4941

CONSTRUCTION QUALITY ASSURANCE

FINAL REPORT

PHASE IV - CELLS 4 AND 5 CONSTRUCTION ON-SITE DISPOSAL FACILITY

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

prepared by

GEOSYNTEC CONSULTANTS

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under

Fluor Fernald, Inc.
Contract No. 95PS005028

REVISION 0
JUNE 2000
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APPENDIX E (continued)

Geotechnical Laboratory Test Results

Hydraulic Conductivity

FLEXIBLE WALL PERMEABILITY TEST[1]

ASTM D5084 *

Project Name:	Fluor Fernald OSDF Option-2
Project Number:	GTX-G0076
Client Project Number:	N/A
Client/Site ID:	LP01-01
Sample Number:	5417
Material Type:	SOIL
Expected/Specified Value:	<1.0E-7 cm/s
Date Received:	8/15/2001

Specimen	Test Specimen Initial Conditions					Test Conditions					Hydraulic
No.	Spec. Prep. [2] (-)	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid [3] (-)	Average Gradient (-)	Conductivity (cm/s)
1	R	7.55	7.16	116.3	15.8	67.1	62.1	5.0	DTW	13.3	2.1E-8

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDI = Deaired Deionized Water

* Deviations:
Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

JT 8-20-01

✓ SS 8-20-01

FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	BOARD #	7
PROJECT NUMBER	013-3175	CELL #	7
SAMPLE ID	LP01-07 - -	Flow Pump Speed	10
SAMPLE TYPE	Bulk	Technician	JH

COMMENTS: Per client request, sample was remolded to approximately 111.0 pcf at a moisture content of 17.5%.

Sample Data, Initial			
Height, inches	2.999	B-Value, f	0.95
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.45	Top Pres.	80.0
Mass, g	630.01	Tot. B.P.	80.0
Moisture Content, %	18.31	Head, max.	128.02
Dry Density, pcf	110.59	Head, min.	128.02
Spec. Gravity	2.733	Max. Grad.	16.87
Volume Solids, cm³	194.84	Min. Grad.	16.87
Volume Voids, cm³	105.61		
Void Ratio	0.54		
Saturation, %	92.3%		

Sample Data, Final	
Height, inches	2.987
Diameter, inches	2.801
Area, cm²	39.75
Volume, cm³	301.61
Mass, g	636.04
Moisture Content, %	19.45
Dry Density, pcf	110.17
Volume Solids, cm³	194.84
Volume Voids, cm³	106.78
Void Ratio	0.55
Saturation, %	97.0%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	630.01	686.98
Wt Soil & Tare, f	g	532.49	583.49
Wt Tare	g	0.00	51.30
Wt Moisture Lost	g	97.52	103.49
Wt Dry Soil	g	532.49	532.19
Water Content	%	18.31%	19.45%

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand.

Flow Pump Rate: 3.00E-05 cm³/sec

USCS: (CL)

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
9/5/01	37139	9	5	21.3	0	0	0	0	1.82	128.02	16.87	4.4E-08
9/5/01	37139	9	10	21.3	5	5	300	300	1.82	128.02	16.87	4.4E-08
9/5/01	37139	9	15	21.3	5	10	300	600	1.82	128.02	16.87	4.4E-08
9/5/01	37139	9	20	21.3	5	15	300	900	1.82	128.02	16.87	4.4E-08 *
9/5/01	37139	9	25	21.3	5	20	300	1200	1.82	128.02	16.87	4.4E-08 *
9/5/01	37139	9	30	21.3	5	25	300	1500	1.82	128.02	16.87	4.4E-08 *
9/5/01	37139	9	35	21.3	5	30	300	1800	1.82	128.02	16.87	4.4E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 4.4E-08 cm/sec **

DATE 9/5/01
CHECK [illegible]
REVIEW [illegible]

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Golder Associates Inc.

FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	013-3175
SAMPLE ID	LP01-07 - -
SAMPLE TYPE	Bulk

BOARD #	7
CELL #	7
Flow Pump Speed	10
Technician	JH

COMMENTS: Per client request, sample was remolded to approximately 111.0 pcf at a moisture content of 17.5%.

Sample Data, Initial			
Height, inches	2.999	B-Value, f	0.95
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.45	Top Pres.	80.0
Mass, g	630.01	Tot. B.P.	80.0
Moisture Content, %	18.31	Head, max.	128.02
Dry Density, pcf	110.59	Head, min.	128.02
Spec. Gravity(assumed)	2.700	Max. Grad.	16.87
Volume Solids, cm³	197.22	Min. Grad.	16.87
Volume Voids, cm³	103.23		
Void Ratio	0.52		
Saturation, %	94.5%		

Sample Data, Final	
Height, inches	2.987
Diameter, inches	2.801
Area, cm²	39.75
Volume, cm³	301.61
Mass, g	636.04
Moisture Content, %	19.45
Dry Density, pcf	110.17
Volume Solids, cm³	197.22
Volume Voids, cm³	104.40
Void Ratio	0.53
Saturation, %	99.2%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	630.01	686.98
Wt Soil & Tare, f	g	532.49	583.49
Wt Tare	g	0.00	51.30
Wt Moisture Lost	g	97.52	103.49
Wt Dry Soil	g	532.49	532.19
Water Content	%	18.31%	19.45%

Flow Pump Rate: 3.00E-05 cm³/sec

USCS: (CL)

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/05/2001	37139	9	5	21.3	0	0	0	0	1.82	128.02	16.87	4.4E-08
09/05/2001	37139	9	10	21.3	5	5	300	300	1.82	128.02	16.87	4.4E-08
09/05/2001	37139	9	15	21.3	5	10	300	600	1.82	128.02	16.87	4.4E-08
09/05/2001	37139	9	20	21.3	5	15	300	900	1.82	128.02	16.87	4.4E-08 *
09/05/2001	37139	9	25	21.3	5	20	300	1200	1.82	128.02	16.87	4.4E-08 *
09/05/2001	37139	9	30	21.3	5	25	300	1500	1.82	128.02	16.87	4.4E-08 *
09/05/2001	37139	9	35	21.3	5	30	300	1800	1.82	128.02	16.87	4.4E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 4.4E-08 cm/sec **

DATE 09/05/2001
CHECK
REVIEW

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Golder Associates Inc.

FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	BOARD #	8
PROJECT NUMBER	013-3175	CELL #	8
SAMPLE ID	LP01-10 - -	Flow Pump Speed	10
SAMPLE TYPE	Bulk	Technician	JH

COMMENTS: Per client request, sample was remolded to approximately 114.5 pcf at a moisture content of 15.9%.

Sample Data, Initial			
Height, inches	2.998	B-Value, f	0.99
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm^2	39.44	Bot. Pres.	80.0
Volume, cm^3	300.35	Top Pres.	80.0
Mass, g	639.46	Tot. B.P.	80.0
Moisture Content, %	16.17	Head, max.	133.65
Dry Density, pcf	114.36	Head, min.	133.65
Spec. Gravity(assumed)	2.700	Max. Grad.	17.53
Volume Solids, cm^3	203.86	Min. Grad.	17.53
Volume Voids, cm^3	96.49		
Void Ratio	0.47		
Saturation, %	92.3%		

Sample Data, Final	
Height, inches	3.002
Diameter, inches	2.811
Area, cm^2	40.04
Volume, cm^3	305.30
Mass, g	649.09
Moisture Content, %	17.92
Dry Density, pcf	112.50
Volume Solids, cm^3	203.86
Volume Voids, cm^3	101.43
Void Ratio	0.50
Saturation, %	97.3%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	639.46	733.15
Wt Soil & Tare, f	g	550.44	634.55
Wt Tare	g	0.00	84.42
Wt Moisture Lost	g	89.02	98.60
Wt Dry Soil	g	550.44	550.13
Water Content	%	16.17%	17.92%

Flow Pump Rate: 3.00E-05 cm^3/sec

USCS: (CL)

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/05/2001	37139	10	5	21.4	0	0	0	0	1.9	133.65	17.53	4.1E-08
09/05/2001	37139	10	10	21.4	5	5	300	300	1.9	133.65	17.53	4.1E-08
09/05/2001	37139	10	15	21.4	5	10	300	600	1.9	133.65	17.53	4.1E-08
09/05/2001	37139	10	20	21.4	5	15	300	900	1.9	133.65	17.53	4.1E-08 *
09/05/2001	37139	10	25	21.4	5	20	300	1200	1.9	133.65	17.53	4.1E-08 *
09/05/2001	37139	10	30	21.4	5	25	300	1500	1.9	133.65	17.53	4.1E-08 *
09/05/2001	37139	10	35	21.4	5	30	300	1800	1.9	133.65	17.53	4.1E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 4.1E-08 cm/sec **

DATE 09/05/2001
CHECK
REVIEW

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FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	013-3175
SAMPLE ID	LP01-10 - -
SAMPLE TYPE	Bulk

BOARD #	8
CELL #	8
Flow Pump Speed	10
Technician	JH

COMMENTS: Per client request, sample was remolded to approximately 114.5 pcf at a moisture content of 15.9%.

Sample Data, Initial			
Height, inches	2.998	B-Value, f	0.99
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.35	Top Pres.	80.0
Mass, g	639.46	Tot. B.P.	80.0
Moisture Content, %	16.17	Head, max.	133.65
Dry Density, pcf	114.36	Head, min.	133.65
Spec. Gravity	2.710	Max. Grad.	17.53
Volume Solids, cm³	203.11	Min. Grad.	17.53
Volume Voids, cm³	97.24		
Void Ratio	0.48		
Saturation, %	91.6%		

Sample Data, Final	
Height, inches	3.002
Diameter, inches	2.811
Area, cm²	40.04
Volume, cm³	305.30
Mass, g	649.09
Moisture Content, %	17.92
Dry Density, pcf	112.50
Volume Solids, cm³	203.11
Volume Voids, cm³	102.18
Void Ratio	0.50
Saturation, %	96.5%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	639.46	733.15
Wt Soil & Tare, f	g	550.44	634.55
Wt Tare	g	0.00	84.42
Wt Moisture Lost	g	89.02	98.60
Wt Dry Soil	g	550.44	550.13
Water Content	%	16.17%	17.92%

Flow Pump Rate: 3.00E-05 cm³/sec

USCS: (CL)

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psf)	Head (cm)	Gradient	Permeability (cm/sec)
9/5/01	37139	10	5	21.4	0	0	0	0	1.9	133.65	17.53	4.1E-08
9/5/01	37139	10	10	21.4	5	5	300	300	1.9	133.65	17.53	4.1E-08
9/5/01	37139	10	15	21.4	5	10	300	600	1.9	133.65	17.53	4.1E-08
9/5/01	37139	10	20	21.4	5	15	300	900	1.9	133.65	17.53	4.1E-08 *
9/5/01	37139	10	25	21.4	5	20	300	1200	1.9	133.65	17.53	4.1E-08 *
9/5/01	37139	10	30	21.4	5	25	300	1500	1.9	133.65	17.53	4.1E-08 *
9/5/01	37139	10	35	21.4	5	30	300	1800	1.9	133.65	17.53	4.1E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 4.1E-08 cm/sec **

DATE 9/5/01
CHECK
REVIEW

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FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	013-3175
SAMPLE ID	LP01-15 - -
SAMPLE TYPE	Bag

BOARD #	3
CELL #	3
Flow Pump Speed	9
Technician	JH

COMMENTS: Per client request, sample was remolded to approximately 113.0 pcf at a moisture content of 16.0%.

Sample Data, Initial			
Height, inches	3.007	B-Value, f	0.99
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	301.25	Top Pres.	80.0
Mass, g	631.23	Tot. B.P.	80.0
Moisture Content, %	17.37	Head, max.	142.79
Dry Density, pcf	111.40	Head, min.	142.79
Spec. Gravity	2.742	Max. Grad.	18.44
Volume Solids, cm³	196.14	Min. Grad.	18.44
Volume Voids, cm³	105.12		
Void Ratio	0.54		
Saturation, %	88.9%		

Sample Data, Final	
Height, inches	3.049
Diameter, inches	2.800
Area, cm²	39.73
Volume, cm³	307.66
Mass, g	641.81
Moisture Content, %	19.34
Dry Density, pcf	109.08
Volume Solids, cm³	196.14
Volume Voids, cm³	111.52
Void Ratio	0.57
Saturation, %	93.3%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	631.23	693.77
Wt Soil & Tare, f	g	537.81	589.81
Wt Tare	g	0.00	52.22
Wt Moisture Lost	g	93.42	103.96
Wt Dry Soil	g	537.81	537.59
Water Content	%	17.37%	19.34%

Flow Pump Rate 5.70E-05 cm³/sec

USCS (CL)

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace fine gravel.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
10/3/01	37167	8	10	18.3	0	0	0	0	2.03	142.79	18.44	8.1E-08
10/3/01	37167	8	15	18.3	5	5	300	300	2.03	142.79	18.44	8.1E-08
10/3/01	37167	8	20	18.3	5	10	300	600	2.03	142.79	18.44	8.1E-08
10/3/01	37167	8	25	18.3	5	15	300	900	2.03	142.79	18.44	8.1E-08 *
10/3/01	37167	8	30	18.3	5	20	300	1200	2.03	142.79	18.44	8.1E-08 *
10/3/01	37167	8	35	18.3	5	25	300	1500	2.03	142.79	18.44	8.1E-08 *
10/3/01	37167	8	40	18.3	5	30	300	1800	2.03	142.79	18.44	8.1E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 8.1E-08 cm/sec **

DATE 10/3/01
CHECK
REVIEW

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FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	013-3175
SAMPLE ID	LP01-15A - -
SAMPLE TYPE	Bag

BOARD #	4
CELL #	4
Flow Pump Speed	10
Technician	FT

COMMENTS: Per client request, sample was remolded to approximately 113.0 pcf at a moisture content of 16.2%.

Sample Data, Initial			
Height, inches	3.001	B-Value, f	0.97
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.65	Top Pres.	80.0
Mass, g	630.67	Tot. B.P.	80.0
Moisture Content, %	16.33	Head, max.	136.46
Dry Density, pcf	112.52	Head, min.	136.46
Spec. Gravity (assumed)	2.742	Max. Grad.	17.72
Volume Solids, cm³	197.72	Min. Grad.	17.72
Volume Voids, cm³	102.93		
Void Ratio	0.52		
Saturation, %	86.0%		

Sample Data, Final	
Height, inches	3.032
Diameter, inches	2.793
Area, cm²	39.53
Volume, cm³	304.41
Mass, g	642.25
Moisture Content, %	18.46
Dry Density, pcf	111.13
Volume Solids, cm³	197.72
Volume Voids, cm³	106.69
Void Ratio	0.54
Saturation, %	93.8%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	630.67	694.53
Wt Soil & Tare, f	g	542.15	594.45
Wt Tare	g	0.00	52.43
Wt Moisture Lost	g	88.52	100.08
Wt Dry Soil	g	542.15	542.02
Water Content	%	16.33%	18.46%

Flow Pump Rate: 3.00E-05 cm³/sec

USCS: (CL)

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace fine gravel.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
10/19/01	37183	10	15	18.7	0	0	0	0	1.94	136.46	17.72	4.4E-08
10/19/01	37183	10	20	18.7	5	5	300	300	1.94	136.46	17.72	4.4E-08
10/19/01	37183	10	25	18.7	5	10	300	600	1.94	136.46	17.72	4.4E-08
10/19/01	37183	10	30	18.7	5	15	300	900	1.94	136.46	17.72	4.4E-08 *
10/19/01	37183	10	35	18.7	5	20	300	1200	1.94	136.46	17.72	4.4E-08 *
10/19/01	37183	10	40	18.7	5	25	300	1500	1.94	136.46	17.72	4.4E-08 *
10/19/01	37183	10	45	18.7	5	30	300	1800	1.94	136.46	17.72	4.4E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 4.4E-08 cm/sec **

DATE 10/19/01
CHECK PWM
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Golder Associates Inc.

FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH		
PROJECT NUMBER	013-3175		
SAMPLE ID	LP01-18	-	-
SAMPLE TYPE	Bag		

BOARD #	9
CELL #	9
Flow Pump Speed	10
Technician	FT

COMMENTS: Per client request, sample was remolded to approximately 109.5 pcf at a moisture content of 18.0%.

Sample Data, Initial			
Height, inches	3.005	B-Value, f	1.00
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	301.05	Top Pres.	80.0
Mass, g	623.70	Tot. B.P.	80.0
Moisture Content, %	18.07	Head, max.	123.10
Dry Density, pcf	109.49	Head, min.	123.10
Spec. Gravity	2.704	Max. Grad.	15.84
Volume Solids, cm³	195.35	Min. Grad.	15.84
Volume Voids, cm³	105.70		
Void Ratio	0.54		
Saturation, %	90.3%		

Sample Data, Final	
Height, inches	3.059
Diameter, inches	2.821
Area, cm²	40.32
Volume, cm³	313.31
Mass, g	637.17
Moisture Content, %	20.62
Dry Density, pcf	105.21
Volume Solids, cm³	195.35
Volume Voids, cm³	117.96
Void Ratio	0.60
Saturation, %	92.3%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	623.70	688.73
Wt Soil & Tare, f	g	528.24	579.85
Wt Tare	g	0.00	51.87
Wt Moisture Lost	g	95.46	108.88
Wt Dry Soil	g	528.24	527.98
Water Content	%	18.07%	20.62%

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand.

Flow Pump Rate: 3.00E-05 cm³/sec

USCS: (CL)

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
9/28/01	37162	10	30	19.4	0	0	0	0	1.75	123.10	15.84	4.8E-08
9/28/01	37162	10	35	19.4	5	5	300	300	1.75	123.10	15.84	4.8E-08
9/28/01	37162	10	40	19.4	5	10	300	600	1.75	123.10	15.84	4.8E-08
9/28/01	37162	10	45	19.4	5	15	300	900	1.75	123.10	15.84	4.8E-08 *
9/28/01	37162	10	50	19.4	5	20	300	1200	1.75	123.10	15.84	4.8E-08 *
9/28/01	37162	10	55	19.4	5	25	300	1500	1.75	123.10	15.84	4.8E-08 *
9/28/01	37162	11	0	19.4	5	30	300	1800	1.75	123.10	15.84	4.8E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 4.8E-08 cm/sec **

DATE	9/28/01
CHECK	BSS
REVIEW	PWG

000011

4941

FLOW PUMP #2B

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	013-3175
SAMPLE ID	LP01-21 - - -
SAMPLE TYPE	Bag

BOARD #	8
CELL #	8
Flow Pump Speed	7
Technician	FT

COMMENTS: Per client request, sample was remolded to approximately 113 pcf at a moisture content of 16.5%.

Sample Data, Initial			
Height, inches	3.002	B-Value, f	0.97
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.75	Top Pres.	80.0
Mass, g	634.14	Tot. B.P.	80.0
Moisture Content, %	16.33	Head, max.	140.68
Dry Density, pcf	113.10	Head, min.	140.68
Spec. Gravity	2.750	Max. Grad.	17.88
Volume Solids, cm³	198.23	Min. Grad.	17.88
Volume Voids, cm³	102.53		
Void Ratio	0.52		
Saturation, %	86.8%		

Sample Data, Final	
Height, inches	3.097
Diameter, inches	2.807
Area, cm²	39.92
Volume, cm³	314.06
Mass, g	651.78
Moisture Content, %	19.57
Dry Density, pcf	108.31
Volume Solids, cm³	198.23
Volume Voids, cm³	115.84
Void Ratio	0.58
Saturation, %	92.1%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	634.14	694.70
Wt Soil & Tare, f	g	545.12	588.10
Wt Tare	g	0.00	43.26
Wt Moisture Lost	g	89.02	106.60
Wt Dry Soil	g	545.12	544.84
Water Content	%	16.33%	19.57%

Flow Pump Rate: 1.96E-04 cm³/sec

USCS: (CL)

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand, little fine gravel.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
10/9/01	37173	10	5	19.4	0	0	0	0	2	140.68	17.88	2.8E-07
10/9/01	37173	10	10	19.4	5	5	300	300	2	140.68	17.88	2.8E-07
10/9/01	37173	10	15	19.4	5	10	300	600	2	140.68	17.88	2.8E-07
10/9/01	37173	10	20	19.4	5	15	300	900	2	140.68	17.88	2.8E-07 *
10/9/01	37173	10	25	19.4	5	20	300	1200	2	140.68	17.88	2.8E-07 *
10/9/01	37173	10	30	19.4	5	25	300	1500	2	140.68	17.88	2.8E-07 *
10/9/01	37173	10	35	19.4	5	30	300	1800	2	140.68	17.88	2.8E-07 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 2.8E-07 cm/sec **

DATE 10/9/01
CHECK
REVIEW PDM

4941

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- 4941

FLEXIBLE WALL TRIAXIAL MEABILITY
ASTM D 5084
METHOD C, FALLING HEAD W/INCREASING TAIL WATER PRESSURE

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH			Using Pipettes Only	YES
PROJECT NUMBER	013-3175			Using Pipettes & Burettes	NO
SAMPLE ID	LP01-21A		-	BOARD # 3	TECH PWM
SAMPLE TYPE	Bag			CELL # 3	DATE 10/16/01

COMMENTS: Per client request, sample was remolded to approximately 113 pcf at a moisture content of 16.5%.

Sample Data, Initial	
Height, inches	2.986
Diameter, inches	2.790
Area, cm^2	39.44
Volume, cm^3	299.15
Mass, g	634.10
Moisture Content, %	16.34
Dry Density, pcf	113.69
Spec. Gravity	2.750
Volume Solids, cm^3	198.20
Volume Voids, cm^3	100.95
Void Ratio	0.51
Saturation	88.2%

B-Value, f	0.97
Cell Pres	85.00
Bot. Pres.	82.00
Top Pres.	80.00
Head, cm	140.68
Max. Grad.	21.56
Min. Grad.	20.20
Max. E.S.	5.00
Min. E.S.	3.00

Sample Data, Final	
Height, inches	2.982
Diameter, inches	2.792
Area, cm^2	39.50
Volume, cm^3	299.18
Mass, g	648.99
Moisture Content %	19.07
Dry Density, pcf	113.68
Saturation	102.9%
Inflow Volume per (1 cc)	1.00
Outflow Volume per(1cc)	1.00

Water Contents	Initial Trimmings	Final Partial Sample
Wt soil&tare, i	634.10	700.44
Wt soil&tare, f	545.04	596.46
Wt Tare	0.00	51.24
Wt Moisture Lost	89.06	103.98
Wt Dry Soil	545.04	545.22
Water Content	16.34%	19.07%

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand, little fine gravel.

USCS: (CL)

TIME FUNCTION			READINGS			TIME IN MINUTES & SECONDS						VOLUME		PERMEABILITY
DATE	HOUR	MIN	Inflow (cc)	Outflow (cc)	Temp.	dt (min)	dt (sec)	dt, acc (sec)	Head (cm)	(H1/H2) (inc.)	Gradient	Inflow (cc)	Outflow (cc)	@ 20 Degrees C (cm/sec)
10/16/01	8	20	0.00	25.00	20.0	0.0	0	0	163.27		21.56	0.00	0.00	0.0
10/16/01	8	56	0.20	24.80	20.0	36.0	2160	2160	162.91	1.00	21.51	0.20	0.20	9.67E-08
10/16/01	11	5	0.50	24.50	20.0	129.0	7740	9900	162.37	1.00	21.44	0.30	0.30	4.06E-08
10/16/01	13	15	0.60	24.40	20.3	130.0	7800	17700	162.19	1.00	21.41	0.10	0.10	1.34E-08
10/16/01	17	4	0.90	24.00	19.6	229.0	13740	31440	161.55	1.00	21.33	0.30	0.40	2.71E-08
10/17/01	10	38	2.20	22.80	19.3	1054.0	63240	94680	159.29	1.01	21.03	1.30	1.20	2.14E-08
10/17/01	17	10	2.70	22.40	19.3	392.0	23520	118200	158.48	1.01	20.92	0.50	0.40	2.09E-08 *
10/18/01	8	20	3.90	21.20	21.2	910.0	54600	172800	156.31	1.01	20.64	1.20	1.20	2.31E-08 *
10/18/01	17	5	4.50	20.40	20.2	525.0	31500	204300	155.05	1.01	20.47	0.60	0.80	2.42E-08 *
10/19/01	8	56	5.80	19.40	18.0	951.0	57060	261360	152.97	1.01	20.20	1.30	1.00	2.34E-08 *

Inflow Rate	0.000022
Outflow Rate	0.000021
Outflow/Inflow Ratio	0.97

PERMEABILITY REPORTED AS 2.3E-08 cm/sec

DATE 10/16/01
CHECK
REVIEW

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	013-3175
SAMPLE ID	LP01-22 - -
SAMPLE TYPE	Bulk

BOARD #	8
CELL #	8
Flow Pump Speed	7
Technician	JH

COMMENTS: The sample was remolded to 94.6% of the Maximum Dry Density and OPTM +1% (using ASTM D 698).

Sample Data, Initial			
Height, inches	2.998	B-Value, f	0.97
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.35	Top Pres.	80.0
Mass, g	625.91	Tot. B.P.	80.0
Moisture Content, %	17.01	Head, max.	109.03
Dry Density, pcf	111.13	Head, min.	109.03
Spec. Gravity	2.683	Max. Grad.	14.14
Volume Solids, cm³	199.37	Min. Grad.	14.14
Volume Voids, cm³	100.98		
Void Ratio	0.51		
Saturation, %	90.1%		

Sample Data, Final	
Height, inches	3.036
Diameter, inches	2.806
Area, cm²	39.90
Volume, cm³	307.66
Mass, g	642.91
Moisture Content, %	20.19
Dry Density, pcf	108.49
Volume Solids, cm³	199.37
Volume Voids, cm³	108.28
Void Ratio	0.54
Saturation, %	99.7%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	625.91	693.86
Wt Soil & Tare, f	g	534.92	585.88
Wt Tare	g	0.00	51.00
Wt Moisture Lost	g	90.99	107.98
Wt Dry Soil	g	534.92	534.88
Water Content	%	17.01%	20.19%

Flow Pump Rate: 3.00E-04 cm³/sec

USCS: (CL)

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand, little fine gravel.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
10/8/01	37172	10	0	20.2	0	0	0	0	1.55	109.03	14.14	5.3E-07
10/8/01	37172	10	5	20.2	5	5	300	300	1.55	109.03	14.14	5.3E-07
10/8/01	37172	10	10	20.2	5	10	300	600	1.55	109.03	14.14	5.3E-07
10/8/01	37172	10	20	20.2	10	20	600	1200	1.55	109.03	14.14	5.3E-07 *
10/8/01	37172	10	30	20.2	10	30	600	1800	1.55	109.03	14.14	5.3E-07 *
10/8/01	37172	10	40	20.2	10	40	600	2400	1.55	109.03	14.14	5.3E-07 *
10/8/01	37172	10	50	20.2	10	50	600	3000	1.55	109.03	14.14	5.3E-07 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 5.3E-07 cm/sec **

DATE 10/8/01
CHECK
REVIEW

4941

000014

Golder Associates Inc.

FLEXIBLE WALL TRIAXIAL PERMEABILITY
ASTM D 5084
METHOD C, FALLING HEAD W/INCREASING TAIL WATER PRESSURE

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	013-3175
SAMPLE ID	LP01-22R -
SAMPLE TYPE	Bag

Using Pipettes Only	YES
Using Pipettes & Burettes	NO
BOARD #	6
CELL #	6
TECH	FT
DATE	10/10/01

COMMENTS

Sample Data, Initial

Height, inches	3.007
Diameter, inches	2.790
Area, cm^2	39.44
Volume, cm^3	301.25
Mass, g	625.19
Moisture Content, %	16.53
Dry Density, pcf	111.13
Spec. Gravity (assumed)	2.683
Volume Solids, cm^3	197.24
Volume Voids, cm^3	104.01
Void Ratio	0.53
Saturation	85.3%

B-Value,f	0.98
Cell Pres	85.00
Bot. Pres.	82.00
Top Pres.	80.00
Head, cm	140.68
Max. Grad.	21.21
Min. Grad.	17.50
Max. E.S.	5.00
Min. E.S.	3.00

Sample Data, Final

Height, inches	3.031
Diameter, inches	2.805
Area, cm^2	39.87
Volume, cm^3	306.93
Mass, g	645.91
Moisture Content %	20.39
Dry Density, pcf	109.07
Saturation	99.7%
Inflow Volume per (1 cc)	1.00
Outflow Volume per (1 cc	1.00

Water Contents	Initial Trimmings	Final Partial Sample
Wt soil&tare, i	625.19	366.58
Wt soil&tare, f	536.50	313.25
Wt Tare	0.00	51.73
Wt Moisture Lost	88.69	53.33
Wt Dry Soil	536.50	261.52
Water Content	16.53%	20.39%

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some, coarse to fine sand, little fine gravel.

USCS: (CL)

TIME FUNCTION			READINGS			TIME IN MINUTES & SECONDS						VOLUME		PERMEABILITY
DATE	HOUR	MIN	Inflow (cc)	Outflow (cc)	Temp.	dt (min)	dt (sec)	dt, acc (sec)	Head (cm)	(H1/H2) (inc.)	Gradient	Inflow (cc)	Outflow (cc)	@ 20 Degrees C (cm/sec)
10/22/01	8	20	0.00	25.00	17.1	0.0	0	0	163.27		21.21	0.00	0.00	0.0
10/22/01	9	11	3.30	22.10	17.1	51.0	3060	3060	157.67	1.04	20.48	3.30	2.90	1.16E-06
10/22/01	9	30	4.20	21.20	17.1	19.0	1140	4200	156.04	1.01	20.27	0.90	0.90	9.25E-07
10/22/01	10	22	6.50	18.90	18.5	52.0	3120	7320	151.88	1.03	19.73	2.30	2.30	8.52E-07
10/22/01	10	50	7.60	17.80	19.0	28.0	1680	9000	149.90	1.01	19.47	1.10	1.10	7.63E-07
10/22/01	12	34	11.10	14.30	20.5	104.0	6240	15240	143.57	1.04	18.65	3.50	3.50	6.48E-07
10/22/01	13	41	13.10	12.30	20.5	67.0	4020	19260	139.96	1.03	18.18	2.00	2.00	5.95E-07
10/22/01	14	23	14.00	11.20	20.9	42.0	2520	21780	138.15	1.01	17.94	0.90	1.10	4.79E-07
10/22/01	15	31	15.90	9.30	20.9	68.0	4080	25860	134.72	1.03	17.50	1.90	1.90	5.73E-07
10/23/01	8	5	0.00	25.00	20.6	994.0	59640	85500	163.27	0.83	21.21	0.00	0.00	ERR
10/23/01	10	21	6.10	19.30	21.2	136.0	8160	93660	152.61	1.07	19.82	6.10	5.70	7.63E-07 *
10/23/01	11	31	8.50	16.70	21.3	70.0	4200	97860	148.09	1.03	19.24	2.40	2.60	6.58E-07 *
10/23/01	13	12	11.80	13.60	21.4	101.0	6060	103920	142.31	1.04	18.48	3.30	3.10	6.03E-07 *
10/23/01	15	29	15.60	9.70	21.3	137.0	8220	112140	135.35	1.05	17.58	3.80	3.90	5.61E-07 *

Inflow Rate	0.000281
Outflow Rate	0.000276
Outflow/Inflow Rati	0.98

PERMEABILITY REPORTED AS 6.5E-07 cm/sec

DATE 10/22/01
CHECK PWM
REVIEW BS

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

Golder Associates Inc.

FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	013-3175
SAMPLE ID	LP01-24 - -
SAMPLE TYPE	Bag

BOARD #	8
CELL #	8
Flow Pump Speed	10
Technician	FT

COMMENTS: Per client request, sample was remolded to approximately 111.5 pcf at a moisture content of 17.5%.

Sample Data, Initial			
Height, inches	2.988	B-Value, f	0.99
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	299.35	Top Pres.	80.0
Mass, g	629.47	Tot. B.P.	80.0
Moisture Content, %	17.42	Head, max.	104.81
Dry Density, pcf	111.75	Head, min.	104.81
Spec. Gravity (assumed)	2.720	Max. Grad.	13.68
Volume Solids, cm³	197.09	Min. Grad.	13.68
Volume Voids, cm³	102.26		
Void Ratio	0.52		
Saturation, %	91.3%		

Sample Data, Final	
Height, inches	3.016
Diameter, inches	2.804
Area, cm²	39.84
Volume, cm³	305.20
Mass, g	640.53
Moisture Content, %	19.48
Dry Density, pcf	109.61
Volume Solids, cm³	197.09
Volume Voids, cm³	108.10
Void Ratio	0.55
Saturation, %	96.6%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	629.47	692.09
Wt Soil & Tare, f	g	536.09	587.70
Wt Tare	g	0.00	51.85
Wt Moisture Lost	g	93.38	104.39
Wt Dry Soil	g	536.09	535.85
Water Content	%	17.42%	19.48%

Flow Pump Rate: 3.00E-05 cm³/sec

USCS: (CL)

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace fine gravel.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
10/27/2001	37191	8	35	16.2	0	0	0	0	1.49	104.81	13.68	6.0E-08
10/27/2001	37191	8	40	16.2	5	5	300	300	1.49	104.81	13.68	6.0E-08
10/27/2001	37191	8	45	16.2	5	10	300	600	1.49	104.81	13.68	6.0E-08
10/27/2001	37191	8	50	16.2	5	15	300	900	1.49	104.81	13.68	6.0E-08 *
10/27/2001	37191	8	55	16.2	5	20	300	1200	1.49	104.81	13.68	6.0E-08 *
10/27/2001	37191	9	0	16.2	5	25	300	1500	1.49	104.81	13.68	6.0E-08 *
10/27/2001	37191	9	5	16.2	5	30	300	1800	1.49	104.81	13.68	6.0E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 6.0E-08 cm/sec **

4941

DATE 10/27/01
CHECK [illegible]
REVIEW

000016

Golder Associates Inc.

FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	013-3175
SAMPLE ID	LP01-29 - -
SAMPLE TYPE	Bag

BOARD #	4
CELL #	4
Flow Pump Speed	10
Technician	FT

COMMENTS: Per client request, sample was remolded to approximately 110.0 pcf at a moisture content of 18.0%.

Sample Data, Initial			
Height, inches	3.000	B-Value, f	0.96
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.55	Top Pres.	80.0
Mass, g	624.96	Tot. B.P.	80.0
Moisture Content, %	17.56	Head, max.	119.58
Dry Density, pcf	110.38	Head, min.	119.58
Spec. Gravity (assumed)	2.720	Max. Grad.	15.81
Volume Solids, cm³	195.45	Min. Grad.	15.81
Volume Voids, cm³	105.10		
Void Ratio	0.54		
Saturation, %	88.8%		

Sample Data, Final	
Height, inches	2.977
Diameter, inches	2.791
Area, cm²	39.47
Volume, cm³	298.46
Mass, g	630.13
Moisture Content, %	18.53
Dry Density, pcf	111.15
Volume Solids, cm³	195.45
Volume Voids, cm³	103.01
Void Ratio	0.53
Saturation, %	95.6%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	624.96	681.59
Wt Soil & Tare, f	g	531.63	583.11
Wt Tare	g	0.00	51.60
Wt Moisture Lost	g	93.33	98.48
Wt Dry Soil	g	531.63	531.51
Water Content	%	17.56%	18.53%

Flow Pump Rate: 3.00E-05 cm³/sec

USCS: (CL)

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace fine gravel.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
10/19/01	37183	8	45	18.5	0	0	0	0	1.7	119.58	15.81	5.0E-08
10/19/01	37183	8	50	18.5	5	5	300	300	1.7	119.58	15.81	5.0E-08
10/19/01	37183	8	55	18.5	5	10	300	600	1.7	119.58	15.81	5.0E-08
10/19/01	37183	9	0	18.5	5	15	300	900	1.7	119.58	15.81	5.0E-08 *
10/19/01	37183	9	5	18.5	5	20	300	1200	1.7	119.58	15.81	5.0E-08 *
10/19/01	37183	9	10	18.5	5	25	300	1500	1.7	119.58	15.81	5.0E-08 *
10/19/01	37183	9	15	18.5	5	30	300	1800	1.7	119.58	15.81	5.0E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 5.0E-08 cm/sec **

DATE 10/19/01
CHECK
REVIEW

000017

4941

FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH		
PROJECT NUMBER	013-3175		
SAMPLE ID	LP01-35	-	-
SAMPLE TYPE	Bag		

BOARD #	4
CELL #	4
Flow Pump Speed	10
Technician	JH

COMMENTS: Per client request, sample was remolded to approximately 116.5 pcf at a moisture content of 15.5%.

Sample Data, Initial			
Height, inches	2.998	B-Value, f	0.98
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.35	Top Pres.	80.0
Mass, g	647.43	Tot. B.P.	80.0
Moisture Content, %	15.22	Head, max.	151.93
Dry Density, pcf	116.74	Head, min.	151.93
Spec. Gravity (assumed)	2.720	Max. Grad.	19.98
Volume Solids, cm³	206.59	Min. Grad.	19.98
Volume Voids, cm³	93.76		
Void Ratio	0.45		
Saturation, %	91.2%		

Sample Data, Final	
Height, inches	2.994
Diameter, inches	2.789
Area, cm²	39.41
Volume, cm³	299.74
Mass, g	653.57
Moisture Content, %	16.31
Dry Density, pcf	116.98
Volume Solids, cm³	206.59
Volume Voids, cm³	93.15
Void Ratio	0.45
Saturation, %	98.4%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	647.43	704.49
Wt Soil & Tare, f	g	561.92	612.89
Wt Tare	g	0.00	51.27
Wt Moisture Lost	g	85.51	91.60
Wt Dry Soil	g	561.92	561.62
Water Content	%	15.22%	16.31%

Flow Pump Rate: 3.00E-05 cm³/sec

USCS: (CL)

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace fine gravel.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
10/25/01	37189	9	20	20.9	0	0	0	0	2.16	151.93	19.98	3.7E-08
10/25/01	37189	9	25	20.9	5	5	300	300	2.16	151.93	19.98	3.7E-08
10/25/01	37189	9	30	20.9	5	10	300	600	2.16	151.93	19.98	3.7E-08
10/25/01	37189	9	35	20.9	5	15	300	900	2.16	151.93	19.98	3.7E-08 *
10/25/01	37189	9	40	20.9	5	20	300	1200	2.16	151.93	19.98	3.7E-08 *
10/25/01	37189	9	45	20.9	5	25	300	1500	2.16	151.93	19.98	3.7E-08 *
10/25/01	37189	9	50	20.9	5	30	300	1800	2.16	151.93	19.98	3.7E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.7E-08 cm/sec **

DATE 10/25/01
CHECK
REVIEW

000018

4941

FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	013-3175
SAMPLE ID	LP01-39
SAMPLE TYPE	Bag

BOARD #	5
CELL #	5
Flow Pump Speed	10
Technician	FT

COMMENTS: Per client request, sample was remolded to approximately 112.5 pcf at a moisture content of 16.5%.

Sample Data, Initial			
Height, inches	2.995	B-Value, f	0.97
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.05	Top Pres.	80.0
Mass, g	631.02	Tot. B.P.	80.0
Moisture Content, %	17.21	Head, max.	123.10
Dry Density, pcf	111.96	Head, min.	123.10
Spec. Gravity (assumed)	2.720	Max. Grad.	16.19
Volume Solids, cm³	197.93	Min. Grad.	16.19
Volume Voids, cm³	102.12		
Void Ratio	0.52		
Saturation, %	90.7%		

Sample Data, Final	
Height, inches	2.994
Diameter, inches	2.791
Area, cm²	39.47
Volume, cm³	300.17
Mass, g	638.99
Moisture Content, %	18.69
Dry Density, pcf	111.92
Volume Solids, cm³	197.93
Volume Voids, cm³	102.24
Void Ratio	0.52
Saturation, %	98.4%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	631.02	690.91
Wt Soil & Tare, f	g	538.36	590.32
Wt Tare	g	0.00	52.15
Wt Moisture Lost	g	92.66	100.59
Wt Dry Soil	g	538.36	538.17
Water Content	%	17.21%	18.69%

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand, little fine gravel.

Flow Pump Rate: 3.00E-05 cm³/sec

USCS: (CL)

TIME FUNCTIONS, SECONDS								dP					
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)	
10/19/01	37183	10	10	18.7	0	0	0	0	1.75	123.10	16.19	4.9E-08	
10/19/01	37183	10	15	18.7	5	5	300	300	1.75	123.10	16.19	4.9E-08	
10/19/01	37183	10	20	18.7	5	10	300	600	1.75	123.10	16.19	4.9E-08	
10/19/01	37183	10	25	18.7	5	15	300	900	1.75	123.10	16.19	4.9E-08	*
10/19/01	37183	10	30	18.7	5	20	300	1200	1.75	123.10	16.19	4.9E-08	*
10/19/01	37183	10	35	18.7	5	25	300	1500	1.75	123.10	16.19	4.9E-08	*
10/19/01	37183	10	40	18.7	5	30	300	1800	1.75	123.10	16.19	4.9E-08	*

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 4.9E-08 cm/sec **

DATE 10/19/01
CHECK
REVIEW

000019

4941

Golder Associates Inc.

FLOW PUMP #2B

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	BOARD #	7
PROJECT NUMBER	013-3175	CELL #	7
SAMPLE ID	LP01-40 - - -	Flow Pump Speed	10
SAMPLE TYPE	Bag	Technician	FT

COMMENTS: Per client request, sample was remolded to approximately 118.5 pcf at a moisture content of 14.7%.

Sample Data, Initial			
Height, inches	2.992	B-Value, f	0.97
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	299.75	Top Pres.	80.0
Mass, g	654.69	Tot. B.P.	80.0
Moisture Content, %	14.39	Head, max.	111.84
Dry Density, pcf	119.14	Head, min.	111.84
Spec. Gravity (assumed)	2.720	Max. Grad.	15.14
Volume Solids, cm³	210.41	Min. Grad.	15.14
Volume Voids, cm³	89.34		
Void Ratio	0.42		
Saturation, %	92.2%		

Sample Data, Final	
Height, inches	2.908
Diameter, inches	2.821
Area, cm²	40.32
Volume, cm³	297.85
Mass, g	659.10
Moisture Content, %	15.16
Dry Density, pcf	119.90
Volume Solids, cm³	210.41
Volume Voids, cm³	87.44
Void Ratio	0.42
Saturation, %	99.3%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	664.69	710.00
Wt Soil & Tare, f	g	572.31	623.27
Wt Tare	g	0.00	51.32
Wt Moisture Lost	g	82.38	86.73
Wt Dry Soil	g	572.31	571.95
Water Content	%	14.39%	15.16%

Flow Pump Rate: 2.33E-05 cm³/sec

USCS: (CL)

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace fine gravel.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
10/26/2001	37190	11	0	20.6	0	0	0	0	1.59	111.84	15.14	3.8E-08
10/26/2001	37190	11	5	20.6	5	5	300	300	1.59	111.84	15.14	3.8E-08
10/26/2001	37190	11	10	20.6	5	10	300	600	1.59	111.84	15.14	3.8E-08
10/26/2001	37190	11	15	20.6	5	15	300	900	1.59	111.84	15.14	3.8E-08 *
10/26/2001	37190	11	20	20.6	5	20	300	1200	1.59	111.84	15.14	3.8E-08 *
10/26/2001	37190	11	25	20.6	5	25	300	1500	1.59	111.84	15.14	3.8E-08 *
10/26/2001	37190	11	30	20.6	5	30	300	1800	1.59	111.84	15.14	3.8E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.8E-08 cm/sec **

DATE 10/26/01
CHECK
REVIEW

4941

000020

FLOW PUMP #2B

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	013-3175
SAMPLE ID	LP01-49 - - -
SAMPLE TYPE	Bag

BOARD #	3
CELL #	3
Flow Pump Speed	10
Technician	JH

COMMENTS: Per client request, sample was remolded to approximately 115.4 pcf at a moisture content of 15.5%.

Sample Data, Initial			
Height, inches	2.986	B-Value, f	0.98
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	299.15	Top Pres.	80.0
Mass, g	641.63	Tot. B.P.	80.0
Moisture Content, %	15.52	Head, max.	151.23
Dry Density, pcf	115.85	Head, min.	151.23
Spec. Gravity (assumed)	2.720	Max. Grad.	19.91
Volume Solids, cm³	204.19	Min. Grad.	19.91
Volume Voids, cm³	94.96		
Void Ratio	0.47		
Saturation, %	90.8%		

Sample Data, Final	
Height, inches	2.990
Diameter, inches	2.807
Area, cm²	39.92
Volume, cm³	303.21
Mass, g	649.40
Moisture Content, %	16.92
Dry Density, pcf	114.30
Volume Solids, cm³	204.19
Volume Voids, cm³	99.02
Void Ratio	0.48
Saturation, %	94.9%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	641.63	701.34
Wt Soil & Tare, f	g	555.40	607.38
Wt Tare	g	0.00	52.19
Wt Moisture Lost	g	86.23	93.96
Wt Dry Soil	g	555.40	555.19
Water Content	%	15.52%	16.92%

Flow Pump Rate: 2.33E-05 cm³/sec

USCS: (CL)

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand, little fine gravel.

TIME FUNCTIONS, SECONDS								dP					
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)	
10/25/01	37189	9	30	20.9	0	0	0	0	2.15	151.23	19.91	2.9E-08	
10/25/01	37189	9	35	20.9	5	5	300	300	2.15	151.23	19.91	2.9E-08	
10/25/01	37189	9	40	20.9	5	10	300	600	2.15	151.23	19.91	2.9E-08	
10/25/01	37189	9	45	20.9	5	15	300	900	2.15	151.23	19.91	2.9E-08	*
10/25/01	37189	9	50	20.9	5	20	300	1200	2.15	151.23	19.91	2.9E-08	*
10/25/01	37189	9	55	20.9	5	25	300	1500	2.15	151.23	19.91	2.9E-08	*
10/25/01	37189	10	0	20.9	5	30	300	1800	2.15	151.23	19.91	2.9E-08	*

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 2.9E-08 cm/sec **

4941

DATE	10/25/01
CHECK	AWM
REVIEW	BSS

Golder Associates Inc.

FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	013-3175
SAMPLE ID	LP01-50 - -
SAMPLE TYPE	Bag

BOARD #	4
CELL #	4
Flow Pump Speed	10
Technician	JH

COMMENTS: Per client request, sample was remolded to approximately 116.0 pcf at a moisture content of 15.0%.

Sample Data, Initial			
Height, inches	2.986	B-Value, f	0.98
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	299.15	Top Pres.	80.0
Mass, g	642.32	Tot. B.P.	80.0
Moisture Content, %	14.83	Head, max.	123.80
Dry Density, pcf	116.68	Head, min.	123.80
Spec. Gravity(assumed)	2.720	Max. Grad.	16.38
Volume Solids, cm³	205.65	Min. Grad.	16.38
Volume Voids, cm³	93.50		
Void Ratio	0.45		
Saturation, %	88.7%		

Sample Data, Final	
Height, inches	2.975
Diameter, inches	2.788
Area, cm²	39.39
Volume, cm³	297.62
Mass, g	651.79
Moisture Content, %	16.52
Dry Density, pcf	117.28
Volume Solids, cm³	205.65
Volume Voids, cm³	91.97
Void Ratio	0.45
Saturation, %	100.5%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	642.32	703.60
Wt Soil & Tare, f	g	559.37	611.21
Wt Tare	g	0.00	52.00
Wt Moisture Lost	g	82.95	92.39
Wt Dry Soil	g	559.37	559.21
Water Content	%	14.83%	16.52%

Flow Pump Rate: 3.00E-05 cm³/sec

USCS: (CL)

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand, little fine gravel.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
10/25/01	37189	8	30	20.8	0	0	0	0	1.76	123.80	16.38	4.6E-08
10/25/01	37189	8	35	20.8	5	5	300	300	1.76	123.80	16.38	4.6E-08
10/25/01	37189	8	40	20.8	5	10	300	600	1.76	123.80	16.38	4.6E-08
10/25/01	37189	8	45	20.8	5	15	300	900	1.76	123.80	16.38	4.6E-08 *
10/25/01	37189	8	50	20.8	5	20	300	1200	1.76	123.80	16.38	4.6E-08 *
10/25/01	37189	8	55	20.8	5	25	300	1500	1.76	123.80	16.38	4.6E-08 *
10/25/01	37189	9	0	20.8	5	30	300	1800	1.76	123.80	16.38	4.6E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 4.6E-08 cm/sec **

4941

DATE 10/25/01
CHECK
REVIEW

FROM GAS_LAB 7/8 492 8233
07-11-1999 09:49AM
000022

FLOW PUMP #2B

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	013-3175
SAMPLE ID	LP01-52 - - -
SAMPLE TYPE	Bag

BOARD #	5
CELL #	5
Flow Pump Speed	10
Technician	FT

COMMENTS: Per client request, sample was remolded to approximately 118.0 pcf at a moisture content of 14.2%.

Sample Data, Initial			
Height, inches	2.997	B-Value, f	0.96
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.25	Top Pres.	80.0
Mass, g	648.96	Tot. B.P.	80.0
Moisture Content, %	14.92	Head, max.	139.27
Dry Density, pcf	117.36	Head, min.	139.27
Spec. Gravity (assumed)	2.720	Max. Grad.	18.30
Volume Solids, cm³	207.61	Min. Grad.	18.30
Volume Voids, cm³	92.64		
Void Ratio	0.45		
Saturation, %	90.9%		

Sample Data, Final	
Height, inches	2.997
Diameter, inches	2.796
Area, cm²	39.61
Volume, cm³	301.54
Mass, g	653.92
Moisture Content, %	15.80
Dry Density, pcf	116.86
Volume Solids, cm³	207.61
Volume Voids, cm³	93.93
Void Ratio	0.45
Saturation, %	95.0%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	648.96	705.28
Wt Soil & Tare, f	g	564.71	616.11
Wt Tare	g	0.00	51.67
Wt Moisture Lost	g	84.25	89.17
Wt Dry Soil	g	564.71	564.44
Water Content	%	14.92%	15.80%

Flow Pump Rate: 2.33E-05 cm³/sec

USCS: (CL)

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace fine gravel.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
10/26/2001	37190	9	5	21.1	0	0	0	0	1.98	139.27	18.30	3.1E-08
10/26/2001	37190	9	10	21.1	5	5	300	300	1.98	139.27	18.30	3.1E-08
10/26/2001	37190	9	15	21.1	5	10	300	600	1.98	139.27	18.30	3.1E-08
10/26/2001	37190	9	20	21.1	5	15	300	900	1.98	139.27	18.30	3.1E-08 *
10/26/2001	37190	9	25	21.1	5	20	300	1200	1.98	139.27	18.30	3.1E-08 *
10/26/2001	37190	9	30	21.1	5	25	300	1500	1.98	139.27	18.30	3.1E-08 *
10/26/2001	37190	9	35	21.1	5	30	300	1800	1.98	139.27	18.30	3.1E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.1E-08 cm/sec **

DATE 10/26/01
CHECK
REVIEW

4941

0000023

Golder Associates Inc.

FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH		
PROJECT NUMBER	013-3175		
SAMPLE ID	LP01-55	-	-
SAMPLE TYPE	Bag		

BOARD #	6
CELL #	6
Flow Pump Speed	10
Technician	FT

COMMENTS: Per client request, sample was remolded to approximately 115.6 pcf at a moisture content of 15.1%.

Sample Data, Initial			
Height, inches	2.992	B-Value, f	0.98
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	299.75	Top Pres.	80.0
Mass, g	639.40	Tot. B.P.	80.0
Moisture Content, %	15.12	Head, max.	105.51
Dry Density, pcf	115.63	Head, min.	105.51
Spec. Gravity(assumed)	2.720	Max. Grad.	13.96
Volume Solids, cm³	204.20	Min. Grad.	13.96
Volume Voids, cm³	95.55		
Void Ratio	0.47		
Saturation, %	87.9%		

Sample Data, Final	
Height, inches	2.975
Diameter, inches	2.790
Area, cm²	39.44
Volume, cm³	298.05
Mass, g	646.18
Moisture Content, %	16.34
Dry Density, pcf	116.29
Volume Solids, cm³	204.20
Volume Voids, cm³	93.84
Void Ratio	0.46
Saturation, %	96.7%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	639.40	697.33
Wt Soil & Tare, f	g	555.44	606.65
Wt Tare	g	0.00	51.60
Wt Moisture Lost	g	83.96	90.68
Wt Dry Soil	g	555.44	555.05
Water Content	%	15.12%	16.34%

Flow Pump Rate 3.00E-05 cm³/sec

USCS (CL)

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand, little fine gravel.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
11/16/01	37211	8	45	21.2	0	0	0	0	1.5	105.51	13.96	5.3E-08
11/16/01	37211	8	50	21.2	5	5	300	300	1.5	105.51	13.96	5.3E-08
11/16/01	37211	8	55	21.2	5	10	300	600	1.5	105.51	13.96	5.3E-08
11/16/01	37211	9	0	21.2	5	15	300	900	1.5	105.51	13.96	5.3E-08 *
11/16/01	37211	9	5	21.2	5	20	300	1200	1.5	105.51	13.96	5.3E-08 *
11/16/01	37211	9	10	21.2	5	25	300	1500	1.5	105.51	13.96	5.3E-08 *
11/16/01	37211	9	15	21.2	5	30	300	1800	1.5	105.51	13.96	5.3E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 5.3E-08 cm/sec **

DATE 11/16/01
CHECK BSS
REVIEW

4941

000024

FLOW PUMP #2B

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	BOARD #	6
PROJECT NUMBER	013-3175	CELL #	6
SAMPLE ID	LP01-53 - - -	Flow Pump Speed	10
SAMPLE TYPE	Bag	Technician	FT/PM

COMMENTS: Per client request, sample was remolded to approximately 113.0 pcf at a moisture content of 16.3%.

Sample Data, Initial			
Height, inches	2.996	B-Value, f	0.97
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.15	Top Pres.	80.0
Mass, g	632.30	Tot. B.P.	80.0
Moisture Content, %	16.78	Head, max.	130.13
Dry Density, pcf	112.57	Head, min.	130.13
Spec. Gravity (assumed)	2.720	Max. Grad.	17.24
Volume Solids, cm³	199.06	Min. Grad.	17.24
Volume Voids, cm³	101.09		
Void Ratio	0.51		
Saturation, %	89.9%		

Sample Data, Final	
Height, inches	2.971
Diameter, inches	2.794
Area, cm²	39.56
Volume, cm³	298.50
Mass, g	636.80
Moisture Content, %	17.61
Dry Density, pcf	113.19
Volume Solids, cm³	199.06
Volume Voids, cm³	99.44
Void Ratio	0.50
Saturation, %	95.9%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	632.30	687.24
Wt Soil & Tare, f	g	541.45	591.98
Wt Tare	g	0.00	51.01
Wt Moisture Lost	g	90.85	95.26
Wt Dry Soil	g	541.45	540.97
Water Content	%	16.78%	17.61%

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand, little fine gravel.

Flow Pump Rate: 2.33E-05 cm³/sec

USCS: (CL)

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
11/13/01	37208	9	15	17.4	0	0	0	0	1.85	130.13	17.24	3.7E-08
11/13/01	37208	9	20	17.4	5	5	300	300	1.85	130.13	17.24	3.7E-08
11/13/01	37208	9	25	17.4	5	10	300	600	1.85	130.13	17.24	3.7E-08
11/13/01	37208	9	30	17.4	5	15	300	900	1.85	130.13	17.24	3.7E-08 *
11/13/01	37208	9	35	17.4	5	20	300	1200	1.85	130.13	17.24	3.7E-08 *
11/13/01	37208	9	40	17.4	5	25	300	1500	1.85	130.13	17.24	3.7E-08 *
11/13/01	37208	9	45	17.4	5	30	300	1800	1.85	130.13	17.24	3.7E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.7E-08 cm/sec **

DATE 11/13/01
CHECK DA
REVIEW PNM

4941

000025

FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	013-3175
SAMPLE ID	LP01-58 - -
SAMPLE TYPE	Bag

BOARD #	5
CELL #	5
Flow Pump Speed	10
Technician	FT/JH

COMMENTS: Per client request, sample was remolded to approximately 115.5 pcf at a moisture content of 15.7%.

Sample Data, Initial			
Height, inches	3.009	B-Value, f	0.98
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	301.45	Top Pres.	80.0
Mass, g	642.81	Tot. B.P.	80.0
Moisture Content, %	15.59	Head, max.	144.20
Dry Density, pcf	115.12	Head, min.	144.20
Spec. Gravity(assumed)	2.720	Max. Grad.	18.94
Volume Solids, cm³	204.46	Min. Grad.	18.94
Volume Voids, cm³	97.00		
Void Ratio	0.47		
Saturation, %	89.4%		

Sample Data, Final	
Height, inches	2.998
Diameter, inches	2.787
Area, cm²	39.36
Volume, cm³	299.71
Mass, g	649.05
Moisture Content, %	16.71
Dry Density, pcf	115.79
Volume Solids, cm³	204.46
Volume Voids, cm³	95.25
Void Ratio	0.47
Saturation, %	97.6%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	642.81	734.05
Wt Soil & Tare, f	g	556.13	641.17
Wt Tare	g	0.00	85.30
Wt Moisture Lost	g	86.68	92.88
Wt Dry Soil	g	556.13	555.87
Water Content	%	15.59%	16.71%

Flow Pump Rate: 3.00E-05 cm³/sec

USCS: (CL)

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand, little fine gravel.

TIME FUNCTIONS, SECONDS								dP					
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)	
11/14/01	37209	8	40	17.2	0	0	0	0	2.05	144.20	18.94	4.3E-08	
11/14/01	37209	8	45	17.2	5	5	300	300	2.05	144.20	18.94	4.3E-08	
11/14/01	37209	8	50	17.2	5	10	300	600	2.05	144.20	18.94	4.3E-08	
11/14/01	37209	8	55	17.2	5	15	300	900	2.05	144.20	18.94	4.3E-08	*
11/14/01	37209	9	0	17.2	5	20	300	1200	2.05	144.20	18.94	4.3E-08	*
11/14/01	37209	9	5	17.2	5	25	300	1500	2.05	144.20	18.94	4.3E-08	*
11/14/01	37209	9	10	17.2	5	30	300	1800	2.05	144.20	18.94	4.3E-08	*

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 4.3E-08 cm/sec **

4941

DATE 11/14/01
CHECK DA
REVIEW PWM

000026

FLEXIBLE WALL TRIAXIAL PERMEABILITY
ASTM D 5084
METHOD C, FALLING HEAD W/INCREASING TAIL WATER PRESSURE

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	013-3175
SAMPLE ID	LP01-64
SAMPLE TYPE	Bag

Using Pipettes Only	YES
Using Pipettes & Burettes	NO
BOARD#	8
CELL #	8
TECH	JH/DA
DATE	11/28/01

COMMENTS: Per client request, sample was remolded to approximately 114 pcf at moisture content of 16.0%.

Sample Data, Initial	
Height, inches	3.007
Diameter, inches	2.790
Area, cm^2	39.44
Volume, cm^3	301.25
Mass, g	636.70
Moisture Content, %	15.24
Dry Density, pcf	114.45
Spec. Gravity (assumed)	2.720
Volume Solids, cm^3	203.13
Volume Voids, cm^3	98.12
Void Ratio	0.48
Saturation	85.8%

B-Value,f	0.98
Cell Pres	85.00
Bot. Pres.	82.00
Top Pres.	80.00
Head, cm	140.68
Max. Grad.	21.43
Min. Grad.	15.79
Max. E.S.	5.00
Min. E.S.	3.00

Sample Data, Final	
Height, inches	3.003
Diameter, inches	2.810
Area, cm^2	40.01
Volume, cm^3	308.23
Mass, g	651.95
Moisture Content %	18.00
Dry Density, pcf	111.86
Saturation	94.6%
Inflow Volume per (1 cc)	1.00
Outflow Volume per (1 cc)	1.00

Water Contents	Initial	Final
Wt soil&tare, i	636.70	702.88
Wt soil&tare, f	552.52	603.50
Wt Tare	0.00	51.26
Wt Moisture Lost	84.18	99.38
Wt Dry Soil	552.52	552.24
Water Content	15.24%	18.00%

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand.

USCS: (CL)

TIME FUNCTION			READINGS			TIME IN MINUTES & SECONDS						VOLUME		PERMEABILITY
DATE	HOUR	MIN	Inflow (cc)	Outflow (cc)	Temp.	dt (min)	dt (sec)	dt, acc (sec)	Head (cm)	(H1/H2) (inc.)	Gradient	Inflow (cc)	Outflow (cc)	@ 20 Degrees C (cm/sec)
11/28/01	14	40	0.00	25.00	21.8	0.0	0	0	165.10		21.43	0.00	0.00	0.0
11/28/01	17	37	21.10	4.40	22.1	177.0	10620	10620	124.46	1.33	16.16	21.10	20.60	2.45E-06
11/29/01	9	49	0.20	25.00	21.4	972.0	58320	68940	164.90	0.75	21.41	0.00	0.00	
11/29/01	17	51	6.00	20.40	21.3	482.0	28920	97860	154.77	1.07	20.09	5.80	4.60	2.06E-07
11/30/01	7	41	12.30	13.60	20.8	830.0	49800	147660	142.00	1.09	18.43	6.30	6.80	1.65E-07
11/30/01	16	34	15.30	10.30	20.6	533.0	31980	179640	135.86	1.05	17.64	3.00	3.30	1.32E-07
12/1/01	14	30	21.50	4.30	18.5	1316.0	78960	258600	123.97	1.10	16.09	6.20	6.00	1.17E-07
12/3/01	9	50	0.00	25.00	20.4	2600.0	156000	414600	165.10	0.75	21.43	0.00	0.00	
12/3/01	17	18	3.30	21.90	20.6	448.0	26880	441480	158.86	1.04	20.62	3.30	3.10	1.37E-07
12/4/01	17	26	11.30	13.60	21.2	1448.0	86880	528360	142.97	1.11	18.56	8.00	8.30	1.14E-07
12/5/01	7	25	15.30	9.60	20.6	839.0	50340	578700	135.18	1.06	17.55	4.00	4.00	1.07E-07
12/5/01	11	58	16.70	8.40	21.5	273.0	16380	595080	132.64	1.02	17.22	1.40	1.20	1.08E-07 *
12/5/01	16	39	17.90	7.10	22.6	281.0	16860	611940	130.21	1.02	16.90	1.20	1.30	1.00E-07 *
12/6/01	7	30	21.60	3.40	21.7	891.0	53460	665400	122.99	1.06	15.97	3.70	3.70	9.92E-08 *
12/6/01	10	29	22.30	2.70	22.0	179.0	10740	676140	121.63	1.01	15.79	0.70	0.70	9.59E-08 *

Inflow Rate	0.000096
Outflow Rate	0.000094
Outflow/Inflow Ratio	0.98

PERMEABILITY REPORTED AS: 1.0E-07 cm/sec

DATE	11/28/01
CHECK	
REVIEW	

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

4941

000027

FLEXIBLE WALL TRIAXIAL PERMEABILITY
ASTM D 5084
METHOD C, FALLING HEAD W/INCREASING TAIL WATER PRESSURE

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	013-3175
SAMPLE ID	LP01-66
SAMPLE TYPE	Bag

Using Pipettes Only	YES
Using Pipettes & Burettes	NO
BOARD#	9
CELL #	9
TECH	JH/DA
DATE	11/28/01

COMMENTS: Per client request, sample was remolded to approximately 115.1 pcf at moisture content of 15.1%.

Sample Data, Initial	
Height, inches	2.991
Diameter, inches	2.790
Area, cm^2	39.44
Volume, cm^3	299.65
Mass, g	637.19
Moisture Content, %	14.71
Dry Density, pcf	115.68
Spec. Gravity (assumed)	2.720
Volume Solids, cm^3	204.23
Volume Voids, cm^3	95.42
Void Ratio	0.47
Saturation	85.6%

B-Value,f	1.00
Cell Pres	85.00
Bot. Pres.	82.00
Top Pres.	80.00
Head, cm	140.68
Max. Grad.	21.68
Min. Grad.	17.55
Max. E.S.	5.00
Min. E.S.	3.00

Sample Data, Final	
Height, inches	2.998
Diameter, inches	2.780
Area, cm^2	39.16
Volume, cm^3	298.20
Mass, g	652.28
Moisture Content %	17.42
Dry Density, pcf	116.24
Saturation	103.0%
Inflow Volume per (1 cc)	1.00
Outflow Volume per (1 cc)	1.00

Water Contents	Initial	Final
Wt soil&tare, i	637.19	736.64
Wt soil&tare, f	555.50	639.92
Wt Tare	0.00	84.77
Wt Moisture Lost	81.69	96.72
Wt Dry Soil	555.50	555.15
Water Content	14.71%	17.42%

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand.

USCS: (CL)

TIME FUNCTION			READINGS			TIME IN MINUTES & SECONDS						VOLUME		PERMEABILITY
DATE	HOUR	MIN	Inflow (cc)	Outflow (cc)	Temp.	dt (min)	dt (sec)	dt, acc (sec)	Head (cm)	(H1/H2) (inc.)	Gradient	Inflow (cc)	Outflow (cc)	@ 20 Degrees C (cm/sec)
11/28/01	14	15	0.00	25.00	21.8	0.0	0	0	165.10		21.68	0.00	0.00	0.0
11/28/01	17	39	2.10	23.20	22.1	204.0	12240	12240	161.30	1.02	21.18	2.10	1.80	1.77E-07
11/29/01	9	47	0.10	25.00	21.4	968.0	58080	70320	165.00	0.98	21.67	0.00	0.00	
11/29/01	17	51	3.50	22.70	21.3	484.0	29040	99360	159.45	1.03	20.94	3.40	2.30	1.12E-07
11/30/01	7	40	8.20	17.20	20.8	829.0	49740	149100	149.30	1.07	19.63	4.70	5.50	1.24E-07
12/1/01	14	31	16.30	9.00	18.5	1851.0	111060	260160	133.62	1.12	17.55	8.10	8.20	1.03E-07
12/3/01	9	25	0.00	25.00	20.4	2574.0	154440	414600	165.10	0.81	21.68	0.00	0.00	
12/3/01	17	18	2.40	22.40	20.6	473.0	28380	442980	160.22	1.03	21.04	2.40	2.60	1.02E-07
12/4/01	7	38	6.60	18.20	19.4	860.0	51600	494580	152.04	1.05	19.97	4.20	4.20	1.01E-07
12/4/01	9	49	7.20	17.60	20.3	131.0	7860	502440	150.87	1.01	19.81	0.60	0.60	9.56E-08
12/4/01	13	48	8.30	16.50	21.1	239.0	14340	516780	148.72	1.01	19.53	1.10	1.10	9.52E-08
12/4/01	17	27	9.30	15.50	21.2	219.0	13140	529920	146.77	1.01	19.27	1.00	1.00	9.55E-08 *
12/5/01	7	26	13.00	11.70	20.6	839.0	50340	580260	139.46	1.05	18.31	3.70	3.80	9.80E-08 *
12/5/01	11	59	14.20	10.50	21.5	273.0	16380	596640	137.13	1.02	18.01	1.20	1.20	9.75E-08 *
12/5/01	16	39	15.40	9.30	22.6	280.0	16800	613440	134.79	1.02	17.70	1.20	1.20	9.40E-08 *

Inflow Rate	0.000055
Outflow Rate	0.000055
Outflow/Inflow Ratio	0.99

PERMEABILITY REPORTED AS: 9.6E-08 cm/sec

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

DATE: 11/28/01
CHECK: [illegible]
REVIEW: [illegible]

4941

000028

FLOW PUMP #2B

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

ROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	BOARD #	5
ROJECT NUMBER	013-3175	CELL #	5
AMPLE ID	LP01-67 - - -	Flow Pump Speed	9
AMPLE TYPE	Bag	Technician	PWM

COMMENTS: Per client request, sample was remolded to approximately 115.0 pcf at a moisture content of 15.6%.

ample Data, Initial			
Height, inches	3.006	B-Value, f	0.99
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	301.15	Top Pres.	80.0
Mass, g	639.72	Tot. B.P.	80.0
Moisture Content, %	15.73	Head, max.	85.81
Dry Density, pcf	114.54	Head, min.	85.81
pec. Gravity (assumed)	2.720	Max. Grad.	11.06
Volume Solids, cm³	203.23	Min. Grad.	11.06
Volume Voids, cm³	97.93		
Void Ratio	0.48		
aturation, %	88.8%		

Sample Data, Final	
Height, inches	3.054
Diameter, inches	2.802
Area, cm²	39.78
Volume, cm³	308.60
Mass, g	651.62
Moisture Content, %	17.88
Dry Density, pcf	111.77
Volume Solids, cm³	203.23
Volume Voids, cm³	105.37
Void Ratio	0.52
Saturation, %	93.8%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	639.72	765.21
Wt Soil & Tare, f	g	552.77	666.42
Wt Tare	g	0.00	113.96
Wt Moisture Lost	g	86.95	98.79
Wt Dry Soil	g	552.77	552.46
Water Content	%	15.73%	17.88%

DESCRIPTION: Dark Yellowish Brown, SILTY CLAY, some coarse to fine sand, little fine gravel.

Flow Pump Rate: 4.46E-05 cm³/sec

USCS: (CL)

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
12/14/01	37239	13	0	20.7	0	0	0	0	1.22	85.81	11.06	1.0E-07
12/14/01	37239	13	5	20.7	5	5	300	300	1.22	85.81	11.06	1.0E-07
12/14/01	37239	13	10	20.7	5	10	300	600	1.22	85.81	11.06	1.0E-07
12/14/01	37239	13	15	20.7	5	15	300	900	1.22	85.81	11.06	1.0E-07 *
12/14/01	37239	13	20	20.7	5	20	300	1200	1.22	85.81	11.06	1.0E-07 *
12/14/01	37239	13	25	20.7	5	25	300	1500	1.22	85.81	11.06	1.0E-07 *
12/14/01	37239	13	30	20.7	5	30	300	1800	1.22	85.81	11.06	1.0E-07 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.0E-07 cm/sec **

DATE 12/14/01
CHECK RWA
REVIEW BSS

000029

4941

FLOW PUMP #2B

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	023-3313
SAMPLE ID	LP02-01 - - -
SAMPLE TYPE	Bag

BOARD #	7
CELL #	7
Flow Pump Speed	10
Technician	JH

COMMENTS: Per client request, sample was remold to a Dry Density of 110.2 pcf at a Moisture Content of 18.2%

Sample Data, Initial		B-Value, f	1.00
Height, inches	3.009	Cell Pres.	85.0
Diameter, inches	2.790	Bot. Pres.	80.0
Area, cm²	39.44	Top Pres.	80.0
Volume, cm³	301.45	Tot. B.P.	80.0
Mass, g	627.87	Head, max.	87.22
Moisture Content, %	19.60	Head, min.	87.22
Dry Density, pcf	108.67	Max. Grad.	11.44
Spec. Gravity (assumed)	2.720	Min. Grad.	11.44
Volume Solids, cm³	193.01		
Volume Voids, cm³	108.44		
Void Ratio	0.56		
Saturation, %	94.9%		

Sample Data, Final	
Height, inches	3.002
Diameter, inches	2.766
Area, cm²	38.77
Volume, cm³	295.60
Mass, g	630.18
Moisture Content, %	20.04
Dry Density, pcf	110.82
Volume Solids, cm³	193.01
Volume Voids, cm³	102.59
Void Ratio	0.53
Saturation, %	102.5%

Permeant: Dealred Tap Water

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	627.87	682.21
Wt Soil & Tare, f	g	524.99	577.05
Wt Tare	g	0.00	52.22
Wt Moisture Lost	g	102.88	105.16
Wt Dry Soil	g	524.99	524.83
Water Content	%	19.60%	20.04%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some medium to fine sand.

Flow Pump Rate: 2.33E-05 cm³/sec

USCS: (CL)

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
7/3/02	37440	10	5	21.7	0	0	0	0	1.24	87.22	11.44	5.1E-08
7/3/02	37440	10	10	21.7	5	5	300	300	1.24	87.22	11.44	5.1E-08
7/3/02	37440	10	15	21.7	5	10	300	600	1.24	87.22	11.44	5.1E-08
~~7/3/02~~	~~37440~~	~~10~~	~~20~~	~~21.7~~	~~5~~	~~15~~	~~300~~	~~900~~	~~1.24~~	~~87.22~~	~~11.44~~	~~5.1E-08~~ *
7/3/02	37440	10	25	21.7	5	20	300	1200	1.24	87.22	11.44	5.1E-08 *
7/3/02	37440	10	30	21.7	5	25	300	1500	1.24	87.22	11.44	5.1E-08 *
7/3/02	37440	10	35	21.7	5	30	300	1800	1.24	87.22	11.44	5.1E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 5.1E-08 cm/sec **

4941

DATE 7/3/02
CHECK
REVIEW

000030

FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	BOARD #	6	COMMENTS	Per client request, sample was targeted to be remold to a Dry Density of 110.5 pcf at a Moisture Content of 17.5%
PROJECT NUMBER	023-3313	CELL #	6		
SAMPLE ID	LP-02-5	Flow Pump Speed	10		
SAMPLE TYPE	Bag	Technician	FT		

Sample Data, Initial				Sample Data, Final	
Height, inches	3.008	B-Value, f	0.97	Height, inches	3.025
Diameter, inches	2.790	Cell Pres.	85.0	Diameter, inches	2.799
Area, cm²	39.44	Bot. Pres.	80.0	Area, cm²	39.70
Volume, cm³	301.35	Top Pres.	80.0	Volume, cm³	305.02
Mass, g	625.45	Tot. B.P.	80.0	Mass, g	638.28
Moisture Content, %	17.45	Head, max.	84.41	Moisture Content, %	19.86
Dry Density, pcf	110.26	Head, min.	84.41	Dry Density, pcf	108.94
Spec. Gravity	2.720	Max. Grad.	10.99	Volume Solids, cm³	195.77
Volume Solids, cm³	195.77	Min. Grad.	10.99	Volume Voids, cm³	109.24
Volume Voids, cm³	105.58			Void Ratio	0.56
Void Ratio	0.54			Saturation, %	96.8%
Saturation, %	88.0%				

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	625.45	722.35
Wt Soil & Tare, f	g	532.51	616.60
Wt Tare	g	0.00	84.22
Wt Moisture Lost	g	92.94	105.75
Wt Dry Soil	g	532.51	532.38
Water Content	%	17.45%	19.86%

Flow Pump Rate 2.50E-05 cm³/sec

USCS (CL)

DESCRIPTION

Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,sec (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
7/12/02	37449	8	45	20.8	0	0	0	0	1.2	84.41	10.99	5.6E-08
7/12/02	37449	8	50	20.8	5	5	300	300	1.2	84.41	10.99	5.6E-08
7/12/02	37449	8	55	20.8	5	10	300	600	1.2	84.41	10.99	5.6E-08
7/12/02	37449	9	0	20.8	5	15	300	900	1.2	84.41	10.99	5.6E-08 *
7/12/02	37449	9	5	20.8	5	20	300	1200	1.2	84.41	10.99	5.6E-08 *
7/12/02	37449	9	10	20.8	5	25	300	1500	1.2	84.41	10.99	5.6E-08 *
7/12/02	37449	9	15	20.8	5	30	300	1800	1.2	84.41	10.99	5.6E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 5.6E-08 cm/sec **

4941

DATE 7/12/02
CHECK
REVIEW

000031

FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	023-3313
SAMPLE ID	LP-02-14
SAMPLE TYPE	Bag

BOARD #	4
CELL #	4
Flow Pump Speed	10
Technician	JH

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 117.9 pcf at a Moisture Content of 14.5%

Sample Data, Initial			
Height, inches	3.005	B-Value, f	0.98
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	301.05	Top Pres.	80.0
Mass, g	650.05	Tot. B.P.	80.0
Moisture Content, %	14.29	Head, max.	153.34
Dry Density, pcf	117.89	Head, min.	153.34
Spec. Gravity (assumed)	2.720	Max. Grad.	19.99
Volume Solids, cm³	209.10	Min. Grad.	19.99
Volume Voids, cm³	91.96		
Void Ratio	0.44		
Saturation, %	88.4%		

Sample Data, Final	
Height, inches	3.020
Diameter, inches	2.794
Area, cm²	39.56
Volume, cm³	303.42
Mass, g	658.81
Moisture Content, %	15.84
Dry Density, pcf	116.96
Volume Solids, cm³	209.10
Volume Voids, cm³	94.33
Void Ratio	0.45
Saturation, %	95.5%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	650.05	744.62
Wt Soil & Tare, f	g	568.75	654.61
Wt Tare	g	0.00	86.19
Wt Moisture Lost	g	81.30	90.01
Wt Dry Soil	g	568.75	568.42
Water Content	%	14.29%	15.84%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

Flow Pump Rate: 2.50E-05 cm³/sec

USCS: (CL)

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
7/28/02	37465	14	5	20.9	0	0	0	0	2.18	153.34	19.99	3.1E-08
7/28/02	37465	14	10	20.9	5	5	300	300	2.18	153.34	19.99	3.1E-08
7/28/02	37465	14	15	20.9	5	10	300	600	2.18	153.34	19.99	3.1E-08
7/28/02	37465	14	20	20.9	5	15	300	900	2.18	153.34	19.99	3.1E-08 *
7/28/02	37465	14	25	20.9	5	20	300	1200	2.18	153.34	19.99	3.1E-08 *
7/28/02	37465	14	30	20.9	5	25	300	1500	2.18	153.34	19.99	3.1E-08 *
7/28/02	37465	14	35	20.9	5	30	300	1800	2.18	153.34	19.99	3.1E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.1E-08 cm/sec **

4941

DATE 7/28/02
CHECK BJS
REVIEW RWM

000032

FLOW PUMP #1

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	023-3313
SAMPLE ID	LP-02-18 - - -
SAMPLE TYPE	Bag

BOARD #	8
CELL #	8
Flow Pump Speed	10
Technician	FT

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 110.5 pcf at a Moisture Content of 17.5%

Sample Data, Initial			
Height, inches	2.998	B-Value, f	1.00
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.35	Top Pres.	80.0
Mass, g	625.06	Tot. B.P.	80.0
Moisture Content, %	18.41	Head, max.	137.16
Dry Density, pcf	109.67	Head, min.	137.16
Spec. Gravity (assumed)	2.720	Max. Grad.	18.00
Volume Solids, cm³	194.07	Min. Grad.	18.00
Volume Voids, cm³	106.28		
Void Ratio	0.55		
Saturation, %	91.4%		

Sample Data, Final	
Height, inches	3.000
Diameter, inches	2.796
Area, cm²	39.61
Volume, cm³	301.85
Mass, g	632.59
Moisture Content, %	19.84
Dry Density, pcf	109.13
Volume Solids, cm³	194.07
Volume Voids, cm³	107.78
Void Ratio	0.56
Saturation, %	97.2%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	625.06	716.54
Wt Soil & Tare, f	g	527.87	611.88
Wt Tare	g	0.00	84.30
Wt Moisture Lost	g	97.19	104.66
Wt Dry Soil	g	527.87	527.58
Water Content	%	18.41%	19.84%

Flow Pump Rate: 2.50E-05 cm³/sec

USCS: (CL)

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

TIME FUNCTIONS, SECONDS

DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dP dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
7/12/02	37449	13	5	21.4	0	0	0	0	1.95	137.16	18.00	3.4E-08
7/12/02	37449	13	10	21.4	5	5	300	300	1.95	137.16	18.00	3.4E-08
7/12/02	37449	13	15	21.4	5	10	300	600	1.95	137.16	18.00	3.4E-08
7/12/02	37449	13	20	21.4	5	15	300	900	1.95	137.16	18.00	3.4E-08
7/12/02	37449	13	25	21.4	5	20	300	1200	1.95	137.16	18.00	3.4E-08 *
7/12/02	37449	13	30	21.4	5	25	300	1500	1.95	137.16	18.00	3.4E-08 *
7/12/02	37449	13	35	21.4	5	30	300	1800	1.95	137.16	18.00	3.4E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.4E-08 cm/sec **

DATE 7/12/02
CHECK BS
REVIEW [illegible]

4941

000033

Golder Associates Inc.

FLOW PUMP #2B

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	023-3313
SAMPLE ID	LP02-20 - - -
SAMPLE TYPE	Bag

BOARD #	5
CELL #	5
Flow Pump Speed	9
Technician	JH

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 114.1 pcf at a Moisture Content of 15.5%.

Sample Data, Initial			
Height, inches	2.997	B-Value, f	0.99
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.25	Top Pres.	80.0
Mass, g	634.38	Tot. B.P.	80.0
Moisture Content, %	15.74	Head, max.	149.12
Dry Density, pcf	113.91	Head, min.	149.12
Spec. Gravity (assumed)	2.720	Max. Grad.	19.55
Volume Solids, cm³	201.51	Min. Grad.	19.55
Volume Voids, cm³	98.74		
Void Ratio	0.49		
Saturation, %	87.4%		

Sample Data, Final	
Height, inches	3.003
Diameter, inches	2.794
Area, cm²	39.56
Volume, cm³	301.72
Mass, g	642.62
Moisture Content, %	17.24
Dry Density, pcf	113.36
Volume Solids, cm³	201.51
Volume Voids, cm³	100.21
Void Ratio	0.50
Saturation, %	94.3%

Permeant: Desired Tap Water

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	634.38	726.69
Wt Soil & Tare, f	g	548.10	632.22
Wt Tare	g	0.00	84.39
Wt Moisture Lost	g	86.28	94.47
Wt Dry Soil	g	548.10	547.83
Water Content	%	15.74%	17.24%

Flow Pump Rate: 4.46E-05 cm³/sec

USCS: (CL)

DESCRIPTION: Yellowish Brown, SILTY CLAY, some medium to fine sand, trace gravel.

TIME FUNCTIONS, SECONDS

DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dP dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
7/28/02	37465	14	5	20.9	0	0	0	0	2.12	149.12	19.55	5.7E-08
7/28/02	37465	14	10	20.9	5	5	300	300	2.12	149.12	19.55	5.7E-08
7/28/02	37465	14	15	20.9	5	10	300	600	2.12	149.12	19.55	5.7E-08
7/28/02	37465	14	20	20.9	5	15	300	900	2.12	149.12	19.55	5.7E-08
7/28/02	37465	14	25	20.9	5	20	300	1200	2.12	149.12	19.55	5.7E-08 *
7/28/02	37465	14	30	20.9	5	25	300	1500	2.12	149.12	19.55	5.7E-08 *
7/28/02	37465	14	35	20.9	5	30	300	1800	2.12	149.12	19.55	5.7E-08 *
												5.7E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 5.7E-08 cm/sec **

4941

DATE 7/28/02
CHECK
REVIEW

000034

FLOW PUMP #2B

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	023-3313
SAMPLE ID	LP02-33 - - -
SAMPLE TYPE	Bag

BOARD #	5
CELL #	5
Flow Pump Speed	9
Technician	JH

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 115.4 pcf at a Moisture Content of 15.1%

Sample Data, Initial			
Height, inches	2.997	B-Value, f	0.96
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.25	Top Pres.	80.0
Mass, g	640.78	Tot. B.P.	80.0
Moisture Content, %	14.69	Head, max.	136.46
Dry Density, pcf	116.12	Head, min.	136.46
Spec. Gravity (assumed)	2.720	Max. Grad.	17.96
Volume Solids, cm³	205.41	Min. Grad.	17.96
Volume Voids, cm³	94.84		
Void Ratio	0.46		
Saturation, %	86.5%		

Sample Data, Final	
Height, inches	2.991
Diameter, inches	2.802
Area, cm²	39.78
Volume, cm³	302.23
Mass, g	649.90
Moisture Content, %	16.32
Dry Density, pcf	115.35
Volume Solids, cm³	205.41
Volume Voids, cm³	96.82
Void Ratio	0.47
Saturation, %	94.2%

Permeant: Deaired Tap Water

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	640.78	734.49
Wt Soil & Tare, f	g	558.72	643.36
Wt Tare	g	0.00	84.96
Wt Moisture Lost	g	82.06	91.13
Wt Dry Soil	g	558.72	558.40
Water Content	%	14.69%	16.32%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some medium to fine sand, trace gravel.

Flow Pump Rate: 4.46E-05 cm³/sec

USCS: (CL)

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
8/6/02	37474	8	5	21.5	0	0	0	0	1.94	136.46	17.96	6.0E-08
8/6/02	37474	8	10	21.5	5	5	300	300	1.94	136.46	17.96	6.0E-08
8/6/02	37474	8	15	21.5	5	10	300	600	1.94	136.46	17.96	6.0E-08
8/6/02	37474	8	20	21.5	5	15	300	900	1.94	136.46	17.96	6.0E-08 *
8/6/02	37474	8	25	21.5	5	20	300	1200	1.94	136.46	17.96	6.0E-08 *
8/6/02	37474	8	30	21.5	5	25	300	1500	1.94	136.46	17.96	6.0E-08 *
8/6/02	37474	8	35	21.5	5	30	300	1800	1.94	136.46	17.96	6.0E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 6.0E-08 cm/sec **

4941

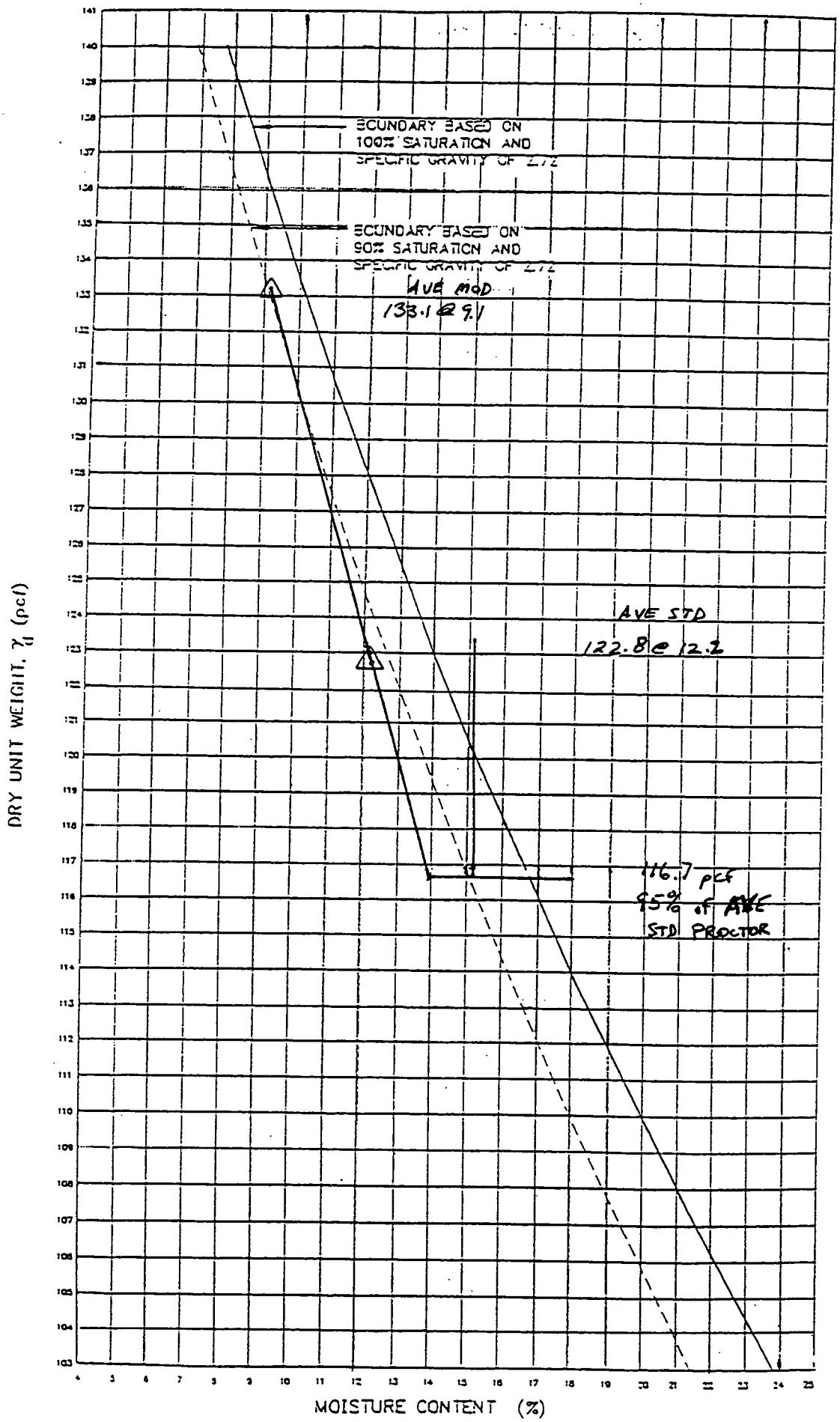
DATE 8/6/02
CHECK BSA
REVIEW PWM

000035

Acceptable Permeability Zones (APZs)

99-4

4941



STOCKPILE
99-4

$$\frac{\%M}{\frac{62.4}{DD} - \frac{1}{2.72}} = 0.9 \text{ (minimum)}$$

000038

TABLE 1 RCI 20102-054R

STOCKPILE 99-4

ple No.	Frequency (Yds.)	STD.	MOD.	LL/PL/PI	#200 %PASS	HYD. COND.	% CLAY
LPIII-42	33,000	119.6@13.9 120.4@13.6	— —	32/18/14	74.2	—	19.5
LPIII-43	34,500	122.4@12.5 123.4@12.2	132.8@8.9 133.7@8.7	29/16/13	69.4	7.6×10^{-8}	18.2
LPIII-44	36,000	125.0@11.6 125.9@11.3	— —	27/15/12	68.6	—	16.7
LPIII-46	37,500	122.5@11.9 123.4@11.6	129.1@10.1 129.9@9.9	30/14/16	68.1	2.1×10^{-8}	17.6
LPIII-47	39,000	122.4@11.9 123.8@12.1	— —	32/15/17	68.7	—	19.2
LPIII-48	40,500	121.0@13.0 122.2@12.6	134.9@8.8 135.8@8.6	27/15/12	67.4	—	16.1
;II-49	42,000	119.8@12.5 120.7@12.2	— —	28/15/13	69.7	—	17.3

Average Corrected Standard = 122.8 @ 12.2

Average Corrected Modified = 133.1 @ 9.1

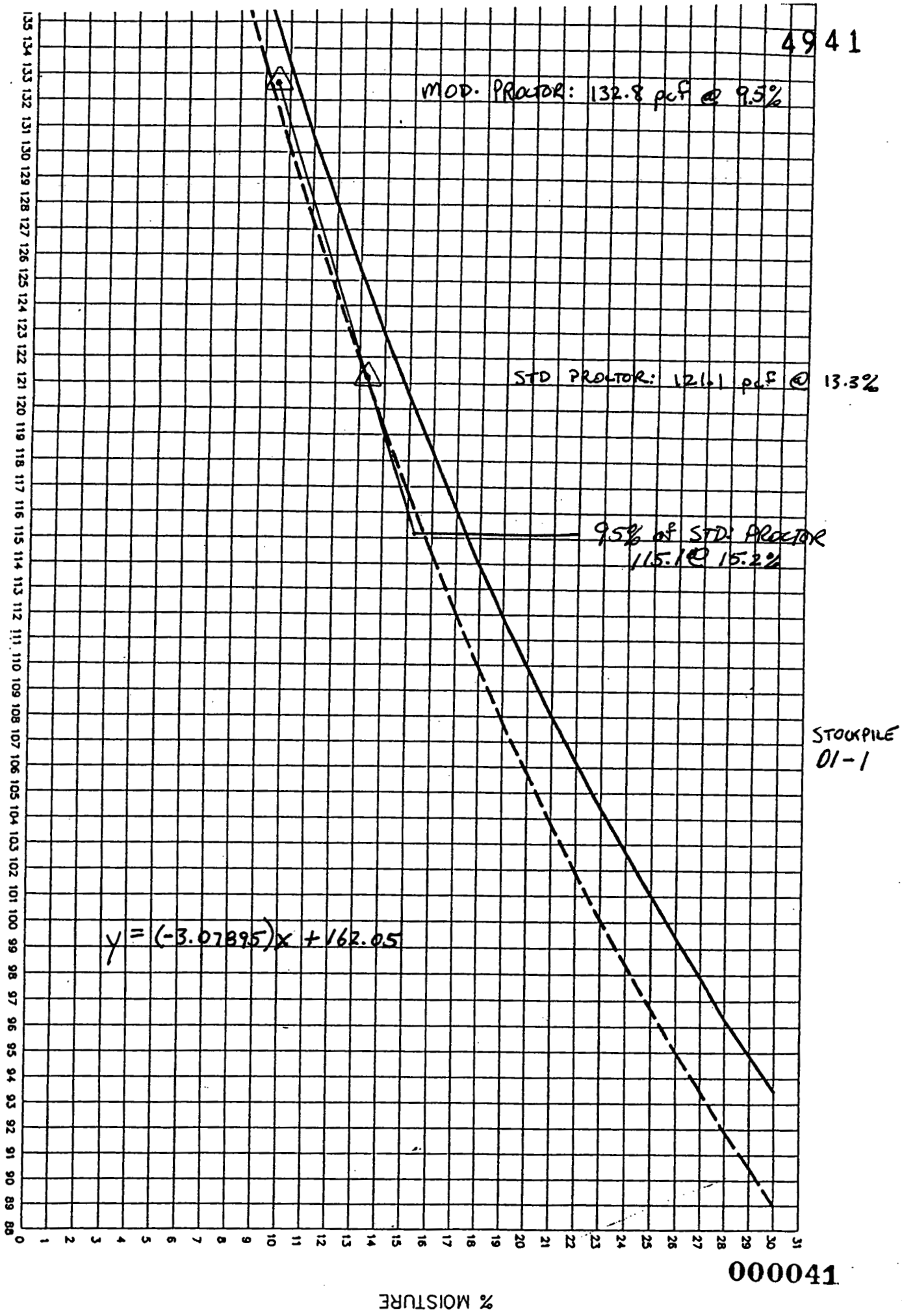
Reported Tons = 15,634 @ 10% = 14,212

Estimated Total Yardage = 8,559

Cumulative Yardage = 37,582

Final Composite Hydraulic Conductivity = 2.3×10^{-8} and 2.5×10^{-8} cm/sec, remolded to the 90% saturation curve which was used as the APZ for Cells 1 and 2. The first two Composite #4 points were remolded to less than the 90% saturation curve within the line of optimums APZ and were 2.0×10^{-7} and 3.0×10^{-7} cm/sec. The core samples LP III-111 through 114 (see Fig 1) were remolded close to the line of optimums APZ.

Stockpile 01-1

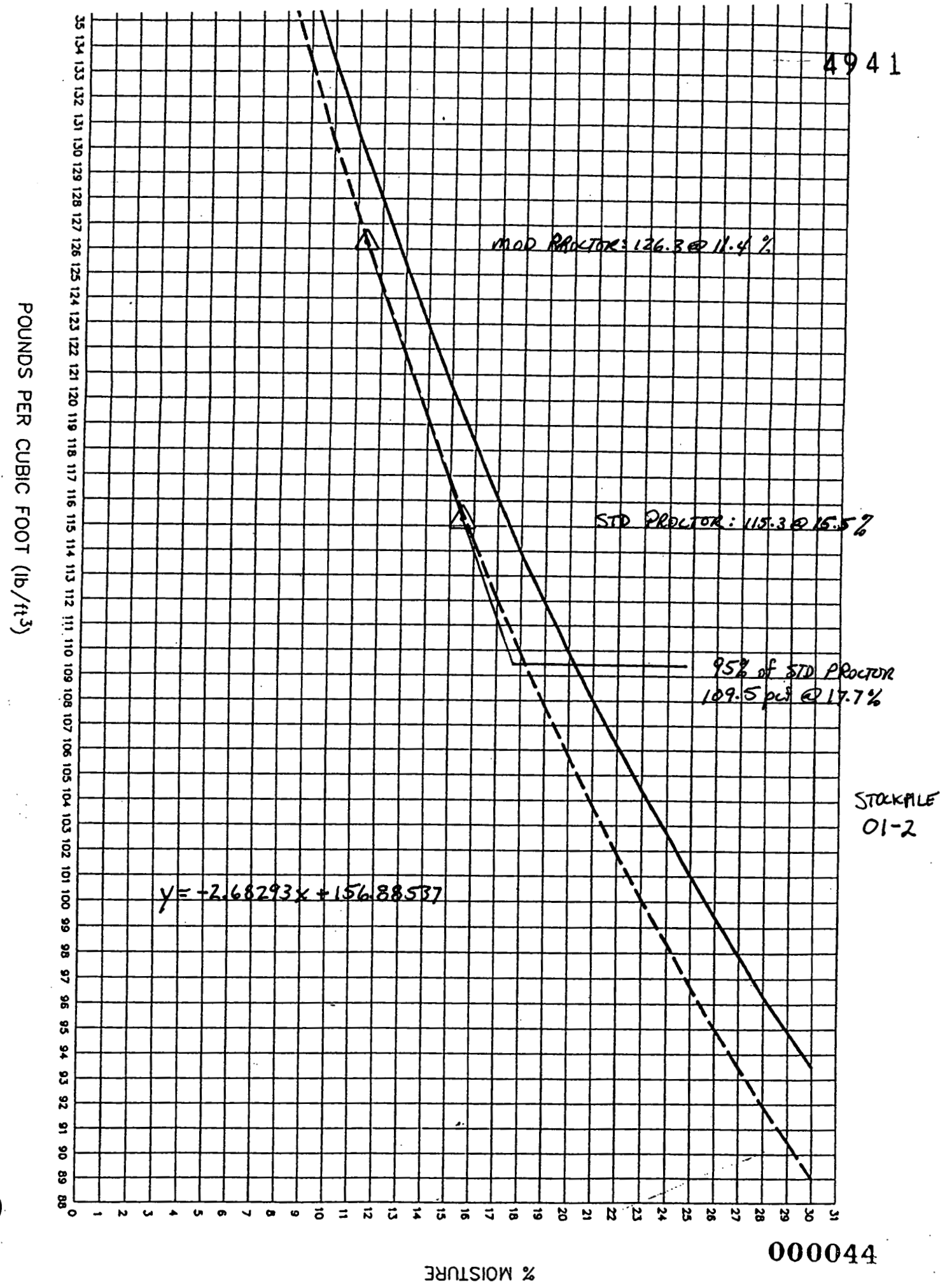

MOD. PROCTOR: 132.8 pcf @ 9.5%
STD PROCTOR: 121.1 pcf @ 13.3%
95% of STD PROCTOR
115.1 @ 15.2%
STOCKPILE
01-1
y = (-3.07895)x + 162.05
POUNDS PER CUBIC FOOT (lb/ft³)
% MOISTURE

STOCKPILE 01-1

Sample Number	Sample Frequency (cu Yds)	Moisture Content %	Standard Proctor (and rock correction)	Modified Proctor pcf @ %	Liquid Limit %	Plastic Limit %	Plasticity Index	Passing #200 sieve %	Clay Content %	Classification (USCS)	Hydraulic Conductivity
LP01-01	1500	12.6	122.1@13.0 122.9@12.7	133.1@8.9 133.8@8.7	29	16	13	68.3	22.3	Sandy Lean Clay (CL)	2.10E-08
LP01-02	3000	10.5	123.4@12.5 124.3@12.2	— —	31	16	15	80.4	29.0	Lean Clay w/Sand (CL)	— —
LP01-03	4500	13.3	124.0@12.1 127.1@11.1	131.7@9.8 134.5@9.0	30	16	14	65.7	20.1	Sandy Lean Clay (CL)	— —
LP01-04	6000	13.0	116.3@14.5 116.9@14.3	— —	33	16	17	74.9	25.3	Lean Clay w/Sand (CL)	— —
LP01-05	7500	12.4	118.0@14.5 118.6@14.3	129.5@11.0 130.0@10.8	32	16	16	72.5	23.0	Lean Clay w/Sand (CL)	— —
LP01-06	9000	17.0	116.5@15.0 116.8@14.9	— —	34	16	18	71.4	29.5	Lean Clay w/Sand (CL)	— —

Reported total yards, surveyed:	9734
Converted total yards in place:	8410
Average Stockpile Moisture:	13.1
Average Corrected Standard Proctor:	121.1@13.3%
Average Corrected Modified Proctor:	132.8@9.5%
Cumulative cubic yards:	8,410
Composite Hydraulic Conductivity:	4.10E-08

Stockpile 01-2

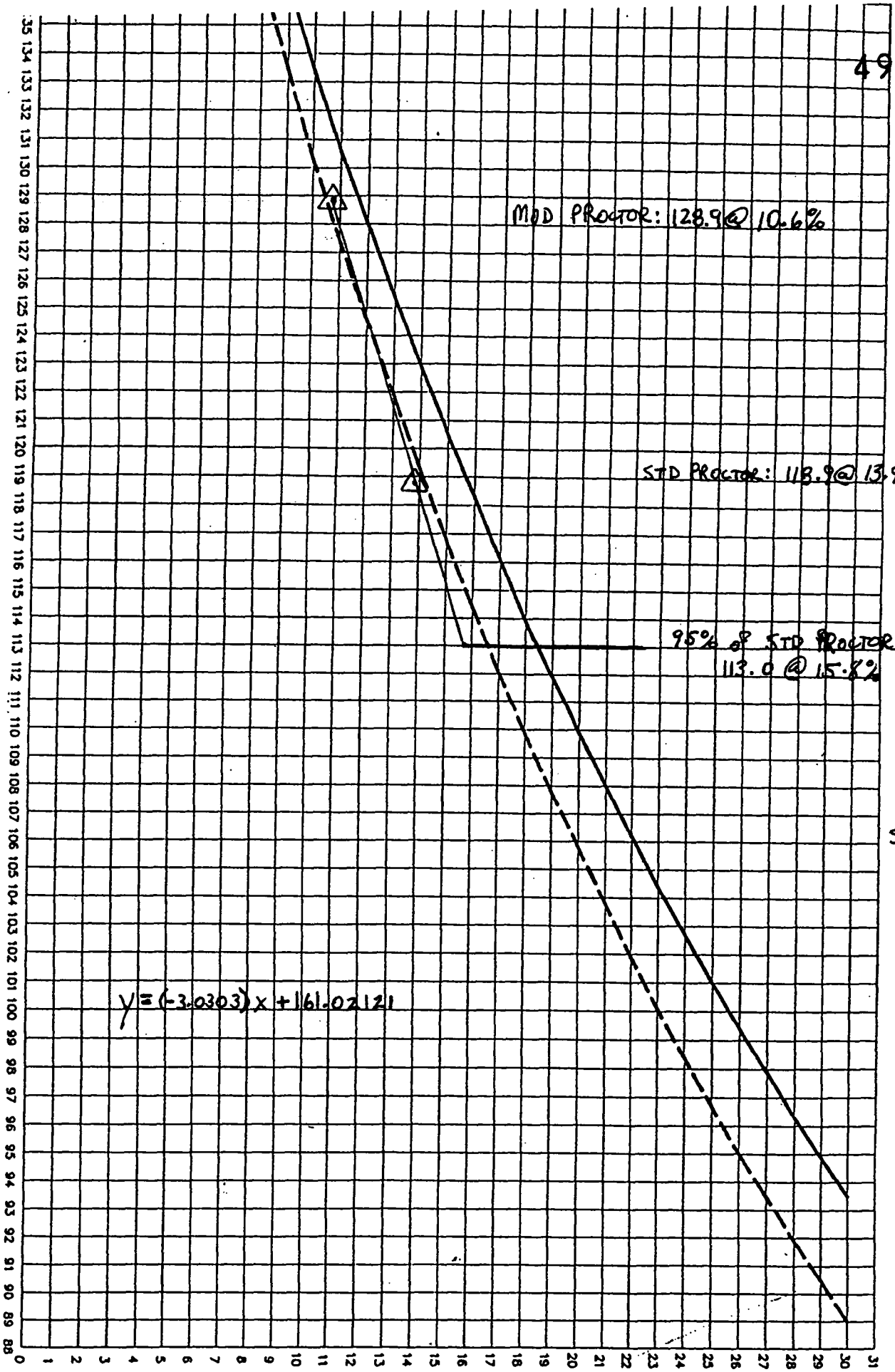

4941
MOD PROCTOR: 126.3 @ 11.4 %
STD PROCTOR: 115.3 @ 15.5 %
95% of STD PROCTOR
109.5 pcf @ 17.7%
STOCKPILE
01-2
y = -2.68293x + 156.88537
POUNDS PER CUBIC FOOT (lb/ft³)
% MOISTURE

STOCKPILE 01-2

Sample Number	Sample Frequency (cu Yds)	Moisture Content %	Standard Proctor (and rock correction)	Modified Proctor pcf @ %	Liquid Limit %	Plastic Limit %	Plasticity Index	Passing #200 sieve %	Clay Content %	Classification (USCS)	Hydraulic Conductivity
LP01-07	1500	16.7	116.5@15.0 117.4@14.7	127.3@10.9 128.1@10.7	35	17	18	77.6	30	Lean Clay w/sand (CL)	4.40E-08
LP01-08	3000	19.4	115.1@15.7 115.8@15.4	— —	34	18	16	78.2	30.5	Lean Clay w/sand (CL)	— —
LP01-09	4500	20.3	113.4@16.3 113.9@16.1	124.0@12.3 124.4@12.2	38	16	22	80.7	33	Lean Clay w/sand (CL)	— —
LP01-11	6000	18.2	115.0@15.5 115.3@15.4	— —	39	18	21	82.8	32	Lean Clay w/sand (CL)	— —
LP01-12	7500	18.7	114.0@16.0 114.5@15.8	126.3@11.3 126.5@11.2	37	16	21	80.4	31	Lean Clay w/sand (CL)	— —
LP01-19	9000	20.2	114.4@15.7 115.0@15.5	— —	34	17	17	78.7	31	Lean Clay w/sand (CL)	— —

Reported total yards, surveyed:	9,200 cys
Converted total yards in place:	7,948.80
Average Stockpile Moisture:	18.70%
Average Corrected Standard Proctor:	115.3 @ 15.5
Average Corrected Modified Proctor:	126.3 @ 11.4
Cumulative cubic yards:	16,359 cys
Composite Hydraulic Conductivity:	4.8E -8

Stockpile 01-3

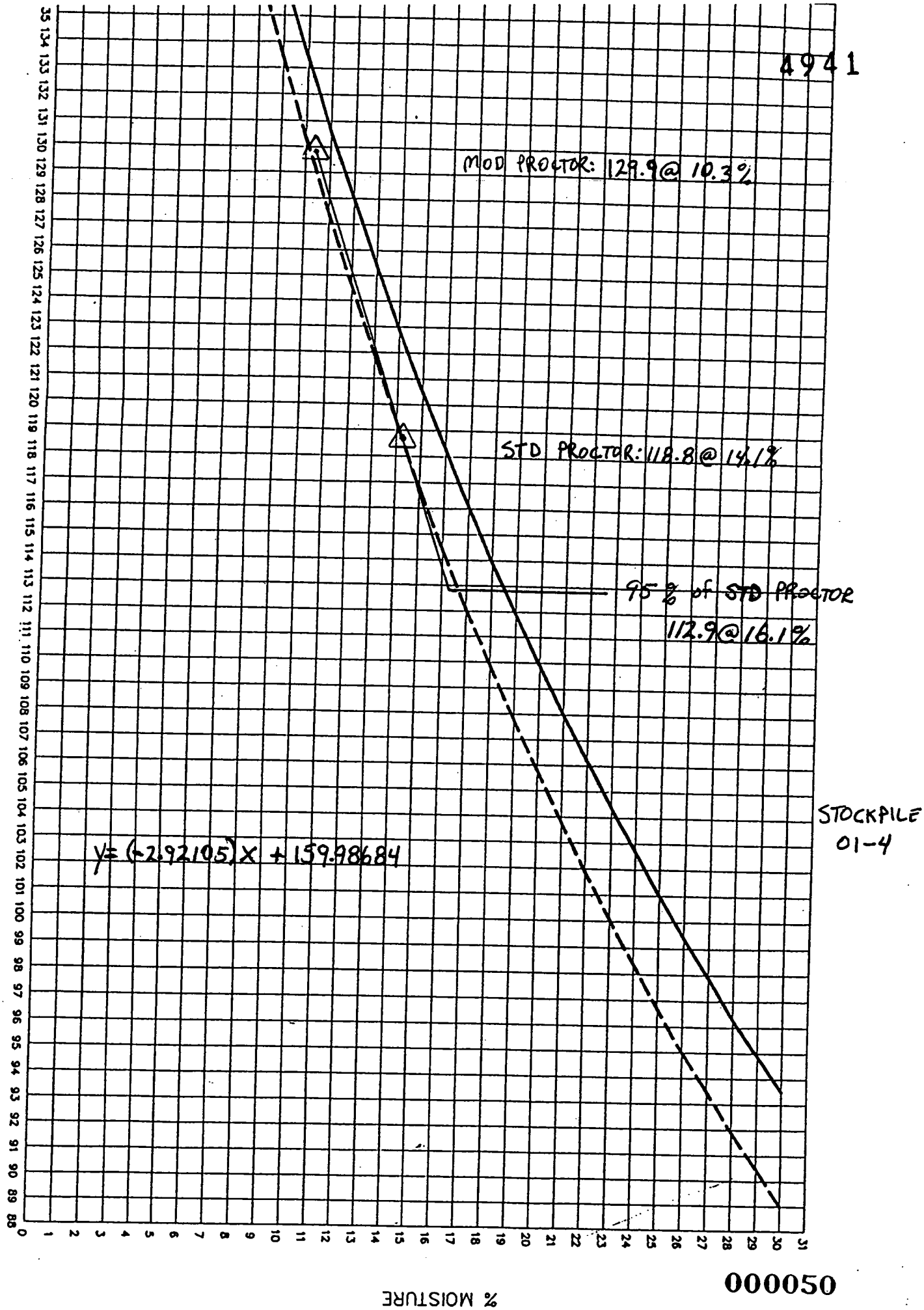

MOD PROCTOR: 128.9 @ 10.6%
STD PROCTOR: 118.9 @ 13.9%
95% of STD PROCTORS
113.0 @ 15.8%
STOCKPILE
01-3
y = (-3.0303)x + 161.02121
POUNDS PER CUBIC FOOT (lb/ft³)
% MOISTURE

STOCKPILE 01-3

Sample Number	Sample Frequency (cu Yds)	Moisture Content %	Standard Proctor (and rock correction)	Modified Proctor pcf @ %	Liquid Limit %	Plastic Limit %	Plasticity Index	Passing #200 sieve %	Clay Content %	Classification (USCS)	Hydraulic Conductivity
LP01-13	1500	17.7	115.0@16.0 116.6@15.4	126.9@11.0 128.3@10.6	39	16	23	79.9	32.0	Lean Clay w/sand (CL)	— —
LP01-14	3000	20.2	118.0@14.5 119.4@14.0	— —	34	16	18	71.6	28.0	Lean Clay w/sand (CL)	— —
LP01-15	4500	14.5	118.1@14.0 119.1@13.6	129.7@10.0 130.6@9.8	34	16	18	76.0	30.0	Lean Clay w/sand (CL)	4.40E-08 —
LP01-16	6000	16.6	120.0@13.0 120.5@12.8	— —	32	16	16	75.1	28.5	Lean Clay w/sand (CL)	— —
LP01-17	7500	17.2	117.0@14.0 117.6@13.8	127.0@11.5 127.6@11.3	33	17	16	78.1	31.5	Lean Clay w/sand (CL)	— —
LP01-20	9000	16.1	120.0@13.6 120.3@13.5	— —	36	17	19	64.6	29.5	Sandy Lean Clay (CL)	— —
LP01-25	10,500	17.9	117.3@14.9 118.9@14.3	127.5@11.0 128.9@10.6	36	17	19	76.4	30.5	Lean Clay w/sand (CL)	— —

Reported total yards, surveyed:	11, 531 cys
Converted total yards in place:	9,963 cys
Average Stockpile Moisture:	17.00%
Average Corrected Standard Proctor:	118.9 @ 13.9%
Average Corrected Modified Proctor:	128.9 @ 10.6%
Cumulative cubic yards:	27,890 cys
Composite Hydraulic Conductivity:	2.30E-08

Stockpile 01-4

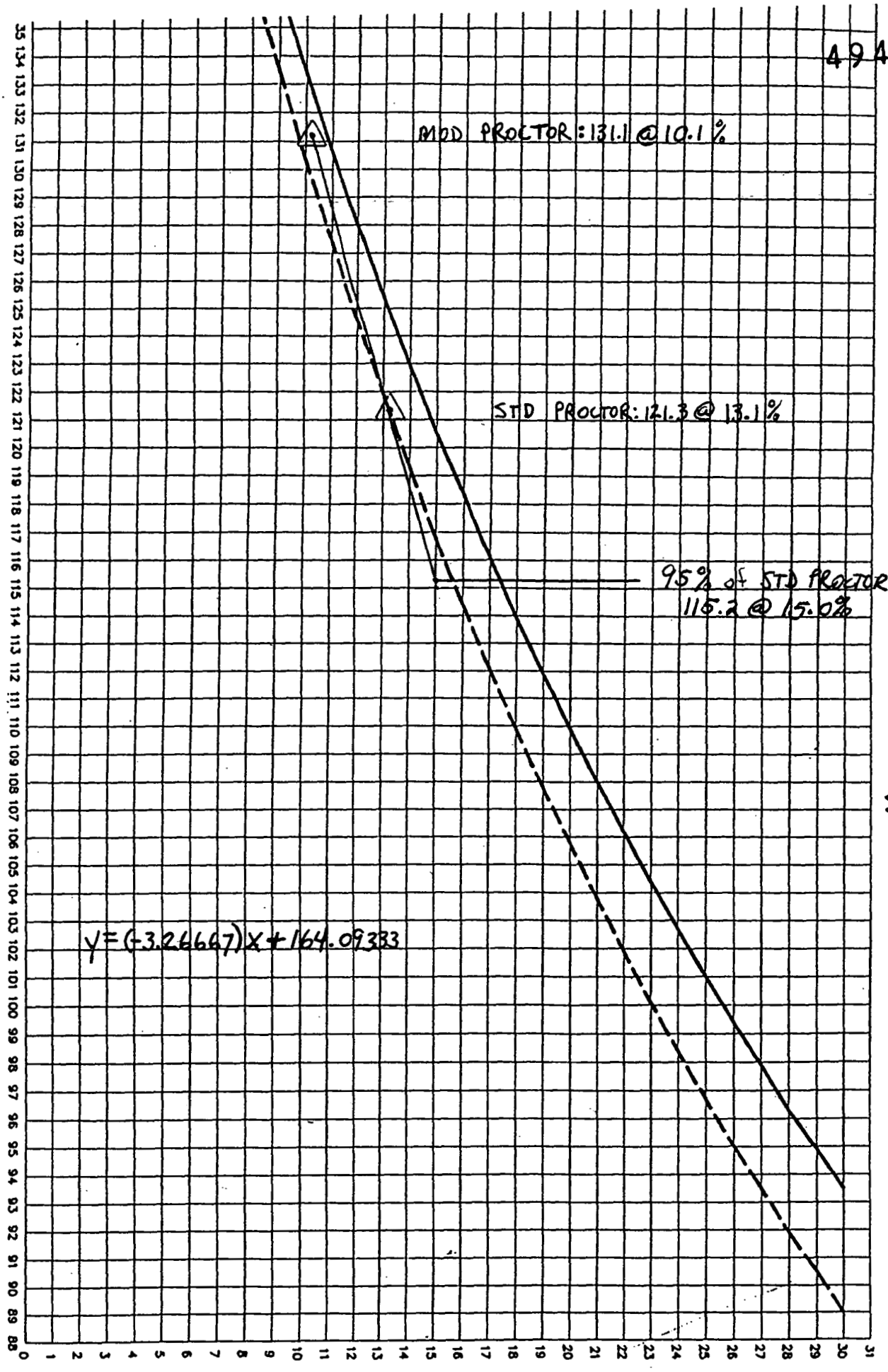

4941
MOD PROCTOR: 129.9@ 10.3%
STD PROCTOR: 118.8@ 14.1%
95 % of STD PROCTOR
112.9@16.1%
STOCKPILE
01-4
y= (-2.92105)x + 159.98684
POUNDS PER CUBIC FOOT (lb/ft³)
% MOISTURE

