448 50853
	450 50853
	452 50853
	453 50853
	454 50853
	455 50853
	457 50853
	458 50853
	459 50853
	460 50853
	461 50853
	462 50853
	465 50853
468 →	466 50853
478 →	470 50853
480 →	~~479 50853~~
	~~481 50853~~
	483 50853
	484 50853
	489 50853
494 →	490 50853
	496 50853
	500 50853
	509 50853
	522 50853
	523 50853
	524 50853

GSE-2317-013 R0

LG OZ Hanwoven, p. 17 of 20 JFT

ile 1701		
oll number		Batch
411	8517	40879
	8576	40879
	8582	40879
	8589	40879
	8629 ✓	40880
	8634 ✓	40880
412	6286	40920
	6343	40920
	6344	40920
	6390	40920
	6496	40921
	6497	40921
	6498	40921
	6504	40921
	6531	40921

These Rolls are not supposed to come to the site. The correct list of rolls is provided in Submittal No. 013, Rev.

Kwasi Boahene-Tweneboa

9/3/98

Attachment "A"

SUPPLIER DOCUMENT SUBMITTAL

FDFPROJECT NO: 20102	CONTRACT NO: 2317	SUBMITTAL NO: 012	REV: 0	DATE: 8-26-98	PAGE 1 OF 5

FROM: GSE Lining Technology, Inc.

SIGNATURE: _____

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY: _____

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION (17)		
QTY.	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
1	GSE-2317-012	0						X			X	GCL Needle-Free Cert; GML Roll	X		02770P, para. 1.05.C;	X		
												Test Data Report for Roll			2.01.B, C; 2.03.A.1, B.4&5,	X		
												# AK-2549FF; and Carbon Black			2.03.B.7	X		
												Dispersion Test Results						

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS
Jim Jenkins, FDF, Engineering, Approver	64						
Dan Bodine, GeoSyntec	38						
Jim Turner, FDF, QA	64						
Chuck Van Arsdale, FDF, Engineering	64						

RECEIVED BY: K Bodine (SIGN/DATE AND RETURN A COPY TO ECDC, MS52-7) DATE: 9/1/98 NO COMMENTS: X COMMENTS ATTACHED _____

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A -ACCEPTED DOCUMENT: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: REVISE AND RESUBMIT AS CFC OR INF
C - REVISE AND RESUBMIT

000034

2061

RECEIVED
AUG 26 1998
DGB/KBT

FS-F-4955-RV1 (06/18/98)

2061

FERMCO OU2

GSE-2317-~~010~~ 012 ~~011~~ 12/0

p. 2 of 5

JT 8-26-98

GSE

DEALER SALES

AUG 11 12 00 PM '98

DATE: 11 AUGUST, 1998

NUMBER OF PAGES INCLUDING COVER SHEET 4

TO: JIM TURNER
FLUOR DANIEL FERNALD
PHONE: 513/648-4941
FAX: 513/648-5767

CC:

FROM: ERIC REED
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE RD.
HOUSTON, TX 77073
PHONE: 800/435-2008
FAX: 281/230-8663
E-MAIL: ERICR@GSEWORLD.COM

REMARKS: ☒ URGENT ☐ FOR YOUR REVIEW ☐ REPLY ASAP ☐ PLEASE COMMENT

Jim, here is the certification from CETCO on the Needle free, a missing RTDR and the updated Carbon Black Dispersion. Also the trucks did not go out yesterday since the rolls to be shipped were on the bottom of the pile and they were not able to get them out in time. They should be going out today but I will confirm by Fax.

C: GeoSynter
Chuck Van Ansdale
Rich Helbrack
Jim Turner

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
1350 West Shure Drive • Arlington Heights, IL 60004-1440 • USA
(847) 392-5800 • Fax (847) 506-6150
http://www.cetco.com

GSE-2317-012 R/0
p. 3 of 5

BENTOMAT NEEDLE MANUFACTURING CERTIFICATION

Project: FERMCO
Fernald, OH

CETCO hereby affirms that all BENTOMAT geosynthetic clay liner material is continually processed with a needle removal system and that all the BENTOMAT geosynthetic clay liner is certified to be needle-free.

James T. Olsta

James T. Olsta
Technical Manager, Lining Technologies Group
Colloid Environmental Technologies Co. (CETCO)

g:liner\forms\mqcert

A 100% Owned Subsidiary of AMCOL International
Printed on recycled paper

GSE

2061 Roll Test Data Report

GSE-2317-012 R0

ROLL NO. AK-2549 FF

p.4 of 5

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-2549 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8489	sq.ft.
	789	sq. meters
LENGTH:	360	feet
	110	meters
WIDTH:	23.58	feet
	7.2	meters
WEIGHT:	3521	pounds
	1597	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45448
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.936
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.490

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
NSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	192 lb/in	34 kg/cm
MD -		173	31	191	34
LD ELONGATION	D638				
CD -		13 %		20 %	
MD -		13		19	
NSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	395 lb/in	71 kg/cm
MD -		324	59	414	74
ELONGATION	D638				
CD -		560 %		693 %	
MD -		560		716	
TIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	72 lb	33 kg
MD -		60	27	74	33
CTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	127 lb	58 kg
INKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.0 %	
MD -		+/-2.00		0.0	
BON BLACK DISPERSION	D3015	A2		A2	
BON BLACK CONTENT	D1603	2.00 %		2.46 %	
MEMBRANE DENSITY	D1505		0.940 g/cc		0.946 g/cc
R	D1693-B	1500 hours		Start 5/29/98	
CKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	78	1.99
AVG. THICKNESS				80	2.04

TEST NOTES. MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

IER: FLUOR DANIEL FERNALD/FERMCO
NO 7920
MENTS

DATE SHIPPED

APPROVED 8-6-98

GSE-2317-012 R/0.
p. 5 of 5

GSE®

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
281-443-8564
Fax 281-875-6010

Quality Assurance Laboratory Test Results

Test: Microscopic evaluation of the dispersion of Carbon Black in Polyolefin Geosynthetics ASTM D 5596

Criteria: 10 Views, all must be category 1 or 2, cannot be any category 3.

Job Name: Fluor Daniel Fernald Fernico

MR Number: 7920-01

Job Number: C1269

Roll Number	Test Status
AJ 5175 FF	Pass
AK 2527 FF	Pass
AK 2528 FF	Pass
AK 2553 FF	Pass
AK 4197 FF	Pass
AK 4202 FF	Pass
AK 4207 FF	Pass
AK 4211 FF	Pass
AK 4212 FF	Pass
AK 4213 FF	Pass
AK 4214 FF	Pass
AK 4215 FF	Pass
AK 4222 FF	Pass
AK 4227 FF	Pass
AK 4230 FF	Pass
AK 4236 FF	Pass
AK 4241 FF	Pass
AK 4246 FF	Pass
AK 4252 FF	Pass
AK 4253 FF	Pass
AK 4258 FF	Pass
AK 4262 FF	Pass
AK 4263 FF	Pass
AK 4268 FF	Pass
AK 4269 FF	Pass

Roll Number	Test Status
AK 4270 FF	Pass
AK 4271 FF	Pass
AK 4272 FF	Pass
AK 4273 FF	Pass
AK 4274 FF	Pass
AK 4275 FF	Pass
AK 4280 FF	Pass
AK 4285 FF	Pass
AK 4292 FF	Pass
AK 4295 FF	Pass

NO QC I.D.
initial and date

KRT
9/2/98

Attachment "A"

SUPPLIER DOCUMENT SUBMITTAL

FDFPROJECT NO: 20102	CONTRACT NO: 2317	SUBMITTAL NO: 011	REV: 1	DATE: 10-27-98	PAGE 1 OF 8

FROM: GSE Lining Technology, Inc.

SIGNATURE: _____

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY: _____

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION (17)		
QTY.	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
1	GSE-2317-011	1						X			X	Hydraulic Conductivity and Shear	X		02772P, para. 1.04B, 1.04C		X	
												Test Data Reports			2.01.E.1, 2.01.F.1, 2.02.B, &			
												(see also GSE-2317-004 Rev. 0)			C and 2.01.G.			

TEST DATA OK HOWEVER
(1) Correct lot # on PRECISION RPT. (TYPO)
(2) Attach Packing List with Roll #'s delivered to this site. (Copy Provided by DGB)

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS
Jim Jenkins, FDF, Engineering, Approver	64						
Dan Bodine, GeoSyntec	38						
Jim Turner, FDF, QA	64						
Chuck Van Arsdale, FDF, Engineering	64						

RECEIVED OCT 28 1998 K Hussman

RECEIVED BY: Daniel Bodine (SIGN/DATE AND RETURN A COPY TO ECDC, MS52-7) DATE: 29 Oct 98 NO COMMENTS: ____ COMMENTS ATTACHED X Above

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE
A - ACCEPTED DOCUMENT: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: REVISE AND RESUBMIT AS CFC OR INF
C - REVISE AND RESUBMIT

000039

2061

FS-F-4955-RV1 (06/18/98)

GSE-2317-011 R.1
p. 2 of 8

PRECISION GEOSYNTHETIC LABORATORIES
1742 West Katella Suite #4, Orange, CA 92867

FAX

ORIGINAL

Date: Oct 26 '98
Number of pages including cover sheet: 7

To:
Jim Turner
ERIC Reed

Phone:
Fax phone: 513-648-5767
CC:

From:
Ora

Phone: 714-744-4599
Fax phone: 714-744-0357

REMARKS: ☐ Urgent ☐ For your review ☐ Reply ASAP ☐ Please comment

Last GCL Test result.

000040

GSE-2317-011 R.1
p. 3 of 8

2061

Precision Geosynthetic Laboratories

October 25, 1998

Mr. Eric Reed
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073

ORIGINAL

Dear Mr. Reed: **RE:** FERNALD OSDF

Thank you for consulting Precision Geosynthetic Laboratories for your material testing needs.

Enclosed is the laboratory report for the testing of one 91) GCL and one (1) HDT Textured HDPE for Interface Shear received October 9 1998.

It should be noted that the test specimen and test sample used for this report were believed to be representative of the material produced under the designation herein stated. However, these results are indicative of only the specimen that were actually tested. The testing herein is based upon accepted industry practice as well as the test method listed. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the final use and purpose of the material.

By accepting the data and results represented on this report, Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims arising out of the use of this data to the cost for the respective test(s) represented in this report, and Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liability in excess of the aforementioned limit.

The test data and all associated project information provided shall be held in confidence and disclosed to other parties only with the authorization of Client or Precision Geosynthetic Laboratories.

If you have any questions or if we may be of further service, please do not hesitate to call at 800-522-4599.

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Cora B. Queja
Quality Assurance

Ronald E. Belanger
Technical Director

Enclosure: (Job No. 9801470)

000041

1742 West Katella, Suite #4, Orange, CA 92867 TEL : (714) 744-4599 FAX : (714) 744-0357

GSE-2317-011 R.1
p. 4 of 8

October 7, 1998

VERIFICATION OF MATERIAL PROPERTIES

FERNALD OSF

FOR: GSE LINING TECHNOLOGY
(Reference: PGL Job No. 980766)

MATERIAL DESCRIPTION: (1) GCL for Permeability
(1) GCL for Internal Shear & Interface Shear
(1) HDT for Interface Shear

ORIGINAL

ORIGIN OF MATERIAL: Fernald Project Site
CETCO - CLAYMAX DIVISION, Fairmount, GA

DATE RECEIVED: October 7, 1998 **SHIPPER**: UPS

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER
GCL Roll #13539 Lot # 199839030	C #33303
HDT 80 mil HDT , Textured both sides	C #AK2528

TESTS REQUIRED:

DESCRIPTION	TEST METHOD
Interface Shear	ASTM D5321
Internal Shear	ASTM D5321
Hydraulic Conductivity	ASTM D5887

TEST CONDITIONS: The samples were conditioned for a minimum of one hour in the laboratory at 23 ± 2°C (73.1 ± 3.6°F) and at 60 ± 10% relative humidity prior to test.

TEST RESULTS:

The test results is summarized in Tables 1 through 2 and report from Vector Engineering. The units in which the data are reported are included on the tables.

PRECISION GEOSYNTHETIC LABORATORIES

Cora B. Queja
Quality Assurance

Ronald E. Belanger
Technical Director

000042

Precision Geosynthetic Laboratories

2061

GSE 2317-011 R.1
p. 5 of 8

TABLE 1.
MATERIAL PROPERTIES
FERNALD OSDF

FOR: GSE LINING TECHNOLOGY
(Reference: PGL Job No. 98981470)

CETCO – BENTOMAT ST
HYDRAULIC CONDUCTIVITY
(by ASTM D5887)

ORIGINAL

ROLL NUMBER	PGL C# NO.	CONFINING PRESSURE (psi)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)	RESULTS (cm/sec) (10^{-9})	PROJECT SPECS. (cm/sec) (10^{-9})
1. Roll # 13539	C# 33303	5	14.67	141.25	2.7	5

Precision Geosynthetic Laboratories

GSE-2317-011 R.1
p. 6 of 8

TABLE 2.
MATERIAL PROPERTIES
FERNALD OSDF

FOR: GSE LINING TECHNOLOGY
(Reference: PGL Job No. 981470)

OCT 23, 1998

INTERNAL SHEAR TEST RESULT (ASTM D5321)

TEST CONDITIONS:

ORIGINAL

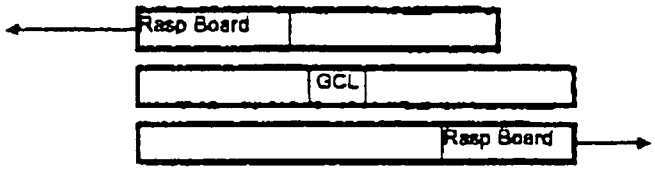
SAMPLE PREPARATION
1. Specimens were cut to 20" x 20"

HYDRATION:
1. Hydrated for 7 days at 3 psi using dead weights

CONSOLIDATION:
1. Each set of specimen was consolidated for 48 hrs at 5, 20, & 45 psi.
2. Loads were applied by pneumatic pressure.

SHEAR TEST:
1. Shear test was conducted at 0.004 in/ min
2. Sheared at minimum 2 inch horizontal displacement.
3. The test specimens were flooded during testing.
4. Tests were performed in general accordance with ASTM D5321-93 Method A using Brainard- Kilman LG-112 Direct Shear machine with effective area of 12 in x 12 in.

TEST CONFIGURATION



SAMPLE IDENTIFICATION:
PGL C# 33303, GCL Roll #13539

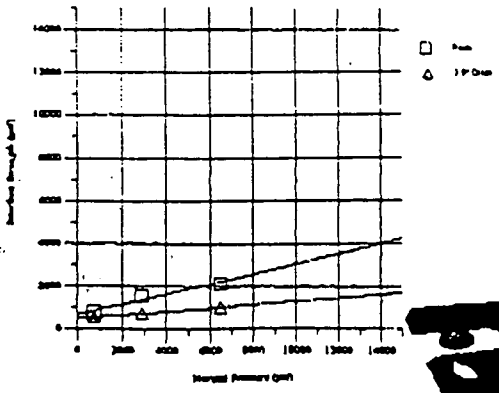
TEST RESULTS:

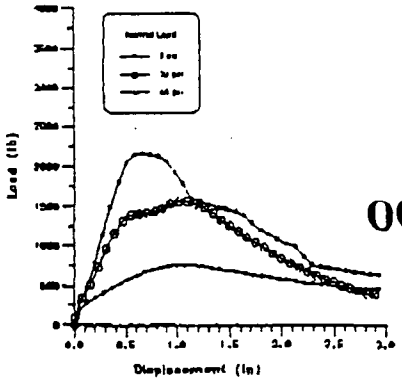
STRENGTH

SAMPLE ID	NORMAL STRESS (psi)	NORMAL STRESS (psf)	Moisture Content (%)	PEAK STRENGTH SHEAR STRESS (psf) (psi)	PEAK STRENGTH PEAK SECANT ANGLE	2" DISPLACEMENT SHEAR STRESS (psf) (psi)	2" DISPLACEMENT 2" DISPLACEMENT SECANT ANGLE
C# 33303	5	720	124.31	758 5.3	46	572 4.0	38
ROLL #	20	2880	109.40	1583 11.0	28	782 5.4	15
LOT #	45	6480	72.34	2159 15.0	18	1024 7.1	9
COHESION:				702		533	

OBSERVATIONS:

Shearing occurred in the stitches of the GCL. At 2 inches displacement, 100 % of the stitches were completely separated from the woven side of the GCL for test run at and 20-psi 45- psi normal loads while 60% of the stitches were separated from the woven side of the GCL.





000044

Precision Geosynthetic Laboratories

GSE-2317-011 R.1

Vector Engineering Inc.

Laboratory Services
12438 Loma Rica Drive., Suite C, Grass Valley, CA 95945
(530) 272-2448 Fax (530) 272-8553

LARGE SCALE DIRECT SHEAR REPORT

Test Method ASTM D-5321-B

2061

p.7of8

Client Name: PRECISION LABS | Project Name: FURNALD SITE | Project No: 943022.35-904A

Superstrate: <— Board Spacers

Material 1: <— CETCO Bentomat ST #13639 199839030 | LSN: AZT

Material 2: —> GSE 80 mil HDPE, Textured Both Sides, AK2528 | LSN: AZV

Substrate: —> Concrete Board with Sand Layer

DISPLACEMENT vs. SHEAR STRESS

Test Point	Normal Stress psi	Normal Stress psf
1.	5.0	720
2.	20.0	2880
3.	45.0	6480

MOISTURE DATA:

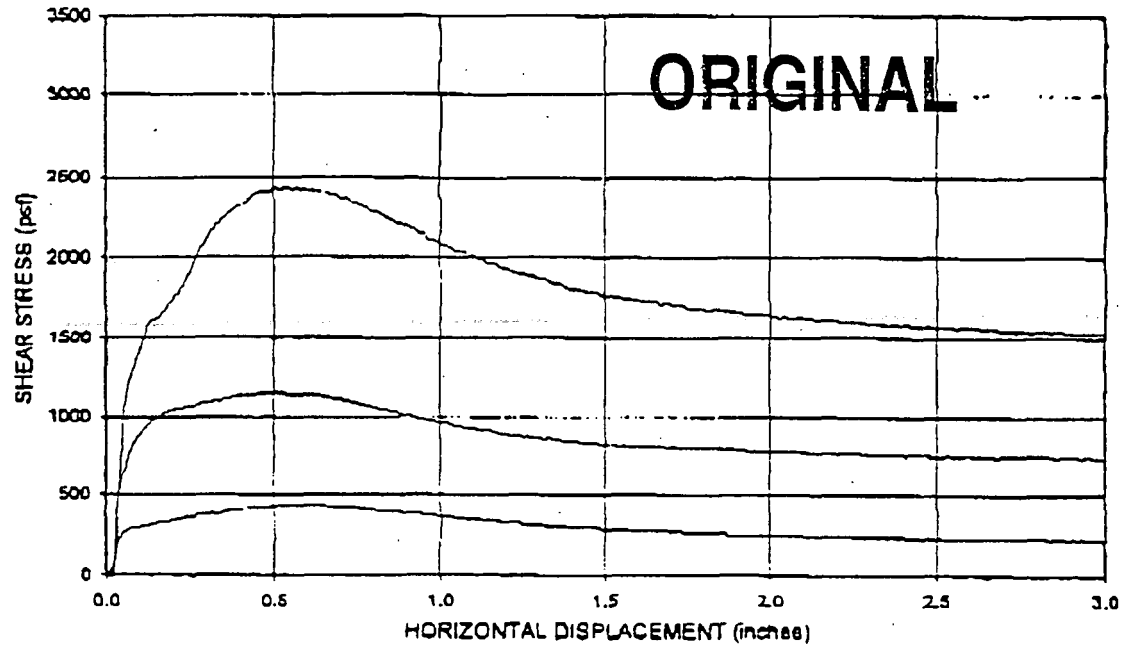
(GCL)

Initial Water Content(%): 20.21

Initial Dry Density: n/a pcf

Final Water Content(%):

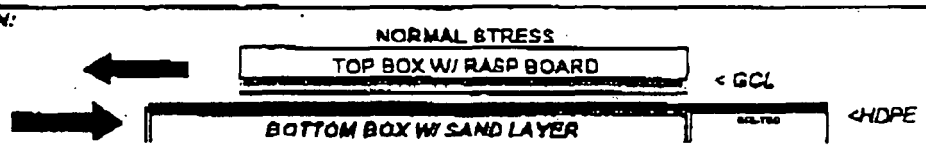
1.	2.	3.
84.2	77.8	63.8



STANDARD CONDITIONS:

1. The "gap" between shear boxes was set at 80 mil (2.0 mm)
2. The test specimens were flooded during testing unless otherwise noted.
3. High Normal Stress (>6psi) was applied using air pressure.
4. Low Normal Stress (<5psi) was applied using dead weights.
5. The tests were terminated after 3.0" of displacement unless otherwise noted.
6. Tests were performed in general accordance with ASTM procedure D-5321-92 Method B using a Brainard-Kilman LG-112 direct shear machine with an effective area of 12" x 12".

TEST ORIENTATION:



SPECIAL TEST NOTES:

1. The GCL was wrapped around a 12" x 12" rasp board in the upper box.
2. Each specimen of HDPE was cut to 14" x 20".
3. The HDPE was bolted into the lower shear box with "channel clamps".
4. The GCL specimens were hydrated for 7 days at 3 psi. In contact with the textured HDPE.
5. After hydration, each test point was consolidated for 48 hours at the specified normal stress, then sheared.
6. Shearing occurred at the contact between the GCL and the HDPE.
7. Stretching or deformation of the GCL or HDPE were not observed.

000045

By accepting the data and results represented on this page, Client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties for claims arising out of use of this data to the cost for the respective test(s) represented herein, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

Report Date: 10/22/98 | Entered By: JG | Reviewed By: KAL | Lab Log: 904A

Precision Geosynthetic Laboratories

lot # 199839030 GSE-2317-011 R,1
p. 8 of 8

Client Name: PRECISION LABS Project Name: FURNALD SITE Project No: 943022.35-

Superstrate: ← Board Spacers

Material 1: ← CETCO Bentomat ST #18538:199839030 LSN: AZT

Material 2: → GSE 80 mil HDPE, Textured Both Sides, AK2528 LSN: AZV

Substrate: → Concrete Board with Sand Layer

PEAK STRENGTH

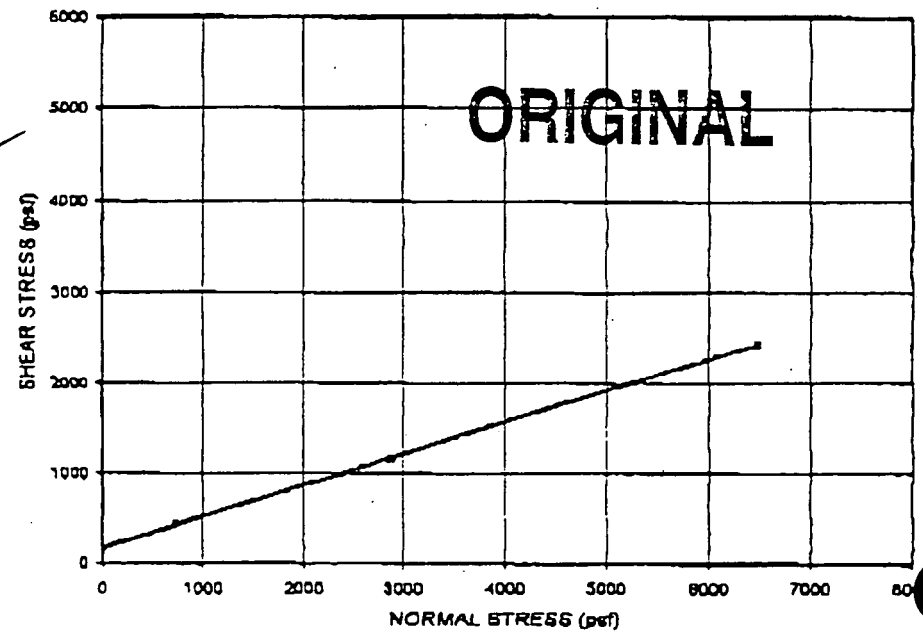
Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Secant Friction Angle
1.	5.0	720	430 3.0 psi	31
2.	20.0	2880	1150 8.0 psi	22
3.	45.0	6480	2440 16.9 psi	21

Adhesion: 170 psf

Friction Angle: 19 degrees

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



STRENGTH ENVELOPE
(at 2.5 in. displacement)

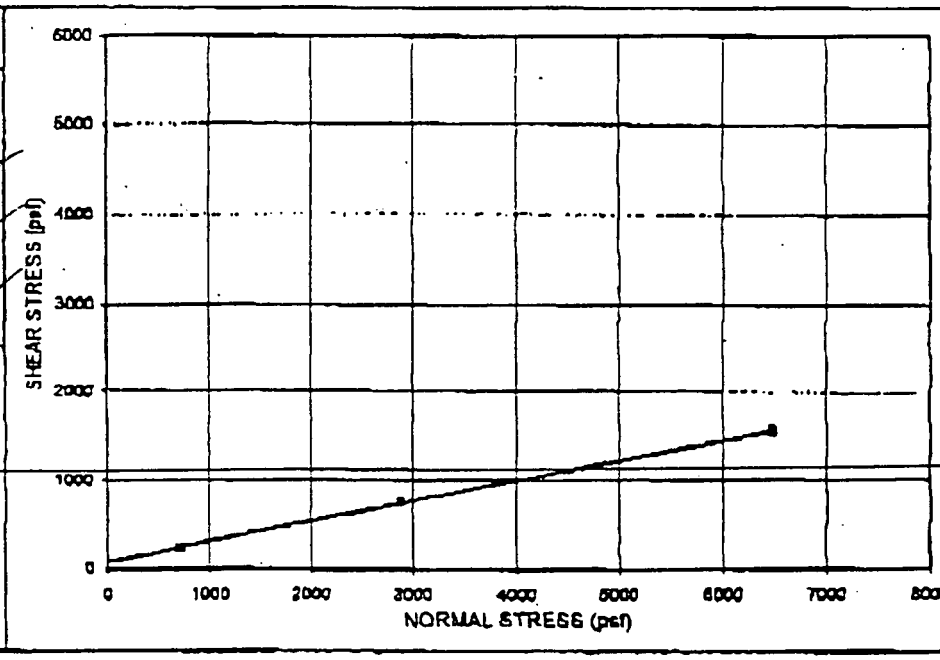
Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Secant Friction Angle
1.	5.0	720	230 1.6 psi	18
2.	20.0	2880	750 5.2 psi	15
3.	45.0	6480	1570 10.9 psi	14

Adhesion: 70 psf

Friction Angle: 13 degrees

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



NOTE: The Friction Angle and Adhesion (or Cohesion) results given here are based on a mathematically determined best fit line. Further interpretation should be conducted by a qualified professional experienced in geosynthetic and geotechnical engineering.

By accepting the data and report represented on this page, Client agrees to limit the liability of Vector Engineering, Inc. from client and all other parties for claims arising out of use of this data to the cost for the respective test(s) represented hereon, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned sum

Report Date: 10/22/98 Entered By: JG Reviewed By: KK Lab Log: 90

000046

Precision Geosynthetic Laboratories

PACKING LIST

2061

COLLOID ENVIRONMENTAL TECH CO
1350 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087504
ORDER DATE: 7/02/98
SHIP DATE:. 10/06/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
30-BENTOMAT ST	SFT SF	199839030	00013539	150.0	15.0	2250.0	3146
30-BENTOMAT ST	SFT SF	199839030	00013541	150.0	15.0	2250.0	2950
30-BENTOMAT ST	SFT SF	199839030	00013543	150.0	15.0	2250.0	3043
0-BENTOMAT ST	SFT SF	199839030	00013544	150.0	15.0	2250.0	3035

RDER TOTALS.....	9000.0	12174.
TOTAL ITEMS..... 4		

Plus 4 Bags

000047

Attachment "A"

SUPPLIER DOCUMENT SUBMITTAL

FDFPROJECT NO: 20102	CONTRACT NO: 2317	SUBMITTAL NO: 011	REV: 0	DATE: 8-26-98	PAGE 1 OF 23

FROM: GSE Lining Technology, Inc.

SIGNATURE:

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY:

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION (17)		
QTY.	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
1	GSE-2317-011	0						X			X	Hydraulic Conductivity and Shear	X		02772P, para. 1.04 B, 1.04	X		
												Test Data Reports (see also GSE-			2.01.E.1, 2.01.F.1, 2.02 B, &	X		
												2317-004)			C and 2.01.G			

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS
Jim Jenkins, FDF, Engineering, Approver	64						
Dan Bodine, GeoSyntec	38						
Jim Turner, FDF, QA	64						
Chuck Van Arsdale	64						

000048

RECEIVED BY: [signature] DATE: 9/1/98 NO COMMENTS: ___ COMMENTS ATTACHED X

(SIGN/DATE AND RETURN A COPY TO ECDC, MS52-7)

Vector's final report should show 0.004 in./min strain rate.

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: REVISE AND RESUBMIT AS CFC OR INF
C - REVISE AND RESUBMIT

AUG 26 1998
DUBLICAT

FS-F-495[redacted] (06/18/98)

GSE-2317-011 R/0

FERMCO OU2 2061

p 2 of ~~24~~ 23 JTT

PRECISION GEOSYNTHETIC LABORATORIES
1742 West Katella Suite #4, Orange, CA 92867

AUG 10 2 50 PM '98

FAX

2nd

Date: August 10 '98

Number of pages including cover sheet: 7

To: ERIC REED -GSE
Jim Turner - Flour Daniel
Chuck Hornaday - CETCO
Jim Olsta - CETCO

re: Fernald OSDF

Phone: 281-230-8663
Fax phone: 573-648-5767
CC: 847-577-5571

From: Cora Anji.

Phone: 714-744-4599
Fax phone: 714-744-0357

REMARKS: ☐ Urgent ☐ For your review ☐ Reply ASAP ☐ Please comment

Herewith is a partial report
(1) Internal Shear - GCL (2)
(2) Interface Shear - GCL/HD (2)

This makes 4 Internal Shear
4 Interface Shear
completed.

TABLE 4,
MATERIAL PROPERTIES
FERNALD OSDF

FOR: GSE LINING TECHNOLOGY
(Reference: PGL Job No. 980766)

Aug 7, 1998

INTERFACE SHEAR TEST RESULT (ASTM D5321)

TEST CONDITIONS:

SAMPLE PREPARATION

1. Specimens were cut to 20" x 20"

HYDRATION:

1. Hydrated for 7 days at 3 psi using dead weights

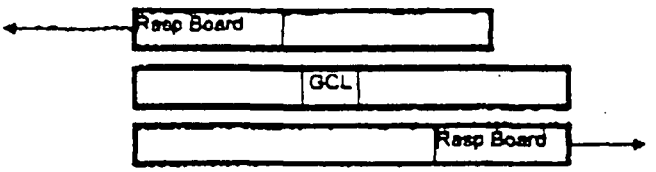
CONSOLIDATION:

1. Each set of specimen was consolidated for 48 hrs at 5, 20, & 45 psi.
2. Loads were applied by pneumatic pressure.

SHEAR TEST:

1. Shear test was conducted at 0.004 in/ min
2. Sheared at minimum 2 inch horizontal displacement.
3. The test specimens were flooded during testing.
4. Tests were performed in general accordance with ASTM D5321-93 Method A using Brainard- Kilman LG-112 Direct Shear machine with effective area of 12 in x 12 in.

TEST CONFIGURATION



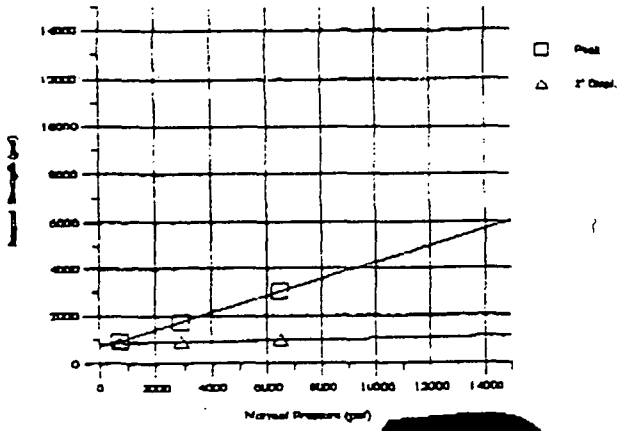
SAMPLE IDENTIFICATION:
PGL C# 29821, GCL Roll # 7677

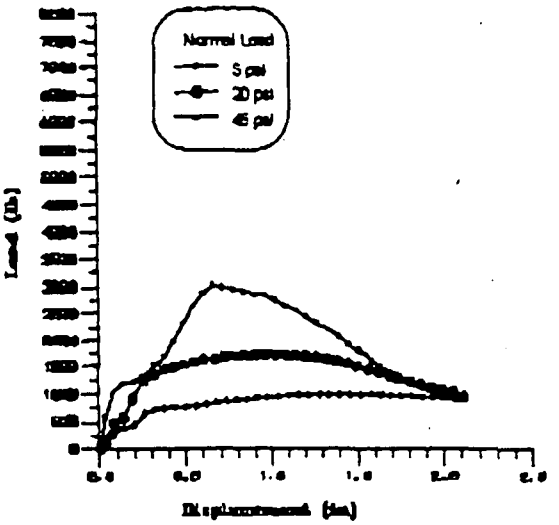
TEST RESULTS:

SAMPLE ID	NORMAL STRESS (psi)	NORMAL STRESS (psf)	FINAL Moisture Content (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE	2" DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2" DISPLACEMENT STRENGTH 2" DISPLACEMENT SECANT ANGLE
C# 29821	5	720	130.25	980	54	886	51
ROLL #7677	20	2880	112.45	1724	31	917	18
LOT# 199829030	45	6480	79.21	3030	25	982	9
		COHESION:			713		872

OBSERVATIONS:

Shearing occured in the stitches of the GCL. At 2" displacement, 100% of the stitches were completely separated from the nonwoven side of the GCL for test run at 45 psi normal load while all the stitches were still connected but elongated for 5 and 20 psi normal loads..





Precision Geosynthetic Laboratories

GSF-23-7-011 R/0
p. 4 of ~~27~~ 23 JTT

TABLE 5
MATERIAL PROPERTIES
FERNALD OSDF

FOR: GSE LINING TECHNOLOGY
(Reference: PGL Job No. 980766)

Aug 7, 1998

INTERFACE SHEAR TEST RESULT (ASTM D5321)

TEST CONDITIONS:

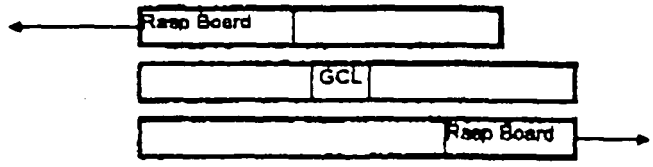
SAMPLE PREPARATION
1. Specimens were cut to 20" x 20"

HYDRATION:
1. Hydrated for 7 days at 3 psi using dead weights

CONSOLIDATION:
1. Each set of specimen was consolidated for 48 hrs at 5, 20, & 45 psi.
2. Loads were applied by pneumatic pressure.

SHEAR TEST:
1. Shear test was conducted at 0.004 in/ min
2. Sheared at minimum 2 inch horizontal displacement.
3. The test specimens were flooded during testing.
4. Tests were performed in general accordance with ASTM D5321-93 Method A using Brainard- Killman LG-112 Direct Shear machine with effective area of 12 in x 12 in.

TEST CONFIGURATION

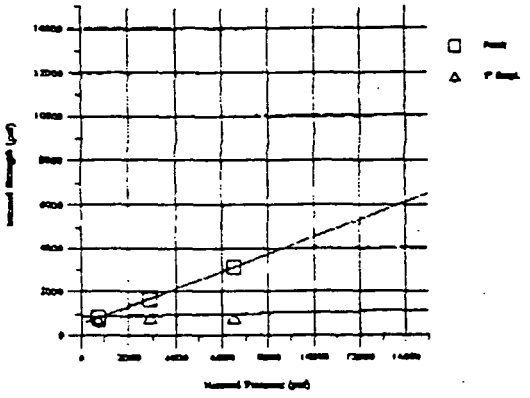


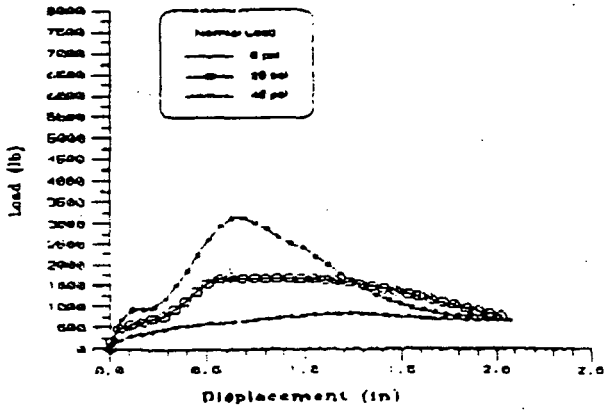
SAMPLE IDENTIFICATION:
PGL C# 29618, GCL Roll # 7717

TEST RESULTS:

SAMPLE ID	NORMAL STRESS (psi)	NORMAL STRESS (psf)	FINAL Moisture Content (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE	2" DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2" DISPLACEMENT STRENGTH 2" DISPLACEMENT SECANT ANGLE
C# 29618	5	720	138.14	820	49	672	43
ROLL #7717	20	2880	90.30	1667	30	782	15
LOT# 198830030	45	6480	78.95	3123	28	765	7
	COHESION:			521		684	

OBSERVATIONS: At 2 in. displacement, for 5 psi normal load, 100% of stitches were connected to nonwoven side, for 20 psi, 70% of stitches were seperated from nonwoven side, for 45 psi, 100% of stitches were seperated from nonwoven side.





Precision Geosynthetic Laboratories

GSE-2317-011 K10

Vector Engineering, Inc.

Laboratory Services

12490 Lime Rice Drive, Suite C, Grass Valley, CA 95945
(530) 272-3446 Fax (530) 272-6580

LARGE SCALE DIRECT SHEAR REPORT

2061 Test Method ASTM D-5321-B

p. 5 of 27

Client Name: PRECISION LABS | Project Name: FURNALD SITE | Project No: 943022.33-8

Specimen: <— Board Spacers

Material 1: <— CETCO Bentomat ST, #7677 199829030 | LSN: AXF

Material 2: —> 80 mil GSE HDPE Textured Both Sides, AK4216FF | LSN: AWW

Substrate: —> Concrete Board with Sand Layer

DISPLACEMENT vs. SHEAR STRESS

Test Point	Normal Stress psi	Normal Stress psf
1.	5.0	720
2.	20.0	2880
3.	45.0	6480

MOISTURE DATA:

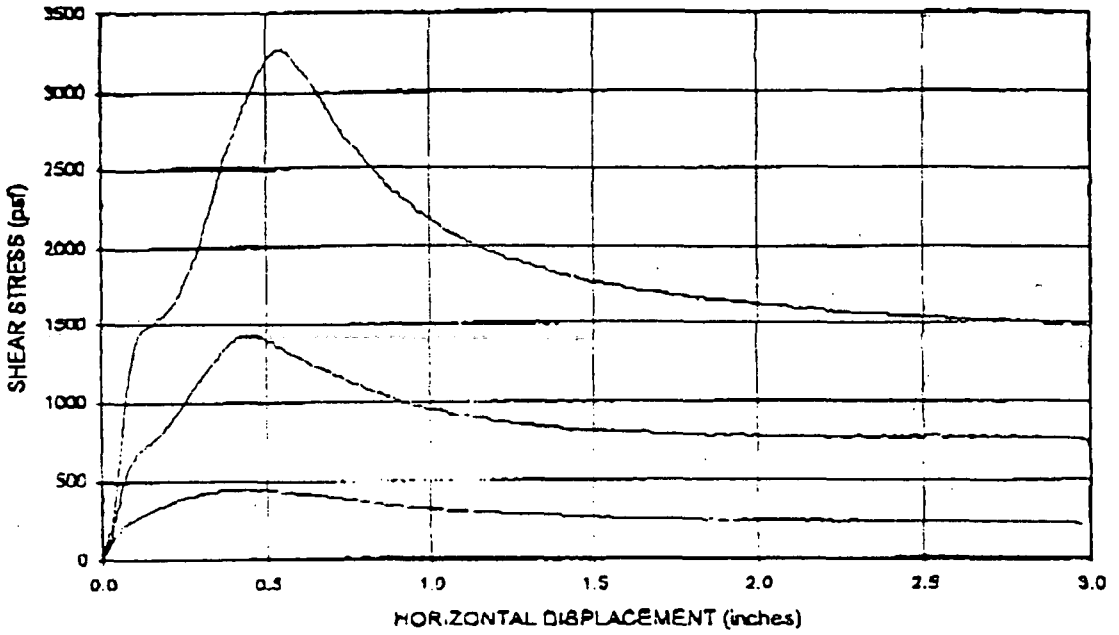
(soil)

Initial Water Content: 19.14%

Initial Dry Density: pcf

Final Water Content

1.	2.	3.
101.4%	85.9%	61.8%



STANDARD CONDITIONS:

1. The "gap" between shear boxes was set at 80 mil (2.0 mm)
2. The test specimens were flooded during testing unless otherwise noted.
3. High Normal Stress (>5psi) was applied using air pressure.
4. Low Normal Stress (<5psi) was applied using dead weights.
5. The tests were terminated after 3.0" of displacement unless otherwise noted.
6. Tests were performed in general accordance with ASTM procedure D-5321-92 Method B using a Brainard-Killman LO-112 direct shear machine with an effective area of 12" x 12".

TEST ORIENTATION:

SPECIAL TEST NOTES:

1. The GCL was wrapped around a 12"x12" rasp boardin the upper box.
2. Each specimen of HDPE was cut to 14" x 20".
3. The HDPE was bolted to the lower shear box with "channel clamps."
4. The GCL specimens were hydrated for 7 days at 3 psi, in contact with the textured HDPE.
5. After hydration, each test point was consolidated for 48 hours at the specified normal stress, then sheared.
6. Shearing occurred at the contact between the GCL and the HDPE.
7. Streching or deformation of the GCL or HDPE were not observed.

By accepting the data and results represented on this page, Client agrees to limit the liability of Vector Engineering, Inc. from client and all other parties for claims arising out of use of this data to the exact for the respective test(s) represented herein, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

Report Date: 08/03/98 | Entered By: RWM | Reviewed By: KR | Lab Log: 8

GSE-2317-011/R10

Vector Engineering Inc.

Laboratory Services
12438 Loma Rica Drive, Suite C, Grass Valley, CA 95945
(530) 272-2448 Fax (530) 272-6503

LARGE SCALE DIRECT SHEAR REPORT

Test Method ASTM D-5321-B p. 6 of 21

Client Name: PRECISION LABS Project Name: FURNALD SITE Project No: 943022.33-828

Superstrate: <— Board Spacers

Material 1: <— CETCO Bentomat ST, #7877 199929030 LBW: AXF

Material 2: —> 80 mil GSE HDPE Textured Both Sides, AK4216FF LBW: AWW

Substrate: —> Concrete Board with Sand Layer

PEAK STRENGTH

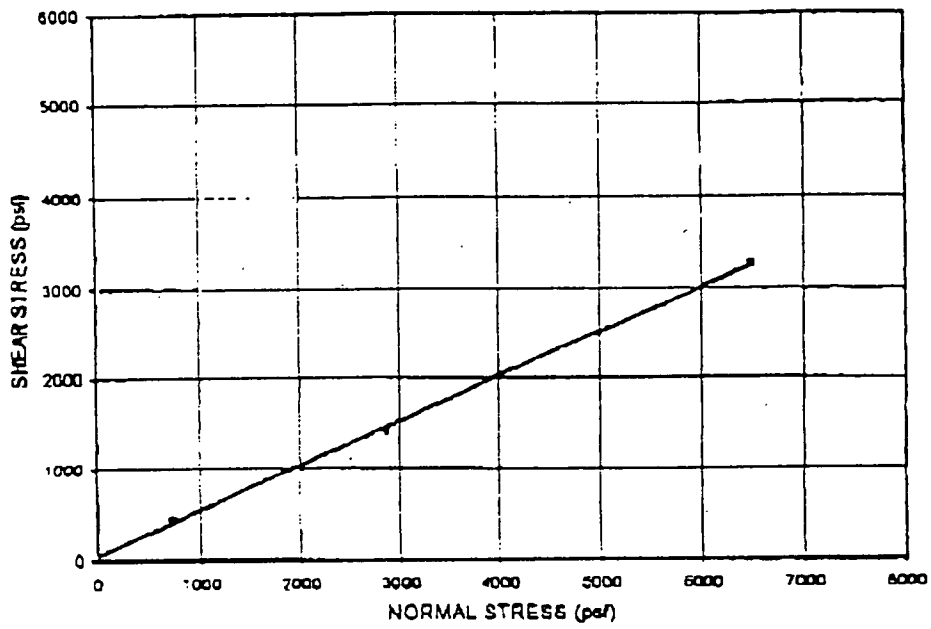
Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Secant Friction Angle
1.	5.0	720	450	32
2.	20.0	2880	1420	28
3.	45.0	6480	3260	27

Adhesion: 60 psf

Friction Angle: 28 degrees

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



STRENGTH ENVELOPE

(at 2.0 in. displacement)

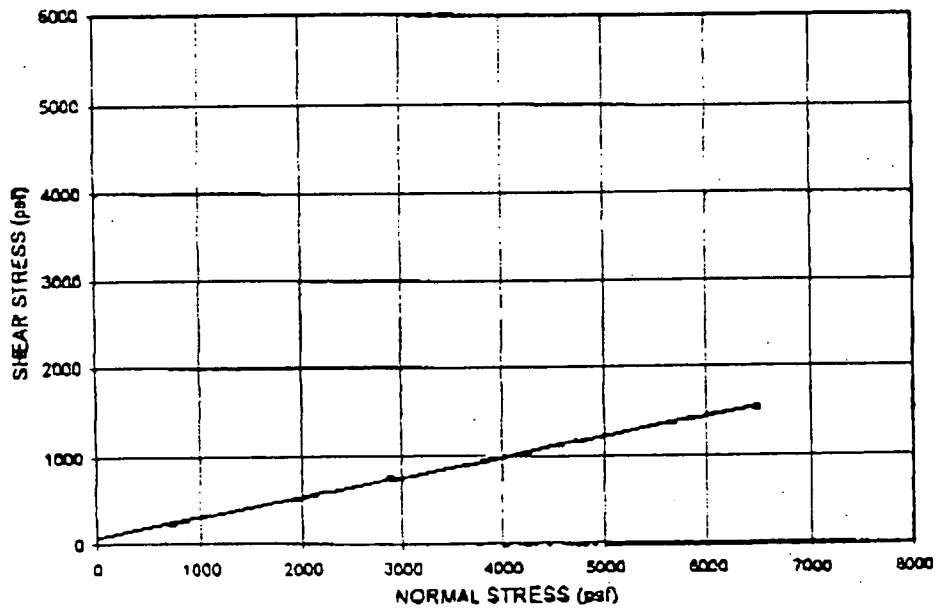
Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Secant Friction Angle
1.	5.0	720	230	18
2.	20.0	2880	760	15
3.	45.0	6480	1540	13

Adhesion: 20 psf

Friction Angle: 13 degrees

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



NOTE: The Friction Angle and Adhesion (or Cohesion) results given here are based on a mathematically determined best fit line. Further interpretation should be conducted by a qualified professional experienced in geosynthetic and geotechnical engineering.

By accepting the data and result reports entered on this page, Client agrees to hold the liability of Vector Engineering, Inc. from client and all other parties for claims arising out of use of the data in the past for the respective test(s) represented hereon, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of one aforementioned sum.

Report Date: 08/03/98 Entered By: RWM Reviewed By: KRL Lab Log:

GSE2317-011 R/O

Vector Engineering Inc.

Laboratory Services

12438 Loma Rica Drive, Suite C, Grass Valley CA 95945
(530) 272-2448 Fax (530) 272-6580

LARGE SCALE DIRECT SHEAR REPORT

Test Method ASTM D-5321-B

2061

p. 7 of 23

Client Name: PRECISION LABS | Project Name: FURNALD SITE | Project No: 943022.33-81

Superstrate: <— Board Spacers

Material 1: <— CETCO Bentomat ST, #7717 199830030 | LSAC: AXG

Material 2: —> 80 mil GSE HDPE, Textured both Sides, AK4230KK | LSAC: AWX

Substrate: —> Concrete Boards with Sand Layer

DISPLACEMENT vs. SHEAR STRESS

Test Point	Normal Stress psi	Normal Stress psf
1.	5.0	720
2.	20.0	2800
3.	45.0	6480

MOISTURE DATA:

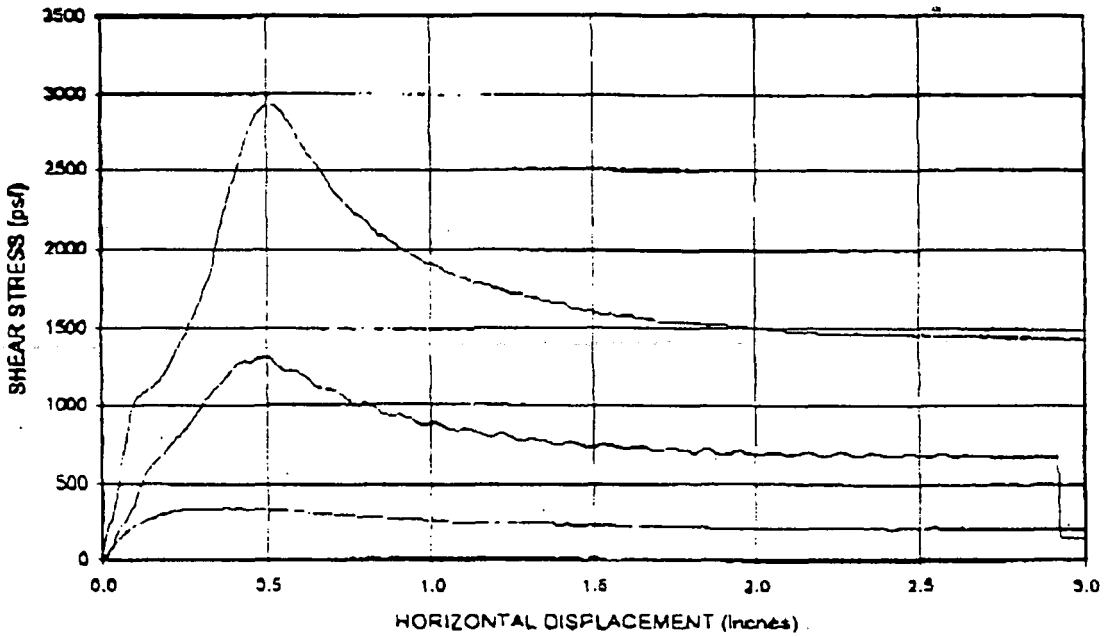
(soil)

Initial Water Content: 19.14%

Initial Dry Density: NA pcf

Final Water Content:

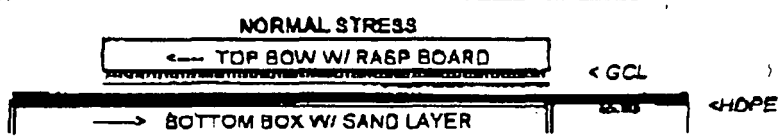
1.	2.	3.
5.1%	80%	83.3%



STANDARD CONDITIONS:

1. The "gap" between shear boxes was set at 80 mil (2.0 mm)
2. The test specimens were flooded during testing unless otherwise noted.
3. High Normal Stress (>5psi) was applied using air pressure.
4. Low Normal Stress (<5psi) was applied using dead weights.
5. The tests were terminated after 3.0" of displacement unless otherwise noted.
6. Tests were performed in general accordance with ASTM procedure D-5321-92 Method B using a Brainard-Killman LG-112 direct shear machine with an effective area of 12" x 12".

TEST ORIENTATION:



SPECIAL TEST NOTES:

1. The GCL was wrapped around a 12"x12" rasp board in the upper box.
2. Each specimen of HDPE was cut to 14" x 20"
3. The HDPE was bolted to the lower shear box with "channel clamps."
4. The GCL specimens were hydrated for 7 days at 3 psi, in contact with the textured HDPE.
5. After hydration, each test point was consolidated for 46 hours at the specified normal stress, then sheared.
6. Shearing occurred at the contact between the GCL and the HDPE.
7. Streching or deformation of the GCL or HDPE were not observed.

By accepting the data and result represented on this page, Client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties for claims arising out of use of this data to the cost for the preparation herein, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

Report Date: 08/06/98 | Entered By: RWM | Reviewed By: | Lab Log: 8280

GSE-2317-011 R/0

Vector Engineering Inc.

Laboratory Services

12438 Loma Rica Drive, Suite C, Grass Valley, CA 95945
(530) 272-2448 Fax (530) 272-6483

LARGE SCALE DIRECT SHEAR REPORT

Test Method ASTM D-5321-B

p.8 of 27 23 17

Client Name: PRECISION LABS Project Name: FURNALD SITE Project No: 943022.33-826

Superstrate: <— Board Specers

Material 1: <— CETCO Bentomat ST,#7717 199830030 L&W: AXG

Material 2 —> 60 mil GSE HDPE. Textured both Sides, AK4230KK LSW: AWX

Substrate: —> Concrete Boards with Sand Layer

PEAK STRENGTH

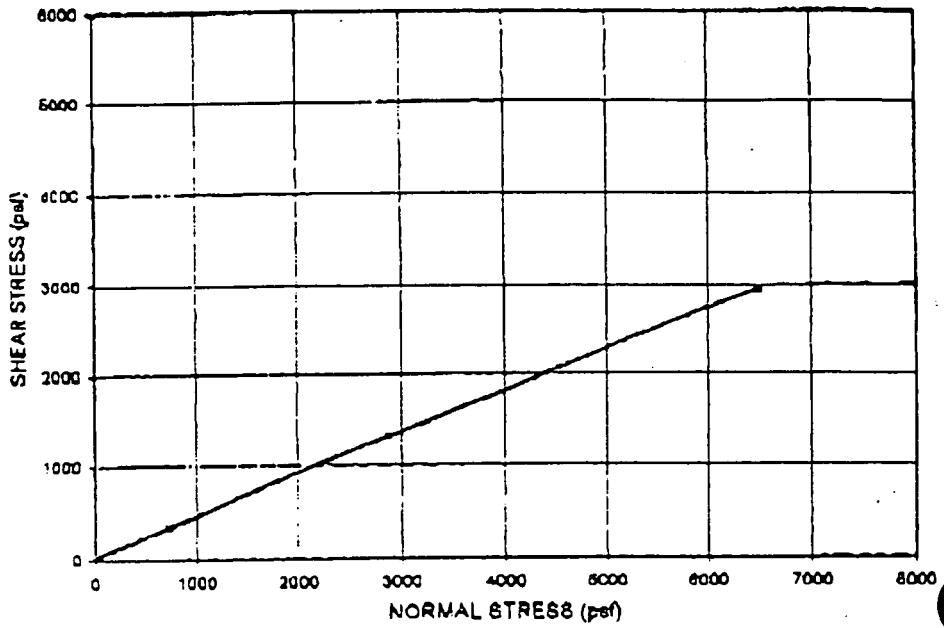
Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Secant Friction Angle
1.	5.0	720	350	26
2.	20.0	2880	1320	25
3.	45.0	6480	2940	24

Adhesion: 30 psf

Friction Angle: 24 degrees

Displ. Rate: 0.04 in./min.

NOTE: GRAPH NOT TO SCALE



STRENGTH ENVELOPE
(at 2.0 in. displacement)

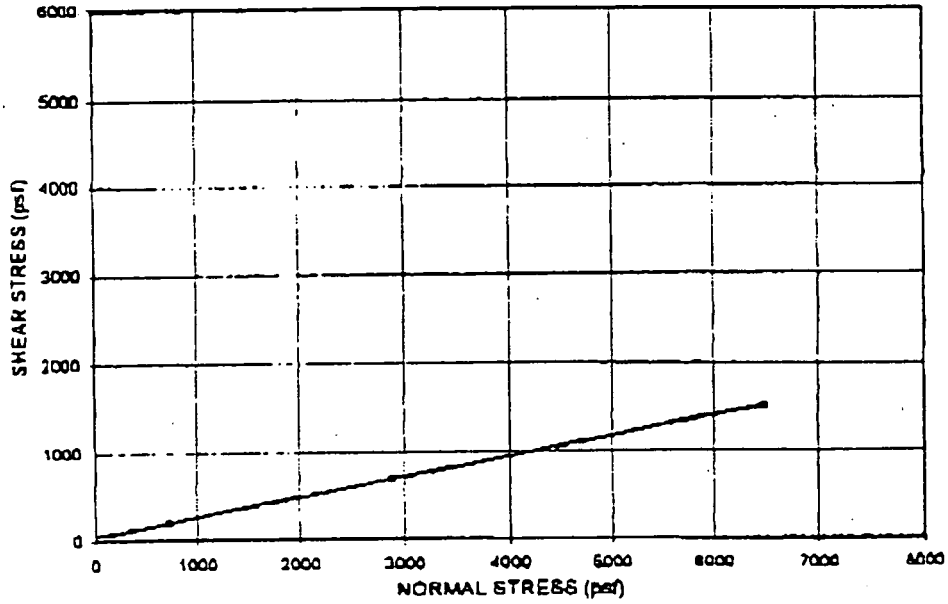
Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Secant Friction Angle
1.	5.0	720	210	16
2.	20.0	2880	690	13
3.	45.0	6480	1500	13

Adhesion: 40 psf

Friction Angle: 13 degrees

Displ. Rate: 0.04 in./min.

NOTE: GRAPH NOT TO SCALE



NOTE: The Friction Angle and Adhesion (or Cohesion) results given here are based on a mathematically determined best fit line. Further interpretation should be conducted by a qualified professional experienced in geosynthetic and geotechnical engineering.

By accepting the data and results represented on this page, Client agrees to hold the liability of Vector Engineering, Inc. from direct and all other damages for actions arising out of use of this data to the past for the respective test(s) represented hereon, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

Report Date: 08/06/98 Entered By: RWM Reviewed By: [illegible] Lab Log:

THIS

PAGE

INTENTIONALLY

BLANK

GSE-2317-011 R/0
p. 9 of ~~17~~ 23 8/26/98

FERMCO OU2

PRECISION GEOSYNTHETIC LABORATORIES
1742 West Katella Suite #4, Orange, CA 92867

Aug 11 8 30 PM '98

FAX

3rd

Date: Aug 11 '98
Number of pages including cover sheet: 7

To: ERIC REED - GSE
JIM TURNER - Flour Daniel
Chuck Hornaday - CETCO
Jim Olsta - CETCO
re: Fernald OSDF

Phone: 281-230-8663
Fax phone: 573-648-5767
CC: 847-577-5771

From: Cora Cruz

Phone: 714 744-4599
Fax phone: 714-744-0357

REMARKS: ☐ Urgent ☐ For your review ☐ Reply ASAP ☐ Please comment

Partial report
(1) Internal Shear - GCL (2)
(2) Interface Shear - GCL/HD (2)

This makes 6 Internal Shear
6 Interface Shear
completed

One more to go!!!

GSE 7317-011 R10
p. 10 of 7+23 JCT

TABLE 6.
MATERIAL PROPERTIES
FERNALD OSDF

2061

FOR: GSE LINING TECHNOLOGY
(Reference: PGL Job No. 980766)

Aug 9, 1998

INTERNAL SHEAR TEST RESULT (ASTM D5321)

TEST CONDITIONS:

SAMPLE PREPARATION

1. Specimens were cut to 20" x 20"

HYDRATION:

1. Hydrated for 7 days at 3 psi using dead weights

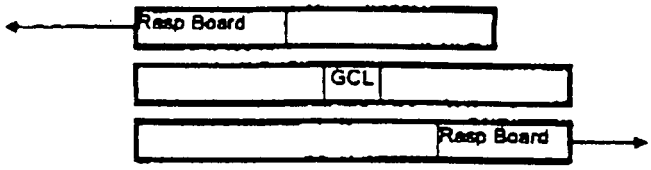
CONSOLIDATION:

1. Each set of specimen was consolidated for 48 hrs at 5, 20, & 45 psi.
2. Loads were applied by pneumatic pressure.

SHEAR TEST:

1. Shear test was conducted at 0.004 in/ min
2. Sheared at minimum 2 inch horizontal displacement.
3. The test specimens were flooded during testing.
4. Tests were performed in general accordance with ASTM D5321-93 Method A using Brainard- Kâman LG-112 Direct Shear machine with effective area of 12 in x 12 in.

TEST CONFIGURATION



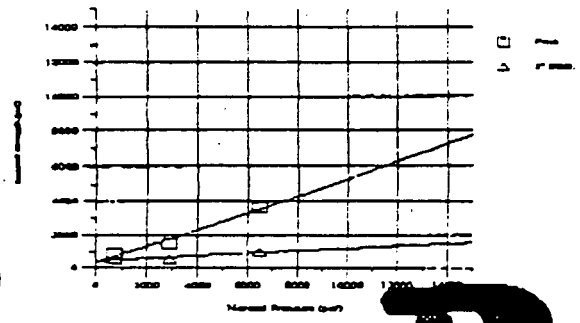
SAMPLE IDENTIFICATION:

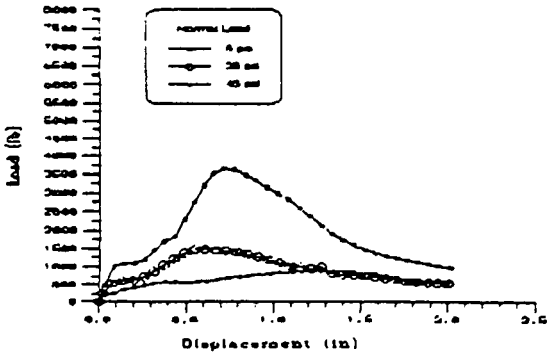
PGL C# 29901, GCL Roll # 7814

TEST RESULTS:

SAMPLE ID	NORMAL STRESS (psi)	NORMAL STRESS (psf)	FINAL Moisture Content (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE	2" DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2" DISPLACEMENT STRENGTH 2" DISPLACEMENT SECANT ANGLE
C# 29901	5	720	130.25	880	51	554	38
ROLL #7814	20	2880	95.81	1479	27	528	10
LOT# 199830030	45	6480	86.30	3645	29	956	8
	COHESION:			347		428	

OBSERVATIONS: At 2 inches displacement, for 5 psi normal load; 100% of stitches were still connected to woven side. At 20 psi, 70% of stitches were separated from woven side and for 40 and 100% were separated from woven side at 45 psi.





Precision Geosynthetic Laboratories

GSE-2317-011 R/0
p. 11 of 23 JT

TABLE 7
MATERIAL PROPERTIES
FERNALD OSDF

FOR: GSE LINING TECHNOLOGY
(Reference: PGL Job No. 980766)

Aug 11, 1998

INTERNAL SHEAR TEST RESULT (ASTM D5321)

TEST CONDITIONS:

SAMPLE PREPARATION

1. Specimens were cut to 20" x 20"

HYDRATION:

1. Hydrated for 7 days at 3 psi using dead weights

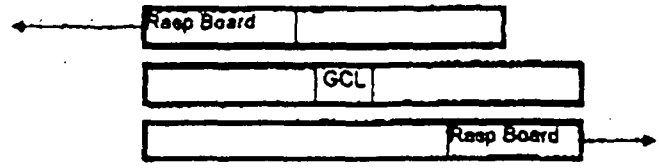
CONSOLIDATION:

1. Each set of specimen was consolidated for 48 hrs at 5, 20, & 45 psi.
2. Loads were applied by pneumatic pressure.

SHEAR TEST:

1. Shear test was conducted at 0.004 in/ min
2. Sheared at minimum 2 inch horizontal displacement.
3. The test specimens were flooded during testing.
4. Tests were performed in general accordance with ASTM D5321-93 Method A using Brainard- Kilman LG-112 Direct Shear machine with effective area of 12 in x 12 in.

TEST CONFIGURATION

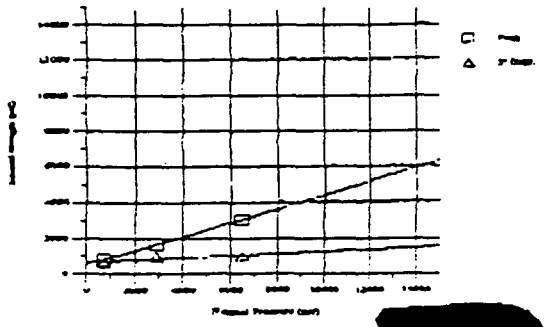


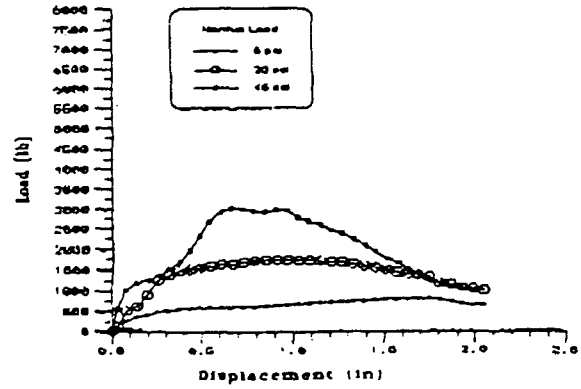
SAMPLE IDENTIFICATION:
PGL C# 29907, GCL Roll # 7854

TEST RESULTS:

SAMPLE ID	NORMAL STRESS (psi)	NORMAL STRESS (psf)	FINAL Moisture Content (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE	2" DISPLACEMENT STRENGT SHEAR STRESS (psf)	2" DISPLACEMENT STRENGT 2" DISPLACEMENT SECANT ANGLE
C# 29907	5	720	127.30	802	48	638	41
ROLL #7854	20	2880	94.51	1725	31	989	19
LOT# 199830030	45	6480	87.81	3024	25	995	9
COHESION:				563		684	

OBSERVATIONS: At 2 in. displacement, for 5 psi normal load, 20% of stitches were separated from woven side; for 20 & 45 psi, 100% of stitches were separated from woven side.





Precision Geosynthetic Laboratories

GSE-2317-011 R10

Vector Engineering Inc.

Laboratory Services

10438 Lone Rice Drive, Suite C, Grass Valley, CA 95945
(530) 272-2448 Fax (530) 272-8553

LARGE SCALE DIRECT SHEAR REPORT

Test Method ASTM D-5321-B

2061

p. 12 of 21 23 JTY

Client Name: PRECISION LABS

Project Name: FURNALD SITE

Project No: 943022.35-828E

Superstrate: <—— Board Spacers

Material 1: <—— CETCO Bentomat ST, #7814 199830030

Material 2: ——> 80 mil GSE HDPE, Textured Both Sides, AK4256FF

Substrate: ——> Concrete Board with Sand Layer

LSN: AXH

LSN: AWY

PEAK STRENGTH

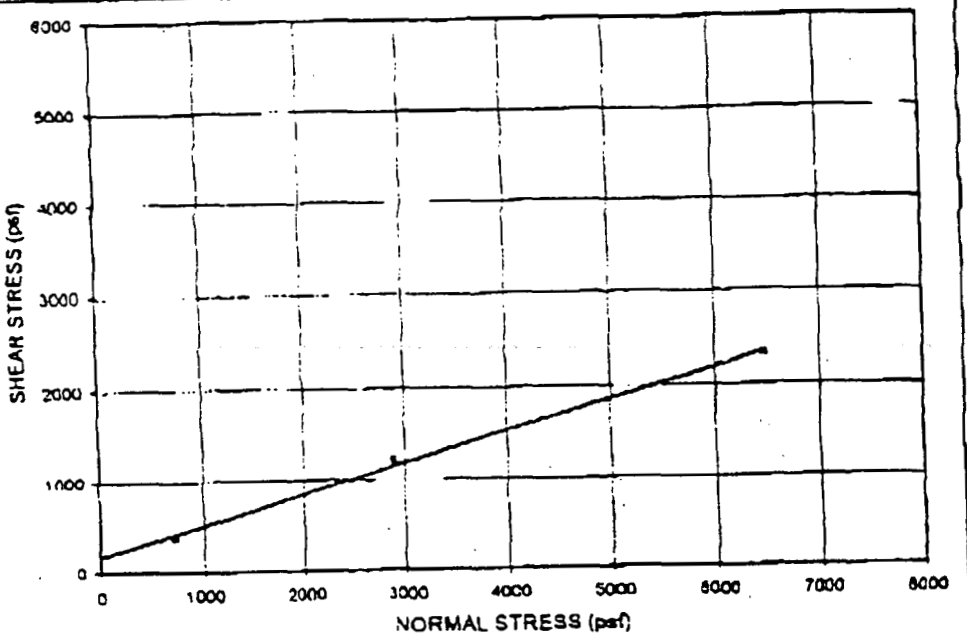
Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Secant Friction Angle
1.	5.0	720	380	28
2.	20.0	2880	1220	23
3.	45.0	6480	2330	20

Adhesion: 180 psf

Friction Angle: 19 degrees

Displ. Rate: 0.04 in./min.

NOTE: GRAPH NOT TO SCALE



STRENGTH ENVELOPE

(at 2.5 in. displacement)

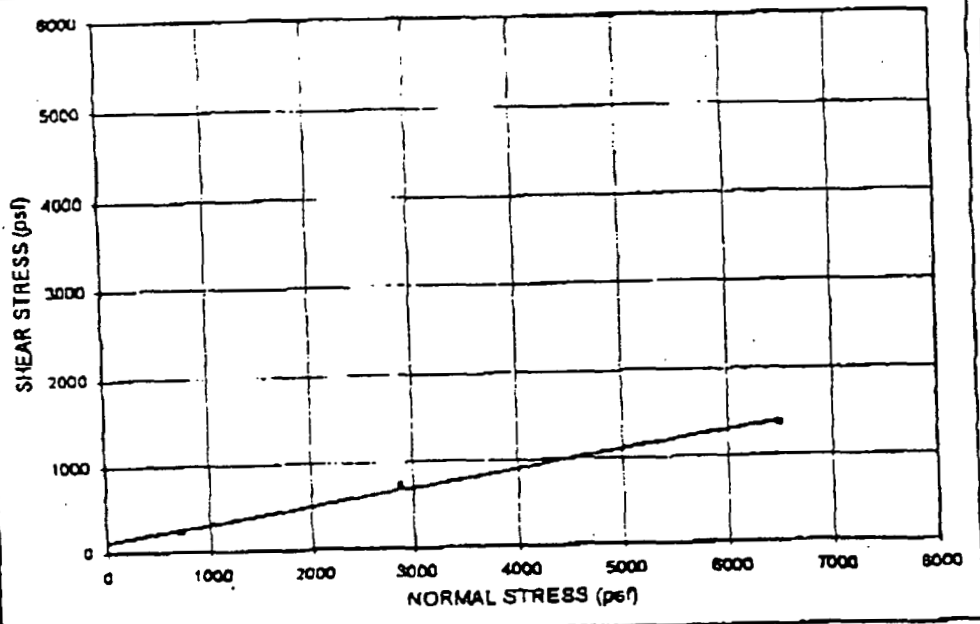
Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Secant Friction Angle
1.	5.0	720	230	18
2.	20.0	2880	730	14
3.	45.0	6480	1370	12

Adhesion: 120 psf

Friction Angle: 11 degrees

Displ. Rate: 0.04 in./min.

NOTE: GRAPH NOT TO SCALE



NOTE: The Friction Angle and Adhesion (or Cohesion) results given here are based on a mathematically determined best fit line. Further interpretation should be conducted by a qualified professional experienced in geosynthetic and geotechnical engineering.

By accepting the data and result represented on this page, Client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties for claims arising out of use of this data to the cost for the respective test(s) represented hereon, and Client agrees to indemnify and hold harmless Vector Inc. and against all liability in excess of the above-mentioned limit.

Report Date: 08/07/98

Entered By: RWM

Reviewed By: KR

Lab Log: 82

GSE-2317-011 R/0

Vector Engineering Inc.

Laboratory Services

12438 Loma Rica Drive, Suite C, Grass Valley, CA 95945
(530) 272-2448 Fax (530) 272-6333

LARGE SCALE DIRECT SHEAR REPORT

Test Method ASTM D-5321-B

p. 13 of 23 JTT

Client Name: PRECISION LABS | Project Name: FURNALD SITE | Project No: 943022.35-8

Support Plate <—— Board Spacers

Material 1 <—— CETCO Bentomat ST, #7814 199830030 LSN: AXH

Material 2 ——> 80 mil GSE HDPE, Textured Both Sides, AK4256FF LSN: AWY

Substrate ——> Concrete Board with Sand Layer

DISPLACEMENT vs. SHEAR STRESS

Test Point	Normal Stress psi	Normal Stress psf
1.	5.0	720
2.	20.0	2880
3.	45.0	6480

MOISTURE DATA:

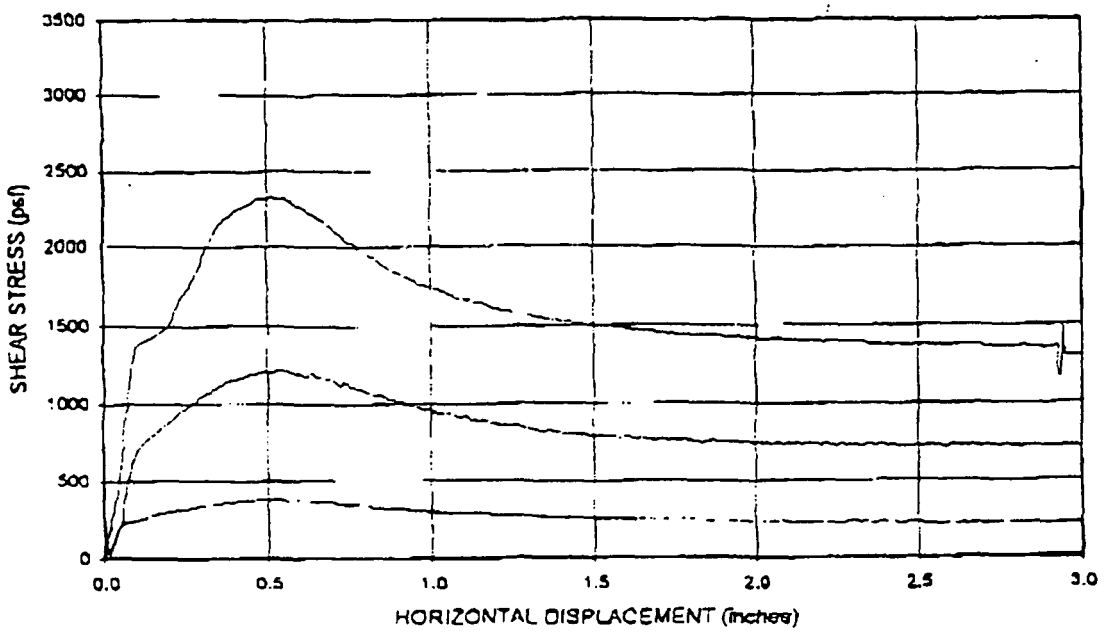
(soil)

Initial Water Content 18.28%

Initial Dry Density: NA pcf

Final Water Content:

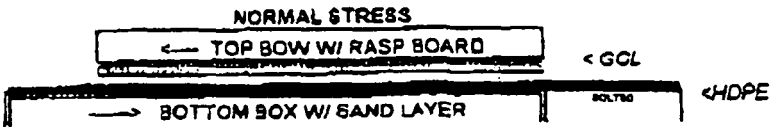
1.	2.	3.
73.8%	97.8%	72.6%



STANDARD CONDITIONS:

1. The "gap" between shear boxes was set at 80 mil (2.0 mm)
2. The test specimens were flooded during testing unless otherwise noted.
3. High Normal Stress (>5psi) was applied using air pressure.
4. Low Normal Stress (<5psi) was applied using dead weights.
5. The tests were terminated after 3.0" of displacement unless otherwise noted.
6. Tests were performed in general accordance with ASTM procedure D-5321-92 Method B using a Brainard-Killman LG-112 direct shear machine with an effective area of 12" x 12".

TEST ORIENTATION:



SPECIAL TEST NOTES:

1. The GCL was wrapped around a 12"x12" rasp boardin the upper box.
2. Each specimen of HDPE was cut to 14" x 20".
3. The HDPE was bolted to the lower shear box with "channel clamps."
4. The GCL specimens were hydrated for 7 days at 3 psi, in contact with the textured HDPE.
5. After hydration, each test point was consolidated for 48 hours at the specified normal stress, then sheared.
6. Shearing occurred at the contact between the GCL and the HDPE.
7. Stretching or deformation of the GCL or HDPE were not observed.

By accepting the data and result represented on this page, Client agrees to hold the liability of Vector Engineering, Inc. from client and all other parties for claims arising out of use of this data to be used for the respective test(s) represented herein, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

Report Date: 08/07/98 | Entered By: RVM | Reviewed By: KRL | Lab Log: 82

GSE-2317-011 K/O

Vector Engineering Inc.

Laboratory Services

12436 Lame Rice Drive, Suite C, Grass Valley, CA 95945
(530) 272-2448 Fax (530) 272-8653

LARGE SCALE DIRECT SHEAR REPORT

Test Method ASTM D-5321-B

2061

p. 14 of 23 + STY 2

Client Name: PRECISION LABS

Project Name: FURNALD SITE

Project No: 943022.35-828F

Superstrate: <—— Board Spacers

Material 1: <—— CETCO Bentomat ST #7854 199830030 LSN: AXI

Material 2: ——> 60 mil GSE Textured both sides AK427OFF LSN: AWZ

Substrate: ——> Concrete Board w/Sand Layer

PEAK STRENGTH

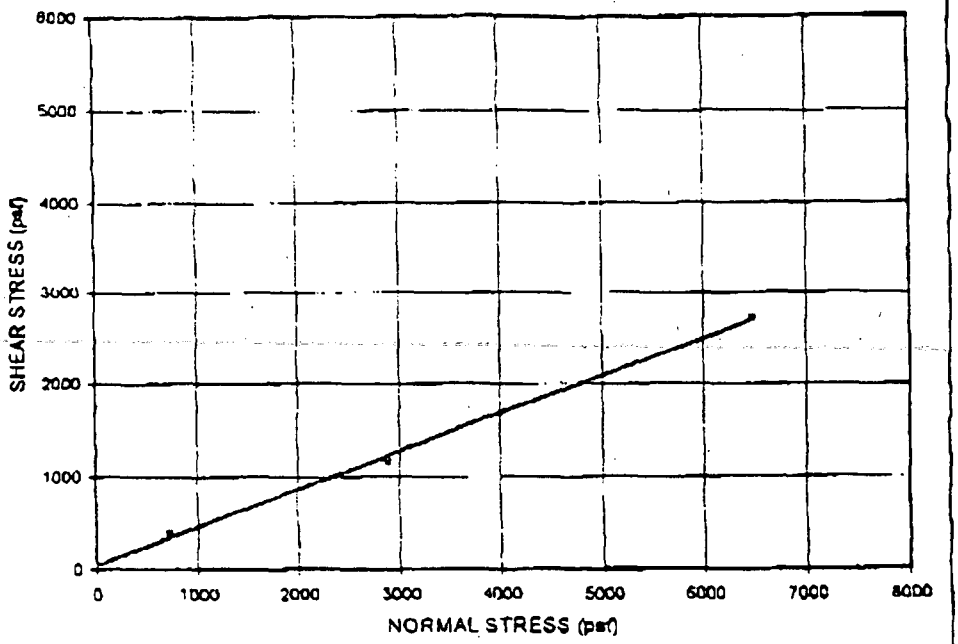
Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Secant Friction Angle
1.	5.0	720	390	28
2.	20.0	2880	1140	22
3.	45.0	6480	2720	23

Adhesion: 40 psf

Friction Angle: 22 degrees

Displ. Rate: 0.04 in./min.

NOTE: GRAPH NOT TO SCALE



STRENGTH ENVELOPE

(at 2.5 in. displacement)

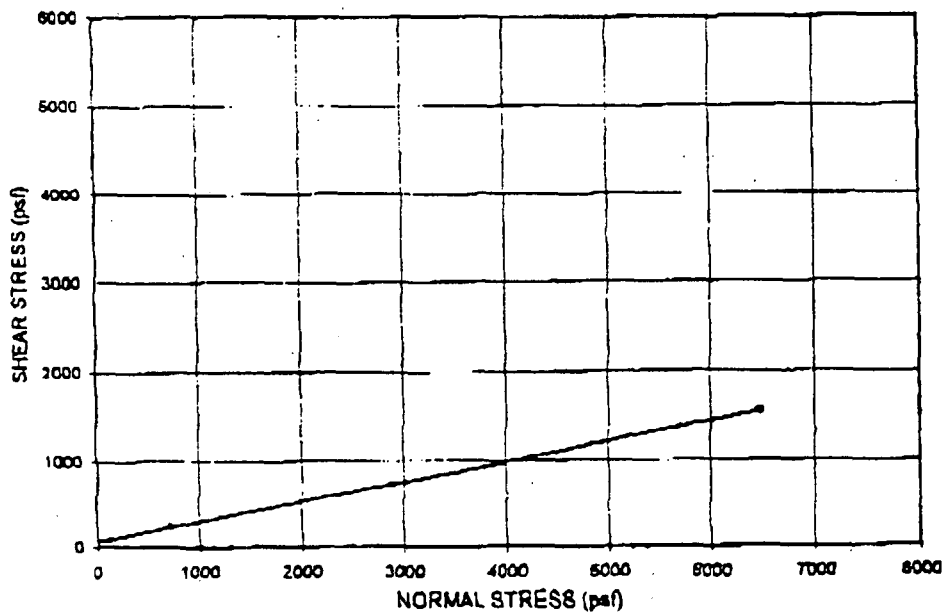
Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Secant Friction Angle
1.	6.0	720	240	18
2.	20.0	2880	710	14
3.	45.0	6480	1550	13

Adhesion: 60 psf

Friction Angle: 13 degrees

Displ. Rate: 0.04 in./min.

NOTE: GRAPH NOT TO SCALE



NOTE: The Friction Angle and Adhesion (or Cohesion) results given here are based on a mathematically determined best fit line. Further interpretation should be conducted by a qualified professional experienced in geosynthetic and geotechnical engineering.

By accepting the data and result represented on this page, Client agrees to limit the liability of Vector Engineering, Inc. from client and all other parties for claims arising out of use of this data to the cost for the respective test(s) represented hereon, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

Report Date: 08/08/98 Entered By: JG Reviewed By: KRL Lab Log: 82

GSE-2317-011 R/O

Vector Engineering Inc.

Laboratory Services
12436 Loma Rica Drive, Suite C, Grass Valley, CA 95945
(530) 272-2448 Fax (530) 272-8553

LARGE SCALE DIRECT SHEAR REPORT

Test Method ASTM D-5321-B

p. 15 of 21+23 JTM

Client Name: PRECISION LABS | Project Name: FURNALD SITE | Project No: 943022.35

Superstrate: <— Board Spacers

Material 1: <— CETCO Bentomat ST #7854 199830030 | LSN: AXI

Material 2: —> 80 mil GSE Textured both sides AK427OFF | LSK: AWZ

Substrate: —> Concrete Board w/Sand Layer

DISPLACEMENT vs. SHEAR STRESS

Test Point	Normal Stress psi	Normal Stress psf
1.	5.0	720
2.	20.0	2880
3.	45.0	6480

MOISTURE DATA:

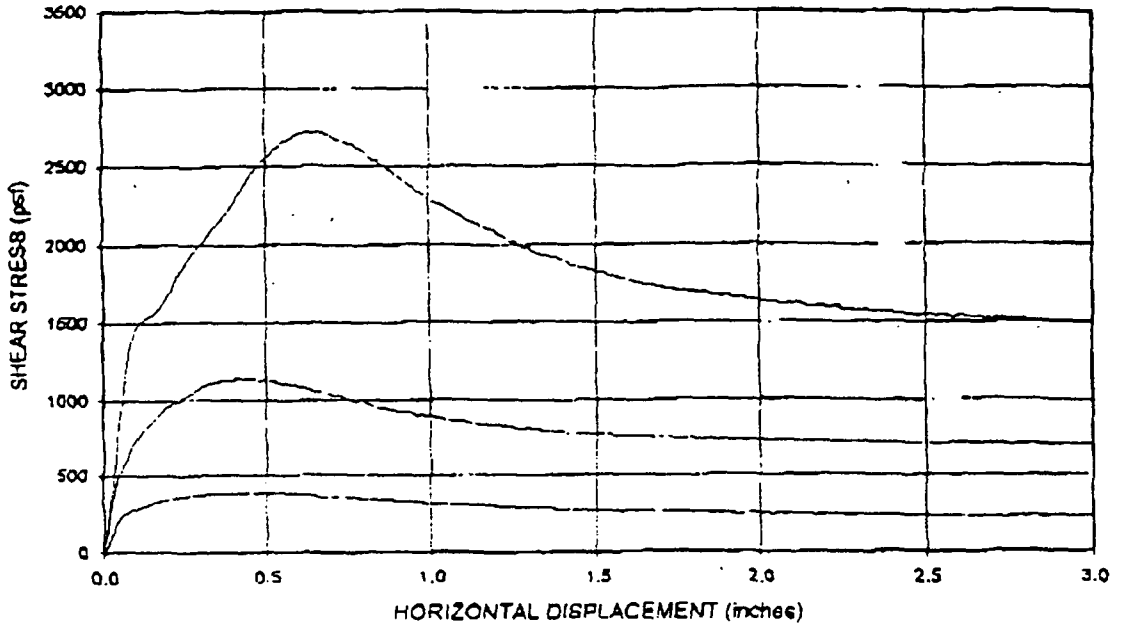
(soil)

Initial Water Content: 17.19%

Initial Dry Density: NA pcf

Final Water Content

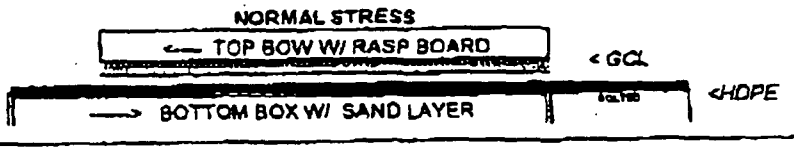
1.	2.	3.
38.7%	97.2%	70.40%



STANDARD CONDITIONS:

1. The "gap" between shear boxes was set at 80 mil (2.0 mm)
2. The test specimens were flooded during testing unless otherwise noted.
3. High Normal Stress (>5psi) was applied using air pressure.
4. Low Normal Stress (<5psi) was applied using dead weights.
5. The tests were terminated after 3.0" of displacement unless otherwise noted.
6. Tests were performed in general accordance with ASTM procedure D-5321-92 Method B using a Brainard-Killman LG-112 direct shear machine with an effective area of 12" x 12".

TEST ORIENTATION:



SPECIAL TEST NOTES:

1. The GCL was wrapped around a 12"x12" rasp boardin the upper box.
2. Each specimen of HDPE was cut to 14" x 20".
3. The HDPE was bolted to the lower shear box with "channel clamps."
4. The GCL specimens were hydrated for 7 days at 3 psi. in contact with the textured HDPE.
5. After hydration, each test point was consolidated for 48 hours at the specified normal stress, then sheared.
6. Shearing occurred at the contact between the GCL and the HDPE.
7. Streching or deformation of the GCL or HDPE were not observed.

By accepting the data and result represented on this page, Client agrees to limit the liability of Vector Engineering Inc. from client and all other parties for claims arising out of use of this data to the cost for the respective test(s) represented hereon and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

Report Date: 08/08/98 | Entered By: JG | Reviewed By: KEC | Lab Log:

THIS

PAGE

INTENTIONALLY

BLANK

GSE-2317-011 R/0
p. 16 of 23

FERMCO OU2

PRECISION GEOSYNTHETIC LABORATORIES
1742 West Katella Suite #4, Orange, CA 92867

AUG 13 3 03 PM '98

FAX

Date: August 12

Number of pages including cover sheet: 2

To: ERIC REED - GSE
Jim Turner - Flour D
Chuck Hornaday - CETCO
Jim Olsta - CETCO

re: Fernald OSDF

Phone: 281-230-8663
Fax phone: 573-648-5767
CC: 847-577-5571

From: Cora Qui

Phone: 714-744-4599
Fax phone: 714-744-0357

REMARKS: ☐ Urgent ☐ For your review ☐ Reply ASAP ☐ Please comment

ERRATUM

This is to confirm that the following reports from Vector was indeed run at 0.004 in/min instead of 0.04 in/min as stated in the fax report.
The correct 0.004 in/min will be in the final report.
Sorry for the inconvenience.

2061 GSE-2317-011 R/0
p. 17 of 23

VECTOR
LABORATORY SERVICES

LABORATORY FAX

Vector Engineering, Inc.
12438 Loma Rica Dr., Suite C
Grass Valley, CA 95945

RECIPIENT Cora B. Queja	SENT BY Kenneth R. Criley
COMPANY Prescision Laboratories	COMPANY Vector Engineering
FAX NUMBER (714) 744-0357	FAX NUMBER (530) 272-6480
VOICE NUMBER (714) 744-4599	VOICE NUMBER (530) 272-5182 x241
DATE August 12, 1998	LAB LOG NUMBER 828.0
TIME 11:57 AM	PROJECT NO. 943022.36
TOTAL PAGES 1	SUBJECT Laboratory Testing - FERMCO, G980766 PO# 8974

Message:

Please note the following corrections to our Direct Shear Reports for the referenced project.

The following test results listed the shear diaplacement rate incorrectly as 0.04 in. / min..

Lab Report # 828B, 828D, 828E, 828F, & 828G. These are being corrected to 0.004 in. / min., and will be resubmitted in the final report.

These tests, were all conducted at 0.004 in. / min. horizontal displacement rate.

Need to verify that the 0.004 in./min shear displacement rate is reported on the final report.
KRCriley 9/1/98

Note: If you do not receive all pages clearly please call (530) 272-2448 as soon as possible!

000066

08/12/98 12:42 FAX 1 714 744 0357 PRECISION GEOSYN ELECTOR LAB --- CORA QUEJA 02 01

GSE 2317-011 R/0

FERMCO OU2

PRECISION GEOSYNTHETIC LABORATORIES
1742 West Katella Suite #4, Orange, CA 92867

p. 18 of 23

AUG 17 7 19 AM '98

FAX

4th

Date: August 14

Number of pages including cover sheet: 4

To: ERIC REED - GSE
Jim Turner - Flour D
Chuck Hornaday - CETCO
Jim Olsta - CETCO

re: Fernald - OSDF

Phone:
Fax phone: 281-230-8663
CC: 513-648-5767
847-577-5871

From: CORA QUEH

Phone: 714-744-4599
Fax phone: 714-744-0357

REMARKS: ☐ Urgent ☐ For your review ☐ Reply ASAP ☐ Please comment

Here's the result of the last Direct Shear. Final report (3 originals) will be sent to ERIC REED once we finish the last 3 permeabilities.

Thank you to Everybody. I hope Precision Labs was able to serve you to your expectations. We enjoyed working with you & hope to serve you again in your other projects. Should you have questions, please do not hesitate to give me a call.

Have a NICE WEEKEND!

TABLE 8.
MATERIAL PROPERTIES
FERNALD OSDF

2061 GSE-2317-011 R/0
p. 19 of 23

FOR: GSE LINING TECHNOLOGY
(Reference: PGL Job No. 980766)

Aug 13, 1998

INTERNAL SHEAR TEST RESULT (ASTM D5321)

TEST CONDITIONS:

SAMPLE PREPARATION

1. Specimens were cut to 20" x 20"

HYDRATION:

1. Hydrated for 7 days at 3 psi using dead weights

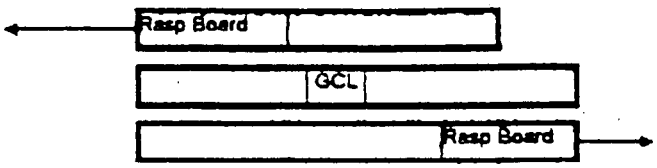
CONSOLIDATION:

1. Each set of specimen was consolidated for 48 hrs at 5, 20, & 45 psi.
2. Loads were applied by pneumatic pressure.

SHEAR TEST:

1. Shear test was conducted at 0.004 in/ min ✓
2. Sheared at minimum 2 inch horizontal displacement.
3. The test specimens were flooded during testing.
4. Tests were performed in general accordance with ASTM D5321-93 Method A using Brasnard- Kilman LG-112 Direct Shear machine with effective area of 12 in x 12 in.

TEST CONFIGURATION

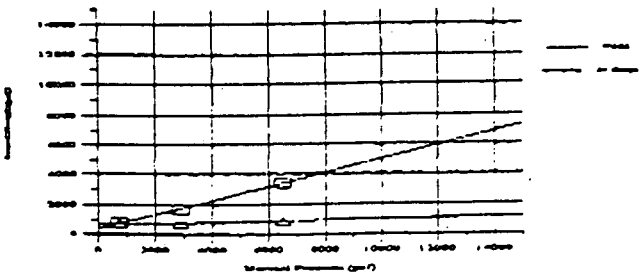


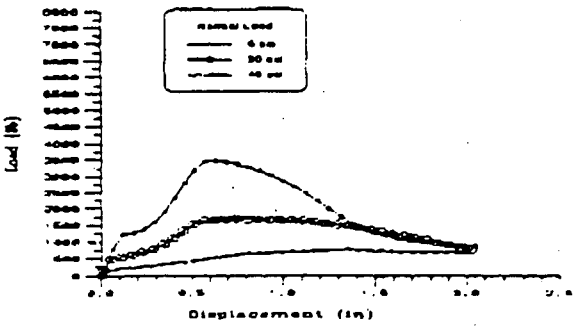
SAMPLE IDENTIFICATION:
PGL C# 30355, GCL Roll # 7897

TEST RESULTS:

SAMPLE ID	NORMAL STRESS (psi)	NORMAL STRESS (psf)	FINAL Moisture Content (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE	2" DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2" DISPLACEMENT STRENGTH 2" DISPLACEMENT SECANT ANGLE
C# 30355	5 ✓	720	130.12	776	47 ✓	683	43 ✓
ROLL #7897	20 ✓	2880	92.21	1670	30 ✓	745	15 ✓
	45 ✓	6480	57.54	3413	28 ✓	874	8 ✓
COHESION:				406		655	

OBSERVATIONS: At 2 in. displacement, for 5 psi normal load, all stitches were still connected with woven side. 100% of stitches were separated from woven side, for 20 and 45 psi.





Precision Geosynthetic Laboratories

GSE-23.7-011 R0

Vector Engineering Inc.

Laboratory Services

12438 Loma Rica Drive, Suite C, Grass Valley, CA 95945
(530) 272-2448 Fax (530) 272-6583

LARGE SCALE DIRECT SHEAR REPORT

Test Method ASTM D-5321-8

Client Name: PRECISION LABS — Project Name: FURNALD SITE — Project No: 943022.35-828

Substrate: <—— Board Spacers

Material 1: <—— CETCO Bentomat ST # 7897 199830030 — LSR: AXJ

Material 2: ——> 80 mil GSE Textured both sides AK4285FF — LSR: AXA

Surface: ——> Concrete Board w/Sand Layer

PEAK STRENGTH

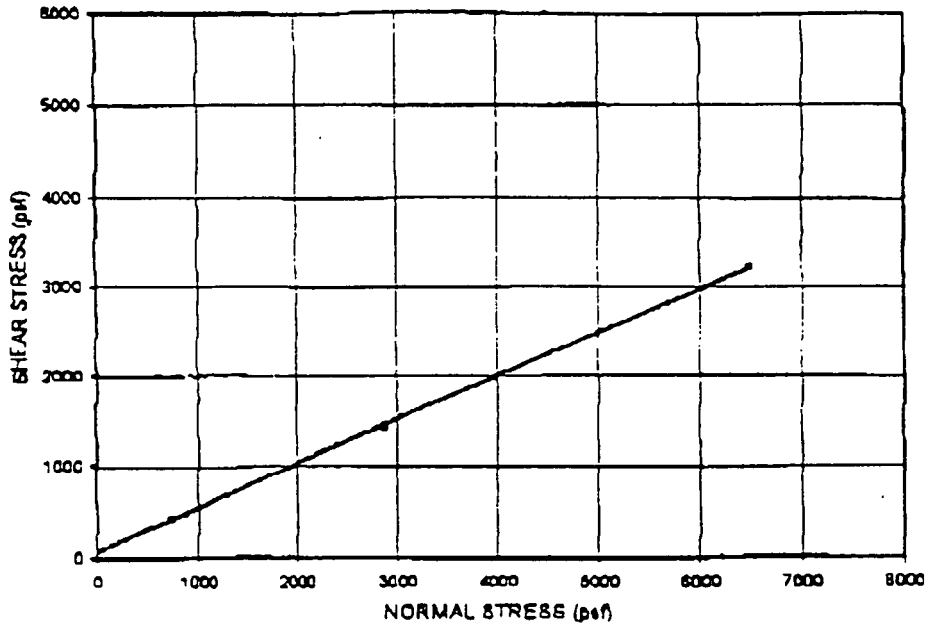
Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Secant Friction Angle
1.	5.0 ✓	720	430	31 ✓
2.	20.0 ✓	2880	1440	27 ✓
3.	45.0 ✓	6480	3220	26 ✓

Adhesion: 60 psf

Friction Angle: 28 degrees

Displ. Rate: 0.004 in./min. ✓

NOTE: GRAPH NOT TO SCALE



STRENGTH ENVELOPE

(at 2.5 in. displacement)

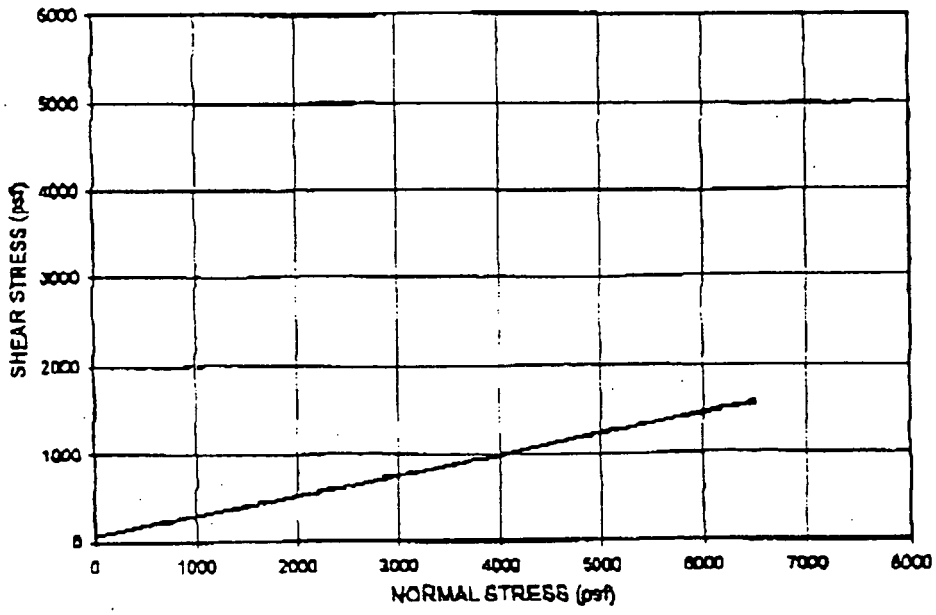
Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Secant Friction Angle
1.	5.0	720	230	18 ✓
2.	20.0	2880	740	14 ✓
3.	45.0	6480	1550	13 ✓

Adhesion: 70 psf

Friction Angle: 13 degrees

Displ. Rate: 0.004 in./min. ✓

NOTE: GRAPH NOT TO SCALE



NOTE: The Friction Angle and Adhesion (or Cohesion) results given here are based on a mathematically determined best fit line. Further interpretation should be conducted by a qualified professional experienced in geosynthetic and geotechnical engineering.

By accepting the data and results represented on this page, Client agrees to limit the liability of Vector Engineering, Inc. from client and all other parties for claims arising out of use of this data to the cost for the respective test(s) represented hereon, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

Report Date: 08/10/98 — Entered By: JG — Reviewed By: [illegible] — Lab Log: 82

Vector Engineering Inc.

Laboratory Services

12438 Loma Rica Drive, Suite C, Grass Valley, CA 95945
(530) 273-3448 Fax (530) 272-6530

LARGE SCALE DIRECT SHEAR REPORT

2061 Test Method ASTM D-5321-B

GSE-2317-011 R 10
p. 21 of 23

Client Name: PRECISION LABS — Project Name: FURNALD SITE — Project No: 843022.35-82

Superstrate: <— Board Spacers
Material 1: <— CETCO Bentomat ST # 7897 189830030 — LSN: AXJ
Material 2: —> 60 mil GSE Textured both sides AK4286FF — LSN: AXA
Substrate: —> Concrete Board w/Sand Layer

DISPLACEMENT vs. SHEAR STRESS

Test Point	Normal Stress psi	Normal Stress psf
1.	6.0 ✓	720
2.	20.0 ✓	2880
3.	45.0 ✓	6480

MOISTURE DATA:

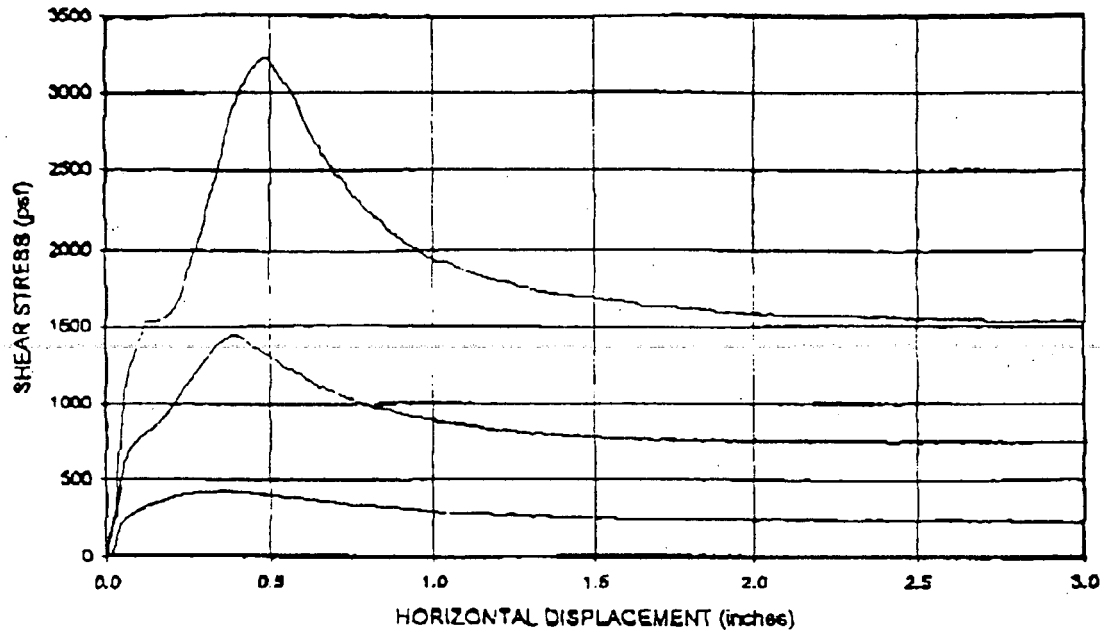
(soil)

Initial Water Content: 25.56%

Initial Dry Density: NA pcf

Final Water Content:

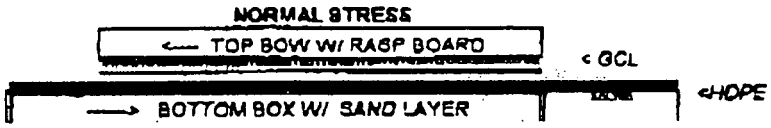
1.	2.	3.
23.6%	91.5%	55.7%



STANDARD CONDITIONS:

1. The "gap" between shear boxes was set at 80 mil (2.0 mm)
2. The test specimens were flooded during testing unless otherwise noted.
3. High Normal Stress (>5psi) was applied using air pressure.
4. Low Normal Stress (<5psf) was applied using dead weights.
5. The tests were terminated after 3.0" of displacement unless otherwise noted.
6. Tests were performed in general accordance with ASTM procedure D-5321-92 Method B using a Brainard-Killman LG-112 direct shear machine with an effective area of 12" x 12".

TEST ORIENTATION:



SPECIAL TEST NOTES:

1. The GCL was wrapped around a 12"x12" rasp board in the upper box.
2. Each specimen of HDPE was cut to 14" x 20".
3. The HDPE was bolted to the lower shear box with "channel clamps."
4. The GCL specimens were hydrated for 7 days at 3 psi. in contact with the textured HDPE.
5. After hydration, each test point was consolidated for 48 hours at the specified normal stress, then sheared.
6. Shearing occurred at the contact between the GCL and the HDPE.
7. Stretching or deformation of the GCL or HDPE were not observed.

By accepting the data and result represented on this page, Client agrees to unit the liability of Vector Engineering, Inc. from claim and all other parties for claims arising out of use of this data to the exact for the respective testing stated herein, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

Report Date: 08/10/98 — Entered By: JG — Reviewed By: [illegible] — Lab Log: 828

GSE-2317-011 R/0
p. 22 of 23

PRECISION GEOSYNTHETIC LABORATORIES
1742 West Katella Suite #4, Orange, CA 92867

FAX 5th

Date: August 18
Number of pages including cover sheet: 2

To: ERIC REED - GSE
Jim Turner - Flour Danie
Chuck Hornaday - CETCO
Jim Olsta - CETCO
re: Fernald OSDF

Phone: 281-230-8663
Fax phone: 513-648-5767
CC: 847-577-5571

From: Cora Quij.

Phone: 714-744-4599
Fax phone: 714-744-0357

REMARKS: ☐ Urgent ☐ For your review ☐ Reply ASAP ☐ Please comment

Herewith, the complete permeability result. Three (3) original copy of the report will be sent to ERIC REED Today.

AGAIN Thank you very much!

Aug 19 10 45 AM '98

FERMCO OU2

GSE-2317-011 R/0
p. 23 of 23

2061

TABLE 1.
MATERIAL PROPERTIES
FERNALD OSDF

FOR: GSE LINING TECHNOLOGY
(Reference: PGL Job No. 980766)

CETCO - BENTOMAT ST HYDRAULIC CONDUCTIVITY (by ASTM D5887)

ROLL NUMBER	PGL C# NO.	CONFINING PRESSURE (psi)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)	RESULTS (cm/sec) (10^{-9})	PROJECT SPECS. (cm/sec) (10^{-9})
1. Roll # 7554	C# 29659	5	13.59	156.94	2.8	5
2. Roll # 7636	C# 29719	5	14.90	171.93	2.7	5
3. Roll # 7570	C# 29720	5	14.93	163.88	3.1	5
4. Roll # 7586	C# 29721	5	15.90	177.03	3.6	5
5. Roll #7602	C# 29722	5	15.86	155.26	3.1	5
6. Roll # 7619	C# 29723	5	15.92	172.18	3.0	5
7. Roll # 7653	C# 29814	5	18.05	150.99	3.6	5
8. Roll # 7669	C# 29815	5	18.26	163.35	3.6	5
9. Roll #7685	C# 29816	5	19.11	157.79	3.6	5
10. Roll # 7701	C# 29817	5	19.42	150.45	2.7	5
11. Roll # 7717	C# 29818	5	19.83	147.19	3.5	5
12. Roll # 7733	C# 29819	5	15.45	189.75	2.7	5
13. Roll # 7749	C# 29820	5	17.52	172.96	3.6	5
14. Roll #7814	C# 29901	5	17.63	154.25	3.6	5
15. Roll # 7830	C# 29902	5	18.68	135.45	3.6	5
16. Roll # 7846	C# 29903	5	18.48	154.12	3.6	5
17. Roll # 7862	C# 29904	5	13.46	189.95	1.9	5
18. Roll # 7880	C# 29905	5	12.60	177.87	2.0	5
19. Roll #7897	C# 29906	5	12.00	174.59	2.8	5

OK
KBT
9/1/98

Attachment ".

SUPPLIER DOCUMENT SUBMITTAL

FDFPROJECT NO: 20102	CONTRACT NO: 2317	SUBMITTAL NO: 010	REV: 0	DATE: 8-24-98	PAGE 1 OF

FROM: GSE Lining Technology, Inc.

SIGNATURE:

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY: Melissa Crews 8-24-98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION (17)		
QTY.	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
1	GSE-2317-010	0						X			X	Synthetic Industries - Individual Roll	X		02714P, Para. 1.04.B.3;		X	
												Data - Bill of Lading 101			Para.2.02			

RECEIVED AUG 26 1998 DC, B/EBT

DISTRIBUTION

REVIEW DISTRIBUTION

DISTRIBUTION	MS	DISTRIBUTION	MS
Jim Jenkins, FDF, Engineering, Approver	64		
Dan Bodine, GeoSyntec	38		
Jim Turner, FDF, QA	64		

CFC DISTRIBUTION

DISTRIBUTION	MS	DISTRIBUTION	MS

RECEIVED BY: [signature] DATE: 9/3/98 NO COMMENTS: ____ COMMENTS ATTACHED X

(SIGN/DATE AND RETURN A COPY TO ECDC, MS52-7)

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: REVISE AND RESUBMIT AS CFC OR INF
C - REVISE AND RESUBMIT

000023

FERMCO OU2 2061

08/19/98

AUG 21 3 55 PM '98

GSE-2317-010 2/0

Synthetic Industries
Individual Roll Data
Bill of Lading:101

Roll Number	Style	Batch Number	Mass/ Area Osy D5261	Lab Thick mils D5199	Tensile (MD) lbs D4632	Tensile (XMD) lbs D4632	Elongation (MD) % D4632	Elongation (XMD) % D4632	Trap Tear (MD) lbs D4533	Trap Tear (XMD) lbs D4533	Mullen Burst psi D3786	Punct Resist lbs D4833	AOS mm D4751	Permit sec-1 D4491
4118650A	1701	40880	17.4	183	467	704	82	72	196	291	970	102	CANCEL	
4118657A	1701	40890	16.6	173	450	705	83	79	209	329	1000	121	0.108	1.684
5137290A	1071	50853	10.8	133	340	393	60	72	154	204	577	192	0.144	2.960
5137300A	1071	50853	11.2	137	337		63		143		621	191	0.145	3.334
5137320A	1071	50853	10.8	130	332	396	65	73	133	176	581	188	0.149	3.652
5137330A	1071	50853	10.9	133	334	403	60	73	157	202	593	189	0.141	3.259
5137340A	1071	50853	10.5	128	336	398	65	74	129	182	554	185		
5137360A	1071	50853	11.3	137	296	417	68	75	124	195	589	183		
5137370A	1071	50853	10.5	126	315	396	67	74	118	177	546	189	0.145	3.690
5137400A	1071	50853	10.9	122	333	423	67	76	122	170		191	0.148	2.540
5137420A	1071	50853	10.5	127	329	378	62	73	152	167	557	189	0.147	3.590
5137430A	1071	50853	10.5	130	327		64		157		559	190		
5137450A	1071	50853	10.4	130	334	385	66	72	162	183	553	198		
5137460A	1071	50853	10.1	125	333	382	69	75	150	206	547	184		
5137470A	1071	50853	10.6	132	336	399	64	71	170	201	549	186	0.139	2.746
5137480A	1071	50853	11.0	134	330	423	68	72	112	173	560	188		
5137490A	1071	50853	11.3	133	335	429	69	73	119	180	580	205		
5137500A	1071	50853	10.4	124	297	380	66	71	117	168	544	183	0.148	2.484
6050309A	861	60217	8.1	112	283	269	56	72	113	130	483	145	~~MISSING~~	
6050381A	861	60217	8.3	112	275	285	61	75	143	158	457	156		
6050400A	861	60217	8.3	113	296	283	58	75	142	156	489	147	0.172	3.293
6050430A	861	60217	8.2	106	277	252	56	72	139	151	444	141	0.177	2.998
6050440A	861	60217	8.1	105	270	253	56	71	106	122	451	145	0.175	3.470
6050460A	861	60217	8.8	117	274	278	58	72	131	141	484	148		
6050470A	861	60217	8.2	107	300	264	60	76	113	125	465	158		
6050490A	861	60217	8.8	112	284	290	59	77	130	139	504	159	0.177	3.250
6050500A	861	60217	8.2	107	282	272	59	78	118	140	466	154	0.174	3.438

MAY HAVE RETEST FAILED DOB

OK.

Sid Weiss

[ ] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig:_____ Date:_____

Synthetic Industries' current standard manufacturing quality control (MQC) testing frequency for GEOTEX nonwoven geotextiles one (1) test per 90,000 sf (8,360 sm) for index properties (mass per unit area, thickness, grab tensile and elongation, trapezoidal ar, mullen burst and puncture resistance) for styles heavier than 601 and one (1) test per 162,000 sf (15,000 sm) for index properties r style 601 and lighter. Although we strive to test our nonwoven geotextiles for apparent opening size (AOS) and rmittivity/permeability/water flow rate approximately once every 540,000 sf (50,160 sm), the actual frequency of testing for rformance properties will vary depending upon production schedules, product availability, customer requirements, job ecifications or other agreements arranged with Synthetic Industries prior to the time of purchase. If additional testing is needed to eet higher frequencies required by the project specifications, it is the purchaser's responsibility to notify Synthetic Industries d ask for assistance in calculating the costs for the additional tests.

Once rolls of nonwoven geotextiles are produced, inspected and the test results from the frequency stated above indicates that terials produced during the production run meets our published minimum average roll values, approved rolls are shipped for rage until an order requires the material to be shipped. Since rolls are loaded at the warehouse independent of production sequence results listed above may include data from rolls which were not shipped. However, the data provided is from the same n run as the rolls actually shipped on this bill of lading.

COMMENTS ON SUBMITTAL NO. 010

1. Need a letter from manufacturer that "Sid Weiser" is the quality control manager or authorized to sign MQC test data

2. Puncture resistance data for 15 oz/y are impossible to read. MAY HAVE FAILED - DGB FOR QA ENGINEERING WITH DGB

3. There are missing test data (XMD) for some of the rolls. These are circled (O) on the previous page.

4. MQC data for 16 oz/yd², 10 oz/yd and ≥ 7 oz/yd² do not cover the range of rolls to be shipped to the site.

5. Test data for UV Resistance missing.

Kumar Badri-Narayanan
9/3/98

FERMCO OU2

2061

08/19/98

AUG 21 3 55 PM '98

Synthetic Industries
Individual Roll Data
Bill of Lading:101

Roll Number	Style	Batch Number	Mass/ Area Osy D5261	Lab Thick mils D5199	Tensile (MD) lbs D4632	Tensile (XMD) lbs D4632	Elongation (MD) % D4632	Elongation (XMD) % D4632	Trap Tear (MD) lbs D4533	Trap Tear (XMD) lbs D4533	Mullen Burst psi D3786	Punct Resist lbs D4833	AOS mm D4751	Permit sec-1 D4491
4118650A	1701	40880	17.4	183	467	704	82	72	196	291	970	102		
4118657A	1701	40880	16.6	173	450	705	83	79	209	329	1000	127	0.108	1.684
5137290A	1071	50853	10.8	133	340	393	60	72	154	204	577	192	0.144	2.960
5137300A	1071	50853	11.2	137	337		63		149		621	191	0.145	3.334
5137320A	1071	50853	10.8	130	332	396	65	73	133	176	581	188	0.149	3.652
5137330A	1071	50853	10.9	133	334	403	60	73	157	202	593	185	0.141	3.259
5137340A	1071	50853	10.5	128	336	398	65	74	129	182	554	185		
5137360A	1071	50853	11.3	137	296	417	68	75	124	195	589	183		
5137370A	1071	50853	10.5	126	315	396	67	74	118	177	546	189	0.145	3.690
5137400A	1071	50853	10.9	122	333	423	67	76	122	170		191	0.148	2.540
5137420A	1071	50853	10.5	127	329	378	62	73	152	167	567	189	0.147	3.590
5137430A	1071	50853	10.5	130	327		64		157		559	190		
5137450A	1071	50853	10.4	130	334	385	66	72	162	183	553	198		
5137460A	1071	50853	10.1	125	333	382	69	75	150	206	547	186		
5137470A	1071	50853	10.6	132	336	399	64	71	170	201	549	186	0.139	2.746
5137480A	1071	50853	11.0	134	330	423	68	72	112	173	560	188		
5137490A	1071	50853	11.3	133	335	429	69	73	119	180	580	205		
5137500A	1071	50853	10.4	124	297	380	66	71	117	168	544	183	0.148	2.484
6050309A	861	60217	8.1	112	283	269	56	72	113	130	483	145		
6050381A	861	60217	8.3	112	275	285	61	75	143	158	457	150		
6050400A	861	60217	8.3	113	296	283	58	75	142	156	489	145	0.172	3.293
6050430A	861	60217	8.2	106	277	252	56	72	139	151	444	141	0.177	2.998
6050440A	861	60217	8.1	105	270	253	56	71	106	122	453	145	0.175	3.470
6050460A	861	60217	8.8	117	274	278	58	72	131	141	484	148		
6050470A	861	60217	8.2	107	300	264	60	76	113	125	465	158		
6050490A	861	60217	8.8	112	284	290	59	77	130	139	504	159	0.177	3.250
6050500A	861	60217	8.2	107	282	272	59	78	118	140	466	154	0.174	3.438

Ted Weiss

Synthetic Industries' current standard manufacturing quality control (MQC) testing frequency for GEOTEX nonwoven geotextiles is one (1) test per 90,000 sf (8,360 sm) for index properties (mass per unit area, thickness, grab tensile and elongation, trapezoidal tear, mullen burst and puncture resistance) for styles heavier than 601 and one (1) test per 162,000 sf (15,000 sm) for index properties for style 601 and lighter. Although we strive to test our nonwoven geotextiles for apparent opening size (AOS) and permittivity/permeability/water flow rate approximately once every 540,000 sf (50,160 sm), the actual frequency of testing for performance properties will vary depending upon production schedules, product availability, customer requirements, job specifications or other agreements arranged with Synthetic Industries prior to the time of purchase. If additional testing is needed to meet higher frequencies required by the project specifications, it is the purchaser's responsibility to notify Synthetic Industries and ask for assistance in calculating the costs for the additional tests.

Once rolls of nonwoven geotextiles are produced, inspected and the test results from the frequency stated above indicates that materials produced during the production run meets our published minimum average roll values, approved rolls are shipped for storage until an order requires the material to be shipped. Since rolls are loaded at the warehouse independent of production sequence the results listed above may include data from rolls which were not shipped. However, the data provided is from the same production run as the rolls actually shipped on this bill of lading.

SUPPLIER DOC NT SUBMITTAL

FDF PROJECT NO.: 20102	CONTRACT NO.: 2317	SUBMITTAL NO.: 009	REV.: 0	DATE: 8.13.98	PAGE __ OF __

FROM: GSE Lining

SIGNATURE: _____

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 44

RECEIVED BY: Melissa Grimes DATE: 8.13.98

QTY.	DOCUMENT NUMBER	REV	DOCUMENT FAMILY 1 PRO	2 H&S	3 MED	4 TRG	5 CON	6 ENG	7 QAC	RESUBMITTAL YES	NO	TITLE/DESCRIPTION	SUBMITTAL TYPE CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION A	B	C
	GSE-2317009	0						X				Test Results for Brittleness Temp. of Plastics & Elastomers by Impact			02770P 2.03.B.7		X	

RECEIVED AUG 13 1998 KBT

DISTRIBUTION

REVIEW DISTRIBUTION Distribution	MS	Distribution	MS	CFC DISTRIBUTION Distribution	MS	Distribution	MS
Jim Jenkins							
Mike Godber							
Geosyntec							

220000

RECEIVED BY: K Brockmeyer DATE: 8/14/98 NO COMMENTS ___ COMMENTS ATTACHED X

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 44)

COMMENTS N[redacted] 1 more test on Resin | SUBMITTA[redacted]N CODE: (BY SUPPLIER) | SUPPLIER ACTION CODE: (ECDC) SUPPLIER [redacted]N ABOVE

GSE™

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
713-443-8564
Fax: 713-875-6010

Quality Assurance Laboratory Test Results

Test: Brittleness Temperature of Plastics and Elastomers by Impact ASTM D746
Criteria: -60° C
Job Name: Fluor Daniel Fernald/Fermco
MR Number: 7920-01
Job Number: C1269

Roll Number	Resin Lot Number	Status
AK4197FF	Z-45473	Pass
AK4275FF	Z-40477	Pass
AK2553FF	Z-45448	Pass
AK4262FF	Z-40476	Pass

KBT

Resin Lot Z-~~45473~~ 40476 KBT has ~~508,439.0~~ ft²
Need two tests per spec requirement of one test per 400,000 ft² (Part 2.03-B.7 of 02770P).

For environmental lining solutions . . . the world comes to GSE™
A Gundle/SLT Environmental, Inc. Company

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.	CONTRACT NO.:	SUBMITTAL NO.:	REV.:	DATE:	PAGE __ OF __
20102	2317	008	0	8.13.98	

FROM: GSC Lining

SIGNATURE: _____

FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 44

RECEIVED BY: Melissa Quiles DATE: 8.13.98

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY 1 PRO	2 H&S	3 MED	4 TRG	5 CON	6 ENG	7 QAC	RESUBMITTAL YES	NO	TITLE/DESCRIPTION	SUBMITTAL TYPE CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION A	B	C
	GSE-2317-008	0						X				Test Results for Measuring core thickness of Geomembrane, Carbon Black dispersion + Roll test Reports.	X		02770P 203-B.5		X	

RECEIVED AUG 13 1998 KBT

DISTRIBUTION

REVIEW DISTRIBUTION Distribution	MS	Distribution	MS	CFC DISTRIBUTION Distribution	MS	Distribution	MS
Jim Jenkins							
GeoSyntec							
Mike Godber							

640000

RECEIVED BY: [signature] DATE: 8/24/98 NO COMMENTS ___ COMMENTS ATTACHED X

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 44)

COMMENTS Need 2 more carbon black

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INFORMATION/RECORD

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE
A - ACCEPTED DOCUMENT: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: REVISE AND RESUBMIT CFC OR INF

GSE

Quality Assurance Laboratory Test Results

Test: Measuring Core Thickness of Textured Geomembrane
ASTM D5994
Job Name: Fluor Daniel Fernald/Fermco
MR Number 7920-01
Job Number: C1269

Roll Number	Job Specification (mils)	Test Results (mils)	Status	Roll Number	Job Specification (mils)	Test Results (mils)	Status
AJ5175FF	>76	80	Pass	AK4220FF	>76	80	Pass
AK2527FF	>76	80	Pass	AK4221FF	>76	80	Pass
AK2528FF	>76	81	Pass	AK4222FF	>76	80	Pass
AK2550FF	>76	82	Pass	AK4223FF	>76	81	Pass
AK2553FF	>76	83	Pass	AK4224FF	>76	82	Pass
AK2554FF	>76	84	Pass	AK4225FF	>76	82	Pass
AK4197FF	>76	83	Pass	AK4226FF	>76	82	Pass
AK4198FF	>76	82	Pass	AK4227FF	>76	83	Pass
AK4200FF	>76	82	Pass	AK4228FF	>76	83	Pass
AK4201FF	>76	82	Pass	AK4229FF	>76	82	Pass
AK4202FF	>76	81	Pass	AK4230FF	>76	82	Pass
AK4203FF	>76	81	Pass	AK4231FF	>76	81	Pass
AK4204FF	>76	80	Pass	AK4232FF	>76	82	Pass
AK4205FF	>76	81	Pass	AK4233FF	>76	82	Pass
AK4206FF	>76	80	Pass	AK4234FF	>76	82	Pass
AK4207FF	>76	82	Pass	AK4235FF	>76	81	Pass
AK4208FF	>76	82	Pass	AK4236FF	>76	80	Pass
AK4209FF	>76	81	Pass	AK4237FF	>76	80	Pass
AK4210FF	>76	83	Pass	AK4238FF	>76	81	Pass
AK4211FF	>76	82	Pass	AK4239FF	>76	83	Pass
AK4212FF	>76	80	Pass	AK4240FF	>76	81	Pass
AK4213FF	>76	80	Pass	AK4241FF	>76	80	Pass
AK4214FF	>76	81	Pass	AK4242FF	>76	82	Pass
AK4215FF	>76	81	Pass	AK4243FF	>76	82	Pass
AK4216FF	>76	81	Pass	AK4244FF	>76	80	Pass
AK4217FF	>76	82	Pass	AK4245FF	>76	82	Pass
AK4218FF	>76	83	Pass	AK4246FF	>76	80	Pass
AK4219FF	>76	82	Pass	AK4247FF	>76	80	Pass

APPROVED #22 F15194 QA

GSE®

Quality Assurance Laboratory Test Results

Test: Measuring Core Thickness of Textured Geomembrane
ASTM D5994
Job Name: Fluor Daniel Fernald/Fermco
MR Number 7920-01
Job Number: C1269

Roll Number	Job Specification (mils)	Test Results (mils)	Status	Roll Number	Job Specification (mils)	Test Results (mils)	Status
AK4248FF	>76	80	Pass	AK4276FF	>76	81	Pass
AK4249FF	>76	81	Pass	AK4277FF	>76	81	Pass
AK4250FF	>76	80	Pass	AK4278FF	>76	81	Pass
AK4251FF	>76	82	Pass	AK4279FF	>76	82	Pass
AK4252FF	>76	80	Pass	AK4280FF	>76	82	Pass
AK4253FF	>76	80	Pass	AK4281FF	>76	82	Pass
AK4254FF	>76	80	Pass	AK4282FF	>76	80	Pass
AK4255FF	>76	81	Pass	AK4283FF	>76	81	Pass
AK4256FF	>76	80	Pass	AK4284FF	>76	82	Pass
AK4257FF	>76	80	Pass	AK4285FF	>76	80	Pass
AK4258FF	>76	81	Pass	AK4286FF	>76	80	Pass
AK4259FF	>76	81	Pass	AK4287FF	>76	82	Pass
AK4260FF	>76	81	Pass	AK4288FF	>76	81	Pass
AK4261FF	>76	82	Pass	AK4289FF	>76	81	Pass
AK4262FF	>76	82	Pass	AK4290FF	>76	81	Pass
AK4263FF	>76	81	Pass	AK4291FF	>76	84	Pass
AK4264FF	>76	81	Pass	AK4292FF	>76	83	Pass
AK4265FF	>76	82	Pass	AK4293FF	>76	83	Pass
AK4266FF	>76	80	Pass	AK4294FF	>76	81	Pass
AK4267FF	>76	80	Pass	AK4295FF	>76	82	Pass
AK4268FF	>76	80	Pass	AK4296FF	>76	82	Pass
AK4269FF	>76	81	Pass				
AK4270FF	>76	82	Pass				
AK4271FF	>76	82	Pass				
AK4272FF	>76	81	Pass				
AK4273FF	>76	81	Pass				
AK4274FF	>76	81	Pass				
AK4275FF	>76	81	Pass				

APPROVED #22 6/5/01 QA

GSE®

2061

22 tests corresponds to $80,000

Quality Assurance Laboratory Test Results

Test: Microscopic evaluation of the dispersion of Carbon Black in Polyolefin Geosynthetics ASTM D 5596
Criteria: 10 Views, all must be category 1 or 2, cannot be any category 3.
Job Name: Fluor Daniel Fernald/Fermco
MR Number: 7920-01
Job Number: C1269

Roll Number	Test Status
AJ5175FF	Pass
AK2553FF	Pass
AK4197FF	Pass
AK4202FF	Pass
AK4207FF	Pass
AK4215FF	Pass
AK4222FF	Pass
AK4227FF	Pass
AK4230FF	Pass
AK4236FF	Pass
AK4241FF	Pass
AK4246FF	Pass
AK4252FF	Pass
AK4253FF	Pass
AK4258FF	Pass
AK4262FF	Pass
AK4263FF	Pass
AK4275FF	Pass
AK4280FF	Pass
AK4285FF	Pass
AK4292FF	Pass
AK4295FF	Pass

Need at least 2 tests from Resin Lot No. Z-45448

Need 4 tests — OK KBT

Need 13 tests

2 more tests from Rolls AK4264FF to AK4274FF

Need 5 tests — OK KBT

APPROVED #22 8/4/96 QA

GSE

Roll Test Data Report

ROLL NO. AK-2549 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-2549 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8489	sq.ft.
	789	sq. meters
LENGTH:	360	feet
	110	meters
WIDTH:	23.58	feet
	7.2	meters
WEIGHT:	3521	pounds
	1597	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45448
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.936
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.490

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	192	lb/in	34	kg/cm
MD -		173		31		191		34	
YIELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				19			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	395	lb/in	71	k
MD -		324		59		414		74	
L K ELONGATION	D638								
CD -		560	%			693	%		
MD -		560				716			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	72	lb	33	kg
MD -		60		27		74		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	127	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.0	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.46	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.946	g/cc
ESCR	D1693-B	1500	hours			Start	5/29/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	m
MINIMUM		76		1.92		78		1.99	
AVG. THICKNESS						80		2.04	

TEST NOTES. MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

APPROVED JG 8-6-98

C OMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

GSE

Roll Test Data Report

2061

ROLL NO. AK-4197 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4197 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3485	pounds
	1581	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
ENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	199 lb/in	36 kg/cm
MD -		173	31	195	35
ELD ELONGATION	D638				
CD -		13 %		21 %	
MD -		13		21	
ENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	449 lb/in	80 kg/cm
MD -		324	59	440	79
K ELONGATION	D638				
CD -		560 %		751 %	
MD -		560		714	
NITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	71 lb	32 kg
MD -		60	27	74	34
UNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	129 lb	58 kg
HRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/- 2.00 %		0.6 %	
MD -		+/- 2.00		0.1	
ARBON BLACK DISPERSION	D3015	A2		A2	
ARBON BLACK CONTENT	D1603	2.00 %		2.42 %	
EOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
SCR	D1693-B	1500 hours		Start 7/10/98	
HICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.94
AVG. THICKNESS				80	2.04

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-31-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081741

GSE

Roll Test Data Report

ROLL NO. AK-4198 F

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4198 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8569	sq.ft.
	796	sq. meters
LENGTH:	359	feet
	109	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3500	pounds
	1588	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	200	lb/in	36	kg/c
MD -		173		31		196		35	
YIELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	426	lb/in	76	k
MD -		324		59		395		7[illegible]	
BREAK ELONGATION	D638								
CD -		560	%			710	%		
MD -		560				634			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	72	lb	33	kg
MD -		60		27		76		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	127	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.6	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.44	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.94	
AVG. THICKNESS						80		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-31-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

GSE

Roll Test Data Report

ROLL NO. AK-4199 FF

2061

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4199 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3474	pounds
	1576	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
NSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	203 lb/in	36 kg/cm
MD -		173	31	197	35
ELD ELONGATION	D638				
CD -		13 %		21 %	
MD -		13		21	
NSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	406 lb/in	73 kg/cm
MD -		324	59	451	81
K ELONGATION	D638				
CD -		560 %		666 %	
MD -		560		730	
ITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	76 lb	35 kg
MD -		60	27	79	36
INCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	128 lb	58 kg
IRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.3 %	
MD -		+/-2.00		0.1	
RBON BLACK DISPERSION	D3015	A2		A2	
RBON BLACK CONTENT	D1603	2.00 %		2.45 %	
OMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
CR	D1693-B	1500 hours		Start 7/10/98	
ICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.94
AVG. THICKNESS				80	2.04

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-31-98

USTOMER: FLUOR DANIEL FERNALD/FERMCO
B NO. 7920
OMMENTS

DATE SHIPPED

20081741

GSE

Roll Test Data Report

ROLL NO. AK-4200 F

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4200 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8593	sq.ft.
	799	sq. meters
LENGTH:	360	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3555	pounds
	1613	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	203	lb/in	36	kg/c
MD -		173		31		195		35	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	428	lb/in	77	[illegible]
MD -		324		59		434		78	
BREAK ELONGATION	D638								
CD -		560	%			706	%		
MD -		560				706			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	77	lb	35	kg
MD -		60		27		72		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	131	lb	59	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.46	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.94	
AVG. THICKNESS						80		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-31-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081741

000087

GSE

Roll Test Data Report

2061

ROLL NO. AK-4201 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4201 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3511	pounds
	1593	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-45473
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
ENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	203	lb/in	36	kg/cm
MD -		173		31		198		35	
ELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				21			
ENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	390	lb/in	70	kg/cm
MD -		324		59		411		73	
AK ELONGATION	D638								
CD -		560	%			638	%		
MD -		560				664			
ITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	73	lb	33	kg
MD -		60		27		75		34	
UNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	131	lb	59	kg
HRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.5	%		
MD -		+/-2.00				0.4			
ARBON BLACK DISPERSION	D3015	A2				A2			
ARBON BLACK CONTENT	D1603	2.00	%			2.45	%		
EOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
SCR	D1693-B	1500	hours			Start	7/10/98		
HICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.94	
AVG. THICKNESS						80		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-31-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081741

GSE

Roll Test Data Report

ROLL NO. AK-4202 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4202 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8617	sq.ft.
	801	sq. meters
LENGTH:	361	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3559	pounds
	1614	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-45473
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	203	lb/in	36	kg/cm
MD -		173		31		193		35	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	413	lb/in	74	kg/cm
MD -		324		59		426		76	
BREAK ELONGATION	D638								
CD -		560	%			672	%		
MD -		560				691			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	76	lb	34	kg
MD -		60		27		72		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	120	lb	55	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.5	%		
MD -		+/-2.00				0.4			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.44	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.94	
AVG. THICKNESS						80		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-31-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081741

GSE

2061

Roll Test Data Report

ROLL NO. AK-4203 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4203 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3502	pounds
	1588	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-45473
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
NSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	205	lb/in	37	kg/cm
MD -		173		31		198		35	
ELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				21			
NSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	420	lb/in	75	kg/cm
MD -		324		59		410		73	
K ELONGATION	D638								
CD -		560	%			696	%		
MD -		560				667			
ITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	76	lb	35	kg
MD -		60		27		75		34	
NCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	128	lb	58	kg
RINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.3			
RBON BLACK DISPERSION	D3015	A2				A2			
RBON BLACK CONTENT	D1603	2.00	%			2.42	%		
OMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
CR	D1693-B	1500	hours			Start	7/10/98		
ICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-31-98

USTOMER: FLUOR DANIEL FERNALD/FERMCO
OB NO. 7920
OMMENTS

DATE SHIPPED

20081741

000090

GSE

Roll Test Data Report

ROLL NO. AK-4204 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4204 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3585	pounds
	1626	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	206 lb/in	37 kg/cm
MD -		173	31	201	36
YIELD ELONGATION	D638				
CD -		13 %		20 %	
MD -		13		20	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	394 lb/in	70 kg/
MD -		324	59	397	71
L AK ELONGATION	D638				
CD -		560 %		658 %	
MD -		560		646	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	79 lb	36 kg
MD -		60	27	77	35
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	124 lb	56 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.3 %	
MD -		+/-2.00		0.3	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.41 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
ESCR	D1693-B	1500 hours		Start 7/10/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				80	2.03

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

VG
7-31-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081741

GSE

2061

Roll Test Data Report

ROLL NO. AK-4205 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4205 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3507	pounds
	1591	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
NSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	200	lb/in	36	kg/cm
MD -		173		31		198		35	
ELD ELONGATION	D638								
CD -		13	%			23	%		
MD -		13				23			
NSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	428	lb/in	76	kg/cm
MD -		324		59		433		77	
K ELONGATION	D638								
CD -		560	%			714	%		
MD -		560				718			
ITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	72	lb	33	kg
MD -		60		27		73		33	
NCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	125	lb	56	kg
RINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.6	%		
MD -		+/-2.00				0.2			
RBON BLACK DISPERSION	D3015	A2				A2			
RBON BLACK CONTENT	D1603	2.00	%			2.40	%		
OMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
CR	D1693-B	1500	hours			Start	7/10/98		
ICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-31-98

JSTOMER: FLUOR DANIEL FERNALD/FERMCO
B NO. 7920
OMMENTS
20081741

DATE SHIPPED

GSE

Roll Test Data Report

ROLL NO. AK-4206 FF

ROLL DIMENSIONS ≈ ± 1%		
ROLL NUMBER:	AK-4206 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8641	sq.ft.
	803	sq. meters
LENGTH:	362	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3508	pounds
	1591	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-45473
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	201	lb/in	36	kg/cm
MD -		173		31		198		35	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	440	lb/in	79	kg/c
MD -		324		59		420		75	
BREAK ELONGATION	D638								
CD -		560	%			739	%		
MD -		560				691			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	73	lb	33	kg
MD -		60		27		72		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	122	lb	55	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.6	%		
MD -		+/-2.00				0.2			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.40	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

YG
7-31-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081741

GSE

Roll Test Data Report

ROLL NO. AK-4207 FF

2061

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4207 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3474	pounds
	1576	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
NSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	206 lb/in	37 kg/cm
MD -		173	31	199	36
ELD ELONGATION	D638				
CD -		13 %		21 %	
MD -		13		21	
NSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	432 lb/in	77 kg/cm
MD -		324	59	417	74
AK ELONGATION	D638				
CD -		560 %		712 %	
MD -		560		675	
ITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	79 lb	36 kg
MD -		60	27	79	36
NCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	129 lb	59 kg
RINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.2 %	
MD -		+/-2.00		0.1	
RBON BLACK DISPERSION	D3015	A2		A2	
RBON BLACK CONTENT	D1603	2.00 %		2.39 %	
OMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
CR	D1693-B	1500 hours		Start 7/10/98	
ICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				80	2.03

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-31-98

JSTOMER: FLUOR DANIEL FERNALD/FERMCO
B NO. 7920
OMMENTS

DATE SHIPPED

20081741

000094

GSE

Roll Test Data Report

ROLL NO. AK-4208 F

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4208 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3503	pounds
	1589	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-45473
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	203	lb/in	36	kg/cr
MD -		173		31		200		36	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	372	lb/in	66	kg
MD -		324		59		399		71	
b. .K ELONGATION	D638								
CD -		560	%			619	%		
MD -		560				646			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	33	kg
MD -		60		27		74		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	122	lb	55	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.2	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.39	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-31-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081741

GSE

Roll Test Data Report

2061

ROLL NO. AK-4209 FF

ROLL DIMENSIONS ≈ ± 1%		
ROLL NUMBER:	AK-4209 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3510	pounds
	1592	kilograms

RESIN LOT INFORMATION	
LOT NUMBER	Z-45473
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
NSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	205	lb/in	37	kg/cm
MD -		173		31		199		36	
ELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				21			
NSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	406	lb/in	73	kg/cm
MD -		324		59		406		73	
K ELONGATION	D638								
CD -		560	%			668	%		
MD -		560				656			
ITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	77	lb	35	kg
MD -		60		27		76		35	
NCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	125	lb	56	kg
RINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.1	%		
MD -		+/-2.00				0.1			
RBON BLACK DISPERSION	D3015	A2				A2			
RBON BLACK CONTENT	D1603	2.00	%			2.38	%		
OMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
CR	D1693-B	1500	hours			Start	7/10/98		
ICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-31-98

USTOMER: FLUOR DANIEL FERNALD/FERMCO
B NO. 7920
OMMENTS

DATE SHIPPED

20081741

GSE

Roll Test Data Report

ROLL NO. AK-4210 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4210 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3559	pounds
	1614	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	207	lb/in	37	kg/cm
MD -		173		31		203		36	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	429	lb/in	77	kg/
MD -		324		59		431		77	
B. .K ELONGATION	D638								
CD -		560	%			706	%		
MD -		560				692			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	76	lb	35	kg
MD -		60		27		76		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	126	lb	57	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.1	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.38	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-31-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081741

GSE

Roll Test Data Report

2061

ROLL NO. AK-4213 FF

ROLL DIMENSIONS ≈ ± 1%		
ROLL NUMBER:	AK-4213 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3478	pounds
	1578	kilograms

RESIN LOT INFORMATION	
LOT NUMBER	Z-45473
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
ENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	201	lb/in	36	kg/cm
MD -		173		31		195		35	
ELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				20			
ENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	416	lb/in	74	kg/cm
MD -		324		59		411		73	
AK ELONGATION	D638								
CD -		560	%			697	%		
MD -		560				677			
ITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	71	lb	32	kg
MD -		60		27		75		34	
UNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	125	lb	57	kg
HRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.0			
ARBON BLACK DISPERSION	D3015	A2				A2			
ARBON BLACK CONTENT	D1603	2.00	%			2.36	%		
EOMEMBRANE DENSITY	D1505			0.940	g/cc			0.943	g/cc
SCR	D1693-B	1500	hours			Start	7/10/98		
HICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
8-3-98

USTOMER: FLUOR DANIEL FERNALD/FERMCO

DATE SHIPPED

DB NO. 7920

OMMENTS

20081813

000098

GSE

Roll Test Data Report

ROLL NO. AK-4214 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4214 FF	
PROD DATE:	07/13/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3548	pounds
	1609	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	199	lb/in	35	kg/cm
MD -		173		31		195		35	
YIELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	403	lb/in	72	kg/c
MD -		324		59		412		74	
B. .K ELONGATION	D638								
CD -		560	%			678	%		
MD -		560				680			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	34	kg
MD -		60		27		74		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	126	lb	57	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.35	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.943	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
8-3-9

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081813

GSE

Roll Test Data Report

ROLL NO. AK-4215 FF

2061

ROLL DIMENSIONS ≈ ± 1%		
ROLL NUMBER:	AK-4215 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3486	pounds
	1581	kilograms

RESIN LOT INFORMATION	
LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
NSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	193	lb/in	34	kg/cm
MD -		173		31		188		34	
ELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				22			
NSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	420	lb/in	75	kg/cm
MD -		324		59		390		70	
K ELONGATION	D638								
CD -		560	%			725	%		
MD -		560				649			
ITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	71	lb	32	kg
MD -		60		27		87		40	
NCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	126	lb	57	kg
RINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.1			
RBON BLACK DISPERSION	D3015	A2				A2			
RBON BLACK CONTENT	D1603	2.00	%			2.34	%		
EOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
SCR	D1693-B	1500	hours			Start	7/10/98		
HICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
8-3-98

USTOMER: FLUOR DANIEL FERNALD/FERMCO

DATE SHIPPED

OB NO. 7920

OMMENTS

20081813

000100

GSE

Roll Test Data Report

ROLL NO. AK-4216 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4216 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8593	sq.ft.
	799	sq. meters
LENGTH:	360	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3483	pounds
	1580	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	201	lb/in	36	kg/cm
MD -		173		31		197		35	
YIELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				19			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	404	lb/in	72	kg/
MD -		324		59		424		76	
L AK ELONGATION	D638								
CD -		560	%			666	%		
MD -		560				680			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	76	lb	35	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	132	lb	60	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.36	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
8-3-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081813

FDF PROJECT N[redacted]0102 | CONTRACT NO.: 2317 | [redacted]ITTAL NO.: 006 | REV.: 0 | DATE: 08.13.98 [redacted] | PAGE __ OF __

FROM: GSE Lining

[redacted] FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 44

SIGNATURE: _____

RECEIVED BY: Melissa Clemes DATE: 8.13.98

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY 1 PRO	2 H&S	3 MED	4 TRG	5 CON	6 ENG	7 QAC	RESUBMITTAL YES	NO	TITLE/DESCRIPTION	SUBMITTAL TYPE CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION A	B	C
	GSE-2317-006	0						X			X	Certification of Hyperfrictionflix	X		02770P 1.05.A.4 1.05.B.3	X X		

RECEIVED AUG 13 1998 KBT

DISTRIBUTION

REVIEW DISTRIBUTION Distribution	MS	Distribution	MS	CFC DISTRIBUTION Distribution	MS	Distribution	MS
Jim Jenkins							
Gus Synter							
Mike Gerber							

000102

2061

RECEIVED BY: [signature] DATE: 8/14/98 NO COMMENTS X COMMENTS ATTACHED ____

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 44)

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: REVISE AND RESUBMIT AS CFC OR INF
C - REVISE AND RESUBMIT

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT N	2102	CONTRACT NO.: 2317	TTAL NO.: 007	REV.: 0	DATE: 8.13.98	AGE

FROM: GSE Lining

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 44

SIGNATURE:

RECEIVED BY: Melissa Cruces DATE: 8.13.98

			DOCUMENT FAMILY							RESUBMITTAL				SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	1 PRO	2 H&S	3 MED	4 TRG	5 CON	6 ENG	7 QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
	GSE-2317-007	0						X			X	GSE-Hyperflex friction flex + Warranty	X		02770P 1.05.A.7			

RECEIVED
AUG 13 1998
KBT

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Jim Jenkins							
Mike Godbey							
GeoSyntec							

0001103

RECEIVED BY: K Bodmer DATE: 8/14/98 NO COMMENTS ___ COMMENTS ATTACHED X

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 44)

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - C[illegible]ED FOR CONSTRUCTION

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT: CONFORMS WIT[illegible]IREMENTS

PRO-RATA LIMITED WARRANTY
FOR GSE LINING TECHNOLOGY, INC.
(GEOSYNTHETIC MANUFACTURED MATERIALS)
(U.S.A.)

2061

Date:	August 6, 1998	Warranty No.:	FLU7920
Purchaser Name:	Department of Energy	Project No.:	C1269
Address:	P.O. Box 538705	Effective Date:	August 7, 1998
City, State:	Cincinatti, Ohio	Project Name:	Fluor Daniel/Fernald-Fermco
Product Type/Description:	GSE HyperFrictionFlex® 80 mil	Project Address:	Fernald, Ohio

GSE Lining Technology, Inc. ("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 twenty (20) years from the above effective date for "normal use" in approved applications. 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. This limited warranty only extends to the geosynthetic portion of this product manufactured by GSE and does not apply to any third-party manufactured materials attached to GSE's product. The third-party portion of the product will carry the original manufacturer's warranty that will be passed through to the Purchaser.

Any claim for any alleged breach of this warranty must be made in writing, by certified mail or courier, to the President of GSE, 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.

GSE LINING TECHNOLOGY, INC.

BY: Carolyn Gregg
Authorized Representative

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT N 2102 | CONTRACT NO.: 2317 | TTAL NO.: 007 | REV.: 0 | DATE: 8.13.98 | PAGE _ 1

FROM: GSE Lining

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 44

SIGNATURE: _____

RECEIVED BY: Melissa Cullers DATE: 8.13.98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	1 PRO	2 H&S	3 MED	4 TRG	5 CON	6 ENG	7 QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
	GSE-2317-007	0						X			X	GSE-Hyperflex friction flex + Warranty	X		02770P 1.05.A.7			

RECEIVED
AUG 13 1998
KBT

001005

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Jim Jenkins							
Mike Goodbar							

FDF PROJECT NO.	CONTRACT NO.	SUBMITTAL NO.	REV.	DATE	PAGE _ OF _
5102	2317	0026	0	07.13.98	

FROM: GSE Lining

FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 44

SIGNATURE: _____

RECEIVED BY: Melissa Clevers DATE: 8.13.98

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY 1 PRO	2 H&S	3 MED	4 TRG	5 CON	6 ENG	7 QAC	RESUBMITTAL YES	NO	TITLE/DESCRIPTION	SUBMITTAL TYPE CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION A	B	C
	GSE-2317-0026	0						X			X	Certification of Hyperfrictionflix	X		02770P 1.05.A.4 1.05.B.3	X X		

RECEIVED AUG 13 1998 KBT

DISTRIBUTION

REVIEW DISTRIBUTION Distribution	MS	Distribution	MS	CFC DISTRIBUTION Distribution	MS	Distribution	MS
Jim Jenkins							
Geosynted							
Mike Gerber							

RECEIVED BY: [signature] DATE: 8/14/98 NO COMMENTS X COMMENTS ATTACHED ____

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 44)

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE
A - ACCEPTED DOCUMENT: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: REVISE AND RESUBMIT AS CFC OR INF
C - REVISE AND RESUBMIT

000106

2061

GSE Lining Technology, Inc.

GSE-2317-006 R/C

P.1 of 6

August 5, 1998

Fluor Daniel Fernald
7400 Willey Road
Fernald, OH 45030

[ ] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig:_____ Date:_____

Attn: Jim Turner

RE: Certification of HyperFrictionFlex® Properties

Certification

The undersigned, being qualified and authorized to do so, hereby certifies the 80 mil HyperFrictionFlex will meet the following properties:

1. MARV - GSE's HyperFrictionFlex physical and mechanical properties will meet the properties as listed in Table 02770P-1 with a 95% confidence level.
2. SP-NCTL (ASTM D5397) - GSE's HyperFrictionFlex will easily meet or exceed the specifed (30% stress of yield) value of 500 hours. See attached full curve performed per formulation. Note the average failure time at 30% was 1137.3 hours which is typical of the HyperFlex material. The actual test results will be available on Aug. 25, 1998.
3. Reclaim - GSE hereby certifies that no reclaimed polymer will be used in the production of materials for the above referenced project. Recycled material reworked from GSE's manufacturing process may be added, but will not exceed 2% by weight.

Eric Reed

Eric Reed
Technical Representative
GSE Corporate Engineering & Technical Support

GSE®

2061

05 August 1998

Flour Daniel Fernald
7400 Willey Road
Fernald OH 45030
ATTN: Uday Kumthekar

James Gussman, Laboratory Technician, is authorized to inspect and sign off on all QC documents. Likewise, Eric Reed is authorized to write certification letters concerning this and all GSE projects.

Regards,

Nathan Ivy
Laboratory Manager
GSE Lining Technology, Inc.

GSE-2317-006 R1
P. 2 of 6

Notched Constant Tensile Load (NCTL) Stress Crack Testing of GSE 60 mil HyperFlex® ASTM D 5397 - Full Curve

NATHAN IVY

GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD
HOUSTON, TX 77073

SEPTEMBER 1996

000109

HFNCTL.DOC
09/25/96 1:02 PM
Nathan Ivy

ABSTRACT

The GSE Manufacturing Quality Assurance/Quality Control Laboratory has completed the NCTL full curve for the high density polyethylene geomembrane, HyperFlex. A sample of 60 mil GSE HyperFlex HDPE geomembrane was tested for stress crack potential. The test was allowed to continue for 4000 hours (20 times the most commonly accepted minimum acceptable limit). The results of the plot do not indicate a clear ductile-brittle transition time.

BACKGROUND

The specimens were tested in accordance with ASTM D 5397. According to ASTM, 'this method is used to develop test data from which the (potential) susceptibility of geomembrane sheet material to stress cracking under a constant tensile load condition and an accelerated environmental condition can be evaluated.' The method requires that thirty specimens be cut from a single sample (typically of a roll of geomembrane). Each of these specimens is subsequently cut to 80% of the thickness of the specimen (notched 20%). The specimens are then held at a constant 50°C in a circulating bath which contains a reagent solution composed of 90% water and 10% Igepal 630 surfactant. The specimens are then loaded with a percentage of the yield load of the unnotched specimen. The percentages range from 20%-65% in increments of 5%. There are three replicates of each yield load stress.

A relatively abrupt offset in the stress-time relationship is considered to demonstrate a ductile-brittle transition. Although there is no proven or industry wide consensus, the stress cracking potential is considered undesirably high for ductile-brittle transitions of less than a range of about 100-400 hours.

TEST SPECIMENS

60 mil HyperFlex was chosen for this test. The primary reason for choice is that it is the most widely specified thickness of high density polyethylene geomembrane material. Secondly, this thickness is most commonly used for NCTL stress crack testing.

RAW MATERIAL:

Base Resin Product Code:	HDA-601
Resin Manufacturer:	Mobil
Resin Density:	0.935 g/cc
Base Resin Lot Number:	W-45223
Carbon Black Concentrate Manufacturer:	Ampacet
Carbon Black Concentrate Lot Number:	J-06751

FINISHED PRODUCT:

Product Tested:	GSE 60 mil HyperFlex	
Roll Identification:	AH6000	
Density:	0.943 g/cc	*ASTM D 1505*
Yield Stress:	2506 psi	*ASTM D 638 NSF Modified*
Date of Manufacture:	06 June 1996	

TEST RESULTS

ASTM requires that the report include the yield stress (above) and the average failure time and coefficient of variation values for each of the applied stress levels. The coefficient of variation is defined below:

$$\textit{coefficient of variation} = \frac{\textit{standard deviation}}{\textit{mean}}$$

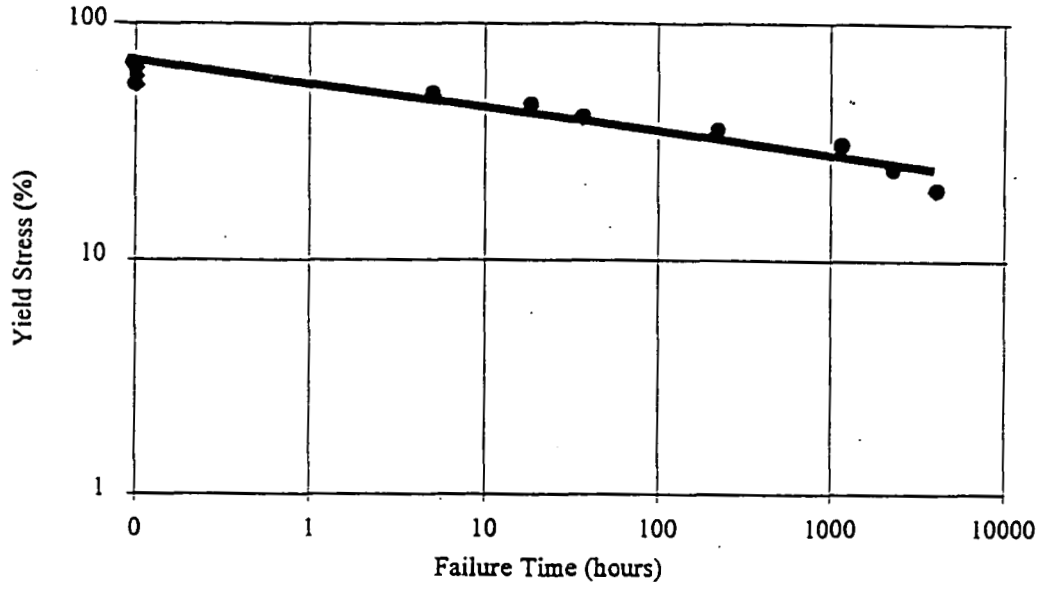
Likewise, the coefficient of variation must be less that 15% for average failure times of greater than 10 hours. The next page contains a table of yield stress, failure time, and average failure time for all replicates. The variation for the 55 and 50% loads are higher due to the small average failure time. From the equation above, it can be seen that the coefficient of variation is inversely proportional to the mean failure time. Thus, the smaller the mean failure time, the larger the coefficient of variation. The specimens that were loaded at 60 and 65% of yield stress broke instantaneously due in part to the manipulation required in setting up the test apparatus.

TABLE 1: % YIELD STRESS, FAILURE TIMES AND COEFFICIENT OF VARIATION

% OF YIELD STRESS	FAILURE TIME (HOURS)	AVERAGE FAILURE TIME (HOURS)	COEFFICIENT OF VARIATION
65	0	0.0	0.0%
65	0		
65	0		
60	0	0.0	0.0%
60	0		
60	0		
55	0	.07	86.6%
55	.1		
55	.1		
50	8.4	5.1	59.7%
50	2.5		
50	4.2		
45	15.4	18.2	14.9%
45	20.8		
45	18.3		
40	35.7	35.9	10.7%
40	39.9		
40	32.2		
35	180	214.3	14.2%
35	238		
35	225		
30	942	1137.3	14.9%
30	1231		
30	1239		
25	1875	>2241.7	14.2%
25	>2425*		
25	>2425*		
20	>4002	>4002.0	0.0%
20	>4002		
20	>4002		

* More than one test apparatus was required to set up all of the required specimens. One bath was at 2425 hours when the test was terminated.

CHART 1. - PERCENT YIELD STRESS VERSUS FAILURE TIME



RESULTS AND CONCLUSIONS:

The above graph is a log-log plot of percent yield stress versus failure time. Inspection of the test specimens under a microscope indicates that the failure of the specimen that broke at 1875 hours was ductile in nature. This points to the conclusion that the true ductile-brittle transition time was not revealed within the length of time the specimens above were tested. Due to the nature of log-log graphs, the line will necessary have an increasingly negative slope as time goes on. This particular test was terminated at 4002 hours due to the need to utilize the space in the test apparatus.

SUPPLIER DOCUMENT SUBMITTAL

FDFPROJECT NO: 20102	CONTRACT NO: 2317	SUBMITTAL NO: 005	REV: 2	DATE: 09/29/98	PAGE 1 OF 2

FROM: GSE Lining Systems, Inc.

SIGNATURE: _____

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY: _____

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION (17)		
QTY.	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
1	GSE-2317-005	2						X		X		Geomembrane Liner Resin Certifica-	X		02770P, Para. 1.05.A.3;	X		
												tion Sheet - Lot Y 45934			para. 1.05.B.1, 2			

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS
Jim Jenkins, FDF, Engineering, Approver							
Dan Bodine, GeoSyntec							
Jim Turner, FDF, QA							
Chuck Van Arsdale, FDF, Engineering							

RECEIVED OCT 0 2 1998 R Guiman

RECEIVED BY: [signature] DATE: 10/5/98 NO COMMENTS: X COMMENTS ATTACHED ____

(SIGN/DATE AND RETURN A COPY TO ECDC, MS52-7)

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: REVISE AND RESUBMIT AS CFC OR INF
C - REVISE AND RESUBMIT

000114

2061

FS-F-4955-RV1 (06/18/98)

INSTRUCTIONS FOR COMPLETING THE SUPPLIER DOCUMENT SUBMITTAL:

Supplier Submittal Originator

1. Enter the FDF project number. If not applicable, enter "N/A".

2. Enter the Contract number. If not applicable, enter "N/A".

3. Enter Submittal number.

4. Enter Submittal revision number.

5. Enter the date the Submittal was prepared.

6. Enter Page Number of submittal.

7. Enter name and address of the organization submitting the documents and signature of the individual preparing the Submittal.

9. Enter the quantity of each document being submitted.

10. Enter unique identification number for each document.

11. Enter the revision level (number, letter, date) of each document.

12. Check the block for the correct Document Family from the Submittal Register.

13. Check Yes or No for resubmittal.

14. Enter the title and/or a brief description for each document.

15. Enter a "X" in the appropriate SUBMITTAL TYPE column for each document that identifies the type of document and the action to be taken by FDF.

16. Enter the specification number associated with each document.

FDF Responsibility:

8. (FDF) Enter signature of the individual that verifies documents listed on the submittal are received.

17. ECDC will check the Supplier Action Code from the sticker attached to the submittal by the reviewer.

18. Enter the department of the individual(s) to receive the document(s).

19. Enter the mail stop for the individual(s) to receive the document(s).

20. Enter signature and Date after verifying that documents were received as listed on the Distribution Sheet or annotating any discrepancies.

21. Check appropriate block upon receipt of documents.

22. Enter identification/description of documents listed on the submittal that were not received; documents received but not listed on the submittal; discrepancies in quantity, revision, etc.; information concerning the documents such as suitability for copying; and any other comments deemed necessary and applicable to the submittal.

STAR... Safety Through Accountability and Recognition

Mobil Polyethylene ORIGINAL 2061

Certificate of Analysis

"QUALITY PEOPLE MAKING QUALITY PRODUCTS"

BILL WALLING
GSE LINING TECHNOLOGY INC.
19103 GUNDLE ROAD
HOUSTON, TX 77073

11/11/1997

Mobil Chemical, a major supplier of quality polyethylene, has shipped a lot of material to your facility. The lot identification and analyses are listed below. This data has been supplied by our Quality Control Laboratory located here in Beaumont. If you should need further information or another copy of this report, please call your sales office in IRVING, TX Phone: (214)580-1040.

Resin Identification		Resin Analysis Test	Lot Data
Product Type	HDA601	Density (gms/cc)	0.935
Lot Number	Y-45934	Melt Index (gm/10 min)I2	0.59
Hopper Car Number	MOBX-052654		
Quantity Shipped	174,450 LB		
Date Manufactured	10/18/1997		
Delivery Note	0080013794		
P.O. Number	1070		
Location Shipped To ALDINE, TX			

Thank you for your business. If you need additional assistance, please do not hesitate to contact our Sales Representative in your area.

CC: MP-DALLAS

Fax To: (281) 847-3885 NATHAN IVY
(281) 230-2510 RICK SCHAEFER

Attachment "A"

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO: 20102	CONTRACT NO: 2317	SUBMITTAL NO: 005	REV: 1	DATE: 8-31-98	PAGE 1 OF 3

FROM: GSE Lining Technology, Inc.

SIGNATURE: _____

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY: _____

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION (17)		
QTY.	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
1	GSE-2317-005	1						X		X		Resin Certs	X		02770P, para. 1.05.A.3;	X		
															para. 1.05.B.1,2			

RECEIVED
SEP 01 1998
KBT

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS
Jim Jenkins, FDF, Engineering, Approver	64						
Dan Bodine, GeoSyntec	38						
Jim Turner, FDF, QA	64						
Chuck Van Arsdale, FDF, Engineering	64						

RECEIVED BY: [signature] DATE: 9/1/98 NO COMMENTS: ____ COMMENTS ATTACHED X

(SIGN/DATE AND RETURN A COPY TO ECDC, MS52-7)

THIS WAS REVIEWED IN SUBMITTAL NO. 005

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: REVISE AND RESUBMIT AS CFC OR INF
C - REVISE AND RESUBMIT

000117

2061

FS-F-4955-RV1 (06/18/98)

STAR... Safety Through Accountability and Recognition GSE-2317-005 R/1

p. 2 of 3

2061

Mobil Polyethylene
Certificate of Analysis

"QUALITY PEOPLE MAKING QUALITY PRODUCTS"

BILL WALLING
GSE LINING TECHNOLOGY INC.
19103 GUNDLE ROAD
HOUSTON, TX 77073-3515

06/11/1998

Mobil Chemical, a major supplier of quality polyethylene, has shipped a lot of material to your facility. The lot identification and analyses are listed below. This data has been supplied by our Quality Control Laboratory located here in Beaumont. If you should need further information or another copy of this report, please call your sales office in EDISON, NJ Phone: (908)321-6000.

Resin Identification		Resin Analysis Test	Lot Data
Product Type	HDG601	Density (gms/cc)	0.934
Lot Number	Z-45473	Melt Index (gm/10 min) I2	0.40
Hopper Car Number	MOBX-052539		
Quantity Shipped	171,700 LB		
Date Manufactured	05/12/1998		
Delivery Note	0080031624		
P.O. Number	S060721		
Location Shipped To ALDINE, TX			

Thank you for your business. If you need additional assistance, please do not hesitate to contact our Sales Representative in your area.

Fax To: (281) 847-3885 N. IVY
(281) 230-2510 RICK SCHAEFER

STAR... Safety Through Accountability and Recognition

GSE-2317-005 R/1

p. 3 of 3

Mobil Polyethylene
Certificate of Analysis

"QUALITY PEOPLE MAKING QUALITY PRODUCTS"

BILL WALLING
GSE LINING TECHNOLOGY INC.
19103 GUNDLE ROAD
HOUSTON, TX 77073-3515

06/05/1998

Mobil Chemical, a major supplier of quality polyethylene, has shipped a lot of material to your facility. The lot identification and analyses are listed below. This data has been supplied by our Quality Control Laboratory located here in Beaumont. If you should need further information or another copy of this report, please call your sales office in EDISON, NJ Phone: (908)321-6000.

Resin Identification		Resin Analysis Test	Lot Data
Product Type	HDG601	Density (gms/cc)	0.935
Lot Number	Z-40476	Melt Index (gm/10 min) I2	0.40
Hopper Car Number	MBLX-053595		
Quantity Shipped	184,950 LB		
Date Manufactured	05/12/1998		
Delivery Note	0080031037		
P.O. Number	S060721		
Location Shipped To ALDINE, TX			

Thank you for your business. If you need additional assistance, please do not hesitate to contact our Sales Representative in your area.

Fax To: (281) 847-3885 N. IVY
(281) 230-2510 RICK SCHAEFER

FDF PROJECT: 20102 | CONTRACT NO.: 2317 | TRANSMITTAL NO.: 005 | REV.: 0 | DATE: 8.13.98 | PAGE __ OF __

FROM: GSE Lining Technology

FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 44

SIGNATURE: _____

RECEIVED BY: Melissa Simms DATE: 8.13.98

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY 1 PRO	2 H&S	3 MED	4 TRG	5 CON	6 ENG	7 QAC	RESUBMITTAL YES	NO	TITLE/DESCRIPTION	SUBMITTAL TYPE CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION A	B	C
	GSE-2317-005	0						X			X	Resin Carts			027720 ~~[illegible]~~	X		
															027702 [illegible]			

RECEIVED AUG 13 1998 KBT

DISTRIBUTION

REVIEW DISTRIBUTION Distribution	MS	Distribution	MS	CFC DISTRIBUTION Distribution	MS	Distribution	MS
Jim Jenkins							
Gordon Lee							
Mike Gaddar							

RECEIVED BY: [signature] DATE: 8/14/98 NO COMMENTS ____ COMMENTS ATTACHED ____

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 44)

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: REVISE AND RESUBMIT AS CFC OR INF
C - REVISE AND RESUBMIT

000120

20611

STAR... Safety Through Accountability and Recognition

Mobil Polyethylene
Certificate of Analysis

"QUALITY PEOPLE MAKING QUALITY PRODUCTS"

BILL WALLING
GSE LINING TECHNOLOGY INC.
19103 GUNDLE ROAD
HOUSTON, TX 77073-3515

06/05/1998

Mobil Chemical, a major supplier of quality polyethylene, has shipped a lot of material to your facility. The lot identification and analyses are listed below. This data has been supplied by our Quality Control Laboratory located here in Beaumont. If you should need further information or another copy of this report, please call your sales office in EDISON, NJ Phone: (908)321-6000.

Resin Identification		Resin Analysis Test	Lot Data
Product Type	HDG601	Density (gms/cc)	0.935
Lot Number	Z-40476	Melt Index (gm/10 min) I2	0.40
Hopper Car Number	MBLX-053595		
Quantity Shipped	184,950 LB		
Date Manufactured	05/12/1998		
Delivery Note	0080031037		
P.O. Number	S060721		
Location Shipped To ALDINE, TX			

Thank you for your business. If you need additional assistance, please do not hesitate to contact our Sales Representative in your area.

Fax To: (281) 847-3885 N. IVY
(281) 230-2510 RICK SCHAEFER

STAR... Safety Through Accountability and Recognition

2061

Mobil Polyethylene
Certificate of Analysis

"QUALITY PEOPLE MAKING QUALITY PRODUCTS"

DENISE ADAMS
GSE LINING TECHNOLOGY INC
19103 GUNDLE ROAD
HOUSTON, TX 77073

05/07/1998

Mobil Chemical, a major supplier of quality polyethylene, has shipped a lot of material to your facility. The lot identification and analyses are listed below. This data has been supplied by our Quality Control Laboratory located here in Beaumont. If you should need further information or another copy of this report, please call your sales office in EDISON, NJ Phone: (908)321-6000.

Resin Identification		Resin Analysis Test	Lot Data
Product Type	HDA601	Density (gms/cc)	0.936
Lot Number	Z-45448	Melt Index (gm/10 min) I2	0.49
Hopper Car Number	ACFX-053496		
Quantity Shipped	176,300 LB		
Date Manufactured	05/05/1998		
Delivery Note	0080028718		
Location Shipped To ALDINE, TX			

Thank you for your business. If you need additional assistance, please do not hesitate to contact our Sales Representative in your area.

CC: MP-EDISON

Fax To: (281) 230-2510 DENISE ADAMS
(281) 847-3885 JD
(281) 230-2510 DON BOHAC

STAR... Safety Through Accountability and Recognition

Mobil Polyethylene
Certificate of Analysis

"QUALITY PEOPLE MAKING QUALITY PRODUCTS"

BILL WALLING
GSE LINING TECHNOLOGY INC.
19103 GUNDLE ROAD
HOUSTON, TX 77073-3515

06/11/1998

Mobil Chemical, a major supplier of quality polyethylene, has shipped a lot of material to your facility. The lot identification and analyses are listed below. This data has been supplied by our Quality Control Laboratory located here in Beaumont. If you should need further information or another copy of this report, please call your sales office in EDISON, NJ Phone: (908)321-6000.

Resin Identification		Resin Analysis Test	Lot Data
Product Type	HDG601	Density (gms/cc)	0.934
Lot Number	Z-40477	Melt Index (gm/10 min) I2	0.37
Hopper Car Number	ACFX-058975		
Quantity Shipped	179,100 LB		
Date Manufactured	05/12/1998		
Delivery Note	0080031622		
P.O. Number	S060721		
Location Shipped To ALDINE, TX			

OK, see attached memo.

Thank you for your business. If you need additional assistance, please do not hesitate to contact our Sales Representative in your area.

Fax To: (281) 847-3885 N. IVY
(281) 230-2510 RICK SCHAEFER

STAR... Safety Through Accountability and Recognition

Mobil Polyethylene

2061

Certificate of Analysis

"QUALITY PEOPLE MAKING QUALITY PRODUCTS"

BILL WALLING
GSE LINING TECHNOLOGY INC.
19103 GUNDLE ROAD
HOUSTON, TX 77073-3515

06/11/1998

Mobil Chemical, a major supplier of quality polyethylene, has shipped a lot of material to your facility. The lot identification and analyses are listed below. This data has been supplied by our Quality Control Laboratory located here in Beaumont. If you should need further information or another copy of this report, please call your sales office in EDISON, NJ Phone: (908)321-6000.

Resin Identification		Resin Analysis Test	Lot Data
Product Type	HDG601	Density (gms/cc)	0.934
Lot Number	Z-45473	Melt Index (gm/10 min) I2	0.40
Hopper Car Number	MOBX-052539		
Quantity Shipped	171,700 LB		
Date Manufactured	05/12/1998		
Delivery Note	0080031624		
P.O. Number	S060721		
Location Shipped To ALDINE, TX			

ok, see attached memo ~~[illegible]~~

Thank you for your business. If you need additional assistance, please do not hesitate to contact our Sales Representative in your area.

Fax To: (281) 847-3885 N. IVY
(281) 230-2510 RICK SCHAEFER

M E M O R A N D U M

TO: Jim Turner and Mike Godber
Flour Daniel Fernald

FROM: Kwasi Badu-Tweneboah and Daniel Bodine
GeoSyntec Consultants

DATE: 14 August, 1998

SUBJECT: Evaluation of GSE's Test Results for
HDPE Resin Specific Gravity – OSDF Phase II
Fernald Environmental Management Project
Fernald, Ohio

The purpose of this memorandum is to provide Fluor Daniel Fernald (FDF) with GeoSyntec Consultants' (GeoSyntec's) evaluation of GSE's test results for HDPE resin specific gravity of Lots Z-45473 and Z-40477. These lots have GSE-reported resin density of 0.934 g/cc per ASTM D 1505. Part 2.01.B.1 of Section 02770 (Geomembrane Liner) requires the HDPE resin to have minimum specific gravity of 0.935 per ASTM D 792 Method A, or ASTM D 1505. As indicated above GSE reported results as density per ASTM D 1505.

ASTM D 792 provides the following equation for converting specific gravity (sp gr) to density (D):

$$D, \text{kg/m}^3 = \text{sp gr} \times 997.6$$

The above equation can be re-arranged to convert density (using units of g/cc) to specific gravity as follows:

$$\text{sp gr} = D \times 1.0024$$

Therefore, for resin density of 0.934 g/cc, the corresponding specific gravity is 0.936, which exceeds the specified value of 0.935. Based on this evaluation, GeoSyntec believes that the resin density results provided by GSE are consistent with the specified ASTM test methods, and, therefore acceptable.

Should you have any questions on the above evaluation, do not hesitate to contact us.

* * * * *

Copies to: Collin Sukow (GeoSyntec)
Dave Phillips (GeoSyntec)
GeoSyntec Project File

GQ0409/FDF98MEM.DOC

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT: 20102 | CONTRACT NO.: 2317 | SUBMITTAL NO.: 004 | REV.: 0 | DATE: 8/6/98 | PAGE __ OF __

FROM: CGE Lining Technology.

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 44

SIGNATURE: _____

RECEIVED BY: Melissa Lewis DATE: 8-6-98

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY 1 PRO	2 H&S	3 MED	4 TRG	5 CON	6 ENG	7 QAC	RESUBMITTAL YES	NO	TITLE/DESCRIPTION	SUBMITTAL TYPE CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION A	B	C
	CGE-2317-004	0						X				Hydraulic Conductivity	X		02372P 1.04B Shear test 1.04C 4 Shear Test Results for Lot # 19982903-0		X	

RECEIVED AUG 06 1998 R. Hudman

DISTRIBUTION

REVIEW DISTRIBUTION Distribution	MS	Distribution	MS	CFC DISTRIBUTION Distribution	MS	Distribution	MS
Jim Jenkins							
Geosynter							
Jim Turner							

RECEIVED BY: [signature] DATE: 8/10/98 NO COMMENTS ___ COMMENTS ATTACHED X

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 44)

COMMENTS

SUBMITTAL ACTION CODE: (BY SUPPLIER) CFC - [redacted]FIED FOR CONSTRUCTION

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE A - ACCEPTED DOCUMENT: CONFORMS W[redacted]QUIREMENTS

0001227

2061

Precision Geosynthetic Laboratories 1742 West Katella Ave., Suite 4, Orange, CA 92867

FAX

Date: Aug 5, 1998

Number of pages including cover sheet: 8

To: ERIC REED - GSE
Jim Turner - Flour Daniel
Chuck Hornaday - CETCO
~~RE:~~ Jim Olsta - CETCO
~~RE:~~ RE: Fernald OSDF
Phone: 281-230-8663
Fax phone: 513-648-5767
CC: 847-392-0462
847-557-5571

From: Cora B. Queja

Phone: (714) 744-4599
Fax: (714) 744-0357
CompuServe: 102402,3642
Internet: precisionlab.earthlink.net

REMARKS: ☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Here with is a partial report of the ff.

(6) Internal Shear - GCL (2)
(2) Interface Shear - GCL/HD (2)
Complete report
(1) Permeability - 16 rolls - GCL.

I will be faxing you the rest as they are available.

NOTICE: This message is intended only for use of the individual or entity to which it is addressed and may represent an attorney-client communications or otherwise contain information that is privileged, confidential and exempt from disclosure under applicable law. If the reader of this message is NOT the intended recipient, or the employee or agent responsible for delivering this message to the intended recipient, you are hereby notified that any dissemination, distribution or copying or other use of this communication is strictly prohibited. If you receive the communication in error, please notify us immediately by telephone, and return the message to us at the above address. Thank you.

H:\FAX

TABLE 1.
MATERIAL PROPERTIES
FERNALD OSDF

FOR: GSE LINING TECHNOLOGY
(Reference: PGL Job No. 980766)

GEOSYNTHETIC CLAY LINER - CETCO
HYDRAULIC CONDUCTIVITY
(by ASTM D5887)

ROLL NUMBER	PGL C# NO.	CONFINING PRESSURE (psi)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)	RESULTS (cm/sec) (x 10^{-9})	PROJECT SPECS. (cm/sec) (x 10^{-9})
1. Roll # 7554	C# 29659	5	13.59	156.94	2.8	5
2. Roll # 7636	C# 29719	5	14.90	171.93	2.7	5
3. Roll # 7570	C# 29720	5	14.93	163.88	3.1	5
4. Roll # 7586	C# 29721	5	15.90	177.03	3.6	5
5. Roll #7602	C# 29722	5	15.86	155.26	3.1	5
6. Roll # 7619	C# 29723	5	15.92	172.18	3.0	5
7. Roll # 7653	C# 29814	5	18.05	150.99	3.6	5
8. Roll # 7669	C# 29815	5	18.26	163.35	3.6	5
9. Roll #7685	C# 29816	5	19.11	157.79	3.6	5
10. Roll # 7701	C# 29817	5	19.42	150.45	2.7	5
11. Roll # 7717	C# 29818	5	19.83	147.19	3.5	5
12. Roll # 7733	C# 29819	5	15.45	189.75	2.7	5
13. Roll # 7749	C# 29820	5	17.52	172.96	3.6	5
14. Roll #7814	C# 29901	5	17.63	154.45	3.6	5
15. Roll # 7830	C# 29902	5	18.68	135.45	3.6	5
16. Roll # 7846	C# 29903	5	18.48	154.12	3.6	5

Need 3 more tests from Roll #s 7847 through 7897. Tests were supposed to be conducted on Roll #s 7862, 7880, and 7897

Only 2 Direct shear test results are available as of 8/10/98.

Precision Geosynthetic Laboratories

TABLE 2.
MATERIAL PROPERTIES
FERNALD OSDF

2061

FOR: GSE LINING TECHNOLOGY
(Reference: PGL Job No. 980766)

Aug 3, 1998

INTERNAL SHEAR TEST RESULT (ASTM D5321)

TEST CONDITIONS:

SAMPLE PREPARATION

1. Specimens were cut to 20" x 20"

HYDRATION:

1. Hydrated for 7 days at 3 psi using dead weights

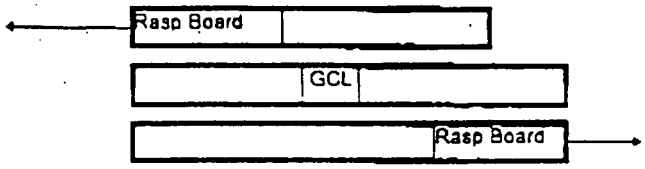
CONSOLIDATION:

1. Each set of specimen was consolidated for 48 hrs at 5, 20, & 45 psi.
2. Loads were applied by pneumatic pressure.

SHEAR TEST:

1. Shear test was conducted at 0.004 in/ min
2. Sheared at minimum 2 inch horizontal displacement.
3. The test specimens were flooded during testing.
4. Tests were performed in general accordance with ASTM D5321-93 Method A using Brainard- Kilman LG-112 Direct Shear machine with effective area of 12 in x 12 in.

TEST CONFIGURATION



SAMPLE IDENTIFICATION:

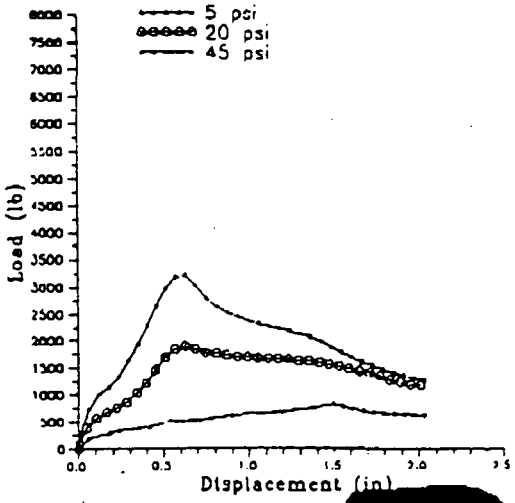
PGL C# 29659, GCL Roll # 7554

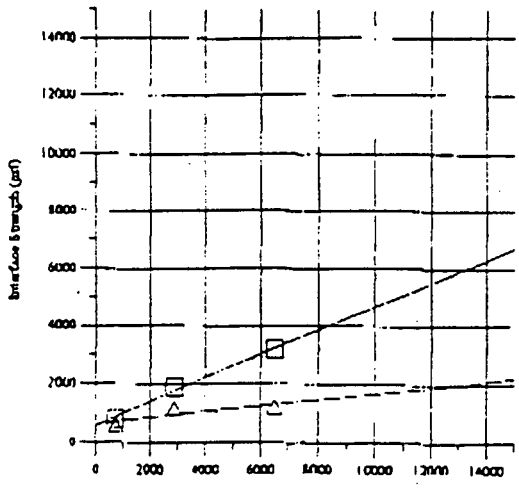
TEST RESULTS:

SAMPLE ID	NORMAL STRESS (psi)	NORMAL STRESS (psf)	FINAL Moisture Content (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE	2" DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2" DISPLACEMENT STRENGTH 2" DISPLACEMENT SECANT ANGLE
C# 29659	5	720	156.92	821	49	598	40
ROLL #7554	20	2880	131.82	1884	33	1154	22
LOT # 199829030	45	6480	92.88	3199	26	1245	11
	COHESION:			597		651	

OBSERVATIONS:

Shearing occured in the stitches of the GCL. At 2" displacement, 40 % of the stitches were mobilized, however complete mobilization occured at 3" displacement.





Precision Geosynthetic Laboratories

TABLE 3.
MATERIAL PROPERTIES
FERNALD OSDF

FOR: GSE LINING TECHNOLOGY
(Reference: PGL Job No. 980766)

Aug 3, 1998

INTERNAL SHEAR TEST RESULT (ASTM D5321)

TEST CONDITIONS:

SAMPLE PREPARATION

1. Specimens were cut to 20" x 20"

HYDRATION:

1. Hydrated for 7 days at 3 psi using dead weights

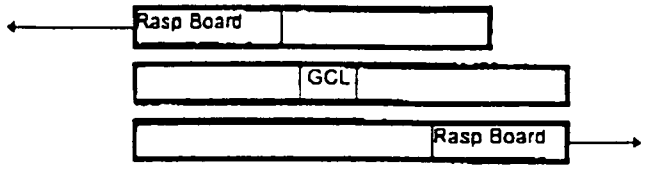
CONSOLIDATION:

1. Each set of specimen was consolidated for 48 hrs at 5, 20, & 45 psi.
2. Loads were applied by pneumatic pressure.

SHEAR TEST:

1. Shear test was conducted at 0.004 in/ min
2. Sheared at minimum 2 inch horizontal displacement.
3. The test specimens were flooded during testing.
4. Tests were performed in general accordance with ASTM D5321-93 Method A using Brainard- Kilman LG-112 Direct Shear machine with effective area of 12 in x 12 in.

TEST CONFIGURATION



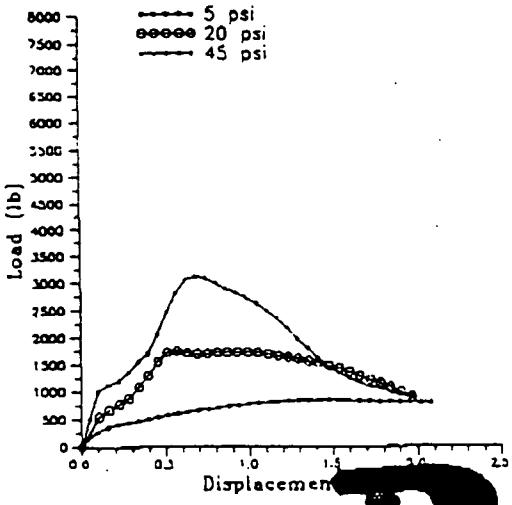
SAMPLE IDENTIFICATION:
PGL C# 29718, GCL Roll # 7594

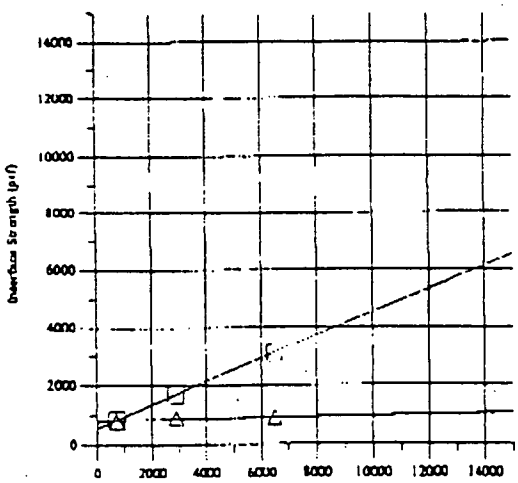
TEST RESULTS:

SAMPLE ID	NORMAL STRESS (psi)	NORMAL STRESS (psf)	FINAL Moisture Content (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE	2" DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2" DISPLACEMENT STRENGTH 2" DISPLACEMENT SECANT ANGLE
C# 29718	5	720	110.22	836	49	797	48
ROLL #7594	20	2880	90.20	1720	31	895	17
LOT # 199829030	45	6480	88.07	3132	26	907	8
	COHESION:			559		808	

OBSERVATIONS:

Stitches of specimens sheared at 20 & 45 psi normal stresses completely broke up at 2" displacement. However, specimen sheared at 5 psi, the stitches yielded but did not break.





Precision Geosynthetic Laboratories

VECTOR ENGINEERING, INC.
12438 Loma Rica Dr., Suite C, Grass Valley, CA 95945
(916) 272-2448 Fax (916) 272-8333

LARGE SCALE DIRECT SHEAR REPORT

Client Name: Precision Labs Project Name: Furnald Site; No.: 943022.33-929A

Material 1:	<---	CETCO Bentomat ST, #7554 199829030	LBN: AXC
Material 2:	--->	80 mil GSE HDPE, Textured, AK2524FF	LBN: AWU
Substrate:	--->	<concrete sand>	

DISPLACEMENT vs SHEAR STRESS

Test Point	Normal Stress psi	Normal Stress psf
1.	5.0	720
2.	20.0	2880
3.	45.0	6480

MOISTURE DATA

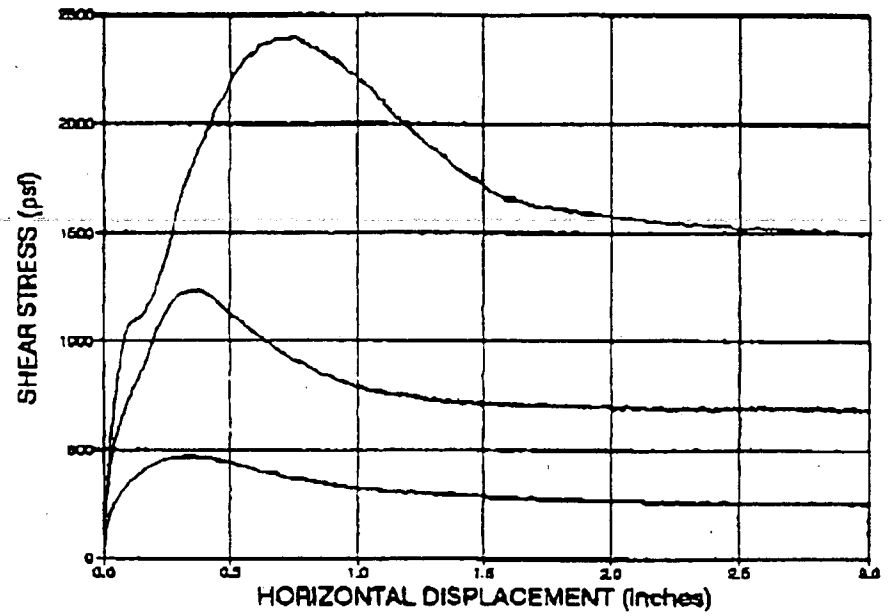
(GCL)

Initial Moisture Content: 18.7%

Initial Dry Density: NA pcf

Final Moisture Content:

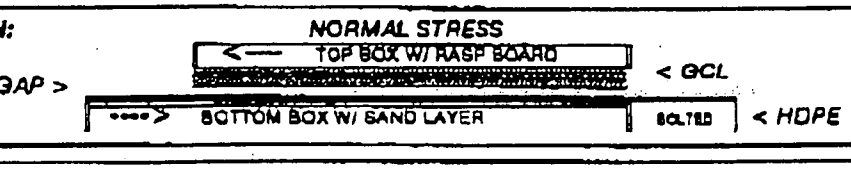
1.	2.	3.
96.0	83.1	61.9



STANDARD CONDITIONS:

1. The "gap" between shear boxes was set at 80 mil (2.0 mm).
2. The test specimens were flooded during testing unless noted.
3. High Normal Stress (>5psi) was applied using air pressure.
4. Low Normal Stress (<5 psi) was applied using dead weights
5. The tests were terminated 3.0" displacement unless noted.
6. Tests were performed in general accordance with ASTM procedure D 5321-92 Method A using a Brainard-Kilman LG-112 direct shear machine with an effective area of 12 in. x 12 in. (Machine A)

TEST ORIENTATION:



SPECIAL TEST NOTES:

1. The GCL was wrapped around a 12" x 12" rasp board in the upper box.
2. Each specimen of HDPE was cut to 14"x 20" dimensions.
3. The HDPE was bolted to the lower shear box with "channel clamps".
4. The GCL specimens were hydrated for 7 days at 3 psi, in contact with the textured HDPE
5. After Hydration, each test point was consolidated for 48 hrs. at the specified Normal Stress, then sheared.
6. Shearing occured at the contact between the GCL and the HDPE.
7. Streching or deformation of the GCL or HDPE were not observed.

By accepting the data and results represented on this page, Client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties for claims arising out of the use of this data to the sole for the respective task(s) represented herein, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

lab file: 929A-03B.WO print date 06/03/94 prepared by: RWM

PLATE 2.

VECTOR ENGINEERING, INC.
12430 Lower Aldo Dr., Suite C, Grass Valley, CA 95945
(916) 272-2440 Fax (916) 272-8533

LARGE SCALE DIRECT SHEAR REPORT

Client Name: Precision Labs Project Name: Furnald Site; No.: 943022.33-628A

Material 1:	<---	CETCO Bentomat ST, #7554 166829030	LSN: AXC
Material 2:	--->	80 mil GSE HDPE, Textured, AK2524FF	LSN: AWU
Substrate:	--->	<concrete sand>	

PEAK STRENGTH

Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf
1.	5.0	720	470
2.	20.0	2880	1240
3.	45.0	6480	2390

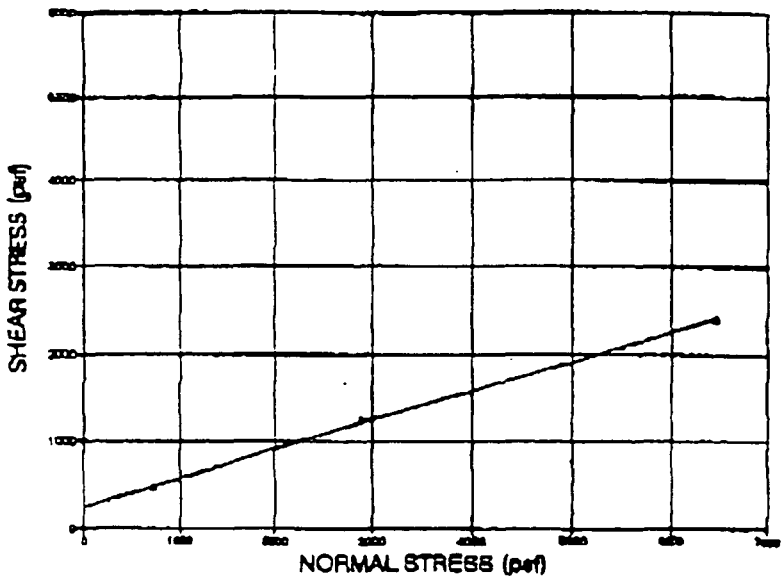
Secant Angles = 33, 23 & 20 deg.

Adhesion: 250 psf

Friction Angle: 18 degrees

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



STRENGTH ENVELOPE

(at 2.0 in. displacement)

Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf
1.	5.0	720	260
2.	20.0	2880	700
3.	45.0	6480	1570

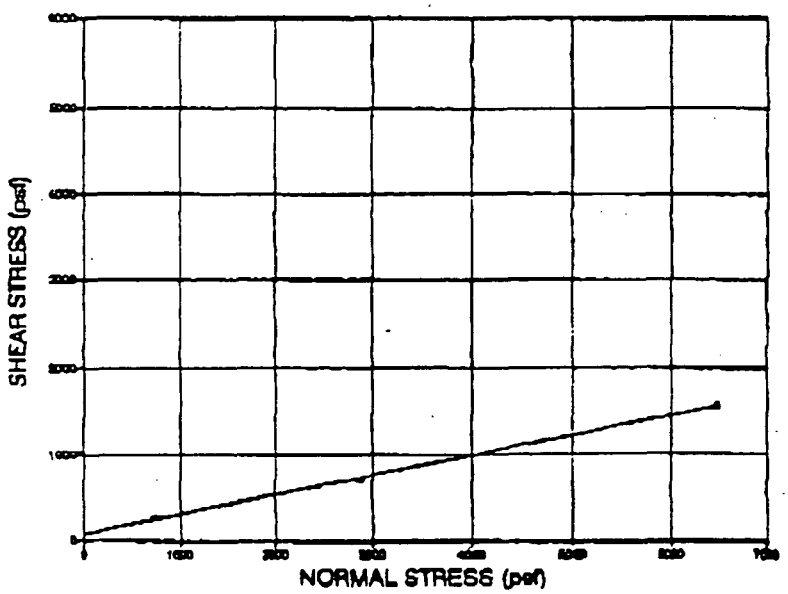
Secant Angles = 20, 14 & 14 deg.