STOCKPILE 01-4

Sample Number	Sample Frequency (cu Yds)	Moisture Content %	Standard Proctor (and rock correction)	Modified Proctor pcf @ %	Liquid Limit %	Plastic Limit %	Plasticity Index	Passing #200 sieve %	Clay Content %	Classification (USCS)	Hydraulic Conductivity
LP01-22	1500	16.5	116.0 @ 14.9 116.8 @ 14.6	128.0 @ 11.0 128.7 @ 10.8	36 **37**	17 **16**	19 **21**	67.5	30.0	Sandy Lean Clay (CL)	*5.30E-07* *6.50E-07*
LP01-23	3000	18.4	114.0 @ 16.3 115.5 @ 15.7	— —	38	17	21	78.5	31.0	Lean Clay w/sand (CL)	— —
LP01-24	4500	17.6	116.4 @ 15.2 117.4 @ 14.8	127.6 @ 10.8 128.5 @ 10.5	34	16	18	77.0	30.5	Lean Clay w/sand (CL)	6.00E-08
LP01-26	6000	17.4	115.3 @ 15.3 117.1 @ 14.6	— —	35	16	19	72.9	30.0	Lean Clay w/sand (CL)	— —
LP01-27	7500	13.7	122.7 @ 12.5 123.6 @ 12.2	131.9 @ 9.8 132.6 @ 9.6	28	15	13	71.7	24.0	Lean Clay w/sand (CL)	
LP01-28	9000	16.1	121.5 @ 12.9 122.5 @ 12.6	— —	27	16	11	73.5	24.5	Lean Clay w/sand (CL)	— —

Reported total yards, surveyed:	6,968 cys
Converted total yards in place:	6,020 cys
Average Stockpile Moisture:	16.60%
Average Corrected Standard Proctor:	118.8 @ 14.1
Average Corrected Modified Proctor:	129.9 @ 10.3
Cumulative cubic yards:	33,910 cys
Composite Hydraulic Conductivity:	4.90E-08

Stockpile 01-5



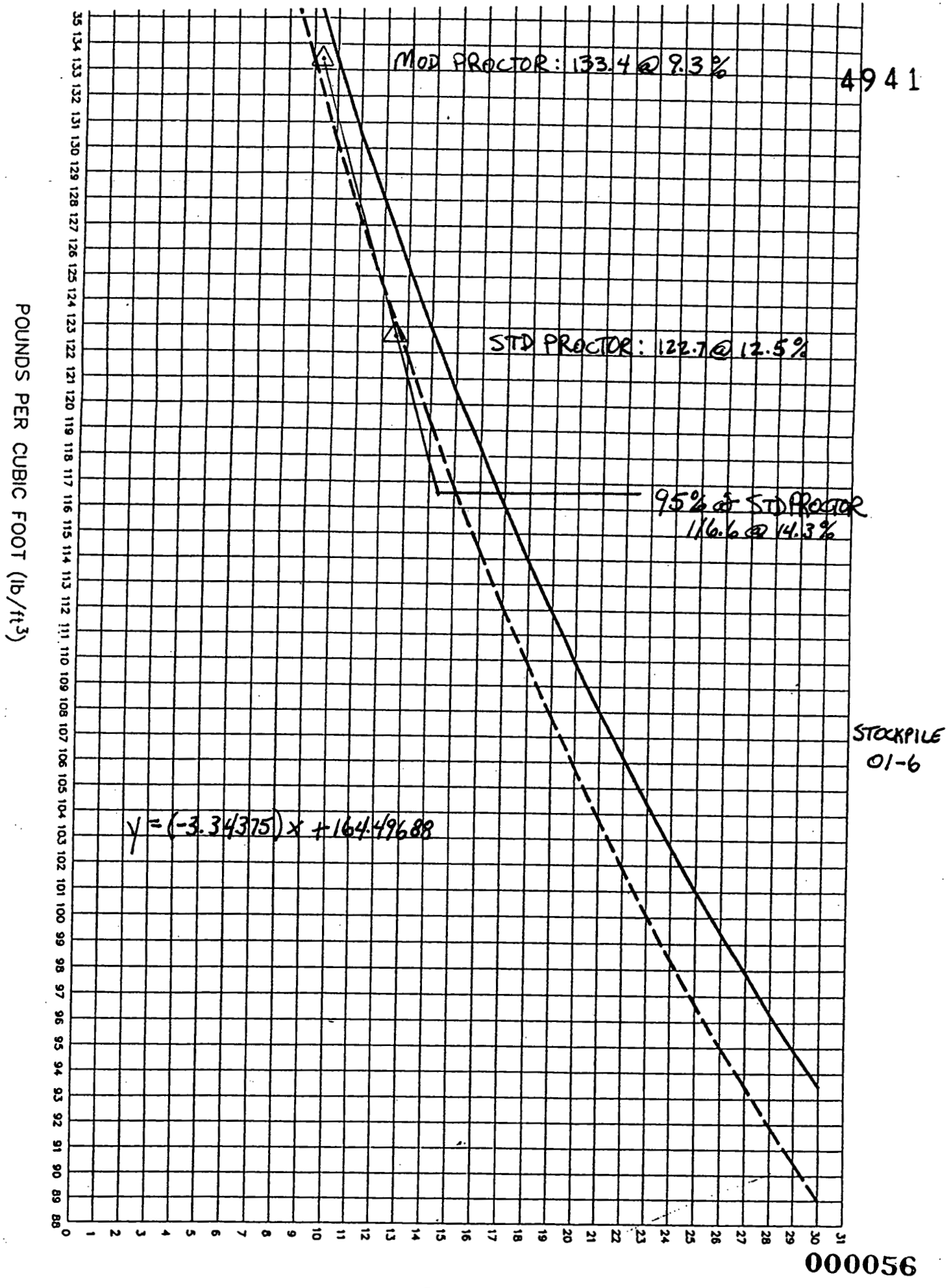
STOCKPILE
01-5

STOCKPILE 01-5

Sample Number	Sample Frequency (cu Yds)	Moisture Content %	Standard Proctor (and rock correction)	Modified Proctor pcf @ %	Liquid Limit %	Plastic Limit %	Plasticity Index	Passing #200 sieve %	Clay Content %	Classification (USCS)	Hydraulic Conductivity
LP01-29	1500	16.1	115.2 @ 15.7 116.4 @ 15.2	129.0 @ 10.9 130.0 @ 10.6	33	16	17	73.1	29.0	Lean Clay w/sand (CL)	5.00E-08 —
LP01-30	3000	16.0	122.5 @ 12.4 123.3 @ 12.2	— —	28	16	12	73.3	25.5	Lean Clay w/sand (CL)	— —
LP01-31	4500	14.7	124.0 @ 11.6 125.3 @ 11.2	132.0 @ 9.6 133.2 @ 9.3	26	15	11	70.5	22.0	Lean Clay w/sand (CL)	— —
LP01-32	6000	15.7	118.1 @ 14.9 119.7 @ 14.3	— —	32	16	16	74.4	26.0	Lean Clay w/sand (CL)	— —
LP01-38	7500	15.8	121.0 @ 12.9 121.7 @ 12.7	129.5 @ 10.5 130.2 @ 10.3	32	16	16	74.2	27.5	Lean Clay w/sand (CL)	— —

Reported total yards, surveyed:	7,573 cys
Converted total yards in place:	6,543 cys
Average Stockpile Moisture:	15.70%
Average Corrected Standard Proctor:	121.3 @ 13.1
Average Corrected Modified Proctor:	131.1 @ 10.1
Cumulative cubic yards:	40,453 cys
Composite Hydraulic Conductivity:	2.90E-08

Stockpile 01-6



4941

STOCKPILE
01-6

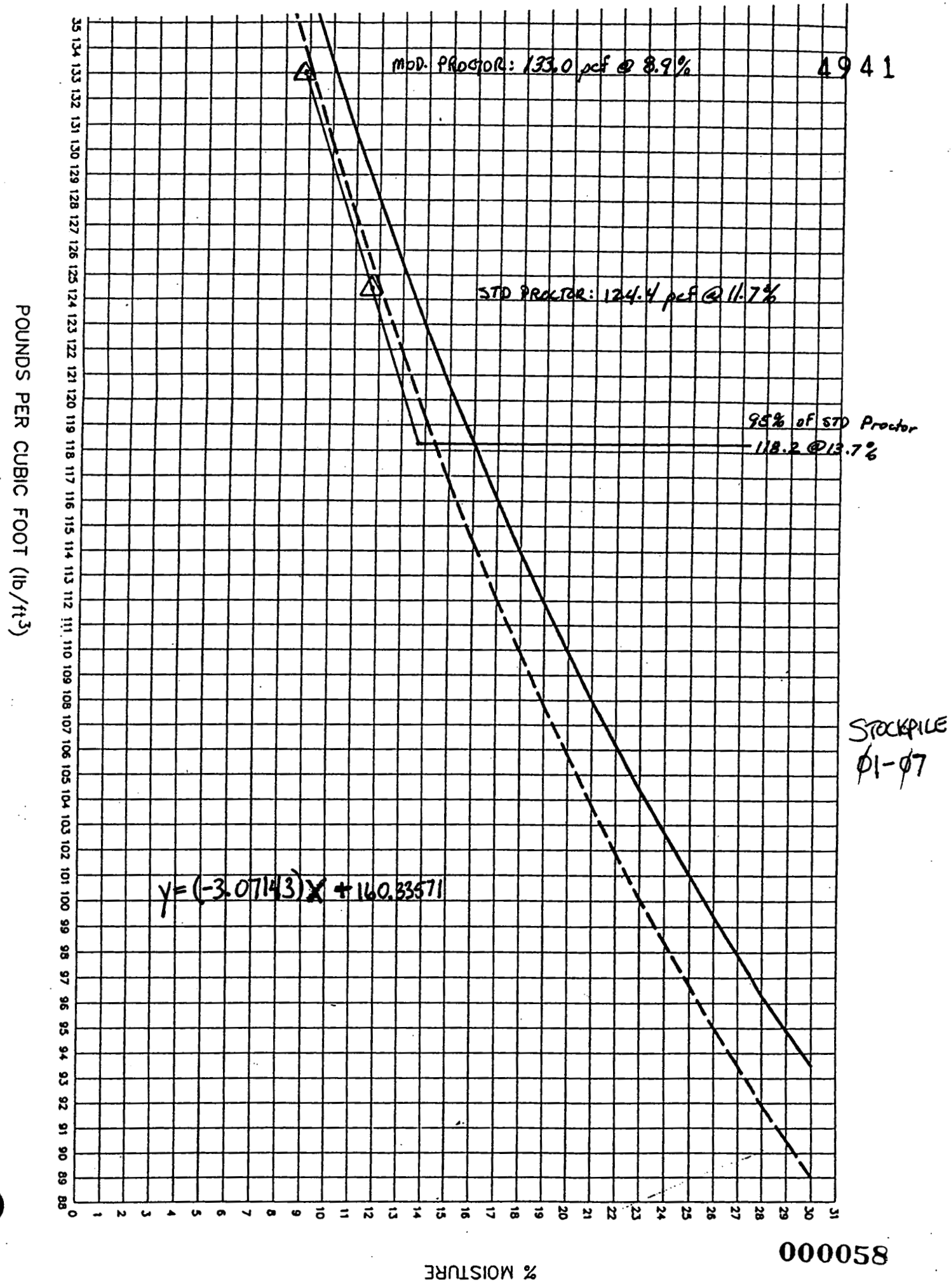
000056

STOCKPILE 01-6

Sample Number	Sample Frequency (cu Yds)	Moisture Content %	Standard Proctor (and rock correction)	Modified Proctor pcf @ %	Liquid Limit %	Plastic Limit %	Plasticity Index	Passing #200 sieve %	Clay Content %	Classification (USCS)	Hydraulic Conductivity
LP01-33	1500	18.2	122.2 @ 13.1 124.3 @ 12.4	133.6 @ 9.2 135.3 @ 8.7	26	15	11	65.7	21.5	Sandy Lean Clay (CL)	
LP01-34	3000	15.8	118.0 @ 13.8 118.8 @ 13.5	— —	34	17	17	72.8	28.0	Lean Clay w/sand (CL)	
LP01-35	4500	14.2	121.6 @ 13.0 123.2 @ 12.5	130.2 @ 10.0 131.6 @ 9.6	30	16	14	71.3	25.0	Lean Clay w/sand (CL)	3.70E-08
LP01-36	6000	13.8	122.3 @ 12.8 123.3 @ 12.5	— —	29	16	13	70.6	25.0	Lean Clay w/sand (CL)	
LP01-37	7500	14.3	123.0 @ 11.8 124.5 @ 11.3	132.0 @ 10.0 133.3 @ 9.6	29	16	13	69.3	23.5	Sandy Lean Clay (CL)	
LP01-44	9000	12.8	120.8 @ 13.2 122.3 @ 12.7	— —	31	16	15	70.0	27.5	Lean Clay w/sand (CL)	

Reported total yards, surveyed:	9,706 cys
Converted total yards in place:	8,386 cys
Average Stockpile Moisture:	14.90%
Average Corrected Standard Proctor:	122.7 @ 12.5
Average Corrected Modified Proctor:	133.4 @ 9.3
Cumulative cubic yards:	48,839 cys
Composite Hydraulic Conductivity:	4.60E-08

Stockpile 01-7


4941
MOD. PROCTOR: 133.0 pcf @ 8.9%
STD PROCTOR: 124.4 pcf @ 11.7%
95% of STD Proctor
118.2 @ 13.7%
STOCKPILE
Ø1-Ø7
y=(-3.07143)x + 160.33571
POUNDS PER CUBIC FOOT (lb/ft³)
% MOISTURE
000058

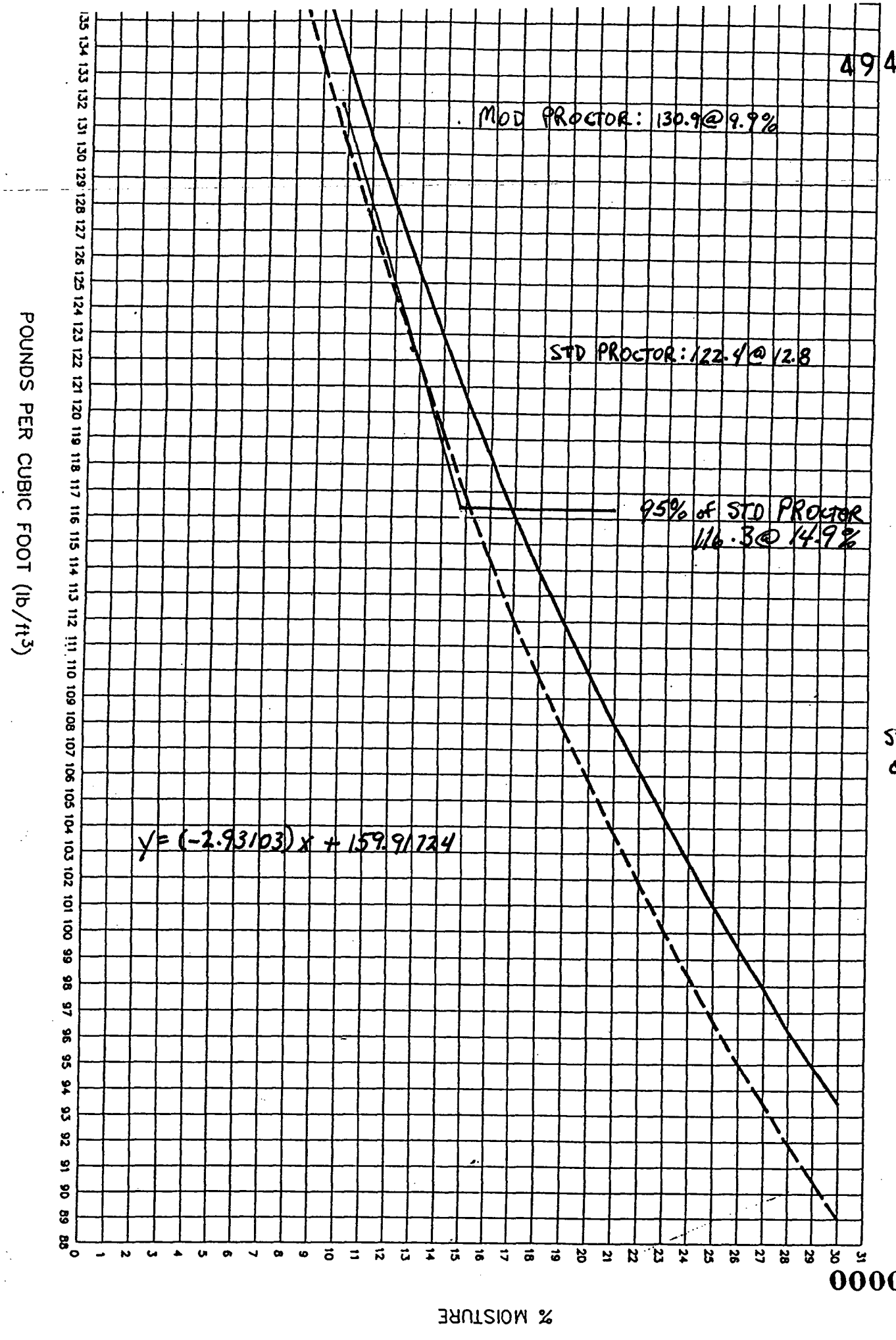
STOCKPILE 01-7

Sample Number	Sample Frequency (cu Yds)	Moisture Content %	Standard Proctor (and rock correction)	Modified Proctor pcf @ %	Liquid Limit %	Plastic Limit %	Plasticity Index	Passing #200 sieve %	Clay Content %	Classification (USCS)	Hydraulic Conductivity
LP01-40	1500	14.2	123.9 @ 12.1 124.8 @ 11.8	133.0 @ 8.4 133.8 @ 8.2	25	15	10	68.3	22.5	Sandy Lean Clay (CL)	3.80E-08
LP01-41	3000	16.4	124.2 @ 11.6 125.7 @ 11.1	— —	27	15	12	71.3	24.0	Lean Clay w/sand (CL)	
LP01-42	4500	15.9	123.2 @ 11.8 124.3 @ 11.5	— —	25	15	10	70.6	25.0	Lean Clay w/sand (CL)	
LP01-43	6000	16.4	119.2 @ 13.7 120.8 @ 13.2	129.5 @ 10.0 130.8 @ 9.6	32	16	16	70.7	29.0	Lean Clay w/sand (CL)	
LP01-45	7500	14.3	125.3 @ 11.4 126.6 @ 11.0	133.2 @ 9.3 134.3 @ 9.0	*24* *23* *21*	*15* *15* *13*	*9* *8* *8*	66.0	20.0	Sandy Lean Clay (CL)	
LP01-45A	—	—	—	—	30	16	14	—	—	—	—

Reported total yards, surveyed:	7,109 cys
Converted total yards in place:	6,142 cys
Average Stockpile Moisture:	15.40%
Average Corrected Standard Proctor:	124.4 @ 11.7
Average Corrected Modified Proctor:	133.0 @ 8.9
Cumulative cubic yards:	54,981 cys
Composite Hydraulic Conductivity:	3.10E-08

Sample LP01-45 failed the Atterberg Limits test that requires a minimum PI of 10. See NCR-20103-06 for details.

Stockpile 01-8

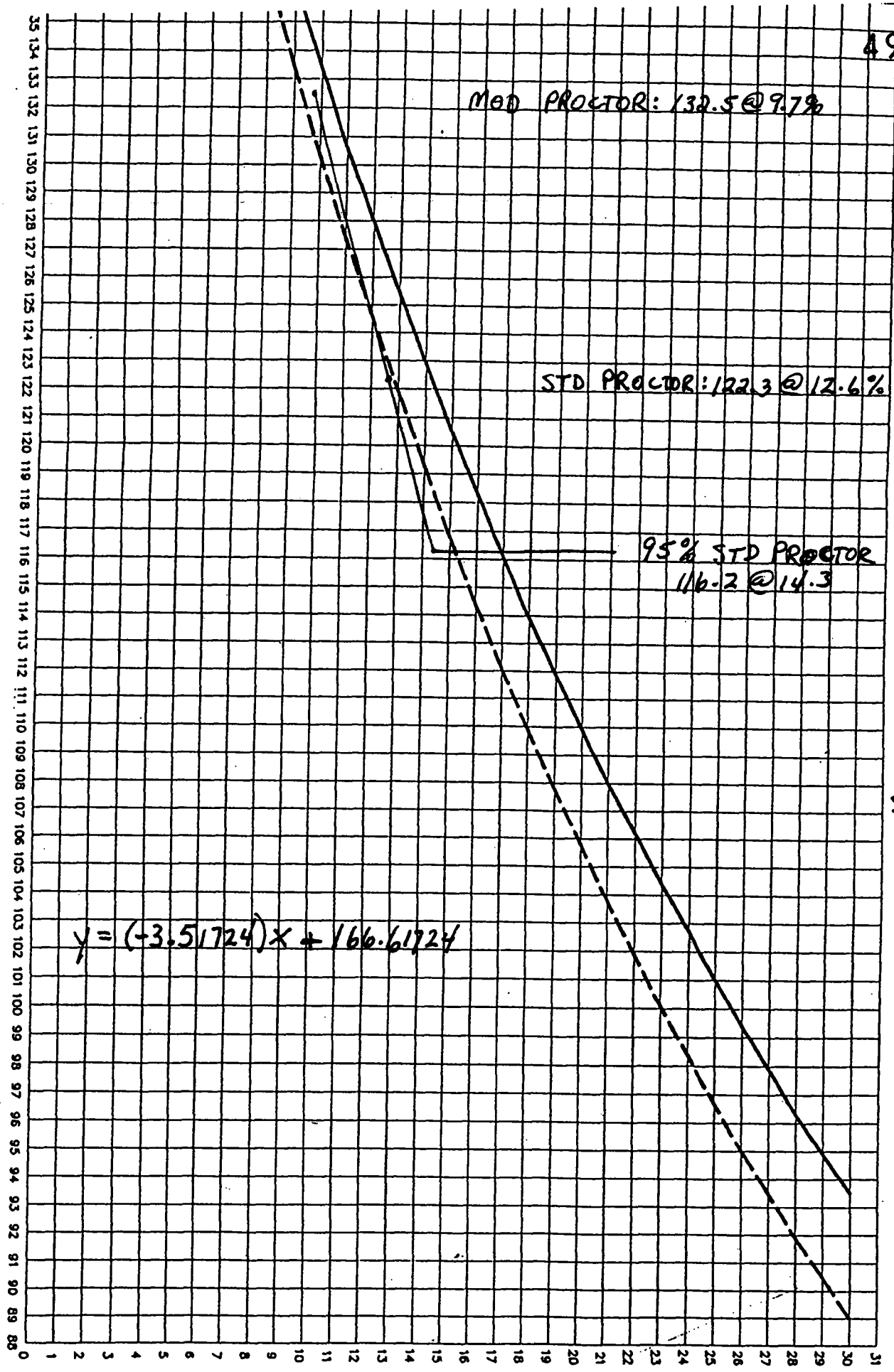

4941
MOD PROCTOR: 130.9@9.9%
STD PROCTOR: 122.4@12.8
95% of STD PROCTOR
116.3@14.9%
y = (-2.93103) x + 159.91724
POUNDS PER CUBIC FOOT (lb/ft³)
% MOISTURE
STOCKPILE
01-8

STOCKPILE 01-8

Sample Number	Sample Frequency (cu Yds)	Moisture Content %	Standard Proctor (and rock correction)	Modified Proctor pcf @ %	Liquid Limit %	Plastic Limit %	Plasticity Index	Passing #200 sieve %	Clay Content %	Classification (USCS)	Hydraulic Conductivity
LP01-46	1500	15.8	123.0 @ 12.2 124.1 @ 11.9	130.7 @ 10.1 131.7 @ 9.8	30	16	14	73.8	23.5	Lean Clay w/sand (CL)	
LP01-47	3000	13.0	121.2 @ 13.2 123.5 @ 12.0	— —	30	16	14	73.6	25.0	Lean Clay w/sand (CL)	
LP01-48	4500	18.9	120.3 @ 13.5 121.0 @ 13.2	129.0 @ 10.4 129.6 @ 10.2	32	16	16	75.2	25.0	Lean Clay w/sand (CL)	
LP01-51	6000	17.0	118.5 @ 14.5 119.9 @ 14.0	— —	30	16	14	74.1	25.5	Lean Clay w/sand (CL)	
LP01-53	7500	15.0	118.2 @ 14.1 119.2 @ 13.7	130.5 @ 10.0 131.3 @ 9.8	31	16	15	70.7	27.5	Lean Clay w/sand (CL)	3.70E-08
LP01-54	9000	14.4	124.1 @ 12.6 126.9 @ 11.7	— —	29	16	13	64.1	25.5	Sandy Lean Clay (CL)	

Reported total yards, surveyed:	6,551 cys
Converted total yards in place:	5,660 cys
Average Stockpile Moisture:	15.70%
Average Corrected Standard Proctor:	122.4 @ 12.8
Average Corrected Modified Proctor:	130.9 @ 9.9
Cumulative cubic yards:	60,641 cys
Composite Hydraulic Conductivity:	4.30E-08

Stockpile 01-9



STOCKPILE
01-9

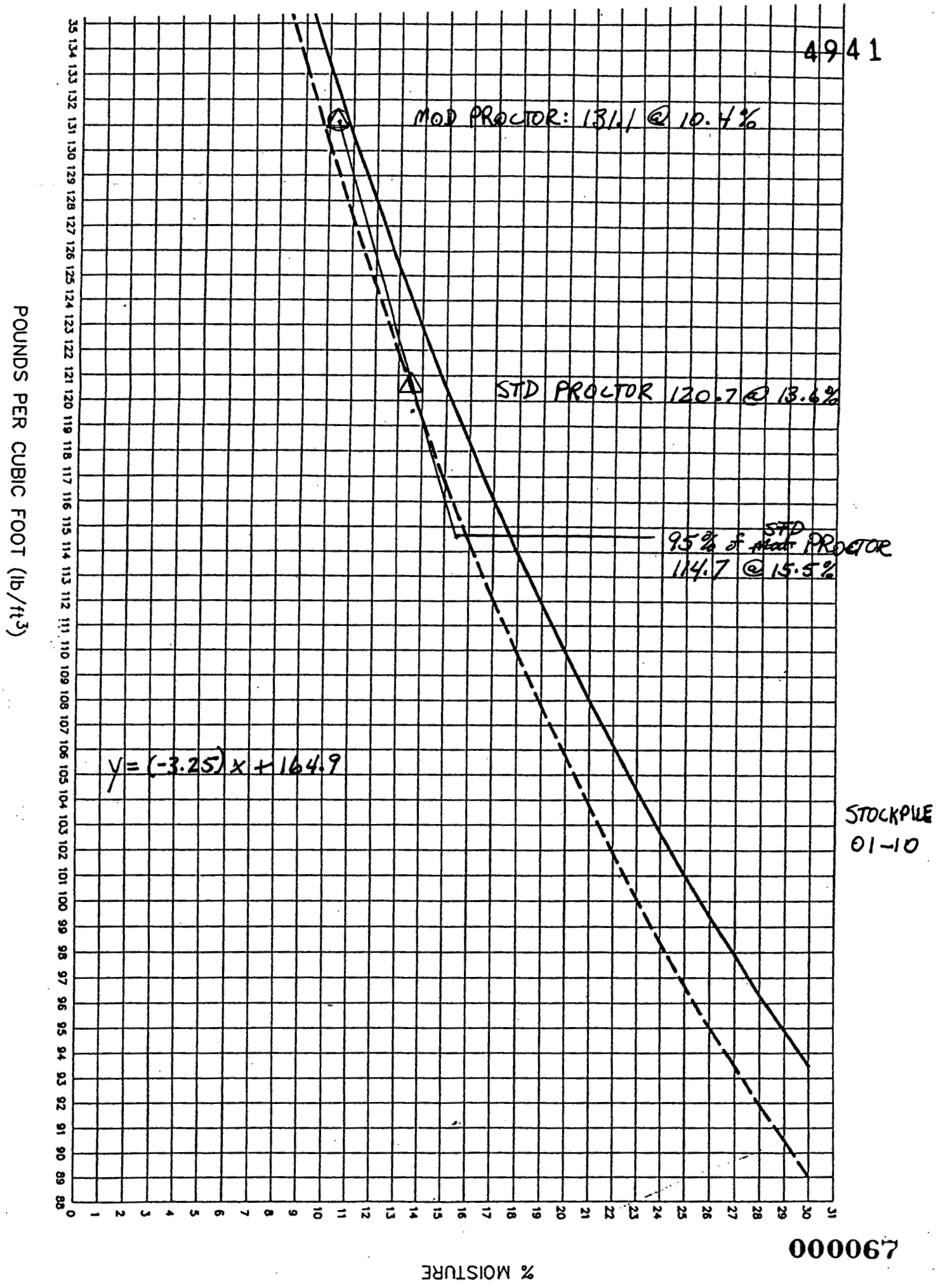
STOCKPILE 01-9

Sample Number	Sample Frequency (cu Yds)	Moisture Content %	Standard Proctor (and rock correction)	Modified Proctor pcf @ %	Liquid Limit %	Plastic Limit %	Plasticity Index	Passing #200 sieve %	Clay Content %	Classification (USCS)	Hydraulic Conductivity
LP01-55	1500	14.0	120.6 @ 13.4 122.6 @ 12.7	132.3 @ 10.0 134.0 @ 9.5	30	16	14	68.4	24.0	Sandy Lean Clay (CL)	5.30E-08
LP01-56	3000	14.1	124.5 @ 11.4 125.2 @ 11.2	— —	27	15	12	65.2	23.0	Sandy Lean Clay (CL)	
LP01-57	4500	15.0	118.8 @ 13.9 120.0 @ 13.5	129.7 @ 10.5 130.8 @ 10.2	34	16	18	70.9	25.5	Lean Clay w/sand (CL)	
LP01-59	6000	14.7	117.9 @ 13.5 120.1 @ 12.8	— —	31	15	16	69.4	25.0	Sandy Lean Clay (CL)	
LP01-60	7500	13.2	121.7 @ 13.0 123.0 @ 12.6	131.5 @ 9.8 132.6 @ 9.5	31	15	16	72.2	27.5	Lean Clay w/sand (CL)	
LP01-63	9000	9.5**	120.9 @ 13.2 122.6 @ 12.6	— —	31	16	15	70.5	26.0	Lean Clay w/sand (CL)	

Reported total yards, surveyed:	10,082 cys
Converted total yards in place:	8,711 cys
Average Stockpile Moisture:	14.20%
Average Corrected Standard Proctor:	122.3 @ 12.6
Average Corrected Modified Proctor:	132.5 @ 9.7
Cumulative cubic yards:	69,352 cys
Composite Hydraulic Conductivity:	9.60E-08

** Sample taken from the top of the stockpile after seveal days of drying and moisture not representative of the stockpile.

Stockpile 01-10

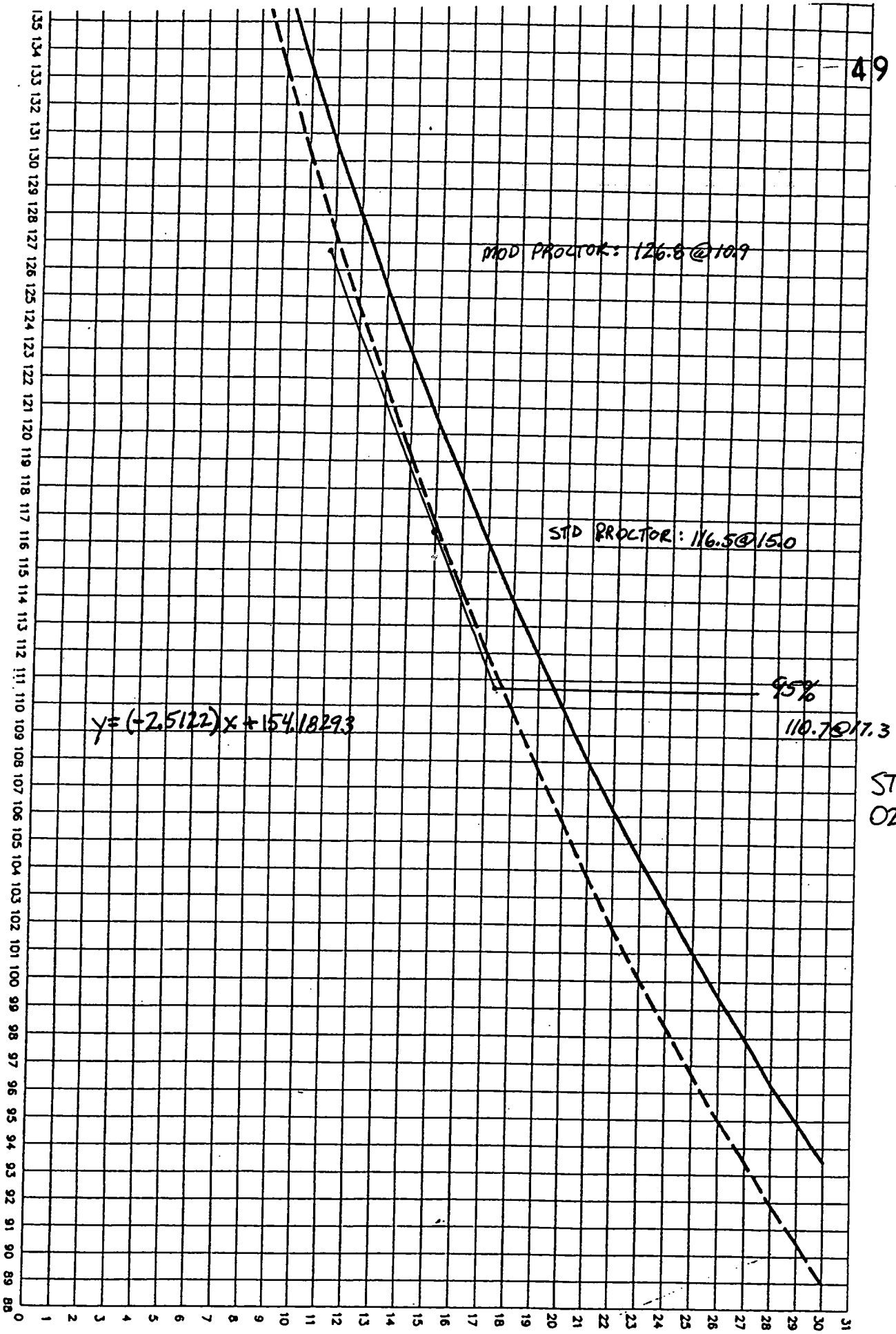

MOD PROCTOR: 131.1 @ 10.4%
STD PROCTOR 120.7 @ 13.6%
95% of STD PROCTOR
114.7 @ 15.5%
y = (-3.25) x + 164.9
STOCKPILE
01-10
POUNDS PER CUBIC FOOT (lb/ft³)
% MOISTURE

STOCKPILE 01-10

Sample Number	Sample Frequency (cu Yds)	Moisture Content %	Standard Proctor (and rock correction)	Modified Proctor pcf @ %	Liquid Limit %	Plastic Limit %	Plasticity Index	Passing #200 sieve %	Clay Content %	Classification (USCS)	Hydraulic Conductivity
LP01-61	1500	14.5	121.4 @ 13.6 122.8 @ 13.1	131.0 @ 10.4 132.2 @ 10.0	34	15	19	72..6	28.0	Lean Clay w/sand (CL)	
LP01-62	3000	14.7	119.3 @ 14.1 120.0 @ 13.9	— —	33	16	17	73.1	26.0	Lean Clay w/sand (CL)	
LP01-64	4500	15.5	119.5 @ 14.0 120.1 @ 13.8	129.3 @ 11.0 129.9 @ 10.8	33	16	17	69.6	27.0	Sandy Lean Clay (CL)	1.00E-07
LP01-65	6000	14.3	118.8 @ 14.0 119.7 @ 13.7	— —	33	16	17	71.7	26.0	Lean Clay w/sand (CL)	

Reported total yards, surveyed:	6,500 cys
Converted total yards in place:	5,616 cys
Average Stockpile Moisture:	14.80%
Average Corrected Standard Proctor:	120.7 @ 13.6
Average Corrected Modified Proctor:	131.1 @ 10.4
Cumulative cubic yards:	74,968 cys
Composite Hydraulic Conductivity:	1.00E-07

Stockpile 02-1



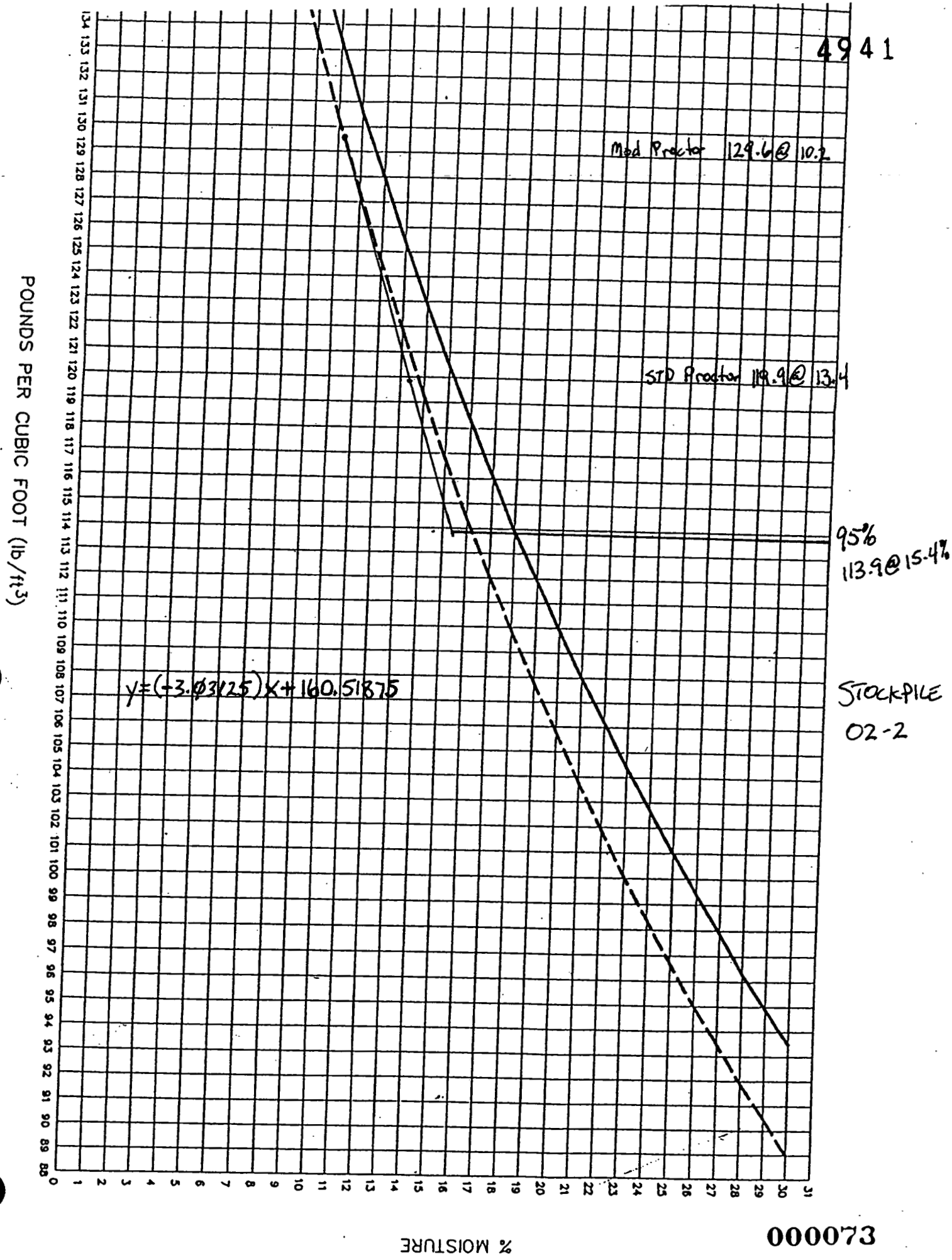
STOCKPILE
02-1

STOCKPILE 02-1

Sample Number	Sample Frequency (cu Yds)	Moisture Content %	Standard Proctor (and rock correction)	Modified Proctor pcf @ %	Liquid Limit %	Plastic Limit %	Plasticity Index	Passing #200 sieve %	Clay Content %	Classification (USCS)	Hydraulic Conductivity
LP02-1	1500	14.4	115.8 @ 15.6 117.1 @ 15.1	127.1 @ 11.2 128.2 @ 10.9	34	17	17	78.6	29.0	(CL) Lean Clay w/sand	5.10E-08 —
LP02-2	3000	14.3	114.0 @ 15.4 114.8 @ 15.1	— —	36	18	18	78.9	32.0	(CL) Lean Clay w/sand	— —
LP02-3	4500	13.8	116.3 @ 15.1 117.7 @ 14.6	124.5 @ 12.0 127.4 @ 11.6	33	17	16	74.3	29.5	(CL) Lean Clay w/sand	— —
LP02-4	6000	15.3	116.0 @ 15.0 116.4 @ 14.8	— —	37	16	21	75.8	30.0	(CL) Lean Clay w/sand	— —
LP02-6	7500	14.1	115.9 @ 15.5 117.2 @ 15.0	— —	32	17	15	71.9	30.5	(CL) Lean Clay w/sand	— —
LP02-7	9000	19.9	113.8 @ 16.2 115.1 @ 15.7	124.4 @ 10.4 125.6 @ 10.1	34	17	17	73.8	30.5	(CL) Lean Clay w/sand	— —
LP02-8	9000+	12.6	116.5 @ 14.6 117.2 @ 14.4	125.4 @ 11.0 126.0 @ 10.8	32	16	16	75.6	30.5	(CL) Lean Clay w/sand	— —

Reported total yards, surveyed:	11,200
Converted total yards in place:	9,677
Average Stockpile Moisture:	14.90%
Average Corrected Standard Proctor:	116.5 @ 15.0
Average Corrected Modified Proctor:	126.8 @ 10.9
Cumulative cubic yards:	9,677
Composite Hydraulic Conductivity:	3.40E-08

Stockpile 02-2

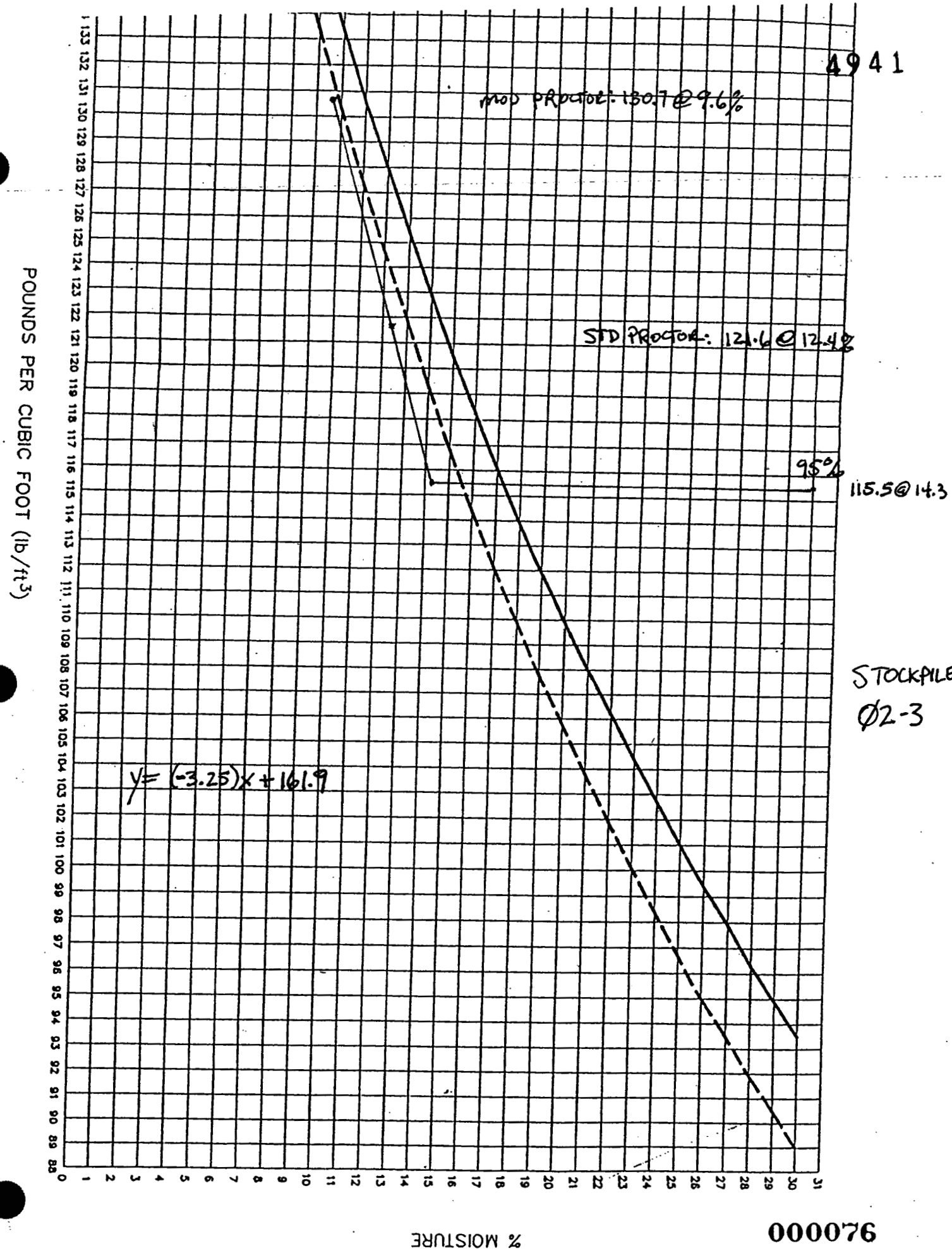

Mod Proctor 129.6@ 10.2
STD Proctor 119.9@ 13.4
95%
113.9@15.4%
y=(-3.03125)x+160.51875
STOCKPILE
02-2
POUNDS PER CUBIC FOOT (lb/ft3)
% MOISTURE

STOCKPILE 02-2

Sample Number	Sample Frequency (cu Yds)	Moisture Content %	Standard Proctor (and rock correction)	Modified Proctor pcf @ %	Liquid Limit %	Plastic Limit %	Plasticity Index	Passing #200 sieve %	Clay Content %	Classification (USCS)	Hydraulic Conductivity
LP02-5	1500	13.0	115.6 @ 15.4 116.6 @ 15.1	125.0 @ 11.9 125.6 @ 11.7	35	17	18	76.4	30.5	(CL) Lean Clay w/sand	5.60E-08
LP02-9	3000	12.9	117.1 @ 14.1 118.4 @ 13.6	— —	29	16	13	64.8	27.0	(CL) Sandy Lean Clay	— —
LP02-10	4500	11.6	121.0 @ 13.0 122.7 @ 12.5	130.0 @ 10.0 131.5 @ 9.6	29	16	13	64.0	27.0	(CL) Sandy Lean Clay	— —
LP02-11	6000	11.9	120.4 @ 12.3 121.7 @ 11.9	— —	26	15	11	66.0	25.0	(CL) Sandy Lean Clay	— —
LP02-12	7500	13.8	121.0 @ 14.0 122.4 @ 13.5	130.6 @ 9.5 131.8 @ 9.2	29	15	14	69.3	27.0	(CL) Sandy Lean Clay	— —
LP02-13	9000	10.5	116.0 @ 14.4 117.7 @ 13.8	— —	29	16	13	70.4	26.0	(CL) Lean Clay w/sand	— —

Reported total yards, surveyed:	9,081
Converted total yards in place:	7,851
Average Stockpile Moisture:	12.30%
Average Corrected Standard Proctor:	119.9 @ 13.4
Average Corrected Modified Proctor:	129.6 @ 10.2
Cumulative cubic yards:	17,523
Composite Hydraulic Conductivity:	5.70E-08

Stockpile 02-3


4941
MOD PROCTOR: 130.7 @ 9.6%
STD PROCTOR: 121.6 @ 12.4%
95%
115.5 @ 14.3
STOCKPILE
Ø2-3
y= (-3.25)x + 161.9
POUNDS PER CUBIC FOOT (lb/ft³)
% MOISTURE

STOCKPILE 02-3

Sample Number	Sample Frequency (cu Yds)	Moisture Content %	Standard Proctor (and rock correction)	Modified Proctor pcf @ %	Liquid Limit %	Plastic Limit %	Plasticity Index	Passing #200 sieve %	Clay Content %	Classification (USCS)	Hydraulic Conductivity
LP02-14	1500	11.4	121.1 @ 13.0 123.7 @ 12.2	130.2 @ 9.5 132.4 @ 8.9	27	15	12	62.8	22.0	(CL) Sandy Lean Clay	3.10E-08 —
LP02-15	3000	12.6	121.2 @ 12.9 122.7 @ 12.4	— —	28	15	13	66.9	22.0	(CL) Sandy Lean Clay	— —
LP02-16	4500	11.6	121.4 @ 12.6 122.9 @ 12.1	131.1 @ 9.5 132.4 @ 9.1	26	15	11	67.1	21.0	(CL) Sandy Lean Clay	— —
LP02-17	6000	12.8	122.4 @ 12.0 123.5 @ 11.7	— —	26	16	10	65.8	21.0	(CL) Sandy Lean Clay	— —
LP02-19	7500	13.2	116.4 @ 14.1 117.3 @ 13.8	125.6 @ 10.6 126.4 @ 10.4	30	15	15	68.5	26.0	(CL) Sandy Lean Clay	— —
LP02-21	9000	12.7	118.0 @ 13.1 120.2 @ 12.4	— —	30	16	14	66.5	26.0	(CL) Sandy Lean Clay	— —
LP02-22	9000+	12.2	119.0 @ 13.0 120.6 @ 12.5	130.3 @ 9.7 131.6 @ 9.3	28	16	12	67.2	23.0	(CL) Sandy Lean Clay	— —

Reported total yards, surveyed:	10,817
Converted total yards in place:	9,346
Average Stockpile Moisture:	12.40%
Average Corrected Standard Proctor:	121.6 @ 12.4
Average Corrected Modified Proctor:	130.7 @ 9.6
Cumulative cubic yards:	26,869
Composite Hydraulic Conductivity:	6.00E-08

000077

4941

Bentonite Granules

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: PHIV	SUBMITTAL NO. 20104-PHIV-02225-001	REV.: 1	DATE: 8/8/02	Page 1 of 2

FROM:
CETCO

SIGNATURE: Chuck C. VanArsdale

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

RECEIVED BY: Teresa Schwab DATE: 8/9/02

			DOCUMENT FAMILY									SUBMITTAL TYPE				SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	DRFT	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
7	PHIV-02225-001	1						X			Specification Sheet for bentonite powder or granules		X		02225-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	64				
BILL ZEBICK	64				
MIKE GODBER	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

NO COMMENTS: _____ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

ORIGINAL

6200079

4941

RECEIVED BY: Chuck C. VanArsdale DATE: 8/16/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

FS-F-4955

--4941

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY 37
LOVELL, WYO. 82431

DATE: 31-Jul-02

TO: GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD

HAMILTON, OH. 45013

ATTN: QUALITY CONTROL

Dear Sirs:

A shipment of CG 50 (MAY 2002 COMPOSITE)
left our Lovell, WY plant on 06-May-02
in WEST TRK.#77
as requested on your order no. 1276

A sample from this shipment was tested, and gave the following results:

TEST	REQ. SPECIFICATION	ACTUAL RESULTS
RET. 10 MESH	1 MAX.	0
PASSING 200 MESH	15 % MAX	0.2
MOISTURE	12.0% MAX.	8.8
BULK DENSITY	65 lbs/ft3 (TYPICAL)	63.1
FLUID LOSS	18.0 MAX.	14.6
FREE SWELL	24 MIN.	26

We hereby certify that the results shown above represent this shipment.
Tests were conducted using American Colloid Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

INFORMATION ONLY

Tests Conducted By: B.M.

Approved By: MOSES BRISENO

(X) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: [illegible] Date: 8/16/02

ACC

In any correspondence regarding this shipment, please refer to our Order Number 151862

4941

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY 37
LOVELL, WYO. 82431

DATE: 08-Aug-02

TO: GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD

HAMILTON, OH. 45013

ATTN: QUALITY CONTROL

Dear Sirs:

A shipment of CG 50 (MAY 2002 COMPOSITE)
left our Lovell, WY plant on 06-May-02
in WEST TRK.#77
as requested on your order no. 1276

A sample from this shipment was tested, and gave the following results:

TEST	REQ. SPECIFICATION	ACTUAL RESULTS
Sodium Montmorillonite	85% Average	85
Water Plate Adsorption (ASTM E 946)	500 Average	720

We hereby certify that the results shown above represent this shipment.
Tests were conducted using American Colloid Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: B.M.

Approved By: MOSES BRISENO

ACC

In any correspondence regarding this shipment, please refer to our
Order Number 131862

Granular Drainage Layer Material

No. 78 Stone

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: PHIV	SUBMITTAL NO. 20104-PHIV--02710-001	REV.: 0	DATE: 4/29/02	Page 1 of 2

FROM:
FLUOR FERNALD

SIGNATURE: 4/29/02

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

RECEIVED BY: Teresa Schwab DATE: 4/29/02

			DOCUMENT FAMILY									SUBMITTAL TYPE				SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	DRFT	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
7	PHIV-02710-001	0						X			Source of Granular Drainage Material - #78 Coarse Aggregate			X	02710-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	64				
BILL ZEBICK	64				
MIKE GODBER	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

RECEIVED
MAY 13 2002

NO COMMENTS

COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

000084

RECEIVED BY: DATE: 5/3/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

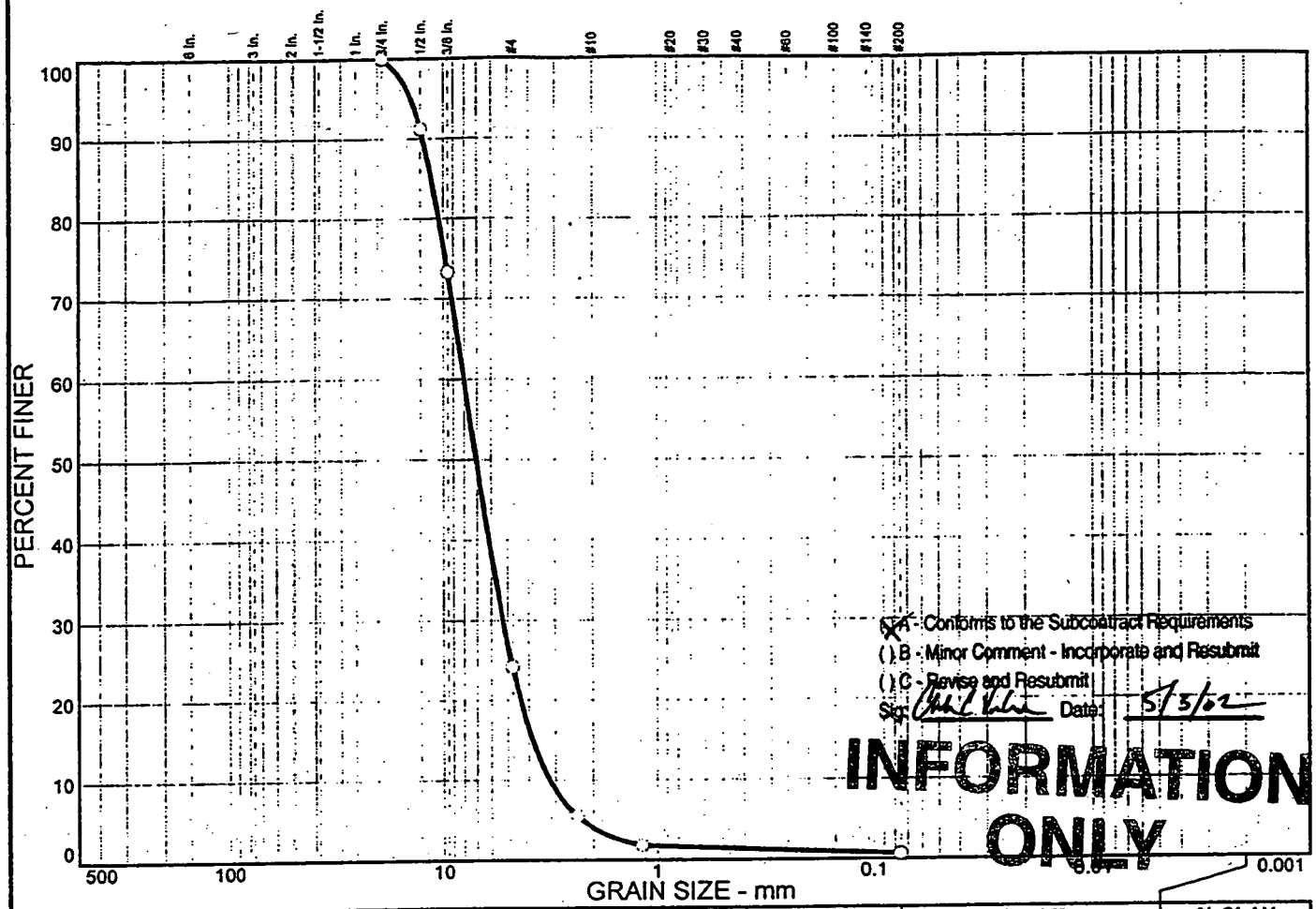
4941

FS-F-4955

ORIGINAL

Grain Size Distribution Test Report

4941



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	75.8	23.6	0.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0	100	
.5 in.	91.2	85-100	
.375 in.	73.3	40-75	
#4	24.2	5-25	
#8	5.5	0-10	
#16	1.8	0-5	
#200	0.6	0-2	

* ASTM D-2487

Soil Description

EAGLE QUARRY MODIFIED #78
(Poorly graded gravel with sand)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 11.3 D_{60}= 7.99 D_{50}= 7.01
D_{30}= 5.26 D_{15}= 3.82 D_{10}= 3.18
C_u= 2.52 C_c= 1.09

Classification

USCS= GP AASHTO=

Remarks

#78 SOURCE

Sample No.: #78 Source of Sample: L2980 Date: 4/11/02
Location: Elev./Depth:

H. C. NUTTING COMPANY

Robert L. Hones V.P. / Lab Dir.

Client: HANSON AGGREGATES DAVON INC.
Project: FLUOR FERNARD, CELL 2, PREP CELL

000085

Project No: 11976.004 Plate

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: PHIV	SUBMITTAL NO. 20104-PHIV--02710-003	Rev. 1	DATE: 6/03/02	Page 1 of 2

FROM:
FLUOR FERNALD

SIGNATURE: [signature] 6/3/02

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

RECEIVED BY: Teresa Schwab DATE: 6/17/02

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
7	PHIV-02710-003	1							X		Certification from supplier that AASHTO #78 coarse aggregate meets the material requirements of 02710		X		02710-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE	64				
GREGG JOHNSON	64				
BILL ZEBICK	64				
MIKE GODBER (APPROVER)	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

NO COMMENTS: COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

000086

RECEIVED BY: [signature] DATE: 6/18/02
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

FS-F-4955

ORIGINAL

--4941

Hanson

Hanson Aggregates
Davon, Inc.
4281 Roush Road
Hillsboro
OH 45133
Tel (937) 393-4211
Fax (937) 364-2509

April 1, 2002

Alan Hohnhorst, MS60
Fluor Fernald, Inc.
P. O. Box 538704
Cincinnati, Ohio 45253-8704

Re: Solicitation No. F02PB09113

Dear Alan:

Enclosed is our response to the referenced solicitation quoting #78 Limestone in accordance with the technical specifications for the material required at Fernald.

As you know, we have supplied modified #78 Limestone previously to Fluor Fernald and to Petro Environmental for work on cell one and two at the Fernald site. We certify that the material we offer, at this time, from our Eagle Quarry located at 13526 Overstake Road, Winchester, Ohio meets the technical specifications outlined in the solicitation.

If any further information is required, let me know.

Yours truly,

Robert R. Backer

Robert R. Backer
Sales Representative for
Hanson Aggregates – Davon, Inc.

(X) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: Date: 6/18/02

INFORMATION ONLY

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: PHIV	SUBMITTAL NO. 20104-PHIV--02710-002	REV.: 0	DATE: 4/17/02	Page 1 of 4

FROM:
FLUOR FERNALD

SIGNATURE: 4/17/02

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

RECEIVED BY: DATE: 4/22/02

			DOCUMENT FAMILY									SUBMITTAL TYPE				SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	DRFT	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
7	PHIV-02710-002	0						X			Test results on Granular Drainage Material		X		02710-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	64				
BILL ZEBICK	64				
MIKE GODBER	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

RECEIVED
MAY 13 2002

NO COMMENTS: _____ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

000088

RECEIVED BY: DATE: 4/30/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

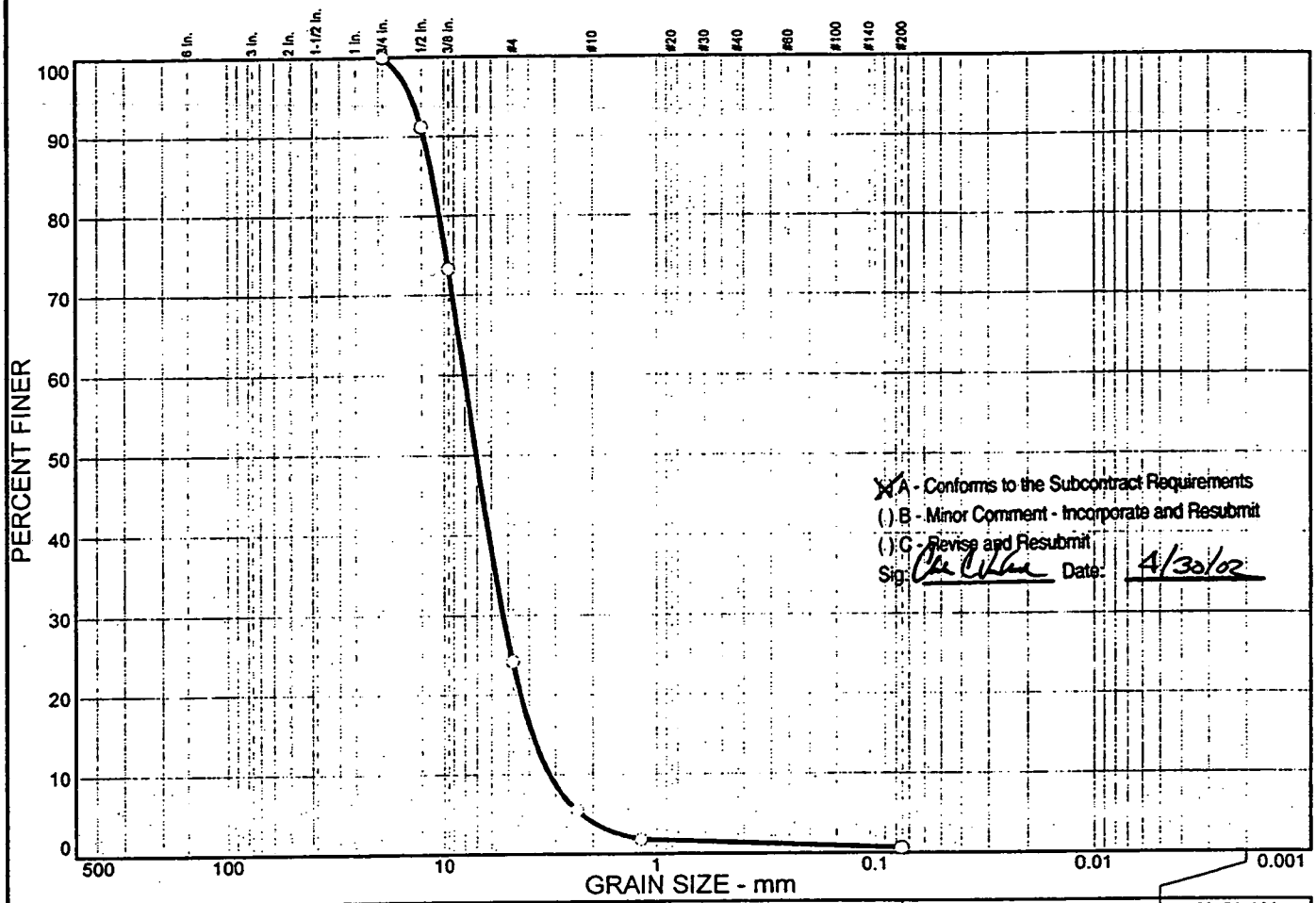
4941

FS-F-4955

ORIGINAL

Grain Size Distribution Test Report

--4941



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	75.8	23.6	0.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0	100	
.5 in.	91.2	85-100	
.375 in.	73.3	40-75	
#4	24.2	5-25	
#8	5.5	0-10	
#16	1.8	0-5	
#200	0.6	0-2	

* ASTM D-2487

Soil Description

EAGLE QUARRY MODIFIED #78
(Poorly graded gravel with sand)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 11.3 D_{60}= 7.99 D_{50}= 7.01
D_{30}= 5.26 D_{15}= 3.82 D_{10}= 3.18
C_u= 2.52 C_c= 1.09

Classification

USCS= GP AASHTO=

Remarks

INFORMATION ONLY

Sample No.: #78 Source of Sample: L2980 Date: 4/11/02
Location: Elev./Depth:

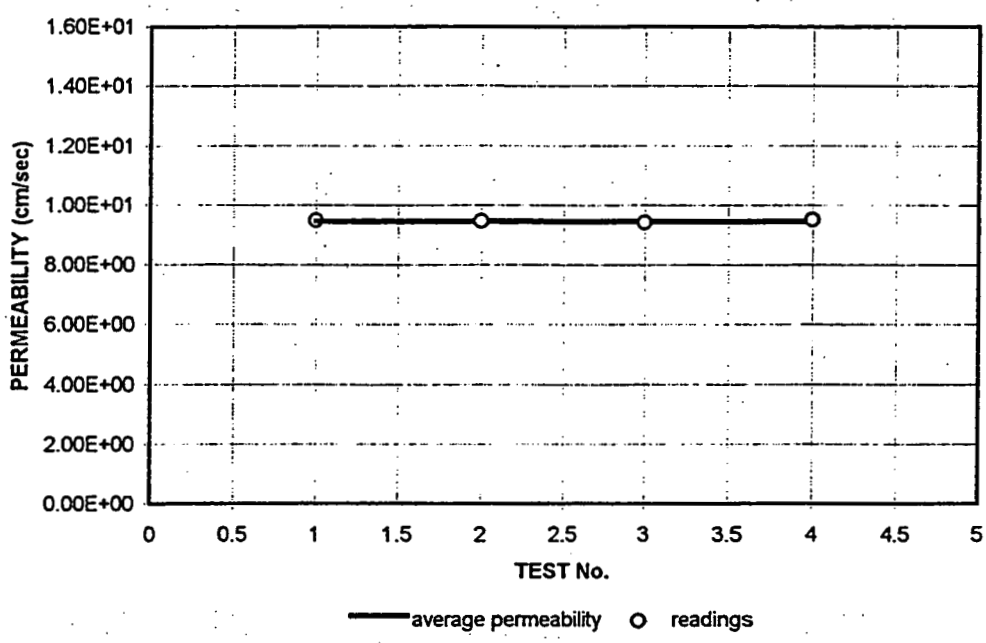
000089

H. C. NUTTING COMPANY

Robert L. Jones V.P. / Lab Dir.

Client: HANSON AGGREGATES DAVON INC.
Project: FLUOR FERNARD, CELL 2, PREP CELL 4 & 5
Project No: 11976.004 Plate

CONSTANT HEAD PERMEABILITY TEST



Test Specification: ASTM D 2434

Test No.	Manometers		Water Levels		Water Head	Flow Volume	Elapsed Time	Calculated Permeability
	H1 (cm)	H2 (cm)	L1 (cm)	L2 (cm)	(cm)	(cm^3)	(s)	(cm/s)
1	45.5	46.1	1000		0.6	1000	14.69	9.48E+00
2	45.5	46.1	1000		0.6	1000	14.74	9.45E+00
3	45.5	46.1	1000		0.6	1000	14.79	9.42E+00
4	45.5	46.1	1000		0.6	1000	14.68	9.49E+00
Average								**9.46E+00**

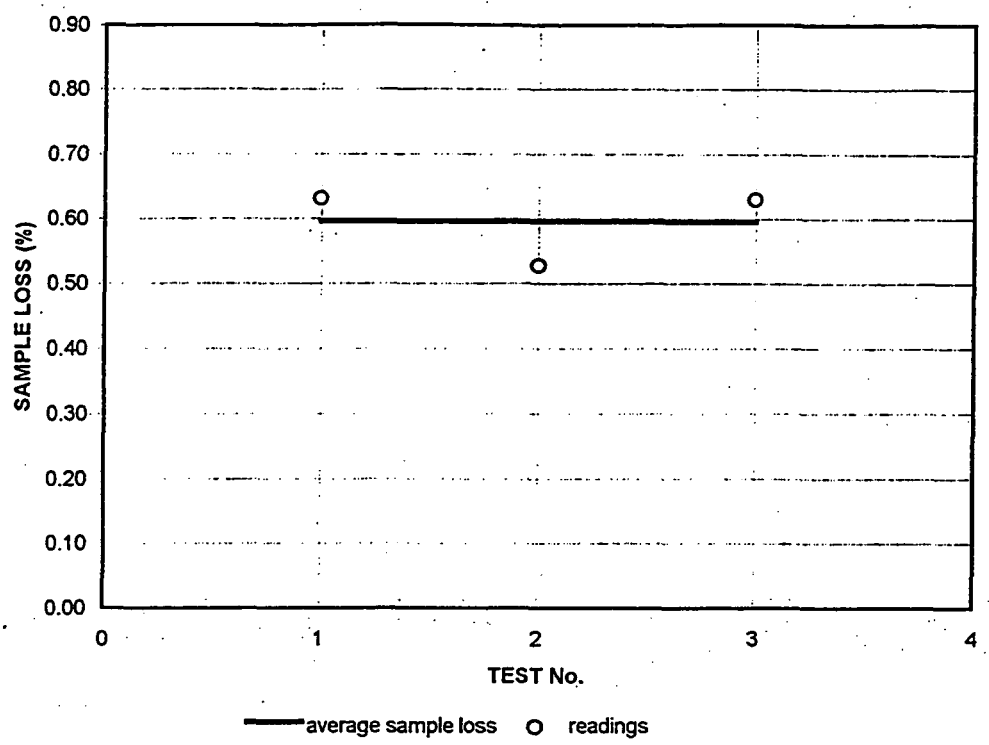
Specimen Conditions			
Diameter D (in)	6.0	Weight of Specimen (gms)	6230.0
Length of Specimen (in)	8.0	Density of Specimen (pcf)	104.9
Length of Flow (in)	6.0	Approximate Porosity(%)	37.7

Material Description		Remarks
Carbonate Content (%)	0.60	SOURCE: EAGLE QUARRY
USCS		
Water Content (%)		

Project Name	Fluor Fernald	Tested by	FCE Review. by TGG
Client	Hanson Agg. W.O.# 11976.004	CONSTANT HEAD PERMEABILITY TEST	
Sample Number	#78		
Sample Location	Cell 2 Prep Cell 4&5		
Date	10-Apr-02 Lab No. 2980	H. C. NUTTING COMPANY	

Robert L. Hack V.P./Lab Div

INSOLUBLE CARBONATE CONTENT TEST



Test Specification: ASTM D 3042

Trial No.	Sample+ Tare Weight (g)	Tare Weight (g)	Sample Weight (g)	Sample+ Tare Weight (g)	Tare Weight (g)	Sample Weight (g)	Sample Loss (g)	Sample Loss (%)
1	475.2		475.2	472.2		472.2	3	0.63
2	455.2		455.2	452.8		452.8	2.4	0.53
3	428.6		428.6	425.9		425.9	2.7	0.63
Total	1359		1359	1350.9		1350.9	8.1	**0.60**

Material Description	Remarks SOURCE: EAGLE QUARRY
Permeability (cm/s) 9.46E+00 USCS	Solution: pH of 4

Project Name	Fluor Fernald	Tested by FCE	Review. by TGG
Client Hanson Agg.	W.O.# 11976.004	Robert L. Horne V.P. / Lab. Dir	
Sample Number	#78	INSOLUBLE CARBONATE CONTENT TEST	
Sample Location	Cell 2 Prep Cell 4&5		
Date 12-Apr-02	Lab No. 2980	H. C. NUTTING COMPANY	

4/15/02

GEOSYNTEC/FLUOR FERNALD/OH
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth	Soil Classi-fication	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Carbonate Content (%)	Additional Tests Conducted (See Notes)
					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer 0.002 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)			
FM02-1	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	99.2	3.0E+00	0.07	-
FM02-2	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	105.3	5.8E+00	0.02	-
FM02-2A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	103.1	3.4E+00	-	-
FM02-3	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	98.2	2.6E+00	-	-
FM02-4	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	104.8	2.3E+00	0.47	-
FM02-4A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	101.7	2.4E+00	-	-
FM02-5	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	97.0	1.7E+00	-	-
FM02-6	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	97.0	1.7E+00	0.04	-
FM02-7	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	100.7	3.1E+00	-	-
FM02-8	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	100.6	2.9E+00	0.12	-
FM02-9	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	97.8	3.5E+00	0.05	-
FM02-10	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	102.7	3.0E+00	0.06	-
FM02-11	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	102.7	3.0E+00	0.15	-
FM02-12	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	105.0	1.8E+00	0.16	-
FM02-13	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	99.6	2.8E+00	0.12	-

ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

GEOSYNTEC/FLUOR FERNALD/OH
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth	Soil Classi-fication	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Carbonate Content (%)	Additional Tests Conducted (See Notes)
					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer 0.002 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)			
FM02-14	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	103.3	1.9E+00	0.05	-
FM02-15	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	104.8	2.7E+00	0.11	-
FM02-16	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	104.8	2.7E+00	-	-
FM02-17	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	103.2	2.5E+00	-	-
FM02-18	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	103.2	2.5E+00	-	-
FM02-19	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	104.7	1.2E+00	0.17	-
FM02-20	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	103.8	4.8E+00	0.06	-
FM02-21	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	103.9	2.1E+00	-	-
FM02-22	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	103.9	2.6E+00	0.10	-
GD02-1	Bulk	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05	-
GD02-2	Bulk	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03	-
GD02-3	Bulk	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11	-
GD02-4	Bulk	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07	-

ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

000093

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 6Q134 TASK NO.: 04.1

DESCRIPTION: Filter Stone Phase IV DATE: 15 day April month 2002 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: FM02-01

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		L-6	L-6
WT. OF DRY SAMPLE PLUS TARE	(grams)	1981.9	1967.0
WT. OF TARE	(grams)	199.1	199.1
WT. OF DRY SAMPLE	(grams)	1782.8	1767.9

SIEVE ANALYSIS

QA ID: KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	0	0	100	100
1 1/2"	37.50	0	0	100	100
1"	25.00	0	0	100	100
3/4"	19.00	0	0	100	100
1/2"	12.50	259.8	14.6	85.4	85 To 100
3/8"	9.50	761.7	42.7	57.3	40 To 75
#4	4.75	1561.6	87.6	12.4	5 To 25
#8	2.36	1720.2	96.5	3.5	0 To 10
#16	1.10	1752.8	98.3	1.7	0 To 5
#30	0.60	1761.2	98.8	1.2	0 To 5
#50	0.30	1763.9	98.9	1.1	0 To 5
#100	0.15	1765.5	99.0	1.0	0 To 5
#200	0.75	1767.1	99.1	0.9	0 To 2
PAN		1767.9			

000094

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

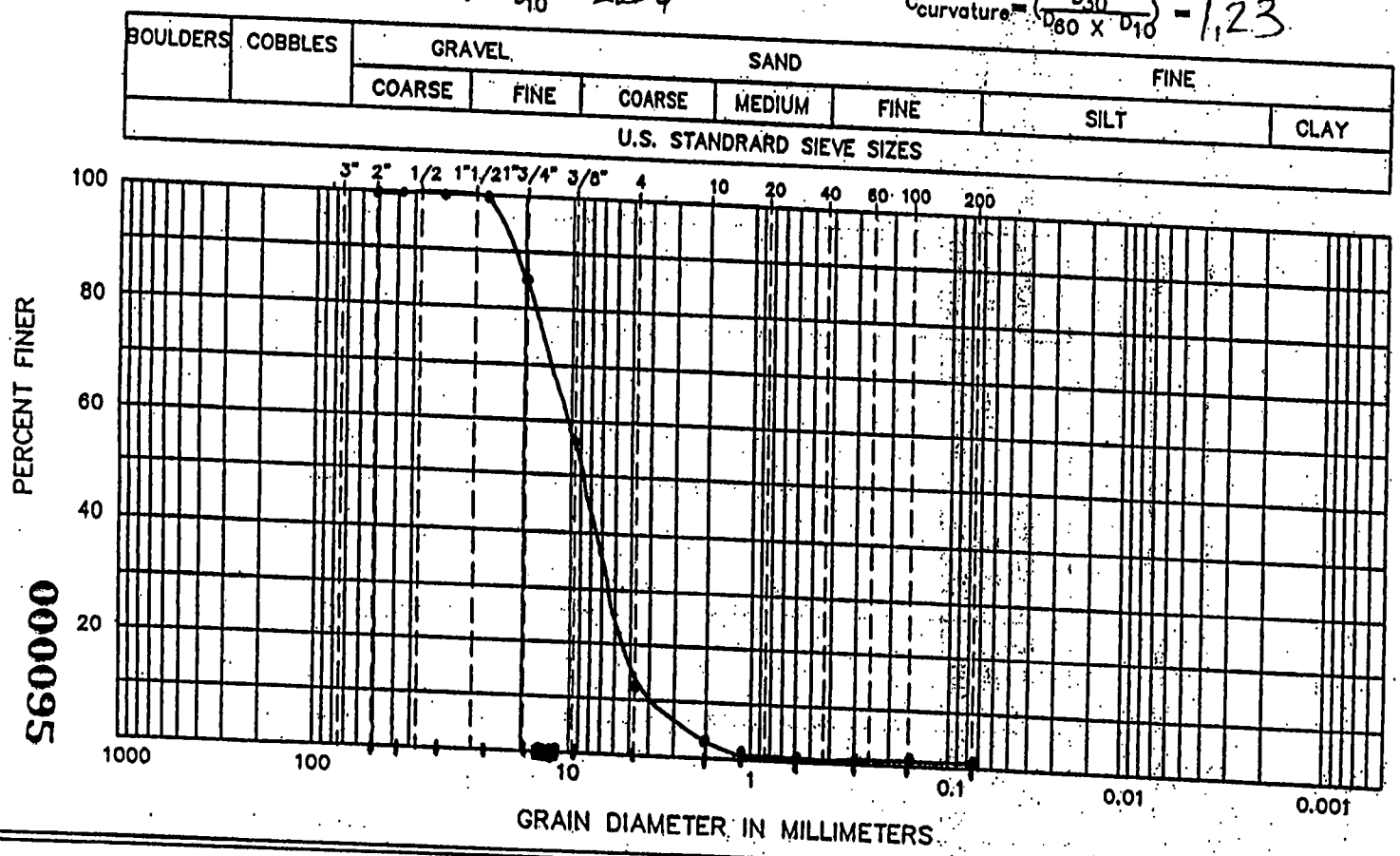
PROJECT NO.: GQ1341 TASK NO.: 04.1

MATERIAL TYPE: #78 Stone - Filter Material

DATE: 30 day July month 2002 year

SAMPLE NO.: FM02-1 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = 2.50$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = 1.23$



ATTERBERG LIMITS

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SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	—
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	85.4
3/8-in.	57.3
NO. 4	12.4
NO. ~~40~~ 8	3.5
NO. ~~20~~ 16	1.7
NO. ~~40~~ 30	1.2
NO. ~~80~~ 50	1.1
NO. 100	1.0
NO. 200	0.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

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SHEET NO. ____ OF ____

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4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-1	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bulk	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	8	940	19.0	112.17	
2.	8	940	19.0	111.90	*
3.	8	940	19.0	112.71	*
4.	8	940	19.0	112.44	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	7589.0
APPARATUS WEIGHT (g):	3662.0
WET SAMPLE WEIGHT (g):	3927.0
SAMPLE LENGTH (in):	12.0
SAMPLE DIAMETER (in):	4.0
SAMPLE AREA (in²):	12.57
SAMPLE AREA (cm²):	81.07
SAMPLE VOLUME (in³):	150.80
SAMPLE VOLUME (ft³):	0.087
WET DENSITY IN (pcf):	99.2
DRY DENSITY IN (pcf):	99.2

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	12.0
SAMPLE DIAMETER (in):	4.0
AVERAGE Q VALUE (ml/sec):	112.35
AVERAGE TEMP (°C):	19.0
TEMPERATURE CORRECTION:	1.025
HEAD OF WATER (in):	5.7
HYDRAULIC GRADIENT (i):	0.48

K VALUE CORRECTED FOR 20 DEGREES C = 3.0E+00 cm/sec

000096

TECH	TJ
DATE	4/16/02
CHECK	BSS
REVIEW	PWM

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

1841

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 6Q134 1 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 04 day June month 2001 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: FM 02-2

Bucket Sample 32.90 LB'S
17185.83 grams

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		X	11.59 X
WT. OF DRY SAMPLE PLUS TARE	(grams)	5320.7	5257.2
WT. OF TARE	(grams)	939.1	939.1
WT. OF DRY SAMPLE	(grams)	4381.6	4318.1

SIEVE ANALYSIS

QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø	100	100
1½"	37.50	Ø	Ø	100	100
1"	25.00	Ø	Ø	100	100
3/4"	19.00	Ø	Ø	100	100
½"	12.50	329.9	7.5	92.5	85 To 100
3/8"	9.50	1313.7	30.0	70.0	40 To 75
#4	4.75	3842.8	87.7	12.3	5 To 25
#8	2.36	4229.7	96.5	3.5	0 To 10
#16	1.18	4277.6	97.6	2.4	0 To 5
#30	0.60	4301.1	98.2	1.8	0 To 5
#50	0.30	4306.9	98.3	1.7	0 To 5
#100	0.15	4311.3	98.4	1.6	0 To 5
#200	0.75	4316.4	98.5	1.5	0 To 2
PAN	—	4318.2	—	—	—

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%FINER = 100 − Σ% RETAINED

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SHEET NO. 1 OF 3

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

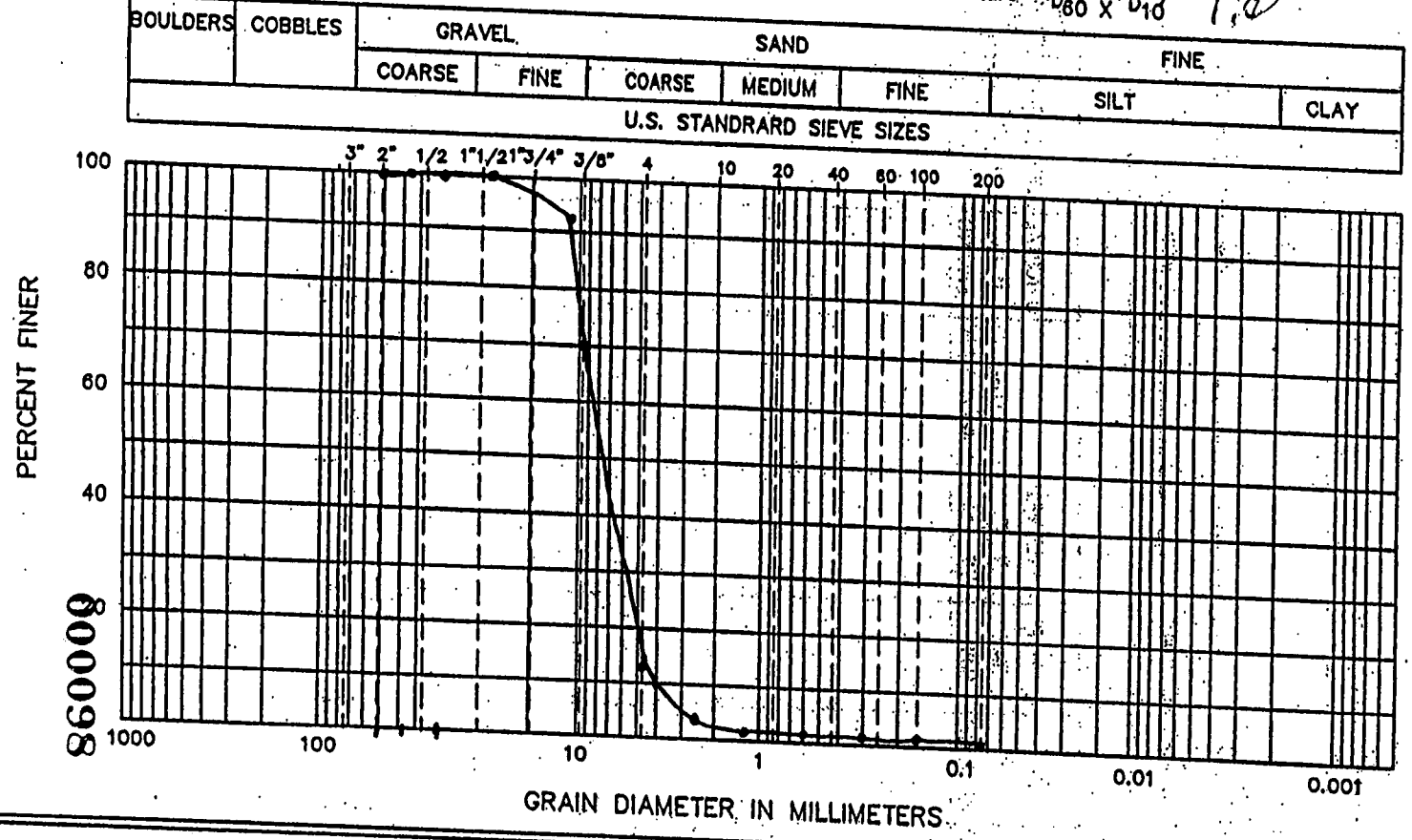
PROJECT NO.: GQ1341 TASK NO.: 04.1

MATERIAL TYPE: #78 Stone - Filter Material

DATE: 30 day July month 2002 year

SAMPLE NO.: FM02-2 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right)^2 = 2.25$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = 1.0$



ATTERBERG LIMITS

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SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	—
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	92.5
3/8-in.	70.0
NO. 4	12.3
NO. ~~10~~ 8	3.5
NO. ~~20~~ 16	2.4
NO. ~~40~~ 30	1.8
NO. ~~80~~ 50	1.7
NO. 100	1.6
NO. 200	1.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

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7-4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-2	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	5	1230	22.0	229.05	
2.	5	1230	22.0	232.95	*
3.	5	1230	22.0	232.51	*
4.	5	1230	22.0	234.29	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	7856.0
APPARATUS WEIGHT (g):	3686.0
WET SAMPLE WEIGHT (g):	4170.0
SAMPLE LENGTH (in):	12.0
SAMPLE DIAMETER (in):	4.0
SAMPLE AREA (in²):	12.57
SAMPLE AREA (cm²):	81.07
SAMPLE VOLUME (in³):	150.80
SAMPLE VOLUME (ft³):	0.087
WET DENSITY IN (pcf):	105.3
DRY DENSITY IN (pcf):	105.3

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	12.0
SAMPLE DIAMETER (in):	4.0
AVERAGE Q VALUE (ml/sec):	233.25
AVERAGE TEMP (°C):	22.0
TEMPERATURE CORRECTION:	0.953
HEAD OF WATER (in):	5.7
HYDRAULIC GRADIENT (i):	0.48

K VALUE CORRECTED FOR 20 DEGREES C = 5.8E+00 cm/sec

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TECH	TJ
DATE	6/20/02
CHECK	DA
REVIEW	PWM

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-2A	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	3	650	21.5	216.67	
2.	3	650	21.5	214.52	*
3.	3	650	21.5	216.67	*
4.	3	650	21.5	212.42	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	12010.0
APPARATUS WEIGHT (g):	4356.0
WET SAMPLE WEIGHT (g):	7654.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in²):	28.27
SAMPLE AREA (cm²):	182.41
SAMPLE VOLUME (in³):	282.74
SAMPLE VOLUME (ft³):	0.164
WET DENSITY IN (pcf):	103.1
DRY DENSITY IN (pcf):	103.1

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	214.54
AVERAGE TEMP (°C):	21.5
TEMPERATURE CORRECTION:	0.965
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

K VALUE CORRECTED FOR 20 DEGREES C = 3.4E+00 cm/sec

000100

TECH	DW
DATE	6/21/02
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REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 6Q134 / TASK NO.: 04.1

DESCRIPTION: Phase II DATE: 13 day June month 2001 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: FM02-3

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		11.99 LBS X	11.84 LBS X
WT. OF DRY SAMPLE PLUS TARE	(grams)	5438.7 gram	5370.6 gram
WT. OF TARE	(grams)	939.1	939.1
WT. OF DRY SAMPLE	(grams)	4499.6	4431.5

SIEVE ANALYSIS

QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø	100	100
1½"	37.50	Ø	Ø	100	100
1"	25.00	Ø	Ø	100	100
3/4"	19.00	Ø	Ø	100	100
½"	12.50	562.3	12.5	87.5	85 To 100
3/8"	9.50	1572.1	34.9	65.1	40 To 75
#4	4.75	3981.8	88.5	11.5	5 To 25
#8	2.36	4350.1	96.7	3.3	0 To 10
#16	1.18	4410.4	98.0	2.0	0 To 5
#30	0.60	4418.6	98.2	1.8	0 To 5
#50	0.30	4420.8	98.2	1.8	0 To 5
#100	0.15	4422.8	98.3	1.7	0 To 5
#200	0.75	4425.1	98.3	1.7	0 To 2
PAN		4429.1	98.4	1.6	

000101

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

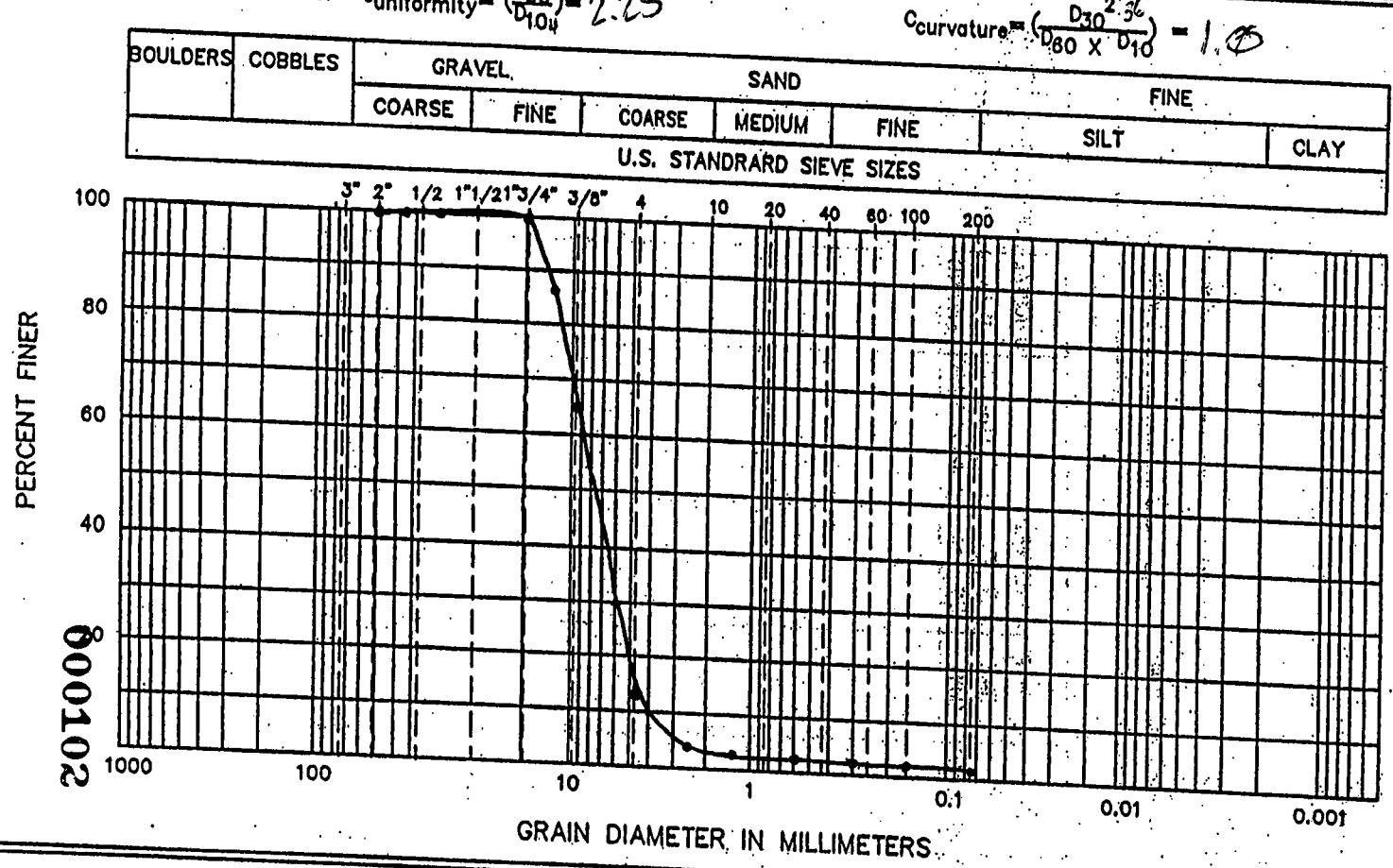
PROJECT NO.: GQ1341 TASK NO.: 04.1

MATERIAL TYPE: #78 Stone - Filter Material

DATE: 30 day July month 2002 year

SAMPLE NO.: FM02-3 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = 2.25$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = 1.0$



ATTERBERG LIMITS

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SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	—
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	87.5
3/8-in.	65.1
NO. 4	11.5
NO. ~~10~~ 8	3.3
NO. ~~20~~ 16	2.0
NO. ~~40~~ 30	1.8
NO. ~~60~~ 50	1.8
NO. 100	1.7
NO. 200	1.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

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SHEET NO. ____ OF ____

000102

1-494

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-3	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	5	530	21.5	104.13	
2.	5	530	21.5	104.13	*
3.	5	540	21.5	105.26	*
4.	5	530	21.5	106.00	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	7739.0
APPARATUS WEIGHT (g):	3868.0
WET SAMPLE WEIGHT (g):	3871.0
SAMPLE LENGTH (in):	12.0
SAMPLE DIAMETER (in):	4.0
SAMPLE AREA (in^2):	12.57
SAMPLE AREA (cm^2):	81.07
SAMPLE VOLUME (in^3):	150.17
SAMPLE VOLUME (ft^3):	0.087
WET DENSITY IN (pcf):	98.2
DRY DENSITY IN (pcf):	98.2

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	12.0
SAMPLE DIAMETER (in):	4.0
AVERAGE Q VALUE (ml/sec):	105.13
AVERAGE TEMP (°C):	21.5
TEMPERATURE CORRECTION:	0.965
HEAD OF WATER (in):	5.7
HYDRAULIC GRADIENT (i):	0.48

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 2.6E+00 cm/sec

000103

TECH	TJ/DW
DATE	6/20/02
CHECK	DA
REVIEW	[illegible]

4941

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 6Q134 1 TASK NO.: 04.1

DESCRIPTION: DATE: 12 day June month 2001 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: FM02-4

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		X	Y
WT. OF DRY SAMPLE PLUS TARE	(grams)	12.72 lbs 5769.8	12.47 5656.4
WT. OF TARE	(grams)	939.1	939.1
WT. OF DRY SAMPLE	(grams)	4830.7	4717.3

SIEVE ANALYSIS

QA ID: [illegible]

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø	100	100
1½"	37.50	Ø	Ø	100	100
1"	25.00	Ø	Ø	100	100
3/4"	19.00	Ø	Ø	100	100
½"	12.50	447.7	9.3	90.7	85 To 100
3/8"	9.50	1484.9	30.7	69.3	40 To 75
#4	4.75	4177.8	86.5	13.5	5 To 25
#8	2.36	4637.8	96.0	4.0	0 To 10
#16	1.18	4680.3	96.9	3.1	0 To 5
#30	0.60	4686.9	97.0	3.0	0 To 5
#50	0.30	4691.1	97.1	2.9	0 To 5
#100	0.15	4696.9	97.2	2.8	0 To 5
#200	0.75	4717.1	97.6	2.4	0 To 2
PAN		4717.2	97.7	2.3	

000104

%FINER = 100 − Σ% RETAINED

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6239 LB's Total Sample

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

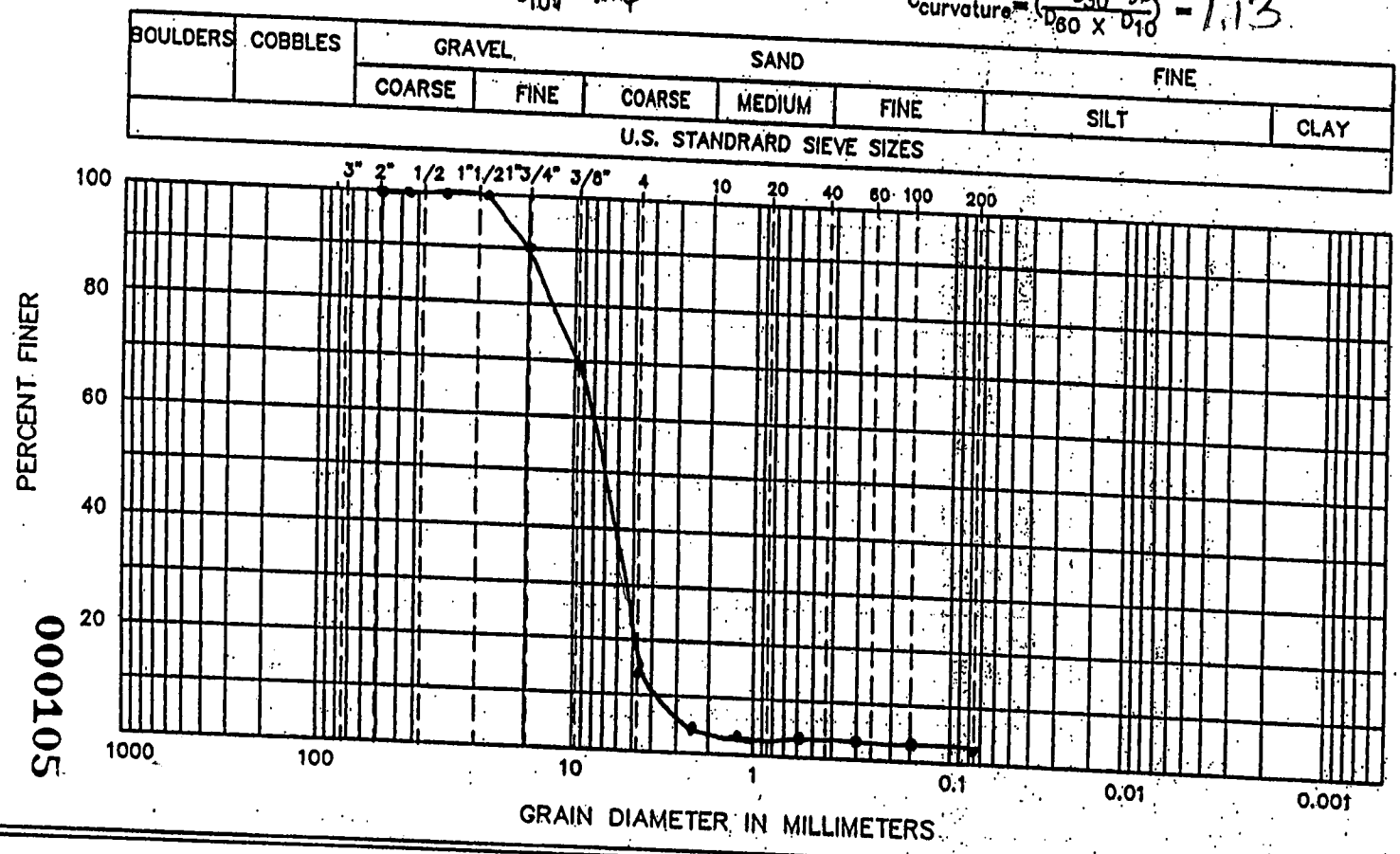
MATERIAL TYPE: #78 Stone - Filter Material

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 30 day July month 2002 year

SAMPLE NO.: FM02-4 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = 2.0$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = 1.13$



ATTERBERG LIMITS

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SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	—
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	90.7
3/8-in.	69.3
NO. 4	13.5
NO. ~~40~~ 8	4.0
NO. ~~20~~ 16	3.1
NO. ~~40~~ 30	3.0
NO. ~~80~~ 50	2.9
NO. 100	2.8
NO. 200	2.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

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4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-4	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	10	960	22.5	93.11	
2.	10	950	22.5	92.95	*
3.	10	950	22.5	92.68	*
4.	10	950	22.5	92.41	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	7905.0
APPARATUS WEIGHT (g):	3774.0
WET SAMPLE WEIGHT (g):	4131.0
SAMPLE LENGTH (in):	12.0
SAMPLE DIAMETER (in):	4.0
SAMPLE AREA (in²):	12.57
SAMPLE AREA (cm²):	81.07
SAMPLE VOLUME (in³):	150.17
SAMPLE VOLUME (ft³):	0.087
WET DENSITY IN (pcf):	104.8
DRY DENSITY IN (pcf):	104.8

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	12.0
SAMPLE DIAMETER (in):	4.0
AVERAGE Q VALUE (ml/sec):	92.68
AVERAGE TEMP (°C):	22.5
TEMPERATURE CORRECTION:	0.942
HEAD OF WATER (in):	5.7
HYDRAULIC GRADIENT (i):	0.48

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 2.3E+00 cm/sec

000106

TECH	TJ
DATE	6/20/02
CHECK	DA
REVIEW	[illegible]

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-4A -
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag
REMARKS	-	SAMPLE DEPTH	-

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	5	800	22.0	151.52	
2.	5	790	22.0	151.34	*
3.	5	800	22.0	151.52	*
4.	5	800	22.0	152.38	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	11846.0
APPARATUS WEIGHT (g):	4335.0
WET SAMPLE WEIGHT (g):	7511.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in²):	28.27
SAMPLE AREA (cm²):	182.41
SAMPLE VOLUME (in³):	281.33
SAMPLE VOLUME (ft³):	0.163
WET DENSITY IN (pcf):	101.7
DRY DENSITY IN (pcf):	101.7

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	151.75
AVERAGE TEMP (°C):	22.0
TEMPERATURE CORRECTION:	0.953
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 2.4E+00 cm/sec

000107

TECH	TJ
DATE	6/20/02
CHECK	DA
REVIEW	[illegible]

4941

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 6Q134 1 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 14 day June month 2001 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: FM 02-5

10 Total dry sample 52.88 LBS

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		14.32 Lb's X	14.14 Lb's X
WT. OF DRY SAMPLE PLUS TARE	(grams)	6495.6	6413.9
WT. OF TARE	(grams)	939.1	939.1
WT. OF DRY SAMPLE	(grams)	5556.5	5474.8

SIEVE ANALYSIS

QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø	100	100
1 1/2"	37.50	Ø	Ø	100	100
1"	25.00	Ø	Ø	100	100
3/4"	19.00	Ø	Ø	100	100
1/2"	12.50	588.7	10.6	89.4	85 To 100
3/8"	9.50	1765.5	31.8	68.2	40 To 75
#4	4.75	5011.5	90.2	9.8	5 To 25
#8	2.36	5414.7	97.4	2.6	0 To 10
#16	1.18	5448.8	98.1	1.9	0 To 5
#30	0.60	5456.4	98.2	1.8	0 To 5
#50	0.30	5460.7	98.3	1.7	0 To 5
#100	0.15	5464.7	98.3	1.7	0 To 5
#200	0.75	5470.5	98.5	1.5	0 To 2
PAN		5472.7			

000108

%FINER = 100 − Σ% RETAINED

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CHECKED BY: CJ

SHEET NO. 1 OF 3

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

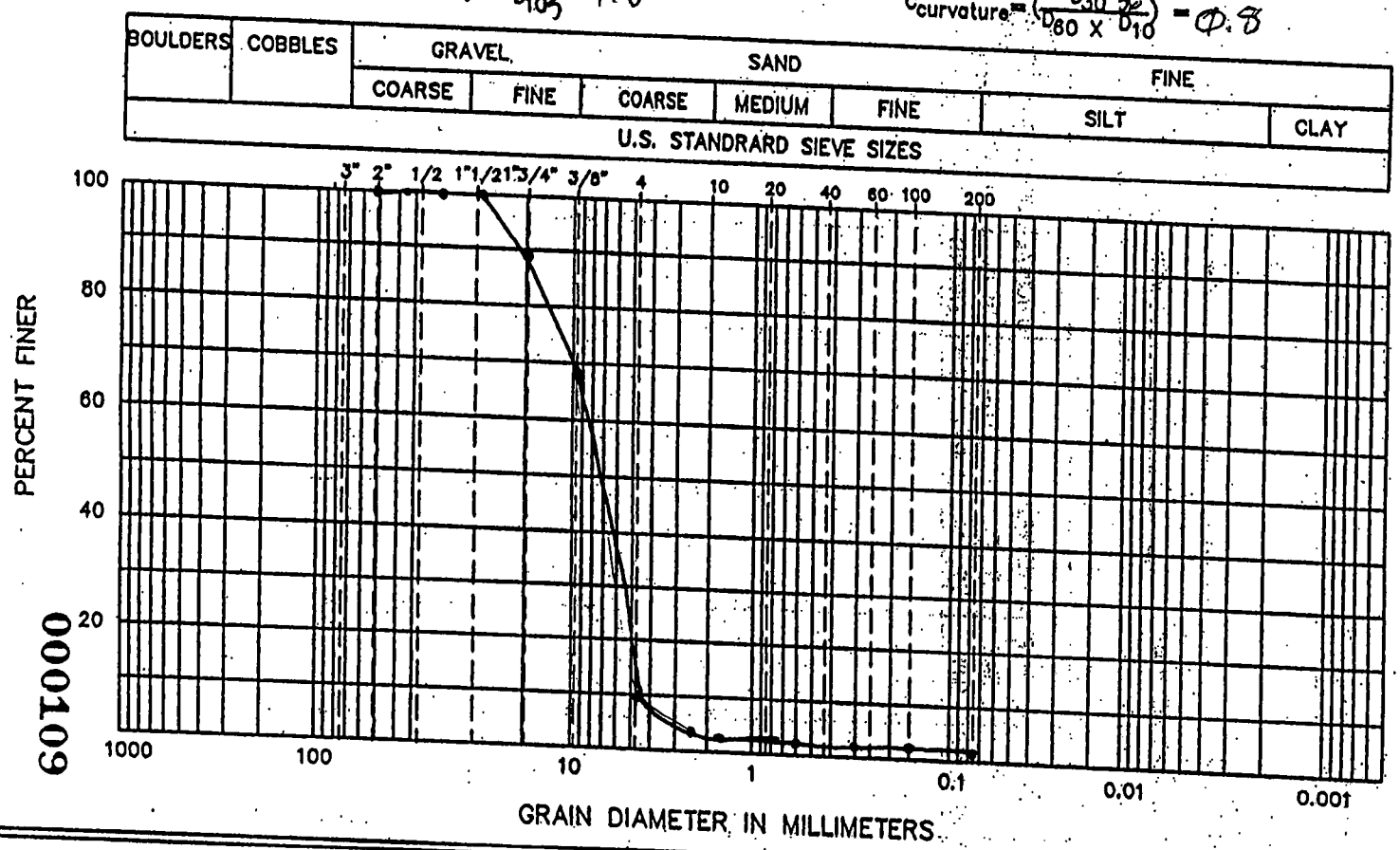
PROJECT NO.: GQ1341 TASK NO.: 04.1

MATERIAL TYPE: #78 Stone - Filter Material

DATE: 30 day July month 2002 year

SAMPLE NO.: FM02-5 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = 1.8$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = 0.8$



ATTERBERG LIMITS

(LL): .....