Adhesion: 80 psf

Friction Angle: 13 degrees

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



NOTE: The Friction Angle and Adhesion (or Cohesion) results given here are based upon a mathematically determined 'best fit' line. Further interpretation should be conducted by a qualified professional experienced in geosynthetic and geotechnical engineering.

By accepting this data and results represented on this page, Client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties for claims arising out of the use of data to the extent for the respective test(s) represented herein, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

Report Date 8/1/98 Reviewed by: [signature]

PLATE 1.

2061

VECTOR ENGINEERING, INC.
12450 Lakes Road Dr., Suite C, Grass Valley, CA 95945
(916) 272-2448 Fax: (916) 272-5333

LARGE SCALE DIRECT SHEAR REPORT

Client Name: Precision Labs Project Name: Furnald Site; No.: 943022.33-6288

Material 1:	<---	CETCO Bentomat ST, #7594 199829030	LSN:	AXE
Material 2:	--->	80 mil GSE HDPE, Textured, AK4196FF	LSN:	AWV
Substrate:	--->	<concrete sand>		

PEAK STRENGTH

Test Point	Normal Stress		Shear Stress
	psi	psf	psf
1.	5.0	720	490
2.	20.0	2880	1360
3.	45.0	6480	2690

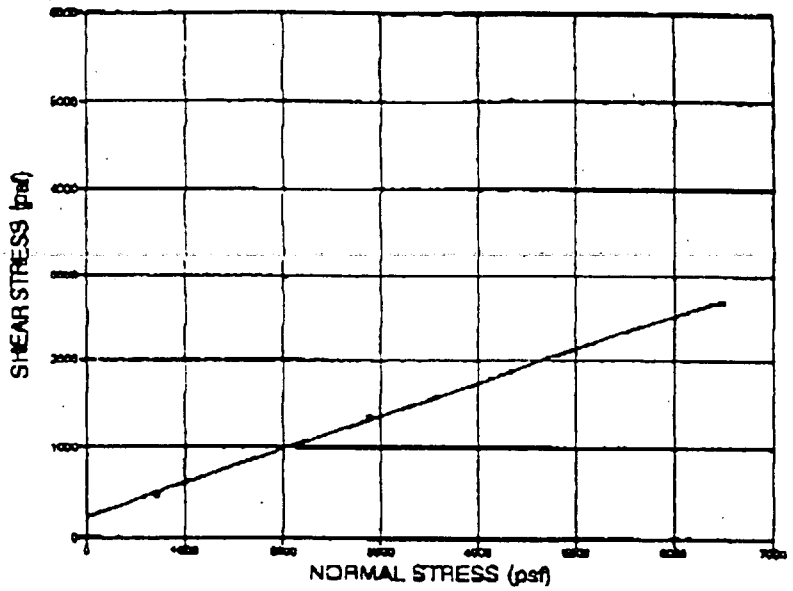
Secant Angles = 34, 25 & 22 Deg.

Adhesion: 240 psf

Friction Angle: 21 degrees

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



STRENGTH ENVELOPE

(@ 2.0 in. displacement)

Test Point	Normal Stress		Shear Stress
	psi	psf	psf
1.	5.0	720	300
2.	20.0	2880	840
3.	45.0	6480	1770

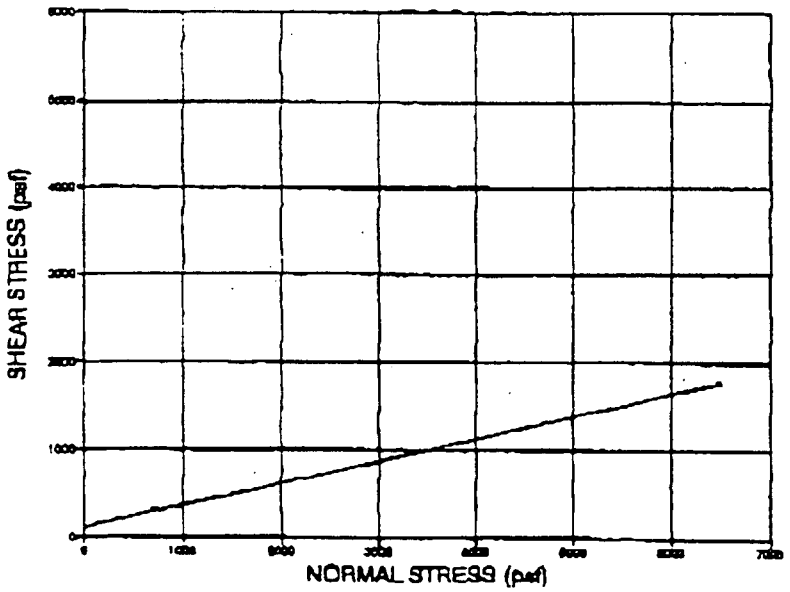
Secant Angles = 23, 18 & 16 Deg.

Adhesion: 110 psf

Friction Angle: 14 degrees

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



NOTE: The Friction Angle and Adhesion (or Cohesion) results given here are based upon a mathematically determined "best fit" line. Further interpretation should be conducted by a qualified professional experienced in geosynthetic and geotechnical engineering.

By accepting the data and results represented on this page, Client agrees to hold the liability of Vector Engineering, Inc. from Client and all other parties for claims arising out of the use of this data to the cost for the respective test(s) represented herein, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

Report Date 7/31/98 Reviewed by: REK

VECTOR ENGINEERING INC.
13486 Loma Rica Dr., Suite C, Grass Valley, CA 95945
(916) 272-2448 Fax: (916) 272-6333

LARGE SCALE DIRECT SHEAR REPORT

Client Name: Precision Labs — Project Name: Furnald Site; No.: 943022.33-8288

Material 1:	<—	CETCO Bentomat ST, #7594 189829030	LSN: AXE
Material 2:	—>	80 mil GSE HDPE, Textured, AK4188FF	LSN: AWV
Substrate:	—>	<concrete sand>	

DISPLACEMENT vs SHEAR STRESS

Test Point	Normal Stress psi	Normal Stress psf
1.	5.0	720
2.	20.0	2880
3.	45.0	6480

MOISTURE DATA

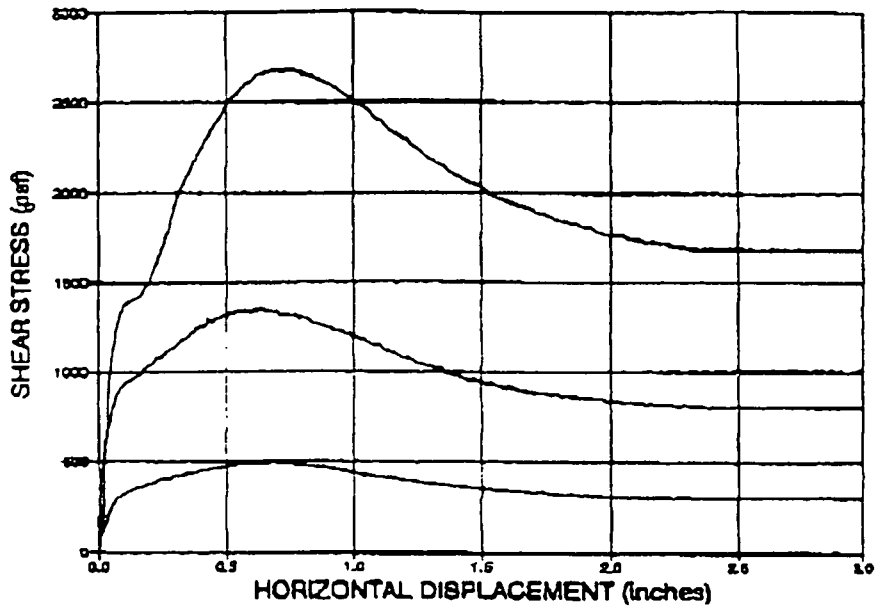
(GCL)

Initial Moisture Content: %

Initial Dry Density: NA pcf

Final Moisture Content

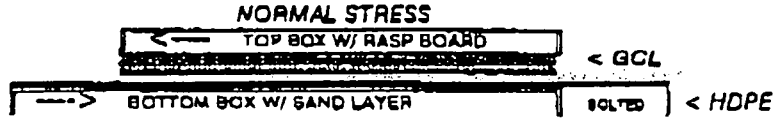
1.	2.	3.
88.1	65.4	62.2



STANDARD CONDITIONS:

1. The "gap" between shear boxes was set at 80 mil (2.0 mm).
2. The test specimens were flooded during testing unless noted.
3. High Normal Stress (>5psi) was applied using air pressure.
4. Low Normal Stress (<5 psi) was applied using dead weights
5. The tests were terminated 3.0" displacement unless noted.
6. Tests were performed in general accordance with ASTM procedure D 5321-92 Method B using a Brainard-Kilman LG-112 direct shear machine with an effective area of 12 in. x 12 in. (Machine A)

TEST ORIENTATION:



SPECIAL TEST NOTES:

1. The GCL was wrapped around a 12" x 12" rasp board in the upper box.
2. Each specimen of HDPE was cut to 14"x 20" dimensions.
3. The HDPE was bolted to the lower shear box with "channel clamps".
4. The GCL specimens were hydrated for 7 days at 3 psi, in contact with the textured HDPE
5. After Hydration, each test point was consolidated for 48 hrs. at the specified Normal Stress, then sheared.
6. Shearing occured at the contact between the GCL and the HDPE.
7. Stretching or deformation of the GCL or HDPE were not observed.

By accepting the data and results represented on this page, Client agrees to hold the liability of Vector Engineering, Inc. from Client and all other parties for claims arising out of the use of the data to the extent that the respective hurt(s) represented herein, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

lab file: 8288-D68.WQ print date: 08/05/96 entered by: RWU

PLATE 2.

Attachment "A"

SUPPLIER DOCUMENT SUBMITTAL

FDFPROJECT NO: 20102	CONTRACT NO: 2317	SUBMITTAL NO: 003	REV: 1	DATE: 10-21-98	PAGE 1 OF 19

FROM: GSE Lining Technology, Inc.

SIGNATURE: _____

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY: _____

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION (17)		
QTY.	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
1	GSE-2317-003	1						X			X	QA/QC Data Package, Geosynthetic	X		02772P, para. 1.04B, 1.04C	A		
												Clay Liner - Replacement Rolls			(Incomplete see below)			
												~~Submitted for Review~~						C
												~~For Review~~						C
												Test Method						
												ASTM D 5993 (OR)						
												For Bentonite Mass/Area						
												R. Bodine						

Direct Shear Test Not Yet Submitted
Permeability Test Not Yet Submitted

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS	DISTRIBUTION	MS
Jim Jenkins, FDF, Engineering, Approver	64						
Dan Bodine, GeoSyntec	38						
Jim Turner, FDF, QA	64						
Chuck Van Arsdale	64						

RECEIVED BY: Dan Bodine (SIGN/DATE AND RETURN A COPY TO ECDC, MS52-7) DATE: 22 Oct 98 NO COMMENTS: _____ COMMENTS ATTACHED above

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A -ACCEPTED DOCUMENT: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: REVISE AND RESUBMIT AS CFC OR INF
C - REVISE AND RESUBMIT

000136

2061

FS-F-4955-RV1 (06/18/98)

GSE

DEALER SALES

DATE: 21 OCTOBER, 1998

NUMBER OF PAGES INCLUDING COVER SHEET 18

TO: JIM TURNER
FLUOR DANIEL FERNALD
PHONE: 513/648-4941
FAX: 513/648-5767

CC:

FROM: ERIC REED
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE RD.
HOUSTON, TX 77073
PHONE: 800/435-2008
FAX: 281/230-8663
E-MAIL: ERICR@GSEWORLD.COM

REMARKS: ☒ URGENT ☐ FOR YOUR REVIEW ☐ REPLY ASAP ☐ PLEASE COMMENT

Jim, here is the QC information for the last five rolls of GCL. Let me know as soon as you can if everything is acceptable.

Oct 21 4 26 PM '98
FERMCO OU2
000137
MAR-05-1900 04:55 P.01

CETCO

2061

GEOSYNTHETIC CLAY LINER

MANUFACTURING QA/QC DATA PACKAGE

PROJECT NAME: FERMCO-Fernald, OH

PREPARED FOR: Ms. Karen Louie
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073-3598

PREPARED BY: Cynthia Willix
CETCO
P. O. Box 88
234 Gordon Street
Fairmount, GA 30139
Telephone # (706) 337-5316
Fax # (706) 337-2215

MAR-05-1300 04:56 P.02

CETCO

GEOSYNTHETIC CLAY LINER

DAILY MANUFACTURING QA/QC DATA

FOR ALL GCL MANUFACTURED ON:

FERMCO
FERNALD, OH
CUSTOMER PO# S 061110-01
ORDER# 87504

CONTENTS:

1. DAILY GCL PRODUCTION CERTIFICATION
2. GCL MANUFACTURING CERTIFICATON AND TEST RESULTS
3. GCL MQA TRACKING FORM

MAR-05-1900 04:56 P.02

CETCO 2061

DAILY GEOSYNTHETIC CLAY LINER PRODUCTION CERTIFICATION

000140

CETCO

GEOSYNTHETIC CLAY LINER MANUFACTURING CERTIFICATION

CETCO JOB:	FERMCO-FERNALD, OH
DATE:	OCTOBER 6, 1998
ORDER #(S):	87504
PRODUCT(S):	BENTOMAT ST

Colloid Environmental Technologies Company (CETCO) hereby affirms and certifies that all of the Geosynthetic Clay Liner (GCL) manufactured in this lot achieves the physical and chemical criteria listed on the attached analysis sheets.

Cynthia Willix

Cynthia Willix
Quality Assurance Coordinator
CETCO

Subscribed and sworn to before me this 6 day of Oct., 19 98.

Diane Hunsucker

Notary Public

OFFICIAL SEAL
DIANE B. HUNSUCKER
Notary Public, Georgia
GORDON COUNTY
My Commission Expires
Jan. 2, 2002

000141

CETCO 2061

BENTOMAT ST
MANUFACTURING CERTIFICATION

TO: Ms. Karen Louie
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073-3598

PROJECT: FERMCO-Fernald, OH

ORDER #: 87504

CETCO hereby affirms and certifies that Bentomat ST material supplied to this project will meet the physical criteria listed below:

PROPERTY	TEST METHOD	MINIMUM VALUE
Finished Product		
Bentonite Mass/Area	ASTM D 5261	1.0 lb/sq.ft. min.*
Fluid Loss	ASTM D 5891	18 ml max.
Free Swell	ASTM D 5890	24 ml/2g
Grab Strength	ASTM D 4632	90 lbs. MARV
Grab Elongation	ASTM D 4632	10% typical
Index Flux	ASTM D 5887	1 x 10(-8) m3/m2/sec (max.)
Moisture	ASTM D 4643	25 % max
Peel Strength	ASTM D 4632(modified)	15 lbs. min.
Permeabilty	ASTM D 5887	max. 5 x 10(-9) cm/sec
Tensile Strength	ASTM D 4595	35 ppi

* Reported at 25% moisture content.

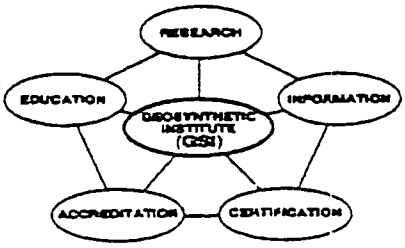
GAI Lab Accredited Test Methods were followed during confromance testing for :
ASTM D 5993 - Bentonite Mass/Area
ASTM D 4632 - Grab Strength and Grab Elongation

Cynthia Willy
Colloid Environmental Technologies Co. (CETCO)

Subscribed and sworn to before me this 6 day of Oct. 1998.

Diane Hunsucker
Notary Public

OFFICIAL SEAL
DIANE B. HUNSUCKER
Notary Public, Georgia
COWLDON COUNTY
My Commission Expires
Jan. 2, 2002



000142

PACKING LIST

COLLOID ENVIRONMENTAL TECH CO
1350 WEST SHURE DRIVE
A[illegible]NGTON HEIGHTS IL 60004

ORDER NO:.. 000087504
ORDER DATE: 7/02/98
SHIP DATE:. 10/06/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
030-BENTOMAT ST		SFT	SF 199839030	00013539	150.0	15.0	2250.0	3146
030-BENTOMAT ST		SFT	SF 199839030	00013541	150.0	15.0	2250.0	2950
030-BENTOMAT ST		SFT	SF 199839030	00013543	150.0	15.0	2250.0	3043
030-BENTOMAT ST		SFT	SF 199839030	00013544	150.0	15.0	2250.0	3035

	========	=======
RDER TOTALS.....	9000.0	12174.

TOTAL ITEMS..... 4

000143

CETCO

2061

GEOSYNTHETIC CLAY LINER QUALITY TEST RESULTS

000144

QCTEFT2 QCTEFT2
10/06/98 15:17:00

COLLOID ENVIRONMENTAL TECH CO

PAGE: 1

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

OKD 63

O R D E R # 000087504

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199839030	00013544	.98	18.40	144.60	28.80	23.30	33.00	13.06
030-BENTOMAT ST	199839030	00013543	.98	18.40	144.60	28.80	23.30	33.00	13.06
030-BENTOMAT ST	199839030	00013541	.98	18.40	144.60	28.80	23.30	33.00	13.06
030-BENTOMAT ST	199839030	00013539	.98	18.40	144.60	28.80*	23.30*	33.00	13.06

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

000145

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

2061

September 23, 1998

American Colloid-Fairmont, GA
P.O. Box 88
234 Gordon Street
Fairmont, Ga. 30139

RE: Bill Of Lading #178226
PO #O-DH1-22375

This is to certify that Style 82 Tex, a woven polypropylene fabric produced by Synthetic Industries, will meet the following certifiable minimum average values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level.

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS	S.I. UNITS
MASS PER UNIT AREA	ASTM D-5261	3.2 oz/yd²	105 g/m²
THICKNESS	ASTM D-5199	16 mils	0.4 mm
TENSILE STRENGTH	ASTM D-4632	135 X 135 LBS	600 X 600 N
ELONGATION	ASTM D-4632	15 X 15 %	
WIDE WIDTH TENSILE STRENGTH	ASTM D-4595	70 X 70 LBS/IN	12 X 12 kN/M
PUNCTURE STRENGTH	ASTM D-4833	70 LBS	310 N
MULLEN BURST	ASTM D-3786	265 PSI	1820 kPa
TRAPEZOIDAL TEAR	ASTM D 4533	45 X 45 LBS	200 X 200 N
A.O.S.	ASTM D-4751	40 US STD SIEVE	0.425 mm
PERMITTIVITY	ASTM D-4491	0.08 SEC⁻¹	
PERMEABILITY	ASTM D-4491	0.004 cm/sec	
UV RESISTANCE (Strength Retained After 150 Hours Xenon Arc Weatherometer)	ASTM D-4355	90 %	

Sincerely,

Warren Sickler
Technical Manager, Woven Geotextile Products

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery it shall be of the quality and specifications stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any recommendations made by the Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published specifications, and the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous Data Sheets for this style and is subject to change without notice. The effective date for this product data is 04/19/96.

000146

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423-899-0444 • Fax • 423-899-7819 • 1-800-621-0444

SYNTHETIC INDUSTRIES
Geosynthetic Products Division

178226

Style: 82-TEX

ROLL #	ASTM D-4632 GRAB TENSILE (LBS) W x F	ASTM D-4632 ELONGATION (%) W x F	ASTM D-3786 MULLEN BURST PSI	ASTM D-5261 MASS/UNIT AREA OZ/SQ YARD
7453964	148 x 136	21 x 23	310	3.5
7460949	163 x 160	24 x 28	313	3.5
7461443	157 x 144	22 x 22	351	3.5
7462765	166 x 159	26 x 24	330	3.5
7462766	178 x 168	25 x 25	326	3.6
7462767	170 x 151	20 x 21	330	3.4
7463901	165 x 162	24 x 25	330	3.6
7463902	160 x 155	25 x 24	323	3.5
7463903	177 x 154	24 x 22	330	3.5
7469584	163 x 149	22 x 23	326	3.4
7469585	150 x 150	21 x 25	320	3.4
7469586	158 x 145	23 x 25	346	3.5
7469887	156 x 146	25 x 25	310	3.5
7469888	144 x 165	24 x 25	350	3.7
7470168	159 x 145	22 x 23	326	3.4
7470169	146 x 149	23 x 27	323	3.5
470952	163 x 142	23 x 23	330	3.5
7471529	158 x 157	21 x 25	346	3.4
7471531	170 x 166	25 x 22	338	3.6
7473263	169 x 145	26 x 25	338	3.5

000147

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423-899-0444 • Fax • 423-899-7610

2061

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

September 23, 1998

Cetco / Fairmount
Cynthia Willix
PO Box 88
Fairmount GA 30139
BoL: 625192, 625193 , 625195 PO 0-DH1-22377

This is to certify that Product GEOTEX™ 650, a nonwoven polypropylene geotextile produced by Synthetic Industries will meet the following certifiable minimum average roll values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level.

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS
Weight	ASTM D-5261	6.0 oz/yd^2
Thickness	ASTM D-5199	120 mils
Tensile Strength	ASTM D-4632	45 lbs
Elongation	ASTM D-4632	90 %
Trapezoidal Tear	ASTM D-4533	25 lbs
Mullen Burst	ASTM D-3786	190 psi
Puncture Strength	ASTM D-4833	50 lbs

Sincerely,

Sid Weiser

Sid Weiser
Technical Manager
Performance Nonwovens Division

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery it shall be of the quality and specifications stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any recommendations made by the Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published specifications, and the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous Data Sheets for this style and is subject to change without notice. The effective date for this product data is 02/1997

Synthetic Industries, Inc.
4019 Industry Drive • Chattanooga, Tennessee • 37416 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

000148

09/21/98 16:21 Page 1

Synthetic Industries
Individual Roll Data
Bill of Lading:625195

Roll Number	Style	Mass/ Unit Osy D5261	Lab Thick mils D5199	Tensile (MD) lbs D4632	Tensile (XMD) lbs D4632	Elongation (MD) % D4632	Elongation (XMD) % D4632	Trap Tear (MD) lbs D4533	Trap Tear (XMD) lbs D4533	Mullen Burst psi D3786	Punct Resist lbs D4833
8601359A	650	7.0	135	95	122	95	120	46	46	220	64
8801783A	650	7.0	139	100	173	101	117	43	54	231	78
8801786A	650	6.5	130	90	137	104	129	46	49	216	59

Sid Wessin

Synthetic Industries' current standard manufacturing quality control (MQC) testing frequency for GEOTEX nonwoven geotextiles is one (1) test per 90,000 sf (8,360 sm) for index properties (mass per unit area, thickness, grab tensile and elongation, trapezoidal tear, mullen burst and puncture resistance) for styles heavier than 601 and one (1) test per 162,000 sf (15,000 sm) for index properties for style 601 and lighter. Although we strive to test our nonwoven geotextiles for apparent opening size (AOS) and Permittivity/permeability/water flow rate approximately once every 540,000 sf (50,160 sm), the actual frequency of testing for performance properties will vary depending upon production schedules, product availability, customer requirements, job specifications or other agreements arranged with Synthetic Industries prior to the time of purchase. If additional testing is needed to meet higher frequencies required by the project specifications, it is the purchaser's responsibility to notify Synthetic Industries and ask for assistance in calculating the costs for the additional tests.

Once rolls of nonwoven geotextiles are produced, inspected and the test results from the frequency stated above indicates that materials produced during the production run meets our published minimum average roll values, approved rolls are shipped for storage until an order requires the material to be shipped. Since rolls are loaded at the warehouse independent of production seque test results listed above may include data from rolls which were not shipped. However, the data provided is from the same production run as the rolls actually shipped on this bill of lading.

000149

2061

22/96 16:11 Page 1

Synthetic Industries
Individual Roll Data
Bill of Lading:625192

Roll Number	Style	Mass/ Unit Osy D5261	Lab Thick mils D5199	Tensile (MD) lbs D4632	Tensile (XMD) lbs D4632	Elongation (MD) % D4632	Elongation (XMD) % D4632	Trap Tear (MD) lbs D4533	Trap Tear (XMD) lbs D4533	Mullen Burst psi D3786	Punct Resist lbs D4833
B801367A	550	6.5	130	95	112	105	119	43	43	213	63
B801721A	650	6.8	136	116	175	105	122	51	57	231	77

Bid Wessi

Synthetic Industries' current standard manufacturing quality control (MQC) testing frequency for GEOTEX nonwoven geotextiles is one (1) test per 90,000 sf (8,360 sm) for index properties (mass per unit area, thickness, grab tensile and elongation, trapezoidal tear, mullen burst and puncture resistance) for styles heavier than 601 and one (1) test per 162,000 sf (15,000 sm) for index properties for style 601 and lighter. Although we strive to test our nonwoven geotextiles for apparent opening size (AOS) and Permittivity/permeability/water flow rate approximately once every 540,000 sf (50,160 sm), the actual frequency of testing for performance properties will vary depending upon production schedules, product availability, customer requirements, job specifications or other agreements arranged with Synthetic Industries prior to the time of purchase. If additional testing is needed to meet higher frequencies required by the project specifications, it is the purchaser's responsibility to notify Synthetic Industries and ask for assistance in calculating the costs for the additional tests.

Once rolls of nonwoven geotextiles are produced, inspected and the test results from the frequency stated above indicates that materials produced during the production run meets our published minimum average roll values, approved rolls are shipped for storage until an order requires the material to be shipped. Since rolls are loaded at the warehouse independent of production sequence test results listed above may include data from rolls which were not shipped. However, the data provided is from the same production run as the rolls actually shipped on this bill of lading.

000150

09/22/96 15:12 Page 1

Synthetic Industries
Individual Roll Data
Bill of Lading:625195

Roll Number	Style	Mass/ Unit Osy D5261	Lab Thick mils D5199	Tensile (MD) lbs D4632	Tensile (XMD) lbs D4632	Elongation (MD) % D4632	Elongation (XMD) % D4632	Trap Tear (MD) lbs D4533	Trap Tear (XMD) lbs D4533	Mullen Burst psi D3786	Punct Resist lbs D4833
B801[illegible]A	650	7.0	135	95	122	95	120	46	46	220	64
B801783A	650	7.0	139	100	173	101	117	43	54	231	75
B801786A	650	6.5	130	90	137	104	129	46	49	216	59

Sid Wesson

Synthetic Industries' current standard manufacturing quality control (MQC) testing frequency for GEOTEX nonwoven geotextiles is one (1) test per 90,000 sf (8,360 sm) for index properties (mass per unit area, thickness, grab tensile and elongation, trapezoidal tear, mullen burst and puncture resistance) for styles heavier than 601 and one (1) test per 162,000 sf (15,000 sm) for index properties for style 601 and lighter. Although we strive to test our nonwoven geotextiles for apparent opening size (AOS) and Permittivity/permeability/water flow rate approximately once every 540,000 sf (50,160 sm), the actual frequency of testing for performance properties will vary depending upon production schedules, product availability, customer requirements, job specifications or other agreements arranged with Synthetic Industries prior to the time of purchase. If additional testing is needed to meet higher frequencies required by the project specifications, it is the purchaser's responsibility to notify Synthetic Industries and ask for assistance in calculating the costs for the additional tests.

Once rolls of nonwoven geotextiles are produced, inspected and the test results from the frequency stated above indicates that materials produced during the production run meets our published minimum average roll values, approved rolls are shipped for storage until an order requires the material to be shipped. Since rolls are loaded at the warehouse independent of production sequence, test results listed above may include data from rolls which were not shipped. However, the data provided is from the same production run as the rolls actually shipped on this bill of lading.

000151

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY 37
LOVELL, WYO. 82431

DATE: 26-Aug-98

TO: CETCO - CLAYMAX CORP.
P.O. BOX 88

FAIRMOUNT, GA. 30139

ATTN: CYNTHIA WILLIX

Dear Sirs:

A shipment of CG 50
left our Lovell, WY plant on 22-Aug-98
in BN 450233
as requested on your order no. VERBAL

A sample from this shipment was tested, and gave the following results:

TEST	METHOD	REQ. SPECIFICATION	ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0% .	0
PASSING 200 MESH	ASTM C 136	1.0 % MAX	0.4
MOISTURE	ASTM D 2216	12.0% MAX.	8.4
FREE SWELL	ASTM D 5890	24 MIN.	24
FLUID LOSS	ASTM D 5891	18.0 MAX.	12.6

We hereby certify that the results shown above represent this shipment.
Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: D.M.

Approved By: MOSES BRISENO

CETCO

000152

In any correspondence regarding this shipment, please refer to our
Order Number 90524

CETCO

GEOSYNTHETIC CLAY LINER MQA TRACKING FORMS

000153

Printed on recycled paper

OCG#TF1 OCT#TF1
10/06/98 15:17:00

COLLOID ENVIRONMENTAL TECH CO
GCL MOA/MGC TRACKING FORM

PAGE: 1

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087504

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP LOT#	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM LOT#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199839030									
00013539	030-BENTOMAT ST	150	2250	3146	7473263		B801785A		450233
00013541	030-BENTOMAT ST	150	2250	2950	7473263		B801785A		450233
00013543	030-BENTOMAT ST	150	2250	3043	7473263		B801719A		450233
00013544	030-BENTOMAT ST	150	2250	3035	7473263		B801719A		450233

TOTAL SQUARE FEET 9,000

TOTAL PAGES 1

2061

000154

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT: 20102	CONTRACT NO.: 2317	SUBMITTAL NO.: 002	REV.: 0	DATE:	PAGE __ OF __

FROM: GSE Lining Technology

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 44

SIGNATURE: _____

RECEIVED BY: [illegible] DATE: 8/6/98

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY 1 PRO	2 H&S	3 MED	4 TRG	5 CON	6 ENG	7 QAC	RESUBMITTAL YES	NO	TITLE/DESCRIPTION	SUBMITTAL TYPE CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION A	B	C
	GSE-2317-003	0						X				QA/QC Data Package	X		02772P 1.04B		X	
												Geosynthetic Clay Liner			MQC test results			
															02772P 1.04C			
															1. Lot Batch + Roll #s			
															2 Sampling Procedures			
															3 MQC test results			

RECEIVED
AUG 06 1998
KChurman

DISTRIBUTION

REVIEW DISTRIBUTION Distribution	MS	Distribution	MS	CFC DISTRIBUTION Distribution	MS	Distribution	MS
Geosyntec							

000155

RECEIVED BY: [signature] DATE: 8/14/98 NO COMMENTS ___ COMMENTS ATTACHED X

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 44)

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)
CFC [illegible]IFIED FOR CONSTRUCTION

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE
A - ACCEPTED DOCUMENT: CONFORMS [illegible] REQUIREMENTS

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
234 Gordon Street • Fairmount, GA 30139 • USA
(706) 337-5316 • Fax (706) 337-7334

2061

28-Jul-98

Ms. Karen Louie
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073-3598

Dear Ms. Louie:

Please find enclosed the MQA/MQC Data Package for Geosynthetic Clay Liner (GCL) shipments to FERMCO, Fernald, OH. Please note that the data for the permeability and fluid loss will be forwarded to you from our Arlington Heights, IL office by Jim Olsta.

If you have any questions regarding the enclosed QA/QC information, please contact Mr. Derek Reece @ 1-800-220-2536.

Sincerely,

Cynthia Willix

Cynthia Willix
Quality Assurance Coordinator

copy: Jim Turner
Rick Heath

Uday Kumthekar
Received
August 5, 1998
2:30 pm

000156

CETCO

GEOSYNTHETIC CLAY LINER

MANUFACTURING QA/QC DATA PACKAGE

PROJECT NAME: FERMCO-Fernald, OH

PREPARED FOR: Ms. Karen Louie
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073-3598

PREPARED BY: Diane Hunsucker
CETCO
P. O. Box 88
234 Gordon Street
Fairmount, GA 30139
Telephone # (706) 337-5316
Fax # (706) 337-2215

000157

CETCO

2061

GEOSYNTHETIC CLAY LINER

DAILY MANUFACTURING QA/QC DATA

FOR ALL GCL MANUFACTURED ON:

FERMCO
FERNALD, OH
CUSTOMER PO# S 061110-01
ORDER# 87482,87485-87503

CONTENTS:

1. DAILY GCL PRODUCTION CERTIFICATION
2. GCL MANUFACTURING CERTIFICATON AND TEST RESULTS
3. GCL MQA TRACKING FORM

000158

CETCO

DAILY GEOSYNTHETIC CLAY LINER PRODUCTION CERTIFICATION

000159

CETCO

2061

GEOSYNTHETIC CLAY LINER MANUFACTURING CERTIFICATION

CETCO JOB:	FERMCO-FERNALD, OH
DATE:	JULY 27, 1998
ORDER #(S):	87482,87485-87503
PRODUCT(S):	BENTOMAT ST

Colloid Environmental Technologies Company (CETCO) hereby affirms and certifies that all of the Geosynthetic Clay Liner (GCL) manufactured in this lot achieves the physical and chemical criteria listed on the attached analysis sheets.

Cynthia Willix

Cynthia Willix
Quality Assurance Coordinator
CETCO

Subscribed and sworn to before me this 28 day of July, 19 98.

Diane Hunsucker

Notary Public

OFFICIAL SEAL
DIANE B. HUNSUCKER
Notary Public, Georgia
GORDON COUNTY
My Commission Expires
Jan. 2, 2002

000160

CETCO

BENTOMAT ST
MANUFACTURING CERTIFICATION

TO: Ms. Karen Louie
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073-3598

PROJECT: FERMCO-Fernald, OH

ORDER #: 87482,87485-87503

CETCO hereby affirms and certifies that Bentomat ST material supplied to this project will meet the physical criteria listed below:

PROPERTY	TEST METHOD	MINIMUM VALUE
Finished Product		
Bentonite Mass/Area	ASTM D 5261	1.0 lb/sq.ft. min.*
Fluid Loss	ASTM D 5891	18 ml max.
Free Swell	ASTM D 5890	24 ml/2g
Grab Strength	ASTM D 4632	90 lbs. MARV
Grab Elongation	ASTM D 4632	10% typical
Index Flux	ASTM D 5887	1 x 10(-8) m3/m2/sec (max.)
Moisture	ASTM D 4643	25 % max
Peel Strength	ASTM D 4632(modified)	15 lbs. min.
Permeabilty	ASTM D 5887	max. 5 x 10(-9) cm/sec
Tensile Strength	ASTM D 4595	35 ppi

* Reported at 25% moisture content.

GAI Lab Accredited Test Methods were followed during confromance testing for :
ASTM D 5993 - Bentonite Mass/Area
ASTM D 4632 - Grab Strength and Grab Elongation

Cynthia Willix
Colloid Environmental Technologies Co. (CETCO)

Subscribed and sworn to before me this 28 day of Jy 1998.

Diane Hunsucker
Notary Public

OFFICIAL SEAL
DIANE B. HUNSUCKER
Notary Public, Georgia
GWINNETT COUNTY
My Commission Expires
Jan. 2, 2002

RESEARCH
EDUCATION
INFORMATION
GEOSYNTHETIC INSTITUTE (GSI)
ACCREDITATION
CERTIFICATION

000161

P A C K I N G L I S T

2061

COLLOID ENVIRONMENTAL TECH CO
1250 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087482
ORDER DATE: 7/02/98
SHIP DATE:. 7/23/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
)30-BENTOMAT ST	SFT SF	199829030	00007555	150.0	15.0	2250.0	3055
)30-BENTOMAT ST	SFT SF	199829030	00007556	150.0	15.0	2250.0	3094
)30-BENTOMAT ST	SFT SF	199829030	00007561	150.0	15.0	2250.0	3138
)30-BENTOMAT ST	SFT SF	199829030	00007566	150.0	15.0	2250.0	3056
-BENTOMAT ST	SFT SF	199829030	00007575	150.0	15.0	2250.0	3086
-BENTOMAT ST	SFT SF	199829030	00007576	150.0	15.0	2250.0	3059
)30-BENTOMAT ST	SFT SF	199829030	00007577	150.0	15.0	2250.0	3082
)30-BENTOMAT ST	SFT SF	199829030	00007581	150.0	15.0	2250.0	3034
)30-BENTOMAT ST	SFT SF	199829030	00007582	150.0	15.0	2250.0	3034
)30-BENTOMAT ST	SFT SF	199829030	00007591	150.0	15.0	2250.0	3072
)30-BENTOMAT ST	SFT SF	199830030	00007639	150.0	15.0	2250.0	3035
)30-BENTOMAT ST	SFT SF	199830030	00007640	150.0	15.0	2250.0	3060
)30-BENTOMAT ST	SFT SF	199830030	00007641	150.0	15.0	2250.0	3143
)30-BENTOMAT ST	SFT SF	199830030	00007644	150.0	15.0	2250.0	3165

ORDER TOTALS.....	31500.0	43113.
TOTAL ITEMS..... 14		

P A C K I N G L I S T

COLLOID ENVIRONMENTAL TECH CO
1350 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087485
ORDER DATE: 7/02/98
SHIP DATE:. 7/23/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
030-BENTOMAT ST		SFT	SF	199829030	00007554	150.0	15.0	2250.0	3103
030-BENTOMAT ST		SFT	SF	199829030	00007557	150.0	15.0	2250.0	3082
030-BENTOMAT ST		SFT	SF	199829030	00007568	150.0	15.0	2250.0	3036
030-BENTOMAT ST		SFT	SF	199829030	00007569	150.0	15.0	2250.0	3047
030-BENTOMAT ST		SFT	SF	199829030	00007570	150.0	15.0	2250.0	3118
030-BENTOMAT ST		SFT	SF	199829030	00007579	150.0	15.0	2250.0	3115
030-BENTOMAT ST		SFT	SF	199829030	00007586	150.0	15.0	2250.0	3103
030-BENTOMAT ST		SFT	SF	199829030	00007587	150.0	15.0	2250.0	3070
030-BENTOMAT ST		SFT	SF	199829030	00007588	150.0	15.0	2250.0	3070
030-BENTOMAT ST		SFT	SF	199829030	00007589	150.0	15.0	2250.0	3052
030-BENTOMAT ST		SFT	SF	199829030	00007594	150.0	15.0	2250.0	3102
030-BENTOMAT ST		SFT	SF	199829030	00007595	150.0	15.0	2250.0	3119
030-BENTOMAT ST		SFT	SF	199829030	00007623	150.0	15.0	2250.0	3072
030-BENTOMAT ST		SFT	SF	199829030	00007636	150.0	15.0	2250.0	3007

ORDER TOTALS.....	31500.0	43096.
TOTAL ITEMS..... 14		

P A C K I N G L I S T

2061

COLLOID ENVIRONMENTAL TECH CO
1250 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087486
ORDER DATE: 7/02/98
SHIP DATE:. 7/23/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
130-BENTOMAT ST		SFT	SF 199829030	00007558	150.0	15.0	2250.0	3070
130-BENTOMAT ST		SFT	SF 199829030	00007559	150.0	15.0	2250.0	3063
130-BENTOMAT ST		SFT	SF 199829030	00007562	150.0	15.0	2250.0	3337
130-BENTOMAT ST		SFT	SF 199829030	00007571	150.0	15.0	2250.0	3164
BENTOMAT ST		SFT	SF 199829030	00007572	150.0	15.0	2250.0	2873
-BENTOMAT ST		SFT	SF 199829030	00007573	150.0	15.0	2250.0	3074
130-BENTOMAT ST		SFT	SF 199829030	00007574	150.0	15.0	2250.0	3069
130-BENTOMAT ST		SFT	SF 199829030	00007578	150.0	15.0	2250.0	3100
130-BENTOMAT ST		SFT	SF 199829030	00007580	150.0	15.0	2250.0	3093
130-BENTOMAT ST		SFT	SF 199829030	00007583	150.0	15.0	2250.0	3072
130-BENTOMAT ST		SFT	SF 199829030	00007585	150.0	15.0	2250.0	3078
130-BENTOMAT ST		SFT	SF 199829030	00007590	150.0	15.0	2250.0	3112
130-BENTOMAT ST		SFT	SF 199829030	00007593	150.0	15.0	2250.0	3110
130-BENTOMAT ST		SFT	SF 199829030	00007597	150.0	15.0	2250.0	3178

ORDER TOTALS.....	31500.0	43393.
TOTAL ITEMS..... 14		

P A C K I N G L I S T

COLLOID ENVIRONMENTAL TECH CO
1350 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087487
ORDER DATE: 7/02/98
SHIP DATE:. 7/23/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
030-BENTOMAT ST		SFT	SF	199829030	00007563	150.0	15.0	2250.0	3091
030-BENTOMAT ST		SFT	SF	199829030	00007564	150.0	15.0	2250.0	3081
030-BENTOMAT ST		SFT	SF	199829030	00007565	150.0	15.0	2250.0	3100
030-BENTOMAT ST		SFT	SF	199829030	00007584	150.0	15.0	2250.0	3073
030-BENTOMAT ST		SFT	SF	199830030	00007657	150.0	15.0	2250.0	3119
0__-BENTOMAT ST		SFT	SF	199830030	00007667	150.0	15.0	2250.0	3161
030-BENTOMAT ST		SFT	SF	199830030	00007673	150.0	15.0	2250.0	3122
030-BENTOMAT ST		SFT	SF	199830030	00007674	150.0	15.0	2250.0	3186
030-BENTOMAT ST		SFT	SF	199830030	00007677	150.0	15.0	2250.0	3329
030-BENTOMAT ST		SFT	SF	199830030	00007679	150.0	15.0	2250.0	3148
030-BENTOMAT ST		SFT	SF	199830030	00007680	150.0	15.0	2250.0	3139
030-BENTOMAT ST		SFT	SF	199830030	00007684	150.0	15.0	2250.0	3100
030-BENTOMAT ST		SFT	SF	199830030	00007686	150.0	15.0	2250.0	3100
030-BENTOMAT ST		SFT	SF	199830030	00007687	150.0	15.0	2250.0	3149

ORDER TOTALS.....	31500.0	43898.
TOTAL ITEMS..... 14		

PACKING LIST

2061

COLLOID ENVIRONMENTAL TECH CO
1250 WEST SHURE DRIVE
[illegible]INGTON HEIGHTS IL 60004

ORDER NO:.. 000087488
ORDER DATE: 7/02/98
SHIP DATE:. 7/23/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
030-BENTOMAT ST	SFT SF	199830030	00007650	150.0	15.0	2250.0	3134
030-BENTOMAT ST	SFT SF	199830030	00007658	150.0	15.0	2250.0	3126
030-BENTOMAT ST	SFT SF	199830030	00007659	150.0	15.0	2250.0	3097
030-BENTOMAT ST	SFT SF	199830030	00007660	150.0	15.0	2250.0	3077
[illegible]BENTOMAT ST	SFT SF	199830030	00007661	150.0	15.0	2250.0	3098
0[illegible]-BENTOMAT ST	SFT SF	199830030	00007662	150.0	15.0	2250.0	3070
030-BENTOMAT ST	SFT SF	199830030	00007663	150.0	15.0	2250.0	3114
030-BENTOMAT ST	SFT SF	199830030	00007664	150.0	15.0	2250.0	3110
030-BENTOMAT ST	SFT SF	199830030	00007669	150.0	15.0	2250.0	3193
030-BENTOMAT ST	SFT SF	199830030	00007675	150.0	15.0	2250.0	3165
030-BENTOMAT ST	SFT SF	199830030	00007676	150.0	15.0	2250.0	3169
030-BENTOMAT ST	SFT SF	199830030	00007678	150.0	15.0	2250.0	3159
030-BENTOMAT ST	SFT SF	199830030	00007682	150.0	15.0	2250.0	3139
030-BENTOMAT ST	SFT SF	199830030	00007683	150.0	15.0	2250.0	3158

ORDER TOTALS.....	31500.0	43809.
TOTAL ITEMS..... 14		

PACKING LIST

COLLOID ENVIRONMENTAL TECH CO
1350 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087489
ORDER DATE: 7/02/98
SHIP DATE:. 7/23/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
030-BENTOMAT ST		SFT	SF	199829030	00007616	150.0	15.0	2250.0	3089
030-BENTOMAT ST		SFT	SF	199830030	00007651	150.0	15.0	2250.0	3094
030-BENTOMAT ST		SFT	SF	199830030	00007652	150.0	15.0	2250.0	3188
030-BENTOMAT ST		SFT	SF	199830030	00007653	150.0	15.0	2250.0	3187
030-BENTOMAT ST		SFT	SF	199830030	00007666	150.0	15.0	2250.0	3161
030-BENTOMAT ST		SFT	SF	199830030	00007668	150.0	15.0	2250.0	3147
030-BENTOMAT ST		SFT	SF	199830030	00007670	150.0	15.0	2250.0	3146
030-BENTOMAT ST		SFT	SF	199830030	00007672	150.0	15.0	2250.0	3110
030-BENTOMAT ST		SFT	SF	199830030	00007681	150.0	15.0	2250.0	3139
030-BENTOMAT ST		SFT	SF	199830030	00007739	150.0	15.0	2250.0	3061
030-BENTOMAT ST		SFT	SF	199830030	00007743	150.0	15.0	2250.0	3104
030-BENTOMAT ST		SFT	SF	199830030	00007744	150.0	15.0	2250.0	3069
030-BENTOMAT ST		SFT	SF	199830030	00007750	150.0	15.0	2250.0	3099
030-BENTOMAT ST		SFT	SF	199830030	00007751	150.0	15.0	2250.0	3066

ORDER TOTALS.....	31500.0	43660.
TOTAL ITEMS..... 14		

PACKING LIST

2061

COLLOID ENVIRONMENTAL TECH CO
1350 WEST SHURE DRIVE
[illegible]INGTON HEIGHTS IL 60004

ORDER NO:.. 000087490
ORDER DATE: 7/02/98
SHIP DATE:. 7/23/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
30-BENTOMAT ST		SFT	SF	199829030	00007613	150.0	15.0	2250.0	3086
30-BENTOMAT ST		SFT	SF	199829030	00007614	150.0	15.0	2250.0	3050
30-BENTOMAT ST		SFT	SF	199829030	00007629	150.0	15.0	2250.0	3069
30-BENTOMAT ST		SFT	SF	199829030	00007630	150.0	15.0	2250.0	3004
30-BENTOMAT ST		SFT	SF	199829030	00007631	150.0	15.0	2250.0	3034
30-BENTOMAT ST		SFT	SF	199829030	00007633	150.0	15.0	2250.0	3036
30-BENTOMAT ST		SFT	SF	199830030	00007665	150.0	15.0	2250.0	3070
30-BENTOMAT ST		SFT	SF	199830030	00007725	150.0	15.0	2250.0	3181
30-BENTOMAT ST		SFT	SF	199830030	00007734	150.0	15.0	2250.0	3113
30-BENTOMAT ST		SFT	SF	199830030	00007736	150.0	15.0	2250.0	3103
30-BENTOMAT ST		SFT	SF	199830030	00007741	150.0	15.0	2250.0	3079
30-BENTOMAT ST		SFT	SF	199830030	00007747	150.0	15.0	2250.0	3062
30-BENTOMAT ST		SFT	SF	199830030	00007748	150.0	15.0	2250.0	3058
30-BENTOMAT ST		SFT	SF	199830030	00007749	150.0	15.0	2250.0	3071

ORDER TOTALS.....	31500.0	43016.
TOTAL ITEMS..... 14		

P A C K I N G L I S T

COLLOID ENVIRONMENTAL TECH CO
1350 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087491
ORDER DATE: 7/02/98
SHIP DATE:. 7/23/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
030-BENTOMAT ST		SFT	SF 199829030	00007628	150.0	15.0	2250.0	3112
030-BENTOMAT ST		SFT	SF 199829030	00007632	150.0	15.0	2250.0	2963
030-BENTOMAT ST		SFT	SF 199829030	00007635	150.0	15.0	2250.0	3012
030-BENTOMAT ST		SFT	SF 199830030	00007643	150.0	15.0	2250.0	3098
030-BENTOMAT ST		SFT	SF 199830030	00007656	150.0	15.0	2250.0	3125
030-BENTOMAT ST		SFT	SF 199830030	00007717	150.0	15.0	2250.0	3140
030-BENTOMAT ST		SFT	SF 199830030	00007724	150.0	15.0	2250.0	3067
030-BENTOMAT ST		SFT	SF 199830030	00007726	150.0	15.0	2250.0	3097
030-BENTOMAT ST		SFT	SF 199830030	00007727	150.0	15.0	2250.0	3200
030-BENTOMAT ST		SFT	SF 199830030	00007729	150.0	15.0	2250.0	3138
030-BENTOMAT ST		SFT	SF 199830030	00007730	150.0	15.0	2250.0	3143
030-BENTOMAT ST		SFT	SF 199830030	00007733	150.0	15.0	2250.0	3187
030-BENTOMAT ST		SFT	SF 199830030	00007735	150.0	15.0	2250.0	3120
030-BENTOMAT ST		SFT	SF 199830030	00007745	150.0	15.0	2250.0	3082

	========	=======
ORDER TOTALS.....	31500.0	43484.

TOTAL ITEMS..... 14

PACKING LIST

2061

COLLOID ENVIRONMENTAL TECH CO
1250 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087492
ORDER DATE: 7/02/98
SHIP DATE:. 7/23/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
30-BENTOMAT ST		SFT	SF	199830030	00007654	150.0	15.0	2250.0	3112
30-BENTOMAT ST		SFT	SF	199830030	00007709	150.0	15.0	2250.0	3126
30-BENTOMAT ST		SFT	SF	199830030	00007711	150.0	15.0	2250.0	3081
30-BENTOMAT ST		SFT	SF	199830030	00007712	150.0	15.0	2250.0	3066
30-BENTOMAT ST		SFT	SF	199830030	00007713	150.0	15.0	2250.0	3056
30-BENTOMAT ST		SFT	SF	199830030	00007715	150.0	15.0	2250.0	3088
30-BENTOMAT ST		SFT	SF	199830030	00007718	150.0	15.0	2250.0	3054
30-BENTOMAT ST		SFT	SF	199830030	00007719	150.0	15.0	2250.0	3054
30-BENTOMAT ST		SFT	SF	199830030	00007720	150.0	15.0	2250.0	3046
30-BENTOMAT ST		SFT	SF	199830030	00007721	150.0	15.0	2250.0	3051
30-BENTOMAT ST		SFT	SF	199830030	00007722	150.0	15.0	2250.0	3022
30-BENTOMAT ST		SFT	SF	199830030	00007728	150.0	15.0	2250.0	3109
30-BENTOMAT ST		SFT	SF	199830030	00007731	150.0	15.0	2250.0	3138
30-BENTOMAT ST		SFT	SF	199830030	00007732	150.0	15.0	2250.0	3089

ORDER TOTALS.....	31500.0	43092.
TOTAL ITEMS..... 14		

PACKING LIST

COLLOID ENVIRONMENTAL TECH CO
1350 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087493
ORDER DATE: 7/02/98
SHIP DATE:. 7/24/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
030-BENTOMAT ST		SFT	SF 199829030	00007605	150.0	15.0	2250.0	3143
030-BENTOMAT ST		SFT	SF 199830030	00007645	150.0	15.0	2250.0	3126
030-BENTOMAT ST		SFT	SF 199830030	00007647	150.0	15.0	2250.0	3130
030-BENTOMAT ST		SFT	SF 199830030	00007648	150.0	15.0	2250.0	3120
030-BENTOMAT ST		SFT	SF 199830030	00007649	150.0	15.0	2250.0	3165
0[illegible] BENTOMAT ST		SFT	SF 199830030	00007694	150.0	15.0	2250.0	3143
030-BENTOMAT ST		SFT	SF 199830030	00007697	150.0	15.0	2250.0	3152
030-BENTOMAT ST		SFT	SF 199830030	00007698	150.0	15.0	2250.0	3123
030-BENTOMAT ST		SFT	SF 199830030	00007701	150.0	15.0	2250.0	3151
030-BENTOMAT ST		SFT	SF 199830030	00007706	150.0	15.0	2250.0	3126
030-BENTOMAT ST		SFT	SF 199830030	00007708	150.0	15.0	2250.0	3100
030-BENTOMAT ST		SFT	SF 199830030	00007716	150.0	15.0	2250.0	3070
030-BENTOMAT ST		SFT	SF 199830030	00007723	150.0	15.0	2250.0	3083
030-BENTOMAT ST		SFT	SF 199830030	00007737	150.0	15.0	2250.0	3093

ORDER TOTALS.....	31500.0	43725.
TOTAL ITEMS..... 14		

PACKING LIST

2061

COLLOID ENVIRONMENTAL TECH CO
1250 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087494
ORDER DATE: 7/02/98
SHIP DATE:. 7/24/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
030-BENTOMAT ST		SFT	SF	199829030	00007611	150.0	15.0	2250.0	3173
030-BENTOMAT ST		SFT	SF	199829030	00007622	150.0	15.0	2250.0	3067
030-BENTOMAT ST		SFT	SF	199830030	00007655	150.0	15.0	2250.0	3132
030-BENTOMAT ST		SFT	SF	199830030	00007685	150.0	15.0	2250.0	3156
-BENTOMAT ST		SFT	SF	199830030	00007690	150.0	15.0	2250.0	3128
030-BENTOMAT ST		SFT	SF	199830030	00007691	150.0	15.0	2250.0	3111
030-BENTOMAT ST		SFT	SF	199830030	00007692	150.0	15.0	2250.0	3126
030-BENTOMAT ST		SFT	SF	199830030	00007693	150.0	15.0	2250.0	3185
030-BENTOMAT ST		SFT	SF	199830030	00007695	150.0	15.0	2250.0	3127
030-BENTOMAT ST		SFT	SF	199830030	00007696	150.0	15.0	2250.0	3180
030-BENTOMAT ST		SFT	SF	199830030	00007702	150.0	15.0	2250.0	3096
030-BENTOMAT ST		SFT	SF	199830030	00007703	150.0	15.0	2250.0	3143
030-BENTOMAT ST		SFT	SF	199830030	00007710	150.0	15.0	2250.0	3007
030-BENTOMAT ST		SFT	SF	199830030	00007740	150.0	15.0	2250.0	3077

ORDER TOTALS.....	31500.0	43708.
TOTAL ITEMS..... 14		

000172

P A C K I N G L I S T

COLLOID ENVIRONMENTAL TECH CO
1350 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087495
ORDER DATE: 7/02/98
SHIP DATE:. 7/24/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
030-BENTOMAT ST		SFT	SF 199829030	00007604	150.0	15.0	2250.0	3122
030-BENTOMAT ST		SFT	SF 199829030	00007610	150.0	15.0	2250.0	3118
030-BENTOMAT ST		SFT	SF 199829030	00007612	150.0	15.0	2250.0	3082
030-BENTOMAT ST		SFT	SF 199829030	00007625	150.0	15.0	2250.0	3097
030-BENTOMAT ST		SFT	SF 199829030	00007627	150.0	15.0	2250.0	3045
030-BENTOMAT ST		SFT	SF 199830030	00007646	150.0	15.0	2250.0	3194
030-BENTOMAT ST		SFT	SF 199830030	00007688	150.0	15.0	2250.0	3150
030-BENTOMAT ST		SFT	SF 199830030	00007689	150.0	15.0	2250.0	3138
030-BENTOMAT ST		SFT	SF 199830030	00007699	150.0	15.0	2250.0	3120
030-BENTOMAT ST		SFT	SF 199830030	00007700	150.0	15.0	2250.0	3133
030-BENTOMAT ST		SFT	SF 199830030	00007705	150.0	15.0	2250.0	3034
030-BENTOMAT ST		SFT	SF 199830030	00007738	150.0	15.0	2250.0	3112
030-BENTOMAT ST		SFT	SF 199830030	00007742	150.0	15.0	2250.0	3082
030-BENTOMAT ST		SFT	SF 199830030	00007888	150.0	15.0	2250.0	3032

ORDER TOTALS.....	31500.0	43459.
TOTAL ITEMS..... 14		

000173

P A C K I N G L I S T

2061

COLLOID ENVIRONMENTAL TECH CO
1250 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087496
ORDER DATE: 7/02/98
SHIP DATE:. 7/24/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
30-BENTOMAT ST		SFT	SF 199829030	00007592	150.0	15.0	2250.0	3107
30-BENTOMAT ST		SFT	SF 199829030	00007596	150.0	15.0	2250.0	3113
30-BENTOMAT ST		SFT	SF 199829030	00007599	150.0	15.0	2250.0	3136
30-BENTOMAT ST		SFT	SF 199829030	00007601	150.0	15.0	2250.0	3102
-BENTOMAT ST		SFT	SF 199829030	00007602	150.0	15.0	2250.0	3173
-BENTOMAT ST		SFT	SF 199829030	00007603	150.0	15.0	2250.0	3093
30-BENTOMAT ST		SFT	SF 199829030	00007606	150.0	15.0	2250.0	3119
30-BENTOMAT ST		SFT	SF 199829030	00007615	150.0	15.0	2250.0	3098
30-BENTOMAT ST		SFT	SF 199829030	00007624	150.0	15.0	2250.0	3067
30-BENTOMAT ST		SFT	SF 199830030	00007704	150.0	15.0	2250.0	3125
30-BENTOMAT ST		SFT	SF 199830030	00007883	150.0	15.0	2250.0	3020
30-BENTOMAT ST		SFT	SF 199830030	00007884	150.0	15.0	2250.0	3016
30-BENTOMAT ST		SFT	SF 199830030	00007885	150.0	15.0	2250.0	3004
30-BENTOMAT ST		SFT	SF 199830030	00007886	150.0	15.0	2250.0	3009

ORDER TOTALS.....	31500.0	43182.
TOTAL ITEMS..... 14		

P A C K I N G L I S T

COLLOID ENVIRONMENTAL TECH CO
1350 WEST SHURE DRIVE
LINGTON HEIGHTS IL 60004

ORDER NO:.. 000087497
ORDER DATE: 7/02/98
SHIP DATE:. 7/27/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
030-BENTOMAT ST		SFT	SF 199829030	00007600	150.0	15.0	2250.0	3115
030-BENTOMAT ST		SFT	SF 199829030	00007607	150.0	15.0	2250.0	2933
030-BENTOMAT ST		SFT	SF 199829030	00007608	150.0	15.0	2250.0	3128
030-BENTOMAT ST		SFT	SF 199829030	00007609	150.0	15.0	2250.0	3152
030-BENTOMAT ST		SFT	SF 199829030	00007619	150.0	15.0	2250.0	3133
030-BENTOMAT ST		SFT	SF 199829030	00007626	150.0	15.0	2250.0	3073
030-BENTOMAT ST		SFT	SF 199829030	00007634	150.0	15.0	2250.0	3038
030-BENTOMAT ST		SFT	SF 199830030	00007671	150.0	15.0	2250.0	3130
030-BENTOMAT ST		SFT	SF 199830030	00007746	150.0	15.0	2250.0	3106
030-BENTOMAT ST		SFT	SF 199830030	00007859	150.0	15.0	2250.0	3015
030-BENTOMAT ST		SFT	SF 199830030	00007860	150.0	15.0	2250.0	3011
030-BENTOMAT ST		SFT	SF 199830030	00007861	150.0	15.0	2250.0	3025
030-BENTOMAT ST		SFT	SF 199830030	00007873	150.0	15.0	2250.0	3032
030-BENTOMAT ST		SFT	SF 199830030	00007882	150.0	15.0	2250.0	3003

ORDER TOTALS.....	31500.0	42894.
TOTAL ITEMS..... 14		

P A C K I N G L I S T

2061

COLLOID ENVIRONMENTAL TECH CO
[illegible]50 WEST SHURE DRIVE
[illegible]INGTON HEIGHTS IL 60004

ORDER NO:.. 000087498
ORDER DATE: 7/02/98
SHIP DATE:. 7/27/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
)30-BENTOMAT ST		SFT	SF	199829030	00007620	150.0	15.0	2250.0	3120
)30-BENTOMAT ST		SFT	SF	199829030	00007621	150.0	15.0	2250.0	3128
)30-BENTOMAT ST		SFT	SF	199830030	00007707	150.0	15.0	2250.0	3092
)30-BENTOMAT ST		SFT	SF	199830030	00007829	150.0	15.0	2250.0	3060
[illegible]BENTOMAT ST		SFT	SF	199830030	00007838	150.0	15.0	2250.0	3064
)30-BENTOMAT ST		SFT	SF	199830030	00007845	150.0	15.0	2250.0	2908
)30-BENTOMAT ST		SFT	SF	199830030	00007858	150.0	15.0	2250.0	3015
)30-BENTOMAT ST		SFT	SF	199830030	00007870	150.0	15.0	2250.0	3049
)30-BENTOMAT ST		SFT	SF	199830030	00007871	150.0	15.0	2250.0	3040
)30-BENTOMAT ST		SFT	SF	199830030	00007872	150.0	15.0	2250.0	3023
)30-BENTOMAT ST		SFT	SF	199830030	00007874	150.0	15.0	2250.0	3027
)30-BENTOMAT ST		SFT	SF	199830030	00007875	150.0	15.0	2250.0	3040
)30-BENTOMAT ST		SFT	SF	199830030	00007880	150.0	15.0	2250.0	3014
)30-BENTOMAT ST		SFT	SF	199830030	00007881	150.0	15.0	2250.0	3014

ORDER TOTALS.....	31500.0	42594.
TOTAL ITEMS..... 14		

P A C K I N G L I S T

COLLOID ENVIRONMENTAL TECH CO
1350 WEST SHURE DRIVE
INGTON HEIGHTS IL 60004

ORDER NO:.. 000087499
ORDER DATE: 7/02/98
SHIP DATE:. 7/27/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
030-BENTOMAT ST	SFT SF	199829030	00007617	150.0	15.0	2250.0	3051
030-BENTOMAT ST	SFT SF	199829030	00007618	150.0	15.0	2250.0	3078
030-BENTOMAT ST	SFT SF	199830030	00007815	150.0	15.0	2250.0	3148
030-BENTOMAT ST	SFT SF	199830030	00007822	150.0	15.0	2250.0	3089
030-BENTOMAT ST	SFT SF	199830030	00007831	150.0	15.0	2250.0	3077
030-BENTOMAT ST	SFT SF	199830030	00007832	150.0	15.0	2250.0	3054
030-BENTOMAT ST	SFT SF	199830030	00007847	150.0	15.0	2250.0	3047
030-BENTOMAT ST	SFT SF	199830030	00007848	150.0	15.0	2250.0	3030
030-BENTOMAT ST	SFT SF	199830030	00007850	150.0	15.0	2250.0	3049
030-BENTOMAT ST	SFT SF	199830030	00007862	150.0	15.0	2250.0	3040
030-BENTOMAT ST	SFT SF	199830030	00007869	150.0	15.0	2250.0	2999
030-BENTOMAT ST	SFT SF	199830030	00007876	150.0	15.0	2250.0	3017
030-BENTOMAT ST	SFT SF	199830030	00007877	150.0	15.0	2250.0	3014
030-BENTOMAT ST	SFT SF	199830030	00007878	150.0	15.0	2250.0	3004

	========	=======
ORDER TOTALS.....	31500.0	42697.
TOTAL ITEMS..... 14		

PACKING LIST

2061

COLLOID ENVIRONMENTAL TECH CO
1350 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087500
ORDER DATE: 7/02/98
SHIP DATE:. 7/27/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
030-BENTOMAT ST		SFT	SF 199830030	00007816	150.0	15.0	2250.0	3086
030-BENTOMAT ST		SFT	SF 199830030	00007817	150.0	15.0	2250.0	3080
030-BENTOMAT ST		SFT	SF 199830030	00007818	150.0	15.0	2250.0	3109
030-BENTOMAT ST		SFT	SF 199830030	00007833	150.0	15.0	2250.0	3060
[illegible]-BENTOMAT ST		SFT	SF 199830030	00007835	150.0	15.0	2250.0	3068
[illegible]-BENTOMAT ST		SFT	SF 199830030	00007836	150.0	15.0	2250.0	3064
030-BENTOMAT ST		SFT	SF 199830030	00007849	150.0	15.0	2250.0	3052
030-BENTOMAT ST		SFT	SF 199830030	00007851	150.0	15.0	2250.0	3049
030-BENTOMAT ST		SFT	SF 199830030	00007852	150.0	15.0	2250.0	3001
030-BENTOMAT ST		SFT	SF 199830030	00007866	150.0	15.0	2250.0	3099
030-BENTOMAT ST		SFT	SF 199830030	00007867	150.0	15.0	2250.0	3033
030-BENTOMAT ST		SFT	SF 199830030	00007868	150.0	15.0	2250.0	3028
030-BENTOMAT ST		SFT	SF 199830030	00007887	150.0	15.0	2250.0	3012
030-BENTOMAT ST		SFT	SF 199830030	00007889	150.0	15.0	2250.0	3001

ORDER TOTALS..... 31500.0 42742.

TOTAL ITEMS..... 14

LISTED TWICE
see Next page

PACKING LIST

COLLOID ENVIRONMENTAL TECH CO
1350 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087501
ORDER DATE: 7/02/98
SHIP DATE:. 7/27/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
030-BENTOMAT ST	SFT SF	199830030	00007819	150.0	15.0	2250.0	3089
030-BENTOMAT ST	SFT SF	199830030	00007820	150.0	15.0	2250.0	3104
030-BENTOMAT ST	SFT SF	199830030	00007830	150.0	15.0	2250.0	3041
030-BENTOMAT ST	SFT SF	199830030	00007836	150.0	15.0	2250.0	3064
030-BENTOMAT ST	SFT SF	199830030	00007839	150.0	15.0	2250.0	3030
0_ BENTOMAT ST	SFT SF	199830030	00007846	150.0	15.0	2250.0	3071
030-BENTOMAT ST	SFT SF	199830030	00007853	150.0	15.0	2250.0	3042
030-BENTOMAT ST	SFT SF	199830030	00007855	150.0	15.0	2250.0	3010
030-BENTOMAT ST	SFT SF	199830030	00007863	150.0	15.0	2250.0	3050
030-BENTOMAT ST	SFT SF	199830030	00007864	150.0	15.0	2250.0	3044
030-BENTOMAT ST	SFT SF	199830030	00007865	150.0	15.0	2250.0	3042
030-BENTOMAT ST	SFT SF	199830030	00007891	150.0	15.0	2250.0	3060
030-BENTOMAT ST	SFT SF	199830030	00007892	150.0	15.0	2250.0	3090
030-BENTOMAT ST	SFT SF	199830030	00007893	150.0	15.0	2250.0	3065

ORDER TOTALS.....	31500.0	42802.
TOTAL ITEMS..... 14		

LISTED TWICE
ONLY 271 OUT OF
275 ROLLS HERE

PACKING LIST

COLLOID ENVIRONMENTAL TECH CO
1350 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087502
ORDER DATE: 7/02/98
SHIP DATE:. 7/27/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
30-BENTOMAT ST		SFT	SF 199830030	00007814	150.0	15.0	2250.0	3150
30-BENTOMAT ST		SFT	SF 199830030	00007821	150.0	15.0	2250.0	3084
30-BENTOMAT ST		SFT	SF 199830030	00007823	150.0	15.0	2250.0	3067
30-BENTOMAT ST		SFT	SF 199830030	00007824	150.0	15.0	2250.0	3074
30-BENTOMAT ST		SFT	SF 199830030	00007840	150.0	15.0	2250.0	3021
30-BENTOMAT ST		SFT	SF 199830030	00007841	150.0	15.0	2250.0	3051
30-BENTOMAT ST		SFT	SF 199830030	00007842	150.0	15.0	2250.0	3034
30-BENTOMAT ST		SFT	SF 199830030	00007844	150.0	15.0	2250.0	3014
30-BENTOMAT ST		SFT	SF 199830030	00007854	150.0	15.0	2250.0	3049
30-BENTOMAT ST		SFT	SF 199830030	00007856	150.0	15.0	2250.0	3079
30-BENTOMAT ST		SFT	SF 199830030	00007857	150.0	15.0	2250.0	3078
30-BENTOMAT ST		SFT	SF 199830030	00007894	150.0	15.0	2250.0	3060
30-BENTOMAT ST		SFT	SF 199830030	00007896	150.0	15.0	2250.0	3032
30-BENTOMAT ST		SFT	SF 199830030	00007897	150.0	15.0	2250.0	3082

ORDER TOTALS.....	31500.0	42875.
TOTAL ITEMS..... 14		

PACKING LIST

COLLOID ENVIRONMENTAL TECH CO
1350 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000087503
ORDER DATE: 7/02/98
SHIP DATE:. 7/27/98

SOLD TO: 001376
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD

HOUSTON TX 77073

SHIP FROM:. FAIRMOUNT,GA
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
7400 WILLEY ROAD

FERNALD OH 45030

PO: S 061110-01

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGH
030-BENTOMAT ST		SFT	SF 199830030	00007642	150.0	15.0	2250.0	3098
030-BENTOMAT ST		SFT	SF 199830030	00007825	150.0	15.0	2250.0	3081
030-BENTOMAT ST		SFT	SF 199830030	00007826	150.0	15.0	2250.0	3081
030-BENTOMAT ST		SFT	SF 199830030	00007827	150.0	15.0	2250.0	3096
030-BENTOMAT ST		SFT	SF 199830030	00007843	150.0	15.0	2250.0	3014
-BENTOMAT ST		SFT	SF 199830030	00007895	150.0	15.0	2250.0	3055

ORDER TOTALS.....	13500.0	18425.
TOTAL ITEMS..... 6		

LOT #	No. of Rolls	Area (ft^2)
199829030	80	180,000
199830030	192	432,000
	272 − 1 = 271	612,000

MQC at 1 per 40,000 ft^2

Total # of MQC tests = 16

CETCO

2061

GEOSYNTHETIC CLAY LINER QUALITY TEST RESULTS

000182

A Wholly Owned Subsidiary of AMCOL International

Printed on recycled paper

QCG#FT2 QCT#FT2
8/04/98 6:44:55

COLLOID ENVIRONMENTAL TECH CO

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087482

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007644	1.02	15.20	124.80	26.10	26.70	30.00	13.02
030-BENTOMAT ST	199830030	00007641	1.02	15.20	124.80	26.10	26.70	30.00	13.02
030-BENTOMAT ST	199830030	00007640	1.02	15.20	124.80	26.10	26.70	30.00	13.02
030-BENTOMAT ST	199830030	00007639	1.02	15.20	124.80	26.10	26.70	30.00	13.02
030-BENTOMAT ST	199829030	00007591	1.04	13.60	116.80	40.30	24.31	29.00	12.78
030-BENTOMAT ST	199829030	00007582	1.02	13.60	116.80	40.10	24.32	35.00	13.90
030-BENTOMAT ST	199829030	00007581	1.02	13.60	116.80	40.10	24.32	35.00	13.90
030-BENTOMAT ST	199829030	00007577	1.02	13.60	116.80	40.50	24.32	35.00	13.90
030-BENTOMAT ST	199829030	00007576	1.02	13.60	116.80	40.50	24.32	35.00	13.90
030-BENTOMAT ST	199829030	00007575	1.02	13.60	116.80	40.50	24.32	35.00	13.90
030-BENTOMAT ST	199829030	00007566	1.00	13.60	116.80	34.30	24.30	44.00	12.76
030-BENTOMAT ST	199829030	00007561	1.00	13.60	116.80	34.30*	24.30	44.00	12.76
030-BENTOMAT ST	199829030	00007556	1.00	13.60	116.80	35.60	24.30	44.00	12.76
030-BENTOMAT ST	199829030	00007555	1.00	13.60	116.80	35.60	24.30	44.00	12.76

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

000183

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087485

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199829030	00007636	1.09*	14.40*	112.20*	47.60*	18.30*	30.00	13.02*
030-BENTOMAT ST	199829030	00007623	1.01	13.60	116.80	37.80	24.70	30.00	12.44
030-BENTOMAT ST	199829030	00007595	1.04	13.60	116.80	28.60	24.31	29.00	12.78
030-BENTOMAT ST	199829030	00007594	1.04	13.60	116.80	28.60*	24.31	29.00	12.78
030-BENTOMAT ST	199829030	00007589	1.04	13.60	116.80	40.30	24.31	29.00	12.78
030-BENTOMAT ST	199829030	00007588	1.04	13.60	116.80	40.30	24.31	29.00	12.78
030-BENTOMAT ST	199829030	00007587	1.04	13.60	116.80	40.30	24.31	29.00	12.78
030-BENTOMAT ST	199829030	00007586	1.04*	13.60	116.80	40.30*	24.31*	29.00*	12.78*
030-BENTOMAT ST	199829030	00007579	1.02	13.60	116.80	40.10	24.32	35.00	13.90
030-BENTOMAT ST	199829030	00007570	1.02*	13.60	116.80	40.50*	24.32*	35.00*	13.90*
030-BENTOMAT ST	199829030	00007569	1.00	13.60	116.80	34.30	24.30	44.00	12.76
030-BENTOMAT ST	199829030	00007568	1.00	13.60	116.80	34.30	24.30	44.00	12.76
030-BENTOMAT ST	199829030	00007557	1.00	13.60	116.80	35.60	24.30	44.00	12.76
030-BENTOMAT ST	199829030	00007554	1.00*	13.60	116.80*	35.60*	24.30*	44.00*	12.76

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

000184

2061

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087486

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199829030	00007597	1.04	13.60	116.80	28.60	24.31	29.00	12.78
030-BENTOMAT ST	199829030	00007593	1.04	13.60	116.80	40.30	24.31	29.00	12.78
030-BENTOMAT ST	199829030	00007590	1.04	13.60	116.80	40.30	24.31	29.00	12.78
030-BENTOMAT ST	199829030	00007585	1.02	13.60	116.80	40.10	24.32	35.00	13.90
030-BENTOMAT ST	199829030	00007583	1.02	13.60	116.80	40.10	24.32	35.00	13.90
030-BENTOMAT ST	199829030	00007580	1.02	13.60	116.80	40.10	24.32	35.00	13.90
030-BENTOMAT ST	199829030	00007578	1.02	13.60	116.80	40.10*	24.32	35.00	13.90
030-BENTOMAT ST	199829030	00007574	1.02	13.60	116.80	40.50	24.32	35.00	13.90
030-BENTOMAT ST	199829030	00007573	1.02	13.60	116.80	40.50	24.32	35.00	13.90
030-BENTOMAT ST	199829030	00007572	1.02	13.60	116.80	40.50	24.32	35.00	13.90
030-BENTOMAT ST	199829030	00007571	1.02	13.60	116.80	40.50	24.32	35.00	13.90
030-BENTOMAT ST	199829030	00007562	1.00	13.60	116.80	34.30	24.30	44.00	12.76
030-BENTOMAT ST	199829030	00007559	1.00	13.60	116.80	35.60	24.30	44.00	12.76
030-BENTOMAT ST	199829030	00007558	1.00	13.60	116.80	35.60	24.30	44.00	12.76

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

000185

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087487

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007687	1.02	12.40	111.60	39.40	24.20	26.00	11.58
030-BENTOMAT ST	199830030	00007686	1.02	12.40	111.60	39.40	24.20	26.00	11.58
030-BENTOMAT ST	199830030	00007684	1.11	12.40	111.60	43.70	22.90	24.00	13.40
030-BENTOMAT ST	199830030	00007680	1.11	12.40	111.60	43.70	22.90	24.00	13.40
030-BENTOMAT ST	199830030	00007679	1.11	12.40	111.60	43.70	22.90	24.00	13.40
030-BENTOMAT ST	199830030	00007677	1.11	12.40	111.60	43.70*	22.90	24.00	13.40
030-BENTOMAT ST	199830030	00007674	1.11	12.40	111.60	46.30	22.90	24.00	13.40
030-BENTOMAT ST	199830030	00007673	1.11	12.40	111.60	46.30	22.90	24.00	13.40
030-BENTOMAT ST	199830030	00007667	1.02	12.40	111.60	50.20	25.00	33.00	13.80
030-BENTOMAT ST	199830030	00007657	1.02	14.40	112.20	46.60	25.00	33.00	13.80
030-BENTOMAT ST	199829030	00007584	1.02	13.60	116.80	40.10	24.32	35.00	13.90
030-BENTOMAT ST	199829030	00007565	1.00	13.60	116.80	34.30	24.30	44.00	12.76
030-BENTOMAT ST	199829030	00007564	1.00	13.60	116.80	34.30	24.30	44.00	12.76
030-BENTOMAT ST	199829030	00007563	1.00	13.60	116.80	34.30	24.30	44.00	12.76

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087488

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007683	1.11	12.40	111.60	43.70	22.90	24.00	13.40
030-BENTOMAT ST	199830030	00007682	1.11	12.40	111.60	43.70	22.90	24.00	13.40
030-BENTOMAT ST	199830030	00007678	1.11	12.40	111.60	43.70	22.90	24.00	13.40
030-BENTOMAT ST	199830030	00007676	1.11	12.40	111.60	46.30	22.90	24.00	13.40
030-BENTOMAT ST	199830030	00007675	1.11	12.40	111.60	46.30	22.90	24.00	13.40
030-BENTOMAT ST	199830030	00007669	1.11*	12.40	111.60	46.30*	22.90*	24.00*	13.40*
030-BENTOMAT ST	199830030	00007664	1.02	12.40	111.60	50.20	25.00	33.00	13.80
030-BENTOMAT ST	199830030	00007663	1.02	12.40	111.60	50.20	25.00	33.00	13.80
030-BENTOMAT ST	199830030	00007662	1.02	12.40	111.60	50.20	25.00	33.00	13.80
030-BENTOMAT ST	199830030	00007661	1.02	12.40*	111.60*	50.20*	25.00	33.00	13.80
030-BENTOMAT ST	199830030	00007660	1.02	14.40	112.20	46.60	25.00	33.00	13.80
030-BENTOMAT ST	199830030	00007659	1.02	14.40	112.20	46.60	25.00	33.00	13.80
030-BENTOMAT ST	199830030	00007658	1.02	14.40	112.20	46.60	25.00	33.00	13.80
030-BENTOMAT ST	199830030	00007650	1.08	14.40	112.20	17.70	24.80	30.00	13.02

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

000187

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087489

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007751	.98	14.00	109.20	31.70	23.80	25.00	11.70
030-BENTOMAT ST	199830030	00007750	.98	14.00	109.20	31.70	23.80	25.00	11.70
030-BENTOMAT ST	199830030	00007744	1.02	14.00	109.20	42.30	23.10	25.00	13.02
030-BENTOMAT ST	199830030	00007743	1.02	14.00	109.20	42.30	23.10	25.00	13.02
030-BENTOMAT ST	199830030	00007739	1.02	14.00	109.20	39.10	23.10	25.00	13.02
030-BENTOMAT ST	199830030	00007681	1.11	12.40	111.60	43.70	22.90	24.00	13.40
030-BENTOMAT ST	199830030	00007672	1.11	12.40	111.60	46.30	22.90	24.00	13.40
030-BENTOMAT ST	199830030	00007670	1.11	12.40	111.60	46.30	22.90	24.00	13.40
030-BENTOMAT ST	199830030	00007668	1.02	12.40	111.60	50.20	25.00	33.00	13.80
030-BENTOMAT ST	199830030	00007666	1.02	12.40	111.60	50.20	25.00	33.00	13.80
030-BENTOMAT ST	199830030	00007653	1.02*	14.40	112.20	46.60*	25.00*	33.00*	13.80*
030-BENTOMAT ST	199830030	00007652	1.08	14.40	112.20	17.70	24.80	30.00	13.02
030-BENTOMAT ST	199830030	00007651	1.08	14.40	112.20	17.70	24.80	30.00	13.02
030-BENTOMAT ST	199829030	00007616	1.07	13.60	116.80	31.10	23.80	33.00	14.18

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

000188

2061

QCG0FT2 QCT0FT2
8/04/98 7:27:08

COLLOID ENVIRONMENTAL TECH CO

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087490

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007749	.98*	14.00	109.20	31.70*	23.80*	25.00	11.70*
030-BENTOMAT ST	199830030	00007748	1.02	14.00	109.20	42.30	23.10	25.00	13.02
030-BENTOMAT ST	199830030	00007747	1.02	14.00	109.20	42.30	23.10	25.00	13.02
030-BENTOMAT ST	199830030	00007741	1.02	14.00	109.20	42.30*	23.10	25.00	13.02
030-BENTOMAT ST	199830030	00007736	1.02	14.00	109.20	39.10	23.10	25.00	13.02
030-BENTOMAT ST	199830030	00007734	1.02	14.00	109.20	39.10	23.10	25.00	13.02
030-BENTOMAT ST	199830030	00007725	1.00	14.00	109.20	30.20*	24.40	24.00	13.18
030-BENTOMAT ST	199830030	00007665	1.02	12.40	111.60	50.20	25.00	33.00	13.80
030-BENTOMAT ST	199829030	00007633	1.01	13.60	116.80	34.80	24.70	30.00	12.44
030-BENTOMAT ST	199829030	00007631	1.01	13.60	116.80	34.80	24.70	30.00	12.44
030-BENTOMAT ST	199829030	00007630	1.01	13.60	116.80	34.80	24.70	30.00	12.44
030-BENTOMAT ST	199829030	00007629	1.01	13.60	116.80	34.80	24.70	30.00	12.44
030-BENTOMAT ST	199829030	00007614	1.07	13.60	116.80	31.10	23.80	33.00	14.18
030-BENTOMAT ST	199829030	00007613	1.07	13.60	116.80	31.10	23.80	33.00	14.18

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

000189

$\gamma_d = 0.98\ lb/ft^2$

$w = 23.80\ \%$

$\gamma_w = \gamma_d (1+w)$

$= 0.98(1+0.238)$

$= 1.21\ lb/ft^2$ at 23.8%

$= 1.22\ lb/ft^2$ at 25%

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087491

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007745	1.02	14.00	109.20	42.30	23.10	25.00	13.02
030-BENTOMAT ST	199830030	00007735	1.02	14.00	109.20	39.10	23.10	25.00	13.02
030-BENTOMAT ST	199830030	00007733	1.02*	14.00	109.20	39.10*	23.10*	25.00*	13.02*
030-BENTOMAT ST	199830030	00007730	1.00	14.00	109.20	30.20	24.40	24.00	13.18
030-BENTOMAT ST	199830030	00007729	1.00	14.00	109.20	30.20	24.40	24.00	13.18
030-BENTOMAT ST	199830030	00007727	1.00	14.00	109.20	30.20	24.40	24.00	13.18
030-BENTOMAT ST	199830030	00007726	1.00	14.00	109.20	30.20	24.40	24.00	13.18
030-BENTOMAT ST	199830030	00007724	1.00	14.00	109.20	28.40	24.40	24.00	13.18
030-BENTOMAT ST	199830030	00007717	1.00*	14.00	109.20	28.40*	24.40*	24.00	13.18*
030-BENTOMAT ST	199830030	00007656	1.02	14.40	112.20	46.60	25.00	33.00	13.80
030-BENTOMAT ST	199830030	00007643	1.02	15.20	124.80	26.10	26.70	30.00	13.02
030-BENTOMAT ST	199829030	00007635	1.01	13.60	116.80	34.80	24.70	30.00	12.44
030-BENTOMAT ST	199829030	00007632	1.01	13.60	116.80	34.80	24.70	30.00	12.44
030-BENTOMAT ST	199829030	00007628	1.01	13.60	116.80	34.80*	24.70	30.00	12.44

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

000190

2061

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087492

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007732	1.00	14.00	109.20	30.20	24.40	24.00	13.18
030-BENTOMAT ST	199830030	00007731	1.00	14.00	109.20	30.20	24.40	24.00	13.18
030-BENTOMAT ST	199830030	00007728	1.00	14.00	109.20	30.20	24.40	24.00	13.18
030-BENTOMAT ST	199830030	00007722	1.00	14.00	109.20	28.40	24.40	24.00	13.18
030-BENTOMAT ST	199830030	00007721	1.00	14.00	109.20	28.40	24.40	24.00	13.18
030-BENTOMAT ST	199830030	00007720	1.00	14.00	109.20	28.40	24.40	24.00	13.18
030-BENTOMAT ST	199830030	00007719	1.00	14.00	109.20	28.40	24.40	24.00	13.18
030-BENTOMAT ST	199830030	00007718	1.00	14.00	109.20	28.40	24.40	24.00	13.18
030-BENTOMAT ST	199830030	00007715	1.05	14.00	109.20	28.00	24.50	24.00	13.08
030-BENTOMAT ST	199830030	00007713	1.05	14.00	109.20	28.00	24.50	24.00	13.08
030-BENTOMAT ST	199830030	00007712	1.05	14.00	109.20	28.00	24.50	24.00	13.08
030-BENTOMAT ST	199830030	00007711	1.05	14.00	109.20	28.00	24.50	24.00	13.08
030-BENTOMAT ST	199830030	00007709	1.05	12.40	111.60	35.30	24.50	24.00	13.08
030-BENTOMAT ST	199830030	00007654	1.02	14.40	112.20	46.60	25.00	33.00	13.80

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

000191

*** End of Report ***

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087493

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007737	1.02	14.00	109.20	39.10	23.10	25.00	13.02
030-BENTOMAT ST	199830030	00007723	1.00	14.00	109.20	28.40	24.40	24.00	13.18
030-BENTOMAT ST	199830030	00007716	1.05	14.00	109.20	28.00	24.50	24.00	13.08
030-BENTOMAT ST	199830030	00007708	1.05	12.40	111.60	35.30	24.50	24.00	13.08
030-BENTOMAT ST	199830030	00007706	1.05	12.40	111.60	35.30	24.50	24.00	13.08
030-BENTOMAT ST	199830030	00007701	1.05*	12.40	111.60	35.30	24.50*	24.00*	13.08*
030-BENTOMAT ST	199830030	00007698	1.02	12.40	111.60	35.30	24.20	26.00	11.58
030-BENTOMAT ST	199830030	00007697	1.02	12.40	111.60	35.30	24.20	26.00	11.58
030-BENTOMAT ST	199830030	00007694	1.02	12.40	111.60	35.30	24.20	26.00	11.58
030-BENTOMAT ST	199830030	00007649	1.08	14.40	112.20	17.70	24.80	30.00	13.02
030-BENTOMAT ST	199830030	00007648	1.08	14.40	112.20	17.70	24.80	30.00	13.02
030-BENTOMAT ST	199830030	00007647	1.08	14.40	112.20	17.70	24.80	30.00	13.02
030-BENTOMAT ST	199830030	00007645	1.08*	14.40*	112.20*	17.70*	24.80*	30.00	13.02
030-BENTOMAT ST	199829030	00007605	1.07	13.60	116.80	36.50	23.80	33.00	14.18

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

000192

2061

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087494

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007740	1.02	14.00	109.20	39.10	23.10	25.00	13.02
030-BENTOMAT ST	199830030	00007710	1.05	14.00*	109.20*	28.00*	24.50	24.00	13.08
030-BENTOMAT ST	199830030	00007703	1.05	12.40	111.60	35.30	24.50	24.00	13.08
030-BENTOMAT ST	199830030	00007702	1.05	12.40	111.60	35.30	24.50	24.00	13.08
030-BENTOMAT ST	199830030	00007696	1.02	12.40	111.60	35.30	24.20	26.00	11.58
030-BENTOMAT ST	199830030	00007695	1.02	12.40	111.60	35.30	24.20	26.00	11.58
030-BENTOMAT ST	199830030	00007693	1.02	12.40	111.60	35.30*	24.20	26.00	11.58
030-BENTOMAT ST	199830030	00007692	1.02	12.40	111.60	39.40	24.20	26.00	11.58
030-BENTOMAT ST	199830030	00007691	1.02	12.40	111.60	39.40	24.20	26.00	11.58
030-BENTOMAT ST	199830030	00007690	1.02	12.40	111.60	39.40	24.20	26.00	11.58
030-BENTOMAT ST	199830030	00007685	1.02*	12.40	111.60	39.40*	24.20*	26.00*	11.58*
030-BENTOMAT ST	199830030	00007655	1.02	14.40	112.20	46.60	25.00	33.00	13.80
030-BENTOMAT ST	199829030	00007622	1.01	13.60	116.80	37.80	24.70	30.00	12.44
030-BENTOMAT ST	199829030	00007611	1.07	13.60	116.80	31.10*	23.80	33.00	14.18

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

000193

COLLOID ENVIRONMENTAL TECH CO

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087495

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007888	1.01	15.20	124.80	49.60*	24.50	30.00	13.98
030-BENTOMAT ST	199830030	00007742	1.02	14.00	109.20	42.30	23.10	25.00	13.02
030-BENTOMAT ST	199830030	00007738	1.02	14.00	109.20	39.10	23.10	25.00	13.02
030-BENTOMAT ST	199830030	00007705	1.05	12.40	111.60	35.30	24.50	24.00	13.08
030-BENTOMAT ST	199830030	00007700	1.02	12.40	111.60	35.30	24.20	26.00	11.58
030-BENTOMAT ST	199830030	00007699	1.02	12.40	111.60	35.30	24.20	26.00	11.58
030-BENTOMAT ST	199830030	00007689	1.02	12.40	111.60	39.40	24.20	26.00	11.58
030-BENTOMAT ST	199830030	00007688	1.02	12.40	111.60	39.40	24.20	26.00	11.58
030-BENTOMAT ST	199830030	00007646	1.08	14.40	112.20	17.70	24.80	30.00	13.02
030-BENTOMAT ST	199829030	00007627	1.01	13.60	116.80	37.80	24.70	30.00	12.44
030-BENTOMAT ST	199829030	00007625	1.01	13.60	116.80	37.80	24.70	30.00	12.44
030-BENTOMAT ST	199829030	00007612	1.07	13.60	116.80	31.10	23.80	33.00	14.18
030-BENTOMAT ST	199829030	00007610	1.07	13.60	116.80	36.50	23.80	33.00	14.18
030-BENTOMAT ST	199829030	00007604	1.07	13.60	116.80	36.50	23.80	33.00	14.18

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

000194

2061

QCG#FT2 QCT#FT2
8/04/98 7:28:50

COLLOID ENVIRONMENTAL TECH CO

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087496

MATERIAL	LOT No.	ROLL No	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007886	34.60	24.50	30.00	13.98
030-BENTOMAT ST	199830030	00007885	34.60	24.50	30.00	13.98
030-BENTOMAT ST	199830030	00007884	34.60	24.50	30.00	13.98
030-BENTOMAT ST	199830030	00007883	34.60	24.50	30.00	13.98
030-BENTOMAT ST	199830030	00007704	35.30	24.50	24.00	13.08
030-BENTOMAT ST	199829030	00007624	37.80	24.70	30.00	12.44
030-BENTOMAT ST	199829030	00007615	31.10	23.80	33.00	14.18
030-BENTOMAT ST	199829030	00007606	36.50	23.80	33.00	14.18
030-BENTOMAT ST	199829030	00007603	36.50	23.80	33.00	14.18
030-BENTOMAT ST	199829030	00007602	36.50*	23.80*	33.00*	14.18*
030-BENTOMAT ST	199829030	00007601	28.60	24.31	29.00	12.78
030-BENTOMAT ST	199829030	00007599	28.60	24.31	29.00	12.78
030-BENTOMAT ST	199829030	00007596	28.60	24.31	29.00	12.78
030-BENTOMAT ST	199829030	00007592	40.30	24.31	29.00	12.78

MISSING DATA

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

Need Bentonite Content QC Data in these rolls.

*** End of Report ***

000195

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087497

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007882	1.01	15.20	124.80	34.60	24.50	30.00	13.98
030-BENTOMAT ST	199830030	00007873	1.07	15.20	124.80	30.80	22.80	27.00	12.48
030-BENTOMAT ST	199830030	00007861	1.09	15.20	124.80	23.90	24.40	26.00	12.72
030-BENTOMAT ST	199830030	00007860	1.09	15.20	124.80	23.90	24.40	26.00	12.72
030-BENTOMAT ST	199830030	00007859	1.09	15.20	124.80	23.90	24.40	26.00	12.72
030-BENTOMAT ST	199830030	00007746	1.02	14.00	109.20	42.30	23.10	25.00	13.02
030-BENTOMAT ST	199830030	00007671	1.11	12.40	111.60	46.30	22.90	24.00	13.40
030-BENTOMAT ST	199829030	00007634	1.01	13.60	116.80	34.80	24.70	30.00	12.44
030-BENTOMAT ST	199829030	00007626	1.01	13.60	116.80	37.80	24.70	30.00	12.44
030-BENTOMAT ST	199829030	00007619	1.01*	13.60	116.80	37.80*	24.70*	30.00*	12.44*
030-BENTOMAT ST	199829030	00007609	1.07	13.60	116.80	36.50	23.80	33.00	14.18
030-BENTOMAT ST	199829030	00007608	1.07	13.60	116.80	36.50	23.80	33.00	14.18
030-BENTOMAT ST	199829030	00007607	1.07	13.60	116.80	36.50	23.80	33.00	14.18
030-BENTOMAT ST	199829030	00007600	1.04	13.60	116.80	28.60	24.31	29.00	12.78

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

000196

2061

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087498

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007881	1.01	15.20	124.80	34.60	24.50	30.00	13.98
030-BENTOMAT ST	199830030	00007880	1.01*	15.20	124.80	34.60*	24.50*	30.00*	13.98*
030-BENTOMAT ST	199830030	00007875	1.07	15.20	124.80	30.80	22.80	27.00	12.48
030-BENTOMAT ST	199830030	00007874	1.07	15.20	124.80	30.80	22.80	27.00	12.48
030-BENTOMAT ST	199830030	00007872	1.07	15.20	124.80	30.80	22.80	27.00	12.48
030-BENTOMAT ST	199830030	00007871	1.07	15.20	124.80	30.80	22.80	27.00	12.48
030-BENTOMAT ST	199830030	00007870	1.07	15.20	124.80	30.80*	22.80	27.00	12.48
030-BENTOMAT ST	199830030	00007858	1.09	15.20	124.80	23.90	24.40	26.00	12.72
030-BENTOMAT ST	199830030	00007845	1.02	15.20	124.80	29.90	23.10	26.00	12.58
030-BENTOMAT ST	199830030	00007838	1.02	15.20	124.80	29.90*	23.10	26.00	12.58
030-BENTOMAT ST	199830030	00007829	1.02	15.20	124.80	26.10	26.70	26.00	12.68
030-BENTOMAT ST	199830030	00007707	1.05	12.40	111.60	35.30	24.50	24.00	13.08
030-BENTOMAT ST	199829030	00007621	1.01	13.60	116.80	37.80	24.70	30.00	12.44
030-BENTOMAT ST	199829030	00007620	1.01	13.60	116.80	37.80	24.70	30.00	12.44

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

000197

COLLOID ENVIRONMENTAL TECH CO

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087499

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007878	1.07	15.20	124.80	30.80	22.80	27.00	12.48
030-BENTOMAT ST	199830030	00007877	1.07	15.20	124.80	30.80	22.80	27.00	12.48
030-BENTOMAT ST	199830030	00007876	1.07	15.20	124.80	30.80	22.80	27.00	12.48
030-BENTOMAT ST	199830030	00007869	1.07	15.20	124.80	30.80	22.80	27.00	12.48
030-BENTOMAT ST	199830030	00007862	1.07*	15.20	124.80	30.80*	22.80*	27.00*	12.48*
030-BENTOMAT ST	199830030	00007850	1.09	15.20	124.80	24.40	24.40	26.00	12.72
030-BENTOMAT ST	199830030	00007848	1.09	15.20	124.80	24.40	24.40	26.00	12.72
030-BENTOMAT ST	199830030	00007847	1.09	15.20	124.80	24.40	24.40	26.00	12.72
030-BENTOMAT ST	199830030	00007832	1.02	15.20	124.80	31.10	23.10	26.00	12.58
030-BENTOMAT ST	199830030	00007831	1.02	15.20	124.80	31.10	23.10	26.00	12.58
030-BENTOMAT ST	199830030	00007822	1.02	15.20	124.80	26.10*	26.70	26.00	12.68
030-BENTOMAT ST	199830030	00007815	1.02	15.20	124.80	30.30	26.70	26.00	12.68
030-BENTOMAT ST	199829030	00007618	1.07	13.60	116.80	31.10	23.80	33.00	14.18
030-BENTOMAT ST	199829030	00007617	1.07	13.60	116.80	31.10	23.80	33.00	14.18

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

000198

2061

COLLOID ENVIRONMENTAL TECH CO

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087500

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007889	1.01	15.20	124.80	49.60	24.50	30.00	13.98
030-BENTOMAT ST	199830030	00007887	1.01	15.20	124.80	34.60	24.50	30.00	13.98
030-BENTOMAT ST	199830030	00007868	1.07	15.20	124.80	30.80	22.80	27.00	12.48
030-BENTOMAT ST	199830030	00007867	1.07	15.20	124.80	30.80	22.80	27.00	12.48
030-BENTOMAT ST	199830030	00007866	1.07	15.20	124.80	30.80	22.80	27.00	12.48
030-BENTOMAT ST	199830030	00007852	1.09	15.20	124.80	24.40	24.40	26.00	12.72
030-BENTOMAT ST	199830030	00007851	1.09	15.20	124.80	24.40	24.40	26.00	12.72
030-BENTOMAT ST	199830030	00007849	1.09	15.20	124.80	24.40	24.40	26.00	12.72
030-BENTOMAT ST	199830030	00007835	1.02	15.20	124.80	31.10	23.10	26.00	12.58
030-BENTOMAT ST	199830030	00007833	1.02	15.20	124.80	31.10	23.10	26.00	12.58
030-BENTOMAT ST	199830030	00007818	1.02	15.20	124.80	30.30	26.70	26.00	12.68
030-BENTOMAT ST	199830030	00007817	1.02	15.20	124.80	30.30	26.70	26.00	12.68
030-BENTOMAT ST	199830030	00007816	1.02	15.20	124.80	30.30	26.70	26.00	12.68

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

000189

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087501

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007893	1.01	15.20	124.80	49.60	24.50	30.00	13.98
030-BENTOMAT ST	199830030	00007892	1.01	15.20	124.80	49.60	24.50	30.00	13.98
030-BENTOMAT ST	199830030	00007891	1.01	15.20	124.80	49.60	24.50	30.00	13.98
030-BENTOMAT ST	199830030	00007865	1.07	15.20	124.80	30.80	22.80	27.00	12.48
030-BENTOMAT ST	199830030	00007864	1.07	15.20	124.80	30.80	22.80	27.00	12.48
030-BENTOMAT ST	199830030	00007863	1.07	15.20	124.80	30.80	22.80	27.00	12.48
030-BENTOMAT ST	199830030	00007855	1.09	15.20	124.80	23.90	24.40	26.00	12.72
030-BENTOMAT ST	199830030	00007853	1.09	15.20	124.80	24.40	24.40	26.00	12.72
030-BENTOMAT ST	199830030	00007846	1.09*	15.20	124.80	24.40*	24.40*	26.00	12.72*
030-BENTOMAT ST	199830030	00007839	1.02	15.20	124.80	29.90	23.10	26.00	12.58
030-BENTOMAT ST	199830030	00007836	1.02	15.20	124.80	31.10	23.10	26.00	12.58
030-BENTOMAT ST	199830030	00007830	1.02*	15.20	124.80	31.10*	23.10*	26.00	12.58*
030-BENTOMAT ST	199830030	00007820	1.02	15.20	124.80	30.30	26.70	26.00	12.68
030-BENTOMAT ST	199830030	00007819	1.02	15.20	124.80	30.30	26.70	26.00	12.68

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

000200

2061

QCG#FT2 QCT#FT2
8/04/98 7:30:31

COLLOID ENVIRONMENTAL TECH CO

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087502

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007897	.94*	15.20	137.40*	40.70*	24.90*	34.00*	13.06*
030-BENTOMAT ST	199830030	00007896	1.01	15.20	124.80	49.60	24.50	30.00	13.98
030-BENTOMAT ST	199830030	00007894	1.01	15.20	124.80	49.60	24.50	30.00	13.98
030-BENTOMAT ST	199830030	00007857	1.09	15.20	124.80	23.90	24.40	26.00	12.72
030-BENTOMAT ST	199830030	00007856	1.09	15.20	124.80	23.90	24.40	26.00	12.72
030-BENTOMAT ST	199830030	00007854	1.09	15.20	124.80	23.90*	24.40	26.00	12.72
030-BENTOMAT ST	199830030	00007844	1.02	15.20	124.80	29.90	23.10	26.00	12.58
030-BENTOMAT ST	199830030	00007842	1.02	15.20	124.80	29.90	23.10	26.00	12.58
030-BENTOMAT ST	199830030	00007841	1.02	15.20	124.80	29.90	23.10	26.00	12.58
030-BENTOMAT ST	199830030	00007840	1.02	15.20	124.80	29.90	23.10	26.00	12.58
030-BENTOMAT ST	199830030	00007824	1.02	15.20	124.80	26.10	26.70	26.00	12.68
030-BENTOMAT ST	199830030	00007823	1.02	15.20	124.80	26.10	26.70	26.00	12.68
030-BENTOMAT ST	199830030	00007821	1.02	15.20	124.80	30.30	26.70	26.00	12.68
030-BENTOMAT ST	199830030	00007814	1.02*	15.20*	124.80*	30.30*	26.70*	26.00*	12.68*

NOTE:
An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

SLIGHTLY EXCEED SPECS, BUT OKAY.

*** End of Report ***

$\gamma_{wet} = 0.94(1+0.249)$
$= 1.17\ lb/ft^2$ at 24.9%
$> 1.00\ lb/ft^2$ at 25%

000201

QCG#FT2 QCT#FT2
8/04/98 7:31:02

COLLOID ENVIRONMENTAL TECH CO

GCL QUALITY DATA

FAIRMOUNT,GA
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

O R D E R # 000087503

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25% Typical ASTM D 4643	FREE SWELL 24 ms/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
030-BENTOMAT ST	199830030	00007895	1.01	15.20	124.80	49.60	24.50	30.00	13.98
030-BENTOMAT ST	199830030	00007843	1.02	15.20	124.80	29.90	23.10	26.00	12.58
030-BENTOMAT ST	199830030	00007827	1.02	15.20	124.80	26.10	26.70	26.00	12.68
030-BENTOMAT ST	199830030	00007826	1.02	15.20	124.80	26.10	26.70	26.00	12.68
030-BENTOMAT ST	199830030	00007825	1.02	15.20	124.80	26.10	26.70	26.00	12.68
030-BENTOMAT ST	199830030	00007642	1.02	15.20	124.80	26.10	26.70	30.00	13.02
TOTAL # of QC TESTS			19			35	20	14	18

NOTE:
An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

2061

- Free Swell and Fluid Loss do not meet the frequency requirements.
- Number of rolls tested and number of lots were not in accordance with sampling frequency of 1 per 40,000 square feet.

000202

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

June 26, 1998

Cetco-Fairmont
P.O. Box 88
234 Gordon Street
Fairmont, GA 30139

RE: Bill Of Lading #: 174930
PO# 0-DH1-20810

This is to certify that Style 82 Tex, a woven polypropylene fabric produced by Synthetic Industries, will meet the following certifiable minimum average values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level.

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS	S.I. UNITS
MASS PER UNIT AREA	ASTM D-5261	3.2 oz/yd^2	105 g/m^2
TENSILE STRENGTH	ASTM D-4632	135 X 135 LBS	600 X 600 N
ELONGATION	ASTM D-4632	15 X 15 %	
PUNCTURE STRENGTH	ASTM D-4833	70 LBS	310 N
MULLEN BURST	ASTM D-3786	265 PSI	1820 kPa
TRAPEZOIDAL TEAR	ASTM D-4533	45 X 45 LBS	200 X 200 N
A.O.S.	ASTM D-4751	40 US STD SIEVE	0.425 mm
PERMITTIVITY	ASTM D-4491	0.08 SEC^{-1}	
UV RESISTANCE	ASTM D-4355	90 %	

(Strength Retained After 150 Hours Xenon Arc Weatherometer)

Sincerely,

Randy Johnson
Technical Manager, Woven Geotextile Products

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery it shall be of the quality and specifications stated herein. ANY IMPLIED WARRANTY Of FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any recommendations made by the Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published specifications, and the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous Data Sheets for this style and is subject to change without notice. The effective date for this product data is 04/19/96.

000203

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

ISO 9002 CERTIFIED World Class Quality

L:174930

Style: 82-TEX

ROLL #	ASTM D-4632 GRAB TENSILE (LBS) W x F	ASTM D-4632 ELONGATION (%) W x F	ASTM D-3786 MULLEN BURST PSI	ASTM D-5261 MASS/UNIT AREA OZ/SQ YARD
7183604	167 x 163	25 x 25	313	3.5
7237663	159 x 155	24 x 24	320	3.5
7244950	140 x 152	22 x 24	323	3.5
7249354	143 x 139	24 x 22	310	3.4
7249762	152 x 139	23 x 19	320	3.5
7250488	154 x 157	19 x 21	298	3.5
7251494	163 x 161	23 x 24	326	3.6
7254969	160 x 157	23 x 22	313	3.5
7255739	165 x 164	24 x 25	338	3.6
7342788	178 x 146	24 x 24	345	3.4
7347342	169 x 144	24 x 25	336	3.4
7350340	179 x 150	25 x 27	345	3.4
7360184	171 x 143	26 x 29	313	3.3
7360509	157 x 148	23 x 24	338	3.4
7360510	160 x 149	22 x 24	360	3.2
7360516	162 x 145	21 x 23	336	3.4
7363893	159 x 143	24 x 25	330	3.4
7363894	153 x 153	23 x 26	363	3.5
7363895	162 x 166	22 x 28	336	3.5
7368919	167 x 152	23 x 24	328	3.4
7368923	168 x 158	23 x 26	366	3.5
7368924	174 x 158	23 x 27	356	3.5
7370760	148 x 135	20 x 23	308	3.6
7370762	153 x 147	20 x 24	346	3.4
7371471	169 x 143	24 x 28	315	3.5
7371473	171 x 138	23 x 24	315	3.5
7371479	169 x 137	24 x 25	316	3.5
7371813	168 x 135	23 x 24	346	3.4
7375851	155 x 148	20 x 23	333	3.4
7375853	161 x 147	22 x 23	328	3.4
7375854	163 x 147	23 x 23	331	3.5
7375855	159 x 148	23 x 26	340	3.6
7375856	157 x 156	22 x 25	326	3.6
7376471	173 x 147	24 x 23	336	3.4
7377278	153 x 151	22 x 25	303	3.5
7377279	154 x 153	24 x 25	306	3.5
7378419	169 x 167	24 x 27	340	3.6

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

SYNTHETIC INDUSTRIES
Geosynthetic Products Division

March 27, 1998

Cetco-Fairmont
P.O. Box 88
234 Gordon Street
Fairmont, GA 30139

RE: Bill Of Lading #: 171526
PO# 0-DH1-20008

This is to certify that Style 82 Tex, a woven polypropylene fabric produced by Synthetic Industries, will meet the following certifiable minimum average values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level.

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS	S.I. UNITS
MASS PER UNIT AREA	ASTM D-5261	3.2 oz/yd^2	105 g/m^2
TENSILE STRENGTH	ASTM D-4632	135 X 135 LBS	600 X 600 N
ELONGATION	ASTM D-4632	15 X 15 %	
PUNCTURE STRENGTH	ASTM D-4833	70 LBS	310 N
MULLEN BURST	ASTM D-3786	265 PSI	1820 kPa
TRAPEZOIDAL TEAR	ASTM D-4533	45 X 45 LBS	200 X 200 N
A.O.S.	ASTM D-4751	40 US STD SIEVE	0.425 mm
PERMITTIVITY	ASTM D-4491	0.08 SEC^{-1}	
UV RESISTANCE	ASTM D-4355	90 %	

(Strength Retained After 150 Hours Xenon Arc Weatherometer)

Sincerely,

Randy Johnson
Technical Manager, Woven Geotextile Products

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery it shall be of the quality and specifications stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any recommendations made by the Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published specifications, and the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous Data Sheets for this style and is subject to change without notice. The effective date for this product data is 04/19/96.

Synthetic Industries, Inc.
4019 Industry Drive • Chattanooga, Tennessee • 37416 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

ISO 9002 CERTIFIED World Class Quality

:171526

Style: 82-TEX

ROLL #	ASTM D-4632 GRAB TENSILE (LBS) W x F	ASTM D-4632 ELONGATION (%) W x F	ASTM D-3786 MULLEN BURST PSI	ASTM D-5261 MASS/UNIT AREA OZ/SQ YARD
7256767	141 x 147	21 x 22	300	3.6
7256768	143 x 139	21 x 21	313	3.5
7263243	146 x 145	23 x 27	316	3.5
7263244	151 x 153	22 x 26	316	3.5
7263255	143 x 148	21 x 25	316	3.5
7263256	141 x 154	22 x 25	285	3.5
7263742	156 x 161	24 x 25	348	3.7
7263743	159 x 151	23 x 23	346	3.5
7263745	159 x 150	26 x 28	310	4.0
7265036	145 x 144	21 x 22	316	3.5
7265037	154 x 149	22 x 25	333	3.6
7265039	144 x 145	23 x 23	313	3.5
7266481	154 x 167	26 x 28	316	3.5
7266606	163 x 157	24 x 26	323	3.7
7266609	156 x 150	24 x 25	323	3.5
7266610	162 x 155	23 x 24	323	3.5
7267514	171 x 159	25 x 24	326	3.6
7267515	161 x 152	24 x 26	335	3.5
7268511	147 x 140	22 x 21	338	3.5
7268514	153 x 166	24 x 25	330	3.5
7268515	147 x 172	21 x 25	333	3.5
7268597	164 x 147	26 x 24	326	3.5
7268599	157 x 160	23 x 29	315	3.5
7268600	163 x 144	26 x 24	316	3.5
7268601	164 x 153	24 x 26	335	3.5
7272267	148 x 153	22 x 26	305	3.5
7272926	151 x 145	23 x 26	315	3.5
7272927	154 x 153	25 x 27	321	3.5
7273890	155 x 149	24 x 26	323	3.6
7273891	151 x 154	26 x 29	320	3.5
7273892	154 x 159	26 x 29	323	3.5
7275281	142 x 147	23 x 25	296	3.5
7276009	156 x 149	23 x 27	298	3.5
7276010	155 x 156	25 x 28	315	3.5
7279650	162 x 153	23 x 24	343	3.5
7279764	152 x 143	24 x 23	311	3.5
7280345	162 x 155	23 x 25	326	3.5

Synthetic Industries, Inc.
4019 Industry Drive • Chattanooga, Tennessee • 37416 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

SYNTHETIC INDUSTRIES
Geosynthetic Products Division

April 8, 1998

Cetco-Fairmont
P.O. Box 88
234 Gordon Street
Fairmont, GA 30139

RE: Bill Of Lading #: 171968
PO# 0-DH1-20080

This is to certify that Style 82 Tex, a woven polypropylene fabric produced by Synthetic Industries, will meet the following certifiable minimum average values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level.

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS	S.I. UNITS
MASS PER UNIT AREA	ASTM D-5261	3.2 oz/yd^2	105 g/m^2
TENSILE STRENGTH	ASTM D-4632	135 X 135 LBS	600 X 600 N
ELONGATION	ASTM D-4632	15 X 15 %	
PUNCTURE STRENGTH	ASTM D-4833	70 LBS	310 N
MULLEN BURST	ASTM D-3786	265 PSI	1820 kPa
TRAPEZOIDAL TEAR	ASTM D-4533	45 X 45 LBS	200 X 200 N
A.O.S.	ASTM D-4751	40 US STD SIEVE	0.425 mm
PERMITTIVITY	ASTM D-4491	0.08 SEC^{-1}	
UV RESISTANCE	ASTM D-4355	90 %	
(Strength Retained After 150 Hours Xenon Arc Weatherometer)			

Sincerely,

Randy Johnson
Technical Manager, Woven Geotextile Products

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery it shall be of the quality and specifications stated herein. ANY IMPLIED WARRANTY Of FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any recommendations made by the Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published specifications, and the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous Data Sheets for this style and is subject to change without notice. The effective date for this product data is 04/19/96.

Synthetic Industries, Inc.
4019 Industry Drive • Chattanooga, Tennessee • 37416 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

2061

ISO 9002 CERTIFIED World Class Quality

OL:171968

Style: 82-TEX

ILL #	ASTM D-4632 GRAB TENSILE (LBS) W x F	ASTM D-4632 ELONGATION (%) W x F	ASTM D-3786 MULLEN BURST PSI	ASTM D-4533 TRAP TEAR (LBS) W x F
4931	150 x 151	22 x 23	320	64 x 84
4932	142 x 140	26 x 24	313	60 x 74
4942	149 x 137	21 x 22	306	60 x 63
0942	164 x 154	27 x 27	323	70 x 88
1326	153 x 136	23 x 23	333	63 x 67
2889	162 x 155	23 x 25	325	68 x 75
2890	152 x 137	22 x 25	300	69 x 78
2891	164 x 150	23 x 25	315	72 x 83
4077	151 x 154	24 x 27	296	63 x 73
7877	168 x 152	25 x 25	320	68 x 74
9535	162 x 139	21 x 21	316	75 x 78
9615	163 x 147	25 x 23	336	66 x 70
0093	157 x 155	23 x 26	323	65 x 82
[illegible]22	154 x 141	21 x 22	303	64 x 75
[illegible]2	149 x 149	25 x 26	316	64 x 72
9954	166 x 144	25 x 21	323	68 x 74
5335	145 x 145	21 x 23	303	63 x 80
5934	149 x 156	24 x 24	350	69 x 88
7664	156 x 151	23 x 24	333	70 x 80
8727	154 x 160	22 x 23	316	63 x 76
8756	159 x 154	25 x 23	335	70 x 86
4956	138 x 138	20 x 22	316	58 x 73
5837	158 x 167	23 x 24	341	70 x 92
8946	177 x 160	25 x 25	323	71 x 96
9223	163 x 150	23 x 24	306	74 x 93
9355	148 x 137	21 x 21	306	63 x 73
9757	160 x 155	24 x 23	331	66 x 81
0390	151 x 142	23 x 22	298	70 x 81
0393	247 x 143	22 x 21	323	63 x 69
1495	159 x 160	24 x 25	318	66 x 86
3175	158 x 152	24 x 26	305	70 x 87
3176	148 x 141	25 x 24	322	65 x 77
4974	153 x 140	22 x 19	308	64 x 68
6759	142 x 144	20 x 23	274	65 x 71
3724	171 x 160	26 x 22	330	69 x 86
[illegible]5	156 x 157	24 x 25	316	73 x 89
[illegible]6	152 x 160	25 x 24	308	70 x 78

000208

Synthetic Industries, Inc.
4019 Industry Drive • Chattanooga, Tennessee • 37416 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-521-0444

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

BOL:171968

Style:82-TEX

ROLL #	ASTM D-4632 GRAB TENSILE (LBS) W x F	ASTM D-4632 ELONGATION (%) W x F	ASTM D-3786 MULLEN BURST PSI	ASTM D-4533 TRAP TEAR (LBS) W x F
7286654	160 x 158	22 x 26	325	67 x 82
7238227	168 x 166	26 x 28	335	82 x 98
7249761	155 x 170	24 x 27	322	73 x 88

000209

Synthetic Industries, Inc.
4019 Industry Drive • Chattanooga, Tennessee • 37416 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

SYNTHETIC INDUSTRIES

2061

Geosynthetic Products Division

July 21, 1998

American Coloid-Fairmont, GA
P.O. Box 88
234 Gordon Street
Fairmont, GA 30139

RE: Bill Of Lading #:175788
PO#0-DM1-20976

This is to certify that Style 82 Tex, a woven polypropylene fabric produced by Synthetic Industries, will meet the following certifiable minimum average values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level.

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS	S.I. UNITS
MASS PER UNIT AREA	ASTM D-5261	3.2 oz/yd²	105 g/m²
TENSILE STRENGTH	ASTM D-4632	135 X 135 LBS	600 X 600 N
ELONGATION	ASTM D-4632	15 X 15 %	
PUNCTURE STRENGTH	ASTM D-4833	70 LBS	310 N
MULLEN BURST	ASTM D-3786	265 PSI	1820 kPa
TRAPEZOIDAL TEAR	ASTM D-4533	45 X 45 LBS	200 X 200 N
A.O.S.	ASTM D-4751	40 US STD SIEVE	0.425 mm
PERMITTIVITY	ASTM D-4491	0.08 SEC⁻¹	
UV RESISTANCE	ASTM D-4355	90 %	

(Strength Retained After 150 Hours Xenon Arc Weatherometer)

Sincerely,

Randy Johnson
Technical Manager, Woven Geotextile Products

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery it shall be of the quality and specifications stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any recommendations made by the Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published specifications, and the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous Data Sheets for this style and is subject to change without notice. The effective date for this product data is 1/19/96.

000210

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423-899-0444 • Fax • 423-899-7819 • 1-800-621-0444

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

:175788

Style: 82-TEX

ROLL #	ASTM D-4632 GRAB TENSILE (LBS) W x F	ASTM D-4632 ELONGATION (%) W x F	ASTM D-3786 MULLEN BURST PSI	ASTM D-4533 TRAP TEAR (LBS) W x F	ASTM D-5261 MASS/UNIT AREA OZ/SQ YD	Lot #
7182221	165 x 165	25 x 27	326	72 x 83	3.4	372
7197665	162 x 151	24 x 24	311	70 x 74	3.3	207
7327306	160 x 143	23 x 27	316	117 x123	3.4	372
7342790	167 x 139	25 x 26	353	74 x 83	3.3	375
7380479	177 x 164	23 x 25	353	81 x 94	3.6	375
7380483	163 x 155	27 x 30	316	70 x 95	3.4	375
7380484	178 x 152	24 x 27	330	73 x 86	3.4	375
7381596	167 x 155	27 x 29	316	73 x 96	3.5	395
7381597	165 x 153	22 x 28	330	63 x 95	3.5	395
7381598	169 x 156	22 x 26	301	77 x 83	3.4	395
7386147	174 x 147	23 x 25	325	71 x 84	3.4	394
7386148	166 x 159	29 x 33	333	76 x 95	3.5	394
7386149	169 x 164	27 x 31	350	79 x 07	3.6	394
7386150	157 x 154	25 x 28	318	78 x 84	3.5	394
7386785	168 x 140	22 x 22	340	71 x 74	3.4	23[illegible]
73[illegible]91	165 x 143	26 x 28	310	73 x 87	3.5	23[illegible]
73[illegible]40	157 x 148	27 x 30	293	77 x 84	3.5	409
7390041	155 x 169	26 x 24	320	91 x 77	3.4	409
7390042	170 x 153	23 x 27	285	78 x 92	3.4	409
7390045	166 x 155	22 x 24	308	69 x 73	3.2	409
7390046	179 x 148	25 x 28	311	76 x 77	3.3	409
7390551	149 x 147	25 x 27	321	69 x 81	3.5	372
7390552	172 x 149	22 x 26	316	60 x 78	3.4	372
7390555	160 x 158	25 x 29	310	72 x 85	3.5	372
7390557	169 x 155	23 x 25	321	71 x 80	3.5	372
7393143	155 x 143	26 x 31	303	74 x 81	3.4	371
7394762	168 x 148	24 x 26	341	75 x101	3.4	371
7394768	167 x 146	23 x 27	315	70 x 81	3.4	371
7394769	170 x 172	23 x 31	306	68 x 90	3.6	371
7394772	150 x 147	26 x 29	313	70 x 87	3.4	375
7394775	165 x 151	25 x 28	316	68 x 76	3.4	375
7394777	175 x 153	26 x 27	333	67 x 79	3.4	375
7394779	153 x 149	23 x 27	323	69 x 87	3.5	375
7398295	183 x 173	24 x 25	325	67 x 79	3.6	395
7398296	168 x 152	22 x 27	300	79 x 86	3.5	395
7401638	166 x 145	22 x 25	306	55 x 75	3.4	230
7401639	153 x 151	22 x 25	326	72 x 91	3.5	230

000211

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

SYNTHETIC INDUSTRIES

2061

Geosynthetic Products Division

:175788

Style: 82-TEX

#	ASTM D-4632 GRAB TENSILE (LBS) W x F	ASTM D-4632 ELONGATION (%) W x F	ASTM D-3786 MULLEN BURST PSI	ASTM D-4533 TRAP TEAR (LBS) W x F	ASTM D-5261 MASS/UNIT AREA OZ/SQ YD	Lot #
.859	174 x 154	25 x 28	341	69 x 92	3.6	394
.868	159 x 140	23 x 26	323	73 x 91	3.3	394

000212

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

LINQ
INDUSTRIAL FABRICS, INC.

GEOTEXTILE DIVISION
2550 WEST FIFTH NORTH STREET
SUMMERVILLE
SOUTH CAROLINA 29483-9669
803/875-8277
FAX 803/875-8276

06/26/98

COLLOID ENVIRONMENTAL TECH CO
P O BOX 88
FAIRMOUNT GA 30139

Dear Sir:

This letter is to certify that Style 31109 supplied by LINQ Industrial Fabrics from Order No. 10779270 meets the fabric properties listed below:

Fabric Properties	Test Method	MARV
MASS (OZ/YD2)	ASTM D-5261	3.3
GRAB TENSILE (LBS)	ASTM D-4632	109
GRAB ELONGATION (%)	ASTM D-4632	15

Sincerely,

Warren Sickler
Technical Service Engineer

SHIPPING LIST & DELIVERY RECEIPT

550 WEST FIFTH ...
SUMMERVILLE, S.C. 29483

153802 000001
CETCO
234 GORDON ST.
FAIRMOUNT, GA 30139
PH #706-337-5316

GTF 907

ORDER NO. 10779270

Page 1

DATE	PURCHASE ORDER NO.
06/24/98	0-DH1-20785/PC 1

2061

1. PP/FOB ORIG
2. PP/FOB DEST
3. COLL/FOB ORI
4. COLL/FOB DEST

FRT TERMS: 1

NET WT.: 27,050 TOTAL LYDS:

GROSS WT.: 27,390 TOTAL SYDS:

PALMETTO B/L#16337

STYLE	QTY. SHIPPED	UNIT	DESCRIPTION (ROLL NO. / QTY. / WEIGHT)
L31109-101840	140596.35	SY	BLACK CETCO 16X13 184" - 1ST**
			<L011482> 5433.11 1063 1045
			<L011490> 8152.22 1595 1568
			<L203349> 8821.77 1726 1697
			<L206740> 8448.66 1653 1626
			<L208880> 6542.22 1280 1259
			<L208883> 6225.33 1218 1198
			<L209287> 8351.55 1634 1607
			<L209289> 7779.11 1522 1497
			<L209290> 6271.33 1227 1207
			<L210243> 9133.55 1787 1757
			<L210244> 6056.66 1185 1165
			<L210504> 6532.00 1278 1257
			<L200856> 6705.77 1312 1290
			<L210618> 7728.00 1512 1487
			<L211974> 7395.77 1447 1423
			<L211975> 6608.66 1293 1271
			<L542055> 8162.44 1597 1570
			<L544765> 7303.77 1429 1405
			<L548377> 2887.77 565 556
			<L900145> 6056.66 1185 1165
			TOTAL 27050
			> 20 units
CO			PRICES MEET COMPETITIVE OFFER

RBlackwell 6

000214

SPECIAL INSTRUCTIONS:

Received By _____ Date _____

Driver's Signature _____ Date _____

NO CLAIMS WILL BE HONORED FOR SHORTAGES UNLESS IDENTIFIED ON THIS SHIPPING LIST. LINQ INDUSTRIAL FABRICS MUST BE NOTIFIED PROMPTLY OF ANY DISCREPANCY.

CONTROL NO.

CARRIER'S COPY

L53931

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

July 6, 1998

Cetco-Fairmont
P.O. Box 88
234 Gordon Street
Fairmont, GA 30139

RE: Bill Of Lading #: 175148
PO# 0-DH1-20850

This is to certify that Style 82 Tex, a woven polypropylene fabric produced by Synthetic Industries, will meet the following certifiable minimum average values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level.

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS	S.I. UNITS
MASS PER UNIT AREA	ASTM D-5261	3.2 oz/yd^2	105 g/m^2
TENSILE STRENGTH	ASTM D-4632	135 X 135 LBS	600 X 600 N
ELONGATION	ASTM D-4632	15 X 15 %	
PUNCTURE STRENGTH	ASTM D-4833	70 LBS	310 N
MULLEN BURST	ASTM D-3786	265 PSI	1820 kPa
TRAPEZOIDAL TEAR	ASTM D-4533	45 X 45 LBS	200 X 200 N
A.O.S.	ASTM D-4751	40 US STD SIEVE	0.425 mm
PERMITTIVITY	ASTM D-4491	0.08 SEC^{-1}	
UV RESISTANCE	ASTM D-4355	90 %	

(Strength Retained After 150 Hours Xenon Arc Weatherometer)

Sincerely,

Randy Johnson
Technical Manager, Woven Geotextile Products

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery it shall be of the quality and specifications stated herein. ANY IMPLIED WARRANTY Of FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any recommendations made by the Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published specifications, and the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous Data Sheets for this style and is subject to change without notice. The effective date for this product data is 04/19/96.

000215

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

2061

ISO 9002 CERTIFIED World Class Quality

L:175148

Style: 82-TEX

ROLL #	ASTM D-4632 GRAB TENSILE (LBS) W x F	ASTM D-4632 ELONGATION (%) W x F	ASTM D-3786 MULLEN BURST PSI	ASTM D-5261 MASS/UNIT AREA OZ/SQ YARD
7233427	155 x 150	24 x 23	313	3.5
7237315	155 x 140	23 x 23	313	3.3
7285377	165 x 160	24 x 23	350	3.5
7297920	143 x 154	22 x 28	303	3.4
7354172	167 x 135	21 x 24	330	3.2
7368925	170 x 146	25 x 25	330	3.3
7368926	170 x 152	23 x 27	338	3.5
7368928	170 x 162	23 x 28	346	3.5
7370763	147 x 148	22 x 26	323	3.6
7370764	151 x 139	20 x 22	345	3.5
7370765	148 x 145	20 x 26	308	3.6
7371470	158 x 137	21 x 23	341	3.5
7371474	173 x 156	23 x 26	306	3.6
7371475	169 x 142	24 x 28	325	3.6
7371476	166 x 156	23 x 24	320	3.6
7375858	167 x 156	22 x 27	346	3.6
7375859	156 x 144	23 x 27	336	3.6
7376472	171 x 158	22 x 26	343	3.5
7376473	182 x 153	24 x 25	358	3.4
7376474	176 x 155	23 x 27	303	3.5
7376475	147 x 153	23 x 28	356	3.4
7377280	158 x 154	22 x 25	333	3.5
7377281	159 x 158	23 x 24	330	3.5
7377282	156 x 162	23 x 26	328	3.5
7378420	175 x 156	25 x 26	353	3.4
7380478	183 x 160	26 x 28	333	3.5
7380480	177 x 162	24 x 25	343	3.4
7380487	187 x 159	25 x 26	336	3.4
7381399	148 x 143	22 x 25	288	3.4
7381507	164 x 142	24 x 26	346	3.5
7381527	173 x 151	23 x 23	343	3.5
7381590	175 x 158	24 x 26	348	3.4
7381592	157 x 146	24 x 27	316	3.4

000216

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

June 9, 1998

Cetco-Fairmont
P.O. Box 88
234 Gordon Street
Fairmont, GA 30139

RE: Bill Of Lading #: 174160
PO# 0-DH1-20688

This is to certify that Style 82 Tex, a woven polypropylene fabric produced by Synthetic Industries, will meet the following certifiable minimum average values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level.

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS	S.I. UNITS
MASS PER UNIT AREA	ASTM D-5261	3.2 oz/yd^2	105 g/m^2
TENSILE STRENGTH	ASTM D-4632	135 X 135 LBS	600 X 600 N
ELONGATION	ASTM D-4632	15 X 15 %	
PUNCTURE STRENGTH	ASTM D-4833	70 LBS	310 N
MULLEN BURST	ASTM D-3786	265 PSI	1820 kPa
TRAPEZOIDAL TEAR	ASTM D-4533	45 X 45 LBS	200 X 200 N
A.O.S.	ASTM D-4751	40 US STD SIEVE	0.425 mm
PERMITTIVITY	ASTM D-4491	0.08 SEC^{-1}	
UV RESISTANCE	ASTM D-4355	90 %	

(Strength Retained After 150 Hours Xenon Arc Weatherometer)

Sincerely,

Randy Johnson
Technical Manager, Woven Geotextile Products

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery it shall be of the quality and specifications stated herein. ANY IMPLIED WARRANTY Of FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any recommendations made by the Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published specifications, and the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous Data Sheets for this style and is subject to change without notice. The effective date for this product data is 04/19/96.

000217

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

2061

ISO 9002 CERTIFIED World Class Quality

L:174160

Style: 82-TEX

ROLL #	ASTM D-4632 GRAB TENSILE (LBS) W x F	ASTM D-4632 ELONGATION (%) W x F	ASTM D-3786 MULLEN BURST PSI	ASTM D-5261 MASS/UNIT AREA OZ/SQ YARD
7180004	135 x 135	21 x 26	288	3.2
7186916	155 x 145	24 x 26	331	3.3
7194401	145 x 137	22 x 25	300	3.3
7194934	157 x 135	22 x 22	326	3.3
7202895	164 x 151	23 x 24	325	3.4
7209534	152 x 136	22 x 19	318	3.3
7226352	161 x 168	26 x 28	345	3.5
7280351	159 x 166	22 x 24	338	3.5
7326833	181 x 138	25 x 26	320	3.3
7330647	168 x 141	24 x 27	338	3.4
7330653	164 x 142	20 x 23	338	3.4
7331503	165 x 149	24 x 24	315	3.4
7341275	167 x 147	23 x 25	326	3.5
7341276	159 x 151	22 x 24	333	3.4
7341277	182 x 150	24 x 24	336	3.5
7341278	159 x 148	25 x 27	313	3.6
7341512	174 x 141	22 x 24	325	3.4
7341513	159 x 139	24 x 24	331	3.4
7341515	170 x 145	21 x 26	326	3.4
7341517	173 x 143	21 x 25	345	3.4
7342785	170 x 144	25 x 26	310	3.5
7342786	171 x 149	23 x 24	336	3.4
7342787	170 x 146	23 x 25	336	3.4
7344551	151 x 140	23 x 25	350	3.4
7345261	161 x 143	23 x 29	324	3.5
7345264	175 x 145	23 x 25	343	3.5
7345265	172 x 148	22 x 27	326	3.4
7345266	157 x 139	22 x 28	326	3.4
7345267	175 x 143	22 x 26	333	3.4
7347337	165 x 138	24 x 27	338	3.5
7347338	177 x 140	23 x 26	340	3.4
7347339	159 x 149	24 x 26	326	3.5
7347340	164 x 153	24 x 29	330	3.4
7347341	180 x 153	24 x 26	338	3.4
7349769	153 x 141	22 x 25	301	3.4
7349770	146 x 135	20 x 22	333	3.5
7350338	182 x 139	25 x 31	296	3.3

000218

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

BOL:174160

Style: 82-TEX

ROLL #	ASTM D-4632 GRAB TENSILE (LBS) W x F	ASTM D-4632 ELONGATION (%) W x F	ASTM D-3786 MULLEN BURST PSI	ASTM D-5261 MASS/UNIT AREA OZ/SQ YARD
7354393	166 x 146	26 x 29	340	3.4
7354394	178 x 141	25 x 26	326	3.4

000219

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

2061

ISO 9002 CERTIFIED World Class Quality

June 19, 1998

Cetco-Fairmont
P.O. Box 88
234 Gordon Street
Fairmont, GA 30139

RE: Bill Of Lading #: 174634
PO# 0-DH1-20776

This is to certify that Style 82 Tex, a woven polypropylene fabric produced by Synthetic Industries, will meet the following certifiable minimum average values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level.

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS	S.I. UNITS
MASS PER UNIT AREA	ASTM D-5261	3.2 oz/yd^2	105 g/m^2
TENSILE STRENGTH	ASTM D-4632	135 X 135 LBS	600 X 600 N
ELONGATION	ASTM D-4632	15 X 15 %	
PUNCTURE STRENGTH	ASTM D-4833	70 LBS	310 N
MULLEN BURST	ASTM D-3786	265 PSI	1820 kPa
TRAPEZOIDAL TEAR	ASTM D-4533	45 X 45 LBS	200 X 200 N
A.O.S.	ASTM D-4751	40 US STD SIEVE	0.425 mm
PERMITTIVITY	ASTM D-4491	0.08 SEC^{-1}	
UV RESISTANCE	ASTM D-4355	90 %	

(Strength Retained After 150 Hours Xenon Arc Weatherometer)

Sincerely,

Randy Johnson
Technical Manager, Woven Geotextile Products

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery it shall be of the quality and specifications stated herein. ANY IMPLIED WARRANTY Of FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any recommendations made by the Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published specifications, and the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous Data Sheets for this style and is subject to change without notice. The effective date for this product data is 04/19/96.

000220

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

BOL:174634

Style: 82-TEX

ROLL #	ASTM D-4632 GRAB TENSILE (LBS) W x F	ASTM D-4632 ELONGATION (%) W x F	ASTM D-3786 MULLEN BURST PSI	ASTM D-5261 MASS/UNIT AREA OZ/SQ YARD
7320212	148 x 143	23 x 25	323	3.5
7326830	167 x 140	25 x 31	320	3.5
7326831	178 x 143	24 x 26	300	3.3
7327309	139 x 152	27 x 23	311	3.5
7341202	165 x 150	26 x 27	338	3.5
7341272	167 x 137	24 x 26	315	3.4
7341280	164 x 160	23 x 26	316	3.5
7341508	153 x 138	22 x 25	313	3.5
7341509	174 x 137	22 x 25	330	3.4
7342782	168 x 145	23 x 23	316	3.5
7342791	173 x 147	22 x 26	326	3.3
7345268	163 x 143	24 x 27	316	3.5
7347344	181 x 145	23 x 26	320	3.4
7347345	161 x 157	23 x 27	328	3.6
7350341	173 x 140	26 x 29	343	3.5
7350342	172 x 154	27 x 32	310	3.5
7350343	171 x 157	25 x 32	330	3.5
7354173	161 x 147	24 x 28	321	3.7
7354174	158 x 147	24 x 26	331	3.6
7354395	165 x 139	25 x 26	336	3.5
7354396	169 x 136	22 x 23	333	3.4
7354397	158 x 135	22 x 24	323	3.5
7354399	171 x 144	21 x 24	316	3.4
7354400	174 x 152	23 x 25	303	3.6
7356908	161 x 147	21 x 26	340	3.5
7356909	158 x 147	20 x 25	315	3.5
7356910	152 x 138	21 x 25	318	3.5
7358648	180 x 160	23 x 27	366	3.5
7358649	182 x 158	23 x 27	366	3.5
7358650	178 x 158	24 x 25	355	3.5
7358651	172 x 149	25 x 28	348	3.4
7359104	151 x 136	22 x 25	328	3.5
7359105	155 x 138	27 x 27	320	3.6
7360511	177 x 169	24 x 23	326	3.7
7360512	159 x 151	22 x 29	333	3.5
7363669	163 x 145	22 x 25	333	3.5
7363670	170 x 143	22 x 27	306	3.6

000221

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

2061

ISO 9002 CERTIFIED World Class Quality

L:174634

Style: 82-TEX

ROLL #	ASTM D-4632 GRAB TENSILE (LBS) W x F	ASTM D-4632 ELONGATION (%) W x F	ASTM D-3786 MULLEN BURST PSI	ASTM D-5261 MASS/UNIT AREA OZ/SQ YARD
7363672	161 x 139	21 x 26	316	3.5

000222

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

July 2, 1998

Cetco / Fairmount
Cynthia Willix
PO Box 88
Fairmount GA 30139
BoL; 624023 PO 0-DH1-20879

This is to certify that Product GEOTEX™ 650, a nonwoven polypropylene geotextile produced by Synthetic Industries will meet the following certifiable minimum average roll values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level.

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS
Weight	ASTM D-5261	6.0 oz/yd^2
Thickness	ASTM D-5199	120 mils
Tensile Strength	ASTM D-4632	45 lbs
Elongation	ASTM D-4632	90 %
Trapezoidal Tear	ASTM D-4533	25 lbs
Mullen Burst	ASTM D-3786	190 psi
Puncture Strength	ASTM D-4833	50 lbs

Sincerely,

Sid Weiser
Technical Manager
Performance Nonwovens Division

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery it shall be of the quality and specifications stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR *PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any recommendations made by the Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published specifications, and the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous Data Sheets for this style and is subject to change without notice. The effective date for this product data is 02/1897*

Synthetic Industries, Inc.
4019 Industry Drive • Chattanooga, Tennessee • 37416 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-521-0444

Synthetic Industries
Individual Roll Data
Bill of Lading:624023

Roll Number	Style	Mass/ Unit Osy D5261	Lab Thick mils D5199	Tensile (MD) lbs D4632	Tensile (XMD) lbs D4632	Elongation (MD) % D4632	Elongation (XMD) % D4632	Trap Tear (MD) lbs D4533	Trap Tear (XMD) lbs D4533	Mullen Burst psi D3786	Punct Resist lbs D4833
5140649A	650	6.4	144	74	100	105	115	38	33	246	63
5140652A	650	6.8	144	67	115	112	124	35	36	229	67
5140661A	650	6.5	142	68		114		35		207	64
5140695A	650	7.2	142	97	152	100	109	47	47	287	95
5140726A	650	6.8	127	84	116	125	129	42	37	223	64

Synthetic Industries' current standard manufacturing quality control (MQC) testing frequency for GEOTEX nonwoven geotextiles one (1) test per 90,000 sf (8,360 sm) for index properties (mass per unit area, thickness, grab tensile and elongation, trapezoidal ear, mullen burst and puncture resistance) for styles heavier than 601 and one (1) test per 162,000 sf (15,000 sm) for index properties or style 601 and lighter. Although we strive to test our nonwoven geotextiles for apparent opening size (AOS) and ermittivity/permeability/water flow rate approximately once every 540,000 sf (50,160 sm), the actual frequency of testing for erformance properties will vary depending upon production schedules, product availability, customer requirements, job pecifications or other agreements arranged with Synthetic Industries prior to the time of purchase. If additional testing is needed to eet higher frequencies required by the project specifications, it is the purchaser's responsibility to notify Synthetic Industries nd ask for assistance in calculating the costs for the additional tests.

Once rolls of nonwoven geotextiles are produced, inspected and the test results from the frequency stated above indicates that ials produced during the production run meets our published minimum average roll values, approved rolls are shipped for rage until an order requires the material to be shipped. Since rolls are loaded at the warehouse independent of production sequence st results listed above may include data from rolls which were not shipped. However, the data provided is from the same oduction run as the rolls actually shipped on this bill of lading.

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

July 24, 1998

Cetco / Fairmount
Cynthia Willix
PO Box 88
Fairmount GA 30139
Bol: 624275 PO# O-DH1-20977

This is to certify that Product GEOTEX™ 650, a nonwoven polypropylene geotextile produced by Synthetic Industries will meet the following certifiable minimum average roll values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level.

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS
Weight	ASTM D-5261	6.0 oz/yd^2
Thickness	ASTM D-5199	120 mils
Tensile Strength	ASTM D-4632	45 lbs
Elongation	ASTM D-4632	90 %
Trapezoidal Tear	ASTM D-4533	25 lbs
Mullen Burst	ASTM D-3786	190 psi
Puncture Strength	ASTM D-4833	50 lbs

Sincerely,

Sid Weiser

Sid Weiser
Technical Manager
Performance Nonwovens Division

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery a shall be of the quality and specifications stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any recommendations made by the Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published specifications, and the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous Data Sheets for this style and is subject to change without notice. The effective date for this product data is 02/1997

Synthetic Industries, Inc.
4019 Industry Drive • Chattanooga, Tennessee • 37416 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

2061

7/23/98 14:06 Page 1

Synthetic Industries
Individual Roll Data
Bill of Lading:624275

Roll Number	Style	Mass/ Unit Osy D5261	Lab Thick mils D5199	Tensile (MD) lbs D4632	Tensile (XMD) lbs D4632	Elongation (MD) % D4632	Elongation (XMD) % D4632	Trap (MD) lbs D4533	Tear (XMD) lbs D4533	Mullen Burst psi D3786	Puncr Resist lbs D4833
S144026A	650	7.1	129	89	149	106	126	42	38	249	67
S144029A	650	6.8	125	78	124	107	123	37	37	249	65
S144035A	650	6.8	128	88	111	108	142	48	41	223	70
S144038A	650	7.4	137	84	156	99	117	43	50	299	

Bid Weiss

Synthetic Industries' current standard manufacturing quality control (MQC) testing frequency for GEOTEX nonwoven geotextiles is one (1) test per 90,000 sf (8,360 sm) for index properties (mass per unit area, thickness, grab tensile and elongation, trapezoidal tear, mullen burst and puncture resistance) for styles heavier than 601 and one (1) test per 162,000 sf (15,000 sm) for index properties for style 601 and lighter. Although we strive to test our nonwoven geotextiles for apparent opening size (AOS) and Permittivity/permeability/water flow rate approximately once every 540,000 sf (50,160 sm), the actual frequency of testing for performance properties will vary depending upon production schedules, product availability, customer requirements, job specifications or other agreements arranged with Synthetic Industries prior to the time of purchase. If additional testing is needed to meet higher frequencies required by the project specifications, it is the purchaser's responsibility to notify Synthetic Industries and ask for assistance in calculating the costs for the additional tests.

Once rolls of nonwoven geotextiles are produced, inspected and the test results from the frequency stated above indicates that materials produced during the production run meets our published minimum average roll values, approved rolls are shipped for storage until an order requires the material to be shipped. Since rolls are loaded at the warehouse independent of production sequence results listed above may include data from rolls which were not shipped. However, the data provided is from the same production run as the rolls actually shipped on this bill of lading.

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

June 23, 1998

Cetco / Fairmount
Cynthia Willix
PO Box 88
Fairmount GA 30139
BoL; 623857 PO 0-DH1-20782

This is to certify that Product GEOTEX™ 650, a nonwoven polypropylene geotextile produced by Synthetic Industries will meet the following certifiable minimum average roll values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level.

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS
Weight	ASTM D-5261	6.0 oz/yd^2
Thickness	ASTM D-5199	120 mils
Tensile Strength	ASTM D-4632	45 lbs
Elongation	ASTM D-4632	90 %
Trapezoidal Tear	ASTM D-4533	25 lbs
Mullen Burst	ASTM D-3786	190 psi
Puncture Strength	ASTM D-4833	50 lbs

Sincerely,

Sid Weiser
Technical Manager
Performance Nonwovens Division

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery it shall be of the quality and specifications stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any recommendations made by the Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published specifications, and the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous Data Sheets for this style and is subject to change without notice The effective date for this product data is 02/1897

000227

Synthetic Industries, Inc.
4019 Industry Drive • Chattanooga, Tennessee • 37416 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

2061

Synthetic Industries
Individual Roll Data
Bill of Lading:623857

Roll Number	Style	Mass/ Unit Osy D5261	Lab Thick mils D5199	Tensile (MD) lbs D4632	Tensile (XMD) lbs D4632	Elongation (MD) % D4632	Elongation (XMD) % D4632	Trap Tear (MD) lbs D4533	Trap Tear (XMD) lbs D4533	Mullen Burst psi D3786	Punct Resist lbs D4833
5140675A	650	7.2	151	57	100	119	131	31	25	219	55
5140756A	650	6.5	134	70	104	116	117	42	36	224	66
5140758A	650	6.8	129	82	114	111	119	36	44	214	74
5140760A	650	6.6	132	79	127	109	122	42	39	234	71
5140763A	650	7.5	137	93	167	110	107	51	52	220	72
5140831A	650	7.0	131	87	119	115	132	42	38	224	80

Synthetic Industries' current standard manufacturing quality control (MQC) testing frequency for GEOTEX nonwoven geotextiles ne (1) test per 90,000 sf (8,360 sm) for index properties (mass per unit area, thickness, grab tensile and elongation, trapezoidal , mullen burst and puncture resistance) for styles heavier than 601 and one (1) test per 162,000 sf (15,000 sm) for index properties style 601 and lighter. Although we strive to test our nonwoven geotextiles for apparent opening size (AOS) and mittivity/permeability/water flow rate approximately once every 540,000 sf (50,160 sm), the actual frequency of testing for formance properties will vary depending upon production schedules, product availability, customer requirements, job cifications or other agreements arranged with Synthetic Industries prior to the time of purchase. If additional testing is needed to t higher frequencies required by the project specifications, it is the purchaser's responsibility to notify Synthetic Industries for assistance in calculating the costs for the additional tests.

rolls of nonwoven geotextiles are produced, inspected and the test results from the frequency stated above indicates that erials produced during the production run meets our published minimum average roll values, approved rolls are shipped for age until an order requires the material to be shipped. Since rolls are loaded at the warehouse independent of production sequence results listed above may include data from rolls which were not shipped. However, the data provided is from the same duction run as the rolls actually shipped on this bill of lading.

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

July 20, 1998

Cetco / Fairmount
Cynthia Willix
PO Box 88
Fairmount GA 30139
Bol: 624217,624230 PO# 0-DH1-20948

This is to certify that Product GEOTEX™ 650, a nonwoven polypropylene geotextile produced by Synthetic Industries will meet the following certifiable minimum average roll values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level.

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS
Weight	ASTM D-5261	6.0 oz/yd^2
Thickness	ASTM D-5199	120 mils
Tensile Strength	ASTM D-4632	45 lbs
Elongation	ASTM D-4632	90 %
Trapezoidal Tear	ASTM D-4533	25 lbs
Mullen Burst	ASTM D-3786	190 psi
Puncture Strength	ASTM D-4833	50 lbs

Sincerely,

Sid Weiser
Technical Manager
Performance Nonwovens Division

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery it will be of the quality and specifications stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any recommendations made by the Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published specifications, and the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous Data Sheets for this style and is subject to change without notice. The effective date for this product data is 02/18/97

Synthetic Industries, Inc.
4019 Industry Drive • Chattanooga, Tennessee • 37416 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

/17/98 16:10 Page 1

2061

Synthetic Industries
Individual Roll Data
Bill of Lading:624217

Roll Number	Style	Mass/ Unit Oay D5261	Lab Thick mils D5199	Tensile (MD) lbs D4632	Tensile (XMD) lbs D4632	Elongation (MD) % D4632	Elongation (XMD) % D4632	Trap Tear (MD) lbs D4533	Trap Tear (XMD) lbs D4533	Mullen Burst psi D3786	Punct Resist lbs D4833
5143800A	650	6.7	127	104	91	97	116	53	39	254	91
5143803A	650	7.4	143	75	130	98	109	45	31	271	81
5143818A	650	6.5	130	69		94		33		233	
5143853A	650	6.7	134	76		113		36		227	

Sid Nelson

Synthetic Industries' current standard manufacturing quality control (MQC) testing frequency for GEOTEX nonwoven geotextiles is one (1) test per 90,000 sf (8,360 sm) for index properties (mass per unit area, thickness, grab tensile and elongation, trapezoidal tear, mullen burst and puncture resistance) for styles heavier than 601 and one (1) test per 162,000 sf (15,000 sm) for index properties for style 601 and lighter. Although we strive to test our nonwoven geotextiles for apparent opening size (AOS) and Permittivity/permeability/water flow rate approximately once every 540,000 sf (50,160 sm), the actual frequency of testing for performance properties will vary depending upon production schedules, product availability, customer requirements, job specifications or other agreements arranged with Synthetic Industries prior to the time of purchase. If additional testing is needed to meet higher frequencies required by the project specifications, it is the purchaser's responsibility to notify Synthetic Industries and ask for assistance in calculating the costs for the additional tests.

Once rolls of nonwoven geotextiles are produced, inspected and the test results from the frequency stated above indicates that materials produced during the production run meets our published minimum average roll values, approved rolls are shipped for storage until an order requires the material to be shipped. Since rolls are loaded at the warehouse independent of production sequence the results listed above may include data from rolls which were not shipped. However, the data provided is from the same production run as the rolls actually shipped on this bill of lading.

07/17/98 16:10 Page 1

Synthetic Industries
Individual Roll Data
Bill of Lading:624230

Roll Number	Style	Mass/ Unit Osy D5261	Lab Thick mils D5199	Tensile (MD) lbs D4632	Tensile (XMD) lbs D4632	Elongation (MD) % D4632	Elongation (XMD) % D4632	Trap Tear (MD) lbs D4533	Trap Tear (XMD) lbs D4533	Mullen Burst psi D3786	Puncr Resisc lbs D4833
5143858A	650	6.6	132	67	87	106	126	39	46	227	
5143888A	650	7.5	141	78	118	99	116	54	43	231	
5143896A	650	6.9	140	81		106		40		239	78

Ted Wilson

Synthetic Industries' current standard manufacturing quality control (MQC) testing frequency for GEOTEX nonwoven geotextiles is one (1) test per 90,000 sf (8,360 sm) for index properties (mass per unit area, thickness, grab tensile and elongation, trapezoidal tear, mullen burst and puncture resistance) for styles heavier than 601 and one (1) test per 162,000 sf (15,000 sm) for index properties for style 601 and lighter. Although we strive to test our nonwoven geotextiles for apparent opening size (AOS) and Permittivity/permeability/water flow rate approximately once every 540,000 sf (60,160 sm), the actual frequency of testing for performance properties will vary depending upon production schedules, product availability, customer requirements, job specifications or other agreements arranged with Synthetic Industries prior to the time of purchase. If additional testing is needed to meet higher frequencies required by the project specifications, it is the purchaser's responsibility to notify Synthetic Industries and ask for assistance in calculating the costs for the additional tests.

Once rolls of nonwoven geotextiles are produced, inspected and the test results from the frequency stated above indicates that materials produced during the production run meets our published minimum average roll values, approved rolls are shipped for storage until an order requires the material to be shipped. Since rolls are loaded at the warehouse independent of production sequence t results listed above may include data from rolls which were not shipped. However, the data provided is from the same production run as the rolls actually shipped on this bill of lading.

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

2061

July 21, 1998

American Coloid-Fairmont, GA
P.O. Box 88
234 Gordon Street
Fairmont, GA 30139

RE: Bill Of Lading #:175788
PO#0-DM1-20976

This is to certify that Style 82 Tex, a woven polypropylene fabric produced by Synthetic Industries, will meet the following certifiable minimum average values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level.

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS	S.I. UNITS
MASS PER UNIT AREA	ASTM D-5261	3.2 oz/yd²	105 g/m²
TENSILE STRENGTH	ASTM D-4632	135 X 135 LBS	600 X 600 N
ELONGATION	ASTM D-4632	15 X 15 %	
PUNCTURE STRENGTH	ASTM D-4833	70 LBS	310 N
MULLEN BURST	ASTM D-3786	265 PSI	1820 kPa
TRAPEZOIDAL TEAR	ASTM D-4533	45 X 45 LBS	200 X 200 N
A.O.S.	ASTM D-4751	40 US STD SIEVE	0.425 mm
PERMITTIVITY	ASTM D-4491	0.08 SEC⁻¹	
UV RESISTANCE	ASTM D-4355	90 %	

(Strength Retained After 150 Hours Xenon Arc Weatherometer)

Sincerely,

Randy Johnson
Technical Manager, Woven Geotextile Products

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery it shall be of the quality and specifications stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any recommendations made by the Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published specifications, and the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous Data Sheets for this style and is subject to change without notice. The effective date for this product data is 4/19/96.

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423-899-0444 • Fax • 423-899-7819 • 1-800-621-0444

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

:175788

Style: 82-TEX

ROLL #	ASTM D-4632 GRAB TENSILE (LBS) W x F	ASTM D-4632 ELONGATION (%) W x F	ASTM D-3786 MULLEN BURST PSI	ASTM D-4533 TRAP TEAR (LBS) W x F	ASTM D-5261 MASS/UNIT AREA OZ/SQ YD	Lot #
7182221	165 x 165	25 x 27	326	72 x 83	3.4	372
7197665	162 x 151	24 x 24	311	70 x 74	3.3	207
7327306	160 x 143	23 x 27	316	117 x123	3.4	372
7342790	167 x 139	25 x 26	353	74 x 83	3.3	375
7380479	177 x 164	23 x 25	353	81 x 94	3.6	375
7380483	163 x 155	27 x 30	316	70 x 95	3.4	375
7380484	178 x 152	24 x 27	330	73 x 86	3.4	375
7381596	167 x 155	27 x 29	316	73 x 96	3.5	395
7381597	165 x 153	22 x 28	330	63 x 95	3.5	395
7381598	169 x 156	22 x 26	301	77 x 83	3.4	395
7386147	174 x 147	23 x 25	325	71 x 84	3.4	394
7386148	166 x 159	29 x 33	333	76 x 95	3.5	394
7386149	169 x 164	27 x 31	350	79 x 07	3.6	394
7386150	157 x 154	25 x 28	318	78 x 84	3.5	394
7386785	168 x 140	22 x 22	340	71 x 74	3.4	23[illegible]
7386791	165 x 143	26 x 28	310	73 x 87	3.5	23[illegible]
73[illegible]0	157 x 148	27 x 30	293	77 x 84	3.5	409
7390041	155 x 169	26 x 24	320	91 x 77	3.4	409
7390042	170 x 153	23 x 27	285	78 x 92	3.4	409
7390045	166 x 155	22 x 24	308	69 x 73	3.2	409
7390046	179 x 148	25 x 28	311	76 x 77	3.3	409
7390551	149 x 147	25 x 27	321	69 x 81	3.5	372
7390552	172 x 149	22 x 26	316	60 x 78	3.4	372
7390555	160 x 158	25 x 29	310	72 x 85	3.5	372
7390557	169 x 155	23 x 25	321	71 x 80	3.5	372
7393143	155 x 143	26 x 31	303	74 x 81	3.4	371
7394762	168 x 148	24 x 26	341	75 x101	3.4	371
7394768	167 x 146	23 x 27	315	70 x 81	3.4	371
7394769	170 x 172	23 x 31	306	68 x 90	3.6	371
7394772	150 x 147	26 x 29	313	70 x 87	3.4	375
7394775	165 x 151	25 x 28	316	68 x 76	3.4	375
7394777	175 x 153	26 x 27	333	67 x 79	3.4	375
7394779	153 x 149	23 x 27	323	69 x 87	3.5	375
7398295	183 x 173	24 x 25	325	67 x 79	3.6	395
7398296	168 x 152	22 x 27	300	79 x 86	3.5	395
7401638	166 x 145	22 x 25	306	55 x 75	3.4	230
7401639	153 x 151	22 x 25	326	72 x 91	3.5	230

000233

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

2061

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

175788

Style: 82-TEX

L #	ASTM D-4632 GRAB TENSILE (LBS) W x F	ASTM D-4632 ELONGATION (%) W x F	ASTM D-3786 MULLEN BURST PSI	ASTM D-4533 TRAP TEAR (LBS) W x F	ASTM D-5261 MASS/UNIT AREA OZ/SQ YD	Lot #
1859	174 x 154	25 x 28	341	69 x 92	3.6	394
1868	159 x 140	23 x 26	323	73 x 91	3.3	394

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

July 24, 1998

Cetco / Fairmount
Cynthia Willix
PO Box 88
Fairmount GA 30139
Bol: 624275 PO# O-DH1-20977

This is to certify that Product GEOTEX™ 650, a nonwoven polypropylene geotextile produced by Synthetic Industries will meet the following certifiable minimum average roll values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level.

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS
Weight	ASTM D-5261	6.0 oz/yd^2
Thickness	ASTM D-5199	120 mils
Tensile Strength	ASTM D-4632	45 lbs
Elongation	ASTM D-4632	90 %
Trapezoidal Tear	ASTM D-4533	25 lbs
Mullen Burst	ASTM D-3786	190 psi
Puncture Strength	ASTM D-4833	50 lbs

Sincerely,

Sid Weiser

Sid Weiser
Technical Manager
Performance Nonwovens Division

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery a strict fit of the quality and specifications stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any recommendations made by the Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published specifications, and the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous Data Sheets for this style and is subject to change without notice. The effective date for this updated data is 02/1997

Synthetic Industries, Inc.
4019 Industry Drive • Chattanooga, Tennessee • 37416 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

2061

07/23/98 14:06 Page 1

Synthetic Industries
Individual Roll Data
Bill of Lading:024273

Roll Number	Style	Mass/ Unit Osy D5261	Lab Thick mils D5199	Tensile (MD) lbs D4632	Tensile (XMD) lbs D4632	Elongation (MD) % D4632	Elongation (XMD) % D4632	Trap Tear (MD) lbs D4533	Trap Tear (XMD) lbs D4533	Mullen Burst psi D3786	Puncr Resist lbs D4833
S144026A	650	7.1	129	89	149	106	126	42	38	249	67
S144029A	650	6.8	125	78	124	107	123	37	37	242	65
S144035A	650	6.8	128	86	111	109	142	48	41	223	70
S144038A	650	7.4	137	84	156	99	117	43	50	299	

Sid Weiss

Synthetic Industries' current standard manufacturing quality control (MQC) testing frequency for GEOTEX nonwoven geotextiles is one (1) test per 90,000 sf (8,360 sm) for index properties (mass per unit area, thickness, grab tensile and elongation, trapezoidal tear, mullen burst and puncture resistance) for styles heavier than 601 and one (1) test per 162,000 sf (15,000 sm) for index properties for style 601 and lighter. Although we strive to test our nonwoven geotextiles for apparent opening size (AOS) and Permittivity/permeability/water flow rate approximately once every 540,000 sf (50,160 sm), the actual frequency of testing for performance properties will vary depending upon production schedules, product availability, customer requirements, job specifications or other agreements arranged with Synthetic Industries prior to the time of purchase. If additional testing is needed to meet higher frequencies required by the project specifications, it is the purchaser's responsibility to notify Synthetic Industries and ask for assistance in calculating the costs for the additional tests.

Once rolls of nonwoven geotextiles are produced, inspected and the test results from the frequency stated above indicates that materials produced during the production run meets our published minimum average roll values, approved rolls are shipped for [illegible]ge until an order requires the material to be shipped. Since rolls are loaded at the warehouse independent of production sequence [illegible]esults listed above may include data from rolls which were not shipped. However, the data provided is from the same production run as the rolls actually shipped on this bill of lading.

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY 37
LOVELL, WYO. 82431

DATE: 20-Jul-98

TO: CETCO - CLAYMAX CORP.
P.O. BOX 88

FAIRMOUNT, GA. 30139

ATTN: CYNTHIA WILLIX

Dear Sirs:

A shipment of CG 50
left our Lovell, WY plant on 17-Jul-98
in AMERICO #1182
as requested on your order no. VERBAL

A sample from this shipment was tested, and gave the following results:

TEST	METHOD	REQ. SPECIFICATION	ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0% .	0
PASSING 200 MESH	ASTM C 136	1.0 % MAX	0.3
MOISTURE	ASTM D 2216	12.0% MAX.	8.8
FREE SWELL	ASTM D 5890	24 MIN.	25
FLUID LOSS	ASTM D 5891	18.0 MAX.	12.8

We hereby certify that the results shown above represent this shipment.
Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: C.L.

Approved By: MOSES BRISENO

CETCO

In any correspondence regarding this shipment, please refer to our
Order Number 88589

BENTONITE
CERTIFICATE OF ANALYSIS

2061

CETCO
92 HWY 37
LOVELL, WYO. 82431

DATE: 06-Jul-98

TO: CETCO - CLAYMAX CORP.
P.O. BOX 88

FAIRMOUNT, GA. 30139

ATTN: CYNTHIA WILLIX

Dear Sirs:

A shipment of **CG 50**
left our Lovell, WY plant on **29-Jun-98**
in **BN 458652**
as requested on your order no. **VERBAL**

A sample from this shipment was tested, and gave the following results:

TEST	METHOD	REQ. SPECIFICATION	ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0% .	0
PASSING 200 MESH	ASTM C 136	1.0 % MAX	1
MOISTURE	ASTM D 2216	12.0% MAX.	8
FREE SWELL	ASTM D 5890	24 MIN.	25
FLUID LOSS	ASTM D 5891	18.0 MAX.	14.2

We hereby certify that the results shown above represent this shipment.
Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: **R.P.**

Approved By: **MOSES BRISENO**

CETCO

In any correspondence regarding this shipment, please refer to our
Order Number **85188**

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY 37
LOVELL, WYO. 82431

DATE: 06-Jul-98

TO: CETCO - CLAYMAX CORP.
P.O. BOX 88

FAIRMOUNT, GA. 30139

ATTN: CYNTHIA WILLIX

Dear Sirs:

A shipment of CG 50
left our Lovell, WY plant on 30-Jun-98
in BN 454496
as requested on your order no. VERBAL

A sample from this shipment was tested, and gave the following results:

TEST	METHOD	REQ. SPECIFICATION	ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0% .	0
PASSING 200 MESH	ASTM C 136	1.0 % MAX	1
MOISTURE	ASTM D 2216	12.0% MAX.	8
FREE SWELL	ASTM D 5890	24 MIN.	25
FLUID LOSS	ASTM D 5891	18.0 MAX.	14.2

We hereby certify that the results shown above represent this shipment.
Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: R.P.

Approved By: MOSES BRISENO

CETCO

In any correspondence regarding this shipment, please refer to our
Order Number 85189

2061

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY 37
LOVELL, WYO. 82431

DATE: 20-Jul-98

TO: CETCO - CLAYMAX CORP.
P.O. BOX 88

FAIRMOUNT, GA. 30139

ATTN: CYNTHIA WILLIX

Dear Sirs:

A shipment of CG 50
left our Lovell, WY plant on 17-Jul-98
in MOON #177
as requested on your order no. VERBAL

A sample from this shipment was tested, and gave the following results:

TEST	METHOD	REQ. SPECIFICATION	ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0%	0
PASSING 200 MESH	ASTM C 136	1.0 % MAX	0.5
MOISTURE	ASTM D 2216	12.0% MAX.	7.2
FREE SWELL	ASTM D 5890	24 MIN.	24
FLUID LOSS	ASTM D 5891	18.0 MAX.	13

We hereby certify that the results shown above represent this shipment.
Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: C.L.

Approved By: MOSES BRISENO

CETCO

In any correspondence regarding this shipment, please refer to our
Order Number 88593

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY 37
LOVELL, WYO. 82431

DATE: 11-Jul-98

TO: CETCO - CLAYMAX CORP.
P.O. BOX 88

FAIRMOUNT, GA. 30139

ATTN: CYNTHIA WILLIX

Dear Sirs:

A shipment of CG 50
left our Lovell, WY plant on 07-Jul-98
in BN 450249
as requested on your order no. VERBAL

A sample from this shipment was tested, and gave the following results:

TEST	METHOD	REQ. SPECIFICATION	ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0% .	0
PASSING 200 MESH	ASTM C 136	1.0 % MAX	0.6
MOISTURE	ASTM D 2216	12.0% MAX.	9.6
FREE SWELL	ASTM D 5890	24 MIN.	24
FLUID LOSS	ASTM D 5891	18.0 MAX.	13.4

We hereby certify that the results shown above represent this shipment.
Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: C.L.

Approved By: MOSES BRISENO

CETCO

000241

In any correspondence regarding this shipment, please refer to our
Order Number 85195

000242

2061

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY 37
LOVELL, WYO. 82431

DATE: 01-Jul-98

TO: CETCO - CLAYMAX CORP.
P.O. BOX 88

FAIRMOUNT, GA. 30139

ATTN: CYNTHIA WILLIX

Dear Sirs:

A shipment of CG 50
left our Lovell, WY plant on 25-Jun-98
in BN 455854
as requested on your order no. VERBAL

A sample from this shipment was tested, and gave the following results:

TEST	METHOD	REQ. SPECIFICATION	ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0% .	0
PASSING 200 MESH	ASTM C 136	1.0 % MAX	1
MOISTURE	ASTM D 2216	12.0% MAX.	8.8
FREE SWELL	ASTM D 5890	24 MIN.	24
FLUID LOSS	ASTM D 5891	18.0 MAX.	13

We hereby certify that the results shown above represent this shipment.
Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: C.L.

Approved By: MOSES BRISENO

CETCO

In any correspondence regarding this shipment, please refer to our
Order Number 85183

2061

CETCO

2061

GEOSYNTHETIC CLAY LINER MQA TRACKING FORMS

000243

QCG#TF1 QCT#TF1
7/23/98 15:53:19

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087482

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP LOT#	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM LOT#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199829030									
00007555	030-BENTOMAT ST	150	2250	3055	7341509		5143886A		454496
00007556	030-BENTOMAT ST	150	2250	3094	7341509		5143886A		454496
00007561	030-BENTOMAT ST	150	2250	3138	203349		5143879A		454496
00007566	030-BENTOMAT ST	150	2250	3056	203349		5143879A		454496
00007575	030-BENTOMAT ST	150	2250	3086	203349		5143800A		454496
00007576	030-BENTOMAT ST	150	2250	3059	203349		5143800A		454496
00007577	030-BENTOMAT ST	150	2250	3082	203349		5143800A		454496
00007581	030-BENTOMAT ST	150	2250	3034	7354399		5143888A		454496
00007582	030-BENTOMAT ST	150	2250	3034	7354399		5143800A		454496
00007591	030-BENTOMAT ST	150	2250	3072	7209534		5143889A		458652
LOT# 199830030									
00007639	030-BENTOMAT ST	150	2250	3035	7354172		5140647A		88589
00007640	030-BENTOMAT ST	150	2250	3060	7354172		5140647A		88589
00007641	030-BENTOMAT ST	150	2250	3143	7354172		5140647A		88589
00007644	030-BENTOMAT ST	150	2250	3165	7354172		5140647A		88589

TOTAL SQUARE FEET..... 31.500

TOTAL PAGES 1

000244

2061

OCG#TF1 OCT#TF1
7/23/98 15:06:00

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087485

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP LOT#	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM LOT#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199829030									
00007554	030-BENTOMAT ST	150	2250	3103	7341509		5143886A		454496
00007557	030-BENTOMAT ST	150	2250	3082	7341509		5143886A		454496
00007568	030-BENTOMAT ST	150	2250	3036	203349		5143879A		454496
00007569	030-BENTOMAT ST	150	2250	3047	203349		5143800A		454496
00007570	030-BENTOMAT ST	150	2250	3118	203349		5143800A		454496
00007579	030-BENTOMAT ST	150	2250	3115	7354399		5143888A		454496
00007586	030-BENTOMAT ST	150	2250	3103	7354399		5143888A		454496
00007587	030-BENTOMAT ST	150	2250	3070	7354399		5143888A		458652
00007588	030-BENTOMAT ST	150	2250	3070	7354399		5143888A		458652
00007589	030-BENTOMAT ST	150	2250	3052	7354399		5143889A		458652
00007594	030-BENTOMAT ST	150	2250	3102	7209534		5143889A		458652
00007595	030-BENTOMAT ST	150	2250	3119	7209534		5143883A		458652
00007623	030-BENTOMAT ST	150	2250	3072	7180004		5143858A		458652
00007636	030-BENTOMAT ST	150	2250	3007	7354172		5143819A		458652

TOTAL SQUARE FEET..... 31.500

TOTAL PAGES 1

000245

QCG#TF1 QCT#TF1
7/23/98 15:07:47

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087486

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP LOT#	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM LOT#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199829030									
00007558	030-BENTOMAT ST	150	2250	3070	203349		5143886A		454496
00007559	030-BENTOMAT ST	150	2250	3063	203349		5143886A		454496
00007562	030-BENTOMAT ST	150	2250	3337	203349		5143879A		454496
00007571	030-BENTOMAT ST	150	2250	3164	203349		5143800A		454496
00007572	030-BENTOMAT ST	150	2250	2873	203349		5143800A		454496
00007573	030-BENTOMAT ST	150	2250	3074	203349		5143800A		454496
00007574	030-BENTOMAT ST	150	2250	3069	203349		5143800A		454496
00007578	030-BENTOMAT ST	150	2250	3100	203349		5143800A		454496
00007580	030-BENTOMAT ST	150	2250	3093	7354399		5143888A		454496
00007583	030-BENTOMAT ST	150	2250	3072	7354399		5143888A		454496
00007585	030-BENTOMAT ST	150	2250	3078	7354399		5143888A		454496
00007590	030-BENTOMAT ST	150	2250	3112	7209534		5143889A		458652
00007593	030-BENTOMAT ST	150	2250	3110	7209534		5143889A		458652
00007597	030-BENTOMAT ST	150	2250	3178	7209534		5143883A		458652

TOTAL SQUARE FEET..... 31.500

TOTAL PAGES 1

000246

2061

QCG#TF1 QCT#TF1
7/24/98 6:30:54

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087487

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP LOT#	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM LOT#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199829030									
00007563	030-BENTOMAT ST	150	2250	3091	203349		5143879A		454496
00007564	030-BENTOMAT ST	150	2250	3081	203349		5143879A		454496
00007565	030-BENTOMAT ST	150	2250	3100	203349		5143879A		454496
00007584	030-BENTOMAT ST	150	2250	3073	7354399		5143888A		454496
LOT# 199830030									
00007657	030-BENTOMAT ST	150	2250	3119	7279650		5143856A		88589
00007667	030-BENTOMAT ST	150	2250	3161	7386785		5143818A		88589
00007673	030-BENTOMAT ST	150	2250	3122	7386785		5143787A		88589
00007674	030-BENTOMAT ST	150	2250	3186	7386785		5143787A		88589
00007677	030-BENTOMAT ST	150	2250	3329	7386785		5143787A		88589
00007679	030-BENTOMAT ST	150	2250	3148	7386785		5143852A		88589
00007680	030-BENTOMAT ST	150	2250	3139	7386785		5143852A		88589
00007684	030-BENTOMAT ST	150	2250	3100	7386785		5143852A		88589
00007686	030-BENTOMAT ST	150	2250	3100	7386785		5143852A		88589
00007687	030-BENTOMAT ST	150	2250	3149	7390042		5143853A		88589

TOTAL SQUARE FEET..... 31.500

000247

TOTAL PAGES 1

QCG#TF1 QCT#TF1
7/24/98 6:31:23

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087488

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP LOT#	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM LOT#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199830030									
00007650	030-BENTOMAT ST	150	2250	3134	7279650		5140647A		88589
00007658	030-BENTOMAT ST	150	2250	3126	7279650		5143856A		88589
00007659	030-BENTOMAT ST	150	2250	3097	7279650		5143818A		88589
00007660	030-BENTOMAT ST	150	2250	3077	7279650		5143818A		88589
00007661	030-BENTOMAT ST	150	2250	3098	7279650		5143818A		88589
00007662	030-BENTOMAT ST	150	2250	3070	7279650		5143818A		88589
00007663	030-BENTOMAT ST	150	2250	3114	7279650		5143818A		88589
00007664	030-BENTOMAT ST	150	2250	3110	7386785		5143818A		88589
00007669	030-BENTOMAT ST	150	2250	3193	7386785		5143787A		88589
00007675	030-BENTOMAT ST	150	2250	3165	7386785		5143787A		88589
00007676	030-BENTOMAT ST	150	2250	3169	7386785		5143787A		88589
00007678	030-BENTOMAT ST	150	2250	3159	7386785		5143852A		88589
00007682	030-BENTOMAT ST	150	2250	3139	7386785		5143852A		88589
00007683	030-BENTOMAT ST	150	2250	3158	7386785		5143852A		88589

TOTAL SQUARE FEET..... 31.500

TOTAL PAGES 1

000248

2061

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087489

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP LOT#	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM LOT#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199829030									
00007616	030-BENTOMAT ST	150	2250	3089	7280351		5143858A		458652
LOT# 199830030									
00007651	030-BENTOMAT ST	150	2250	3094	7279650		5143856A		88589
00007652	030-BENTOMAT ST	150	2250	3188	7279650		5143856A		88589
00007653	030-BENTOMAT ST	150	2250	3187	7279650		5143856A		88589
00007666	030-BENTOMAT ST	150	2250	3161	7386785		5143818A		88589
00007668	030-BENTOMAT ST	150	2250	3147	7386785		5143818A		88589
00007670	030-BENTOMAT ST	150	2250	3146	7386785		5143787A		88589
00007672	030-BENTOMAT ST	150	2250	3110	7386785		5143787A		88589
00007681	030-BENTOMAT ST	150	2250	3139	7386785		5143852A		88589
00007739	030-BENTOMAT ST	150	2250	3061	7398296		5143849A		88593
00007743	030-BENTOMAT ST	150	2250	3104	7398296		5140643A		88593
00007744	030-BENTOMAT ST	150	2250	3069	7398296		5140643A		88593
00007750	030-BENTOMAT ST	150	2250	3099	7401638		5140643A		88593
00007751	030-BENTOMAT ST	150	2250	3066	7401638		5140643A		88593

TOTAL SQUARE FEET..... 31.500

000249

TOTAL PAGES 1

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087490

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP LOT#	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM LOT#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199829030									
00007613	030-BENTOMAT ST	150	2250	3086	7280351		5143846A		458652
00007614	030-BENTOMAT ST	150	2250	3050	7280351		5143846A		458652
00007629	030-BENTOMAT ST	150	2250	3069	7250390		5143803A		458652
00007630	030-BENTOMAT ST	150	2250	3004	7250390		5143803A		458652
00007631	030-BENTOMAT ST	150	2250	3034	7250390		5143803A		458652
00007633	030-BENTOMAT ST	150	2250	3036	7250390		5143819A		458652
LOT# 199830030									
00007665	030-BENTOMAT ST	150	2250	3070	7386785		5143818A		88589
00007725	030-BENTOMAT ST	150	2250	3181	7390557		5143854A		88589
00007734	030-BENTOMAT ST	150	2250	3113	7398296		5143849A		88593
00007736	030-BENTOMAT ST	150	2250	3103	7398296		5143849A		88593
00007741	030-BENTOMAT ST	150	2250	3079	7398296		5143849A		88593
00007747	030-BENTOMAT ST	150	2250	3062	7398296		5140643A		88593
00007748	030-BENTOMAT ST	150	2250	3058	7398296		5140643A		88593
00007749	030-BENTOMAT ST	150	2250	3071	7398296		5140643A		88593

TOTAL SQUARE FEET..... 31.500

TOTAL PAGES 1

000250

2061

OCG#TF1 OCT#TF1
7/24/98 8:26:33

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087491

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP LOT#	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM LOT#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199829030									
00007628	030-BENTOMAT ST	150	2250	3112	7180004		5143803A		458652
00007632	030-BENTOMAT ST	150	2250	2963	7250390		5143803A		458652
00007635	030-BENTOMAT ST	150	2250	3012	7250390		5143819A		458652
LOT# 199830030									
00007643	030-BENTOMAT ST	150	2250	3098	7354172		5140647A		88589
00007656	030-BENTOMAT ST	150	2250	3125	7279650		5143856A		88589
00007717	030-BENTOMAT ST	150	2250	3140	7390557		5143854A		88589
00007724	030-BENTOMAT ST	150	2250	3067	7390557		5143854A		88589
00007726	030-BENTOMAT ST	150	2250	3097	7390557		5143854A		88589
00007727	030-BENTOMAT ST	150	2250	3200	7390557		5143854A		88589
00007729	030-BENTOMAT ST	150	2250	3138	7390557		5143854A		88589
00007730	030-BENTOMAT ST	150	2250	3143	7398296		5143854A		88589
00007733	030-BENTOMAT ST	150	2250	3187	7398296		5143849A		88593
00007735	030-BENTOMAT ST	150	2250	3120	7398296		5143849A		88593
00007745	030-BENTOMAT ST	150	2250	3082	7398296		5140643A		88593

TOTAL SQUARE FEET..... 31.500

000251

TOTAL PAGES 1

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087492

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP LOT#	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM LOT#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199830030									
00007654	030-BENTOMAT ST	150	2250	3112	7279650		5143856A		88589
00007709	030-BENTOMAT ST	150	2250	3126	7390557		5140762A		88589
00007711	030-BENTOMAT ST	150	2250	3081	7390557		5140762A		88589
00007712	030-BENTOMAT ST	150	2250	3066	7390557		5140762A		88589
00007713	030-BENTOMAT ST	150	2250	3056	7390557		5140762A		88589
00007715	030-BENTOMAT ST	150	2250	3088	7390557		5140762A		88589
00007718	030-BENTOMAT ST	150	2250	3054	7390557		5143854A		88589
00007719	030-BENTOMAT ST	150	2250	3054	7390557		5143854A		88589
00007720	030-BENTOMAT ST	150	2250	3046	7390557		5143854A		88589
00007721	030-BENTOMAT ST	150	2250	3051	7390557		5143854A		88589
00007722	030-BENTOMAT ST	150	2250	3022	7390557		5143854A		88589
00007728	030-BENTOMAT ST	150	2250	3109	7390557		5143854A		88589
00007731	030-BENTOMAT ST	150	2250	3138	7398296		5143854A		88589
00007732	030-BENTOMAT ST	150	2250	3089	7398296		5143854A		88589

TOTAL SQUARE FEET..... 31.500

TOTAL PAGES 1

2061

000252

QCG#TF1 QCT#TF1
7/24/98 14:27:31

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087493

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP LOT#	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM LOT#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199829030									
00007605	030-BENTOMAT ST	150	2250	3143	7375851		5143883A		458652
LOT# 199830030									
00007645	030-BENTOMAT ST	150	2250	3126	7244956		5140647A		88589
00007647	030-BENTOMAT ST	150	2250	3130	7244956		5140647A		88589
00007648	030-BENTOMAT ST	150	2250	3120	7244956		5140647A		88589
00007649	030-BENTOMAT ST	150	2250	3165	7244956		5140647A		88589
00007694	030-BENTOMAT ST	150	2250	3143	7390042		5143853A		88589
00007697	030-BENTOMAT ST	150	2250	3152	7390042		5143820A		88589
00007698	030-BENTOMAT ST	150	2250	3123	7390042		5143820A		88589
00007701	030-BENTOMAT ST	150	2250	3151	7390042		5143820A		88589
00007706	030-BENTOMAT ST	150	2250	3126	7390042		5140762A		88589
00007708	030-BENTOMAT ST	150	2250	3100	7390557		5140762A		88589
00007716	030-BENTOMAT ST	150	2250	3070	7390557		5143854A		88589
00007723	030-BENTOMAT ST	150	2250	3083	7390557		5143854A		88589
00007737	030-BENTOMAT ST	150	2250	3093	7398296		5143849A		88593

TOTAL SQUARE FEET..... 31,500

000253

TOTAL PAGES 1

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087494

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP LOT#	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM LOT#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199829030									
00007611	030-BENTOMAT ST	150	2250	3173	7280351		5143846A		458652
00007622	030-BENTOMAT ST	150	2250	3067	7180004		5143858A		458652
LOT# 199830030									
00007655	030-BENTOMAT ST	150	2250	3132	7279650		5143856A		88589
00007685	030-BENTOMAT ST	150	2250	3156	7386785		5143852A		88589
00007690	030-BENTOMAT ST	150	2250	3128	7390042		5143853A		88589
00007691	030-BENTOMAT ST	150	2250	3111	7390042		5143853A		88589
00007692	030-BENTOMAT ST	150	2250	3126	7390042		5143853A		88589
00007693	030-BENTOMAT ST	150	2250	3185	7390042		5143853A		88589
00007695	030-BENTOMAT ST	150	2250	3127	7390042		5143853A		88589
00007696	030-BENTOMAT ST	150	2250	3180	7390042		5143853A		88589
00007702	030-BENTOMAT ST	150	2250	3096	7390042		5143820A		88589
00007703	030-BENTOMAT ST	150	2250	3143	7390042		5143820A		88589
00007710	030-BENTOMAT ST	150	2250	3007	7390557		5140762A		88589
00007740	030-BENTOMAT ST	150	2250	3077	7398296		5143849A		88593

TOTAL SQUARE FEET..... 31.500

TOTAL PAGES 1

000254

20C1

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087495

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP LOT#	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM LOT#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199829030									
00007604	030-BENTOMAT ST	150	2250	3122	7375851		5143883A		458652
00007610	030-BENTOMAT ST	150	2250	3118	7280351		5143846A		458652
00007612	030-BENTOMAT ST	150	2250	3082	7280351		5143846A		458652
00007625	030-BENTOMAT ST	150	2250	3097	7180004		5143803A		458652
00007627	030-BENTOMAT ST	150	2250	3045	7180004		5143803A		458652
LOT# 199830030									
00007646	030-BENTOMAT ST	150	2250	3194	7244956		5140647A		88589
00007688	030-BENTOMAT ST	150	2250	3150	7390042		5143853A		88589
00007689	030-BENTOMAT ST	150	2250	3138	7390042		5143853A		88589
00007699	030-BENTOMAT ST	150	2250	3120	7390042		5143820A		88589
00007700	030-BENTOMAT ST	150	2250	3133	7390042		5143820A		88589
00007705	030-BENTOMAT ST	150	2250	3034	7390042		5143820A		88589
00007738	030-BENTOMAT ST	150	2250	3112	7398296		5143849A		88593
00007742	030-BENTOMAT ST	150	2250	3082	7398296		5143849A		88593
00007888	030-BENTOMAT ST	150	2250	3032	7401639		5144037A		450249

TOTAL SQUARE FEET..... 31.500

000255

TOTAL PAGES 1

QCG#TF1 QCT#TF1
7/24/98 14:28:20

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087496

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP LOT#	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM LOT#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199829030									
00007592	030-BENTOMAT ST	150	2250	3107	7209534		5143889A		458652
00007596	030-BENTOMAT ST	150	2250	3113	7209534		5143883A		458652
00007599	030-BENTOMAT ST	150	2250	3136	7209534		5143883A		458652
00007601	030-BENTOMAT ST	150	2250	3102	7209534		5143883A		458652
00007602	030-BENTOMAT ST	150	2250	3173	7375851		5143883A		458652
00007603	030-BENTOMAT ST	150	2250	3093	7375851		5143883A		458652
00007606	030-BENTOMAT ST	150	2250	3119	7375851		5143846A		458652
00007615	030-BENTOMAT ST	150	2250	3098	7280351		5143846A		458652
00007624	030-BENTOMAT ST	150	2250	3067	7180004		5143803A		458652
LOT# 199830030									
00007704	030-BENTOMAT ST	150	2250	3125	7390042		5143820A		88589
00007883	030-BENTOMAT ST	150	2250	3020	7401639		5144037A		450249
00007884	030-BENTOMAT ST	150	2250	3016	7401639		5144037A		450249
00007885	030-BENTOMAT ST	150	2250	3004	7401639		5144037A		450249
00007886	030-BENTOMAT ST	150	2250	3009	7401639		5144037A		450249

TOTAL SQUARE FEET..... 31.500

TOTAL PAGES 1

000256

2061

QCG#TF1 QCT#TF1
7/27/98 12:36:48

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 00008749B

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199829030							
00007620	030-BENTOMAT ST	150	2250	3120	7180004	5143858A	458652
00007621	030-BENTOMAT ST	150	2250	3128	7180004	5143858A	458652
LOT# 199830030							
00007707	030-BENTOMAT ST	150	2250	3092	7390557	5140762A	88589
00007829	030-BENTOMAT ST	150	2250	3060	7390045	5144036A	455854
00007838	030-BENTOMAT ST	150	2250	3064	7390552	5144038A	455854
00007845	030-BENTOMAT ST	150	2250	2908	7390552	5144038A	450249
00007858	030-BENTOMAT ST	150	2250	3015	7390046	5144035A	450249
00007870	030-BENTOMAT ST	150	2250	3049	7401639	5144029A	450249
00007871	030-BENTOMAT ST	150	2250	3040	7401639	5144028A	450249
00007872	030-BENTOMAT ST	150	2250	3023	7401639	5144028A	450249
00007874	030-BENTOMAT ST	150	2250	3027	7401639	5144028A	450249
00007875	030-BENTOMAT ST	150	2250	3040	7401639	5144028A	450249
00007880	030-BENTOMAT ST	150	2250	3014	7401639	5144028A	450249
00007881	030-BENTOMAT ST	150	2250	3014	7401639	5144037A	450249

TOTAL SQUARE FEET..... 31,500

TOTAL PAGES 1

000257

000258

QCG#TF1 QCT#TF1
7/27/98 12:36:31

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087497

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP LOT#	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM LOT#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199829030									
00007600	030-BENTOMAT ST	150	2250	3115	7209534		5143883A		458652
00007607	030-BENTOMAT ST	150	2250	2933	7375851		5143846A		458652
00007608	030-BENTOMAT ST	150	2250	3128	7375851		5143846A		458652
00007609	030-BENTOMAT ST	150	2250	3152	7375851		5143846A		458652
00007619	030-BENTOMAT ST	150	2250	3133	7280351		5143858A		458652
00007626	030-BENTOMAT ST	150	2250	3073	7180004		5143803A		458652
00007634	030-BENTOMAT ST	150	2250	3038	7250390		5143819A		458652
LOT# 199830030									
00007671	030-BENTOMAT ST	150	2250	3130	7386785		5143787A		88589
00007746	030-BENTOMAT ST	150	2250	3106	7398296		5140643A		88593
00007859	030-BENTOMAT ST	150	2250	3015	7390046		5144035A		450249
00007860	030-BENTOMAT ST	150	2250	3011	7390046		5144035A		450249
00007861	030-BENTOMAT ST	150	2250	3025	7390046		5144035A		450249
00007873	030-BENTOMAT ST	150	2250	3032	7401639		5144028A		450249
00007882	030-BENTOMAT ST	150	2250	3003	7401639		5144037A		450249

TOTAL SQUARE FEET..... 31,500

TOTAL PAGES 1

2061

QCG#TF1 QCT#TF1
7/27/98 12:36:48

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087498

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199829030							
00007620	030-BENTOMAT ST	150	2250	3120	7180004	5143858A	458652
00007621	030-BENTOMAT ST	150	2250	3128	7180004	5143858A	458652
LOT# 199830030							
00007707	030-BENTOMAT ST	150	2250	3092	7390557	5140762A	88589
00007829	030-BENTOMAT ST	150	2250	3060	7390045	5144036A	455854
00007838	030-BENTOMAT ST	150	2250	3064	7390552	5144038A	455854
00007845	030-BENTOMAT ST	150	2250	2908	7390552	5144038A	450249
00007858	030-BENTOMAT ST	150	2250	3015	7390046	5144035A	450249
00007870	030-BENTOMAT ST	150	2250	3049	7401639	5144029A	450249
00007871	030-BENTOMAT ST	150	2250	3040	7401639	5144028A	450249
00007872	030-BENTOMAT ST	150	2250	3023	7401639	5144028A	450249
00007874	030-BENTOMAT ST	150	2250	3027	7401639	5144028A	450249
00007875	030-BENTOMAT ST	150	2250	3040	7401639	5144028A	450249
00007880	030-BENTOMAT ST	150	2250	3014	7401639	5144028A	450249
00007881	030-BENTOMAT ST	150	2250	3014	7401639	5144037A	450249

TOTAL SQUARE FEET..... 31,500

TOTAL PAGES 1

000259

QCG#TF1 QCT#TF1
7/27/98 12:37:04

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087499

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199829030							
00007617	030-BENTOMAT ST	150	2250	3051	7280351	5143858A	458652
00007618	030-BENTOMAT ST	150	2250	3078	7280351	5143858A	458652
LOT# 199830030							
00007815	030-BENTOMAT ST	150	2250	3148	7381598	199826010	455854
00007822	030-BENTOMAT ST	150	2250	3089	7390045	5144027A	455854
00007831	030-BENTOMAT ST	150	2250	3077	7390552	5144036A	455854
00007832	030-BENTOMAT ST	150	2250	3054	7390552	5144036A	455854
00007847	030-BENTOMAT ST	150	2250	3047	7390552	5144038A	450249
00007848	030-BENTOMAT ST	150	2250	3030	7390552	5144038A	450249
00007850	030-BENTOMAT ST	150	2250	3049	7390046	5144038A	450249
00007862	030-BENTOMAT ST	150	2250	3040	7390046	5144035A	450249
00007869	030-BENTOMAT ST	150	2250	2999	7401639	5144029A	450249
00007876	030-BENTOMAT ST	150	2250	3017	7401639	5144028A	450249
00007877	030-BENTOMAT ST	150	2250	3014	7401639	5144028A	450249
00007878	030-BENTOMAT ST	150	2250	3004	7401639	5144028A	450249

TOTAL SQUARE FEET..... 31,500

TOTAL PAGES 1

000260

2061

QCG#TF1 QCT#TF1
7/27/98 12:37:20

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087500

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199830030							
00007816	030-BENTOMAT ST	150	2250	3086	7381598	5144027A	455854
00007817	030-BENTOMAT ST	150	2250	3080	7381598	5144027A	455854
00007818	030-BENTOMAT ST	150	2250	3109	7381598	5144027A	455854
00007833	030-BENTOMAT ST	150	2250	3060	7390552	5144036A	455854
00007835	030-BENTOMAT ST	150	2250	3068	7390552	5144036A	455854
00007849	030-BENTOMAT ST	150	2250	3052	7390046	5144038A	450249
00007851	030-BENTOMAT ST	150	2250	3049	7390046	5144038A	450249
00007852	030-BENTOMAT ST	150	2250	3001	7390046	5144038A	450249
00007866	030-BENTOMAT ST	150	2250	3099	7390046	5144029A	450249
00007867	030-BENTOMAT ST	150	2250	3033	7390046	5144029A	450249
00007868	030-BENTOMAT ST	150	2250	3028	7390046	5144029A	450249
00007887	030-BENTOMAT ST	150	2250	3012	7401639	5144037A	450249
00007889	030-BENTOMAT ST	150	2250	3001	7401639	5144037A	450249

TOTAL SQUARE FEET..... 29,250

TOTAL PAGES 1

000261

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087501

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199830030							
00007819	030-BENTOMAT ST	150	2250	3089	7381598	5144027A	455854
00007820	030-BENTOMAT ST	150	2250	3104	7381598	5144027A	455854
00007830	030-BENTOMAT ST	150	2250	3041	7390045	5144036A	455854
00007836	030-BENTOMAT ST	150	2250	3064	7390552	5144038A	455854
00007839	030-BENTOMAT ST	150	2250	3030	7390552	5144038A	450249
00007846	030-BENTOMAT ST	150	2250	3071	7390552	5144038A	450249
00007853	030-BENTOMAT ST	150	2250	3042	7390046	5144035A	450249
00007855	030-BENTOMAT ST	150	2250	3010	7390046	5144035A	450249
00007863	030-BENTOMAT ST	150	2250	3050	7390046	5144029A	450249
00007864	030-BENTOMAT ST	150	2250	3044	7390046	5144029A	450249
00007865	030-BENTOMAT ST	150	2250	3042	7390046	5144029A	450249
00007891	030-BENTOMAT ST	150	2250	3060	7394779	5144015A	450249
00007892	030-BENTOMAT ST	150	2250	3090	7394779	5144015A	450249
00007893	030-BENTOMAT ST	150	2250	3065	7394779	5144015A	450249

TOTAL SQUARE FEET..... 31,500

TOTAL PAGES 1

QCG#TF1 QCT#TF1
7/27/98 12:37:52

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087502

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199830030							
00007814	030-BENTOMAT ST	150	2250	3150	7381598	199826010	455854
00007821	030-BENTOMAT ST	150	2250	3084	7390045	5144027A	455854
00007823	030-BENTOMAT ST	150	2250	3067	7390045	5144027A	455854
00007824	030-BENTOMAT ST	150	2250	3074	7390045	5144027A	455854
00007840	030-BENTOMAT ST	150	2250	3021	7390552	5144038A	450249
00007841	030-BENTOMAT ST	150	2250	3051	7390552	5144038A	450249
00007842	030-BENTOMAT ST	150	2250	3034	7390552	5144038A	450249
00007844	030-BENTOMAT ST	150	2250	3014	7390552	5144038A	450249
00007854	030-BENTOMAT ST	150	2250	3049	7390046	5144035A	450249
00007856	030-BENTOMAT ST	150	2250	3079	7390046	5144035A	450249
00007857	030-BENTOMAT ST	150	2250	3078	7390046	5144035A	450249
00007894	030-BENTOMAT ST	150	2250	3060	7394779	5144015A	450249
00007896	030-BENTOMAT ST	150	2250	3032	7394779	5144015A	450249
00007897	030-BENTOMAT ST	150	2250	3082	7394779	5144015A	450249

TOTAL SQUARE FEET..... 31,500

TOTAL PAGES 1

000263

QCG#TF1 QCT#TF1
7/27/98 12:38:08

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
P.O. BOX 88
FAIRMOUNT GA 30139

SHIP TO: GSE LINING TECHNOLOGIES
C/O FLUOR DANIEL FERNALD
FERNALD OH

ORDER NUMBER 000087503

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199830030							
00007642	030-BENTOMAT ST	150	2250	3098	7354172	5140647A	88589
00007825	030-BENTOMAT ST	150	2250	3081	7390045	5144027A	455854
00007826	030-BENTOMAT ST	150	2250	3081	7390045	5144036A	455854
00007827	030-BENTOMAT ST	150	2250	3096	7390045	5144036A	455854
00007843	030-BENTOMAT ST	150	2250	3014	7390552	5144038A	450249
00007895	030-BENTOMAT ST	150	2250	3055	7394779	5144015A	450249

TOTAL SQUARE FEET..... 13,500

TOTAL PAGES 1

000264

2061

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20102	CONTRACT NO.: 2317	SUBMITTAL NO.: 002	REV.: 0	DATE: 7-29-98	PAGE __ OF __

FROM: GSE Lining technology, Inc

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 44

SIGNATURE: _____

RECEIVED BY: Melissa Crewe DATE: 7-29-98

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY 1 PRO	2 H&S	3 MED	4 TRG	5 CON	6 ENG	7 QAC	RESUBMITTAL YES	NO	TITLE/DESCRIPTION	SUBMITTAL TYPE CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION A	B	C
	GSE-2317-002	0						X				Quality Assurance Laboratory Test Results	X					X
												1. Carbon Black Dispersion test, ESCR and thickness not tested using specified ASTM test methods.						
												2. Resin Lot No Z-40477 has only 2 rolls tested. These rolls are next to each other. Need 4 randomly spaced rolls tested						
												3. Test results included 6 rolls from two resins that do not total 100,000 ft².						