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SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	—
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	89.4
3/8-in.	68.2
NO. 4	9.8
NO. ~~10~~ 8	2.6
NO. ~~20~~ 16	1.9
NO. ~~40~~ 30	1.8
NO. ~~80~~ 50	1.7
NO. 100	1.7
NO. 200	1.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000109

4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-5	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	10	700	22.0	70.21	
2.	10	690	22.0	69.42	*
3.	10	700	22.0	70.42	*
4.	10	700	22.0	70.00	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	7574.0
APPARATUS WEIGHT (g):	3741.0
WET SAMPLE WEIGHT (g):	3833.0
SAMPLE LENGTH (in):	12.0
SAMPLE DIAMETER (in):	4.0
SAMPLE AREA (in²):	12.57
SAMPLE AREA (cm²):	81.07
SAMPLE VOLUME (in³):	150.55
SAMPLE VOLUME (ft³):	0.087
WET DENSITY IN (pcf):	97.0
DRY DENSITY IN (pcf):	97.0

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	12.0
SAMPLE DIAMETER (in):	4.0
AVERAGE Q VALUE (ml/sec):	69.95
AVERAGE TEMP (°C):	22.0
TEMPERATURE CORRECTION:	0.953
HEAD OF WATER (in):	5.7
HYDRAULIC GRADIENT (i):	0.48

K VALUE CORRECTED FOR 20 DEGREES C = 1.7E+00 cm/sec

000110

TECH	DW
DATE	6/20/02
CHECK	DA
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

4941

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase DATE: 19 day June month 2002 year

MATERIAL TYPE: 78 STONE SAMPLE NO.: FM 02-6

45.15 Lb's Total Sample wt.

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		13.33 X	13.12 X
WT. OF DRY SAMPLE PLUS TARE	(grams)	6046.5	5978.4
WT. OF TARE	(grams)	939.1	939.1
WT. OF DRY SAMPLE	(grams)	5107.4	5039.3

SIEVE ANALYSIS

QA ID: DAE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø	100	100
1½"	37.50	Ø	Ø	100	100
1"	25.00	Ø	Ø	100	100
3/4"	19.00	Ø	Ø	100	100
½"	12.50	628.0	12.3	87.7	85 To 100
3/8"	9.50	1882.7	36.8 KS	63.2 KS	40 To 75
#4	4.75	4609.2	90.2	9.8	5 To 25
#8	2.36	4950.4	96.9	3.1	0 To 10
#16	1.18	5000.5	97.9	2.1	0 To 5
#30	0.60	5014.4	98.2	1.8	0 To 5
#50	0.30	5021.0	98.3	1.7	0 To 5
#100	0.15	5026.8	98.4	1.6 KS	0 To 5
#200	0.75	5034.1	98.6 KS	1.4 KS	0 To 2
PAN		5035.6	98.6	1.4	

000111

%FINER = 100 − Σ% RETAINED

©GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: KS SHEET NO. 1 OF 3

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase II

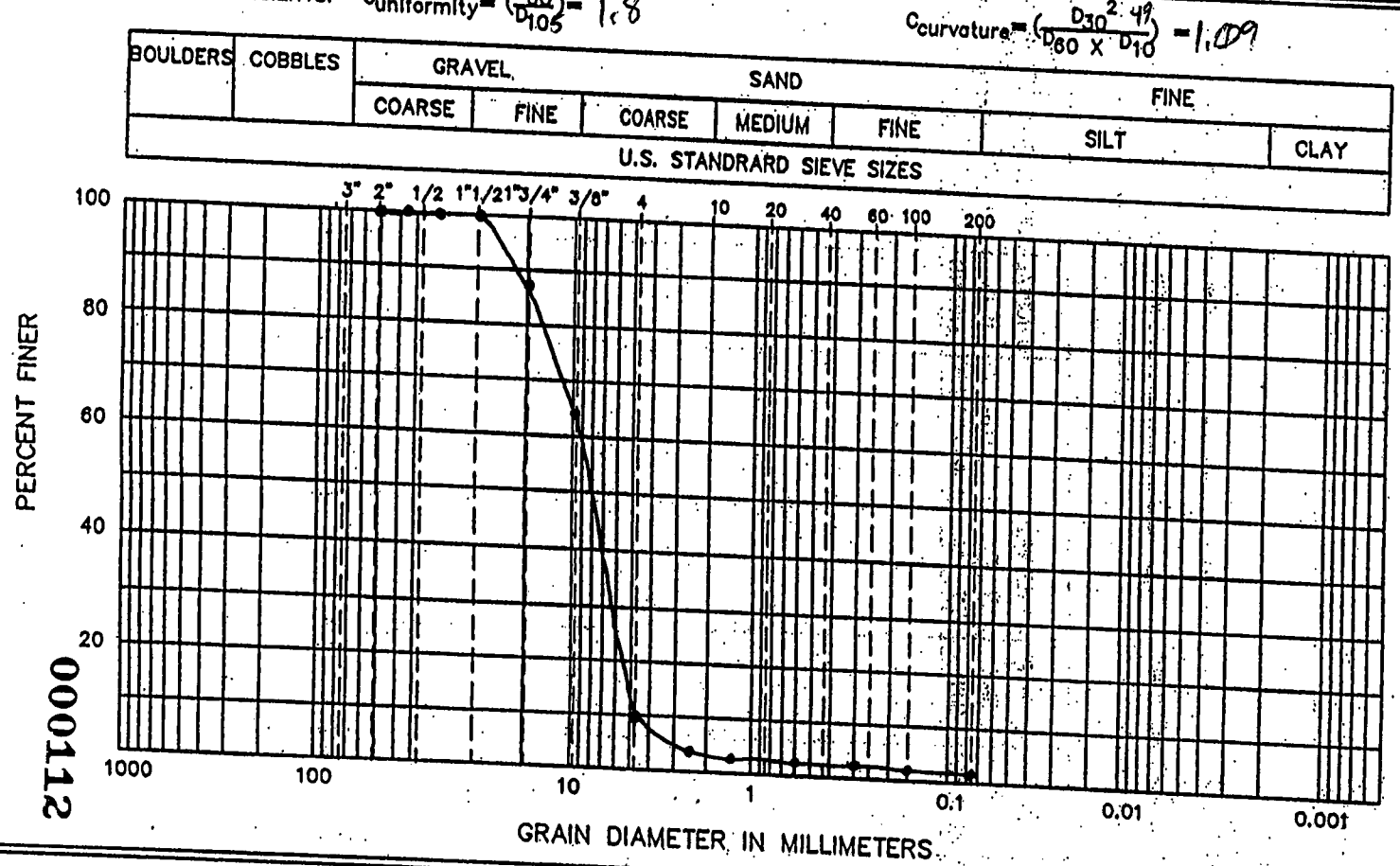
PROJECT NO.: GQ1341 TASK NO.: 04.1

MATERIAL TYPE: #78 Stone - Filter Material

DATE: 30 day July month 2002 year

SAMPLE NO.: FM02-6 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = 1.8$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = 1.09$



ATTERBERG LIMITS

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SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	—
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	87.7
3/8-in.	63.1
NO. 4	9.8
NO. ~~10~~ 8	3.1
NO. ~~20~~ 16	2.1
NO. ~~40~~ 30	1.8
NO. ~~80~~ 50	1.7
NO. 100	1.6
NO. 200	1.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000112

4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-6	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	29	5650	22.0	70.21	
2.	29	5650	22.0	69.42	*
3.	29	5650	22.0	70.42	*
4.	29	5650	22.0	70.00	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	11815.0
APPARATUS WEIGHT (g):	4339.0
WET SAMPLE WEIGHT (g):	3833.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in²):	12.57
SAMPLE AREA (cm²):	81.07
SAMPLE VOLUME (in³):	150.55
SAMPLE VOLUME (ft³):	0.087
WET DENSITY IN (pcf):	97.0
DRY DENSITY IN (pcf):	97.0

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	69.95
AVERAGE TEMP (°C):	22.0
TEMPERATURE CORRECTION:	0.953
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.48

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 1.7E+00 cm/sec

000113

TECH	TJ
DATE	7/2/02
CHECK	DA
REVIEW	FWM

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

4941

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 601341 TASK NO.: 04.1

DESCRIPTION: Phase DATE: 25 day June month 2002 year

MATERIAL TYPE: 78 STONE SAMPLE NO.: FM 02-7

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	14.51 BEFORE WASH	14.30 AFTER WASH
TARE NO.	X	X
WT. OF DRY SAMPLE PLUS TARE (grams)	6581.7	6486.5
WT. OF TARE (grams)	939.1	939.1
WT. OF DRY SAMPLE (grams)	5642.6	5547.4

SIEVE ANALYSIS

QA ID: DAE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø		100
1 1/2"	37.50	Ø	Ø		100
1"	25.00	Ø	Ø		100
3/4"	19.00	Ø	Ø		100
1/2"	12.50	840.4	14.9	85.1	85 To 100
3/8"	9.50	2864.4	50.8	49.2	40 To 75
#4	4.75	5358.2	94.9	5.1	5 To 25
#8	2.36	5483.2	97.2	2.8	0 To 10
#16	1.18	5507.4	97.6	2.4	0 To 5
#30	0.60	5517.7	97.8	2.2	0 To 5
#50	0.30	5524.3	97.9	2.1	0 To 5
#100	0.15	5531.2	98.0	2.0	0 To 5
#200	0.75	5543.6	98.2	1.8	0 To 2
PAN		5544.6			

000114

%FINER = 100 − Σ% RETAINED

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SHEET NO. 1 OF 3

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: GQ1341 TASK NO.: 04.1

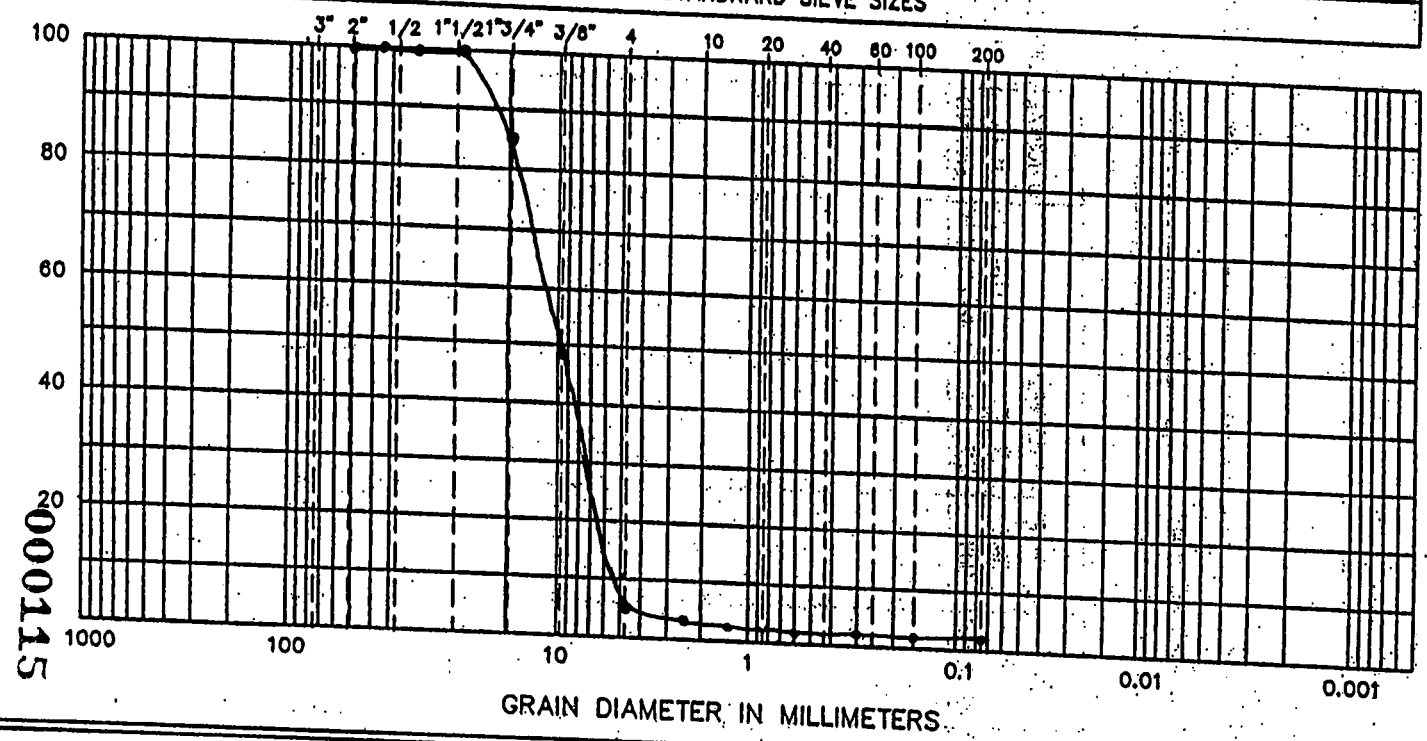
MATERIAL TYPE: #78 Stone - Filter Material

DATE: 30 day July month 2002 year

SAMPLE NO.: FM02-7 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ ~~2.0~~ 2.2 KS

$C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$ ~~1.28~~ 1.16 KS



ATTERBERG LIMITS

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SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	—
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	85.1
3/8-in.	49.2
NO. 4	5.1
NO. ~~10~~ 8 KS	2.8
NO. ~~20~~ 16 KS	2.4
NO. ~~40~~ 30 KS	2.2
NO. ~~80~~ 50 KS	2.1
NO. 100	2.0
NO. 200	1.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. ____ OF ____

0001115

4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-7	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	24	5650	22.0	197.35	
2.	23	5650	22.0	197.62	•
3.	23	5650	22.0	197.00	•
4.	23	5650	22.0	196.73	•

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	11924.0
APPARATUS WEIGHT (g):	4401.0
WET SAMPLE WEIGHT (g):	7476.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in²):	28.27
SAMPLE AREA (cm²):	182.41
SAMPLE VOLUME (in³):	282.74
SAMPLE VOLUME (ft³):	0.164
WET DENSITY IN (pcf):	100.7
DRY DENSITY IN (pcf):	100.7

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	197.12
AVERAGE TEMP (°C):	22.0
TEMPERATURE CORRECTION:	0.953
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 3.1E+00 cm/sec

000116

TECH	TJ
DATE	7/2/02
CHECK	DA
REVIEW	[illegible]

4941

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase DATE: 01 day July month 2002 year

MATERIAL TYPE: 78 STONE SAMPLE NO.: FM02-8

Total Sample

42.94

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	BEFORE WASH (13D2 Split Sample)	AFTER WASH
TARE NO.	X	X
WT. OF DRY SAMPLE PLUS TARE (grams)	5905.9	5828.8
WT. OF TARE (grams)	938.9	938.9
WT. OF DRY SAMPLE (grams)	4967.0	4889.9

SIEVE ANALYSIS

QA ID: DJE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	0	0	100	100
1½"	37.50	0	0	100	100
1"	25.00	0	0	100	100
¾"	19.00	0	0	100	100
½"	12.50	748.5	15.0	85.0	85 To 100
⅜"	9.50	2309.2	46.5	53.5	40 To 75
#4	4.75	4662.3	93.9	6.1	5 To 25
#8	2.36	4853.3	97.7	2.3	0 To 10
#16	1.18	4872.4	98.1	1.9	0 To 5
#30	0.60	4879.6	98.2	1.8	0 To 5
#50	0.30	4883.6	98.3	1.7	0 To 5
#100	0.15	4887.2	98.3	1.7	0 To 5
#200	0.75	4892.6	98.5	1.5	0 To 2
PAN		~~4895.6~~	~~98.6~~		

000117

%FINER = 100 − Σ% RETAINED

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SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

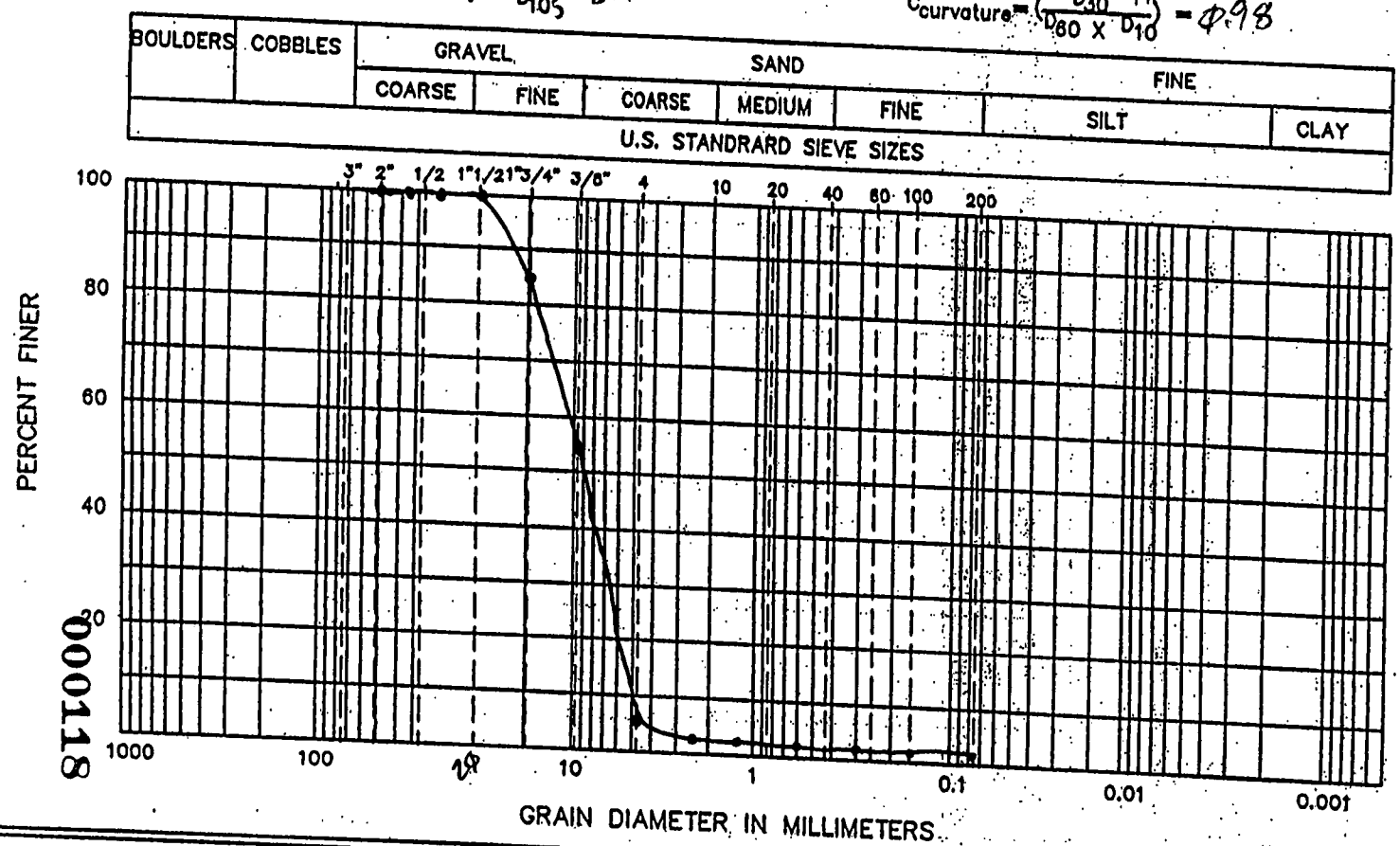
PROJECT NO.: GQ1341 TASK NO.: 04.1

MATERIAL TYPE: #78 Stone - Filter Material

DATE: 30 day July month 2002 year

SAMPLE NO.: FM02-8 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = 2.0$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = 0.98$



ATTERBERG LIMITS

(LL) .....

(PL) .....

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SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	—
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	85.0
3/8-in.	53.5
NO. 4	6.1
NO. ~~10~~ 8	2.3
NO. ~~20~~ 16	1.9
NO. ~~40~~ 30	1.8
NO. ~~80~~ 50	1.7
NO. 100	1.7
NO. 200	1.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

0000118

4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-8 -
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag
REMARKS	-	SAMPLE DEPTH	-

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	30	5650	22.0	186.78	
2.	31	5650	22.0	184.64	*
3.	31	5650	22.0	183.74	*
4.	31	5650	22.0	183.74	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	11852.0
APPARATUS WEIGHT (g):	4383.0
WET SAMPLE WEIGHT (g):	7469.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in²):	28.27
SAMPLE AREA (cm²):	182.41
SAMPLE VOLUME (in³):	282.74
SAMPLE VOLUME (ft³):	0.164
WET DENSITY IN (pcf):	100.6
DRY DENSITY IN (pcf):	100.6

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	184.04
AVERAGE TEMP (°C):	22.0
TEMPERATURE CORRECTION:	0.953
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 2.9E+00 cm/sec

000119

TECH	JH
DATE	7/24/02
CHECK	
REVIEW	

4941

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 601341 TASK NO.: 041

DESCRIPTION: Phase DATE: 16 day July month 2002 year

MATERIAL TYPE: 78 STONE SAMPLE NO.: Fm 02-9

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		12.42 BEFORE WASH	12.83 AFTER WASH
TARE NO.		X	X
WT. OF DRY SAMPLE PLUS TARE	(grams)	5860.5	5819.7
WT. OF TARE	(grams)	939.1	939.1
WT. OF DRY SAMPLE	(grams)	4921.4	4880.6

SIEVE ANALYSIS

QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø	100	100
1 1/2"	37.50	Ø	Ø	100	100
1"	25.00	Ø	Ø	100	100
3/4"	19.00	Ø	Ø	100	100
1/2"	12.50	1537.9	31.2	68.8	85 To 100
3/8"	9.50	3233.1	65.7	34.3	40 To 75
#4	4.75	4794.3	97.4	2.6	5 To 25
#8	2.36	4854.4	98.6	1.4	0 To 10
#16	1.18	4859.1	98.7	1.3	0 To 5
#30	0.60	4861.4	98.8	1.2	0 To 5
#50	0.30	4863.6	98.8	1.2	0 To 5
#100	0.15	4874.3	99.0	1.0	0 To 5
#200	0.75	4880.5	99.2	0.8	0 To 2
PAN					

000120

%FINER = 100 − Σ% RETAINED

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-15.14 LBS - 1.08 = 43.26

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase II

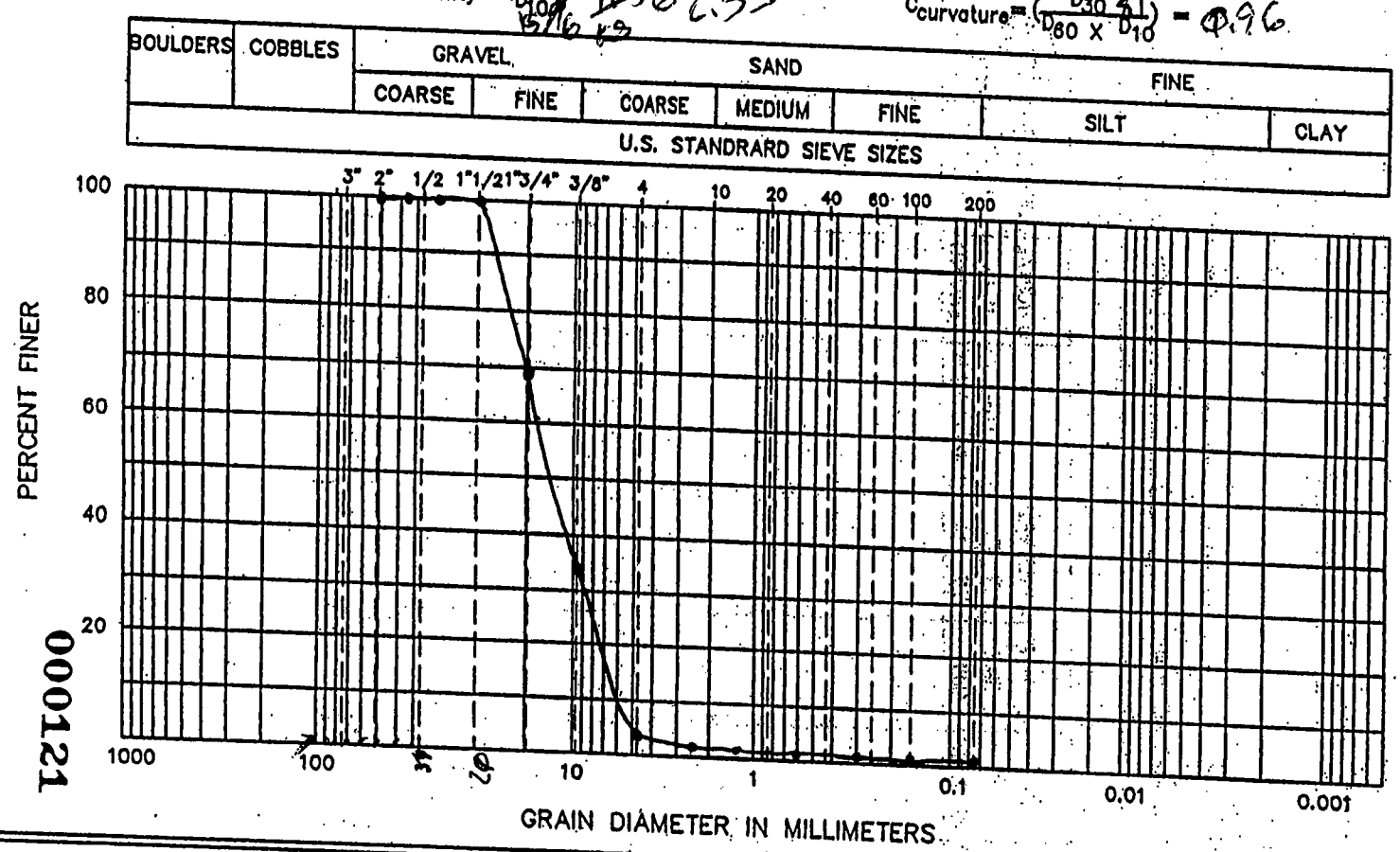
PROJECT NO.: GQ1341 TASK NO.: 04.1

MATERIAL TYPE: #78 Stone - Filter Material

DATE: 30 day July month 2002 year

SAMPLE NO.: FM02-9 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right)$ = 1.56233 $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right)$ = 0.96



ATTERBERG LIMITS

(LL) .....

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SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	—
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	68.8
3/8-in.	34.3
NO. 4	2.6
NO. ~~10~~ 8	1.4
NO. ~~20~~ 16	1.3
NO. ~~40~~ 30	1.2
NO. ~~80~~ 50	1.2
NO. 100	1.0
NO. 200	0.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

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SHEET NO. ____ OF ____

000121

4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-9	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	26	5650	22.0	220.10	
2.	26	5650	22.0	218.82	*
3.	25	5650	22.0	222.70	*
4.	26	5650	22.0	219.16	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	11646.0
APPARATUS WEIGHT (g):	4385.0
WET SAMPLE WEIGHT (g):	7261.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in²):	28.27
SAMPLE AREA (cm²):	182.41
SAMPLE VOLUME (in³):	282.74
SAMPLE VOLUME (ft³):	0.164
WET DENSITY IN (pcf):	97.8
DRY DENSITY IN (pcf):	97.8

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	220.23
AVERAGE TEMP (°C):	22.0
TEMPERATURE CORRECTION:	0.953
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 3.5E+00 cm/sec

000122

TECH	JH
DATE	7/24/02
CHECK	BES
REVIEW	[illegible]

4941

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: _____ TASK NO.: _____

DESCRIPTION: PHASE IV DATE: 13 day JUL month 02 year

MATERIAL TYPE: 78 STONE SAMPLE NO.: FM-02-10

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		X	X
WT. OF DRY SAMPLE PLUS TARE	(grams)	14 JUL 02 ~~6391~~ 6391.2	6286.9
WT. OF TARE	(grams)	939.1	939.1
WT. OF DRY SAMPLE	(grams)	5452.1	5347.8

SIEVE ANALYSIS

QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	0	0	100	100
1 1/2"	37.50	0	0	100	100
1"	25.00	0	0	100	100
3/4"	19.00	0	0	100	100
1/2"	12.50	311.9	5.7	94.3	85-100
3/8"	9.50	1278.0	23.4	76.6	40-75
#4	4.75	4738.1	86.9	13.1	5-25
#8	2.36	5263.7	96.5	3.5	0-10
#16	1.18	5308.5	97.4	~~3~~ 2.6	0-5
#30	0.60	5317.2	97.5	2.5	0-5
#50	0.30	5321.4	97.6	2.4	0-5
#100	0.15	5329.6	97.8	2.2	0-5
#200	0.075	5342.8	98.0	2.0	0-2
PAN	—	5344.1	—	—	—

000123

%FINER = 100 − Σ% RETAINED

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SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase II

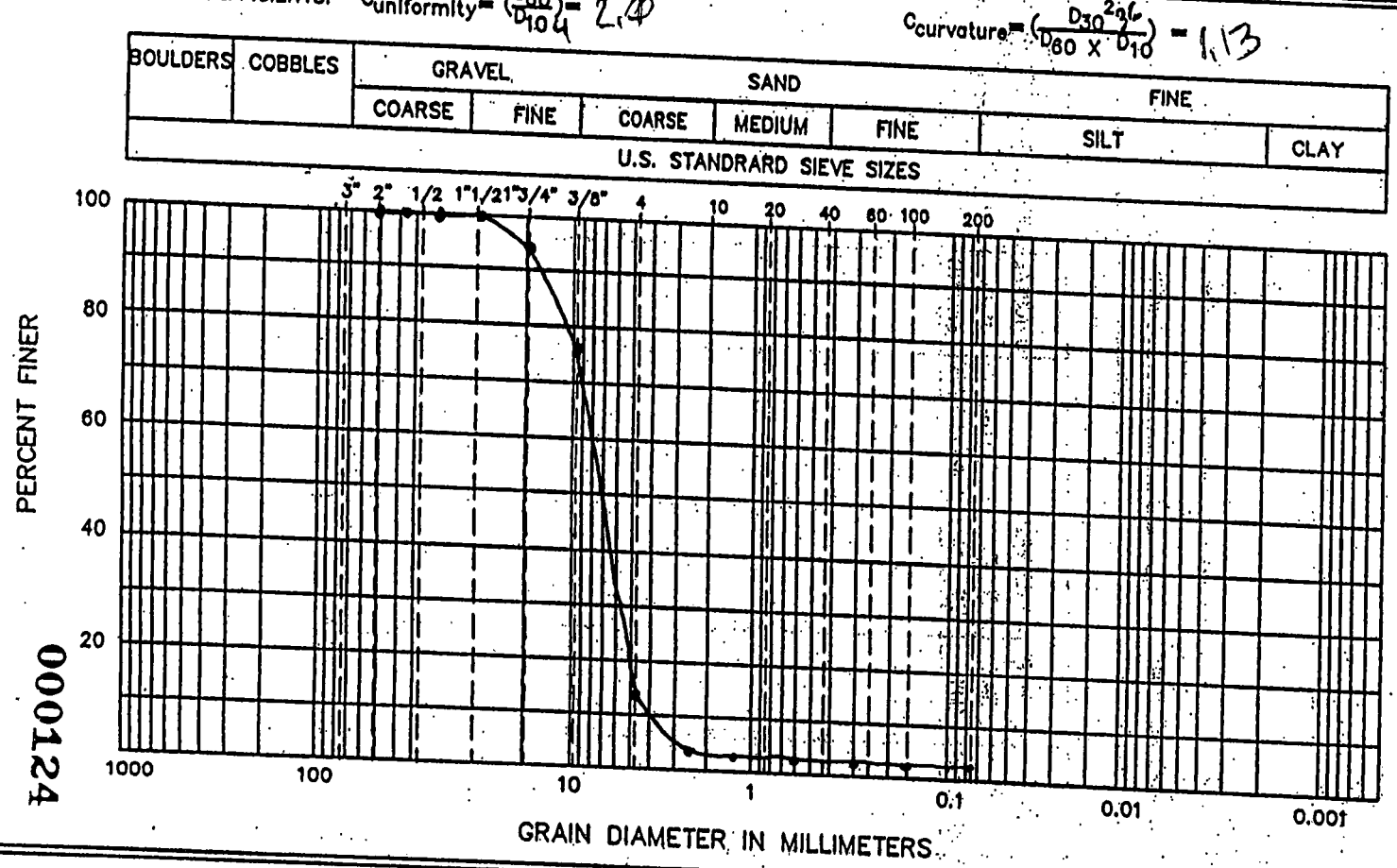
PROJECT NO.: GQ1341 TASK NO.: 04.1

MATERIAL TYPE: #78 Stone - Filter Material

DATE: 30 day July month 2002 year

SAMPLE NO.: FM02-10 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = 2.0$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = 1.13$



ATTERBERG LIMITS

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SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	—
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	94.3
3/8-in.	76.6
NO. 4	13.1
NO. ~~10~~ 8	3.5
NO. ~~20~~ 16	2.6
NO. ~~40~~ 30	2.5
NO. ~~80~~ 50	2.4
NO. 100	2.2
NO. 200	2.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

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CHECKED BY:

SHEET NO. ____ OF ____

0001124

404

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-10	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	29	5650	22.0	192.31	
2.	30	5650	22.0	189.53	*
3.	29	5650	22.0	192.77	*
4.	29	5650	22.0	192.11	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	11955.0
APPARATUS WEIGHT (g):	4333.0
WET SAMPLE WEIGHT (g):	7622.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in²):	28.27
SAMPLE AREA (cm²):	182.41
SAMPLE VOLUME (in³):	282.74
SAMPLE VOLUME (ft³):	0.164
WET DENSITY IN (pcf):	102.7
DRY DENSITY IN (pcf):	102.7

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	191.47
AVERAGE TEMP (°C):	22.0
TEMPERATURE CORRECTION:	0.953
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 3.0E+00 cm/sec

000125

TECH	JH
DATE	7/24/02
CHECK	
REVIEW	

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

4941

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase DATE: 18 day July month 2002 year

MATERIAL TYPE: 78 STONE SAMPLE NO.: FM 02-11

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		12.50 BEFORE WASH	AFTER WASH
TARE NO.		X	X
WT. OF DRY SAMPLE PLUS TARE	(grams)	5706.3	5677.1
WT. OF TARE	(grams)	939.1	939.1
WT. OF DRY SAMPLE	(grams)	4767.2	4738.0

SIEVE ANALYSIS

QA ID: DJE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø	100	100
1 1/2"	37.50	Ø	Ø	100	100
1"	25.00	Ø	Ø	100	100
3/4"	19.00	Ø	Ø	100	100
1/2"	12.50	418.6	8.8	91.2	85 To 100
3/8"	9.50	1491.6	31.3	68.7	40 To 75
#4	4.75	4418.0	92.7	7.3	5 To 25
#8	2.36	4669.2	97.9	2.1	0 To 10
#16	1.18	4719.5	99.0	1.0	0 To 5
#30	0.60	4732.4	99.3	0.7	0 To 5
#50	0.30	4735.0	99.3	0.7	0 To 5
#100	0.15	4736.9	99.4	0.6	0 To 5
#200	0.075	4737.9	99.4	0.6	0 To 2
PAN					

000126

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase II

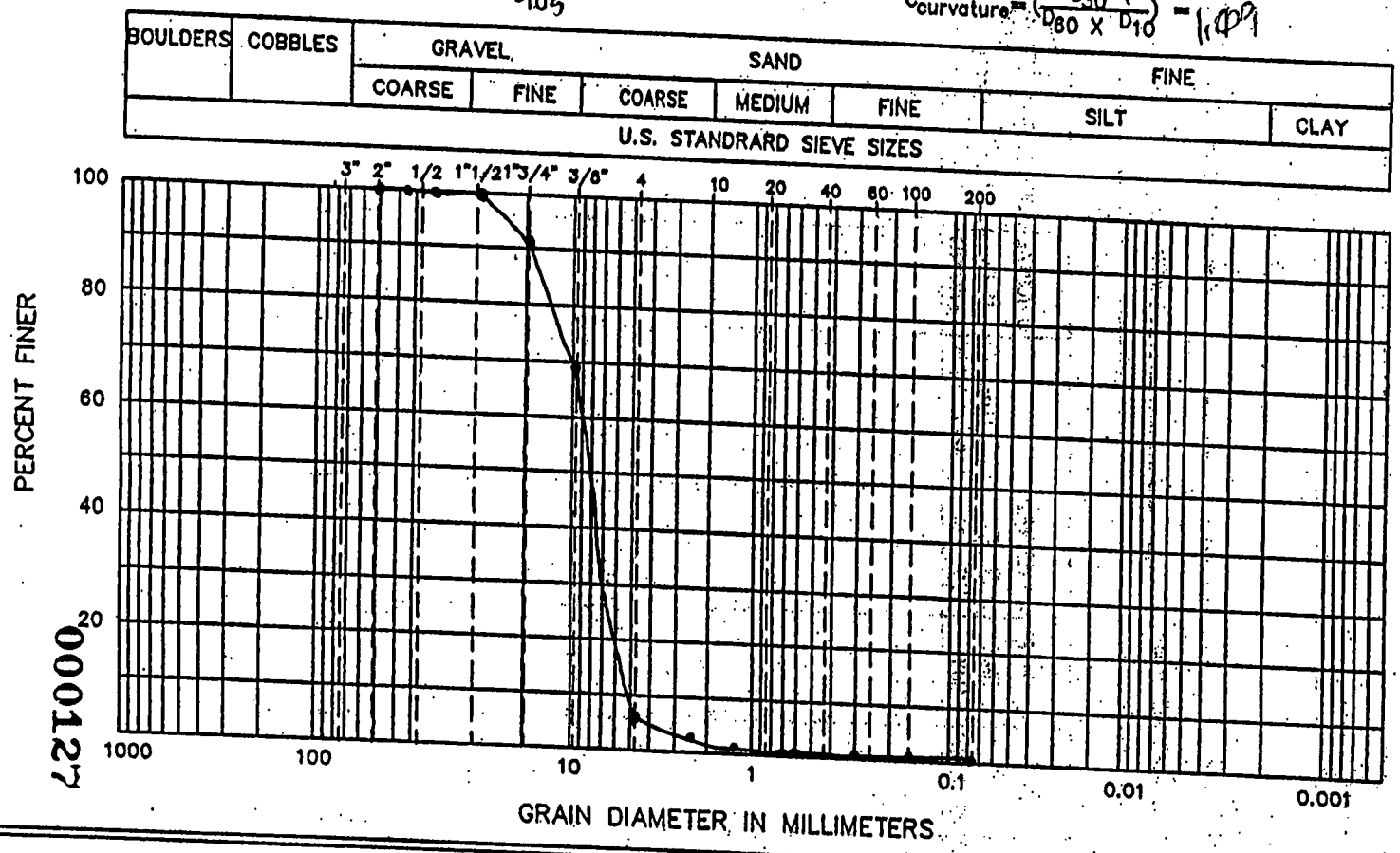
MATERIAL TYPE: #78 Stone - Filter Material

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 30 day July month 2002 year

SAMPLE NO.: FM02-11 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = 1.8$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = 1.09$



ATTERBERG LIMITS

(LL) .....

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SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	—
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	91.2
3/8-in.	68.7
NO. 4	7.3
NO. ~~10~~ 8	2.1
NO. ~~20~~ 16	1.0
NO. ~~40~~ 30	0.7
NO. ~~80~~ 50	0.7
NO. 100	0.6
NO. 200	0.6

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

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SHEET NO. ____ OF ____

0001127

4041

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-11 -
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag
REMARKS	-	SAMPLE DEPTH	-

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	49	5650	22.5	192.31	
2.	49	5650	22.5	189.53	*
3.	51	5650	22.5	192.77	*
4.	50	5650	22.5	192.11	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	12245.0
APPARATUS WEIGHT (g):	4451.0
WET SAMPLE WEIGHT (g):	7622.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in^2):	28.27
SAMPLE AREA (cm^2):	182.41
SAMPLE VOLUME (in^3):	282.74
SAMPLE VOLUME (ft^3):	0.164
WET DENSITY IN (pcf):	102.7
DRY DENSITY IN (pcf):	102.7

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	191.47
AVERAGE TEMP (°C):	22.0
TEMPERATURE CORRECTION:	0.953
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 3.0E+00 cm/sec

000128

TECH	JH
DATE	8/9/02
CHECK	[illegible]
REVIEW	[illegible]

4941

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 601341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 25 day July month 2002 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: FM02-12

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		14.10 BEFORE WASH	13.85 AFTER WASH
TARE NO.		X	X
WT. OF DRY SAMPLE PLUS TARE	(grams)	6395.8	6282.4
WT. OF TARE	(grams)	939.1	939.1
WT. OF DRY SAMPLE	(grams)	5456.7	5343.3

SIEVE ANALYSIS

QA ID: DIF

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø	100	100
1½"	37.50	Ø	Ø	100	↕
1"	25.00	Ø	Ø	100	↓
¾"	19.00	Ø	Ø	100	100
½"	12.50	673.5	12.3	87.7	85 To 100
⅜"	9.50	1942.4	35.6	64.4	40 To 75
#4	4.75	4904.5	89.9	10.1	5 To 25
#8	2.36	5254.7	96.3	3.7	0 To 10
#16	1.18	5299.4	97.1	2.9	0 To 5
#30	0.60	5312.6	97.4	2.6	0 To 5
#50	0.30	5318.3	97.5	2.5	0 To 5
#100	0.15	5322.8	97.5	2.5	0 To 5
#200	0.075	5338.9	97.8	2.2	0 To 2
PAN		5339.7	97.9		

000129

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

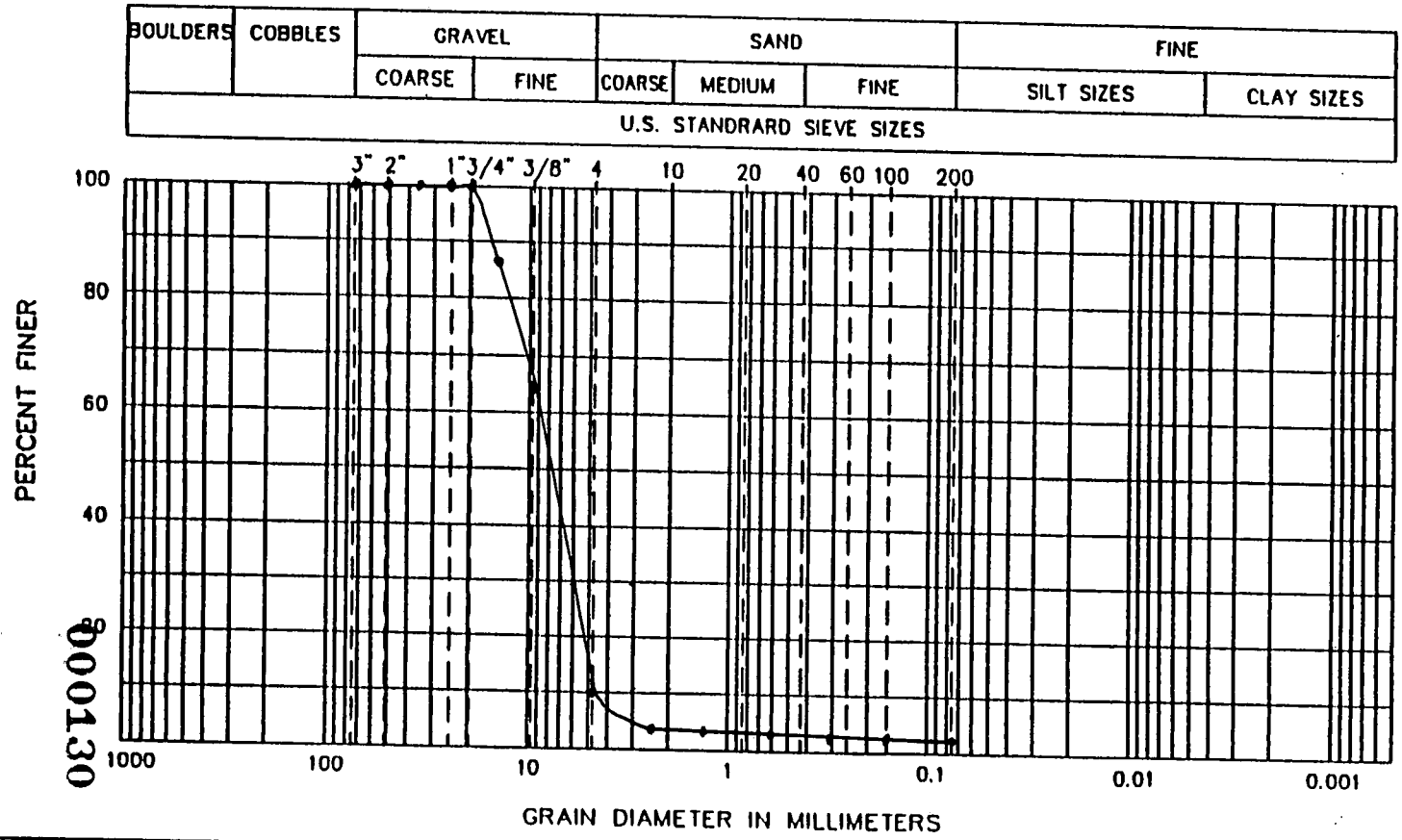
MATERIAL TYPE: ~~Low Perm~~ #78 Stone C/KS Filter Material

PROJECT NO. GQ1341 TASK NO.: 04.1

DATE: 5 day Nov month 2002 year

SAMPLE NO.: FM02-12 QA ID: KS

CURVE COEFFICIENTS: (C_u) 9/5 = 1.8 (C_c) 36/45 = 0.8



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	87.7
3/8-in.	64.4
NO. 4	10.1
NO. 8	3.7
NO. 16	2.9
NO. 30	2.6
NO. 50	2.5
NO. 100	2.5
NO. 200	2.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

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CHECKED BY:

SHEET NO. ____ OF ____

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4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-12	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	36	5650	22.5	114.65	
2.	37	5650	22.5	114.35	*
3.	36	5650	22.5	111.20	*
4.	36	5650	22.5	112.13	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	12096.0
APPARATUS WEIGHT (g):	4509.0
WET SAMPLE WEIGHT (g):	7794.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in²):	28.27
SAMPLE AREA (cm²):	182.41
SAMPLE VOLUME (in³):	282.74
SAMPLE VOLUME (ft³):	0.164
WET DENSITY IN (pcf):	105.0
DRY DENSITY IN (pcf):	105.0

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	112.56
AVERAGE TEMP (°C):	22.5
TEMPERATURE CORRECTION:	0.942
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 1.8E+00 cm/sec

000131

TECH	JH
DATE	8/9/02
CHECK	BS
REVIEW	PWM

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase DATE: 05 day Aug month 2002 year

MATERIAL TYPE: 78 STONE SAMPLE NO.: JFM02-13

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	13.54 BEFORE WASH	AFTER WASH
TARE NO.	X	X
WT. OF DRY SAMPLE PLUS TARE (grams)	6141.7	6114.5
WT. OF TARE (grams)	939.1	939.1
WT. OF DRY SAMPLE (grams)	5202.6	5175.4

SIEVE ANALYSIS

QA ID: PLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø	100	100
1½"	37.50	Ø	Ø	100	100
1"	25.00	Ø	Ø	100	100
3/4"	19.00	Ø	Ø	100	100
1/2"	12.50	780.2	15.0	85.0	85 To 100
3/8"	9.50	1939.3	37.3	62.7	40 To 75
#4	4.75	4812.5	92.5	7.5	5 To 25
#8	2.36	5100.0	98.0	2.0	0 To 10
#16	1.18	5118.1	98.4	1.6	0 To 5
#30	0.60	5120.0	98.4	1.6	0 To 5
#50	0.30	5120.8	98.4	1.6	0 To 5
#100	0.15	5122.1	98.5	1.5	0 To 5
#200	0.075	5124.6	98.5	1.5	0 To 2
PAN		5125.1			

000132

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

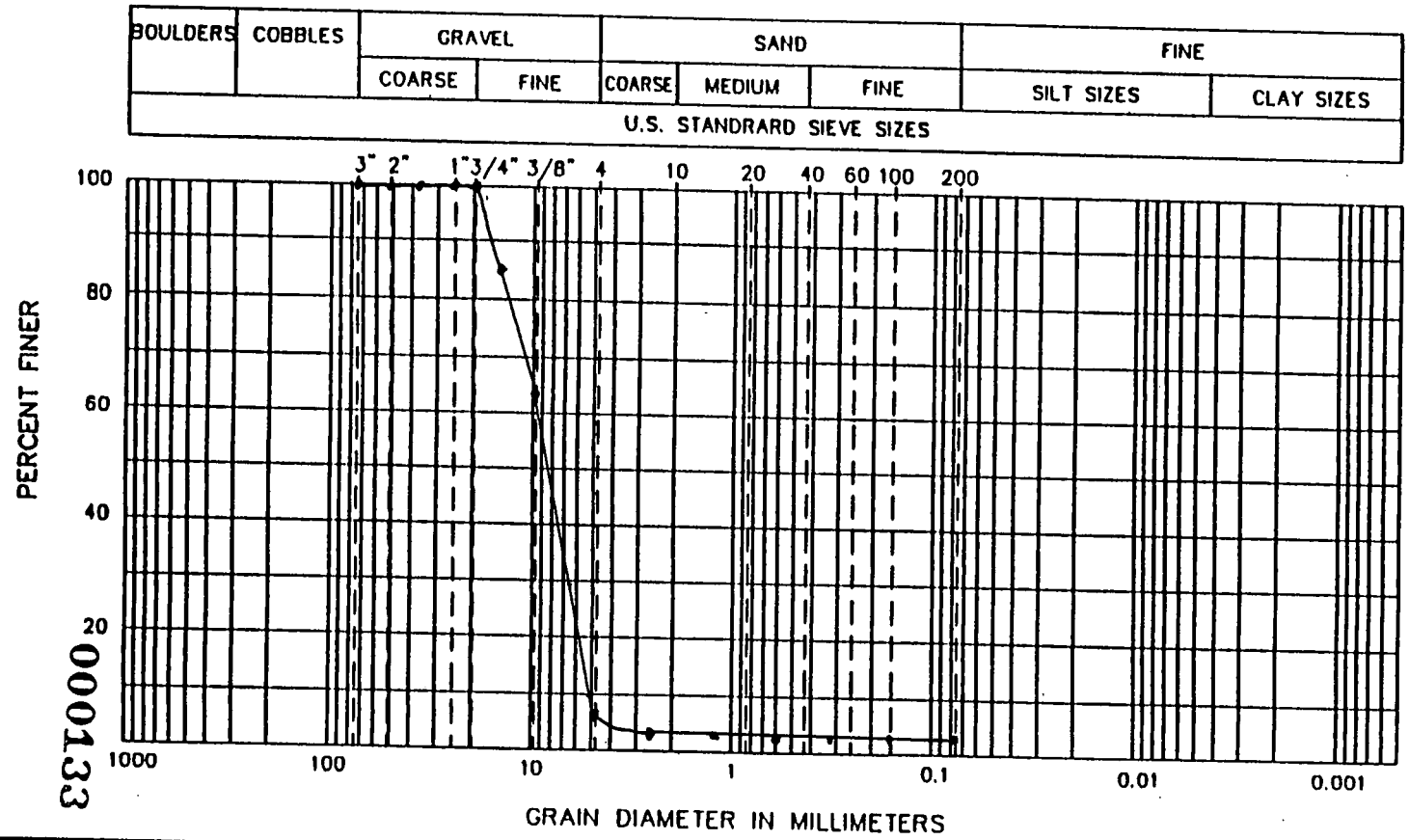
MATERIAL TYPE: 78 Stone-Filter Material

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 5 day Nov month 2000 year

SAMPLE NO.: FM02-13 QA ID: 1CS

CURVE COEFFICIENTS: (C_u) 9/5 = 1.8 (C_c) 49/45 = 1.09



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	85.0
3/8-in.	62.7
NO. 4	7.5
NO. 8	2.0
NO. 16	1.6
NO. 30	1.6
NO. 50	1.6
NO. 100	1.5
NO. 200	1.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

©GEOSYNTEC CONSULTANTS FILE NO. 2-18-PSD

CHECKED BY: _____

SHEET NO. _____ OF _____

0001133

4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-13	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	32	5650	22.0	174.60	
2.	32	5650	22.0	174.33	*
3.	32	5650	22.0	174.01	*
4.	32	5650	22.0	174.17	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	11878.0
APPARATUS WEIGHT (g):	4485.0
WET SAMPLE WEIGHT (g):	7393.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in^2):	28.27
SAMPLE AREA (cm^2):	182.41
SAMPLE VOLUME (in^3):	282.74
SAMPLE VOLUME (ft^3):	0.164
WET DENSITY IN (pcf):	99.6
DRY DENSITY IN (pcf):	99.6

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	174.17
AVERAGE TEMP (°C):	22.0
TEMPERATURE CORRECTION:	0.953
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 2.8E+00 cm/sec

000134

TECH	JH
DATE	8/9/02
CHECK	BS
REVIEW	PWM

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136) 989

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 601341 TASK NO.: 041

DESCRIPTION: Phase DATE: 15 day Aug month 2002 year

MATERIAL TYPE: 78 STONE SAMPLE NO.: FM02-14

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	15.07 BEFORE WASH	14.93 AFTER WASH
TARE NO.	X	X
WT. OF DRY SAMPLE PLUS TARE (grams)	6835.8	6772.2
WT. OF TARE (grams)	939.1	939.1
WT. OF DRY SAMPLE (grams)	5896.7	5833.1

SIEVE ANALYSIS

QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø	100	100
1 1/2"	37.50	Ø	Ø	100	100
1"	25.00	Ø	Ø	100	100
3/4"	19.00	Ø	Ø	100	100
1/2"	12.50	630.8	10.7	89.3	85 To 100
3/8"	9.50	1965.9	33.3	66.7	40 To 75
#4	4.75	5242.9	88.9	11.1	5 To 25
#8	2.36	5758.9	97.7	2.3	0 To 10
#16	1.18	5809.2	98.5	1.5	0 To 5
#30	0.60	5820.4	98.7	1.3	0 To 5
#50	0.30	5825.1	98.8	1.2	0 To 5
#100	0.15	5830.2	98.9	1.1	0 To 5
#200	0.075	5830.9	98.9	1.1	0 To 2
PAN		5832.8			

000135

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: 04.1

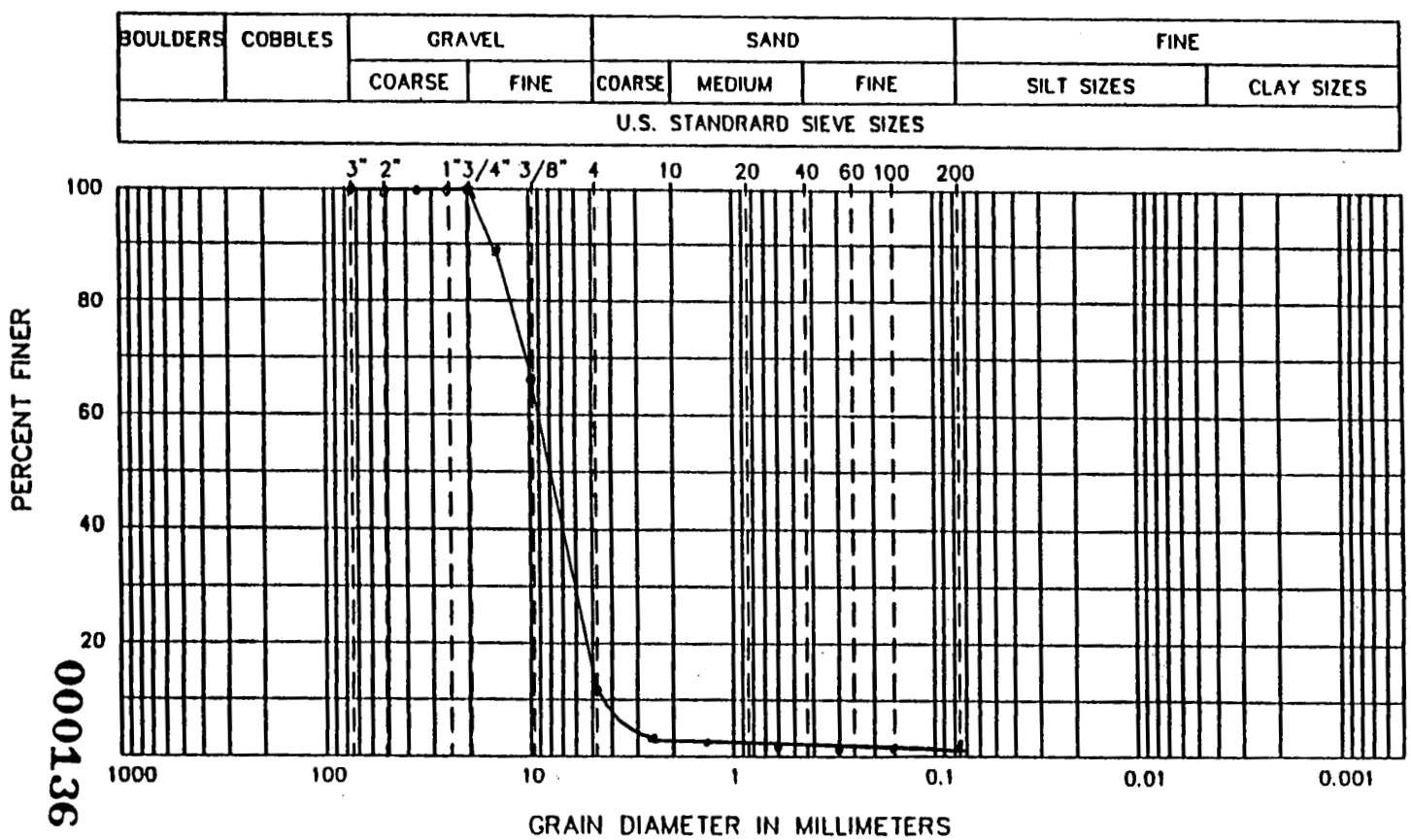
DESCRIPTION: Phase IV

DATE: 5 day Nov month 2002 year

MATERIAL TYPE: 78 Stone - Filter Material

SAMPLE NO.: FM02-14 QA ID: KS

CURVE COEFFICIENTS: (C_u) 9/4 = 2.25 (C_c) 36/36 = 1.0



ATTERBERG LIMITS

(LL) .....

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SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	89.3
3/8-in.	66.7
NO. 4	11.1
NO. 8	2.3
NO. 16	1.5
NO. 30	1.3
NO. 50	1.2
NO. 100	1.1
NO. 200	1.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD CHECKED BY: _____ SHEET NO. ____ OF ____

000136

4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-14 -
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag
REMARKS	-	SAMPLE DEPTH	-

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	47	5650	22.0	120.32	
2.	47	5650	22.0	119.83	*
3.	48	5650	22.0	118.13	*
4.	48	5650	22.0	118.75	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	12169.0
APPARATUS WEIGHT (g):	4500.0
WET SAMPLE WEIGHT (g):	7669.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in²):	28.27
SAMPLE AREA (cm²):	182.41
SAMPLE VOLUME (in³):	282.74
SAMPLE VOLUME (ft³):	0.164
WET DENSITY IN (pcf):	103.3
DRY DENSITY IN (pcf):	103.3

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	118.90
AVERAGE TEMP (°C):	22.0
TEMPERATURE CORRECTION:	0.953
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 1.9E+00 cm/sec

000137

TECH	JH
DATE	8/9/02
CHECK	[illegible]
REVIEW	PWM

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 60134 TASK NO.: 041

DESCRIPTION: Phase DATE: ____ day ____ month 2002 year

MATERIAL TYPE: 78 STONE SAMPLE NO.: FM02-15

SOIL SAMPLE SIZE 6309.576 + 48.880 = 6358.456

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams) 5419.5	SAND	FINE GRAIN
	115	65

48.9/9mm 14.26 = 6468.3

	BEFORE WASH	AFTER WASH
TARE NO.	X	X
WT. OF DRY SAMPLE PLUS TARE (grams)	6468.3	6358.4
WT. OF TARE (grams)	939.0	939.0
WT. OF DRY SAMPLE (grams)	5529.3	5419.4

SIEVE ANALYSIS

QA ID: ____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø	100	100
1 1/2"	37.50	Ø	Ø	100	100
1"	25.00	Ø	Ø	100	100
3/4"	19.00	Ø	Ø	100	100
1/2"	12.50	800.3	14.5	85.5	85 To 100
3/8"	9.50	1913.8	34.6	65.4	40 To 75
#4	4.75	4794.8	86.7	13.3	5 To 25
#8	2.36	5342.6	96.6	3.4	0 To 10
#16	1.18	5403.8	97.7	2.3	0 To 5
#30	0.60	5417.1	98.0	2.0	0 To 5
#50	0.30	5417.3	98.0	2.0	0 To 5
#100	0.15	5419.3	98.0	2.0	0 To 5
#200	0.075	5419.4	98.0	2.0	0 To 2
PAN					

000138

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

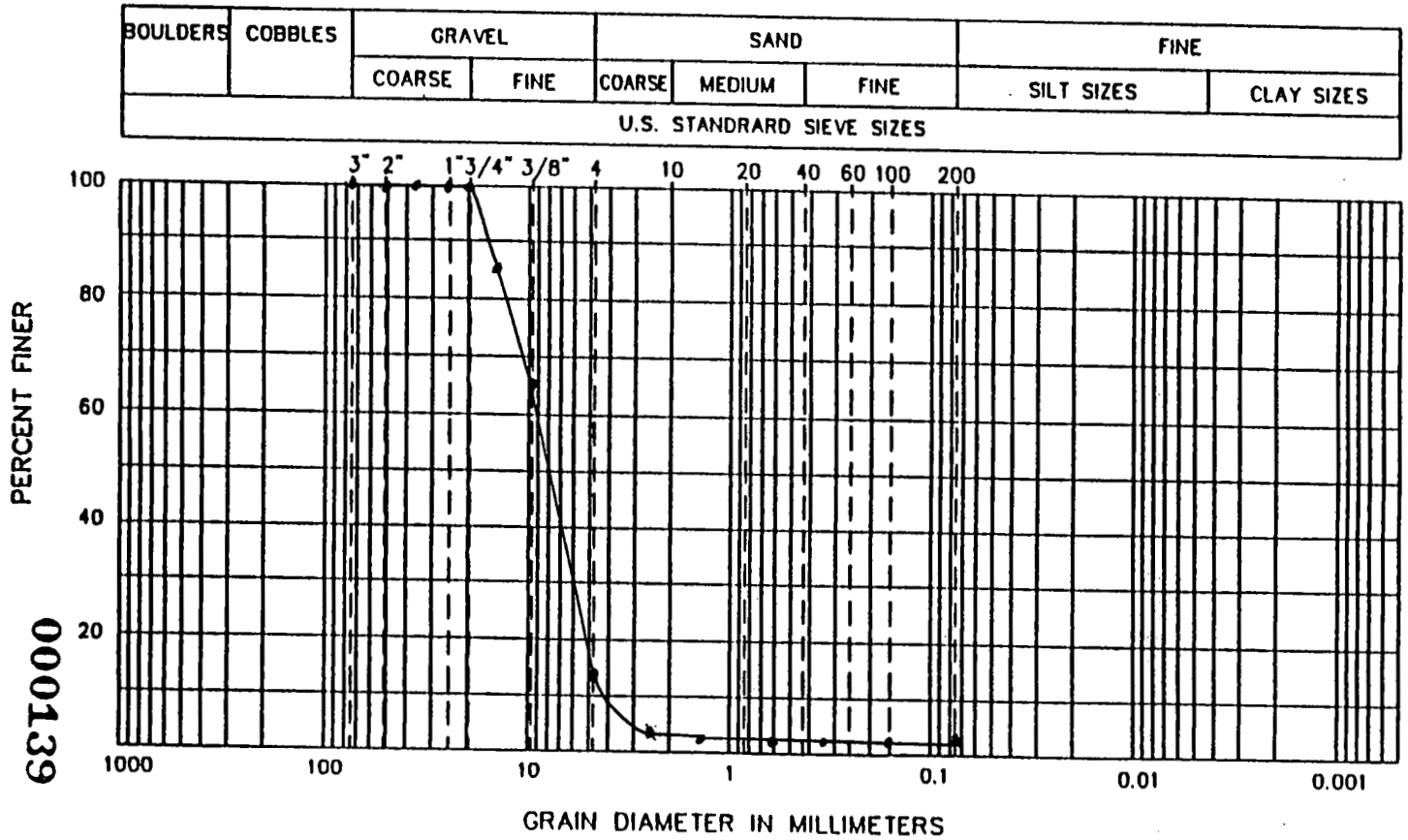
MATERIAL TYPE: 78 Stone-filter Material

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 5 day Nov month 2002 year

SAMPLE NO.: FM02-15 QA ID: KS

CURVE COEFFICIENTS: (C_u) 9/4 = 2.25 (C_c) 36/36 = 1.0



ATTERBERG LIMITS

(LL) .....

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SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	85.5
3/8-in.	65.4
NO. 4	13.3
NO. 8	3.4
NO. 16	2.3
NO. 30	2.0
NO. 50	2.0
NO. 100	2.0
NO. 200	2.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. _____ OF _____

000139

4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

4941

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-15	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	34	5650	22.0	167.95	
2.	34	5650	22.0	168.56	•
3.	34	5650	22.0	167.26	•
4.	34	5650	22.0	168.31	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	12224.0
APPARATUS WEIGHT (g):	4446.0
WET SAMPLE WEIGHT (g):	7778.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in²):	28.27
SAMPLE AREA (cm²):	182.41
SAMPLE VOLUME (in³):	282.74
SAMPLE VOLUME (ft³):	0.164
WET DENSITY IN (pcf):	104.8
DRY DENSITY IN (pcf):	104.8

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	168.04
AVERAGE TEMP (°C):	22.0
TEMPERATURE CORRECTION:	0.953
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 2.7E+00 cm/sec

000140

TECH	TJ
DATE	8/22/02
CHECK	[illegible]
REVIEW	[illegible]

4941

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 601341 TASK NO.: 04.1

DESCRIPTION: Phase DATE: 20 day July month 2002 year

MATERIAL TYPE: 78 STONE SAMPLE NO.: FMO 2-16

SOIL SAMPLE SIZE 14.68 LBs = 6658.8 − 1040.6 Tares in oven

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	5618.2 (grams)	SAND	FINE GRAIN
		115	65

	14.59 BEFORE WASH	AFTER WASH
TARE NO.	X	X
WT. OF DRY SAMPLE PLUS TARE (grams)	6618.0	6557.2
WT. OF TARE (grams)	939.0	939.0
WT. OF DRY SAMPLE (grams)	5679.0	5618.2

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	0	0	100	100
1 1/2"	37.50	0	0	100	100
1"	25.00	0	0	100	100
3/4"	19.00	0	0	100	100
1/2"	12.50	800.1	14.0	85.9	85 To 100
3/8"	9.50	1553.9	27.4	72.6	40 To 75
#4	4.75	4749.7	83.6	16.4	5 To 25
#8	2.36	5496.2	96.8	3.2	0 To 10
#16	1.18	5583.3	98.3	1.7	0 To 5
#30	0.60	5601.3	98.6	1.4	0 To 5
#50	0.30	5606.8	98.7	1.3	0 To 5
#100	0.15	5611.6	98.8	1.2	0 To 5
#200	0.075	5616.3	98.9	1.1	0 To 2
PAN		5617.3			

000141

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

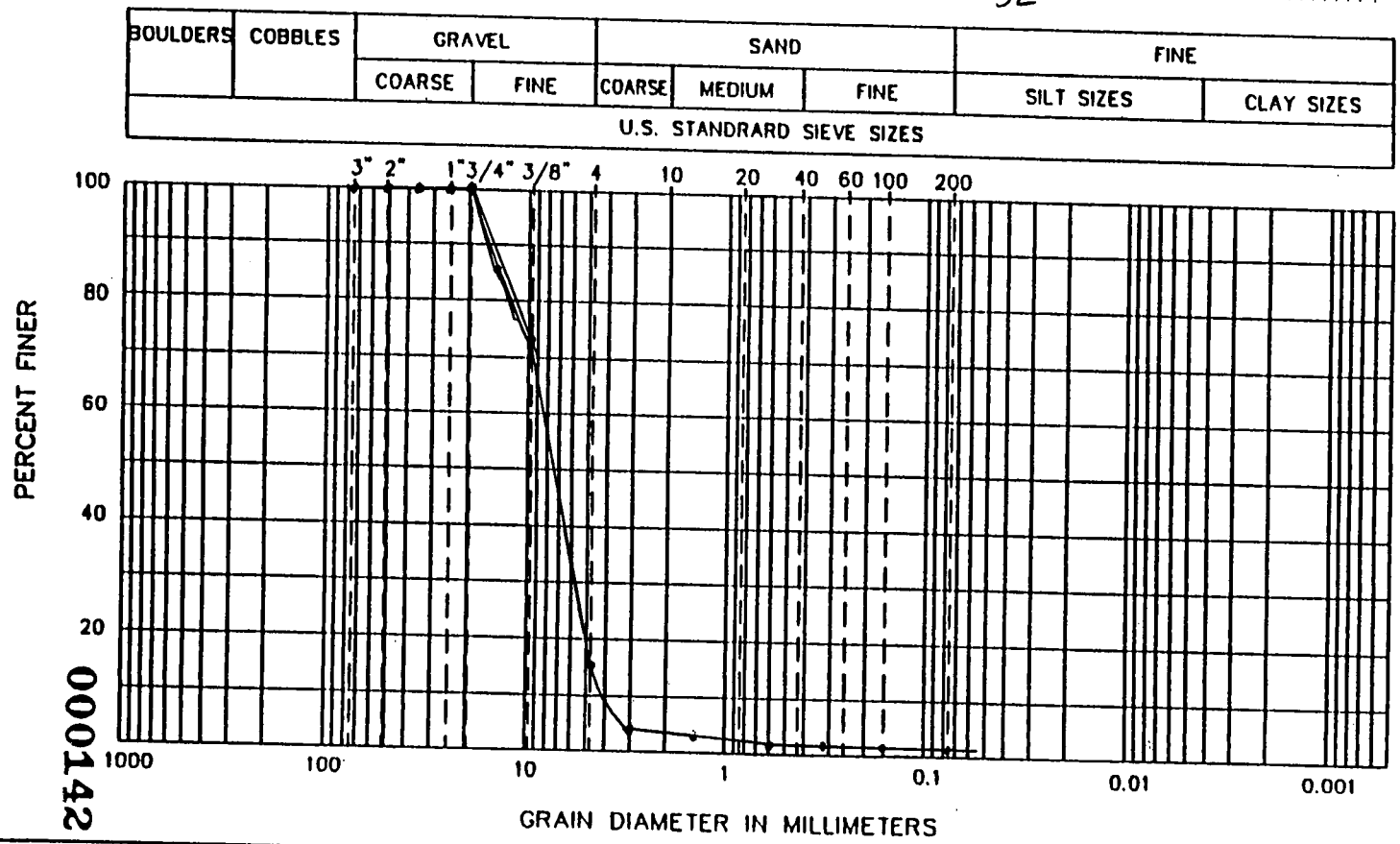
MATERIAL TYPE: 78 Stone-Filter Material

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 5 day Nov month 2000 year

SAMPLE NO.: FM02-16 QA ID: KS

CURVE COEFFICIENTS: (C_u) 8/4 = 2.0 (C_c) 36/32 = 1.13



ATTERBERG LIMITS

(LL) .....

(PL) .....

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SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	85.9
3/8-in.	72.6
NO. 4	16.4
NO. 8	3.2
NO. 16	1.7
NO. 30	1.4
NO. 50	1.3
NO. 100	1.2
NO. 200	1.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

0001142

4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

4941

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-16	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	55	5650	21.5	167.95	
2.	55	5650	21.5	168.56	*
3.	55	5650	21.5	167.26	*
4.	54	5650	21.5	168.31	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	12170.0
APPARATUS WEIGHT (g):	4510.0
WET SAMPLE WEIGHT (g):	7778.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in²):	28.27
SAMPLE AREA (cm²):	182.41
SAMPLE VOLUME (in³):	282.74
SAMPLE VOLUME (ft³):	0.164
WET DENSITY IN (pcf):	104.8
DRY DENSITY IN (pcf):	104.8

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	168.04
AVERAGE TEMP (°C):	22.0
TEMPERATURE CORRECTION:	0.953
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 2.7E+00 cm/sec

000143

TECH	TJ
DATE	9/4/02
CHECK	[illegible]
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 601341 TASK NO.: 04.1

DESCRIPTION: Phase DATE: 26 day Aug month 2002 year

MATERIAL TYPE: 78 STONE SAMPLE NO.: JFM02-17

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	BEFORE WASH	AFTER WASH
TARE NO.	X	XIV
WT. OF DRY SAMPLE PLUS TARE (grams)	6867.5	6887.5
WT. OF TARE (grams)	939.0	1071.2
WT. OF DRY SAMPLE (grams)	5928.5	5816.3

SIEVE ANALYSIS

QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø	100	100
1½"	37.50	Ø	Ø	100	100
1"	25.00	Ø	Ø	100	100
¾"	19.00	Ø	Ø	100	100
½"	12.50	352.7	5.9	94.1	85 To 100
⅜"	9.50	1280.5	21.6	78.4	40 To 75
#4	4.75	4846.7	81.8	18.2	5 To 25
#8	2.36	5732.7	96.7	3.3	0 To 10
#16	1.18	5800.3	97.8	2.2	0 To 5
#30	0.60	5812.2	98.0	2.0	0 To 5
#50	0.30	5814.8	98.1	1.9	0 To 5
#100	0.15	5815.2	98.1	1.9	0 To 5
#200	0.075	5816.8	98.1	1.9	0 To 2
PAN					

000144

%FINER = 100 − Σ% RETAINED

©GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

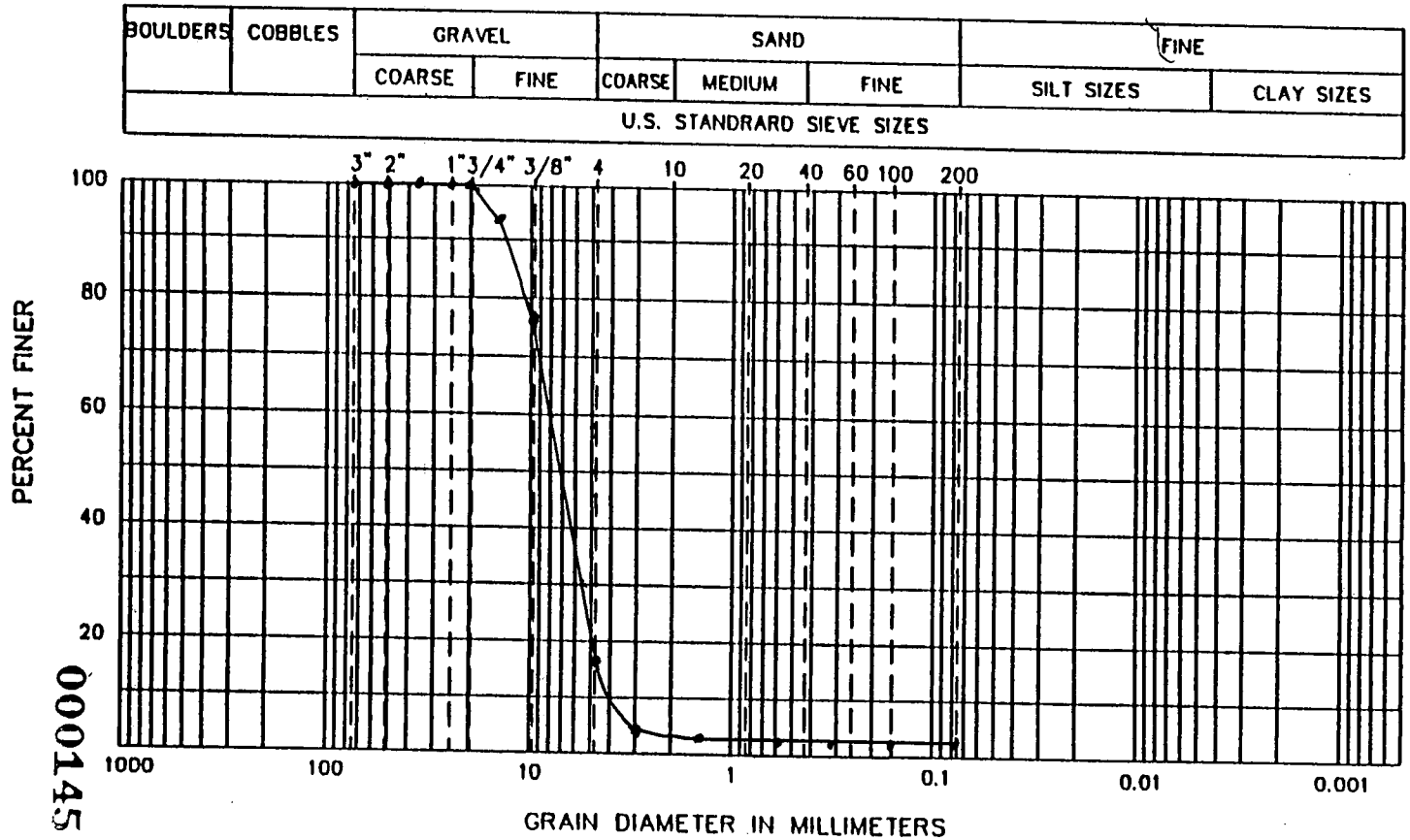
MATERIAL TYPE: 78 Stone - Filter Material

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 5 day Nov month 2002 year

SAMPLE NO.: FM02-17 QA ID: KS

CURVE COEFFICIENTS: (C_u) 8/4 = 2.0 (C_c) 36/32 = 1.13



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	94.1
3/8-in.	78.4
NO. 4	18.2
NO. 8	3.3
NO. 16	2.2
NO. 30	2.0
NO. 50	1.9
NO. 100	1.9
NO. 200	1.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

0001445

4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

4941

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-17	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	37	5650	21.5	154.46	
2.	37	5650	21.5	154.63	*
3.	37	5650	21.5	154.25	*
4.	37	5650	21.5	153.28	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	12176.0
APPARATUS WEIGHT (g):	4514.0
WET SAMPLE WEIGHT (g):	7662.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in²):	28.27
SAMPLE AREA (cm²):	182.41
SAMPLE VOLUME (in³):	282.74
SAMPLE VOLUME (ft³):	0.164
WET DENSITY IN (pcf):	103.2
DRY DENSITY IN (pcf):	103.2

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	154.05
AVERAGE TEMP (°C):	21.5
TEMPERATURE CORRECTION:	0.965
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 2.5E+00 cm/sec

000146

TECH	TJ
DATE	9/4/02
CHECK	BS
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase DATE: 03 day Sept month 2002 year

MATERIAL TYPE: 78 STONE SAMPLE NO.: FM02-18

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	17.42 Dirty BEFORE WASH	17.70 - Clean AFTER WASH
TARE NO.	X	XV
WT. OF DRY SAMPLE PLUS TARE (grams)	7904.9	8028.70
WT. OF TARE (grams)	939.0	1065.30
WT. OF DRY SAMPLE (grams)	6965.9	6963.4

SIEVE ANALYSIS

QA ID: [illegible]

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø	100	100
1 1/2"	37.50	Ø	Ø	100	100
1"	25.00	Ø	Ø	100	100
3/4"	19.00	Ø	Ø	100	100
1/2"	12.50	806.7	11.6	88.4	85 To 100
3/8"	9.50	3013.8	43.3	56.7	40 To 75
#4	4.75	6631.3	95.2	4.8	5 To 25
#8	2.36	6920.7	99.4	Ø.6	0 To 10
#16	1.18	6957.Ø	99.9	Ø.1	0 To 5
#30	0.60	6960.9	99.9	Ø.1	0 To 5
#50	0.30	6961.5	99.9	Ø.1	0 To 5
#100	0.15	6961.8	99.9	Ø.1	0 To 5
#200	0.075	6962.8	99.9	Ø.1	0 To 2
PAN		6963.1			

000147

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: 04.1

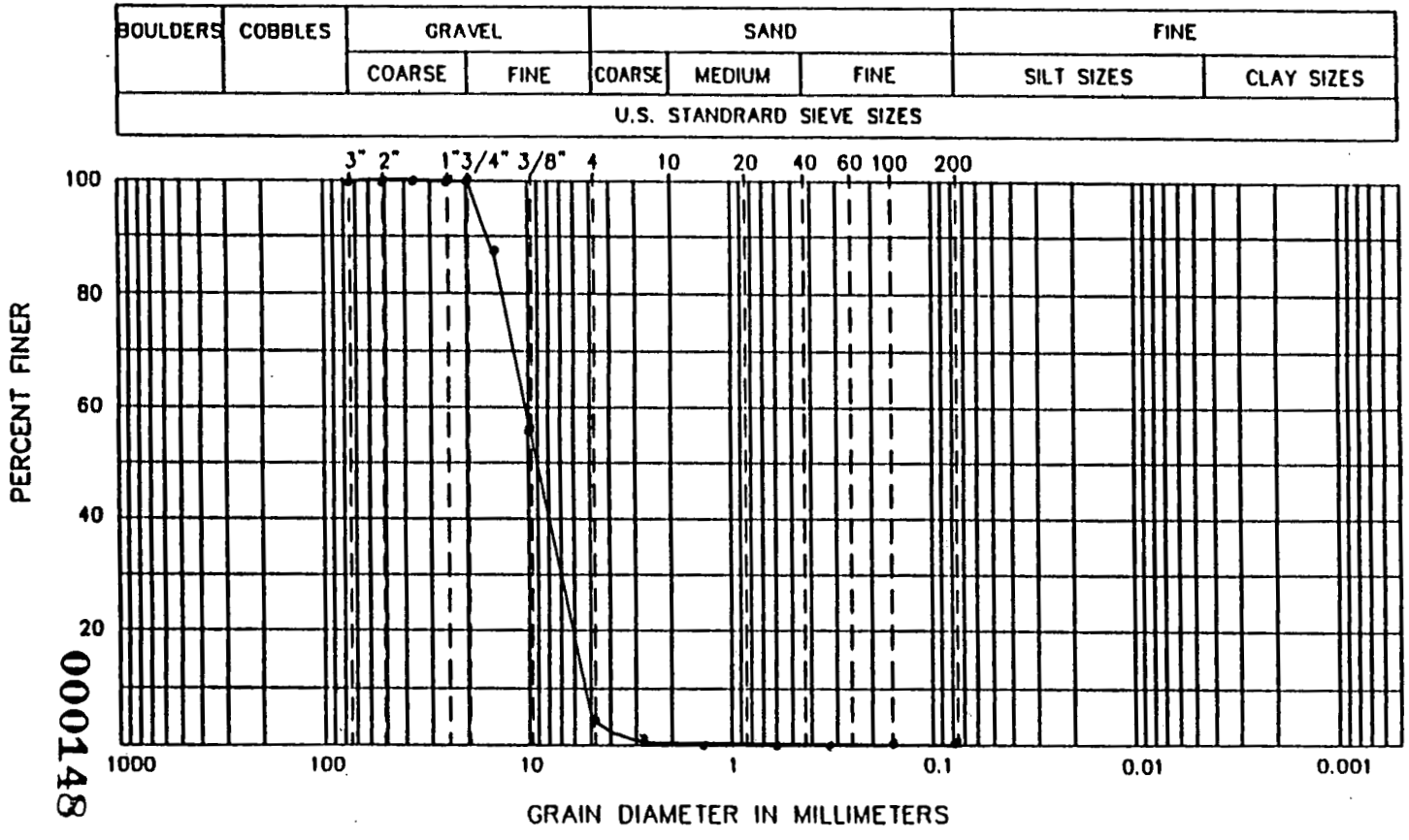
DESCRIPTION: Phase IV

DATE: 5 day Nov month 2002 year

MATERIAL TYPE: 78 Stone - Filter Material

SAMPLE NO.: FM02-18 QA ID: KS

CURVE COEFFICIENTS: (C_u) 10/5 = 2.0 (C_c) 49/50 = 0.98



ATTERBERG LIMITS

(LL) .....

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SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	88.9
3/8-in.	56.7
NO. 4	4.8
NO. 8	0.6
NO. 16	0.1
NO. 30	0.1
NO. 50	0.1
NO. 100	0.1
NO. 200	0.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

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0001148

4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

4941

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-18	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	38	5650	20.5	150.51	
2.	38	5650	20.5	149.95	*
3.	38	5650	20.5	149.55	*
4.	37	5650	20.5	150.91	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	12171.0
APPARATUS WEIGHT (g):	4514.0
WET SAMPLE WEIGHT (g):	7657.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in²):	28.27
SAMPLE AREA (cm²):	182.41
SAMPLE VOLUME (in³):	282.74
SAMPLE VOLUME (ft³):	0.164
WET DENSITY IN (pcf):	103.2
DRY DENSITY IN (pcf):	103.2

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	150.14
AVERAGE TEMP (°C):	20.5
TEMPERATURE CORRECTION:	0.988
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 2.5E+00 cm/sec

000149

TECH	TJ
DATE	9/4/02
CHECK	[illegible]
REVIEW	[illegible]

4941

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 601341 TASK NO.: 04.1

DESCRIPTION: Phase DATE: 01 day Oct month 2002 year

MATERIAL TYPE: 78 STONE SAMPLE NO.: FM-02-19

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
14.2 Lb's = 6472.9 (grams)	115	65

	BEFORE WASH	AFTER WASH
TARE NO.	X Big Pan	X Big Pan
WT. OF DRY SAMPLE PLUS TARE (grams)	6472.9	6355.0
WT. OF TARE (grams)	939.0	939.0
WT. OF DRY SAMPLE (grams)	5533.9	5416.0

SIEVE ANALYSIS

QA ID: [illegible]

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	0	0	100	100
1 1/2"	37.50	0	0	100	100
1"	25.00	0	0	100	100
3/4"	19.00	0	0	100	100
1/2"	12.50	330.6	6.0	94.0	85 To 100
3/8"	9.50	1298.0	23.5	76.5	40 To 75
#4	4.75	4448.6	80.4	19.6	5 To 25
#8	2.36	5202.4	94.1	6.0	0 To 10
#16	1.18	5325.4	96.2	3.8	0 To 5
#30	0.60	5359.3	96.8	3.2	0 To 5
#50	0.30	5373.6	97.2	2.8	0 To 5
#100	0.15	5394.4	97.5	2.5	0 To 5
#200	0.075	5412.6	97.8	2.2	0 To 2
PAN					

000150

%FINER = 100 − Σ% RETAINED

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SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

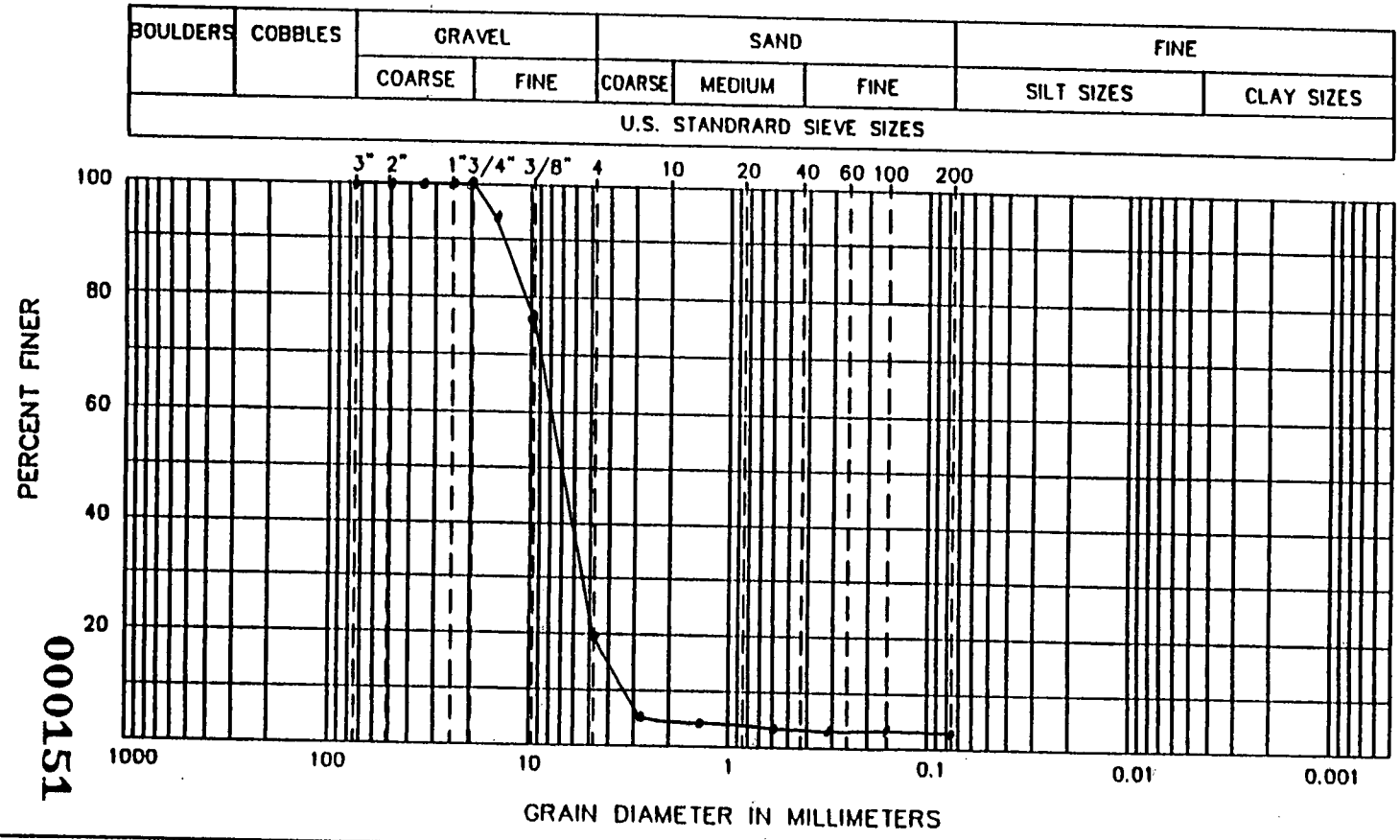
MATERIAL TYPE: 78 Stone - Filter Material

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 5 day Nov month 2002 year

SAMPLE NO.: FM02-19 QA ID: KS

CURVE COEFFICIENTS: (C_u) 8/4 = 2.0 (C_c) 36/32 = 1.13



ATTERBERG LIMITS

(LL) .....

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SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	94.0
3/8-in.	76.5
NO. 4	19.6
NO. 8	6.0
NO. 16	3.8
NO. 30	3.2
NO. 50	2.8
NO. 100	2.5
NO. 200	2.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

©GEOSYNTEC CONSULTANTS FILE NO. 2-18-PSD

CHECKED BY:

SHEET NO. ____ OF ____

0001151

7-4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

4941

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-19	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	20	920	19.0	46.58	*
2.	20	950	19.0	46.77	*
3.	21	990	19.0	46.11	*
4.	21	950	19.0	45.78	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	7865.0
APPARATUS WEIGHT (g):	3719.0
WET SAMPLE WEIGHT (g):	4146.0
SAMPLE LENGTH (in):	12.0
SAMPLE DIAMETER (in):	4.0
SAMPLE AREA (in²):	12.57
SAMPLE AREA (cm²):	81.07
SAMPLE VOLUME (in³):	150.80
SAMPLE VOLUME (ft³):	0.087
WET DENSITY IN (pcf):	104.7
DRY DENSITY IN (pcf):	104.7

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	12.0
SAMPLE DIAMETER (in):	4.0
AVERAGE Q VALUE (ml/sec):	46.31
AVERAGE TEMP (°C):	19.0
TEMPERATURE CORRECTION:	1.025
HEAD OF WATER (in):	5.7
HYDRAULIC GRADIENT (i):	0.48

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 1.2E+00 cm/sec

000152

TECH	DA
DATE	10/15/02
CHECK	BBS
REVIEW	PWM

GEOSYNTEC CONSULTANTS

4941

FLUOR FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 6Q1341 TASK NO.: Φ4.1

DESCRIPTION: Phase IV DATE: 4 day Nov month 2007 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: FMΦ7-2Φ

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	BEFORE WASH	AFTER WASH
TARE NO.	Big Bowl	X
WT. OF DRY SAMPLE PLUS TARE (grams)	5248.2	5574.7
WT. OF TARE (grams)	574.Φ	939.Φ
WT. OF DRY SAMPLE (grams)	4674.2	4635.7

SIEVE ANALYSIS

QA ID: KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Φ	Φ	1ΦΦ	
1½"	37.50	Φ	Φ	1ΦΦ	~~100~~
1"	25.00	Φ	Φ	1ΦΦ	~~95-100~~
¾"	19.00	Φ	Φ	1ΦΦ	100
½"	12.50	498.7	1Φ.7	89.3	~~25-60~~ 85-100
⅜"	9.50	2Φ23.7	43.3	56.7	40-75
#4	4.75	4451.9	95.2	4.8	~~0-10~~ 5-25
#8	2.36	459Φ.8	98.2	1.8	~~0-5~~ 0-10
#16	1.18	46Φ9.5	98.6	1.4	0-5
#30	0.60	4615.Φ	98.7	1.3	
#50	0.30	4617.Φ	98.8	1.2	
#100	0.15	4621.6	98.9	1.1	
#200	0.075	4628.7	99.Φ	1.Φ	0-2
PAN		463Φ.9			

000153

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: 28 Stone

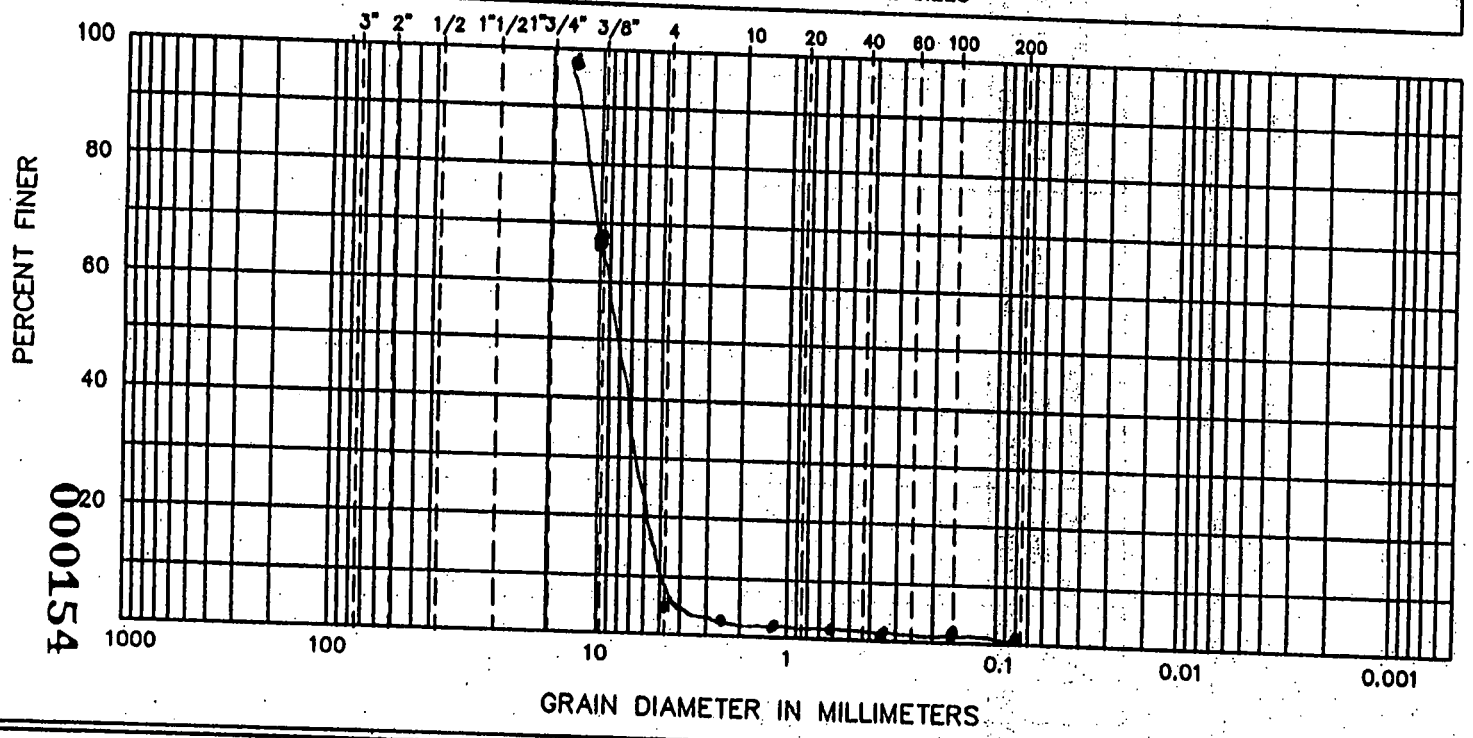
PROJECT NO. GQ1341 TASK NO.: 04.1

DATE: 04 day Nov month 2002 year

SAMPLE NO.: FM02-20 QA ID: DLF

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{9}{5}$ 1.80

$C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{6.6}{5 \times 9} = 0.968$



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	100
1/2-in.	89.3
3/8-in.	56.7
NO. 4	4.8
NO. ~~10~~ 8	1.8
NO. ~~20~~ 16	1.4
NO. ~~40~~ 30	1.3
NO. ~~60~~ 50	1.2
NO. 100	1.1
NO. 200	1.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): GP

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CHECKED BY: [signature]

SHEET NO. ____ OF ____

0001154

4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

4941

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-20 -
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag
REMARKS	-	SAMPLE DEPTH	-

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	21.53	5650	16.0	262.42	*
2.	21.80	5650	16.0	259.17	*
3.	21.91	5650	16.0	257.87	*
4.	21.92	5650	16.0	257.76	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	12151.0
APPARATUS WEIGHT (g):	4444.0
WET SAMPLE WEIGHT (g):	7707.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in²):	28.27
SAMPLE AREA (cm²):	182.41
SAMPLE VOLUME (in³):	282.74
SAMPLE VOLUME (ft³):	0.164
WET DENSITY IN (pcf):	103.8
DRY DENSITY IN (pcf):	103.8

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	259.31
AVERAGE TEMP (°C):	16.0
TEMPERATURE CORRECTION:	1.106
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

K VALUE CORRECTED FOR 20 DEGREES C = 4.8E+00 cm/sec

000155

TECH	TJ
DATE	11/14/02
CHECK	BSS
REVIEW	FWM

GEOSYNTEC CONSULTANTS

4941

FLUOR FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 6 day Nov month 2002 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: Fm02-21

SOIL SAMPLE SIZE 55.49 Lb's/Bucket Sample

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	15.62 65

		BEFORE WASH	AFTER WASH
TARE NO.		Big Pan	Big Pan
WT. OF DRY SAMPLE PLUS TARE	(grams)	7194.1	7085.2
WT. OF TARE	(grams)	939.0 gm	939.0
WT. OF DRY SAMPLE	(grams)	6255.10	6146.2

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	0	0	100	100
1½"	37.50	0	0	100	↕
1"	25.00	0	0	100	↓
¾"	19.00	0	0	100	100
½"	12.50	425.7	6.8	93.2	85 To 100
⅜"	9.50	1593.3	25.5	74.5	40 To 75
#4	4.75	5152.3	82.4	17.6	5 To 25
#8	2.36	5919.5	94.6	5.4	0 To 10
#16	1.18	6067.4	97.0	3.0	0 To 5
#30	0.60	6104.1	97.6	2.4	↑
#50	0.30	6118.6	97.8	2.2	↕
#100	0.15	6129.9	98.0	2.0	↓
#200	0.075	6143.4	98.2	1.8	0 To 2
PAN		6145.1	98.2	1.8	

000156

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase II

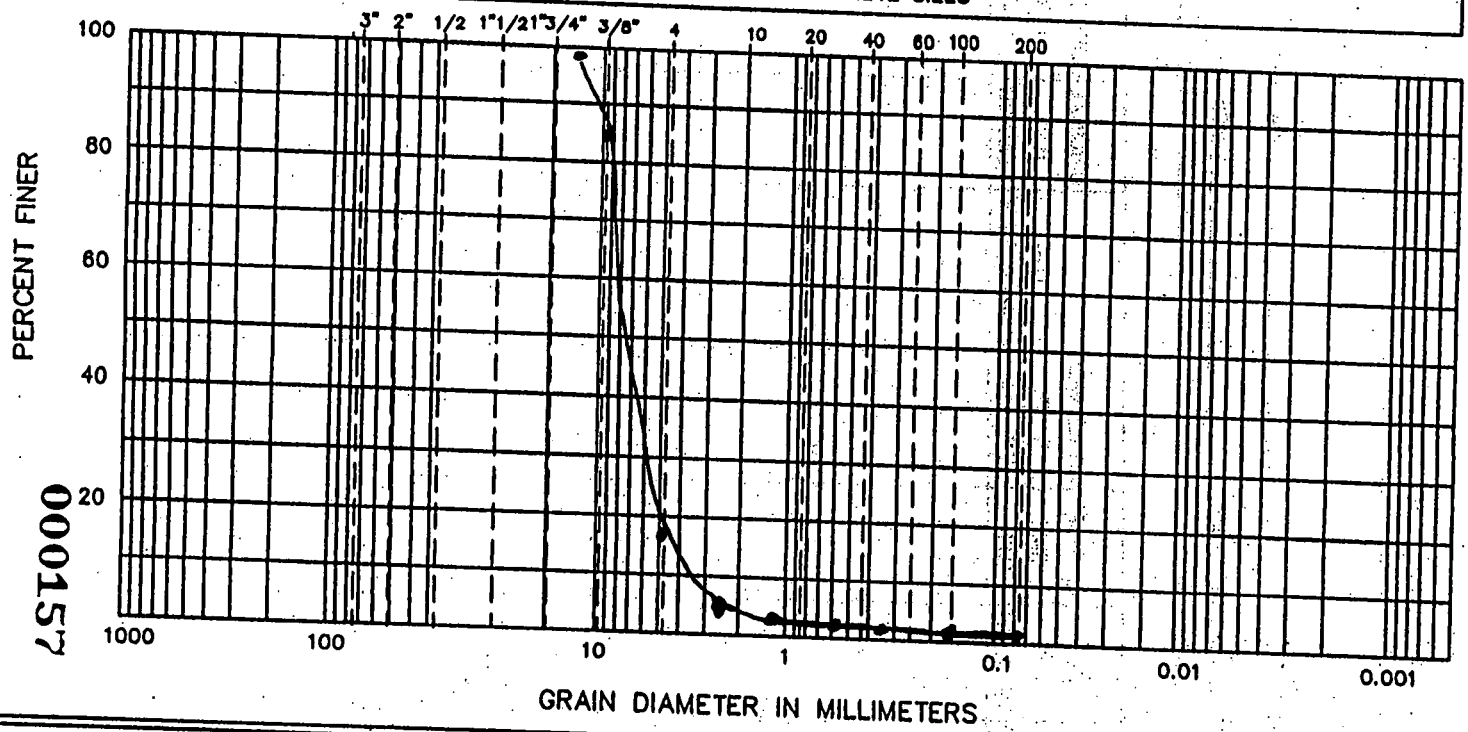
MATERIAL TYPE: 78 Store

PROJECT NO.: GQ134 TASK NO.: 04.1

DATE: 06 day Nov month 2002 year

SAMPLE NO.: EM02-21 QA ID: DCE

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{8}{3.5}$ 2.29 $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{(6)^2}{\cancel{29.6}\ \cancel{9.1}\ 28.0} = 1.29$



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	99.2
3/8-in.	74.5
NO. 4	17.6
NO. ~~10~~ 8	5.4
NO. ~~20~~ 16	3.0
NO. ~~40~~ 30	2.4
NO. ~~60~~ 50	2.2
NO. 100	2.0
NO. 200	1.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): GP

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: CH

SHEET NO. OF

000157

4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

4941

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-21 -
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag
REMARKS	-	SAMPLE DEPTH	-

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	48.00	5650	17.0	117.71	*
2.	47.93	5650	17.0	117.88	*
3.	48.03	5650	17.0	117.63	*
4.	47.99	5650	17.0	117.73	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	12205.0
APPARATUS WEIGHT (g):	4496.0
WET SAMPLE WEIGHT (g):	7709.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in²):	28.27
SAMPLE AREA (cm²):	182.41
SAMPLE VOLUME (in³):	282.74
SAMPLE VOLUME (ft³):	0.164
WET DENSITY IN (pcf):	103.9
DRY DENSITY IN (pcf):	103.9

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	117.74
AVERAGE TEMP (°C):	17.0
TEMPERATURE CORRECTION:	1.077
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 2.1E+00 cm/sec

TECH	TJ
DATE	11/14/02
CHECK	BS
REVIEW	[illegible]

000158

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

4941

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 20 day Nov month 2002 year

MATERIAL TYPE: #78 Stone SAMPLE NO.: FM02-22

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65 6781.3

	BEFORE WASH	14.95 AFTER WASH
TARE NO.	Big Bowl	Big Bowl
WT. OF DRY SAMPLE PLUS TARE (grams)	6858.4	6781.3
WT. OF TARE (grams)	574.0	574.0
WT. OF DRY SAMPLE (grams)	6284.4	6207.3

SIEVE ANALYSIS

QA ID: KS/DME

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	0	0	100	
1 1/2"	37.50	0	0	100	
1"	25.00	0	0	100	
3/4"	19.00	0	0	100	100
1/2"	12.50	589.0	9.4	90.6	85 To 100
3/8"	9.50	2050.1	32.6	67.4	40 To 95
#4	4.75	5592.1	89.0	11.0	5 To 25
#8	2.36	6040.4	96.1	3.9	0 To 10
#16	1.18	6139.4	97.7	2.3	0 To 5
#30	0.60	6168.0	98.1	1.9	
#50	0.30	6179.0	98.3	1.7	
#100	0.15	6187.1	98.5	1.5	
#200	0.075	6197.4	98.6	1.4	0 To 2
PAN		6205.7	98.7	1.3	

000159

%FINER = 100 − Σ% RETAINED

©GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: [illegible] SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

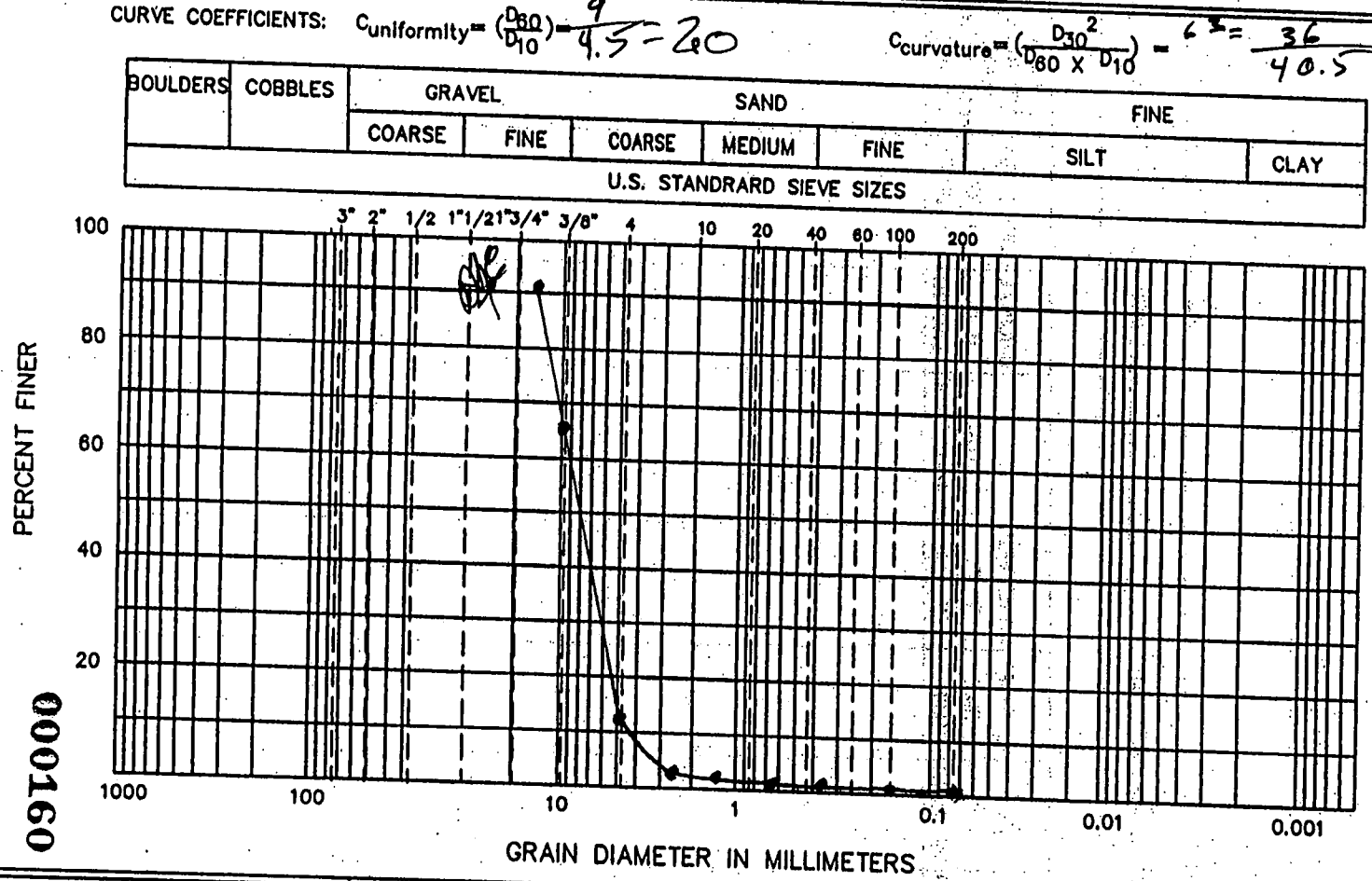
MATERIAL TYPE: #2 & Stone

PROJECT NO.: GQ134 TASK NO.: 041

DATE: 20 day Nov month 2002 year

SAMPLE NO.: FM02-22 QA ID: DLE

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{9}{4.5} = 2.0$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{6^2}{4.5} = \frac{36}{4.5} = 1.33$



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	90.6
3/8-in.	67.4
NO. 4	16.0
NO. ~~10~~ 8	3.9
NO. ~~20~~ 16	2.3
NO. ~~40~~ 30	1.9
NO. ~~60~~ 50	1.7
NO. 100	1.7
NO. 200	1.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): GP

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

0001160

4941

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

4941

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	FM02-22	-
PROJECT NUMBER	023-3313	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	43.66	5650	13.0	129.41	*
2.	43.61	5650	13.0	129.56	*
3.	43.55	5650	13.0	129.74	*
4.	43.63	5650	13.0	129.50	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	12156.0
APPARATUS WEIGHT (g):	4442.0
WET SAMPLE WEIGHT (g):	7714.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in²):	28.27
SAMPLE AREA (cm²):	182.41
SAMPLE VOLUME (in³):	282.74
SAMPLE VOLUME (ft³):	0.164
WET DENSITY IN (pcf):	103.9
DRY DENSITY IN (pcf):	103.9

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	129.55
AVERAGE TEMP (°C):	13.0
TEMPERATURE CORRECTION:	1.197
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

K VALUE CORRECTED FOR 20 DEGREES C = 2.6E+00 cm/sec

TECH	TJ
DATE	12/3/02
CHECK	BSS
REVIEW	PWM

000161

CARBONATE CONTENT- AGGREGATES
ASTM D 3042

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	023-3313
REMARKS	Per client request, the acid used had a pH of 4.

SAMPLE ID	FM02-1	GD02-1	FM02-2
Date	4/5/02	5/28/02	6/20/02
Tested by	DA/TJ	TJ	TJ
Checked by			
Reviewed by			
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.06	0.05	0.02
2	0.11	0.05	0.02
3	0.05	0.05	0.01
AVERAGE	0.07	0.05	0.02

SAMPLE ID	FM02-4	FM02-6	FM02-8
Date	6/20/02	7/2/02	7/24/02
Tested by	TJ	TJ	TJ
Checked by			BH
Reviewed by			PWM
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.35	0.08	0.23
2	0.09	0.04	0.08
3	0.97	0.01	0.06
AVERAGE	0.47	0.04	0.12

CARBONATE CONTENT- AGGREGATES
ASTM D 3042

4941

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	023-3313
REMARKS	Per client request, the acid used had a pH of 4.

SAMPLE ID	FM02-9	FM02-10	FM02-11
Date	7/24/02	7/24/02	8/9/02
Tested by	TJ	TJ	TJ
Checked by			BRS
Reviewed by			PWM
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.05	0.05	0.16
2	0.06	0.06	0.13
3	0.04	0.06	0.15
AVERAGE	0.05	0.06	0.15

SAMPLE ID	FM02-12	FM02-13	FM02-14
Date	8/9/02	8/9/02	8/9/02
Tested by	TJ	TJ	TJ
Checked by	BRS	BRS	BRS
Reviewed by	PWM	PWM	PWM
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.21	0.13	0.05
2	0.15	0.12	0.06
3	0.11	0.1	0.05
AVERAGE	0.16	0.12	0.05

CARBONATE CONTENT- AGGREGATES
ASTM D 3042

4941

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	023-3313
REMARKS	Per client request, the acid used had a pH of 4.

SAMPLE ID	FM02-15	FM02-19	FM02-20
Date	8/21/02	10/15/02	11/14/02
Tested by	TJ	TJ	TJ
Checked by			
Reviewed by			
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.14	0.24	0.07
2	0.11	0.12	0.06
3	0.09	0.14	0.05
AVERAGE	0.11	0.17	0.06

SAMPLE ID	GD02-2	GD02-3	GD02-4
Date	8/9/02	8/21/02	11/5/02
Tested by	TJ	TJ	TJ
Checked by			
Reviewed by			
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.03	0.04	0.05
2	0.02	0.12	0.03
3	0.03	0.18	0.14
AVERAGE	0.03	0.11	0.07

000164

No. 57 Stone

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: PHIV	SUBMITTAL NO. 20104-PHIV--02710-001	REV.: 1	DATE: 4/29/02
FROM: FLUOR FERNALD		TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7		Page 1 of 2

SIGNATURE: 4/29/02

RECEIVED BY: Teresa Schwab DATE: 4/29/02

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
7	PHIV-02710-001	1						X			Source of Granular Drainage Material - #57 Coarse Aggregate			X	02710-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	64				
BILL ZEBICK	64				
MIKE GODBER	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

RECEIVED MAY 13 2002

NO COMMENTS: COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

000169

RECEIVED BY: DATE: 5/3/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

FS-F-4955

ORIGINAL

4941

BOWSER-MORNER, INC.

Delivery Address: 4518 Taylorsville Road • Dayton, Ohio 45424 Mailing Address: P. O. Box 51 • Dayton, Ohio 45401

AASHTO/ISO 17025 Accredited

LABORATORY REPORT

Report To: Martin Marietta Aggregates
Attn: Mr. Sam Feltner
107 River Circle Road
Fairfield, Ohio 45014

#57 SOURCE

Date: April 22, 2002
Report No. 010407A
W.O. No. 125181
No. of Pages: 2

Report On: Laboratory Analysis of No. 57 Gravel • Hamilton, Ohio (No. 46303)

On April 11, 2002, one sample of No. 57 gravel was submitted for selected laboratory analysis. Testing was performed as specified by the client and in accordance with the following procedures:

ASTM C 117, "Materials Finer than 75-µm (No. 200) Sieve Mineral Aggregates by Washing".

ASTM C 136, "Sieve Analysis of Fine and Coarse Aggregates".

ASTM D 2434, "Permeability of Granular Soils (Constant Head)".

ASTM D 2487, "Classification of Soils for Engineering Purposes (Unified Soil Classification System)".

ASTM D 3024, "Insoluble Residue in Carbonate Aggregates", modified to a pH of 4.

Laboratory results are presented on the attached data sheet.

Should you have any questions, or if we may be of further service, please contact me at (937) 236-8805, extension 307.

Respectfully submitted,

BOWSER-MORNER, INC.

Robert A. Stadler, P.E.
Manager, Construction Materials
Geotechnical Laboratories

( ) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: Date: 5/3/02

RAS/sdr/cmb
010407A
1-Client
1-File
1-Jim Martin

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INFORMATION ONLY

FDF PROJECT NO: 104	CONTRACT NO: PHIV	SUBMITTAL NO. 20104-PHIV--02710-003	Rev. 0	DATE: 5/13/02	Page 1 of 2

FROM:
FLUOR FERNALD

SIGNATURE: 5/13/02 SH WOLINSKY

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

RECEIVED BY: Teresa Schwab DATE: 5/15/02

			DOCUMENT FAMILY									SUBMITTAL TYPE				SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	DRFT	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
7	PHIV-02710-003	0							X		Certification from supplier that AASHTO #57 coarse aggregate meets the material requirements of 02710		X		02710-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE	64				
GREGG JOHNSON	64				
BILL ZEBICK	64				
MIKE GODBER (APPROVER)	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

NO COMMENTS: X COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

000168

RECEIVED BY: Michael W. Galler DATE: 5/29/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

494

ORIGINAL

4941

Martin Marietta Aggregates

MidAmerica Division & Southwest Ohio District
4770 Duke Drive, Suite 200
Mason, OH 45040
Telephone (513) 701-1140
Fax (513) 701-1149

Submittal No. 20104-PH1V-02710-003, REV 0

April 29, 2002

Mr. Chuck Van Arsdale
MS-64
P.O. Box 538704
Cincinnati, Ohio 45253-8704

Project Reference: Fluor Fernald, Cell 4 & 5 Liner, Granular Drainage Corridor Material

Dear Chuck:

We herewith certify that the No.57 Gravel produced at our Hamilton, Ohio facility for the above referenced project conforms to sections "1.0 Submittals" and "2.0 Material Specification" of the project specifications and as previously indicated by our commercial lab (Bowser Morner, Inc.) report sent to you earlier. Specifically, the material was tested in accordance with ASTM C136, ASTM C117, ASTM D2434, ASTM D2487, and ASTM D3024 (modified).

Very truly yours,

MARTIN MARIETTA AGGREGATES

James R. Martin

James R. Martin
Technical Projects Coordinator

(X) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: Date: 5/8/02

INFORMATION ONLY

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT No. 20104	CONTRACT NO: PHIV	SUBMITTAL NO. 20104-PHIV--02710-002	REV.: 1	DATE: 4/29/02	Page 1 of 3

FROM:
FLUOR FERNALD

SIGNATURE: 4/29/02

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

RECEIVED BY: Teresa Schwab DATE: 4/29/02

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
7	PHIV-02710-002	1						X			Test Results on Granular Drainage Material - #57 Coarse Aggregate		X		02710-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	64				
BILL ZEBICK	64				
MIKE GODBER	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

RECEIVED
MAY 13 2002

NO COMMENTS: COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

000120

RECEIVED BY: DATE: 5/3/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

ORIGINAL

FS-F-4955

4941

BOWSER-MORNER, INC.