RECEIVED JUL 29 1998 KBT

DISTRIBUTION

REVIEW DISTRIBUTION Distribution	MS	Distribution	MS	CFC DISTRIBUTION Distribution	MS	Distribution	MS
Jim Jenkins							
Mike Godber							
GeoSyntec							

RECEIVED BY: K Brown Marshall DATE: 8/1/98 NO COMMENTS ___ COMMENTS ATTACHED X

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 44)

COMMENTS | SUBMITTAL ACTION CODE: (BY SUPPLIER) | SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

000295

GSE

Roll Test Data Report

2061

ROLL NO. AK-4211 FF

ROLL DIMENSIONS ≈ ± 1%		
ROLL NUMBER:	AK-4211 FF	
PROD DATE:	07/14/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3502	pounds
	1588	kilograms

RESIN LOT INFORMATION	
LOT NUMBER	Z-45473
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	207	lb/in	37	kg/cm
MD -		173		31		202		36	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	392	lb/in	70	kg/cm
MD -		324		59		466		83	
BREAK ELONGATION	D638								
CD -		560	%			629	%		
MD -		560				744			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	73	lb	33	kg
MD -		60		27		74		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	132	lb	60	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/- 2.00	%			0.7	%		
MD -		+/- 2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.37	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.943	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

ROLL NO. AK-4212 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4212 FF	
PROD DATE:	07/14/98	
SHEET AREA:	8665	sq.ft.
	805	sq. meters
LENGTH:	363	feet
	111	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3538	pounds
	1605	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	235 lb/in	42 kg/cm
MD -		173	31	218	39
YIELD ELONGATION	D638				
CD -		13 %		22 %	
MD -		13		23	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	421 lb/in	75 kg/c
MD -		324	59	426	76
AK ELONGATION	D638				
CD -		560 %		684 %	
MD -		560		680	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	74 lb	33 kg
MD -		60	27	74	34
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	134 lb	61 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.7 %	
MD -		+/-2.00		0.0	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.36 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.943 g/cc
ESCR	D1693-B	1500 hours		Start 7/10/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				80	2.03

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

7-15-98

1065

07/07/98
12:32:45

SLT . LL TRANSFER TO MAS90

2061

ROLL NUMBER	PRODUCT	DATE MADE	STA	LENGTH	WIDTH	AREA	WEIGHT	JOB NO
AK4157	HME080A004	07/05/98	A1	355	23.8700	8473.85	3396	
AK4158	HME080A004	07/05/98	A1	355	23.8700	8473.85	3407	
AK4159	HME080A004	07/05/98	A1	355	23.8700	8473.85	3403	
AK4160	HME080A004	07/05/98	A1	355	23.8700	8473.85	3401	
AK4161	HME080A004	07/05/98	A1	355	23.8700	8473.85	3408	
AK4162	HME080A004	07/05/98	A1	355	23.8700	8473.85	3419	
AK4163	HME080A004	07/05/98	A1	355	23.8700	8473.85	3413	
AK4164	HME080A004	07/05/98	A1	355	23.8700	8473.85	3417	
AK4165	HME080A004	07/05/98	A1	355	23.8700	8473.85	3421	
AK4166	HME080A004	07/05/98	A1	355	23.8700	8473.85	3422	
AK4167	HME080A004	07/05/98	A1	355	23.8700	8473.85	3422	
AK4168	HME080A004	07/05/98	A1	355	23.8700	8473.85	3427	
AK4169	HME080A004	07/05/98	A1	355	23.8700	8473.85	3428	
AK4170	HME080A004	07/05/98	A1	355	23.8700	8473.85	3428	
AK4171	HME080A004	07/06/98	A1	355	23.8700	8473.85	3424	
AK4172	HME080A004	07/06/98	A1	355	23.8700	8473.85	3424	
AK4173	HME080A004	07/06/98	A1	355	23.8700	8473.85	3423	
AK4174	HME080A004	07/06/98	A1	355	23.8700	8473.85	3441	
AK4175	HME080A004	07/06/98	A1	355	23.8700	8473.85	3431	
AK4176	HME080A004	07/06/98	A1	355	23.8700	8473.85	3423	
AK4177	HME080A004	07/06/98	A1	355	23.8700	8473.85	3428	
AK4178	HME080A004	07/06/98	A1	355	23.8700	8473.85	3429	
[illegible]179	HME080A004	07/06/98	A1	355	23.8700	8473.85	3428	
[illegible]180	HME080A004	07/06/98	A1	355	23.8700	8473.85	3424	
AK4181	HME080A004	07/06/98	A1	355	23.8700	8473.85	3426	
AK4182	HME080A004	07/06/98	A1	355	23.8700	8473.85	3420	
AK4183	HME080A004	07/06/98	A1	355	23.8700	8473.85	3422	
AK4184	HME080A004	07/06/98	A1	355	23.8700	8473.85	3418	
AK4185	HME080A004	07/06/98	A1	355	23.8700	8473.85	3426	
AK4186	HME080A004	07/06/98	A1	355	23.8700	8473.85	3427	
AK4187	HME080A004	07/06/98	A1	355	23.8700	8473.85	3419	
AK4188	HME080A004	07/06/98	A1	355	23.8700	8473.85	3421	
AK4189	HME080A004	07/06/98	A1	355	23.8700	8473.85	3421	
AK4190	HME080A004	07/06/98	A1	355	23.8700	8473.85	3421	
AK4191	HME080A004	07/06/98	A1	355	23.8700	8473.85	3420	
AK4192	HME080A004	07/06/98	A1	355	23.8700	8473.85	3424	
AK4193	HME080A004	07/06/98	A1	355	23.8700	8473.85	3407	
AK4194	HME080A004	07/06/98	A3	295	23.8700	7041.65	2822	
AK4195	HME080A004	07/06/98	R	184	23.8700	4392.08	1853	
[illegible]	HME080A004	07/06/98	A1	355	23.8700	8473.85	3440	
AK4197	HME080A004	07/06/98	A1	710	23.8700	16947.70	6798	
AK4198	HME080A004	07/06/98	A1	1	23.8700	23.87	1	
AK4199	HME080A004	07/06/98	A1	710	23.8700	16947.70	6794	
AK4200	HME080A004	07/06/98	A1	1	23.8700	23.87	1	
AK4201	HME080A004	07/06/98	A1	710	23.8700	16947.70	6804	
AK4202 ✓	HME080A004	07/06/98	A1	1	23.8700	23.87	1	
AK4203	HME080A004	07/06/98	A1	710	23.8700	16947.70	6804	
AK4204	HME080A004	07/06/98	A1	1	23.8700	23.87	1	
[illegible]205	HME080A004	07/07/98	A1	710	23.8700	16947.70	6794	
[illegible]4206	HME080A004	07/07/98	A1	1	23.8700	23.87	1	

Z45473

Need 4 Lots for this
(1 per 4,000 K²) Lot.

9 DBL Rolls @ 16947.7
= 152,529.3

07/07/98
12:32:45

SLT . .LL TRANSFER TO MAS90

ROLL NUMBER	PRODUCT	DATE MADE	STA	LENGTH	WIDTH	AREA	WEIGHT	JOB NO
AK4207 ✓	HME080A004	07/07/98	A1	710	23.8700	16947.70	6797 *	
AK4208	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
AK4209	HME080A004	07/07/98	A1	710	23.8700	16947.70	6796	Z4547
* AK4210	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
* AK4211	HME080A004	07/07/98	A1	710	23.8700	16947.70	6803	
* AK4212	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
REPORT TOTALS				19657		469212.59	189072	

07/09/98
14:08:10

SLT ..LL TRANSFER TO MAS90

PAGE 1 3 of 5

2061

ROLL NUMBER	PRODUCT	DATE MADE	STA	LENGTH	WIDTH	AREA	WEIGHT	JOB NO
AK4213	HME080A004	07/07/98	A1	710	23.8700	16947.70	6790	Z45473
AK4214	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
AK4215	HME080A004	07/07/98	A1	710	23.8700	16947.70	6808	
AK4216	HME080A004	07/07/98	A1	1	23.8700	23.87	1	Z40476
AK4217	HME080A004	07/07/98	A1	710	23.8700	16947.70	6790	
AK4218	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
AK4219	HME080A004	07/07/98	A1	710	23.8700	16947.70	6780	
AK4220	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
AK4221	HME080A004	07/07/98	A1	710	23.8700	16947.70	6780	
AK4222	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
AK4223	HME080A004	07/07/98	A1	710	23.8700	16947.70	6792	
AK4224	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
AK4225	HME080A004	07/07/98	A1	710	23.8700	16947.70	6791	
AK4226	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
AK4227	HME080A004	07/07/98	A1	710	23.8700	16947.70	6795	
AK4228	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
AK4229	HME080A004	07/07/98	A1	710	23.8700	16947.70	6783	
AK4230	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
AK4231	HME080A004	07/07/98	A1	710	23.8700	16947.70	6800	
AK4232	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
AK4233	HME080A004	07/07/98	A1	710	23.8700	16947.70	6778	
AK4234	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
[illegible]235	HME080A004	07/07/98	A1	710	23.8700	16947.70	6775	
[illegible]36	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
AK4237	HME080A004	07/07/98	A1	710	23.8700	16947.70	6784	
AK4238	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
AK4239	HME080A004	07/07/98	A1	710	23.8700	16947.70	6781	
AK4240	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
AK4241	HME080A004	07/07/98	A1	710	23.8700	16947.70	6778	
AK4242	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
AK4243	HME080A004	07/07/98	A1	710	23.8700	16947.70	6790	
AK4244	HME080A004	07/07/98	A1	1	23.8700	23.87	1	
AK4245	HME080A004	07/08/98	A1	710	23.8700	16947.70	6788	
AK4246	HME080A004	07/08/98	A1	1	23.8700	23.87	1	
AK4247	HME080A004	07/08/98	A1	710	23.8700	16947.70	6782	
AK4248	HME080A004	07/08/98	A1	1	23.8700	23.87	1	
AK4249	HME080A004	07/08/98	A1	710	23.8700	16947.70	6798	
AK4250	HME080A004	07/08/98	A1	1	23.8700	23.87	1	
AK4251	HME080A004	07/08/98	A1	710	23.8700	16947.70	6796	
AK4252	HME080A004	07/08/98	A1	1	23.8700	23.87	1	
AK4253	HME080A004	07/08/98	A1	710	23.8700	16947.70	6795	
AK4254	HME080A004	07/08/98	A1	1	23.8700	23.87	1	
AK4255	HME080A004	07/08/98	A1	710	23.8700	16947.70	6792	
AK4256	HME080A004	07/08/98	A1	1	23.8700	23.87	1	
AK4257	HME080A004	07/08/98	A1	710	23.8700	16947.70	6784	
AK4258	HME080A004	07/08/98	A1	1	23.8700	23.87	1	
AK4259	HME080A004	07/08/98	A1	710	23.8700	16947.70	6794	
AK4260	HME080A004	07/08/98	A1	1	23.8700	23.87	1	
[illegible]61	HME080A004	07/08/98	A1	710	23.8700	16947.70	6790	
[illegible]262	HME080A004	07/08/98	A1	1	23.8700	23.87	1	

30 DOL Rolls @ 16947.7
508,431 ft²

07/09/98
14:08:10

SLT ROLL TRANSFER TO MAS90

ROLL NUMBER	PRODUCT	DATE MADE	STA	LENGTH	WIDTH	AREA	WEIGHT	JOB NO
AK4263	HME080A004	07/08/98	A1	710	23.8700	16947.70	6798	
AK4264	HME080A004	07/08/98	A1	1	23.8700	23.87	1	
AK4265	HME080A004	07/08/98	A1	710	23.8700	16947.70	6786	
AK4266	HME080A004	07/08/98	A1	1	23.8700	23.87	1	
AK4267	HME080A004	07/08/98	A1	710	23.8700	16947.70	6782	
AK4268	HME080A004	07/08/98	A1	1	23.8700	23.87	1	
AK4269	HME080A004	07/08/98	A1	710	23.8700	16947.70	6712	
AK4270	HME080A004	07/08/98	A1	1	23.8700	23.87	1	
AK4271	HME080A004	07/08/98	A1	710	23.8700	16947.70	6745	
AK4272	HME080A004	07/08/98	A1	1	23.8700	23.87	1	Z40476
AK4273	HME080A004	07/08/98	A1	710	23.8700	16947.70	6755	
AK4274	HME080A004	07/08/98	A1	1	23.8700	23.87	1	
AK4275	HME080A004	07/08/98	A1	710	23.8700	16947.70	6763	
AK4276	HME080A004	07/08/98	A1	1	23.8700	23.87	1	Z40477
AK4277	HME080A004	07/08/98	A1	710	23.8700	16947.70	6772	
AK4278	HME080A004	07/08/98	A1	1	23.8700	23.87	1	
AK4279	HME080A004	07/08/98	A1	710	23.8700	16947.70	6778	
AK4280	HME080A004	07/08/98	A1	1	23.8700	23.87	1	
AK4281	HME080A004	07/08/98	A1	710	23.8700	16947.70	6770	
AK4282	HME080A004	07/08/98	A1	1	23.8700	23.87	1	
AK4283	HME080A004	07/08/98	A1	710	23.8700	16947.70	6770	
AK4284	HME080A004	07/08/98	A1	1	23.8700	23.87	1	
AK4285	HME080A004	07/08/98	A1	710	23.8700	16947.70	6772	
[illegible]4286	HME080A004	07/09/98	A1	1	23.8700	23.87	1	
[illegible]287	HME080A004	07/09/98	A1	710	23.8700	16947.70	6771	
AK4288	HME080A004	07/09/98	A1	1	23.8700	23.87	1	
REPORT TOTALS				27018		644919.66	257726	

11 DBL ROLLS @ 16947.7
186,424.7

07/10/98
11:07:32

SLT : LL TRANSFER TO MAS90

2061

ROLL NUMBER	PRODUCT	DATE MADE	STA	LENGTH	WIDTH	AREA	WEIGHT	JOB NO
AK4289	HME080A004	07/09/98	A1	710	23.8700	16947.70	6776	
AK4290	HME080A004	07/09/98	A1	1	23.8700	23.87	1	
AK4291	HME080A004	07/09/98	A1	710	23.8700	16947.70	6776 *	Z40477
AK4292 ✓	HME080A004	07/09/98	A1	1	23.8700	23.87	1	
AK4293	HME080A004	07/09/98	A1	710	23.8700	16947.70	6775	
AK4294	HME080A004	07/09/98	A1	1	23.8700	23.87	1	
AK4295 ✓	HME080A004	07/09/98	A1	710	23.8700	16947.70	6778	
AK4296	HME080A004	07/09/98	A1	1	23.8700	23.87	1	
~~AK4297~~	~~HME060A004~~	~~07/09/98~~	~~R~~	~~178~~	23.7200	4222.16	1396	
AK4298	HME060A004	07/09/98	A1	950	23.7200	22534.00	6760	1625
AK4299	HME060A004	07/09/98	A1	1	23.7200	23.72	1	1625
AK4300	HME060A004	07/09/98	A1	950	23.7200	22534.00	6736	1625
AK4301	HME060A004	07/09/98	A1	1	23.7200	23.72	1	1625
AK4302	HME060A004	07/09/98	A1	950	23.7200	22534.00	6767	1625
AK4303	HME060A004	07/09/98	A1	1	23.7200	23.72	1	1625
AK4304	HME060A004	07/09/98	A1	950	23.7200	22534.00	6780	1625
AK4305	HME060A004	07/09/98	A1	1	23.7200	23.72	1	1625
AK4306	HME060A004	07/09/98	A1	950	23.7200	22534.00	6787	1625
AK4307	HME060A004	07/09/98	A1	1	23.7200	23.72	1	1625
AK4308	HME060A004	07/09/98	A1	950	23.7200	22534.00	6777	1625
AK4309	HME060A004	07/09/98	A1	1	23.7200	23.72	1	1625
AK4310	HME060A004	07/09/98	A1	950	23.7200	22534.00	6771	1625
AK4311	HME060A004	07/09/98	A1	1	23.7200	23.72	1	1625
[illegible]12	HME060A004	07/09/98	A1	950	23.7200	22534.00	6785	1625
[illegible]313	HME060A004	07/09/98	A1	1	23.7200	23.72	1	1625
AK4314	HME060A004	07/09/98	A1	950	23.7200	22534.00	6785	1625
AK4315	HME060A004	07/09/98	A1	1	23.7200	23.72	1	1625
AK4316	HME060A004	07/09/98	A1	950	23.7200	22534.00	6786	1625
AK4317	HME060A004	07/09/98	A1	1	23.7200	23.72	1	1625
AK4318	HME060A004	07/09/98	A1	950	23.7200	22534.00	6786	1625
AK4319	HME060A004	07/09/98	A1	1	23.7200	23.72	1	1625
AK4320	HME060A004	07/09/98	A1	950	23.7200	22534.00	6796	1625
AK4321	HME060A004	07/10/98	A1	1	23.7200	23.72	1	1625
AK4322	HME060A004	07/10/98	A1	950	23.7200	22534.00	6793	1625
AK4323	HME060A004	07/10/98	A1	1	23.7200	23.72	1	1625
AK4324	HME060A004	07/10/98	A1	950	23.7200	22534.00	6790	1625
AK4325	HME060A004	07/10/98	A1	1	23.7200	23.72	1	1625
EPORT TOTALS				16336		387916.52	123418	

LOT NO	NO ROLLS	LOT ft²		M QC
Z45473	18 ROLLS	152,529.3	2 Samples	
Z40476	60 ROLLS	508,431.0	5 samples	
Z40477	22 ROLLS	186,427.7	2 samples	
	100 ROLLS	847,388 ft²		

000272

GSE®

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
281-443-8564
Fax: 281-875-6010

Quality Assurance Laboratory Test Results

Test: Asperity measurement of Textured Geomembranes Using a Depth Gage GRI GM12
Job Name: Fluor Daniel Fernald/Fermco
MR Number: 7920-01
Job Number: C1269

Roll #	Minimum Requirement (mils)	Test Results	Status	Roll #	Minimum Requirement (mils)	Test Results	Status
AK4246FF	7	16	Pass	AK4272FF	7	19	Pass
AK4247FF	7	19	Pass	AK4273FF	7	18	Pass
AK4248FF	7	18	Pass	AK4274FF	7	18	Pass
AK4249FF	7	17	Pass	AK4275FF	7	18	Pass
AK4250FF	7	18	Pass	AK4276FF	7	17	Pass
AK4251FF	7	19	Pass	AK4277FF	7	17	Pass
AK4252FF	7	18	Pass	AK4278FF	7	19	Pass
AK4253FF	7	17	Pass	AK4279FF	7	19	Pass
AK4254FF	7	19	Pass	AK4280FF	7	20	Pass
AK4255FF	7	18	Pass	AK4281FF	7	20	Pass
AK4256FF	7	20	Pass	AK4282FF	7	16	Pass
AK4257FF	7	19	Pass	AK4283FF	7	18	Pass
AK4258FF	7	18	Pass	AK4284FF	7	19	Pass
AK4259FF	7	18	Pass	AK4285FF	7	17	Pass
AK4260FF	7	20	Pass	AK4286FF	7	18	Pass
AK4261FF	7	21	Pass	AK4287FF	7	18	Pass
AK4262FF	7	19	Pass	AK4288FF	7	19	Pass
AK4263FF	7	17	Pass	AK4289FF	7	20	Pass
AK4264FF	7	16	Pass	AK4290FF	7	20	Pass
AK4265FF	7	15	Pass	AK4291FF	7	21	Pass
AK4266FF	7	19	Pass	AK4292FF	7	18	Pass
AK4267FF	7	18	Pass	AK4293FF	7	19	Pass
AK4268FF	7	19	Pass	AK4294FF	7	17	Pass
AK4269FF	7	18	Pass	AK4295FF	7	19	Pass
AK4270FF	7	17	Pass	AK4296FF	7	18	Pass
AK4271FF	7	17	Pass				

Z40678

Z40

000273

GSE®

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
281-443-8564
Fax 281-875-6010

Quality Assurance Laboratory Test Results

Test: Asperity measurement of Textured Geomembranes Using a Depth Gage GRI GM12

Job Name: Fluor Daniel Fernald/Fermco

MR Number: 7920-01

Job Number: C1269

Roll #	Minimum Requirement (mils)	Test Results	Status	Roll #	Minimum Requirement (mils)	Test Results	Status
45934 AJ5123FF	7	4-45934 19	Pass	AK4219FF	7	19	Pass
AK2527FF	7	17	Pass	AK4220FF	7	18	Pass
AK2528FF	7	24	Pass	AK4221FF	7	21	Pass
45448 AK2550FF	7	18	Pass	AK4222FF	7	19	Pass
AK2553FF	7	21	Pass	AK4223FF	7	21	Pass
AK2554FF	7	22	Pass	AK4224FF	7	20	Pass
AK4197FF	7	21	Pass	AK4225FF	7	18	Pass
AK4198FF	7	23	Pass	AK4226FF	7	19	Pass
4199 EK AK4200FF	7	23	Pass	AK4227FF	7	22	Pass
AK4201FF	7	21	Pass	AK4228FF	7	18	Pass
AK4202FF	7	15	Pass	AK4229FF	7	17	Pass Z40476
AK4203FF	7	16	Pass	AK4230FF	7	16	Pass
AK4204FF	7	29	Pass	AK4231FF	7	15	Pass
75473 AK4205FF	7	22	Pass	AK4232FF	7	16	Pass
AK4206FF	7	17	Pass	AK4233FF	7	19	Pass
AK4207FF	7	20	Pass	AK4234FF	7	14	Pass
AK4208FF	7	22	Pass	AK4235FF	7	18	Pass
AK4209FF	7	17	Pass	AK4236FF	7	23	Pass
AK4210FF	7	16	Pass	AK4237FF	7	14	Pass
AK4211FF	7	20	Pass	AK4238FF	7	21	Pass
AK4212FF	7	22	Pass	AK4239FF	7	20	Pass
AK4213FF	7	23	Pass	AK4240FF	7	21	Pass
AK4214FF	7	20	Pass	AK4241FF	7	18	Pass
AK4215FF	7	18	Pass	AK4242FF	7	16	Pass
AK4216FF	7	20	Pass	AK4243FF	7	20	Pass
76 AK4217FF	7	20	Pass	AK4244FF	7	19	Pass
AK4218FF	7	22	Pass	AK4245FF	7	17	Pass

GSE®

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
281-443-8564
Fax 281-875-6010

Quality Assurance Laboratory Test Results

Test: Microscopic evaluation of the dispersion of Carbon Black in Polyolefin Geosynthetics ASTM D 5596
Criteria: 10 Views, all must be category 1 or 2, cannot be any category 3.
Job Name: Fluor Daniel Fernald Fermco
MR Number: 7920-01
Job Number: C1269

Roll Number	Test Status
AJ 5175 FF	Pass
AK 2527 FF	Pass
AK 2528 FF	Pass
AK 2553 FF	Pass
AK 4197 FF	Pass
AK 4202 FF	Pass
AK 4207 FF	Pass
AK 4211 FF	Pass
AK 4212 FF	Pass
AK 4213 FF	Pass
AK 4214 FF	Pass
AK 4215 FF	Pass
AK 4222 FF	Pass
AK 4227 FF	Pass
AK 4230 FF	Pass
AK 4236 FF	Pass
AK 4241 FF	Pass
AK 4246 FF	Pass
AK 4252 FF	Pass
AK 4253 FF	Pass
AK 4258 FF	Pass
AK 4262 FF	Pass
AK 4263 FF	Pass
AK 4268 FF	Pass
AK 4269 FF	Pass

Roll Number	Test Status
AK 4270 FF	Pass
AK 4271 FF	Pass
AK 4272 FF	Pass
AK 4273 FF	Pass
AK 4274 FF	Pass
AK 4275 FF	Pass
AK 4280 FF	Pass
AK 4285 FF	Pass
AK 4292 FF	Pass
AK 4295 FF	Pass

For environmental lining solutions . . . the world comes to GSE.®
A Gundle/SLT Environmental, Inc. Company

REVIEW COMMENTS ON QUALITY ASSURANCE LABORATORY TEST RESULTS
(Submittal No. 002, Rev. 0, dated 7-29-98)

GeoSyntec has reviewed Submittal No. 002, Rev. 0 - Quality Assurance Laboratory Test Results - for the OSDF Phase II project. GeoSyntec reviewed the document and compared them with the requirements of the technical specifications. Comments on the submittal package are presented below.

General Comments

The submittal package contained only the results of the manufacturing quality control tests for the HDPE textured geomembrane liner. The tests were performed by GSE Lining Technology, Inc. (GSE), the geomembrane manufacturer. The test results were reviewed with respect to the requirements of Section 02770P (Geomembrane Liner). These requirements are presented in Part 2.01.B (page 02770P-3) and Table 02770P-1.

Geomembrane Production Frequency

Part 2.01.C of Section 02770P requires that at least 100,000 ft^2 of geomembrane be manufactured and supplied for the project from each resin lot used. GSE's test results for geomembrane rolls manufactured from five resin lots:

- 18 rolls (Nos. AK4197-AK4214), totaling 152,529 ft^2, from Resin Lot No. Z-45473;
- 60 rolls (Nos. AK4215-AK4274), totaling 508,431 ft^2, from Resin Lot No. Z-40476;
- 22 rolls (Nos. AK4275 - AK4296), totaling 186428 ft^2, from Resin Lot No. Z-40477;
- 5 rolls (Nos. AK2527, AK2528, AK2550, AK2553, AK2554), totaling 50,626ft^2, from Resin No. Z-45448; and
- 1 roll (No. AJ5175FF), totaling 8359 ft^2, from Resin Lot No. Y-45934.

As indicated above the last two resin lots (Z-45448 and Y-45934) do not meet the minimum requirements for geomembrane production, and cannot be used for the OSDF Phase II project.

Geomembrane Roll Testing Frequency

Part 2.03.B.5 of Section 02770P requires the manufactured geomembrane rolls to be sampled and tested at a minimum of once every 40,000 square feet. For the 18 geomembrane manufactured from Resin Lot No. Z-45473, only two rolls (AK4211 and AK 4212) have been tested; while tests were conducted on each roll from the other resin

lots. Per specification requirements, four rolls must be tested on Resin Lot No. Z-45473. If only four rolls are to be tested, the rolls should be sampled such that no two adjoining rolls are tested.

Geomembrane Test Results

The GSE's test results were reviewed with respect to the specified geomembrane properties per Part 2.01.B and Table 02770P-1 of Section 02770P. In general, test results met the requirements of the specifications except for the following:

- Carbon Black Dispersion was tested and reported per ASTM D 3015 instead of the required ASTM D 5596;

- Thickness was tested and reported per ASTM D 1593/D 751 instead of the specified GRI-GM8; and

- environmental stress crack resistance (ESCR) is being tested per ASTM D 1693-B; the specification calls for Notched Constant Tensile Load per ASTM D 5397.

GeoSyntec and FDF discussed the specified properties and test methods with GSE during the bid negotiation process. GSE agreed to follow the specifications. Therefore, GSE should provide test results for carbon black dispersion, thickness, and notched constant tensile load using the specified test methods and minimum frequencies. The results provided to date are not acceptable for these three geomembrane properties.

Manufacturing Quality Control Issues for OSDF Geosynthetics - August 7, 1998			
Required	Date Required	Status	Comment
02770P/1.04 (Signed Manufacturer's 20-year Warranty)	8/7/98		FDF to Review
02770P/1.05.A.3 (Resin origin and identification): Lots Z-45448 (50,600 sq ft) and Z-40477 (186,900 sq ft)	8/7/98	GeoSyntec did not complete for [illegible]	OK
02770P/1.05.A.4 (Certification of Minimum Average Roll Values for properties listed in Table 02770P-1)		Received 8/6/98	Reviewing OK?
02770P/1.05.B.3 (No reclaimed polymer used)		Received 8/6/98	Reviewing OK?
02770P/1.05.C.1 (Delegation Letter from QC Mgr.)		Received 8/5/98	Acceptable. GeoSyntec needs a copy?
02770P/2.01.B.1 (Resin Specific Gravity .934)	8/7/98		GeoSyntec to furnish justification. DONE
02770P/2.03.B.5 (Thickness per GRI-GM8 vs. ASTM D 5199)		Received 8/5/98. Thickness per ASTM D 5994.	Acceptable. OK.
02770P/2.03.B.5 (Carbon Black Dispersion per ASTM D 5596)	8/7/98	Received 8/6/98	Incomplete; tests insufficiently spaced to cover rolls AK2527/28 from Lot Z-45448; rolls AK4211-14 from Lot Z-45473; or rolls AK4268-74 from Lot Z-40476. Four more tests required (minimum). GeoSyntec needs a copy
02770P/2.03.B.7 (Environmental Stress Crack results - need 3 tests minimum)	8/26/98	~~4 tests~~	
02770P/2.03.B.7 (Low Temperature Brittleness on GML (not resin) - need 3 tests minimum)	8/7/98	4 tests, 1 [illegible] per resin lot	OK w/ GeoSyntec
002772P/1.04.A (Name of Product)		Received 8/6/98	Acceptable OK.

DRAFT

Manufacturing Quality Control Issues for OSDF Geosynthetics - August 7, 1998			
Required	Date Required	Status	Comment
02772P/1.04.A.5 (Certification of Manufacturer's requirements for geotextile component of GCL are met)		Received 8/6/98	Reviewing
02772P/1.04.A.6 (Certification of minimum average roll values for all properties listed in Table 02772P-1)	8/7/98	Received 8/6/98	
02772P/1.04.B (Results of GCL MQC tests, plus continuous inspection and needle-free)	8/7/98		
02772P/2.02.B (Test results meet specification and occur once per 40,000 sq. ft.)	8/7/98		
02714P/1.04.A.2 (Certification of minimum average roll values and test procedures for all properties listed in 02714P-1 through 02714P-3)	?		
02714P/1.04.B (Manufacturer's Quality Control Certificates signed by QC manager for each roll of geotextile)	?		
02714P/2.02.B (Manufacturing QC tests at least once per 50,000 square feet)	?		
02714P/2.02.C. (Manufacturing QC tests ON FILTER ONLY at least once per 100,000 square feet on ASTM D 4751 and ASTM D 4491)	?		

draft

99.92
18.14

118.06

461.44
238.00

699.44
18.14

717.58

LIST OF DISCREPANCIES Augus
GEOSYNTHETICS MATERIAL SUBMITTALS

1. Bentonite Certificates of Analysis - Moisture is measured by AST specifications require ASTM D 4643. ? Specs Me

2. GCL Quality Data Sheets:
   a. Tensile Strength Test per ASTM D 4595 [Standard: 35 lbs found on these sheets. ~~Grab Strength~~
   b. Bentonite Mass per Unit Area (BMPUA):
      i. Test used is ASTM D 5993: test specified is ASTM
      ii. Following rolls and lots tested under the 1.0 psf mir Rolls 7749, 7750 and 7751 of Lot 19983003
      iii. Following rolls and lots were not tested for BMPUA:
         (1) Lot 199829030: Rolls 7592, 7596, 7599-76 and 7624.
         (2) Lot 199830030: Rolls 7704, 7883-7886.
   c. Moisture: The following rolls from Lot 199830030 tested o maximum moisture content:
      Rolls 7639-7644; 7814-7827; 7829/7842 [Roll 782 located in GCL Quality Data Sheet)
   d. Instructions confusing regarding asterisks marking rolls teste preference: I would prefer NOT to see data on untested rolls general instruction stating that the data for those rolls is rep next previous roll that WAS tested.

3. GCL Upper Roll MQC Data Sheets: The following roll numbers, used the FDF GCL order, are missing:

4. GCL Lower Roll MQC Data Sheets: The follwoing roll numbers, used of the FDF GCL order, are missing: 5140643; 5140647; 5140762; 5143819; 5143820; 5143846; 5143849; 5143852; 5143854; 51 5143879; 5143883; 5143886; 5143889; 5144015; 5144027; 51 199826010.

Not Required per Specs, page

MQC test data do not m meet the minimum fre requirements per Specs. But data seem okay!

2061

RECEIVED
AUG 11 1998
OGB @ 1200

GSE

DEALER SALES

DATE: 11 AUGUST, 1998

NUMBER OF PAGES INCLUDING COVER SHEET 4

TO: JIM TURNER
FLUOR DANIEL FERNALD
PHONE: 513/648-4941
FAX: 513/648-5767

CC:

FROM: ERIC REED
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE RD.
HOUSTON, TX 77073
PHONE: 800/435-2008
FAX: 281/230-8663
E-MAIL: ERICR@GSEWORLD.COM

REMARKS: ☒ URGENT ☐ FOR YOUR REVIEW ☐ REPLY ASAP ☐ PLEASE COMMENT

Jim, here is the certification from CETCO on the Needle free, a missing RTDR and the updated Carbon Black Dispersion. Also the trucks did not go out yesterday since the rolls to be shipped were on the bottom of the pile and they were not able to get them out in time. They should be going out today but I will confirm by Fax.

GSE

Quality Assurance Laboratory Test Results

Test: Microscopic evaluation of the dispersion of Carbon Black in Polyolefin Geosynthetics ASTM D 5596
Criteria: 10 Views, all must be category 1 or 2, cannot be any category 3.
Job Name: Fluor Daniel Fernald/Fermco
MR Number: 7920-01
Job Number: C1269

	Roll Number	Test Status	
15934	AJ5175FF	Pass	OK
45446	AK2553FF	Pass	Roll AK2527, part of AK2528 not covered
45473	AK4197FF	Pass	
	AK4202FF	Pass	
	AK4207FF	Pass	Rolls AK4211-4214 not covered
	AK4215FF	Pass	
	AK4222FF	Pass	
	AK4227FF	Pass	
04 76	AK4230FF	Pass	
	AK4236FF	Pass	
	AK4241FF	Pass	
	AK4246FF	Pass	
	AK4252FF	Pass	
	AK4253FF	Pass	
	AK4258FF	Pass	
	AK4262FF	Pass	
	AK4263FF	Pass	Rolls AK4268-AK4274 not covered
	AK4275FF	Pass	
01 04 77	AK4280FF	Pass	
	AK4285FF	Pass	OK
	AK4292FF	Pass	
	AK4295FF	Pass	

APPROVED #22 8/4/97 QA

2061

Synthetic Industries
Individual Roll Data
Bill of Lading:0

Roll Number	Style	Batch Number	Mass/ Area Oey D5261	Lab Thick mils D5199	Tensile (MD) lbs D4632	Tensile (XMD) lbs D4632	Elongation (MD) % D4632	Elongation (XMD) % D4632	Trap (MD) lbs D4533	Tear (XMD) lbs D4533	Mullen Burst psi D3786	Punct Resist lbs D4833	AOS mm D4751	Permit sec-1 D4491
4118650A	1701	40880	17.4	183	467	704	82	72	196	291	970	302		
4118657A	1701	40880	16.6	173	450	705	83	79	209	329	1000	327	0.108	1.684
5137290A	1071	50853	10.8	133	340	393	60	72	154	204	577	192		
5137300A	1071	50853	11.2	137	337		63		149		621	193	0.145	3.334
5137320A	1071	50853	10.8	130	332	396	65	73	133	176	581	188		
5137330A	1071	50853	10.9	133	334	403	60	73	157	202	593	185		
5137340A	1071	50853	10.5	128	336	398	65	74	129	182	554	185		
5137360A	1071	50853	11.3	137	296	417	68	75	124	195	589	183		
5137370A	1071	50853	10.5	126	315	396	67	74	118	177	546	189		
5137400A	1071	50853	10.9	122	333	423	67	76	122	170		193	0.148	2.540
5137420A	1071	50853	10.5	127	329	378	62	73	152	167	567	189		
5137430A	1071	50853	10.5	130	327		64		157		559	190		
5137450A	1071	50853	10.4	130	334	385	66	72	162	183	553	198		
5137460A	1071	50853	10.1	125	333	382	69	75	150	206	547	186		
5137470A	1071	50853	10.6	132	336	399	64	71	170	201	549	186		
5137480A	1071	50853	11.0	134	330	423	68	72	112	173	560	188		
5137490A	1071	50853	11.3	133	335	429	69	73	119	180	580	205		
5137500A	1071	50853	10.4	124	297	380	66	71	117	168	544	183	0.148	2.484
6050400A	861	60217	8.3	113	296	283	58	75	142	158	489	145	0.172	3.293
6050430A	861	60217	8.2	106	277	252	56	72	139	151	444	141		
6050440A	861	60217	8.1	105	270	253	56	71	106	122	453	145		
6050460A	861	60217	8.8	117	274	278	58	72	131	141	484	148		
6050470A	861	60217	8.2	107	300	264	60	76	113	125	466	158		
6050490A	861	60217	8.8	112	284	290	59	77	130	139	504	159		
6050500A	861	60217	8.2	107	282	272	59	78	118	140	466	154	0.174	3.438

Synthetic Industries' current standard manufacturing quality control (MQC) testing frequency for GEOTEX nonwoven geotextiles is one (1) test per 90,000 sf (8,360 sm) for index properties (mass per unit area, thickness, grab tensile and elongation, trapezoidal tear, mullen burst and puncture resistance) for styles heavier than 601 and one (1) test per 162,000 sf (15,000 sm) for index properties for style 601 and lighter. Although we strive to test our nonwoven geotextiles for apparent opening size (AOS) and Permittivity/permeability/water flow rate approximately once every 540,000 sf (50,160 sm), the actual frequency of testing for performance properties will vary depending upon production schedules, product availability, customer requirements, job specifications or other agreements arranged with Synthetic Industries prior to the time of purchase. If additional testing is needed to meet higher frequencies required by the project specifications, it is the purchaser's responsibility to notify Synthetic Industries and ask for assistance in calculating the costs for the additional tests.

Once rolls of nonwoven geotextiles are produced, inspected and the test results from the frequency stated above indicates that materials produced during the production run meets our published minimum average roll values, approved rolls are shipped for storage until an order requires the material to be shipped. Since rolls are loaded at the warehouse independent of production sequence the results listed above may include data from rolls which were not shipped. However, the data provided is from the same production run as the rolls actually shipped on this bill of lading.

GSE

GSE Lining Technology, Inc.

2061

August 5, 1998

Fluor Daniel Fernald
7400 Willey Road
Fernald, OH 45030

Attn: Jim Turner

RE: Certification of HyperFrictionFlex® Properties

Certification

The undersigned, being qualified and authorized to do so, hereby certifies the 80 mil HyperFrictionFlex will meet the following properties:

1. MARV - GSE's HyperFrictionFlex physical and mechanical properties will meet the properties as listed in Table 02770P-1 with a 95% confidence level.
2. SP-NCTL (ASTM D5397) - GSE's HyperFrictionFlex will easily meet or exceed the specifed (30% stress of yield) value of 500 hours. See attached full curve performed per formulation. Note the average failure time at 30% was 1137.3 hours which is typical of the HyperFlex material. The actual test results will be available on Aug. 25, 1998.
3. Reclaim - GSE hereby certifies that no reclaimed polymer will be used in the production of materials for the above referenced project. Recycled material reworked from GSE's manufacturing process may be added, but will not exceed 2% by weight.

Eric Reed

Eric Reed
Technical Representative
GSE Corporate Engineering & Technical Support

2061

Notched Constant Tensile Load (NCTL) Stress Crack Testing of GSE 60 mil HyperFlex® ASTM D 5397 - Full Curve

NATHAN IVY

GSE LINING TECHNOLOGY, INC.
19103 GUNDLE ROAD
HOUSTON, TX 77073

SEPTEMBER 1996

000286

ABSTRACT

The GSE Manufacturing Quality Assurance/Quality Control Laboratory has completed the NCTL full curve for the high density polyethylene geomembrane, HyperFlex. A sample of 60 mil GSE HyperFlex HDPE geomembrane was tested for stress crack potential. The test was allowed to continue for 4000 hours (20 times the most commonly accepted minimum acceptable limit). The results of the plot do not indicate a clear ductile-brittle transition time.

BACKGROUND

The specimens were tested in accordance with ASTM D 5397. According to ASTM, 'this method is used to develop test data from which the (potential) susceptibility of geomembrane sheet material to stress cracking under a constant tensile load condition and an accelerated environmental condition can be evaluated.' The method requires that thirty specimens be cut from a single sample (typically of a roll of geomembrane). Each of these specimens is subsequently cut to 80% of the thickness of the specimen (notched 20%). The specimens are then held at a constant 50°C in a circulating bath which contains a reagent solution composed of 90% water and 10% Igepal 630 surfactant. The specimens are then loaded with a percentage of the yield load of the unnotched specimen. The percentages range from 20%-65% in increments of 5%. There are three replicates of each yield load stress.

A relatively abrupt offset in the stress-time relationship is considered to demonstrate a ductile-brittle transition. Although there is no proven or industry wide consensus, the stress cracking potential is considered undesirably high for ductile-brittle transitions of less than a range of about 100-400 hours.

TEST SPECIMENS

60 mil HyperFlex was chosen for this test. The primary reason for choice is that it is the most widely specified thickness of high density polyethylene geomembrane material. Secondly, this thickness is most commonly used for NCTL stress crack testing.

RAW MATERIAL:

Base Resin Product Code:	HDA-601
Resin Manufacturer:	Mobil
Resin Density:	0.935 g/cc
Base Resin Lot Number:	W-45223
Carbon Black Concentrate Manufacturer:	Ampacet
Carbon Black Concentrate Lot Number:	J-06751

FINISHED PRODUCT:

Product Tested:	GSE 60 mil HyperFlex	
Roll Identification:	AH6000	
Density:	0.943 g/cc	*ASTM D 1505*
Yield Stress:	2506 psi	*ASTM D 638 NSF Modified*
Date of Manufacture:	06 June 1996	

TEST RESULTS

ASTM requires that the report include the yield stress (above) and the average failure time and coefficient of variation values for each of the applied stress levels. The coefficient of variation is defined below:

$$\textit{coefficient of variation} = \frac{\textit{standard deviation}}{\textit{mean}}$$

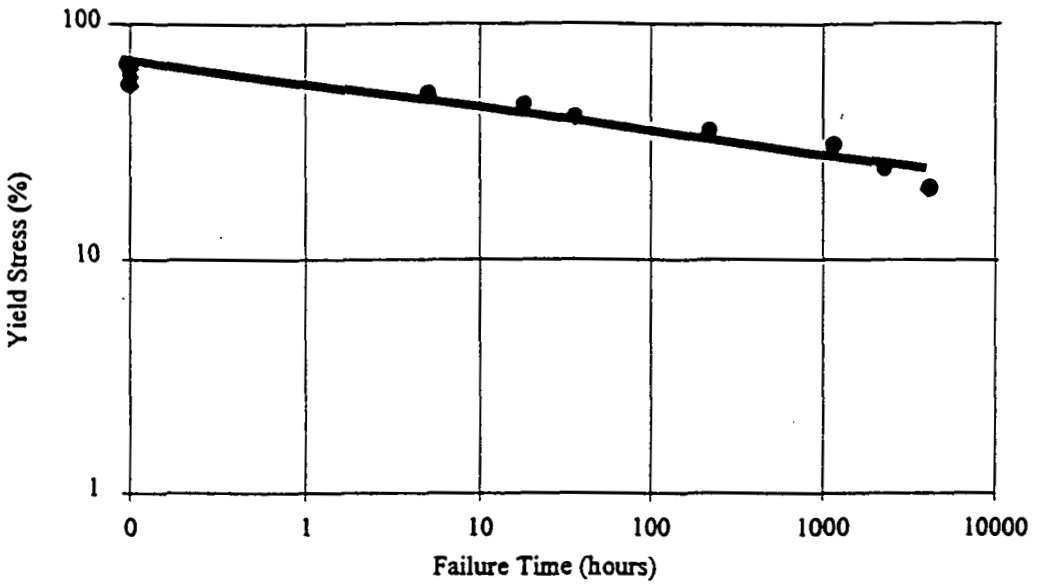
Likewise, the coefficient of variation must be less that 15% for average failure times of greater than 10 hours. The next page contains a table of yield stress, failure time, and average failure time for all replicates. The variation for the 55 and 50% loads are higher due to the small average failure time. From the equation above, it can be seen that the coefficient of variation is inversely proportional to the mean failure time. Thus, the smaller the mean failure time, the larger the coefficient of variation. The specimens that were loaded at 60 and 65% of yield stress broke instantaneously due in part to the manipulation required in setting up the test apparatus.

TABLE 1: % YIELD STRESS, FAILURE TIMES AND COEFFICIENT OF VARIATION

% OF YIELD STRESS	FAILURE TIME (HOURS)	AVERAGE FAILURE TIME (HOURS)	COEFFICIENT OF VARIATION
65	0	0.0	0.0%
65	0		
65	0		
60	0	0.0	0.0%
60	0		
60	0		
55	0	.07	86.6%
55	.1		
55	.1		
50	8.4	5.1	59.7%
50	2.5		
50	4.2		
45	15.4	18.2	14.9%
45	20.8		
45	18.3		
40	35.7	35.9	10.7%
40	39.9		
40	32.2		
35	180	214.3	14.2%
35	238		
35	225		
30	942	1137.3	14.9%
30	1231		
30	1239		
25	1875	>2241.7	14.2%
25	>2425*		
25	>2425*		
20	>4002	>4002.0	0.0%
20	>4002		
20	>4002		

* More than one test apparatus was required to set up all of the required specimens. One bath was at 2425 hours when the test was terminated.

CHART 1. - PERCENT YIELD STRESS VERSUS FAILURE TIME



RESULTS AND CONCLUSIONS:

The above graph is a log-log plot of percent yield stress versus failure time. Inspection of the test specimens under a microscope indicates that the failure of the specimen that broke at 1875 hours was ductile in nature. This points to the conclusion that the true ductile-brittle transition time was not revealed within the length of time the specimens above were tested. Due to the nature of log-log graphs, the line will necessary have an increasingly negative slope as time goes on. This particular test was terminated at 4002 hours due to the need to utilize the space in the test apparatus.

STAR... Safety Through Accountability and Recognition

Mobil Polyethylene
Certificate of Analysis

"QUALITY PEOPLE MAKING QUALITY PRODUCTS"

Bill Walling
GSE
19103 Gundle Road
Houston, TX 77073

January 28, 1997

Mobil Chemical, a major supplier of quality polyethylene, has shipped a lot of Material to your facility. The lot identification and analysis are listed below. This data has been supplied by our Quality Control Laboratory located here in Beaumont. If you should need further information or another copy of this report please call your sales office in Irving, TX 214-580-1040.

Resin Identification		Resin Analysis Test	Lot Data
Product Type	HDA-601	Melt Index (gms/10 min) I:	0.55
Lot Number	W-46090	Density (gms/cc)	0.935
Hopper Car Number	ACFX-57288		
Quantity Shipped	174,850		
Date of Manufacture	26-Dec-96		
P.O. Number			
Location Shipped to Aldine, TX		LTB Test ASTM D746 <-90°C	

Thank you for your business. If you need additional assistance, please do not hesitate to contact our Sales Representative in your area.

Sincerely,

C. A. Winney
Quality Assurance Specialist

cc: MP-DALLAS

FAX to 713 [illegible] N. Ivy
FAX to 713 [illegible] R. Schaefer

2061

GSE

DEALER SALES

DATE: 4 AUGUST, 1998

NUMBER OF PAGES INCLUDING COVER SHEET 14

TO: JIM TURNER
FLUOR DANIEL FERNALD
PHONE: 513/648-4941
FAX: 513/648-5767

CC:

FROM: ERIC REED
GSE LINING TECHNOLOGY, INC.
19103 GUNDLE RD.
HOUSTON, TX 77073
PHONE: 800/435-2008
FAX: 281/230-8663
E-MAIL: ERICR@GSEWORLD.COM

REMARKS: ☒ URGENT ☐ FOR YOUR REVIEW ☐ REPLY ASAP ☐ PLEASE COMMENT

Jim, here are the missing Roll Test Data Reports as well as the Dispersion report. As I indicated, I will have the SP-NCTL letter, Authorization letter, Certificate of Analysis information for the resin and the thickness method confirmation tomorrow.

RECEIVED
AUG 05 1998
R Gilsinan

GSE

Roll Test Data Report

2061

ROLL NO. AK-4197 FF

ROLL DIMENSIONS = ± 1%		
ROLL NUMBER:	AK-4197 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3485	pounds
	1581	kilograms

RESIN LOT INFORMATION	
LOT NUMBER	Z-45473
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.05
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
NSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	199	lb/in	36	kg/cm
MD -		173		31		195		35	
ELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				21			
NSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	449	lb/in	80	kg/cm
MD -		324		59		440		79	
ELONGATION	D638								
CD -		560	%			751	%		
MD -		560				714			
ITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	71	lb	32	kg
MD -		60		27		74		34	
NCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	129	lb	58	kg
RINKAGE	D1204								
CD -	(1 HR @ 100C)	+-2.00	%			0.6	%		
MD -		+-2.00				0.1			
RBON BLACK DISPERSION	D3015	A2				A2			
RBON BLACK CONTENT	D1603	2.00	%			2.42	%		
OMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
CR	D1693-B	1500	hours			Start	7/10/98		
ICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.94	
AVG. THICKNESS						80		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

OMER: FLUOR DANIEL FERNALD/FERMCO

B NO. 7920

OMMENTS

DATE SHIPPED

7-31-98

GSE

Roll Test Data Report

ROLL NO. AK-4198 FF

ROLL DIMENSIONS = ± 1%		
ROLL NUMBER:	AK-4198 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8569	sq.ft.
	796	sq. meters
LENGTH:	359	feet
	109	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3500	pounds
	1588	kilograms

RESIN LOT INFORMATION	
LOT NUMBER	Z-45473
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	200	lb/in	36	kg/cm
MD -		173		31		196		35	
YIELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	426	lb/in	76	kg/cm
MD -		324		59		395		71	
BREAK ELONGATION	D638								
CD -		560	%			710	%		
MD -		560				634			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	72	lb	33	kg
MD -		60		27		76		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	127	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	-2.00	%			0.6	%		
MD -		-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.44	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.94	
AVG. THICKNESS						80		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

APPROVED 7-31-98

GSE

Roll Test Data Report

ROLL NO. AK-4199 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4199 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3474	pounds
	1576	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	203 lb/in	36 kg/cm
MD -		173	31	197	35
YIELD ELONGATION	D638				
CD -		13 %		21 %	
MD -		13		21	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	406 lb/in	73 kg/cm
MD -		324	59	451	81
K ELONGATION	D638				
CD -		560 %		666 %	
MD -		560		730	
NITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	76 lb	35 kg
MD -		60	27	79	36
UNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	128 lb	58 kg
HRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.3 %	
MD -		+/-2.00		0.1	
ARBON BLACK DISPERSION	D3015	A2		A2	
ARBON BLACK CONTENT	D1603	2.00 %		2.45 %	
EOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
SCR	D1693-B	1500 hours		Start 7/10/98	
HICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.94
AVG. THICKNESS				80	2.04

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

MER: FLUOR DANIEL FERNALD/FERMCO
O. 7920
OMMENTS

DATE SHIPPED

7-31-98

STAR... Safety Through Accountability and Recognition

Mobil Polyethylene
Certificate of Analysis

"QUALITY PEOPLE MAKING QUALITY PRODUCTS"

BILL WALLING
GSE LINING TECHNOLOGY INC.
19103 GUNDLE ROAD
HOUSTON, TX 77073-3515

06/11/1998

Mobil Chemical, a major supplier of quality polyethylene, has shipped a lot of material to your facility. The lot identification and analyses are listed below. This data has been supplied by our Quality Control Laboratory located here in Beaumont. If you should need further information or another copy of this report, please call your sales office in EDISON, NJ Phone: (908)321-6000.

Resin Identification		Resin Analysis Test	Lot Data
Product Type	HDG601	Density (gms/cc)	0.934
Lot Number	Z-45473	Melt Index (gm/10 min) I2	0.40
Hopper Car Number	MOBX-052539		
Quantity Shipped	171,700 LB		
Date Manufactured	05/12/1998		
Delivery Note	0080031624		
P.O. Number	S060721		
Location Shipped To ALDINE, TX			

Thank you for your business. If you need additional assistance, please do not hesitate to contact our Sales Representative in your area.

Fax To: (281) 847-3885 N. IVY
(281) 230-2510 RICK SCHAEFER

STAR... Safety Through Accountability and Recognition

2061

Mobil Polyethylene
Certificate of Analysis

"QUALITY PEOPLE MAKING QUALITY PRODUCTS"

BILL WALLING
GSE LINING TECHNOLOGY INC.
19103 GUNDLE ROAD
HOUSTON, TX 77073-3515

06/05/1998

Mobil Chemical, a major supplier of quality polyethylene, has shipped a lot of material to your facility. The lot identification and analyses are listed below. This data has been supplied by our Quality Control Laboratory located here in Beaumont. If you should need further information or another copy of this report, please call your sales office in EDISON, NJ Phone: (908)321-6000.

Resin Identification		Resin Analysis Test	Lot Data
Product Type	HDG601	Density (gms/cc)	0.935
Lot Number	Z-40476	Melt Index (gm/10 min) I2	0.40
Hopper Car Number	MBLX-053595		
Quantity Shipped	184,950 LB		
Date Manufactured	05/12/1998		
Delivery Note	0080031037		
P.O. Number	S060721		
Location Shipped To ALDINE, TX			

Thank you for your business. If you need additional assistance, please do not hesitate to contact our Sales Representative in your area.

Fax To: (281) 847-3885 N. IVY
(281) 230-2510 RICK SCHAEFER

GSE

Roll Test Data Report

ROLL NO. AK-4200 FF

ROLL DIMENSIONS = ± 1%		
ROLL NUMBER:	AK-4200 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8593	sq.ft.
	799	sq. meters
LENGTH:	360	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3555	pounds
	1613	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	< -70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	203 lb/in	36 kg/cm
MD -		173	31	195	35
YIELD ELONGATION	D638				
CD -		13 %		22 %	
MD -		13		21	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	[illegible] kg/cm	428 lb/in	-- kg/cm
MD -		324	[illegible]	464	75
B[illegible]K ELONGATION	D638				
CD -		560 %		706 %	
MD -		560		706	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	77 lb	35 kg
MD -		60	27	72	33
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	131 lb	59 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.3 %	
MD -		+/-2.00		0.1	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.46 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
ESCR	D1693-B	1500 hours		Start 7/10/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.94
AVG. THICKNESS				80	2.04

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH = 1.3 ON YIELD, 2.5 ON BREAK
-ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

APPROVED JG #20 7-31-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

GSE

Roll Test Data Report

2061

ROLL NO. AK-4201 FF

ROLL DIMENSIONS = ± 1%

ROLL NUMBER:	AK-4201 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3511	pounds
	1593	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
ENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	203 lb/in	36 kg/cm
MD -		173	31	198	35
ELD ELONGATION	D638				
CD -		13 %		22 %	
MD -		13		21	
ENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	390 lb/in	70 kg/cm
MD -		324	59	411	73
K ELONGATION	D638				
CD -		560 %		638 %	
MD -		560		664	
ITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	73 lb	33 kg
MD -		60	27	75	34
NCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	131 lb	59 kg
RINKAGE	D1204				
CD -	1 HR @ 100C	+/-2.00 %		0.5 %	
MD -		+/-2.00		0.4	
ARBON BLACK DISPERSION	D3015	A2		A2	
ARBON BLACK CONTENT	D1603	2.00 %		2.45 %	
EOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
SCR	D1693-B	1500 hours		Start 7/10/98	
HICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.94
AVG. THICKNESS				80	2.04

TEST NOTES. MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD. 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

APPROVED JG 7-31-98

OMER: FLUOR DANIEL FERNALD/FERMCO
B NO. 7920
OMMENTS

DATE SHIPPED

GSE

Roll Test Data Report

ROLL NO. AK-4202 FF

ROLL DIMENSIONS = ± 1%		
ROLL NUMBER:	AK-4202 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8617	sq.ft.
	801	sq. meters
LENGTH:	361	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3559	pounds
	1614	kilograms

RESIN LOT INFORMATION	
LOT NUMBER	Z-45473
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	203 lb/in	36 kg/cm
MD -		173	31	193	35
YIELD ELONGATION	D638				
CD -		13 %		21 %	
MD -		13		20	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	58 kg/cm	413 lb/in	74 kg/cm
MD -		324	58	426	76
BREAK ELONGATION	D638				
CD -		560 %		672 %	
MD -		560		691	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	76 lb	34 kg
MD -		60	27	72	33
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	120 lb	55 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/- 2.00 %		0.5 %	
MD -		+/- 2.00		0.4	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.44 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
ESCR	D1693-B	1500 hours		Start 7/10/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.94
AVG. THICKNESS				80	2.04

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

7-31-98

GSE

Roll Test Data Report

2061

ROLL NO. AK-4203 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4203 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3502	pounds
	1588	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
NSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	205 lb/in	37 kg/cm
MD -		173	31	198	35
ELD ELONGATION	D638				
CD -		13 %		20 %	
MD -		13		21	
NSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	420 lb/in	75 kg/cm
MD -		324	59	410	73
ELONGATION	D638				
CD -		560 %		696 %	
MD -		560		667	
ITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	76 lb	35 kg
MD -		60	27	75	34
NCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	128 lb	58 kg
RINKAGE	D1204				
CD -	(1 HR @ 100C)	-2.00 %		0.3 %	
MD -		-2.00		0.3	
RBON BLACK DISPERSION	D3015	A2		A2	
RBON BLACK CONTENT	D1603	2.00 %		2.42 %	
OMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
CR	D1693-B	1500 hours		Start 7/10/98	
ICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				80	2.03

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

MER: FLUOR DANIEL FERNALD/FERMCO
NO. 7920
MMENTS

DATE SHIPPED

APPROVED JG 7-31-98

000301

GSE

Roll Test Data Report

ROLL NO. AK-4204 FF

ROLL DIMENSIONS ≈ ±1%

ROLL NUMBER:	AK-4204 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3585	pounds
	1626	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	206 lb/in	37 kg/cm
MD -		173	31	201	36
YIELD ELONGATION	D638				
CD -		13 %		20 %	
MD -		13		20	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb in	59 kg/cm	394 lb/in	70 kg/cm
MD -		324	59	397	71
BREAK ELONGATION	D638				
CD -		560 %		658 %	
MD -		560		646	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	79 lb	36 kg
MD -		60	27	77	35
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	124 lb	56 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.3 %	
MD -		-/-2.00		0.3	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.41 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
ESCR	D1693-B	1500 hours		Start 7/10/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				80	2.03

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

7-31-98

GSE

Roll Test Data Report

2061

ROLL NO. AK-4205 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4205 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3507	pounds
	1591	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
ENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	200 lb/in	36 kg/cm
MD -		173	31	198	35
IELD ELONGATION	D638				
CD -		13 %		23 %	
MD -		13		23	
ENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	428 lb/in	76 kg/cm
MD -		324	59	433	77
K ELONGATION	D638				
CD -		560 %		714 %	
MD -		560		718	
NITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	72 lb	33 kg
MD -		60	27	73	33
UNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	125 lb	56 kg
HRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/- 2.00 %		0.6 %	
MD -		+/- 2.00		0.2	
ARBON BLACK DISPERSION	D3015	A2		A2	
ARBON BLACK CONTENT	D1603	2.00 %		2.40 %	
EOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
SCR	D1693-B	1500 hours		Start 7/10/98	
HICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				80	2.03

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

APPROVED JG 7-31-98

OMER: FLUOR DANIEL FERNALD/FERMCO
RO. 7920
OMMENTS

DATE SHIPPED

GSE

Roll Test Data Report

ROLL NO. AK-4207 FF

GSE

Roll Test Data Report

ROLL NO. AK-4206 FF

ROLL DIMENSIONS ≈ ± 1%		
ROLL NUMBER:	AK-4206 FF	
PROD DATE:	07/10/98	
SHEET AREA:	6641	sq.ft.
	803	sq. meters
LENGTH:	362	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3508	pounds
	1591	kilograms

RESIN LOT INFORMATION	
LOT NUMBER	Z-45473
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	201	lb/in	36	kg/cm
MD -		173		31		198		35	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	440	lb/in	79	kg/
MD -		324		59		420		75	
BREAK ELONGATION	D638								
CD -		560	%			739	%		
MD -		560				691			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	73	lb	33	kg
MD -		60		27		72		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	122	lb	55	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.6	%		
MD -		+/-2.00				0.2			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.40	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.97	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
FOR TENSILE ELONGATION TEST GAUGE LENGTH = 1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

APPROVED
7-31-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

GSE

Roll Test Data Report

2061

ROLL NO. AK-4209 FF

ROLL DIMENSIONS = ± 1%		
ROLL NUMBER:	AK-4209 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.67	feet
	7.3	meters
WEIGHT:	3510	pounds
	1592	kilograms

RESIN LOT INFORMATION	
LOT NUMBER	Z-45473
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	205 lb/in	37 kg/cm
MD -		173	31	199	36
YIELD ELONGATION	D638				
CD -		13 %		20 %	
MD -		13		21	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	406 lb/in	73 kg/cm
MD -		324	59	406	73
BREAK ELONGATION	D638				
CD -		560 %		668 %	
MD -		560		656	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	77 lb	35 kg
MD -		60	27	76	35
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	125 lb	56 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.1 %	
MD -		+/-2.00		0.1	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.38 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
ESCR	D1693-B	1500 hours		Start 7/10/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				80	2.03

TEST NOTES. MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
PO. 7920
COMMENTS

DATE SHIPPED

APPROVED YS 7-31-98

GSE

Roll Test Data Report

ROLL NO. AK-4210 FF

ROLL DIMENSIONS = ± 1%

ROLL NUMBER:	AK-4210 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	786	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3559	pounds
	1614	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	207	lb/in	37	kg/cm
MD -		173		31		203		36	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	429	lb/in	77	kg/cm
MD -		324		59		431		77	
BREAK ELONGATION	D638								
CD -		560	%			706	%		
MD -		560				692			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	76	lb	35	kg
MD -		60		27		76		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	126	lb	57	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.1	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.38	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

JG 7-31-98

GSE

Roll Test Data Report - 2061

ROLL NO. AK-4213 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4213 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3478	pounds
	1578	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.05
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	201 lb/in	36 kg/cm
MD -		173	31	195	35
YIELD ELONGATION	D638				
CD -		13 %		20 %	
MD -		13		20	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	416 lb/in	74 kg/cm
MD -		324	59	411	73
BREAK ELONGATION	D638				
CD -		560 %		697 %	
MD -		560		677	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	71 lb	32 kg
MD -		60	27	75	34
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	125 lb	57 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.3 %	
MD -		+/-2.00		0.0	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.36 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.943 g/cc
ESCR	D1693-B	1500 hours		Start 7/10/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				80	2.03

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
PO NO 7920
COMMENTS

DATE SHIPPED

ACCEPTED 8-3-98

GSE

Roll Test Data Report

ROLL NO. AK-4214 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4214 FF	
PROD DATE:	07/13/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3548	pounds
	1609	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	199 lb/in	35 kg/cm
MD -		173	31	195	35
YIELD ELONGATION	D638				
CD -		13 %		20 %	
MD -		13		20	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	403 lb/in	72 kg/c
MD -		324	59	412	74
BREAK ELONGATION	D638				
CD -		560 %		678 %	
MD -		560		680	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	74 lb	34 kg
MD -		60	27	74	34
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	126 lb	57 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.3 %	
MD -		+/-2.00		0.0	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.35 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.943 g/cc
ESCR	D1693-B	1500 hours		Start 7/10/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				80	2.03

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

APPROVED JG 8-3-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

GSE

Roll Test Data Report

2061

GSE

Roll Test Data Report

ROLL NO. AK-4215 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4215 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3486	pounds
	1581	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.00
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	193 lb/in	34 kg/cm
MD -		172	31	188	34
YIELD ELONGATION	D638				
CD -		13 %		21 %	
MD -		13		22	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	420 lb/in	75 kg/cm
MD -		324	59	390	70
BREAK ELONGATION	D638				
CD -		560 %		725 %	
MD -		560		649	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	71 lb	32 kg
MD -		60	27	87	40
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	126 lb	57 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.3 %	
MD -		+/-2.00		0.1	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.34 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
ESCR	D1693-B	1500 hours		START 7/10/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				80	2.03

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

APPROVED JG 8-3-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

Author: Don Goetz at FNST-03
Date: 8/3/98 5:18 PM
Priority: Normal
TO: Jyh-Dong Chiou at FNST-02
TO: Susan Lorenz at FNST-06
TO: Linda Barlow at FNST-02
TO: Lee E McDaniel
TO: Daniel Stempfley at FNST-05
TO: Robert Crowley at FNST-05
TO: Gregg Johnson at FNST-02
TO: Jeff Middaugh
TO: Philip Thomas at FNST-05
TO: Rob Turnbull
TO: Greg Peters
TO: Matt Harper
TO: Kevin Harbin
TO: Louis Wehlitz
TO: Bill Zebick at FNST-02
TO: Michael Hickey at FNST-02
TO: Mike Godber at FNST-04
TO: Renee Erisman at FNST-06
TO: Marc Jewett at FNST-02
TO: Butch Freels at FNUN-01
TO: Raymond Reinhart at FNST-05
TO: Alex Bell at FNST-06
TO: Jeannie Foster at FNST-02
TO: Don Goetz
Subject: Parking on the old North Acces Road leading to T-98/T96 area
---------- Message Contents ----------

This cc:Mail is to remind everyone not to park on the side of the road. Please park in the Petro parking area or one of the plant parking lots.

In the next week or two Petro will begin deliver of the stone for cell 2 LDS/LCS drainage layers. These deliveries will be along the the old North Access Road pass T-98 into cell 3 for stockpiling. There may be as 100 to 150 trucks per day and we can not permit vehicles parking along the side of the road as they may impede emergency safety vehicles and haul trucks (note, that parking along side road may subject someone's vehicle to damage from falling stone).

Should you have any questions please contact Don Goetz at X5517 or Lou Wehlitz at X5230.

Author: Don Goetz at FNST-03
Date: [redacted]
Priority: Normal
TO: Raymond Reinhart at FNST-05
TO: Alex Bell at FNST-06
CC: Bill Zebick at FNST-02
CC: Louis Wehlitz
CC: Matt Harper
CC: Kevin Harbin
CC: Jeffrey Ellis at FNST-06
CC: Warren Hooper at FNST-02
CC: Rob Turnbull
CC: Greg Peters
CC: Tim Smith
CC: Daniel Stempfley at FNST-05
CC: Gregg Johnson at FNST-02
CC: Jeff Middaugh
CC: Philip Thomas at FNST-05
CC: Renee Erisman at FNST-06
Subject: Gate hours at OSDF

---------- Message Contents ----------

Alex,

This cc:Mail is to follow up our conversation at 1530 today. Per our conversation Gates E-1, E-2, and E-3 at the OSDF will open at 0500 and secured after 2000 (unless other arrangements are made); the contractor has been notified of this schedule.

Thanks,

Don Goetz (X5517)

2061

Author: Jim Turner at FNST-05
Date: 8/5/98 7:18 PM
Priority: Normal
TO: ericr@gseworld.com at FE-INTERNET
CC: Rick Holbrook at FNST-02
CC: Uday Kumthekar at FNST-02
CC: Rick Heath at FNST-02
CC: Mike Godber at FNST-04
CC: Renee Erisman at FNST-06
Subject: List of Submittals Attached (Corel WordPerfect 8)

---------- Message Contents ----------

Eric:

I received the list of thicknesses and the delegation letter. Those are reflected on the attached matrix. Please review the matrix and be prepared to discuss it tomorrow (Thursday, August 6th). We are setting up a phone call to you for 1:00 p.m. EDT (12:00 noon CDT). Please let us know where we can reach you, or if another time is more appropriate. We will answer any questions about the matrix then, unless you call me earlier.

Thanks for your response on the items.

Jim Turner

Manufacturing Quality Control Issues for OSDF Geosynthetics - August 5, 1998			
Required	Date Required	Status	Comment
02770P/1.04 (Signed Manufacturer's 20-year Warranty)			
02770P/1.05.A.3 (Resin origin and identification): Lots Z-45448 (50,600 sq ft) and Z-40477 (186,900 sq ft)			
02770P/1.05.A.4 (Certification of Minimum Average Roll Values for properties listed in Table 02770P-1)			
02770P/1.05.B.3 (No reclaimed polymer used)			
02770P/1.05.C.1 (Delegation Letter from QC Mgr.)		Received 8/5/98	Acceptable.
02770P/2.01.B.1 (Resin Specific Gravity .934)			GeoSyntec to furnish justification.
02770P/2.03.B.5 (Thickness per GRI-GM8 vs. ASTM D 5199)		Received 8/5/98. Thickness per ASTM D 5994.	Acceptable.
02770P/2.03.B.5 (Carbon Black Dispersion per ASTM D 5596)			
02770P/2.03.B.7 (Environmental Stress Crack results - need 3 tests minimum)	8/26/98		
02770P/2.03.B.7 (Low Temperature Brittleness on GML (not resin) - need 3 tests minimum)			
002772P/1.04.A (Name of Product)			
02772P/1.04.A.5 (Certification of Manufacturer's requirements for geotextile component of GCL are met)			
02772P/1.04.A.6 (Certification of minimum average roll values for all properties listed in Table 02772P-1)			
02772P/1.04.B (Results of GCL MQC tests, plus continuous inspection and needle-free)			
02772P/2.02.B (Test results meet specification and occur once per 40,000 sq. ft.)			

02714P/1.04.A.2 (Certification of minimum average roll values and test procedures for all properties listed in 02714P-1 through 02714P-3)			
02714P/1.04.B (Manufacturer's Quality Control Certificates signed by QC manager for each roll of geotextile)			
02714P/2.02.B (Manufacturing QC tests at least once per 50,000 square feet)			
02714P/2.02.C. (Manufacturing QC tests ON FILTER ONLY at least once per 100,000 square feet on ASTM D 4751 and ASTM D 4491)			

Kwasi

Author: Jim Turner at FNST-05
Date: 8/5/98 2:56 PM
Priority: Normal
Receipt Requested
TO: ericr@gseworld.com at FE-INTERNET
CC: Rick Holbrook at FNST-02
CC: Rick Heath at FNST-02
CC: Dan Bodine at FNST-04
CC: Renee Erisman at FNST-06
CC: Mike Godber at FNST-04
CC: Uday Kumthekar at FNST-02
Subject: Response to Fax

---------- Message Contents ----------

Eric:

Received your fax this morning. Received all but 3 of the Roll Test Data Reports that we were missing, and those three are not a problem; your testing regimen, since it exceeds our smallest once per 40,000 square foot frequency, covers those missing sheets.

I also received two certificates of analysis; one for Lot Z-45473 (153,200 sq ft) and one for Lot Z-40476.

I did not receive the Dispersion Report, and I need COAs for Lots Z-45448 (50,600 sq ft) and Z-40477 (186,900 sq ft).

ALSO: Our specification requires that low-temperature brittleness be "run at a minimum of once every 400,000 square feet . . . . Provide written certification that these tests have been performed on geomembrane samples obtained from rolls delivered to the site." (Tests listed are environmental stress crack, ASTM D 5397; low temperature brittleness, ASTM D 746, Procedure B; and dimensional stability, ASTM D 1204).

Dimensional stability, which is recorded on each RTDR that we have received, is no problem. ESCR is being performed. Low temperature brittleness is also recorded on each RTDR, but it is recorded AS A RESIN LOT TEST, NOT A TEST ON THE MEMBRANE.

PLEASE ENSURE THAT LOW TEMPERATURE BRITTLENESS IS PERFORMED ON AT LEAST ONE ROLL PER LOT OR ONE ROLL PER 400,000 SQ. FT., WHICHEVER IS MORE, AND THAT THE RESULTS ARE REPORTED TO US AS SOON AS RECEIVED.

I have faxed you a Record of Telephone Conversation from our conversation yesterday. In case you have not received it (3 pages, including cover), I attached it to this as a WordPerfect 8 file.

I will be in contact soon.

Jim Turner

RECORD OF TELEPHONE CONVERSATION TC:OPI(QA):98-0001 - Continued

RECORD OF TELEPHONE CONVERSATION TC:OPI(QA):98-0001

DATE: August 4th, 1998
FROM: Jim Turner
TO: Eric Reed

LOCATION: GSE Lining Systems, Inc., Houston, TX
LOCATION: Fernald
SUBJECT: QUALITY CONTROL/QUALITY ASSURANCE ON GEOMEMBRANE LINER MATERIAL, GEOSYNTHETIC CLAY LINER MATERIAL, AND GEOTEXTILE MATERIAL FOR THE ON-SITE DISPOSAL FACILITY PHASE II

Date: August 4th, 1998
From: Jim Turner
To: Eric Reed

DISTRIBUTION:

File 20102, ECDC, MS52-7
Dan Bodine, GeoSyntec, MS38
Dave Duderstadt, FDF, MS64
Mike Godber, FDF, MS64
Don Goetz, FDF, MS64
Rick Heath, FDF, MS64
Mike Hickey, FDF, MS64
Rick Holbrook, FDF, MS64
Jim Jenkins, FDF, MS64
Uday Kumthekar, FDF, MS64
Dave Phillips, GeoSyntec, Atlanta
Frank Thompson, FDF, MS52-2
Lou Wehlitz, FDF, MS64
Bill Zebick, FDF, MS64

I called Eric Reed of GSE Lining Systems, Inc., to discuss various items that needed resolution in regards to quality assurance/quality control submittals and testing.

My first question regarded their Roll Test Data Report (RTDR) forms, which were received from GSE and distributed by Engineering/Construction Document Control (ECDC) to FDF Engineering, GeoSyntec Engineering, and FDF QA on July 29th, 1998. Specifically, I asked Eric if the stamp, initials, and date in the lower right hand corner of the RTDR represented the Quality Control manager (as required by Specification 02770P, Section 105.C.1). Eric said no, that the stamp, initials, and signature represent one of several QC technicians. I suggested to Eric that one way he could comply with the spirit of the specification is to have the QC manager write a memorandum of delegation, authorizing the QC technicians to sign the RTDR for our project in his (or her) stead. This authorization could extend to the signer of the Asperity Test results as well. Eric agreed to pursue that option.

Next, Eric informed me that the missing RTDR (seventeen reports were missing from the original SUBMITTALS) have been located and will be faxed and FEDEXed to me.

I indicated to Eric that the following submittal items were incomplete:

000316

- From the list of 10 completed facilities of > = 100,000 ft^2, the facility listing did not specify the purpose of those facilities. (105.A.2.a) I told Eric I would confirm whether that requirement could be waived.
- Origin (resin supplier's name, resin production plant) and identification (brand name, number) of the polyethylene resin used was incomplete. Only

Date: August 4th, 1998
From: Jim Turner
To: Eric Reed

the resin lot number and resin type appear on the RTDR. (105.A.3.)

Certification of minimum average roll value (MARV - 95% lower confidence limit) for physical and mechanical properties listed in Table 02770P-1 (105.A.4.)

- Copies of QC Certificates issued by the resin supplier including production dates and origin of resin used to manufacture geomembrane under this Contract (105.B.1)
- Certification that no reclaimed polymer is added to this resin (105.B.3).

Eric mentioned that some of this information would be available from the resin manufacturer's Certificates of Analysis (COA), which he will forward to me. He also agreed to look up the rest of this information and forward it.

I mentioned to Eric that our specification calls for thickness measured in accordance with test method GRI-GM8, but that their RTDR measure thickness in accordance with ASTM D 1593 and D 751. Eric related that ASTM D 5994 supersedes GRI-GM8, but that additional thickness data in accordance with ASTM D 5199 could be made available. ASTM D 5199 tests the thickness of the smooth roll before texturing. Eric proposed that GSE's method of applying the texture does not alter the thickness of the sheet. He further asserted that, if strength and other MQA data are adequate, they render thickness moot. I agreed to approach our engineers about the acceptability of thickness measured in accordance with ASTM D 5199. If acceptable, such would be offered under a separate cover, much as our asperity data was sent.

JTT

c: File Record Storage Copy 102.5 (c/o D.J. Crosby, FDF, MS30)

GSE®

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
281-443-8564
Fax 281-875-6010

Quality Assurance Laboratory Test Results

Test: Asperity measurement of Textured Geomembranes Using a Depth Gage GRI GM12
Job Name: Fluor Daniel Fernald/Fermco
MR Number: 7920-01
Job Number: C1269

Roll #	Minimum Requirement (mils)	Test Results	Status	Roll #	Minimum Requirement (mils)	Test Results	Status
AJ5173FF	7 Y-45934	19	Pass	AK4219FF	7	19	Pass
AK2527FF	7	17	Pass	AK4220FF	7	18	Pass
AK2528FF	7	24	Pass	AK4221FF	7	21	Pass
AK2550FF	7	18	Pass	AK4222FF	7	19	Pass
AK2553FF	7	21	Pass	AK4223FF	7	21	Pass
AK2554FF	7	22	Pass	AK4224FF	7	20	Pass
AK4197FF	7	21	Pass	AK4225FF	7	18	Pass
AK4198FF	7	23	Pass	AK4226FF	7	19	Pass
AK4200FF	7	23	Pass	AK4227FF	7	22	Pass
AK4201FF	7	21	Pass	AK4228FF	7	18	Pass
AK4202FF	7	15	Pass	AK4229FF	7	17	Pass
AK4203FF	7	16	Pass	AK4230FF	7	16	Pass
AK4204FF	7	29	Pass	AK4231FF	7	15	Pass
AK4205FF	7	22	Pass	AK4232FF	7	16	Pass
AK4206FF	7	17	Pass	AK4233FF	7	19	Pass
AK4207FF	7	20	Pass	AK4234FF	7	14	Pass
AK4208FF	7	22	Pass	AK4235FF	7	18	Pass
AK4209FF	7	17	Pass	AK4236FF	7	23	Pass
AK4210FF	7	16	Pass	AK4237FF	7	14	Pass
AK4211FF	7	20	Pass	AK4238FF	7	21	Pass
AK4212FF	7	22	Pass	AK4239FF	7	20	Pass
AK4213FF	7	23	Pass	AK4240FF	7	21	Pass
AK4214FF	7	20	Pass	AK4241FF	7	18	Pass
AK4215FF	7	18	Pass	AK4242FF	7	16	Pass
AK4216FF	7	20	Pass	AK4243FF	7	20	Pass
AK4217FF	7	20	Pass	AK4244FF	7	19	Pass
AK4218FF	7	22	Pass	AK4245FF	7	17	Pass

For environmental lining solutions . . . the world comes to GSE.®
A Gundle/SLT Environmental, Inc. Company

GSE®

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
281-443-8564
Fax 281-875-6010

Quality Assurance Laboratory Test Results

Test: Asperity measurement of Textured Geomembranes Using a Depth Gage GRI GM12
Job Name: Fluor Daniel Fernald/Fermco
MR Number: 7920-01
Job Number: C1269

Roll #	Minimum Requirement (mils)	Test Results	Status	Roll #	Minimum Requirement (mils)	Test Results	Status
AK4246FF	7	16	Pass	AK4272FF	7	19	Pass
AK4247FF	7	19	Pass	AK4273FF	7	18	Pass
AK4248FF	7	18	Pass	AK4274FF	7	18	Pass
AK4249FF	7	17	Pass	AK4275FF	7	18	Pass
AK4250FF	7	18	Pass	AK4276FF	7	17	Pass
AK4251FF	7	19	Pass	AK4277FF	7	17	Pass
AK4252FF	7	18	Pass	AK4278FF	7	19	Pass
AK4253FF	7	17	Pass	AK4279FF	7	19	Pass
AK4254FF	7	19	Pass	AK4280FF	7	20	Pass
AK4255FF	7	18	Pass	AK4281FF	7	20	Pass
AK4256FF	7	20	Pass	AK4282FF	7	16	Pass
AK4257FF	7	19	Pass	AK4283FF	7	18	Pass
AK4258FF	7	18	Pass	AK4284FF	7	19	Pass
AK4259FF	7	18	Pass	AK4285FF	7	17	Pass
AK4260FF	7	20	Pass	AK4286FF	7	18	Pass
AK4261FF	7	21	Pass	AK4287FF	7	18	Pass
AK4262FF	7	19	Pass	AK4288FF	7	19	Pass
AK4263FF	7	17	Pass	AK4289FF	7	20	Pass
AK4264FF	7	16	Pass	AK4290FF	7	20	Pass
AK4265FF	7	15	Pass	AK4291FF	7	21	Pass
AK4266FF	7	19	Pass	AK4292FF	7	18	Pass
AK4267FF	7	18	Pass	AK4293FF	7	19	Pass
AK4268FF	7	19	Pass	AK4294FF	7	17	Pass
AK4269FF	7	18	Pass	AK4295FF	7	19	Pass
AK4270FF	7	17	Pass	AK4296FF	7	18	Pass
AK4271FF	7	17	Pass				

For environmental lining solutions . . . the world comes to GSE.®
A Gundle/SLT Environmental, Inc. Company

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AJ-5175 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8359	sq.ft.
	777	sq. meters
LENGTH:	356	feet
	109	meters
WIDTH:	23.48	feet
	7.2	meters
WEIGHT:	3483	pounds
	1580	kilograms

RESIN LOT INFORMATION

LOT NUMBER Y-45934 **2061**
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.590

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	202 lb/in	36 kg/cm
MD -		173	31	202	36
YIELD ELONGATION	D638				
CD -		13 %		21 %	
MD -		13		20	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	414 lb/in	74 kg/cm
MD -		324	59	432	77
BREAK ELONGATION	D638				
CD -		560 %		691 %	
MD -		560		723	
[illegible]AL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	73 lb	33 kg
MD -		60	27	74	33
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	126 lb	57 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.2 %	
MD -		+/-2.00		0.2	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.46 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.945 g/cc
ESCR	D1693-B	1500 hours		Start 12/05/97	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	79	2.00
AVG. THICKNESS				80	2.04

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-17-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
[illegible]MENTS

DATE SHIPPED

GSE

Roll Test Data Report

ROLL NO. AK-2527 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-2527 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8371	sq.ft.
	778	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.58	feet
	7.2	meters
WEIGHT:	3475	pounds
	1576	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45448
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.936
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.490

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	195	lb/in	35	kg/cm
MD -		173		31		204		36	
YIELD ELONGATION	D638								
CD -		13	%			23	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	409	lb/in	73	kg/c
MD -		324		59		443		79	
AK ELONGATION	D638								
CD -		560	%			689	%		
MD -		560				727			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	33	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	131	lb	60	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.33	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	5/29/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		78		1.97	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

7-17-98

20081727

GSE

Roll Test Data Report

2061

ROLL NO. AK-2528 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-2528 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8489	sq.ft.
	789	sq. meters
LENGTH:	360	feet
	110	meters
WIDTH:	23.58	feet
	7.2	meters
WEIGHT:	3516	pounds
	1595	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45448
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.936
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.490

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	196	lb/in	35	kg/cm
MD -		173		31		194		35	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	421	lb/in	75	kg/cm
MD -		324		59		444		79	
BREAK ELONGATION	D638								
CD -		560	%			729	%		
MD -		560				762			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	71	lb	32	kg
MD -		60		27		73		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	121	lb	55	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.2	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.35	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	5/29/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		78		1.97	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-17-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081727

GSE

Roll Test Data Report

ROLL NO. AK-2549 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-2549 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8489	sq.ft.
	789	sq. meters
LENGTH:	360	feet
	110	meters
WIDTH:	23.58	feet
	7.2	meters
WEIGHT:	3521	pounds
	1597	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45448
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.936
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.490

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	192	lb/in	34	kg/cm
MD -		173		31		191		34	
YIELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				19			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	395	lb/in	71	kg/c
MD -		324		59		414		74	
AK ELONGATION	D638								
CD -		560	%			693	%		
MD -		560				716			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	72	lb	33	kg
MD -		60		27		74		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	127	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.0	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.46	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.946	g/cc
ESCR	D1693-B	1500	hours			Start	5/29/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		78		1.99	
AVG. THICKNESS						80		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-22-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081732

GSE

Roll Test Data Report

ROLL NO. AK-2550 FF

2061

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-2550 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8371	sq.ft.
	778	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.58	feet
	7.2	meters
WEIGHT:	3473	pounds
	1575	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45448
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.936
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.490

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	197 lb/in	35 kg/cm
MD -		173	31	200	36
YIELD ELONGATION	D638				
CD -		13 %		23 %	
MD -		13		21	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	424 lb/in	76 kg/cm
MD -		324	59	436	78
BREAK ELONGATION	D638				
CD -		560 %		727 %	
MD -		560		728	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	72 lb	33 kg
MD -		60	27	72	33
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	126 lb	57 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.0 %	
MD -		+/-2.00		0.0	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.48 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.946 g/cc
ESCR	D1693-B	1500 hours		Start 5/29/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	78	1.99
AVG. THICKNESS				80	2.04

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-17-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20001727

GSE

Roll Test Data Report

ROLL NO. AK-2553 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-2553 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8371	sq.ft.
	778	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.58	feet
	7.2	meters
WEIGHT:	3456	pounds
	1568	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45448
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.936
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.490

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	204	lb/in	36	kg/cr
MD -		173		31		203		36	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	375	lb/in	67	kg/
MD -		324		59		438		78	
AK ELONGATION	D638								
CD -		560	%			783	%		
MD -		560				724			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	75	lb	34	kg
MD -		60		27		77		35	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	133	lb	60	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.0	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.43	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.946	g/cc
ESCR	D1693-B	1500	hours			Start	5/29/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		78		1.99	
AVG. THICKNESS						80		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-17-9

STOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS
30081727

DATE SHIPPED

GSE

Roll Test Data Report

ROLL NO. AK-2554 FF

2061

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-2554 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8536	sq.ft.
	793	sq. meters
LENGTH:	362	feet
	110	meters
WIDTH:	23.58	feet
	7.2	meters
WEIGHT:	3477	pounds
	1577	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-45448
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.936
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.490

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	210	lb/in	38	kg/cm
MD -		173		31		208		37	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	403	lb/in	72	kg/cm
MD -		324		59		411		73	
BREAK ELONGATION	D638								
CD -		560	%			654	%		
MD -		560				657			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	77	lb	35	kg
MD -		60		27		79		36	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	132	lb	60	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.0	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.42	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.946	g/cc
ESCR	D1693-B	1500	hours			Start	5/29/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		78		1.99	
AVG. THICKNESS						80		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

DATE SHIPPED

7-17-98

000326

GSE

Roll Test Data Report

ROLL NO. AK-4211 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4211 FF	
PROD DATE:	07/14/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3502	pounds
	1588	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-45473
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	207	lb/in	37	kg/cm
MD -		173		31		202		36	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	392	lb/in	70	kg/c
MD -		324		59		466		83	
AK ELONGATION	D638								
CD -		560	%			629	%		
MD -		560				744			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	73	lb	33	kg
MD -		60		27		74		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	132	lb	60	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.7	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.37	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.943	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-9

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report 2061

ROLL NO. AK-4212 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4212 FF	
PROD DATE:	07/14/98	
SHEET AREA:	8665	sq.ft.
	805	sq. meters
LENGTH:	363	feet
	111	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3538	pounds
	1605	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-45473
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	235	lb/in	42	kg/cm
MD -		173		31		218		39	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				23			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	421	lb/in	75	kg/cm
MD -		324		59		426		76	
BREAK ELONGATION	D638								
CD -		560	%			684	%		
MD -		560				680			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	33	kg
MD -		60		27		74		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	134	lb	61	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.7	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.36	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.943	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

RECEIVED JG 7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

ROLL NO. AK-4217 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4217 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3485	pounds
	1581	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	187	lb/in	33	kg/cm
MD -		173		31		179		32	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	403	lb/in	72	kg/c
MD -		324		59		420		75	
4K ELONGATION	D638								
CD -		560	%			709	%		
MD -		560				723			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	70	lb	32	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	111	lb	50	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.6	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.38	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

30081725

GSE

Roll Test Data Report 2061

ROLL NO. AK-4218 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4218 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8617	sq.ft.
	801	sq. meters
LENGTH:	361	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3549	pounds
	1610	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	199	lb/in	36	kg/cm
MD -		173		31		191		34	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	386	lb/in	69	kg/cm
MD -		324		59		392		70	
BREAK ELONGATION	D638								
CD -		560	%			659	%		
MD -		560				658			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	34	kg
MD -		60		27		74		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	122	lb	55	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.6	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.41	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

APPROVED JG 7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

DATE SHIPPED

20081725

000330

000329

GSE

Roll Test Data Report

ROLL NO. AK-4219 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4219 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3483	pounds
	1580	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	206	lb/in	37	kg/cm
MD -		173		31		205		37	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				19			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	432	lb/in	77	kg/c
MD -		324		59		450		80	
AK ELONGATION	D638								
CD -		560	%			710	%		
MD -		560				715			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	34	kg
MD -		60		27		76		35	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	134	lb	61	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.4	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.43	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-17-

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

GSE

Roll Test Data Report - 2061

ROLL NO. AK-4220 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4220 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8593	sq.ft.
	799	sq. meters
LENGTH:	360	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3531	pounds
	1602	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	198	lb/in	35	kg/cm
MD -		173		31		198		35	
YIELD ELONGATION	D638								
CD -		13	%			18	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	441	lb/in	79	kg/cm
MD -		324		59		425		76	
BREAK ELONGATION	D638								
CD -		560	%			740	%		
MD -		560				693			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	75	lb	34	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	127	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.4	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.45	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-17-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

DATE SHIPPED

GSE

Roll Test Data Report

ROLL NO. AK-4221 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4221 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3488	pounds
	1582	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	201	lb/in	36	kg/cm
MD -		173		31		201		36	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	444	lb/in	79	kg/c
MD -		324		59		424		76	
AK ELONGATION	D638								
CD -		560	%			741	%		
MD -		560				687			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	73	lb	33	kg
MD -		60		27		76		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	129	lb	58	kg.
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.1	%		
MD -		+/-2.00				0.3			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.43	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

JG 7-17-98

GSE

Roll Test Data Report - 2061

ROLL NO. AK-4222 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4222 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8522	sq.ft.
	792	sq. meters
LENGTH:	357	feet
	109	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3523	pounds
	1598	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	199	lb/in	36	kg/cm
MD -		173		31		197		35	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	425	lb/in	76	kg/cm
MD -		324		59		420		75	
BREAK ELONGATION	D638								
CD -		560	%			722	%		
MD -		560				693			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	72	lb	32	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	125	lb	57	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.1	%		
MD -		+/-2.00				0.3			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.42	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-17-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

DATE SHIPPED

20081727

GSE

Roll Test Data Report

ROLL NO. AK-4223 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4223 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3495	pounds
	1585	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	208	lb/in	37	kg/cm
MD -		173		31		205		37	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	421	lb/in	75	kg/c
MD -		324		59		450		80	
AK ELONGATION	D638								
CD -		560	%			682	%		
MD -		560				727			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	34	kg
MD -		60		27		74		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	131	lb	59	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.0	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.40	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

SG 7-17-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

GSE

Roll Test Data Report 2061

ROLL NO. AK-4224 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4224 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8545	sq.ft.
	794	sq. meters
LENGTH:	358	feet
	109	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3529	pounds
	1601	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
ENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	206	lb/in	37	kg/cm
MD -		173		31		208		37	
IELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				21			
ENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	412	lb/in	74	kg/cm
MD -		324		59		436		78	
AK ELONGATION	D638								
CD -		560	%			659	%		
MD -		560				683			
NITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	34	kg
MD -		60		27		76		34	
UNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	131	lb	59	kg
HRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.0	%		
MD -		+/-2.00				0.1			
ARBON BLACK DISPERSION	D3015	A2				A2			
ARBON BLACK CONTENT	D1603	2.00	%			2.39	%		
EOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
SCR	D1693-B	1500	hours			Start	7/10/98		
HICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

STOMER: FLUOR DANIEL FERNALD/FERMCO
OB NO. 7920
OMMENTS

DATE SHIPPED

7-17-98

GSE

Roll Test Data Report

ROLL NO. AK-4225 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4225 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3486	pounds
	1581	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	200 lb/in	36 kg/cm
MD -		173	31	196	35
YIELD ELONGATION	D638				
CD -		13 %		21 %	
MD -		13		21	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	377 lb/in	67 kg/cm
MD -		324	59	355	63
BRE ELONGATION	D638				
CD -		560 %		633 %	
MD -		560		588	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	73 lb	33 kg
MD -		60	27	75	34
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	125 lb	56 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.2 %	
MD -		+/-2.00		0.1	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.37 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
ESCR	D1693-B	1500 hours		Start 7/10/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				80	2.03

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-17-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

000337

GSE

Roll Test Data Report 2061

ROLL NO. AK-4226 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4226 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8617	sq.ft.
	801	sq. meters
LENGTH:	361	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3522	pounds
	1598	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	194 lb/in	35 kg/cm
MD -		173	31	193	34
YIELD ELONGATION	D638				
CD -		13 %		21 %	
MD -		13		21	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	435 lb/in	78 kg/cm
MD -		324	59	400	71
BREAK ELONGATION	D638				
CD -		560 %		745 %	
MD -		560		671	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	70 lb	32 kg
MD -		60	27	73	33
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	124 lb	56 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/- 2.00 %		0.2 %	
MD -		+/- 2.00		0.1	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.36 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
ESCR	D1693-B	1500 hours		Start 7/10/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				80	2.03

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

JG 7-17-98

GSE

Roll Test Data Report

ROLL NO. AK-4227 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4227 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3452	pounds
	1566	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	199	lb/in	36	kg/cm
MD -		173		31		197		35	
YIELD ELONGATION	D638								
CD -		13	%			23	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	427	lb/in	76	kg/
MD -		324		59		431		77	
AK ELONGATION	D638								
CD -		560	%			716	%		
MD -		560				717			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	71	lb	32	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	128	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.0	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.35	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