Delivery Address: 4518 Taylorsville Road • Dayton, Ohio 45424 Mailing Address: P. O. Box 51 • Dayton, Ohio 45401

AASHTO/ISO 17025 Accredited

LABORATORY REPORT

Report To: Martin Marietta Aggregates
Attn: Mr. Sam Feltner
107 River Circle Road
Fairfield, Ohio 45014

Date: April 22, 2002
Report No. 010407A
W.O. No. 125181
No. of Pages: 2

Report On: Laboratory Analysis of No. 57 Gravel - Hamilton, Ohio (No. 46303)

On April 11, 2002, one sample of No. 57 gravel was submitted for selected laboratory analysis. Testing was performed as specified by the client and in accordance with the following procedures:

ASTM C 117, "Materials Finer than 75-µm (No. 200) Sieve Mineral Aggregates by Washing".

ASTM C 136, "Sieve Analysis of Fine and Coarse Aggregates".

ASTM D 2434, "Permeability of Granular Soils (Constant Head)".

ASTM D 2487, "Classification of Soils for Engineering Purposes (Unified Soil Classification System)".

ASTM D 3024, "Insoluble Residue in Carbonate Aggregates", modified to a pH of 4.

Laboratory results are presented on the attached data sheet.

Should you have any questions, or if we may be of further service, please contact me at (937) 236-1205, extension 307.

Respectfully submitted,

BOWSER-MORNER, INC.

Robert A. Stadler, P.E.
Manager, Construction Materials
Geotechnical Laboratories

X A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig. [illegible] Date: 5/3/02

RAS/scr/cmb
010407A
1-Client
1-File
1-Jim Martin

INFORMATION ONLY

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4941

1.) No. 57 Gravel

A. Decant and Gradation (ASTM C 117, C 136)

Sieve Size		Percent Passing	ASTM C 33 Specification, %
37.5mm	(1 1/2")	100	100
25.0mm	(1")	100	95-100
19.0mm	(3/4")	91	---
12.5mm	(1/2")	42	25-60
9.5mm	(3/8")	7	---
4.75mm	(#4)	1	0-10
2.36mm	(#8)	1	0-5
0.075mm	(No. 200) Decant, %	0.1	~~1.0~~ Max. 2.0 cv
USCS Classification		GP	---

B. Acid Solubility; modified to pH 4 (ASTM D 3042)

Acid Soluble, % Loss: 0.06

C. Constant Head Permeability (ASTM D 2434)

Dry Density, pcf:	102.5
Void Ratio, %:	37.7
Permeability, cm/sec:	28.7

GEOSYNTEC/FLUOR FERNALD/OH
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth	Soil Classification	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Carbonate Content (%)	Additional Tests Conducted (See Notes)
					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer 0.002 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)			
FM02-14	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	103.3	1.9E+00	0.05	-
FM02-15	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	104.8	2.7E+00	0.11	-
FM02-16	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	104.8	2.7E+00	-	-
FM02-17	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	103.2	2.5E+00	-	-
FM02-18	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	103.2	2.5E+00	-	-
FM02-19	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	104.7	1.2E+00	0.17	-
FM02-20	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	103.8	4.8E+00	0.06	-
FM02-21	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	103.9	2.1E+00	-	-
FM02-22	Bag	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	103.9	2.6E+00	0.10	-
GD02-1	Bulk	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05	-
GD02-2	Bulk	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03	-
GD02-3	Bulk	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11	-
GD02-4	Bulk	-	(GP)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07	-

ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

4941

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 15 day May month 2002 year

MATERIAL TYPE: 57 Stone SAMPLE NO.: GD02-1

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		X	X
WT. OF DRY SAMPLE PLUS TARE	(grams)	6504.6	6486.48
WT. OF TARE	(grams)	939.1	939.10
WT. OF DRY SAMPLE	(grams)	5565.5	5547.38

SIEVE ANALYSIS

QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø	100	
1½"	37.50	Ø	Ø	100	
1"	25.00	Ø	Ø	100	95-100
3/4"	19.00	635.2	11.4	88.6	
1/2"	12.50	3589.7	64.5	35.5	25-60
3/8"	9.50	5111.0	91.8	8.2	
#4	4.75	5521.7	99.2	0.8	0-10
#8	2.36	5544.6	99.6	0.4	0-5
#16	1.18	5545.2	99.6	0.4	
#30	0.60	5545.6	99.6	0.4	
#50	0.30	5546.0	99.6	0.4	
#100	0.15	5546.5	99.7	0.3	
#200	0.75	5547.0	99.7	0.3	
PAN		5547.3	99.7	0.3	

000174

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 6Q1341 TASK NO.: 04.1

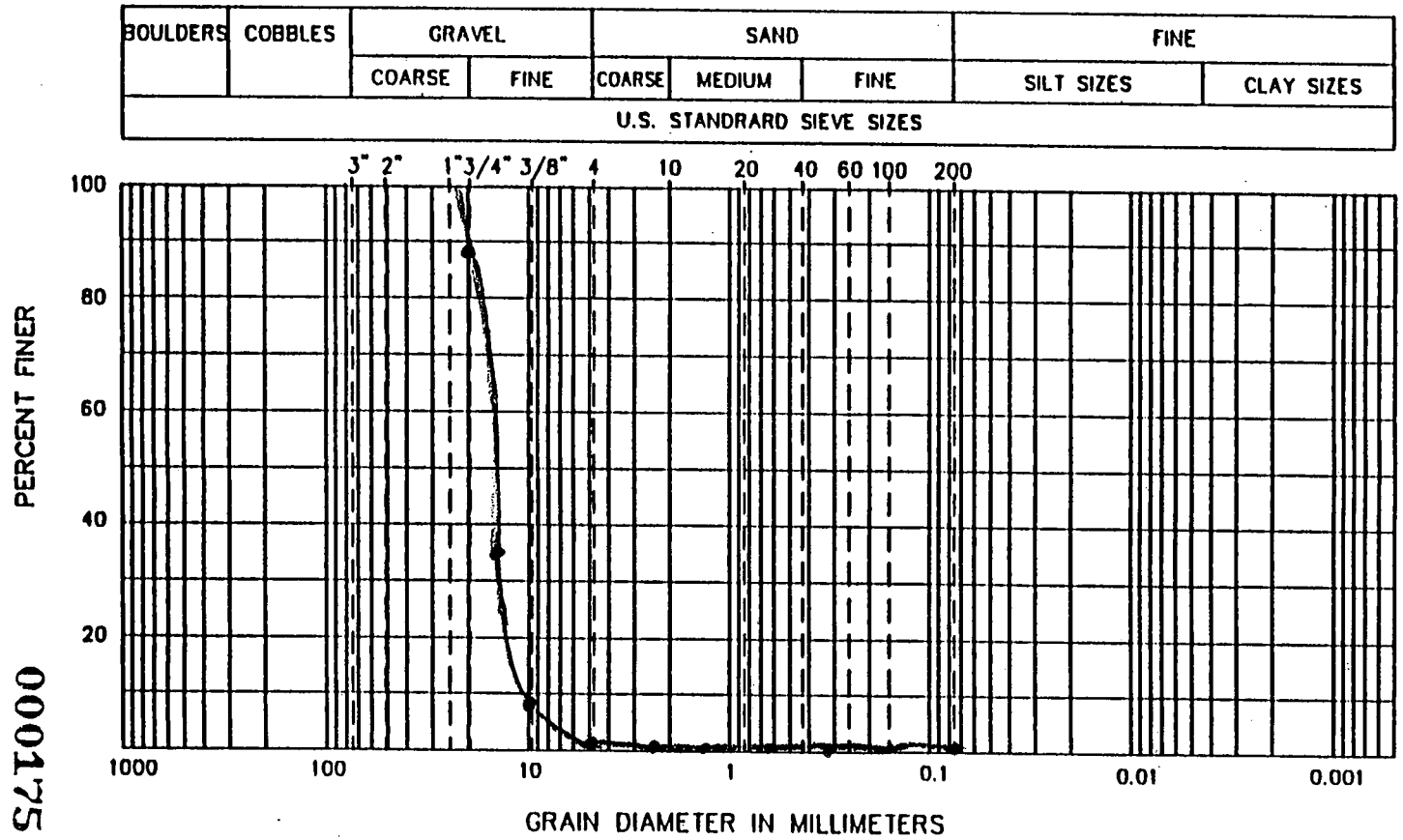
DESCRIPTION: Phase IV

DATE: 15 day May month 2002 year

MATERIAL TYPE: 57 Stone

SAMPLE NO.: GD02-1 QA ID: DHF

CURVE COEFFICIENTS: (C_u) ..... (C_c) .....



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	—
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	98.6
1/2-in.	35.5
3/8-in.	8.2
NO. 4	0.8
NO. 8	0.4
NO. 16	0.4
NO. 30	0.4
NO. 50	0.4
NO. 100	0.3
NO. 200	0.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

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SHEET NO. 2 OF 2

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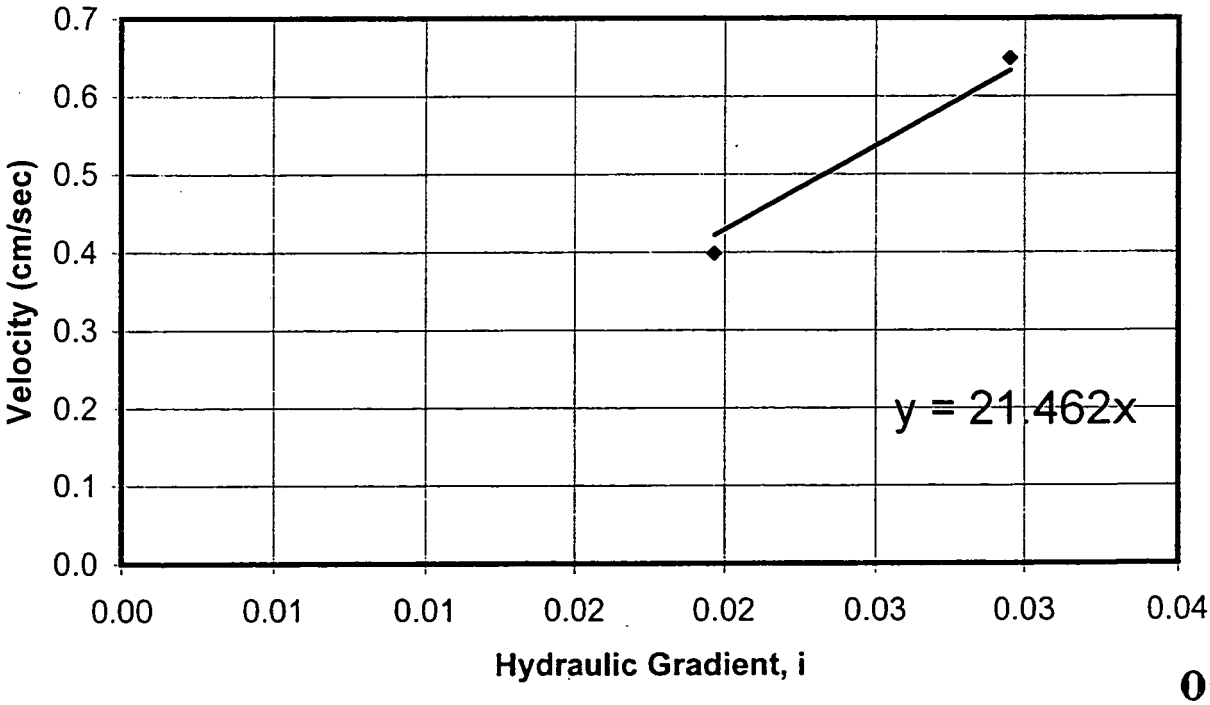
HYDRAULIC CONDUCTIVITY

Project No.	*GTX-G0339*	Tested By	*HJ*
Project Name	*Golder Associates*	Test Date	*June 12,2002*
Boring No.	*23-3313*	Reviewed By	*JW*
Sample No.	*GD02-1*	Review Date	*June 12, 2002*
Sample Depth	*N/A*		
Sample Description	*Gravel*		

ASTM D2434-68 Constant Head Permeability

Sample Type:	*Bag*
Sample Orientation:	*Vertical*
Initial Water Content, %:	*0.0*
Wet Unit Weight, pcf:	*107.0*
Dry Unit Weight, pcf:	*107.0*
Compaction, %:	*N/A*
Hydraulic Conductivity, cm/sec. @20° C:	***2.1E+01***



GeoTesting Express

PERMEABILITY TEST - Constant Head
(ASTM D2434 - 68)

Project No.	GTX-G0339	Tested By	HJ
Project Name	Golder Associates	Test Date	June 12,2002
Location	23-3313	Reviewed By	JW
Sample No.	GD02-1	Review Date	June 12, 2002
Sample Depth	N/A	Lab No.	7092
Sample Description	Gravel		

Sample Data

Length, in		Diameter, in		Pan No.	
Location 1	4.003	Location 1	13.000	Wet Soil + Pan, grams	15400.00
Location 2	4.003	Location 2	13.000	Dry Soil+Pan, grams	15400.00
Location3	4.003	Location 3	13.000	Pan Weight, grams	480.00
Average	4.003	Average	13.000	Moisture Content, %	0.0
		Sample wet weight, grams	14920.00	Wet Unit Wt, pcf	107.0
		Membrane, Cap weight, gram	0.00	Dry Unit Wt, pcf	107.0

Time (sec)	Q (cm^3)	H (cm)	Temp °C	v (cm/sec)	k (cm/sec)	k (cm/sec) 20 °C	i (cm/cm)
5.10	1740.00	0.20	21.5	0.40	2.0E+01	2.0E+01	0.02
4.03	2240.00	0.30	21.5	0.65	2.2E+01	2.1E+01	0.03

No. of Trials	Sample Type	Max. Density (pcf)	Compaction %	Sample Orientation
2	Bag	N/A	N/A	Vertical

L = length of sample in cm
A = area of sample in cm^2

H = constant head in cm
t = time in seconds

A = 856.34 cm^2
L = 10.17 cm

Uncorrected k (cm/sec) = 2.1E+01

Permeability, k at 20 °C = **2.1E+01** cm/sec

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 6Q134/ TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 07 day Aug month 2002 year

MATERIAL TYPE: 57 Stone SAMPLE NO.: G-B 02-2

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	270 LBS BEFORE WASH	26.8 LBS AFTER WASH
TARE NO.	X	X
WT. OF DRY SAMPLE PLUS TARE (grams)	12247.2	12174.6
WT. OF TARE (grams)	939.1	939.1
WT. OF DRY SAMPLE (grams)	11308.1	11235.5

SIEVE ANALYSIS

QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø	100	100
1½"	37.50	Ø	Ø	100	100
1"	25.00	53.1	.5	99.5	95 To 100
¾"	19.00	1755.2	15.5	84.5	~~95 To 100~~
½"	12.50	8063.2	71.3	28.7	25 To 60
⅜"	9.50	10489.0	92.8	7.2	~~25 To 60~~
#4	4.75	11215.4	99.2	0.8	0 To 10
#8	2.36	11221.7	99.2	0.8	0 To 5
#16	1.18	11222.2	99.2	0.8	↕
#30	0.60	11222.9	99.2	0.8	
#50	0.30	11224.3	99.3	0.7	
#100	0.15	11226.7	99.3	0.7	0 To 5
#200	0.075	11230.3	99.3	0.7	0 To 2
PAN		11231.5			

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%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

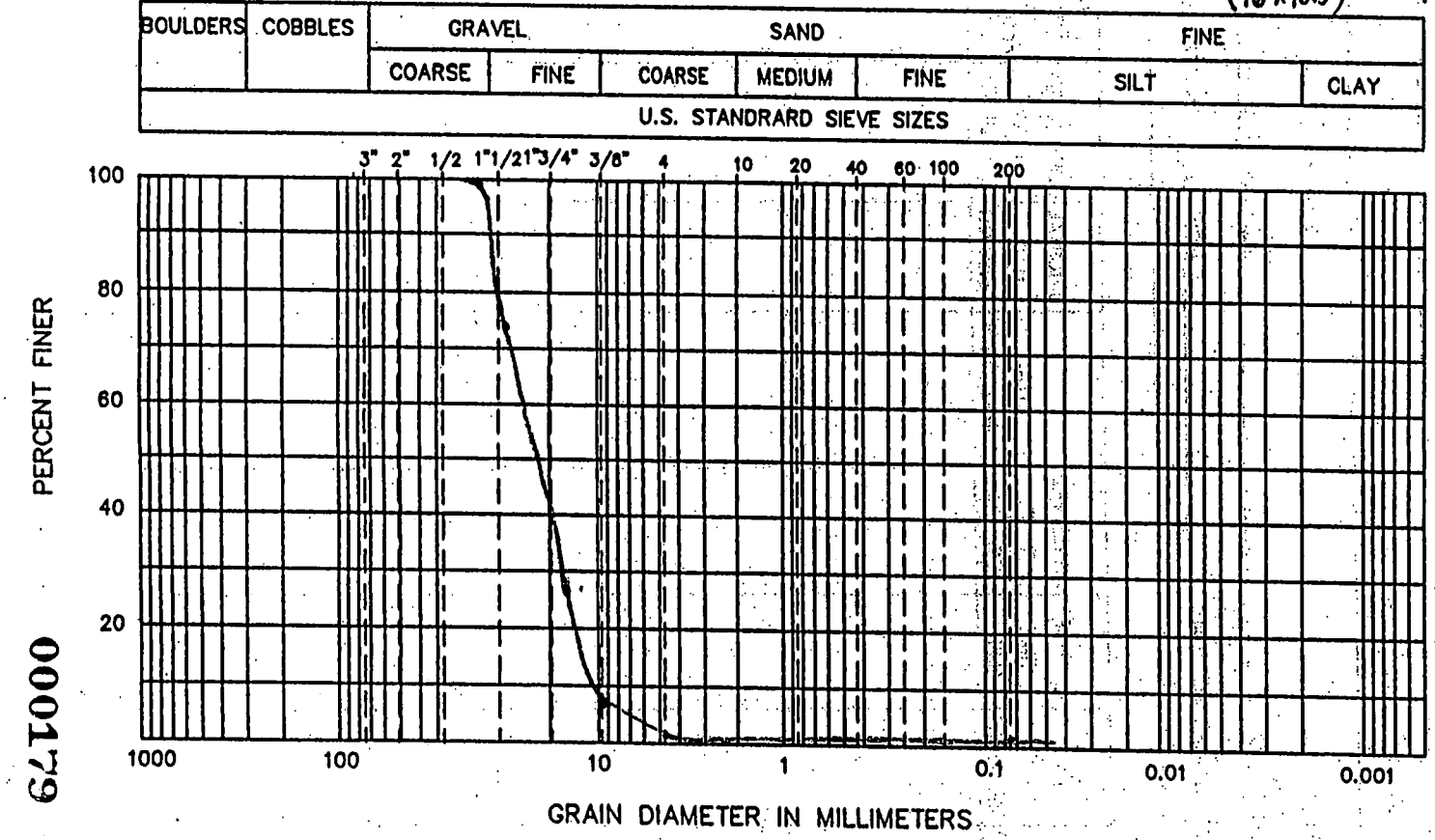
MATERIAL TYPE: 57 Stone

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 7 day Aug month 2002 year

SAMPLE NO.: GD02-2 QA ID: CJ

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{16}{10.5} = 1.52$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{(12.5)^2}{(16 \times 10.5)} = 0.93$



ATTERBERG LIMITS

(LL) .....

(PL) ... N/A .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	100
1-In.	99.5
3/4-In.	84.5
1/2-In.	28.7
3/8-In.	7.2
NO. 4	0.8
NO. ~~10~~ 8	0.8
NO. ~~20~~ 16	0.8
NO. ~~40~~ 30	0.8
NO. ~~60~~ 50	0.7
NO. 100	0.7
NO. 200	0.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	

SOIL CLASSIFICATION (ASTM D 2487): GP- Poorly Graded Gravel

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CHECKED BY: CJ

SHEET NO. 2 OF 2

000179

4974

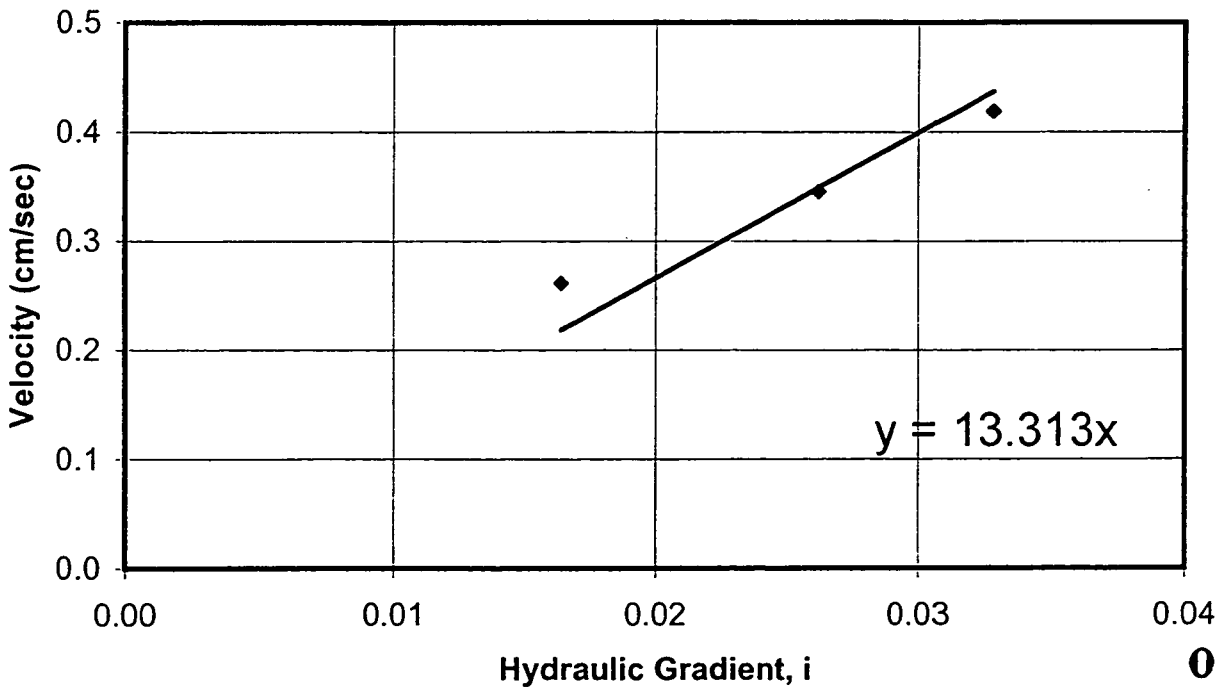
GeoTesting Express

HYDRAULIC CONDUCTIVITY

Project No.	*GTX-G0339*	Tested By	*HJ*
Project Name	*Golder Perm Tests*	Test Date	*August 14,2002*
Boring No.	*N/A*	Reviewed By	*JW*
Sample No.	*GD02-2*	Review Date	*August 14,2002*
Sample Depth	*N/A*		
Sample Description	*57 Stone*		

ASTM D2434-68 Constant Head Permeability

Sample Type:	*Bag*
Sample Orientation:	*Vertical*
Initial Water Content, %:	*0.0*
Wet Unit Weight, pcf:	*105.6*
Dry Unit Weight, pcf:	*105.6*
Compaction, %:	*N/A*
Hydraulic Conductivity, cm/sec. @20° C:	***1.3E+01***



4941

GeoTesting Express

PERMEABILITY TEST - Constant Head
(ASTM D2434 - 68)

Project No.	GTX-G0339	Tested By	HJ
Project Name	Golder Perm Tests	Test Date	August 14,2002
Location	N/A	Reviewed By	JW
Sample No.	GD02-2	Review Date	August 14,2002
Sample Depth	N/A	Lab No.	7468
Sample Description	57 Stone		

Sample Data

Length, in		Diameter, in		Pan No.	
Location 1	6.000	Location 1	13.000	Wet Soil + Pan, grams	22080.00
Location 2	6.000	Location 2	13.000	Dry Soil+Pan, grams	22080.00
Location3	6.000	Location 3	13.000	Pan Weight, grams	0.00
Average	6.000	Average	13.000	Moisture Content, %	0.0
		Sample wet weight, grams	22080.00	Wet Unit Wt, pcf	105.6
		Membrane, Cap weight, gram	0.00	Dry Unit Wt, pcf	105.6

Time (sec)	Q (cm³)	H (cm)	Temp °C	v (cm/sec)	k (cm/sec)	k (cm/sec) 20 °C	i (cm/cm)
11.44	2560.00	0.25	20.0	0.26	1.6E+01	1.6E+01	0.02
11.50	3400.00	0.40	20.0	0.35	1.3E+01	1.3E+01	0.03
11.66	4180.00	0.50	20.0	0.42	1.3E+01	1.3E+01	0.033

No. of Trials	Sample Type	Max. Density (pcf)	Compaction %	Sample Orientation
3	Bag	N/A	N/A	Vertical

L = length of sample in cm
A = area of sample in cm²

H = constant head in cm
t = time in seconds

A = 856.34 cm²
L = 15.24 cm

Uncorrected k (cm/sec) = 1.3E+01

Permeability, k at 20 °C = **1.3E+01** cm/sec

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 12 day Aug month 2002 year

MATERIAL TYPE: 57 Stone SAMPLE NO.: GP02-3

SOIL SAMPLE SIZE ~~+6.96~~

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) 27.33 = 12396.888 (grams)	SAND	FINE GRAIN
	115	65

	574.700 11822.2	28.29 BEFORE WASH	AFTER WASH
TARE NO.		X Big Pan	Big Bowl ~~X~~ Big Pan
WT. OF DRY SAMPLE PLUS TARE (grams)		12832.3	12403.8
WT. OF TARE (grams)		939.1	~~939.1~~ + 574.7
WT. OF DRY SAMPLE (grams)		11893.2	~~11882.2~~ 11829.1

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø	100	
1½"	37.50	Ø	Ø	100	100
1"	25.00	Ø	Ø	100	95 to 100
¾"	19.00	1599.6	13.4	86.6	~~95 to 100~~
½"	12.50	8107.4	68.2	31.8	25 to 60
⅜"	9.50	10862.6	91.3	8.7	~~25 to 60~~
#4	4.75	11823.0	99.4	0.6	Ø to 10
#8	2.36	11826.4	99.4	0.6	Ø to 5
#16	1.18	11827.3	99.4	0.6	↑
#30	0.60	11828.3	99.5	0.5	↕
#50	0.30	11828.6	99.5	0.5	↓
#100	0.15	11828.7	99.5	0.5	0 to 5
#200	0.075	11829.1	99.5	0.5	0 to 2
PAN					

000182

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

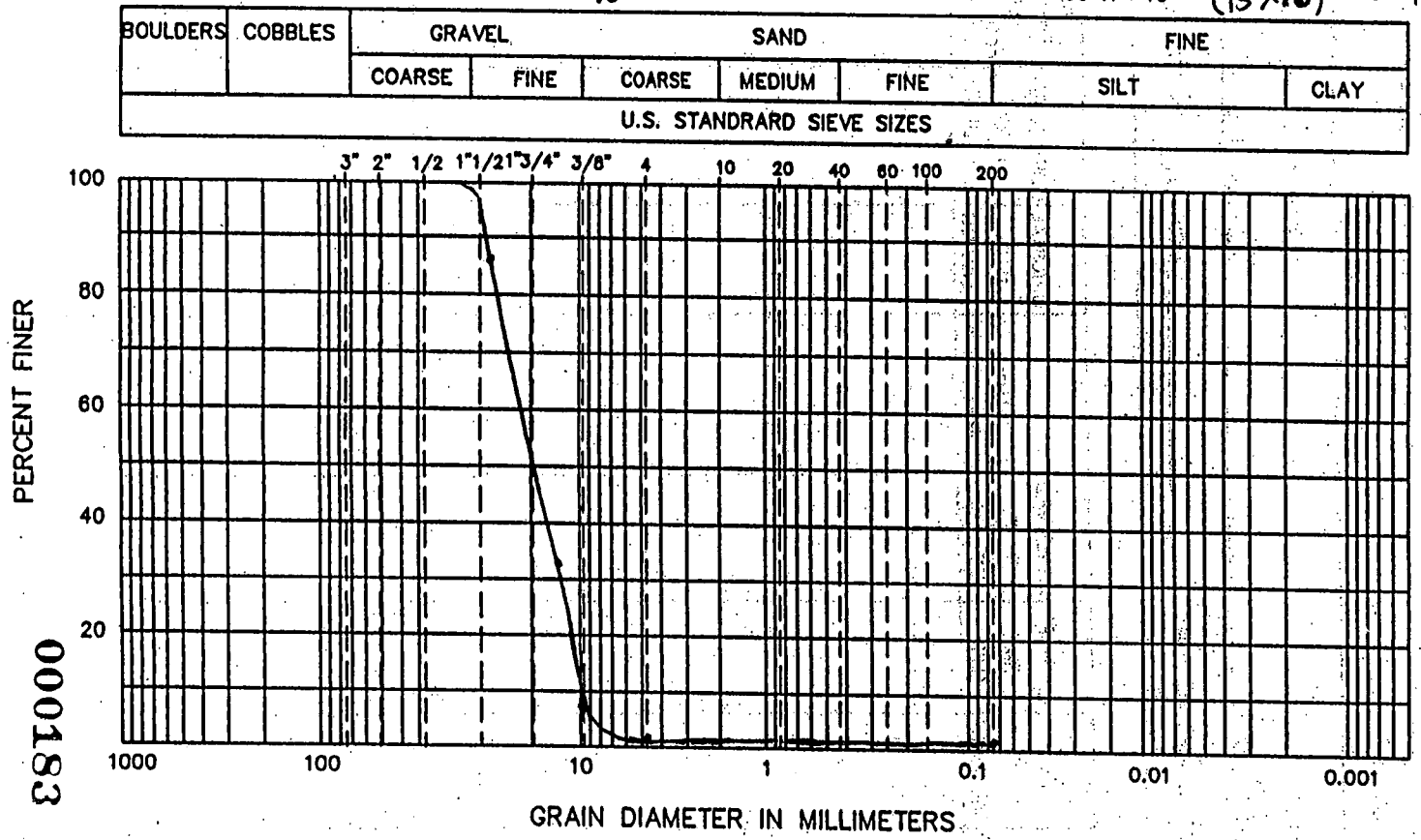
MATERIAL TYPE: 57 Stone

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 12 day Aug month 2002 year

SAMPLE NO.: GD02-3 QA ID: CL

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{15}{10} = 1.5$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{(12)^2}{(15 \times 10)} = 0.96$



ATTERBERG LIMITS

(LL) .....

(PL) N/A

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	86.6
1/2-in.	31.8
3/8-in.	8.7
NO. 4	0.6
NO. ~~10~~ 8	0.6
NO. ~~20~~ 16	0.6
NO. ~~40~~ 30	0.5
NO. ~~60~~ 50	0.5
NO. 100	0.5
NO. 200	0.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	

SOIL CLASSIFICATION (ASTM D 2487): GP - Poorly Graded Gravel

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49411

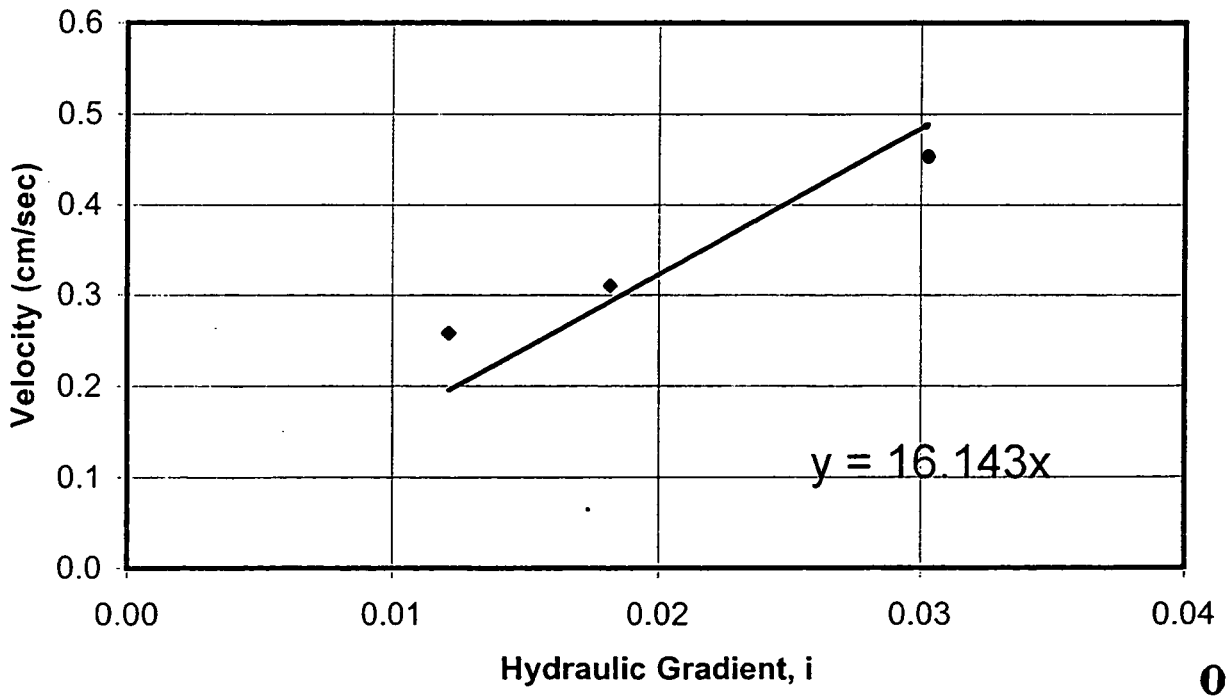
GeoTesting Express

HYDRAULIC CONDUCTIVITY

Project No.	*GTX-G0339*	Tested By	*HJ*
Project Name	*Golder Perm Tests*	Test Date	*August 30, 2002*
Boring No.	*N/A*	Reviewed By	*JW*
Sample No.	*GD02-3*	Review Date	*August 30, 2002*
Sample Depth	*N/A*		
Sample Description	*57 Stone*		

ASTM D2434-68 Constant Head Permeability

Sample Type:	*Bag*
Sample Orientation:	*Vertical*
Initial Water Content, %:	*0.0*
Wet Unit Weight, pcf:	*96.1*
Dry Unit Weight, pcf:	*96.1*
Compaction, %:	*N/A*
Hydraulic Conductivity, cm/sec. @20° C:	***1.6E+01***



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PERMEABILITY TEST - Constant Head
(ASTM D2434 - 68)

Project No.	GTX-G0339	Tested By	HJ
Project Name	Golder Perm Tests	Test Date	August 30, 2002
Location	N/A	Reviewed By	JW
Sample No.	GD02-3	Review Date	August 30, 2002
Sample Depth	N/A	Lab No.	7538
Sample Description	57 Stone		

Sample Data

Length, in		Diameter, in		Pan No.	
Location 1	6.500	Location 1	13.000	Wet Soil + Pan, grams	21772.40
Location 2	6.500	Location 2	13.000	Dry Soil+Pan, grams	21772.40
Location3	6.500	Location 3	13.000	Pan Weight, grams	0.00
Average	6.500	Average	13.000	Moisture Content, %	0.0
		Sample wet weight, grams	21772.40	Wet Unit Wt, pcf	96.1
		Membrane, Cap weight, gram	0.00	Dry Unit Wt, pcf	96.1

Time (sec)	Q (cm³)	H (cm)	Temp °C	v (cm/sec)	k (cm/sec)	k (cm/sec) 20 °C	i (cm/cm)
11.47	2540.00	0.20	21.0	0.26	2.1E+01	2.1E+01	0.01
11.30	3004.00	0.30	21.0	0.31	1.7E+01	1.7E+01	0.02
11.59	4500.00	0.50	21.0	0.45	1.5E+01	1.5E+01	0.03

No. of Trials	Sample Type	Max. Density (pcf)	Compaction %	Sample Orientation
3	Bag	N/A	N/A	Vertical

L = length of sample in cm
A = area of sample in cm²

H = constant head in cm
t = time in seconds

A = 856.34 cm²
L = 16.51 cm

Uncorrected k (cm/sec) = 1.6E+01

Permeability, k at 20 °C = **1.6E+01** cm/sec

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

4941

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 4 day Nov month 2002 year

MATERIAL TYPE: 57 Stone SAMPLE NO.: 6D02-4

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		5B-1	Big bowl
WT. OF DRY SAMPLE PLUS TARE	(grams)	6726.9	6926.5
WT. OF TARE	(grams)	296.4	574.0
WT. OF DRY SAMPLE	(grams)	6430.5	6352.5

SIEVE ANALYSIS

QA ID: LS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	0	~~100~~ 0	100	
1½"	37.50	0	0	100	100
1"	25.00	39.3	0.6	99.4	95-100
¾"	19.00	634.7	9.9	90.1	
½"	12.50	3831.9	59.6	40.4	25-60
⅜"	9.50	5652.7	87.9	12.1	
#4	4.75	6304.9	98.0	2.0	0-10
#8	2.36	6324.4	98.4	1.6	0-5
#16	1.18	6333.3	98.5	1.5	
#30	0.60	6336.6	98.5	1.5	
#50	0.30	6337.8	98.6	1.4	
#100	0.15	6339.3	98.6	1.4	
#200	0.075	6342.6	98.6	1.4	
PAN		6343.6	98.6	1.4	

000186

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

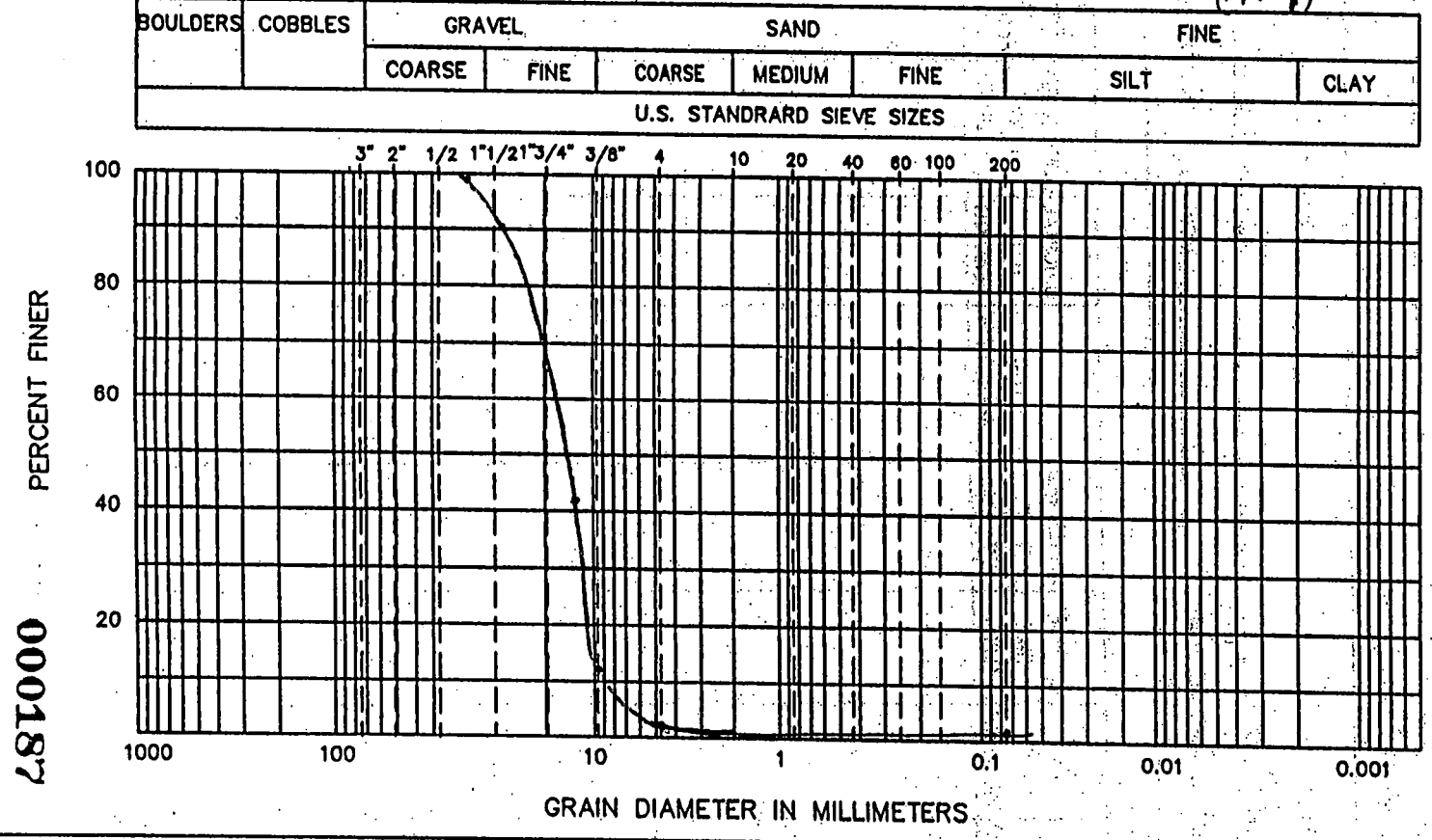
MATERIAL TYPE: #57 Stone

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 4 day Nov month 2003 year

SAMPLE NO.: GD02-4 QA ID: CJ

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{14}{9.0} = 1.56$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{(11)^2}{(14 \times 9)} = 0.96$



ATTERBERG LIMITS

(LL) .....

(PL) N/A

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.4
3/4-in.	90.1
1/2-in.	40.4
3/8-in.	12.1
NO. 4	2.0
NO. ~~10~~ 8	1.6
NO. ~~20~~ 16	1.5
NO. ~~40~~ 30	1.5
NO. ~~60~~ 50	1.4
NO. 100	1.4
NO. 200	1.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	

SOIL CLASSIFICATION (ASTM D 2487): GP Poorly graded Gravel

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: CJ

SHEET NO. 2 OF 2

000187

494.1

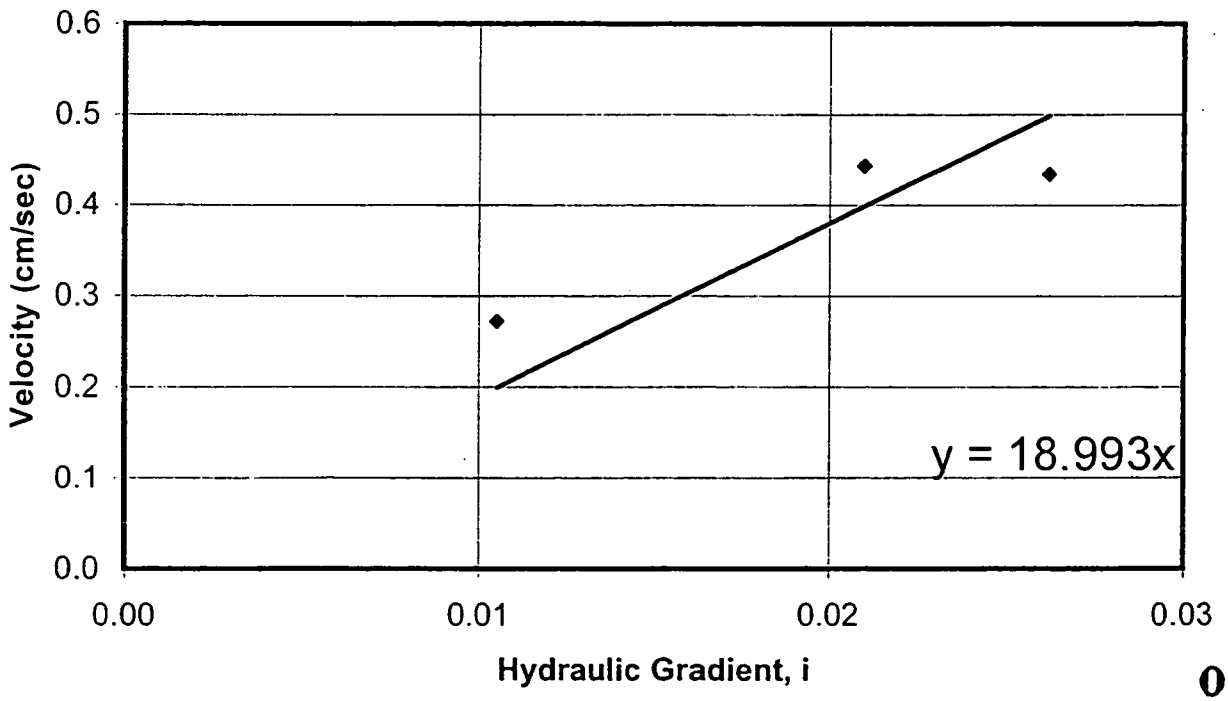
GeoTesting Express

HYDRAULIC CONDUCTIVITY

Project No.	*GTX-G0392*	Tested By	*HJ*
Project Name	*Golder Perm*	Test Date	*11/08/02*
Boring No.	*N/A*	Reviewed By	*JW*
Sample No.	*GD02-4*	Review Date	*11/08/02*
Sample Depth	*N/A*		
Sample Description	*Gravel*		

ASTM D2434-68 Constant Head Permeability

Sample Type:	*Bag*
Sample Orientation:	*Vertical*
Initial Water Content, %:	*0.0*
Wet Unit Weight, pcf:	*92.1*
Dry Unit Weight, pcf:	*92.1*
Compaction, %:	*N/A*
Hydraulic Conductivity, cm/sec. @20° C:	***1.9E+01***



4941

GeoTesting Express

PERMEABILITY TEST - Constant Head
(ASTM D2434 - 68)

Project No. GTX-G0392
Project Name Golder Perm
Location N/A
Sample No. GD02-4
Sample Depth N/A
Sample Description Gravel

Tested By HJ
Test Date 11/08/02
Reviewed By JW
Review Date 11/08/02
Lab No. 7702

Sample Data

Length, in		Diameter, in		Pan No.	
Location 1	7.500	Location 1	13.000	Wet Soil + Pan, grams	24080.00
Location 2	7.500	Location 2	13.000	Dry Soil+Pan, grams	24080.00
Location3	7.500	Location 3	13.000	Pan Weight, grams	0.00
Average	7.500	Average	13.000	Moisture Content, %	0.0
		Sample wet weight, grams	24080.00	Wet Unit Wt, pcf	92.1
		Membrane, Cap weight, gram	0.00	Dry Unit Wt, pcf	92.1

Time (sec)	Q (cm³)	H (cm)	Temp °C	v (cm/sec)	k (cm/sec)	k (cm/sec) 20 °C	i (cm/cm)
9.69	2260.00	0.20	20.0	0.27	2.6E+01	2.6E+01	0.01
9.91	3760.00	0.40	20.0	0.44	2.1E+01	2.1E+01	0.02
11.25	4180.00	0.50	20.0	0.43	1.7E+01	1.7E+01	0.026

No. of Trials	Sample Type	Max. Density (pcf)	Compaction %	Sample Orientation
3	Bag	N/A	N/A	Vertical

L = length of sample in cm
A = area of sample in cm²

H = constant head in cm
t = time in seconds

A = 856.34 cm²
L = 19.05 cm

Uncorrected k (cm/sec) = 1.9E+01

Permeability, k at 20 °C = **1.9E+01** cm/sec

CARBONATE CONTENT- AGGREGATES
ASTM D 3042

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	023-3313
REMARKS	Per client request, the acid used had a pH of 4.

SAMPLE ID	FM02-1	GD02-1	FM02-2
Date	4/5/02	5/28/02	6/20/02
Tested by	DA/TJ	TJ	TJ
Checked by			
Reviewed by			
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.06	0.05	0.02
2	0.11	0.05	0.02
3	0.05	0.05	0.01
AVERAGE	0.07	0.05	0.02

SAMPLE ID	FM02-4	FM02-6	-
Date	6/20/02	7/2/02	
Tested by	TJ	TJ	
Checked by		DA	
Reviewed by		PWM	
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.35	0.08	-
2	0.09	0.04	-
3	0.97	0.01	-
AVERAGE	0.47	0.04	-

CARBONATE CONTENT- AGGREGATES
ASTM D 3042

4941

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	023-3313
REMARKS	Per client request, the acid used had a pH of 4.

SAMPLE ID	FM02-15	FM02-19	FM02-20
Date	8/21/02	10/15/02	11/14/02
Tested by	TJ	TJ	TJ
Checked by			
Reviewed by			
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.14	0.24	0.07
2	0.11	0.12	0.06
3	0.09	0.14	0.05
AVERAGE	0.11	0.17	0.06

SAMPLE ID	GD02-2	GD02-3	GD02-4
Date	8/9/02	8/21/02	11/5/02
Tested by	TJ	TJ	TJ
Checked by			
Reviewed by			
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.03	0.04	0.05
2	0.02	0.12	0.03
3	0.03	0.18	0.14
AVERAGE	0.03	0.11	0.07

000191

Pipe Embedment Fill

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: PHIV	SUBMITTAL NO. 20104-PHIV--02215-001	Rev. 0	DATE: 6/11/02	Page 1 of 4

FROM:
FLUOR FERNALD

SIGNATURE: [signature] 6/11/02

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

RECEIVED BY: Susan Schwab DATE: 6/17/02

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
7	PHIV-02215-001	0							X		Certification and test results for embedment fill material from Welch Sand & Gravel - Ross, OH		X		02215-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE	64				
GREGG JOHNSON	64				
BILL ZEBICK	64				
MIKE GODBER (APPROVER)	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

NO COMMENTS: COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

RECEIVED BY: [signature] DATE: 6/18/02
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

000193

4941

ORIGINAL

FS-F-4955

4941

WELCH

SAND & GRAVEL, INC.
10217 COLUMBIA STREET, HARRISON, OHIO 45030-9751

PHONE (513) 353-3220
FAX (513) 353-3225

June 6, 2002

Fluor Daniel Fernald
P.O. Box 538704
Cincinnati, OH 45253

Attn: Sam Wolinsky

Dear Sam:

Please be advised that Welch Sand & Gravel is supplying 703.06 embedment fill sand for Fernald projects, P.O. #02FF0704/0561.

This sand has been tested in accordance with ASTMC136 procedures and meets the gradation analysis enclosed for 703.06 material.

Sincerely,

Gene Gillespie
Mgr., Aggregate Sales

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: _____ Date: 6/18/02

INFORMATION ONLY

000194

4941

Welch Sand & Gravel, Inc.

10217 Columbia Street, Harrison, Ohio 45030-9751 Phone: (513)353-2220

AGGREGATE TEST DATA AND RESULTS

PROJECT NO. Fernald On Site Disposal Facility
COUNTY Hamilton DATE 06/05/02
Contractor Fluor Daniel Plant Location Ross
Coarse Agg. Size/Type _____ Source _____ Sample No. ___
Fine Agg. Size/Type 703.06 Source Stock Pile Sample No. ___

COARSE AGGREGATE SIEVE ANALYSIS

*Sieve Sizes	Grams Retained	Percent Retained	Percent Passing	Specifications
2 1/2"				
2"				
1 1/2"				
1"				
3/4"				
1/2"				
3/8"				
No. 4				
No. 8				
No. 16				
No. 100				
PAN			xxxxxxxx	xxxxxxxx
TOTAL			xxxxxxxx	xxxxxxxx

FINE AGGREGATE SIEVE ANALYSIS

*Sieve Sizes	Grams Retained	Percent Retained	Percent Passing	Specifications
3/8"				
No. 4	158	5.8	94.2	90-100
No. 8				
No.16				
No. 30				
No. 50	1681	61.9	32.3	7-40
No. 100				
No. 200	842	31.0	1.3	0-10
PAN	31	1.3	xxxxxxxx	xxxxxxxx
TOTAL	2712	100.0	xxxxxxxx	xxxxxxxx

FINENESS MODULUS (F.M.) =

OTHER TESTS OR REMARKS: _____

*Note: Other sieve sizes may be written in if needed.

Sample Tested By: Lee Gillespie

Certification No. 977

000195

4941

~~EXAMPLE~~ CERTIFICATION STATEMENT
FOR FEMP GRANULAR MATERIAL PURCHASE

I certify that the material offered under this quotation from our #3 Quarry located at Ross Plant meets the requirements specified in technical specification section 02215.
11489 Hamilton Cleves Hwy.

SIGNATURE & COMPANY NAME

Gene Gillespie
Welch Sand & Gravel

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

494

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 60134 TASK NO.: 04

DESCRIPTION: Phase IV DATE: 9 day April month 2002 year

MATERIAL TYPE: Sand SAMPLE NO.: EBS02-01

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		L-4	L-4
WT. OF DRY SAMPLE PLUS TARE	(grams)	861.9	858.7
WT. OF TARE	(grams)	145.4	145.4
WT. OF DRY SAMPLE	(grams)	716.5	713.3

SIEVE ANALYSIS

QA ID: KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
3/8"	9.5	0	0	100	
#4	4.75	0	0	100	90-100
#8	2.36	22.9	3.2	96.8	
#16	1.18	164.2	22.9 ~~23.0~~	77.0 77.1	
#30	0.600	405.7	56.6 ~~56.9~~	43.1 43.4	
#50	0.300	660.4	92.2 ~~92.6~~	7.4 7.8	7-40
#100	0.150	708.5	98.9 ~~99.3~~	0.7 1.1	
#200	0.075	713.1	99.5 100	0 0.5	0-10
Pan	—				

000197

%FINER = 100 − Σ% RETAINED

©GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: [signature] SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: 04.1

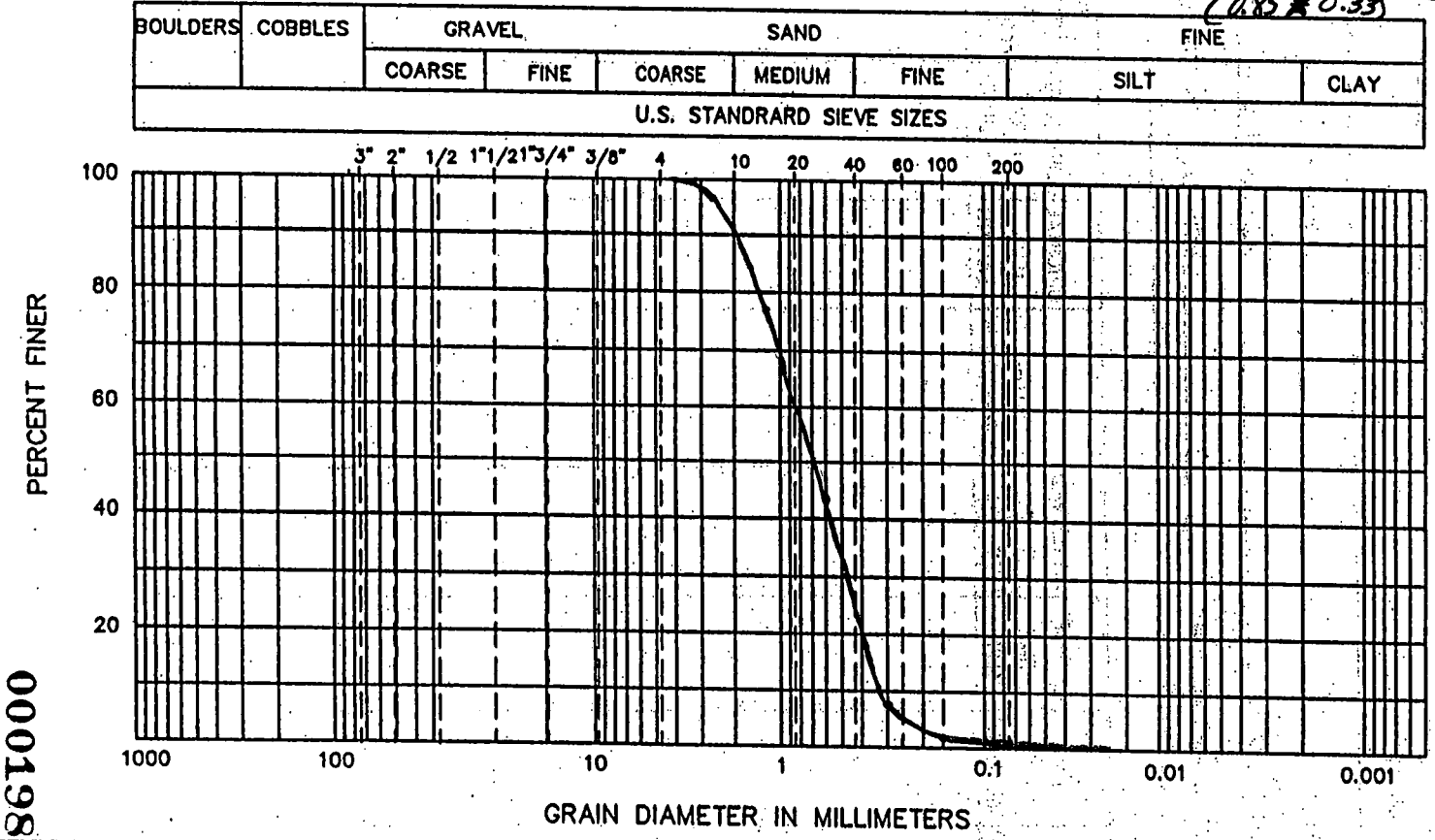
DESCRIPTION: Phase IV

DATE: 9 day April month 2002 year

MATERIAL TYPE: Embedment Sand

SAMPLE NO.: EBSQ2-1 QA ID: CL

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{0.85}{0.33} = 2.56$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{(0.47)^2}{(0.85 \times 0.33)} = 0.79$



ATTERBERG LIMITS

(LL) .....

(PL) N/A

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	100
1/2-in.	100
3/8-in.	100
NO. 4	100
NO. ~~10~~ 8	96.8
NO. ~~20~~ 16	77.1
NO. ~~40~~ 30	43.4
NO. ~~60~~ 50	7.8
NO. 100	1.1
NO. 200	0.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	

SOIL CLASSIFICATION (ASTM D 2487): SP - Poorly graded Sand

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: CL

SHEET NO. 2 OF 2

0001198

404

Riprap

Type C Dumped Rockfill

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104

CONTRACT NO: PHIV

SUBMITTAL NO. 20104-PHIV--02271-001 | REV.: 1 | DATE: 4/18/02 | Page 1 of 4

FROM:
FLUOR FERNALD

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

SIGNATURE: [signature] 4/18/02

RECEIVED BY: Teresa Schwab DATE: 4/23/02

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
7	PHIV-02271-001	1						X			Source of Type C Rip Rap and Test Results demonstrating materials meet requirements of 02271 and ODOT		X	X	02271-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
~~ECDC~~	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	64				
BILL ZEBICK	64				
MIKE GODBER	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

NO COMMENTS: COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

RECEIVED BY: [signature] DATE: 4/25/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

0002001

7-4941

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

ORIGINAL

4941

NEW POINT STONE CO., INC.

992 S COUNTY ROAD 800 E
GREENSBURG, IN 47240
PHONE (812) 663-2021 FAX (812) 662-6088

April 17, 2002

Flour Fernald Inc.
ATTN: Chuck VanArsdall
PO Box 538704
Cincinnati, OH 45253

RE: Flour Daniel Fernald
PO #02FF0596
Type C Rip Rap Submittals

Dear Chuck,

We submit the following information with regard to above mentioned project:

1. SOURCE- The source of the Rip Rap is New Point Stone Co., Inc.992 S County Road 800 E, Greensburg, IN 47240. This quarry is located in Decatur County in Southeastern Indiana just North of the Interstate 74 Exit no 143. The Rip Rap will be processed from ledges 1-5 as designated by the Indiana Department of transportation. The New Point Quarry is designated as source #2536 by INDOT and is a Certified Aggregate Producer (Q952002). The New Point Quarry is listed as an approved source in the Parsons (1996) University of Cincinnati Report.
2. METHOD-Gradation of the type C Rip Rap will be achieved by processing the stone through a Jaw Crusher with an open side setting to restrict the largest sizes to under 18 inches. This material will then be screened over a heavy-duty screen to remove fines and approximately 10 inch and smaller material. In this manner the material smaller than 6 inches will consist predominantly of rock spalls
3. RESULTS- Attached are test results for specific gravity and absorption conducted in accordance with ASTM C127
4. CERTIFICATION- Attached is certification that material meets requirements.

I hope that these submittals meet your approval.

INFORMATION ONLY

Sincerely,

John R. Wanstrath

John R. Wanstrath, Sec./Treas.
New Point Stone Co., Inc.

(X) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Date: 4/25/02

Attachments:

MATERIAL CERTIFICATION

The type C Limestone Rip Rap from the New Point Quarry, New Point Stone Co., Inc. meets the material requirements as specified by Fluor Daniel Fernald. In Particular those requirements are:

1. Bulk Specific Gravity of at least 2.60
2. Maximum absorption of ~~2.0~~ 0.83 per cent. Per ASTM C127
3. Gradation of ODOT Type C Rip Rap, per section 601.07

April 17, 2002

Ric Fullenkamp
INDOT Certified Aggregate Technician

April 17, 2002

John R. Wanstrath, Sec-Treas.
New Point Stone Co., Inc.

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: PHIV	SUBMITTAL NO. 20104-PHIV--02271-002	Rev. 1	DATE: 4/18/02	Page 1 of 3

FROM:
FLUOR FERNALD

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

SIGNATURE: 4/18/02

RECEIVED BY: Teresa Schwab DATE: 4/23/02

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
7	PHIV-02271-002	1							X		Certification from supplier that Type C Rip Rap meets the material requirements of 02271 and ODOT		X		02271-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
~~ECDC~~	52-7				
~~CHUCK VANARSDALE~~	64				
GREGG JOHNSON	64				
BILL ZEBICK	64				
MIKE GODBER (APPROVER)	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

NO COMMENTS: ____ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

RECEIVED BY: Michael W. Godber DATE: 5/24/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

000204

FS-F-4955
Rev. 3: 05/14/1999. CT-2.4.2

NEW POINT STONE CO., INC.

4941

992 S COUNTY ROAD 800 E
GREENSBURG, IN 47240
PHONE (812) 663-2021 FAX (812) 662-6088

April 17, 2002

Flour Fernald Inc.
ATTN: Chuck VanArsdall
PO Box 538704
Cincinnati, OH 45253

RE: Flour Daniel Fernald
PO #02FF0596
Type C Rip Rap Submittals

Dear Chuck,

We submit the following information with regard to above mentioned project:

1. SOURCE- The source of the Rip Rap is New Point Stone Co., Inc.992 S County Road 800 E, Greensburg, IN 47240. This quarry is located in Decatur County in Southeastern Indiana just North of the Interstate 74 Exit no 143. The Rip Rap will be processed from ledges 1-5 as designated by the Indiana Department of transportation. The New Point Quarry is designated as source #2536 by INDOT and is a Certified Aggregate Producer (Q952002). The New Point Quarry is listed as an approved source in the Parsons (1996) University of Cincinnati Report.
2. METHOD-Gradation of the type C Rip Rap will be achieved by processing the stone through a Jaw Crusher with an open side setting to restrict the largest sizes to under 18 inches. This material will then be screened over a heavy-duty screen to remove fines and approximately 10 inch and smaller material. In this manner the material smaller than 6 inches will consist predominantly of rock spalls
3. RESULTS- Attached are test results for specific gravity and absorption conducted in accordance with ASTM C127
4. ✓ CERTIFICATION- Attached is certification that material meets requirements.

I hope that these submittals meet your approval.

INFORMATION ONLY

Sincerely,

John R. Wanstrath

John R. Wanstrath, Sec./Treas.
New Point Stone Co., Inc.

(X) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: Date: 4/24/02

Attachments:

DMTE - 5
SOURCE
FIELD OFFICE (3) Q6/18

INDIANA DEPARTMENT OF TRANSPORTATION
DIVISION OF MATERIALS AND TESTS
SUMMARY OF PRODUCTION QUALITY RESULTS

JUNE 12, 2001

SOURCE NEW POINT STONE COMPANY 2536
992 S CR RD 800 E GREENSBURG, IN 472-10 Q952002

LAB NUMBER	DATE SAMPLED	SIZE NUMBER	REMARKS	BULK SP.G.	LA WEAR PCT	BRINE LOSS PCT	SS LOSS PCT	FT LOSS PCT	QUAL RTNG
01-7-0870-01282	01-05-01	8 STONE	LED 1-3	2.675	24.66			2.31	AI
01-7-0870-01280	01-05-01	8 STONE	LED 1-5	2.651	29.57			6.32	AI
01-7-0870-01287	01-05-01	53 STONE	LED 1-5	2.642	30.97			5.11	DI

THIS IS A CATEGORY II SOURCE, SUBCATEGORY A. SOURCE INACTIVE DATE IS 04-05-02.

FOR LEDGE QUALITY TEST RESULTS SEE SUMMARY LETTER DATED AUGUST 5, 1985.

SOURCE IS APPROVED TO SUPPLY AGGREGATES TO CONTRACTS SPECIFYING TYPE AP FROM LEDGES 1-3; EXCLUSIVELY. RE-TEST DATE IS 09-09-03.

THIS REPORT IS NOT INTENDED TO BE USED FOR ADVERTISING.

MKP

David H. Andrusek
for CHIEF, DIVISION OF MATERIALS AND TESTS

RECEIVED JUN 15 2001
By

JIM
TOM
DAVE

GLEN
DUCER

4941

000206

MATERIAL TEST RESULTS

4941

DATE: September 7, 2001
SOURCE: New Point Quarry Source #2536
LEDGES 1-5

TEST PERFORMED: ASTM C127 Absorption
PROJECT- Fluor Daniel Fernald

	A (DRY)	B (WET)
SUBSAMPLE 1 WEIGHT	4,195.3	4,201.2
SUBSAMPLE 2 WEIGHT	7,492.0	7,507.3
SUBSAMPLE 3 WEIGHT	8,137.5	8,155.6
SUBSAMPLE 4 WEIGHT	10,438.7	10,561.9
SUBSAMPLE 5 WEIGHT	8,205.8	8,214.1
SUBSAMPLE 6 WEIGHT	7,324.2	7,331.1
SUBSAMPLE 7 WEIGHT	10,530.0	10,610.3
TOTAL SAMPLE	56,323.5	56,581.5

ABSORPTION, % = (B-A) / A X 100

$$\text{ABSORPTION } .458\% = \frac{56{,}581.5 - 56{,}323.5}{56{,}323.5} \times 100$$

Ric Fullenkamp
INDOT Certified Aggregate Technician

Type D Dumped Rockfill

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: PHIV	SUBMITTAL NO. 20104-PHIV--02271-002	REV.: 0	DATE: 4/09/02	Page 1 of 2

FROM:
FLUOR FERNALD

SIGNATURE: SH Wolinsky 4/9/02

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

RECEIVED BY: Teresa Schwab DATE: 4/10/02

			DOCUMENT FAMILY									SUBMITTAL TYPE				SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	DRFT	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
6	PHIV-02271-002	0							X		Certification from supplier that rip rap meets the material requirements of 02271 and ODOT		X		02271	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE	64				
DON PFISTER - DOE	45				
BILL ZEBICK	64				
MIKE GODBER (APPROVER)	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				

NO COMMENTS: _____ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

RECEIVED BY: _____ DATE: _____

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

002009

FS-F-4955

ORIGINAL

4941

Hanson

Hanson Aggregates
Davon, Inc.
4281 Roush Road
Hillsboro
OH 45133
Tel (937) 393-4211
Fax (937) 364-2509

April 4, 2002

Mr. Randy Ector
Fluor Fernald, Inc.
U. S. DOE c/o Fluor Fernald
7400 Willey Road
Hamilton, Ohio 45013

Re: Inquiry on Type D Rip Rap for use at Fernald Site

Dear Randy:

The source of the Type D Rip Rap we have quoted in accordance with your 3/27/02 solicitation is our Highland Stone Quarry located at 4281 Roush Road, Hillsboro, Ohio.

This letter is our certification that the Type D Rip Rap at the Highland Stone Quarry is produced to be in conformance with Type D Rock Fill specified in item 601.07 and 703.04(3) of the State of Ohio, Department of Transportation, Construction and Material Specifications, January 1, 1997. Further, the material offered will have a maximum loss of 15% from a sodium sulfate soundness test conducted in accordance with ASTM D5240 and a maximum loss of 50% in a Los Angeles Abrasion test conducted in accordance with ASTM C535.

If anything further is needed, please let me know.

Yours truly,

Robert R. Backer

Robert R. Backer
Sales Representative for
Hanson Aggregates – Davon, Inc.

(X) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: Date: 4/17/02

INFORMATION ONLY

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104

CONTRACT NO: PHIV

SUBMITTAL NO. 20104-PHIV--02271-001

REV.: 0

DATE: 4/10/02

FROM:
FLUOR FERNALD

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

SIGNATURE: 4/10/02

RECEIVED BY: Glenna Kraus DATE: 4/15/02

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
7	PHIV-02271-001	0						X			Source of rip rap and test results demonstrating materials meet requirements of 02271 and ODOT		X		02271-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	64				
BILL ZEBICK	64				
MIKE GODBER	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

NO COMMENTS: _____ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

RECEIVED BY: Chuck C. VanArsdale DATE: 4/18/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

ORIGINAL

000211

4941

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

4941

Hanson

Hanson Aggregates
Midwest, Inc.
209 Old Harrods Creek Road
P.O. Box 436329
Louisville
KY 40253-6329
Tel (502) 244-7550
Fax (502) 244-7555

April 9, 2002

Mr. Randy Ector
Fluor Fernald, Inc.
U. S. DOE c/o Fluor Fernald
7400 Willey Road
Hamilton, Ohio 45013

Re: Type D Rip Rap for general use at Fernald

Dear Randy:

This letter is a follow up to our certification letter of April 4, 2002 and reinforces our statement that the Type D Rip Rap produced at the Highland Stone Quarry meets the Sodium Sulfate Soundness requirement and the Los Angeles requirement mentioned in your inquiry.

The state does not run gradations on Rip Rap and they establish the physical properties by testing material crushed to smaller sizes than the Rip Rap sizes. Therefore, I am enclosing a three page ODOT report #00595681-01 showing test results on #57 limestone with a Soundness Loss of 2% and a Los Angeles % Loss of 28.5.

If gradation is a concern, a representative of your firm or the associated testing agency working with you at Fernald could come to Highland Stone and visually approve the material.

If anything else is required, let me know.

Yours truly,

Bob Backer

Robert R. Backer
Sales Representative for
Hanson Aggregates- Davon, Inc.

Enclosures

NA - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: [illegible] Date: 4/18/02

INFORMATION ONLY

4941

AGGREGATE TEST

Sample Id: 00595681-01

Sieve	%Pass	Specs
4 in		-
3.5 in		-
3 in		-
2.5 in		-
2 in		-
1.5 in	100	100-100
1 in	100	95-100
3/4 in	98	-
1/2 in	38	25-80
3/8 in	7	-
No. 4	1	0-10
No. 8	1	0-5
No. 10		-
No. 16		-
No. 30		-
No. 40		-
No. 50		-
No. 70		-
No. 100		-
No. 200		-

FA P-200	
Fractured %	
Abrasion Loss %	
Soundness Loss %	2
Dry Rod Lbs/CF	
As Rod Lbs/CF	
Max Dry Wt Lbs/CF	
Opt Moist %	
Freeze Thaw Area	
Silicon Dioxide	

Deleterious	
Shale Marl %	
Chert %	0.10
Limonitic Matl %	
Soft Pieces %	
Clay Lumps %	
Coal %	
Total %	

Specific Gr	2.700
Absorption %	0.67

Test Comments

APPROVED

INV. SIEVE: 1/2"-3/8"= 1.9% | #4= 3.1%>

4941

Ohio Department of Transportation

Sample Id: 00595681-01
Type Insp: QAL
Test Code: 001
AGGREGATE TEST

Sample Origin: 09
Date Sampled: 04/25/2001
Project: -

Prod/Supp: HANSON-FAIRVIEW
City: FAIRVIEW
State: OH
P/S Cd: 04815-01
Mix Plant:
City:
State:
M/P Cd: -

Material: 57 CR STONE 57/02
Material Cd: 025057
Desc 1:
Consign To:
Sampled Fm: S.P.
Resp Loc: TL

Entl: E
Desc 2:
Nbr Items: 0
Mfg Cntl #: 087690
Lab: AG TL - AGGREGATE

Representn: 0
Unit: TON
Desc 3:
Proj Asgn Qty: 0
Non-Proj Asgn: 0

Shipped: 04/27/2001
Test Start: 05/02/2001
Test Result: APPQ

Received: 04/27/2001
Est Compl: 05/23/2001
Authorized: 05/01/2001

Actual Compl: 05/01/2001
By: CENKG1

LA. ABRASION TEST

TIME: 10:54 10:54

DATE: 2/26/2001

AGG SIZE: 57'S

GELOGICAL FORMATION: HIGHLAND STONE

QUARRY LOCATION:

THICKNESS OF LEDGE:

	ASTM C-131			
GRADING	ORIGINAL WEIGHT	FINAL WEIGHT	DIFFERENCE	%LOSS
B	5,000.0	3,577.4	1,422.6	28.5

JOB I.D.

COMMENT:

4941

000215

Gravity Inlet Structures (GIS)

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104

CONTRACT NO: PHIV

SUBMITTAL NO. 20104-PHIV--02721-004 | REV.: 0 | DATE: 3/18/02

FROM:
FLUOR FERNALD

SIGNATURE: 3/18/02

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

RECEIVED BY: Teresa Schwab DATE: 3/21/02

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
7	PHIV-02721-004	0							X		Manufacturer's certification that culverts, gravity inlet structures, & joint material meet material requirement of 02721		X		~~MS4122~~ 02721	~~X~~	X	

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE	64				
DON PFISTER - DOE	45				
BILL ZEBICK	64				
MIKE GODBER (APPROVER)	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				

NO COMMENTS: X COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

SEE CHUCK VAN ARSDALE COMMENTS

RECEIVED BY: Michael W. Godber DATE: 3/25/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

000217

4941

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

ORIGINAL

4941

ST REGIS CULVERT INC.
202 Morrell Street • Charlotte, MI 48813

FAXED
MAR 13 2002

Fluor Fernard

Attention: Weezie

Fax: (517) 648-4964

200 FT / 36" 16 GA ALUMINIZED TYPE II
36" HUGGER BANDS

180 FT / 42" 16 GA ALUMINIZED TYPE II
42" HUGGER BANDS

INFORMATION ONLY

The above material meets the following specifications:

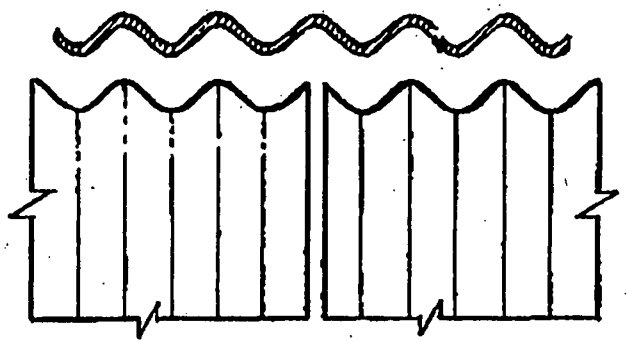
1. **AASHTO M247 / ASTM A 929 (ALUMINIZED STEEL TYPE 2 MATERIAL).**
2. **AASHTO M36 / ASTM A 760 (CONDUIT, PIPE).**
3. **AASHTO STANDARD BRIDGE DESIGN SPECIFICATIONS, SECTION 12 (STRUCTURAL DESIGN) AND ASTM A 796.**
4. **FOLLOW ASTM A 798 (INSTALLATION).**

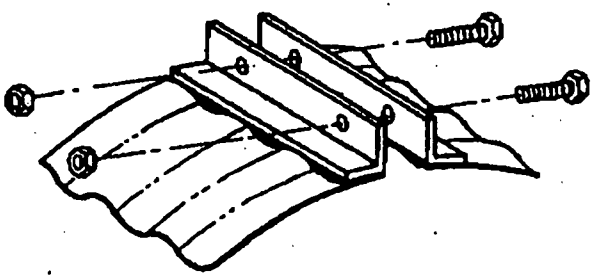
CCV COMMENTS
- NEED SIGNATURE ON THIS PAGE.
- INCLUDE "O-RINGS" ON MATERIAL PROVIDED THAT MEET SPECIFICATIONS

MG 4/2/02

(X) A - Conforms to the Subcontract Requirements
(X) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: ~~M. Gal~~ Michael Mifolla Date: ~~3/19/02~~ MG 4/2/02

ANNULAR BAND



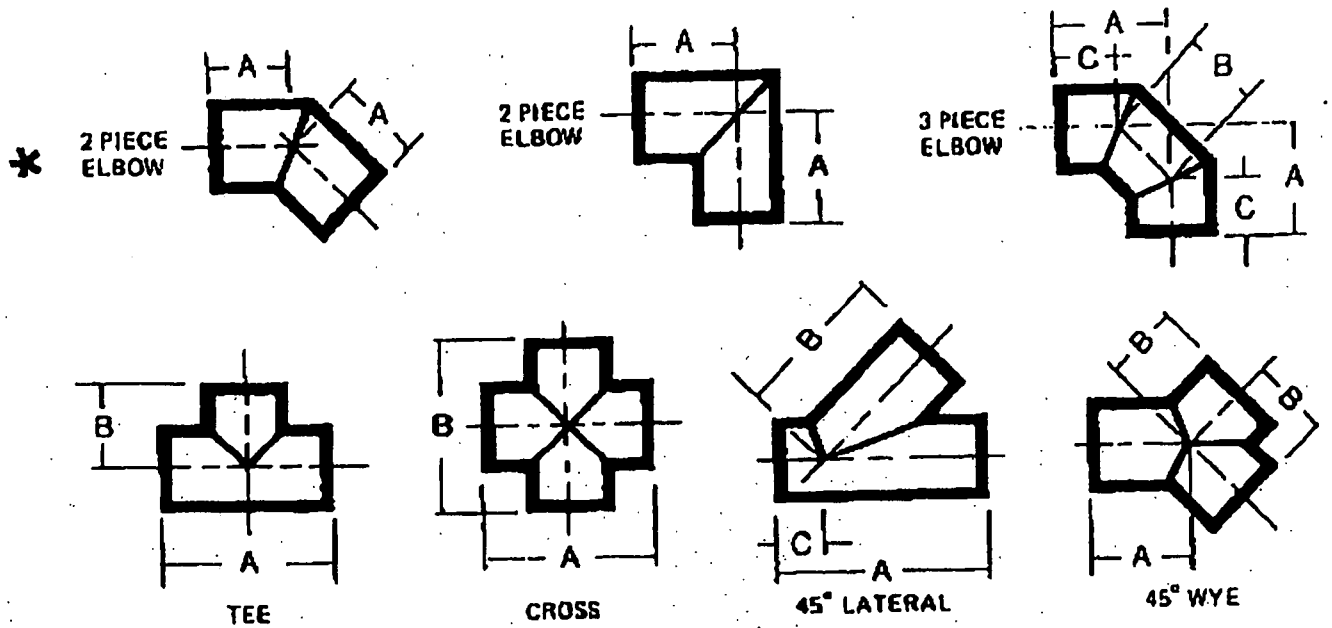


Band Angle Connector

ST REGIS CULVERT INC.

4941

FITTINGS FOR CORRUGATED STEEL PIPE



Diameter	Gauge	Degree
36"	16	30
36"	16	30

Aluminized Type II Corrugated Steel Pipe
Specifications: AASHTO M274/ASTM A 929
AASHTO M36/ASTM A 760
AASHTO Standard Bridge Design
Section 12
ASTM A 798

ST REGIS
CULVERT INC.

000220

SUPPLIER DOCUMENT SUBMITTAL

NS 6/17/02

FDF PROJECT NO.: 20104	CONTRACT NO: PHIV	SUBMITTAL NO. 20104-PHIV-02721-004	REV.: ~~0~~ 1	DATE: 6/3/02	Page 1 of 3

FROM: AEROCRETE

SIGNATURE: Lyn Landrum (Sign here)

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

RECEIVED BY: Teresa Schwab DATE: 6/17/02

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
7	PHIV-02721-004 NS 6/17/02	1 ~~0~~							X		Manufacturer's certification the Gravity Inlet Structures meet the material requirements of 02721		X		02721-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE	64				
MIKE GODBER (APPROVER)	64				
KWASI BABU-TWENEBOAH	38				

NO COMMENTS: _____ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

RECEIVED BY: [signature] DATE: 6/12/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

000221

4941

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

ORIGINAL

C478 CERTIFICATION

See attached letter from Aerocrete's engineers

1941

CARDINAL

ENGINEERING
ARCHITECTURE
LAND SURVEYING

November 25, 1992

Mr. William Hasank, President
Aerocrete
5660 Limaburg Road
Burlington, Kentucky 41005

RE: Manhole Reinforcing

Dear Bill:

During the review of your shop drawings, I compared the reinforcing to A.S.T.M. Designation C478 "Standard Specification for Precast Reinforced Concrete Manhole Sections".

Section 8.1.1.2. requires that "the circumferential reinforcement may consist of either one or two lines of steel, the total area per vertical foot of which shall not be less than 0.0025 times the inside diameter in inches". This represents 0.12 square inches per vertical foot of manhole riser for a 48" diameter manhole.

Section 8.1.1.6 allows "the spacing center to center of circumferential reinforcement in a cage shall not exceed 6 inches". This 0.12 square inches per vertical foot of pipe translates into a 6 x 6 x W 2.9 x W 2.9 wire mesh cage, (overlaps shall be 40 diameters and include a vertical member).

Likewise, Section 8.3.1. requires a layer of reinforcement in the 6" thick base slab of 0.12 inches square per linear foot in both directions. (6 x 6 x W 2.9 x W 2.9 wire fabric).

The Sanitation District specifications for "Manhole Hole Alternate" require a floor thickness of minimum 6 inches with mesh reinforcement of 0.40 square inches per square foot both ways. This 0.40 square inches of steel is provided by placing #4 bars on a 6" grid both ways.

ONE MOOCK ROAD
WILDER, KENTUCKY
41071 (606) 581-9600
FAX: (606) 581-9636

INFORMATION ONLY

(X) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: Date: 6/12/02

000223

The Kentucky Department of Transportation standards for manhole bases require #4 bars on 12" centers both ways resulting in 0.20 square inch of reinforcing per lineal foot or 0.20 square inches per square foot of reinforcing.

Clearly, the reinforcing as required by the Sanitation District is the most restrictive and will be the basis of your shop drawings.

Flat top slabs (Section 8.4.2. of the A.S.T.M. specs) are required to have 0.12 square inches of reinforcements in both directions and additional steel of 0.20 square inches at 90 degrees to reinforce the opening. Kentucky Department of Transportation standards require a 4" grid of # 6 bars opposed to #4 bars in the top flat slab.

The 4" x 4" grid of #6 and #4 bars is the most restrictive and will be used in the design.

Enclosed are the shop drawings which reflect the most restrictive designs which meet the requirements of A.S.T.M. C478, Sanitation District No. 1 of Campbell and Kenton Counties, and the Kentucky Department of Transportation specifications.

Very truly yours,

David K. Noran, P.E., L.S.
President

DKN:nmr

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20.	CONTRACT NO: PHIV	SUBMITTAL NO. 20104-PHIV-02721-005	REV.: 3	DATE: 11/14/02	Page 1 of 5

FROM:
DeBra- Kuempel

SIGNATURE: Chuck C. VanArsdale 11/14/02

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

RECEIVED BY: Teresa Schwab DATE: 11/15/02

			DOCUMENT FAMILY									SUBMITTAL TYPE				SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	DRFT	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
7	PHIV-02721-005A	0						X			Shop Drawings for culverts at Sedimentation Basin #		X		02721-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	64				
BILL ZEBICK	64				
MIKE GODBER	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

NO COMMENTS: X COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

000225

RECEIVED BY: Chuck C. VanArsdale DATE: 12/4/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

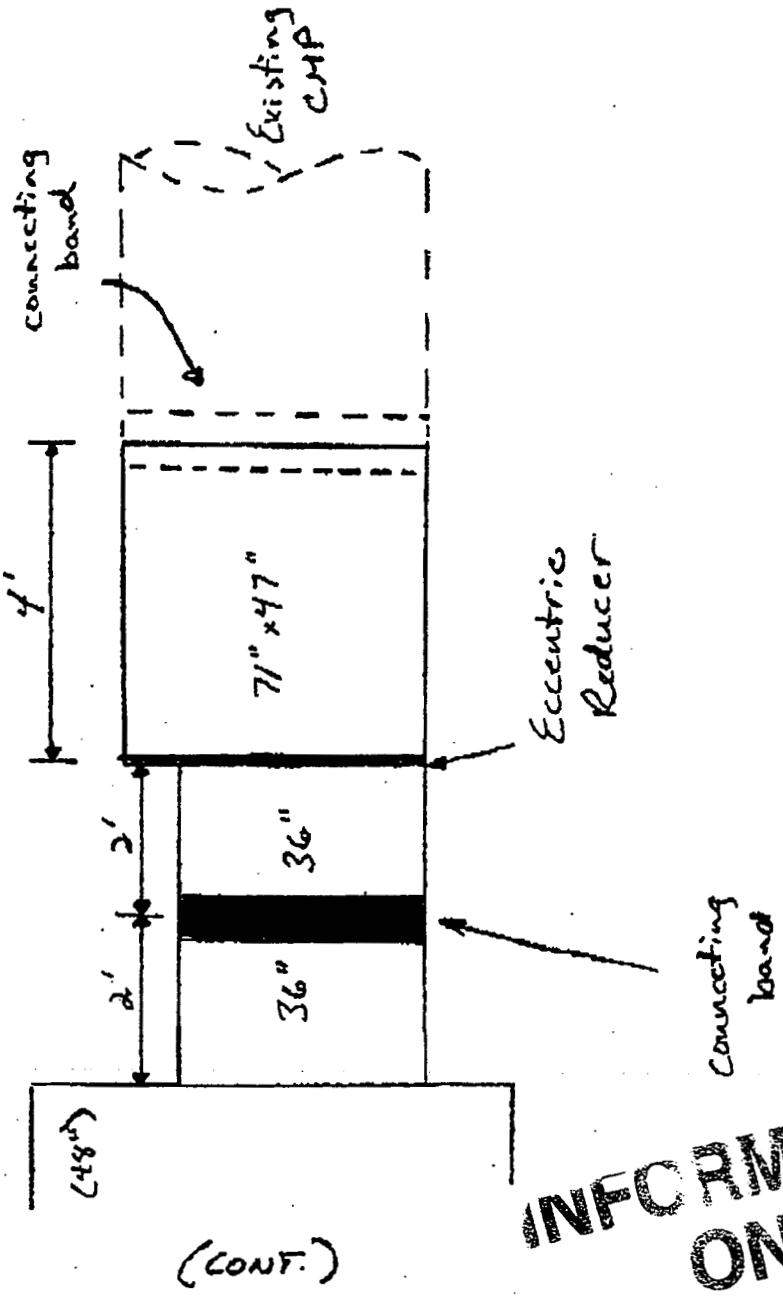
4941

ORIGINAL

① 4941

CONTECH
CONSTRUCTION PRODUCTS INC.

- FERNALD PLANT
- DEBRA-KUEMPEL



INFORMATION ONLY

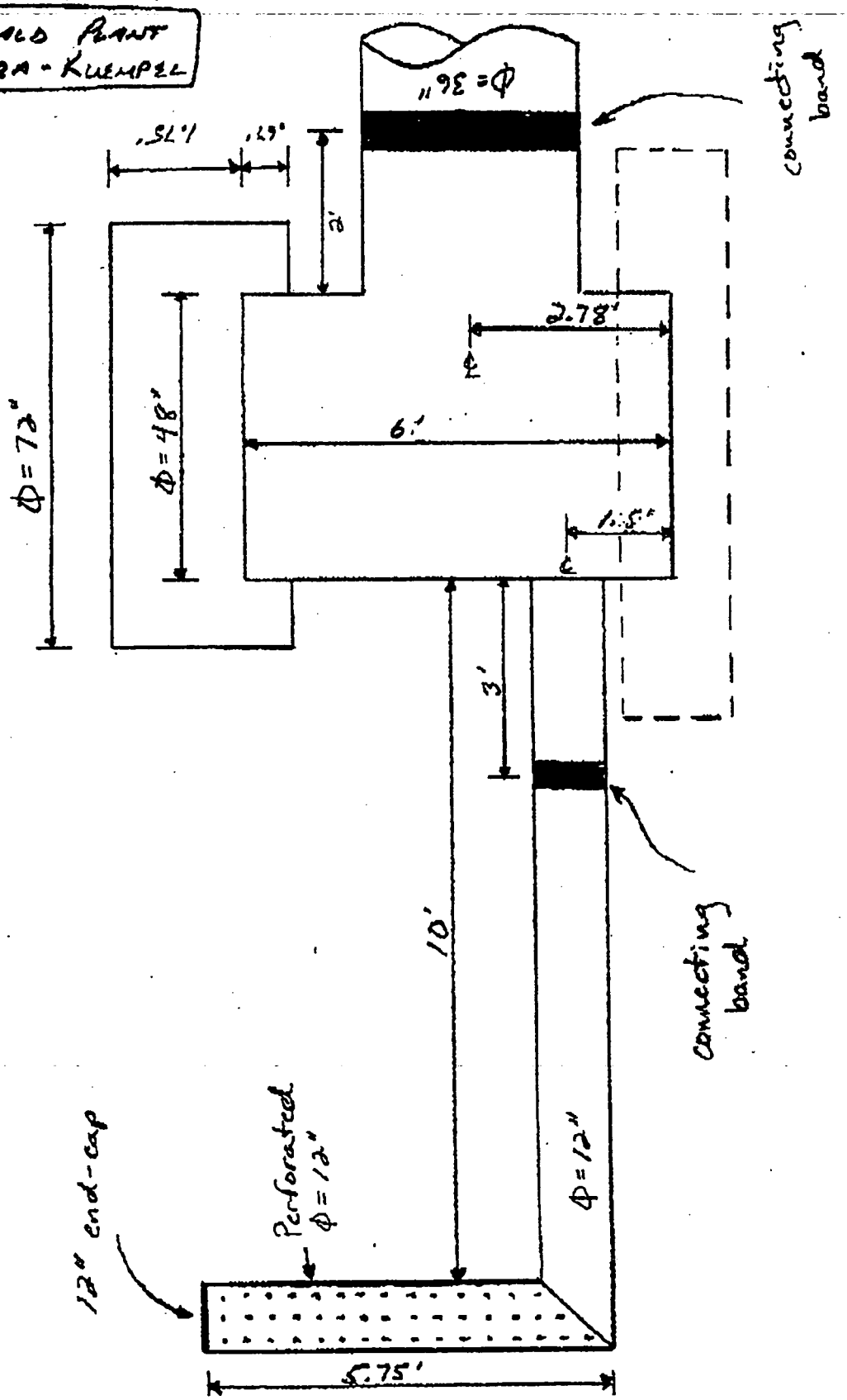
[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [signature] Date: 12/13/02
11-11-02

(2)

4941

CONTECH
CONSTRUCTION PRODUCTS INC.

- FERNALD PLANT
- DEBRA - KUEMPEL



11-11-02

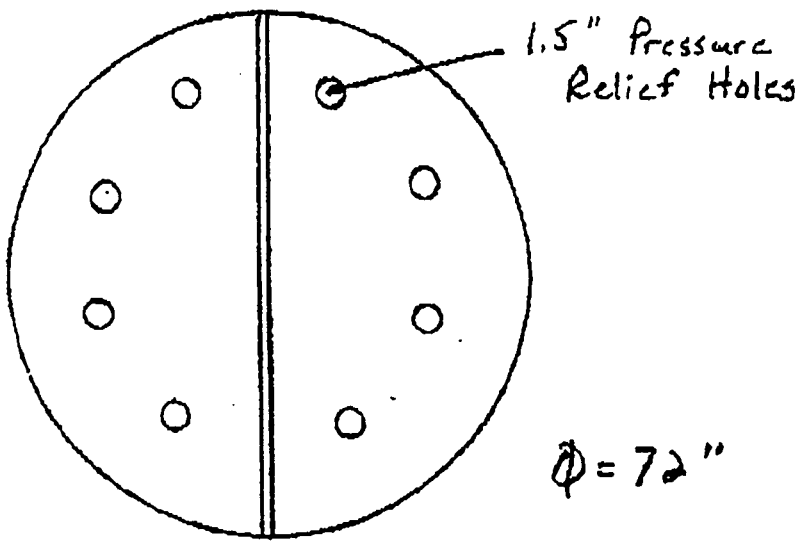
000227

(3)

4941

CONTECH
CONSTRUCTION PRODUCTS INC.

- FERNALD PLANT
- DEBRA-KUEMPEL

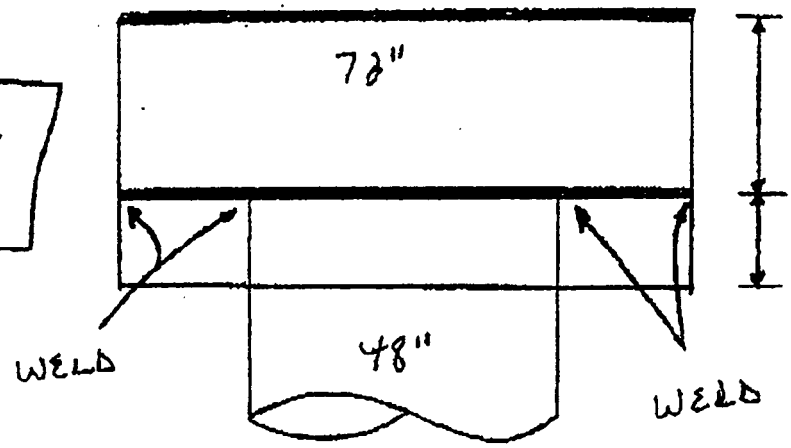


11-11-02

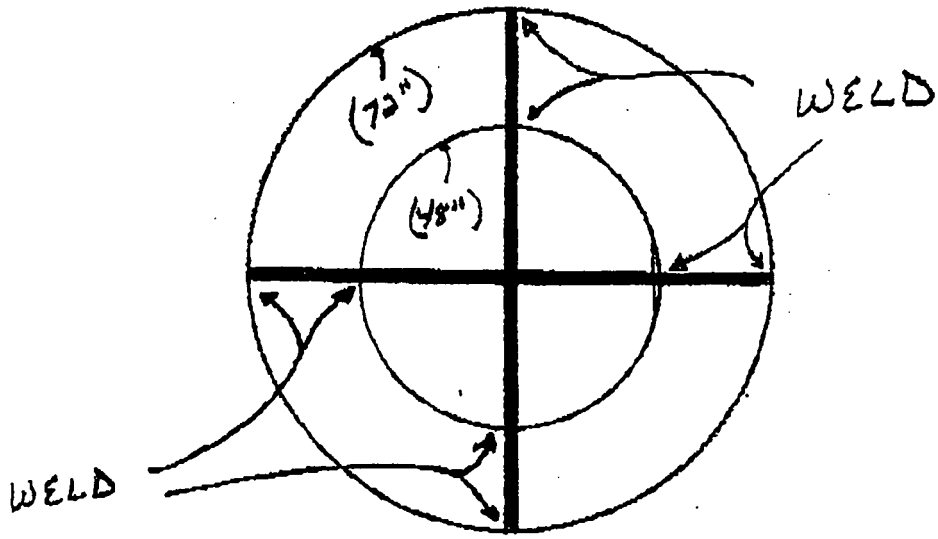
CONTECH
CONSTRUCTION PRODUCTS INC.

(4) 4941

72" TRASH RACK
SUPPORT BEAMS



-FERNALD-PLANT
-DEBRA-KUEMPEL



000229

11-13-02

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20...	CONTRACT NO: PHIV	SUBMITTAL NO. 20104-PHIV-02721-005	REV.: 2	DATE: 8/7/02	Page 1 of 2

FROM:
Aerocrete Precast Corporation

SIGNATURE: Chuck C. VanArsdale 8/7/02

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

RECEIVED BY: Susan Schwab DATE: 8/8/02

			DOCUMENT FAMILY									SUBMITTAL TYPE				SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	DRFT	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
7	PHIV-02721-005	2						X			Shop Drawings for Gravity Inlet Structure		X		02721-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	64				
BILL ZEBICK	64				
MIKE GODBER	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

NO COMMENTS: _____ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

ORIGINAL

000230

RECEIVED BY: Chuck C. VanArsdale DATE: 8/16/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
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4941

FS-F-4955

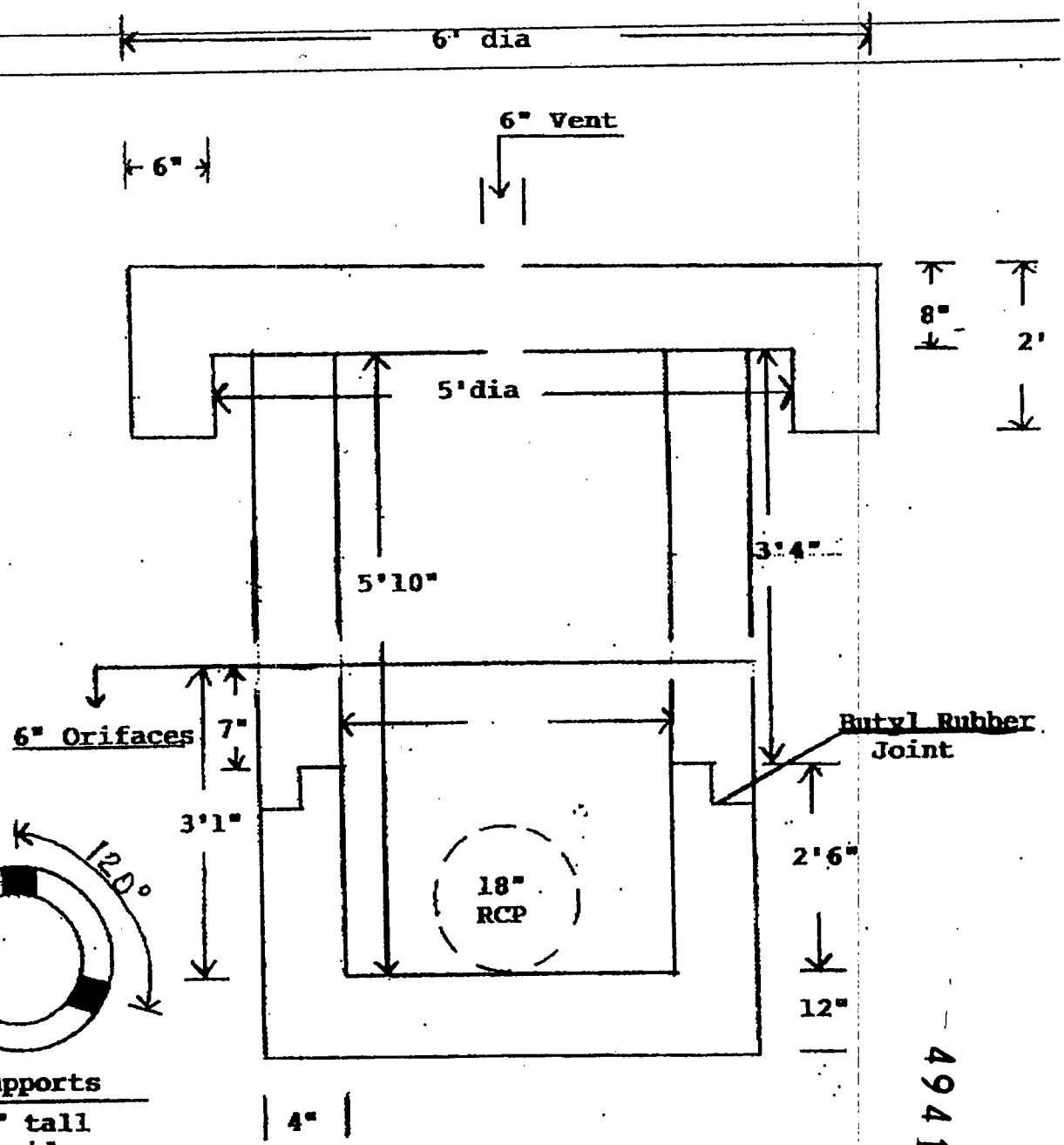
SPECIFICATIONS
4000 MIX CONCRETE

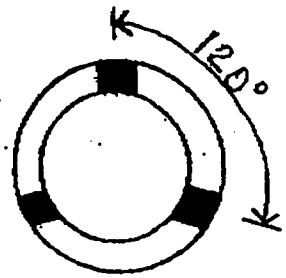
REINFORCMENT (PER ASTM C478)
#4 REBAR
6x6 WIRE MESH

Lifting & Handling Devices
(Supplied By Aerocrete, if needed)
Base - 3 ea 1" lift eye & sling
Section - Manhole Bar
Top - 3 ea 1" lift eye & Sling

Approximate Weights
Base - 2,840 lb
Section - 1,680 lb
Top - 4,800 lb

ECDC CONTROLLED
COPY NO. 76896





3 Supports
1'6" tall
12" wide
4" thick

ANTI-VORTEX
AEROCRETE PRECAST CORP
BURLINGTON, KY 41005
(859) 371-8800

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 8/16/02

000231

4941

Topsoil

GEOSYNTEC/FLUOR FERNALD/OH
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth	Soil Classi-fication	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Organic Content (%)	Additional Tests Conducted (See Notes)
					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer 0.002 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)		
TS02-1	Bag	-	(CL)	-	-	-	-	-	-	-	-	-	-	-	-	-	3.5	-
TS02-2	Bag	-	(CL)	-	-	-	-	-	-	-	-	-	-	-	-	-	5.4	-
TS02-3	Bag	-	(CL)	-	-	-	-	-	-	-	-	-	-	-	-	-	4.2	-
TS02-4	Bag	-	(CL)	-	-	-	-	-	-	-	-	-	-	-	-	-	4.6	-
TS02-5	Bag	-	(CL)	-	-	-	-	-	-	-	-	-	-	-	-	-	4.5	-
TS02-6	Bag	-	(CL)	-	-	-	-	-	-	-	-	-	-	-	-	-	4.6	-
TS02-7 South	Bag	-	(CL)	-	-	-	-	-	-	-	-	-	-	-	-	-	4.9	-
TS02-8 North	Bag	-	(CL)	-	-	-	-	-	-	-	-	-	-	-	-	-	4.0	-

ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

Golder Associates Inc.

ORGANIC CONTENT (PERCENT ORGANICS)

ASTM D 2974

Method C

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	TS02 - 1
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
REMARKS		SAMPLE DEPTH	-

Hygroscopic Moisture Content

Tare Number	
Weight Of Wet Soil & Tare (gm)	
Weight Of Dry Soil & Tare (gm)	
Weight of Tare (gm)	
Weight Of Water In (gm)	
Weight Of Dry Soil (gm)	
Moisture Content (%) Mc_H	

Crucible Number		G	F	E
Weight Of Soil Dry & Crucible	(W1)	52.48	51.87	50.83
Weight After Burning & Crucible	(W2)	51.41	50.64	49.62
Weight Of Crucible	(W3)	21.85	16.57	17.54
Weight Of Soil Dry	$(W4 = W1-W3)/Mc_H$	30.63	35.30	33.29
Weight After Burning	(W5 = W2-W3)	29.56	34.07	32.08
Weight Lost	(W6=W4-W5)	1.07	1.23	1.21
Ash Percent	W7 = (W5/W4)*100	96.5%	96.5%	96.4%
Organics Percent	(W8 = 100-W7)	3.5%	3.5%	3.6%

ORGANIC CONTENT = 3.5%

Description: Grayish Brown, SILTY CLAY, some fine sand.

USCS: (CL)

TECH	TJ/DA
DATE	4/5/02
CHECK	BLS
REVIEW	PWM

ORGANIC CONTENT (PERCENT ORGANICS)

ASTM D 2974

Method C

1941

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	TS02 - 2
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
REMARKS		SAMPLE DEPTH	-

Hygroscopic Moisture Content

Tare Number	
Weight Of Wet Soil & Tare (gm)	
Weight Of Dry Soil & Tare (gm)	
Weight of Tare (gm)	
Weight Of Water In (gm)	
Weight Of Dry Soil (gm)	
Moisture Content (%) Mc_H	

Crucible Number		G	F	E
Weight Of Soil Dry & Crucible	(W1)	49.77	48.23	50.13
Weight After Burning & Crucible	(W2)	48.03	46.56	48.49
Weight Of Crucible	(W3)	17.61	17.14	19.59
Weight Of Soil Dry	$(W4 = W1-W3)/Mc_H$	32.16	31.09	30.54
Weight After Burning	(W5 = W2-W3)	30.42	29.42	28.90
Weight Lost	(W6=W4-W5)	1.74	1.67	1.64
Ash Percent	W7 = (W5/W4)*100	94.6%	94.6%	94.6%
Organics Percent	(W8 = 100-W7)	5.4%	5.4%	5.4%

ORGANIC CONTENT = 5.4%

Description: Dark Gray, SILTY CLAY, some fine sand.

USCS: (CL)

TECH	TJ/DA
DATE	4/5/02
CHECK	BGS
REVIEW	KWM

ORGANIC CONTENT (PERCENT ORGANICS)

ASTM D 2974

Method C

4941

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	TS02 - 3
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
REMARKS		SAMPLE DEPTH	-

Hygroscopic Moisture Content

Tare Number	
Weight Of Wet Soil & Tare (gm)	
Weight Of Dry Soil & Tare (gm)	
Weight of Tare (gm)	
Weight Of Water In (gm)	
Weight Of Dry Soil (gm)	
Moisture Content (%) Mc_H	

Crucible Number		G	F	E
Weight Of Soil Dry & Crucible	(W1)	47.11	45.96	40.84
Weight After Burning & Crucible	(W2)	45.90	44.71	39.83
Weight Of Crucible	(W3)	19.12	16.21	16.73
Weight Of Soil Dry	$(W4 = W1-W3)/Mc_H$	27.99	29.75	24.11
Weight After Burning	(W5 = W2-W3)	26.78	28.50	23.10
Weight Lost	(W6=W4-W5)	1.21	1.25	1.01
Ash Percent	W7 = (W5/W4)*100	95.7%	95.8%	95.8%
Organics Percent	(W8 = 100-W7)	4.3%	4.2%	4.2%

ORGANIC CONTENT = 4.2%

Description: Dark Gray, SILTY CLAY, some fine sand.

USCS: (CL)

TECH	TJ/DA
DATE	4/5/02
CHECK	BS
REVIEW	AWM

000236

ORGANIC CONTENT (PERCENT ORGANICS)

ASTM D 2974

Method C

4941

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	TS02 - 4
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
REMARKS		SAMPLE DEPTH	-

Hygroscopic Moisture Content

Tare Number	
Weight Of Wet Soil & Tare (gm)	
Weight Of Dry Soil & Tare (gm)	
Weight of Tare (gm)	
Weight Of Water In (gm)	
Weight Of Dry Soil (gm)	
Moisture Content (%) Mc_H	

Crucible Number		N	O	P
Weight Of Soil Dry & Crucible	(W1)	47.46	48.29	47.83
Weight After Burning & Crucible	(W2)	46.12	46.93	46.37
Weight Of Crucible	(W3)	18.25	18.69	16.74
Weight Of Soil Dry	$(W4 = W1-W3)/Mc_H$	29.21	29.60	31.09
Weight After Burning	(W5 = W2-W3)	27.87	28.24	29.63
Weight Lost	(W6=W4-W5)	1.34	1.36	1.46
Ash Percent	W7 = (W5/W4)*100	95.4%	95.4%	95.3%
Organics Percent	(W8 = 100-W7)	4.6%	4.6%	4.7%

ORGANIC CONTENT = 4.6%

Description: Olive Brown, SILTY CLAY, some fine sand.

USCS: (CL)

TECH	TJ/DA
DATE	4/5/02
CHECK	[illegible]
REVIEW	PWM

000237

ORGANIC CONTENT (PERCENT ORGANICS)

ASTM D 2974

Method C

4941

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	TS02 - 5
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
REMARKS		SAMPLE DEPTH	-

Hygroscopic Moisture Content

Tare Number	
Weight Of Wet Soil & Tare (gm)	
Weight Of Dry Soil & Tare (gm)	
Weight of Tare (gm)	
Weight Of Water In (gm)	
Weight Of Dry Soil (gm)	
Moisture Content (%) Mc_H	

Crucible Number		H	J	L
Weight Of Soil Dry & Crucible	(W1)	47.79	49.52	49.07
Weight After Burning & Crucible	(W2)	46.40	48.13	47.61
Weight Of Crucible	(W3)	17.27	17.82	17.58
Weight Of Soil Dry	$(W4 = W1-W3)/Mc_H$	30.52	31.70	31.49
Weight After Burning	(W5 = W2-W3)	29.13	30.31	30.03
Weight Lost	(W6=W4-W5)	1.39	1.39	1.46
Ash Percent	W7 = (W5/W4)*100	95.4%	95.6%	95.4%
Organics Percent	(W8 = 100-W7)	4.6%	4.4%	4.6%

ORGANIC CONTENT = 4.5%

Description: Dark Gray, SILTY CLAY, some fine sand.

USCS: (CL)

TECH	TJ/DA
DATE	4/5/02
CHECK	
REVIEW	

000238

ORGANIC CONTENT (PERCENT ORGANICS)

ASTM D 2974

Method C

1941

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	TS02 - 6
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
REMARKS		SAMPLE DEPTH	-

Hygroscopic Moisture Content

Tare Number	
Weight Of Wet Soil & Tare (gm)	
Weight Of Dry Soil & Tare (gm)	
Weight of Tare (gm)	
Weight Of Water In (gm)	
Weight Of Dry Soil (gm)	
Moisture Content (%) Mc_H	

Crucible Number		E	F	W
Weight Of Soil Dry & Crucible	(W1)	48.58	47.53	48.59
Weight After Burning & Crucible	(W2)	47.21	46.05	47.21
Weight Of Crucible	(W3)	19.12	16.23	17.55
Weight Of Soil Dry	$(W4 = W1-W3)/Mc_H$	29.46	31.30	31.04
Weight After Burning	(W5 = W2-W3)	28.09	29.82	29.66
Weight Lost	(W6=W4-W5)	1.37	1.48	1.38
Ash Percent	W7 = (W5/W4)*100	95.3%	95.3%	95.6%
Organics Percent	(W8 = 100-W7)	4.7%	4.7%	4.4%

ORGANIC CONTENT = 4.6%

Description: Olive Brown, SILTY CLAY, some fine sand.

USCS: (CL)

TECH	TJ/DA
DATE	4/5/02
CHECK	BBS
REVIEW	PWM

ORGANIC CONTENT (PERCENT ORGANICS)

ASTM D 2974

Method C

4941

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	TS02 - 7 South
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
REMARKS		SAMPLE DEPTH	-

Hygroscopic Moisture Content

Tare Number		34
Weight Of Wet Soil & Tare (gm)		67.13
Weight Of Dry Soil & Tare (gm)		67.00
Weight of Tare (gm)		3.20
Weight Of Water In (gm)		0.13
Weight Of Dry Soil (gm)		63.80
Moisture Content (%)	Mc_H	0.20

Crucible Number		H	L	W
Weight Of Soil Dry & Crucible	(W1)	48.80	49.44	50.21
Weight After Burning & Crucible	(W2)	47.28	47.81	48.51
Weight Of Crucible	(W3)	17.27	17.57	17.54
Weight Of Soil Dry	$(W4 = W1-W3)/Mc_H$	31.47	31.81	32.60
Weight After Burning	(W5 = W2-W3)	30.01	30.24	30.97
Weight Lost	(W6=W4-W5)	1.46	1.57	1.63
Ash Percent	W7 = (W5/W4)*100	95.4%	95.1%	95.0%
Organics Percent	(W8 = 100-W7)	4.6%	4.9%	5.0%

ORGANIC CONTENT = 4.9%

Description: Olive Brown, SILTY CLAY, some fine sand.

USCS: (CL)

TECH	TJ
DATE	5/29/02
CHECK	[illegible]
REVIEW	PWM

000240

ORGANIC CONTENT (PERCENT ORGANICS)

ASTM D 2974

Method C

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	TS02 - 8 North
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
REMARKS		SAMPLE DEPTH	-

Hygroscopic Moisture Content

Tare Number		A
Weight Of Wet Soil & Tare (gm)		67.81
Weight Of Dry Soil & Tare (gm)		67.57
Weight of Tare (gm)		3.26
Weight Of Water In (gm)		0.24
Weight Of Dry Soil (gm)		64.31
Moisture Content (%)	Mc_H	0.37

Crucible Number		H	L	W
Weight Of Soil Dry & Crucible	(W1)	51.33	54.80	48.29
Weight After Burning & Crucible	(W2)	49.94	53.32	46.95
Weight Of Crucible	(W3)	19.58	21.84	16.56
Weight Of Soil Dry	$(W4 = W1-W3)/Mc_H$	31.63	32.84	31.61
Weight After Burning	(W5 = W2-W3)	30.36	31.48	30.39
Weight Lost	(W6=W4-W5)	1.27	1.36	1.22
Ash Percent	W7 = (W5/W4)*100	96.0%	95.9%	96.1%
Organics Percent	(W8 = 100-W7)	4.0%	4.1%	3.9%

ORGANIC CONTENT = 4.0%

Description: Olive Brown, SILTY CLAY, some fine sand.

USCS: (CL)

TECH	TJ
DATE	5/29/02
CHECK	BZS
REVIEW	PWM

APPENDIX F

Manufacturer's Quality Control Documentation

Fluor Fernald/Manufacturer Submittals

Geosynthetic Clay Liner

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO: 104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02772P-001	REV.: 0	DATE: Nov9, 2001

FROM:
CETCO

SIGNATURE: Wm Yuchik

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

RECEIVED BY: Jennifer Smith DATE: 11/13/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02772P-001	0						X	X		GCL Product Name		X	X	02772P.1.04.A.1	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Chuck VanArsdale - Approver	64				
Gregg Johnson	64				
Bill Zebick	64				
Mike Godber	64				
Kwasi Badu-Tweneboah	38				

NO COMMENTS: COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

ORIGINAL

RECEIVED BY: Chuck VanArsdale DATE: 11/16/01

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

000245

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

4941

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: [illegible] Date: 11/16/01

CETCO
LINING TECHNOLOGIES
geosynthetic clay liners

4941

November 9, 2001

1440-OPT2-02772P-001

Subject: Fluor Fernald Geosynthetic Clay Liner

INFORMATION ONLY

GCL Product Name

The Geosynthetic Clay Liners product name will be Bentomat ST manufactured by CETCO.

Signed,

William Urchik
Product Development Engineer
CETCO

1500 Shure Drive • Arlington Heights, Illinois 60004 • 800-527-9948 • FAX 847-577-5571
www.CETCO.com

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104

CONTRACT NO: 1440

SUBMITTAL NO. 20104-1440/2-02772P-002

REV.: 0

DATE: Nov9, 2001

FROM:
CETCO

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

SIGNATURE: WM Yuchik

RECEIVED BY: Jennifer Goldhart DATE: 11/13/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02772P-002	0						X			Daily Production Capacity			X	02772P.1.04.A.2	X		

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Gregg Johnson	64				
Bill Zebick	64				
Mike Godber	64				
Kwasi Badu-Tweneboah	38				

NO COMMENTS: _____ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

ORIGINAL

RECEIVED BY: Chuck C. Van Arsdale DATE: 11/16/01

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
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DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

000247

4941

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

CETCO
LINING TECHNOLOGIES
geosynthetic clay liners

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: _____ Date: 11/16/01

4941

November 9, 2001

1440-OPT2-02772P-002

INFORMATION ONLY

Subject: Fluor Fernald Geosynthetic Clay Liner

GCL MANUFACTURER'S CORPORATE BACKGROUND AND MANUFACTURING CAPACITIES

CETCO has been manufacturing reinforced geosynthetic clay liners for over five years. CETCO has manufactured over 250,000,000 square feet of reinforced geosynthetic clay liner. Please accept this as confirmation that CETCO will meet the delivery schedule for this project

CETCO has two manufacturing plants in the United States. One in Fairmount, Georgia and another in Lovell, Wyoming. They have a combined annual capacity of over 100,000,000 square feet which translates to a daily production capacity of over 200,000 square feet.

Yours truly,

William A. Urchik
Product Development Engineer
CETCO

1500 Shure Drive • Arlington Heights, Illinois 60004 • 800-527-9948 • FAX 847-577-5571
www.CETCO.com

SUPPLIER DO. .IENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02772P-003	REV.: 0	DATE: Nov9 , 2001	Page 1 of 3

FROM:
CETCO

SIGNATURE: Wm Urchek

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

RECEIVED BY: [signature] DATE: 11/13/01

			DOCUMENT FAMILY									SUBMITTAL TYPE				SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	DRFT	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
6	1440-OPT2-02772P-003	0							x		Manufacturer's Quality Control ~~MQA~~ Procedures		x		02772P.1.04.A.3	X		
											QS 11/13/01							

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Chuck VanArsdale	64				
Kwasi Badu-Tweneboah	38				
Bill Zebick	64				

NO COMMENTS: ✓ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

ORIGINAL

000249

RECEIVED BY: [signature] DATE: 19 November 2001

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

James T. Turner
for Michael W. Godber

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

FS-F-4955

4941

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: James T. Carver / A. Michael W. Godber Date: 19 Nov. 20

November 9, 2001

1440-OPT2-02772P-003

Subject: Fluor Fernald Geosynthetic Clay Liner

Manufacturer's MQA Procedures

Yours truly,

William A. Urchik
Product Development Engineer
CETCO

INFORMATION ONLY

1500 Shure Drive • Arlington Heights, Illinois 60004 • 800-527-9948 • FAX 847-577-5571
www.CETCO.com

CETCO GCL

MANUFACTURING QUALITY ASSURANCE AND QUALITY CONTROL MANUAL

Version 6.0, January 2001

CONFIDENTIALITY NOTICE

This manual contains confidential company information and is to be distributed exclusively to those personnel who are directly involved with the manufacturing and evaluation of Bentomat. THIS DOCUMENT SHALL NOT BE PUBLICLY DISTRIBUTED WITHOUT THE EXPRESS CONSENT (VERBAL OR WRITTEN) OF COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY.

1500 W. Shure Drive • Arlington Heights, IL 60004 • USA • (847) 392-5800 • FAX (847) 577-5571
A wholly owned subsidiary of AMCOL International

The information and data contained herein are believed to be accurate and reliable. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.

POLICY STATEMENT

The Geosynthetic Clay Liner (GCL) Manufacturing Quality Assurance/Quality Control Manual has been prepared by Colloid Environmental Technologies Company (CETCO), a wholly owned subsidiary of AMCOL International, Inc. This policy states that our primary goal is to achieve optimum productivity while assuring full customer satisfaction. To reach this goal, CETCO is committed to the pursuit of continuous improvement of all processes and materials utilized in the manufacture of GCL.

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A wholly owned subsidiary of AMCOL International

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SECTION 1

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INTRODUCTION

1.1 Definitions

This manual contains objectives and criteria for maintaining CETCO Geosynthetic Clay Liner (GCL) *Manufacturing Quality Control* and *Manufacturing Quality Assurance* as defined below:

Manufacturing Quality Control (MQC) refers to a planned system of inspections for directly monitoring and controlling the quality of the GCL product during the manufacturing process. MQC is performed by CETCO to ensure that the specified values for GCLs are achieved.

Manufacturing Quality Assurance (MQA) refers to a planned system of activities that provide assurance that the manufactured GCLs product actually meets its specified properties.

The above definitions, provided by Koerner and Daniel,* imply that MQC procedures are implemented to control the product *during* manufacture, while MQA procedures are implemented to ensure the product meets specifications *after* manufacture. CETCO GCLs are assembled from three component materials, meaning that there are *four* materials streams (two geosynthetics, the clay, and the finished product) which are subject to either MQA or MQC. Quality control procedures are implemented on those components and finished products which are manufactured by CETCO. Quality assurance procedures are implemented on the components of GCL that are furnished by outside suppliers. Therefore, this manual contains an integrated series of procedures that may be classified as both MQA and MQC, as determined by the source of the component materials.

The organizational structure of the CETCO GCL MQA/MQC Program is depicted in Figure 1-1. The "core" quality personnel are shown in the center of the diagram, with peripheral quality support provided by the other personnel. For each project, the CETCO GCL Sales Manager is the key liaison between the manufacturer and the engineer, and any special MQA/MQC issues which deviate from this manual should be communicated between these two parties prior to production for the project. Figure 1-2 presents the Order Review Process for discrepancies between contract specifications and CETCO standard GCL specifications.

1.2 MQA/MQC Objectives

CETCO GCLs are utilized in a wide variety of important environmental and engineering applications which often provide protection of human health and the environment from contaminated soil or water. Accordingly, CETCO GCLs have been designed with certain engineering properties which make it suitable for use in these critical applications. The quality of CETCO GCLs has a direct influence on the degree of

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environmental protection they provide. It is therefore of paramount importance that the entire manufacturing process for CETCO GCLs is tightly controlled and monitored through the implementation of a comprehensive quality program.

This manual establishes the manufacturing guidelines and product testing procedures necessary to ensure that CETCO GCLs meet all of their design specifications. Where applicable, established ASTM sampling and testing methodologies and protocols for GCLs or its components are specified for use.

The remainder of this manual is presented in three sections. Section 2 contains test procedures for GCLs and each of its components, and Section 3 describes the record keeping and reporting procedures which will document adherence to this plan and will verify the overall quality of the product. Lastly, Section 4 presents in tabular form an overall summary of the manufacturing QA/QC program.

1.3 Revisions

Because one of CETCO's corporate commitments is continual product improvement, the procedures specified in this manual may require some modifications as such improvements occur. Interim revisions to the existing manual will be issued as required, and the manual itself will be updated and reissued on a regular basis to incorporate recent revisions. It is every employee's responsibility to remain abreast of the continued revisions to the quality program.

1.4 Audits

Formal internal audits of the GCL manufacturing quality program will be conducted annually by CETCO in order to determine the adequacy of quality procedures and the degree of conformance with these procedures. Informal audits will be conducted on an as-needed basis by plant management.

Results of the audits will be distributed to the CETCO Management Representative, to the Plant Manager and to corporate management. If the audit reveals that major corrective actions are required to achieve conformance with quality objectives, a quality improvement plan will be prepared and submitted to the CETCO Management Representative. A file of all audits and corrective action plans will be maintained by CETCO. Implementation of the quality improvement plan will be managed by the CETCO Management Representative and/or Plant Manager.

* Koerner, R.M. and D.E. Daniel (1992) *Manufacturing and Construction Quality Control and Quality Assurance of Geosynthetic* Proceedings of the 6th GRI Seminar: MQC/MQA and COC/COA of Geosynthetics, December 10-11, 1992, Philadelphia, PA, pp. 1 14.

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SECTION 2

MQA/MQC PROCEDURES

This section of the CETCO GCL Manufacturing QA/QC Manual describes specific procedures carried out to evaluate the quality of each GCL component (top geosynthetic, bottom geosynthetic, bentonite clay), the quality of the actual production process, and the quality of the finished GCL product. This program allows immediate verification of critical production parameters used to monitor production quality, while the laboratory test program will verify the specified engineering characteristics of the GCL.

2.1 Geosynthetic Components

Depending upon the type of GCL the top and bottom geosynthetic components may consist either of a woven geotextile, nonwoven geotextile, or flexible membrane liner laminated to a geotextile. ASTM D5889 states the minimum types of tests and their frequencies for the MQC of the geosynthetic materials used in the GCL.

2.1.1 Woven Geotextile

The woven geotextile is manufactured elsewhere and is delivered to the GCL plant in rolls up to 1,500 yards long, depending on the style being used. CETCO receives and maintains on file manufacturer's certifications stating that the products meet the engineering specifications listed in Table 2-1.

Each geotextile roll is labeled with a lot and roll number, and the date and time at which a roll is placed into GCL production is recorded on a daily operating log. This procedure allows the usage of the woven geotextile to be tracked such that its lot and roll number can be directly determined from the corresponding GCL lot and roll number.

If the overall quality of the of the woven geotextile roll is unknown (eg., not certified by the manufacturer, lot and roll tag missing, or the data misplaced) full roll-width samples are obtained at a frequency of one per every 200,000 square feet to confirm that the geotextile is acceptable with respect to its required mass per unit area and grab strength values.

2.1.2 Non-Woven Geotextile

The non-woven needlepunched geotextile is manufactured in rolls up to 1,500 yards long by CETCO or elsewhere and is subjected to conformance tests at the plant of origin prior to delivery to the GCL plant. CETCO receives and maintains on file manufacturer's certifications stating that the products meet the engineering specifications listed in Table 2-1.

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Each geotextile roll is labeled with a lot and roll number, and the date and time at which a roll is placed into GCL production is recorded on a daily operating log. This procedure allows the usage of the woven geotextile to be tracked such that its lot and roll number can be directly determined from the corresponding GCL lot and roll number.

If the overall quality of the of the woven geotextile roll is unknown (eg., not certified by the manufacturer, lot and roll tag missing, or the data misplaced) full roll-width samples are obtained at a frequency of one per every 200,000 square feet to confirm that the geotextile is acceptable with respect to its required mass per unit area and grab strength values.

2.1.3 Flexible Membrane Liner Laminated to Geosynthetic

When a membrane is laminated to the GCL as in the CL Product Series, the membrane shall be subjected to the MQC testing outlined in Table 2-2 either by the supplier or by CETCO.

2.2 Sodium Bentonite

ASTM D5889 identifies the minimum types of tests and their frequencies for the MQC of sodium bentonite prior to incorporation into GCLs. Granular sodium bentonite incorporated into the GCL is supplied by one or more bentonite plants. The bentonite manufacturer provides test data for each shipment received at the GCL plant.

The sodium bentonite is typically railed or conveyed to the GCL plants. Railcars hold approximately 90 tons. The clay testing is therefore performed twice per railcar, but a minimum of every 50 tons. QA procedures for bentonite shipped to the GCL plant primarily involves collecting and maintaining Certificates of Analysis (C.O.A.'s) issued by the bentonite manufacturer with each bentonite shipment.

The quality parameters for the sodium bentonite are its swell index and fluid loss, which are indicators of GCL hydraulic performance. The clay in CETCO GCLs has a minimum swell index of 24 mL/2g, as determined in accordance with ASTM D5890. The clay in CETCO GCLs has a maximum fluid loss value of 18 mL, as determined in accordance with ASTM D5891. A summary of the bentonite MQA parameters is provided in Table 2-3.

Additionally, shipment COAs indicate moisture content and particle sizing. These properties do not pertain to final GCL quality. They pertain to properties needed for efficient processing of the bentonite into the GCL at CETCO plants. They are **not** part of the ASTM D5889 GCL Quality Control.

The CETCO bentonite C.O.A.'s are received and retained at the GCL plant, and the accompanying clay lot numbers are recorded in the operations log using procedures similar to those described in Section 2.1 for the geosynthetic components. In order to coordinate the usage of the certified bentonite and the production of GCL, the lot number and the time/date of use is recorded in the daily log. Thus, the daily

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log allows every roll of GCL to be traced to the bentonite lot number. More information regarding the reporting and record keeping procedures is presented in Section 3.

2.3 Production Processes

The machinery utilized for the production of GCLs is highly controlled, and critical production parameters are automatically monitored. Human input into the manufacturing process is critical, however, to the extent necessary to maintain the machinery and the requisite QA/QC information. As described below, quality control procedures during production focus primarily on maintaining the calibration and operation of the production system.

2.3.1 Punch Density (Bentomat GCLs Only)

Punch density refers to the number of needlepunched fibers per unit area joining the top and bottom geotextiles of the Bentomat GCLs. The correct punch density has been determined to correspond to various operational parameters, which are maintained during production. Calibration of the needling machinery is performed regularly, and Bentomat peel test results provide a quantitative verification that the punch density meets minimum standards.

2.3.2 Lamination (CL/CLT Series)

Lamination refers to bonding the FML to the needlepunched geotextile with an adhesive.

2.3.3 Roll Length and Width

The dimensions of the GCL panels are directly evaluated. Length measurements are made through continuous monitoring by an electronic linear measuring device connected to the wind-up roll at the end of the production line. When the standard length of 150 feet is reached, the roll is cut and prepared for storage or shipment. Periodically, a GCL roll is manufactured to a length of 153 feet such that a full roll-width QA sample may be taken.

It is noted that shorter rolls are produced when production is temporarily suspended for materials re-supply. These short rolls are often useful for completing the square footage requirements for a particular job. The length of all short rolls is recorded as well. The correct width of either 14.5 or 15 feet is maintained by periodic width measurements are made prior to roll-up using a tape measure placed perpendicular to the machine direction of the GCL.

2.3.4 External Markings

GCLs are furnished with two dashed lines ("lap line" at 6 inches and "match line" at 9 inches) on each end of the upper geosynthetic to facilitate its installation. The lines are applied to the finished GCL as it passe

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by a system of rotating stationary inking devices. The ink reservoirs are checked frequently during each shift to ensure an adequate supply during production. Visual observations of lap line placement are also conducted by the shift supervisor. The system is automated and requires few adjustments, although the locations of the lines are measured at a frequency of at least once per shift. The lines on standard rolls of GCL are located within 1/4 inch of the 6 and 9-inch points as measured perpendicular from each edge.

The GCL product is marked with the word "CETCO" to facilitate product identification.

2.3.5 Equipment Inspection

The mechanical equipment and appurtenant devices used in the manufacture of GCL are regularly inspected and maintained in accordance with the overall plant maintenance program.

2.4 Finished GCL

This section of the manual describes the sampling and testing procedures implemented to ensure that each roll of GCL has been manufactured to meet its standard design specifications. **CETCO defines a lot of GCL as one week of production of a product at a particular plant.** ASTM D5889 outlines the minimum types of tests and their frequency for the MQC of the finished GCL. Besides the clay mass per unit area, clay moisture content, grab tensile strength and flux listed in ASTM D5889, CETCO also performs peel strength testing on its Bentomat products. Based on testing frequency, rolls are identified during production so that their length may be extended by 3 feet in order to accommodate sampling. Table 2-4 presents the finished GCL MQA test specifications.

The bentonite mass per unit area test procedures are performed in accordance with ASTM D 5993. It must be noted that an accurate bentonite mass per unit area determination requires that the moisture content of the finished product also be determined. In ASTM D5993, bentonite mass per unit area is defined as the *dried* mass per area of the *bentonite,* as opposed to the mass per area of the entire GCL. In other words, dried bentonite mass per area is calculated by subtracting out the weight of the water in a GCL sample *and* the weight of the geosynthetics. The geosynthetic weights are *typical* values because it is neither possible nor practical to attempt removal of the bentonite entirely from the GCL in order to weigh each component separately. Five test specimens are cut from each full roll-width sample as shown in Figure 2-1. The number of test specimens obtained per sample may be modified as variability data is generated.

The specimens for grab tensile testing are taken from the same full roll width samples at a frequency of one per 200,000 square feet and are tested according to the procedures in ASTM D 4632. No fewer than five specimens per sampling event are tested.

Index flux and hydraulic conductivity testing are performed at a rate of one per lot. Index flux is run per ASTM D5887 and hydraulic conductivity is calculated by measuring the thickness and using the formulas presented in ASTM D 5887.

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Peel testing is performed on Bentomat needlepunched products at a minimum frequency of one per 40,000 square feet. A modified method ASTM D 4632 (Appendix B) is used as a basis for determining specimen size and general procedure. In the peel test, a Bentomat specimen is partly de-laminated by cutting the needlepunched bonds between the geotextiles just enough to allow each geotextile to be separately inserted into the grips of the tensile testing device. The specimen is peeled at the same rate as specified in ASTM D 4632, and the peak resistance is recorded as the peel strength for that specimen.

Internal direct shear testing is performed per ASTM D5321 on Bentomat needlepunched products on a periodic basis, typically quarterly, at CETCO's Corporate Laboratory in Arlington Heights, IL. The GCL is hydrated under a load of 200 psf for 48 hours and then sheared at 0.04 in./min.

Specimens of finished GCL are archived for 12 months and then are discarded. These samples can be utilized for post-project testing if a dispute arises. However, it is the **purchaser's responsibility** to ensure that representative samples of the GCL are retained if testing is requested after this one-year period has expired.

2.5 Plant Storage and Handling

Care is taken at the plant to handle and store the finished rolls of GCL in a manner that prevents damage to the product and its packaging. All handling of the product must be executed with a forklift or other suitable vehicle outfitted with a carpet pole or "stinger." The stinger must be strong enough to support the weight of a full roll of GCL with minimal bending.

GCL storage is be limited to stacks no higher than 7 rolls. This provides easy equipment access and minimizes the chance for damage to the roll core and to the GCL itself. The inventories of GCL and its component materials will be rotated for additional protection against potential long-term, storage-related damage.

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SECTION 3

RECORDING AND RECORD KEEPING

GCL is manufactured from three different raw materials, each requiring its own QA/QC testing and record keeping. The finished GCL product also requires testing, so comprehensive documentation of all GCL manufacturing activities is essential in order to properly manage the large amount of information generated during production. This section of the GCL MQA/MQC Manual lists the quality-related information recorded and provides the procedures for maintaining the records.

3.1 Plant Records

Daily Operations Log. Plant records include both a continuous daily operations log and a log of test data. Items included in the daily production log include:

- Name of the person maintaining the log.
- Current date and shift.
- Current lot and roll number in production.
- Length and width of each roll produced.
- Written verification of proper production parameters.
- A record of raw material usage, including lot/roll numbers and dates of use.
- Documentation of relevant information affecting production.

QA Log. A separate log is maintained at the plant to record information pertaining to test data. Information included in the QA log includes:

- Date, time, lot, and roll number of all tested samples.
- QA test results summarized in tabular form.
- Name of person conducting the tests.
- Actions taken if test results were unsatisfactory.

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The QA log may be kept electronically as data is tabulated directly on an available computer or may be kept in writing, at the discretion of the shift supervisor.

For future reference, both of these logs shall be maintained at the plant indefinitely. Copies of test results recorded on the QA log will be provided as required. The daily production log and the QA log are the most important means by which GCL quality is documented; therefore, these logs must be neatly and accurately maintained.

Product Labeling. Adhesive labels are placed on the outer wrap of every GCL roll and on the core. The labels themselves provide the following information:

- Length and width of roll.
- Total weight of roll.
- Product identification (material codes and type designation).
- Lot number and roll number.

Packing Slips. The plant provides the site manager or his designate with a packing slip for each shipment of GCL to the project site. The packing slip includes the following information:

- CETCO order number and customer P.O. number.
- GCL lot numbers, roll numbers, roll dimensions, and roll weights.
- Shipment address.

Copies of the packing slips shall be maintained at the plant.

3.2 CETCO Laboratory Records

CETCO shall maintain complete records of all testing performed at its laboratories in the event tha supplemental MQA testing is required for a particular project. Using standard laboratory record keepin procedures, CETCO shall maintain records of:

- Results of physical and hydraulic tests on geosynthetic components, bentonite, and GCL.
- Documentation of follow-up action, if any, after evaluation of test data.

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3.3 GCL Manufacturing Certification Reports

Each shipment of GCL for which MQA/MQC documentation is required will be properly accompanied by a MQA/MQC Data Package (Appendix C). The package includes a certification statement indicating to the customer that the purchased GCL complies with all of the properties certified by CETCO Lining Technologies Group.

The supplier certifications for the bentonite clay for free swell and fluid loss will be included in this report. Supplier MQA/MQC data on the geotextiles will be included, when required per the project specifications. The GCL MQA/MQC test data reports for bentonite mass per unit area, grab tensile strength and peel strength (for Bentomat orders) will be furnished, as well as, the QA tracking forms identifying the raw material lots associated with each GCL lot and roll number for the order. Due to the time required to run the index flux, hydraulic conductivity and internal direct shear testing, this information when required per the project specifications will be forwarded under separate cover.

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SECTION 4

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SUMMARY OF GCL MQA/MQC PLAN

This section provides a tabular summary of the of the MQA/MQC plan for finished GCL and its component materials. Table 4-1 and Table 4-2 serve as convenient references for the overall scope of the plan but should not be used until the plan is read and understood in its entirety. The tables illustrate that the plan is designed to provide comprehensive verification of GCL quality. It is emphasized that the program will be amended as required to conform to future product/process improvement.

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CETCO GCL MQA/MQC PROGRAM ORGANIZATION CHART

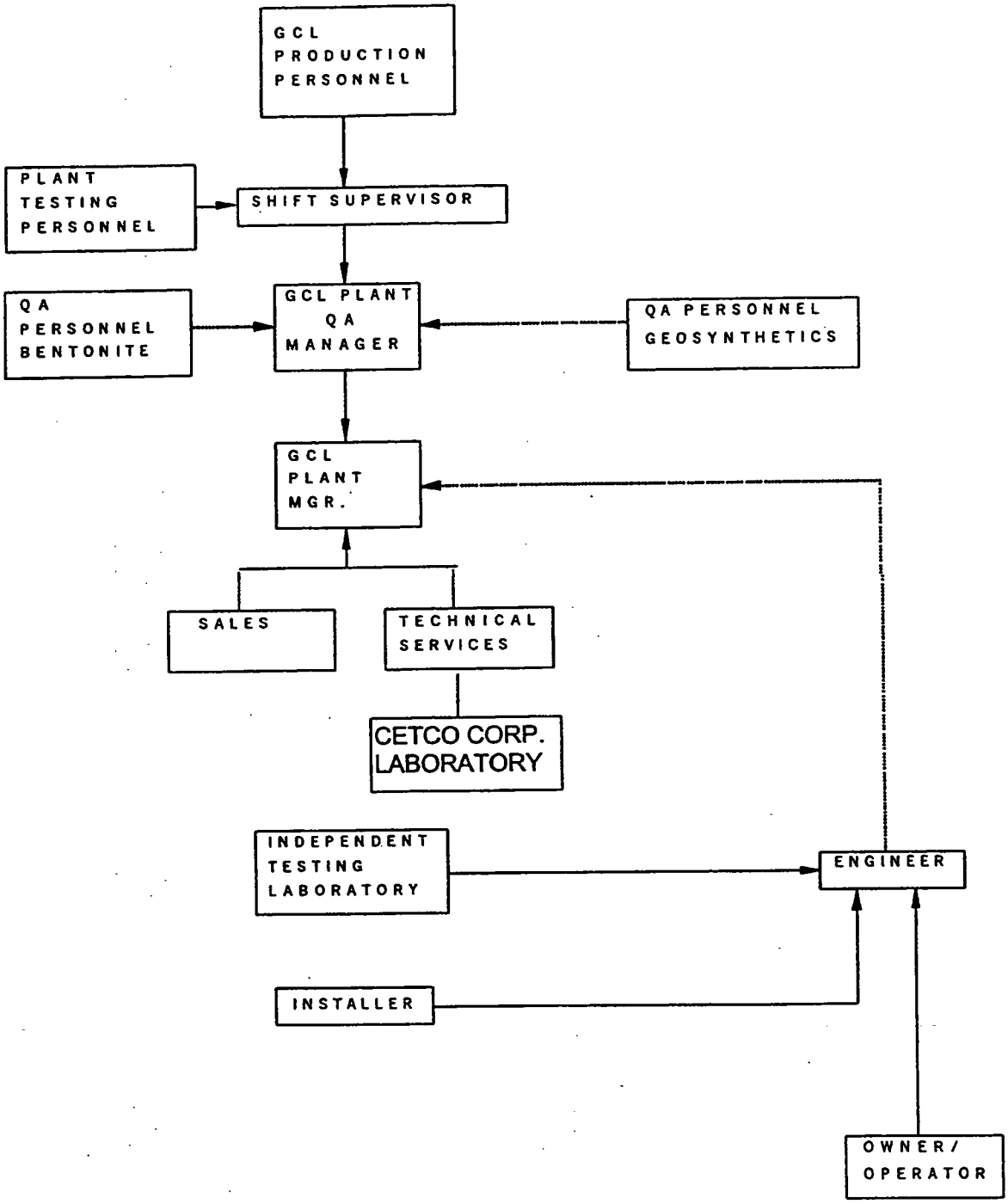

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FIGURE 1-2

CETCO ORDER REVIEW PROCESS

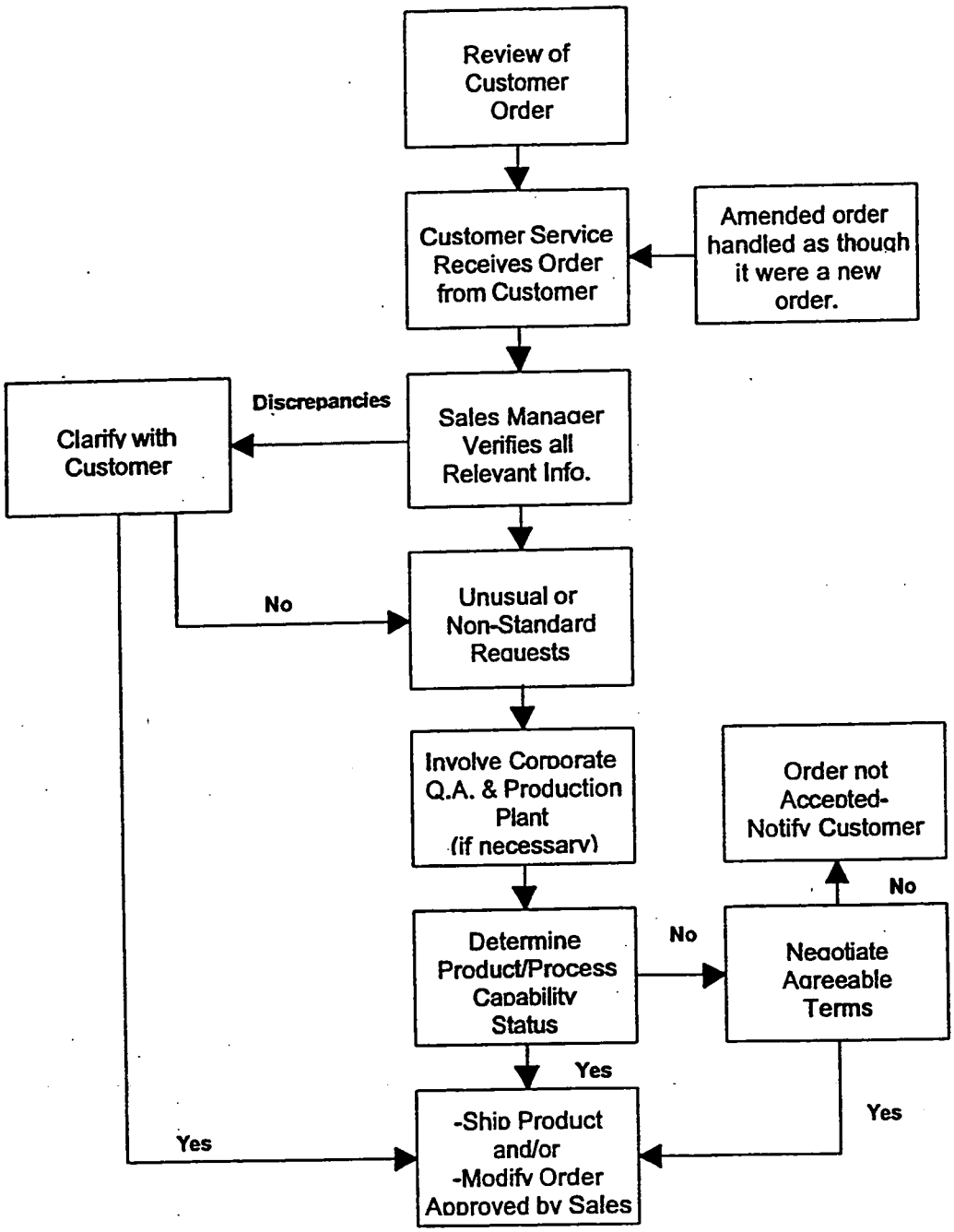

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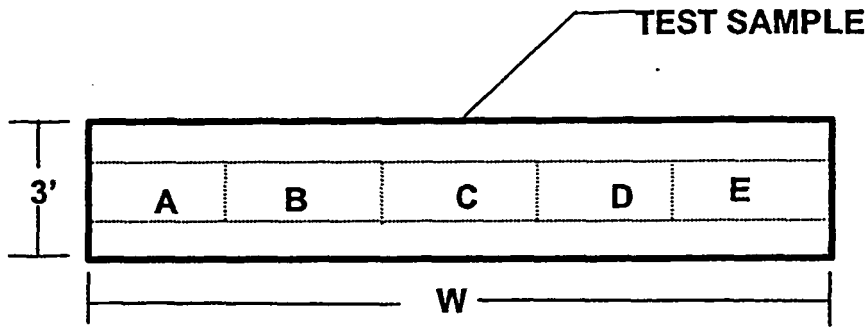
FIGURE 2-1

GUIDE FOR OBTAINING SAMPLES AND TEST SPECIMENS



NOTES

1. Dashed lines represent acceptable "windows" from which test specimens A, B, C, D, and E are cut.
2. The specimens are cut at random locations within each window. For the standard 15-foot wide GCL product, the windows are 3 ft long and for standard 14.5 ft-wide GCL products, the windows are 2.9 ft long.
3. All samples must be cut using a die and hydraulic punch.
4. At least one 1' x 1' specimen is archived (see Section 3).
5. The above figure depicts sampling guidelines for nonwoven geotextile manufactured by CETCO as well as the finished GCL product.

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TABLE 2-1

MQA PARAMETERS FOR GEOTEXTILE COMPONENT OF GCL

PROPERTY	TEST METHOD	FREQUENCY	RECORDED VALUE[1]
Grab Strength	ASTM D 4632	200,000 sq. ft	Typical and MARV
Mass per Unit Area	ASTM D 5261	200,000 sq. ft	MARV

NOTES

1. Values represent geotextile prior to incorporation into GCL.

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TABLE 2-2

MQC PARAMETERS FOR FML LAMINATE COMPONENT OF CL GCL SERIES

PROPERTY	TEST METHOD	FREQUENCY	RECORDED VALUE[1]
Grab Strength	ASTM D 638	200,000 sq. ft	MARV
Thickness	ASTM D 5199	200,000 sq. ft	MARV
Mass per Unit Area	ASTM D 5261	200,000 sq. ft	Typical & MARV

NOTES

1. Values represent FML laminate prior to incorporation into GCL.

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TABLE 2-3

MQA PARAMETERS FOR SODIUM BENTONITE COMPONENT OF GCL

PROPERTY[1]	TEST METHOD	FREQUENCY	REQUIRED VALUE
Swell Index	ASTM D 5890	every 50 tonnes	24 mL/2g minimum
Fluid Loss	ASTM D 5891	every 50 tonnes	18 mL maximum
Moisture Content	ASTM D 2216	every 50 tonnes	12% maximum
Particle Size[2]	ASTM D 422	every 50 tonnes	100 % typ. - #10 mesh 1 % typ. - #200 mesh

NOTES

1. These parameters are for the bentonite incorporated into the GCL and do not necessarily reflect the properties of the bentonite in the finished product. This is especially the case with moisture content.

2. Particle size range based on available bentonite supply. Particle size may change depending on bentonite availability.

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TABLE 2-4

MQA/MQC PARAMETERS FOR FINISHED GCL

PROPERTY	TEST METHOD[1]	FREQUENCY[2]	REQUIRED VALUE[3]
Bentonite Mass/Area[4]	ASTM D 5993	40,000 sq. ft	0.75 lbs./sq. ft
Grab Strength[5]	ASTM D 4632	200,000 sq. ft	product dependent (see Table 4-1 and Table 4-2)
Peel Strength[5]	ASTM D 4632	40,000 sq. ft	15 lbs. minimum for needlepunched GCL only
Index Flux[6]	ASTM D 5887	Weekly	product dependent (see Table 4-1 and Table 4-2)
Permeability[6]	ASTM D 5887	Weekly	product dependent (see Table 4-1 and Table 4-2)
Internal Shear[7]	ASTM D5321	Periodic	product dependent (see Table 4-1 and Table 4-2)

NOTES

1. ASTM methods are also modified wherever necessary to facilitate the testing of a GCL rather than a geotextile.
2. The test frequency listed is based on ASTM D5889. Actual frequency may vary due to roll dimensions.
3. All values are minimum average roll values (MARVs) unless otherwise indicated.
4. Bentonite mass per unit area is exclusive of the average weight of the geotextiles and is normalized to 0 percent moisture content per ASTM D 5993.
5. Tensile values represent testing with the test specimens oriented in the machine direction.
6. Index flux and permeability with deaired distilled water at 5-psi maximum confining stress and 2 psi head.
7. Internal direct shear sample hydrated for 48 hours at 200 psf normal load.

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The information and date contained herein are believed to be accurate and reliable. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.

TABLE 4-1

BENTOMAT MQA/MQC PLAN SUMMARY[1]

(Version 6.0, revised January 2001)

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	12 percent max.
	Particle Type: Granular[6]	ASTM D 421	50 tonnes	100% typical- #10 1% typical - #200
Bentomat CL/CLT	Bentonite Mass/Area[7]	ASTM D 5993	40,000 sq. ft	0.75 lb./sq. ft
	Grab Strength[8]	ASTM D 4632	200,000 sq. ft	120 lbs. for CL/CLT
	Peel Strength[8]	ASTM D 4632	40,000 sq. ft	15 lbs.
	Index Flux[9]	ASTM D 5887	Weekly	1×10^{-9} $m^3/m^2/sec$ for CL/CLT
	Permeability[9]	ASTM D 5887	Weekly	5×10^{-10} cm/sec for CL/CLT
	Internal Shear[10]	ASTM D5321	Periodic	500 psf
Bentomat DN	Bentonite Mass/Area[7]	ASTM D 5993	40,000 sq. ft	0.75 lb./sq. ft
	Grab Strength[8]	ASTM D 4632	200,000 sq. ft	150 lbs. for DN
	Peel Strength[8]	ASTM D 4632	40,000 sq. ft	15 lbs.
	Index Flux[11]	ASTM D 5887	Weekly	1×10^{-8} $m^3/m^2/sec$
	Permeability[11]	ASTM D 5887	Weekly	5×10^{-9} cm/sec
	Internal Shear[10]	ASTM D5321	Periodic	500 psf
Bentomat ST	Bentonite Mass/Area[7]	ASTM D 5993	40,000 sq. ft	0.75 lb./sq. ft
	Grab Strength[8]	ASTM D 4632	200,000 sq. ft	90 lbs. for ST
	Peel Strength[8]	ASTM D 4632	40,000 sq. ft	15 lbs.
	Index Flux[11]	ASTM D 5887	Weekly	1×10^{-8} $m^3/m^2/sec$
	Permeability[11]	ASTM D 5887	Weekly	5×10^{-9} cm/sec
	Internal Shear[10]	ASTM D5321	Periodic	500 psf

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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 reference moisture content of 0 percent.
8. All tensile testing represent values with the test specimens oriented in the machine direction.
9. ASTM D 5887 Index Flux and 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.
10. ASTM D5321 internal direct shear performed on GCL sample hydrated under 200 psf normal load and then sheared at 0.04 in./min.
11. ASTM D 5887 Index Flux and 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.

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TABLE 4-2

CLAYMAX MQA/MQC PLAN SUMMARY[1]

(Version 6.0, January 2001)

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	12 percent max.
	Particle Type: Granular[6]	ASTM D 421	50 tonnes	100% typical - #10 1% typical - #200
Clayma 200R	Bentonite Mass/Area[7]	ASTM D 5993	40,000 sq. ft	0.75 lb./sq. ft
	Grab Strength[8]	ASTM D 4632	200,000 sq. ft	75 lbs. (330 N)
	Peel Strength[8]	ASTM D 4632	N/A	N/A
	Index Flux[9]	ASTM D 5887	Weekly	1×10^{-8} $m^3/m^2/sec$
	Permeability[9]	ASTM D 5887	Weekly	5×10^{-9} cm/sec
	Internal Shear[10]	ASTM D5321	Periodic	50 psf
Claymax 600CL	Bentonite Mass/Area[7]	ASTM D 5993	40,000 sq. ft	0.75 lb./sq. ft
	Grab Strength[8]	ASTM D 4632	200,000 sq. ft	75 lbs. (330 N)
	Peel Strength[8]	ASTM D 4632	N/A	N/A
	Index Flux[11]	ASTM D 5887	Weekly	1×10^{-9} $m^3/m^2/sec$ for 600CL
	Permeability[11]	ASTM D 5887	Weekly	5×10^{-10} cm/sec for 600CL
	Internal Shear[10]	ASTM D5321	Periodic	50 psf

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.*
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 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, 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 reference moisture content of 0 percent.
8. All tensile testing represent values with the test specimens oriented in the machine direction.
9. ASTM D 5887 Index Flux and 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.
10. ASTM D5321 internal direct shear performed on GCL sample hydrated under 200 psf normal load and then sheared at 0.04 in./min.
11. ASTM D 5887 Index Flux and 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.

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APPENDIX A

REFERENCED STANDARDS AND TEST METHODS

ASTM D 421 Standard Practice of Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants

ASTM D638 Standard Test Method for Tensile Properties of Plastics

ASTM D2216 Standard Test Method for Laboratory Determination of Moisture Content of Soil and Rock

ASTM D4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles

ASTM D4643 Determination of Moisture Content of Soil by the Microwave Oven Method

ASTM D5199 Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes

ASTM D5261 Standard Test Method for Measuring Mass Per Unit Area of Geotextiles

ASTM D5321 Standard Test Method for Direct Shear of Geosynthetics

ASTM D5887 Standard Test Method or Measurement of Index Flux Through Saturated GCL Specimens Using a Flexible Wall Permeameter

ASTM D5889 Standard Practice for Quality Control of GCLs

ASTM D5890 Standard Test Method for Swell Index Measurement of the Clay Mineral Component of GCLs

ASTM D5891 Standard Test Method for Measurement of Fluid Loss of Clay Mineral Component of GCLs

ASTM D5993 Standard Test Method for Measuring the Mass Per Unit of GCLs

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APPENDIX B

TEST METHOD FOR DETERMINING BENTOMAT PEEL STRENGTH - Modified ASTM D4632

Use

The purpose of this test is to provide a means of evaluating the index peel strength Bentomat. The test is used to evaluate whether it is necessary to replace needles during Bentomat production.

Frequency

One sample roll should be manufactured 3 feet extra long for every 40,000 square feet of GCL manufactured. Obtain five test specimens per sample.

Personnel

Roll-up operator
QA Tester

Equipment

Sharp utility knife or textile cutter
Tensile testing device
Cutting template (1 sf ft)

Procedures

1. Cut a 3-foot full roll-width sample from each designated roll.
2. Use a template to cut five 4" by 8" specimens from the sample in the machine direction.
3. Draw a line across the 4-inch width of each specimen, exactly 2.5 inches from one end.
4. Use a utility knife to slice the needlepunched bonds between the two geotextiles, from the end of each specimen to the 2.5-inch line drawn previously.
5. Mount the specimen in the tensile testing device such that the upper jaw contains the top geotextile and the lower jaw contains the carrier geotextile. The jaws should be set at a baseline distance of one inch apart.
6. Use the tensile testing device to peel each specimen at the same rate as is done for standard tensile testing.

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TEST METHOD FOR DETERMINING BENTOMAT PEEL STRENGTH – Modified ASTM D4632 (Continued)

Reporting

Record the maximum peel strength for each specimen. The peel strength results for the five specimens should be averaged, and this average should be recorded, rounding off to one digit after the decimal.

Results

The average peel strength must be greater than or equal to 15 lbs.

Action

If the average peel strength value does not achieve the minimum requirements stated above, the test must be repeated on 5 additional specimens taken from adjacent locations on the test sample. If the average peel strength of the 5 additional specimens exceeds 15 lbs., the roll is acceptable. If not, the roll should not be accepted for this shipment and the two GCL rolls manufactured immediately before and after the rejected roll should be sampled as described above. The same acceptance/rejection criteria should be applied to these rolls. This process should be repeated until the acceptance criteria are achieved.

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APPENDIX C

SAMPLE CETCO GCL MQA/MQC DATA PACKAGE

BENTOMAT ST

MANUFACTURING QA / QC DATA PACKAGE

PROJECT NAME:	**Layfield Plastics LTD.** **Edmonton, AB. T5S2H6**
CUSTOMER P.O.:	**E14460**
PREPARED FOR:	**Layfield Plastics LTD.** **11608-180** **Edmonton, AB. T5S2H6**
Telephone # :	**780-451-7237**
PREPARED BY:	**Noe Garcia** **Quality Assurance** **CETCO** P.O. Box 428 92 Hwy. 37 Lovell, Wy. 82431
Telephone #:	800-322-1149 (Ext. 423)
Fax #:	**(307)548-6927, (307)548-6413**
E-Mail:	**ngarc@cetco.com**

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY

GEOSYNTHETIC CLAY LINER MANUFACTURER'S CERTIFICATION

TO: **Layfield Plastic, Ltd.**

ORDER#: **137348**

CETCO hereby affirms that all the Bentomat ST geosynthetic clay liner material manufactured for the above project will achieve the hydraulic and physical properties listed below:

PROPERTY	TEST METHOD	CERTIFIED VALUE
Bentonite Swell Index	ASTM D5890	24 mL/2g min.
Bentonite Fluid Loss	ASTM D5891	18 mL max.
Bentonite Mass Per Unit Area*	ASTM D5993	min. 0.75 lbs./sq.ft.
GCL Grab Strength**	ASTM D4632	90 lbs. MARV
GCL Peel Strength**	ASTM D4632(mod.)	15 lbs. min.
GCL Index Flux	ASTM D5887	max. 1 x 10(-8) m3/m2/sec.
GCL Permeability	ASTM D5084	max. 5 x 10(-9) cm/sec
GCL Hydrated Internal Shear Strength***	ASTM D5321	500 psf typical

*reported at 0 percent moisture.
**performed in the machine direction.
***at 200 psf normal load.

BENTONITE CLAY CERTIFICATIONS

TECHNICAL DATA SHEET

ORIGIN INFORMATION

BENTONITE

Manufacturer: **Colloid Environmental Technologies Co.**

PRODUCTION

Facility: **Colloid Environmental Technologies Co.**
92 HWY. 37
Lovell, WY 82431

Contact: Jay Bischoff (800)-322-1159

Brand Name: CG 50

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Layfield Plastics LTD. DATE: 11/27/00

ATTN: Norman Ritter,

Dear Customer:
The BENTONITE that is used to produce our GCL is CG 50 from CETCO, Order Number See Below

A sample of the CG 50 was tested from Lot Number 112700A and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	26.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	15.4
Moisture	ASTM D 2216	12.0 % (MAX)	8.0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.3

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: RP, SF

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.
137348

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Layfield Plastics LTD. DATE: 11/29/00

ATTN: Norman Ritter,

Dear Customer:
The BENTONITE that is used to produce our GCL is CG 50 from CETCO, Order Number See Below

A sample of the CG 50 was tested from Lot Number 112900A and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	24.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	16.2
Moisture	ASTM D 2216	12.0 % (MAX)	8.4
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.6

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: RP, SF

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.
137348

4941

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Layfield Plastics LTD. DATE: 11/30/00

ATTN: Norman Ritter,

Dear Customer:
The BENTONITE that is used to produce our GCL is CG 50 from CETCO, Order Number See Below

A sample of the CG 50 was tested from Lot Number 113000B and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	25.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	16.2
Moisture	ASTM D 2216	12.0 % (MAX)	9.0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.6

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: RP, SF

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.
137348

000285

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Layfield Plastics LTD. DATE: 12/1/00

ATTN: Norman Ritter,

Dear Customer:
The BENTONITE that is used to produce our GCL is CG 50 from CETCO, Order Number See Below

A sample of the CG 50 was tested from Lot Number 120100A and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	26.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	15.6
Moisture	ASTM D 2216	12.0 % (MAX)	8.0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.4

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: RP, SF

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.
137348

BENTOMAT ST
QUALITY TEST RESULTS

QCG#FT2 QCT#FT2
2/01/01 11:48:13

CETCO

GCL QUALITY DATA

LOVELL AMERICAN COLLOID

SHIP TO: LAYFI
11603
EDMON

O R D E R # 000137348

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632
LO-BENTOMAT ST	200049L0	00017370	.86	142.50	33.10
LO-BENTOMAT ST	200049L0	00017369	.86*	142.50	33.10*
LO-BENTOMAT ST	200049L0	00017366	.89	142.50	45.60
LO-BENTOMAT ST	200049L0	00017334	.89	161.60	25.90
LO-BENTOMAT ST	200049L0	00017333	.89	161.60	25.90
LO-BENTOMAT ST	200049L0	00017296	.89	296.30	20.90
LO-BENTOMAT ST	200049L0	00017295	.89	296.30	20.90
LO-BENTOMAT ST	200049L0	00017220	.90	209.30	36.30
LO-BENTOMAT ST	200049L0	00017216	.90	209.30	36.30
LO-BENTOMAT ST	200049L0	00017214	.90	209.30	36.30
LO-BENTOMAT ST	200049L0	00017210	.91	209.30	47.20
LO-BENTOMAT ST	200049L0	00017205	.91	209.30	47.20
LO-BENTOMAT ST	200049L0	00017067	.88	286.50	34.40
LO-BENTOMAT ST	200049L0	00017066	.88	286.50	34.40
LO-BENTOMAT ST	200049L0	00017046	.90	286.50	41.40

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.
Peel Strength is tested a minimum of every 40,000sf.
Bentonite Mass/Area is reported at 0% moisture cont ent.
Grab Elongation is tested a minimum of every 200,000sf.

*** End of Report ***

000288

1941

BENTOMAT ST
MQA TRACKING FORMS

QCG#TF1 QCT#TF1
2/01/01 11:48:12

CETCO
GCL MQA/MQC TRACKING FORM

SHIP TO: LAYFIELD PLASTICS LTD
11603 - 180 STREET
EDMONTON AB

ORDER NUMBER 000137348

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
LOT# 200049L0									
00017046	LO-BENTOMAT ST	150	2250	2718	8238438		A904378A		112700A
00017066	LO-BENTOMAT ST	150	2250	2645	8358968		A903318A		112700A
00017067	LO-BENTOMAT ST	150	2250	2649	8358968		A903318A		112700A
00017205	LO-BENTOMAT ST	150	2250	2649	8189780		A904374A		112900A
00017210	LO-BENTOMAT ST	150	2250	2676	8189780		A903952A		112900A
00017214	LO-BENTOMAT ST	150	2250	2670	8189780		A903952A		112900A
00017216	LO-BENTOMAT ST	150	2250	2669	8189780		200045VR	00001709	112900A
00017220	LO-BENTOMAT ST	150	2250	2712	8189780		200045VR	00001709	112900A
00017295	LO-BENTOMAT ST	150	2250	2760	8374955		200045VR	00001708	113000B
00017296	LO-BENTOMAT ST	150	2250	2764	8374955		200045VR	00001708	113000B
00017333	LO-BENTOMAT ST	150	2250	2629	8395034		200046VR	00001766	113000B
00017334	LO-BENTOMAT ST	150	2250	2693	8395034		200046VR	00001766	113000B
00017366	LO-BENTOMAT ST	150	2250	2781	8378896		200046VR	00001770	120100A
00017369	LO-BENTOMAT ST	150	2250	2784	8378896		200046VR	00001770	120100A
00017370	LO-BENTOMAT ST	150	2250	2764	8378896		200046VR	00001770	120100A

TOTAL SQUARE FEET..... 33,750

TOTAL PAGES 1

000290

-4941

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	UBMITTAL NO. 20104-1440/2-02772P-004	REV.: 1	DATE: 11/27/01	Page 1 of ~~8~~ 4 CV

FROM:
CETCO

SIGNATURE: Chuck C. VanAcker 11/27/01

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

RECEIVED BY: Jennifer Talbert DATE: 11/28/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02772 P-004	1						X			REQUIREMENTS FOR GEOTEXTILE COMPONENT		X		02772P.1.04.A.4	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Chuck VanAcsdale - Approver	64				
Greeg Johnson	64				
Bill Zebick	64				
Mike Godber	64				
Kwasi Badu-Tweneboah	38				

NO COMMENTS: ✓ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

ORIGINAL

RECEIVED BY: Chuck C. VanAcker DATE: 12/10/01

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

000291

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

CETCO
LINING TECHNOLOGIES
geosynthetic clay liners

4941

November9, 2001

1440-OPT2-02772P-004

Subject: Fluor Fernald Geosynthetic Clay Liner

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: [illegible] Date: 12/10/01

GCL Geotextiles

Please accept this as the requirement for the Geotextiles used in the manufacture of Bentomat ST.

INFORMATION ONLY

Signed,

William Urchik
Product Development Engineer
CETCO

1500 Shure Drive • Arlington Heights, Illinois 60004 • 800-527-9948 • FAX 847-577-5571
www.CETCO.com

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

2/26/2001

Cetco
Jim Olsta

Ref:

This letter of Compliance indicates that 82TEX , a woven polypropylene geotextile, produced by S I Corporation 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. This goetextile will be continuously inspected for the presence of needles.

Physical Property	Test Method		MARV			SI Unit		
Mass Per Unit Area	ASTM D-5261	oz/yd2 - (g/m2)	3.20			(108.48)		
Thickness	ASTM D-5199	mils - (mm	16			(0.4064		
Tensile Strength (Grab	ASTM D-4632	lb - (N)	135	X	135	(600.75	X	(600.75)
Elongation	ASTM D-4632	%	15	X	15			
Trapezoidal Tear	ASTM D-4533	lb - (N)	45	X	45	(200.25	X	(200.25)
Mullen Burst	ASTM D-3786	psi - (Kpa)	265			(1826.9		
Puncture Strength	ASTM D-4833	lb - (N)	70			(311.5)		
AOS	ASTM D-4751	US Sieve - (mm	40			0.425		
Permittivit	ASTM D-4491	SEC-1	0.08					
Permeability -	ASTM D-4491	cm - (sec)	0.004					
Water Flow Rate	ASTM D-4491	gpm/ft - (lpm/m2)	6			(244.45		
UV Resistance-4	ASTM D-4355	% Retained	90					

Strength Retained after 500 hours exposure in Xenon Arc Weatherometer

Sincerely,

Patti Weaver

Patti Weaver
Technical Manager
Geosynthetics Products Division

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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

4941

26-Feb-01

Cetco
Jim Olsta

Ref:

This letter of Compliance indicates that GEOTEX 650 , a nonwoven polypropylene geotextile produced by S I Corporation, 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. This geotextile will be continuously inspected for the presence of needles.

Physical Property	Test Method	MARV		SI Unit	
Mass Per Unit Area	ASTM D-5261	6.0	oz/yd2	(203.4)	g/m2
Thickness	ASTM D-5199	120	mils	(3.048)	mm
Tensile Strength	ASTM D-4632	45	lbs	(200.25)	N
Elongation	ASTM D-4632	90	%	90	%
Trapezoidal Tear	ASTM D-4533	25	lbs	(111.25)	N
Mullen Burst	ASTM D-3786	190	psi	(1309.8	kPa
Puncture Strength	ASTM D-4833	50	lbs	(222.5)	N
A.O.S.	ASTM D-4751		Sieve		mm
Permittivity	ASTM D-4491		sec-1		sec-1
Permeability	ASTM D-4491		cm/sec		cm/sec
Water Flow Rate	ASTM D-4491		gpm/ft2	()	lpm/m2
UV Resistance	ASTM D-4355		%		%

Strength Retained after 500 hours exposure in Xenon Arc Weatherometer

Sincerely

Patti Weaver

Patti Weaver
Technical Manager
Geosynthetics Products Division

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SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104

CONTRACT NO: 1440

SUBMITTAL NO. 20104-1440/2-02772P-005 | REV.: 0 | DATE: Nov9, 2001 | Page 1 of 3

FROM:
CETCO

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

SIGNATURE: Wm Uschik

RECEIVED BY: [signature] DATE: 11/13/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02772P-005	0							x		Certification of Geotextile Component ~~Geotextile CERT.~~ QA 11/13/01		x		02772P.1.04.A.5	X		

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RECEIVED BY: [signature] DATE: 19 November 2001

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James T. Turner for Michael W. Godber

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000295

4941

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

4941

CETCO
LINING TECHNOLOGIES
geosynthetic clay liners

November9, 2001 1440-OPT2-02772P-005

Subject: Fluor Fernald Geosynthetic Clay Liner

GCL Geotextiles

Please accept this as certification that the Manufacturer's requirements for the geotextile component of the GCL are met.

Signed,

William Urchik
Product Development Engineer
CETCO

INFORMATION ONLY

[X] A - Conforms to the Subcontract Requirements
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[ ] C - Revise and Resubmit
Sig: James T. Turner for Michael W. Golker Date: 19 Nov. 2001

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SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02772P-006	REV.: 0	DATE: Nov9, 2001	Page 1 of 3

FROM:
CETCO

SIGNATURE: Wm Yrchik

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

RECEIVED BY: Jennifer Lindroth DATE: 11/13/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02772P-006	0							x		Certification of ~~GCL Cert. MARV Values~~ Minimum Average Roll Values QS 11/12/01		x		02772P.1.04.A.6	X		

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11-19-01 for James T. Turner for Michael W. Godber

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FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

4941

CETCO
LINING TECHNOLOGIES
geosynthetic clay liners

November 9, 2001 1440-OPT2-02772P-006

Subject: Fluor Fernald Geosynthetic Clay Liner

GCL Properties

Please accept this as certification that Bentomat ST will meet the properties listed in Table02772P-1. Attached is the CETCO certified Properties sheet for your reference.

Signed,

William Urchik
Product Development Engineer
CETCO

[x] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: James T. Turner for Michael W. Godbee Date: 19 Nov. 2001

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CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
Lining Technologies www.cetco.com

Bentomat® ST Certified Properties

Bentomat "ST" is a reinforced GCL consisting of a layer of sodium bentonite between woven and non-woven geotextiles, which are needlepunched together.

MATERIAL PROPERTY	TEST METHOD	TEST FREQUENCY, ft^2 (m^2)	CERTIFIED VALUES
Bentonite Swell Index[1]	ASTM D 5890	1 per 50 tons	24 mL/2g min.
Bentonite Fluid Loss[1]	ASTM D 5891	1 per 50 tons	18 mL max.
Bentonite Mass/Area[2]	ASTM D 5993	40,000 ft^2 (4,000 m^2)	0.75 lb/ft^2 (3.6 kg/m^2)
GCL Grab Strength[3]	ASTM D 4632	200,000 ft^2 (20,000 m^2)	90 lbs (400 N)
GCL Peel Strength[3]	ASTM D 4632	40,000 ft^2 (4,000 m^2)	15 lbs (65 N)
GCL Index Flux[4]	ASTM D 5887	Weekly	1×10^{-8} $m^3/m^2/sec$
GCL Permeability[4]	ASTM D 5084	Weekly	5×10^{-9} cm/sec
GCL Hydrated Internal Shear Strength[5]	ASTM D 5321	Periodic	500 psf (24 kPa) typical

Notes:

1 Bentonite property tests performed at CETCO's bentonite processing facility before shipment to CETCO's GCL production facilities.

2 Bentonite mass/area reported at 0 percent moisture content.

3 All tensile testing is performed in the machine direction, with results as minimum average roll values unless otherwise indicated.

4 Index flux and permeability testing 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 925 gal/acre/day. This flux value is equivalent to a permeability of 5×10^{-9} cm/sec for typical GCL thickness. 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. The last 20 weekly values prior the end of the production date of the supplied GCL may be provided.

5 Peak value measured at 200 psf (10 kPa) normal stress. Site-specific materials, GCL products, and test conditions must be used to verify internal and interface strength of the proposed design.

1500 West Shure Drive Arlington Heights, Illinois 60004 [800] 527.9948 tel [847] 392.5800 fax [847] 577.5571

Bentomat® ST Panel and Roll Specifications

STANDARD PANEL SPECIFICATIONS

Panel Dimensions*.....15 ft. (4.6 m) wide; 150 ft. (45.7 m) long
Total Panel Area.....2,250 sq. ft. (209 sq. m)
Effective Area.....2,145 sq. ft. (200 sq. m)
{Assumes 6-in. (150 mm) edge overlap and 2-ft. (600 mm) end overlap}

STANDARD ROLL SPECIFICATIONS

Dimensions.....16 ft. (4.88 m) wide w/ core; 24 in. (610 mm) diameter
Nominal Weight.....2,700 lbs. (1,225 kg)
Core Size (I.D.).....4 in. (100 mm) I.D. Inner core plug measures 2.5 in. (63 mm)
Packaging.....8-mil (0.2 mm) U.V.-resistant polyethylene sleeve

STANDARD SHIPPING SPECIFICATIONS

Shipment Size.....15 rolls per truckload or container load
Granular Bentonite.....50-lb. (23 kg) bags

UNLOADING AND HANDLING EQUIPMENT

Core Pipe and Spreader Bar.....18 ft. (5.5 m) long, 2.5 in. (63 mm) Nominal Pipe Size, XXH
OR: Solid steel pipe
OR: Stinger attachment for forklift
Chains or Straps.....2 required; each approximately 12 ft. (3.7 m) long
Equipment.....Front end loader or forklift (typical)

• Custom lengths/widths available

000300

The information and data contained herein are believed to be accurate and reliable. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.

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SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02772P-007	REV.: 0	DATE: Nov9, 2001	Page 1 of 3

FROM:
CETCO

SIGNATURE: Wm Uschek

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

RECEIVED BY: Jennifer S. Short DATE: 11/13/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02772P-007	0					x				Recommended Installation Procedures QA 11/13/01		x		02772P.1.04.A.7	X		

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Mike Godbee	64				

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RECEIVED BY: Bill Zebick DATE: 11/26/01
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FS-F-4955
Rev. 3: 05/14/1999 CT 2.4.2

CETCO
LINING TECHNOLOGIES
geosynthetic clay liners

November 9, 2001 1440-OPT2-02772P-007

Subject: Fluor Fernald Geosynthetic Clay Liner

GCL Installation Procedures

Attached are the CETCO Recommended Installation Procedures.

Signed,

William Urchik
Product Development Engineer
CETCO

INFORMATION ONLY

[✓] A - Conforms to the Subcontract Requirements
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Sig: Bill Zebrak Date: 11/26/01

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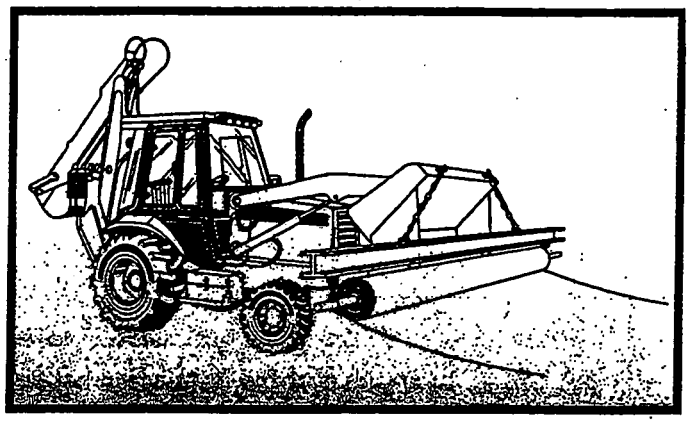
4941

Installation Guidelines



BENTOMAT®
CLAYMAX®

Geosynthetic Clay Liner

CETCO

LINING TECHNOLOGIES GROUP www.cetco.com

000303

1 Introduction

1.1 This document provides procedures for the installation of CETCO's GCLs in a manner that maximizes safety, efficiency, and the physical integrity of the GCL.

1.2 These guidelines are based upon several years of experience at a variety of sites and should be generally applicable to any type of lining project using CETCO's GCLs. The user should contact CETCO if it is believed that conditions at a particular site warrant modifications to these guidelines.

1.3 The performance of the GCL is wholly dependent on the quality of its installation. It is the installer's responsibility to adhere to these guidelines, and to the project specifications and drawings, as closely as possible. It is the engineer's and owner's responsibility to provide construction quality assurance (CQA) for the installation, to ensure that the installation has been executed properly. This document covers only installation procedures.

2 Equipment Requirements

2.1 CETCO GCLs are delivered in rolls weighing 2,500-2,700 lbs. (1,140 - 1,225 kg). It is necessary to support this weight using an appropriate core pipe as indicated in Table 1. For any installation, the core pipe must not deflect more than 3 inches (75 mm) as measured from end to midpoint when a full GCL roll is lifted.

Table 1. Core Pipe Requirements

Product	Nominal GCL Roll Size, W x L Ft. (m)	Typical GCL Roll Wt., lbs. (kg)	Interior Core Size, in. (mm)	Core Pipe Length x Diameter, ft. x in. (m x mm)	Minimum Core Pipe Strength
Bentomat CL, ST, DN, CLT	15 x 150 (4.6 x 45)	2,700 (1,225)	4 (100)	18 x 3 O.D. (5.5 x 75)	XXH
Claymax 200R, 600CL	15 x 150 (4.6 x 45)	2,500 (1,140)	4 (100)	18 x 3 O.D. (5.5 x 75)	XXH

2.2 Lifting chains or straps appropriately rated, should be used in combination with a spreader bar made from an I-beam as shown in the cover illustration. The spreader bar ensures that the lifting chains or straps do not chafe against the ends of the GCL roll, allowing it to rotate freely during installation.

2.3 A front end-loader, backhoe, dozer, or other equipment can be utilized with the spreader bar and core bar. Alternatively, a forklift with a "stinger" attachment may be used for on-site handling and, in

certain cases, installation. A forklift without a stinger attachment should not be used to lift or handle the GCL rolls. Stinger attachments specially fabricated to fit various forklift makes and models are available through CETCO.

2.4 When installing over certain geosynthetic materials, a 4-wheel, all-terrain vehicle (ATV) can be used to deploy the GCL from behind. An ATV can be driven directly on the GCL provided that no sudden stops, starts, or turns are made.

2.5 Additional equipment needed for installation of CETCO's GCLs includes:

- Utility knife and spare blades (for cutting the GCL).
- Granular bentonite or bentonite mastic (for overlapped seams of GCLs with needlepunched, non-woven geotextiles and for sealing around structures and details). Both are available from CETCO.
- Waterproof tarpaulins (for temporary cover on installed material as well as for stockpiled rolls).
- Optional chalk line marker to simplify bentonite placement at seams (when installing a GCL with needlepunched, non-woven geotextile components).
- Optional flat-bladed vise grips (for positioning the GCL panel by hand).

3 Subgrade Preparation

3.1 Subgrade surfaces consisting of granular soils or gravel may not be acceptable due to their large void fraction and puncture potential. In high head (greater than one foot) applications subgrade soils should possess a particle size distribution such that at least 80 percent of the soil is finer than a #60 sieve (0.250 mm).

3.2 When the GCL is placed over an earthen subgrade, the subgrade surface must be in accordance with the project specifications. Engineer's approval of the subgrade must be obtained prior to installation. The finished surface should be firm and unyielding, without abrupt elevation changes, voids, cracks, ice, or standing water.

3.3 The subgrade surface must be smooth and free of vegetation, sharp-edged rocks, stones, sticks, construction debris, and other foreign matter that could contact the GCL. The subgrade should be rolled with a smooth-drum compactor to remove any wheel ruts, footprints, or other abrupt grade changes. Furthermore, all protrusions extending more than 0.5 inch (12 mm) from the subgrade surface shall either be removed, crushed, or pushed into the surface with a smooth-drum compactor. The GCL may be installed on a frozen subgrade, but the subgrade soil in the unfrozen state should meet the above requirements.

4 Unloading

4.1 In most cases, CETCO GCLs are delivered on flatbed trucks. To unload the rolls from the flatbed, insert the core pipe through the roll. This may require removal of the core plug, which should be replaced after the roll is unloaded. Secure the lifting straps or chains to each end of the core pipe, and to the spreader bar mounted on the lifting equipment. Hoist the roll straight up; make sure its weight is evenly distributed so that it does not tilt or sway when lifted.

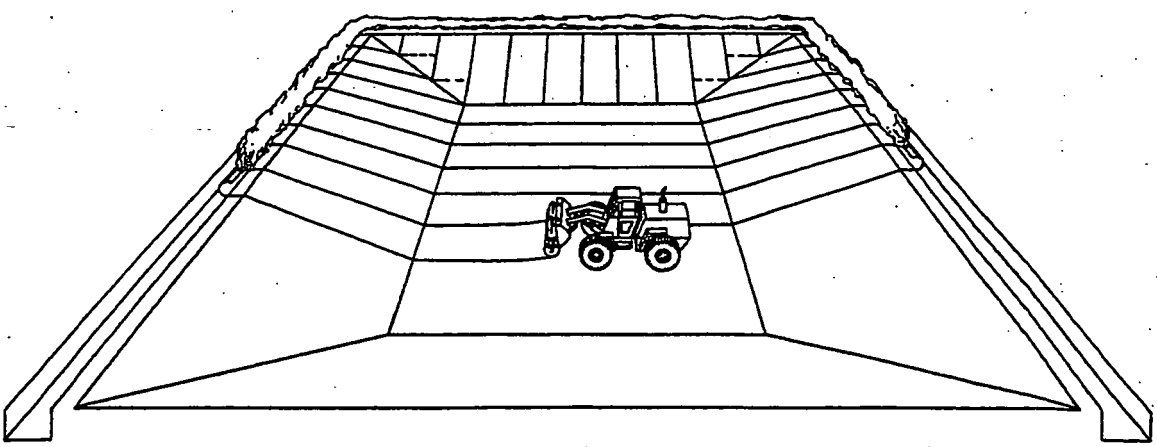
4.2 CETCO GCLs are also delivered in closed shipping containers. To remove the roll from the container, it is best to utilize a forklift mounted with a "stinger" attachment. Guide the stinger as far as possible through the core and lift the roll up and out of the container.

5 Installation

5.1 GCL rolls should be taken to the working area of the site in their original packaging. Prior to deployment, the packaging should be carefully removed without damaging the GCL. The orientation of the GCL (i.e., which side faces up) may be important if the GCL has two different geotextiles. Unless otherwise specified, however, the GCL should be installed such that the product name printed on one side of the GCL faces up.

5.2 Equipment which could damage the GCL should not be allowed to travel directly on it. Acceptable installation, therefore, may be accomplished such that the GCL is unrolled in front of the backwards-moving equipment (Figure 1). If the installation equipment causes rutting of the subgrade, the subgrade must be restored to its originally accepted condition before placement continues.

Figure 1. Typical Bentomat®/Claymax® installation strategy



5.3 If sufficient access is available; GCL may be deployed by suspending the roll at the top of the hill with a group of laborers pulling the material off of the roll and down the slope.

5.4 GCL rolls should not be released on the slope and allowed to unroll freely by gravity.

5.5 Care must be taken to minimize the extent to which the GCL is dragged across the subgrade in order to avoid damage to the bottom surface of the GCL. A temporary geosynthetic subgrade covering commonly known as a slip sheet or rub sheet may be used to reduce friction damage during placement.

5.6 The GCL should be placed so that seams are parallel to the direction of the slope. End-of-roll seams should also be located at least 3 ft. (1 m) from the toe and crest of slopes steeper than 4H:1V.

5.7 All GCL panels should lie flat on the underlying surface, with no wrinkles or folds, especially at the exposed edges of the panels.

5.8 The GCL should not be installed in standing water or during rainy weather. Only as much GCL shall be deployed as can be covered at the end of the working day with soil, a geomembrane, or a temporary waterproof tarpaulin. The GCL shall not be left uncovered overnight. If the GCL is hydrated when no confining stress is present, it may be necessary to remove and replace the hydrated material. The project engineer and CQA inspector should be consulted for specific guidance if premature hydration occurs.

5.9 In hot weather conditions, Claymax must be covered with a soil layer within eight hours of deployment.

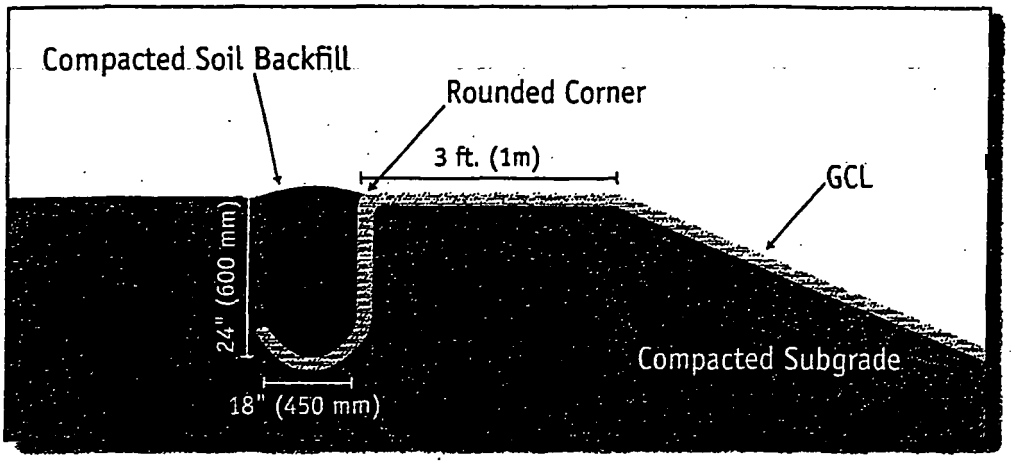
6 Anchorage

6.1 If required by the project drawings, the end of the GCL roll should be placed in an anchor trench at the top of a slope. The front edge of the trench should be rounded to eliminate any sharp corners that could cause excessive stress on the GCL. Loose soil should be removed or compacted into the floor of the trench.

6.2 Sufficient anchorage may alternately be obtained by extending the end of the GCL roll back from the crest of the slope. The length of this "runout" anchor is project-specific.

6.3 If a trench is used for anchoring the end of the GCL, soil backfill should be placed in the trench to provide resistance against pullout. The size and shape of the trench, as well as the appropriate backfill procedures, should be in accordance with the project drawings and specifications. Typical dimensions are shown in Figure 2.

Figure 2. Typical anchor trench design



6.4 The GCL should be placed in the anchor trench such that it covers the entire trench floor but does not extend up the rear trench wall.

7 Seaming

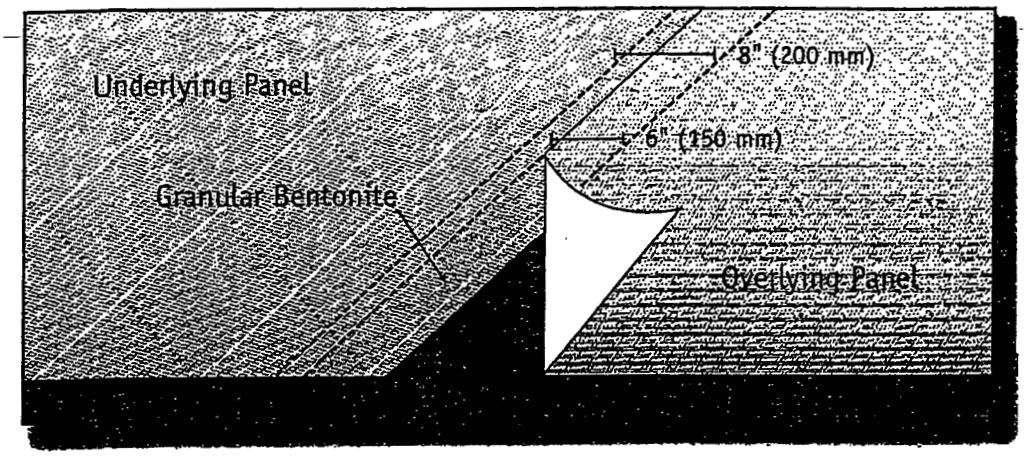
7.1 GCL seams are constructed by overlapping their adjacent edges. Care should be taken to ensure that the overlap zone is not contaminated with loose soil or other debris. Supplemental bentonite is required for CETCO Bentomat GCLs but not Claymax 200R or 600CL.

7.2 Unless otherwise specified, the minimum dimension of the longitudinal overlap should be 6 inches (150 mm). End-of-roll overlapped seams should be similarly constructed, but the minimum overlap should measure 24 inches (600 mm).

7.3 Seams at the ends of the panels should be constructed such that they are shingled in the direction of the grade to prevent the potential for runoff flow to enter the overlap zone. End panel overlap seams on slopes are permissible, provided adequate slope stability analysis has been conducted (i.e. the GCL is not expected to be in tension).

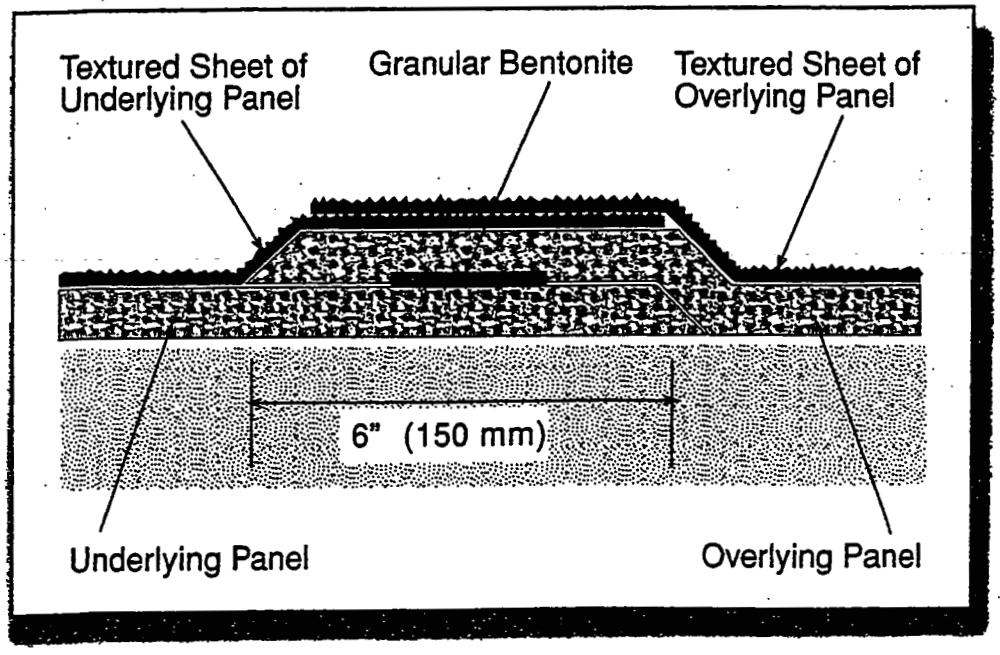
7.4 Bentonite-enhanced seams are constructed first by overlapping the adjacent panels as instructed above, exposing the underlying edge, and then applying a continuous bead or fillet of granular sodium bentonite (supplied with the GCL) along a zone defined by the edge of the underlying panel and the 6-inch (150 mm) line (Figure 3A). The minimum application rate at which the bentonite is applied is one quarter pound per lineal foot (0.4 kg/m).

Figure 3A. Bentonite-enhanced overlapped seam



7.5 Bentomat CLT panels are left unlaminated on the outer 6 inches (150 mm) of the roll. Thus, optionally, the Bentomat CLT side to side overlap may be interwoven with the bentonite portion and geomembrane portions adjacent (see Figure 3B). The geomembrane ends may then be welded together.

Figure 3B. Bentomat CLT overlapped seam



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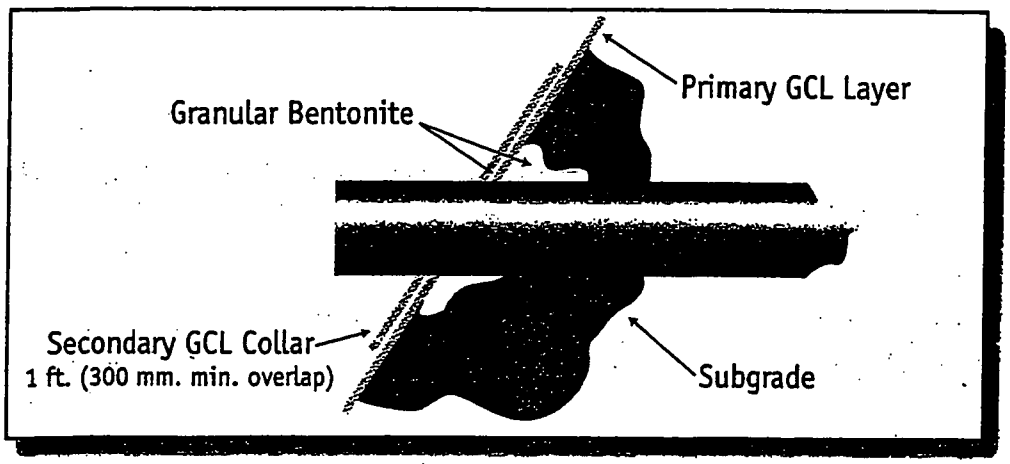
8.1 Cutting the GCL should be performed using a sharp utility knife. Frequent blade changes are recommended to avoid irregular tearing of the geotextile components of the GCL during the cutting process.

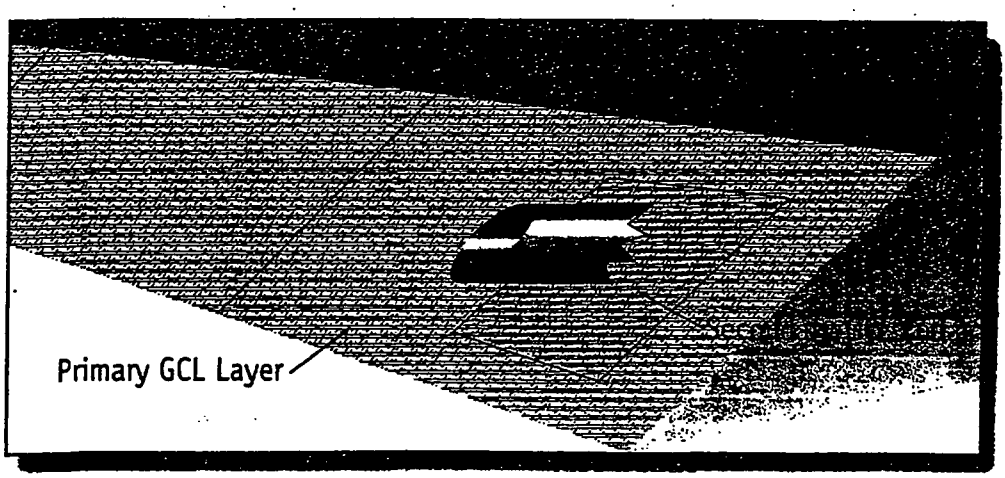
8.2 The GCL should be sealed around penetrations and structures embedded in the subgrade in accordance with Figures 4 through 6. Granular bentonite or a bentonite mastic shall be used liberally (approx. 2 lbs./ln ft. or 3 kg/m) to seal the GCL to these structures.

Figure 4a. Cross-section of a horizontal pipe penetration



8.3 When the GCL is placed over an earthen subgrade, a "notch" should be excavated into the subgrade around the penetration (Figure 4a). The notch should then be backfilled with granular bentonite or bentonite mastic.

Figure 4b. Isometric view of a completed horizontal pipe penetration



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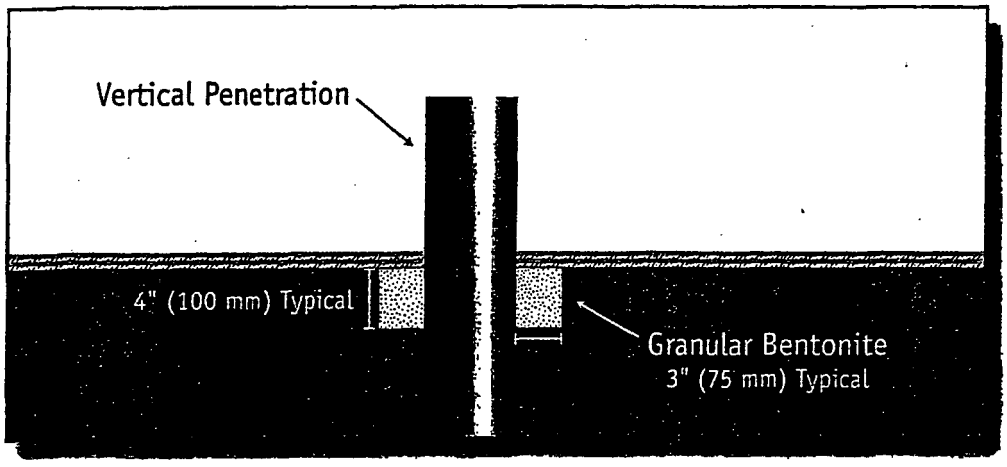
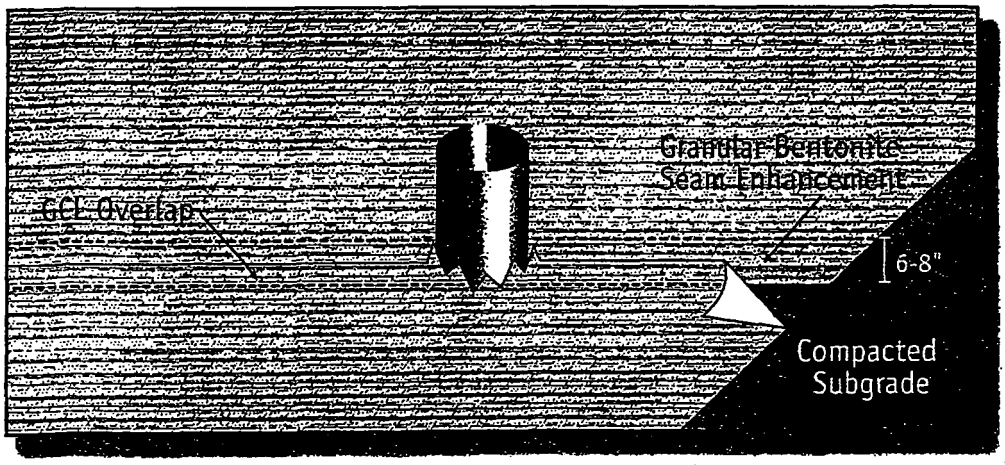
8.4 A secondary collar of GCL should be placed around the penetration as shown in Figure 4b. It is helpful to first trace an outline of the penetration on the GCL and then cut a "star" pattern in the collar to enhance the collar's fit to the penetration.

Figure 5a. Cross-section of a vertical penetration



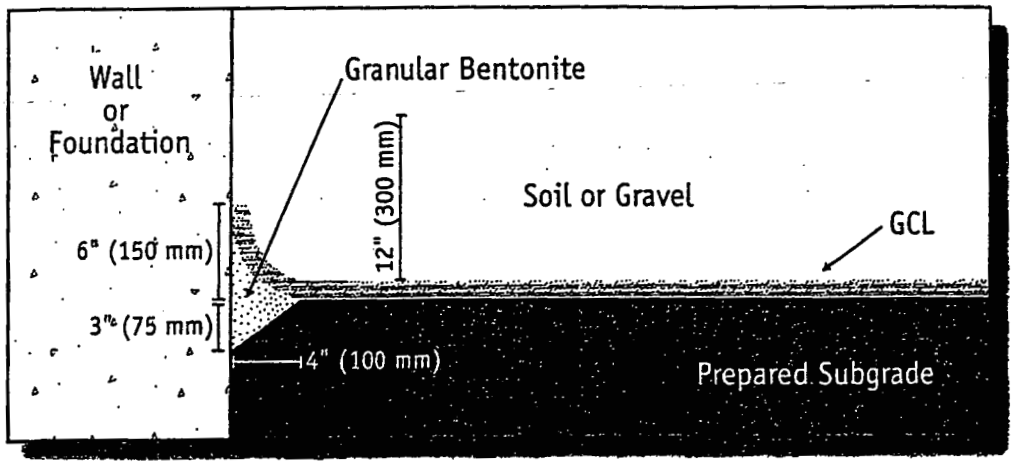
8.5 Vertical penetrations are prepared by notching into the subgrade as shown in Figure 5a. The penetration is completed with two separate pieces of GCL as shown in Figure 5b. A secondary collar is optional in this case.

Figure 5b. Isometric view of the completed vertical penetration



8.6 When the GCL is terminated at a structure or wall that is embedded into the subgrade, the subgrade should be notched as described in sections 8.3 and 8.5. The notch is filled with granular bentonite, and the GCL should be placed over the notch and up against the structure (Figure 6). The connection to the structure can be accomplished by placement of soil or stone backfill in this area.

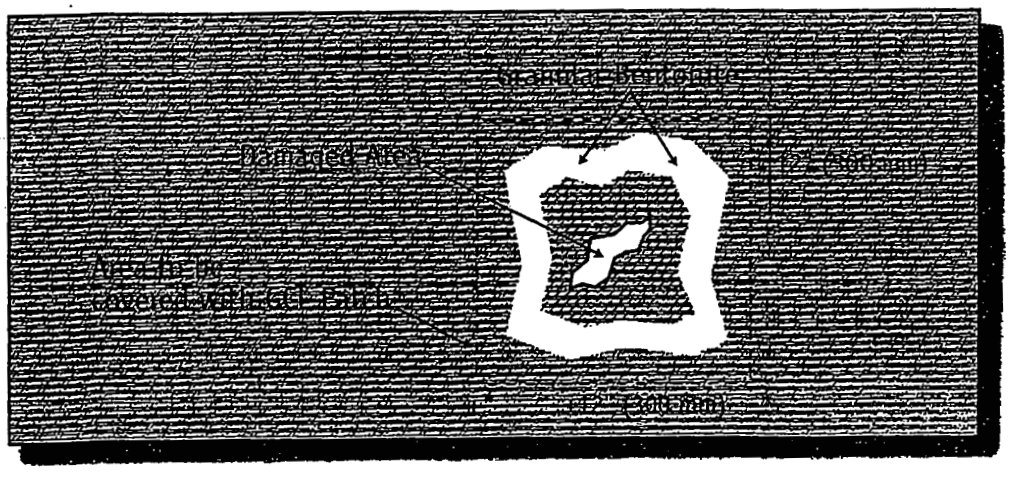
Figure 6. Cross-section of GCL seal against an embedded structure or wall



9 Damage Repair

9.1 If the GCL is damaged (torn, punctured, perforated, etc.) during installation, it may be possible to repair it by cutting a patch to fit over the damaged area (Figure 7). The patch should be obtained from a new GCL roll and should be cut to size such that a minimum overlap of 12 inches (300 mm) is achieved around all parts of the damaged area. Granular bentonite or bentonite mastic should be applied around the damaged area prior to placement of the patch. It may be necessary to use an adhesive such as wood glue to affix the patch in place so that it is not displaced during cover placement. Smaller patches also may be tucked under the damaged area to prevent patch movement.

Figure 7. Damage repair by patching



10 Cover Placement

10.1 Cover soils should be free of angular stones or other foreign matter that could damage the GCL. Cover soils should be approved by the Engineer with respect to particle size, uniformity, and chemical compatibility. Consult your CETCO representative if cover soils with high concentrations of calcium (e.g., limestone, dolomite) are present.

10.2 Recommended cover soils typically have a particle size distribution ranging between fines and 1 inch (25 mm).

10.3 Soil cover shall be placed over the GCL using construction equipment that minimizes stresses on the GCL. A minimum thickness of 1 foot (300 mm) of cover should be maintained between the equipment tires/tracks and the GCL at all times during the covering process. In frequently trafficked areas or roadways, a minimum thickness of 2 feet (600 mm) is required.

10.4 The final thickness of soil cover on the GCL varies with the application. A minimum cover layer must be at least 1 foot (300 mm) thick to provide confining stress to the GCL and prevent damage by equipment, erosion, etc.

10.5 Soil cover should be placed in a manner that prevents the soil from entering the GCL overlap zones. Soil cover should be pushed up slopes, not down slopes, to minimize tensile forces on the GCL.

10.6 When a textured geomembrane is installed over the GCL, a temporary geosynthetic covering known as a slip sheet or rub sheet should be used to minimize friction during placement and to allow the textured geomembrane to be more easily moved into its final position.

11 Hydration

11.1 In cases where the containment of non-aqueous liquids is required, it may be necessary to hydrate the covered GCL with water prior to use. Hydration is usually accomplished by natural rainfall and/or absorption of moisture from soil.

11.2 If manual hydration is necessary, water can be introduced by flooding the lined area or using a sprinkler system. Contact CETCO for specific procedures in these cases.

12 Shipping, Handling and Storage

12.1 All lot and roll numbers should be recorded and compared to the packing list. Each roll of GCL should also be visually inspected during unloading to determine if any packaging has been damaged. Damage, whether obvious or suspected, should be recorded and marked.

12.2 Major damage suspected to have occurred during transit should be reported immediately to the carrier and to CETCO. The nature of the damage should also be indicated on the bill of lading with the specific lot and roll numbers.

12.3 The party directly responsible for unloading the GCL should refer to this manual prior to shipment to ascertain the appropriateness of their unloading equipment and procedures. Unloading and on-site handling of the GCL should be supervised to ensure these goals are achieved. Roll dimensions and weights will vary with the dimensions of the product ordered.

12.4 Rolls should be stacked in a manner that prevents them from sliding or rolling from the stacks. This can be accomplished by frequent chocking of the bottom layer of rolls. Rolls should be stacked no higher than the height at which the spreader bar assembly can be safely handled by laborers (typically no higher than four). Rolls should never be stacked on end.

12.5 Rolls should be stored at the job site away from high-traffic areas but sufficiently close to the active work area to minimize handling. The designated storage area should be flat, dry and stable. Moisture protection of the GCL is provided by its packaging; however, an additional tarpaulin or plastic sheet is recommended.

NOTICE: This document is intended for use as a GENERAL GUIDELINE for the installation of CETCO's GCLs. The information and data contained herein are believed to be accurate and reliable. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.

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SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104

CONTRACT NO: 1440

SUBMITTAL NO. 20104-1440/2-02772P-008 | REV.: 0 | DATE: Nov9, 2001 | Page 1 of 3

FROM:
CETCO

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

SIGNATURE: Wm Urchik

RECEIVED BY: [signature] DATE: 11/13/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02772P-008	0					x				Recommended Storage Requirements and Limitations QA 11/13/01			x	02772P.1.04.A.8	X		

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Kwasi Badu-Tweneboah	38				
Gregg Johnson	64				
Chuck Van Arsdale	64				
Mike Godber	64				

NO COMMENTS: _____ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

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SUBMITTAL ACTION CODE: (BY FDF)
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B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

000315

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

12 Shipping, Handling and Storage

12.1 All lot and roll numbers should be recorded and compared to the packing list. Each roll of GCL should also be visually inspected during unloading to determine if any packaging has been damaged. Damage, whether obvious or suspected, should be recorded and marked.

12.2 Major damage suspected to have occurred during transit should be reported immediately to the carrier and to CETCO. The nature of the damage should also be indicated on the bill of lading with the specific lot and roll numbers.

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Sig: Bill Zebak Date: 11/26/01

CETCO
LINING TECHNOLOGIES GROUP www.cetco.com

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SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02772P-009	REV.: 0	DATE: Nov9, 2001	Page 1 of 3

FROM:
CETCO

SIGNATURE: Wm Zebick

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

RECEIVED BY: Jennifer [illegible] DATE: 11/13/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02772P-009	0					x				Projected Delivery Dates		x		02772P.1.04.A.9	X		

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FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

4941

CETCO
LINING TECHNOLOGIES
geosynthetic clay liners

November 9, 2001

1440-OPT2-02772P-009

Subject: Fluor Fernald Geosynthetic Clay Liner

GCL MANUFACTURER'S Delivery Schedule

Please accept this as confirmation that CETCO will meet the projected delivery schedule for this project

Yours truly,

William A. Urchik
Product Development Engineer
CETCO

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000318

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FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02772P-010	REV.: 0	DATE: Nov9, 2001	Page 1 of 3

FROM:
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SIGNATURE: Wm Uschab

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

RECEIVED BY: Jennifer L. Hoff DATE: 11/13/01

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6	1440-OPT2-02772P-010 JA 11/13/01	0						x			Completed Form GCL-1		x		02772P.1.04.A.10	X		

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FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

TABLE GCL-1 TECHNICAL INFORMATION GEOSYNTHETIC CLAY LINER
REQUISITION #F99SC001440

1440-OPT2-02772P-010 4941
Refer to Specification Section 02772P

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
YSICAL PROPERTIES				
ENTONITE CONTENT	D5993	1.0 lb/ft^2 MIN	yes	MEASURED AT ≤ 25% MOISTURE CONTENT
BENTONITE MOISTURE CONTENT	D4643	25% MAX	yes	
BENTONITE FREE SWELL	D5890	24 ML/2G MIN	yes	
HYDRAULIC CONDUCTIVITY	D5887	5x10^{-9} CM/S MAX	yes	
BENTONITE FLUID LOSS	D5891	18 ML MAX	yes	
POLYMER COMPOSITION		95% POLY MIN	yes	POLYESTER OR POLYPROPYLENE
MECHANICAL PROPERTIES				
TENSILE STRENGTH	D4595	35 LB/IN MIN	yes	
PEEL STRENGTH	D4632	15 LB/IN MIN	yes	
SHEAR STRENGTH (INTERNAL & INTERFACE)	D6243	SEE 02772P, 2.01.F.3	yes	Dependent on additional testing
ROLL SIZE		15 FT WIDE, (MIN) 100 FT LENGTH (MIN)	yes	
MINIMUM LOT SIZE		>100,000 SF	yes	
SUBMITTALS REQUIRED TO BE PROVIDED WITH PROPOSAL				SUPPLIER MUST INDICATE WHERE REQUIRED
				SUBMITTALS ARE INCLUDED IN THE PROPOSAL
PRODUCT NAME		Bentomat ST		
NAME AND PHONE # OF CONTACT PERSON		Bill Urchik		800-527-9948x7939
DAILY PRODUCTION CAPACITY AND ASSURANCE OF SCHEDULE			yes	
MQC PROCEDURES			yes	
MANUFACTURERS GEOTEXTILE REQUIREMENTS			yes	
CERTIFICATION OF MFG. REQUIREMENTS OF GEOTEXTILE COMPONENTS			yes	
CERTIFICATION OF MARV AND TEST PROCEDURES FOR GCL			yes	
RECOMMENDED INSTALLATION PROCEDURES			yes	
(INCLUDING NEED FOR POWDERED BENTONITE AT SEAMS)			yes	
ORAGE REQUIREMENTS AND LIMITATIONS			yes	
OJECTED DELIVERY DATES			yes	
MANUFACTURER WARRANTY			yes	
MSDS			yes	
TESTING FREQUENCY				
BENTONITE CONTENT	1/40,000 SF		yes	
BENTONITE MOISTURE CONTENT	1/40,000 SF		yes	
BENTONITE FREE SWELL	1/40,000 SF		yes	additional testing required
HYDRAULIC CONDUCTIVITY	1/40,000 SF		yes	additional testing required
BENTONITE FLUID LOSS	1/40,000 SF		yes	additional testing required
TENSILE STRENGTH	1/40,000 SF		yes	additional testing required
PEEL STRENGTH	1/40,000 SF		yes	
SHEAR STRENGTH (INTERNAL & INTERFACE)	1/100,000 SF		yes	additional testing required
SCHEDULED DELIVERY DATES				
TOTAL QUANTITY	1,660,000 SF		yes	

W Urchik
Signature

Nov. 9, 2001
DATE

NAME OF BIDDER

INFORMATION ONLY

Revised 10/5/2001

000320

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: [illegible] Date: 11/19/01

OPTION 2 TABLE GCL-1

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02772P-011	REV.: 0	DATE: Nov9 , 2001	Page 1 of 3

FROM:
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TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7

SIGNATURE: WM Uschik

RECEIVED BY: Jennifer [illegible] DATE: 11/13/01

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6	1440-OPT2-02772P-011	0		x							Material Safety Data Sheets ~~MSDS~~ QA 11/13/01			x	02772P.1.04.A.11	X		

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Bill Zebick	62				
Debra Grant	35				

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1-4911

000321

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

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[ ] C - Revise and Resubmit
Sig: [illegible] Date: 11/15/01

4941

1440-OPT2-02772P-011

MATERIAL SAFETY DATA SHEET May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

PRODUCT NAME: BENTOMAT-ST

INFORMATION ONLY

Section I MANUFACTURER'S INFORMATION

MANUFACTURER'S NAME & ADDRESS:

CETCO – *Lining Technologies Group*
1500 West Shure Drive
Arlington Heights, IL 60004

Telephone Number: 847-392-5800 / E-mail: www.cetco.com
EMERGENCY CONTACT: *CHEMTREC* 800-424-9300
Date Prepared: March 24, 1999

Section II HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

HAZARDOUS COMPONENTS: (Specific Chemical Identity: Common Names(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
Crystalline Quartz CAS# 14808-60-7			*	< 6%
Respirable Crystalline Quartz			NIOSH	< 2%
Present (TWA)	0.1 mg/m^3	0.1 mg/m^3	50 ug/m^3	
Proposed (TWA)		50.0 ug/m^3		
Nuisance Dust:				
Respirable	5 mg/m^3	5 mg/m^3		
Total Dust	15 mg/m^3	10 mg/m^3		

*** WARNING:** This product contains a small amount of crystalline silica, which may cause delayed respiratory disease if inhaled over a prolonged period of time. Avoid breathing dust. Use NIOSH/MSHA approved respirator where TLV for crystalline silica (Quartz) may be exceeded. IARC Monographs on the evaluation of the Carcinogenic Risk of Chemicals to Humans (volume 68, 1997) concludes that crystalline silica is carcinogenic to humans in the form of quartz. IARC classification 1.

The small quantities of crystalline silica (quartz) found in this product are, under normal conditions, naturally coated with an unremovable layer of amorphous silica and/or bentonite clay. IARC (vol. 68, 1997, pg. 191-192) has stated that crystalline silica (quartz) can differ in toxicity depending on the minerals with which it is combined, citing studies in IARC (vol. 42, 1987, p. 86) which stated that the toxic effect of crystalline silica (quartz) is reduced by the "protective effect...due mainly to clay minerals..."

National Institute for Occupational Safety and Health (NIOSH) has recommended that the permissible exposure limit be changed to 50 micrograms respirable free silica per cubic meter of air (0.05 mg/ m^3) as determined by a full shift sample up to a 10 hour working day, 40 hours per week. See: 1974 NIOSH criteria for a recommended Standard for Occupational Exposure to Crystalline Silica should be consulted for more detailed information.

PEL - OSHA Permissible Exposure Limit.
TLV - American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value.
TWA - 8 hour time weighted average

Note: The Permissible Exposure Limits (PEL) reported above are the pre - 1989 limits that were reinstated by OSHA June 30, 1993 following a decision by the United States Circuit Court of Appeals for the 11th Circuit. Federal OSHA is now enforcing these PELs. More restrictive exposure limits may be enforced by some other jurisdictions.

PRODUCT NAME: BENTOMAT-ST

Section II HAZARDOUS INGREDIENTS/IDENTITY INFORMATION CONT.

PRODUCT IDENTIFICATION:
Chemical Name: Clay Silicate Compound / Geotextile Composite.
NFPA/HMIS: Health - 2, Fire - 0, Reactivity - 0, Specific Hazard - *See Section VI.*
DOT Class: Not Regulated (49 CFR, IMDG, ICAO, IATA).

Section III PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point: Not Applicable.
Vapor Pressure (mm Hg.): Not Applicable.
Vapor Density (AIR = 1): Not Applicable.
Solubility in Water: Negligible.
Appearance and Odor: Pale gray to buff powder or granules in a geotextile material, odorless.
Specific Gravity (H_2O = 1): 2.5
Melting Point: Not Applicable.
Evaporation Rate (Butyl Acetate = 1): Not Applicable.

Section IV FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Available.
Flammable Limits: Not Available. LEL - NA UEL - NA
Extinguishing Media: Not Applicable.
Special Fire Fighting Procedures: Not Applicable.
Unusual Fire/Explosion Hazards: Not Applicable.

Section V REACTIVITY DATA

Stability Unstable -
Stable - X

Conditions to Avoid - None Known.

Incompatibility (Materials to Avoid): Powerful oxidizing agents such as fluorine, chlorine trifluoride, manganese trioxide, etc.

Hazardous Decomposition or By-products: Silica will dissolve in hydrofluoric acid producing a corrosive gas, silicon tetrafluoride.

Hazardous Polymerization May Occur -
Will Not Occur - X

Conditions to Avoid - None Known.

PRODUCT NAME: BENTOMAT-ST

Section VI HEALTH HAZARD DATA

Route(s) of Entry: **Inhalation?** Yes **Skin?** No **Ingestion?** No

Health Hazards (Acute and Chronic):

Inhalation: Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may have the following serious chronic health effects:

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness and reduced pulmonary function. Smoking exacerbates this disease. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1 - carcinogenic to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibers (published in June 1997) in conjunction with the use of these materials. The National Toxicology Program classifies respirable crystalline silica as "reasonably anticipated to be a carcinogen". For further information See: "Adverse effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, page 761-765, 1997.

Other Data with Possible Relevance to Human Health: The small quantities of crystalline silica (quartz) found in this product are, under normal conditions, naturally coated with an unremovable layer of amorphous silica and/or bentonite clay. IARC (Vol. 68, 1997, pp. 191-192) has stated that crystalline silica (quartz) can differ in toxicity depending on the minerals with which it is combined, citing studies in IARC (Vol. 42, 1987 pg. 86) which stated that the toxic effect of crystalline silica (quartz) is reduced by the "protective effect....due mainly to clay minerals...".

Carcinogenicity: NTP? No IARC Monographs? Yes OSHA Regulated? No

Signs and Symptoms of Exposure: Excessive inhalation of generated dust may result in shortness of breath and reduced pulmonary function.

Medical Conditions Generally Aggravated by Exposure: Individuals with respiratory disease, including but not limited to, asthma and bronchitis, or subject to eye irritation should not be exposed to respirable crystalline silica (quartz) dust.

Emergency and First Aid Procedures:

Eyes & Skin:	Flush with water.
Gross Inhalation of Dust:	Remove to fresh air; give oxygen or artificial respiration if necessary; seek medical attention.
Ingestion:	If large amounts are swallowed, get immediate medical attention.

Section VII PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material is Released or Spilled: Vacuum if possible to avoid generating airborne dust. Avoid breathing dust. Wear an approved respirator. Avoid adding water; product will become slippery when wet.

Waste Disposal Method: Bury in an approved sanitary landfill, in accordance with federal, state and local regulations.

Precautions to Be Taken in Handling and Storing: Avoid breathing dust, use NIOSH/MSHA approved respirator where TLV limits for Crystalline Silica may be exceeded.

Other Precautions: Slippery when wet.

PRODUCT NAME: BENTOMAT-ST

Section VIII CONTROL MEASURES

Respiratory Protection: Use appropriate respiratory protection for respirable particulate based on consideration of airborne workplace concentration and duration of exposure arising from intended end use. Refer to the most recent standards of ANSI (z88.2) OSHA (29 CFR 1910.134), MSHA (30 CFR Parts 56 and 57) and NIOSH Respirator Decision Logic.

Ventilation: Use local exhaust as required to maintain exposures below applicable occupational exposure limits (See Section II). See also ACGIH "Industrial Ventilation – A Manual for Recommend Practice", (current edition).

Protective Gloves: Not Required.

Eye Protection: Recommended.

Other Protective Clothing or Equipment: None

Work/Hygienic Practices: Use good housekeeping practices.

Section IX REGULATORY INFORMATION

SARA 311/312: Hazard Categories for SARA Section 311/312 Reporting: Chronic Health
SARA 313: This product contains the following chemicals subject to annual release reporting requirements under the SARA section 313 (40 CFR 372): None
CERCLA section 103 Reportable Quantity: None

California Proposition 65: *This product contains the following substances known to the state of California to cause cancer and/or reproductive harm: This product contains crystalline silica (respirable); however, the user should note that the small quantities of crystalline silica (quartz) found in this product are, under normal conditions, naturally coated with an unremovable layer of amorphous silica and/or bentonite clay. IARC (Vol. 68, 1997, pg. 191-192) has stated that crystalline silica (quartz) can differ in toxicity depending on the minerals with which it is combined. Citing studies in IARC (Vol. 42, 1987, p. 86) which stated that the toxic effect of crystalline silica (quartz) is reduced by the "protective effect....due mainly to clay minerals...".*

Toxic Substances Control Act: All of the components of this product are listed on the EPA TSCA Inventory or are exempt from notification requirements.

European Inventory of Commercial Chemical Substances: All the components of this product are listed on the EINECS Inventory or exempt from notification requirements. (The EINECS number for Quartz: 231-545-5)

Canadian Environmental Protection Act: All the components of this product are listed on the Canadian Domestic Substances List or exempt from notification requirements.

Japan MITI: All the components of this product are existing chemical substances as defined in the Chemical Substance Control Law.

Australian Inventory of Chemical Substances: All the components of this product are listed on the AICS Inventory or exempt from notification requirements.

Canadian WHMIS Classification: Class D, Division 2, Subdivision A (Very Toxic Material causing other Toxic Effects)

European Community Labeling Classification: Harmful (Xn)
European Community Risk and Safety Phrases: R40, R48, S22

NF-+PA Hazard Rating:	Health: 1	Fire: 0	Reactivity: 0
HMIS Hazard Rating:	Health: *	Fire: 0	Reactivity: 0

*Warning - Chronic health effect possible - inhalation of silica dust may cause lung injury/disease (silicosis). Take appropriate measures to avoid breathing dust. See Section II.

PRODUCT NAME: BENTOMAT-ST

Section IX REGULATORY INFORMATION CONT.

REFERENCES:

Registry for Toxic Effects of Chemical Substances (RTECS), 1995.

Patty's Industrial Hygiene and Toxicology.

NTP Seventh Annual Report on Carcinogens, 1994.

IARC Monograph Volume 68, Silica, Some Silicates and Organic Fibers, 1997.

The information herein has been compiled from sources believed to be reliable and is accurate to the best of our knowledge. However, CETCO cannot give any guarantees regarding information from other sources, and expressly does not make any warranties, nor assumes any liability, for its use.

MATERIAL SAFETY DATA SHEET May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

PRODUCT NAME: CG-50

Section I MANUFACTURER'S INFORMATION

MANUFACTURER'S NAME AND ADDRESS:

CETCO – *Lining Technologies Group*
1500 West Shure Drive
Arlington Heights, Illinois 60004

Telephone Number: 847-392-5800 / E-mail: www.cetco.com
Emergency Contact *CHEMTREC*: 800-424-9300
Date Prepared: March 29, 1999

Section II HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

HAZARDOUS COMPONENTS: (Specific Chemical Identity: Common Names(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
Crystalline Quartz: CAS# 14808-60-7			*	< 6%
Respirable Crystalline Quartz:			NIOSH	< 2%
Present (TWA)	0.1 mg/m^3	0.1 mg/m^3	50 ug/m^3	
Proposed (TWA)		50.0 ug/m^3		
Nuisance Dust:				
Respirable	5 mg/m^3	5 mg/m^3		
Total Dust	15 mg/m^3	10 mg/m^3		

* **WARNING:** This product contains a small amount of crystalline silica, which may cause delayed respiratory disease if inhaled over a prolonged period of time. Avoid breathing dust. Use NIOSH/MSHA approved respirator where TLV for crystalline silica (Quartz) may be exceeded. IARC Monographs on the evaluation of the Carcinogenic Risk of Chemicals to Humans (volume 68, 1997) concludes that crystalline silica is carcinogenic to humans in the form of quartz. IARC classification 1.

The small quantities of crystalline silica (quartz) found in this product are, under normal conditions, naturally coated with an unremovable layer of amorphous silica and/or bentonite clay. IARC (vol. 68, 1997, pg. 191-192) has stated that crystalline silica (quartz) can differ in toxicity depending on the minerals with which it is combined, citing studies in IARC (vol. 42, 1987, p. 86) which stated that the toxic effect of crystalline silica (quartz) is reduced by the "protective effect...due mainly to clay minerals..."

National Institute for Occupational Safety and Health (NIOSH) has recommended that the permissible exposure limit be changed to 50 micrograms respirable free silica per cubic meter of air (0.05 mg/ m^3) as determined by a full shift sample up to a 10 hour working day, 40 hours per week. *See*: 1974 NIOSH criteria for a recommended Standard for Occupational Exposure to Crystalline Silica should be consulted for more detailed information.

PEL - OSHA Permissible Exposure Limit.
TLV - American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value.
TWA - 8 hour time weighted average

Note: The Permissible Exposure Limits (PEL) reported above are the pre - 1989 limits that were reinstated by OSHA June 30, 1993 following a decision by the United States Circuit Court of Appeals for the 11th Circuit. Federal OSHA is now enforcing these PELs. More restrictive exposure limits may be enforced by some other jurisdictions.

PRODUCT NAME: CG-50

Section II HAZARDOUS INGREDIENTS/IDENTITY INFORMATION CONT.

PRODUCT IDENTIFICATION:

Chemical Name: Dry Mixture of Inorganic Mineral Compounds.

NFPA/HMIS: Health - 2, Fire - 0, Reactivity - 0, Specific Hazard - *See Section VI.*

DOT Class: Not Regulated (49 CFR, IMDG, ICAO / IATA).

Section III PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point:	Not Applicable.	**Specific Gravity** (H_2O = 1):	2.5
Vapor Pressure (mm Hg.):	Not Applicable.	**Melting Point:**	1400°F
Vapor Density (AIR = 1):	Not Applicable.	**Evaporation Rate** (Butyl Acetate = 1):	Not Applicable.
Solubility in Water:	Negligible.		
Appearance and Odor:	Tan or beige to light gray colored granules, odorless.		

Section IV FIRE AND EXPLOSION HAZARD DATA

Flash Point (*Method Used*):	Not Available.		
Flammable Limits:	Not Available.	**LEL** - NA.	**UEL** - NA.
Extinguishing Media:	Not Applicable.		
Special Fire Fighting Procedure:	Not Applicable.		
Unusual Fire/Explosion Hazards:	Product may pose possible dust explosion under *extremely rare* circumstances or conditions.		

Section V REACTIVITY DATA

Stability: Unstable - Stable - X **Conditions to Avoid** - None Known.

Incompatibility (*Materials to Avoid*): Powerful oxidizing agents such as fluorine, chlorine trifluoride, manganese trioxide, etc.

Hazardous Decomposition or By-products: Silica will dissolve in hydrofluoric acid producing a corrosive gas, silicon tetrafluoride.

Hazardous Polymerization: May Occur - Will Not Occur - X **Conditions to Avoid** - None Known.

PRODUCT NAME: CG-50

Section VI HEALTH HAZARD DATA

Route(s) of Entry: Inhalation? Yes Skin? No Ingestion? No

Health Hazards (Acute and Chronic):

Inhalation: Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may have the following serious chronic health effects:

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness and reduced pulmonary function. Smoking exacerbates this disease. Individuals with silicosis are predisposed to develop tuberculosis.

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Other Precautions: Slippery when wet.

PRODUCT NAME: CG-50

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Protective Gloves: Not Required.

Eye Protection: Recommended.

Other Protective Clothing or Equipment: None.

Work/Hygienic Practices: Use good housekeeping practices.

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European Community Risk and Safety Phrases: R40, R48, S22

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HMIS Hazard Rating:	Health: *	Fire: 0	Reactivity: 0

*Warning - Chronic health effect possible - inhalation of silica dust may cause lung injury/disease (silicosis). Take appropriate measures to avoid breathing dust. *See Section II.*

PRODUCT NAME: CG-50

Section IX REGULATORY INFORMATION CONT.

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SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02772P-013	REV.: 0	DATE: 3/18/02	Page 1 of 73

FROM:
GSE LINING TECHNOLOGIES

SIGNATURE: [signature] 3/18/02 For Bill Urschel

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

RECEIVED BY: [signature] DATE: 3/19/02

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02772P-013	0						X			MANUFACTURING QUALITY CONTROL TEST FOR EACH GCL LOT		X		02772P.1.04.B.1	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Chuck Van Arsdale	64	Approver			
Gregg Johnson	64				
Bill Zebick	64				
Mike Godber	64				
Kwasi Badu-Tweneboah	38				
ECDC					

NO COMMENTS: COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

000332

RECEIVED BY: [signature] DATE: 4/15/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

1941

FS-F-4955

ORIGINAL

GEOSYNTHETIC CLAY LINER QUALITY TEST RESULTS

4941

GEOSYNTHETIC CLAY LINER

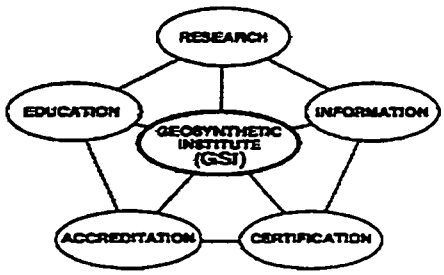
MANUFACTURING CERTIFICATION

Project Name:	Flour Daniel Fernald
Prepared For:	GSE Lining Technology, Inc.
Customer PO:	3285-000-OD
Order Number:	151862
Ship Date:	PRESCANE

CETCO hereby affirms and certifies that the BENTOMAT ST material supplied to this project will meet the physical and chemical criteria listed below.