JG 7-17-98

20081727

GSE

Roll Test Data Report - 2061

ROLL NO. AK-4228 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4228 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8689	sq.ft.
	807	sq. meters
LENGTH:	364	feet
	111	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3569	pounds
	1619	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	198	lb/in	35	kg/cm
MD -		173		31		197		35	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	415	lb/in	74	kg/cm
MD -		324		59		444		79	
AK ELONGATION	D638								
CD -		560	%			692	%		
MD -		560				733			
NITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	72	lb	33	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	136	lb	62	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.0	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.34	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-17-98

STOMER: FLUOR DANIEL FERNALD/FERMCO
OB NO. 7920
COMMENTS

DATE SHIPPED

20181727

000340

GSE

Roll Test Data Report

ROLL NO. AK-4229 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4229 FF	
PROD DATE:	07/14/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3540	pounds
	1606	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	211	lb/in	38	kg/cm
MD -		173		31		212		38	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	413	lb/in	74	kg/c
MD -		324		59		421		75	
IK ELONGATION	D638								
CD -		560	%			694	%		
MD -		560				693			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	82	lb	37	kg
MD -		60		27		77		35	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	134	lb	61	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.0	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.33	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

1-15-98 QA

20081725

GSE

Roll Test Data Report 2061

ROLL NO. AK-4230 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4230 FF	
PROD DATE:	07/14/98	
SHEET AREA:	8593	sq.ft.
	799	sq. meters
LENGTH:	360	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3488	pounds
	1582	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	203 lb/in	36 kg/cm
MD -		173	31	200	36
YIELD ELONGATION	D638				
CD -		13 %		21 %	
MD -		13		20	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	428 lb/in	76 kg/cm
MD -		324	59	425	76
BREAK ELONGATION	D638				
CD -		560 %		738 %	
MD -		560		717	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	73 lb	33 kg
MD -		60	27	74	34
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	128 lb	58 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.0 %	
MD -		+/-2.00		0.1	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.32 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
ESCR	D1693-B	1500 hours		Start 7/10/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				80	2.03

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

7-15-98

20081725

GSE

Roll Test Data Report

ROLL NO. AK-4231 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4231 FF	
PROD DATE:	07/14/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3504	pounds
	1589	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	203	lb/in	36	kg/cm
MD -		173		31		204		36	
YIELD ELONGATION	D638								
CD -		13	%			23	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	436	lb/in	78	[illegible]
MD -		324		59		426		76	
AK ELONGATION	D638								
CD -		560	%			725	%		
MD -		560				683			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	72	lb	33	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	125	lb	57	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.0	%		
MD -		+/-2.00				0.2			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.33	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-9[illegible]

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

30081725

GSE

Roll Test Data Report 2061

ROLL NO. AK-4232 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4232 FF	
PROD DATE:	07/14/98	
SHEET AREA:	8569	sq.ft.
	796	sq. meters
LENGTH:	359	feet
	109	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3543	pounds
	1607	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	204	lb/in	36	kg/cm
MD -		173		31		206		37	
YIELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	409	lb/in	73	kg/cm
MD -		324		59		452		81	
AK ELONGATION	D638								
CD -		560	%			673	%		
MD -		560				727			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	75	lb	34	kg
MD -		60		27		76		35	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	131	lb	60	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.0	%		
MD -		+/-2.00				0.2			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.34	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

SG 7-15-98

20081725

GSE

Roll Test Data Report

ROLL NO. AK-4233 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4233 FF	
PROD DATE:	07/14/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3483	pounds
	1580	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	203	lb/in	36	kg/cm
MD -		173		31		203		36	
YIELD ELONGATION	D638								
CD -		13	%			19	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	436	lb/in	78	kg/
MD -		324		59		425		76	
AK ELONGATION	D638								
CD -		560	%			721	%		
MD -		560				700			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	33	kg
MD -		60		27		74		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	129	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.1	%		
MD -		+/-2.00				0.3			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.34	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-15-

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

2061

ROLL NO. AK-4234 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4234 FF	
PROD DATE:	07/14/98	
SHEET AREA:	8593	sq.ft.
	799	sq. meters
LENGTH:	360	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3548	pounds
	1609	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	208	lb/in	37	kg/cm
MD -		173		31		208		37	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	430	lb/in	77	kg/cm
MD -		324		59		411		73	
AK ELONGATION	D638								
CD -		560	%			707	%		
MD -		560				655			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	75	lb	34	kg
MD -		60		27		86		39	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	128	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.1	%		
MD -		+/-2.00				0.3			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.35	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-15-98

STOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20001725

GSE

Roll Test Data Report

ROLL NO. AK-4235 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4235 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3484	pounds
	1580	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	197	lb/in	35	kg/cm
MD -		173		31		191		34	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	438	lb/in	78	kg/
MD -		324		59		424		76	
AK ELONGATION	D638								
CD -		560	%			772	%		
MD -		560				724			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	76	lb	35	kg
MD -		60		27		73		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	120	lb	55	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/- 2.00	%			0.1	%		
MD -		+/- 2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.36	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

APPROVED JG 7-15-9

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

2061

ROLL NO. AK-4236 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4236 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3588	pounds
	1628	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	196	lb/in	35	kg/cm
MD -		173		31		187		33	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	373	lb/in	67	kg/cm
MD -		324		59		401		72	
K ELONGATION	D638								
CD -		560	%			660	%		
MD -		560				701			
NITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	73	lb	33	kg
MD -		60		27		70		32	
UNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	120	lb	54	kg
HRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.1	%		
MD -		+/-2.00				0.1			
ARBON BLACK DISPERSION	D3015	A2				A2			
ARBON BLACK CONTENT	D1603	2.00	%			2.37	%		
EOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
SCR	D1693-B	1500	hours			Start	7/10/98		
HICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

RECEIVED JG 7-15-98

TOMER: FLUOR DANIEL FERNALD/FERMCO

DATE SHIPPED

OB NO. 7920

OMMENTS

20081725

000348

GSE

Roll Test Data Report

ROLL NO. AK-4237 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4237 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3489	pounds
	1583	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	199 lb/in	36 kg/cm
MD -		173	31	194	35
YIELD ELONGATION	D638				
CD -		13 %		23 %	
MD -		13		21	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	395 lb/in	70 kg/cm
MD -		324	59	412	74
AK ELONGATION	D638				
CD -		560 %		676 %	
MD -		560		678	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	74 lb	34 kg
MD -		60	27	74	34
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	126 lb	57 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/- 2.00 %		0.1 %	
MD -		+/- 2.00		0.0	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.37 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
ESCR	D1693-B	1500 hours		Start 7/10/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				80	2.03

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

SG 7-15-9

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

2061

ROLL NO. AK-4238 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4238 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8617	sq.ft.
	801	sq. meters
LENGTH:	361	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3538	pounds
	1605	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	197	lb/in	35	kg/cm
MD -		173		31		194		35	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	387	lb/in	69	kg/cm
MD -		324		59		424		76	
AK ELONGATION	D638								
CD -		560	%			654	%		
MD -		560				699			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	69	lb	31	kg
MD -		60		27		73		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	120	lb	54	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.1	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.38	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD. 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-98

STOMER: FLUOR DANIEL FERNALD/FERMCO

DATE SHIPPED

OB NO. 7920

COMMENTS

30081725

000350

GSE

Roll Test Data Report

ROLL NO. AK-4239 F

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4239 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3476	pounds
	1577	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	200	lb/in	36	kg/cr
MD -		173		31		201		36	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	432	lb/in	77	kg/
MD -		324		59		404		72	
AK ELONGATION	D638								
CD -		560	%			727	%		
MD -		560				653			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	76	lb	34	kg
MD -		60		27		76		35	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	127	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/- 2.00	%			0.1	%		
MD -		+/- 2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.38	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-9

STOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

GSE

Roll Test Data Report

2061

ROLL NO. AK-4240 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4240 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8665	sq.ft.
	805	sq. meters
LENGTH:	363	feet
	111	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3545	pounds
	1608	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	202	lb/in	36	kg/cm
MD -		173		31		194		35	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	418	lb/in	75	kg/cm
MD -		324		59		388		69	
EAK ELONGATION	D638								
CD -		560	%			694	%		
MD -		560				652			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	70	lb	32	kg
MD -		60		27		74		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	129	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.1	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.39	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

RECEIVED JG 7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

ROLL NO. AK-4241 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4241 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3458	pounds
	1569	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	190	lb/in	34	kg/cm
MD -		173		31		190		34	
YIELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	422	lb/in	75	kg/
MD -		324		59		430		77	
AK ELONGATION	D638								
CD -		560	%			748	%		
MD -		560				742			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	71	lb	32	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	119	lb	54	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.0	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.38	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

2061

ROLL NO. AK-4242 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4242 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8641	sq.ft.
	803	sq. meters
LENGTH:	362	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3620	pounds
	1642	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
ENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	194	lb/in	35	kg/cm
MD -		173		31		190		34	
IELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				21			
ENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	414	lb/in	74	kg/cm
MD -		324		59		437		78	
K ELONGATION	D638								
CD -		560	%			722	%		
MD -		560				731			
NITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	73	lb	33	kg
MD -		60		27		72		33	
UNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	123	lb	56	kg
HRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.0	%		
MD -		+/-2.00				0.0			
ARBON BLACK DISPERSION	D3015	A2				A2			
ARBON BLACK CONTENT	D1603	2.00	%			2.36	%		
EOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
SCR	D1693-B	1500	hours			Start	7/10/98		
HICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

SG
7-15-98

TOMER: FLUOR DANIEL FERNALD/FERMCO
OB NO. 7920
COMMENTS
20081725

DATE SHIPPED

GSE

Roll Test Data Report

ROLL NO. AK-4243 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4243 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3521	pounds
	1597	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	203 lb/in	36 kg/cm
MD -		173	31	191	34
YIELD ELONGATION	D638				
CD -		13 %		19 %	
MD -		13		20	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	424 lb/in	76 kg/
MD -		324	59	438	78
AK ELONGATION	D638				
CD -		560 %		718 %	
MD -		560		730	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	75 lb	34 kg
MD -		60	27	71	32
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	116 lb	52 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/- 2.00 %		0.3 %	
MD -		+/- 2.00		0.1	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.35 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
ESCR	D1693-B	1500 hours		Start 7/10/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				80	2.03

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

SG
7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081723

GSE

Roll Test Data Report 2061

ROLL NO. AK-4244 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4244 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8593	sq.ft.
	799	sq. meters
LENGTH:	360	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3577	pounds
	1623	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	205	lb/in	37	kg/cm
MD -		173		31		194		35	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	378	lb/in	67	kg/cm
MD -		324		59		398		71	
BREAK ELONGATION	D638								
CD -		560	%			637	%		
MD -		560				660			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	34	kg
MD -		60		27		73		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	126	lb	57	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.33	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO

DATE SHIPPED

JOB NO. 7920

COMMENTS

GSE

Roll Test Data Report

ROLL NO. AK-4245 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4245 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3514	pounds
	1594	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	207	lb/in	37	kg/cm
MD -		173		31		200		36	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	457	lb/in	82	kg/c
MD -		324		59		393		70	
AK ELONGATION	D638								
CD -		560	%			759	%		
MD -		560				646			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	75	lb	34	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	124	lb	56	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.4	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.32	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-98

.STOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

000357

GSE

Roll Test Data Report

2061

ROLL NO. AK-4246 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4246 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8617	sq.ft.
	801	sq. meters
LENGTH:	361	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3579	pounds
	1623	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	207	lb/in	37	kg/cm
MD -		173		31		196		35	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	439	lb/in	78	kg/cm
MD -		324		59		444		79	
BREAK ELONGATION	D638								
CD -		560	%			726	%		
MD -		560				719			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	33	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	129	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.4	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.32	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

ROLL NO. AK-4247 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4247 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3509	pounds
	1592	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	207	lb/in	37	kg/cm
MD -		173		31		198		35	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	409	lb/in	73	kg/
MD -		324		59		438		78	
\K ELONGATION	D638								
CD -		560	%			679	%		
MD -		560				716			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	76	lb	34	kg
MD -		60		27		73		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	126	lb	57	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.1	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.33	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD. 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-15-9

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

2061

ROLL NO. AK-4248 FF

ROLL DIMENSIONS ≈ ± 1%		
ROLL NUMBER:	AK-4248 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8593	sq.ft.
	799	sq. meters
LENGTH:	360	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3541	pounds
	1606	kilograms

RESIN LOT INFORMATION	
LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
ENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	207	lb/in	37	kg/cm
MD -		173		31		197		35	
IELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				20			
ENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	397	lb/in	71	kg/cm
MD -		324		59		426		76	
K ELONGATION	D638								
CD -		560	%			665	%		
MD -		560				704			
NITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	73	lb	33	kg
MD -		60		27		76		35	
UNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	127	lb	58	kg
HRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.1	%		
MD -		+/-2.00				0.0			
ARBON BLACK DISPERSION	D3015	A2				A2			
ARBON BLACK CONTENT	D1603	2.00	%			2.33	%		
EOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
SCR	D1693-B	1500	hours			Start	7/10/98		
HICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-15-98

OMER: FLUOR DANIEL FERNALD/FERMCO

DATE SHIPPED

OB NO. 7920

OMMENTS

GSE

Roll Test Data Report

ROLL NO. AK-4249 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4249 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3479	pounds
	1578	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	210	lb/in	37	kg/cm
MD -		173		31		202		36	
YIELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				19			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	428	lb/in	76	kg/
MD -		324		59		437		78	
AK ELONGATION	D638								
CD -		560	%			699	%		
MD -		560				702			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	78	lb	35	kg
MD -		60		27		76		35	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	132	lb	60	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.1	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.34	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20R01725

GSE

Roll Test Data Report

2061

ROLL NO. AK-4250 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4250 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8641	sq.ft.
	803	sq. meters
LENGTH:	362	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3565	pounds
	1617	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	195	lb/in	35	kg/cm
MD -		173		31		184		33	
YIELD ELONGATION	D638								
CD -		13	%			19	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	449	lb/in	80	kg/cm
MD -		324		59		473		85	
AK ELONGATION	D638								
CD -		560	%			750	%		
MD -		560				816			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	71	lb	32	kg
MD -		60		27		73		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	125	lb	57	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.1	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.34	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD. 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

RECEIVED JG 7-15-98

STOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

DATE SHIPPED

20001725

000362

GSE

Roll Test Data Report

ROLL NO. AK-4251 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4251 FF	
PROD DATE:	07/13/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3488	pounds
	1582	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	210	lb/in	37	kg/cm
MD -		173		31		200		36	
YIELD ELONGATION	D638								
CD -		13	%			19	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	404	lb/in	72	kg/
MD -		324		59		415		74	
AK ELONGATION	D638								
CD -		560	%			657	%		
MD -		560				672			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	76	lb	34	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	130	lb	59	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.2	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.35	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO

DATE SHIPPED

JOB NO. 7920

COMMENTS

20081725

GSE

Roll Test Data Report

2061

ROLL NO. AK-4252 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4252 FF	
PROD DATE:	07/13/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3484	pounds
	1580	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	207	lb/in	37	kg/cm
MD -		173		31		199		35	
YIELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	361	lb/in	64	kg/cm
MD -		324		59		414		74	
AK ELONGATION	D638								
CD -		560	%			590	%		
MD -		560				668			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	76	lb	35	kg
MD -		60		27		74		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	128	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.2	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.36	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

RECEIVED JG 7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

000364

GSE

Roll Test Data Report

ROLL NO. AK-4253 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4253 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3466	pounds
	1572	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	192 lb/in	34 kg/cm
MD -		173	31	183	33
YIELD ELONGATION	D638				
CD -		13 %		22 %	
MD -		13		22	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	383 lb/in	68 kg/
MD -		324	59	390	70
AK ELONGATION	D638				
CD -		560 %		695 %	
MD -		560		692	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	71 lb	32 kg
MD -		60	27	73	33
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	117 lb	53 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.5 %	
MD -		+/-2.00		0.0	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.36 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
ESCR	D1693-B	1500 hours		Start 7/10/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				80	2.03

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

STOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

7-15-98

20081725

GSE

Roll Test Data Report

2061

ROLL NO. AK-4254 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4254 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3545	pounds
	1608	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
ENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	193	lb/in	35	kg/cm
MD -		173		31		186		33	
IELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				22			
ENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	402	lb/in	72	kg/cm
MD -		324		59		409		73	
K ELONGATION	D638								
CD -		560	%			720	%		
MD -		560				708			
NITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	71	lb	32	kg
MD -		60		27		73		33	
UNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	117	lb	53	kg
HRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.5	%		
MD -		+/-2.00				0.0			
ARBON BLACK DISPERSION	D3015	A2				A2			
ARBON BLACK CONTENT	D1603	2.00	%			2.37	%		
EOMEMBRANE DENSITY	D1505 OK			0.940	g/cc			0.944	g/cc
SCR	D1693-B	1500	hours			Start	7/10/98		
HICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

APPROVED JG 7-15-98

TOMER: FLUOR DANIEL FERNALD/FERMCO

OB NO. 7920

COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

ROLL NO. AK-4255 F

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4255 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3460	pounds
	1569	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	202	lb/in	36	kg/c
MD -		173		31		194		35	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	449	lb/in	80	kg
MD -		324		59		415		74	
AK ELONGATION	D638								
CD -		560	%			763	%		
MD -		560				693			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	73	lb	33	kg
MD -		60		27		72		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	121	lb	55	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.2	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.38	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

000367

GSE

Roll Test Data Report - 2061

ROLL NO. AK-4256 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4256 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8617	sq.ft.
	801	sq. meters
LENGTH:	361	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3506	pounds
	1590	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	205	lb/in	37	kg/cm
MD -		173		31		198		35	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	435	lb/in	78	kg/cm
MD -		324		59		435		78	
AK ELONGATION	D638								
CD -		560	%			735	%		
MD -		560				716			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	73	lb	33	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	127	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.2	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.39	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

APPROVED JG 7-15-98

STOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

ROLL NO. AK-4257 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4257 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3470	pounds
	1574	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	208	lb/in	37	kg/cm
MD -		173		31		200		36	
YIELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	427	lb/in	76	kg/cm
MD -		324		59		400		72	
\K ELONGATION	D638								
CD -		560	%			726	%		
MD -		560				672			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	33	kg
MD -		60		27		77		35	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	128	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.2			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.41	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

RECEIVED JG 7-15-98 QA

TOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

DATE SHIPPED

20081725

000369

GSE

Roll Test Data Report

2061

ROLL NO. AK-4258 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4258 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3527	pounds
	1600	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	197	lb/in	35	kg/cm
MD -		173		31		189		34	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	423	lb/in	76	kg/cm
MD -		324		59		409		73	
BREAK ELONGATION	D638								
CD -		560	%			762	%		
MD -		560				725			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	33	kg
MD -		60		27		72		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	120	lb	54	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.2			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.42	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

APPROVED JG 7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

ROLL NO. AK-4259 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4259 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3498	pounds
	1587	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	200	lb/in	36	kg/cr
MD -		173		31		198		35	
YIELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	368	lb/in	66	kg/
MD -		324		59		437		78	
'AK ELONGATION	D638								
CD -		560	%			619	%		
MD -		560				718			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	72	lb	33	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	130	lb	59	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.2	%		
MD -		+/-2.00				0.5			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.44	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

APPROVED JG 7-17-9

STOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

GSE

Roll Test Data Report 2061

ROLL NO. AK-4260 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4260 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8641	sq.ft.
	803	sq. meters
LENGTH:	362	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3548	pounds
	1609	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	205 lb/in	37 kg/cm
MD -		173	31	202	36
YIELD ELONGATION	D638				
CD -		13 %		21 %	
MD -		13		21	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	441 lb/in	79 kg/cm
MD -		324	59	416	74
AK ELONGATION	D638				
CD -		560 %		718 %	
MD -		560		666	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	75 lb	34 kg
MD -		60	27	78	36
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	135 lb	61 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.2 %	
MD -		+/-2.00		0.5	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.45 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.945 g/cc
ESCR	D1693-B	1500 hours		Start 7/10/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				80	2.03

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

APPROVED 7-17-98

TOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

20081727

DATE SHIPPED

GSE

Roll Test Data Report

ROLL NO. AK-4261 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4261 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3488	pounds
	1582	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	198	lb/in	35	kg/cm
MD -		173		31		194		35	
YIELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	396	lb/in	71	kg/
MD -		324		59		407		73	
'AK ELONGATION	D638								
CD -		560	%			667	%		
MD -		560				683			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	71	lb	32	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	127	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.43	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-17-9

STOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

GSE

Roll Test Data Report 2061

ROLL NO. AK-4262 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4262 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8617	sq.ft.
	801	sq. meters
LENGTH:	361	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3535	pounds
	1603	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	199	lb/in	36	kg/cm
MD -		173		31		196		35	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	421	lb/in	75	kg/cm
MD -		324		59		396		71	
EAK ELONGATION	D638								
CD -		560	%			710	%		
MD -		560				656			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	76	lb	35	kg
MD -		60		27		71		32	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	123	lb	56	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.42	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-17-98

STOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

DATE SHIPPED

30081737

GSE

Roll Test Data Report

ROLL NO. AK-4263 F

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4263 FF	
PROD DATE:	07/14/98	
SHEET AREA:	8593	sq.ft.
	799	sq. meters
LENGTH:	360	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3488	pounds
	1582	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	202	lb/in	36	kg/c
MD -		173		31		202		36	
YIELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	416	lb/in	74	kg
MD -		324		59		412		74	
EAK ELONGATION	D638								
CD -		560	%			699	%		
MD -		560				672			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	77	lb	35	kg
MD -		60		27		80		37	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	127	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.4	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.40	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						82		2.07	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-9

.STOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081723

GSE

Roll Test Data Report

2061

ROLL NO. AK-4264 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4264 FF	
PROD DATE:	07/15/98	
SHEET AREA:	8593	sq.ft.
	799	sq. meters
LENGTH:	360	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3520	pounds
	1597	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	194	lb/in	35	kg/cm
MD -		173		31		192		34	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	389	lb/in	70	kg/cm
MD -		324		59		398		71	
AK ELONGATION	D638								
CD -		560	%			674	%		
MD -		560				676			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	75	lb	34	kg
MD -		60		27		72		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	128	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.4	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.39	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.945	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						82		2.07	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

APPROVED SJG 7-17-98

STOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

DATE SHIPPED

20081727

GSE

Roll Test Data Report

ROLL NO. AK-4265 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4265 FF	
PROD DATE:	07/14/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3496	pounds
	1586	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	207	lb/in	37	kg/cm
MD -		173		31		209		37	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	454	lb/in	81	kg/
MD -		324		59		438		78	
AK ELONGATION	D638								
CD -		560	%			746	%		
MD -		560				702			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	75	lb	34	kg
MD -		60		27		74		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	132	lb	60	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.2	%		
MD -		+/-2.00				0.2			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.37	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		77		1.96	
AVG. THICKNESS						82		2.07	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

GSE

Roll Test Data Report 2061

ROLL NO. AK-4266 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4266 FF	
PROD DATE:	07/14/98	
SHEET AREA:	8545	sq.ft.
	794	sq. meters
LENGTH:	358	feet
	109	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3539	pounds
	1605	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
ENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	212	lb/in	38	kg/cm
MD -		173		31		211		38	
IELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				21			
ENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	396	lb/in	71	kg/cm
MD -		324		59		417		75	
K ELONGATION	D638								
CD -		560	%			638	%		
MD -		560				657			
NITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	75	lb	34	kg
MD -		60		27		78		35	
UNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	133	lb	60	kg
HRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.2	%		
MD -		+/-2.00				0.2			
ARBON BLACK DISPERSION	D3015	A2				A2			
ARBON BLACK CONTENT	D1603	2.00	%			2.32	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
HICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		77		1.96	
AVG. THICKNESS						82		2.07	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-98

TOMER: FLUOR DANIEL FERNALD/FERMCO
OB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

ROLL NO. AK-4267 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4267 FF	
PROD DATE:	07/14/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3448	pounds
	1564	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	200	lb/in	36	kg/cm
MD -		173		31		197		35	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	430	lb/in	77	kg/c
MD -		324		59		400		71	
PEAK ELONGATION	D638								
CD -		560	%			722	%		
MD -		560				667			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	71	lb	32	kg
MD -		60		27		72		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	126	lb	57	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.5	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.27	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.94	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20001725

GSE

Roll Test Data Report 2061

ROLL NO. AK-4268 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4268 FF	
PROD DATE:	07/14/98	
SHEET AREA:	8593	sq.ft.
	799	sq. meters
LENGTH:	360	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3546	pounds
	1608	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	209 lb/in	37 kg/cm
MD -		173	31	212	38
YIELD ELONGATION	D638				
CD -		13 %		21 %	
MD -		13		22	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	447 lb/in	80 kg/cm
MD -		324	59	441	79
BREAK ELONGATION	D638				
CD -		560 %		730 %	
MD -		560		694	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	77 lb	35 kg
MD -		60	27	78	36
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	131 lb	59 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.5 %	
MD -		+/-2.00		0.1	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.22 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
ESCR	D1693-B	1500 hours		Start 7/10/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.94
AVG. THICKNESS				80	2.03

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

7-15-98

GSE

Roll Test Data Report

ROLL NO. AK-4269 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4269 FF	
PROD DATE:	07/13/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3464	pounds
	1571	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	205	lb/in	37	kg/cm
MD -		173		31		197		35	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	402	lb/in	72	kg/c
MD -		324		59		379		68	
4K ELONGATION	D638								
CD -		560	%			674	%		
MD -		560				629			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	33	kg
MD -		60		27		72		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	125	lb	57	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.2			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.17	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-9

STOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

GSE

Roll Test Data Report

2061

ROLL NO. AK-4270 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4270 FF	
PROD DATE:	07/13/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3464	pounds
	1571	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	200	lb/in	36	kg/cm
MD -		173		31		192		34	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	406	lb/in	73	kg/cm
MD -		324		59		443		79	
AK ELONGATION	D638								
CD -		560	%			686	%		
MD -		560				748			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	72	lb	33	kg
MD -		60		27		72		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	130	lb	59	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.2			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603 OK	2.00	%			2.12	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.943	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.03	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

DATE SHIPPED

GSE

Roll Test Data Report

ROLL NO. AK-4271 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4271 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3462	pounds
	1570	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	201	lb/in	36	kg/cm
MD -		173		31		193		34	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	391	lb/in	70	kg/
MD -		324		59		434		77	
EAK ELONGATION	D638								
CD -		560	%			663	%		
MD -		560				727			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	73	lb	33	kg
MD -		60		27		72		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	122	lb	55	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.3			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.16	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		77		1.94	
AVG. THICKNESS						80		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-98

STOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

2061

ROLL NO. AK-4272 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4272 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3570	pounds
	1619	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40476
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	197	lb/in	35	kg/cm
MD -		173		31		199		35	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	409	lb/in	73	kg/cm
MD -		324		59		405		72	
AK ELONGATION	D638								
CD -		560	%			704	%		
MD -		560				676			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	76	lb	34	kg
MD -		60		27		76		35	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	125	lb	57	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.3			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.20	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		77		1.94	
AVG. THICKNESS						80		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-98

TOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

DATE SHIPPED

20061725

GSE

Roll Test Data Report

ROLL NO. AK-4273 F

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4273 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3414	pounds
	1549	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	193	lb/in	35	kg/c
MD -		173		31		185		33	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				23			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	432	lb/in	77	kg
MD -		324		59		431		77	
EAK ELONGATION	D638								
CD -		560	%			746	%		
MD -		560				737			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	75	lb	34	kg
MD -		60		27		74		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	114	lb	52	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.4	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.25	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		77		1.95	
AVG. THICKNESS						80		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

STOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

7-15-98

20081725

000385

GSE

Roll Test Data Report

2061

ROLL NO. AK-4274 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4274 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8593	sq.ft.
	799	sq. meters
LENGTH:	360	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3530	pounds
	1601	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40476
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.935
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.400

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	193	lb/in	34	kg/cm
MD -		173		31		184		33	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	401	lb/in	72	kg/cm
MD -		324		59		402		72	
BREAK ELONGATION	D638								
CD -		560	%			707	%		
MD -		560				698			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	34	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	113	lb	51	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.4	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.29	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		77		1.95	
AVG. THICKNESS						80		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

OG
7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

GSE

Roll Test Data Report

ROLL NO. AK-4275 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4275 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3459	pounds
	1569	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40477
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	189	lb/in	34	kg/cm
MD -		173		31		183		33	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	386	lb/in	69	kg/
MD -		324		59		414		74	
BREAK ELONGATION	D638								
CD -		560	%			693	%		
MD -		560				728			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	34	kg
MD -		60		27		72		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	112	lb	51	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.4	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.33	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.943	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-15-98

TOMER: FLUOR DANIEL FERNALD/FERMCO

DATE SHIPPED

JOB NO. 7920

COMMENTS

20001725

GSE

Roll Test Data Report

2061

ROLL NO. AK-4276 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4276 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3528	pounds
	1600	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40477
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	190	lb/in	34	kg/cm
MD -		173		31		182		32	
YIELD ELONGATION	D638								
CD -		13	%			23	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	386	lb/in	69	kg/cm
MD -		324		59		417		74	
BREAK ELONGATION	D638								
CD -		560	%			675	%		
MD -		560				715			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	71	lb	32	kg
MD -		60		27		71		32	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	114	lb	52	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.4	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.36	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.943	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						80		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

JG 7-15-98

20081725

GSE

Roll Test Data Report

ROLL NO. AK-4277 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4277 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3500	pounds
	1588	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40477
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	208	lb/in	37	kg/cm
MD -		173		31		199		36	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	448	lb/in	80	kg/c
MD -		324		59		448		80	
4K ELONGATION	D638								
CD -		560	%			714	%		
MD -		560				714			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	72	lb	33	kg
MD -		60		27		74		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	128	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.4	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.39	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						81		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

RECEIVED JG 7-15-98

TOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

2061

ROLL NO. AK-4278 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4278 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8593	sq.ft.
	799	sq. meters
LENGTH:	360	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3616	pounds
	1640	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40477
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	202	lb/in	36	kg/cm
MD -		173		31		196		35	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	463	lb/in	83	kg/cm
MD -		324		59		438		78	
K ELONGATION	D638								
CD -		560	%			782	%		
MD -		560				722			
NITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	34	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	130	lb	59	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.4	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.43	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						81		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-98

TOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

GSE

Roll Test Data Report

ROLL NO. AK-4279 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4279 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3450	pounds
	1565	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40477
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	195	lb/in	35	kg/cm
MD -		173		31		195		35	
YIELD ELONGATION	D638								
CD -		13	%			23	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	417	lb/in	75	kg/c
MD -		324		59		402		72	
AK ELONGATION	D638								
CD -		560	%			709	%		
MD -		560				654			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	75	lb	34	kg
MD -		60		27		74		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	124	lb	56	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/- 2.00	%			0.1	%		
MD -		+/- 2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.46	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						81		2.05	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

RECEIVED JG 7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

000391

GSE

Roll Test Data Report

2061

ROLL NO. AK-4280 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4280 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3450	pounds
	1565	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40477
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
ENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	210	lb/in	38	kg/cm
MD -		173		31		203		36	
IELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				21			
ENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	416	lb/in	74	kg/cm
MD -		324		59		391		70	
K ELONGATION	D638								
CD -		560	%			681	%		
MD -		560				628			
NITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	77	lb	35	kg
MD -		60		27		75		34	
UNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	129	lb	59	kg
HRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.1	%		
MD -		+/-2.00				0.0			
ARBON BLACK DISPERSION	D3015	A2				A2			
ARBON BLACK CONTENT	D1603	2.00	%			2.49	%		
EOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
SCR	D1693-B	1500	hours			Start	7/10/98		
HICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						81		2.05	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

OG 7-15-98

OMER: FLUOR DANIEL FERNALD/FERMCO

DATE SHIPPED

JB NO. 7920

OMMENTS

000392

GSE

Roll Test Data Report

ROLL NO. AK-4281 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4281 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3537	pounds
	1604	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40477
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	198	lb/in	35	kg/cm
MD -		173		31		194		35	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	414	lb/in	74	kg/
MD -		324		59		444		79	
1K ELONGATION	D638								
CD -		560	%			691	%		
MD -		560				718			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	72	lb	33	kg
MD -		60		27		76		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	127	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.2	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.47	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.94	
AVG. THICKNESS						81		2.05	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

SG
7-15-

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20031725

GSE

Roll Test Data Report

2061

ROLL NO. AK-4282 FF

ROLL DIMENSIONS ≈ ± 1%		
ROLL NUMBER:	AK-4282 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8641	sq.ft.
	803	sq. meters
LENGTH:	362	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3546	pounds
	1608	kilograms

RESIN LOT INFORMATION	
LOT NUMBER	Z-40477
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
ENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	198	lb/in	35	kg/cm
MD -		173		31		195		35	
IELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				21			
ENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	429	lb/in	77	kg/cm
MD -		324		59		428		76	
K ELONGATION	D638								
CD -		560	%			707	%		
MD -		560				691			
NITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	34	kg
MD -		60		27		78		35	
UNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	128	lb	58	kg
HRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.2	%		
MD -		+/-2.00				0.0			
ARBON BLACK DISPERSION	D3015	A2				A2			
ARBON BLACK CONTENT	D1603	2.00	%			2.45	%		
EOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
SCR	D1693-B	1500	hours			Start	7/10/98		
HICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.94	
AVG. THICKNESS						81		2.05	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-98

TOMER: FLUOR DANIEL FERNALD/FERMCO

DATE SHIPPED

JB NO. 7920

OMMENTS

20001725

000394

GSE

Roll Test Data Report

ROLL NO. AK-4283 FI

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4283 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3434	pounds
	1558	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40477
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	199	lb/in	36	kg/cr
MD -		173		31		194		35	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	416	lb/in	74	kg/
MD -		324		59		422		75	
4K ELONGATION	D638								
CD -		560	%			654	%		
MD -		560				695			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	34	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	123	lb	56	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.2	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.43	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.94	
AVG. THICKNESS						81		2.05	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

SG 7-15-9

TOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

GSE

Roll Test Data Report

2061

ROLL NO. AK-4284 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4284 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3540	pounds
	1606	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40477
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	197	lb/in	35	kg/cm
MD -		173		31		191		34	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	416	lb/in	74	kg/cm
MD -		324		59		354		63	
AK ELONGATION	D638								
CD -		560	%			713	%		
MD -		560				606			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	75	lb	34	kg
MD -		60		27		74		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	122	lb	55	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.2	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.41	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.94	
AVG. THICKNESS						81		2.05	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

ROLL NO. AK-4285 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4285 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3445	pounds
	1563	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40477
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	201	lb/in	36	kg/cm
MD -		173		31		194		35	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	408	lb/in	73	kg/
MD -		324		59		430		77	
AK ELONGATION	D638								
CD -		560	%			677	%		
MD -		560				701			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	33	kg
MD -		60		27		73		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	121	lb	55	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.0	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.39	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						81		2.05	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report - 2061

ROLL NO. AK-4286 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4286 FF	
PROD DATE:	07/11/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3505	pounds
	1590	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40477
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	203	lb/in	36	kg/cm
MD -		173		31		198		35	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	433	lb/in	77	kg/cm
MD -		324		59		439		78	
BREAK ELONGATION	D638								
CD -		560	%			724	%		
MD -		560				715			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	33	kg
MD -		60		27		77		35	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	122	lb	56	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/- 2.00	%			0.0	%		
MD -		+/- 2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.41	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/10/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						81		2.05	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JV
7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

ROLL NO. AK-4287 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4287 FF	
PROD DATE:	07/13/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3471	pounds
	1574	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40477
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	238	lb/in	43	kg/cm
MD -		173		31		246		44	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	429	lb/in	77	kg/c
MD -		324		59		411		73	
4K ELONGATION	D638								
CD -		560	%			714	%		
MD -		560				677			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	77	lb	35	kg
MD -		60		27		76		35	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	126	lb	57	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.42	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/17/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						81		2.05	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

SG 7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report 2061

ROLL NO. AK-4288 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4288 FF	
PROD DATE:	07/13/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3536	pounds
	1604	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40477
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	197	lb/in	35	kg/cm
MD -		173		31		193		34	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	412	lb/in	74	kg/cm
MD -		324		59		378		68	
BREAK ELONGATION	D638								
CD -		560	%			690	%		
MD -		560				630			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	72	lb	32	kg
MD -		60		27		73		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	127	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.44	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/17/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						81		2.05	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

RECEIVED JG 7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

ROLL NO. AK-4289 F

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4289 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3456	pounds
	1568	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40477
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	197	lb/in	35	kg/c
MD -		173		31		188		34	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	394	lb/in	70	k
MD -		324		59		374		6	
EAK ELONGATION	D638								
CD -		560	%			671	%		
MD -		560				628			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	72	lb	33	kg
MD -		60		27		74		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	109	lb	49	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.0	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.45	%		
GEOMEMBRANE DENSITY	D1505 ok			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/17/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						81		2.04	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG 7-15-9

JSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

2061

ROLL NO. AK-4290 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4290 FF	
PROD DATE:	07/10/98	
SHEET AREA:	8641	sq.ft.
	803	sq. meters
LENGTH:	362	feet
	110	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3545	pounds
	1608	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40477
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	194 lb/in	35 kg/cm
MD -		173	31	190	34
YIELD ELONGATION	D638				
CD -		13 %		22 %	
MD -		13		21	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	436 lb/in	78 kg/cm
MD -		324	59	428	76
AK ELONGATION	D638				
CD -		560 %		741 %	
MD -		560		723	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	73 lb	33 kg
MD -		60	27	73	33
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	124 lb	56 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.0 %	
MD -		+/-2.00		0.0	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.47 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.944 g/cc
ESCR	D1693-B	1500 hours		Start 7/17/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				81	2.04

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

RECEIVED JG 7-15-98

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report

ROLL NO. AK-4291 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4291 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3440	pounds
	1560	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40477
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	204	lb/in	36	kg/cm
MD -		173		31		197		35	
YIELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	392	lb/in	70	kg/cm
MD -		324		59		419		75	
BREAK ELONGATION	D638								
CD -		560	%			652	%		
MD -		560				687			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	76	lb	35	kg
MD -		60		27		73		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	128	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.44	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/17/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.92	
AVG. THICKNESS						81		2.05	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

APPROVED JG 7-15-98 QA

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

20081725

GSE

Roll Test Data Report 2061

ROLL NO. AK-4292 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4292 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3492	pounds
	1584	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40477
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	204	lb/in	36	kg/cm
MD -		173		31		197		35	
YIELD ELONGATION	D638								
CD -		13	%			20	%		
MD -		13				21			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	391	lb/in	70	kg/cm
MD -		324		59		430		77	
BREAK ELONGATION	D638								
CD -		560	%			655	%		
MD -		560				706			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	76	lb	35	kg
MD -		60		27		74		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	126	lb	57	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.3	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.41	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/17/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.92	
AVG. THICKNESS						81		2.05	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

20681725

DATE SHIPPED

7-15-98

GSE

Roll Test Data Report

ROLL NO. AK-4293 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4293 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3463	pounds
	1571	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40477
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		METRIC		ACTUAL TEST VALUES ENGLISH		METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	192	lb/in	34	kg/cm
MD -		173		31		185		33	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				23			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	386	lb/in	69	kg/c
MD -		324		59		384		69	
4K ELONGATION	D638								
CD -		560	%			682	%		
MD -		560				668			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	76	lb	34	kg
MD -		60		27		73		33	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	121	lb	55	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/- 2.00	%			0.1	%		
MD -		+/- 2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.39	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.944	g/cc
ESCR	D1693-B	1500	hours			Start	7/17/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						81		2.05	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

JG
7-13-9

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS
20081725

DATE SHIPPED

GSE

Roll Test Data Report – 2061

ROLL NO. AK-4294 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4294 FF	
PROD DATE:	07/12/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3552	pounds
	1611	kilograms

RESIN LOT INFORMATION

LOT NUMBER	Z-40477
RESIN TYPE	600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	198	lb/in	35	kg/cm
MD -		173		31		176		31	
YIELD ELONGATION	D638								
CD -		13	%			22	%		
MD -		13				22			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	385	lb/in	69	kg/cm
MD -		324		59		354		63	
AK ELONGATION	D638								
CD -		560	%			707	%		
MD -		560				640			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	70	lb	32	kg
MD -		60		27		71		32	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	111	lb	50	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.1	%		
MD -		+/-2.00				0.0			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.36	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.943	g/cc
ESCR	D1693-B	1500	hours			Start	7/17/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	mm
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						81		2.05	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO

JOB NO. 7920

COMMENTS

20081725

DATE SHIPPED

7-15-98

GSE

Roll Test Data Report

ROLL NO. AK-4295 F

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4295 FF	
PROD DATE:	07/13/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3495	pounds
	1585	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40477
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH		ORDER MINIMUMS METRIC		ACTUAL TEST VALUES ENGLISH		ACTUAL TEST VALUES METRIC	
TENSILE YIELD STRENGTH	D638								
CD -		173	lb/in	31	kg/cm	195	lb/in	35	kg/c
MD -		173		31		194		35	
YIELD ELONGATION	D638								
CD -		13	%			21	%		
MD -		13				20			
TENSILE BREAK STRENGTH	D638								
CD -		324	lb/in	59	kg/cm	427	lb/in	76	kg
MD -		324		59		414		74	
EAK ELONGATION	D638								
CD -		560	%			736	%		
MD -		560				688			
INITIAL TEARING STRENGTH	D1004								
CD -		60	lb	27	kg	74	lb	33	kg
MD -		60		27		75		34	
PUNCTURE STRENGTH	FTMS 101C/2065	105	lb	48	kg	127	lb	58	kg
SHRINKAGE	D1204								
CD -	(1 HR @ 100C)	+/-2.00	%			0.1	%		
MD -		+/-2.00				0.1			
CARBON BLACK DISPERSION	D3015	A2				A2			
CARBON BLACK CONTENT	D1603	2.00	%			2.33	%		
GEOMEMBRANE DENSITY	D1505			0.940	g/cc			0.943	g/cc
ESCR	D1693-B	1500	hours			Start	7/17/98		
THICKNESS	D1593/D751								
NOMINAL		80	mil	2.03	mm	80	mil	2.03	
MINIMUM		76		1.92		76		1.93	
AVG. THICKNESS						81		2.05	

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

STOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS
20081725

DATE SHIPPED

JG
7-15-

GSE

Roll Test Data Report - 2061

ROLL NO. AK-4296 FF

ROLL DIMENSIONS ≈ ± 1%

ROLL NUMBER:	AK-4296 FF	
PROD DATE:	07/13/98	
SHEET AREA:	8474	sq.ft.
	788	sq. meters
LENGTH:	355	feet
	108	meters
WIDTH:	23.87	feet
	7.3	meters
WEIGHT:	3608	pounds
	1637	kilograms

RESIN LOT INFORMATION

LOT NUMBER Z-40477
RESIN TYPE 600 SERIES

PROPERTY	UNITS	METHOD	RESULT
DENSITY	g/cc	D1505	0.934
MOISTURE	%	D570	< 0.09
BRITTLENESS	°C	D746	<-70
MELT INDEX	g/10 min.	D1238	0.370

PROPERTY	ASTM METHOD	ORDER MINIMUMS ENGLISH	ORDER MINIMUMS METRIC	ACTUAL TEST VALUES ENGLISH	ACTUAL TEST VALUES METRIC
TENSILE YIELD STRENGTH	D638				
CD -		173 lb/in	31 kg/cm	201 lb/in	36 kg/cm
MD -		173	31	197	35
YIELD ELONGATION	D638				
CD -		13 %		21 %	
MD -		13		20	
TENSILE BREAK STRENGTH	D638				
CD -		324 lb/in	59 kg/cm	412 lb/in	74 kg/cm
MD -		324	59	396	71
BREAK ELONGATION	D638				
CD -		560 %		676 %	
MD -		560		649	
INITIAL TEARING STRENGTH	D1004				
CD -		60 lb	27 kg	75 lb	34 kg
MD -		60	27	77	35
PUNCTURE STRENGTH	FTMS 101C/2065	105 lb	48 kg	129 lb	58 kg
SHRINKAGE	D1204				
CD -	(1 HR @ 100C)	+/-2.00 %		0.1 %	
MD -		+/-2.00		0.1	
CARBON BLACK DISPERSION	D3015	A2		A2	
CARBON BLACK CONTENT	D1603	2.00 %		2.32 %	
GEOMEMBRANE DENSITY	D1505		0.940 g/cc		0.943 g/cc
ESCR	D1693-B	1500 hours		Start 7/17/98	
THICKNESS	D1593/D751				
NOMINAL		80 mil	2.03 mm	80 mil	2.03 mm
MINIMUM		76	1.92	76	1.93
AVG. THICKNESS				81	2.05

TEST NOTES: MD=MACHINE DIRECTION CD=CROSS DIRECTION ESCR START DATE IS GIVEN
-FOR TENSILE ELONGATION TEST GAUGE LENGTH=1.3 ON YIELD, 2.5 ON BREAK
ALL STRENGTH VALUES BASED ON NOMINAL THICKNESS

CUSTOMER: FLUOR DANIEL FERNALD/FERMCO
JOB NO. 7920
COMMENTS

DATE SHIPPED

7-15-98

20081725

000408

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT: 20102 | CONTRACT NO.: 2317 | SUBMITTAL NO.: 001 | REV.: 0 | DATE: 7-20-98 | PAGE __ OF __

FROM: GSE Manufacturing Lining Technology

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 44

SIGNATURE: _____

RECEIVED BY: Melissa Crews DATE: 7-20-98

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY 1 PRO	2 H&S	3 MED	4 TRG	5 CON	6 ENG	7 QAC	RESUBMITTAL YES	NO	TITLE/DESCRIPTION	SUBMITTAL TYPE CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION A	B	C
	~~2317~~																	
	GSE 2317-001	0						X				Supply of Geosynthetic	X					X

DISTRIBUTION

REVIEW DISTRIBUTION: Distribution	MS	Distribution	MS	CFC DISTRIBUTION: Distribution	MS	Distribution	MS
Jim Jenkins							
Mike Godber							
Dan Bodeine							
Chuck Von Arsdale							

RECEIVED BY: [signature] DATE: 8/1/98 NO COMMENTS ___ COMMENTS ATTACHED X

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 44)

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER) CFC: [illegible]ED FOR CONSTRUCTION

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

0004109

2061

ON-SITE DISPOSAL FACILITY

CONTRACT NO 98SC002317

SUPPLY OF GEOSYNTHETIC MATERIALS

(CELL 2 LINER)

JUNE 8, 1998

- CERTIFICATION FOR GML DOES NOT MEET SPECS.
- NEED FORMAL CERTIFICATION FOR GML, GCL AND GEOTEXTILE WHICH ARE SPECIFIC TO THIS PROJECT.

TABLE 1P TECHNICAL INFORMATION GEOSYNTHETIC CLAY LINER REFER TO SECTION 02772P
REQUISITION # 159792

SUBMIT THE FOLLOWING INFORMATION WITH THE PROPOSAL

SPECIFIED REQUIREMENT	SPECIFIED ASTM METHOD	SPECIFIED REQUIREMENT	CONFORMS TO SPECS YES / NO	REMARKS DOCUMENTAION OF COMPLIANCE WITH THESE R TO BE SUBMITTED WITH THE BIDS
BENTONITE CONTENT	D5381	1.0 LB/SF MIN	Yes	
BENTONITE MOISTURE CONTENT	D4643	25% MAX	Yes	
BENTONITE FREE SWELL	D5890	24 ML/2G MIN	Yes	
HYDRAULIC CONDUCTIVITY	D5887	5X10 -9 CM/SEC MAX	Yes	
WIDE WIDTH TENSILE STRENGTH	D4595	30LB/IN MIN.	Yes	
PEEL STRENGTH	D4632	15 LB	Yes	
POLYMER COMPOSITION		95%POLY MIN	Yes	
% SODIUM MONTMORILLONITE		90% MIN	Yes	
ROLL WIDTH		15 FT MIN	Yes	
ROLL LENGTH		100 FT MIN	Yes	
SHEAR STRENGTH	D5321	SEE 02772P, 2.01, 0.3	Yes	Internal only-interface testi
LOT SIZE > 100,000 SCFT				is product specific
SUBMITTALS TO BE PROVIDED WITH PROPOSALS				
PRODUCT NAME				THE SUPPLIER MUST INDICATE WHERE REQUIRED SUBMITTALS
DAILY PRODUCTION CAPACITY				INCLUDED IN PROPOSALS
MANUFACTURERS QC PROCEDURES				
MANUFACTURERS GEOTEXTILE REQUIREMENTS				
CERTIFICATION OF MARV AND TEST PROCEDURES FOR GCL				MISSING
RECOMMENDED INSTALLATION PROCEDURES				
RECOMMENDED STORAGE REQUIREMENTS				
TESTING FREQUENCY				
BENTONITE AND MOISTURE CONTENT	1/40,000 SF		Yes	
FREE SWELL	1/40,000 SF		Yes	
HYDRAULIC CONDUCTIVITY	1/40,000 SF		Yes	
PEEL	1/40,000 SF		Yes	
SHEER STRENGTH	1/100,000 SF		Yes	
SCHEDULED DELIVERY DATES				
REVISED TOTAL SQ QUANTITY (SCFT)	615,000 SF			

SIGNATURE Roger Krabl DATE May 26, 1998

NAME OF BIDDER GSE Lining Technology, Inc.

REVISED 5/14/98

2061

TABLE 2P TECHNICAL INFORMATION GEOMEMBRANE LINER
REQUISITION # 159792

REFER TO SPECIFICATION SECTION 02770P

SUBMIT THE FOLLOWING INFORMATION WITH THE PROPOSAL

SPECIFIED REQUIREMENTS	SPECIFIED ASTM METHOD	SPECIFIED REQUIREMENT	CONFORMS TO SPECS YES / NO	REMARKS DOCUMENTATION OF THESE REQUIREMENTS TO BE SUBMITTED WITH BID
PHYSICAL PROPERTIES				
THICKNESS MINIMUM	GRI-GM8	76 MILS	Yes	
THICKNESS AVERAGE		80 MILS	Yes	
SPECIFIC GRAVITY	D792 - A OR D1505	0.94 MIN	Yes	
CARBON BLACK	D1603	2 - 3 %	Yes	
CARBON BLACK DISPERSION	D5596	CAT 1 OR 2	Yes	
ASPERITY HEIGHT	GRI-GM12	7 MILS MIN	Yes	
MECHANICAL PROPERTIES				
STRENGTH AT YIELD	D638	168 PPI	Yes	
STRENGTH AT BREAK	D638	120 PPI	Yes	
ELONGATION AT YIELD	D638	12% MIN	Yes	
ELONGATION AT BREAK	D638	100% MIN	Yes	
LOW TEMP BRITTLENESS	D746-B	-60 C MAX	Yes	
DIMENSIONAL STABILITY	D1204	+/-2% MAX	Yes	
NOTCHED CONSTANT TENSILE LOAD	D5397	500 HRS MIN	Yes	
TEAR RESISTANCE	D1004	56 LB	Yes	
RESIN PROPERTIES				
PERCENT VIRGIN RESIN		98% MIN	Yes	
DENSITY	D792 A OR 1505	0.935	Yes	
MELT FLOW INDEX	D 1238 E	1.0g/10-min MAX	Yes	
MINIMUM LOT SIZE		100,000 SF	Yes	
MAXIMUM ADDITIVES/FILLERS		1%	Yes	
ROLL SIZE		15 FT WIDE (MIN)	Yes	PREFERRED LENGTH 450 FT.
SUBMITTALS REQUIRED TO BE PROVIDED WITH PROPOSAL				THE SUPPLIER MUST INDICATE WHERE REQUIRED SUBMITTALS ARE INCLUDED IN PROPOSAL
1. PRODUCTION CAPACITY				Section 2/A
MQC PROCEDURES				Section 2/B
LIST OF MATERIAL PROPERTIES				Section 2/C
2. LIST OF 10 FACILITIES				Section 2/D
3. RESIN INFORMATION				Section 2/E
4. CERTIFICATION OF MARV				Section 2/F
5. LONG TERM STORAGE REQUIREMENTS				Section 2/G
6. INSTALLATION PROCEDURES				Section 2/H
7. WARRANTY				Section 2/I
TESTING FREQUENCY				
SP. GR.	1/40,000 SF		Yes	
THICKNESS	1/40,000 SF		Yes	
ASPERITY	1/40,000 SF		Yes	
TENSILE PROPERTIES	1/40,000 SF		Yes	
CARBON BLACK PROPERTIES	1/40,000 SF		Yes	
ENVIRO STRESS CRACK	1/400,000 SF		Yes	
LOW TEMP BRITTLENESS	1/400,000 SF		Yes	
DIMENSIONAL STABILITY	1/400,000 SF		Yes	
SCHEDULED DELIVERY DATES				Per table 6P
TOTAL QUANTITY	836,000 SF			

SIGNATURE Roger Kroll DATE May 26, 1998

NAME OF BIDDER GSE Lining Technology, Inc.

*with carbon black

REVISED 5/18/98

COULD NOT LOCATE THIS IN SUBMITTAL PACKAGE

TABLE 3P TECHNICAL INFORMATION FOR 7.0 OZ. GEOTEXTILE

REQUISITION # 159792

REFER TO SPECIFICATION SECTION 02714P

SUBMIT THE FOLLOWING INFORMATION WITH THE PROPOSAL

SPECIFIED REQUIREMENTS	SPECIFIED ASTM METHOD	SPECIFIED REQUIREMENT	CONFORMS TO SPEC YES/NO	REMARKS DOCUMENTATION OF THESE REQUIREMENTS TO BE SUBM WITH BID.
PHYSICAL PROPERTIES				
NONWOVEN NEEDLEPUNCHED				
POLYMER COMPOSITION		95% Polypropylene or polyester by wgt. min.	Yes	
MASS PER UNIT AREA	D 5261	7 oz/sy. min.	Yes	
APPARENT OPENING SIZE	D 4751	0.212 mm. max.	Yes	
PERMITTIVITY	D 4491	0.5 sec-1. min.	Yes	
ROLL SIZE		15 FT WIDE (MIN)	Yes	PREFERRED ROLL LENGTH 450 FEET (300)
RECLAIMED POLYMER		<20%	Yes	
LOT SIZE		>100.00 SF	Yes	
MECHANICAL PROPERTIES				
GRAB STRENGTH	D 4632	180 lb. min.	Yes	
TEAR STRENGTH	D 4533	75 lb. min.	Yes	
PUNCTURE STRENGTH	D 4833	75 lb. min.	Yes	
BURST STRENGTH	D 3786	350 psi. min.	Yes	
DURABILITY				
ULTRAVIOLET RESISTANCE	D 4355	70 %. min.	Yes	
SUBMITTALS REQUIRED TO BE PROVIDED WITH PROPOSAL				THE SUPPLIER MUST INDICATE WHERE REQUIRED SUBMITTA ARE INCLUDED IN PROPOSAL
PRODUCT NAME				Section 3/A
CERTIFICATION OF MARV AND				Section 3/A
CORRESPONDING TEST PROCEDURES				Section 3/A
LONG TERM STORAGE REQUIREMENTS				Section 3/B
TESTING FREQUENCY				
MASS PER UNIT AREA	1/50,000 SF		Yes	
GRAB STRENGTH	1/50,000 SF		Yes	
TEAR STRENGTH	1/50,000 SF		Yes	
PUNCTURE STRENGTH	1/50,000 SF		Yes	
BURST STRENGTH	1/50,000 SF		Yes	
APPARENT OPENING SIZE	1/100,000 SF		Yes	
PERMITTIVITY	1/100,000 SF		Yes	
SCHEDULED DELIVERY DATES				
TOTAL QUANTITY	439,000 SF			Per table 6P

SIGNATURE:

NAME OF BIDDER: GSE ~~Lining~~ Technology, Inc.

DATE: May 26, 1998

REVISED 5/18/98

WHERE IN THE SUBMITTAL PACKAGE

TABLE 4P TECHNICAL INFORMATION FOR 10.0 OZ. GEOTEXTILE REFER TO SPECIFICATION SECTION 02714P

REQUISITION # 159792

SUBMIT THE FOLLOWING INFORMATION WITH THE PROPOSAL

SPECIFIED REQUIREMENTS	SPECIFIED ASTM METHOD	SPECIFIED REQUIREMENT	CONFORMS TO SPEC YES/NO	REMARKS DOCUMENTATION OF THESE REQUIREMENTS TO BE SUBMITTED WITH BID.
PHYSICAL PROPERTIES				
NONWOVEN NEEDLEPUNCHED				
POLYMER COMPOSITION		95% Polypropylene or polyester by wgt. min.	Yes	
MASS PER UNIT AREA	D 5261	10 oz/sy. min.	Yes	
ROLL SIZE		15 FT WIDE (MIN)	Yes	PREFERRED LENGTH 450 FEET (300)
RECLAIMED POLYMER		<20%	Yes	
LOT SIZE		>100,00 SF	Yes	
MECHANICAL PROPERTIES				
GRAB STRENGTH	D 4632	225 lb. min.	Yes	
TEAR STRENGTH	D 4533	90 lb. min.	Yes	
PUNCTURE STRENGTH	D 4833	120 lb. min.	Yes	
BURST STRENGTH	D 3786	450 psi. min.	Yes	
DURABILITY				
ULTRAVIOLET RESISTANCE	D 4355	70 %. min.	Yes	
SUBMITTALS REQUIRED TO BE PROVIDED WITH PROPOSAL				THE SUPPLIER MUST INDICATE WHERE REQUIRED SUBMITTALS ARE INCLUDED IN PROPOSAL
PRODUCT NAME				Section 3/C
CERTIFICATION OF MARV AND				Section 3/C
CORRESPONDING TEST PROCEDURES				Section 3/C
LONG TERM STORAGE REQUIREMENTS				Section 3/B
TESTING FREQUENCY				
MASS PER UNIT AREA	1/50,000 SF		Yes	
GRAB STRENGTH	1/50,000 SF		Yes	
TEAR STRENGTH	1/50,000 SF		Yes	
PUNCTURE STRENGTH	1/50,000 SF		Yes	
BURST STRENGTH	1/50,000 SF		Yes	
SCHEDULED DELIVERY DATES				Per table 6P
TOTAL QUANTITY	781,000 SF			

SIGNATURE: [signature] DATE: May 26, 1998

NAME OF BIDDER: GSE Lining Technology, Inc.

REVISED 5/13/98

TABLE 5P TECHNICAL INFORMATION FOR 16.0 OZ. GEOTEXTILE

REQUISITION # 159792

REFER TO SPECIFICATION SECTION 02714P

SUBMIT THE FOLLOWING INFORMATION WITH THE PROPOSAL

SPECIFIED REQUIREMENTS	SPECIFIED ASTM METHOD	SPECIFIED REQUIREMENT	CONFORMS TO SPEC YES/NO	REMARKS DOCUMENTATION OF THESE REQUIREMENTS TO BE SUB WITH BID.
PHYSICAL PROPERTIES				
NONWOVEN NEEDLEPUNCHED				
POLYMER COMPOSITION		95% Polypropylene or polyester by wgt. min.	Yes	
MASS PER UNIT AREA	D 5261	16 oz/sy, min.	Yes	
ROLL SIZE		15 FT WIDE (MIN)	Yes	PREFERRED LENGTH 450 FEET (300)
RECLAIMED POLYMER		<20%	Yes	
LOT SIZE		>100.00 SF	Yes	
MECHANICAL PROPERTIES				
GRAB STRENGTH	D 4632	350 lb. min.	Yes	
TEAR STRENGTH	D 4533	120 lb. min.	Yes	
PUNCTURE STRENGTH	D 4833	180 lb. min.	Yes	
BURST STRENGTH	D 3786	700 psi. min.	Yes	
DURABILITY				
ULTRAVIOLET RESISTANCE	D 4355	70 %. min.	Yes	
SUBMITTALS REQUIRED TO BE PROVIDED WITH PROPOSAL				THE SUPPLIER MUST INDICATE WHERE REQUIRED SUBMITT ARE INCLUDED IN PROPOSAL
PRODUCT NAME				Section 3/D
CERTIFICATION OF MARV AND				Section 3/D
CORRESPONDING TEST PROCEDURES				Section 3/D
LONG TERM STORAGE REQUIREMENTS				Section 3/B
TESTING FREQUENCY				
MASS PER UNIT AREA	1/50,000 SF		Yes	
GRAB STRENGTH	1/50,000 SF		Yes	
TEAR STRENGTH	1/50,000 SF		Yes	
PUNCTURE STRENGTH	1/50,000 SF		Yes	
BURST STRENGTH	1/50,000 SF		Yes	
SCHEDULED DELIVERY DATES				
TOTAL QUANTITY	65,000 SF			Per table 6P

SIGNATURE: Roger Krabl

NAME OF BIDDER: GSE Lining Technology, Inc.

DATE: May 26, 1998

REVISED 5/15/98

GSE

GSE Lining Technology, Inc.

2061

19103 Gundle Road
Houston, Texas 77073
800-435-2008
281-443-8564
Fax 281-875-6010

19 March, 1998

Fluor Daniel Fernald
7400 Willey Road
Fernald, OH 4503

Attn: Kathy Fisher

RE: Certification for the Fermco Project
GSE Project Number C1269

Certification

The undersigned, being qualified and authorized to do so, hereby certifies that the geomembrane will meet or exceed GSE specified material properties. Please see attached properties>

Eric Reed

Eric Reed
Technical Representative-Dealer Sales

GSE specs do not meet project specs on thickness, carbon black dispersion, and ESCR

000416

MINIMUM PROPERTIES FOR TEXTURED HDPE GEOMEMBRANES
GSE HYPERFRICTIONFLEX™ AND GSE HD™ TEXTURED

Property	Test Method[1]	30[3]	40	60	80	100
Minimum Thickness[3], mil	ASTM D 751, D 1593, D 5199 or GRI GM8[2]	27	36	54	72	90
Density, g/cm³	ASTM D 792 (B) or D 1505	0.940	0.940	0.940	0.940	0.940
Carbon Black Content, %	ASTM D 1603, modified	2.0	2.0	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D 3015	A2	A2	A2	A2	A2
Tensile Properties: (each direction)	ASTM D 638 Type IV, 2 ipm					
Strength at Yield, lb/in	NSF 54 modified	65	86	130	173	216
Strength at Break[4], lb/in		(38)	162 (50)	243 (75)	324 (100)	405 (125)
Elongation at Yield, %	(1.3" gauge length)	13	13	13	13	13
Elongation at Break[4], %	(2.5" gauge length)	(120)	500 (120)	560 (120)	560 (120)	560 (120)
Tear Resistance, lb	ASTM D 1004	22	30	45	60	75
Puncture Resistance, lb	FTMS 101 Method 2065	39	52	80	105	130
ESCR, hours	ASTM D 1693 (B)	1500	1500	1500	1500	1500
Dimensional Stability, % change	ASTM D 1204 (1 hr. at 100 °C)	± 2	± 2	± 2	± 2	± 2

[1] GSE utilizes test equipment and procedures which enable effective and economical confirmation that the product will conform to specifications based on the noted procedures. Some test procedures have been modified for application to geosynthetics. All procedures and values are subject to change without prior notification.

[2] Thickness of GSE textured material is determined using GRI GM8 "Measurement of the Core Thickness of Textured Geomembranes".

[3] The flat cast extruder can achieve, when necessary, ± 5% of nominal thickness except for < 60 mil; co-extruded lines can achieve a range of -10% to +15% of nominal thickness. Specifications with more restrictive tolerances should be priced accordingly.

[4] Values in parenthesis correspond to the minimum average roll value (MARV) for coextruded, textured material.

30 mil HyperFrictionFlex® is a nonstandard product

000417

Rev. 03/06/97

DO NOT MEET OR CORRESPOND TO SPECS.

SYNTHETIC INDUSTRIES

2061

ynthetic Products Division

May 9, 1996

.ining Technology Inc
19103 Gundle Rd
Houston TX 77075
BoL: XXXXXXX PO XXXXXXX-XX
Project: Any project Job: Any Job

Is this the product for the filter (Table 02714-1)?

This is to certify that Product 1201, a nonwoven polypropylene geotextile produced by Synthetic Industries will meet the following certifiable minimum average roll values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level.

SAMPLE

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS	S.I. UNITS
Tensile Strength	ASTM D-4632	300 lbs	1335 N
Elongation	ASTM D-4632	50 %	50 %
Trapezoidal Tear	ASTM D-4533	115 lbs	510 N
n Burst	ASTM D-3786	600 psi	4130 Kpa
ure Strength	ASTM D-4833	180 lbs	800 N
AOS	ASTM D-4751	100 US Standard Sieve	0.150 mm
Permittivity	ASTM D-4491	1.0 sec^{1}	1.0 sec^{1}
Permeability	ASTM D-4491	0.29 cm/sec	0.29 cm/sec
Flow Rate	ASTM D-4491	75 gpm/ft	3055 lpm/m^2
U V Resistance	ASTM D-4355	70 %	70 %

Strength Retained after 500 hours exposure in Xenon Arc Weatherometer

SAMPLE

Sincerely,

Kent A. Snyder
Technical Superintendent
Performance Nonwovens Division

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery it shall be of the quality and specifications stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any [illegible] made by the Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published [illegible] and the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous [illegible] of this style and is subject to change without notice. The effective date for this product data is 04/15/96.

000418

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA

SYNTHETIC INDUSTRIES

ynthetic Products Division

May 9, 1996

Lining Technology Inc
19103 Gundle Rd
Houston TX 77075
BoL: XXXXXXX PO XXXXXXX-XX
Project: Any project Job: Any Job

Is this for the geotextile cushion (Table 02714-2)?

This is to certify that Product 1291, a nonwoven polypropylene geotextile produced by Synthetic Industries will meet the following certifiable minimum average roll values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level. This geotextile has been continuously inspected for the presence of needles and none were detected.

SAMPLE

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS	S.I. UNITS
Weight	ASTM D-5261	12.0 oz/yd^2 ✓	405 g/m^2
Thickness	ASTM D-5199	115 mils	2.9 mm
Tensile Strength	ASTM D-4632	310 lbs	1375 N
Elongation	ASTM D-4632	50 %	50 %
ezoidal Tear	ASTM D-4533	120 lbs	530 N
n Burst	ASTM D-3786	620 psi	4270 Kpa
Puncture Strength	ASTM D-4833	210 lbs	930 N
AOS	ASTM D-4751	100 US Standard Sieve	0.150 mm
Permittivity	ASTM D-4491	0.8 sec^1	0.8 sec^1
Permeability	ASTM D-4491	0.29 cm/sec	0.29 cm/sec
Flow Rate	ASTM D-4491	60 gpm/ft	2440 lpm/m^2
U V Resistance	ASTM D-4355	70 %	70 %

SAMPLE

Strength Retained after 500 hours exposure in Xenon Arc Weatherometer

Sincerely,

Kent A. Snyder
Technical Superintendent
Performance Nonwovens Division

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery it shall be of the quality and specifications stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any representations made by the Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published specifications, and the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous data for this style and is subject to change without notice. The effective date for this product data is 04/18/96.

000419

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA
Telephone • 423 899 9444 • Fax • 423 899 7518 • 1 800 521 9444

2061

SYNTHETIC INDUSTRIES

ıthetic Products Division

ning Technology Inc
103 Gundle Rd
ouston TX 77075
oL: XXXXXXX PO XXXXXXX-XX
oject: Any project Job: Any Job

May 9, 1996

Is this product for the supplemental geotextile cushion (Table 02714-3)?

is is to certify that Product 1341, a nonwoven polypropylene geotextile produced by Synthetic dustries will meet the following certifiable minimum average roll values when tested in cordance with the proper ASTM test methods. A minimum average roll value is calculated as e mean minus two standard deviations, yielding a 97.5 percent confidence level. This geotextile s been continuously inspected for the presence of needles and none were detected.

SAMPLE

HYSICAL PROPERTY	TEST METHOD	U.S. UNITS	S.I. UNITS
eight	ASTM D-5261	12.5 oz/yd^2	420 g/m^2
ickness	ASTM D-5199	125 mils	3.1 mm
ensile Strength	ASTM D-4632	325 lbs	1445 N
ation	ASTM D-4632	50 %	50 %
oidal Tear	ASTM D-4533	125 lbs	555 N
ullen Burst	ASTM D-3786	650 psi	4480 Kpa
ncture Strength	ASTM D-4833	220 lbs	975 N
OS	ASTM D-4751	100 US Standard Sieve	0.150 mm
rmittivity	ASTM D-4491	0.8 sec^1	0.8 sec^1
rmeability	ASTM D-4491	0.29 cm/sec	0.29 cm/sec
ow Rate	ASTM D-4491	60 gpm/ft	2440 lpm/m^2
V Resistance	ASTM D-4355	70 %	70 %

ength Retained after 500 hours exposure in Xenon Arc Weatherometer

ncerely,

SAMPLE

ent A. Snyder
echnical Superintendent
erformance Nonwovens Division

makes no warranty, express or implied, concerning the product furnished hereunder other than at the time of delivery it shall be of the quality and specifications stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A TICULAR PURPOSE IS EXPRESSLY EXCLUDED AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any made by the Seller concerning uses or applications of said product are deemed reliable and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries current published of the Customer gives notice to Synthetic Industries before installing the product, then Synthetic Industries will replace the product without charge or refund the purchase price. This Data Sheet supersedes all previous its style and is subject to change without notice. The effective date for the product data is 04/1/96.

000420

Synthetic Industries, Inc.
4019 Industry Drive • Post Office Box 22788 • Chattanooga, Tennessee • 37422 • USA

Which Bentomat product ?

TABLE 4-1
BENTOMAT MQA/MQC PLAN SUMMARY[1]
Version 5.0, effective March 1997 (revised November 1997)

MATERIAL	QUALITY PARAMETER[1]	TEST METHOD[2]	TEST FREQUENCY[3]	CERTIFIED VALUE[4]
Bentonite[5]	Swell Index	ASTM D 5890	50 tonnes	24 mL/2g min.
	Fluid Loss	ASTM D 5891	50 tonnes	18 mL max.
	Moisture Content	ASTM D 2216	50 tonnes	10 percent typical.
	Particle Type: Granular[6]	ASTM D 421	50 tonnes	100% typical - #10 1% typical - #200
Bentomat CL	Bentonite Mass/Area[7]	ASTM D 5993	40,000 sq ft	0.75 lb/sq ft
	Moisture Content[8]	ASTM D 4643	40,000 sq ft	25 percent typical
	Grab Strength[9]	ASTM D 4632	200,000 sq ft	120 lbs for CL
	Peel Strength[9]	ASTM D 4632	40,000 sq ft	15 lbs
	Index Flux[11]	ASTM D 5887 or E96	Weekly	1×10^{-9} $m^3/m^2/sec$
	Permeability[11]	ASTM D 5084 or E96	Weekly	5×10^{-10} cm/sec
Bentomat DN	Bentonite Mass/Area[7]	ASTM D 5993	40,000 sq ft	0.75 lb/sq ft
	Moisture Content[8]	ASTM D 4643	40,000 sq ft	25 percent typical
	Grab Strength[9]	ASTM D 4632	200,000 sq ft	150 lbs for DN
	Peel Strength[9]	ASTM D 4632	40,000 sq ft	15 lbs
	Index Flux[10]	ASTM D 5887	Weekly	1×10^{-8} $m^3/m^2/sec$
	Permeability[10]	ASTM D 5084	Weekly	5×10^{-9} cm/sec
Bentomat ST	Bentonite Mass/Area[7]	ASTM D 5993	40,000 sq ft	0.75 lb/sq ft
	Moisture Content[8]	ASTM D 4643	40,000 sq ft	25 percent typical
	Grab Strength[9]	ASTM D 4632	200,000 sq ft	90 lbs for ST
	Peel Strength[9]	ASTM D 4632	40,000 sq ft	15 lbs
	Index Flux[10]	ASTM D 5887	Weekly	1×10^{-8} $m^3/m^2/sec$
	Permeability[10]	ASTM D 5084	Weekly	5×10^{-9} cm/sec

NOTES:

1. Please refer to the CETCO GCL MQA/MQC manual for additional details regarding this information. Also, the listed values of each parameter are subject to change as manufacturing processes are refined. Contact CETCO for confirmation of this information.
2. ASTM procedures modified as necessary to facilitate the testing of a GCL instead of a geotextile.
3. The listed test frequency is based on ASTM D 5889 *Standard Practice for Quality Control of Geosynthetic Clay Liners*. Actual frequency of all tests may vary slightly due to varying roll dimensions.
4. All required values listed are minimum average roll values (MARVs) unless otherwise indicated.
5. These parameters are for the bentonite before it is incorporated into the finished Bentomat/Claymax product.
6. All bentonite is granular type. The particle size distribution may vary slightly.
7. Mass per unit area of the bentonite component of the Bentomat/Claymax, obtained by weighing an oven-dried sample of known area and subtracting the typical geotextile mass per unit area values. The resulting values are normalized to a reference moisture content of 0 percent.
8. Moisture content of the bentonite, exclusive of the geotextiles.
9. All tensile testing represent values with the test specimens oriented in the machine direction.
10. ASTM D 5887 Index Flux and ASTM D 5084 Hydraulic Conductivity test with deaired-distilled deionized water at 80 psi (551 kPa) cell pressure, 77 psi (531 kPa) headwater pressure and 75 psi (517 kPa) tailwater pressure. This flux value is equivalent to a permeability of 5×10^{-9} cm/sec for typical GCL thickness.
11. ASTM D 5887 Index Flux and ASTM D 5084 Hydraulic Conductivity test with deaired-distilled deionized water at 80 psi (551 kPa) cell pressure, 77 psi (531 kPa) headwater pressure and 75 psi (517 kPa) tailwater pressure. Reported value is equivalent to 95 gal/acre/day. This flux value is equivalent to a permeability of 5×10^{-10} cm/sec for typical GCL thickness. Alternatively, hydraulic conductivity can be determined by performing water vapor transmisivity testing (ASTM E 96) on the membrane side of the GCL and using the conversion outlined by Koerner (1994). This flux value should not be used for equivalency calculations unless the gradients used represent field conditions. A flux test using gradients that represent field conditions must be performed to determine equivalency.

000421

Contractor / Installers Submittals

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NOS.:	20102	X	CONTRACT NUMBER.: FSC-614	SUBMITTAL NO.: 02605-1	REV.: 0	DATE: July 29, 1998	PAGE 1 OF 1
	20402						

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45013-9402

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

SIGNATURE: J. Richard Schaubmann

RECEIVED BY: Melissa Crews DATE: 7-29-98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
6	614-PET-044	0							X		X	Resin Supplier's QC Certificates, Mfg.'s Resin	X		02605-1.04.B.1, 02605-1.04.B.2, &	X		
												Test Results, & Certification of Compliance			02605-1.04.C			

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Mike Godber (Approver)	64	ECDC	52-7	Jim Jenkins	64	OSDF Station	64
Bruce Schweitzer	64	Vern Taylor	52-0	Bruce Schweitzer	64	ECDC	52-7
Jim Jenkins	64			Mike Godber	64	Vern Taylor	52-0
Dan Bodine	38			Dan Bodine	38		

RECEIVED BY: Michael W. Godber DATE: 8/4/98 NO COMMENTS ____ COMMENTS ATTACHED X
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

000423

20611

COMMENTS: THE SPEC HAS A TYPO SINCE IT STATES THE MELT INDEX IS A MINIMUM OF .15G/MIN. THE MIN SHOULD BE A MAXIMUM WHICH IS IN COMPLIANCE WITH ASTM. [illegible] MELT INDEX

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE
A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS - REVISE & RESUBMIT AS CFC OR INF
C - REVISE & RESUBMIT

ENTERED

PETRO
environmental
technologies

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02605-1 (Rev. 0)

RESIN SUPPLIER'S QUALITY CONTROL CERTIFICATES, MANUFACTURER'S RESIN TEST RESULTS, & CERTIFICATION OF COMPLIANCE

Sections 02605-1.04.B.1, -1.04.B.2, & -1.04.C

Document No. 614-PET-044 (Rev. 0)

INFORMATION ONLY

July 29, 1998

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: Date: 8/10/98

000424

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

PHILLIPS DRISCOPIPE
A DIVISION OF PHILLIPS PETROLEUM COMPANY
11711 HOPEWELL ROAD
HAGERSTOWN, MD 21740
(301) 582-6600

July 13,1998

ATTN: JERRY BIAGINI
LEE SUPPLY CO., INC.
P.O. BOX 35
CHARLEROI, PA 15022

1000 Series
CERTIFICATION LETTER

CUSTOMER ORDER NO	888-HG
PHILLIPS ORDER NO:	16928
DATE SHIPPED:	01/30/1998
SHIPPED TO:	Lee Supply, Charleroi, Pa.
QUANTITY:	7,280 ft.
DATE EXTRUDED:	01/1998
PRODUCT	6" 11 1000

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED ABOVE AND SHIPPED ON THE ABOVE ORDER HAS BEEN SAMPLED ACCORDING TO STATISTICAL SAMPLING PLANS IN COMPLIANCE WITH THE "RECOMMENDED IN-PLANT QUALITY CONTROL PROGRAM FOR PLASTIC PIPE, TUBING AND FITTINGS. THE PRODUCT MEETS THE APPLICABLE REQUIREMENTS FOR PIPE, TUBING AND/OR FITTINGS MADE FROM TR 480 POLYETHYLENE DEFINED IN THE APPLICABLE SPECIFICATIONS INDICATED BELOW:

ASTM F714: - SPECIFICATIONS OF POLYETHYLENE (PE) PLASTIC PIPE (SDR-PR) BASED ON OUTSIDE DIAMETER.

ASTM D1248 & D3350 - SPECIFICATIONS FOR PE RESINS.

OTHER:

B. Andrew Mason
Services Supervisor , Hagerstown Md.

000425

PHILLIPS DRISCOPIPE - HAGERSTOWN

CUSTOMER: LEE SUPPLY

CUSTOMER ORDER: 0888

PRODUCT : 6" DR 11 1000

MIN.WALL	0.619	MIN HOOPSTRESS	3477
MAX. WALL	0.652	MAX. HOOPSTRESS	3561
MIN. O.D.	6.613	MIN OR	0.053
MAX. O.D.	6.620	MAX. OR	0.090
MIN. BURST	722	DIMENSION RATIO (DR)	11
MAX. BURST	738	RESIN LOTS USED	71-7-1543

PHILLIPS 66 COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
PASADENA, TEXAS 77501-0792
BOX 792 PHONE: 713-475-3625

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

January 08, 1998

JHV# 413-98

FAX: 301-582-6670

Phillips Driscopipe
11711 Hopewell Road
Hagerstown, MD 21741

Quality Control

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

Type:	HHM TR-480Z
Lot Number:	7171543
P.O. Number:	REL 3
Date Shipped:	01/07/98
Package:	PSPX 2505
Quantity:	190200 LBS.
Melt Index, ASTM D1238:	.11 G/10 MIN
Density, ASTM D1505:	.943 G/CC
ESCR, F/20:	>192 HOURS **

J. H. Vaden
Quality Assurance Manager

For COA questions call Sharon Robinette, 713-475-3625

* Reg. U.S. Pat. Off.
** Nominal Value (not tested on each lot)

cc: QA-File-RC

000427

TOTAL P.01

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NOs.:	20102	X	CONTRACT NUMBER.: FSC-614	SUBMITTAL NO.: 02605-2	REV.: 0	DATE: August 6, 1998	PAGE 1 OF 1
	20402						

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45013-9402

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

SIGNATURE: J. Richard Schairbaum

RECEIVED BY: Melissa Clemens DATE: 8-10-98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
6	614-PET-051	0							X		X	Test Gauge Calibration Documentation	X		02605-3.05.B.7	X		

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Mike Godber (Approver)	64	ECDC	52-7	Jim Jenkins	64	OSDF Station	64
Bruce Schweitzer	64	Vern Taylor	52-0	Bruce Schweitzer	64	ECDC	52-7
Jim Jenkins	64			Mike Godber	64	Vern Taylor	52-0
Dan Bodine	38			Dan Bodine	38		

RECEIVED BY: Michael W. Godber DATE: 8/12/98 NO COMMENTS X COMMENTS ATTACHED ____
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

COMMENTS

ORIGIN

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION

IN[illegible]ORMATION/RECORD

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT - CONFORMS W[illegible]REQUIREMENTS

B - MINOR COMMENTS - REVISE & RESUB[illegible]FC OR INF

00428

PETRO
environmental
technologies

2061

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02605-2 (Rev. 0)

TEST GAUGE CALIBRATION DOCUMENTATION
Section 02605-3.05.B.7

Document No. 614-PET-051 (Rev. 0)

INFORMATION ONLY

August 6, 1998

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: Date: 8/10/98

000429

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

CERTIFICATE OF ACCURACY

CUSTOMER:
PETRO ENVIROMENTAL TECHNOLOGIES INC.
7851 PALACE DRIVE
CINCINNATI, OHIO 45247

SALES ORDER NO. J 003287

		STANDARDS TRACEABLE TO N.I.S.T.		INSTRUMENT CERTIFIED
DESCRIPTION	DIGITAL MAN			PRESSURE GAUGE
MANUFACTURER	MERIAM			ASHCROFT
MODEL NO.	DP2000I			45 1279 AS 04 L.
RANGE	0–75 PSI			0–30 PSI
ACCURACY	.1%			.5 % FULL SCALE
SERIAL NUMBER	D1205E15			N/A
DATE CERTIFIED	02–20–98			08–04–98
N.I.S.T. NO.	822/MET57			98–2678

MINOR DIV.	.2 PSI
AMBIENT TEMP.	75 F.
BARAMETRIC PRESS.	30.16 IN. HG.
RELATIVE HUMIDITY	54 %

VALUED APPLIED PSI	INDICATED PSIG	DEVIATION
0	0	NO READABLE ERROR
3	3	NO READABLE ERROR
6	6	NO READABLE ERROR
9	9	NO READABLE ERROR
12	12	NO READABLE ERROR
15	15	NO READABLE ERROR
18	18	NO READABLE ERROR
21	21	NO READABLE ERROR
24	24	NO READABLE ERROR
27	27	NO READABLE ERROR
30	30	NO READABLE ERROR

USING STANDARDS TRACEABLE TO THE N.I.S.T., THIS INSTRUMENT IS CERTIFIED TO BE ACCURATE WITHIN A MAXIMUM ERROR OF : +/– .5 %

[X] SPAN [ ] READING

WE FUTHER CERTIFY THAT OUR CALIBRATION SYSTEM COMPLIES WITH MIL. STD. 45662–A.

CERTIFIED BY R. U. TECHNICIAN

DATE AUGUST 4, 1998

000430

2061

The Jay Industrial Technologies Group, LLC

CERTIFICATE OF ACCURACY

CUSTOMER:
PETRO ENVIROMENTAL TECHNOLOGIES INC.
7851 PALACE DRIVE
CINCINNATI, OHIO 45247

SALES ORDER NO. J 003287

	STANDARDS TRACEABLE TO N.I.S.T.			INSTRUMENT CERTIFIED
DESCRIPTION	DWT			PRESSURE GAUGE
MANUFACTURER	ASHCROFT			ASHCROFT
MODEL NO.	1305-B			45 1279 AS 02 L.
RANGE	10000 PSI			0-200 PSI
ACCURACY	.05%			.5 % FULL SCALE
SERIAL NUMBER	31828			N/A
DATE CERTIFIED	JUNE 19, 1998			08-04-98
N.I.S.T. NO.	821/254716-95			98-2679

MINOR DIV.	2 PSI
AMBIENT TEMP.	75 F.
BARAMETRIC PRESS.	30.16 IN. HG.
RELATIVE HUMIDITY	54 %

VALUED APPLIED PSI	INDICATED PSIG	DEVIATION
0	0	NO READABLE ERROR
20	20	NO READABLE ERROR
40	40	NO READABLE ERROR
60	60	NO READABLE ERROR
80	80	NO READABLE ERROR
100	100	NO READABLE ERROR
120	120	NO READABLE ERROR
140	140	NO READABLE ERROR
160	160	NO READABLE ERROR
180	180	NO READABLE ERROR
200	200	NO READABLE ERROR

USING STANDARDS TRACEABLE TO THE N.I.S.T., THIS INSTRUMENT IS CERTIFIED TO BE ACCURATE WITHIN A MAXIMUM ERROR OF : +/- .5 %

[X] SPAN [ ] READING

WE FUTHER CERTIFY THAT OUR CALIBRATION SYSTEM COMPLIES WITH MIL. STD. 45662-A.

CERTIFIED BY R. U. TECHNICIAN

DATE AUGUST 8, 1998

000431

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT	20102	X	CONTRACT NUMBER.: FSC-614	SUBMITTAL NO.: 02605-3	REV.: 1	DATE: September 11, 1998	PAGE 1 OF 1
	20402						

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45013-9402

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

SIGNATURE: J. Richard Schaubaum

RECEIVED BY: Melissa Crews DATE: 9-11-98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
5	614-PET-055A	1						X		X		List of Materials/Names of Suppliers		X	02605-1.04.A.2	X		
5	614-PET-055B	1						X		X		Hydrostatic Testing Procedures	X		02605-1.04.A.3	X		

RECEIVED
SEP 28 1998
R. Ousman

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Jim Jenkins (Approver)	64	Vern Taylor SEP 14 1998	52-0	Jim Jenkins	64	OSDF Station	64
Bruce Schweitzer	64			Bruce Schweitzer	64	ECDC	52-7
Dan Bodine	38			Mike Godber	64	Vern Taylor	52-0
ECDC	52-7			Dan Bodine	38		

000432

RECEIVED BY: James C. Jenkins DATE: 9/24/98 NO COMMENTS ✓ COMMENTS ATTACHED ___
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APP[illegible]E SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE
A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS - REVISE & RESUBMIT AS CFC OR INF
C - REVISE & RESUBMIT
[illegible]TIERED

PETRO
environmental
technologies

2061

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02605-3 (Rev. 1)

LIST OF MATERIALS TO BE FURNISHED/
NAMES OF SUPPLIERS &
HYDROSTATIC TESTING PROCEDURES,
Sections 02605-1.04.A.2 -.A.3

Document No. 614-PET-055A (Rev. 1)
Document No. 614-PET-055B (Rev. 1)

September 11, 1998

ECDC CONTROLLED
COPY NO.

C011

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: C Jonkman Date: 9/21/98

000433

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

TABLE OF CONTENTS

SHOP DRAWINGS (Document No. 20102-DWG-004)
Pipe Perforation Pattern

LIST OF MATERIALS (Document No. 614-PET-055A, Rev. 1)
Listing of Materials to be Furnished, Names of Suppliers, & Proposed Delivery Dates

HYDROSTATIC TESTING PROCEDURES (Document No. 614-PET-055B, Rev. 1)

ORIGIN/IDENTIFICATION OF PE RESIN (Document No. 614-PET-055C)

MFG.'S MINIMUM VALUES & CORRESPONDING TEST PROCEDURES (Document No. 614-PET-055D)

PETRC
environmenta
technologie

2061

LIST OF MATERIALS TO BE FURNISHED,

NAMES OF SUPPLIERS, &

PROPOSED DATES OF DELIVERY

Document No. 614-PET-055A, Rev. 1

PETRO
environmental
technologies

LIST OF HDPE MATERIALS TO BE SUPPLIED FOR OSDF PHASE II CELL CONSTRUCTION

HDPE PIPING

Approximately 1440'- 6" SDR11 Series 1000 Driscopipe Perforated

Pipe Manufacturer: Phillips Driscopipe
Perforations: Lee Supply
Estimated Ship Date: 2 weeks after approved submittal

PIPE FITTINGS

5 - 6" Electrofusion Couplers

Manufacturer: Central Plastics
Estimated Ship Date: 2 weeks after approved submittal

END CAPS

6"-Dia. End Caps

Quantity: 3
Manufacturer: Central Plastics
Estimated Ship Date: 2 weeks after approved submittal

PETRO
environmentu
technologie

HYDROSTATIC TESTING PROCEDURES

Document No. 614-PET-055B, Rev. 1

PETRO
environmental
technologies

1.0 HYDROSTATIC TESTING

1.1 Identify and provide all required testing equipment apparatus and materials including pumps, hoses, calibrated gauges, taps, plugs, drains, temporary connections, fittings, applicable PPE and test logs necessary to complete specified test(s) prior to placing backfill.

Pipe may be tested outside of trench, or inside the trench, but prior to placing fill over the pipe.

HYDROSTATIC TESTING CAN BE DANGEROUS, USE CAUTION WHILE PRESSURIZING, INSPECTING AND DE PRESSURIZING. DO NOT FUSE, WELD, HEAT, OR CUT ANY SYSTEM OR COMPONENT WHILE UNDER PRESSURE.

1.2 Notify all pertinent parties a minimum of 24 hours prior to the start of test. Testing shall be in accordance with Technical Specification Section 02605-3.05.B. Air testing in lieu of hydrostatic testing will not be used.

1.3 Prior to testing, an inspection shall be performed to ensure all fusing and/or welding has been completed, all bolted connections have been properly blanked-off and all equipment which could be damaged by the hydrostatic test have been removed and/or isolated.

1.4 Vents and drains of proper size and rating shall be installed to ensure proper venting and to allow completed drainage after testing.

1.5 A calibrated pressure gauge shall be installed where it can be seen by the hydrostatic pump operator. If this is not possible, two gauges may be used, one of which is calibrated and installed on the system. (A reference gauge may be installed during preliminary tests as to prevent damage to the calibrated gauge prior to final testing). Prior to conducting the test, calibration certifications for each gauge to be used during the hydrostatic test will be submitted to FDF.

1.6 The system must be filled with water. Water can be obtained from a hydrant at the North Access Road. The air must be expelled from the system and the pressure safely raised to ***120 psi internal pressure for HDPE solid wall and carrier pipe, and 15 psi internal pressure for HDPE containment pipe.***

1.7 When the specified hydrostatic pressure has been reached and the initial expansion phase has been completed, the hydrostatic pump must be disconnected and the system allowed to stand for the specified duration. The test duration does not include the initial expansion phase. The pressure may not drop, except for pressure expansion and temperature fluctuation allowance, if any, nor may it be raised

with the hydrostatic pump during this time. The system will be inspected for leakage, deformation and/or distortion. ***The pipes shall be tested at the required internal pressure for a minimum period of one hour after the pressure in the pipe has stabilized.***

1.8 If leakage or other defects are found during any part of testing, the test shall be discontinued and the defect repaired. Only after repair is complete may the system be re-tested.

1.9 Once the complete system has been inspected and accepted, the system must be safely de-pressurized and will be drained directly onto the ground.

2.0 ACCEPTANCE CRITERIA

2.1 Acceptance criteria for hydrostatic testing is zero leakage for the stabilized pressure for the minimum duration of the test. Reference specification for expansion leakage allowance, if applicable.

2.2 Document test results as per the attached test record and retained as a Project Quality Record.

3.0 REFERENCES

3.1 Project Technical Specification 20102/614, Section 02605; Part 3.05

3.2 ASME B31.9; Section 937.1 through 937.3

3.3 Manufacturer's Suggested Testing Documentation

3.4 Driscopipe Technical Note #35, March 9, 1993. Hydrostatic Testing of HDPE Pressure Pipelines

HDPE PIPING - HYDROSTATIC PRESSURE TEST RECORD

TEST RECORD NO.: HMW-03-006 DATE: May 07, 1998

LINE SERVICE NO.: Horizontal Monitoring Well - Cell #3	LINE MEDIUM: HDPE 6-in. dia. Carrier Pipe
MAX. OPERATING PRESSURE: Gravity	TEST PRESSURE: 120.0 PSI
SPECIFICATION CODE: Tech. Spec. Section 02605	TEST MEDIUM: Water

REFERENCE DRAWINGS/TEST BOUNDARIES:

Tested 6-in. dia., 140-lin. ft. long segment. To be installed from Village Building Service's tie-in point at Control Point No. 9303 (Horizontal Monitoring Well - Cell 3) to the perforated horizontal monitoring well assembly.

SAMPLE

HDPE PIPE INSTALLED: No

BACKFILL CONDITIONS: Tested prior to installation; will be backfilled with embedment fill material.

ALL REQUIRED GAUGES INSTALLED/ISOLATED: Yes CONFIRMATION: Yes DATE: 11/20/97

CQC NOTIFIED: Yes --- GeoSyntec	DATE/TIME: 05/05/98 --- 2:00 PM
TEST GAUGE IDENT.: Certification Number: 97-0812	CALIBRATION DUE DATE: 08/12/98
TEST START TIME:	TEST GAUGE READING:
TEST FINISH TIME:	TEST GAUGE READING:

TEST VERIFICATION	ACCEPT	REJECT	DATE
CONTRACTOR:	X		05/07/98
CQC CONSULT.:	X		05/07/98
FDF QA/QC:	X		05/07/98

REMARKS/COMMENTS:

None.

REVIEWED/TESTED BY: _____ DATE: 05/07/98

J. Richard Schairbaum, Quality Control Manager

PETRO environmenta technologie

FDF PROJECT	20102	X	CONTRACT NUMBER.: FSC-614	ITTAL NO.: 02714-1	REV.: 0	DATE: September 15, 1998	PAGE 1 OF 1
	20402						

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45013-9402

SIGNATURE: J. Richard Schaubaum

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY: Melissa Clems DATE: 9-16-98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
7	614-PET-062	0					X				X	Letter of Acceptance (Geotextile)		X	02714-2.03.A			

FDF to verify Quantities Accepted

RECEIVED
SEP 17 1998
KWusman

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Lou Wehlitz (Approver)	64	Dan Bodine	38	Jim Jenkins	64	Dan Bodine	38
Bruce Schweitzer	64	ECDC	52-7	Bruce Schweitzer	64	OSDF Station	64
Jim Jenkins	64	Vern Taylor	52-0	Mike Godber	64	ECDC	52-7
Bill Zebick	64			Vern Taylor	52-0		

RECEIVED BY: D. Bodine DATE: 18 Sept 98 NO COMMENTS ____ COMMENTS ~~ATTACHED~~ above ____
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

000441

2061

COMMENTS

SUBMITTAL ACTION CODE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE
A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS - REVISE & RESUBMIT AS CFC OR INF
C - REVISE & RESUBMIT

ENTERED

ORIGINAL

PETRO
environmental
technologies

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02714-1 (Rev. 0)

LETTER OF ACCEPTANCE FOR GEOTEXTILE MATERIALS
Section 02714-2.03.A

Document No. 614-PET-062 (Rev. 0)

September 15, 1998

000442

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

September 15, 1998

Mr. Rick Holbrook
Fluor Daniel Fernald
P. O. Box 538704, Mail Stop 64
Cincinnati, Ohio 45253-8704

RE: Acceptance of Geotextile Materials
Period Beginning September 3, 1998 and Ending September 8, 1998
SWU/OSDF Phase II
Subcontract No. FSC 614

Dear Rick:

This letter is intended to fulfill the submittal requirement listed in paragraph 2.03.A of Technical Specification Section 02714. Specifically, by copy of this letter Petro Environmental Technologies, Inc. conditionally accepts the referenced geotextile materials for installation. Conditional acceptance is based solely on visual inspection of the shipped material unloaded and stored by Petro Environmental. As Petro Environmental has no contractual responsibility for material testing or Quality Assurance, no opinion of the material's suitability with regard to specification-required properties is made. An acceptance status summary for the various geotextiles received to date are as follows:

7-oz. Geotextile Filter in Liner System

	Date	Quantity Accepted	Quantity Rejected
Material Previously Accepted/Rejected	N.A.	NONE	NONE
Accepted/Rejected by this Letter	09/03/98	216,000 SF	NONE
	09/04/98	225,000 SF	NONE
TOTAL TO DATE		441,000 SF	NONE

10-oz. Geotextile Cushion in Liner System

	Date	Quantity Accepted	Quantity Rejected
Material Previously Accepted/Rejected	N.A.	NONE	NONE
Accepted/Rejected by this Letter	09/03/98	270,000 SF	NONE
	09/04/98	72,000 SF	NONE
	09/08/98	441,000 SF	NONE
TOTAL TO DATE		783,000 SF	NONE

PETRO environmental technologies

16-oz. Supplemental Geotextile Cushion in Liner System

	Date	Quantity Accepted	Quantity Rejected
Material Previously Accepted/Rejected	N.A.	NONE	NONE
Accepted/Rejected by this Letter	09/03/98	67,500 SF	NONE
TOTAL TO DATE		67,500 SF	NONE

Sincerely,
PETRO ENVIRONMENTAL TECHNOLOGIES, INC.