PROPERTY	TEST METHOD	MINIMUM VALUE
Peel Strength	ASTM D 4632	15 lbs (65 N)
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)
Bentonite Mass / Area	ASTM D 5993	* .80 lb/sq.ft. (Min.)
Grab Strength	ASTM D 4632	90 lbs. (400 N)
Permeability	ASTM D 5084	5 x 10 (-9) cm/sec. (Max)
Index Flux	ASTM D 5887	1.0 x 10 (-8) m(3)/m(2)/sec. (max.)

*** Reported at 0 % moisture content.**
GAI Lab Accredited Test Methods were followed during conformance testing for:
ASTM D 4632 - Grab Strength and Grab Elongation.
ASTM D 5887 - Index Flux.
ASTM D 5993 - Bentonite Mass/Area.



Colloid Environmental Technologies Co. (CETCO)

Subscribed and sworn to before me this 17 day of January 2001.

INFORMATION ONLY

Notary-Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 121804

( ) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: Date: 4/15/02

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE 25 % (max) ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200203LO	00000905	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000904	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000903	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000902	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000901	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000900	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000899	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000898	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000897	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000896	.91*	116.40*	49.60*	23.80*	29.00*	14.00*
LO-BENTOMAT ST	200203LO	00000895	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000894	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000893	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000892	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000891	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000890	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000889	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000888	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000887	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000886	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000885	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000884	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000883	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000882	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000881	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000880	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000879	.91*	108.10	41.70*	24.90*	28.00*	14.40*
LO-BENTOMAT ST	200203LO	00000878	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000877	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000876	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000870	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000869	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000868	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000867	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000866	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000865	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000864	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000863	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000862	.88	108.10	38.30	24.90	29.00	14.20

000335

4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

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LO-BENTOMAT ST	200203LO	00000860	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000859	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000858	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000857	.88*	108.10	38.30*	24.90*	29.00*	14.20*
LO-BENTOMAT ST	200203LO	00000856	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000855	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000854	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000853	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000852	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000851	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000850	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000849	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000848	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000847	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000846	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000845	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000844	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000843	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000842	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000841	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000840	.97*	108.10	46.80*	23.70*	29.00*	13.80*
LO-BENTOMAT ST	200203LO	00000839	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000838	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000837	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000836	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000835	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000834	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000832	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000831	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000830	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000829	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000828	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000827	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000826	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000825	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000824	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000823	.85*	108.10	45.90*	24.80*	29.00*	14.00*
LO-BENTOMAT ST	200203LO	00000822	.92	108.10	39.60	24.90	28.00	14.40

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QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200203LO	00000821	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000820	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000819	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000818	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000817	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000816	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000815	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000814	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000813	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000812	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000811	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000810	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000809	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000808	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000807	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000806	.92*	108.10*	39.60*	24.90*	28.00*	14.40*
LO-BENTOMAT ST	200203LO	00000804	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000803	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000802	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000801	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000800	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000799	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000798	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000797	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000796	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000795	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000794	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000793	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000792	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000791	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000790	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000789	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000788	.96*	107.40*	23.20*	24.30*	29.00*	14.20*
LO-BENTOMAT ST	200203LO	00000787	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000786	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000785	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000784	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000783	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000782	.89	155.70	49.80	24.90	30.00	13.80

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QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200203LO	00000781	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000780	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000779	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000778	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000777	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000776	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000775	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000774	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000773	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000772	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000771	.89*	155.70	49.80*	24.90*	30.00*	13.80*
LO-BENTOMAT ST	200203LO	00000770	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000769	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000768	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000767	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000766	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000765	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000764	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000763	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000762	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000761	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000760	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000759	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000758	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000757	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000756	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000755	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000754	.95*	155.70	35.50*	24.90*	28.00*	14.20*
LO-BENTOMAT ST	200203LO	00000753	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000752	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000751	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000749	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000748	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000747	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000746	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000745	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000744	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000743	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000742	.85	155.70	33.50	24.20	29.00	14.00

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QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200203LO	00000741	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000740	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000739	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000738	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000737	.85*	155.70*	33.50*	24.20*	29.00*	14.00*
LO-BENTOMAT ST	200203LO	00000736	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000735	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000734	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000733	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000732	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000731	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000730	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000729	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000728	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000727	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000726	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000725	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000724	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000723	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000722	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000721	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000720	.87*	149.30	26.10*	24.10*	28.00*	14.40*
LO-BENTOMAT ST	200203LO	00000719	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000718	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000717	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000716	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000715	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000714	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000713	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000712	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000711	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000710	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000709	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000708	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000707	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000706	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000705	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000704	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000703	.89*	149.30	35.40*	24.80*	30.00*	13.80*

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4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200203LO	00000702	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000701	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000700	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000699	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000698	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000697	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000696	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000694	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000693	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000692	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000691	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000690	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000689	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000688	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000687	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000686	.84*	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000685	1.00	149.30	34.80*	24.80*	29.00*	14.20*
LO-BENTOMAT ST	200203LO	00000684	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000683	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000682	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000681	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000680	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000679	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000678	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000677	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000676	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000675	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000674	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000673	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000672	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000671	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000670	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000669	1.00*	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000668	.90	149.30	35.60*	23.30*	29.00*	14.20*
LO-BENTOMAT ST	200203LO	00000667	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000666	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000665	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000664	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000663	.90	149.30	46.90	24.80	29.00	14.00

000340

A941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200203LO	00000662	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000661	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000660	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000659	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000658	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000657	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000656	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000655	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000653	.90*	149.30*	46.90*	24.80*	29.00*	14.00*
LO-BENTOMAT ST	200202LO	00000652	.86	150.30	44.80	25.00	28.00	14.20
LO-BENTOMAT ST	200202LO	00000651	.86	150.30	44.80	25.00	28.00	14.20
LO-BENTOMAT ST	200202LO	00000650	.86	150.30	44.80	25.00	28.00	14.20
LO-BENTOMAT ST	200202LO	00000649	.86	150.30	44.80	25.00	28.00	14.20
LO-BENTOMAT ST	200202LO	00000648	.86	150.30	44.80	25.00	28.00	14.20
LO-BENTOMAT ST	200202LO	00000647	.86	150.30	44.80	25.00	28.00	14.20
LO-BENTOMAT ST	200202LO	00000646	.86	150.30	44.80	25.00	28.00	14.20
LO-BENTOMAT ST	200202LO	00000645	.86*	150.30	44.80*	25.00*	28.00*	14.20*
LO-BENTOMAT ST	200202LO	00000644	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000643	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000642	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000641	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000640	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000638	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000637	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000636	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000635	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000634	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000633	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000632	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000631	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000630	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000629	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000628	.93*	150.30	41.10*	24.20*	29.00*	14.00*
LO-BENTOMAT ST	200202LO	00000627	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000626	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000625	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000624	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000623	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000622	.96	150.30	26.90	24.00	28.00	14.40

000341

4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000621	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000620	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000614	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000613	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000612	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000611	.96*	150.30*	26.90*	24.00*	28.00*	14.40*
LO-BENTOMAT ST	200202LO	00000610	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000609	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000608	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000607	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000606	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000605	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000604	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000603	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000602	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000601	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000600	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000599	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000598	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000597	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000596	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000595	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000594	.94*	153.70	24.50*	23.30*	30.00*	14.20*
LO-BENTOMAT ST	200202LO	00000593	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000592	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000591	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000590	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000589	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000588	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000587	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000586	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000585	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000584	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000583	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000582	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000581	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000580	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000579	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000578	.87	153.70	23.30	24.80	30.00	[illegible]

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4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000577	.87*	153.70	23.30*	24.80*	30.00*	14.00*
LO-BENTOMAT ST	200202LO	00000576	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000575	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000574	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000573	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000572	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000571	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000570	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000569	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000568	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000567	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000566	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000565	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000564	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000563	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000562	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000561	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000560	.85*	153.70	40.70*	25.01*	28.00*	14.40*
LO-BENTOMAT ST	200202LO	00000559	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000558	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000557	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000556	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000555	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000554	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000553	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000552	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000551	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000550	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000549	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000548	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000547	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000546	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000545	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000544	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000543	.87*	153.70	28.10*	25.00*	29.00*	14.00*
LO-BENTOMAT ST	200202LO	00000536	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000535	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000534	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000533	.90	153.70	23.40	24.90	29.00	14.20

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4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000532	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000531	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000530	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000529	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000528	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000527	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000526	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000525	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000524	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000523	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000522	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000521	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000520	.90*	153.70*	23.40*	24.90*	29.00*	14.20*
LO-BENTOMAT ST	200202LO	00000519	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000518	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000517	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000516	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000515	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000514	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000513	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000512	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000511	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000510	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000509	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000508	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000507	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000506	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000505	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000504	.90*	189.40	40.70*	23.70*	28.00*	14.40*
LO-BENTOMAT ST	200202LO	00000503	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000502	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000501	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000500	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000499	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000498	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000497	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000496	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000495	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000494	.86	189.40	44.30	24.80	29.00	[illegible]40

000344

4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000493	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000492	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000491	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000490	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000489	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000488	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000487	.86*	189.40	44.30*	24.80*	29.00*	14.40*
LO-BENTOMAT ST	200202LO	00000486	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000485	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000484	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000483	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000482	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000481	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000480	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000479	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000478	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000477	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000476	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000475	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000474	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000473	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000472	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000471	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000470	.94*	189.40	44.60*	24.90*	27.00*	14.60*
LO-BENTOMAT ST	200202LO	00000469	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000468	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000467	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000466	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000465	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000464	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000463	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000462	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000461	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000460	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000459	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000458	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000457	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000456	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000455	.88	189.40	56.70	24.80	31.00	14.40

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QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000454	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000453	.88*	189.40	56.70*	24.80*	31.00*	14.40*
LO-BENTOMAT ST	200202LO	00000447	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000446	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000445	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000444	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000443	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000442	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000441	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000440	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000439	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000438	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000437	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000436	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000435	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000434	.86*	189.40*	34.80*	24.80*	31.00*	14.00*
LO-BENTOMAT ST	200202LO	00000432	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000431	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000430	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000429	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000428	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000427	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000426	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000425	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000424	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000423	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000422	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000421	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000420	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000419	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000418	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000417	.92*	167.40	32.10*	23.30*	28.00*	14.40*
LO-BENTOMAT ST	200202LO	00000416	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000415	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000414	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000413	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000412	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000411	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000410	.88	167.40	25.70	23.20	29.00	14.40

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QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000409	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000408	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000407	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000406	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000405	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000404	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000403	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000402	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000401	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000400	.88*	167.40	25.70*	23.20*	29.00*	14.40*
LO-BENTOMAT ST	200202LO	00000399	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000398	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000397	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000396	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000395	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000394	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000393	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000392	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000391	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000390	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000389	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000388	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000387	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000386	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000385	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000384	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000383	.86*	167.40	27.10*	24.00*	28.00*	14.00*
LO-BENTOMAT ST	200202LO	00000382	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000376	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000375	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000374	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000373	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000372	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000371	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000370	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000369	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000368	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000367	.90*	167.40	30.10*	23.20*	27.00*	14.40*
LO-BENTOMAT ST	200202LO	00000366	.87	167.40	42.20	25.00	27.00	14.20

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QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000365	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000364	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000363	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000362	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000361	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000360	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000359	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000358	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000357	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000356	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000355	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000354	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000353	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000352	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000351	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000350	.87*	167.40*	42.20*	25.00*	27.00*	14.20*
LO-BENTOMAT ST	200202LO	00000349	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000348	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000347	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000346	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000345	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000344	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000343	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000342	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000341	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000340	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000339	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000338	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000337	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000336	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000335	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000334	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000333	.89*	172.10	40.30*	24.90*	28.00*	14.40*
LO-BENTOMAT ST	200202LO	00000332	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000331	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000330	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000329	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000328	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000327	.95	172.10	36.30	23.80	30.00	[illegible]

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QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000326	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000325	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000324	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000323	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000322	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000321	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000320	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000319	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000318	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000317	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000316	.95*	172.10	36.30*	23.80*	30.00*	14.00*
LO-BENTOMAT ST	200202LO	00000315	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000314	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000312	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000311	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000310	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000309	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000308	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000307	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000306	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000305	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000304	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000303	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000302	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000301	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000300	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000299	.92*	172.10	42.50*	24.80*	29.00*	14.00*
LO-BENTOMAT ST	200202LO	00000298	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000297	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000296	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000295	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000294	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000293	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000292	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000286	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000285	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000284	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000283	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000282	.92*	172.10	26.60*	24.80*	29.00*	13.80*

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QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000281	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000280	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000279	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000278	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000277	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000276	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000275	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000274	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000273	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000272	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000271	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000270	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000269	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000268	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000267	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000266	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000265	.91*	172.10*	28.00*	23.70*	28.00*	14.20*
LO-BENTOMAT ST	200202LO	00000264	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000263	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000262	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000261	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000260	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000259	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000258	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000257	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000256	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000255	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000254	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000253	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000252	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000251	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000250	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000249	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000248	.87*	169.10	27.50*	24.90*	29.00*	14.00*
LO-BENTOMAT ST	200202LO	00000247	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000246	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000245	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000244	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000243	.94	169.10	38.50	24.90	28.00	14.00

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QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000242	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000241	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000240	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000239	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000238	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000237	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000236	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000235	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000234	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000233	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000232	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000231	.94*	169.10	38.50*	24.90*	28.00*	14.00*
LO-BENTOMAT ST	200202LO	00000230	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000229	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000228	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000227	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000226	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000225	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000224	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000223	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000222	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000221	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000220	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000219	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000218	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000217	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000216	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000215	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000214	1.00*	169.10	38.50*	22.20*	30.00*	13.80*
LO-BENTOMAT ST	200202LO	00000213	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000212	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000211	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000210	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000209	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000205	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000201	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000200	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000199	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000198	.96	169.10	33.10	22.80	27.00	14.40

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QCG/FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000197	.96*	169.10*	33.10*	22.80*	27.00*	14.40*
LO-BENTOMAT ST	200202LO	00000195	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000194	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000193	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000192	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000191	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000190	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000189	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000188	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000187	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000186	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000185	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000184	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000183	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000182	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000181	.88*	140.40	34.00*	24.80*	27.00*	14.40*
LO-BENTOMAT ST	200202LO	00000180	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000179	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000178	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000177	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000176	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000175	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000174	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000173	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000172	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000171	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000170	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000169	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000168	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000167	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000166	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000165	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000164	.91*	140.40	29.30*	25.00*	28.00*	14.00*
LO-BENTOMAT ST	200202LO	00000163	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000162	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000161	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000159	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000158	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000157	.93	140.40	30.60	24.10	28.00	14.20

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QCG#FT2 QCT#FT2
1/17/02 15:03.03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000156	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000155	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000154	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000153	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000152	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000151	.93*	140.40	30.60*	24.10*	28.00*	14.20*
LO-BENTOMAT ST	200202LO	00000145	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000144	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000143	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000142	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000141	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000140	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000139	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000138	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000137	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000136	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000135	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000134	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000133	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000132	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000131	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000130	.90*	140.40	24.80*	24.90*	29.00 *	14.20*
LO-BENTOMAT ST	200202LO	00000129	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000128	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000127	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000126	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000125	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000124	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000123	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000122	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000121	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000120	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000119	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000118	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000117	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000116	.93*	140.40	32.80*	24.90*	29.00*	14.80*

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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.
Bentonite Mass/Area and Moisture content are tested a minimum of every 40,000sf.

TABLE 1.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/8/02**
Date Reported: **1/10/02**
Client Sample ID: **Roll 119 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: 4/r
PGL Job No.: **020008**
PGL Control No.: **73955**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	57	56	60	56	55	56					57	1	35 min.
	Elongation at Break (percent)													
	MD	13	12	13	12	12	12					12	0	

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MD - MA[illegible]E DIRECTION
TD - [illegible]VERSE DIRECTION

Precision Geosynthe[illegible] [illegible]aboratories

ISO 900[illegible]

7-4941

CETCO - 92 Hwy 37, Lovell, WY. 82431

Computation Sheet: GRI Accredited ASTM D-5887, Index Flux

Sample: Bentomat ST
Lot Number: 200203LO
Roll Number: 130
Project Name: Flour Daniel Fernald

Permeability equation : ((0.879*Thickness)/(2*Pi*r^2*Time))*ln(Change in Head)

Flux equation : ((Inflow+Outflow)/200)/Pi*r^2/Time

Initial Thickness : 0.683 cm.
Hydration : 48hrs
Permeant : De-aired DI Water
Date: 2/11/02

Test Position : CET-L-301
Initial Head : 2psi 140.6 cm.
Analyst : SW
Date Started: 1/10/02

Cell Size : 4 in.
Max. Effective Stress : 5psi 34.5kPa
Requested by :

Final Thickness : 0.659 cm.

*** indicates value meets Flux Ratio ASTM termination criteria**

Conversions :

Flux (English) = Flux * 9.2366E+10

Date	Time (min)	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	Initial K (cm/sec)	Initial Flux (m³/m²/sec)		Avg Flux (m³/m²/sec)	Final K (cm/sec)	Final Flux (Gal/Acre/Day)	Inflow to Outflow Ratio
1/16/02	0	0.0	24.0	24.0	0.0	24.0	140.63	164.63							
	110	0.8	23.2	24.0	0.0	23.2	140.63	163.83	2.73E-09	7.48E-09			2.64E-9		#DIV/0!
	257	1.3	22.7	23.6	0.4	22.3	140.63	162.93	2.31E-09	6.29E-09	*		2.23E-9		1.25
	393	1.8	22.2	23.2	0.8	21.4	140.63	162.03	2.51E-09	6.80E-09	*		2.42E-9		1.25
	579	2.3	21.7	22.7	1.3	20.4	140.63	161.03	2.05E-09	5.53E-09	*		1.98E-9		1.00
1/17/02	1438	5.0	19.0	20.2	3.8	15.2	140.63	155.83	2.36E-09	6.22E-09	*		2.28E-9		1.08
	1602	5.5	18.5	19.7	4.3	14.2	140.63	154.83	2.42E-09	6.27E-09	*		2.34E-9		1.00
	1736	5.9	18.1	19.3	4.7	13.4	140.63	154.03	2.39E-09	6.14E-09	*		2.30E-9		1.00
	1837	6.2	17.8	19.0	5.0	12.8	140.63	153.43	2.38E-09	6.11E-09	*		2.30E-9		1.00
	1936	6.5	17.5	18.7	5.3	12.2	140.63	152.83	2.44E-09	6.23E-09	*		2.36E-9		1.00
1/18/02	2868	9.2	14.8	16.0	8.0	6.8	140.63	147.43	2.38E-09	5.96E-09	*		2.30E-9		1.00
	3028	9.6	14.4	15.6	8.4	6.0	140.63	146.63	2.10E-09	5.14E-09	*		2.02E-9		1.00
	3127	9.9	14.1	15.3	8.7	5.4	140.63	146.03	2.56E-09	6.23E-09	*		2.47E-9		1.00
	3325	10.4	13.6	14.8	9.2	4.4	140.63	145.03	2.14E-09	5.19E-09	*	5.52E-09	2.07E-9	510	1.00

Final Flux 5.5E-9 $m^3/m^2/sec$

Final Hydraulic Conductivity 2.2E-9 cm/s

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TABLE 2.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/8/02**
Date Reported: **1/10/02**
Client Sample ID: **Roll 136 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: 4m
PGL Job No. : **020008**
PGL Control No. : **73956**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	69	71	68	69	68	68					69	1	*35 min.*
	Elongation at Break (percent)													
	MD	15	17	15	16	16	15					16	1	

MD - MA[illegible]E DIRECTION
TD - [illegible]VERSE DIRECTION

Precision Geosynthet[illegible] Laboratories

ISO 90[illegible]

000356

F-4941

CETCO - 92 Hwy 37, Lovell, WY. 82431

Computation Sheet: GRI Accredited ASTM D-5887, Index Flux

Sample: Bentomat ST
Lot Number: 200202LO
Roll Number: 151
Project Name: Bentomat QA

Permeability equation : ((0.879*Thickness)/(2*Pi*r^2*Time))*ln(Change in Head)

Flux equation : ((Inflow+Outflow)/200)/Pi*r^2/Time

Initial Thickness : 0.749 cm.
Hydration : 48hrs
Permeant : De-aired DI Water
Date: 2/26/02

Test Position : CET-L-147
Initial Head : 2psi 140.6 cm.
Analyst : SW
Date Started: 1/10/02

Cell Size : 4 in.
Max. Effective Stress : 5psi 34.5kPa
Requested by :

Final Thickness : 0.719 cm.

* indicates value meets Flux Ratio ASTM termination criteria

Conversions :

Flux (English) = Flux * 9.2366E+10

Date	Time (min)	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	Initial K (cm/sec)	Initial Flux (m³/m²/sec)		Avg Flux (m³/m²/sec)	Final K (cm/sec)	Final Flux (Gal/Acre/Day)	Inflow to Outflow Ratio
1/14/02	0	0.0	24.0	24.0	0.0	24.0	140.63	164.63							
	121	0.8	23.2	23.6	0.4	22.8	140.63	163.43	4.09E-09	1.02E-08			3.93E-9		2.00
1/15/02	1063	10.3	13.7	16.1	7.9	5.8	140.63	146.43	7.89E-09	1.85E-08			7.57E-9		1.27
	1184	10.8	13.2	15.8	8.2	5.0	140.63	145.63	3.06E-09	6.80E-09			2.94E-9		1.67
	1305	11.3	12.7	15.4	8.6	4.1	140.63	144.73	3.47E-09	7.65E-09	*		3.33E-9		1.25
	1407	11.7	12.3	15.0	9.0	3.3	140.63	143.93	3.68E-09	8.06E-09	*		3.53E-9		1.00
	1503	12.0	12.0	14.7	9.3	2.7	140.63	143.33	2.94E-09	6.42E-09	*		2.83E-9		1.00
	1614	12.5	11.5	14.4	9.6	1.9	140.63	142.53	3.41E-09	7.41E-09	*		3.28E-9		1.67
1/16/02	2531	15.7	8.3	11.3	12.7	-4.4	140.63	136.23	3.34E-09	7.06E-09	*		3.20E-9		1.03
	2641	16.1	7.9	11.1	12.9	-5.0	140.63	135.63	2.72E-09	5.61E-09	*		2.61E-9		2.00
	2787	16.6	7.4	10.7	13.3	-5.9	140.63	134.73	3.09E-09	6.34E-09	*		2.96E-9		1.25
	2924	17.0	7.0	10.2	13.8	-6.8	140.63	133.83	3.31E-09	6.75E-09	*		3.18E-9		0.80
	3109	17.6	6.4	9.7	14.3	-7.9	140.63	132.73	3.02E-09	6.11E-09	*		2.90E-9		1.20
1/17/02	3969	20.1	3.9	7.3	16.7	-12.8	140.63	127.83	2.96E-09	5.86E-09	*	6.24E-09	2.84E-9	576	1.04

Final Flux 6.2E-9 $m^3/m^2/sec$

Final Hydraulic Conductivity 3.0E-9 cm/s

000357

Flour Fernald

4941

TABLE 3.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

QC'd By: _____

PGL Job No. : 020008

PGL Control No. : 73957

Date Received: 1/8/02

Date Reported: 1/10/02

Client Sample ID: Roll 153 Lot 200202LO

Material Description: GCL, Bentomat ST

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	47	51	48	48	45	48					48	2	35 min.
	Elongation at Break (percent)													
	MD	12	13	11	11	10	12					11	1	

MD - MACHINE DIRECTION
TD - CROSSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9001

000358

F-4941

CETCO - 92 Hwy 37, Lovell, WY. 82431 **Computation Sheet: GRI Accredited ASTM D-5887, Index Flux**

Sample: Bentomat ST
Lot Number: 200202LO
Roll Number: 164
Project Name: Flour Daniel Fernald

Permeability equation : ((0.879*Thickness)/(2*Pi*r^2*Time))*ln(Change in Head)

Flux equation : ((Inflow+Outflow)/200)/Pi*r^2/Time

Initial Thickness : 0.789 cm. **Hydration :** 48hrs **Permeant :** De-aired DI Water **Date:** 2/11/02

Test Position : CET-L-304 **Initial Head :** 2psi 140.6 cm. **Analyst :** SW **Date Started:** 1/10/02

Cell Size : 4 in. **Max. Effective Stress :** 5psi 34.5kPa **Requested by :**

Final Thickness : 0.763 cm.

*** indicates value meets Flux Ratio ASTM termination criteria**

Conversions :

Flux (English) = Flux * 9.2366E+10

Date	Time (min)	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	Initial K (cm/sec)	Initial Flux (m³/m²/sec)		Avg Flux (m³/m²/sec)	Final K (cm/sec)	Final Flux (Gal/Acre /Day)	Inflow to Outflow Ratio
1/14/02	0	0.0	24.0	24.0	0.0	24.0	140.63	164.63							
	121	0.7	23.3	23.4	0.6	22.7	140.63	163.33	4.67E-09	1.10E-08			4.52E-9		1.17
	1063	4.2	19.8	20.4	3.6	16.2	140.63	156.83	3.07E-09	7.09E-09			2.97E-9		1.17
1/15/02	1184	4.7	19.3	20.0	4.0	15.3	140.63	155.93	3.39E-09	7.65E-09	*		3.28E-9		1.25
	1305	5.0	19.0	19.6	4.4	14.6	140.63	155.23	2.65E-09	5.95E-09	*		2.56E-9		0.75
	1407	5.4	18.6	19.3	4.7	13.9	140.63	154.53	3.16E-09	7.05E-09	*		3.05E-9		1.33
	1503	5.7	18.3	19.0	5.0	13.3	140.63	153.93	2.89E-09	6.42E-09	*		2.79E-9		1.00
	1614	6.1	17.9	18.6	5.4	12.5	140.63	153.13	3.35E-09	7.41E-09	*		3.24E-9		1.00
1/16/02	2531	9.2	14.8	15.7	8.3	6.5	140.63	147.13	3.11E-09	6.73E-09	*		3.00E-9		1.07
	2641	9.6	14.4	15.3	8.7	5.7	140.63	146.33	3.53E-09	7.48E-09	*		3.42E-9		1.00
	2787	10.1	13.9	14.9	9.1	4.8	140.63	145.43	3.01E-09	6.34E-09	*		2.91E-9		1.25
	2924	10.5	13.5	14.5	9.5	4.0	140.63	144.63	2.87E-09	6.00E-09	*		2.78E-9		1.00
	3109	11.1	12.9	13.9	10.1	2.8	140.63	143.43	3.21E-09	6.67E-09	*		3.10E-9		1.00
1/17/02	3969	13.9	10.1	11.3	12.7	-2.6	140.63	138.03	3.18E-09	6.45E-09	*	6.37E-09	3.08E-9	589	1.08

Final Flux 6.4E-9 $m^3/m^2/sec$

Final Hydraulic Conductivity 3.0E-9 cm/s

000359

Flour Fernald

4941

TABLE 4.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/8/02**
Date Reported: **1/10/02**
Client Sample ID: **Roll 170 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: [illegible]
PGL Job No. : **020008**
PGL Control No. : **73958**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	65	61	62	62	54	59					60	4	*35 min.*
	Elongation at Break (percent)													
	MD	14	12	14	14	12	14					13	1	

MD - MACHINE DIRECTION
TD - CROSS DIRECTION

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ISO 900

0003360

4941

CETCO - 92 Hwy 37, Lovell, WY. 82431 **Computation Sheet: GRI Accredited ASTM D-5887, Index Flux**

Sample: Bentomat ST
Lot Number: 200202LO
Roll Number: 181
Project Name: Flour Daniel Fernald

Permeability equation : ((0.879*Thickness)/(2*Pi*r^2*Time))*ln(Change in Head)

Flux equation : ((Inflow+Outflow)/200)/Pi*r^2/Time

Initial Thickness : 0.717 cm. **Hydration :** 48hrs **Permeant :** De-aired DI Water **Date:** 2/11/02

Test Position : CET-L-305 **Initial Head :** 2psi 140.6 cm. **Analyst :** SW **Date Started:** 1/10/02

Cell Size : 4 in. **Max. Effective Stress :** 5psi 34.5kPa **Requested by :**

Final Thickness : 0.693 cm. *** indicates value meets Flux Ratio ASTM termination criteria**

Conversions : Flux (English) = Flux * 9.2366E+10

Date	Time (min)	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	Initial K (cm/sec)	Initial Flux (m³/m²/sec)		Avg Flux (m³/m²/sec)	Final K (cm/sec)	Final Flux (Gal/Acre/Day)	Inflow to Outflow Ratio
1/14/02	0	0.0	24.0	24.0	0.0	24.0	140.63	164.63							
	112	0.7	23.3	24.0	0.0	23.3	140.63	163.93	2.46E-09	6.42E-09			2.38E-9		#DIV/0!
	234	1.1	22.9	23.8	0.2	22.7	140.63	163.33	1.95E-09	5.06E-09	*		1.88E-9		2.00
1/15/02	1176	3.9	20.1	21.5	2.5	17.6	140.63	158.23	2.18E-09	5.56E-09	*		2.11E-9		1.22
	1298	4.2	19.8	21.2	2.8	17.0	140.63	157.63	2.02E-09	5.06E-09	*		1.95E-9		1.00
	1419	4.6	19.4	20.9	3.1	16.3	140.63	156.93	2.38E-09	5.95E-09	*		2.30E-9		1.33
	1521	4.9	19.1	20.6	3.4	15.7	140.63	156.33	2.43E-09	6.05E-09	*		2.35E-9		1.00
	1617	5.2	18.8	20.3	3.7	15.1	140.63	155.73	2.59E-09	6.42E-09	*		2.51E-9		1.00
	1728	5.5	18.5	20.0	4.0	14.5	140.63	155.13	2.25E-09	5.56E-09	*		2.18E-9		1.00
1/16/02	2645	8.4	15.6	17.4	6.6	9.0	140.63	149.63	2.55E-09	6.17E-09	*		2.46E-9		1.12
	2755	8.7	15.3	17.0	7.0	8.3	140.63	148.93	2.76E-09	6.54E-09	*		2.67E-9		0.75
	2901	9.1	14.9	16.7	7.3	7.6	140.63	148.23	2.09E-09	4.93E-09	*		2.02E-9		1.33
	3038	9.5	14.5	16.3	7.7	6.8	140.63	147.43	2.56E-09	6.00E-09	*		2.47E-9		1.00
	3223	10.1	13.9	15.7	8.3	5.6	140.63	146.23	2.86E-09	6.67E-09	*		2.77E-9		1.00
1/17/02	4083	12.8	11.2	13.3	10.7	0.5	140.63	141.13	2.67E-09	6.10E-09	*	6.26E-09	2.58E-9	578	1.13

Final Flux 6.3E-9 $m^3/m^2/sec$

Final Hydraulic Conductivity 2.6E-9 cm/s

000361

-49-

TABLE 5.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/8/02**
Date Reported: **1/10/02**
Client Sample ID: **Roll 187 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: [illegible]
PGL Job No. : **020008**
PGL Control No. : **73959**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	68	69	70	75	71	69					71	2	35 min.
	Elongation at Break (percent)													
	MD	14	16	15	16	16	15					15	1	

000362

4941

MD - [illegible]E DIRECTION
TD - [illegible]NSVERSE DIRECTION

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ISO 900[illegible]

CETCO - 92 Hwy 37, Lovell, WY. 82431 **Computation Sheet: GRI Accredited ASTM D-5887, Index Flux**

Sample: Bentomat ST
Lot Number: 200202LO
Roll Number: 197
Project Name: Flour Daniel Fernald #197

Permeability equation : ((0.879*Thickness)/(2*Pi*r^2*Time))*ln(Change in Head)

Flux equation : ((Inflow+Outflow)/200)/Pi*r^2/Time

Initial Thickness : 0.795 cm. **Hydration :** 48hrs **Permeant :** De-aired DI Water **Date:** 2/11/02

Test Position : CET-L-306 **Initial Head :** 2psi 140.6 cm. **Analyst :** SW **Date Started:** 1/10/02

Cell Size : 4 in. **Max. Effective Stress :** 5psi 34.5kPa **Requested by :**

Final Thickness : 0.767 cm.

*** indicates value meets Flux Ratio ASTM termination criteria**

Conversions :

Flux (English) = Flux * 9.2366E+10

Date	Time (min)	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	Initial K (cm/sec)	Initial Flux (m³/m²/sec)		Avg Flux (m³/m²/sec)	Final K (cm/sec)	Final Flux (Gal/Acre /Day)	Inflow to Outflow Ratio
1/14/02	0	0.0	24.0	24.0	0.0	24.0	140.63	164.63							
	112	0.5	23.5	23.9	0.1	23.4	140.63	164.03	2.34E-09	5.51E-09			2.26E-9		5.00
	234	1.0	23.0	23.5	0.5	22.5	140.63	163.13	3.24E-09	7.58E-09			3.13E-9		1.25
1/15/02	1176	4.3	19.7	20.6	3.4	16.3	140.63	156.93	2.95E-09	6.77E-09	*		2.85E-9		1.14
	1298	4.7	19.3	20.3	3.7	15.6	140.63	156.23	2.63E-09	5.90E-09	*		2.54E-9		1.33
	1419	5.1	18.9	19.9	4.1	14.8	140.63	155.43	3.05E-09	6.80E-09	*		2.94E-9		1.00
	1521	5.4	18.6	19.6	4.4	14.2	140.63	154.83	2.72E-09	6.05E-09	*		2.63E-9		1.00
	1617	5.7	18.3	19.3	4.7	13.6	140.63	154.23	2.91E-09	6.42E-09	*		2.80E-9		1.00
	1728	6.1	17.9	18.9	5.1	12.8	140.63	153.43	3.37E-09	7.41E-09	*		3.25E-9		1.00
1/16/02	2645	9.2	14.8	16.1	7.9	6.9	140.63	147.53	3.07E-09	6.61E-09	*		2.96E-9		1.11
	2755	9.6	14.4	15.7	8.3	6.1	140.63	146.73	3.55E-09	7.48E-09	*		3.43E-9		1.00
	2901	10.1	13.9	15.3	8.7	5.2	140.63	145.83	3.03E-09	6.34E-09	*		2.92E-9		1.25
	3038	10.5	13.5	14.9	9.1	4.4	140.63	145.03	2.88E-09	6.00E-09	*		2.78E-9		1.00
	3223	11.1	12.9	14.3	9.7	3.2	140.63	143.83	3.23E-09	6.67E-09	*		3.11E-9		1.00
1/17/02	4083	13.9	10.1	11.7	12.3	-2.2	140.63	138.43	3.20E-09	6.45E-09	*	6.37E-09	3.08E-9	589	1.08

Final Flux 6.4E-9 $m^3/m^2/sec$

Final Hydraulic Conductivity 3.0E-9 cm/s

000363

-4941

Flour Fernald

TABLE 1.
MATERIAL PROPERTIES
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

Date Received: 1/10/02
Date Reported: 1/16/02
Client Sample ID: Roll 209 Lot 200202LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No.: 020013
PGL Control No.: 73975

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	48	45	50	50	50	48					49	2	Max.
	Elongation at Break (percent)													
	MD	12	12	11	12	13	12					12	1	35 min.

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9001

000364

494

TABLE 2.
MATERIAL PROPERTIES
CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/10/02
Date Reported: 1/16/02
Client Sample ID: Roll 221 Lot 200202LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No. : 020013
PGL Control No. : 73976

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)													
	3.7E-09											3.7E-09		$5X10^{-1}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	51	50	54	52	54	53					52	1	35 min.
	Elongation at Break (percent)													
	MD	12	13	12	12	12	12					12	0	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

000365

7-4941

TABLE 3.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/10/02
Date Reported: 1/16/02
Client Sample ID: Roll 238 Lot 200202LO
Material Description: GCL, Bentomat ST

QC'd By: [illegible]
PGL Job No. : 020013
PGL Control No. : 73977

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)	3.3E-09										3.3E-09		$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.) MD	61	66	61	64	61	63					63	2	35 min.
	Elongation at Break (percent) MD	14	15	14	15	14	14					14	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 900

000366

4941

TABLE 4.
MATERIAL PROPERTIES
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

Date Received: 1/10/02
Date Reported: 1/16/02
Client Sample ID: Roll 255 Lot 200202LO
Material Description: GCL, Bentomat ST

QC'd By: [illegible]
PGL Job No. : 020013
PGL Control No. : 73978

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)													
	3.1E-09											3.1E-09		5X10⁻⁹ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	78	77	74	76	77	75					76	1	35 min.
	Elongation at Break (percent)													
	MD	18	17	17	17	17	18					17	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

000367

4941

TABLE 5.
MATERIAL PROPERTIES
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

Date Received: 1/10/02
Date Reported: 1/16/02
Client Sample ID: Roll 272 Lot 200202LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No. : 020013
PGL Control No. : 73979

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)	3.8E-09										3.8E-09		$5X10^{-4}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.) MD	79	83	81	78	88	88					83	4	35 min.
	Elongation at Break (percent) MD	19	20	18	18	19	19					19	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 900

000368

4941

TABLE 6.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/10/02
Date Reported: 1/16/02
Client Sample ID: Roll 294 Lot 200202LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No.: 020013
PGL Control No.: 73980

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)	1.7E-09										1.7E-09		$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	49	47	44	39	44	46					45	3	35 min.
	Elongation at Break (percent)													
	MD	12	10	11	10	11	10					11	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

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TABLE 1.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/11/02**
Date Final Reported: **1/29/02**
Client Sample ID: **Roll 311 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No.: **020015**
PGL Control No.: **73984**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.8E-09										4.8E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	51	52	55	55	53	53					53	1	35 min.
	Elongation at Break (percent)													
	MD	14	14	15	13	14	14					14	0	

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MD - MA[illegible]E DIRECTION
TD - [illegible]ISVERSE DIRECTION

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ISO 900[illegible]

TABLE 2.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/11/02**
Date Reported: **1/29/02**
Client Sample ID: **Roll 328 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No. : **020015**
PGL Control No. : **73985**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		4.4E-09										4.4E-09	N/A	$5X10^{-9}$ *Max.*
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	61	63	67	65	66	65					65	2	*35 min.*
	Elongation at Break (percent)													
	MD	15	15	17	16	16	16					16	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 3.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/11/02**
Date Reported: **1/29/02**
Client Sample ID: **Roll 345 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: [illegible]
PGL Job No. : **020015**
PGL Control No. : **73986**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.2E-09										4.2E-09	N/A	$5X10^{-9}$ *Max.*
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	71	68	71	72	72	73					71	2	*35 min.*
	Elongation at Break (percent)													
	MD	16	17	16	16	16	16					16	0	

MD - MA[illegible]E DIRECTION
TD - [illegible]SVERSE DIRECTION

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ISO 900[illegible]

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TABLE 4.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/11/02**
Date Reported: **1/29/02**
Client Sample ID: **Roll 362 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No. : **020015**
PGL Control No. : **73987**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.1E-09										4.1E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	84	84	89	85	78	80					83	4	35 min.
	Elongation at Break (percent)													
	MD	17	18	20	19	16	20					18	2	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 5.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/11/02**
Date Reported: **1/29/02**
Client Sample ID: **Roll 384 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No. : **020015**
PGL Control No. : **73988**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	3.4E-09										3.4E-09	N/A	$5X10^{-9}$ *Max.*
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	42	46	42	45	46	45					44	2	*35 min.*
	Elongation at Break (percent)													
	MD	11	11	12	10	12	11					11	1	

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MD - M[illegible]E DIRECTION
TD - [illegible]SVERSE DIRECTION

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TABLE 6.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/11/02**
Date Final Reported: **1/29/02**
Client Sample ID: **Roll 401 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: _____
PGL Job No.: **020015**
PGL Control No.: **73989**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.1E-09										4.1E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	60	61	60	62	61	60					61	1	35 min.
	Elongation at Break (percent)													
	MD	13	13	13	14	14	13					13	0	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 1.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/14/02**
Date Final Reported: **2/5/02**
Client Sample ID: **Roll 418 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: SM
PGL Job No.: **020018**
PGL Control No.: **73999**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.5E-09										4.5E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	72	73	68	72	78	79					74	4	35 min.
	Elongation at Break (percent)													
	MD	14	15	14	16	16	18					16	1	

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MD - MACHINE DIRECTION
TD - CROSSVERSE DIRECTION

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TABLE 2.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

QC'd By: [illegible]

PGL Job No. : 020018

PGL Control No. : 74000

Date Received: 1/14/02

Date Final Reported: 2/5/02

Client Sample ID: Roll 435 Lot 200202LO

Material Description: GCL, Bentomat ST

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		4.6E-09										4.6E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	86	89	85	88	87	87					87	1	35 min.
	Elongation at Break (percent)													
	MD	17	18	17	18	18	18					18	0	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

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TABLE 3.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/14/02**
Date Final Reported: **2/5/02**
Client Sample ID: **Roll 457 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: [illegible]
PGL Job No. : **020018**
PGL Control No. : **74001**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.3E-09										4.3E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	40	40	41	42	39	42					41	1	35 min.
	Elongation at Break (percent)													
	MD	10	10	9	10	9	10					10	0	

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MD - [illegible]NE DIRECTION
TD - [illegible]NSVERSE DIRECTION

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TABLE 4.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/14/02**
Date Final Reported: **2/5/02**
Client Sample ID: **Roll 474 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: _____
PGL Job No. : **020018**
PGL Control No. : **74002**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		4.3E-09										4.3E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	55	53	57	54	52	55					54	2	35 min.
	Elongation at Break (percent)													
	MD	13	13	14	12	12	14					13	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 5.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/14/02**
Date Final Reported: **2/5/02**
Client Sample ID: **Roll 491 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: [illegible]
PGL Job No. : **020018**
PGL Control No. : **74003**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.1E-09										4.1E-09	N/A	$5X10^{-9}$ *Max.*
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	69	70	66	68	68	67					68	2	*35 min.*
	Elongation at Break (percent)													
	MD	15	17	15	16	15	15					15	1	

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MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 6.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/14/02**
Date Final Reported: **1/17/02**
Client Sample ID: **Roll 508 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: [illegible]
PGL Job No.: **020018**
PGL Control No.: **74004**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		4.3E-09										4.3E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	76	78	78	76	77	76					77	1	35 min.
	Elongation at Break (percent)													
	MD	17	17	19	18	18	18					18	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 7.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/14/02**
Date Final Reported: **1/17/02**
Client Sample ID: **Roll 525 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: _____
PGL Job No. : **020018**
PGL Control No. : **74005**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	3.9E-09										3.9E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	84	83	83	82	84	86					84	1	35 min.
	Elongation at Break (percent)													
	MD	17	18	18	18	18	17					18	1	

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MD - MACHINE DIRECTION
TD - CROSSVERSE DIRECTION

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TABLE 1.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/15/02**
Date Final Reported: **2/12/02**
Client Sample ID: **Roll 548 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: 8/2
PGL Job No.: **020019**
PGL Control No.: **74006**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		4.4E-09										4.4E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	47	48	44	45	42	43					45	2	35 min.
	Elongation at Break (percent)													
	MD	11	12	11	12	10	10					11	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 2.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/15/02**
Date Final Reported: **2/12/02**
Client Sample ID: **Roll 565 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No. : **020019**
PGL Control No. : **74007**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		3.7E-09										3.7E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	54	55	55	55	58	60					56	2	35 min.
	Elongation at Break (percent)													
	MD	12	12	11	12	12	13					12	1	

MD - [illegible]E DIRECTION
TD - [illegible]NSVERSE DIRECTION

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TABLE 3.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/15/02**
Date Final Reported: **2/12/02**
Client Sample ID: **Roll 582 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: dm
PGL Job No. : **020019**
PGL Control No. : **74008**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		4.5E-09										4.5E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	69	70	62	65	67	66					67	3	35 min.
	Elongation at Break (percent)													
	MD	16	16	15	14	15	14					15	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 1.
MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/15/02
Date Final Reported: 3/4/02
Client Sample ID: Roll 588 Lot 200202LO
Material Description: GCL, Bentomat ST

QC'd By: _____
PGL Job No.: 020048
PGL Control No.: 74013

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
	3.9E-09											3.9E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	70	65	69	68	71	67					68	2	35 min.
	Elongation at Break (percent)													
	MD	14	14	15	15	14	14					14	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 4.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/15/02**
Date Final Reported: **2/12/02**
Client Sample ID: **Roll 599 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: _____
PGL Job No. : **020019**
PGL Control No. : **74009**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.3E-09										4.3E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	76	71	75	75	74	78					75	2	35 min.
	Elongation at Break (percent)													
	MD	17	19	17	16	18	20					18	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 5.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/15/02**
Date Final Reported: **2/12/02**
Client Sample ID: **Roll 621 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: 4/m
PGL Job No. : **020019**
PGL Control No. : **74010**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.1E-09										4.1E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	44	41	41	40	39	43					42	2	35 min.
	Elongation at Break (percent)													
	MD	10	10	10	9	9	9					10	1	

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MD - [illegible]E DIRECTION
TD - [illegible]SVERSE DIRECTION

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TABLE 6.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/15/02**
Date Final Reported: **2/12/02**
Client Sample ID: **Roll 637 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: _____
PGL Job No.: **020019**
PGL Control No.: **74011**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.8E-09										4.8E-09	N/A	$5X10^{-9}$ *Max.*
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	57	53	49	49	51	49					51	3	*35 min.*
	Elongation at Break (percent)													
	MD	13	13	11	11	11	11					12	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 1.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/16/02**
Date Final Reported: **2/19/02**
Client Sample ID: **Roll 653 Lot 200203LO**
Material Description: **GCL, Bentomat ST**

QC'd By: [illegible]
PGL Job No.: **020023**
PGL Control No.: **74040**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		4.7E-09										4.7E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	64	67	66	68	65	66					66	1	35 min.
	Elongation at Break (percent)													
	MD	12	13	13	14	12	12					13	1	

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MD - [illegible]E DIRECTION
TD - [illegible]NSVERSE DIRECTION

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TABLE 2.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/16/02**
Date Final Reported: **2/19/02**
Client Sample ID: **Roll 670 Lot 200203LO**
Material Description: **GCL, Bentomat ST**

QC'd By: [illegible]
PGL Job No. : **020023**
PGL Control No. : **74041**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.3E-09										4.3E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	84	88	86	89	90	84					87	3	35 min.
	Elongation at Break (percent)													
	MD	17	18	18	18	17	16					17	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9002

000391

4941

P-041

TABLE 3.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/16/02**
Date Final Reported: **2/19/02**
Client Sample ID: **Roll 687 Lot 200203LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No. : **020023**
PGL Control No. : **74042**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		4.5E-09										4.5E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	86	85	85	82	82	87					85	2	35 min.
	Elongation at Break (percent)													
	MD	17	16	17	21	16	17					17	2	

MD - [illegible]E DIRECTION
TD - [illegible]NSVERSE DIRECTION

Precision Geosynthet[illegible] Laboratories

ISO 900[illegible]

000392

4941

TABLE 4.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/16/02**
Date Final Reported: **2/19/02**
Client Sample ID: **Roll 704 Lot 200203LO**
Material Description: **GCL, Bentomat ST**

QC'd By: _____
PGL Job No. : **020023**
PGL Control No. : **74043**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.2E-09										4.2E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	46	47	49	48	46	46					47	1	35 min.
	Elongation at Break (percent)													
	MD	10	10	10	9	9	9					9	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9002

000393

4941

TABLE 5.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/16/02**
Date Final Reported: **2/19/02**
Client Sample ID: **Roll 721 Lot 200203LO**
Material Description: **GCL, Bentomat ST**

QC'd By: 4m
PGL Job No. : **020023**
PGL Control No. : **74044**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.2E-09										4.2E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	69	66	63	60	69	62					65	4	35 min.
	Elongation at Break (percent)													
	MD	14	13	14	13	14	14					14	1	

000394

4941

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9001

TABLE 6.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/16/02**
Date Final Reported: **2/19/02**
Client Sample ID: **Roll 738 Lot 200203LO**
Material Description: **GCL, Bentomat ST**

QC'd By: _____
PGL Job No.: **020023**
PGL Control No.: **74045**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		4.0E-09										4.0E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	78	78	77	81	76	78					78	2	35 min.
	Elongation at Break (percent)													
	MD	15	15	15	16	15	16					15	0	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9002

000395

F-4941

TABLE 1.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/17/02**
Date Reported: **2/26/02**
Client Sample ID: **Roll 755 Lot 200203LO**
Material Description: **GCL, Bentomat ST**

QC'd By: gn
PGL Job No.: **020026**
PGL Control No.: **74051**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
	4.7E-09											4.7E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	59	57	61	57	56	55					58	2	35 min.
	Elongation at Break (percent)													
	MD	12	11	11	11	11	11					11	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9002

000396

4941

TABLE 2.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/17/02
Date Reported: 2/26/02
Client Sample ID: Roll 772 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No.: 020026
PGL Control No.: 74052

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
	4.0E-09											4.0E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	70	77	71	75	75	76					74	3	35 min.
	Elongation at Break (percent)													
	MD	14	14	15	13	13	13					14	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9002

0003397

4941

TABLE 3.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/17/02
Date Reported: 2/26/02
Client Sample ID: Roll 789 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By: [illegible]
PGL Job No.: 020026
PGL Control No.: 74053

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)													
	4.2E-09											4.2E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	77	78	78	80	78	78					78	1	35 min.
	Elongation at Break (percent)													
	MD	16	14	15	15	14	16					15	1	

000398

MD MACHINE DIRECTION
TD TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9000

4941

TABLE 4.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/17/02
Date Reported: 2/26/02
Client Sample ID: Roll 807 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By: [illegible]
PGL Job No.: 020026
PGL Control No.: 74054

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
	4.1E-09											4.1E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	50	54	46	50	48	49					49	3	35 min.
	Elongation at Break (percent)													
	MD	11	10	10	9	11	13					11	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9002

000399

4941

TABLE 5.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/17/02
Date Reported: 2/26/02
Client Sample ID: Roll 824 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By: 4/n
PGL Job No.: 020026
PGL Control No.: 74055

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)													
	3.1E-09											3.1E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	57	59	58	59	63	59					59	2	35 min.
	Elongation at Break (percent)													
	MD	13	14	12	13	14	13					13	1	

MD MACHINE DIRECTION
TD TRANSVERSE DIRECTION

Precision Geosynth Laboratories

ISO 900

TABLE 1.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/18/02
Date Final Reported: 3/4/02
Client Sample ID: Roll 841 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By: [illegible]
PGL Job No.: 020027
PGL Control No.: 74059

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
	4.6E-09											4.6E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	74	79	76	77	76	77					76	2	35 min.
	Elongation at Break (percent)													
	MD	15	15	15	14	16	14					15	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9002

000401

4941

PRECISION-LAB-CALIFORNIA (714)520-9637

TABLE 2.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/18/02
Date Initial Reported: 3/4/02
Client Sample ID: Roll 858 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By: [illegible]
PGL Job No.: 020027
PGL Control No.: 74060

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)													
	4.2E-09											4.2E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	90	90	86	94	91	92					90	3	35 min.
	Elongation at Break (percent)													
	MD	18	17	18	18	16	18					18	1	

MD = MACHINE DIRECTION
TD = TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9002

000402

4941

TABLE 3.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/18/02
Date Initial Reported: 3/4/02
Client Sample ID: Roll 880 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By: [illegible]
PGL Job No.: 020027
PGL Control No.: 74061

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
	4.0E-09											4.0E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	44	46	46	43	42	45					44	2	35 min.
	Elongation at Break (percent)													
	MD	10	11	10	10	10	10					10	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9002

TABLE 4.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/18/02
Date Initial Reported: 3/4/02
Client Sample ID: Roll 897 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By: [illegible]
PGL Job No.: 020027
PGL Control No.: 74062

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
	4.4E-09											4.4E-09	N/A	5X10⁻⁹ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	50	50	51	51	52	50					50	1	35 min.
	Elongation at Break (percent)													
	MD	13	12	12	12	13	13					13	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9002

000404

4941

FDF PROJECT N[redacted]104

CONTRACT NO: 1440

SUBMITTAL NO. 20104-1440/2-02772P-013 | REV.: 0 | DATE: 3/18/02

FROM:
GSE LINING TECHNOLOGIES

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

SIGNATURE: [illegible] 3/18/02 For Bill Vochek

RECEIVED BY: [illegible] DATE: 3/19/02

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02772P-013	0						X			MANUFACTURING QUALITY CONTROL TEST FOR EACH GCL LOT		X		02772P.1.04.B.1			

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Chuck Van Arsdale	64	Approver			
Gregg Johnson	64				
Bill Zebick	64				
Mike Godber	64				
Kwasi Badu-Tweneboah	38				
ECDC					

RECEIVED MAR 2 2

NO COMMENTS:

COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

Wide width and perm tests were conducted in a random manner. Need a perm test on Roll No. 1 to cover the first roll manufactured. Total number of MQC tests not the same for all properties.

RECEIVED BY: [illegible] DATE: 4/12/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

0004005

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

ORIGINAL

GEOSYNTHETIC CLAY LINER QUALITY TEST RESULTS

GEOSYNTHETIC CLAY LINER

4941

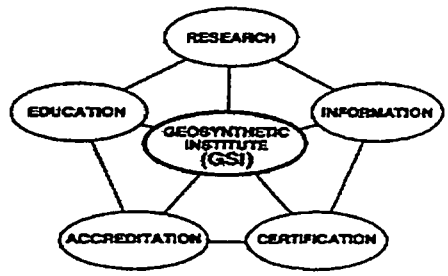
MANUFACTURING CERTIFICATION

Project Name:	Flour Daniel Fernald
Prepared For:	GSE Lining Technology, Inc.
Customer PO:	3285-000-OD
Order Number:	151862
Ship Date:	PRESCANE

CETCO hereby affirms and certifies that the BENTOMAT ST material supplied to this project will meet the physical and chemical criteria listed below.

PROPERTY	TEST METHOD	MINIMUM VALUE
Peel Strength	ASTM D 4632	15 lbs (65 N)
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)
Bentonite Mass / Area	ASTM D 5993	* .80 lb/sq.ft. (Min.)
Grab Strength	ASTM D 4632	90 lbs. (400 N)
Permeability	ASTM D 5084	5 x 10 (-9) cm/sec. (Max)
Index Flux	ASTM D 5887	1.0 x 10 (-8) m(3)/m(2)/sec. (max.)

*** Reported at 0 % moisture content.**
GAI Lab Accredited Test Methods were followed during conformance testing for:
ASTM D 4632 - Grab Strength and Grab Elongation.
ASTM D 5887 - Index Flux.
ASTM D 5993 - Bentonite Mass/Area.



Colloid Environmental Technologies Co. (CETCO)

Subscribed and sworn to before me this 17 day of January 2001.

Notary-Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 121804

$\gamma_w = \gamma_d (1+w)$

$= 0.91(1+0.238)$

$= 1.13$

QCG#FT2 1/17/02 QCT#FT2 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

TOTAL MET CODE

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE ~~MASS/AREA~~ 0.75 lb/sqft ASTM D 5993 (0.8) (43/45 47)	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632 (47)	MOISTURE 25% (max) ASTM D 4643 (47)	FREE SWELL 24 ml/2g ASTM D 5890 (47)	FLUID LOSS 18ML MAX. ASTMD 5891 (47)
LO-BENTOMAT ST	200203LO	00000905	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000904	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000903	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000902	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000901	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000900	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000899	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000898	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000897	.91	116.40	49.60	23.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000896	.91* (1.13)	116.40*	49.60*	23.80*	29.00*	14.00*
LO-BENTOMAT ST	200203LO	00000895	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000894	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000893	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000892	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000891	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000890	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000889	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000888	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000887	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000886	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000885	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000884	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000883	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000882	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000881	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000880	.91	108.10	41.70	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000879	.91* (1.14)	108.10	41.70*	24.90*	28.00*	14.40*
LO-BENTOMAT ST	200203LO	00000878	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000877	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000876	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000870	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000869	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000868	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000867	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000866	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000865	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000864	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000863	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000862	.88	108.10	38.30	24.90	29.00	14.20

000408

4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200203LO	00000861	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000860	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000859	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000858	.88	108.10	38.30	24.90	29.00	14.20
LO-BENTOMAT ST	200203LO	00000857	.88* (1.10)	108.10	38.30*	24.90*	29.00*	14.20*
LO-BENTOMAT ST	200203LO	00000856	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000855	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000854	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000853	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000852	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000851	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000850	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000849	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000848	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000847	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000846	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000845	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000844	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000843	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000842	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000841	.97	108.10	46.80	23.70	29.00	13.80
LO-BENTOMAT ST	200203LO	00000840	.97* (1.20)	108.10	46.80*	23.70*	29.00*	13.80*
LO-BENTOMAT ST	200203LO	00000839	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000838	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000837	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000836	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000835	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000834	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000832	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000831	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000830	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000829	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000828	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000827	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000826	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000825	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000824	.85	108.10	45.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000823	.85* (1.05)	108.10	45.90*	24.80*	29.00*	14.00*
LO-BENTOMAT ST	200203LO	00000822	.92	108.10	39.60	24.90	28.00	14.40

000409

4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200203LO	00000821	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000820	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000819	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000818	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000817	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000816	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000815	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000814	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000813	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000812	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000811	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000810	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000809	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000808	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000807	.92	108.10	39.60	24.90	28.00	14.40
LO-BENTOMAT ST	200203LO	00000806	.92*	108.10*	39.60*	24.90*	28.00*	14.40*
LO-BENTOMAT ST	200203LO	00000804	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000803	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000802	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000801	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000800	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000799	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000798	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000797	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000796	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000795	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000794	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000793	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000792	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000791	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000790	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000789	.96	107.40	23.20	24.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000788	.96*	107.40*	23.20*	24.30*	29.00*	14.20*
LO-BENTOMAT ST	200203LO	00000787	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000786	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000785	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000784	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000783	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000782	.89	155.70	49.80	24.90	30.00	13.80

000410

4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200203LO	00000781	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000780	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000779	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000778	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000777	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000776	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000775	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000774	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000773	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000772	.89	155.70	49.80	24.90	30.00	13.80
LO-BENTOMAT ST	200203LO	00000771	.89*	155.70	49.80*	24.90*	30.00*	13.80*
LO-BENTOMAT ST	200203LO	00000770	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000769	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000768	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000767	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000766	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000765	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000764	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000763	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000762	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000761	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000760	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000759	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000758	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000757	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000756	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000755	.95	155.70	35.50	24.90	28.00	14.20
LO-BENTOMAT ST	200203LO	00000754	.95*	155.70	35.50*	24.90*	28.00*	14.20*
LO-BENTOMAT ST	200203LO	00000753	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000752	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000751	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000749	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000748	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000747	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000746	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000745	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000744	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000743	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000742	.85	155.70	33.50	24.20	29.00	14.00

000411

4941

QCG#FT2 1/17/02 QCT#FT2 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200203LO	00000741	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000740	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000739	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000738	.85	155.70	33.50	24.20	29.00	14.00
LO-BENTOMAT ST	200203LO	00000737	.85*	155.70*	33.50*	24.20*	29.00*	14.00*
LO-BENTOMAT ST	200203LO	00000736	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000735	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000734	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000733	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000732	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000731	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000730	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000729	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000728	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000727	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000726	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000725	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000724	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000723	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000722	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000721	.87	149.30	26.10	24.10	28.00	14.40
LO-BENTOMAT ST	200203LO	00000720	.87*	149.30	26.10*	24.10*	28.00*	14.40*
LO-BENTOMAT ST	200203LO	00000719	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000718	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000717	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000716	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000715	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000714	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000713	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000712	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000711	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000710	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000709	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000708	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000707	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000706	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000705	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000704	.89	149.30	35.40	24.80	30.00	13.80
LO-BENTOMAT ST	200203LO	00000703	.89*	149.30	35.40*	24.80*	30.00*	13.80*

000412

4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200203LO	00000702	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000701	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000700	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000699	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000698	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000697	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000696	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000694	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000693	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000692	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000691	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000690	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000689	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000688	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000687	.84	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000686	.84* (1.05)	149.30	34.80	24.80	29.00	14.20
LO-BENTOMAT ST	200203LO	00000685	1.00	149.30	34.80*	24.80*	29.00*	14.20*
LO-BENTOMAT ST	200203LO	00000684	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000683	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000682	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000681	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000680	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000679	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000678	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000677	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000676	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000675	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000674	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000673	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000672	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000671	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000670	1.00	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000669	1.00*	149.30	35.60	23.30	29.00	14.20
LO-BENTOMAT ST	200203LO	00000668	.90	149.30	35.60*	23.30*	29.00*	14.20*
LO-BENTOMAT ST	200203LO	00000667	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000666	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000665	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000664	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000663	.90	149.30	46.90	24.80	29.00	14.00

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000413

4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200203LO	00000662	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000661	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000660	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000659	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000658	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000657	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000656	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000655	.90	149.30	46.90	24.80	29.00	14.00
LO-BENTOMAT ST	200203LO	00000653	.90*	149.30*	46.90*	24.80*	29.00*	14.00*
LO-BENTOMAT ST	200202LO	00000652	.86	150.30	44.80	25.00	28.00	14.20
LO-BENTOMAT ST	200202LO	00000651	.86	150.30	44.80	25.00	28.00	14.20
LO-BENTOMAT ST	200202LO	00000650	.86	150.30	44.80	25.00	28.00	14.20
LO-BENTOMAT ST	200202LO	00000649	.86	150.30	44.80	25.00	28.00	14.20
LO-BENTOMAT ST	200202LO	00000648	.86	150.30	44.80	25.00	28.00	14.20
LO-BENTOMAT ST	200202LO	00000647	.86	150.30	44.80	25.00	28.00	14.20
LO-BENTOMAT ST	200202LO	00000646	.86	150.30	44.80	25.00	28.00	14.20
LO-BENTOMAT ST	200202LO	00000645	.86* (1-08)	150.30	44.80*	25.00*	28.00*	14.20*
LO-BENTOMAT ST	200202LO	00000644	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000643	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000642	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000641	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000640	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000638	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000637	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000636	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000635	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000634	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000633	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000632	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000631	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000630	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000629	.93	150.30	41.10	24.20	29.00	14.00
LO-BENTOMAT ST	200202LO	00000628	.93*	150.30	41.10*	24.20*	29.00*	14.00*
LO-BENTOMAT ST	200202LO	00000627	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000626	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000625	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000624	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000623	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000622	.96	150.30	26.90	24.00	28.00	14.40

000414

4941

OCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000621	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000620	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000614	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000613	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000612	.96	150.30	26.90	24.00	28.00	14.40
LO-BENTOMAT ST	200202LO	00000611	.96*	150.30*	26.90*	24.00*	28.00*	14.40*
LO-BENTOMAT ST	200202LO	00000610	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000609	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000608	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000607	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000606	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000605	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000604	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000603	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000602	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000601	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000600	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000599	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000598	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000597	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000596	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000595	.94	153.70	24.50	23.30	30.00	14.20
LO-BENTOMAT ST	200202LO	00000594	.94*	153.70	24.50*	23.30*	30.00*	14.20*
LO-BENTOMAT ST	200202LO	00000593	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000592	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000591	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000590	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000589	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000588	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000587	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000586	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000585	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000584	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000583	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000582	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000581	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000580	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000579	.87	153.70	23.30	24.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000578	.87	153.70	23.30	24.80	30.00	14.00

000415

4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000577	.87* (1.09)	153.70	23.30*	24.80*	30.00*	14.00*
LO-BENTOMAT ST	200202LO	00000576	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000575	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000574	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000573	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000572	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000571	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000570	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000569	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000568	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000567	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000566	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000565	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000564	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000563	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000562	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000561	.85	153.70	40.70	25.01	28.00	14.40
LO-BENTOMAT ST	200202LO	00000560	.85* (1.0[illegible])	153.70	40.70*	25.01*	28.00*	14.40*
LO-BENTOMAT ST	200202LO	00000559	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000558	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000557	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000556	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000555	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000554	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000553	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000552	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000551	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000550	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000549	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000548	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000547	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000546	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000545	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000544	.87	153.70	28.10	25.00	29.00	14.00
LO-BENTOMAT ST	200202LO	00000543	.87* (1.09)	153.70	28.10*	25.00*	29.00*	14.00*
LO-BENTOMAT ST	200202LO	00000536	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000535	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000534	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000533	.90	153.70	23.40	24.90	29.00	14.20

over 25%?

000416

4941

QCG#FT2 1/17/02 QCT#FT2 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000532	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000531	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000530	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000529	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000528	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000527	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000526	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000525	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000524	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000523	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000522	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000521	.90	153.70	23.40	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000520	.90*	153.70*	23.40*	24.90*	29.00*	14.20*
LO-BENTOMAT ST	200202LO	00000519	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000518	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000517	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000516	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000515	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000514	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000513	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000512	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000511	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000510	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000509	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000508	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000507	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000506	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000505	.90	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000504	.90*	189.40	40.70	23.70	28.00	14.40
LO-BENTOMAT ST	200202LO	00000503	.86	189.40	40.70*	23.70*	28.00*	14.40*
LO-BENTOMAT ST	200202LO	00000502	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000501	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000500	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000499	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000498	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000497	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000496	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000495	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000494	.86	189.40	44.30	24.80	29.00	14.40

000417

4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000493	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000492	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000491	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000490	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000489	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000488	.86	189.40	44.30	24.80	29.00	14.40
LO-BENTOMAT ST	200202LO	00000487	.86*	189.40	44.30*	24.80*	29.00*	14.40*
LO-BENTOMAT ST	200202LO	00000486	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000485	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000484	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000483	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000482	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000481	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000480	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000479	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000478	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000477	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000476	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000475	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000474	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000473	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000472	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000471	.94	189.40	44.60	24.90	27.00	14.60
LO-BENTOMAT ST	200202LO	00000470	.94*	189.40	44.60*	24.90*	27.00*	14.60*
LO-BENTOMAT ST	200202LO	00000469	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000468	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000467	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000466	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000465	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000464	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000463	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000462	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000461	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000460	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000459	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000458	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000457	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000456	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000455	.88	189.40	56.70	24.80	31.00	14.40

000418

4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000454	.88	189.40	56.70	24.80	31.00	14.40
LO-BENTOMAT ST	200202LO	00000453	.88*	189.40	56.70*	24.80*	31.00*	14.40*
LO-BENTOMAT ST	200202LO	00000447	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000446	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000445	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000444	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000443	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000442	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000441	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000440	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000439	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000438	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000437	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000436	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000435	.86	189.40	34.80	24.80	31.00	14.00
LO-BENTOMAT ST	200202LO	00000434	.86*	189.40*	34.80*	24.80*	31.00*	14.00*
LO-BENTOMAT ST	200202LO	00000432	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000431	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000430	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000429	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000428	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000427	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000426	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000425	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000424	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000423	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000422	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000421	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000420	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000419	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000418	.92	167.40	32.10	23.30	28.00	14.40
LO-BENTOMAT ST	200202LO	00000417	.92*	167.40	32.10*	23.30*	28.00*	14.40*
LO-BENTOMAT ST	200202LO	00000416	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000415	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000414	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000413	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000412	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000411	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000410	.88	167.40	25.70	23.20	29.00	14.40

000419

4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000409	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000408	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000407	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000406	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000405	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000404	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000403	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	00000402	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	0000040[illegible]	.88	167.40	25.70	23.20	29.00	14.40
LO-BENTOMAT ST	200202LO	0000040[illegible]	.88*	167.40	25.70*	23.20*	29.00*	14.40*
LO-BENTOMAT ST	200202LO	00000399	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000398	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000397	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000396	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000395	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000394	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000393	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000392	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000391	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000390	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000389	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000388	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000387	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000386	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000385	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000384	.86	167.40	27.10	24.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000383	.86*	167.40	27.10*	24.00*	28.00*	14.00*
LO-BENTOMAT ST	200202LO	00000382	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000376	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000375	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000374	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000373	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000372	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000371	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000370	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000369	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000368	.90	167.40	30.10	23.20	27.00	14.40
LO-BENTOMAT ST	200202LO	00000367	.90*	167.40	30.10*	23.20*	27.00*	14.40*
LO-BENTOMAT ST	200202LO	00000366	.87	167.40	42.20	25.00	27.00	14.20

000420

4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000365	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000364	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000363	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000362	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000361	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000360	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000359	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000358	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000357	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000356	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000355	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000354	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000353	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000352	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000351	.87	167.40	42.20	25.00	27.00	14.20
LO-BENTOMAT ST	200202LO	00000350	.87* (1-09)	167.40*	42.20*	25.00*	27.00*	14.20*
LO-BENTOMAT ST	200202LO	00000349	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000348	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000347	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000346	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000345	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000344	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000343	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000342	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000341	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000340	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000339	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000338	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000337	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000336	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000335	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000334	.89	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000333	.89*	172.10	40.30	24.90	28.00	14.40
LO-BENTOMAT ST	200202LO	00000332	.95	172.10	40.30*	24.90*	28.00*	14.40*
LO-BENTOMAT ST	200202LO	00000331	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000330	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000329	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000328	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000327	.95	172.10	36.30	23.80	30.00	14.00

000421

4941

OCG#FT2 1/17/02
QCT#FT2 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000326	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000325	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000324	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000323	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000322	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000321	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000320	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000319	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000318	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000317	.95	172.10	36.30	23.80	30.00	14.00
LO-BENTOMAT ST	200202LO	00000316	.95*	172.10	36.30*	23.80*	30.00*	14.00*
LO-BENTOMAT ST	200202LO	00000315	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000314	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000312	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000311	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000310	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000309	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000308	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000307	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000306	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000305	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000304	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000303	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000302	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000301	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000300	.92	172.10	42.50	24.80	29.00	14.00
LO-BENTOMAT ST	200202LO	00000299	.92*	172.10	42.50*	24.80*	29.00*	14.00*
LO-BENTOMAT ST	200202LO	00000298	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000297	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000296	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000295	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000294	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000293	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000292	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000286	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000285	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000284	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000283	.92	172.10	26.60	24.80	29.00	13.80
LO-BENTOMAT ST	200202LO	00000282	.92*	172.10	26.60*	24.80*	29.00*	13.80*

000422

4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000281	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000280	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000279	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000278	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000277	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000276	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000275	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000274	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000273	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000272	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000271	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000270	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000269	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000268	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000267	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000266	.91	172.10	28.00	23.70	28.00	14.20
LO-BENTOMAT ST	200202LO	00000265	.91*	172.10*	28.00*	23.70*	28.00*	14.20*
LO-BENTOMAT ST	200202LO	00000264	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000263	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000262	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000261	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000260	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000259	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000258	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000257	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000256	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000255	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000254	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000253	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000252	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000251	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000250	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000249	.87	169.10	27.50	24.90	29.00	14.00
LO-BENTOMAT ST	200202LO	00000248	.87*	169.10	27.50*	24.90*	29.00*	14.00*
LO-BENTOMAT ST	200202LO	00000247	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000246	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000245	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000244	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000243	.94	169.10	38.50	24.90	28.00	14.00

000423

4941

QCG#FT2 OCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000242	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000241	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000240	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000239	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000238	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000237	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000236	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000235	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000234	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000233	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000232	.94	169.10	38.50	24.90	28.00	14.00
LO-BENTOMAT ST	200202LO	00000231	.94*	169.10	38.50*	24.90*	28.00*	14.00*
LO-BENTOMAT ST	200202LO	00000230	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000229	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000228	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000227	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000226	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000225	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000224	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000223	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000222	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000221	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000220	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000219	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000218	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000217	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000216	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000215	1.00	169.10	38.50	22.20	30.00	13.80
LO-BENTOMAT ST	200202LO	00000214	1.00*	169.10	38.50*	22.20*	30.00*	13.80*
LO-BENTOMAT ST	200202LO	00000213	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000212	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000211	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000210	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000209	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000205	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000201	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000200	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000199	.96	169.10	33.10	22.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000198	.96	169.10	33.10	22.80	27.00	14.40

000424

-4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000197 P	.96* (1.18)	169.10*	33.10*	22.80*	27.00*	14.40*
LO-BENTOMAT ST	200202LO	00000195	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000194	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000193	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000192	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000191	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000190	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000189	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000188	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000187	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000186	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000185	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000184	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000183	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000182	.88	140.40	34.00	24.80	27.00	14.40
LO-BENTOMAT ST	200202LO	00000181 P	.88* (1.10)	140.40	34.00*	24.80*	27.00*	14.40*
LO-BENTOMAT ST	200202LO	00000180	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000179	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000178	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000177	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000176	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000175	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000174	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000173	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000172	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000171	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000170	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000169	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000168	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000167	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000166	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000165	.91	140.40	29.30	25.00	28.00	14.00
LO-BENTOMAT ST	200202LO	00000164 P	.91* (1.14)	140.40	29.30*	25.00*	28.00*	14.00*
LO-BENTOMAT ST	200202LO	00000163	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000162	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000161	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000159	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000158	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000157	.93	140.40	30.60	24.10	28.00	14.20

000425

4941

QCG#FT2 QCT#FT2
1/17/02 15:03:03

CETCO

GCL QUALITY DATA

LOVELL CETCO PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: GSE/FLO
7400 WI
HAMILTO

O R D E R # 000151862

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632	MOISTURE % ASTM D 4643	FREE SWELL 24 ml/2g ASTM D 5890	FLUID LOSS 18ML MAX. ASTMD 5891
LO-BENTOMAT ST	200202LO	00000156	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000155	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000154	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000153	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000152	.93	140.40	30.60	24.10	28.00	14.20
LO-BENTOMAT ST	200202LO	00000151 P	.93*	140.40	30.60*	24.10*	28.00*	14.20*
LO-BENTOMAT ST	200202LO	00000145	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000144	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000143	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000142	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000141	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000140	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000139	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000138	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000137	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000136	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000135	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000134	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000133	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000132	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000131	.90	140.40	24.80	24.90	29.00	14.20
LO-BENTOMAT ST	200202LO	00000130 P	.90*	140.40	24.80*	24.90*	29.00*	14.20*
LO-BENTOMAT ST	200202LO	00000129	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000128	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000127	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000126	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000125	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000124	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000123	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000122	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000121	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000120	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000119	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000118	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000117	.93	140.40	32.80	24.90	29.00	14.80
LO-BENTOMAT ST	200202LO	00000116	.93*	140.40	32.80*	24.90*	29.00*	14.80*

000426

4941

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.
Bentonite Mass/Area and Moisture content are tested a minimum of every 40,000sf.

BLE 1.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/8/02**
Date Reported: **1/10/02**
Client Sample ID: **Roll 119 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: 4m
PGL Job No.: **020008**
PGL Control No.: **73955**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	57	56	60	56	55	56					57	1	*35 min.*
	Elongation at Break (percent)													
	MD	13	12	13	12	12	12					12	0	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9002

0004227

4941

CO - 92 Hwy 37, Lovell, WY. 82431 **Computation Sheet: GRI Accredited ASTM D-5887, Index Flux**

Sample: Bentomat ST
Lot Number: 200203LO
Roll Number: 130
Project Name: Flour Daniel Fernald

Permeability equation : ((0.879*Thickness)/(2*Pi*r^2*Time))*ln(Change in Head)

Flux equation : ((Inflow+Outflow)/200)/Pi*r^2/Time

Initial Thickness : 0.683 cm. **Hydration :** 48hrs **Permeant :** De-aired DI Water **Date:** 2/11/02

Test Position : CET-L-301 **Initial Head :** 2psi 140.6 cm. **Analyst :** SW **Date Started:** 1/10/02

Cell Size : 4 in. **Max. Effective Stress :** 5psi 34.5kPa **Requested by :**

Final Thickness : 0.659 cm.

*** indicates value meets Flux Ratio ASTM termination criteria**

Conversions : Flux (English) = Flux * 9.2366E+10

Date	Time (min)	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	Initial K (cm/sec)	Initial Flux (m³/m²/sec)		Avg Flux (m³/m²/sec)	Final K (cm/sec)	Final Flux (Gal/Acre /Day)	Inflow to Outflow Ratio
1/16/02	0	0.0	24.0	24.0	0.0	24.0	140.63	164.63							
	110	0.8	23.2	24.0	0.0	23.2	140.63	163.83	2.73E-09	7.48E-09			2.64E-9		#DIV/0!
	257	1.3	22.7	23.6	0.4	22.3	140.63	162.93	2.31E-09	6.29E-09	*		2.23E-9		1.25
	393	1.8	22.2	23.2	0.8	21.4	140.63	162.03	2.51E-09	6.80E-09	*		2.42E-9		1.25
	579	2.3	21.7	22.7	1.3	20.4	140.63	161.03	2.05E-09	5.53E-09	*		1.98E-9		1.00
1/17/02	1438	5.0	19.0	20.2	3.8	15.2	140.63	155.83	2.36E-09	6.22E-09	*		2.28E-9		1.08
	1602	5.5	18.5	19.7	4.3	14.2	140.63	154.83	2.42E-09	6.27E-09	*		2.34E-9		1.00
	1736	5.9	18.1	19.3	4.7	13.4	140.63	154.03	2.39E-09	6.14E-09	*		2.30E-9		1.00
	1837	6.2	17.8	19.0	5.0	12.8	140.63	153.43	2.38E-09	6.11E-09	*		2.30E-9		1.00
	1936	6.5	17.5	18.7	5.3	12.2	140.63	152.83	2.44E-09	6.23E-09	*		2.36E-9		1.00
1/18/02	2868	9.2	14.8	16.0	8.0	6.8	140.63	147.43	2.38E-09	5.96E-09	*		2.30E-9		1.00
	3028	9.6	14.4	15.6	8.4	6.0	140.63	146.63	2.10E-09	5.14E-09	*		2.02E-9		1.00
	3127	9.9	14.1	15.3	8.7	5.4	140.63	146.03	2.56E-09	6.23E-09	*		2.47E-9		1.00
	3325	10.4	13.6	14.8	9.2	4.4	140.63	145.03	2.14E-09	5.19E-09	*	5.52E-09	2.07E-9	510	1.00

Final Flux 5.5E-9 $m^3/m^2/sec$

Final Hydraulic Conductivity 2.2E-9 cm/s

000428

4941

ABLE 2.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/8/02**
Date Reported: **1/10/02**
Client Sample ID: **Roll 136 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: AM
PGL Job No. : **020008**
PGL Control No. : **73956**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	69	71	68	69	68	68					69	1	35 min.
	Elongation at Break (percent)													
	MD	15	17	15	16	16	15					16	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

000429

-4941

CO - 92 Hwy 37, Lovell, WY. 82431 **Computation Sheet: GRI Accredited ASTM D-5887, Index Flux**

Sample: Bentomat ST
Lot Number: 200202LO
Roll Number: 151
Project Name: Bentomat QA

Permeability equation : ((0.879*Thickness)/(2*Pi*r^2*Time))*ln(Change in Head)

Flux equation : ((Inflow+Outflow)/200)/Pi*r^2/Time

Initial Thickness : 0.749 cm. **Hydration :** 48hrs **Permeant :** De-aired DI Water **Date:** 2/26/02

Test Position : CET-L-147 **Initial Head :** 2psi 140.6 cm. **Analyst :** SW **Date Started:** 1/10/02

Cell Size : 4 in. **Max. Effective Stress :** 5psi 34.5kPa **Requested by :**

Final Thickness : 0.719 cm.

*** indicates value meets Flux Ratio ASTM termination criteria**

Conversions :

Flux (English) = Flux * 9.2366E+10

Date	Time (min)	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	Initial K (cm/sec)	Initial Flux (m³/m²/sec)		Avg Flux (m³/m²/sec)	Final K (cm/sec)	Final Flux (Gal/Acre/Day)	Inflow to Outflow Ratio
1/14/02	0	0.0	24.0	24.0	0.0	24.0	140.63	164.63							
	121	0.8	23.2	23.6	0.4	22.8	140.63	163.43	4.09E-09	1.02E-08			3.93E-9		2.00
1/15/02	1063	10.3	13.7	16.1	7.9	5.8	140.63	146.43	7.89E-09	1.85E-08			7.57E-9		1.27
	1184	10.8	13.2	15.8	8.2	5.0	140.63	145.63	3.06E-09	6.80E-09			2.94E-9		1.67
	1305	11.3	12.7	15.4	8.6	4.1	140.63	144.73	3.47E-09	7.65E-09	*		3.33E-9		1.25
	1407	11.7	12.3	15.0	9.0	3.3	140.63	143.93	3.68E-09	8.06E-09	*		3.53E-9		1.00
	1503	12.0	12.0	14.7	9.3	2.7	140.63	143.33	2.94E-09	6.42E-09	*		2.83E-9		1.00
	1614	12.5	11.5	14.4	9.6	1.9	140.63	142.53	3.41E-09	7.41E-09	*		3.28E-9		1.67
1/16/02	2531	15.7	8.3	11.3	12.7	-4.4	140.63	136.23	3.34E-09	7.06E-09	*		3.20E-9		1.03
	2641	16.1	7.9	11.1	12.9	-5.0	140.63	135.63	2.72E-09	5.61E-09	*		2.61E-9		2.00
	2787	16.6	7.4	10.7	13.3	-5.9	140.63	134.73	3.09E-09	6.34E-09	*		2.96E-9		1.25
	2924	17.0	7.0	10.2	13.8	-6.8	140.63	133.83	3.31E-09	6.75E-09	*		3.18E-9		0.80
	3109	17.6	6.4	9.7	14.3	-7.9	140.63	132.73	3.02E-09	6.11E-09	*		2.90E-9		1.20
1/17/02	3969	20.1	3.9	7.3	16.7	-12.8	140.63	127.83	2.96E-09	5.86E-09	*	6.24E-09	2.84E-9	576	1.04

Final Flux 6.2E-9 $m^3/m^2/sec$

Final Hydraulic Conductivity 3.0E-9 cm/s

000430

Flour Fernald

4941

TABLE 3.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/8/02
Date Reported: 1/10/02
Client Sample ID: Roll 153 Lot 200202LO
Material Description: GCL, Bentomat ST

QC'd By: [illegible]
PGL Job No. : 020008
PGL Control No. : 73957

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	47	51	48	48	45	48					48	2	35 min.
	Elongation at Break (percent)													
	MD	12	13	11	11	10	12					11	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

000431

4941

C CO - 92 Hwy 37, Lovell, WY. 82431 **Computati Sheet: GRI Accredited ASTM D-5887, Index Flux**

Sample: Bentomat ST
Lot Number: 200202LO
Roll Number: 164
Project Name: Flour Daniel Fernald

Permeability equation : ((0.879*Thickness)/(2*Pi*r^2*Time))*ln(Change in Head)

Flux equation : ((Inflow+Outflow)/200)/Pi*r^2/Time

Initial Thickness : 0.789 cm. **Hydration :** 48hrs **Permeant :** De-aired DI Water **Date:** 2/11/02

Test Position : CET-L-304 **Initial Head :** 2psi 140.6 cm. **Analyst :** SW **Date Started:** 1/10/02

Cell Size : 4 in. **Max. Effective Stress :** 5psi 34.5kPa **Requested by :**

Final Thickness : 0.763 cm.

*** indicates value meets Flux Ratio ASTM termination criteria**

Conversions :

Flux (English) = Flux * 9.2366E+10

Date	Time (min)	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	Initial K (cm/sec)	Initial Flux (m³/m /sec)		Avg Flux (m³/m /sec)	Final K (cm/sec)	Final Flux (Gal/Acre /Day)	Inflow to Outflow Ratio
1/14/02	0	0.0	24.0	24.0	0.0	24.0	140.63	164.63							
	121	0.7	23.3	23.4	0.6	22.7	140.63	163.33	4.67E-09	1.10E-08			4.52E-9		1.17
	1063	4.2	19.8	20.4	3.6	16.2	140.63	156.83	3.07E-09	7.09E-09			2.97E-9		1.17
1/15/02	1184	4.7	19.3	20.0	4.0	15.3	140.63	155.93	3.39E-09	7.65E-09	*		3.28E-9		1.25
	1305	5.0	19.0	19.6	4.4	14.6	140.63	155.23	2.65E-09	5.95E-09	*		2.56E-9		0.75
	1407	5.4	18.6	19.3	4.7	13.9	140.63	154.53	3.16E-09	7.05E-09	*		3.05E-9		1.33
	1503	5.7	18.3	19.0	5.0	13.3	140.63	153.93	2.89E-09	6.42E-09	*		2.79E-9		1.00
	1614	6.1	17.9	18.6	5.4	12.5	140.63	153.13	3.35E-09	7.41E-09	*		3.24E-9		1.00
1/16/02	2531	9.2	14.8	15.7	8.3	6.5	140.63	147.13	3.11E-09	6.73E-09	*		3.00E-9		1.07
	2641	9.6	14.4	15.3	8.7	5.7	140.63	146.33	3.53E-09	7.48E-09	*		3.42E-9		1.00
	2787	10.1	13.9	14.9	9.1	4.8	140.63	145.43	3.01E-09	6.34E-09	*		2.91E-9		1.25
	2924	10.5	13.5	14.5	9.5	4.0	140.63	144.63	2.87E-09	6.00E-09	*		2.78E-9		1.00
	3109	11.1	12.9	13.9	10.1	2.8	140.63	143.43	3.21E-09	6.67E-09	*		3.10E-9		1.00
1/17/02	3969	13.9	10.1	11.3	12.7	-2.6	140.63	138.03	3.18E-09	6.45E-09	*	6.37E-09	3.08E-9	589	1.08

Final Flux 6.4E-9 $m^3/m^2/sec$

Final Hydraulic Conductivity 3.0E-9 cm/s

000432

Flour Fernald

4941

TABLE 4.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/8/02**
Date Reported: **1/10/02**
Client Sample ID: **Roll 170 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No. : **020008**
PGL Control No. : **73958**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	65	61	62	62	54	59					60	4	*35 min.*
	Elongation at Break (percent)													
	MD	14	12	14	14	12	14					13	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

000433

4941

TCO - 92 Hwy 37, Lovell, WY. 82431

Computation Sheet: GRI Accredited ASTM D-5887, Index Flux

Sample: Bentomat ST
Lot Number: 200202LO
Roll Number: 181
Project Name: Flour Daniel Fernald

Permeability equation : ((0.879*Thickness)/(2*Pi*r^2*Time))*ln(Change in Head)

Flux equation : ((Inflow+Outflow)/200)/Pi*r^2/Time

Initial Thickness : 0.717 cm.
Hydration : 48hrs
Permeant : De-aired DI Water
Date: 2/11/02

Test Position : CET-L-305
Initial Head : 2psi 140.6 cm.
Analyst : SW
Date Started: 1/10/02

Cell Size : 4 in.
Max. Effective Stress : 5psi 34.5kPa
Requested by :

Final Thickness : 0.693 cm.

*** indicates value meets Flux Ratio ASTM termination criteria**

Conversions :

Flux (English) = Flux * 9.2366E+10

Date	Time (min)	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	Initial K (cm/sec)	Initial Flux (m³/m²/sec)		Avg Flux (m³/m²/sec)	Final K (cm/sec)	Final Flux (Gal/Acre/Day)	Inflow to Outflow Ratio
1/14/02	0	0.0	24.0	24.0	0.0	24.0	140.63	164.63							
	112	0.7	23.3	24.0	0.0	23.3	140.63	163.93	2.46E-09	6.42E-09			2.38E-9		#DIV/0!
	234	1.1	22.9	23.8	0.2	22.7	140.63	163.33	1.95E-09	5.06E-09	*		1.88E-9		2.00
1/15/02	1176	3.9	20.1	21.5	2.5	17.6	140.63	158.23	2.18E-09	5.56E-09	*		2.11E-9		1.22
	1298	4.2	19.8	21.2	2.8	17.0	140.63	157.63	2.02E-09	5.06E-09	*		1.95E-9		1.00
	1419	4.6	19.4	20.9	3.1	16.3	140.63	156.93	2.38E-09	5.95E-09	*		2.30E-9		1.33
	1521	4.9	19.1	20.6	3.4	15.7	140.63	156.33	2.43E-09	6.05E-09	*		2.35E-9		1.00
	1617	5.2	18.8	20.3	3.7	15.1	140.63	155.73	2.59E-09	6.42E-09	*		2.51E-9		1.00
	1728	5.5	18.5	20.0	4.0	14.5	140.63	155.13	2.25E-09	5.56E-09	*		2.18E-9		1.00
1/16/02	2645	8.4	15.6	17.4	6.6	9.0	140.63	149.63	2.55E-09	6.17E-09	*		2.46E-9		1.12
	2755	8.7	15.3	17.0	7.0	8.3	140.63	148.93	2.76E-09	6.54E-09	*		2.67E-9		0.75
	2901	9.1	14.9	16.7	7.3	7.6	140.63	148.23	2.09E-09	4.93E-09	*		2.02E-9		1.33
	3038	9.5	14.5	16.3	7.7	6.8	140.63	147.43	2.56E-09	6.00E-09	*		2.47E-9		1.00
	3223	10.1	13.9	15.7	8.3	5.6	140.63	146.23	2.86E-09	6.67E-09	*		2.77E-9		1.00
1/17/02	4083	12.8	11.2	13.3	10.7	0.5	140.63	141.13	2.67E-09	6.10E-09	*	6.26E-09	2.58E-9	578	1.13

Final Flux 6.3E-9 $m^3/m^2/sec$

Final Hydraulic Conductivity 2.6E-9 cm/s

0004434

Flour Fernald

TABLE 5.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/8/02**
Date Reported: **1/10/02**
Client Sample ID: **Roll 187 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: [illegible]
PGL Job No. : **020008**
PGL Control No. : **73959**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	68	69	70	75	71	69					71	2	35 min.
	Elongation at Break (percent)													
	MD	14	16	15	16	16	15					15	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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000435

4941

C[illegible]CO - 92 Hwy 37, Lovell, WY. 82431

Computatio[illegible]heet: GRI Accredited ASTM D-5887, Index Flux

Sample: Bentomat ST
Lot Number: 200202LO
Roll Number: 197
Project Name: Flour Daniel Fernald #197

Permeability equation : ((0.879*Thickness)/(2*Pi*r^2*Time))*ln(Change in Head)

Flux equation : ((Inflow+Outflow)/200)/Pi*r^2/Time

Initial Thickness : 0.795 cm.
Hydration : 48hrs
Permeant : De-aired DI Water
Date: 2/11/02

Test Position : CET-L-306
Initial Head : 2psi 140.6 cm.
Analyst : SW
Date Started: 1/10/02

Cell Size : 4 in.
Max. Effective Stress : 5psi 34.5kPa
Requested by :

Final Thickness : 0.767 cm.

*** indicates value meets Flux Ratio ASTM termination criteria**

Conversions :

Flux (English) = Flux * 9.2366E+10

Date	Time (min)	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	Initial K (cm/sec)	Initial Flux (m³/m /sec)		Avg Flux (m³/m /sec)	Final K (cm/sec)	Final Flux (Gal/Acre /Day)	Inflow to Outflow Ratio
1/14/02	0	0.0	24.0	24.0	0.0	24.0	140.63	164.63							
	112	0.5	23.5	23.9	0.1	23.4	140.63	164.03	2.34E-09	5.51E-09			2.26E-9		5.00
	234	1.0	23.0	23.5	0.5	22.5	140.63	163.13	3.24E-09	7.58E-09			3.13E-9		1.25
1/15/02	1176	4.3	19.7	20.6	3.4	16.3	140.63	156.93	2.95E-09	6.77E-09	*		2.85E-9		1.14
	1298	4.7	19.3	20.3	3.7	15.6	140.63	156.23	2.63E-09	5.90E-09	*		2.54E-9		1.33
	1419	5.1	18.9	19.9	4.1	14.8	140.63	155.43	3.05E-09	6.80E-09	*		2.94E-9		1.00
	1521	5.4	18.6	19.6	4.4	14.2	140.63	154.83	2.72E-09	6.05E-09	*		2.63E-9		1.00
	1617	5.7	18.3	19.3	4.7	13.6	140.63	154.23	2.91E-09	6.42E-09	*		2.80E-9		1.00
	1728	6.1	17.9	18.9	5.1	12.8	140.63	153.43	3.37E-09	7.41E-09	*		3.25E-9		1.00
1/16/02	2645	9.2	14.8	16.1	7.9	6.9	140.63	147.53	3.07E-09	6.61E-09	*		2.96E-9		1.11
	2755	9.6	14.4	15.7	8.3	6.1	140.63	146.73	3.55E-09	7.48E-09	*		3.43E-9		1.00
	2901	10.1	13.9	15.3	8.7	5.2	140.63	145.83	3.03E-09	6.34E-09	*		2.92E-9		1.25
	3038	10.5	13.5	14.9	9.1	4.4	140.63	145.03	2.88E-09	6.00E-09	*		2.78E-9		1.00
	3223	11.1	12.9	14.3	9.7	3.2	140.63	143.83	3.23E-09	6.67E-09	*		3.11E-9		1.00
1/17/02	4083	13.9	10.1	11.7	12.3	-2.2	140.63	138.43	3.20E-09	6.45E-09	*	6.37E-09	3.08E-9	589	1.08

Final Flux 6.4E-9 $m^3/m^2/sec$

Final Hydraulic Conductivity 3.0E-9 cm/s

000436

Flour Fernald

4941

TABLE 1.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/10/02
Date Reported: 1/16/02
Client Sample ID: Roll 209 Lot 200202LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No.: 020013
PGL Control No.: 73975

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	48	45	50	50	50	48					49	2	*Max.*
	Elongation at Break (percent)													
	MD	12	12	11	12	13	12					12	1	*35 min.*

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 2.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/10/02
Date Reported: 1/16/02
Client Sample ID: Roll 221 Lot 200202LO
Material Description: GCL, Bentomat ST

QC'd By: [illegible]
PGL Job No. : 020013
PGL Control No. : 73976

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)	3.7E-09										3.7E-09		$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	61	50	54	52	54	53					52	1	35 min.
	Elongation at Break (percent)													
	MD	12	13	12	12	12	12					12	0	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 3.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/10/02
Date Reported: 1/16/02
Client Sample ID: Roll 238 Lot 200202LO
Material Description: GCL, Bentomat ST

QC'd By: [illegible]
PGL Job No. : 020013
PGL Control No. : 73977

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)													
	3.3E-09											3.3E-09		$5X10^{-1}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	61	66	61	64	61	63					63	2	35 min.
	Elongation at Break (percent)													
	MD	14	15	14	15	14	14					14	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

TABLE 4.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/10/02
Date Reported: 1/16/02
Client Sample ID: Roll 255 Lot 200202LO
Material Description: GCL, Bentomat ST

QC'd By: [illegible]
PGL Job No. : 020013
PGL Control No. : 73978

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)													
	3.1E-09											3.1E-09		$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	78	77	74	76	77	75					76	1	35 min.
	Elongation at Break (percent)													
	MD	18	17	17	17	17	18					17	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9002

000440

4941

TABLE 5.
MATERIAL PROPERTIES
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

Date Received: 1/10/02
Date Reported: 1/16/02
Client Sample ID: Roll 272 Lot 200202LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No. : 020013
PGL Control No. : 73979

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)	3.8E-09										3.8E-09		$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	79	83	81	78	88	88					83	4	35 min.
	Elongation at Break (percent)													
	MD	19	20	18	18	19	19					19	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9002

000441

4941

TABLE 6.
MATERIAL PROPERTIES
CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/10/02
Date Reported: 1/16/02
Client Sample ID: **Roll 294 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No.: 020013
PGL Control No.: 73980

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)	1.7E-09										1.7E-09		$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	49	47	44	39	44	46					45	3	35 min.
	Elongation at Break (percent)													
	MD	12	10	11	10	11	10					11	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

BLE 1.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/11/02**
Date Final Reported: **1/29/02**
Client Sample ID: **Roll 311 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No.: **020015**
PGL Control No.: **73984**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		4.8E-09										4.8E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	51	52	55	55	53	53					53	1	35 min.
	Elongation at Break (percent)													
	MD	14	14	15	13	14	14					14	0	

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4941

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

TABLE 2.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/11/02**
Date Reported: **1/29/02**
Client Sample ID: **Roll 328 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No. : **020015**
PGL Control No. : **73985**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		4.4E-09										4.4E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	61	63	67	65	66	65					65	2	35 min.
	Elongation at Break (percent)													
	MD	15	15	17	16	16	16					16	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

000444

4941

BLE 3.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/11/02**
Date Reported: **1/29/02**
Client Sample ID: **Roll 345 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: [illegible]
PGL Job No. : **020015**
PGL Control No. : **73986**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.2E-09										4.2E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	71	68	71	72	72	73					71	2	35 min.
	Elongation at Break (percent)													
	MD	16	17	16	16	16	16					16	0	

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4941

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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BLE 4.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/11/02**
Date Reported: **1/29/02**
Client Sample ID: **Roll 362 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: _____
PGL Job No. : **020015**
PGL Control No. : **73987**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		4.1E-09										4.1E-09	N/A	$5X10^{-9}$ *Max.*
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	84	84	89	85	78	80					83	4	*35 min.*
	Elongation at Break (percent)													
	MD	17	18	20	19	16	20					18	2	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

000446

4941

BLE 5.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/11/02**
Date Reported: **1/29/02**
Client Sample ID: **Roll 384 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No. : **020015**
PGL Control No. : **73988**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		3.4E-09										3.4E-09	N/A	$5X10^{-9}$ *Max.*
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	42	46	42	45	46	45					44	2	*35 min.*
	Elongation at Break (percent)													
	MD	11	11	12	10	12	11					11	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

000447

-4941

BLE 6.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/11/02**
Date Final Reported: **1/29/02**
Client Sample ID: **Roll 401 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No.: **020015**
PGL Control No.: **73989**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		4.1E-09										4.1E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	60	61	60	62	61	60					61	1	35 min.
	Elongation at Break (percent)													
	MD	13	13	13	14	14	13					13	0	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

000448

4941

TABLE 1.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/14/02**
Date Final Reported: **2/5/02**
Client Sample ID: **Roll 418 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: SM
PGL Job No.: **020018**
PGL Control No.: **73999**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.5E-09										4.5E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	72	73	68	72	78	79					74	4	35 min.
	Elongation at Break (percent)													
	MD	14	15	14	16	16	18					16	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

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4941

BLE 2.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/14/02**
Date Final Reported: **2/5/02**
Client Sample ID: **Roll 435 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No. : **020018**
PGL Control No. : **74000**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.6E-09										4.6E-09	N/A	$5X10^{-9}$ *Max.*
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	86	89	85	88	87	87					87	1	*35 min.*
	Elongation at Break (percent)													
	MD	17	18	17	18	18	18					18	0	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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000450

4941

TABLE 3.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/14/02**
Date Final Reported: **2/5/02**
Client Sample ID: **Roll 457 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: [illegible]
PGL Job No. : **020018**
PGL Control No. : **74001**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		4.3E-09										4.3E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	40	40	41	42	39	42					41	1	35 min.
	Elongation at Break (percent)													
	MD	10	10	9	10	9	10					10	0	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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4941

BLE 4.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/14/02**
Date Final Reported: **2/5/02**
Client Sample ID: **Roll 474 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No. : **020018**
PGL Control No. : **74002**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.3E-09										4.3E-09	N/A	$5X10^{-9}$ *Max.*
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	55	53	57	54	52	55					54	2	35 *min.*
	Elongation at Break (percent)													
	MD	13	13	14	12	12	14					13	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

000452

494

TABLE 5.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/14/02**
Date Final Reported: **2/5/02**
Client Sample ID: **Roll 491 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: ____
PGL Job No. : **020018**
PGL Control No. : **74003**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		4.1E-09										4.1E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	69	70	66	68	68	67					68	2	35 min.
	Elongation at Break (percent)													
	MD	15	17	15	16	15	15					15	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

000453

4941

TABLE 6.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/14/02**
Date Final Reported: **1/17/02**
Client Sample ID: **Roll 508 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: [illegible]
PGL Job No.: **020018**
PGL Control No.: **74004**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.3E-09										4.3E-09	N/A	$5X10^{-9}$ *Max.*
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	76	78	78	76	77	76					77	1	35 *min.*
	Elongation at Break (percent)													
	MD	17	17	19	18	18	18					18	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

000454

4941

TABLE 7.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/14/02**
Date Final Reported: **1/17/02**
Client Sample ID: **Roll 525 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: _____
PGL Job No. : **020018**
PGL Control No. : **74005**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	3.9E-09										3.9E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	84	83	83	82	84	86					84	1	35 min.
	Elongation at Break (percent)													
	MD	17	18	18	18	18	17					18	1	

MD = MACHINE DIRECTION
TD = TRANSVERSE DIRECTION

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ISO 9002

000455

4941

BLE 1.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/15/02**
Date Final Reported: **2/12/02**
Client Sample ID: **Roll 548 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No.: **020019**
PGL Control No.: **74006**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.4E-09										4.4E-09	N/A	$5X10^{-9}$ *Max.*
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	47	48	44	45	42	43					45	2	*35 min.*
	Elongation at Break (percent)													
	MD	11	12	11	12	10	10					11	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

000456

4941

TABLE 2.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/15/02**
Date Final Reported: **2/12/02**
Client Sample ID: **Roll 565 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No. : **020019**
PGL Control No. : **74007**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	3.7E-09										3.7E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	54	55	55	55	58	60					56	2	35 min.
	Elongation at Break (percent)													
	MD	12	12	11	12	12	13					12	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9002

000457

-4941

BLE 3.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/15/02**
Date Final Reported: **2/12/02**
Client Sample ID: **Roll 582 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: dm
PGL Job No. : **020019**
PGL Control No. : **74008**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.5E-09										4.5E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	69	70	62	65	67	66					67	3	35 min.
	Elongation at Break (percent)													
	MD	16	16	15	14	15	14					15	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

000458

4941

TABLE 1.
MATERIAL PROPERTIES
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

Date Received: 1/15/02
Date Final Reported: 3/4/02
Client Sample ID: Roll 588 Lot 200202LO
Material Description: GCL, Bentomat ST

QC'd By: _____
PGL Job No.: 020048
PGL Control No.: 74013

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)													
	3.9E-09											3.9E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	70	65	69	68	71	67					68	2	35 min.
	Elongation at Break (percent)													
	MD	14	14	15	15	14	14					14	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

TABLE 4.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/15/02**
Date Final Reported: **2/12/02**
Client Sample ID: **Roll 599 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: [illegible]
PGL Job No. : **020019**
PGL Control No. : **74009**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.3E-09										4.3E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	76	71	75	75	74	78					75	2	35 min.
	Elongation at Break (percent)													
	MD	17	19	17	16	18	20					18	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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000460

4941

BLE 5.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/15/02**
Date Final Reported: **2/12/02**
Client Sample ID: **Roll 621 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: AM
PGL Job No. : **020019**
PGL Control No. : **74010**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.1E-09										4.1E-09	N/A	$5X10^{-9}$ *Max.*
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	44	41	41	40	39	43					42	2	*35 min.*
	Elongation at Break (percent)													
	MD	10	10	10	9	9	9					10	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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ISO 9002

000461

4941

TABLE 6.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/15/02**
Date Final Reported: **2/12/02**
Client Sample ID: **Roll 637 Lot 200202LO**
Material Description: **GCL, Bentomat ST**

QC'd By: _____
PGL Job No.: **020019**
PGL Control No.: **74011**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.8E-09										4.8E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	57	53	49	49	51	49					51	3	35 min.
	Elongation at Break (percent)													
	MD	13	13	11	11	11	11					12	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

ISO 9002

000462

4941

BLE 1.

MATERIAL PROPERTIES

.CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/16/02
Date Final Reported: 2/19/02
Client Sample ID: Roll 653 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By: [illegible]
PGL Job No.: 020023
PGL Control No.: 74040

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.7E-09										4.7E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	64	67	66	68	65	66					66	1	35 min.
	Elongation at Break (percent)													
	MD	12	13	13	14	12	12					13	1	

MD - [illegible]HINE DIRECTION
TD - [illegible]SVERSE DIRECTION

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ISO 9002

000463

4941

BLE 2.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/16/02**
Date Final Reported: **2/19/02**
Client Sample ID: **Roll 670 Lot 200203LO**
Material Description: **GCL, Bentomat ST**

QC'd By: _____
PGL Job No. : **020023**
PGL Control No. : **74041**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
		4.3E-09										4.3E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	84	88	86	89	90	84					87	3	35 min.
	Elongation at Break (percent)													
	MD	17	18	18	18	17	16					17	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 3.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/16/02**
Date Final Reported: **2/19/02**
Client Sample ID: **Roll 687 Lot 200203LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No. : **020023**
PGL Control No. : **74042**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.5E-09										4.5E-09	N/A	$5X10^{-9}$ *Max.*
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	86	85	85	82	82	87					85	2	*35 min.*
	Elongation at Break (percent)													
	MD	17	16	17	21	16	17					17	2	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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BLE 4.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/16/02**
Date Final Reported: **2/19/02**
Client Sample ID: **Roll 704 Lot 200203LO**
Material Description: **GCL, Bentomat ST**

QC'd By: _____
PGL Job No. : **020023**
PGL Control No. : **74043**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.2E-09										4.2E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	46	47	49	48	46	46					47	1	35 min.
	Elongation at Break (percent)													
	MD	10	10	10	9	9	9					9	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 5.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/16/02**
Date Final Reported: **2/19/02**
Client Sample ID: **Roll 721 Lot 200203LO**
Material Description: **GCL, Bentomat ST**

QC'd By: [illegible]
PGL Job No. : **020023**
PGL Control No. : **74044**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.2E-09										4.2E-09	N/A	$5X10^{-9}$ *Max.*
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	69	66	63	60	69	62					65	4	*35 min.*
	Elongation at Break (percent)													
	MD	14	13	14	13	14	14					14	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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BLE 6.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: **1/16/02**
Date Final Reported: **2/19/02**
Client Sample ID: **Roll 738 Lot 200203LO**
Material Description: **GCL, Bentomat ST**

QC'd By: _____
PGL Job No.: **020023**
PGL Control No.: **74045**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*	4.0E-09										4.0E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	78	78	77	81	76	78					78	2	35 min.
	Elongation at Break (percent)													
	MD	15	15	15	16	15	16					15	0	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 1.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/17/02
Date Reported: 2/26/02
Client Sample ID: Roll 755 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By: fn
PGL Job No.: 020026
PGL Control No.: 74051

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)													
	4.7E-09											4.7E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	59	57	61	57	56	55					58	2	35 min.
	Elongation at Break (percent)													
	MD	12	11	11	11	11	11					11	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 2.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/17/02
Date Reported: 2/26/02
Client Sample ID: Roll 772 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No.: 020026
PGL Control No.: 74052

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
	4.0E-09											4.0E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	70	77	71	75	75	76					74	3	35 min.
	Elongation at Break (percent)													
	MD	14	14	15	13	13	13					14	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 3.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/17/02
Date Reported: 2/26/02
Client Sample ID: Roll 789 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By: [illegible]
PGL Job No.: 020026
PGL Control No.: 74053

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
	4.2E-09											4.2E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	77	78	78	80	78	78					78	1	35 min.
	Elongation at Break (percent)													
	MD	16	14	15	15	14	16					15	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 4.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/17/02
Date Reported: 2/26/02
Client Sample ID: Roll 807 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No. : 020026
PGL Control No. : 74054

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
	4.1E-09											4.1E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	50	54	46	50	48	49					49	3	35 min.
	Elongation at Break (percent)													
	MD	11	10	10	9	11	13					11	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 5.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/17/02
Date Reported: 2/26/02
Client Sample ID: Roll 824 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By: 4m
PGL Job No.: 020026
PGL Control No.: 74055

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)	3.1E-09										3.1E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	57	59	58	59	63	59					59	2	35 min.
	Elongation at Break (percent)													
	MD	13	14	12	13	14	13					13	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 1.
MATERIAL PROPERTIES
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

Date Received: 1/18/02
Date Final Reported: 3/4/02
Client Sample ID: Roll 841 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No.: 020027
PGL Control No.: 74059

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)													
	4.6E-09											4.6E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	74	79	76	77	76	77					76	2	35 min.
	Elongation at Break (percent)													
	MD	15	15	15	14	16	14					15	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 2.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/18/02
Date Initial Reported: 3/4/02
Client Sample ID: Roll 858 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By: [illegible]
PGL Job No.: 020027
PGL Control No.: 74060

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)													
	4.2E-09											4.2E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	90	90	86	94	91	92					90	3	35 min.
	Elongation at Break (percent)													
	MD	18	17	18	18	16	18					18	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 3.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/18/02
Date Initial Reported: 3/4/02
Client Sample ID: Roll 880 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By: 4/m
PGL Job No.: 020027
PGL Control No.: 74061

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) *(Confining Stress = 5 psi)*													
	4.0E-09											4.0E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	44	46	46	43	42	45					44	2	35 min.
	Elongation at Break (percent)													
	MD	10	11	10	10	10	10					10	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 4.