J. Richard Schairbaum

J. Richard Schairbaum
Quality Assurance Manager

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.	20102 / 20402	X	CONTRACT NUMBER.: FSC-614	SUBMITTAL NO.: 02770-1	REV.: 0	DATE: August 21, 1998	PAGE 1 OF 1

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45013-9402

SIGNATURE: J. Richard Schairbaum

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY: Melissa Crews DATE: 8-24-98

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	RESUBMITTAL: YES	NO	TITLE/DESCRIPTION	SUBMITTAL TYPE: CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
7	614-PET-058A	0						X			X	Installation Schedule	X		02770-1.04.B.2		X	
7	614-PET-058B	0						X			X	Installation Capabilities - Equip./Daily Prod.		X	02770-1.04.B.3.a-b		X	
7	614-PET-058C	0						X			X	Installation Capabilities - QC Procedures		X	02770-1.04.B.3.c	X		
7	614-PET-058D	0						X			X	Listing of Completed Facilities		X	02770-1.04.B.4	X		
7	614-PET-058E	0						X			X	Resume of Superintendent		X	02770-1.04.B.5		X	
7	614-PET-058F	0						X			X	Cold Weather Seaming Procedures	X		02770-1.04.B.8	X		

RECEIVED SEP 15 1998 OCB

DISTRIBUTION

REVIEW DISTRIBUTION: Distribution	MS	Distribution	MS	CFC DISTRIBUTION: Distribution	MS	Distribution	MS
~~Lou Weblite (Approver)~~	64	Dan Bodine	38	Jim Jenkins	64	Dan Bodine	38
Bruce Schweitzer	64	ECDC	52-7	Bruce Schweitzer	64	OSDF Station	64
Jim Jenkins Approver	64	Vern Taylor AUG 2 1998	52-0	Mike Godber	64	ECDC	52-7
~~Bill Zebiek~~	64			Vern Taylor	52-0		

RECEIVED BY: James C. Jenkins DATE: 9/11/98 NO COMMENTS ____ COMMENTS ATTACHED ✓

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

000445

2061

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE
A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS - REVISE & RESUBMIT AS CFC OR INF
C - REVISE & RESUBMIT

02770-1

FERNALD ENVIRONMENTAL RESTORATION MANAGEMENT CORPORATION

ENGINEERING CALCULATION

PROJECT NUMBER:	
BY: CCV	DATE: 9/2/96
CHECKED BY:	DATE:
PAGE 1 OF 2	
REVISED:	

SUBJECT:

SUBMITTAL 02770-1

- DOC 614-PET-058A - INSTALLATION SCHEDULE
  - "A" STATUS W/COMMENT (B) Revise for new start date
    CAN THEY MAKE SCHEDULE BASED ON INSTALLATION PER DAY?
- DOC 614-PET-058B - EQUIP DAILY PROD.
  - "B" W/COMMENTS RCH (B)
    (B) slow schedule to meet anticipated production rate
  - EQUIPMENT LIST
    - # OF GENERATORS ARE MISSING
    - ~~SPREADER BAR FOR DEPLOYMENT~~
    - LIESTERS
    - ~~TOOR~~
  - DAILY PRODUCTION
    - IN ORDER TO MEET 7 DAY SCHEDULE DAILY PROD NEEDS TO BE BUMPED UP. ≥ 43,000/DAY
    - QC INSPECTOR SHOULD BE PART OF CREW
- DOC 614-PET-058C - INSTALLATION CAP. - QC
  - A W/COMMENT
    "NOTE THAT CONTRACT DOCUMENTS WILL SUPERSEDE ATTACHED INSTALLER'S QUALITY CONTROL MANUAL.
- DOC 614-PET-058D - COMPLETED FACILITIES
  - "A"
    ~~QUALITY CONTROL CHIEF RESUME IS ALSO REQUIRED~~ 02770 1.04 B.5

000446

FS-S-0076 C (09/21/95)

03770-1

FERNALD
ENVIRONMENTAL RESTORATION
MANAGEMENT CORPORATION

ENGINEERING CALCULATION

PROJECT NUMBER: 20102	
BY: CCU	DATE: 9/2/98
CHECKED BY:	DATE:
PAGE 2 OF 2	
SUBJECT:	REVISED:

2061

- DOC 614-PET-058E - RESUME OF INSTALLER & QC CHIEF

(C)

- QUALITY CONTROL CHIEF RESUME IS REQUIRED

- DOC 614-PET-058F - COLD WEATHER SEAMING

(A)

Comments

- Schedule – too optimistic
  - 10 days more realistic for this site for GCL & GML each layer
  Start 10 Sept 98
- limited or no backup equipment
- Daily average production too optimistic
  Try 30,000 ft² GCL/GML
  GeoTextile OK
- Spec. installation procedures govern over QC Procedures

D. G. Bodland
9 Sept 98

PETRO
environmental
technologies

2061

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02770-1 (Rev. 0)

INSTALLATION SCHEDULE, INSTALLATION CAPABILITIES, LISTING OF COMPLETED FACILITIES, RESUME OF SUPERINTENDENT/ & COLD WEATHER SEAMING PROCEDURES

Sections 02770-1.04.B.2, -B.3.a-c, -B.4, -B.5, & -B.8

Document No. 614-PET-058A (Rev. 0)
Document No. 614-PET-058B (Rev. 0)
Document No. 614-PET-058C (Rev. 0)
Document No. 614-PET-058D (Rev. 0)
Document No. 614-PET-058E (Rev. 0)
Document No. 614-PET-058F (Rev. 0)

August 21, 1998

000449

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

INFORMATION ONLY

INSTALLATION SCHEDULE

Section 02770-1.04.B.2
Document No. 614-PET-058A

[ ] A - Conforms to the Subcontract Requirements
[X] B - Minor Comment, Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: _____ Date: 9/11/98

000450

PETRO
environment
technologie

PROPOSED INSTALLATION SCHEDULE FOR INSTALLATION OF GEOSYNTHETICS IN OSDF CELL 2

Description	Duration	Start*	Finish*	Assignments
Secondary GCL	7 days	09/08/98	09/15/98	Solmax Foreman, Solmax Technicians, and Union Labor
Secondary GML	7 days	09/08/98	09/15/98	Solmax Foreman, Solmax Master Seamer, Solmax Technicians, and Union Labor
Sec. Geotextile Cushion	7 days	09/14/98	09/24/98	Solmax Technicians and Union Labor
Primary GCL	7 days	09/24/98	10/05/98	Solmax Foreman, Solmax Technicians, and Union Labor
Primary GML	7 days	09/24/98	10/05/98	Solmax Foreman, Solmax Master Seamer, Solmax Technicians, and Union Labor
Prim. Geotextile Cushion	7 days	10/05/98	10/12/98	Solmax Technicians and Union Labor
Geotextile Filter	7 days	10/12/98	10/19/98	Solmax Technicians and Union Labor

*All dates assume no significant construction or weather delays.

INFORMATION ONLY

INSTALLATION CAPABILITIES -

PROPOSED EQUIPMENT & AVERAGE DAILY PRODUCTION

Sections 02770-1.04.B.3.a-b
Document No. 614-PET-058B

[ ] A - Conforms to the Subcontract Requirements
[X] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: J. C. Jordan Date: 9/11/98

000452

PETRO
environmenta
technologie

Installation Capabilities

1.04 B. 3. a. Information on equipment proposed for this project is as following:

1. Two wedge welders manufactured by Solmax International
2. One ATV manufactured by Honda
3. Two extruder welder
4. Two sewing machines from Union Special
5. Sand bags
6. One field tensiometer
7. One vacuum testing equipment
8. One pressure testing equipment

— GENERATORS? — SPREADER BAR? — LIESTERS?

1.04 B. 3. b. Average daily production anticipated for this project

NEED TO INSTALL ≈43,000 SF/DAY TO MEET 7 DAY SCHEDULE

1. Installed GCL - 40,000 square feet per day — 280,000 SF (APPROX. 300,000 SF PER LAYER) TO BE PLACED
   One foreman, one technician and eight labors
2. Installed 80mil Geomembrane – 40,000 square feet per day
   One foreman, four technicians, and eight labors.
3. Installed Geo Textile – 44,000 square feet per day
   One foreman, one technician and four labors.
4. Installed Geo Filter – 45,000 square feet per day
   One foreman, one technician and four labors.

~~1.04 B. 3. c. Quality control procedures~~

~~Solmax's quality control procedures are described in our Quality Control Manual attached.~~

~~Solmax's US quality control department is headed by Dave Mancini who supervises ten quality control technicians.~~

CDC CONTROLLED
COPY NO. C011

INSTALLATION CAPABILITIES -

QUALITY CONTROL PROCEDURES

Section 02770-1.04.B.3.c
Document No. 614-PET-058C

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: J C Jenkins Date: 9/11/98

000454

PETRO
environmenta
technologies

Installation Capabilities

1.04 B. 3. a. Information on equipment proposed for this project is as following:

1. Two wedge welders manufactured by Solmax International
2. One ATV manufactured by Honda
3. Two extruder welder
4. Two sewing machines from Union Special
5. Sand bags
6. One field tensiometer
7. One vacuum testing equipment
8. One pressure testing equipment

1.04 B. 3. b. Average daily production anticipated for this project

1. Installed GCL - 40,000 square feet per day
   One foreman, one technician and eight labors
2. Installed 80mil Geomembrane – 40,000 square feet per day
   One foreman, four technicians, and eight labors.
3. Installed Geo Textile – 44,000 square feet per day
   One foreman, one technician and four labors.
4. Installed Geo Filter – 45,000 square feet per day
   One foreman, one technician and four labors.

1.04 B. 3. c. Quality control procedures

Solmax's quality control procedures are described in our Quality Control Manual attached.

Solmax's US quality control department is headed by Dave Mancini who supervises ten quality control technicians.

WILL A QUALITY CONTROL INSPECTOR BE ON-SITE FULL-TIME?

ADD NOTE STATING "THE ATTACHED QUALITY CONTROL MANUAL IS SUPERSEDED BY THE PROJECT CONTRACT CONSTRUCTION QUALITY CONTROL DOCUMENT.

SOLMAX

GEOSYNTHETICS

CONSTRUCTION QUALITY CONTROL MANUAL

000456

TABLE OF CONTENTS

1. INTRODUCTION
1.1. Purpose 5
1.2. Scope 5
2. MATERIAL DELIVERY
2.1. Documentation of Material Delivery 5
3. GEOMEMBRANE INSTALLATION
3.1. Earth Work 5
3.1.1. Standard Responsibilities 5
3.1.2. Minimum QC Guidelines 5
3.2. Crest Anchorage System 6
3.3. Preparation for Geomembrane Deployment 6
3.3.1. Panel Layout 6
3.3.2. Panel Identification 7
3.4. Field Panel Placement 7
3.4.1. Weather Conditions 7
3.4.2. Location 7
3.4.3. Documentation of Panel Placement 7
3.4.4. Method of Deployment 7
3.4.5. Damage Repairs 8
3.5. Geomembrane Field Seaming 8
3.5.1. General Requirements 8
3.5.2. Seam Preparation 9
3.5.3. Trial Welds 10
3.5.4. General Seaming Procedures 11
3.5.5. Seaming Documentation 12
4. SEAM TESTING - GEOMEMBRANES
4.1. Concept 12
4.2. Air Pressure Testing 13
4.2.1. Equipment for Air Testing 13
4.2.2. Procedure for Air Testing 13
4.2.3. Procedure for Non-Complying Test 14
4.2.4. General Air Testing Procedures 15
4.2.5. Air Pressure Testing Documentation 15
4.3. Vacuum Testing
4.3.1. Equipment for Vacuum Testing 15
4.3.2. Procedure for Vacuum Testing 15
4.3.3. Procedure for Non-Complying Test 16
4.3.4. General Vacuum Test Procedures 16
4.3.5. Vacuum Testing Documentation 16

TABLE OF CONTENTS

4.4. Destructive Testing 1
4.4.1. Concept 1
4.4.2. Procedure for Destructive Testing 1
4.4.3. Procedure for Non-Complying Destructive Test 1
4.5. Laboratory Testing of Destructive Seam Samples 1
4.5.1. Destructive Seam Testing Laboratory 1
4.5.2. Acceptance Criteria 1
5. DEFECTS AND REPAIRS
5.1. Site Inspection and Review 1
5.2. Technicians Responsibility 1
5.3. Repair Procedures 1
5.3.1. Patching 1
5.3.2. Grinding and Welding 1
5.3.3. Spot Welding or Seaming 1
5.3.4. Capping 1
5.3.5. Extrude Overlap
5.3.6. Removal of Suspect Seams
5.4. Verification of Repairs 2
6. GEOTEXTILES
6.1. Handling and Placement 2
6.2. Seams and Overlap 2
6.3. Repairs 2
7. GEONETS
7.1. Handling and Placement 2
7.2. Layering and Tying of Geonet 2
7.3. Repairs 2
8. GEOSYNTHETIC CLAY LINERS
8.1. Storage 2
8.2. Handling and Placement 2
8.3. Repairs 2
9. GEOCOMPOSITE
9.1. Handling and Placement 2
9.2. Seams and Overlap 2
9.3. Repairs 2

APPENDICES

Appendix A

Inspection of Materials ____ A1
Subgrade Acceptation Certificate ____ A2
Fusion Trial Test Form ____ A3
Extrusion Trial Test Form ____ A4
Seaming Procedures Form ____ A5
Destructive Testing Log ____ A6
Repair Report ____ A7
Field Quality Control Daily Report ____ A8

Appendix B

Sample Installation Warranty ____ B1

1. INTRODUCTION

1.1. Purpose

Solmax Geosynthetics, Inc. developed this manual to outline the Quality Control Program utilized by Solmax's Installation Personnel to assure quality workmanship and the integrity of its geosynthetic installations.

1.2. Scope

All installation and quality control procedures associated with geomembranes, geotextiles, geonets geocomposites, and geosynthetic clay liners will be addressed in this manual.

2. MATERIAL DELIVERY

2.1. Documentation of Material Delivery

A Quality Control Inspector should be present, whenever possible, to observe the delivery and unloading of materials on site. The QC Inspector is to note any materials delivered in a damaged condition. All damaged materials shall be marked and located away from rolls that appear to be in good condition.

The QC Inspector will verify that the rolls are stored in an area with adequate protection from dirt, theft, vandalism and vehicle traffic.

Complete roll numbers, dimensions and condition of rolls will be recorded on the Solmax Inspection of Materials form.

3.0. GEOMEMBRANE INSTALLATION

3.1. Earth Work

3.1.1. Standard Responsibilities

The General and/or Earthwork Contractor shall be responsible for preparing and maintaining the subgrade in a condition suitable for the installation of the liner unless specifically agreed otherwise

3.1.1. Minimum Q.C. Guidelines.

In the absence of specific quality control guidelines, the following guidelines shall be followed.

3.1.2.1. Subgrade surfaces shall be smooth and free of debris, roots, and angular or sharp rocks. The soil shall be well graded and free of deleterious materials that may cause damage to the geomembrane. Unless required by design specifications, the upper six inches (6") of the finished subgrade shall not contain stones or debris larger than one-half inch

(½"). The Subgrade shall be compacted in accordance with the design specifications, but not less than required to provide a firm base to permit the movement of vehicles and welding equipment over the subgrade without causing rutting or other deleterious effects. Changes in grade shall not be sudden or abrupt.

3.1.2.2. The Earthwork Contractor shall protect the subgrade from desiccation flooding and freezing. Protection, if required, may consist of a thin plastic protective cover (or other suitable material as approved by the engineer) installed over the completed subgrade until such a time as the placement of geomembrane liner begins. Subgrades found to have desiccation cracks, exhibit swelling, heaving, or similar conditions shall be replaced or reworked by the General Contractor and/or Earthwork Contractor to remove these effects.

3.1.2.3. Subgrade Acceptance

Upon request, Solmax's QC Inspector will provide the owner's and/or Contractor's Representatives with a written acceptance of the subgrade surface covered by geomembrane. This subgrade acceptance will be limited to the amount of subgrade covered during a particular work shift. Subsequent repairs of the subgrade and the surface shall remain the responsibility of the Earthwork Contractor. An example of Solmax's Subgrade Acceptance Certificate is included in Appendix A.

3.2. Crest Anchorage System

3.2.1. Anchor trenches shall be excavated by the General and/or Earthwork Contractor to the lines and widths shown on the design drawings prior to geomembrane placement.

3.2.2. Anchor trenches susceptible to desiccation cracks should be excavated only the distance required for that days liner placement to minimize the potential of desiccation cracks forming.

3.2.3. Anchor trench corners shall be slightly rounded to minimize sharp bends in the geomembrane.

3.3. Preparation for Geomembrane Deployment

3.3.1. Panel Layout

Prior to commencement of liner deployment, layout drawings shall be produced to indicate the panel configuration and general location of field seams for the project.

3.3.2. Panel Identification

Each Panel used for installation shall be given a distinctive number, which will be correlated with a batch or roll number from the manufacturer. This panel identification number (or portion thereof) will be recorded on the Solmax seaming procedures form. An example of this form is included in Appendix A.

3.4. Field Panel Placement

3.4.1 Weather Conditions

Geomembrane deployment should be avoided in the presence of precipitation, high winds, excessive moisture or areas of standing water.

3.4.2. Location

Solmax will attempt to install field panels as shown on the proposed panel layout drawing. If the field panel orientation differs from the layout drawing, the revised location(s) will be noted in the field. All panel locations, as installed, will be recorded and transferred to the final As-Built record drawing by the QC Inspector.

3.4.3. Documentation of Panel Placement

Information relating to panel placement including date and time installed, panel number, panel dimensions and seaming data will be maintained on the Seaming Procedures form. An example of Solmax's Seaming Procedures form is included in Appendix A.

3.4.4. Method of Deployment

3.4.4.1 The method and equipment used to deploy the panels must not damage the geomembrane or the supporting subgrade surface.

3.4.4.2. No personnel working on the geomembrane will wear shoes that can damage the geomembrane or engage in activities that could result in damage to the geomembrane.

3.4.4.3. The installed geomembrane panels will be adequately loaded or anchored (i.e. sandbags, tires) to prevent uplift of the geomembrane by wind. Care should be exercised so that the geomembrane is not damaged during the placement of the loading materials.

3.4.4.5. Adequate slack, to allow for thermal expansion, shall be added to the panel during deployment.

3.4.5. Damage Repairs

Any damaged area of a panel will be marked and repaired in accordance with Paragraph 5.3 of this document.

3.5. Geomembrane Field Seaming

3.5.1. General Requirements

3.5.1.1. Layout

Seams shall be oriented parallel to the slope, not across the slope. Whenever possible, horizontal seams should be located at least five feet (5') from the toe of the slope. Each seam made in the field shall be numbered. Seaming information shall include seam number, welder's initials, time and date of seaming and trial test number. Seaming data shall be maintained by the QC Inspector and logged on Solmax's Seaming Procedures form presented in Appendix A.

3.5.1.2. Personnel

All Technicians, performing seaming operations, shall be trained in the operation of the specific seaming equipment being used. Each Technician and the equipment being used will qualify each day by successfully welding a test seam as described in Paragraph 3.5.3.

3.5.1.3. Equipment

3.5.1.3.1. Fusion Welding

Fusion Welding consists of placing a heated wedge, mounted on a self propelled vehicular unit, between two (2) overlapped sheets such that the surface of both sheets are heated above the polyethylene's melting point. After being heated by the wedge, the overlapped sheets pass through a set of pre-set pressure wheels, which compress the two (2) sheets together to form the weld. The fusion welder is equipped with devices, which continuously monitor the wedge temperature and machine speed.

3.5.1.3.2. Extrusion Fillet Welding

Extrusion fillet welding consists of introducing a ribbon of molten resin along the edge of the overlap of two (2) geomembrane sheets to be welded. A hot-air preheat and the addition of molten polymer causes some of the material of each sheet to be liquefied resulting in a homogeneous bond between the molten weld bead and the surfaces of the

overlapped sheets. The extrusion welder is equipped with gauges giving the temperature in the apparatus and a numerical setting for the pre-heating unit.

3.5.1.4. Weather Conditions

Solmax Geosynthetics relies on the experience of the site Foreman and the results of test seams to determine whether seaming should be restricted due to the weather. Many factors, such as temperature, humidity, wind, precipitation, etc., can effect the integrity of field seams. These factors must be taken into account when deciding whether or not seaming should ~~proceed.~~ Test seams are required prior to daily seaming to determine if the weather will effect Solmax's ability to produce quality seams.

3.5.2. Seam Preparation

3.5.2.1 Fusion Welding

3.5.2.1.1. Overlap panels of geomembrane approximately four (4") to six (6") inches prior to welding.

3.5.2.1.2. Clean the seam area prior to seaming to assure the area is clean and free of moisture, dust, dirt, and debris of any kind. No grinding is required for fusion welding.

3.5.2.1.3. Adjust the panels so that the seams are aligned with the fewest possible number of wrinkles and "fishmouths".

3.5.2.1.4. A movable protective layer may be used, at the discretion of Solmax's Foreman, directly below the overlap of geomembrane that is to be seamed to prevent build-up of dirt or moisture between the panels.

3.5.2.2. Extrusion Fillet Welding

3.5.2.2.1. Overlap the panels of geomembrane a minimum of three (3) inches

3.5.2.2.2. Using a hot-air device, temporarily tack the panels of geomembrane to be welded, taking care not to damage the geomembrane.

3.5.2.2.3. Clean the seam prior to seaming to assure the area is clean and free of moisture, dust, dirt, and debris of any kind.

3.5.2.2.4. Grind seam overlap prior to welding within one (1) hour of the welding operation in a manner that does not damage the

geomembrane. Grind marks should be covered with extrudate whenever possible. In all cases grinding should not exceed more than one-quarter inch (¼") past the edge of the area covered by the extrudate during welding.

3.5.2.2.5. Purge the extruder prior to beginning the seam to remove all heat-degraded extrudate from the barrel.

3.5.2.2.6. Keep welding rod clean and dry.

3.5.3. Trial Welds

Prior to each seaming period, every five (5) hours, as weather conditions dictate or as requested by the Solmax Q.C. Inspector if welding problems are suspected, trial welds shall be conducted. All trial welds will be conducted under the same conditions as will be encountered during actual seaming. Once qualified by a passing trial weld. Welding Technicians will not change settings without another trial test.

3.5.3.1. Trial Weld Length

Trial welds shall be made by joining two (2) pieces of geomembrane at least six inches (6") in width. Fusion trial welds will be 15 feet long and extrusion trial welds will be a minimum four feet (4') long.

3.5.3.2. Sample Procedure

3.5.3.2.1. Visually inspect the seam for squeeze out, footprint, pressure, and general appearance.

3.5.3.2.2. Cut four (4) one inch (1") specimens, two (2) from the each end of the test seam using a one inch (1") die cutter. The specimens shall be tested in peel and in shear using a field tensiometer.

3.5.3.2.3. In order for a trial weld to be considered acceptable, all four specimens must meet the following criteria:

3.5.3.2.3.1. Exhibit Film Tear Bond (FTB)

3.5.3.2.3.2. Meet or exceed the minimum peel and shear strength values listed in the project specifications. In the case of double track fusion welded seams, both welds must pass to be considered acceptable.

3.5.3.2.4. If a welder repeatedly fails tests utilizing reasonable sets of parameters, the defective welder shall not be accepted and

shall not be used for seaming until the deficiencies are corrected and a passing test seam is achieved.

3.5.3.3. Trial Weld Documentation

3.5.3.3.1. The Q.C. Inspector will be present during peel testing and will record date, time, ambient and operating temperatures, equipment number, operator, speed setting, peel and shear values, and types of break.

3.5.3.3.2. All trial weld records shall be maintained on Solmax's Fusion Trial Test and Extrusion Trial Test forms as exhibited in Appendix A.

3.5.3.3.3. The Solmax Q.C. Inspector, in conjunction with Solmax's Foreman, will give final approval to proceed with welding

3.5.4. General Seaming Procedures

3.5.4.1. Seaming shall extend into the anchor trench

3.5.4.2. While welding a seam, care should be taken to maintain the proper amount of overlap.

3.5.4.3. Inspect seam area to assure it is clean and free of moisture, dust, dirt, and debris of any kind.

3.5.4.4. Welding Technicians will periodically monitor the machine operating temperature and speed, and record this information on the geomembrane.

3.5.4.5. Align wrinkles at the seam overlap to allow welding through the wrinkle.

3.5.4.6. "Fishmouths" or wrinkles at seam overlaps that cannot be welded through shall be cut along the ridge in order to achieve a flat overlap. The cut "Fishmouth" or wrinkle shall be heat tacked flat and extruded or patched with an oval or round patch of the same geomembrane extending a minimum of three inches (3") beyond the cut in all directions.

3.5.4.7. All cross/butt seams between two (2) rows of seamed panels shall be welded during the coolest time of day when practical, to allow for typical thermal expansion of the geomembrane.

3.5.4.8. Prior to welding cross/butt seams, the top and bottom overlap of intersecting fusion welded seams will be trimmed six inches (6").

intersecting extrusion fillet welded seams will be ground to flatten the extrusion bead prior to welding butt seams.

3.5.4.9. All "T" joints produced as a result of cross/butt seams shall be extrusion fillet welded. Overlap on each "leg" of the "T" joint will be trimmed back six inches (6"). Each of the three (3) legs of the "T" shall be ground three inches (3") minimum and extrusion weld all of the prepared by grinding.

3.5.4.10. Whenever possible, Welding Technicians will cut a one inch (1") peel specimen at the end of every seam. Prior to welding the next seam, the specimen will be tested for peel.

3.5.4.11. In the event, non-complying test strips are encountered, additional peel specimens will be taken to localize the flaw. The welding machine will be taken out of service until a passing trial weld is obtained.

3.5.4.1.2. After consulting with Solmax's Foreman, the Q.C. Inspector may take destructive samples from any seam, if defects are suspected.

3.5.5. Seaming Documentation

3.5.5.1. At the beginning of all seams, the Welding Technicians will mark on the liner with permanent markers or grease pencils information regarding date, time, Welders initials, machine number, and temperature setting. The Q.C. Inspector will record this information on Solmax's Seaming Procedures form included in Appendix A.

3.5.5.2. Welding Technicians will periodically check operating temperature and speed and record the information on the geomembrane along the seam.

3.5.5.3. The Q.C. Inspector will periodically check on welding operations to verify seam overlap and cleanliness, etc.

4. SEAM TESTING - GEOMEMBRANES

4.1. Concept

4.1.1. The welded seam created by Solmax's fusion welding process is composed of a central unwelded channel bounded by uniform welds. The presence of the unwelded channel allows the fusion seam to be tested by inflating the sealed channel to a pre determined pressure and observing the stability of the pressurized channel over time.

4.1.2. Solmax performs non-destructive air-pressure testing in accordance with the following procedures adopted by the Geosynthetic Research Institutes Test Method GM-6.

4.2. Air Pressure Testing

4.2.1. Equipment for Air Testing

4.2.1.1. An air pump (manual or motor driven) capable of generating and sustaining a pressure between 20 to 60 psi.

4.2.1.2 A rubber hose with fittings and connections.

4.2.1.3. A sharp hollow needle or other approved pressure feed device with a pressure gauge capable of reading and sustaining a pressure between 0 to 60 psi.

4.2.2. Procedure for Air Testing

4.2.2.1. Seal both ends of the seam to be tested.

4.2.2.2. Insert needle or other approved pressure feed device into the sealed channel created by the fusion weld.

4.2.2.3. Inflate the test channel to a gauge pressure of approximately 30 psi. and maintain the pressure within the range listed in the Initial Pressure Schedule. Close valve, observe and record initial pressure.

INITIAL PRESSURE SCHEDULE *		
MATERIAL MIL	MINIMUM PSI	MAXIMUM PSI
40	24	30
60	27	35
80	30	35
100	30	35

* Initial pressure settings are recorded after an optional two (2) minute stabilization period. The purpose of this "relaxing period" is to permit the air temperature and pressure to stabilize.

4.2.2.4. Observe and record the air pressure three (3) minutes after initial pressure setting is recorded. If a loss of pressure exceeds the following or if the pressure does not stabilize, locate the suspect area and repair in accordance with Section 4.2.3.

MAXIMUM ALLOWABLE PRESSURE DIFFERENTIAL AFTER 3 MINUTES	
MATERIAL (MIL)	PRESSURE DIFF.
40	4 psi
60	3 psi
80	2 psi
100	2 psi

4.2.2.5. At the conclusion of all pressure tests, the end of the air channel opposite the pressure gauge is cut. A decrease in gauge pressure must be observed or the air channel will be considered "blocked" and the test will have to be repeated from the point of blockage. If the point of blockage cannot be found cut the air channel in the middle of the seam and treat each half as a separate test.

4.2.2.6. Remove the pressure needle and seal resulting hole by extrusion welding.

4.2.3. Procedure for Non-Complying Test

In the event of a Non-Complying Air Pressure Test, the following procedure shall be followed:

4.2.3.1. Check Seam end seals and retest seams.

4.2.3.2 If a seam will not maintain the specified pressure, the seam should be visually inspected to localize the flaw. If this method is unsuccessful cut one inch (1") samples from each end of the seam.

4.2.3.3. Perform destructive tests on the samples using the field tensiometer.

4.2.3.4. If all samples pass destructive testing remove the overlap left by the wedge welder and vacuum test the entire length of seam in accordance with paragraph 4.3.

4.2.3.4.1. If a leak is located by the vacuum test, repair by extrusion fillet welding. Test the repair by vacuum testing.

4.2.3.4.2. If no leak is discovered by vacuum testing, the seam will be considered to have passed non-destructive testing.

4.2.3.5. If one or more peel specimens are in non-compliance, additional samples will be taken in accordance with paragraph 4.4.3.

4.2.3.5.1. When two (2) passing samples are located, the length of seam bounded by the two (2) passing test locations will be considered non-complying. The overlap left by the wedge welder will be heat tacked in place along the entire length of seam and the non-complying portion of seam will be extrusion fillet welded.

4.2.3.5.2. Test the entire length of the repaired seam by vacuum testing in accordance with paragraph 4.3.

4.2.4. General Air Testing Procedures

4.2.4.1. The opposite end of the air channel will in all cases be pierced to assure that no blockages of the air channel have occurred.

4.2.4.2. Whenever possible, seams should be air-tested prior to completing butt seams to avoid having to cut into liner. All cuts through the liner as a result of testing will be repaired by extrusion welding.

4.2.4.3. All needle holes in air channels, within the boundaries of the active cell, will be repaired with an extrusion bead.

4.2.5. Air Pressure Testing Documentation

All information regarding air-pressure testing, (initial time and pressure, final time and pressure) will be written on the geomembrane at the end of the seam, or portion of seam tested. The above information, as well as detailed locations of tests, will be recorded on Solmax's Seaming Procedures form included in Appendix A.

4.3. Vacuum Testing

This test is used on extrusion welds, or when the geometry of a fusion weld makes air pressure testing impossible or impractical, or when attempting to locate the precise location of a defect believed to exist after air pressure testing.

4.3.1. Equipment for Vacuum Testing

4.3.1.1. Vacuum box assembly consisting of a rigid housing with a soft neoprene gasket attached to the open bottom, a transparent viewing window, port hole or valve assembly, and a vacuum gauge.

4.3.1.2. Vacuum pump/compressor (i.e. wet/dry shopvac) capable of reducing the vacuum box to a negative 10 inches of mercury (i.e. –5 psi).

4.3.1.3. A vacuum hose with fittings and connections.

4.3.1.4. A bucket and means to apply a soapy solution.

4.3.1.5. A soapy solution.

4.3.2. Procedure for Vacuum Testing

4.3.2.1. Trim any excess overlap from seam.

4.3.2.2. Apply a generous amount of a strong solution of liquid detergent and water to the area to be tested.

4.3.2.3. Place the vacuum box over the area to be tested, with the seam centered within the viewing area, and apply sufficient downward pressure to "seat" the seal strip against the liner.

4.3.2.4. Turn on the vacuum pump/compressor and connect it to the vacuum box and apply a minimum 3 psi vacuum to the area as indicated by the gauge on the vacuum box..

4.3.2.5. Ensure that a leak tight seal is created.

4.3.2.6. For a period of approximately 10 seconds, examine the geomembrane, through the viewing window, for the buildup of soap bubbles along the seam.

4.3.2.7. After this period disconnect the vacuum from the vacuum box, move the box over the next adjoining area with a minimum three inch (3") overlap, and repeat the process.

4.3.3. Procedure for Non-Complying Test

4.3.3.1. Mark all areas where soap bubbles appeared and repair the marked areas in accordance with Paragraph 5.3.

4.3.3.2. Retest repaired areas.

4.3.4. General Vacuum Testing Procedures

4.3.4.1. Vacuum box testing will be performed by the Q.C Inspector and/or qualified construction personnel.

4.3.4.2. Overlap must be trimmed prior to vacuum box testing.

4.3.4.3. Special attention shall be exercised when vacuum testing "T" seams or patch intersections with seams.

4.3.5. Vacuum Testing Documentation

4.3.5.1. Vacuum testing crew will use permanent markers or grease pencils to write on liner indicating tester's initials, date, and pass/fail designation on all areas tested.

4.3.5.2. Records of vacuum testing will be maintained by the Q.C. Inspector on Solmax's Seaming Procedures form and or Repair report included in Appendix A.

4.4. Destructive Testing

4.4.1. Concept

The purpose of destructive testing is to determine and evaluate seam strength. These tests require direct sampling and thus subsequent patching. Therefore, destructive testing should be kept to a minimum to reduce the amount of repairs to the geomembrane.

4.4.2. Procedure for Destructive Testing

4.4.2.1. Destructive samples shall be marked and cut out randomly at a ~~minimum average frequency of~~ one (1) test location every 500 feet of seam length, unless otherwise specified or agreed.

4.4.2.2. Location of destructive samples will be selected by the Q.C. Inspector (or the third party QA Representative), with samples cut by the Solmax construction personnel.

4.4.2.3. Destructive samples should be taken and tested as soon as possible after the seams are welded (the same day), in order to receive test results in a timely manner.

4.4.2.4. Qualified Solmax personnel will observe all field destructive testing and record date, time, seam number, location, and test results on Solmax's Destructive Testing form included in Appendix A.

4.4.2.5. Sample size

4.4.2.5.1. The sample should be twelve inches (12") wide with a seam sixteen inches (16") long centered length-wise in the sample. The sample may be increase in size to accommodate independent laboratory testing, Owner/Engineer archival, or by specific project specifications.

4.4.2.5.2. Two (2), one inch (1") wide, samples shall be cut from each end of the test seam for field testing.

4.4.2.5.3. The four (4) one inch (1") wide samples shall be tested on a field tensiometer for peel and shear strength. If any field specimen does not pass, it will be assumed the sample would also not pass laboratory destructive testing.

The procedure outlined in Paragraph 4.4.3 shall be followed to locate passing samples to send to the laboratory.

4.4.3. Procedure for Non-Complying Destructive Test

4.4.3.1. Cut additional field samples for peel and shear testing. In case of a field production seam, the samples must lie a minimum of ten feet (10') in each direction from the location of the initial non-complying sample. Perform field tests for peel and shear strength. If these samples pass, then laboratory samples can be cut and forwarded to the laboratory for complete testing.

4.4.3.1.1. If the laboratory samples pass, then repair the seam between the two (2) passing sample locations according to the procedures detailed in Section 5.3.

4.4.3.1.2. If either of the samples are still in non-compliance, then additional samples are taken in accordance with the above procedure until two (2) passing samples are found to establish a zone in which the seam should be reconstructed.

4.4.3.2. All passing seams must be bounded by two (2) locations from which samples passing laboratory destructive tests have been taken.

4.4.3.3. All destructive seam samples shall be numbered and recorded on Solmax's Destructive Testing form included in Appendix A.

4.5. Laboratory Testing of Destructive Seam Samples

4.5.1. Destructive Seam Testing Laboratory

In the event that third party laboratory destructive testing is not being performed, seam destructive samples may be sent to Solmax's approved testing laboratory or tested on site when permitted by a site specific quality control plan.

4.5.2. Acceptance Criteria

Destructive samples will be tested for "shear strength" and "peel adhesion" (ASTM D4437 as modified by NSF). Five (5) specimens shall be tested for each test method. Four (4) out of the five (5) specimens must exhibit FTB (as defined by NSF Standard Number 54-1993) for each round of peel and shear testing. For the seam to pass the destructive test, four (4) of the five (5) individual specimens and the average of the five (5) peel and shear tests must meet or exceed the strength requirements as listed in Solmax's Material specification sheet.

5. DEFECTS AND REPAIRS

5.1. Site Inspection and Review

Solmax's QC Inspector and/or Foreman shall conduct a detailed walk through and visually inspect all seams and non seam areas of the geomembrane for any defects, holes, blisters, and signs of damage during installation.

5.2. Technicians Responsibility

All other Solmax installation personnel shall, at all times, be on the lookout for any damaged areas. Damaged areas shall be marked and repaired.

5.3. Repair Procedures

Any portion of the geomembrane or geomembrane seam showing a flaw, or having a destructive or non-destructive test in non-compliance shall be repaired. Several procedures exist for repair and the decision as to the appropriate repair shall be made by Solmax's Foreman.

Procedures available for repair include the following:

5.3.1. Patching

Used to repair large holes, tears, and destructive sample locations. All patches shall extend at least three inches (3") beyond the edges of the defect and all corners shall be rounded.

5.3.2. Grinding and welding

Used to repair sections of extruded fillet seams.

5.3.3. Spot Welding or Seaming

Used to repair small tears, pinholes, or other minor localized flaws.

5.3.4. Capping

Used to repair lengths of extrusion or fusion welded seams.

5.3.5. Extrude Overlap

Runs along the length of fusion welded seams.

000474

5.3.6. Removal of suspect seams

Remove suspect seams and replace with a strip of new material seamed into place.

5.4. Verification of Repairs

Every repair shall be non-destructively tested. Repairs, which pass the non-destructive test, shall be deemed acceptable. Non-destructive testing shall be logged on a Solmax Repair Report form when specified. An example of Solmax's Repair Report form is included in Appendix A.

6. GEOTEXTILES

6.1. Handling and Placement

All geotextiles shall be handled in a manner to ensure they are not damaged. The following special handling requirements shall be adhered to:

6.1.1. On slopes, the geotextiles shall be anchored in the trench and then rolled down the slope when practical. In any event, it should be deployed in such a manner to continually keep the geotextile sheet in sufficient tension to reduce folds or wrinkles.

6.1.2. In the presence of wind, all geotextiles shall be weighted with sandbags or the equivalent.

6.1.3. Geotextiles shall be cut using an approved cutter. If the material is being cut in place, special care must be taken to protect other geosynthetic materials from damage.

6.1.4. Care shall be taken not to entrap stones or excessive dust that could damage the geomembrane, or generate clogging of drains or filters.

6.2. Seams and Overlaps

Geotextiles maybe seamed by thermal bonding or by sewing. No horizontal seams shall be allowed on side slopes.

6.2.1. On slopes steeper than ten (10) horizontal to one (1) vertical, it is recommended that geotextiles be overlapped a minimum of four inches (4") prior to sewing.

6.2.2. On bottoms and slopes shallower than ten (10) horizontal to one (1) vertical, geotextiles can either be sewn as indicated above or thermally bonded. If thermally bonded the geotextile shall be overlapped a minimum of four inches (4") prior to seaming.

6.3. Repairs

Any holes or tears in the geotextile shall be repaired as follows.

6.3.1. On Slopes – A patch made of the same geotextile shall be seamed into place. Should any tear exceed 10% of the width of the roll, that roll shall be removed from the slope and replaced.

6.3.2. Horizontal Areas – A patch made from the same geotextile shall be spot-seamed in place with a minimum of twelve inches (12") overlap in all directions.

7. GEONETS

7.1. Handling and Placement

The geonets shall be handled in such a manner as to ensure the geonets are not damaged in any way.

7.1.1. On slopes, the geonets shall be secured in the anchor trench and then rolled down the slope in such a manner as to continually keep the geonet sheet in tension. If necessary, the geonet shall be positioned by hand after being unrolled to minimize wrinkles. Geonets can be placed in the horizontal direction (i.e., across the slope) in some special locations (e.g., across slopes and special locations where extra layers are required or where the slope is less than 10:1).

Such locations shall be identified by the Design Engineer in the project drawings.

7.1.2. Geonets shall not be welded to geomembranes. Geonets shall be cut using approved cutters, i.e., hook blade, scissors, etc. Care should be taken to prevent damage to underlying layers.

7.1.3. Care must be taken not to entrap dirt in the geonet that could cause clogging of the drainage system, and/or stones that could damage the adjacent geomembrane.

7.2. Layering and Tying of Geonet

When several layers of geonets are installed, care should be taken to prevent the strands of one layer from penetrating the channels of the next layer. Adjacent geonets shall be joined according to the following requirements.

7.2.1. Adjacent rolls shall be overlapped by at least four inches (4") and securely tied.

7.2.2. Tying can be achieved by fasteners. Tying devices shall be white or yellow for ease of inspection. Metallic devices are not allowed.

7.2.3. Tying shall be five feet (5') to ten feet (10') along the bottom, every five feet (5') along the slope, every two feet (2') across the slope and at the top of berms and into anchor trenches at least with one foot (1') intervals.

7.2.4. In corners of the side slopes where overlaps between particular geonet strips are required, an extra layer of geonet shall be unrolled along the slope, on top of the previously installed geonets, from top to bottom of the slope.

7.2.5. When more than one layer of geonet is installed, overlaps must be staggered and layers tied together.

7.3. Repairs

Any holes or tears in the geonet shall be repaired by placing a patch extending two feet (2') beyond edges of the hole or tear. The patch shall be secured to the original geonet by tying every twelve inches (12"). If the hole or tear width across the roll is more than 50% the width of the roll, the damaged area shall be cut out and the two (2) portions of the geonet shall be joined.

8. GEOSYNTHETIC CLAY LINERS

8.1 Storage

8.1.1. Geosynthetic clay liner rolls must always be stored in a location where they will not be exposed to excessive moisture.

8.2. Handling and Placement

8.2.1. On slopes, geosynthetic clay liners should be placed with overlap oriented to the maximum slope (i.e. down the slope, not across the slope).

8.2.2 Adjoining panels of geosynthetic clay liners should be overlapped a minimum of six inches (6").

8.2.3. Geosynthetic clay liners should never be installed in standing water or while rain is falling.

8.2.4. Geosynthetic clay liners should always be installed with appropriate side up.

8.2.5. Rolls should be pulled tight to smooth out any creases or irregularities.

8.2.6. Precautions should be taken to avoid damage to any underlying geosynthetic materials while placing the geosynthetic clay liner.

8.2.7. Cover geosynthetic clay liners with geomembrane or other cover materials after placement to avoid damage from precipitation.

8.3. Repairs

8.3.1. Repairs to cuts or tears in installed rolls should extend a minimum of six inches (6") beyond the area in need of repair. Repair pieces should be held in place until cover material has been placed.

9. GEOCOMPOSITE

9.1. Handling and Placement

All geocomposites shall be handled in a manner to ensure they are not damaged. The following special requirements shall be adhered to:

9.1.1 On slopes, the geocomposites shall be secured in the anchor trench and then rolled down the slope when practical. In any event, it should be deployed in such a manner to continually keep the geocomposite in sufficient tension to reduce folds and wrinkles.

9.1.2. In the presence of high wind, all geocomposites shall be weighted with sandbags or the equivalent.

9.1.3. Geocomposite shall be cut using an approved cutter, i.e. hook blade. If material is being cut in place, special care should be taken to protect other geosynthetic materials from damage.

9.1.4. Care should be taken not to entrap stones or excessive dust that could damage the geomembrane, or generate clogging of drains or filters.

9.2. Seams and Overlaps

Geocomposites may be seamed by thermal bonding or by sewing. No horizontal seams shall be allowed on side slopes greater than 4:1.

9.2.1. On slopes steeper than ten feet (10') horizontal to one foot (1') vertical, it is recommended that geocomposites be continuously sewn. The geotextile must be overlapped by at least three inches (3"), the geonet overlap by at least four inches (4").

9.2.2. On bottoms and slopes shallower than ten feet (10') horizontal to one foot (1') vertical, geocomposites can be either sewn as indicated above or thermally bonded.

9.2.3. Tying of the geonet will be with plastic fasteners. Tying devices shall be white or yellow for easy inspection. Metallic devices are not allowed.

9.2.4. Tying shall be every five feet (5') to ten feet (10') across the bottom, every five feet (5') along the slope, at the top of berms and into anchor trenches at least with one foot (1') intervals. End to end joints on the bottom will be overlapped two feet (2') with no tying.

9.3. Repairs

The repair will be observed and if smaller than three feet (3') by three feet (3') the geocomposite will be repaired. If the tear or hole is larger, then the roll will be cut and a butt joint place.

9.3.1. If the geonet is undamaged and the geotextile is damaged, a patch of geotextile shall be placed. The geotextile patch shall be thermally bonded in place with a minimum of twelve inches (12") overlap in all directions.

9.3.2. If the geonet is damaged, the geonet shall be removed. A section of geonet shall be cut to replace the removed section. The geonet shall be tied to the existing geonet using plastic fasteners placed at least every six inches (6"). A geotextile patch shall be placed over the repaired geonet section. The geotextile patch shall be thermally bonded in place with a minimum of twelve inches (12") overlap in all directions.

Solmax Geosynthetics, Inc. reserves the right to deviate from these procedures in order to keep abreast of changes in technology.

APPENDIX A
• FORMS •

SOLMAX
GEOSYNTHETICS

SUBGRADE ACCEPTATION CERTIFICATE

PROJECT NAME: _____

LOCATION: _____

PROJECT No.: _____

SKETCH ☐ PARTIAL ACCEPTATION ☐ COMPLETE ACCEPTATION

COMMENTS: _____

I, THE INSTALLER'S OFFICIAL REPRESENTATIVE, FIND ACCEPTABLE FOR DEPLOYMENT THE SURFACE CONDITIONS OF THE AREA DESCRIBED ABOVE.

NAME	SIGNATURE	TITLE	DATE

QUALITY CONTROL INSPECTOR SOLMAX GEOSYNTHETICS (WHITE)	CLIENT / ENGINEER (YELLOW)	CONTRACTOR (PINK)	FOREMAN SOLMAX GEOSYNTHETICS (GOLD)

SOLMAX
GEOSYNTHETICS

Document No. SU-QP-10.1-12
Rev. 00

INVENTORY OF MATERIAL

Project Name: _____
Project No: _____
QC Inspector: _____
Date: _____

Material Type: _____
Manufacturer: _____
Product Supplied by: _____
(Solmax or Client)

Lot No.	Roll No.	Dimensions	Reception of Roll		Tag		Conformity of Product	
			Yes	No	Yes	No	Yes	No

SOLMAX
GEOSYNTHETICS

2061

Document No SU-QP-10.1-1
Rev.:00

FUSION TRIAL TEST

Project Name: _____
Project No.: _____
QC Inspector: _____
Page: _____ of _____

Trial No.	Date	Time	Ambient Temp.	Equipment No.	Equipment Temp.	Equipment Speed	Peel Resistance	Peel-Type Break	Shear Resistance	Shear-Type Break	Technician	Tensiometer No.

SOLMAX
GEOSYNTHETICS

Document No. SU-QP-10.1-2
Rev.:00

EXTRUSION TRIAL TEST

Project Name: _____
Project No.: _____
QC Inspector: _____
Page: ____ of ____

Trial No.	Date	Time	Ambient Temp.	Equipment No.	Equipment Temp.	Pre-Heat Temp.	Peel Resistance	Peel-Type Break	Shear Resistance	Shear-Type Break	Technician	Tensiometer No.

000484

SOLMAX
GEOSYNTHETICS

Document No. SU-QP-10.1-5
Rev.: 01

2061

REPAIR REPORT

Project Name: _____
Project No.: _____
QC Inspector: _____
Page: _____ of _____

Repair No.	Type			Repair Location				Date Repaired	Date Verified (tested)	Accepted (Y/N)
	Patch	Extrusion Weld	Other	Panel No.	Seam No.	Intersection	Location			

000485

SOLMAX GEOSYNTHETICS

Document SD-QP-10 F-3 (00)

SEAMING PROCEDURES

Project Name: _____ Project No.: _____

Page ___ of ___

QC Inspector: _____

Seams						Non-Destructive Testing							
Seam No.	Date of Seaming	Time of Seaming	Seam Length	Trial No.	Technician	Test Date	Test Time	Pressure Test	Vacuum Box	Starting Pressure	Ending Pressure	Non-Destructive Testing Details	Accepted (Y/N)

000426

SOLMAX
GEOSYNTHETICS

Document No. SU-QP-10.1
Rev. 00

DESTRUCTIVE TESTING

Project Name: _____
Project No.: _____
QC Inspector: _____
Page: _____ of _____

Trial No.	Seam No.	Sample Location	Date	Time	Peel Resistance	Type of Break	Shear Resistance	Type of Break	Date Repaired	Date Verified	Lab (P/F)	Tensiometer No.

Field Daily Quality Control Report

Project Name: _____ Date: ___ / ___ / ___
Project No.: _____

SITE PERSONNEL

Foreman: _____ QC Inspector: _____
Skilled Laborers: _____ QA Inspector: _____

EQUIPMENT ON SITE

	MOUSE	EXTRUDER	OTHERS
Welder's Name:			
Equipment No.:			
Welder's Name:			
Equipment No.:			

WEATHER CONDITIONS (CHECK)

	SUNNY	CLOUDY	OVERCAST	RAIN	WIND (Mild, Medium, Strong)			T
Morning:	☐	☐	☐	☐	☐	☐	☐	
Afternoon:	☐	☐	☐	☐	☐	☐	☐	

Comments: _____

INSTALLED QUANTITIES

PRODUCT TYPE	QUANTITY (ft^2)	DETAILED LOCATION

NOTES: _____

APPENDIX B

• SAMPLE INSTALLATION WARRANTY •

SOLMAX
GEOSYNTHETICS

WARRANTY

WARRANTY ISSUED BY SOLMAX GEOSYNTHETICS INC. ("SOLMAX") TO "CLIENT" FOR THE INSTALLATION WORKMANSHIP OF GEOMEMBRANE ("GEOMEMBRANE") CONTRACT NO. SU

Subject to the terms and conditions set forth below, **"SOLMAX"** warrants for a period of X years from the date upon which installation was completed that the installation was performed in a good and workmanlike manner.

This warranty covers only those defects in installation workmanship in the **"GEOMEMBRANE"** which existed at the time of its final acceptance. This warranty does not cover any damage to the **"GEOMEMBRANE"**, or defects in the **"GEOMEMBRANE"** found to have been a result of misuse, abuse or conditions existing after installation including, but not limited to, rough handling; malicious mischief; vandalism; sabotage; fire; acts of God; acts of the public enemy; acts of war or public rebellion; severe weather conditions of all types; excessive stress from any source; damage due to any of the following: ice, wind, subsidence, chemicals harmful to the **"GEOMEMBRANE"**, machinery, foreign objects or animals.

In the event circumstances are found to exist which **"CLIENT"** believes may give rise to a claim under this warranty, the following procedure shall be followed:

a. **"CLIENT"** shall give **"SOLMAX"** written notice of the facts and circumstances of said claim within 10 days of becoming aware of said facts and circumstances. Said notice shall be by registered or certified mail, return receipt requested, postage prepaid, addressed to **"SOLMAX", 4691 COMMERCIAL DRIVE, SUITE 345, NEW HARTFORD, NY 13413**. The words **"WARRANTY CLAIM"** shall be clearly marked on the face of the envelope in the lower right hand corner. Said notice shall contain, at a minimum, the name and address of the owner, the name and address of the installation, the date upon which the material was purchased and the facts known to **"CLIENT"** upon which the claim is based. **Failure to strictly comply with all the requirements of this paragraph shall void this warranty.**

b. Within twenty days after receipt of the notice described in paragraph a, above, **"SOLMAX"** shall notify **"CLIENT"** that it will send a representative to inspect the allegedly defective installation. **"CLIENT"** shall pay the expenses incurred by **"SOLMAX"** in making the inspection, including current per diem rates for personnel involved in making the inspection, in the event **"SOLMAX"** reasonably determines that the claim is not covered by this warranty.

c. **"CLIENT"** shall not repair, replace, remove, alter or disturb any **"GEOMEMBRANE"**, nor shall **"CLIENT"** allow anyone else to repair, replace, remove, alter or disturb any **"GEOMEMBRANE"** prior to such inspection without a prior written notice from **"SOLMAX"**. **A failure to strictly comply with this paragraph shall void this warranty or may lead to a determination that the alleged defects are not within the scope of this warranty.**

d. If it is determined that the claim is covered by the warranty, **"SOLMAX"**, in its sole discretion, shall either repair or replace the defective **"GEOMEMBRANE"**. In the event **"SOLMAX"** repairs or replaces the defective **"GEOMEMBRANE"**, **"CLIENT"** shall pay **"SOLMAX"** a sum equal to the material and installation and/or repairs costs (using the then current sales price of material and **"SOLMAX"** daily rates for installation and/or repairs) multiplied by a fraction, the numerator of which is the number of years or fraction thereof, which have elapsed since the **"GEOMEMBRANE"** was installed and the denominator of which is the length of the applicable warranty.

THE REMEDIES PROVIDED HEREIN ARE THE EXCLUSIVE REMEDIES AVAILABLE UNDER THIS WARRANTY. Any determination as to whether the claim is covered by the Warranty or what constitutes the appropriate method of remedying a defect will be made by **"SOLMAX"** after consultation with the **"CLIENT"**.

e. **"CLIENT"** agrees that it shall provide **"SOLMAX"** with clean, dry and unobstructed access to the **"GEOMEMBRANE"** in order for **"SOLMAX"** to perform the inspections and repairs which may be required pursuant to this warranty. **"SOLMAX"** shall not be liable for any costs relating to providing access to the **"GEOMEMBRANE"**.

THE REMEDIES PROVIDED TO "CLIENT" HEREIN ARE THE EXCLUSIVE REMEDIES AVAILABLE UNDER THIS WARRANTY AND ARE INTENDED FOR THE SOLE BENEFIT OF "CLIENT" . Neither this warranty nor any rights hereunder shall be assignable except with the consent of **"SOLMAX"** which shall not be unreasonably withheld. **"SOLMAX" SHALL HAVE NO LIABILITY UNDER THIS WARRANTY TO THIRD PARTIES OR STRANGERS TO THIS AGREEMENT AS TO WHOM NO VALID ASSIGNMENT HAS BEEN MADE.**

THE WARRANTY SET FORTH ABOVE IS THE ONLY WARRANTY APPLICABLE TO THE "GEOMEMBRANE" AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL "SOLMAX" BE LIABLE IN CONTRACT OR IN TORT (INCLUDING NEGLIGENCE) FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES RESULTING FROM FAILURE OF THE INSTALLATION OR BREACH OF THIS WARRANTY. IN THE EVENT THE EXCLUSIVE REMEDY PROVIDED HEREIN FAILS IN ITS ESSENTIAL PURPOSE, AND IN THAT EVENT ONLY, "CLIENT" SHALL BE ENTITLED TO RETURN OF NO MORE THAN THE CONTRACTUAL PRICE FOR SO MUCH OF THE INSTALLATION WORKMANSHIP WHICH HAS VIOLATED THE WARRANTY PROVIDED HEREIN. Except for the warranty set forth above, no representation or warranty made by any sales or other representative of **"SOLMAX"**, or any other person, concerning the **"GEOMEMBRANE"** shall be binding upon **"SOLMAX"**. In the event any term or provision of this warranty is inconsistent with or in conflict with any writing, purchase order, or contract executed by **"SOLMAX"**, then, to the extent such inconsistency or conflict exists, the terms and conditions of this installation warranty shall control in all respects.

The legal relations of **"SOLMAX"** and **"CLIENT"** shall be determined and governed by the laws of the state of New York. **"CLIENT"** consents to the personal jurisdiction of the courts sitting in the state of New York.

Any waiver of the terms and conditions of this warranty shall be in writing signed by **"SOLMAX"**. The failure to insist upon strict compliance with any of the terms and conditions contained herein shall not act as a waiver of strict compliance with all of the remaining terms and conditions of this warranty and shall not operate as a waiver as to any of the terms and conditions of this warranty as to future claims under this warranty.

SOLMAX GEOSYNTHETICS INC.

_____

BY- Craig Zinserling, General Manager

I have read and agree to be bound by the terms and conditions of the foregoing warranty. The said warranty shall not be effective until an original dated and signed copy by an authorized officer of **"CLIENT"** has been duly returned to **"SOLMAX"** and until full payment has been made to **"SOLMAX"**.

CLIENT

BY:_____

TITLE:_____

DATE:_____

INFORMATION ONLY

LISTING OF COMPLETED FACILITIES

Section 02770-1.04.B.4
Document No. 614-PET-058D

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: J. C. Jackson Date: 9/11/98

000492

PETRO
environment
technologi

SOLMAX
GEOSYNTHETICS

HDPE INSTALLATIONS

NAME OF PROJECT:	Guilderland Landfill Closure Guilderland, New York
SCOPE OF WORK:	C&D Landfill Cap
DATE OF INSTALLATION:	August 1996
REFERENCE:	Mr. Mark Hodgkins Kilby Brothers, Inc. Phone: (518) 456-2094
TYPE OF MATERIAL:	40 mil Smooth HDPE - 195,000 SF
SUBGRADE CONDITIONS:	6 inch Subbase/Daily Cover Layer
DESCRIPTION OF REPAIRS (METHOD & EQUIP. USED) :	Areas around appurtenances, Destructive test locations, air test locations, burnouts etc. Equipment: Extrusion welders
INSTALLATION CREW:	Foreman: Bill Akens (5,000,000+ SF experience) Crew: 5 Technicians and 1 QC Inspector 4 Local laborers Duration: 1 weeks Season: Summer
EQUIPMENT USED:	Hot wedge fusion welder manufactured by Solmax: Extrusion welders manufactured by Munsch: Tensiometer manufactured by Solmax; Honda ATV's
FACILITY PERFORMANCE:	Not available

SOLMAX
GEOSYNTHETICS

HDPE INSTALLATIONS

NAME OF PROJECT:	Syracuse Hancock International Airport Syracuse, New York
SCOPE OF WORK:	De-Icing Fluid Lagoons
DATE OF INSTALLATION:	November 1996
REFERENCE:	James Malvasi Maxim Construction Services Corp. Phone: (315) 432-9324
TYPE OF MATERIAL:	60 mil Textured HDPE - 165,000 SF
SUBGRADE CONDITIONS:	Well graded structural fill
DESCRIPTION OF REPAIRS (METHOD & EQUIP. USED) :	Areas around appurtenances. Destructive test locations. a test locations. burnouts etc. Equipment: Extrusion welders
INSTALLATION CREW:	Foreman: Todd Green (9,000,000 SF experience) Crew: 4 Technicians and 1 QC Inspector 4 Local laborers Duration: 4 weeks Season: Late Fall
EQUIPMENT USED:	Hot wedge fusion welder manufactured by Solmax: Extrusion welders manufactured by Munsch: Tensiometer manufactured by Solmax; Honda ATV's
FACILITY PERFORMANCE:	Not available

SOLMAX
GEOSYNTHETICS

HDPE INSTALLATIONS

NAME OF PROJECT:	Seekonk Landfill Closure Seekonk, Massachusetts
SCOPE OF WORK:	Sanitary Landfill Cap
DATE OF INSTALLATION:	July 1996
REFERENCE:	Mr. Joe Cataldo Littleton Environmental Services, Inc. Phone: (508) 486-4340
TYPE OF MATERIAL:	40 mil Textured HDPE - 355,000 SF
SUBGRADE CONDITIONS:	12 inches Daily Cover/ Drainage Layer
DESCRIPTION OF REPAIRS (METHOD & EQUIP. USED) :	Areas around appurtenances, Destructive test locations, air test locations, burnouts etc. Equipment: Extrusion welders
INSTALLATION CREW:	Foreman: Jason Craft (5,000,000+ SF experience) Crew: 5 Technicians and 1 QC Inspector 4 Local laborers Duration: 2 weeks Season: Summer
EQUIPMENT USED:	Hot wedge fusion welder manufactured by Solmax; Extrusion welders manufactured by Munsch; Tensiometer manufactured by Solmax; Honda ATV's
FACILITY PERFORMANCE:	Not available

SOLMAX

HDPE INSTALLATIONS

NAME OF PROJECT:	Madison County DSW&S Wampsville, New York
SCOPE OF WORK:	Leachate Storage Lagoons
DATE OF INSTALLATION:	June 1995
REFERENCE:	Randy Hirschey Madison County Dept. Solid Waste & Sanitation Phone: (315) 361-1354
TYPE OF MATERIAL:	60 mil HDPE - 114,000 SF
SUBGRADE CONDITIONS:	Clay
DESCRIPTION OF REPAIRS (METHOD & EQUIP. USED) :	Areas around appurtenances. Destructive test locations. test locations. burnouts etc. Equipment: Extrusion welders
INSTALLATION CREW:	Foreman: Angelo Gaetano (8,000,000+ SF experience) Crew: 6 Technicians and 1 QC Inspector Duration: 2 weeks Season: Summer
EQUIPMENT USED:	Hot wedge fusion welder manufactured by Solmax: Extrusion welders manufactured by Munsch: Tensiometer manufactured by Solmax: Honda ATV's
FACILITY PERFORMANCE:	Not available

SOLMAX
GEOSYNTHETICS

HDPE INSTALLATIONS

NAME OF PROJECT:	Pepperell Landfill Closure Pepperell, Massachusetts
SCOPE OF WORK:	MSW Landfill Cap
DATE OF INSTALLATION:	August 1996
REFERENCE:	Mr. Joe Cataldo Littleton Environmental Services, Inc. Phone: (508) 486-4340
TYPE OF MATERIAL:	40 mil Textured HDPE - 411,000 SF
SUBGRADE CONDITIONS:	12 inches Daily Cover/ Drainage Layer
DESCRIPTION OF REPAIRS (METHOD & EQUIP. USED) :	Areas around appurtenances, Destructive test locations, air test locations, burnouts etc. Equipment: Extrusion welders
INSTALLATION CREW:	Foreman: Jason Craft (5,000,000+ SF experience) Crew: 5 Technicians and 1 QC Inspector 4 Local laborers Duration: 2 weeks Season: Summer
EQUIPMENT USED:	Hot wedge fusion welder manufactured by Solmax; Extrusion welders manufactured by Munsch; Tensiometer manufactured by Solmax; Honda ATV's
FACILITY PERFORMANCE:	Not available

SOLMAX
GEOSYNTHETICS

HDPE INSTALLATIONS

NAME OF PROJECT:	Colonie Landfill Expansion Town of Colonie, New York
SCOPE OF WORK:	Cell expansion
DATE OF INSTALLATION:	July - August 1995, June 1996
REFERENCE:	Mr. Tom McClain Kilby Brothers, Inc. Phone: (518) 456-2094
TYPE OF MATERIAL:	60 mil Textured HDPE- 1,000,000 SF Geocomposite - 1,000,000 SF Geogrid - 1,000,000 SF
SUBGRADE CONDITIONS:	Clay
DESCRIPTION OF REPAIRS (METHOD & EQUIP. USED) :	Areas around appurtenances, Destructive test locations, air test locations, burnouts etc. Equipment: Extrusion welders
INSTALLATION CREW:	Foreman: Angelo Gaetano (8,000,000+ SF experience) Crew: 6 Technicians and 2 QC Inspectors 6 Local laborers Duration: 3 months Season: Summer
EQUIPMENT USED:	Hot wedge fusion welder manufactured by Solmax; Extrusion welders manufactured by Munsch; Tensiometer manufactured by Solmax; Honda ATV's
FACILITY PERFORMANCE:	Active

SOLMAX

HDPE INSTALLATIONS

NAME OF PROJECT:	Bainbridge Naval Training Center Bainbridge, Maryland
SCOPE OF WORK:	Contaminated Soil Cover
DATE OF INSTALLATION:	April - May 1995
REFERENCE:	Mr. Lawrence J. Sterns, PE OHM Remediation, Inc. Phone: (412) 963-2300
TYPE OF MATERIAL:	40 mil HDPE - 800,000 SF Geocomposite - 1,100,000 SF
SUBGRADE CONDITIONS:	Sand Drainage Layer
DESCRIPTION OF REPAIRS (METHOD & EQUIP. USED) :	Areas around appurtenances, Destructive test locations, air test locations, burnouts etc. Equipment: Extrusion welders
INSTALLATION CREW:	Foreman: Greg Green (10,000,000+ SF experience) Crew: 8 Technicians and 2 QC Inspectors 4 Local laborers Duration: 5 weeks Season: Spring
EQUIPMENT USED:	Hot wedge fusion welder manufactured by Solmax: Extrusion welders manufactured by Munsch: Tensiometer manufactured by Solmax: Honda ATV's
FACILITY PERFORMANCE:	Not available

SOLMAX
GEOSYNTHETICS

HDPE INSTALLATIONS

NAME OF PROJECT:	Western Berks Birdsboro, Pennsylvania
SCOPE OF WORK:	Landfill Cell
DATE OF INSTALLATION:	1993
REFERENCE:	Mr. Jeff Warmkessel Motley Engineering Phone: (215) 775-0888
TYPE OF MATERIAL:	40 mil HDPE - 500,000 SF
SUBGRADE CONDITIONS:	Sand
DESCRIPTION OF REPAIRS (METHOD & EQUIP. USED) :	Areas around appurtenances. Destructive test locations. test locations. burnouts etc. Equipment: Extrusion welders
INSTALLATION CREW:	Foreman: Greg Green (10,000,000+ SF experience) Crew: 5 Technicians and 1 QC Inspector 4 Local laborers Duration: 2 weeks Season: Summer
EQUIPMENT USED:	Hot wedge fusion welder manufactured by Solmax; Extrusion welders manufactured by Munsch; Tensiometer manufactured by Solmax; Honda ATV's
FACILITY PERFORMANCE:	Not available

SOLMAX
GEOSYNTHETICS

HDPE INSTALLATIONS

NAME OF PROJECT:	Waterford Landfill Town of Waterford, New York
SCOPE OF WORK:	MSW Landfill Cap
DATE OF INSTALLATION:	1993
REFERENCE:	Mr. Hal Bayly Kingsley Arms, Inc. Phone: (518) 753-6128
TYPE OF MATERIAL:	40 mil Textured HDPE - 760,000 SF
SUBGRADE CONDITIONS:	Sand
DESCRIPTION OF REPAIRS (METHOD & EQUIP. USED) :	Areas around appurtenances. Destructive test locations. air test locations. burnouts etc. Equipment: Extrusion welders
INSTALLATION CREW:	Foreman: Greg Green (10,000,000+ SF experience) Crew: 6 Technicians and 1 QC Inspector 4 Local laborers Duration: 4 weeks Season: Summer
EQUIPMENT USED:	Hot wedge fusion welder manufactured by Solmax: Extrusion welders manufactured by Munsch; Tensiometer manufactured by Solmax; Honda ATV's
FACILITY PERFORMANCE:	Not available

HDPE INSTALLATIONS

NAME OF PROJECT:	Bethlehem Landfill Closure Bethlehem, PA
SCOPE OF WORK:	MSW Landfill Closure
DATE OF INSTALLATION:	1995, 1996
REFERENCE:	Chris Campman City of Bethlehem Phone: (610) 865-7103
TYPE OF MATERIAL:	40 mil Textured LLDPE – 1,875,000 SF
SUBGRADE CONDITIONS:	Clay
DESCRIPTION OF REPAIRS (METHOD & EQUIP. USED) :	Areas around appurtenances, Destructive test locations, air test locations, burnouts etc. Equipment: Extrusion welders
INSTALLATION CREW:	Foreman: Greg Green Crew: 6 Technicians and 1 QC Inspector 8 Local laborers Duration: 4 months Season: Fall 95 / Summer 96
EQUIPMENT USED:	Hot wedge fusion welder manufactured by Solmax; Extrusion welders manufactured by Munsch; Tensiometer manufactured by Solmax; Honda ATV's
FACILITY PERFORMANCE:	Not available

2061

HDPE INSTALLATIONS

NAME OF PROJECT:	Lanchester County Landfill Expansion Honey Brook, PA
SCOPE OF WORK:	Landfill Cell Expansion
DATE OF INSTALLATION:	1996, 1998
REFERENCE:	Don Buncie Lanchester Landfill Phone: (610) 273-3771
TYPE OF MATERIAL:	60 mil Textured HDPE – 2,234,000 SF
SUBGRADE CONDITIONS:	Clay
DESCRIPTION OF REPAIRS (METHOD & EQUIP. USED) :	Areas around appurtenances, Destructive test locations, air test locations, burnouts etc. Equipment: Extrusion welders
INSTALLATION CREW:	Foreman: Greg Green / Bill Akens Crew: 8 Technicians and 1 QC Inspector 8 Local laborers Duration: 4 months Season: Fall 96 / Summer 97
EQUIPMENT USED:	Hot wedge fusion welder manufactured by Solmax; Extrusion welders manufactured by Munsch; Tensiometer manufactured by Solmax; Honda ATV's
FACILITY PERFORMANCE:	Not available

HDPE INSTALLATIONS

NAME OF PROJECT:	Stony Creek Town of Stony Creek, New York
SCOPE OF WORK:	MSW Landfill Cap
DATE OF INSTALLATION:	November 1995
REFERENCE:	Zack Thomas Town Superintendent Phone: (518) 696-3575
TYPE OF MATERIAL:	40 mil HDPE - 279,000 SF
SUBGRADE CONDITIONS:	Sand
DESCRIPTION OF REPAIRS (METHOD & EQUIP. USED) :	Areas around appurtenances, Destructive test locations, air test locations, burnouts etc. Equipment: Extrusion welders
INSTALLATION CREW:	Foreman: Jason Craft (5,000,000+ SF experience) Crew: 8 Technicians and 1 QC Inspector Duration: 3 weeks Season: Fall
EQUIPMENT USED:	Hot wedge fusion welder manufactured by Solmax; Extrusion welders manufactured by Munsch; Tensiometer manufactured by Solmax; Honda ATV's
FACILITY PERFORMANCE:	Not available

RECENT PROJECT LIST

2061

Project Name:	Town of Granville Landfill Closure
Application:	MSW Landfill Closure
Location:	Granville, NY
Date of Completion:	July 1997
Facility Owner:	Town of Granville, NY
Design Engineer:	Clough Harbour & Associates
Contact:	Mike Amodeo
Telephone No.:	518-453-4500
Material (1):	40 mil Smooth HDPE
Quantity:	708,000 SF
Manufacturer:	SOLMAX
Material (2):	
Quantity:	
Manufacturer:	
Material (3):	
Quantity:	
Manufacturer:	
Material (4):	
Quantity:	
Manufacturer:	
Field Seaming Equipment:	Double Wedge and Extrusion Welders
Installation Supervisor:	Angelo Gaetano
Master Seamer:	Rick Muller
Crew Size:	8 Technicians and Laborers

RECENT PROJECT LIST

Project Name:	Hatfield, MA
Application:	MSW Landfill Closure
Location:	Town of Hatfield, MA
Date of Completion:	September 1997
Facility Owner:	Town of Hatfield, MA
Design Engineer:	Dufresne & Henry
Contact:	Jack Spanbauer
Telephone No.:	413-773-3642
Material (1):	40 mil Textured HDPE
Quantity:	225,000 SF
Manufacturer:	SOLMAX
Material (2):	
Quantity:	
Manufacturer:	
Material (3):	
Quantity:	
Manufacturer:	
Material (4):	
Quantity:	
Manufacturer:	
Field Seaming Equipment:	Double Wedge and Extrusion Welders
Installation Supervisor:	Rick Muller
Master Seamer:	Bob Burns
Crew Size:	8 Technicians and Laborers

RECENT PROJECT LIST

2061

Project Name:	Jones Street Landfill
Application:	MSW Landfill Closure
Location:	Orange, MA
Date of Completion:	October 1997
Facility Owner:	Town of Orange, MA
Design Engineer:	SEA Consultants, Inc.
Contact:	John Nolan
Telephone No.:	
Material (1):	40 mil Smooth HDPE
Quantity:	450,000 SF
Manufacturer:	SOLMAX.
Material (2):	40 mil Textured HDPE
Quantity:	300,000 SF
Manufacturer:	SOLMAX
Material (3):	
Quantity:	
Manufacturer:	
Material (4):	
Quantity:	
Manufacturer:	
Field Seaming Equipment:	Double Wedge and Extrusion Welders
Installation Supervisor:	Greg Green
Master Seamer:	Doug Harris
Crew Size:	8 Technicians and Laborers

000507

RECENT PROJECT LIST

Project Name:	Carrs Mill Landfill
Application:	MSW Landfill Closure
Location:	Lisbon, MD
Date of Completion:	December 1997
Facility Owner:	Howard County, MD
Design Engineer:	SCS Engineers
Contact:	James Law
Telephone No.:	410-995-4040
Material (1):	40 mil Textured VFPE
Quantity:	326,000 SF
Manufacturer:	SOLMAX
Material (2):	Double Sided Geocomposite
Quantity:	360,000 SF
Manufacturer:	National Seal Co.
Material (3):	
Quantity:	
Manufacturer:	
Material (4):	
Quantity:	
Manufacturer:	
Field Seaming Equipment:	Double Wedge and Extrusion Welders
Installation Supervisor:	Dennis Hooks
Master Seamer:	Brian Reiss
Crew Size:	8 Technicians and Laborers

000508

INFORMATION ONLY

RESUME OF INSTALLER'S SUPERINTENDENT

Sections 02770-1.04.B.5
Document No. 614-PET-058E

[ ] A - Conforms to the Subcontract Requirements
[X] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: J. C. Jackson Date: 9/11/98

PETRO
environmental
technologies

RESUME

Name: William Burns

[redacted] [redacted]

Job Title: Foreman

WORK EXPERIENCE

1992 - Present: Solmax Geosynthetics Inc.

- OSHA 40 Hour Certification (Hazardous Material) 1992/1993/1994
- Confined Space Entry Certification

INSTALLATION EXPERIENCE

1992	Landfill Cover Manlius (NY) Town of Manlius	VLDPE 1.0mm/ 40 mil 44,450 m2/ 478,470 ft2
1992	Landfill Cover Augusta (NY) SWOCO	VLDPE 1.0 mm/ 40 mil 83,900 m^2/ 903,120 ft^2
1992	Landfill cover Pensacola(FL) OHM	COEX 1.5 mm/ 60 mil 40,000 m^2/ 430,570 ft^2
1993	Landfill Cover Clifton Park (NY) Town of Clifton Park	HDPE 1.0 mm/ 40 mil 98,900 m^2/ 1,064,585 ft^2
1993	MSW Landfill Atlantic City (NY) City of Atlantic City	HDPE 1.5 mm/ 60 mil 60,000 m^2/ 645,855 ft^2

William Burns
INSTALLATION EXPEREINCE (continued)

1993	MSW Landfill Cap Waterford (NY) Town of Waterford	HDPE 1.0 mm/ 40 mil 70,000 m^2/ 753,500 ft^2
1993	Vehicle Wash Facility Fort Drum (NY) US Corp of Engineers	HDPE 1.0 & 1.5 mm/ 40 & 60 mil 63,100 m^2/ 679,225 ft^2
1993	Decontamination Pad Leeds (NY) American Thermostat	HDPE 1.0/ 40 mil 1,115 m^2/ 12,000 ft^2
1993	Basins Oak Hill (NY) Stiefel Lab.	HDPE 1.5/ 60 mil 3,250 m^2/ 35,000 ft^2
1993	MSW landfill Western Berks (Pa) County of Western Berks	HDPE 1.5/ 60 mil 17,560 m^2/ 189,000 ft^2
1994	Secondary Containment Albany (NY) Sears Oil	HDPE 1.0 mm/ 40 mil 1,150 m^2/ 12,378 ft^2
1994	Rain Water Basin Millsboro (DE) AXZO Industries	Polypropylene 1.2 mm/ 30 mil 3,809 m^2/ 41,000 ft^2
1994	Landfill Cap Reconstruction Lake Placid (NY) Town of North Elba	HDPE 1.0 mm/ 40 mil 19,700 m^2 /213,000 ft^2
1994	Decon Pad Syracuse (NY) OBG Tech. Svcs.	HDPE 1.0 mm/ 40 mil 557 m^2/ 6,000 ft^2
1994	Waste Water Basin Oswego (NY) Ebasco Constructors	HDPE 1.5 & 2.0 mm/ 60 & 80 mil 3,715 m^2/ 40,000 ft^2

William Burns
INSTALLATION EXPERIENCE (continued)

1994	Landfill Cap Schuylerville, (NY) Town of Saratoga	HDPE 1.0 mm/ 40 mil 37,161 m^2/ 400,000 ft^2
1994	Secondary Containment Cutler, (ME) U.S. Navy	HDPE 1.5 mm/ 60 mil 9,290 m^2/ 100,000 ft^2
1994	Secondary Containment Utica, (NY) NY State Psychiatric Center	PVC .75 mm/ 30 mil 200 m^2/ 2400 ft^2
1994	Landfill Cap Lysander, (NY) Town of Lysander	PVC 1.0 mm/ 40 mil 350 m^2/ 3750 ft^2
1994	Secondary Containment Repair Glenmont, (NY) Sears Oil	HDPE 1.5 mm / 60 mil 500 m^2 / 5,500 ft^2
1994	Pond Repair Utica, NY Niagara Mohawk Power Corp.	HDPE 1.5 mm / 60 mil
1994	HDPE Pipe Modification Wampsville (NY) Madison County Landfill	HDPE Plate 0.5 inch HDPE Plate Double Walled Pipes
1995	Landfill Cap Port Deposit, (MD) Bainbridge NTC	HDPE 1.0 mm / 40 mil 60,400 m^2 / 650,000 ft^2
1995	Tank Liner Endicott, (NY) IBM Corp.	HDPE 2.0 mm / 80 mil 75 m^2 / 800 ft^2
1995	Leachate Storage Lagoons Wampsville, (NY) Madison County DSW&S	HDPE 1.5 mm / 60 mil 10,590 m^2 / 114,000 ft^2

William Burns
INSTALLATION EXPERIENCE (continued)

1995	MSW Landfill Expansion Cohoes, (NY) Town of Colonie	HDPE 1.5 mm / 60 mil 88,225 m^2 / 950,000 ft^2
1995	Landfill Cap Portsmouth, (NH) Pease Air Force Base	LLDPE 1.0 mm / 40 mil 101,725 m^2 / 1,095,000 ft^2
1995	Haz. Soil Cell and Cap Medina (NY) FMC Corp	HDPE 1.5 mm / 60 mil 47,010 m^2 / 506,000 ft^2
1996	Tank Liner (Tank 2) Endicott, (NY) IBM Corp.	HDPE 2.0 mm / 80 mil 75 m^2 / 800 ft^2
1996	Fire Prevention Pond Claverack, (NY) Brookwood Detention Center	HDPE 1.0 mm / 40 mil 2,790 m^2 / 30,000 ft^2
1996	Landfill Cap Massena, (NY) Reynolds Metals	LLDPE 1.0 mm / 40 mil 29,800 m^2 / 320,000 ft^2
1996	Landfill Cap Guilderland, (NY) Town of Guilderland	HDPE 1.0 mm / 40 mil 18,600 m^2 / 200,000 ft^2
1996	Landfill Cap Dover, (NY) Town of Dover	LLDPE 1.0 mm / 40 mil 12,550 m^2 / 135,000 ft^2

CDC CONTROLLED
COPY NO. C011

GEOMEMBRANE DEPLOYMENT/SEAMING

FOR COLD WEATHER

Sections 02770-1.04.B.8
Document No. 614-PET-058F

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: C. Jenkins Date: 9/11/98

000514

PETRO
environment
technologi

2061

CDC CONTROLLED
COPY NO. C011

GEOMEMBRANE DEPLOYMENT/SEAMING

FOR COLD WEATHER

Sections 02770-1.04.B.8
Document No. 614-PET-058F

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sign: C. Jenkins Date: 9/11/98

000515

PETRO
environmental
technologies

SOLMAX
GEOSYNTHETICS

COLD WEATHER SEAMING PROCEDURES

The following procedures should be used as a supplement to (not replace) the procedures outlined in the project specifications whenever welding takes place in ambient temperatures below 41° F:

- Ambient temperatures should be measured two feet above the surface of the liner and readings logged every hour.
- Trial welds, for both fusion and extrusion welds, should be run on strips 15 feet long. Bones will be taken every 2 feet for a total of 6 specimens (4 peels and 2 shears).
- Trial welds will be run under conditions as closely resembling field conditions as possible. For example: the material will be exposed to the same elements as will be encountered during seaming. Run trial welds on the same subgrade conditions not on top of another piece of liner. Do not pre-heat trial welds unless you intend on pre-heating during field welding.
- All available information will be logged for both trial welds and field seaming. This information will include but not be limited to the following: machine set temperatures and pyrometer temperatures, speed setting and measured speed, ambient and liner temperature, peel and shear values calibrated to pounds per inch (PPI).
- Additional trial welds will be performed whenever the ambient temperature changes by more than 10° F since the last trial weld.
- Bones will be cut and peel tested from the end of every seam and every 300 feet along each seam during the seaming process.
- If experiencing weld failure due to lack of heat, slow the machine speed first, increase temperature second. Stop deployment and seaming operations if adjustments are ineffective.
- Close visual inspection should be incorporated to ensure that brittle failure does not occur to parent material surrounding welded areas.
- When strong winds are present, a protective shield may be required to prevent convection heat loss during seaming (especially for extrusion welding).
- Portable shelters are not recomended because humidity will increase within the enclosed shelter. An increase in humidity will create condensation within the seam as it is welded causing seam failure.
- Special care should be exercised to prevent any precipitation from entering the weld path.
- Deployment and seaming operations will be terminated durind periods of precipitation.

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NOs.:	20102	X	CONTRACT NUMBER.: FSC-614	SUBMITTAL NO.: 02770-1	REV.: 2	DATE: September 25, 1998	PAGE 1 OF 1
	20402						

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 604
HAMILTON, OHIO 45013-9402

Oct 6 5 44 PM '98

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

SIGNATURE: J. Richard Schaubman

RECEIVED BY: Melissa Crews DATE: 9-28-98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
5	614-PET-058E.2	1						X			X	Resumes of Seaming Personnel/Installation		X	02770-1.04.B.6 & -.B.7	X		
												Crew Documentation						

RECEIVED
OCT 08 1998
R Huffman

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Jim Jenkins (Approver)	64	Vern Taylor	52-0	Jim Jenkins	64	OSDF Station	64
Bruce Schweitzer	64			Bruce Schweitzer	64	ECDC	52-7
Dan Bodine	38			Mike Godber	64	Vern Taylor	52-0
ECDC	52-7			Dan Bodine	38		

SEP 28 1998

RECEIVED BY: _____ DATE: 10/2/98 NO COMMENTS X COMMENTS ATTACHED ____
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

0005114

20061

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE
A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS - REVISE & RESUBMIT AS CFC OR INF
C - REVISE & RESUBMIT

PETRO
environmental
technologies

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02770-1 (Rev. 2)

RESUMES OF SEAMING PERSONNEL/
INSTALLATION CREW DOCUMENTATION
Sections 02770-1.04.B.6 & -.B.7

Document No. 614-PET-058E.2 (Rev. 1)

September 25, 1998

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: _____ Date: 10/6/98

INFORMATION ONLY

000518

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

MASTER SEAMER

ANGELO GAETANO

PETRO
environmental
technologies

SOLMAX
GEOSYNTHETICS

4691 Commercial Drive
Suite 345, New hartfor, NY
13413, USA
Tel.: (315) 853-8930
Fax.: (514) 853-8944

RESUME

Name: Angelo Gaetano

Job Title: Senior Foreman, Master Seamer

WORK EXPERIENCE

- Bachelor of Arts, State University of New York at Buffalo, 1994
- OSHA 40 Hour Certification
- CPR Certification
- First Aid Certification
- Confined Space Entry Certification

Angelo Gaetano has been employed by our company since 1993. Mr. Gaetano has successfully completed SOLMAX's 305 hour Field Technicians Education Program " Welding and Assembling of Geosynthetics" specifically designed and sanctioned by the Quebec Ministry of Education. Mr. Gaetano has gathered extensive experience in the field having successfully participated in the installation of over 12 million square feet of HDPE, 4 million square feet of GCL, 1 million square feet of XR-5 and over 5 million square feet of Geonet/Geocomposite in North America.

INSTALLATION EXPERIENCE

1993	Vehicle Wash Facility Fort Drum (NY) US Corp of Engineers	HDPE 1.0 & 1.5 mm/ 40 & 60 mil 63,100 m^2/ 680,000 ft^2
1993	MSW landfill Western Berks (Pa) County of Western Berks	HDPE 1.5/ 60 mil 17,560 m^2/ 189,000 ft^2
1994	Secondary Containment Albany (NY) Sears Oil	HDPE 1.0 mm/ 40 mil 1,150 m^2 / 12,500 ft^2

INSTALLATION EXPERIENCE (continued)

1994	Landfill Cap Reconstruction Lake Placid (NY) Town of North Elba	HDPE 1.0 mm/ 40 mil 19,700 m2 /213,000 ft2
1994	Landfill Cap Schuylerville (NY) Town of Saratoga	HDPE 1.0 mm/ 40 mil 37,161 m^2/ 400,000 ft^2
1994	Decon Pad Onondaga Indian Reservation O'Brian & Gere Engineering	HDPE 1.0 mm/ 40 mil 700 m^2/ 7225 ft^2
1994	FMC Corporation Medina, (NY) REMCOR, Inc.	HDPE / COEX 1.0 & 1.5 mm/ 40 & 60 mil 30,650 m^2/ 330,000 ft^2
1994	Lagoon Liner Broadheadsville (PA) Broadheadsville School Dist.	HDPE 1.5 mm / 60 mil 10,700 m^2 / 115,500 ft^2
1994	Secondary Containment Jamestown (NY) Valeo Engine Cooling, Inc.	HDPE 1.5mm / 60 mil 1,350 m^2 / 15,000 ft^2
1994	Water Basin Repair Philadelphia, (PA) City of Philadelphia	HDPE 1.5mm / 60 mil 10,680 m^2 / 115,000 ft^2
1994	Landfill Cell Expansion Presho, (NY) County of Steuben	HDPE 1.0 mm / 40 mil 4,250 m^2 / 46,000 ft^2
1994	Golf Course Ponds Page (AZ) Horizon Golf	HDPE 1.0 mm / 40 mil 24,100 m^2 / 260,000 ft^2
1995	Landfill Cap Port Deposit, (MD) Bainbridge NTC	HDPE 1.0 mm / 40 mil 60,400 m^2 / 650,000 ft^2
1995	Tank Liner Endicott, (NY) IBM Corp.	HDPE 2.0 mm / 80 mil 75 m^2 / 800 ft^2

INSTALLATION EXPERIENCE (continued)

1995	Leachate Storage Lagoons Wampsville, (NY) Madison County DSW&S	HDPE 1.5 mm / 60 mil 10,590 m^2 / 114,000 ft^2
1995	Nuclear Waste Cap West Valley, (NY) N.Y.S.E.R.D.A.	XR-5 .9 mm / 36 mil 46,450 m^2 / 500,000 ft^2
1995	Haz. Soil Cap Pendelton, (NY) Frontier Chemical	HDPE 1.5 mm / 60 mil 30,285 m^2 / 326,000 ft^2
1995	Tank Liner (Tank 2) Endicott, (NY) IBM Corp.	HDPE 2.0 mm / 80 mil 75 m^2 / 800 ft^2
1995	MSW Landfill Expansion Cohoes, (NY) Town of Colonie	HDPE 1.5 mm / 60 mil 88,225 m^2 / 950,000 ft^2
1996	Tank Liner #2 Endicott (NY) IBM Corp.	HDPE 2.0 mm/ 80 mil 75 m^2 / 800 ft^2
1996	Landfill cap Bourne (MA) Horizon Golf	Rufco EX 30 0.5 mm/40 mil 28,330 m^2 / 340,315 ft^2
1996	Fondation Liner West Hartford (CT) BJ'S whole sale	Rufco EX 30 0.75/30 mil 14,450 m^2 / 123,250 ft^2
1996	Landfill cap Town of Dover (NY) Town of Dover	LLDPE 1.0 mm/40 mil 12,500 m^2 / 134,550 ft^2
1996	MSW Landfill cell Honey Brook (NY) Pavex	HDPE 1.5 mm/60 mil 111480 sm/1220000 sf

INSTALLATION EXPERIENCE (continued)

1996	Temporary Cover Nashua (NH) L.K. Ladd	RAVEN 0,5 mm/20 mil 73391 sm/790000 sf
1996	Industrial Landfill Cap Goulds Pump (NY) Kilby Brothers	LLDPE 1,5 mm/60 mil 28836 sm/310400 sf
1996	Fluid Lagoon Hancock (NY) Maxim Construction	HDPE 1,5 mm/60 mil 14400 sm/155000 sf
1996	Ash Landfill Cap Sprout Brook (NY) New Roch. Construction Corp.	HDPE 1,5 mm/60 mil 79430 sm/855000 sf
1996	HAZ Landfill Cap Acton (MA) GZA Remediation	HDPE 1,5 mm/60 mil 35181 sm/378700 sf
1996	C+D Landfill Cap Guiderland (NY) Kilby Brothers	HDPE 1,0 mm/40 mil 22296 sm/240000 sf
1996	Industrial Landfill Cap Massena (NY) Bechtel	LLDPE 1,0 mm/40 mil 25000 sm/269107 sf
1996	Brine Setting Ponds Avoca (NY) Poling & Bacon Const.	HDPE 1,0/1,5 mm/40/60 mil 6503 sm/70000 sf
1996	MSW Landfill Cap Colony (NY) Kilby Brothers	HDPE 1,5 mm/60 mil 13935 sm/150000 sf
1996	HAZ Materials Landfill Pendleton (NY) Sevenson Environmental	HDPE 1,5 mm/60 mil 33452 sm/360085 sf

INSTALLATION EXPERIENCE (continued)

1996	Landfill Cap Brigadoon (NY) Dan Hostetter	HDPE 0.75 mm/30 mil 27870 sm/300000 sf
1996	HAZ Landfill Cap Buffalo (NY) SLC Constructors	XR-5 0.75 mm/30 mil 47379 sm/510000 sf
1996	MSW Landfill Cap Schuyler Falls (NY) Luck Brothers	HDPE 1.5 mm/60 mil 30000 sm/322928 sf
1997	Landfill Closure Laurel Park (CT) Smith Kajima	LLDPE 1.0 mm/40 mil 111480 sm/ 1200000 sf
1997	Sanitary Landfill Rockport (MA) SEA Consultants	HDPE 1.0 mm/40 mil 46500 sm/500538 sf
1997	Landfill Closure Norwalk (CT) Site Remediation	HDPE 1.5 mm/60 mil 5202 sm/55996 sf
1997	Lagoon Sludge Monofil (Troy, NY) Rensselaer county bureau	HDPE 1.5 mm/60 mil 7000 sm/75350 sf
1997	Lagoon LiLy Pond (NY) Jett Industries	HDPE 1.5 mm/ 60 mil 929 sm/10,000 sf

2061

SEAMER

ROBERT STUMPF

000525

PETRO
environmental
technologies

Robert Stumpf

[redacted]

Training:

OSHA 40 Hour Training 1910.120, 1990
Certified Liner Installation, Poly-Flex 1992
Re-Certified Liner Installation, Poly-Flex 1996

Experience Summary:

1990 to 1998- Liner Installation Foreman for Kelchner Environmental, Inc.

- Wright-Patterson Air Force Base-Dayton, Oh-Landfills 8 and 10 Remediation/Closure 1995-1996. Installed 990,000 sq. ft. HDPE geomembrane (40% textured, 60% smooth), 990,000 sq. ft. Bentomat GCL, 990,000 sq. ft. woven geotextile, 900,000 sq. ft. geocomposite.

- Rumpke Landfills, various sites 1995. Installed 605,000 sq. ft. 60 mil HDPE geomembrane, 425,000 sq. ft. Bentomat GCL, 425,000 sq. ft. Geotextile.

- Cincinnati Gas and Electric (CGC)- Ash Monofill Construction. Installed 850,000 sq. ft. total geomembrane (60 mil HDPE smooth 60 mil HDPE textured, 30 mil HDPE smooth, and 140 mil HDPE smooth) 425,000 sq. ft 4 oz. Geotextile.

- Champion Paper Co.- Hodapp Landfill Closure- Hamilton, Oh. Installed 600,000 sq.ft. VLDPE geomembrane, 600,000 sq.ft geotextile

OTHER GEOMEMBRANE PROJECTS (HDPE except where noted)

New Paris Landfill	300,000 sq.ft
Former Sohio Refinery-Ft Wright, KY (LLDPE)	1,600,000 sq.ft
Indianapolis, Indiana (VLDPE)	2,100,000 sq.ft
Kingston, Ohio	280,000 sq.ft
Waterveliet, Michigan	180,000 sq.ft
Troy,Ohio	50,000 sq.ft
Streator Landfill	200,000 sq.ft
Brickyard Landfill	585,000 sq.ft
Dixon Landfill	170,000 sq.ft

2061

Robert Stumpf (cont'd)

Upper Rock Island	150,000 sq.ft
Ramsey-Sias Lagoon	150,000 sq.ft
Huron County Landfill	660,000 sq.ft
Chemicals, Inc. Pond	25,000 sq.ft
Bavarian Landfill, 1st 3 phases	600,000 sq.ft
Total Geomembrane Installed	**10,095,000 sq ft**

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.	20102	X	CONTRACT NUMBER.: FSC-614	SUBMITTAL NO.: 02770-1	REV.: 3	DATE: September 30, 1998	PAGE 1 OF 1
	20402						

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7, TRAILER NO. 504
HAMILTON, OHIO 45013-9402

OCT 6 5 46 PM '98

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

SIGNATURE: J. Richard Schairbaum

RECEIVED BY: Melissa Ferris DATE: 9-30-98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
5	614-PET-058E.2	2						X			X	Resumes of Seaming Personnel/Installation		X	02770-1.04.B.6 & -.B.7	X		
												Crew Documentation						

RECEIVED
OCT 08 1998
R Guisman

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Jim Jenkins (Approver)	64	Vern Taylor	52-0	Jim Jenkins	64	OSDF Station	64
Bruce Schweitzer	64			Bruce Schweitzer	64	ECDC	52-7
Dan Bodine	38			Mike Godber	64	Vern Taylor	52-0
ECDC	52-7			Dan Bodine	38		

000528

RECEIVED BY: _____ DATE: 10/5/98 NO COMMENTS X COMMENTS ATTACHED ____
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

COMMENTS

SUBMITTAL ACTION CODE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF[illegible]RMATION/RECORD

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE
A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS - REVISE & RESUBMI[illegible]C OR INF

PETRO
environmental
technologies

2061

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02770-1 (Rev. 3)

RESUMES OF SEAMING PERSONNEL/
INSTALLATION CREW DOCUMENTATION
Sections 02770-1.04.B.6 & -.B.7

Document No. 614-PET-058E.2 (Rev. 2)

September 30, 1998

INFORMATION ONLY

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: _____ Date: 10/6/98

000529

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.548.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

MASTER SEAMER

JERRY ISTRE

000530

PETR

environmen
technologi

JERRY ISTRE - THE JERRY ISTRE COMPANY

Position: Quality Control Inspector, Petro Environmental Tech., Inc.; Master Seamer

Education: Cochise College; Associate Degree in Business Management, 1971
Welding and Pipe Fitting; Crowley, LA, 1972

Relevant Experience:

- *The Istre Company (Owner) - January, 1997 to Present:*

Subcontracts to liner companies working as a Consultant, Supervisor, and Master Seamer to install geomembrane systems, piping systems, train Supervisor, Quality Control Technicians, and welding technicians.