MATERIAL PROPERTIES

CLIENT: CETCO

PROJECT: Flour Daniel Fernald

Date Received: 1/18/02
Date Initial Reported: 3/4/02
Client Sample ID: Roll 897 Lot 200203LO
Material Description: GCL, Bentomat ST

QC'd By: 4/n
PGL Job No.: 020027
PGL Control No.: 74062

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Proj. Specs.
ASTM D5887	Index Flux (cm./ sec.) (Confining Stress = 5 psi)													
	4.4E-09											4.4E-09	N/A	$5X10^{-9}$ Max.
ASTM D4595	Wide- width Strip Tensile													
	Tensile Strength (lbs/ in.)													
	MD	50	50	51	51	52	50					50	1	35 min.
	Elongation at Break (percent)													
	MD	13	12	12	12	13	13					13	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO. 20102

CONTRACT NO: 1440

SUBMITTAL NO. 20104-1440/2-02772P-014 | REV: 0 | DATE: 6/10/02 | Page ___ of ___

FROM: CETCO

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

SIGNATURE: [illegible] for CETCO

RECEIVED BY: [illegible] DATE: 6/10/02

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02772P-014	0						X			INTERNAL AND INTERFACE SHEAR STRENGTH TEST RESULTS FOR EACH GCL LOT		X		02772P.1.04.B.1	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Chuck VanArsdale - Approver	104				
Gregg Johnson	104				
Bill Zebick	104				
Mike Godber	104				
Kwasi Badu-Tweneboah	38				
Don Plister	45				

NO COMMENTS: ____ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

000478

RECEIVED BY: [illegible] DATE: 6/13/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

ORIGINAL

The following test results are divided into three separate parts:

1. Internal shear strength test results (designated #1 – #17)
   Interface shear strength test results (designated by #1A - #17A)
   (only tests results which were performed on GML material which met the thickness specifications are included in this part)

2. Interface shear strength test results (designated by #1A – #17A)
   (only tests results which were performed on GML material which did **not** meet thickness specifications are included in this part)

3. Interface shear strength test results (designated by #1 - #10)
   (re-tests performed on GML material manufactured to replace the non-conforming GML)

(X) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: [illegible] Date: 6/13/02

INFORMATION ONLY

Fem: DF Project
Direct Shear T... ...g Results Summary
2002 Construction Season

MQC Testing					
GCL Roll No.	GML Roll No.	Interface*	Test Series	Results	Remarks
863		I	1	Pass	
863	181	G	1A	Pass	GML Rejected
888	611	G	1	Pass	Retest
819		I	2	Pass	
819	192	G	2A	Pass	GML Rejected
839	622	G	2	Pass	Retest
773		I	3	Pass	
773	219	G	3A	Pass	
728		I	4	Pass	
728	228	G	4A	Pass	
683		I	5	Pass	
683	277	G	5A	Pass	
638		I	6	Pass	
638	255	G	6A	Pass	GML Rejected
662	845	G	4	Pass	Retest
588		I	7	Pass	
588	288	G	7A	Pass	
543		I	8	Pass	
543	299	G	8A	Pass	
492		I	9	Pass	
492	321	G	9A	Pass	GML Rejected
516	877	G	7	Pass	Retest
442		I	10	Pass	
442	310	G	10A	Pass	GML Rejected
475	857	G	5	Pass	Retest
397		I	11	Pass	
397	359	G	11A	Pass	GML Rejected
425	866	G	6	Pass	Retest
347		I	12	Pass	
347	370	G	12A	Pass	GML Rejected
332	868	G	8	Pass	Retest
302		I	13	Pass	
302	348	G	13A	Pass	GML Rejected
241	910	G	10	Pass	Retest
252		I	14	Pass	
252	337	G	14A	Pass	GML Rejected
283	899	G	9	Pass	Retest
210		I	15	Pass	
210	239	G	15A	Pass	Need Correction
162		I	16	Pass	
162	266	G	16A	Pass	GML Rejected
188	834	G	3	Pass	Retest
117		I	17	Pass	
117	203	G	17A	Pass	

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Fernald OSDF

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06/10/2002

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CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERFACE SHEAR TEST RESULTS
(PGL Job No. 020007)

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER	DATE RECEIVED	ORIGIN OF MATERIAL
GCL Roll #117 Lot #200202LO	73953	1/8/02	CETCO
GCL Roll #162 Lot #200202LO	73954	1/8/02	CETCO
GCL Roll #210 Lot #200202LO	73973	1/10/02	CETCO
GCL Roll# 252 Lot #200202LO	73974	1/10/02	CETCO
GCL Roll #302 Lot #200202LO	73990	1/11/02	CETCO
GCL Roll #347 Lot #200202LO	73991	1/11/02	CETCO
GCL Roll #397 Lot #200202LO	73992	1/11/02	CETCO
GCL Roll #442 Lot #200202LO	73997	1/14/02	CETCO
GCL Roll #492 Lot #200202LO	73998	1/14/02	CETCO
GCL Roll #543 Lot #200202LO	74012	1/15/02	CETCO
GCL Roll #582 Lot #200202LO	74013	1/15/01	CETCO
GCL Roll #638 Lot #200202LO 6	74014	1/15/02	CETCO
GCL Roll #683 Lot #200202LO 5	74046	1/16/02	CETCO
GCL Roll #728 Lot #200202LO 4	74047	1/16/02	CETCO
GCL Roll #773 Lot #200202LO 3	74056	1/17/02	CETCO
GCL Roll #819 Lot #200202LO 2	74057	1/17/02	CETCO
GCL Roll #863 Lot #200202LO 1	74058	1/18/02	CETCO
Textured HDPE R#103114181	74086	1/23/02	GSE
Textured HDPE R#103114192	74089	1/24/02	GSE
Textured HDPE R#103114203	74090	1/24/02	GSE
Textured HDPE R#103114219	74092	1/25/02	GSE
Textured HDPE R#103114228	74103	1/28/02	GSE
Textured HDPE R#103114266	74104	1/29/02	GSE
Textured HDPE R#103114239	74105	1/29/02	GSE
Textured HDPE R#103114277	74106	1/29/02	GSE
Textured HDPE R#1031104255	74107	1/29/02	GSE
Textured HDPE R#103114288	74123	1/30/02	GSE
Textured HDPE R#103114299	74126	1/31/02	GSE
Textured HDPE R#103114321	74159	2/1/02	GSE
Textured HDPE R#103114310	74160	2/1/02	GSE
Textured HDPE R#103114359	74169	2/5/02	GSE
Textured HDPE R#103114370	74170	2/5/02	GSE
Textured HDPE R#103114348	74171	2/5/02	GSE
Textured HDPE R#103114337	74172	2/5/02	GSE

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TABLE 1
CLIENT: CETCO
PROJECT: FLOUR DANIEL FERNALD

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INTERFACE SHEAR TEST RESULT (ASTM D 6243)
(PGL Job No. **G020007**)

QC'd by: _____
29-Jan-02

TEST CONFIGURATION 1

TOP BOX

Internal Shear BENTOMAT ST R#863 L#200202LO, C#74058

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 20" x 20".
2. The GCL specimens were constrained between two wooden boards with mending plates. The ends of each were then sandwiched between a second wooden substrate with mending plate.
3. Initial moisture content of the GCL was 16.9%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. GCL specimen was consolidated under drained condition for 48 hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 inch/min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2 " DISPLACEMENT SECANT ANGLE (degrees)
5	720	106.13	1649	66	1218	59
20	2880	96.7	2647	43	1490	27
45	6480	72.16	3428	28	2089	18

	PEAK STRENGTH	2 " DISPLACEMENT STRENGTH
COHESION (psf):	1568	1086
COEFFICIENT OF FRICTION:	0.30	0.15
FRICTION ANGLE(degrees):	16.7	8.7

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

Partial pull out [illegible] was observed at all normal loads.
See Figure [illegible]

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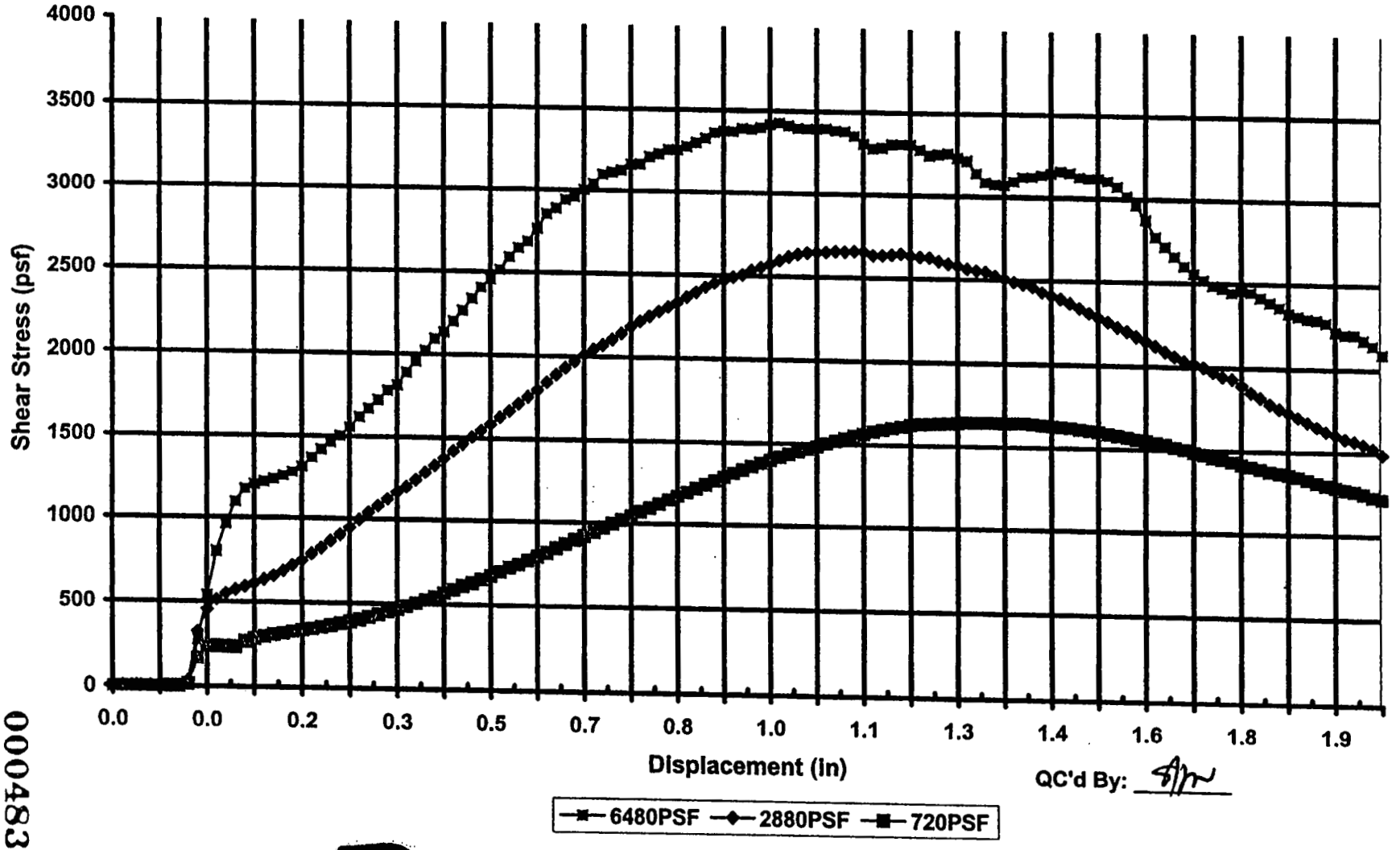
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. G020007_1
INTERNAL SHEAR GCL, BENTOMAT ST R#863 L#200202LO, C#74058



QC'd By: AM

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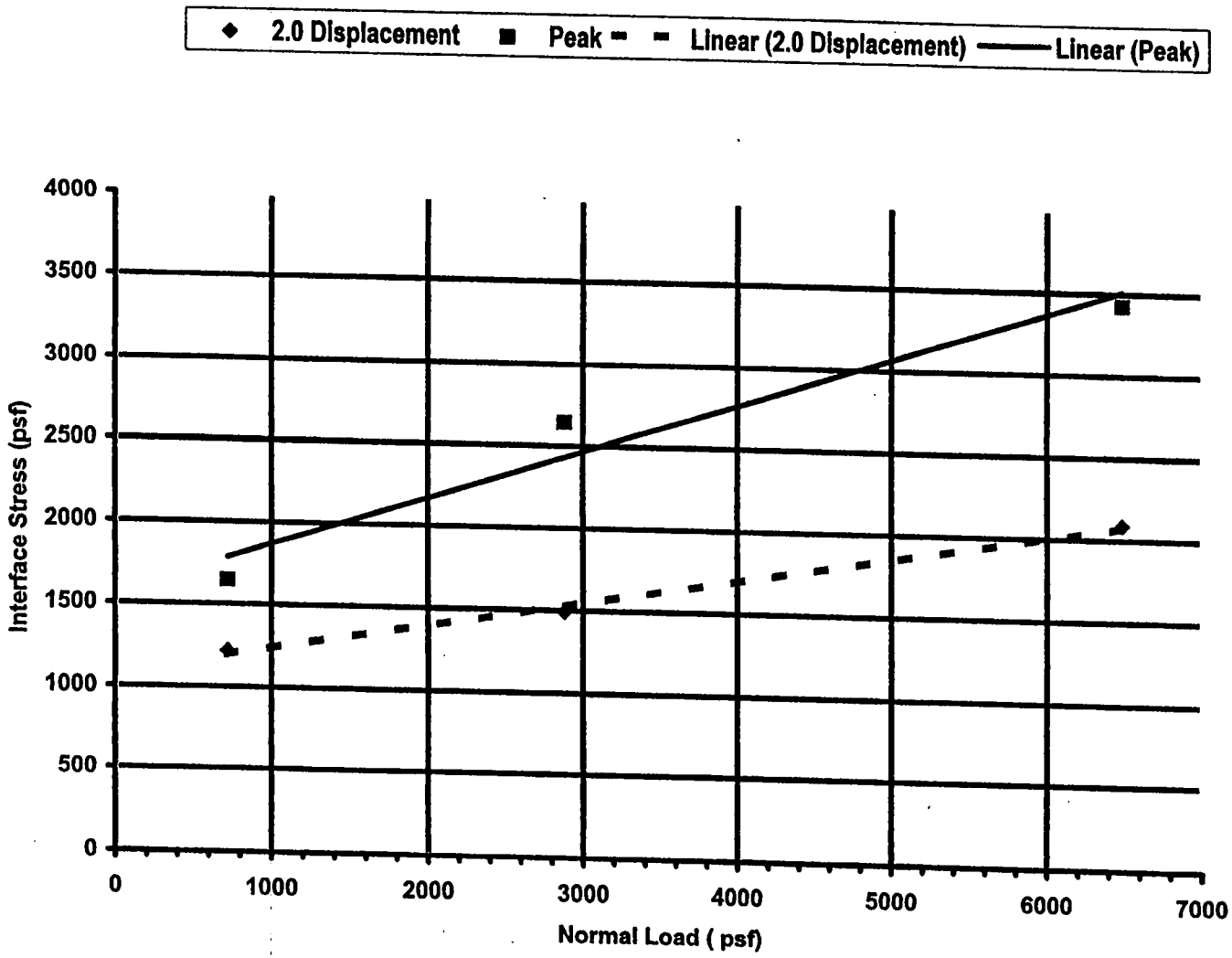
Figure #2
Normal Stress/ Interface Stress
PGL Job No. G020007_1
Internal Shear BENTOMAT ST R#863 L#200202LO, C#74058



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

TABLE 2
CLIENT: CETCO
PROJECT: FLOUR DANIEL FERNALD

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
(PGL Job No. **G020007**)

QC'd by: _____
29-Jan-02

TEST CONFIGURATION 2

TOP BOX

Internal Shear BENTOMAT ST R#819 L#200202LO, C#74057

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 20" x 20".
2. The GCL specimens were constrained between two wooden boards with mending plates. The ends of each were then sandwiched between a second wooden substrate with mending plate.
3. Initial moisture content of the GCL was 14.65%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. GCL specimen was consolidated under drained condition for 48 hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ _ 0.004 inch/min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

			PEAK STRENGTH		2 " DISPLACEMENT STRENGTH	
Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	SHEAR STRESS (psf)	PEAK SECANT ANGLE (degrees)	SHEAR STRESS (psf)	2 " DISPLACEMENT SECANT ANGLE (degrees)
5	720	98.03	2399	73	1376	62
20	2880	87.13	3109	47	1770	32
45	6480	65.62	4376	34	2395	20

COHESION (psf):	2138	1254
COEFFICIENT OF FRICTION:	0.34	0.18
FRICTION ANGLE(degrees):	19.0	10.0

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

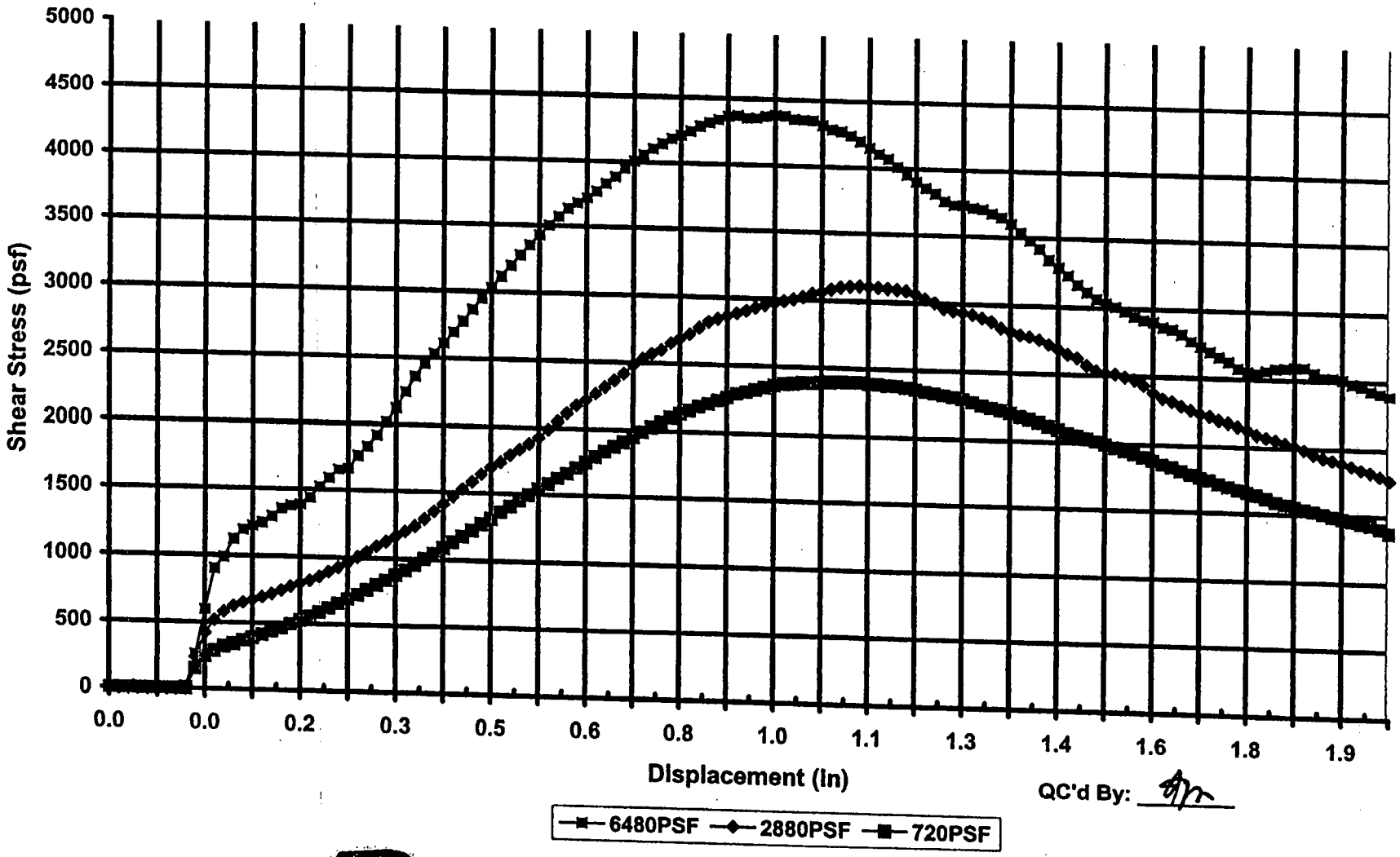
See Figure [illegible]

Partial pull o[illegible]ds was observed at all normal loads.

ISO 9002

Precision Geosynthetic Laboratories

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. G020007_2
INTERNAL SHEAR GCL, BENTOMAT ST R#819 L#200202LO, C#74057

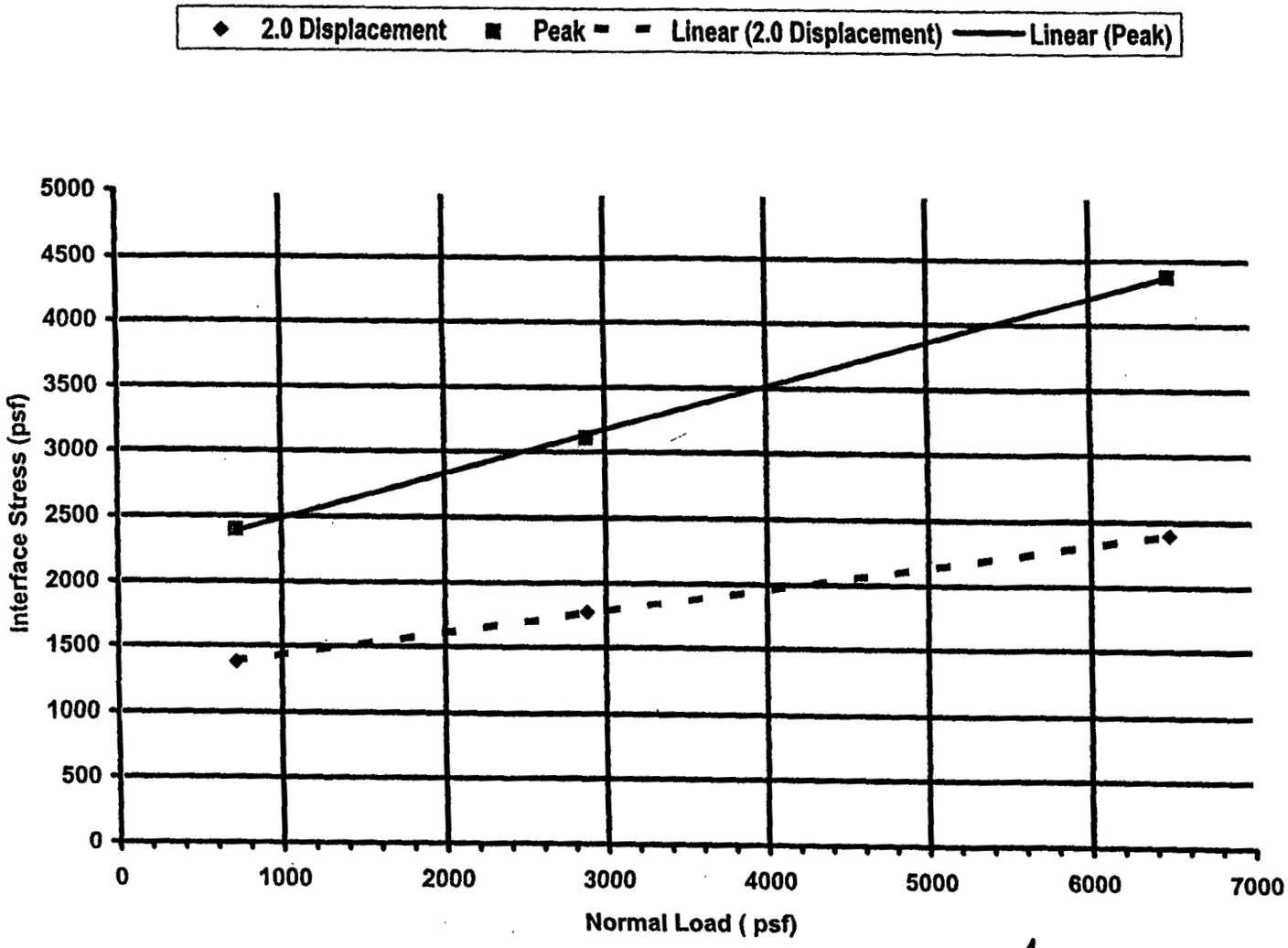


QC'd By: _____

Precision Geosynthetic Laboratories

ISO 9002

Figure #2
Normal Stress/ Interface Stress
PGL Job No. G020007_2
Internal Shear BENTOMAT ST R#819 L#200202LO, C#74057



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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TABLE 3A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
Feb. 19, 2002

TEST CONFIGURATION # 3A

TOP BOX

GCL Bentomat ST R#773 L#200203LO (Woven Side) / C#74056

Textured HDPE R#103114219 / C#74092

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 15.44%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	119.69	436	31	290	22
20.00	2880	93.06	1136	22	953	18
45.00	6480	104.5	2400	20	1577	14

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	174.9	206.43
COEFFICIENT OF FRICTION:	0.34	0.22
FRICTION ANGLE(degrees):	18.9	12.3

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

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ISO 9002

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TABLE 3A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
Feb. 19, 2002

TEST CONFIGURATION # 3A

TOP BOX

GCL Bentomat ST R#773 L#200203LO (Woven Side) / C#74056

Textured HDPE R#103114219 / C#74092

← BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCl stretched for about 0.75 - 1".

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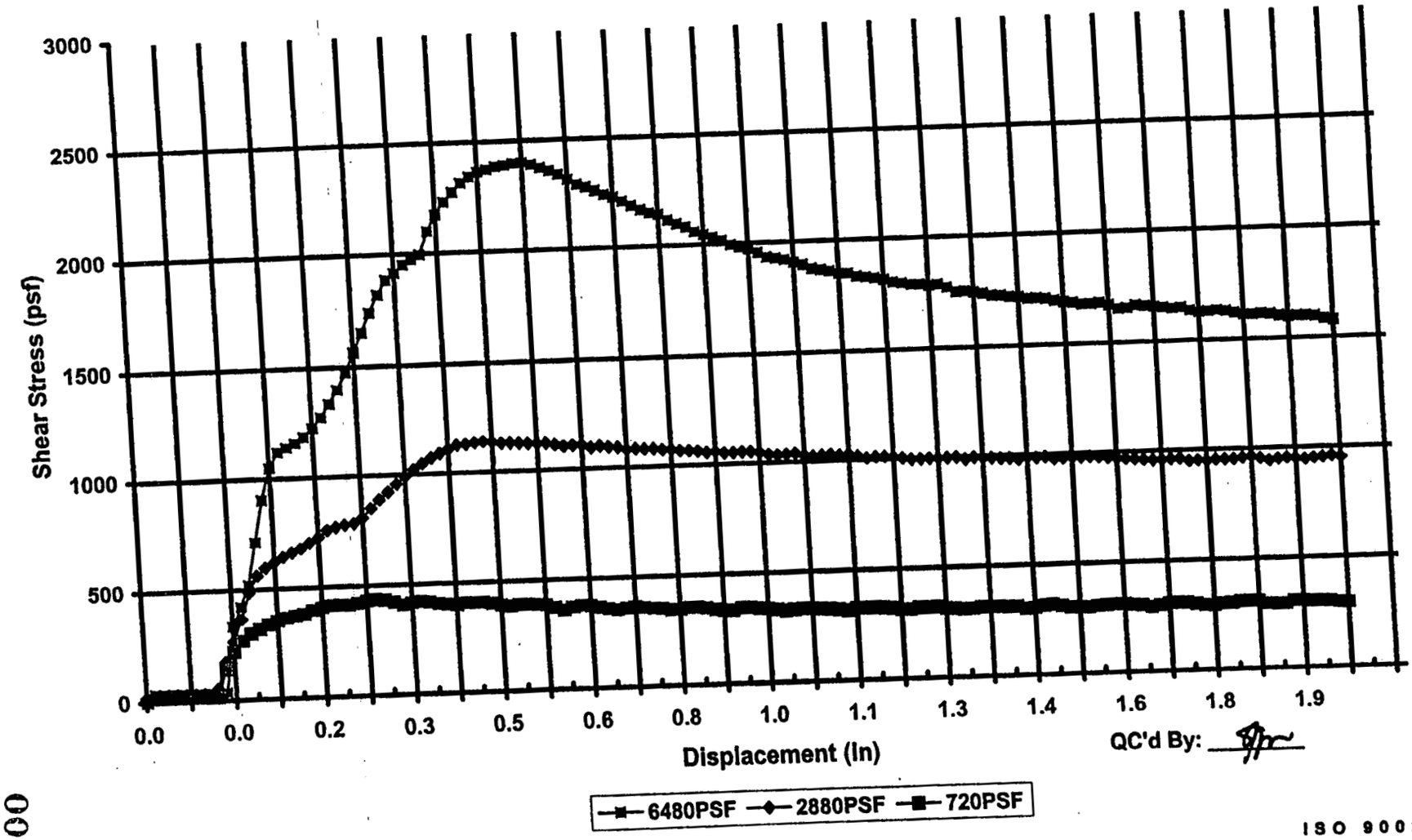
ISO 9002

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_3A
GCL Bentomat ST R#773 L#200203LO, C#74056 / Textured HDPE R#103114219, C#74092



QC'd By: _____

ISO 9002

Precision Geosynthetic Laboratories

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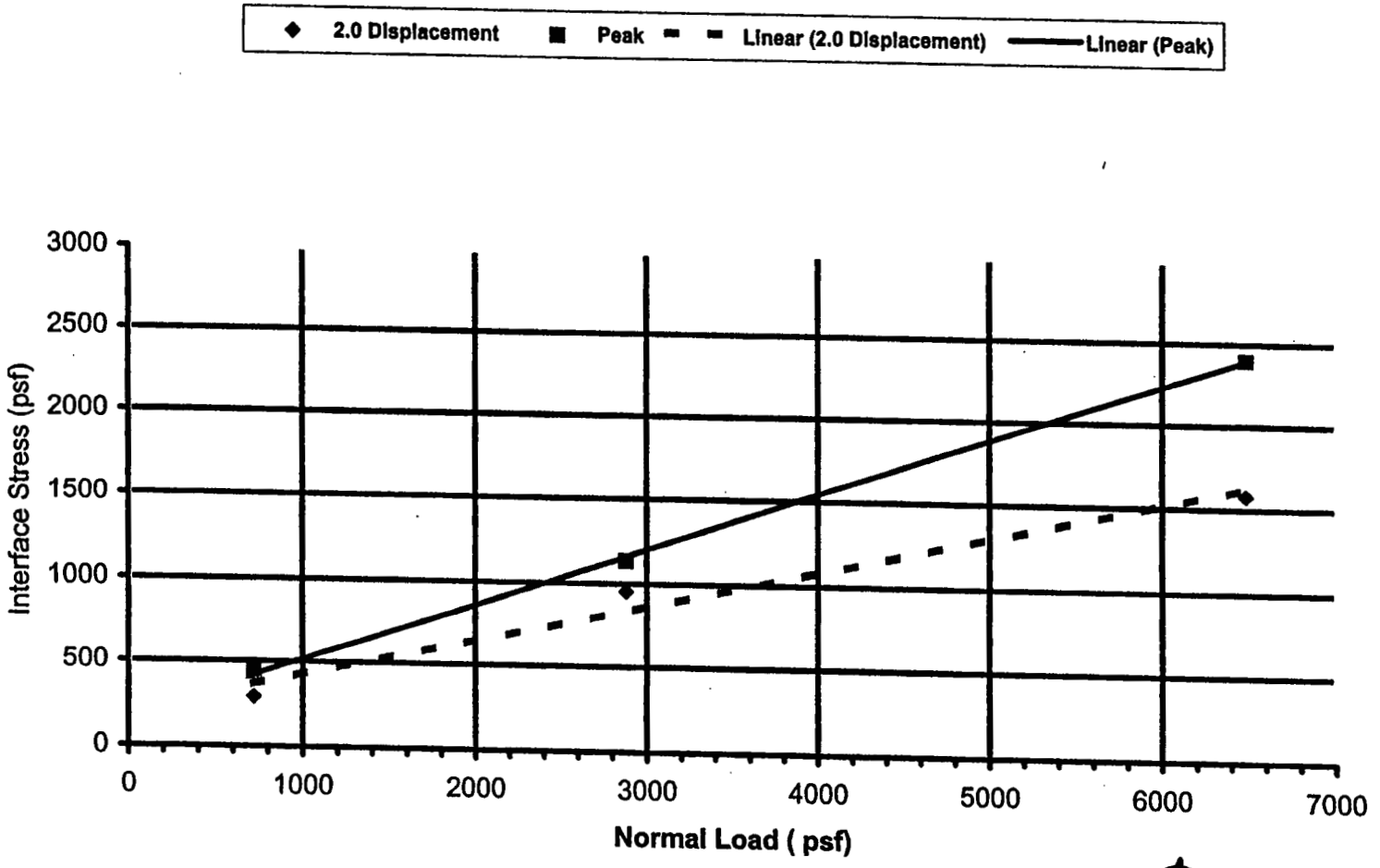
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_3A
GCL Bentomat ST R#773 L#200203LO, C#74056 / Textured HDPE R#103114219, C#74092



QC'd By: [illegible]

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ISO 9002

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TABLE 3
CLIENT: CETCO
PROJECT: FLOUR DANIEL FERNALD

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
(PGL Job No. G020007)

QC'd by: _____
18-Feb-02

TEST CONFIGURATION 3

TOP BOX

Internal Shear BENTOMAT ST R#773 L#200202LO, C#74056

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 20" x 20".
2. The GCL specimens were constrained between two wooden boards with mending plates. The ends of each were then sandwiched between a second wooden substrate with mending plate.
3. Initial moisture content of the GCL was 14.95%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. GCL specimen was consolidated under drained condition for 48 hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 inch/min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2 " DISPLACEMENT SECANT ANGLE (degrees)
5	720	109.13	1913	69	928	52
20	2880	96.54	2193	37	999	19
45	6480	82.6	3906	31	1653	14

	PEAK STRENGTH	2 " DISPLACEMENT STRENGTH
COHESION (psf):	1464	751
COEFFICIENT OF FRICTION:	0.36	0.13
FRICTION ANGLE(degrees):	19.8	7.5

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

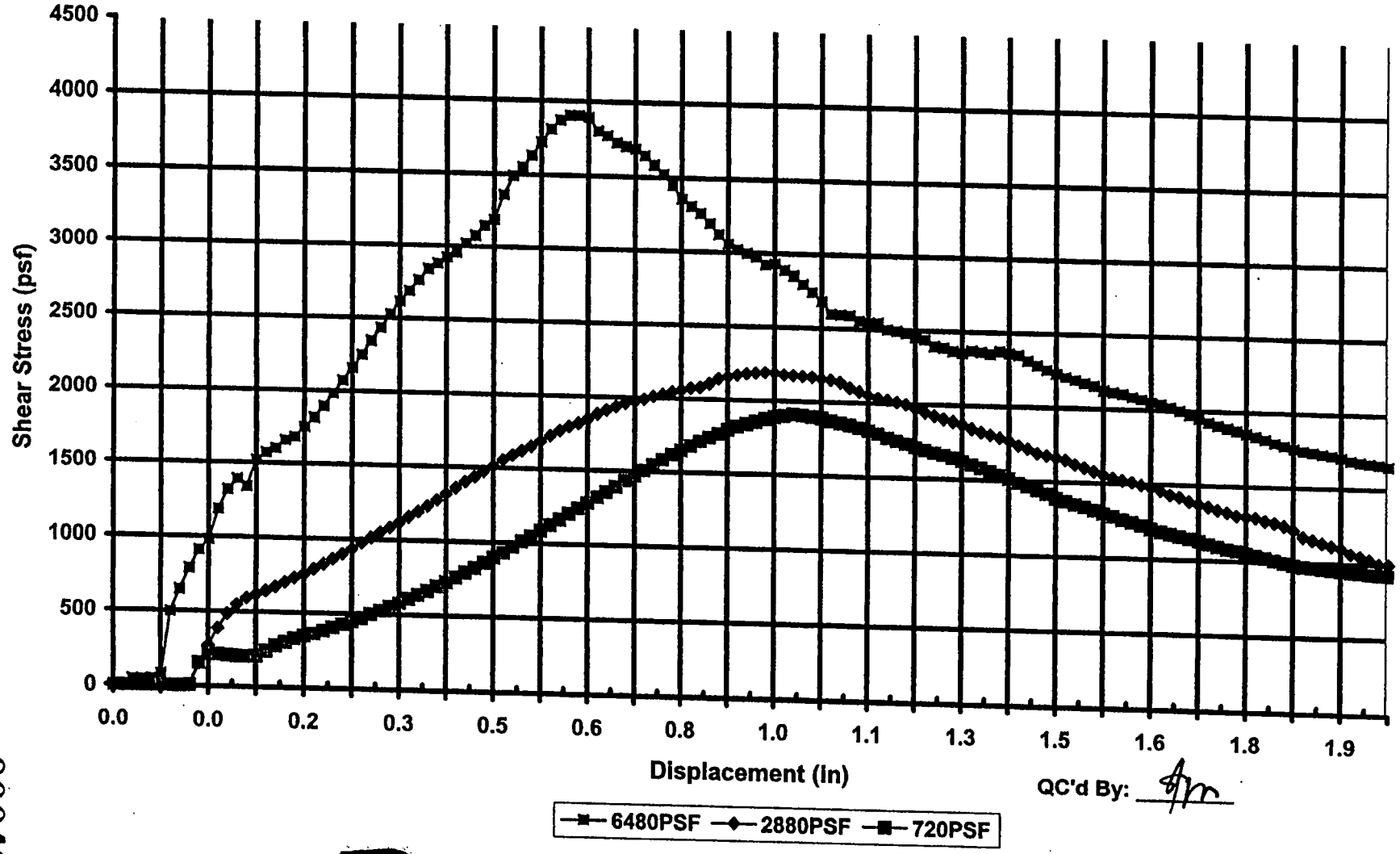
See Figure [illegible]

Partial pull o[illegible]ads was observed at all normal loads.

ISO 9002

Precision Geosynthetic Laboratories

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. G020007_3
INTERNAL SHEAR GCL, BENTOMAT ST R#773 L#200202LO, C#74056



QC'd By: AM

Precision Geosynthetic Laboratories

ISO 9002

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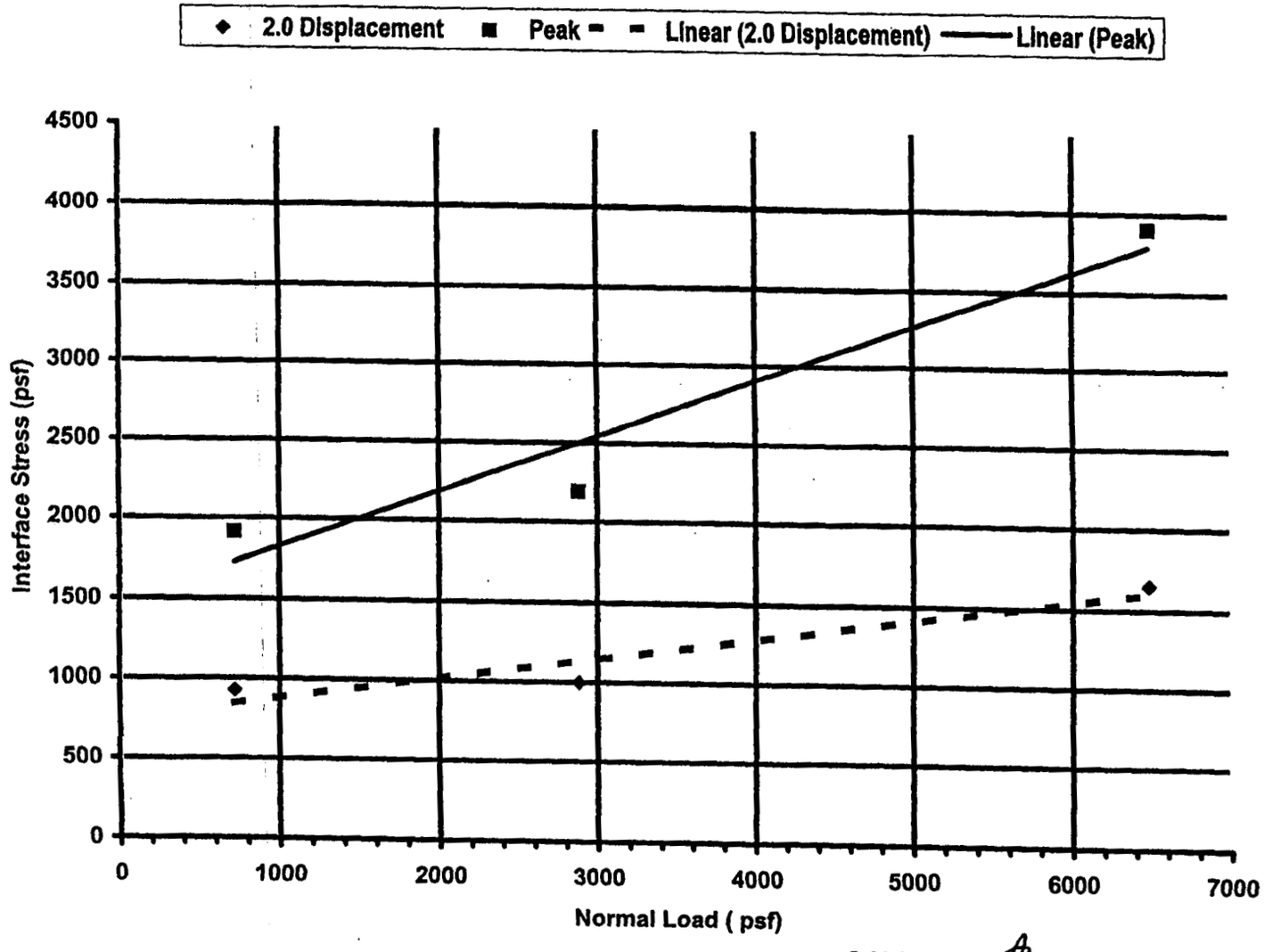
Figure #2
Normal Stress/ Interface Stress
PGL Job No. G020007_3
Internal Shear BENTOMAT ST R#773 L#200202LO, C#74056



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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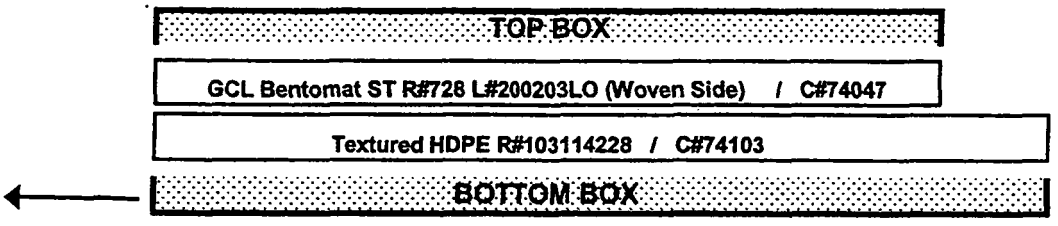
TABLE 4A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
Feb. 13, 2002

TEST CONFIGURATION # 4A



TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 14.58%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	121.05	412	30	341	25
20.00	2880	113.9	1191	22	742	14
45.00	6480	100.8	2227	19	1089	10

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	227.3	299.14
COEFFICIENT OF FRICTION:	0.31	0.13
FRICTION ANGLE(degrees):	17.3	7.2

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

Precision Geosynthetic Laboratories

ISO 9002

TABLE 4A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
Feb. 13, 2002

TEST CONFIGURATION # 4A

TOP BOX

GCL Bentomat ST R#728 L#200203LO (Woven Side) / C#74047

Textured HDPE R#103114228 / C#74103

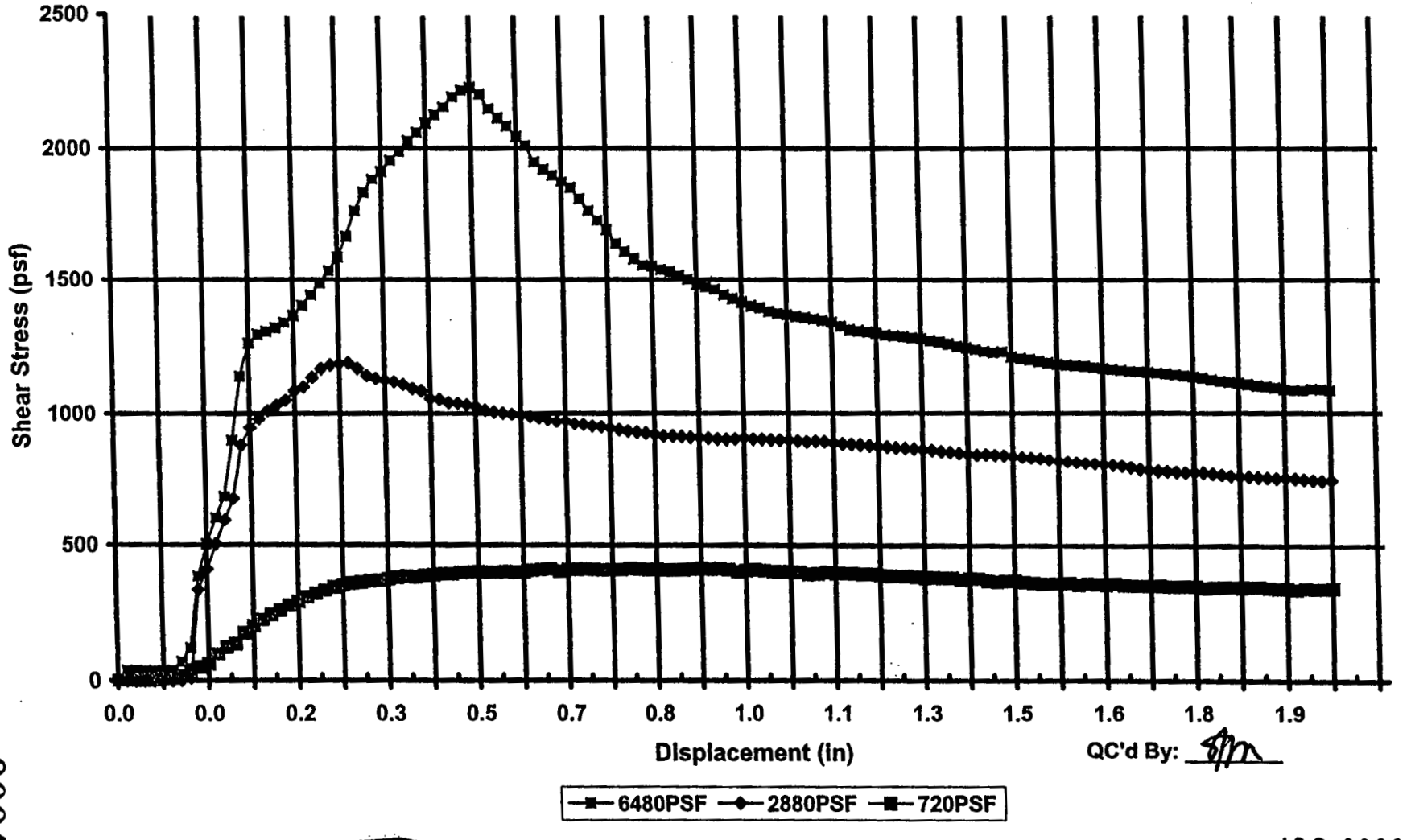
← BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCl stretched for about 0.75 - 1".

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_4A
GCL Bentomat ST R#728 L#200203LO, C#74047 / Textured HDPE R#103114228, C#74103



QC'd By: _____

Precision Geosynthetic Laboratories

ISO 9002

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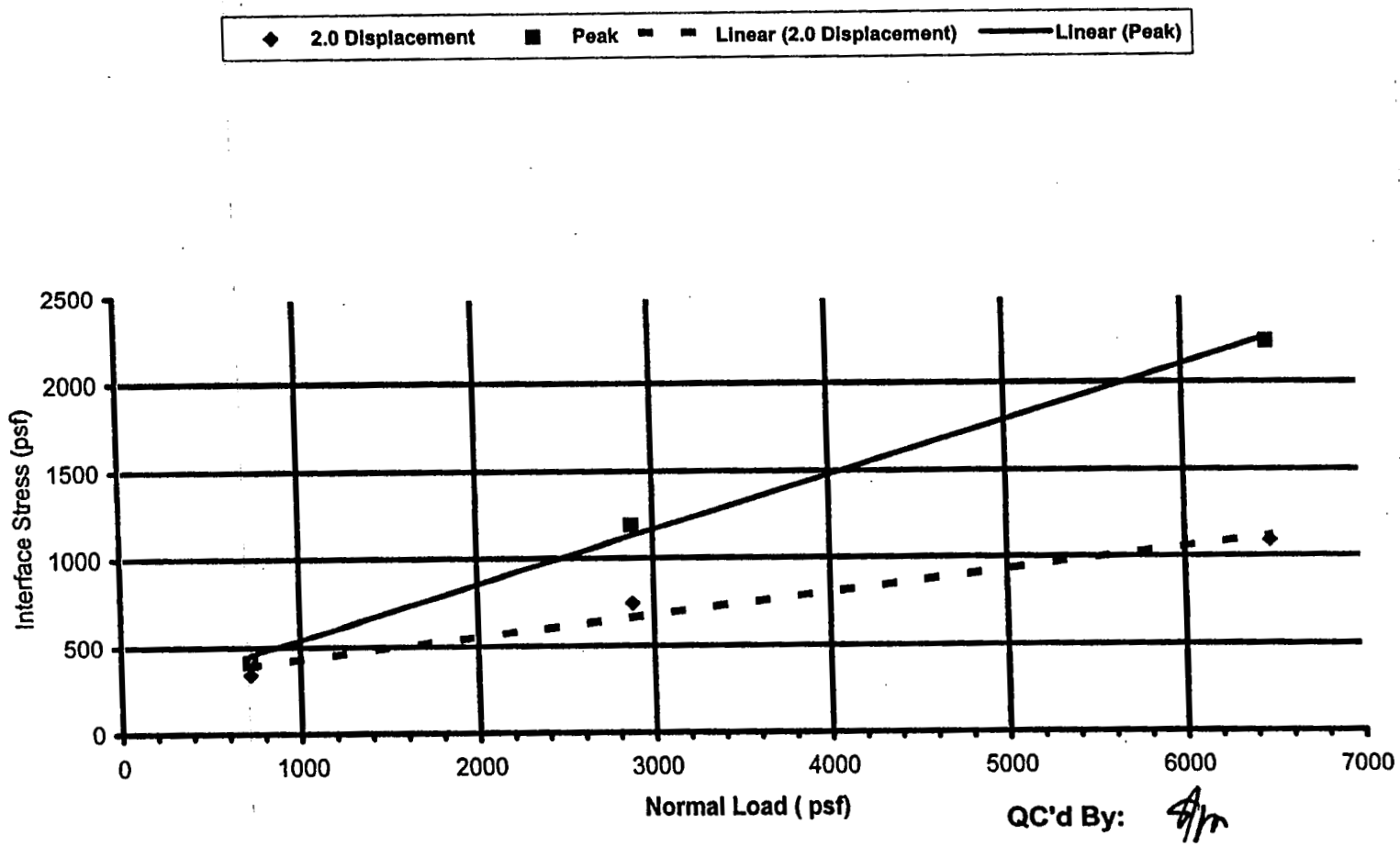
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_4A
GCL Bentomat ST R#728 L#200203LO, C#74047 / Textured HDPE R#103114228, C#74103



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

TABLE 4
CLIENT: CETCO
PROJECT: FLOUR DANIEL FERNALD

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
(PGL Job No. G020007)

QC'd by: 19-Feb-02

TEST CONFIGURATION 4

TOP BOX

Internal Shear BENTOMAT ST R#728 L#200202LO, C#74047

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 20" x 20".
2. The GCL specimens were constrained between two wooden boards with mending plates. The ends of each were then sandwiched between a second wooden substrate with mending plate.
3. Initial moisture content of the GCL was 15.04%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. GCL specimen was consolidated under drained condition for 48 hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 inch/min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2 " DISPLACEMENT SECANT ANGLE (degrees)
5	720	109.9	1832	69	1000	54
20	2880	100.75	2700	43	1352	25
45	6480	86.9	3950	31	1510	13

	PEAK STRENGTH	2 " DISPLACEMENT STRENGTH
COHESION (psf):	1599	1005
COEFFICIENT OF FRICTION:	0.37	0.08
FRICTION ANGLE(degrees):	20.1	4.8

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure [illegible]

Partial pull o[illegible]ds was observed at all normal loads.

Precision Geosynthetic Laboratories

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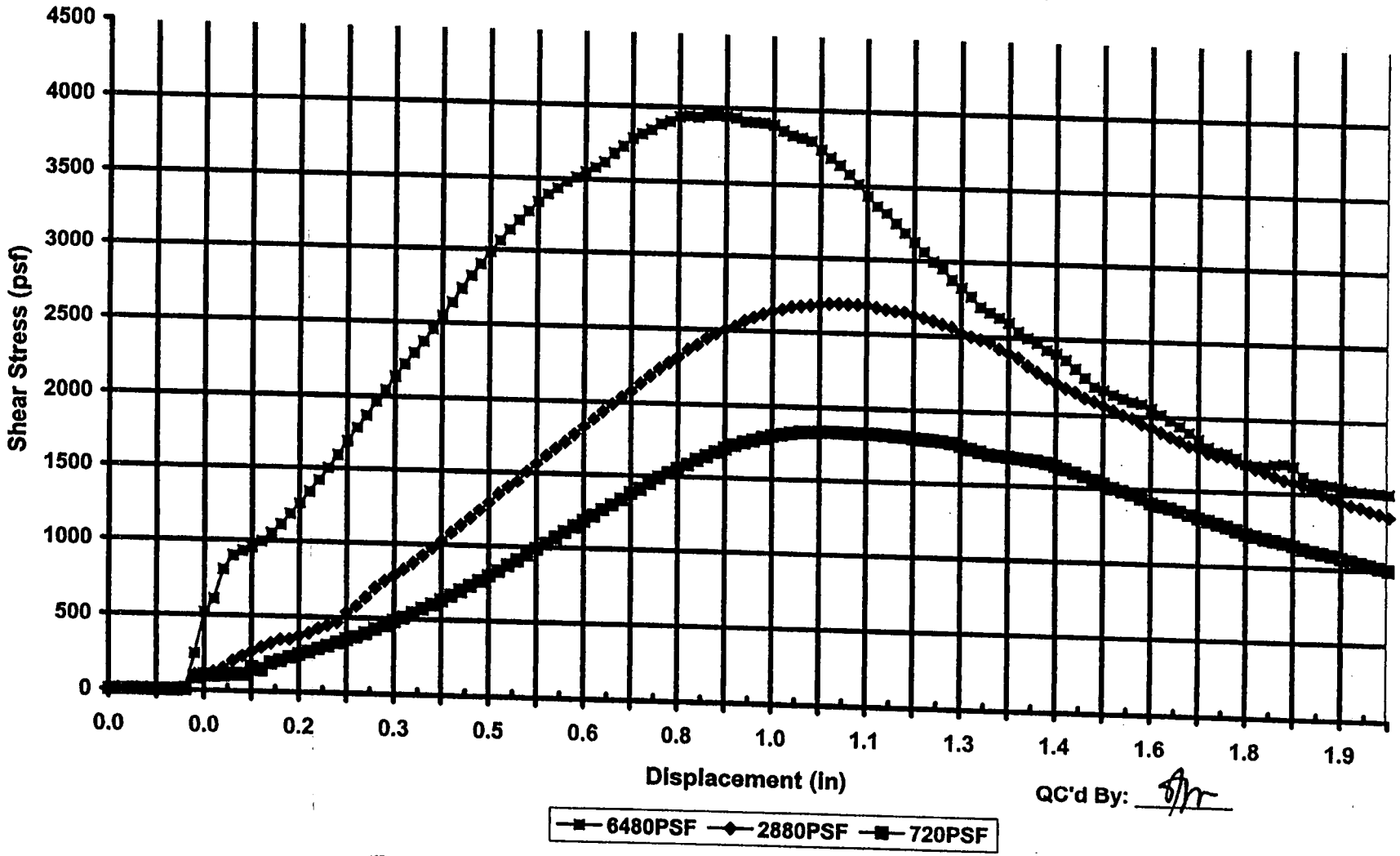
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. G020007_4
INTERNAL SHEAR GCL, BENTOMAT ST R#728 L#200202LO, C#74047

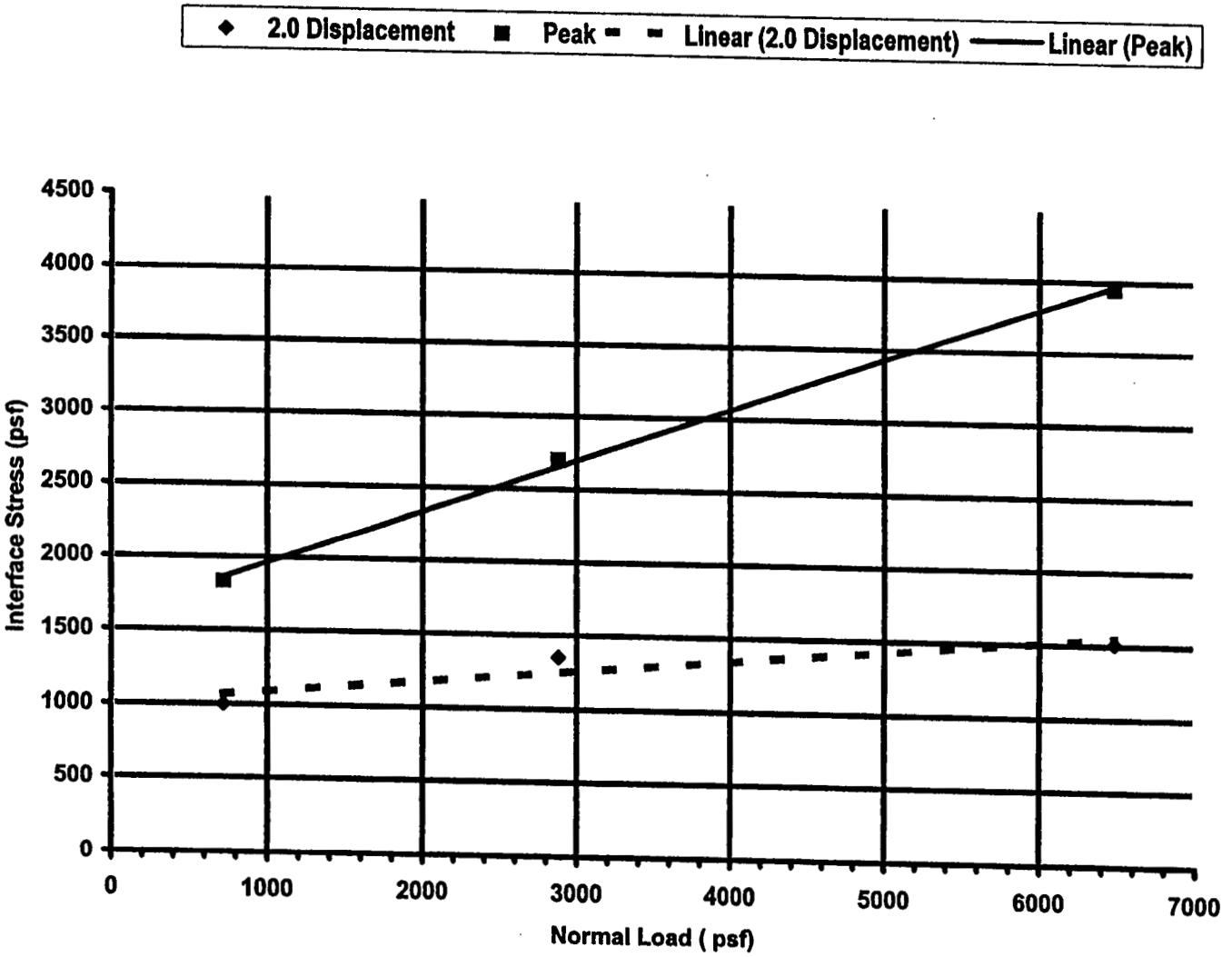


QC'd By: _____

Precision Geosynthetic Laboratories

ISO 9002

Figure #2
Normal Stress/ Interface Stress
PGL Job No. G020007_4
Internal Shear BENTOMAT ST R#728 L#200202LO, C#74047



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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TABLE 5A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
Feb.18, 2002

TEST CONFIGURATION # 5A

TOP BOX

GCL Bentomat ST R#683 L#200203LO (Woven Side) / C#74046

Textured HDPE R#103114277 / C#74106

← BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 13.89%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	118.92	504	35	417	30
20.00	2880	114.7	1052	20	724	14
45.00	6480	99.49	2354	20	1355	12

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	210.3	280.57
COEFFICIENT OF FRICTION:	0.33	0.16
FRICTION ANGLE(degrees):	18.0	9.3

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

Precision Geosynthetic Laboratories

ISO 9002

TABLE 5A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: gm
Feb.18, 2002

TEST CONFIGURATION # 5A

TOP BOX

GCL Bentomat ST R#683 L#200203LO (Woven Side) / C#74046

Textured HDPE R#103114277 / C#74106

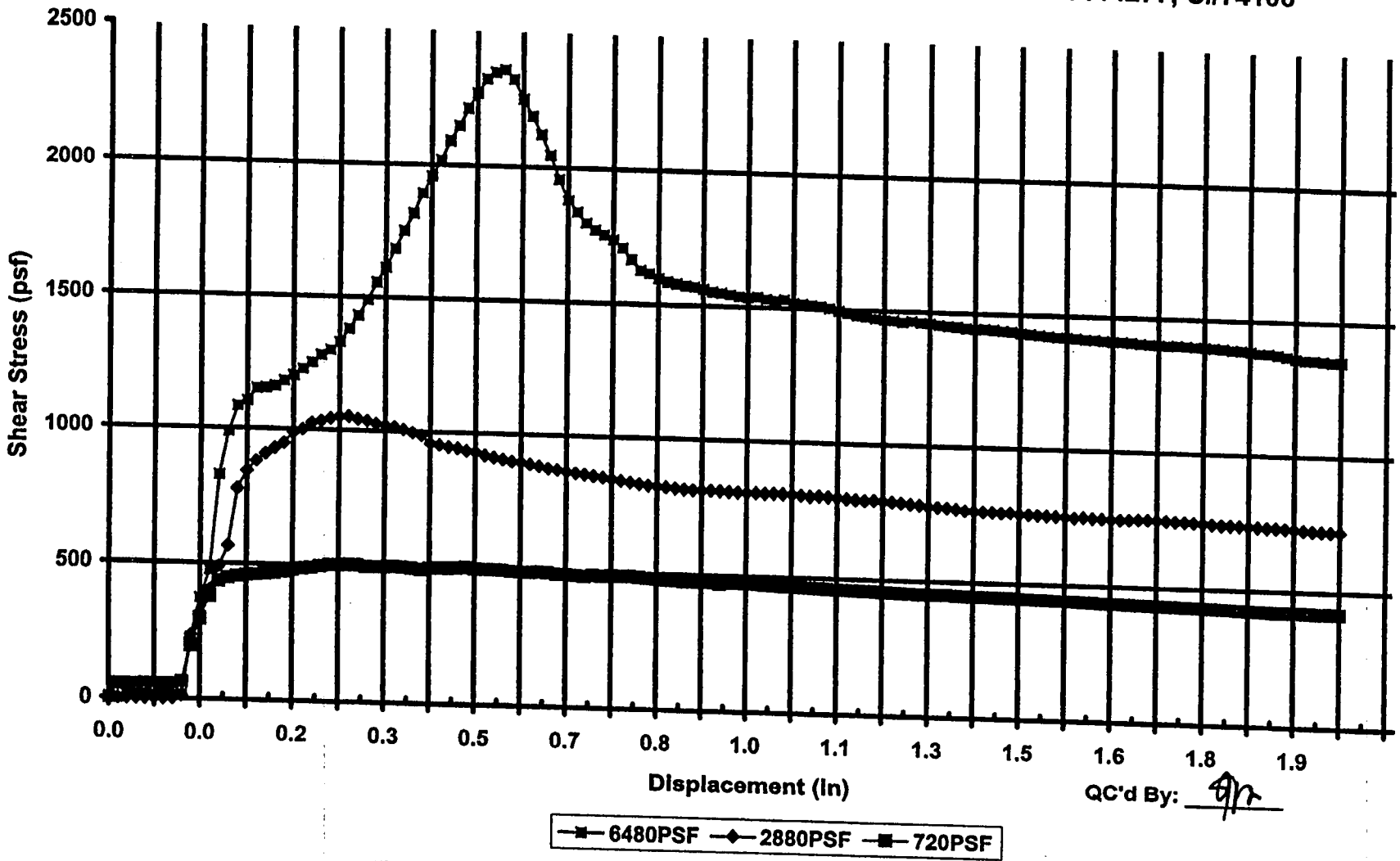
← BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

GCL specimen did not stretch at 5 psi normal load. However at 20 psi, and 35 psi, GCL stretched for about 1".

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_5A
GCL Bentomat ST R#683 L#200203LO, C#74046 / Textured HDPE R#103114277, C#74106



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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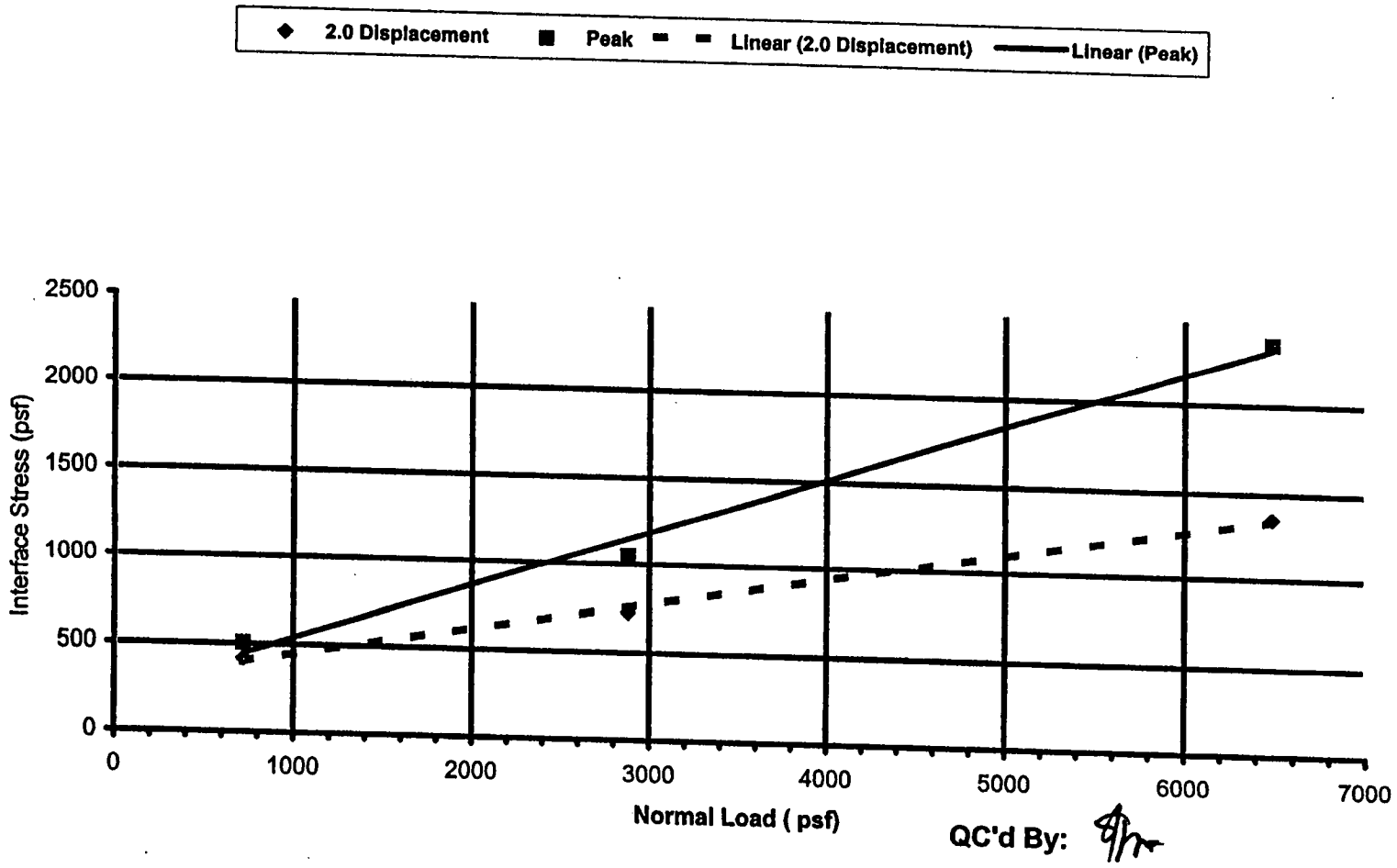
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_5A
GCL Bentomat ST R#683 L#200203LO, C#74046 / Textured HDPE R#103114227, C#74106



QC'd By:

TABLE 5
CLIENT: CETCO
PROJECT: FLOUR DANIEL FERNALD

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
(PGL Job No. **G020007**)

QC'd by: _____
22-Feb-02

TEST CONFIGURATION 5

TOP BOX

Internal Shear BENTOMAT ST R#683 L#200202LO, C#74046

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 20" x 20".
2. The GCL specimens were constrained between two wooden boards with mending plates. The ends of each were then sandwiched between a second wooden substrate with mending plate.
3. Initial moisture content of the GCL was 13.96%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. GCL specimen was consolidated under drained condition for 48 hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 inch/min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2 " DISPLACEMENT SECANT ANGLE (degrees)
5	720	125.68	2071	71	1401	63
20	2880	114.26	2624	42	1784	32
45	6480	78.07	3893	31	2691	23

	PEAK STRENGTH	2 " DISPLACEMENT STRENGTH
COHESION (psf):	1787	1197
COEFFICIENT OF FRICTION:	0.32	0.23
FRICTION ANGLE(degrees):	17.7	12.8

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

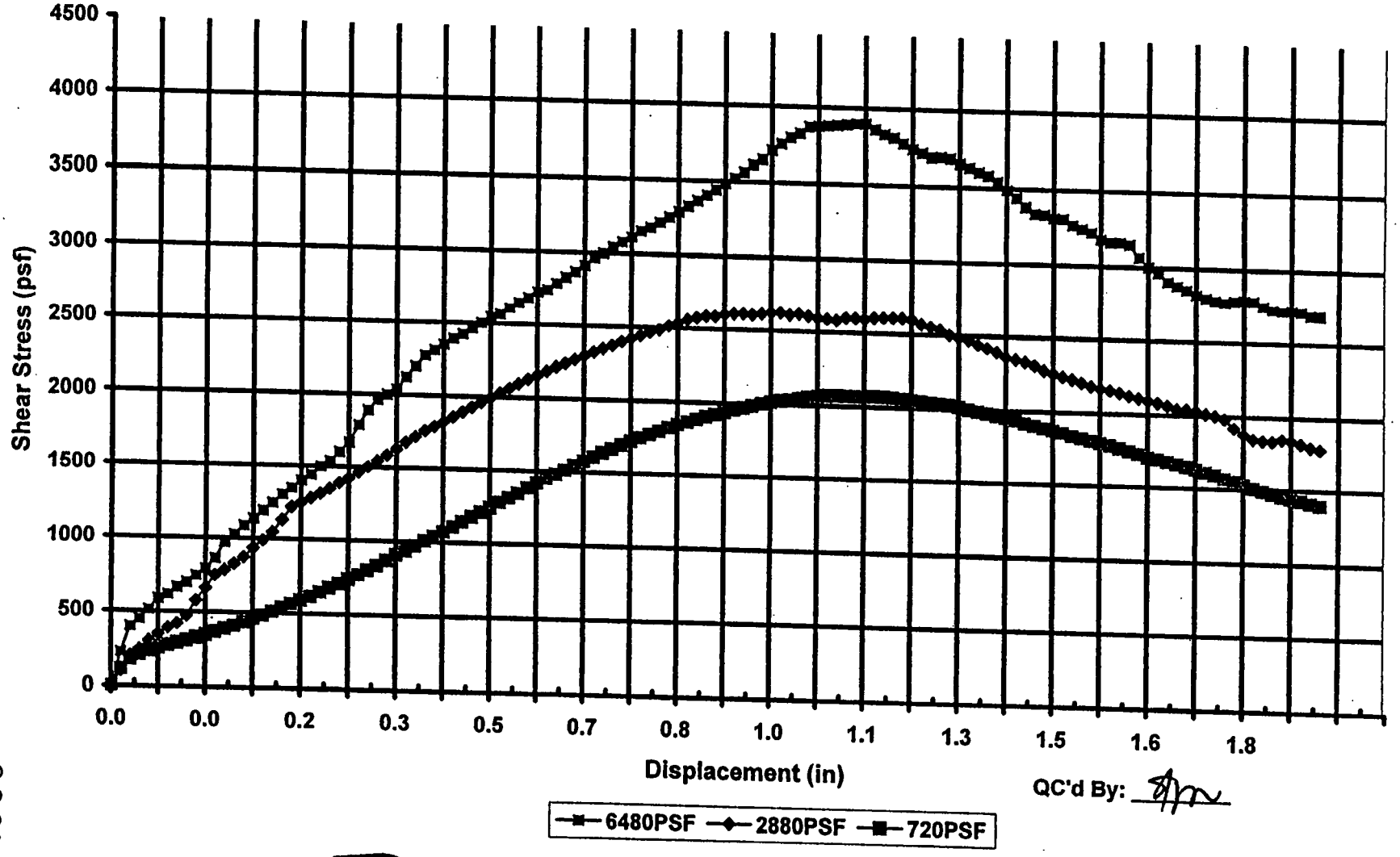
OBSERVATIONS:

Partial pull-out of [illegible]ds was observed at all normal loads.
See Figure [illegible]

Precision Geosynthetic Laboratories

ISO 9002

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. G020007_5
INTERNAL SHEAR GCL, BENTOMAT ST R#683 L#200202LO, C#74046



QC'd By: _____

Precision Geosynthetic Laboratories

ISO 9002

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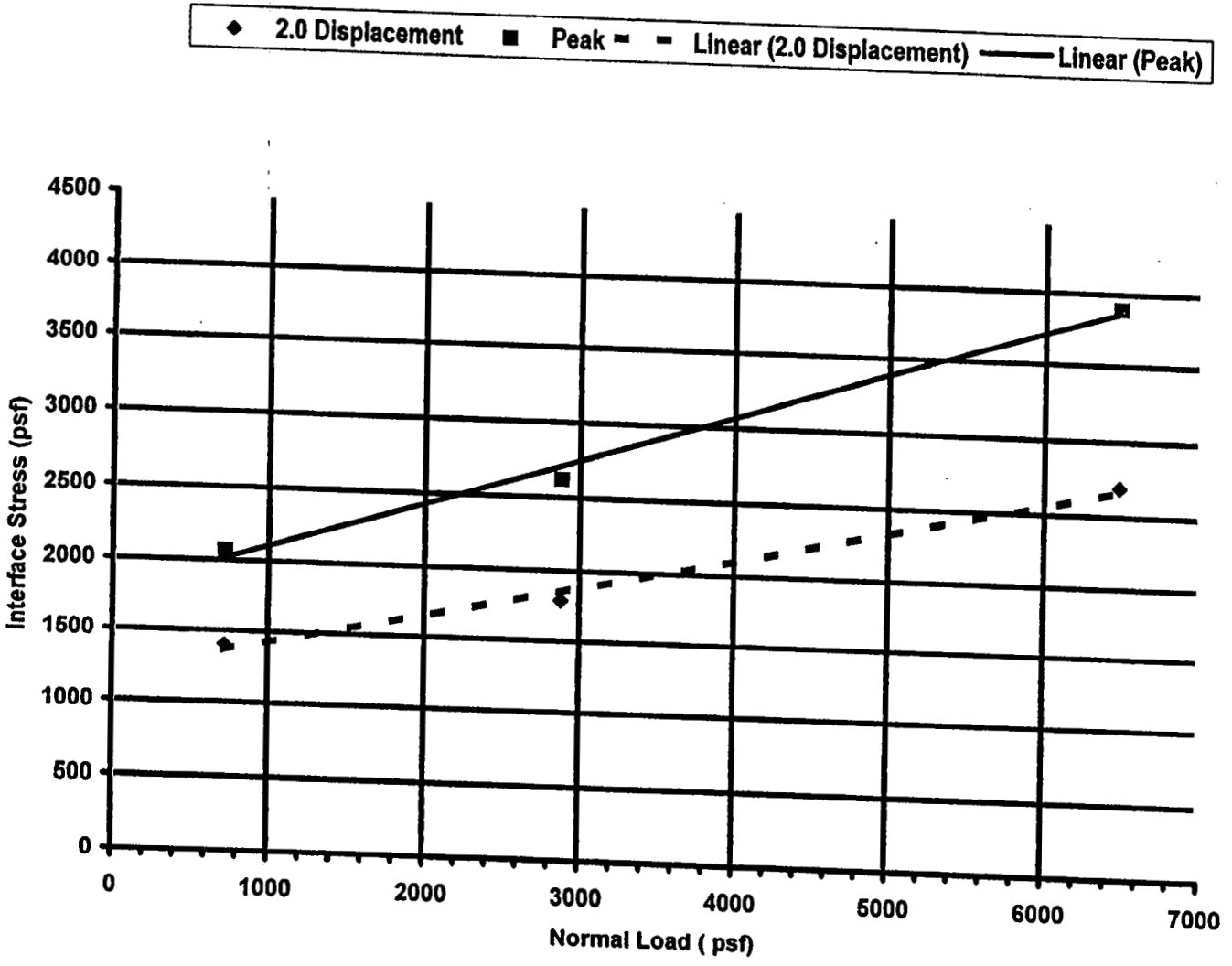
Figure #2
Normal Stress/ Interface Stress
PGL Job No. G020007_5
Internal Shear BENTOMAT ST R#683 L#200202LO, C#74046



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

TABLE 6
CLIENT: CETCO
PROJECT: FLOUR DANIEL FERNALD

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
(PGL Job No. **G020007**)

QC'd by: _____
28-Feb-02

TEST CONFIGURATION 6

TOP BOX

Internal Shear BENTOMAT ST R#638 L#200202LO, C#74014

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 20" x 20".
2. The GCL specimens were constrained between two wooden boards with mending plates. The ends of each were then sandwiched between a second wooden substrate with mending plate.
3. Initial moisture content of the GCL was 16.43%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. GCL specimen was consolidated under drained condition for 48 hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 inch/min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2 " DISPLACEMENT SECANT ANGLE (degrees)
5	720	116.7	1890	69	1021	55
20	2880	89.7	2610	42	1282	24
45	6480	81.9	3875	31	1893	16

	PEAK STRENGTH	2 " DISPLACEMENT STRENGTH
COHESION (psf):	1631	884
COEFFICIENT OF FRICTION:	0.35	0.15
FRICTION ANGLE(degrees):	19.1	8.7

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure [illegible] an[illegible]

Partial pull [illegible]eads was observed at all normal loads.

ISO 9002

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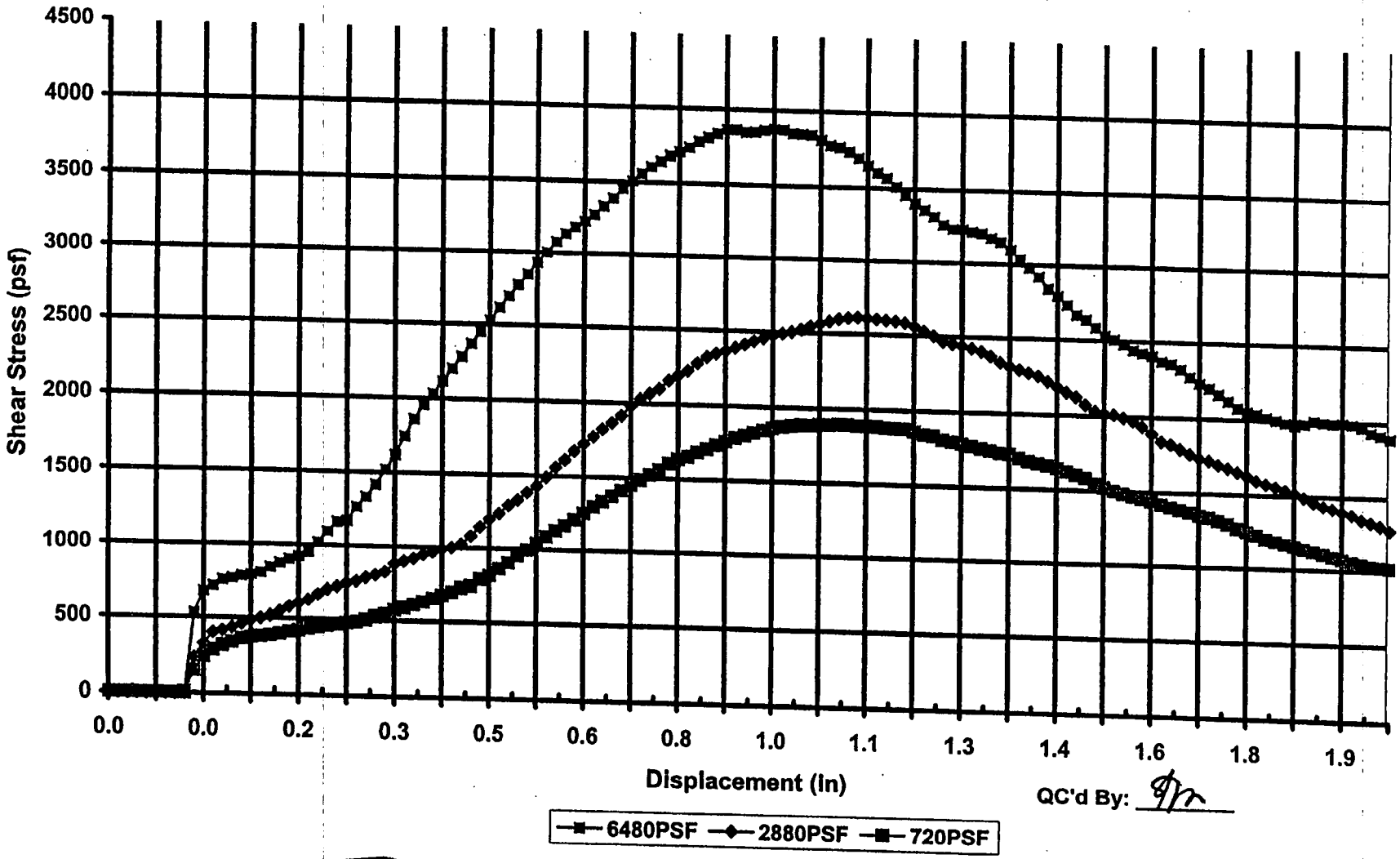
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. G020007_6
INTERNAL SHEAR GCL, BENTOMAT ST R#638 L#200202LO, C#74014



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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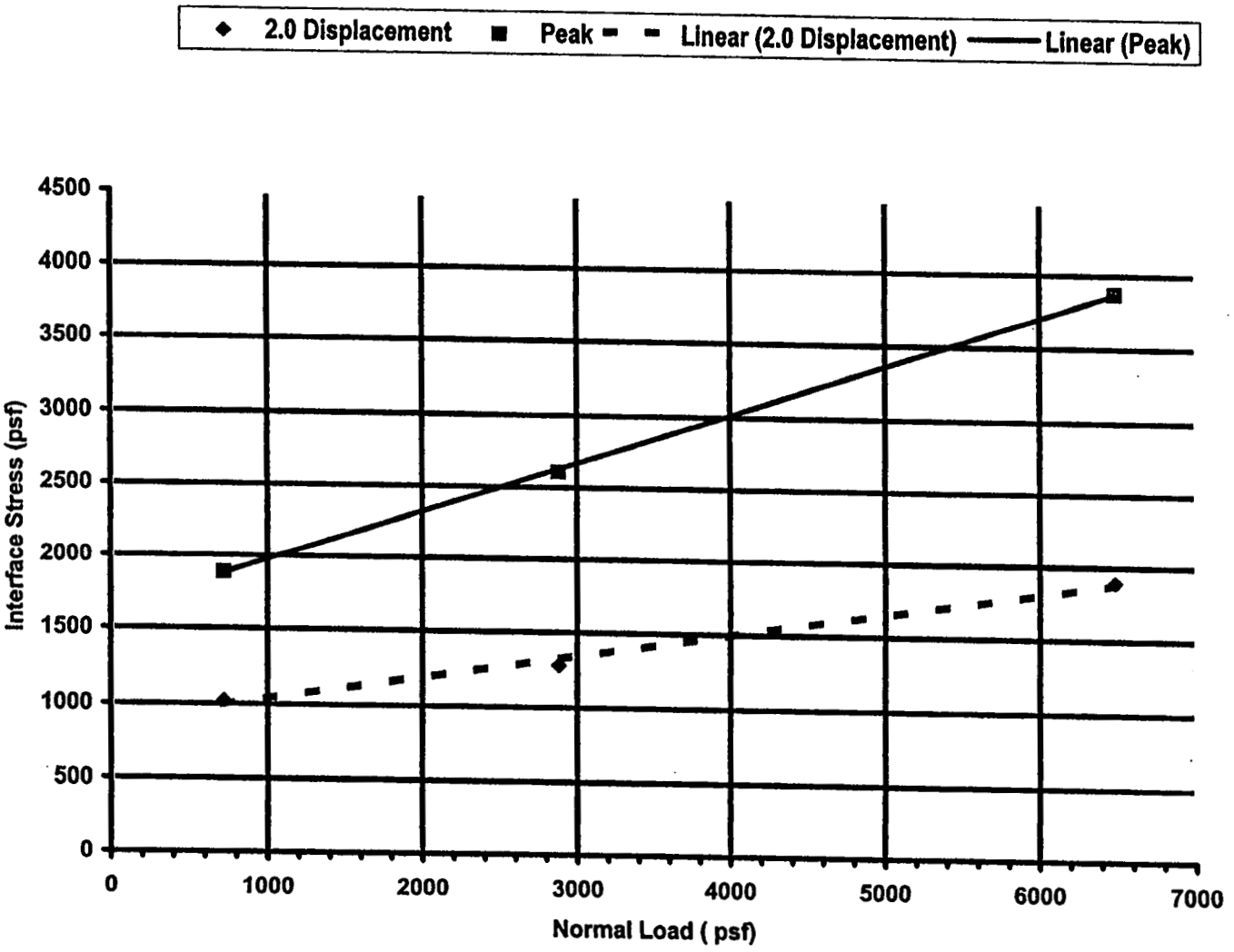
Figure #2
Normal Stress/ Interface Stress
PGL Job No. G020007_6
Internal Shear BENTOMAT ST R#638 L#200202LO, C#74014



QC'd By: [illegible]

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ISO 9002

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TABLE 7A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
Feb. 25, 2002

TEST CONFIGURATION # 7A

TOP BOX

GCL Bentomat ST R#588 L#200203LO (Woven Side) / C#74013

Textured HDPE R#103114288 / C#74123

← BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 14.22%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	114.6	487	34	405	29
20.00	2880	104.92	1438	27	1102	21
45.00	6480	94.8	2388	20	1568	14

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	351.4	371.43
COEFFICIENT OF FRICTION:	0.32	0.19
FRICTION ANGLE(degrees):	17.9	11.0

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

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ISO 9002

TABLE 7A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
Feb. 25, 2002

TEST CONFIGURATION # 7A

TOP BOX

GCL Bentomat ST R#588 L#200203LO (Woven Side) / C#74013

Textured HDPE R#103114288 / C#74123

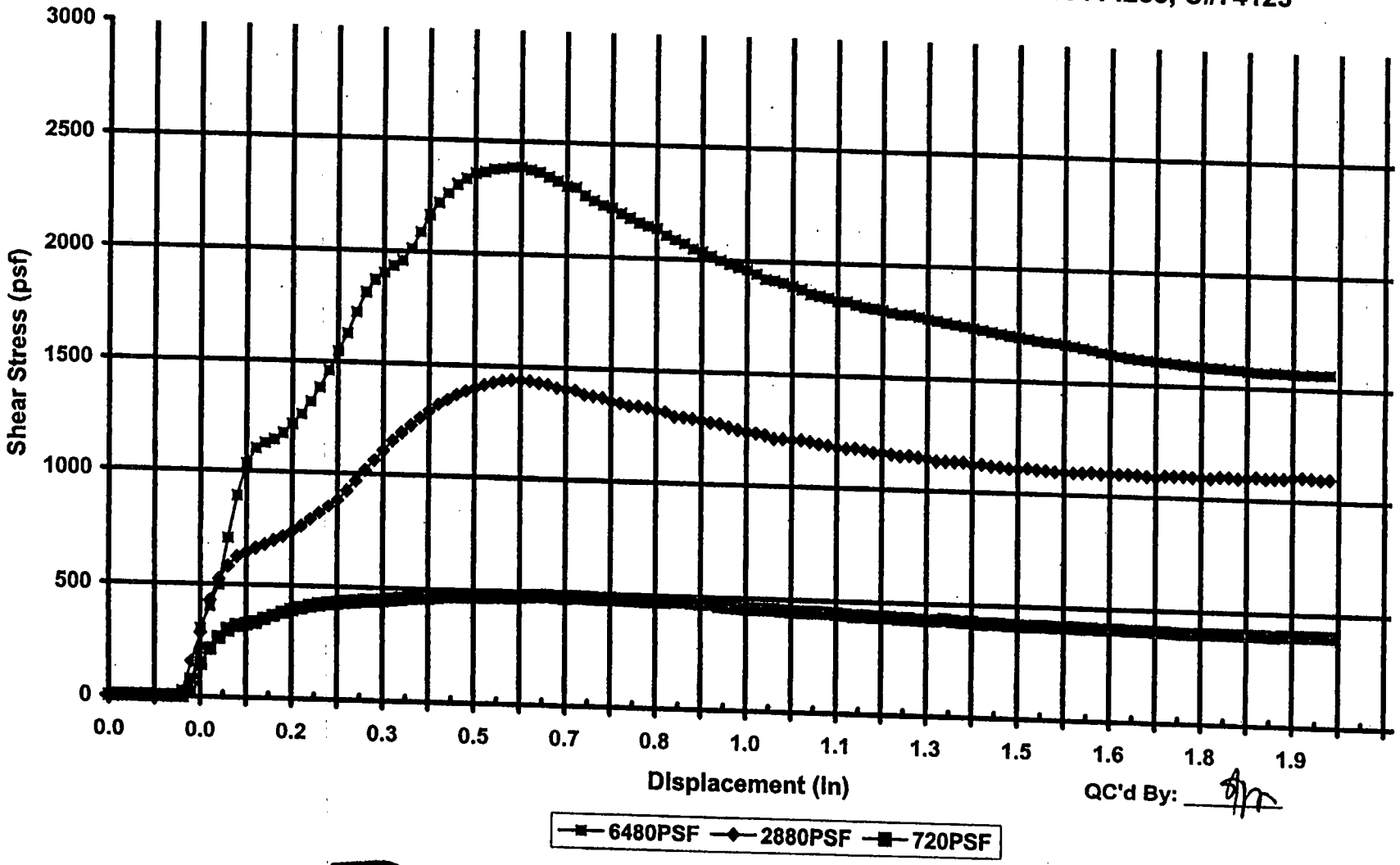
← BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCl stretched for about 0.75 - 1".

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_7A
GCL Bentomat ST R#588 L#200203LO, C#74013 / Textured HDPE R#103114288, C#74123



QC'd By: _____

Precision Geosynthetic Laboratories

ISO 9002

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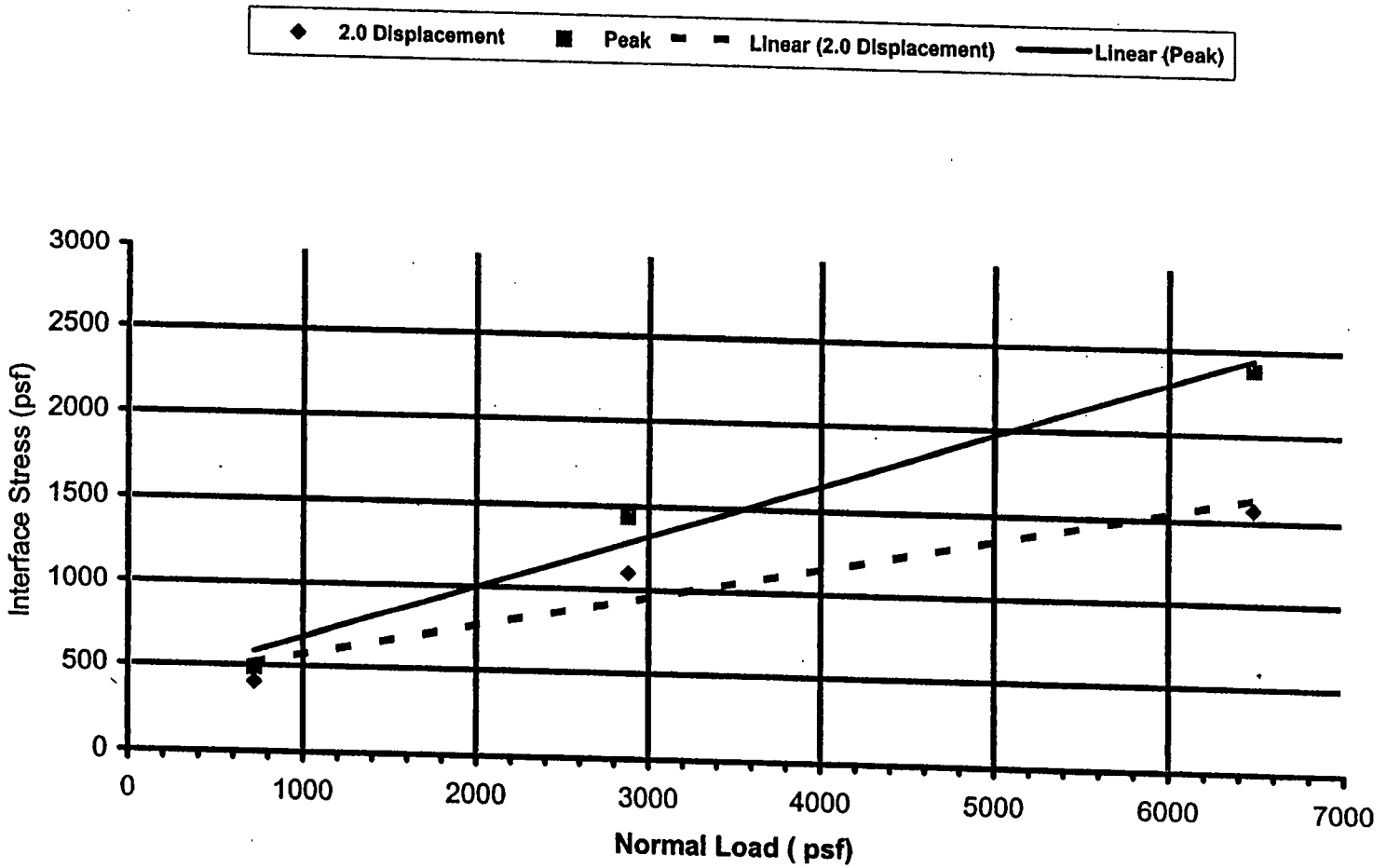
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_7A
GCL Bentomat ST R#588 L#200203LO, C#74013 / Textured HDPE R#103114288, C#74123



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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LAPA

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TABLE 7
CLIENT: CETCO
PROJECT: FLOUR DANIEL FERNALD

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
(PGL Job No. G020007)

QC'd by: 28-Feb-02

TEST CONFIGURATION 7

TOP BOX

Internal Shear BENTOMAT ST R#588 L#200202LO, C#74013

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 20" x 20".
2. The GCL specimens were constrained between two wooden boards with mending plates. The ends of each were then sandwiched between a second wooden substrate with mending plate.
3. Initial moisture content of the GCL was 15.04%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. GCL specimen was consolidated under drained condition for 48 hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 inch/min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2 " DISPLACEMENT SECANT ANGLE (degrees)
5	720	111.6	1243	60	722	45
20	2880	109.62	3264	49	1883	33
45	6480	80.18	3994	32	2234	19

	PEAK STRENGTH	2 " DISPLACEMENT STRENGTH
COHESION (psf):	1323	788
COEFFICIENT OF FRICTION:	0.45	0.25
FRICTION ANGLE(degrees):	24.2	13.8

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure [illegible]

Partial pull o[illegible]ads was observed at all normal loads.

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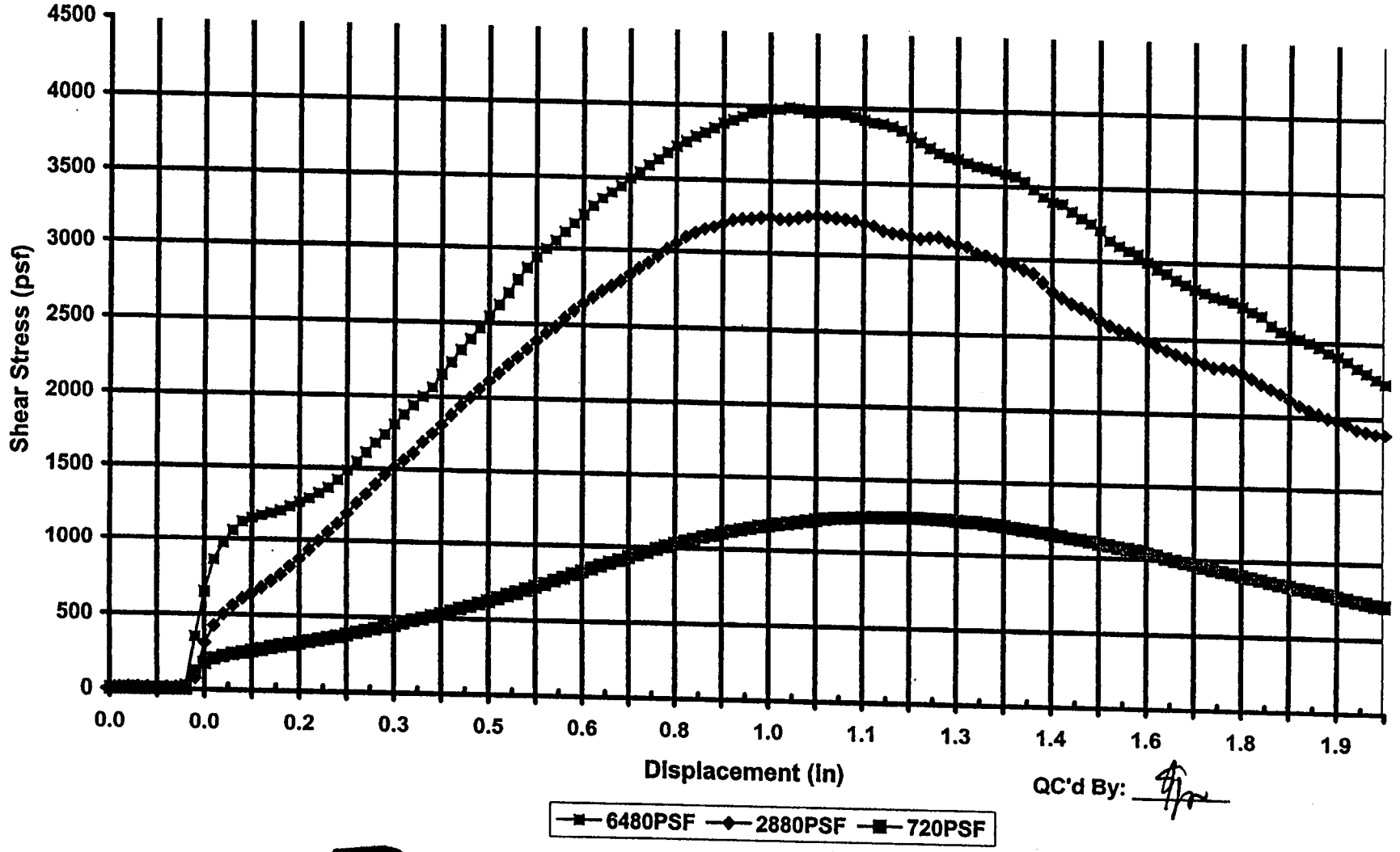
ISO 9002

Precision Geosynthetic Laboratories

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. G020007_7
INTERNAL SHEAR GCL, BENTOMAT ST R#588 L#200202LO, C#74013



QC'd By: _____

Precision Geosynthetic Laboratories

ISO 9002

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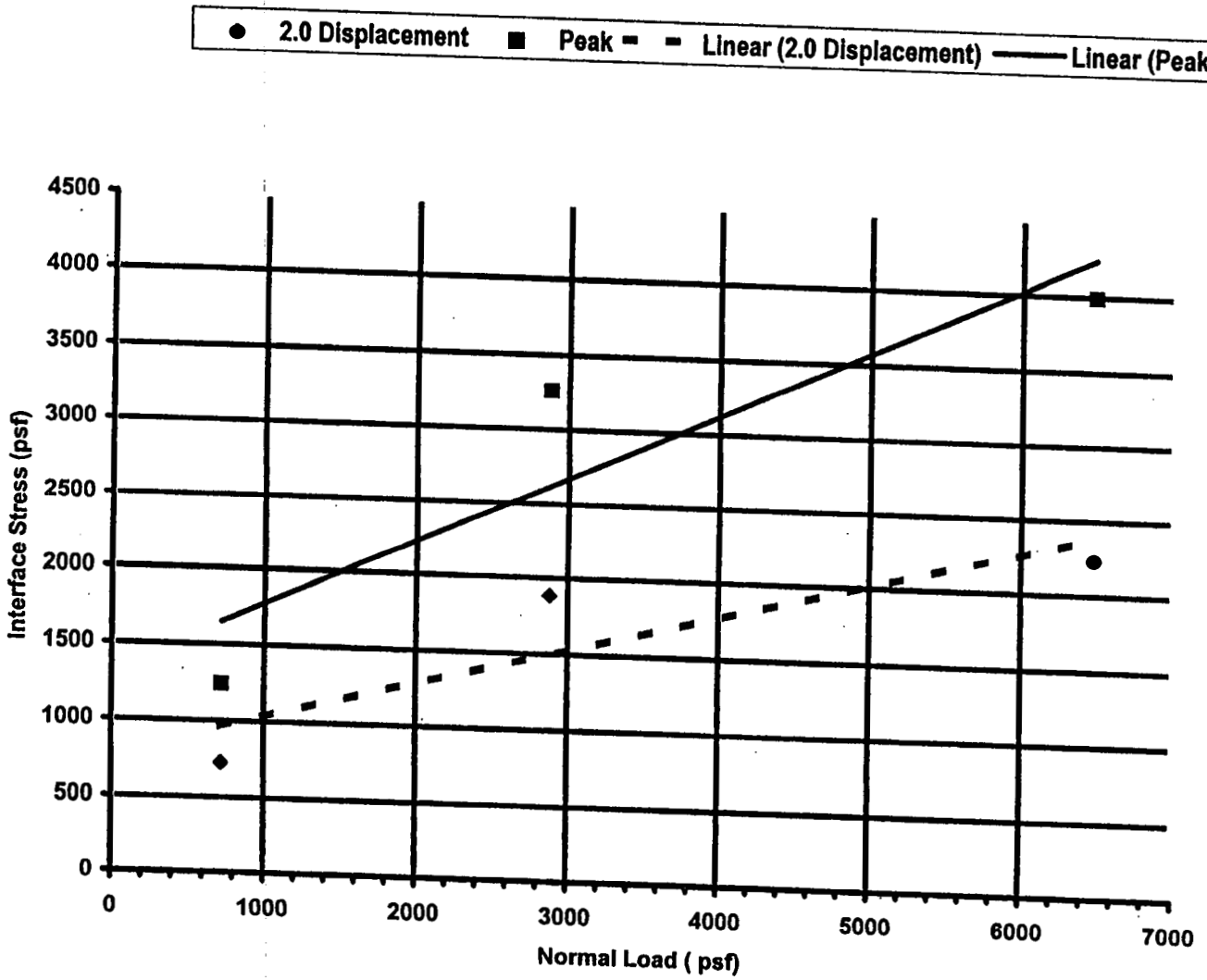
Figure #2
Normal Stress/ Interface Stress
PGL Job No. G020007_7
Internal Shear BENTOMAT ST R#588 L#200202LO, C#74013



QC'd By:

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TABLE 8A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
Feb. 25, 2002

TEST CONFIGURATION # 8A

TOP BOX

GCL Bentomat ST R#543 L#200203LO (Woven Side) / C#74012

Textured HDPE R#103114299 / C#74126

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 14.95%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT STRENGTH 2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	116.69	420	30	310	23
20.00	2880	97.06	1190	22	962	18
45.00	6480	95.7	2306	20	1434	12

COHESION (psf):	211.1	268.29
COEFFICIENT OF FRICTION:	0.33	0.19
FRICTION ANGLE(degrees):	18.0	10.7

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

Precision Geosynthetic Laboratories

ISO 9002

TABLE 8A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
Feb. 25, 2002

TEST CONFIGURATION # 8A

TOP BOX

GCL Bentomat ST R#543 L#200203LO (Woven Side) / C#74012

Textured HDPE R#103114299 / C#74126

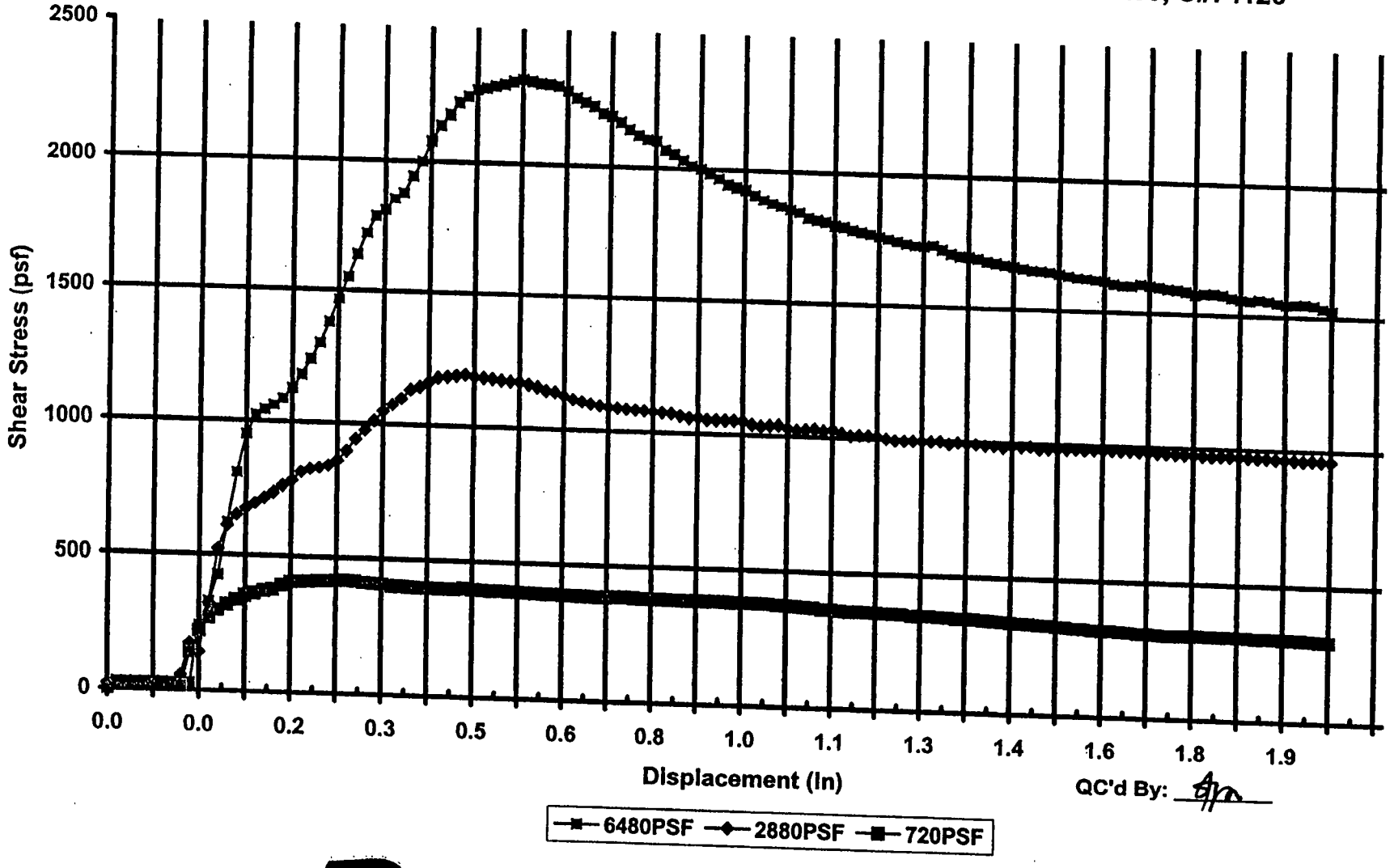
BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCl stretched for about 0.75 - 1".

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_8A
GCL Bentomat ST R#543 L#200203LO, C#74012 / Textured HDPE R#103114299, C#74126



QC'd By: _____

Precision Geosynthetic Laboratories

ISO 9002

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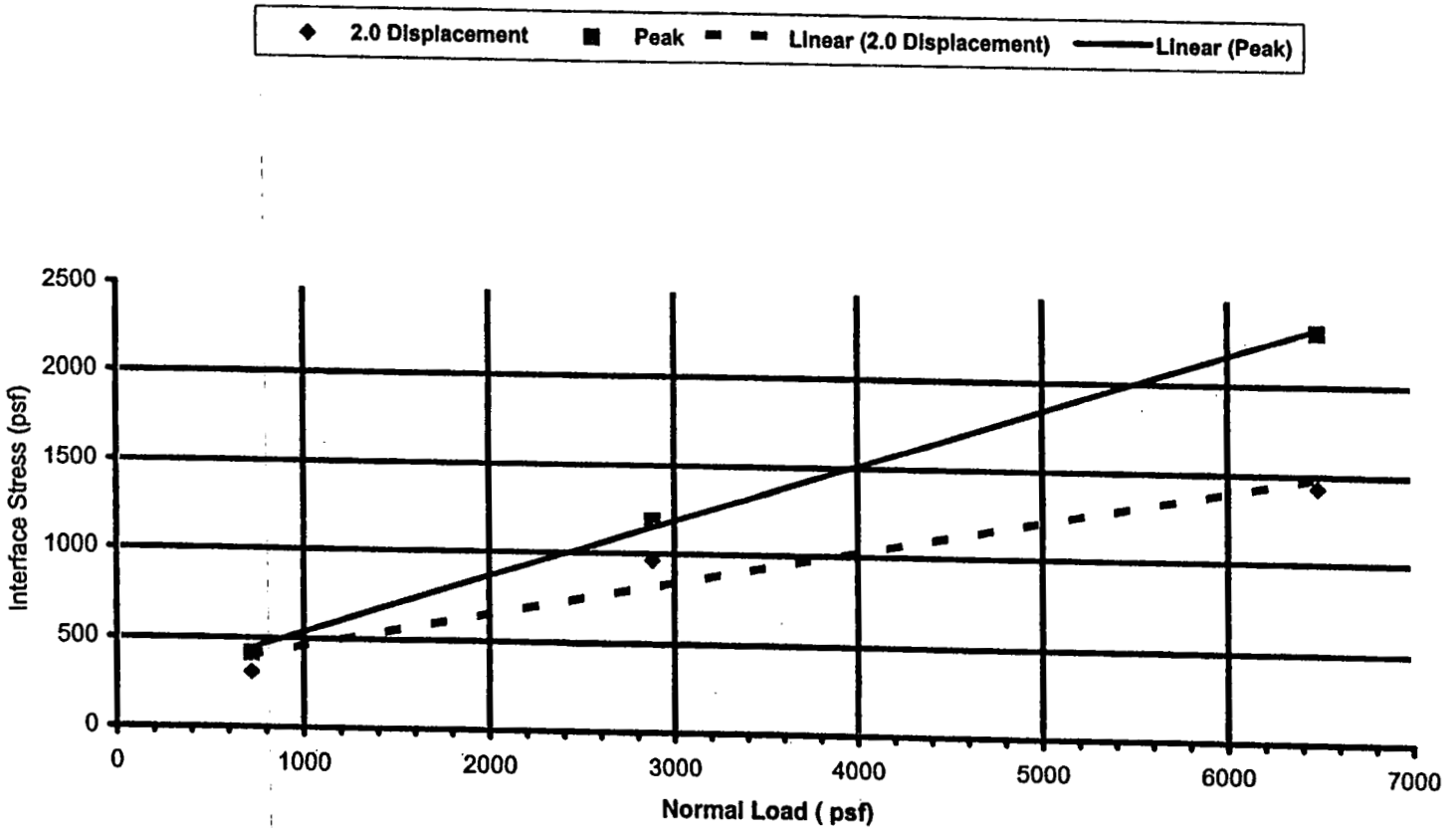
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_8A
GCL Bentomat ST R#543 L#200203LO, C#74012 / Textured HDPE R#103114299, C#74126



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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TABLE 8
CLIENT: CETCO
PROJECT: FLOUR DANIEL FERNALD

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
(PGL Job No. **G020007**)

QC'd by: _____
4-Mar-02

TEST CONFIGURATION 8

TOP BOX

Internal Shear BENTOMAT ST R#543 L#200202LO, C#74012

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 20" x 20".
2. The GCL specimens were constrained between two wooden boards with mending plates. The ends of each were then sandwiched between a second wooden substrate with mending plate.
3. Initial moisture content of the GCL was 13.87%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. GCL specimen was consolidated under drained condition for 48 hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ _ 0.004 inch/min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2 " DISPLACEMENT SECANT ANGLE (degrees)
5	720	104.9	1735	67	992	54
20	2880	86.9	2704	43	1429	26
45	6480	78.9	3972	32	1685	15

	PEAK STRENGTH	2 " DISPLACEMENT STRENGTH
COHESION (psf):	1511	981
COEFFICIENT OF FRICTION:	0.38	0.12
FRICTION ANGLE(degrees):	21.0	6.6

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure # [illegible]

Partial pull o[illegible]ads was observed at all normal loads.