- *Gyr Pipe & Lining Systems, Inc. (Partner/Owner) - January, 1992 to December, 1996:*

Contract to NWT Canadian Government for the purpose of building tank farms in the Arctic. As President, function was to purchase equipment, purchase construction materials, schedule shipments, and production schedules. Also responsible for ensuring that specifications were maintained and the quality of work met or exceeded specifications. The scope of work entailed earthwork, geomembrane systems, tank building, pipe work, and concrete work. Each tank farm was bid at $3.2 million. When not working on the tank farms, subcontracted to Terrafix of Toronto, Canada as Project Manager. This work consisted of earthwork, leachate collection and geomembrane systems.

- *Geo-Con (Field Superintendent) - January, 1990 to December, 1991:*

Responsibilities included running the day-to-day activities for earthwork, geomembrane systems, methane systems, leachate collection systems, and Hazardous-Waste cleanup operations. Was appointed Quality Control Officer for the Bruin Lagoon, PA Project for the Corps of Engineers Haz-Waste cleanup project.

- *Industrial Environmental Liners (Construction Mgr.) - September, 1988 to December, 1989:*

Responsible for managing three field crews, training personnel in areas of welding safety, bidding project, attending field pre-construction and construction meetings, purchasing equipment/ materials, scheduling projects, and finalizing quality control documents.

- *The Gagle Co. (Field Superintendent) - January, 1985 to September, 1988:*

Primary responsibilities were to run the day-to-day activities of a field crew, manage quality control, and layout/weld geomembrane systems.

- *Blattner & Assoc. (Field Superintendent) - January, 1983 to December, 1984:*

Ran the day-to-day activities of a field crew building gold mines and the work involved: earthwork, HDPE piping systems, blasting, moving rock to a crusher, and placement of materials onto a leach pad for gold extraction.

- *Ely Energy Systems (Superintendent) - January, 1980 to 1982:*

Managed field crews in the propane industry and installed propane stand-by systems. Work entailed: earthwork, construction of concrete piers, installing 50,000 gallon tanks, pipe work, and electrical work. Licensed in Oklahoma and Texas.

Certifications:

OSHA 40-Hour 29 CFR 1910.120 Certification
OSHA 29 CFR 1910.120 8-Hour Material Handling Certification
OSHA 29 CFR 1910.120 Supervisor Training
Operations and Emergency Response 8-Hour Training
Hazardous Waste Operations 29 CFR 1910.120 (E) 8-Hour Training
Florida Phosphate Council Safety Program 24-Hour Training
Bay Area Safety Program - 10-Hours
Fernald-GET 8-Hour Training

2061

THE ISTRE COMPANY

P. O. BOX 1451
CROWLEY, LA. 70527-1451
TELE & FAX (318) 795-8220

PROJECT NAME & LOCATION	MATERIAL	SQ. FEET	
City of Dayton-Dayton, Wy.	12 Mil	50,000	HDPE
BFI- Atlantic City, NJ	40 Mil	1,000,000	HDPE
Ft. Howard Paper-Savannah, Ga.	40 & 60 Mil	3,000,000	HDPE
Kaiser Aluminum- New Orleans, La.	40 Mil	1,000,000	HDPE
Inspiration Copper- Claypool, Az.	40 & 80 Mil	100,000	HDPE
Hycroft Mine-Winnamucca, Nv.	40 Mil	1,000,000	HDPE
Perry Eng.-Leesburg, Va.	30 Mil	1,000,000	HDPE
US Corps. of Eng.-Fayetteville, Nc.	12 Mil	150,000	HDPE
Summitville Mine-Summitville, Co.	60 Mil	1,000,000	HDPE
Gilt Edge Brohm Mining-Deadwood,	60 Mil	1,370,000	HDPE
Rollins Envir. Service-Baton Rouge,	80 Mil	1,000,000	HDPE
Wolverine Tube-Decator, Al	40 Mil	100,000	HDPE
American Cyanamid-Laplace, La	20 Mil	290,000	HDPE
Builders Transport-Dallas, Tx	XR-5	10,000	LLDPE
Manada Const-Newburg, Pa	40 Mil	211,000	HDPE
Cheveron-St. James, LA	100 Mil	40,000	HDPE
Ethal Corp.-Baton Rouge, La	30 Mil	500,000	HDPE
Manada Const-Harrisburg, Pa	60 Mil	3,000,000	HDPE
Suntimes- Aurora, IL	20 Mil	200,000	HDPE
Peters Construction-Granite City, IL	60 Mil	1,200,000	HDPE
Viet Construction-Grove, Mn	40 Mil	250,000	HDPE
IL state- West Chicago, IL	30 Mil	70,000	HDPE
Wayne Disposal - Belleville, Mi	80 Mil	550,000	HDPE
N. B. Power - Milbank, New Brunswi	60 Mil	500,000	HDPE
Sydney Steel - Sydney, Nova-Scotia	60 Mil	50,000	HDPE
Bruin Lagoon - Bruin, Pa	60 Mil	200,000	HDPE
USA Steel - Pueblo, Co	30 Mil	1,300,000	HDPE

THE ISTRE COMPANY

P. O. BOX 1451
CROWLEY, LA. 70527-1451
TELE & FAX (318) 785-8220

Hudson Electric - Newburgh, NY	60 Mil	1,300,000	HDPE
BFI - New Orleans, La	SDR-11	12 Miles	HDPE
Muni. Of Coboconk - Coboconk, Ont	60 Mil	800,000	HDPE
Muni. of Tamagami - Tamagami, Ont	60 Mil	250,000	HDPE
Novia Scotia Power - North Sydney,	60 Mil	1,300,000	HDPE
Muni. Of Glecien - Glecien, Alberta	60 Mil	500,000	HDPE
Muni. of Tamagami - Tamagami, Ont	80 Mil	250,000	HDPE
Uniroyal - Elmira, Ontario	60 Mil	170,000	HDPE
Gyr Construction - Clyde River, N W	60 Mil	70,000	HDPE
F B D - Coral Harbour, N W T	60 Mil	70,000	HDPE
Muni Of Ottawa - Ottawa, Ontario	30 Mil	3,000,000	VLDPE
Gyr Construction Igloolic, NWT	60 Mil	80,000	HDPE
Cassello Construction - Bethlaham, N	60 Mil	400,000	HDPE
Terrafix - Lacdubonnie, Manitoba	60 Mil	400,000	HDPE
Nortuck Construction- Arviet, NWT	60 Mil	70,000	HDPE
Hovat Construction- Coral Harbour, N	60 Mil	50,000	HDPE
E. B. Eddy - Espenola, ONT	80 Mil	500,000	HDPE
Muni - Rangely, ME	60 Mil	300,000	HDPE
Muni - Yarmouth, MA	40 Mil	500,000	HDPE
C. F. Industries - Bartow, FL	40 Mil	1,600,000	HDPE
Cargil - Bartow, FL	80 Mil	50,000	HDPE
C. F. Industries - Plant City, FL	60 Mil	20,000	HDPE
Labbe & Sons - Brunswick, Me	40 Mil	375,000	HDPE
City of Warren, Me	40 Mil	150,000	HDPE
Petro-Environmental	80 Mil	400,000	HDPE

SEAMER

CHRIS LINDSEY

PETRO
environmental
technologies

CHRIS LINDSEY – KELCHNER ENVIRONMENTAL

Position: Seamer

Relevant Experience:

- *Fluor Daniel Fernald (Southern Waste Units) - February, 1998 to May, 1998:*

Deployed 60-mil textured HDPE liner along various swales and Basins #1 and #2, as well as completed numerous patched within the Retention Basins. Fusion welded approximately 10,000 ft.^{2}, including grinding and extrusion welding.

- *Lehr Precision, City of Blue Ash – December, 1997 to February, 1998:*

Wedge welded 70,000 ft.^{2} of 60-mil smooth HDPE liner, including detailing, grinding, preparation for extrusion welding.

- *Richmond Co. Landfill, Richmond, Indiana – October, 1997:*

Fusion welded 3,000 ft.^{2} of 80-mil textured HDPE liner for patches/cap.

- *B.P. Refinery, BP Oil Co., Ft. Wright, KY – July, 1997 to September, 1997:*

Wedge welding, extrusion welding, grinding, deployment of 2,003,760 ft.^{2} of 60-mil textured HDPE liner. Also deployed geocomposite and geotextile materials.

Certifications:

OSHA 40-Hour 29 CFR 1910.120 Certification
Fernald-GET 8-Hour Training

FDF PROJECT	20102 / 20402	X	CONTRACT NUMBER.: FSC-614	SUBMITTAL NO.: 02770-1	REV.: 4	DATE: October 6, 1998	PAGE 1 OF 1

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45013-9402

OCT 6 2 17 PM '98

SIGNATURE: J. Richard Schaubauer

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY: Julie O'Donohoe DATE: 10-6-98

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	RESUBMITTAL: YES	NO	TITLE/DESCRIPTION	SUBMITTAL TYPE: CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
5	614-PET-058E.2	3						X			X	Resumes of Seaming Personnel/Installation		X	02770-1.04.B.6 & -.B.7	X		
												Crew Documentation						

RECEIVED
OCT 26 1998
K Guzman

DISTRIBUTION

REVIEW DISTRIBUTION: Distribution	MS	Distribution	MS	CFC DISTRIBUTION: Distribution	MS	Distribution	MS
Jim Jenkins (Approver)	64	Vern Taylor	52-0	Jim Jenkins	64	OSDF Station	64
~~Bruce Schweitzer~~	~~64~~			Bruce Schweitzer	64	ECDC	52-7
Dan Bodine	38			Mike Godber	64	Vern Taylor	52-0
ECDC	52-7			Dan Bodine	38		

RECEIVED BY: _____ DATE: 11/15/98 NO COMMENTS X COMMENTS ATTACHED ____
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PGS. _____ (PAN #)

ORIGINAL

009537

2061

COMMENTS

DUPLICATE ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE
A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS - REVISE & RESUBMIT AS CFC OR INF
C - REVISE & RESUBMIT

PETRO
environmental
technologies

INFORMATION ONLY

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02770-1 (Rev. 4)

RESUMES OF SEAMING PERSONNEL/
INSTALLATION CREW DOCUMENTATION
Sections 02770-1.04.B.6 & -.B.7

Document No. 614-PET-058E.2 (Rev. 3)

October 6, 1998

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comments Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sign: J. C. [illegible] Date: 10/21/98

DUPLICATE ORIGINAL

000538

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

SEAMER

LOUIS LUNA

PETRO
environmental
technologies

RESUME

Name: **Louis Luna**

[redacted] [redacted]

Job Title: Seamer

WORK EXPERIENCE

1996 – Present: Solmax Geosynthetics Inc.

INSTALLATION EXPERIENCE

1996	Temporary Cover IEM SEALAND Inc Nashus, NH	RAVEN 0.5 mm/ 20 mil 790,000 ft^2
1996	Landfill Cap Pepperell, MA Town of Pepperell	HDPE 1.0 mm/ 40 mil 411,000 ft^2
1996	Landfill Cap Seekonk, MA Town of Seekonk	HDPE 1.0 mm / 40 mil 350,000 ft^2
1997	Landfill Closure Cap IEM Sealand Inc Nashus, NH	HDPE 1.0 mm / 40 mil 590,700 ft^2
1998	Landfill Closure Cap Cohoes, NY Town of Colonie	~~LLDPE~~ 1.5 mm / 60 mil 536,000 Ft^2
1998	Landfill Bennington, VT Town of Bennington	~~LLDPE~~ 1.0 mm / 40 mil 880,760 ft^2
1998	Landfill Cell Cap Betheham, PA City of Betheham	~~LLDPE~~ 1.5 mm / 60 mil 232,670 ft^2

SEAMER

KENNETH HAYES

PETRO
environmental
technologies

RESUME

Name: Kenneth Hayes

[redacted] [redacted]

Job Title: Welding Technician / Foreman

WORK EXPERIENCE;

1994 - Present: Solmax Geosynthetics Inc.
OSHA 40 Hour
First Aid
CPR

INSTALLATION EXPERIENCE

1994	MSW landfill cap North Elba (NY) Town of North Elba	HDPE 1.0/ 40 mil 20 9000m^2/225 000ft^2
1994	MSW landfill cap Schuylerville (NY) Town of Saratoga	HDPE 1,0mm/40mil 33 450m^2/360 000ft^2
1994	Second. contain. Cutler (ME) US Navy	HDPE 1,5mm/60mil 6 500m^2/69 970ft^2
1994	Effluent lagoon Brodheadsville (PA) Monroe County	HDPE 1,5mm/60mil 10 730m^2/115 500ft^2
1994	Second. contain. Massena (NY) Reynolds Aluminum	HDPE 0,90mm/36mil 7 940m^2/85 430ft^2
1994	Water basin Phily East City of Philadelphia	HDPE 1,0mm/40mil 10 685m^2/115 020ft^2

Ken Hayes
INSTALLATION EXPERIENCE (continued)

1995	MSW landfill cap Bainbridge (MD) OHM	HDPE 1,0mm/40mil 64 000m^2/650 000ft^2
1995 / 1996	Landfill Cap Bethlehem (PA) City of Bethlehem	LLDPE 1.0 mm / 40 mil 213,670 m^2 / 2,300,000 ft^2
1995	Landfill Cap Stony Creek (NY) Town of Stony Creek	HDPE 1.0 mm / 40 mil 26,000 m^2 / 279,000 ft^2
1995 / 1996	Landfill Cell Colonie, (NY) Town of Colonie	HDPE 1.5 mm / 60 mil 102,190 m^2 / 1,100,000 ft^2
1996 / 1997	Landifll Cell Narvon, (PA) Chester County Solid Waste Auth.	HDPE 1.5 mm / 60 mil 218,700 m^2 / 2,354,000 ft^2

DOCUMENT ROUTING SHEET
ON-SITE DISPOSAL FACILITY
PROJECT NO. 20102

Date: 10/14/98

Project/Contract/P.O. Name OSDF Ph II Project/Contract/P.O. No. FSC-614

Document Title

Review the attached Document/Submittal/DCN and return to: Heath DUE DATE 10/14/98

Submittal/DCN No. 2770-1 Date: Submittal/DCN Title

Routing Sequence	Reviewing Discipline	Review To Be Completed By	Review Completed By	Document/DCN Approved	Document/DCN Disapproved	Sumittal Status "A"	"B"	"C"	"10"	Remarks
1 Reviewer: Barrett	Engineering		10-15-98	JB		RK				
Reviewer:	Construction									
Reviewer:	Safety									
Reviewer:	Quality									
Reviewer:	Procurement									
Reviewer:	Project Controls									
Reviewer:	Envir. Compliance									
Reviewer:	Proj. Manager									
Reviewer:	Estimating									
Reviewer:	Title III A-E									
Reviewer:										
Reviewer:										

Special Instruction/Additional Comments:

Dcocument Originator/DCN Requester: Potter

Sent to ECDC: Date: 10/21/98

Submittal/DCN Sent to Contractor: Date:

Status	Defination
A	Reviewed
B	Reviewed , proceed with work incorporating comments. Change submittal as noted and resubmit
C	Change submittal as noted and resubmitt
10	Information only

z:Udaycard

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.:	20102 / 20402	X	CONTRACT NUMBER.: FSC-614	SUBMITTAL NO.: 02770-1	REV.: 5	DATE: October 7, 1998	PAGE 1 OF 1

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45013-9402

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

SIGNATURE: J. Richard Schaubum

RECEIVED BY: Melissa Crews DATE: 10-8-98

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	RESUBMITTAL: YES	NO	TITLE/DESCRIPTION	SUBMITTAL TYPE: CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
5	614-PET-058E	2						X		X		Resume of Superintendent & Alt. Q.A. Chief		X	02770-1.04.B.6 & -.B.7	X		
5	614-PET-058E.3	0						X			X	Resume of Alt. Superintendent & Alt. Q.A. Chief		X	02770-1.04.B.6 & -.B.7	X		

RECEIVED
OCT 16 1998
R. Ehrman

DISTRIBUTION

REVIEW DISTRIBUTION: Distribution	MS	Distribution	MS
Jim Jenkins (Approver)	64	Vern Taylor	52-0
Bruce Schweitzer	64		
Dan Bodine	38		
ECDC	52-7		

CFC DISTRIBUTION: Distribution	MS	Distribution	MS
Jim Jenkins	64	OSDF Station	64
Bruce Schweitzer	64	ECDC	52-7
Mike Godber	64	Vern Taylor	52-0
Dan Bodine	38		

RECEIVED BY: R. Hecht DATE: 10/13/98 NO COMMENTS X COMMENTS ATTACHED: ___
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

000545

2061

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE
A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS - REVISE & RESUBMIT AS CFC OR INF
C - REVISE & RESUBMIT

ENTERED

PETRO
environmental
technologies

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02770-1 (Rev. 5)

RESUME OF INSTALLER'S SUPERINTENDENT And QUALITY ASSURANCE CHIEF

Sections 02770-1.04.B.5, -.B.6, & -.B.7

Document No. 614-PET-058E (Rev. 2)
Document No. 614-PET-058E.3 (Rev. 0)

October 7, 1998

000546

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

2061

RESUME OF INSTALLER'S SUPERINTENDENT
& ALTERNATE QUALITY ASSURANCE CHIEF

MARC MICOCHERO

Document No. 614-PET-058E (Rev. 2)

INFORMATION ONLY

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: _____ Date: 10/13/98

000547

PETRO
environmental
technologies

SOLMAX
GEOSYNTHETICS

October 7, 1998

Mr. Rick Schairbaum
Project Manager
Petro Environmental Technologies, Inc.
Fernald Site Office
PO Box 538704
Cincinnati, Ohio
45253-8704

Re: SWU/OSDF Phase II
Fernald Cell 2 Liner
Solmax Project #SU9819
Foreman Resume

Dear Mr. Schairbaum:

With regard to Mark Micochero's resume previously submitted he was foreman for the following projects on his resume:

Rand Mining – Yellow Aster Mine, Randsburg, CA	450,000 sf 40 mil HDPE
	450,000 sf 60 mil HDPE
Bedford Landfill, Bedford, MA	680,000 sf 40 mil HDPE
Hayden Hill – Amax Gold, Susanville, CA	3,078,000 sf 40 mil HDPE
	4,118,500 sf 60 mil HDPE
	3,103,462 sf 80 mil HDPE
Bond Gold Company, Beatty, NV	3,265,000 sf 40 mil HDPE
	885,000 sf 60 mil HDPE
	200,000 sf 80 mil HDPE

If you have any questions, please call me at 315-853-8930.

Best regards,
Solmax Geosynthetics

William D. Lilley
Project Manager

SOLMAX GEOSYNTHETICS

RESUME

2061

NAME: Marc Micochero

TITLE: Foreman

PROJECT:

NAME: Chemgold — Yuma, AZ

MATERIAL: HDPE, Geo Fab

SQUARE FT: 1,140,000 60 mil
115,000 Amoco 4512

NAME: Chem-Security — Arlington, OR

MATERIAL: HDPE, Polynet

SQUARE FT: 340,080 60 mil SLT Tex
5,786 TX 3200 Composite

NAME: Chiquita Canyon Landfill — Valencia, CA

MATERIAL: HDPE, Geo Fab

SQUARE FT: 1,377,750 80 mil
349,650 60 mil
1,728,000 Trevira 1142
1,728,000 Trevira 1127

NAME: Newmont Mine - Gold Quarry — Elko, NV

MATERIAL: HDPE, Geotextile, Polynet

SQUARE FT: 40,000 80 mil
20,000 8 oz.
20,000 PN2000

SOLMAX GEOSYNTHETICS

Micochero RESUME Page 2

NAME: Bond Gold Company Beatty, NV

MATERIAL: HDPE, Geo

SQUARE FT: 3,265,000 40 mil
885,000 60 mil
200,000 80 mil
80,000 PN3000

NAME: Rand Mining - Yellow Aster Mine Randsburg, CA

MATERIAL: HDPE

SQUARE FT: 450,000 40 mil
450,000 60 mil

NAME: SP Environmental - Holding Pond Sacramento, CA

MATERIAL: HDPE

SQUARE FT: 45,000 80 mil

NAME: Newmont Gold - Rain Mine Elko, NV

MATERIAL: HDPE

SQUARE FT: 90,000 80 mil

NAME: San Jose Const - Fuel Storage San Jose, CA

MATERIAL: HDPE

SQUARE FT: 4,000 80 mil

NAME: Kirby Canyon Morgan Hill, CA

MATERIAL: HDPE

SQUARE FT: 55,000 60 mil

SOLMAX GEOSYNTHETICS

Micocher RESUME Page 3

2061

NAME: Ewing Baker City, OR

MATERIAL: HDPE

SQUARE FT: 60,950 60 mil

NAME: Hayden Hill - Amax Gold Susanville, CA

MATERIAL: HDPE

SQUARE FT: 3,078,000 40 mil
4,118,500 60 mil
3,103,472 80 mil
330,000 PN3000 Drainage Net
330,000 PN2000 Drainage Net

NAME: Tacoma Landfill Tacoma, WA

MATERIAL: HDPE, Geotextile, Polynet, Geocomposite, Friction Seal

SQUARE FT: 4,200,000 60 mil
1,700,000 60 mil
1,000,000 Double Sided
2,100,000 CN3000
2,100,000 6 oz.

NAME: White Pine Mine Ely, NV

MATERIAL: HDPE

SQUARE FT: 165,000 60 mil

NAME: Chimney Creek Winnemucca, NV

MATERIAL: HDPE, Geotextile

SQUARE FT: 230,000 60 mil
230,000 6 oz. Geotextile

SOLMAX GEOSYNTHETICS

Micochero RESUME Page 4

NAME: Hycroft Black Crow, NV

MATERIAL: HDPE, Geotextile

SQUARE FT: 195,305 40 mil

NAME: Bedford Landfill Bedford, NH

MATERIAL: Solmax 440T

SQUARE FT: 680,000sf

RESUME OF INSTALLER'S ALTERNATE SUPERINTENDENT & ALTERNATE QUALITY ASSURANCE CHIEF

ANGELO GAETANO

Document No. 614-PET-058E.3 (Rev. 0)

INFORMATION ONLY

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: _____ Date: 1/14/98

PETRO environmental technologies

SOLMAX
GEOSYNTHETICS

4691 Commercial Drive
Suite 345, New Hartford, NY
13413, USA
Tel.: (315) 853-8930
Fax.: (514) 853-8944

RESUME

Name: Angelo Gaetano

Job Title: Site Superintendent, Master Seamer, and Quality Control Inspector

EDUCATION

- Bachelor of Arts, State University of New York at Buffalo, 1994
- OSHA 40 Hour Certification
- CPR Certification
- First Aid Certification
- Confined Space Entry Certification

WORK EXPERIENCE

Our company has employed Angelo Gaetano since 1993. Mr. Gaetano has successfully completed SOLMAX's 305 hour Field Technicians Education Program "Welding and Assembling of Geosynthetics" specifically designed and sanctioned by the Quebec Ministry of Education. Mr. Gaetano has gathered extensive experience in the field having successfully participated in the installation of over 12 million square feet of HDPE, 4 million square feet of GCL, 1 million square feet of XR-5 and over 5 million square feet of Geonet/Geocomposite in North America.

INSTALLATION EXPERIENCE

1993	Vehicle Wash Facility Fort Drum (NY) US Corp of Engineers	HDPE 1.0 & 1.5 mm / 40 &60 mil 63,100m² / 680,000 ft2 (*)
1993	MSW landfill Western Berks (Pa) County of Western Berks	HDPE 1.5/ 60 mil 17,560 m2/ 189,000 ft2
1994	Secondary Containment Albany (NY) Sears Oil	HDPE 1.0 mm/ 40 mil 1,150 m2/ 12,500 ft2

INSTALLATION EXPERIENCE (continued)

2061

1994	Landfill Cap Reconstruction Lake Placid (NY) Town of North Elba	HDPE 1.0 mm/ 40 mil 19,700 m2 /213,000 ft2
1994	Landfill Cap Schuylerville (NY) Town of Saratoga	HDPE 1.0 mm/ 40 mil 37,161 m^2/ 400,000 ft^2
1994	Decon Pad Onondaga Indian Reservation O'Brian & Gere Engineering	HDPE 1.0 mm/ 40 mil 700 m^2/ 7225 ft^2
1994	FMC Corporation Medina, (NY) REMCOR, Inc.	HDPE / COEX 1.0 & 1.5 mm/ 40 & 60 mil 30,650 m^2/ 330,000 ft^2
1994	Lagoon Liner Broadheadsville (PA) Broadheadsville School Dist.	HDPE 1.5 mm / 60 mil 10,700 m^2 / 115,500 ft^2
1994	Secondary Containment Jamestown (NY) Valeo Engine Cooling, Inc.	HDPE 1.5mm / 60 mil 1,350 m^2 / 15,000 ft^2
1994	Water Basin Repair Philadelphia, (PA) City of Philadelphia	HDPE 1.5mm / 60 mil 10,680 m^2 / 115,000 ft^2
1994	Landfill Cell Expansion Presho, (NY) County of Steuben	HDPE 1.0 mm / 40 mil 4,250 m^2 / 46,000 ft^2
1994	Golf Course Ponds Page (AZ) Horizon Golf	HDPE 1.0 mm / 40 mil 24,100 m^2 / 260,000 ft^2
1995	Landfill Cap Port Deposit, (MD) Bainbridge NTC	HDPE 1.0 mm / 40 mil 60,400 m^2 / 650,000 ft^2
1995	Tank Liner Endicott, (NY) IBM Corp.	HDPE 2.0 mm / 80 mil 75 m^2 / 800 ft^2 (*)

ANGELO GAETANO

INSTALLATION EXPERIENCE (continued)

1995	Leachate Storage Lagoons Wampsville, (NY) Madison County DSW&S	HDPE 1.5 mm / 60 mil 10,590 m^2 / 114,000 ft^2 (#)
1995	Nuclear Waste Cap West Valley, (NY) N.Y.S.E.R.D.A.	XR-5 .9 mm / 36 mil 46,450 m^2 / 500,000 ft^2 (#)
1995	Haz. Soil Cap Pendelton, (NY) Frontier Chemical	HDPE 1.5 mm / 60 mil 30,285 m^2 / 326,000 ft^2(#)
1995	Tank Liner (Tank 2) Endicott, (NY) IBM Corp.	HDPE 2.0 mm / 80 mil 75 m^2 / 800 ft^2(*)
1995	MSW Landfill Expansion Cohoes, (NY) Town of Colonie	HDPE 1.5 mm / 60 mil 88,225 m^2 / 950,000 ft^2(#)
1996	Tank Liner #2 Endicott (NY) IBM Corp.	HDPE 2.0 mm/ 80 mil 75 m^2 / 800 ft^2(*)
1996	Landfill cap Bourne (MA) Horizon Golf	Rufco EX 30 0.5 mm/40 mil 28,330 m^2 / 340,315 ft^2(#)
1996	Fondation Liner West Hartford (CT) BJ'S whole sale	Rufco EX 30 0.75/30 mil 14,450 m^2 / 123,250 ft^2(#)
1996	Landfill cap Town of Dover (NY) Town of Dover	LLDPE 1.0 mm/40 mil 12,500 m^2 / 134,550 ft^2(#)
1996	MSW Landfill cell Honey Brook (NY) Pavex	HDPE 1,5 mm/60 mil 111,480 sm/1220000sf(#)

ANGELO GAETANO

2061

INSTALLATION EXPERIENCE (continued)

1996	Temporary Cover Nashua (NH) L.K. Ladd	RAVEN 0.5 mm/20 mil 73391 sm/790,000 sf (*)
1996	Industriel Landfill Cap Goulds Pump (NY) Kilby Brothers	LLDPE 1,5 mm/60 mil 28836 sm/310,400 sf(#)
1996	Fluid Lagoon Hancock (NY) Maxim Construction	HDPE 1,5 mm/60 mil 14400 sm/155,000 sf(#)
1996	Ash Landfill Cap Sprout Brook (NY) New Roch. Construction Corp.	HDPE 1,5 mm/60 mil 79430 sm/855,000 sf(#)
1996	HAZ Landfill Cap Acton (MA) GZA Remediation	HDPE 1,5 mm/60 mil 35181 sm/378,700 sf(#)
1996	C+D Landfill Cap Guiderland (NY) Kilby Brothers	HDPE 1,0 mm/40 mil 22296 sm/240,000 sf(#)
1996	Industrial Landfill Cap Massena (NY) Bechtel	LLDPE 1,0 mm/40 mil 25000 sm/269,107 sf (*)
1996	Brine Setting Ponds Avoca (NY) Poling & Bacon Const.	HDPE 1,0/1,5 mm/40/60 mil 6503 sm/70,000 sf (*)
1996	MSW Landfill Cap Colony (NY) Kilby Brothers	HDPE 1,5 mm/60 mil 13935 sm/150,000 sf(#)
1996	HAZ Materials Landfill Pendleton (NY) Sevenson Environmental	HDPE 1,5 mm/60 mil 33452 sm/360,085 sf (*)

ANGELO GAETANO

000557

INSTALLATION EXPERIENCE (continued)

1996	Landfill Cap Brigadoon (NY) Dan Hostetter	HDPE 0,75 mm/30 mil 27870 sm/300,000 sf(#)
1996	HAZ Landfill Cap Buffalo (NY) SLC Constructors	XR-5 0,75 mm/30 mil 47379 sm/510,000 sf(#)
1996	MSW Landfill Cap Schuyler Falls (NY) Luck Brothers	HDPE 1,5 mm/60 mil 30000 sm/322,928 sf(#)
1997	Landfill Closure Laurel Park (CT) Smith Kajima	LLDPE 1,0 mm/40 mil 111480 sm/ 1200000(#)
1997	Sanitary Landfill Rockport (MA) SEA Consultants	HDPE 1.0 mm/40 mil 46500 sm/500,538 sf(#)
1997	Landfill Closure Norwalk (CT) Site Remediation	HDPE 1.5 mm/60 mil 5202 sm/55,996 sf(#)
1997	Lagoon Sludge Monofil (Troy, NY) Rensselaer county bureau	HDPE 1.5 mm/60 mil 7000 sm/75,350 sf(#)
1997	Lagoon LiLy Pond (NY) Jett Industries	HDPE 1.5 mm/ 60 mil 929 sm/10,000 sf(#)
1997	Landfill Closure PCS Superfund Site (MA) IT Corporation	HDPE 1.5 mm/ 60 mil 6254 sm/67,330 sf(#)
1997	Landfill Closure Fimbel Door Corporation (NH) F.L. Merrill Construction	LLDPE 1.0 mm/ 40 mil 1588 sm/17,100 sf (#)
1997	Landfill Closure Carrs Mill Landfill (MD) Pavex	LLDPE 1.0 mm / 40 mil 29820 sm/ 321,000sf(#)

ANGELO GAETANO

2061

1997	Abandoned Solvent Center Pompey, NY OBG Technical Services	LLDPE 1.0 mm / 40 mil 5103 sm / 54,390 sf (*)
1997	Landfill Expansion Westmoreland, PA Municipal Authority of Westmoreland	HDPE 1.5 mm / 60 mil 38274 sm / 412,000sf(#)
1997	C & D Landfill Closure Nashua, NH IEM Sealand Corporation	HDPE 1.0 mm / 40 mil 53044 sm / 570,990sf(#)
1998	Fort Edward Landfill Closure Fort Edward, NY Kubrickey Construction	LLDPE 1.0 mm / 40 mil 111,479 sm / 1200000s(#)
1998	Colonie Landfill Closure Colonie, New York J.H. Maloy, Inc.	LLDPE 1.0 mm / 40 mil 49,797 sm / 530, 000 sf
1998	Strasburg Superfund Site Test Pad and Toe drain Coatesville, PA Earth Tech, Inc.	 LLDPE 1.0 mm / 40 mil 4228 sm / 45,511 sf (*)
1998	Nimo Hudson Hudson, New York AAA Environmental	HDPE 1.0 mm / 40 mil 2786 sm / 30,000 sf (*)
1998	Bennington Superfund Site Bennington, Vermont Sevenson Environmental Services, Inc.	LLDPE 1.0 mm / 40 mil 3251 sm / 35,000 sf (*)

(*) Projects in which Mr. Gaetano was Quality Control Inspector.
(#) Projects in which MR. Gaetano was Site Superintendent.

DOCUMENT ROUTING SHEET
ON-SITE DISPOSAL FACILITY
PROJECT NO. 20102

Date: 10/13/98

Project/Contract/P.O. Name OSDF Phase II Project/Contract/P.O. No. FSC-614

Document Title

Review the attached Document/Submittal/DCN and return to: HeaTL DUE DATE 10/15/98

Submittal/DCN No. 614PET 058 Date: Submittal/DCN Title Resume of Superintendant

058 C3

Routing Sequence	Reviewing Discipline	Review To Be Completed By	Review Completed By	Document/DCN Approved	Document/DCN Disapproved	Sumittal Status "A"	"B"	"C"	"10"	Remarks
(1) Reviewer:	Engineering	ATSHAW VanArsdale				CCV 10/13 YA 10/13				
Reviewer:	Construction									
Reviewer:	Safety									
Reviewer:	Quality									
Reviewer:	Procurement									
Reviewer:	Project Controls									
Reviewer:	Envir. Compliance									
Reviewer:	Proj. Manager									
Reviewer:	Estimating									
Reviewer:	Title III A-E									
Reviewer:										
Reviewer:										

Special Instruction/Additional Comments:

Dcocument Originator/DCN Requester: RE HeaTL

Sent to ECDC: Date: 10/13

Submittal/DCN Sent to Contractor: Date:

Status	Defination
A	Reviewed
B	Reviewed , proceed with work incorporating comments. Change submittal as noted and resubmit
C	Change submittal as noted and resubmitt
10	Information only

a:Udaycard

000560

SUPPLIER DOC[redacted]T SUBMITTAL

FDF PROJECT NO[redacted]	20102	X	CONTRACT NUMBER.: FSC-614	SUBMITTAL NO.: 02770-1	REV.: 6	DATE: October 19, 1998	PAGE 1 OF 1
	20402						

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45013-9402

SIGNATURE: J. Richard Schaibacum

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY: Melissa Cruse DATE: 10-20-98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
5	614-PET-058A	1						X		X		Installation Schedule	X		02770-1.04.B.2	X		
5	614-PET-058B	1						X		X		Installation Capabilities		X	02770-1.04.B.3.a-c	X		

RECEIVED
NOV 09 1998
R Grisman

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Jim Jenkins (Approver)	64	Vern Taylor OCT 21 1998	52-0	Jim Jenkins	64	OSDF Station	64
Bruce Schweitzer	64			Bruce Schweitzer	64	ECDC	52-7
Dan Bodine	38			Mike Godber	64	Vern Taylor	52-0
ECDC	52-7			Dan Bodine	38		

RECEIVED BY: James C. Jenkins DATE: 10/26/98 NO COMMENTS ✓ COMMENTS ATTACHED ___
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

000591

2061

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION

INF - INFORMATION/RECORD

"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS

B - MINOR COMMENTS - REVISE & RESUBMIT AS CFC OR INF

C - REVISE & RESUBMIT

ENTERED

PETRO
environmental
technologies

[ ] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig:_____ Date:_____

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02770-1 (Rev. 6)

INSTALLATION SCHEDULE &
INSTALLATION CAPABILITIES
Sections 02770-1.04.B.2 & -B.3.a-c

Document No. 614-PET-058A (Rev. 1)
Document No. 614-PET-058B (Rev. 1)

October 19, 1998

000562

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

2061

ECDC CONTROLLED
COPY NO. C011

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: J.C. Jackson Date: 10/26/98

INSTALLATION SCHEDULE

Section 02770-1.04.B.2
Document No. 614-PET-058A, Rev. 1

PETRO environmental technologies

PROPOSED INSTALLATION SCHEDULE FOR INSTALLATION OF GEOSYNTHETICS IN OSDF CELL 2

Description	Duration	Start*	Finish*	Assignments
Secondary GCL	28 days	09/11/98	10/12/98	Solmax Foreman, Solmax Technicians, and Union Labor
Secondary GML	28 days	09/11/98	10/12/98	Solmax Foreman, Solmax Master Seamer, Solmax Technicians, and Union Labor
Sec. Geotextile Cushion	5 days	09/25/98	10/13/98	Solmax Technicians and Union Labor
Primary GCL	12 days	10/14/98	10/28/98	Solmax Foreman, Solmax Technicians, and Union Labor
Primary GML	12 days	10/14/98	10/28/98	Solmax Foreman, Solmax Master Seamer, Solmax Technicians, and Union Labor
Prim. Geotextile Cushion	12 days	10/17/98	10/30/98	Solmax Technicians and Union Labor
Geotextile Filter	3 days	10/28/98	10/31/98	Solmax Technicians and Union Labor

*All dates assume no significant construction or weather delays.

PETRO
environmenta
technologie

2061

INFORMATION ONLY

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: Date: 10/26/98

INSTALLATION CAPABILITIES -

PROPOSED EQUIPMENT & AVERAGE DAILY PRODUCTION

Sections 02770-1.04.B.3.a-b
Document No. 614-PET-058B, Rev. 1

PETRO environmental technologies

EQUIPMENT PROPOSED FOR THIS PROJECT

- Three wedge welders manufactured by Solmax International
- One ATV manufactured by Honda
- Two extrusion welder machines
- Two sewing machines from Union Special
- Sandbags
- One field tensiometer
- One vacuum testing equipment
- One pressure testing equipment
- Five generators (min.)
- Three leister machines
- One spreader bar

As needed, the Jerry Istre Company shall also rent the following equipment to Solmax in order to facilitate geosynthetics installation:

- Three Columbine wedge welders
- Two leisters
- Three extrusion welder machines
- One field tensiometer

AVERAGE DAILY PRODUCTION ANTICIPATED

- ***GCL:*** Average 15,000 ft.^{2} per day – 1 foreman, 1 technician, 8 laborers, 1 QC Chief
- ***80-mil GML:*** Average 15,000 ft.^{2} per day – 1 foreman, 4 technicans, 8 laborers, 1 QC Chief
- ***Geotextile:*** Average 50,000 ft.^{2} per day – 1 foreman, 2 technicians (sewers), 4 laborers
- ***Geofilter:*** Average 55,000 ft.^{2} per day – 1 foreman, 2 technicians (sewers), 4 laborers

PETR
environmen
technologi

DOCUMENT ROUTING SHEET
ON-SITE DISPOSAL FACILITY
PROJECT NO. 20102

2061

Date: 10/21/98

Project/Contract/P.O. Name OSDF - Phase II Project/Contract/P.O. No. FSC-614

Document Title

Review the attached Document/Submittal/DCN and return to: Jenkins DUE DATE 10/26/98

Submittal/DCN No. 02770-1 Rev. 6 Date: 10/19 Submittal/DCN Title Installation Schedule Installation Capabilities

Routing Sequence	Reviewing Discipline	Review To Be Completed By	Review Completed By	Document/DCN Approved	Document/DCN Disapproved	Sumittal Status "A"	"B"	"C"	"10"	Remarks
Reviewer:	Engineering Kpath / Van Dusdale		CCV			CCV 10/26				
Reviewer:	Construction	10/26								
Reviewer:	Safety									
Reviewer:	Quality Godber	10/26	11/14 10/26/98			X				
Reviewer:	Procurement									
Reviewer:	Project Controls									
Reviewer:	Envir. Compliance									
Reviewer:	Proj. Manager									
Reviewer:	Estimating									
Reviewer:	Title III A-E									
Reviewer:										
Reviewer:										

Special Instruction/Additional Comments: Review with Approved Revisions

Dcocument Originator/DCN Requester: Petro

Sent to ECDC: Date: 10/26/98

Submittal/DCN Sent to Contractor: Date:

Status	Defination
A	Reviewed
B	Reviewed , proceed with work incorporating comments. Change submittal as noted and resubmit
C	Change submittal as noted and resubmitt
10	Information only

Udaycard

000567

SUPPLIER DOC NT SUBMITTAL

FDF PROJECT NOs.:	20102	X	CONTRACT NUMBER.: FSC-614	SUBMITTAL NO.: 02770-3	REV.: 0	DATE: September 8, 1998	PAGE 1 OF 1
	20402						

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45013-9402

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

SIGNATURE: J. Richard Schaubum

RECEIVED BY: Melissa Creeks DATE: 9-8-98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
5	614-PET-058G	0						X			X	Installer's Letter of Approval	X		02770-1.04.A	X		

RECEIVED
OCT 02 1998
R Chisman

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Jim Jenkins (Approver)	64	Vern Taylor	52-0	Jim Jenkins	64	OSDF Station	64
Bruce Schweitzer	64			Bruce Schweitzer	64	ECDC	52-7
Dan Bodine	38			Mike Godber	64	Vern Taylor	52-0
ECDC	52-7			Dan Bodine	38		

000568

RECEIVED BY: James C. Jenkins DATE: 9/24/98 NO COMMENTS ✓ COMMENTS ATTACHED ____

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION

INF - INFORMATION/RECORD

"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS

B - MINOR COMMENTS - REVISE & RESUBMIT FOR CFC OR INF

C - REVISE & RESUBMIT

PETRO
environmental
technologies

2061

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02770-3 (Rev. 0)

INSTALLER'S LETTER OF APPROVAL
Section 02770-1.04.A

Document No. 614-PET-058G (Rev. 0)

September 8, 1998

INFORMATION ONLY

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comments, Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: Date: 9/24/98

000569

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

GSE®

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
281-443-8564
Fax 281-875-6010

August 27, 1998

Solmax Geosynthetics
4961 Commercial Dr., suite 345
New Hartford, NY 13413

ATTN: Bill Lilley

RE: Installer Approval for Fluor Daniel Fernald Project/FERMCO
GSE MR 7920-01. Project No. C1269
Fluor Daniel Contract No. DE-AC24-920R32972

To whom it may concern:

The undersigned, being qualified and authorized to do so, hereby acknowledges Solmax Geosynthetics International and its employees as an approved installer of GSE's geosynthetic products at the FERMCO Project.

Regards,

David Leggett
Manager - Dealer Sales

000570

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.	20102 / 20402	X	CONTRACT NUMBER.: FSC-614	SUBMITTAL NO.: 02770-5	REV.: 0	DATE: September 9, 1998	PAGE 1 OF 1

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45013-9402

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

SIGNATURE: J. Richard Schaubaum

RECEIVED BY: Melissa Crews DATE: 9-10-98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
6	614-PET-058I	0							X		X	Certificates of Tensiometer Calibration (Istre)	X		02770-1.04.C	X		

RECEIVED
SEP 17 1998
R Glusman

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Mike Godber (Approver)	64	ECDC	52-7	Jim Jenkins	64	OSDF Station	64
Bruce Schweitzer	64	Vern Taylor	52-0	Bruce Schweitzer	64	ECDC	52-7
Jim Jenkins	64			Mike Godber	64	Vern Taylor	52-0
Dan Bodine	38			Dan Bodine	38		

RECEIVED BY: Michael J. Godber DATE: 9/10/98 NO COMMENTS X COMMENTS ATTACHED ____

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

0005271

2061

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION

INF - INFORMATION/RECORD

"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS

B - MINOR COMMENTS - REVISE & RESUBMIT AS CFC OR INF

C - REVISE & RESUBMIT

ENTERED

PETRO
environmental
technologies

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02770-5 (Rev. 0)

CERTIFICATE OF TENSIOMETER CALIBRATION
(JERRY ISTRE COMPANY)
Section 02770-1.04.C

Document No. 614-PET-058I (Rev. 0)

INFORMATION ONLY

September 9, 1998

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: Date: 9/10/98

000572

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

000573

COLUMBINE INTERNATIONAL, Ltd.

CALIBRATION CERTIFICATE

Customer Name: THE ISTRE CO
Tensiometer Serial Number: NAL-0896

110 Volt [X]
220 Volt [ ]

Device Calibrated: S-Type load cell
Range: 0-500 lb Tension
Model No: M2300-500
Serial No: 126721

Readout Model No: 2840AG-24123
Readout Serial No: 10553035-149
Channel No: N/A

Calibration Apparatus:
Dead Weight system w/
Fluke Model 8840A Multimeter

Weights, hanger, & Multimeter:
Last calibrated: 1/96

Indicator reading with no load: 0

Applied Force (lbs):	Output (mv):	Display reading:	Deviation Error (%):
2	2.127	2	0.00
52	4.257	52	0.00
102	6.126	102	0.00
152	8.019	152	0.00
202	9.890	202	0.00
252	11.766	252	0.00
302	13.638	302	0.00

Total Deviation Error (%): 0.00

Temperature at time of calibration: 73 degrees F
Exitation Voltage: 10 V DC

Scale Factor (1)	0.08	Offset (1):	-62
Scale Factor (2)	0.08	Offset (2):	-62
Break poin	2670	Calibration Check	N/A

Traceable to NIST Standards

***NOTE: Readout and load cell above have been systems calibrated and are considered a matched pair. in general, calibrated readouts and load cells are not interchangeable.**

This calibration conforms to the standards set by ASTM E4.

Calibration performed by: ANDRE DERIEUX

Signature: Andre Derieux Date: 4/8/98

2061

(530) 622-2791
5441 Merchant Circle
Placerville, CA 95667

1-800-635-6693
Fax (530) 622-2704
Internet: columbineint.com

SUPPLIER DO ENT SUBMITTAL

FDF PROJECT NOs.:	20102	X	CONTRACT NUMBER.: FSC-614	SUBMITTAL NO.: 02770-5	REV.: 1	DATE: September 11, 1998	PAGE 1 OF 1
	20402						

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45013-9402

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

SIGNATURE: J. Richard Schaubum

RECEIVED BY: Melissa Crews DATE: 9-11-98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
6	614-PET-0581.1	0							X		X	Certificates of Tensiometer Calibration (Solmax)	X		02770-1.04.C	X		

RECEIVED
SEP 17 1998
R. Chuman

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Mike Godber (Approver)	64	ECDC	52-7	Jim Jenkins	64	OSDF Station	64
Bruce Schweitzer	64	Vern Taylor	52-0	Bruce Schweitzer	64	ECDC	52-7
Jim Jenkins	64			Mike Godber	64	Vern Taylor	52-0
Dan Bodine	38			Dan Bodine	38		

RECEIVED BY: Michael W. Godber DATE: 9/14/98 NO COMMENTS X COMMENTS ATTACHED ____
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

000574

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION

IN[illegible]ORMATION/RECORD

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS

B - MINOR COMMENTS - REVISE & RESUBM[illegible] CFC OR INF

PETRO
environmental
technologies

2061

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02770-5 (Rev. 1)

CERTIFICATE OF TENSIOMETER CALIBRATION
(SOLMAX COMPANY)
Section 02770-1.04.C

Document No. 614-PET-058I.1 (Rev. 0)

September 11, 1998

[X] A - Conforms to the Subcontract Requ...
[ ] B - Minor Comment - Incorporate and ...
[ ] C - Revise and Resubmit
Sig: Date: 9/14/98

INFORMATION ONLY

000575

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

SOLMAX
GEOSYNTHETICS

September 9, 1998

Mr. Mark Mather
Project Manager
Petro Environmental Technologies, Inc.
Fernald Site Office
PO Box 538704
Cincinnati, Ohio
45253-8704

Re: SWU/OSDF Phase II
Fernald Cell 2 Liner
Solmax Project #SU9819
Calibration of tensiometer

Dear Mr. Mather:

With regards to the calibration of the field tensionmeter and gages submittals 1.04 C and 1.04 D our calibration is traceable to the national recognized standards of Canada. The sheets attached to the calibration certificates shows that the calibration is done in conformance with the Canadian standards.

If you have any questions, please call me at 315-853-8930.

Best regards,
Solmax Geosynthetics

Bill Lilley

William D. Lilley
Project Manager

SOLMAX GEOSYNTHETICS

Document No. SU-QP-11.1-4
Rev.:00

2061

CALIBRATION LOG SHEET FOR TENSIOMETERS

Equipment No. Tensiometer # T 007

Equipment Standard Parameters:

1° Load Cell:

Required Precision: ± 1 Lb. (4.45 N) **Equipment's Precision:** ± 0,1 Lb. (0.45 N)

Tolerance: ± 2%

Calibrated at: 4,4 Lbs/po (7.71 N/cm) **And** 110,8 Lbs/po (193.9 N/cm)

Calibration Method: Set of calibrated weights certified by an independent firm.

Calibration of the weights: Every 3 years

2° Speed Unit:

Required Precision: ± 10 rpm **Equipment's Precision:** ● 1 rpm

Tolerance: ± 5%

Calibrated at: 2 in./min. (50 mm/min.) 12 in./min. (300 mm/min.) 20 in./min. (500 mm/min.)

Calibration Method: Internal setup using a calibrated tachometer to read the tensiometer's rpm at different speeds.

Calibration of the tachometer: Every 3 years

Results:

Load Cell:

	Results	Tolerance	Comments
4,4 lbs	4.4	4.3 to 4.5	
110,8 lbs	110.8	108,6 to 113,0	

Speed:

	Results	Tolerance	Comments
2 in./min.	1.98	1.9 to 2.1	
12 in./min.	11.98	11.4 to 12.6	
20 in./min.	20	19.0 to 21.0	

Completed by: Daniel E. Saueders — 27/08/98 **Date**

Daniel E. Saueders
Equipment Techician Solmax

BRIAN CONTROLS

a division of

PEACOCK

8600 St.Patrick, Lasalle, (Quebec) H8N 1V1 Telephone (514) 366-5757, Fax (514) 366-1134
Halifax, Moncton, Quebec, Montreal, Toronto, Sarnia, Winnipeg, Calgary, Edmonton, Vancouver

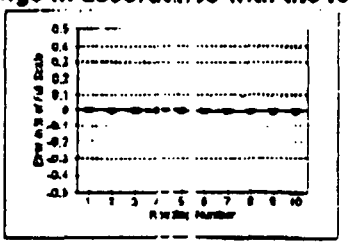
Certified Test Report

Certificate Serial No: 14555
Description: U.S.Gauge model 1:04 4½" Test gauge
Range: 0 to 60 PSI **Serial No:** N/A
Customer: Solmax
Standard used: Mansfield & Green Deadweight Tester
Type: RK-1100 **Serial No:** 72174
Traceability to: N.I.S.T.
Position: Vertical

Cert Date: August 17, 1998
Recert Date: August 17, 1999
Tolerance: ± 0.5%
Order No: PR166782
Our Order No. F-28886
Accuracy: 0.025%
Report No: P-7645
Temperature: 25°C

#	Master	Reading Up	Reading Down	% Error
1	10	10	10	0.00%
2	15	15	15	0.00%
3	20	20	20	0.00%
4	25	25	25	0.00%
5	30	30	30	0.00%
6	35	35	35	0.00%
7	40	40	40	0.00%
8	45	45	45	0.00%
9	50	50	50	0.00%
10	60	60	60	0.00%

Certified that the above item has been inspected and tested to comply in every way with the relevant specifications and/or drawings in accordance with the requirements of the above purchase order.



Form 30-6

Signed: Steve Pardoe

2061

CERTIFICAT # : 03921

PROJEAN INSTRUMENTS INC.
1332 rue Bélanger Montréal, Qué., H2G 1A1
TEL.:(514) 273-8331 FAX: (514) 274-4844

CERTIFICAT D'ÉTALONNAGE
CALIBRATION CERTIFICATE

Manufacturier - manufacturer:	LUTRON
Modèle - Model:	DT-2236
No. de série - Serial no.:	L41957
Instrument:	TACHOMETER
Client - Customer:	SOLMAX INTERNATIONAL
NO. d'invent. - Invent. no.:	
Procédure d'étalonnage: Calibration procedure:	LUTDT2136
Révision-Revision:	1.0
Cycle d'étalonnage: Calibration cycle:	3 ANS
Échéance - Due date:	22-oct-99

---------- État de l'instrument - condition of instrument ----------

A la réception - as received:	Selon les normes/Within specifications NOTE: ÉCHÉANCE DE TROIS ANS DEMANDÉ PAR LE CLIENT
Au retour - as returned:	Selon les normes/Within specifications

— Température et humidité ambiante - Ambient temperature and relative humidity—

TEMPERATURE: 24.2°C HUMIDITÉ-HUMIDITY: 22%

L'étalonnage de l'intrument a été effectuée par:
The calibration of the instrument has been performed by: B. Rondeau

Une vérification du certificat a été effectué par
A vérification of the certificate has been made by:

Date: 22-oct-98

PAGE: 1/3

CERTIFICAT # : 03921

PROJEAN INSTRUMENTS INC.
1332 rue Bélanger Montréal, Qué., H2G 1A1
TEL.:(514) 273-8331 FAX: (514) 274-4848

CERTIFICAT D'ÉTALONNAGE
CALIBRATION CERTIFICATE

Manufacturier - manufacturer:	LUTRON
Modèle - Model:	DT-2236
No. de série - Serial no.:	L4195174
Instrument:	TACHOMETER
Client - Customer:	SOLOMAX INTERNATIONAL
NO. d'invent. - Invent. no.:	
Procédure d'étalonnage: Calibration procedure:	LUTDT2236
Révision-Revision:	1.0
Cycle d'étalonnage: Calibration cycle:	3 ANS
Échéance - Due date:	22-oct-91

---------- Etalons utilisés - Calibration equipement used ----------

Manufacturier	No. inventaire	Date calibré	Échéance
FLUKE 5500	009	08-MAI-96	08-MAI-97

Les étalons utilisés sont retraçables au Conseil National de Recherche du Canada (CNR) ou au National Institute of Standards and Technology (NIST).

The calibration equipement used are tracable to the National Research Council of Canada (NRC) or to the National Institute of Standards and Technology (NIST)

000580

2061

CERTIFICAT # : 03921

An-Ms-Jr

CLIENT : SOLOMAX INTERNATIONAL

INSTRUMENT: TACHOMETER

S/N : L418574

INVENT. # :

DATE CAL: 22-oct-98

DATE DUE: 22-oct-99

PROCEDURE : LUTUT2238

True value Val.Réelle	Reading Lecture	Deviation Déviation	Tolerance Tolérance
60000 RPM	60016 RPM	-0.025 %	± 0.062 %
12000 RPM	12001 RPM	-0.008 %	± 0.058 %
6000 RPM	6002 RPM	-0.033 %	± 0.067 %
1200 RPM	1200 RPM	0.000 %	± 0.133 %
600 RPM	600.0 RPM	0.000 %	± 0.067 %
120 RPM	120.0 RPM	0.000 %	± 0.133 %
60 RPM	60.0 RPM	0.000 %	± 0.217 %
12 RPM	12.0 RPM	0.000 %	± 0.883 %

SUPPLIER DO :ENT SUBMITTAL

FDF PROJECT NOs.:	20102	X	CONTRACT NUMBER.: FSC-614	SUBMITTAL NO.: 02770-6	REV.: 0	DATE: September 11, 1998	PAGE 1 OF 1
	20402						

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45013-9402

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

SIGNATURE: J. Richard Schairbaum

RECEIVED BY: Melissa Lewis DATE: 9-11-98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
6	614-PET-058J.1	0							X		X	Certificate for Air Pressure Gauges (Solmax)	X		02770-1.04.D	X		
6	614-PET-058J.2	0							X		X	Certificate for Vacuum Box Gauge (Solmax)	X		02770-1.04.D	X		

RECEIVED
SEP 17 1998
R Guzman

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Mike Godber (Approver)	64	ECDC	52-7	Jim Jenkins	64	OSDF Station	64
Bruce Schweitzer	64	Vern Taylor	52-0	Bruce Schweitzer	64	ECDC	52-7
Jim Jenkins	64			Mike Godber	64	Vern Taylor	52-0
Dan Bodine	38			Dan Bodine	38		

000582

RECEIVED BY: Michael W. Godber DATE: 9/14/98 NO COMMENTS X COMMENTS ATTACHED ____
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

COMMENTS

SUBMITTAL ACTION CODE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
I[illegible]FORMATION/RECORD

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE
A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS - REVISE & RESUBM[illegible] CFC OR INF

PETRO
environmental
technologies

2061

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02770-6 (Rev. 0)

CERTIFICATES OF CALIBRATION FOR AIR PRESSURE GAUGES AND VACUUM BOX GAUGE (SOLMAX COMPANY)

Section 02770-1.04.D

Document No. 614-PET-058J.1 (Rev. 0)
Document No. 614-PET-058J.2 (Rev. 0)

September 11, 1998

000583

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3403 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

SOLMAX
GEOSYNTHETICS

September 9, 1998

Mr. Mark Mather
Project Manager
Petro Environmental Technologies, Inc.
Fernald Site Office
PO Box 538704
Cincinnati, Ohio
45253-8704

Re: SWU/OSDF Phase II
Fernald Cell 2 Liner
Solmax Project #SU9819
Calibration of tensiometer

Dear Mr. Mather:

With regards to the calibration of the field tensionmeter and gages submittals 1.04 C and 1.04 D our calibration is traceable to the national recognized standards of Canada. The sheets attached to the calibration certificates shows that the calibration is done in conformance with the Canadian standards.

If you have any questions, please call me at 315-853-8930.

Best regards,
Solmax Geosynthetics

Bill Lilley

William D. Lilley
Project Manager

CERTIFICATE OF CALIBRATION FOR AIR PRESSURE GAUGES

(SOLMAX COMPANY)

Section 02770-1.04.D
Document No. 614-PET-058J.1 (Rev. 0)

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: Date: 9/4/98

INFORMATION ONLY

PETRO environmental technologies

SOLMAX
GEOSYNTHETICS

PRESSURE GAUGE CALIBRATION LOG

GAUGE NO.	RANGE	25 psi std	35 psi std.	Delta	Reading correction *	Location
122	0-60 psi	27	37	+2	-2	CANADA
123	0-60 psi	24.5	34.5	-0.5	+.5	CANADA
124	0-60 psi	23	33	-2	-2	CANADA
125	0-60 psi	25	35	0	—	CANADA
126	0-60 psi	25.5	35.5	+0.5	-0.5	CANADA
127	0-60 psi	23	33	-2	+2	CANADA
128	0-60 psi	27	37	+2	-2	CANADA
129	0-60 psi	27	37	+2	-2	CANADA
130	0-60 psi	24	34	-1	+1	CANADA
131	0-60 psi	23.5	33.5	-1.5	+1.5	CANADA
132	0-60 psi	24	34	-1	+1	CANADA
133	0-60 psi	24	34	-1	+1	CANADA
134	0-60 psi	25	35	0	—	CANADA
135	0-60 psi	25	35	0	—	CANADA
①→ 136	0-60 psi	25	35	0	—	USA
137	0-60 psi	23.5	33.5	-1.5	+1.5	CANADA
138	0-60 psi	24	34	-1	+1	CANADA
139	0-60 psi	25	35	0	—	CANADA
②→ 140	0-60 psi	27.5	37.5	+2.5	-2.5	USA
141	0-60 psi	27.5	37.5	+2.5	-2.5	CANADA
142	0-60 psi	25	35	0	—	CANADA
143	0-60 psi	24	34	-1	+1	CANADA
144	0-60 psi	23.5	33.5	-1.5	+1.5	CANADA
③→ 145	0-60 psi	23	33	-2	+2	USA
146	0-60 psi	25.5	35.5	+0.5	-0.5	CANADA

* Add/Subtract from gauge reading in order to obtain actual value.

COMPLETED BY: Carlos Montreo DATE: 15-07-98

Carlos Montreo
Electri-techician
Solmax

2061

CERTIFICATE OF CALIBRATION FOR VACUUM BOX GAUGE

(SOLMAX COMPANY)

Section 02770-1.04.D
Document No. 614-PET-058J.2 (Rev. 0)

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: Date: 9/4/98

INFORMATION ONLY

PETRO environmental technologies

000587

SOLMAX
GEOSYNTHETICS

PRESSURE GAUGE CALIBRATION LOG
(vacuum box)

GAUGE NO.	RANGE	-5 inHg std	-10 inHg std.	Delta	Reading correction *	Location
18	0-30 inHg	-5	-10	0	---	CANADA
19	0-30 inHg	-5	-10	0	---	CANADA
20	0-30 inHg	-5	-10	0	---	CANADA
21	0-30 inHg	-4.5	-9.5	+0.5	-0.5	CANADA
22	0-30 inHg	-5	-10	0	---	CANADA
23	0-30 inHg	-4.5	-9.5	+0.5	-0.5	CANADA
24	0-30 inHg	-5	-10	0	---	CANADA
25	0-30 inHg	-5	-10	0	---	CANADA
26	0-30 inHg	-4.5	-9.5	+0.5	-0.5	CANADA
27	0-30 inHg	-5	-10	0	---	CANADA
28	0-30 inHg	-4.5	-9.5	+0.5	-0.5	CANADA
29	0-30 inHg	-5	-10	0	---	CANADA
30	0-30 inHg	-5	-10	0	---	CANADA
31	0-30 inHg	-5	-9.5	+0.25	-0.25	CANADA
32	0-30 inHg	-5	-10	0	---	CANADA
33	0-30 inHg	-4.5	-9.5	+0.5	-0.5	CANADA
34	0-30 inHg	-4.5	-9.5	+0.5	-0.5	CANADA
1 → 35	0-30 inHg	-5	-9.5	+0.25	-0.25	USA
36	0-30 inHg	-5	-10	0	---	CANADA
37	0-30 inHg	-5	-10	0	---	CANADA

* Add/Subtract from gauge reading in order to obtain actual value.

COMPLETED BY: [signature] DATE: 05/26/98

Carlos Montreo

Electri-techicia n Solmax

SUPPLIER DOC[illegible]T SUBMITTAL

FDF PROJECT NOS.:	20102	X	CONTRACT NUMBER.: FSC-614	SUBMITTAL NO.: 02770-6	REV.: 1	DATE: September 30, 1998	PAGE 1 OF 1
	20402						

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45013-940[illegible]

OCT 6 5 44 PM '98

SIGNATURE: J. Richard Schaubmann

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY: Melissa Green DATE: 9-30-98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
6	614-PET-058J.3	0							X		X	Certificates for Air Pressure/Vacuum Box Gauges	X		02770-1.04.D	X		

RECEIVED
OCT 0 8 1998
R Chusman

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Mike Godber (Approver)	64	ECDC	52-7	Jim Jenkins	64	OSDF Station	64
Bruce Schweitzer	64	Vern Taylor	52-0	Bruce Schweitzer	64	ECDC	52-7
Jim Jenkins	64			Mike Godber	64	Vern Taylor	52-0
Dan Bodine	38			Dan Bodine	38		

000589

RECEIVED BY: Michael M. Godber DATE: 10/4/98 NO COMMENTS X COMMENTS ATTACHED ___
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

2061

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION

INF - INFORMATION/RECORD

"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS

B - MINOR COMMENTS - REVISE & RESUBMIT AS CFC OR INF

C - REVISE & RESUBMIT

PETRO
environmental
technologies

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02770-6 (Rev. 1)

CERTIFICATES OF CALIBRATION FOR AIR PRESSURE AND VACUUM BOX GAUGES
Section 02770-1.04.D

INFORMATION ONLY

Document No. 614-PET-058J.3 (Rev. 0)

September 30, 1998

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: Date: 10/5/98

000590

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3403 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6783 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

The Jay Industrial Technologies Group, LLC

2061

CERTIFICATE OF ACCURACY

CUSTOMER:
PETRO ENVIROMENTAL TECH INC.
7851 PALACE DRIVE
CINCINNATI, OHIO 45249

SALES ORDER NO. J 080727

		STANDARDS TRACEABLE TO N.I.S.T.		INSTRUMENT CERTIFIED
DESCRIPTION	DIGITAL MAN			COMPOUND GAUGE
MANUFACTURER	MERIAM			USG
MODEL NO.	DP2000I			3" DIA. – 1/4" L.
RANGE	75 PSI / 30 IN. HG. VAC.			30 PSI / 30 IN. HG. VAC.
ACCURACY	.1%			1% FULL SCALE
SERIAL NUMBER	D1205E15			N/A
DATE CERTIFIED	02–20–98			09–11–98
N.I.S.T. NO.	822/MET57			98–2758

MINOR DIV.	1 PSI – 2 IN. HG.
AMBIENT TEMP.	69 F.
BAROMETRIC PRESS.	30.18 IN. HG.
RELATIVE HUMIDITY	51 %

VALUED APPLIED		INDICATED		DEVIATION	
PSI	VAC.	PSI	VAC.	PSI	VAC.
0	0	0	0	NO READABLE ERROR	
5	10	5	10	NO READABLE ERROR	
10	20	10	20	NO READABLE ERROR	
15		15		NO READABLE ERROR	
20		20		NO READABLE ERROR	
25		25		NO READABLE ERROR	
30		30		NO READABLE ERROR	

USING STANDARDS TRACEABLE TO THE N.I.S.T., THIS INSTRUMENT IS CERTIFIED TO BE ACCURATE WITHIN A MAXIMUM ERROR OF : +/– 1 %

[X] SPAN [ ] READING

WE FURTHER CERTIFY THAT OUR CALIBRATION SYSTEM COMPLIES WITH MIL. STD. 45662–A.

CERTIFIED BY R. 26 TECHNICIAN

DATE SEPTEMBER 11, 1998

000591

CERTIFICATE OF ACCURACY

CUSTOMER:
PETRO ENVIROMENTAL TECH INC.
7851 PALACE DRIVE
CINCINNATI, OHIO 45249

SALES ORDER NO. J 080727

		STANDARDS TRACEABLE TO N.I.S.T.		INSTRUMENT CERTIFIED
DESCRIPTION	DIGITAL MAN			COMPOUND GAUGE
MANUFACTURER	MERIAM			USG
MODEL NO.	DP2000I			3" DIA. – 1/4" L.
RANGE	75 PSI / 30 IN. HG. VAC.			30 PSI / 30 IN. HG. VAC.
ACCURACY	.1%			1% FULL SCALE
SERIAL NUMBER	D1205E15			N/A
DATE CERTIFIED	02-20-98			09-11-98
N.I.S.T. NO.	822/MET57			98-2759

MINOR DIV.	1 PSI – 2 IN. HG.
AMBIENT TEMP.	69 F.
BAROMETRIC PRESS.	30.18 IN. HG.
RELATIVE HUMIDITY	51 %

VALUED APPLIED		INDICATED		DEVIATION	
PSI	VAC.	PSI	VAC.	PSI	VAC.
0	0	0	0	NO READABLE ERROR	
5	10	5	10	NO READABLE ERROR	
10	20	10	20	NO READABLE ERROR	
15		15		NO READABLE ERROR	
20		20		NO READABLE ERROR	
25		25		NO READABLE ERROR	
30		30		NO READABLE ERROR	

USING STANDARDS TRACEABLE TO THE N.I.S.T., THIS INSTRUMENT IS CERTIFIED TO BE ACCURATE WITHIN A MAXIMUM ERROR OF : +/– 1 %

[X] SPAN [ ] READING

WE FURTHER CERTIFY THAT OUR CALIBRATION SYSTEM COMPLIES WITH MIL. STD. 45662-A.

CERTIFIED BY K. [illegible] TECHNICIAN DATE SEPTEMBER 11, 1998

000592

The Jay Industrial Technologies Group, LLC

CERTIFICATE OF ACCURACY

CUSTOMER:
PETRO ENVIROMENTAL TECH INC.
7851 PALACE DRIVE
CINCINNATI, OHIO 45249

SALES ORDER NO. J 080727

		STANDARDS TRACEABLE TO N.I.S.T.		INSTRUMENT CERTIFIED
DESCRIPTION	DIGITAL MAN			COMPOUND GAUGE
MANUFACTURER	MERIAM			ASHCROFT
MODEL NO.	DP2000I			20 1005 A 02 L.
RANGE	75 PSI / 30 IN. HG. VAC.			15#/100KPA-30"/-100KPA
ACCURACY	.1%			1% FULL SCALE
SERIAL NUMBER	D1205E15			N/A
DATE CERTIFIED	02-20-98			09-11-98
N.I.S.T. NO.	822/MET57			98-2760

MINOR DIV.	.5#/5KPA-1"/5KPA
AMBIENT TEMP.	69 F.
BAROMETRIC PRESS.	30.18 IN. HG.
RELATIVE HUMIDITY	51 %

VALUED APPLIED		INDICATED		DEVIATION	
PSI	VAC.	PSI	VAC.	PSI	VAC.
0	0	0	0	NO READABLE ERROR	
1	5	1	5	NO READABLE ERROR	
3	10	3	10	NO READABLE ERROR	
5	15	5	15	NO READABLE ERROR	
7	20	7	21	0	+1
9	25	9	26	0	+1
11		11		0	
13		12.5		-.5	
15		14.5		-.5	

USING STANDARDS TRACEABLE TO THE N.I.S.T., THIS INSTRUMENT IS CERTIFIED TO BE ACCURATE WITHIN A MAXIMUM ERROR OF : +/- 1 %

[X] SPAN [ ] READING

WE FURTHER CERTIFY THAT OUR CALIBRATION SYSTEM COMPLIES WITH MIL. STD. 45662-A.

CERTIFIED BY R. H. TECHNICIAN DATE SEPTEMBER 11, 1998

CERTIFICATE OF ACCURACY

CUSTOMER:
PETRO ENVIROMENTAL TECH INC.
7851 PALACE DRIVE
CINCINNATI. OHIO 45249

SALES ORDER NO. J 080727

		STANDARDS TRACEABLE TO N.I.S.T.		INSTRUMENT CERTIFIED
DESCRIPTION	DWT			PRESSURE GAUGE
MANUFACTURER	ASHCROFT			UNKNOWN
MODEL NO.	1305-B			1" DIA. - 1/8" L.
RANGE	10000 PSI			160 PSI / 11 BAR
ACCURACY	.05%			1 % FULL SCALE
SERIAL NUMBER	31828			N/A
DATE CERTIFIED	JUNE 19, 1998			09-11-98
N.I.S.T. NO.	821/254716-95			98-2761

MINOR DIV.	5 PSI / .2 BAR
AMBIENT TEMP.	69 F.
BAROMETRIC PRESS.	30.18 IN. HG.
RELATIVE HUMIDITY	51 %

VALUED APPLIED PSI	INDICATED PSIG	DEVIATION
0	0	NO READABLE ERROR
20	20	NO READABLE ERROR
40	40	NO READABLE ERROR
60	60	NO READABLE ERROR
80	80	NO READABLE ERROR
100	100	NO READABLE ERROR
120	120	NO READABLE ERROR
140	140	NO READABLE ERROR
160	160	NO READABLE ERROR

USING STANDARDS TRACEABLE TO THE N.I.S.T., THIS INSTRUMENT IS CERTIFIED TO BE ACCURATE WITHIN A MAXIMUM ERROR OF : +/- 1 %

[X] SPAN [ ] READING

WE FURTHER CERTIFY THAT OUR CALIBRATION SYSTEM COMPLIES WIYH MIL. STD. 45662-A.

CERTIFIED BY R. E. G. TECHNICIAN

DATE SEPTEMBER 11, 1998

000594

2061

The Jay Industrial Technologies Group, LLC

CERTIFICATE OF ACCURACY

CUSTOMER:
PETRO ENVIROMENTAL TECH INC.
7851 PALACE DRIVE
CINCINNATI, OHIO 45249

SALES ORDER NO. J 080727

		STANDARDS TRACEABLE TO N.I.S.T.		INSTRUMENT CERTIFIED
DESCRIPTION	DWT			PRESSURE GAUGE
MANUFACTURER	ASHCROFT			UNKNOWN
MODEL NO.	1305-B			1" DIA. - 1/8" L.
RANGE	10000 PSI			160 PSI / 11 BAR
ACCURACY	.05%			1 % FULL SCALE
SERIAL NUMBER	31828			N/A
DATE CERTIFIED	JUNE 19, 1998			09-11-98
N.I.S.T. NO.	821/254716-95			98-2762

MINOR DIV.	5 PSI / .2 BAR
AMBIENT TEMP.	69 F.
BAROMETRIC PRESS.	30.18 IN. HG.
RELATIVE HUMIDITY	51 %

VALUED APPLIED PSI	INDICATED PSIG	DEVIATION
0	0	NO READABLE ERROR
20	20	NO READABLE ERROR
40	40	NO READABLE ERROR
60	60	NO READABLE ERROR
80	80	NO READABLE ERROR
100	100	NO READABLE ERROR
120	120	NO READABLE ERROR
140	140	NO READABLE ERROR
160	160	NO READABLE ERROR

USING STANDARDS TRACEABLE TO THE N.I.S.T., THIS INSTRUMENT IS CERTIFIED TO BE ACCURATE WITHIN A MAXIMUM ERROR OF : +/- 1 %

[X] SPAN [ ] READING

WE FURTHER CERTIFY THAT OUR CALIBRATION SYSTEM COMPLIES WIYH MIL. STD. 45662-A.

CERTIFIED BY _____ TECHNICIAN

DATE SEPTEMBER 11, 1998

000595

CERTIFICATE OF ACCURACY

CUSTOMER:
PETRO ENVIROMENTAL TECH INC.
7851 PALACE DRIVE
CINCINNATI, OHIO 45249

SALES ORDER NO. J 080727

		STANDARDS TRACEABLE TO N.I.S.T.		INSTRUMENT CERTIFIED
DESCRIPTION	DWT			PRESSURE GAUGE
MANUFACTURER	ASHCROFT			UNKNOWN
MODEL NO.	1305-B			1" DIA. - 1/8" L.
RANGE	10000 PSI			160 PSI / 11 BAR
ACCURACY	.05%			1 % FULL SCALE
SERIAL NUMBER	31828			N/A
DATE CERTIFIED	JUNE 19, 1998			09-11-98
N.I.S.T. NO.	821/254716-95			98-2763

MINOR DIV.	5 PSI / .2 BAR
AMBIENT TEMP.	69 F.
BAROMETRIC PRESS.	30.18 IN. HG.
RELATIVE HUMIDITY	51 %

VALUED APPLIED PSI	INDICATED PSIG	DEVIATION
0	0	NO READABLE ERROR
20	20	NO READABLE ERROR
40	40	NO READABLE ERROR
60	60	NO READABLE ERROR
80	80	NO READABLE ERROR
100	100	NO READABLE ERROR
120	120	NO READABLE ERROR
140	140	NO READABLE ERROR
160	160	NO READABLE ERROR

USING STANDARDS TRACEABLE TO THE N.I.S.T., THIS INSTRUMENT IS CERTIFIED TO BE ACCURATE WITHIN A MAXIMUM ERROR OF : +/- 1 %

[X] SPAN [ ] READING

WE FURTHER CERTIFY THAT OUR CALIBRATION SYSTEM COMPLIES WIYH MIL. STD. 45662-A.

CERTIFIED BY _____ TECHNICIAN

DATE SEPTEMBER 11, 1998

000596

The Jay Industrial Technologies Group, LLC

CERTIFICATE OF ACCURACY

CUSTOMER:
PETRO ENVIROMENTAL TECH INC.
7851 PALACE DRIVE
CINCINNATI, OHIO 45249

SALES ORDER NO. J 080727

		STANDARDS TRACEABLE TO N.I.S.T.		INSTRUMENT CERTIFIED
DESCRIPTION	DIGITAL MAN			PRESSURE GAUGE
MANUFACTURER	MERIAM			BASCO
MODEL NO.	DP2000I			1" DIA. – 1/8" L.
RANGE	0–75 PSI			60 PSI / 400 KPA
ACCURACY	.1%			1% FULL SCALE
SERIAL NUMBER	D1205E15			136
DATE CERTIFIED	02–20–98			09–11–98
N.I.S.T. NO.	822/MET57			98–2764

MINOR DIV.	1 PSI / 10 KPA
AMBIENT TEMP.	69 F.
BAROMETRIC PRESS.	30.18 IN. HG.
RELATIVE HUMIDITY	51 %

VALUED APPLIED PSI	INDICATED PSIG	DEVIATION
0	0	NO READABLE ERROR
5	4	–1
10	10	NO READABLE ERROR
15	15	NO READABLE ERROR
20	20	NO READABLE ERROR
25	25	NO READABLE ERROR
30	30	NO READABLE ERROR
35	35	NO READABLE ERROR
40	39	–1
45	43	–2
50	49	–1
55	54	–1
60	59	–1

USING STANDARDS TRACEABLE TO THE N.I.S.T., THIS INSTRUMENT IS CERTIFIED TO BE ACCURATE WITHIN A MAXIMUM ERROR OF : +/– 1 %

[X] SPAN [ ] READING

WE FURTHER CERTIFY THAT OUR CALIBRATION SYSTEM COMPLIES WITH MIL. STD. 45662–A.

CERTIFIED BY _____ TECHNICIAN

DATE SEPTEMBER 11, 1998

The Jay Industrial Technologies Group

CERTIFICATE OF ACCURACY

CUSTOMER:
PETRO ENVIROMENTAL TECH INC.
7851 PALACE DRIVE
CINCINNATI, OHIO 45249

SALES ORDER NO. J 080727

		STANDARDS TRACEABLE TO N.I.S.T.		INSTRUMENT CERTIFIED
DESCRIPTION	DIGITAL MAN			PRESSURE GAUGE
MANUFACTURER	MERIAM			BASCO
MODEL NO.	DP2000I			1" DIA. – 1/8" L.
RANGE	0–75 PSI			60 PSI / 400 KPA
ACCURACY	.1%			1% FULL SCALE
SERIAL NUMBER	D1205E15			145
DATE CERTIFIED	02–20–98			09–11–98
N.I.S.T. NO.	822/MET57			98–2765

MINOR DIV.	1 PSI / 10 KPA
AMBIENT TEMP.	69 F.
BAROMETRIC PRESS.	30.18 IN. HG.
RELATIVE HUMIDITY	51 %

VALUED APPLIED PSI	INDICATED PSIG	DEVIATION
0	0	NO READABLE ERROR
5	5	NO READABLE ERROR
10	10	NO READABLE ERROR
15	15	NO READABLE ERROR
20	20	NO READABLE ERROR
25	25	NO READABLE ERROR
30	30	NO READABLE ERROR
35	35	NO READABLE ERROR
40	40	NO READABLE ERROR
45	45	NO READABLE ERROR
50	50	NO READABLE ERROR
55	55	NO READABLE ERROR
60	60	NO READABLE ERROR

USING STANDARDS TRACEABLE TO THE N.I.S.T., THIS INSTRUMENT IS CERTIFIED TO BE ACCURATE WITHIN A MAXIMUM ERROR OF : +/– 1 %

[X] SPAN [ ] READING

WE FURTHER CERTIFY THAT OUR CALIBRATION SYSTEM COMPLIES WITH MIL. STD. 45662–A.

CERTIFIED BY K. E. TECHNICIAN

DATE SEPTEMBER 11, 1998

000598

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT	20102 / 20402	X	CONTRACT NUMBER.: FSC-614	SUBMITTAL NO.: 02770-6	REV.: 2	DATE: October 6, 1998	PAGE 1 OF 1

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45011-9402

Oct 6 2 18 PM '98

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

SIGNATURE: J. Richard Schairbaum

RECEIVED BY: Julie O'Donohoe DATE: 10·6·98

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY PRO	H&S	MED	TRG	CON	ENG	QAC	RESUBMITTAL YES	NO	TITLE/DESCRIPTION	SUBMITTAL TYPE CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION A	B	C
6	614-PET-058J.2	1							X		X	Certificate for Vacuum Box Gauge (Solmax)	X		02770-1.04.D	X		

RECEIVED OCT 08 1998 K Chinman

DISTRIBUTION

REVIEW DISTRIBUTION Distribution	MS	Distribution	MS	CFC DISTRIBUTION Distribution	MS	Distribution	MS
Mike Godber (Approver)	64	ECDC	52-7	Jim Jenkins	64	OSDF Station	64
Bruce Schweitzer	64	Vern Taylor	52-0	Bruce Schweitzer	64	ECDC	52-7
Jim Jenkins	64			Mike Godber	64	Vern Taylor	52-0
Dan Bodine	38			Dan Bodine	38		

000599

RECEIVED BY: E Bodine DATE: 10/8/98 NO COMMENTS X COMMENTS ATTACHED ___
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: ___ (REV. #) PCN ___ (PCN #)

ORIGINAL

20061

COMMENTS	SUBMITTAL ACTION CODE: (BY SUPPLIER)	SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE
	CFC - CERTIFIED FOR CONSTRUCTION	A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS
	INF - INFORMATION/RECORD	B - MINOR COMMENTS - REVISE & RESUBMIT AS CFC OR INF
	"X" APPROPRIATE SUBMITTAL ACTION ABOVE	C - REVISE & RESUBMIT

PETRO
environmental
technologies

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02770-6 (Rev. 2)

CERTIFICATE OF CALIBRATION FOR VACUUM BOX GAUGE
Section 02770-1.04.D

Document No. 614-PET-058J.2 (Rev. 1)

October 6, 1998

000600

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

The Jay Industrial Technologies Group, LLC

CERTIFICATE OF ACCURACY

CUSTOMER:
SOLMAX GEOSYNTHETICS
4691 COMMERCIAL DRIVE, SUITE 345
NEW HARTFORD, NY 13413

SALES ORDER NO. J 081865

		STANDARDS TRACEABLE TO N.I.S.T.			INSTRUMENT CERTIFIED
DESCRIPTION	DIGITAL MAN				VACUUM GAUGE
MANUFACTURER	MERIAM				ASHCROFT
MODEL NO.	DP2000I				63 1008 AL 02 L
RANGE	0–30 IN. HG. VAC.				0–30 IN. HG. VAC.
ACCURACY	.1%				1 % FULL SCALE
SERIAL NUMBER	D1205E15				N/A
DATE CERTIFIED	02–20–98				10–06–98
N.I.S.T. NO.	822/MET57				98–2826

MINOR DIV.	.5 IN. HG.
AMBIENT TEMP.	74 F.
BAROMETRIC PRESS.	30.13 IN. HG.
RELATIVE HUMIDITY	66 %

VALUED APPLIED PSI	INDICATED PSIG	DEVIATION
0	0	NO READABLE ERROR
3	3	NO READABLE ERROR
6	6	NO READABLE ERROR
9	9	NO READABLE ERROR
12	12	NO READABLE ERROR
15	15	NO READABLE ERROR
18	18	NO READABLE ERROR
21	21	NO READABLE ERROR
24	24	NO READABLE ERROR
27	27	NO READABLE ERROR

USING STANDARDS TRACEABLE TO THE N.I.S.T., THIS INSTRUMENT IS CERTIFIED TO BE ACCURATE WITHIN A MAXIMUM ERROR OF : +/– 1 %

[X] SPAN [ ] READING

WE FURTHER CERTIFY THAT OUR CALIBRATION SYSTEM COMPLIES WITH MIL. STD. 45662–A.

CERTIFIED BY R. [illegible] TECHNICIAN

DATE OCTOBER 6, 1998

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT N:	20102	X	CONTRACT NUMBER.: FSC-614	MITTAL NO.: 02770-7	REV.: 0	DATE: October 28, 1998	PAGE 1 OF 1
	20402						

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45013-9402

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

SIGNATURE: J. Richard Schaubaum

RECEIVED BY: Melissa Green DATE: 10-26-98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
7	614-PET-058K	0					X				X	Subgrade Acceptance Certificate (C&112)	X		02770-1.04.E	X		

RECEIVED
NOV 09 1998
R. Hudman

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Lou Wehlitz (Approver)	64	Dan Bodine	38	Jim Jenkins	64	Dan Bodine	38
Bruce Schweitzer	64	ECDC	52-7	Bruce Schweitzer	64	OSDF Station	64
Jim Jenkins	64	Vern Taylor	52-0	Mike Godber	64	ECDC	52-7
Bill Zebick	64			Vern Taylor	52-0		

RECEIVED BY: Lou R. Wehlitz DATE: 10/29/98 NO COMMENTS ✓ COMMENTS ATTACHED ____
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

000602

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE
A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS - REVISE & RESUBMIT AS CFC OR INF
C - REVISE & RESUBMIT

ENTERED

PETRO
environmental
technologies

2061

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02770-7 (Rev. 0)

CELL 2 - **SUBGRADE ACCEPTANCE CERTIFICATE**
Section 02770-1.04.E

Document No. 614-PET-058K (Rev. 0)

ECDC CONTROLLED
COPY NO.

October 28, 1998

C011

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Signature: Date: 10/29/98

000603

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

CERTIFICATE OF ACCEPTANCE
SUBGRADE SURFACE

INSTALLER	PROJECT
NAME: Solmax GeoSynthetics	NAME: OSDF Phase II Cell 2
ADDRESS:	LOCATION: Fernald, OH
INSTALLER AUTHORIZED REPRESENTATIVE: Mark Micochero	OWNER: ~~Floor Daniel~~ Floor Daniel / D.OE

I, The undersigned, duly authorized representive of SOLMAX GEOSYNTHETICS do hereby accept the surface on which the geosynthetics will be installed and shall be responsible for maintaining the suitability of this surface, in accordance with the project specifications. (i.e., The contractor shall not install the geosynthetics until the subgrade surface is acceptable. Installation of the geosynthetics will be considered acceptance of the subgrade.)

PRIMARY: ☐ SECONDARY: ☒ OTHER: ☐

DATE	PANEL NOS.	SIGNATURE
11 Sept 1998	S-1 & S-2	Marct. Micochero
14 Sept 1998	S-3 through S-11	Marct. Micochero
15 Sept 1998	S-12 ~~S-11~~ through S-20	Marct. Micochero
16 Sept 1998	S-21 through S-27	Marct. Micochero
18 Sept 1998	S-28 through S-30	Marct. Micochero
19 Sept 1998	S-31 through S-42	Marct. Micochero
RP 25 ~~22~~ Sept 1998	S-43 through S-45	Marct. Micochero
26 Sept 1998	S-46 through S-53	Marct. Micochero
28 Sept 1998	S-54 through S-57	Marct. Micochero
29 Sept 1998	S-58 through S-65	Marct. Micochero
30 Sept 1998	S-66 through S-73	Marct. Micochero
1 Oct. 1998	S-74 through S-84	Marct. Micochero
2 Oct. 1998	S-85 through S-100	Marct. Micochero
12 Oct 1998	S-102 through S-108	Marct. Micochero
14 Oct 1998	S-109 through S-113	Marct. Micochero

000604

FDF PROJECT N[redacted]	20102 / 20402	X	CONTRACT NUMBER.: FSC-614	[redacted]TTAL NO.: 02770-7	REV.: 1	DATE: November 4, 1998	[redacted]PAGE 1 OF 1

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45013-9402

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

SIGNATURE: J. Richard Helsinbaum

RECEIVED BY: Melissa Lewis DATE: 11-5-98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
7	614-PET-058K	1					X				X	Subgrade Accept. Certificate (Primary Layer)	X		02770-1.04.E	X		

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Lou Wehlitz (Approver)	64	Dan Bodine	38	Jim Jenkins	64	Dan Bodine	38
Bruce Schweitzer	64	ECDC	52-7	Bruce Schweitzer	64	OSDF Station	64
Jim Jenkins	64	Vern Taylor	52-0	Mike Godber	64	ECDC	52-7
Bill Zebick	64			Vern Taylor	52-0		

RECEIVED BY: Louis R. Wehlitz DATE: 11/12/98 NO COMMENTS ✓ COMMENTS ATTACHED ___

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

000605

2061

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION

INF - INFORMATION/RECORD

"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS

B - MINOR COMMENTS - REVISE & RESUBMIT AS CFC OR INF

C - REVISE & RESUBMIT

PETRO
environmental
technologies

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02770-7 (Rev. 1)

SUBGRADE ACCEPTANCE CERTIFICATE
Section 02770-1.04.E

Document No. 614-PET-058K (Rev. 1)

November 5, 1998

INFORMATION ONLY

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: Date: 11/23/98

000606

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

CERTIFICATE OF ACCEPTANCE SUBGRADE SURFACE

INSTALLER	PROJECT
NAME: Solmax Geosynthetics	NAME: OSDF Phase II Cell 8
ADDRESS: 25 Robinson Road Clinton, New York 33233	LOCATION: Fernald, Ohio
INSTALLER AUTHORIZED REPRESENTATIVE: Marc Micochero	OWNER: Fluor Daniel Fernald

I, The undersigned, duly authorized representive of Solmax do hereby accept the surface on which the geosynthetics will be installed and shall be responsible for maintaining the suitability of this surface, in accordance with the project specifications. (i.e., The contractor shall not install the geosynthetics until the subgrade surface is acceptable. Installation of the geosynthetics will be considered acceptance of the subgrade.)

PRIMARY: ☒ SECONDARY: ☐ OTHER: ☐

DATE	PANEL NOS.	SIGNATURE
14 Oct 1998	P-1 Through P-4	Marc. Micochero
15 Oct 1998	P-5 Through P-14	Marc. Micochero
16 Oct 1998	P-15 Through P-35	Marc. Micochero
17 Oct 1998	P-36 Through P-37	Marc. Micochero
20 Oct 1998	P-38 Through P-44	Marc. Micochero
21 Oct 1998	P-45 Through P-48	Marc. Micochero
22 Oct 1998	P-49 Through P-53	Marc. Micochero
23 Oct 1998	P-54 Through P-62	Marc. Micochero
24 Oct 1998	P-63 Through P-84	Marc. Micochero
27 Oct 1998	P-85 Through P-87	Anton T. Kilborn

000607

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.:	20102	X	CONTRACT NUMBER.: FSC-614	SUBMITTAL NO.: 02772-1	REV.: 0	DATE: September 8, 1998	PAGE 1 OF 1
	20402						

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45013-9402

SIGNATURE: J. Richard Schaubaum

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY: Melissa Crews DATE: 9-10-98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
7	614-PET-059	0					X				X	Letter of Acceptance for GCL		X	02772-2.03.A	X		

RECEIVED
SEP 15 1998
OBB

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Lou Wehlitz (Approver)	64	Dan Bodine	38	Jim Jenkins	64	Dan Bodine	38
Bruce Schweitzer	64	ECDC	52-7	Bruce Schweitzer	64	OSDF Station	64
Jim Jenkins	64	Vern Taylor	52-0	Mike Godber	64	ECDC	52-7
Bill Zebick	64			Vern Taylor	52-0		

009008

RECEIVED BY: [signature] DATE: 9/11/98 NO COMMENTS ✓ COMMENTS ATTACHED ____
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

COMMENTS

ORIGINAL

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION

IN[illegible]ORMATION/RECORD

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS

B - MINOR COMMENTS - REVISE & RESUB[illegible]FC OR INF

PETRO
environmental
technologies

2061

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02772-1 (Rev. 0)

LETTER OF ACCEPTANCE FOR GEOSYNTHETIC CLAY LINER MATERIAL
Section 02772-2.03.A

Document No. 614-PET-059 (Rev. 0)

September 8, 1998

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sign: Date: 9/11/98

INFORMATION ONLY

000609

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

September 1, 1998

Mr. Rick Holbrook
Fluor Daniel Fernald
P. O. Box 538704, Mail Stop 64
Cincinnati, Ohio 45253-8704

RE: Acceptance of Geosynthetic Clay Liner (GCL)
Period Beginning August 13, 1998 and Ending August 31, 1998
SWU/OSDF Phase II
Subcontract No. FSC 614

Dear Rick:

This letter is intended to fulfill the submittal requirement listed in paragraph 2.03A of Technical Specification Section 02772. Specifically, by copy of this letter Petro Environmental Technologies, Inc. conditionally accepts the referenced GCL material for installation. Conditional acceptance is based solely on visual inspection of the shipped material unloaded and stored by Petro Environmental. As Petro Environmental has no contractual responsibility for material testing or Quality Assurance, no opinion on the material's suitability with regard to specification required properties is made. An acceptance status summary for GCL received to date is as follows:

	Date	Quantity Accepted	Quantity Rejected
Material Previously Accepted/Rejected	N.A.	NONE	NONE
Accepted/Rejected by this Letter	8/13/98	63,000 SF	NONE
	8/17/98	31,500 SF	NONE
	8/18/98	63,000 SF	NONE
	8/19/98	31,500 SF	NONE
	8/27/98	31,500 SF	NONE
	8/28/98	63,000 SF	NONE
	8/31/98	31,500 SF	NONE
TOTAL TO DATE		315,000 SF	NONE

Sincerely,
PETRO ENVIRONMENTAL TECHNOLOGIES, INC.

J. Richard Schairbaum

J. Richard Schairbaum
Quality Assurance Manager

PETR
environme
technolo

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NOS.:	20102	X	CONTRACT NUMBER.: FSC-614	SUBMITTAL NO.: 02772-1	REV.: 1	DATE: September 25, 1998	PAGE 1 OF 1
	20402						

FROM: PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7400 WILLEY ROAD, MAILSTOP 52-7; TRAILER NO. 504
HAMILTON, OHIO 45013-9402

SIGNATURE: J. Richard Schaubaum

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 52-7

RECEIVED BY: Melissa Crews DATE: 9-28-98

			DOCUMENT FAMILY							RESUBMITTAL			SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
7	614-PET-059	1					X			X		Letter of Acceptance for GCL		X	02772-2.03.A	X		

RECEIVED
OCT 02 1998
R. Guzman

DISTRIBUTION

REVIEW DISTRIBUTION				CFC DISTRIBUTION			
Distribution	MS	Distribution	MS	Distribution	MS	Distribution	MS
Lou Wehlitz (Approver)	64	Dan Bodine	38	Jim Jenkins	64	Dan Bodine	38
Bruce Schweitzer	64	ECDC	52-7	Bruce Schweitzer	64	OSDF Station	64
Jim Jenkins	64	Vern Taylor	52-0	Mike Godber	64	ECDC	52-7
Bill Zebick	64			Vern Taylor	52-0		

RECEIVED BY: [illegible] DATE: 9/30/98 NO COMMENTS ✓ COMMENTS ATTACHED ____
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

RESUBMIT ENTIRE DOCUMENT NUMBER AS: _____ (REV. #) OR RESUBMIT CHANGED DOCUMENT PAGES AS: DOC. NO.: _____ (REV. #) PCN: _____ (PCN. #)

000611

20611

COMMENTS

SUBMITTAL ACTION CODE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE
A - ACCEPTED DOCUMENT - CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS - REVISE & RESUBMIT AS CFC OR INF
C - REVISE & RESUBMIT

ENTERED

ORIGINAL

PETRO
environmental
technologies

FLUOR DANIEL FERNALD

SOUTHERN WASTE UNITS (SWUs) EXCAVATION/
ON-SITE DISPOSAL FACILITY (OSDF) (PHASE II) PROJECT
Project Nos. 20102/20402; Contract No. FSC-614

SUPPLIER SUBMITTAL No.: 20102-614-02772-1 (Rev. 1)

LETTER OF ACCEPTANCE FOR GEOSYNTHETIC CLAY LINER MATERIAL
Section 02772-2.03.A

Document No. 614-PET-059 (Rev. 1)

INFORMATION ONLY

September 25, 1998

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: _____ Date: 9/30/98

000612

Fernald Site Office: P.O. Box 249 • Ross, Ohio 45061-0249 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Lodi, Ohio 44254 • 330.948.1494 • Fax 948.1933

September 25, 1998

Mr. Rick Holbrook
Fluor Daniel Fernald
P. O. Box 538704, Mail Stop 64
Cincinnati, Ohio 45253-8704

RE: Acceptance of Geosynthetic Clay Liner (GCL)
Period Beginning September 1, 1998 and Ending September 10, 1998
SWU/OSDF Phase II
Subcontract No. FSC 614

Dear Rick:

This letter is intended to fulfill the submittal requirement listed in paragraph 2.03A of Technical Specification Section 02772. Specifically, by copy of this letter Petro Environmental Technologies, Inc. conditionally accepts the referenced GCL material for installation. Conditional acceptance is based solely on visual inspection of the shipped material unloaded and stored by Petro Environmental. As Petro Environmental has no contractual responsibility for material testing or Quality Assurance, no opinion on the material's suitability with regard to specification required properties is made. An acceptance status summary for GCL received to date is as follows:

	Date	Quantity Accepted	Quantity Rejected
Material Previously Accepted/Rejected	8/13/98-8/31/98	315,000 SF	NONE
Accepted/Rejected by this Letter	9/01/98	63,000 SF	NONE
	9/02/98	31,500 SF	NONE
	9/03/98	31,500 SF	NONE
	9/04/98	63,000 SF	NONE
	9/09/98	63,000 SF	NONE
	9/10/98	40,500 SF	NONE
TOTAL TO DATE		607,500 SF	NONE

Sincerely,
PETRO ENVIRONMENTAL TECHNOLOGIES, INC.

J. Richard Schairbaum

J. Richard Schairbaum
Quality Assurance Manager

PETRO
environmental
technologies