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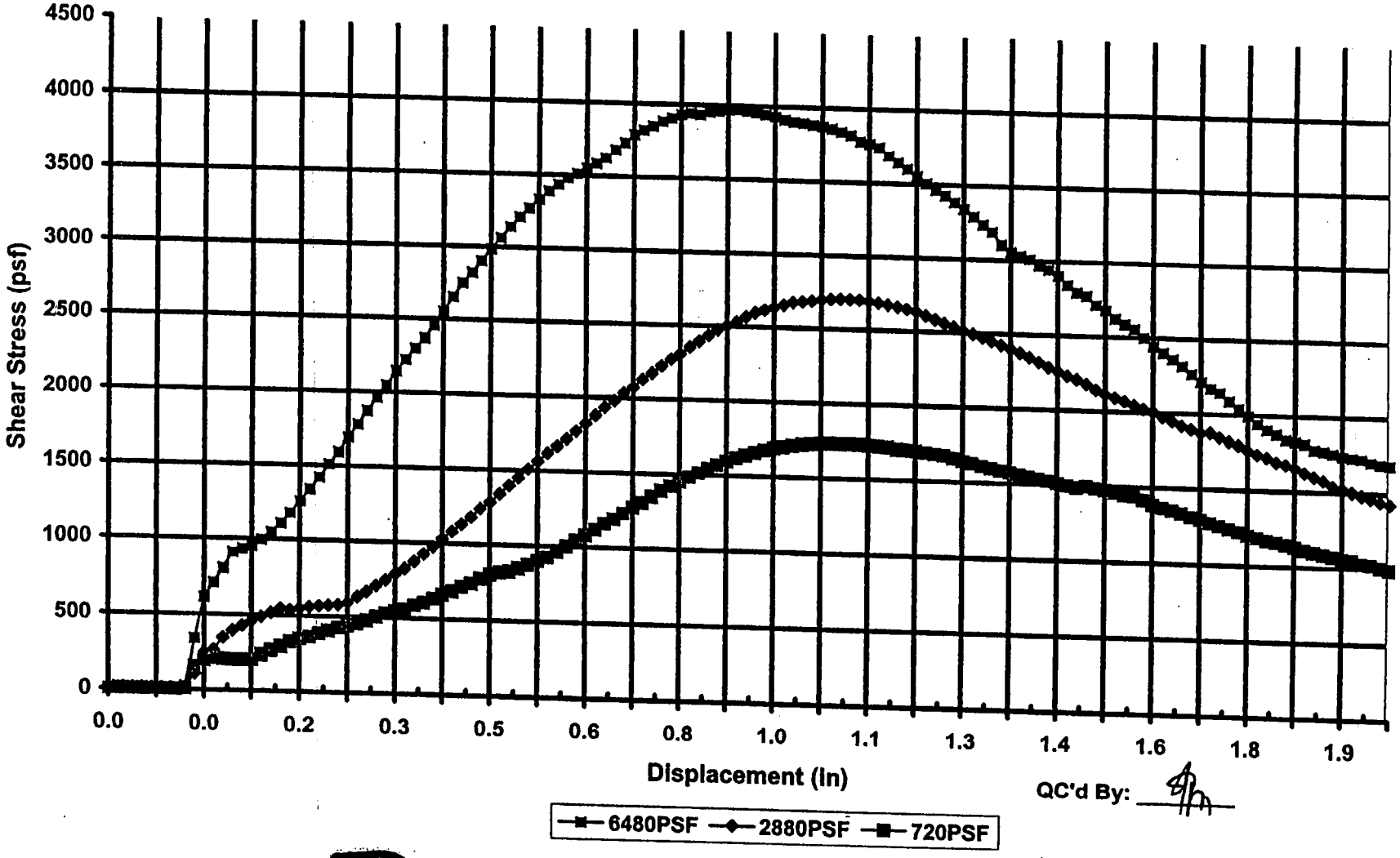
ISO 9002

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. G020007_8
INTERNAL SHEAR GCL, BENTOMAT ST R#543 L#200202LO, C#74012

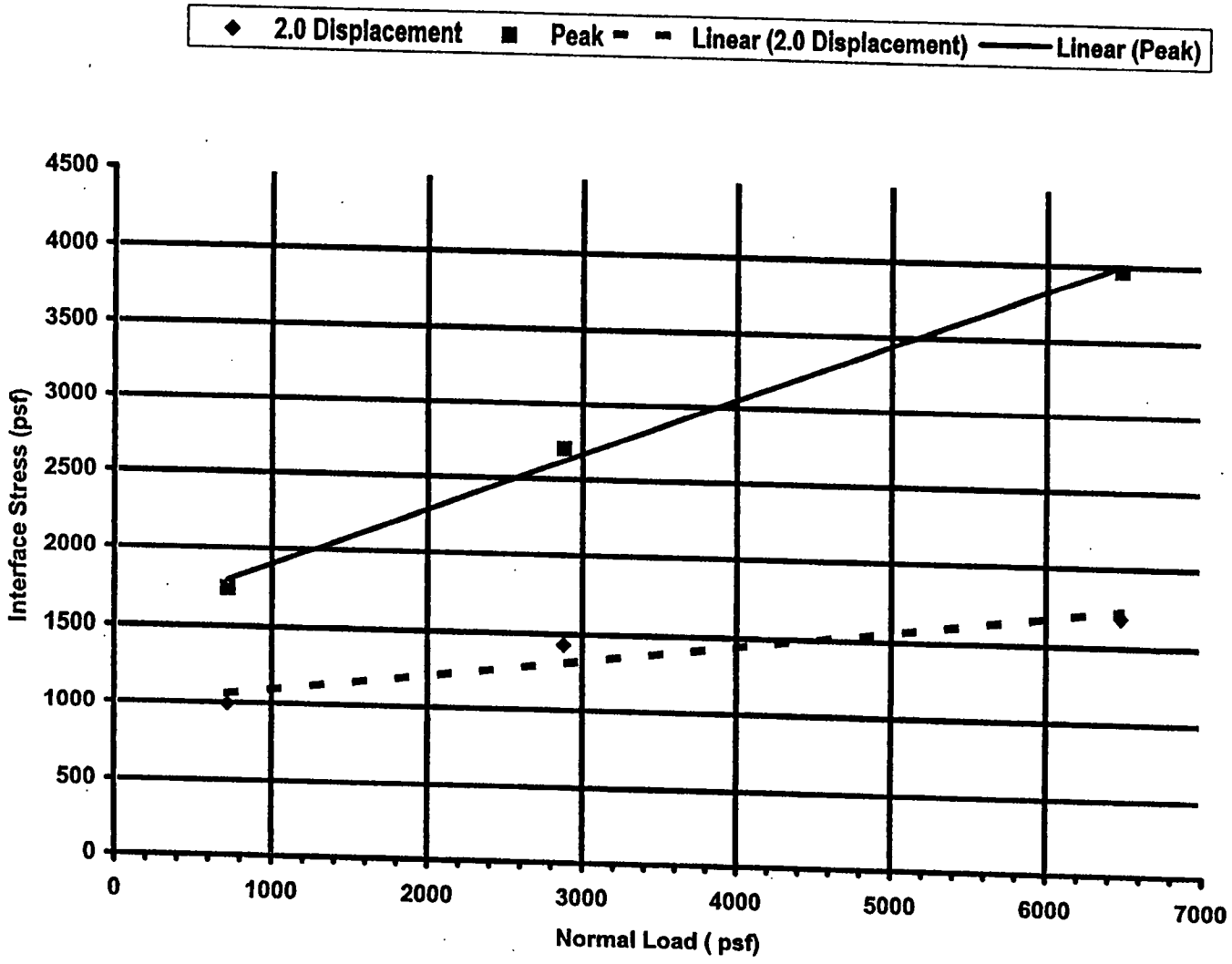


QC'd By: _____

Precision Geosynthetic Laboratories

ISO 9002

Figure #2
Normal Stress/ Interface Stress
PGL Job No. G020007_8
Internal Shear BENTOMAT ST R#543 L#200202LO, C#74012



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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TABLE 9
CLIENT: CETCO
PROJECT: FLOUR DANIEL FERNALD

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
(PGL Job No. **G020007**)

QC'd by: _____
6-Mar-02

TEST CONFIGURATION 9

TOP BOX

Internal Shear BENTOMAT ST R#492 L#200202LO, C#73998

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 20" x 20".
2. The GCL specimens were constrained between two wooden boards with mending plates. The ends of each were then sandwiched between a second wooden substrate with mending plate.
3. Initial moisture content of the GCL was 16.07%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. GCL specimen was consolidated under drained condition for 48 hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ _ 0.004 inch/min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2 " DISPLACEMENT SECANT ANGLE (degrees)
5	720	106.4	2007	70	1020	55
20	2880	97.9	2208	37	1016	19
45	6480	79.9	4280	33	2127	18

	PEAK STRENGTH	2 " DISPLACEMENT STRENGTH
COHESION (psf):	1444	702
COEFFICIENT OF FRICTION:	0.41	0.20
FRICTION ANGLE(degrees):	22.4	11.5

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

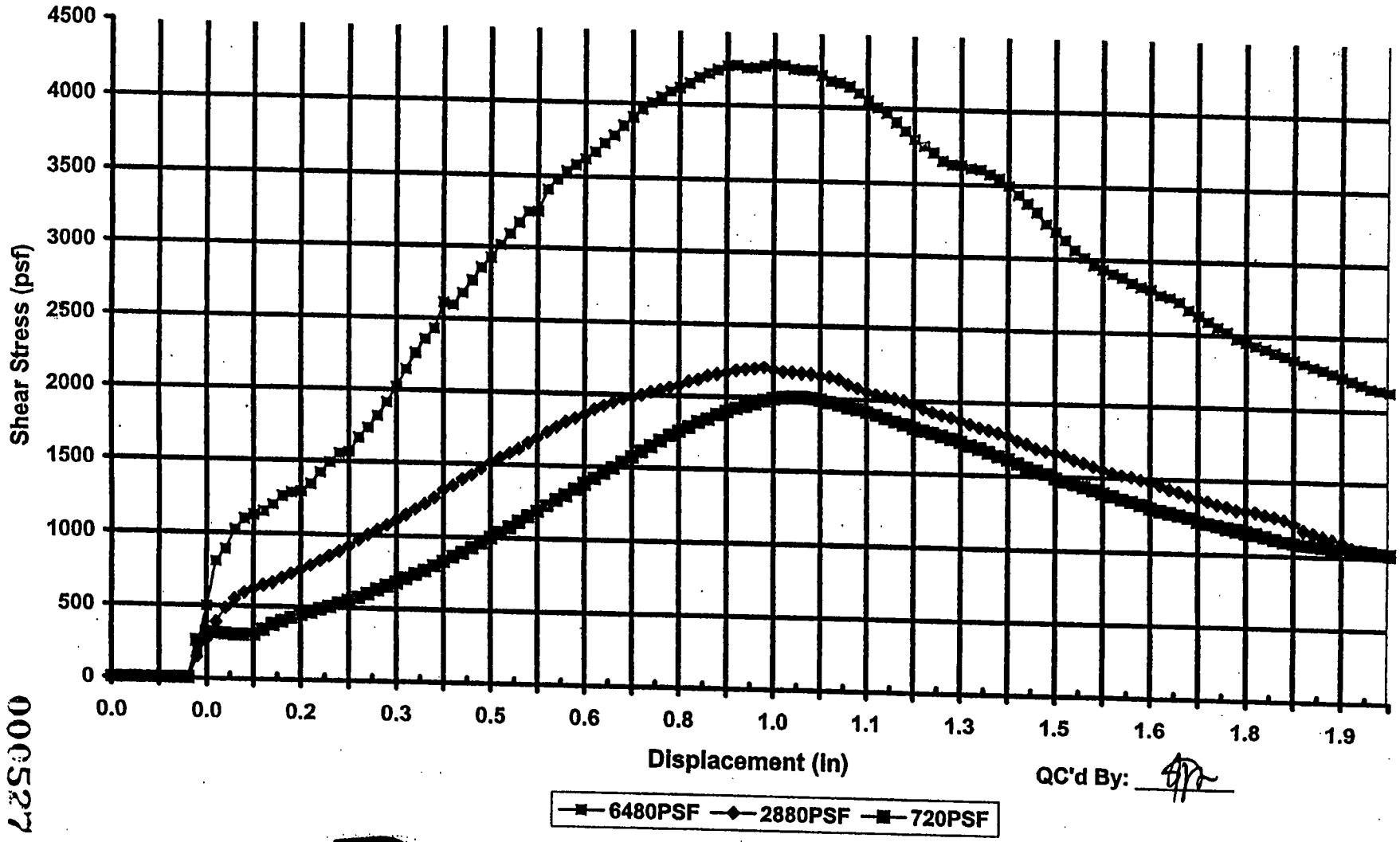
See Figure [illegible]

Partial pull o[illegible]ads was observed at all normal loads.

ISO 9002

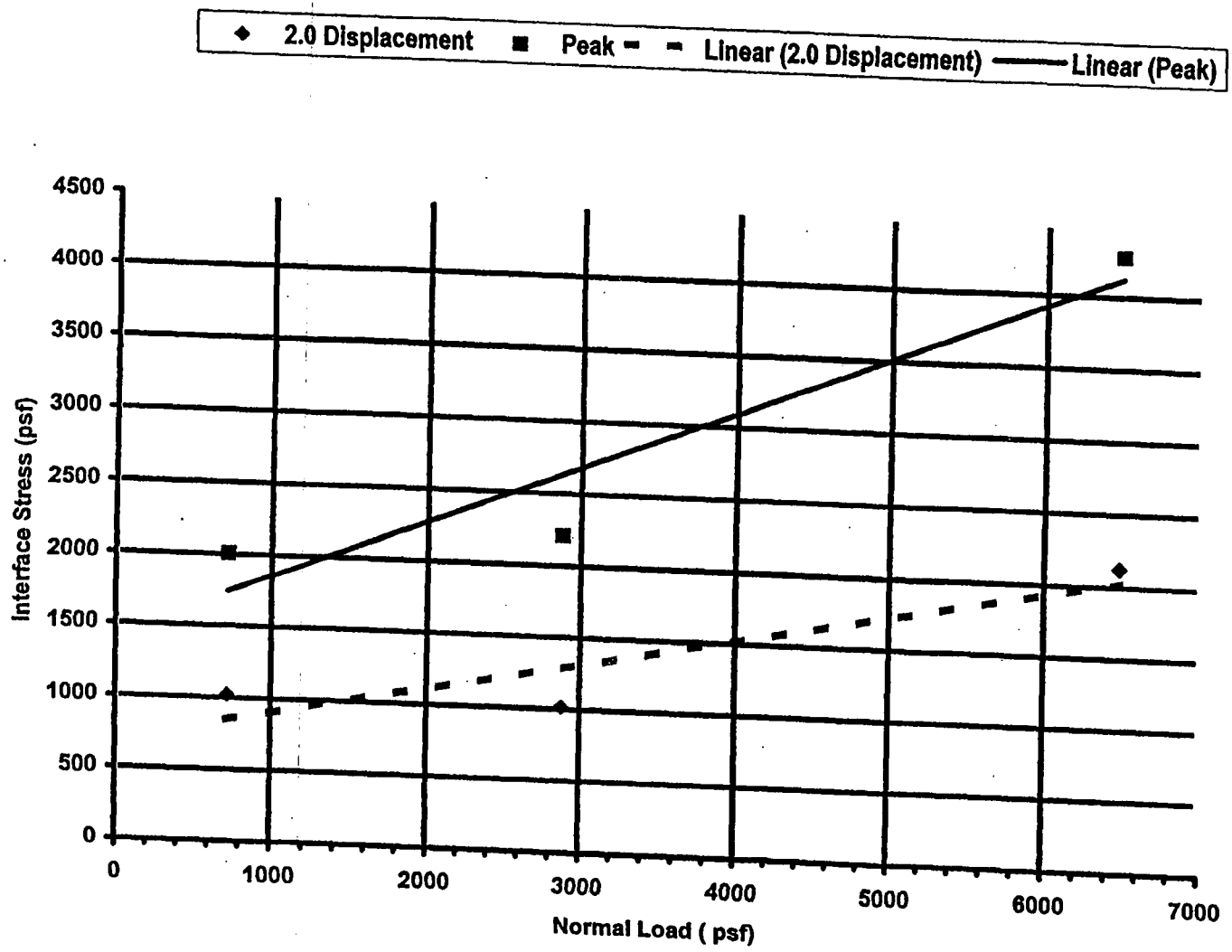
Precision Geosynthetic Laboratories

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. G020007_9
INTERNAL SHEAR GCL, BENTOMAT ST R#492 L#200202LO, C#73998



QC'd By: _____

Figure #2
Normal Stress/ Interface Stress
PGL Job No. G020007_9
Internal Shear BENTOMAT ST R#492 L#200202LO, C#73998



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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4941

TABLE 10
CLIENT: CETCO
PROJECT: FLOUR DANIEL FERNALD

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
(PGL Job No. G020007)

QC'd by: _____ 11-Mar-02

TEST CONFIGURATION 10

TOP BOX

Internal Shear BENTOMAT ST R#442 L#200202LO, C#73997

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 20" x 20".
2. The GCL specimens were constrained between two wooden boards with mending plates. The ends of each were then sandwiched between a second wooden substrate with mending plate.
3. Initial moisture content of the GCL was 11.9%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. GCL specimen was consolidated under drained condition for 48 hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 inch/min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

			PEAK STRENGTH		2 " DISPLACEMENT STRENGTH	
Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	SHEAR STRESS (psf)	PEAK SECANT ANGLE (degrees)	SHEAR STRESS (psf)	2 " DISPLACEMENT SECANT ANGLE (degrees)
5	720	96.86	1228	60	690	44
20	2880	92.13	2239	38	1181	22
45	6480	80.69	3901	31	2785	23

COHESION (psf):	897.6	302
COEFFICIENT OF FRICTION:	0.46	0.37
FRICTION ANGLE(degrees):	24.9	20.4

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NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

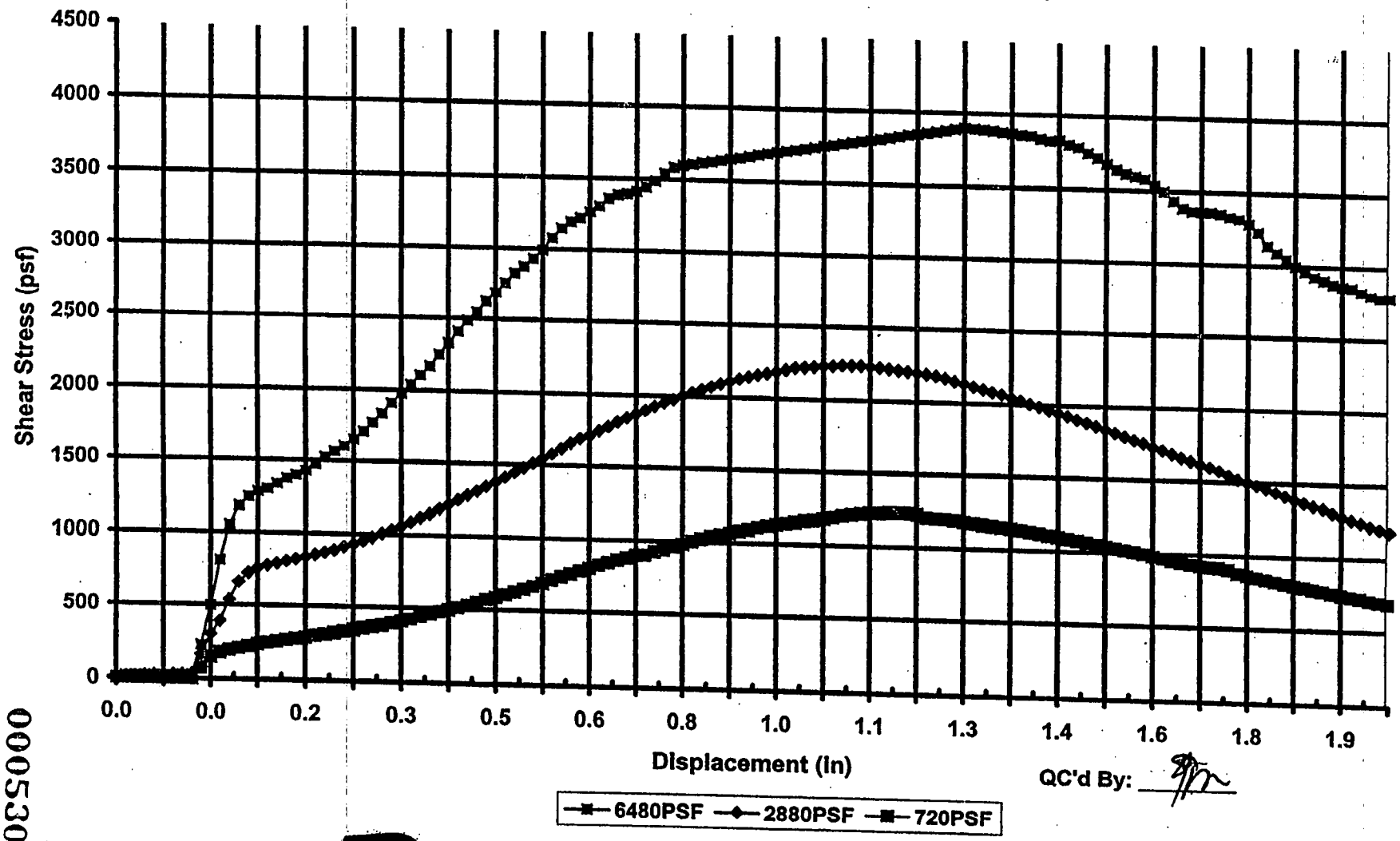
Partial pull [illegible] was observed at all normal loads.

See Figure #[illegible]

ISO 9002

Precision Geosynthetic Laboratories

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. G020007_10
INTERNAL SHEAR GCL, BENTOMAT ST R#442 L#200202LO, C#73997



QC'd By: _____

Precision Geosynthetic Laboratories

ISO 9002

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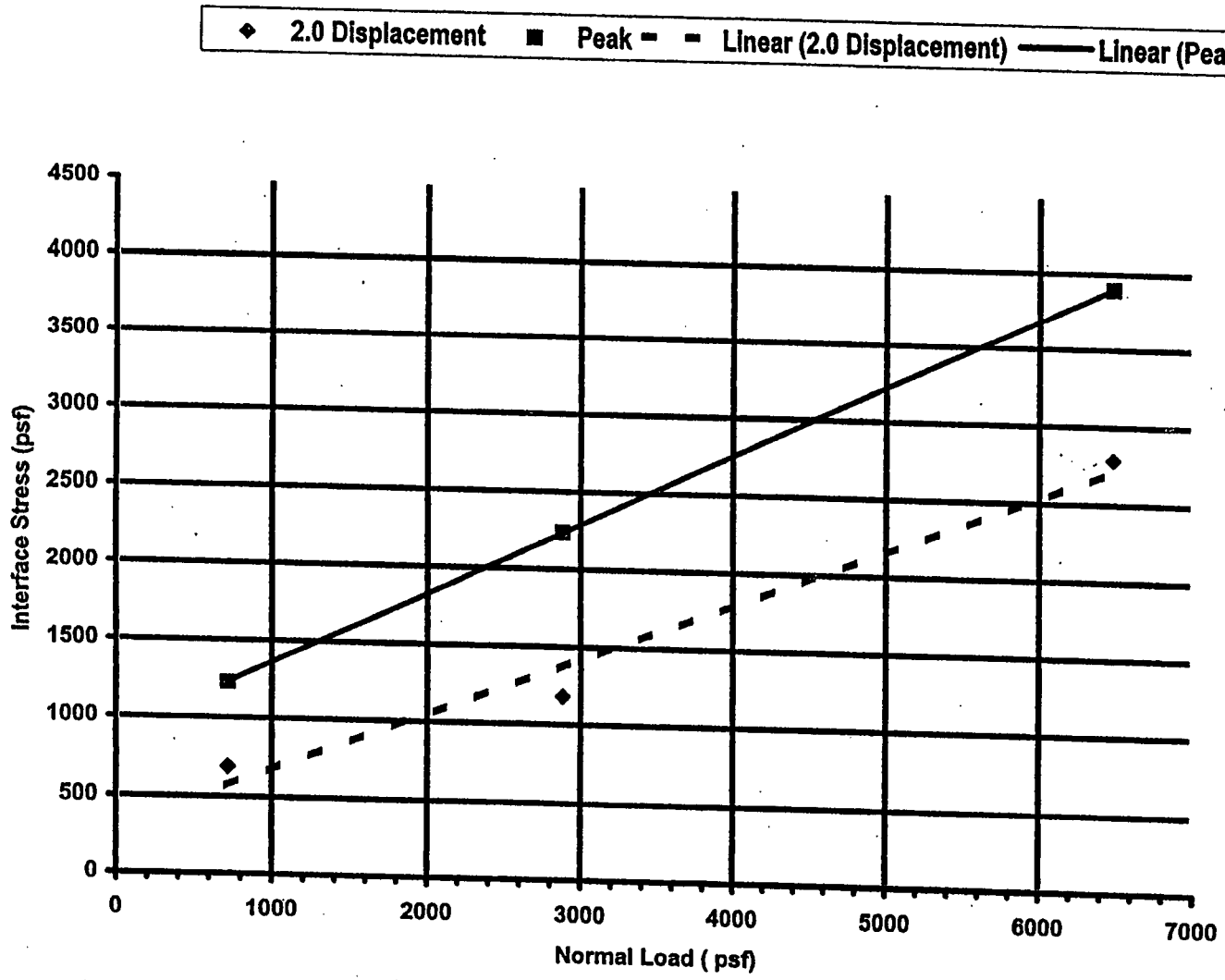
Figure #2
Normal Stress/ Interface Stress
PGL Job No. G020007_10
Internal Shear BENTOMAT ST R#442 L#200202LO, C#73997



QC'd By: _____

Precision Geosynthetic Laboratories

ISO 9002

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TABLE 11
CLIENT: CETCO
PROJECT: FLOUR DANIEL FERNALD

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
(PGL Job No. **G020007**)

QC'd by: 12-Mar-02

TEST CONFIGURATION 11

TOP BOX

Internal Shear BENTOMAT ST R#397 L#200202LO, C#73992

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 20" x 20".
2. The GCL specimens were constrained between two wooden boards with mending plates. The ends of each were then sandwiched between a second wooden substrate with mending plate.
3. Initial moisture content of the GCL was 13.8%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. GCL specimen was consolidated under drained condition for 48 hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 inch/min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2 " DISPLACEMENT STRENGTH 2 " DISPLACEMENT SECANT ANGLE (degrees)
5	720	122.7	2067	71	1407	63
20	2880	111.67	2524	41	1719	31
45	6480	78.07	3718	30	2490	21

	PEAK STRENGTH	2 " DISPLACEMENT STRENGTH
COHESION (psf):	1791	1231
COEFFICIENT OF FRICTION:	0.29	0.19
FRICTION ANGLE(degrees):	16.2	10.8

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

Partial pull out [illegible] was observed at all normal loads.

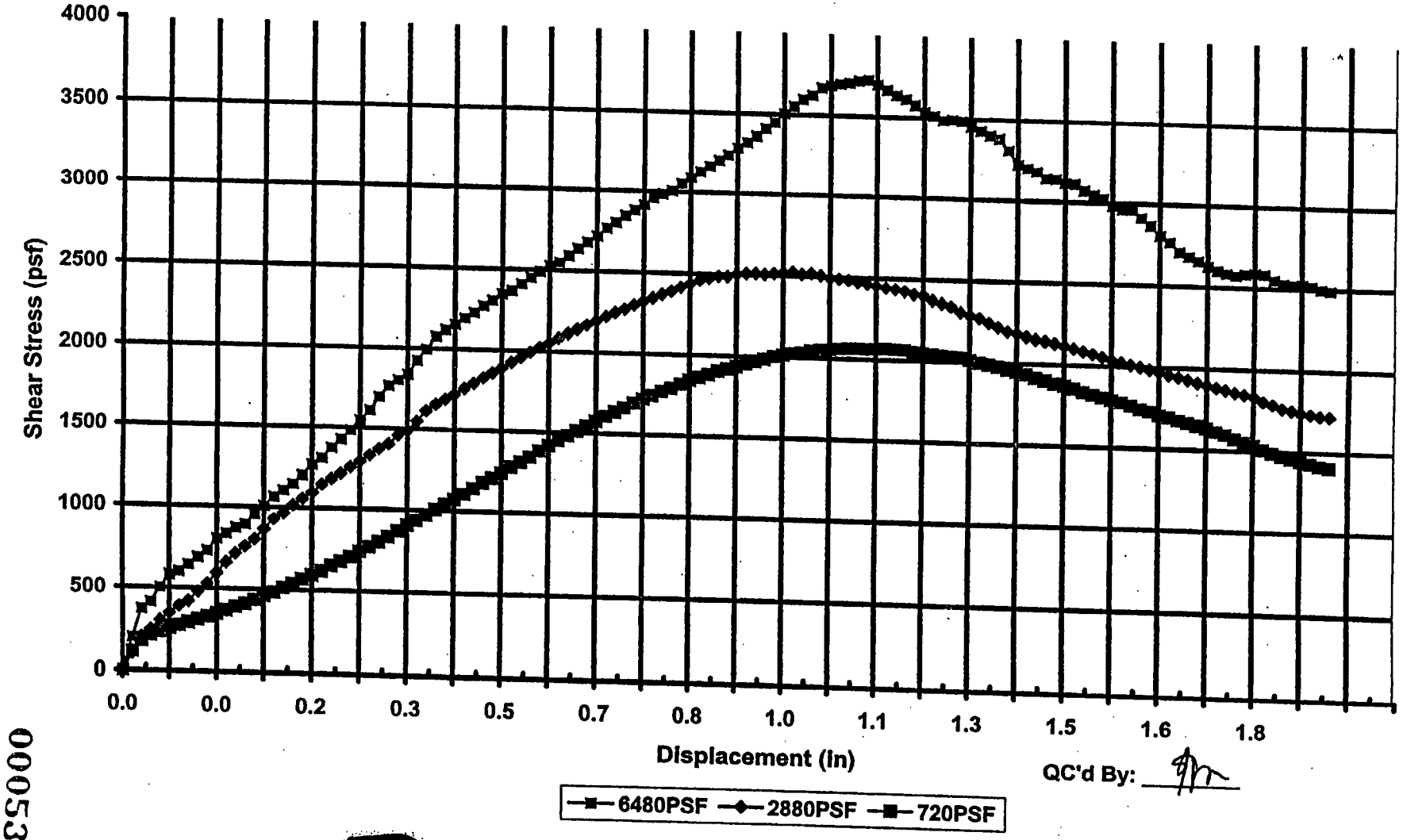
See Figure [illegible]

000532

ISO 9002

Precision Geosynthetic Laboratories

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. G020007_11
INTERNAL SHEAR GCL, BENTOMAT ST R#397 L#200202LO, C#73992



QC'd By: _____

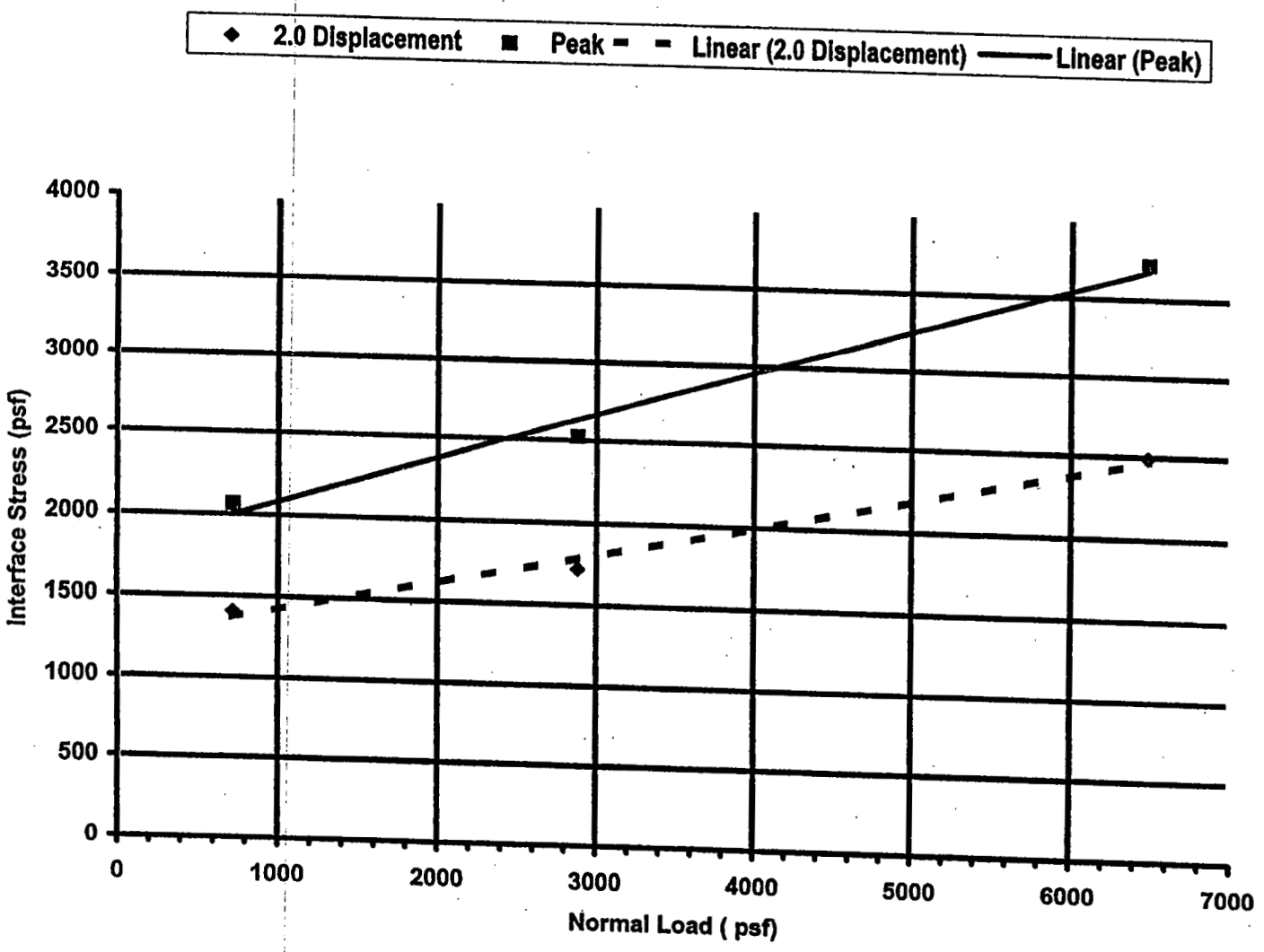
Precision Geosynthetic Laboratories

ISO 9002

000533

4941

Figure #2
Normal Stress/ Interface Stress
PGL Job No. G020007_11
Internal Shear BENTOMAT ST R#397 L#200202LO, C#73992



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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TABLE 12
CLIENT: CETCO
PROJECT: FLOUR DANIEL FERNALD

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
(PGL Job No. **G020007**)

QC'd by: _____
15-Mar-02

TEST CONFIGURATION 12

TOP BOX

Internal Shear BENTOMAT ST R#347 L#200202LO, C#73991

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 20" x 20".
2. The GCL specimens were constrained between two wooden boards with mending plates. The ends of each were then sandwiched between a second wooden substrate with mending plate.
3. Initial moisture content of the GCL was 14.67%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. GCL specimen was consolidated under drained condition for 48 hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ _ 0.004 inch/min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2 " DISPLACEMENT SECANT ANGLE (degrees)
5	720	102.42	1786	68	1290	61
20	2880	101.6	2725	43	1868	33
45	6480	84.7	3353	27	1903	16

	PEAK STRENGTH	2 " DISPLACEMENT STRENGTH
COHESION (psf):	1741	1363
COEFFICIENT OF FRICTION:	0.26	0.10
FRICTION ANGLE(degrees):	14.7	5.5

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure [illegible]

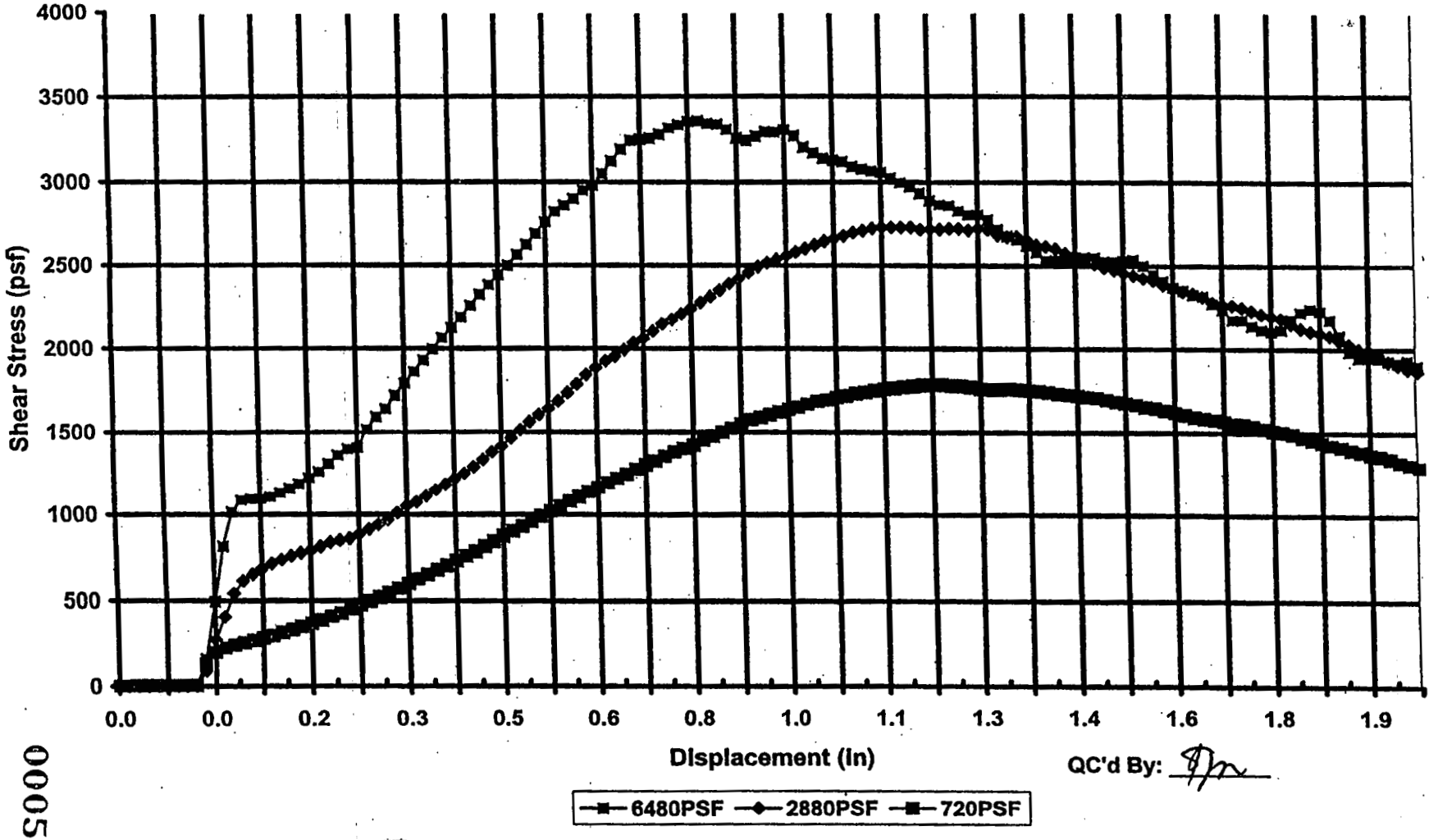
Partial pull o[illegible]ds was observed at all normal loads.

000535

ISO 9002

Precision Geosynthetic Laboratories

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. G020007_12
INTERNAL SHEAR GCL, BENTOMAT ST R#347 L#200202LO, C#73991



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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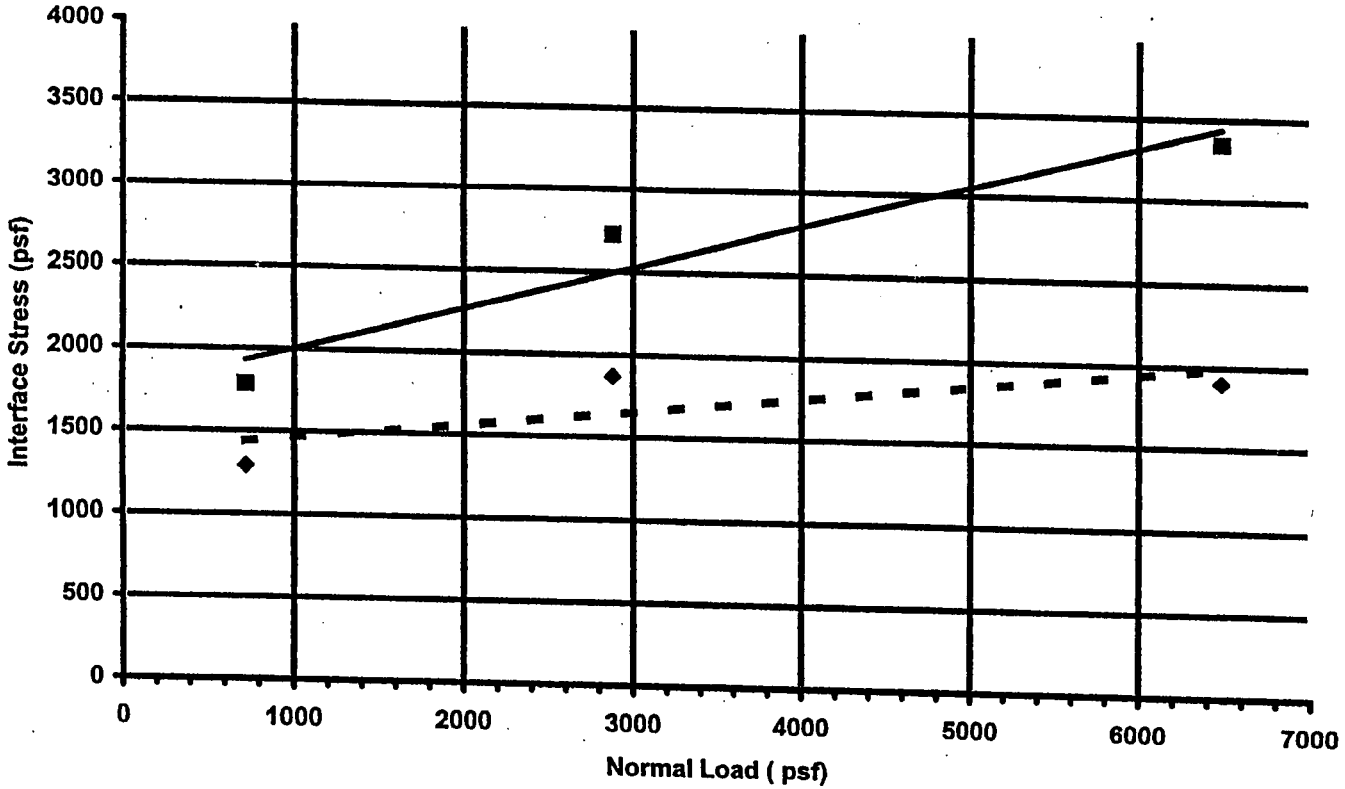
Figure #2
Normal Stress/ Interface Stress
PGL Job No. G020007_12
Internal Shear BENTOMAT ST R#347 L#200202LO, C#73991



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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TABLE 13
CLIENT: CETCO
PROJECT: FLOUR DANIEL FERNALD

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
(PGL Job No. G020007)

QC'd by: _____ 18-Mar-02

TEST CONFIGURATION 13

TOP BOX

Internal Shear BENTOMAT ST R#302 L#200202LO, C#73990

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 20" x 20".
2. The GCL specimens were constrained between two wooden boards with mending plates. The ends of each were then sandwiched between a second wooden substrate with mending plate.
3. Initial moisture content of the GCL was 16.9%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. GCL specimen was consolidated under drained condition for 48 hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 inch/min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2" DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2" DISPLACEMENT STRENGTH 2" DISPLACEMENT SECANT ANGLE (degrees)
5	720	102.9	1655	66	1220	59
20	2880	93.76	2518	41	1685	30
45	6480	83.4	3894	31	2158	18

COHESION (psf):	1385	1151
COEFFICIENT OF FRICTION:	0.39	0.16
FRICTION ANGLE(degrees):	21.2	9.1

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

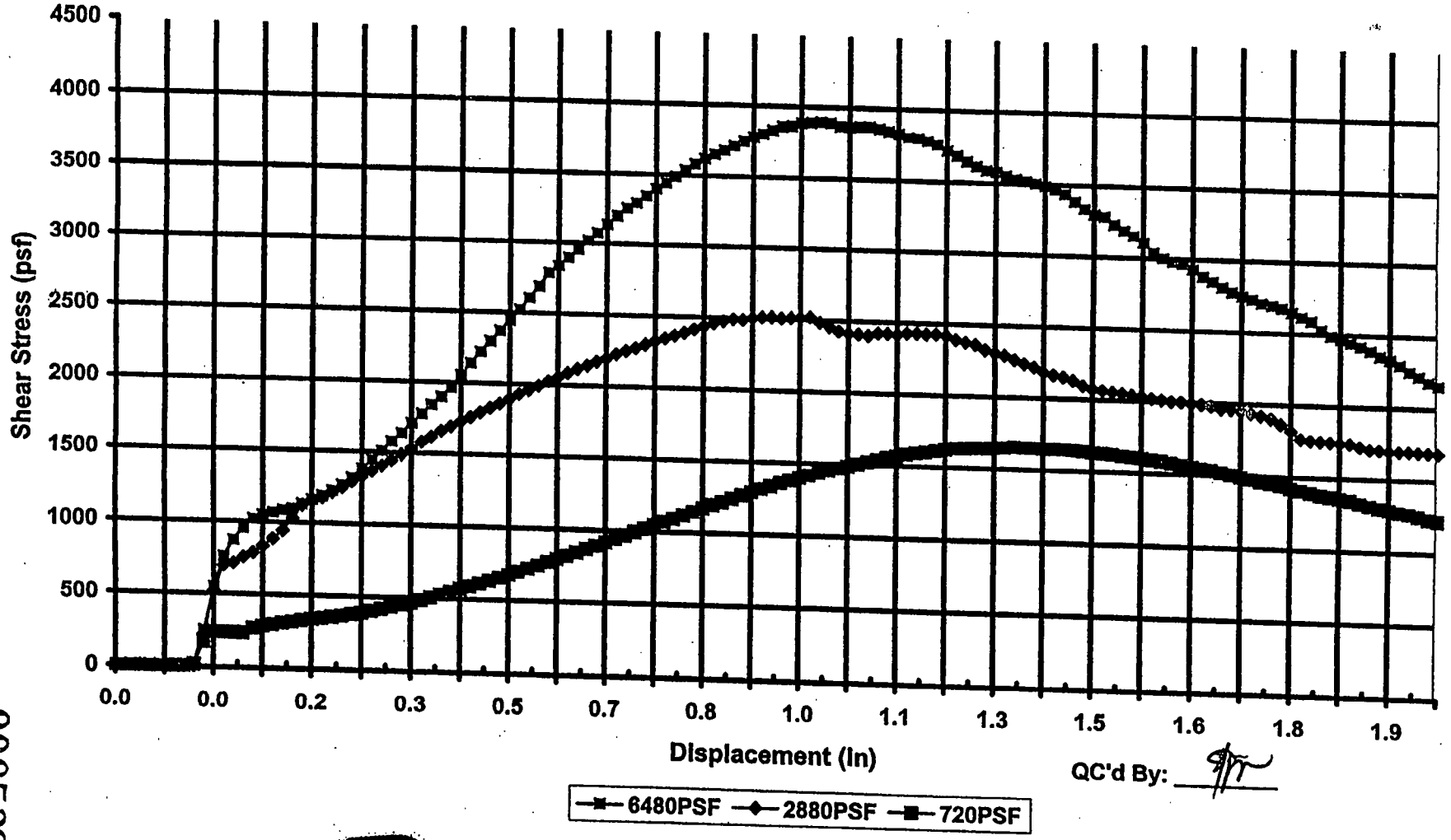
Partial pull out of threads was observed at all normal loads.

See Figure [illegible]

ISO 9002

Precision Geosynthetic Laboratories

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. G020007_13
INTERNAL SHEAR GCL, BENTOMAT ST R#302 L#200202LO, C#73990



QC'd By: _____

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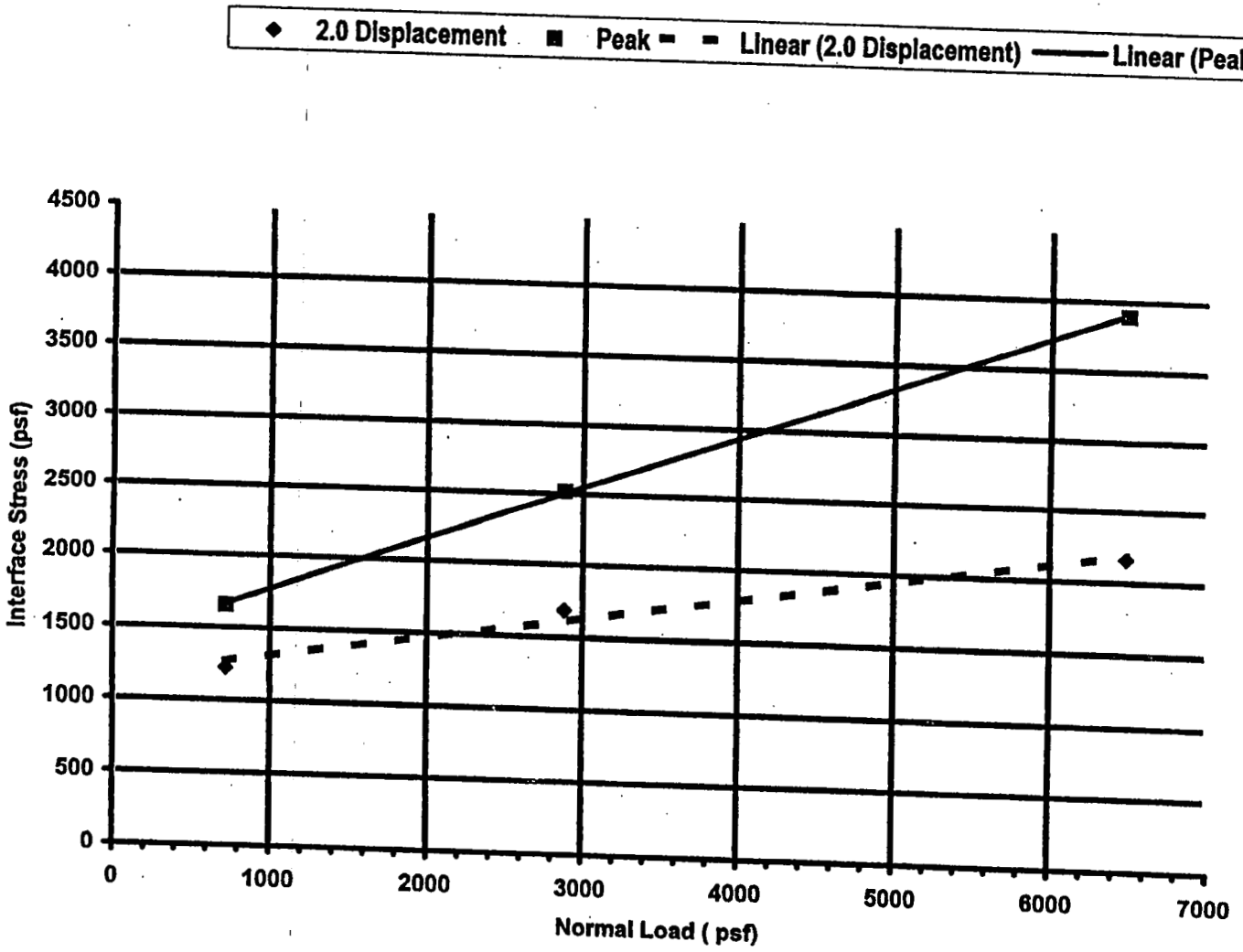
Figure #2
Normal Stress/ Interface Stress
PGL Job No. G020007_13
Internal Shear BENTOMAT ST R#302 L#200202LO, C#73990



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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TABLE 14
CLIENT: CETCO
PROJECT: FLOUR DANIEL FERNALD

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
(PGL Job No. **G020007**)

QC'd by: _____
21-Mar-02

TEST CONFIGURATION 14

TOP BOX

Internal Shear BENTOMAT ST R#252 L#200202LO, C#73974

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 20" x 20".
2. The GCL specimens were constrained between two wooden boards with mending plates. The ends of each were then sandwiched between a second wooden substrate with mending plate.
3. Initial moisture content of the GCL was 16.4%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. GCL specimen was consolidated under drained condition for 48 hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 inch/min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2 " DISPLACEMENT SECANT ANGLE (degrees)
5	720	106.7	1345	62	820	49
20	2880	93.2	2464	41	1390	26
45	6480	86.7	3828	31	2020	17

	PEAK STRENGTH	2 " DISPLACEMENT STRENGTH
COHESION (psf):	1115	721
COEFFICIENT OF FRICTION:	0.43	0.20
FRICTION ANGLE(degrees):	23.1	11.6

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

Partial pull [illegible] was observed at normal loads.

000541

ISO 9002

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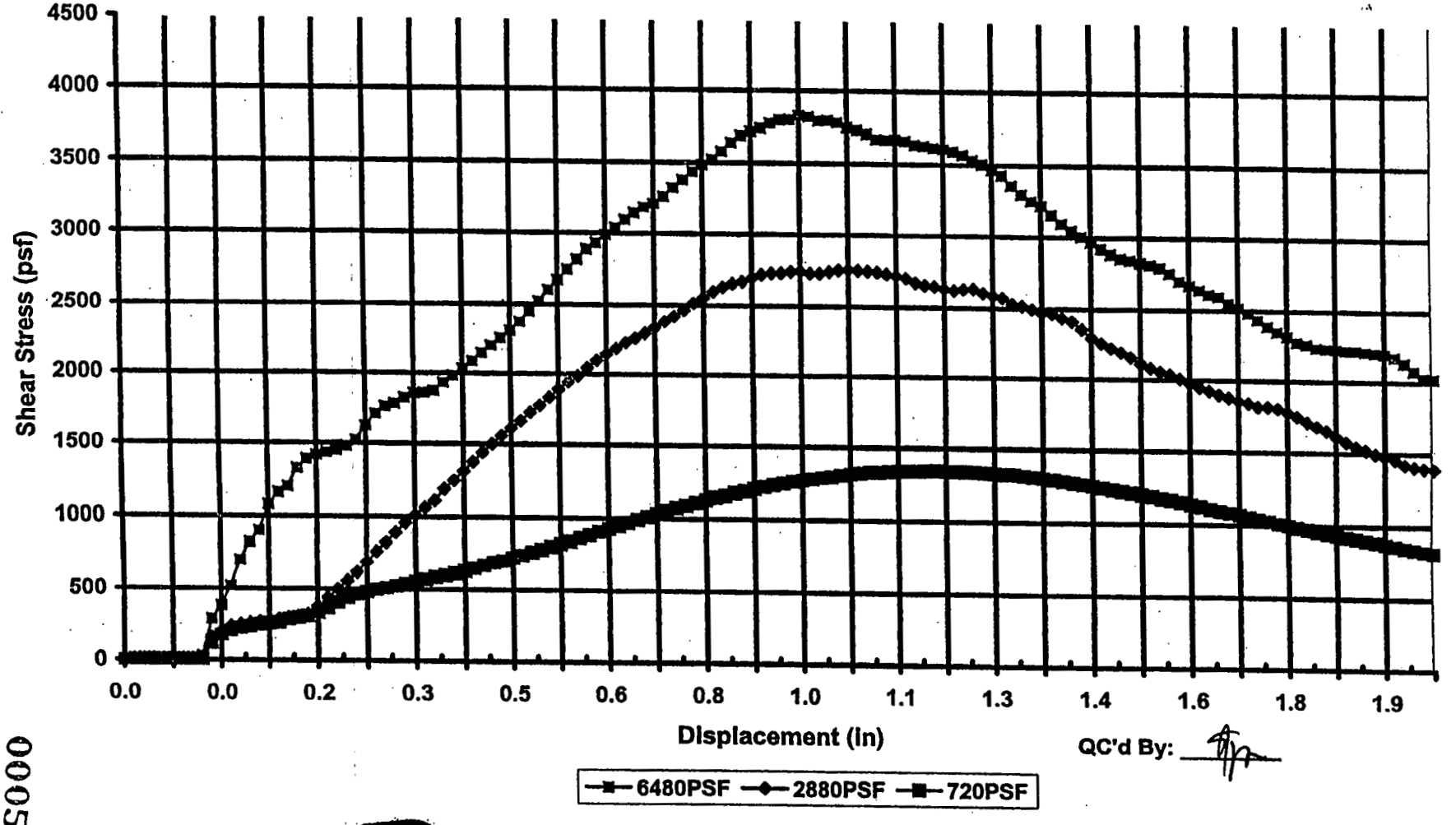
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. G020007_14
INTERNAL SHEAR GCL, BENTOMAT ST R#252 L#200202LO, C#73974



QC'd By: _____

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ISO 9002

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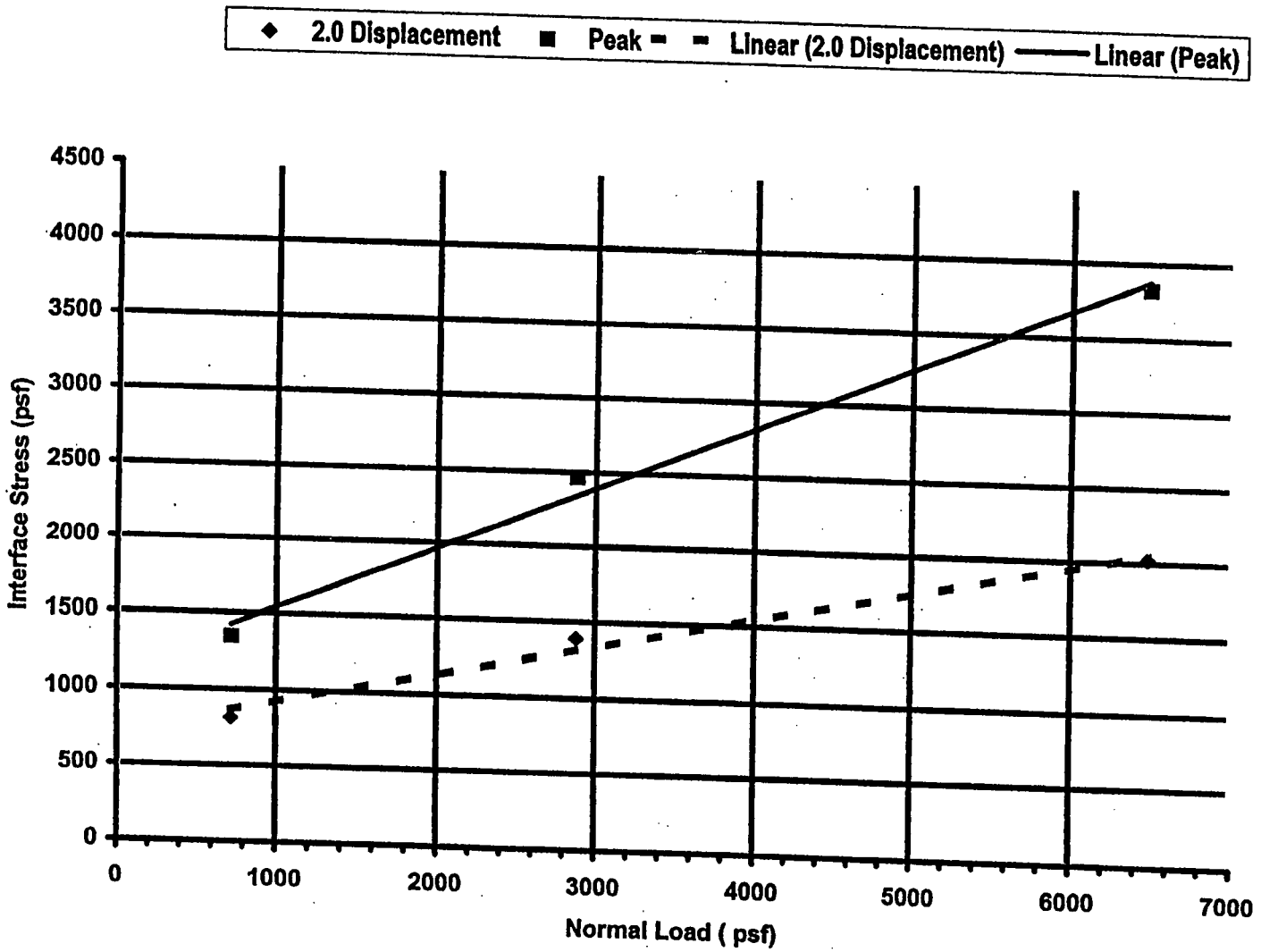
Figure #2
Normal Stress/ Interface Stress
PGL Job No. G020007_14
Internal Shear BENTOMAT ST R#252 L#200202LO, C#73974



QC'd By: [illegible]

Precision Geosynthetic Laboratories

ISO 9002

TABLE 15A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
21-Mar-02

TEST CONFIGURATION # 15A

TOP BOX

GCL Bentomat ST R#210 L#200203LO (Woven Side) / C#73973

Textured HDPE R#103114239 / C#74105

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 15.13%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	118.9	548	37	450	32
20.00	2880	96.9	1359	25	897	17
45.00	6480	84.9	2406	20	1384	12

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	365	375
COEFFICIENT OF FRICTION:	0.32	0.16
FRICTION ANGLE(degrees):	17.7	9.1

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

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ISO 9002

Precision Geosynthetic Laboratories

TABLE 15A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
21-Mar-02

TEST CONFIGURATION # 15A

TOP BOX

GCL Bentomat ST R#210 L#200203LO (Woven Side) / C#73973

Textured HDPE R#103114239 / C#74105

BOTTOM BOX

OBSERVATIONS:

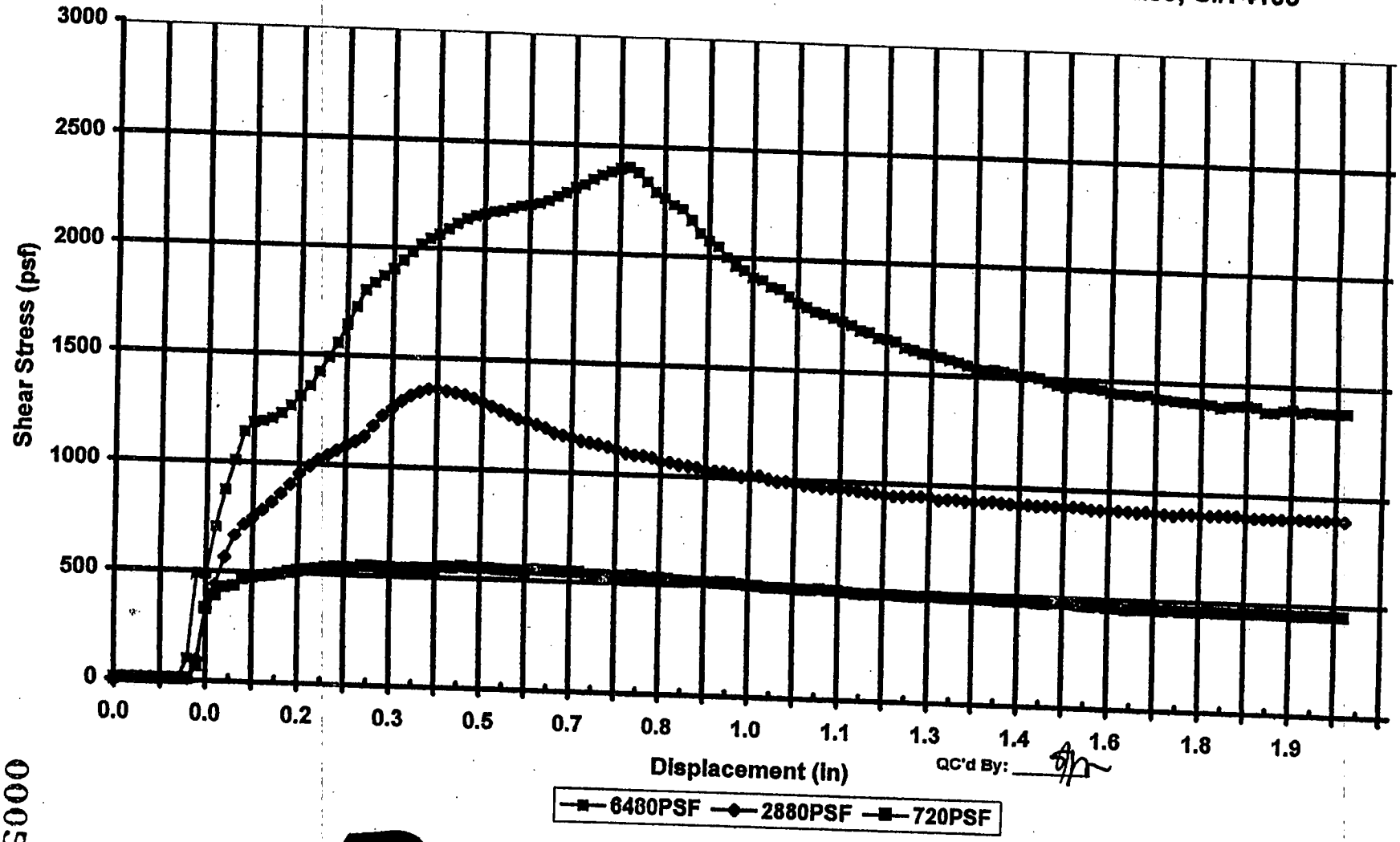
See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCl stretched for about 0.5 - 0.75".

Precision Geosynthetic Laboratories

ISO 9002

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_15A
GCL Bentomat ST R#210 L#200203LO, C#73973 / Textured HDPE R#103114239, C#74105



QC'd By: _____

Precision Geosynthetic Laboratories

ISO 9002

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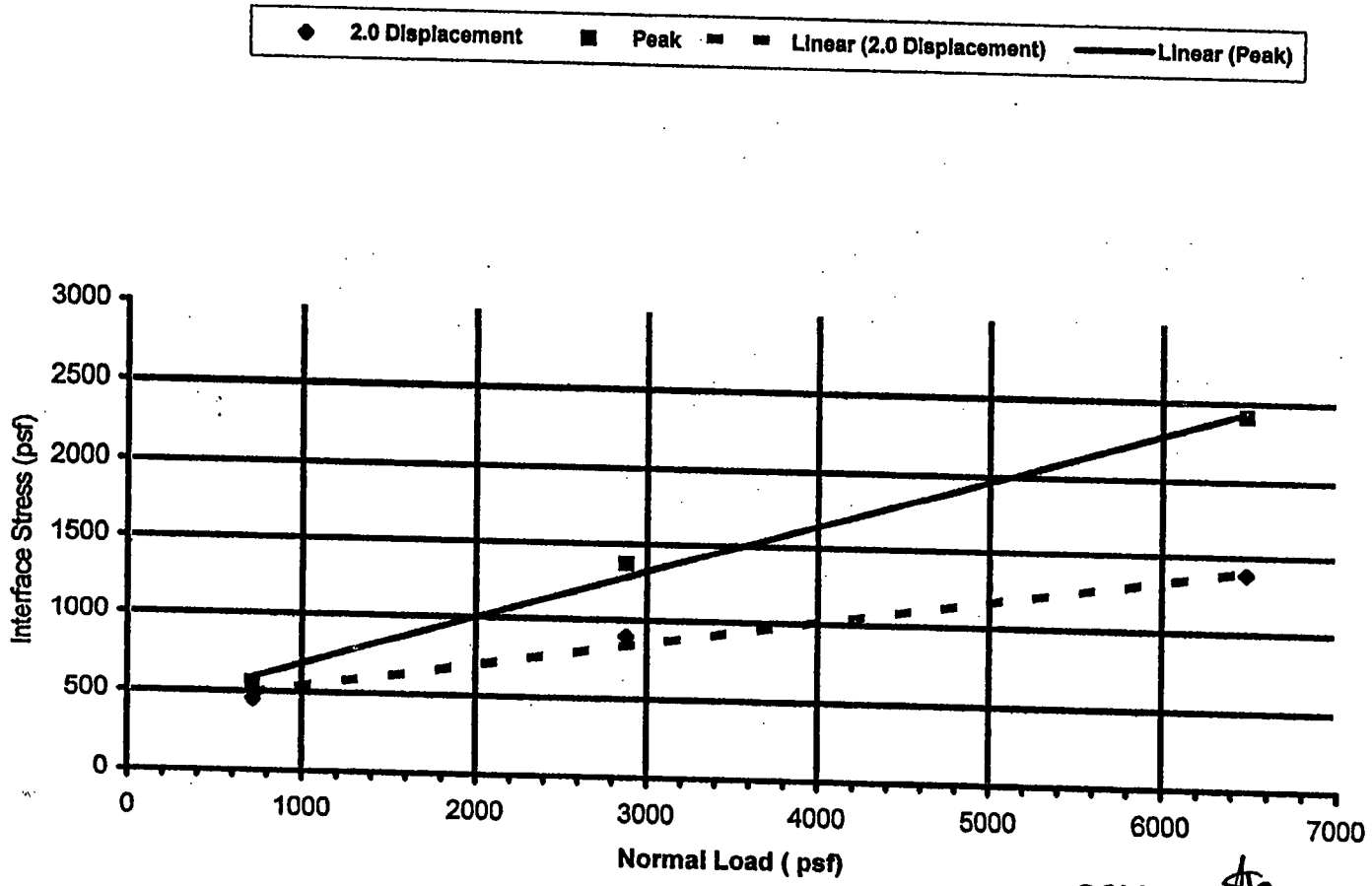
-4941

Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_15A
GCL Bentomat ST R#210 L#200203LO, C#73973 / Textured HDPE R#103114239, C#74105



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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000547

TABLE 15
CLIENT: CETCO
PROJECT: FLOUR DANIEL FERNALD

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
(PGL Job No. **G020007**)

QC'd by: 28-Jan-02

TEST CONFIGURATION 15

TOP BOX

Internal Shear BENTOMAT ST R#210 L#200202LO, C#73973

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 20" x 20".
2. The GCL specimens were constrained between two wooden boards with mending plates. The ends of each were then sandwiched between a second wooden substrate with mending plate.
3. Initial moisture content of the GCL was 18.3%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. GCL specimen was consolidated under drained condition for 48 hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 inch/min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2 " DISPLACEMENT SECANT ANGLE (degrees)
5	720	109.19	1935	70	978	54
20	2880	70.87	2904	45	1455	27
45	6480	66.9	4258	33	1706	15

	PEAK STRENGTH	2 " DISPLACEMENT STRENGTH
COHESION (psf):	1687	974
COEFFICIENT OF FRICTION:	0.40	0.12
FRICTION ANGLE(degrees):	21.8	6.9

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure [illegible]

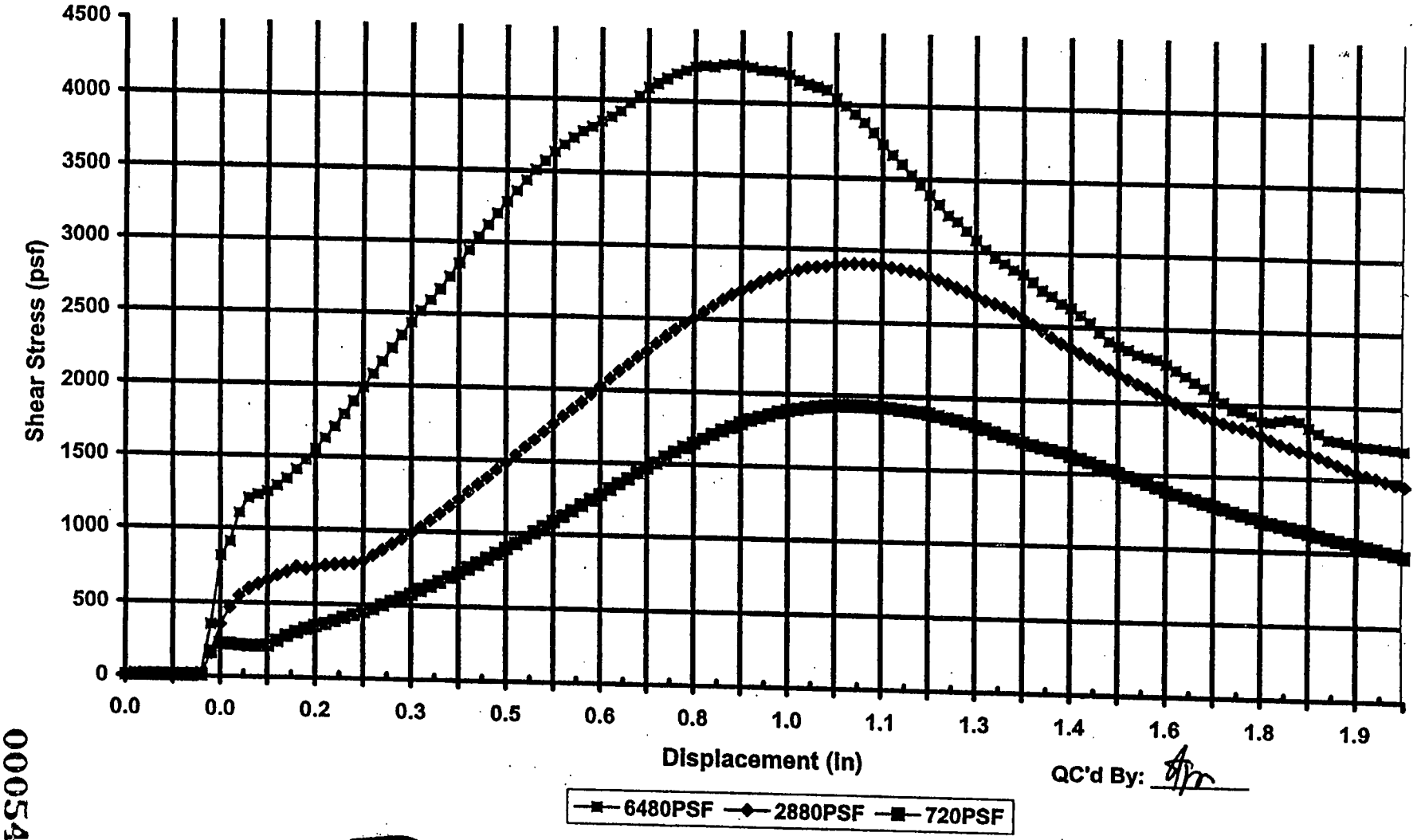
Partial pull o[illegible]ads was observed at all normal loads.

000548

ISO 9002

Precision Geosynthetic Laboratories

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. G020007_15
INTERNAL SHEAR GCL, BENTOMAT ST R#210 L#200202LO, C#73973



QC'd By: _____

Precision Geosynthetic Laboratories

ISO 9002

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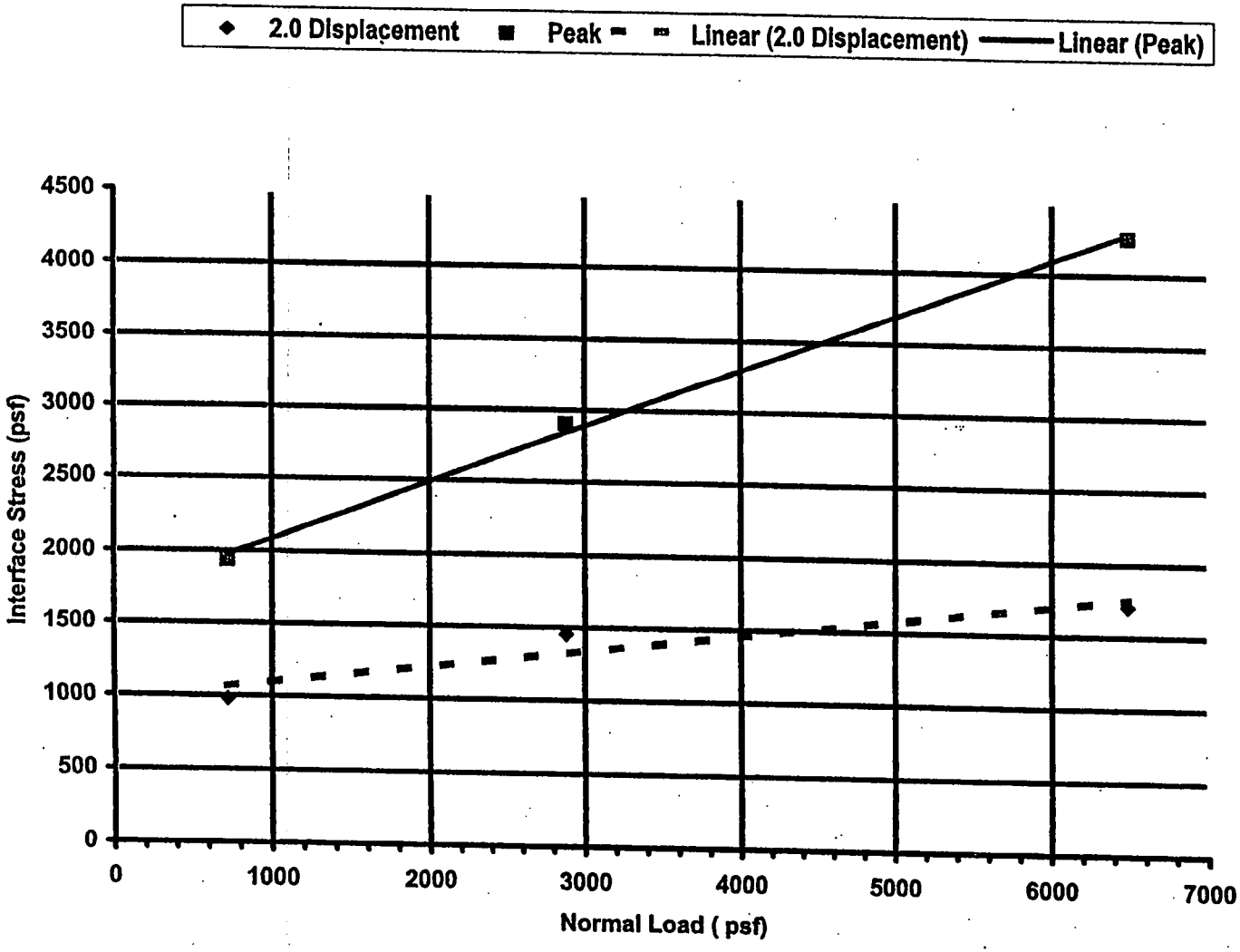
Figure #2
Normal Stress/ Interface Stress
PGL Job No. G020007_15
Internal Shear BENTOMAT ST R#210 L#200202LO, C#73973



QC'd By:

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ISO 9002

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TABLE 16
CLIENT: CETCO
PROJECT: FLOUR DANIEL FERNALD

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
(PGL Job No. **G020007**)

QC'd by:
23-Jan-02

TEST CONFIGURATION 16

TOP BOX

Internal Shear BENTOMAT ST R#162 L#200202LO, C#73954

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 20" x 20".
2. The GCL specimens were constrained between two wooden boards with mending plates. The ends of each were then sandwiched between a second wooden substrate with mending plate.
3. Initial moisture content of the GCL was 17.6%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. GCL specimen was consolidated under drained condition for 48 hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ _ 0.004 inch/min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2 " DISPLACEMENT SECANT ANGLE (degrees)
5	720	88.3	1977	70	1159	58
20	2880	91.8	2093	36	894	17
45	6480	74.9	3796	30	2029	17

COHESION (psf):	1507	797
COEFFICIENT OF FRICTION:	0.33	0.17
FRICTION ANGLE(degrees):	18.4	9.5

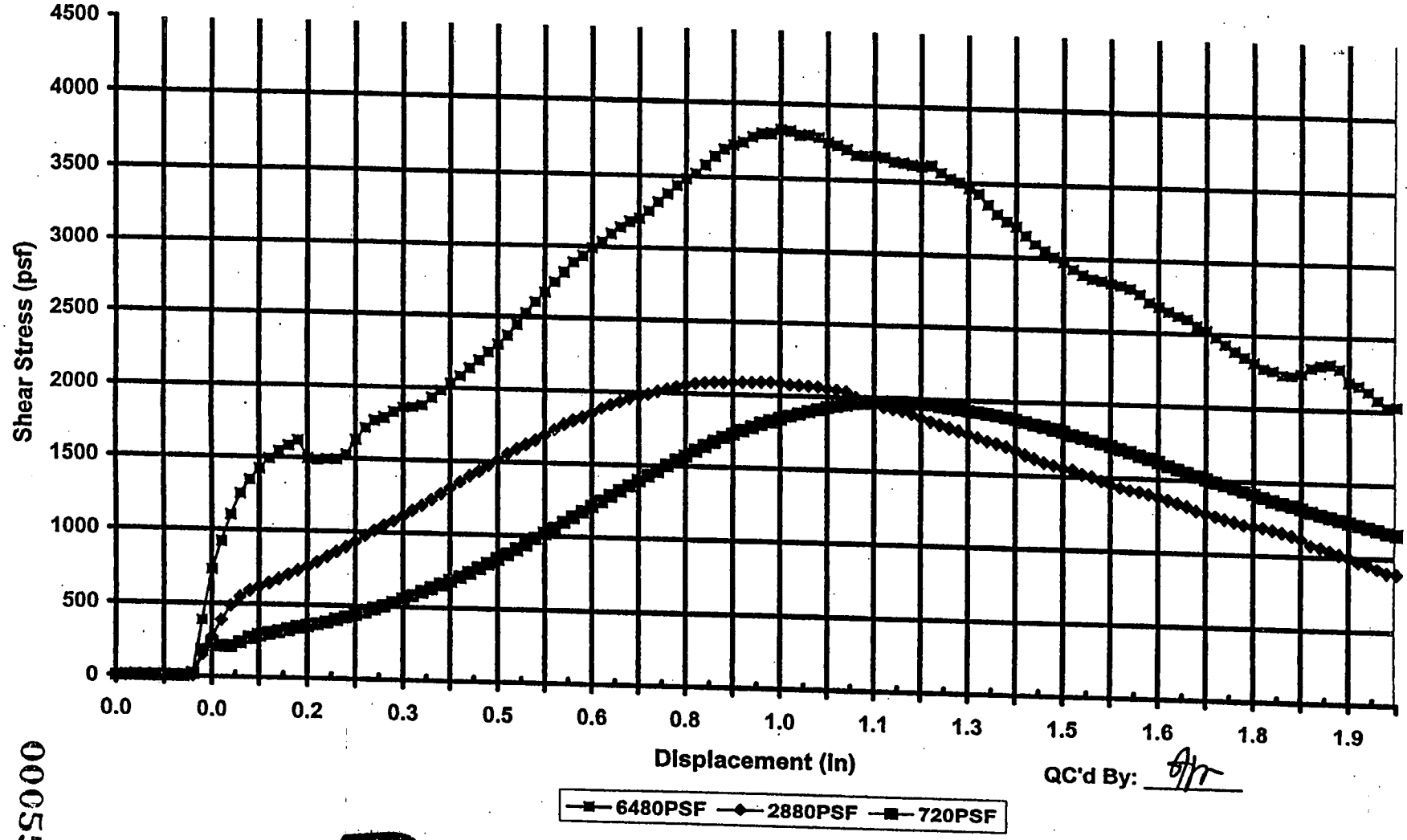
NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

Partial pull out of threads was observed at normal loads.

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. G020007_16
INTERNAL SHEAR GCL, BENTOMAT ST R#162 L#200202LO, C#73954



QC'd By: AM

Precision Geosynthetic Laboratories

ISO 9002

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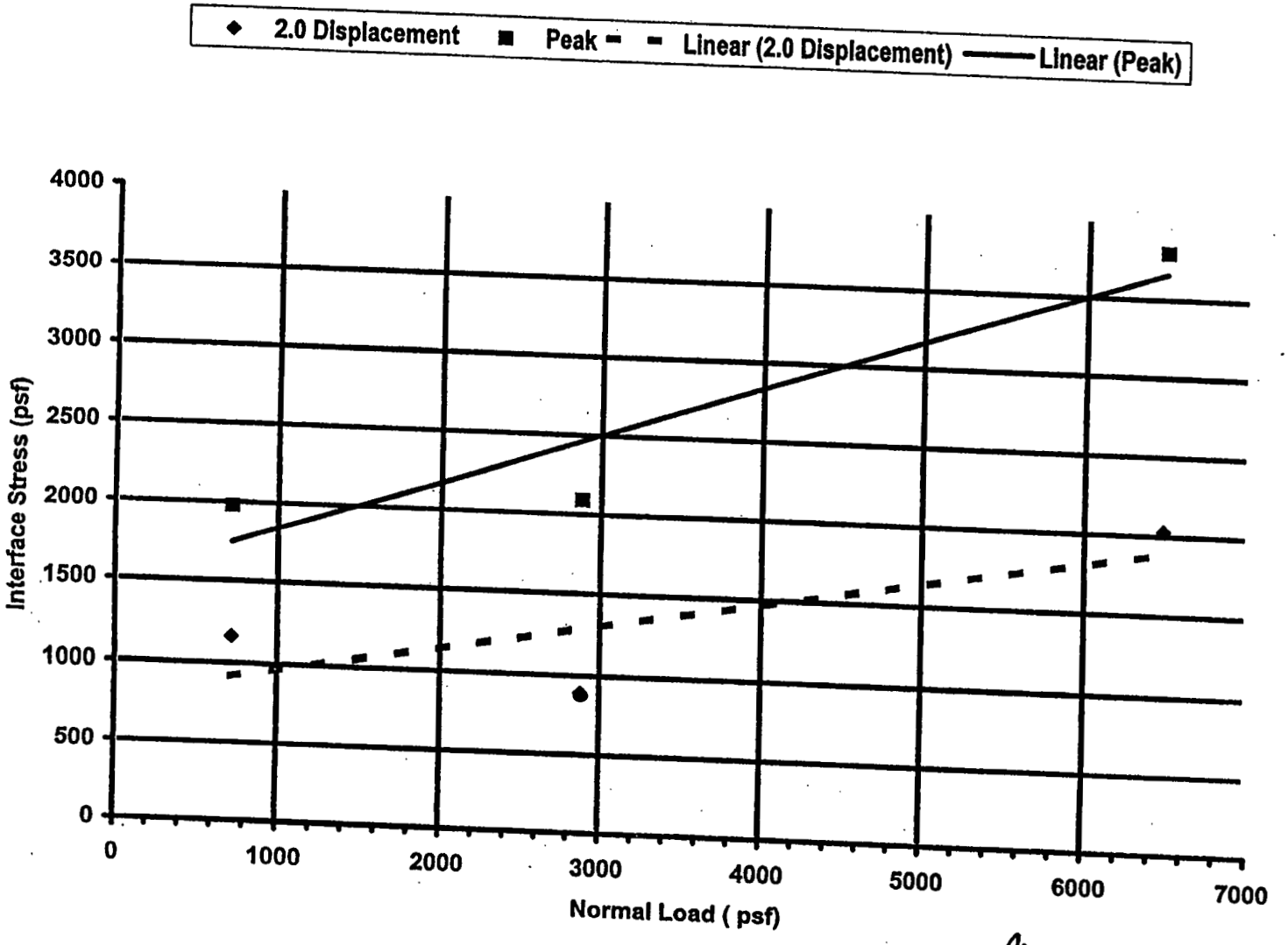
Figure #2
Normal Stress/ Interface Stress
PGL Job No. G020007_16
Internal Shear BENTOMAT ST R#162 L#200202LO, C#73954



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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4941

TABLE 17A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
Feb. 11, 2002

TEST CONFIGURATION # 17A

TOP BOX

GCL Bentomat ST R#117 L#200203LO (Woven Side) / C#73953

Textured HDPE R#103114203 / C#74090

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 10.3%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	130.95	456	32	414	30
20.00	2880	125.73	1372	25	1063	20
45.00	6480	90.36	2164	18	1289	11

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	360.6	442.14
COEFFICIENT OF FRICTION:	0.29	0.14
FRICTION ANGLE(degrees):	16.1	8.1

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

ISO 9002

Precision Geosynthetic Laboratories

TABLE 17A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
Feb. 11, 2002

TEST CONFIGURATION # 17A

TOP BOX

GCL Bentomat ST R#117 L#200203LO (Woven Side) / C#73953

Textured HDPE R#103114203 / C#74090

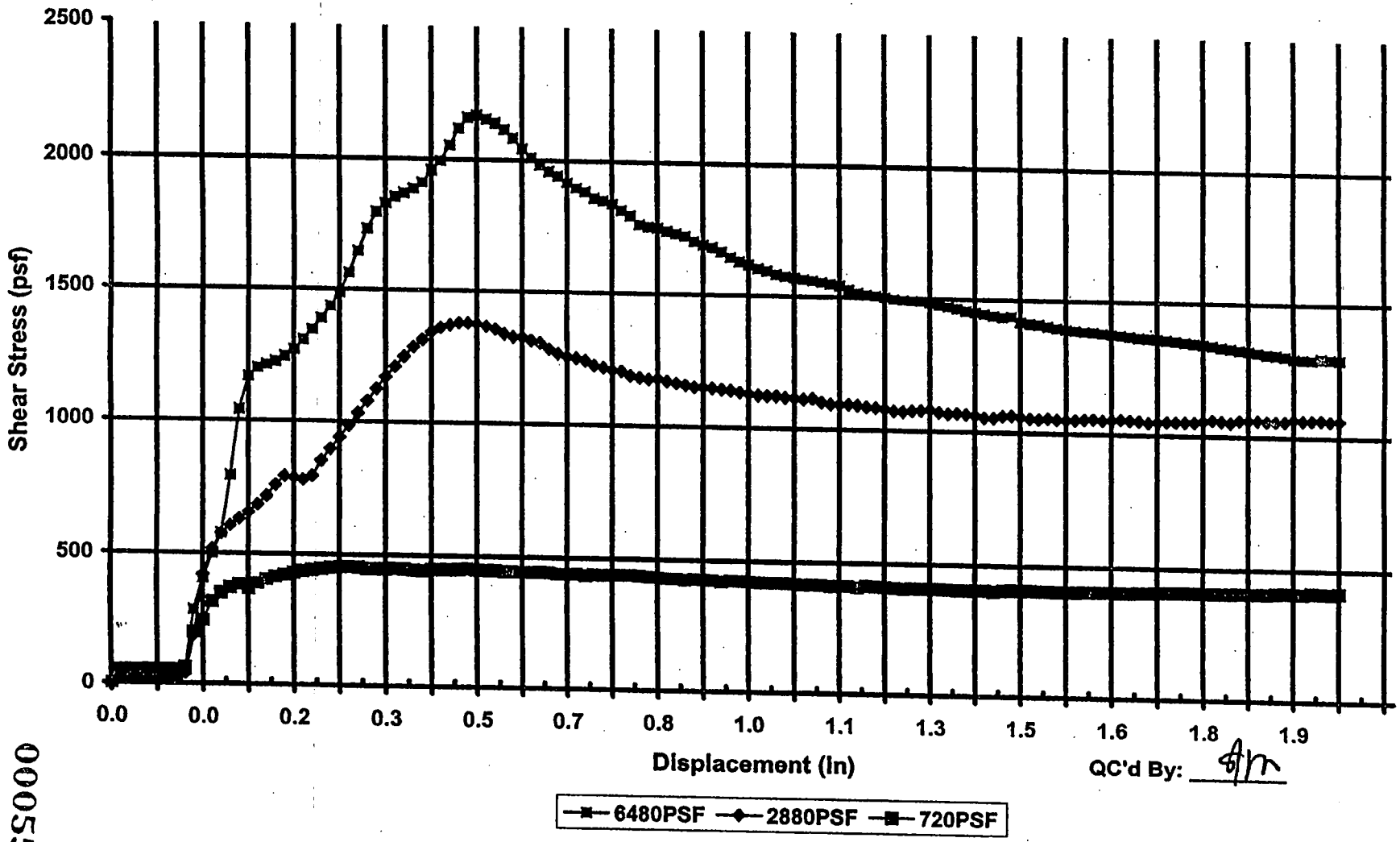
BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCl stretched for about 0.75 - 1".

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_17A
GCL Bentomat ST R#117 L#200203LO, C#73953 / Textured HDPE R#103114203, C#74090



QC'd By: AM

Precision Geosynthetic Laboratories

ISO 9002

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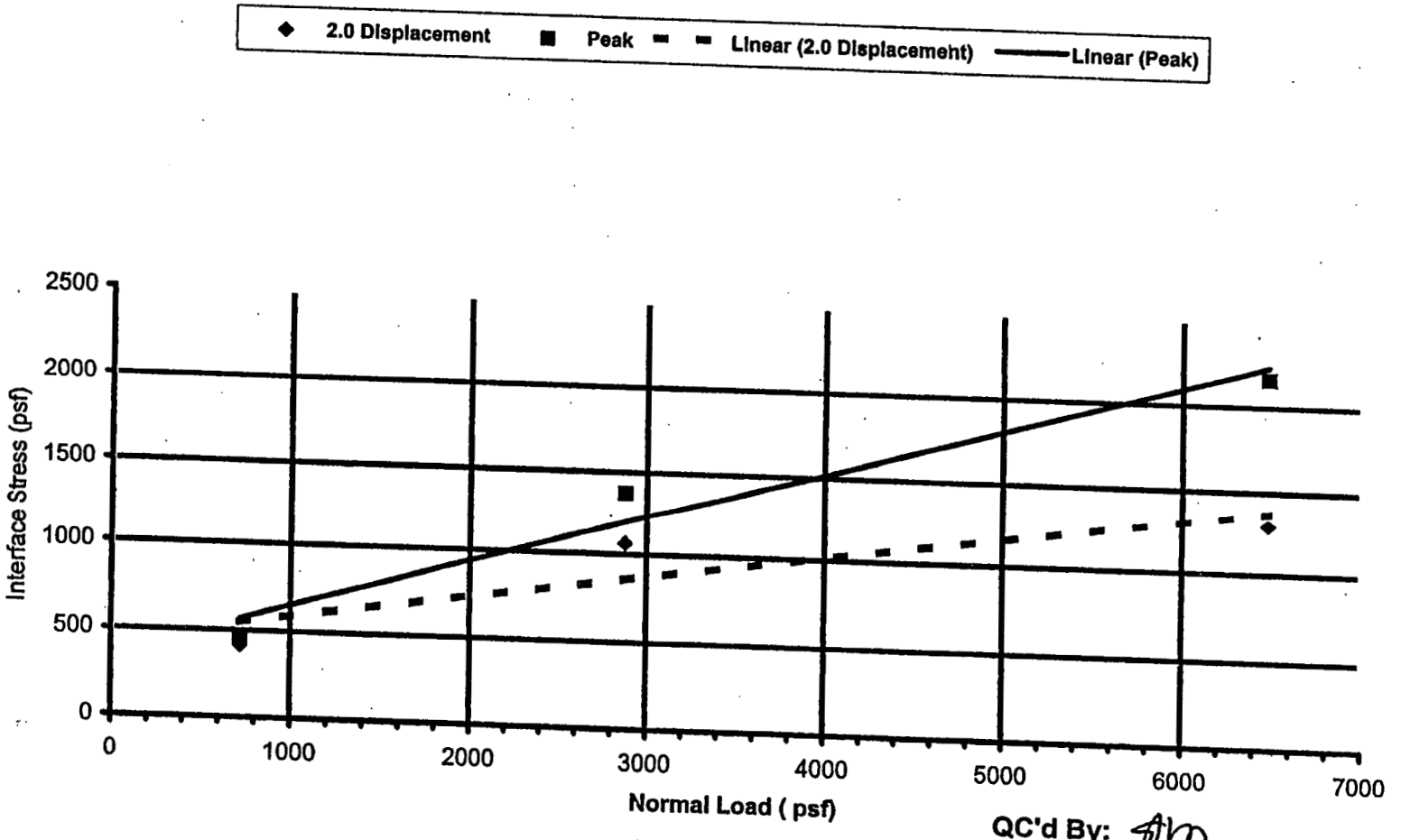
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_17A
GCL Bentomat ST R#117 L#200203LO, C#73953 / Textured HDPE R#103114203, C#74090



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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TABLE 17
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
21-Jan-02

TEST CONFIGURATION # 17

TOP BOX

Bentomat ST R#117 L# 200202LO, C#73953

Internal Shear

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The GCL specimens were constrained between two wooden boardswith mending plates. The ends of each were then sandwiched between a second wooden substrate with mending plates.
3. Initial moisture content of the GCL was 16.9%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	107.5	1482	64	889	51
20.00	2880	98.8	3325	49	2241	38
45.00	6480	80.7	3720	30	2198	19

COHESION (psf):	1632	1094.4
COEFFICIENT OF FRICTION:	0.36	0.20
FRICTION ANGLE(degrees):	19.8	11.5

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

Partial pull[illegible]ds was observed at all normal loads.
See Figure [illegible]

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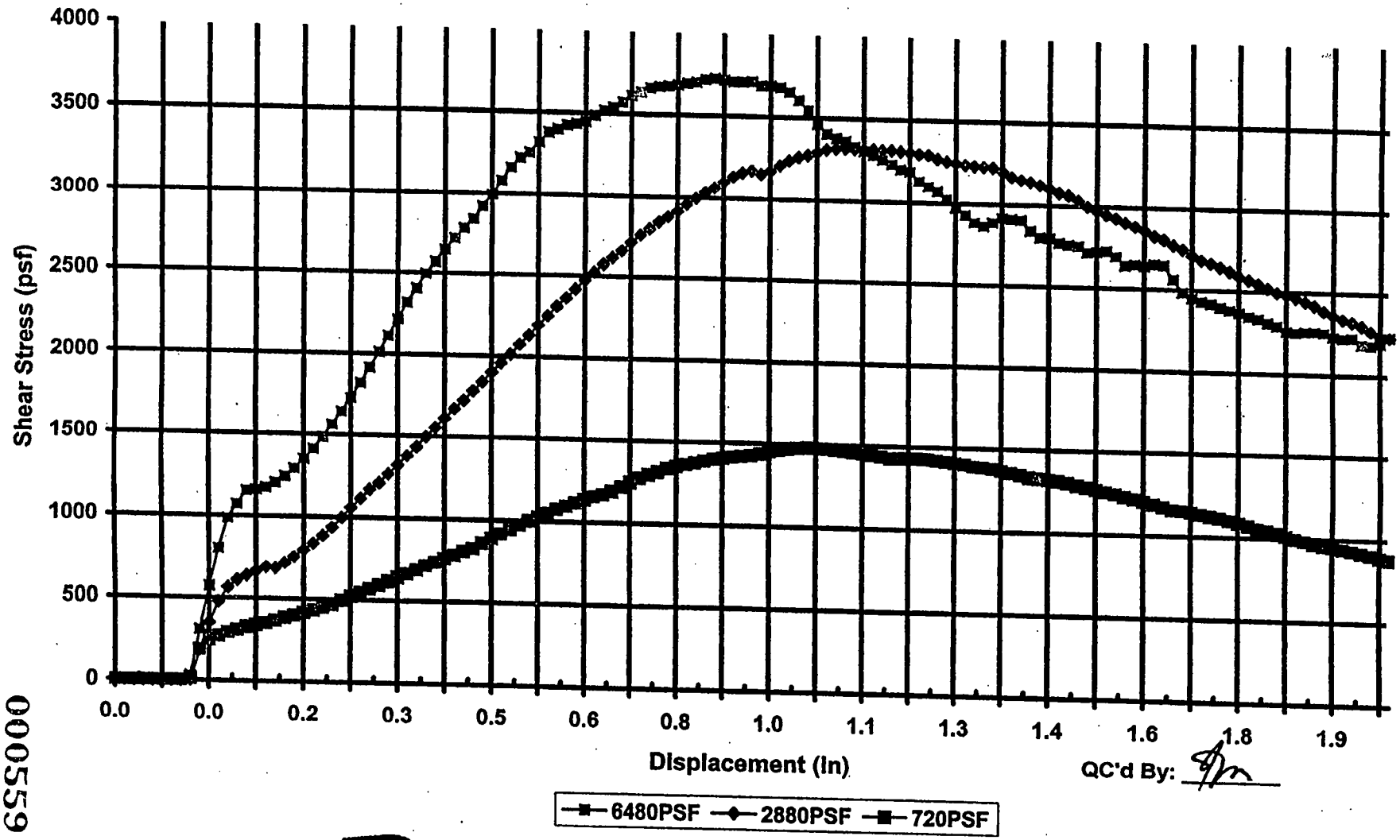
Precision Geosynthetic Laboratories

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_17
Internal Shear Bentomat St R#117 L#200202LO, C#73953



QC'd By: [signature]

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ISO 9002

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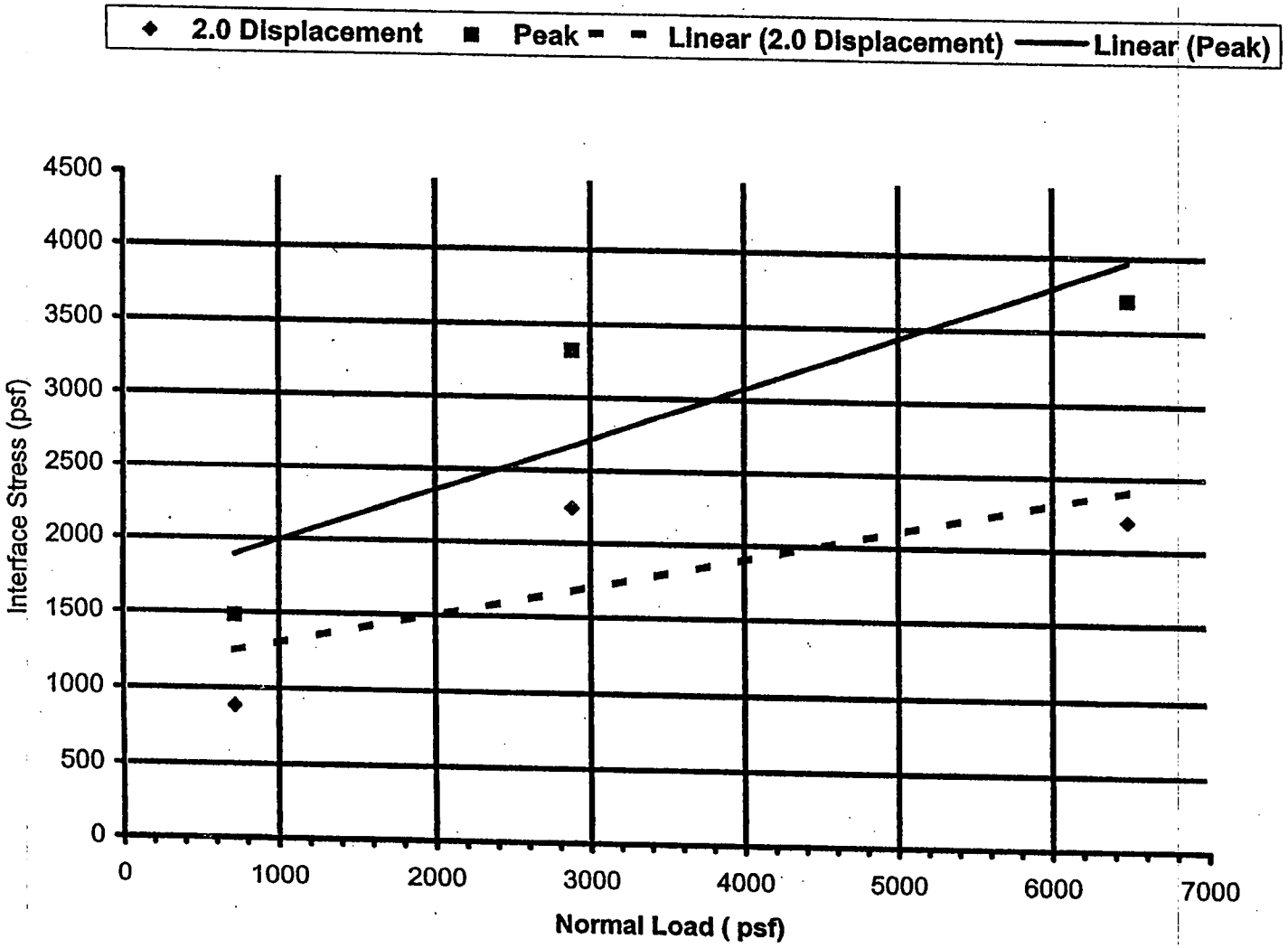
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_17
Internal Shear Bentomat ST R#117 L#200202LO, C#73953



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

Attn: Mr. Chuck Van Arsdale

Re: Rejected Data

Date: May 29, 2002

From: William Urchik

Dear Van Arsdale,

Please be aware that the following ten sets of data are the ones that were rejected and retested.

Yours truly,

Wm Urchik

William Urchik

Product Development Engineer

CETCO

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000562

TABLE 1A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
Feb. 4, 2002

TEST CONFIGURATION # 1A

TOP BOX

GCL Bentomat ST R#863 L#200203LO (Woven Side) / C#74058

Textured HDPE R#103114181 / C#74086

← BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 12.49%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	116.92	714	45	641	42
20.00	2880	134.74	1077	21	800	16
45.00	6480	119.43	2297	20	1173	10

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	417.3	557.14
COEFFICIENT OF FRICTION:	0.28	0.09
FRICTION ANGLE(degrees):	15.7	5.3

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

ISO 9002

Precision Geosynthetic Laboratories

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TABLE 1A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
Feb. 4, 2002

TEST CONFIGURATION # 1A

TOP BOX

GCL Bentomat ST R#863 L#200203LO (Woven Side) / C#74058

Textured HDPE R#103114181 / C#74086

← BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

Stretching of the GCL was observed at all normal loads. Degree of stretching is more severe at higher load.

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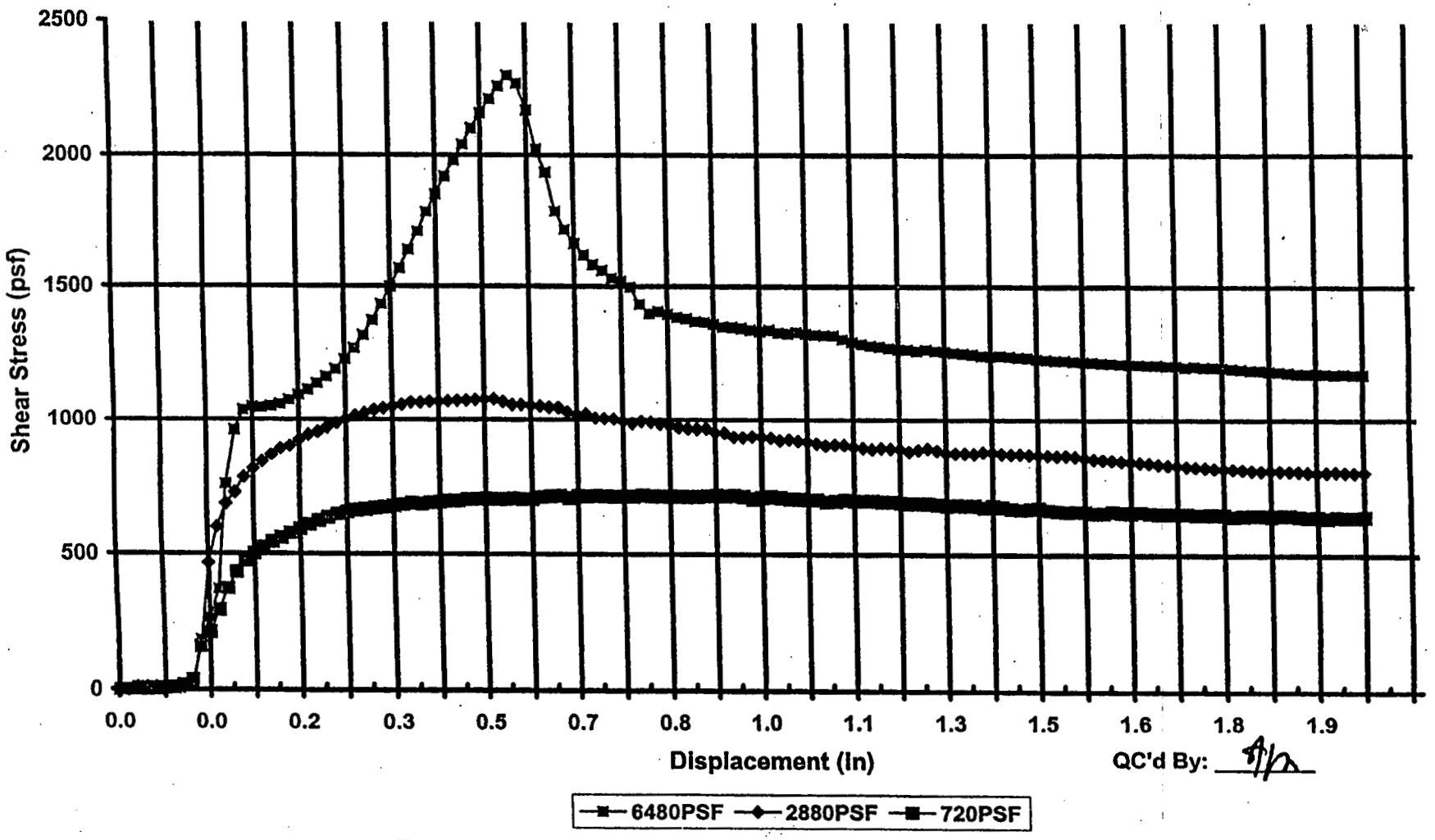
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_1A
GCL Bentomat ST R#863 L#200203LO, C#74058 / Textured HDPE R#103114181, C#74086

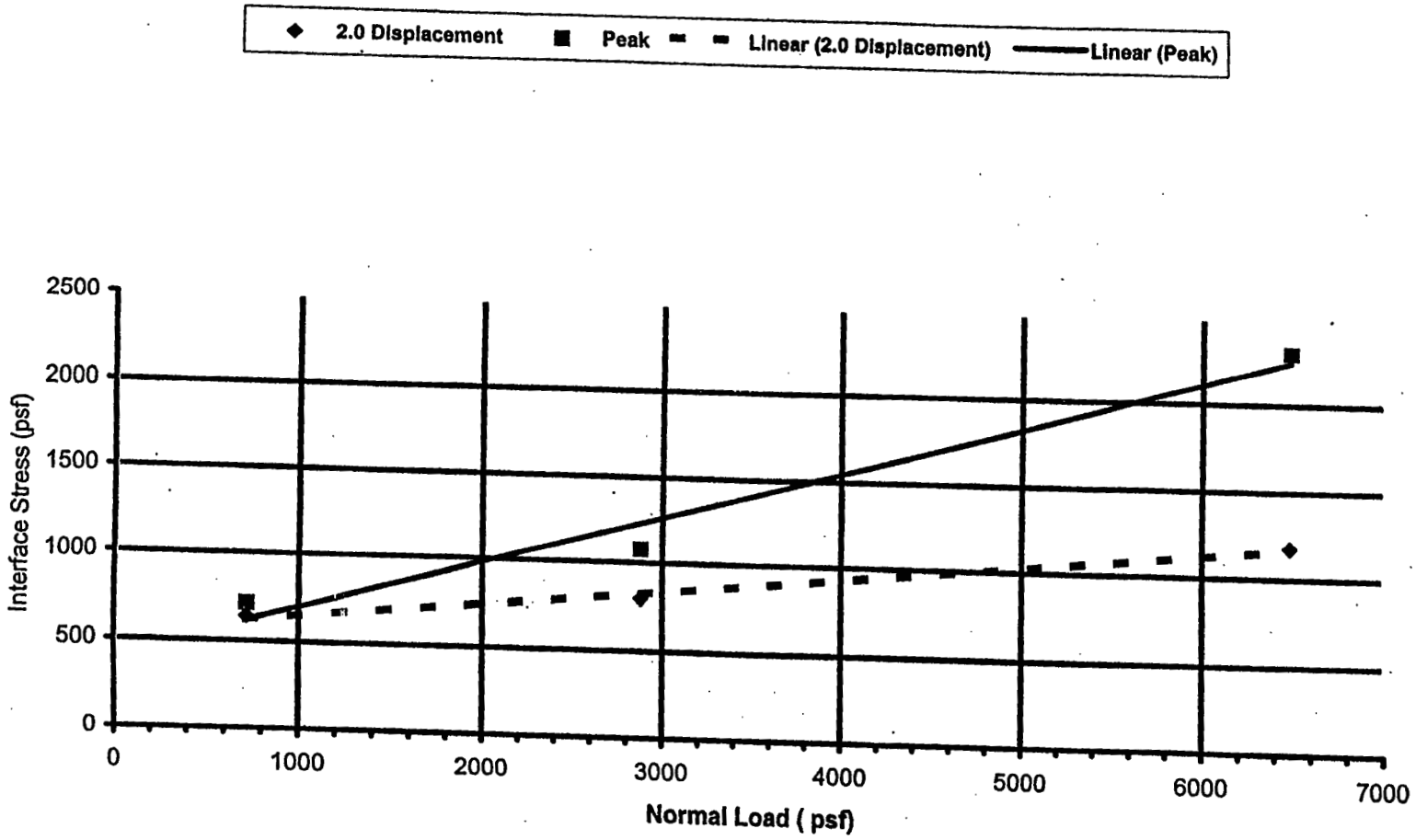


QC'd By: AJ

ISO 9002

Precision Geosynthetic Laboratories

Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_1A
GCL Bentomat ST R#863 L#200203LO, C#74058 / Textured HDPE R#103114181, C#74086



QC'd By:

995000

TABLE 2A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
Feb. 7, 2002

TEST CONFIGURATION # 2A

TOP BOX

GCL Bentomat ST R#819 L#200203LO (Woven Side) / C#74057

Textured HDPE R#103114192 / C#74089

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 10.69%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

			PEAK STRENGTH		2.0 " DISPLACEMENT STRENGTH	
Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	SHEAR STRESS (psf)	PEAK SECANT ANGLE (degrees)	SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	129.89	448	32	356	26
20.00	2880	133.1	1100	21	721	14
45.00	6480	105.76	2083	18	928	8

COHESION (psf):	260.3	349
COEFFICIENT OF FRICTION:	0.28	0.10
FRICTION ANGLE(degrees):	15.8	5.4

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

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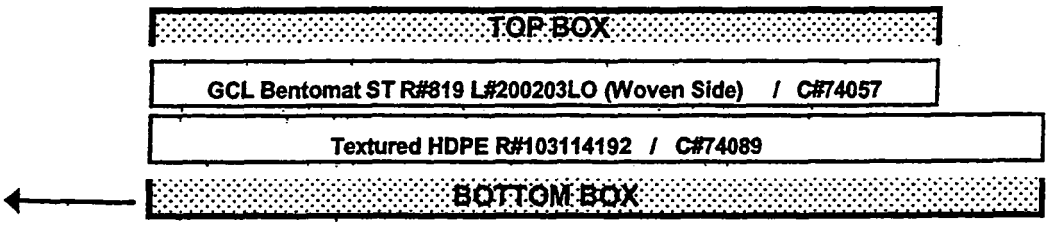
TABLE 2A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
Feb. 7, 2002

TEST CONFIGURATION # 2A



OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCl stretched for about 1".

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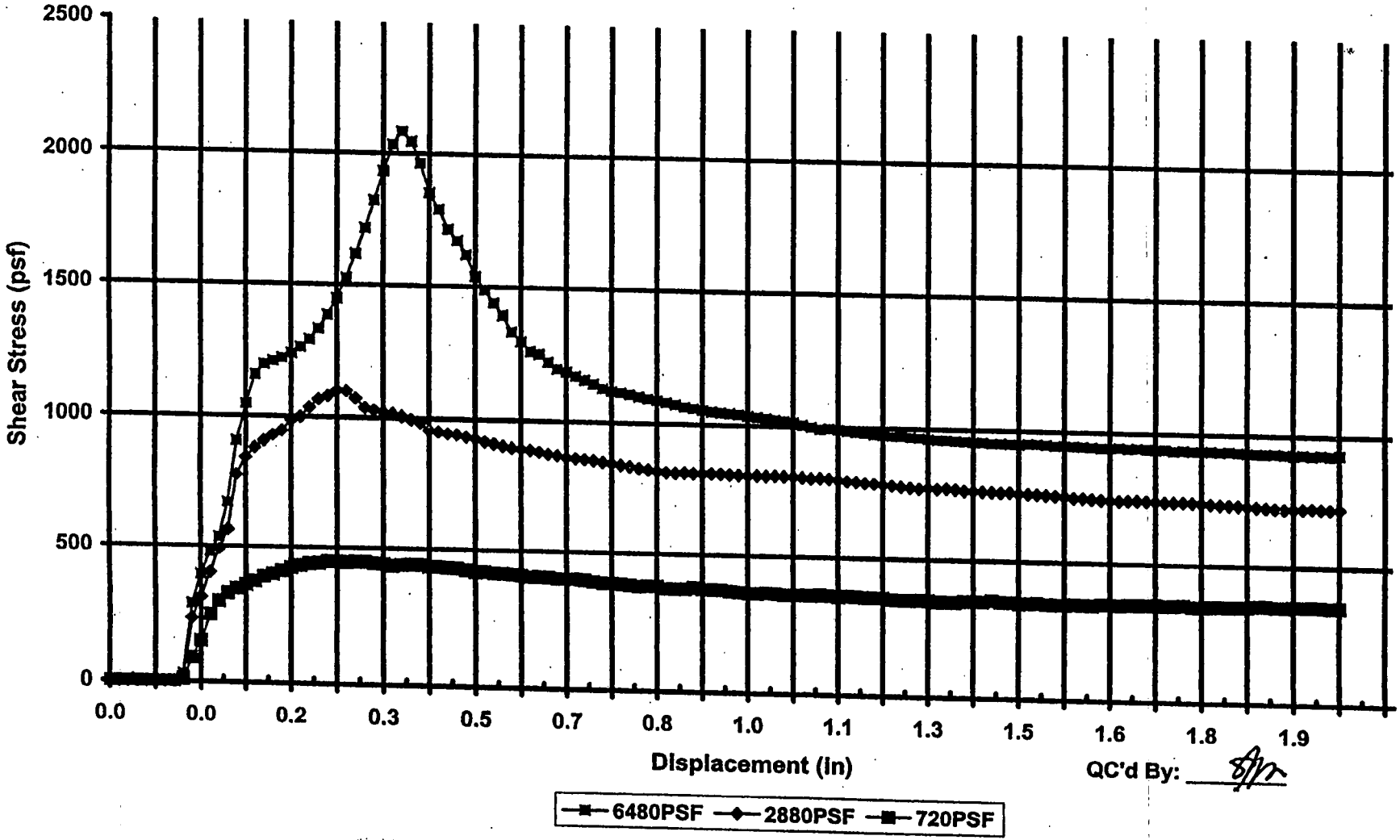
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_2A
GCL Bentomat ST R#819 L#200203LO, C#74057 / Textured HDPE R#103114192, C#74089

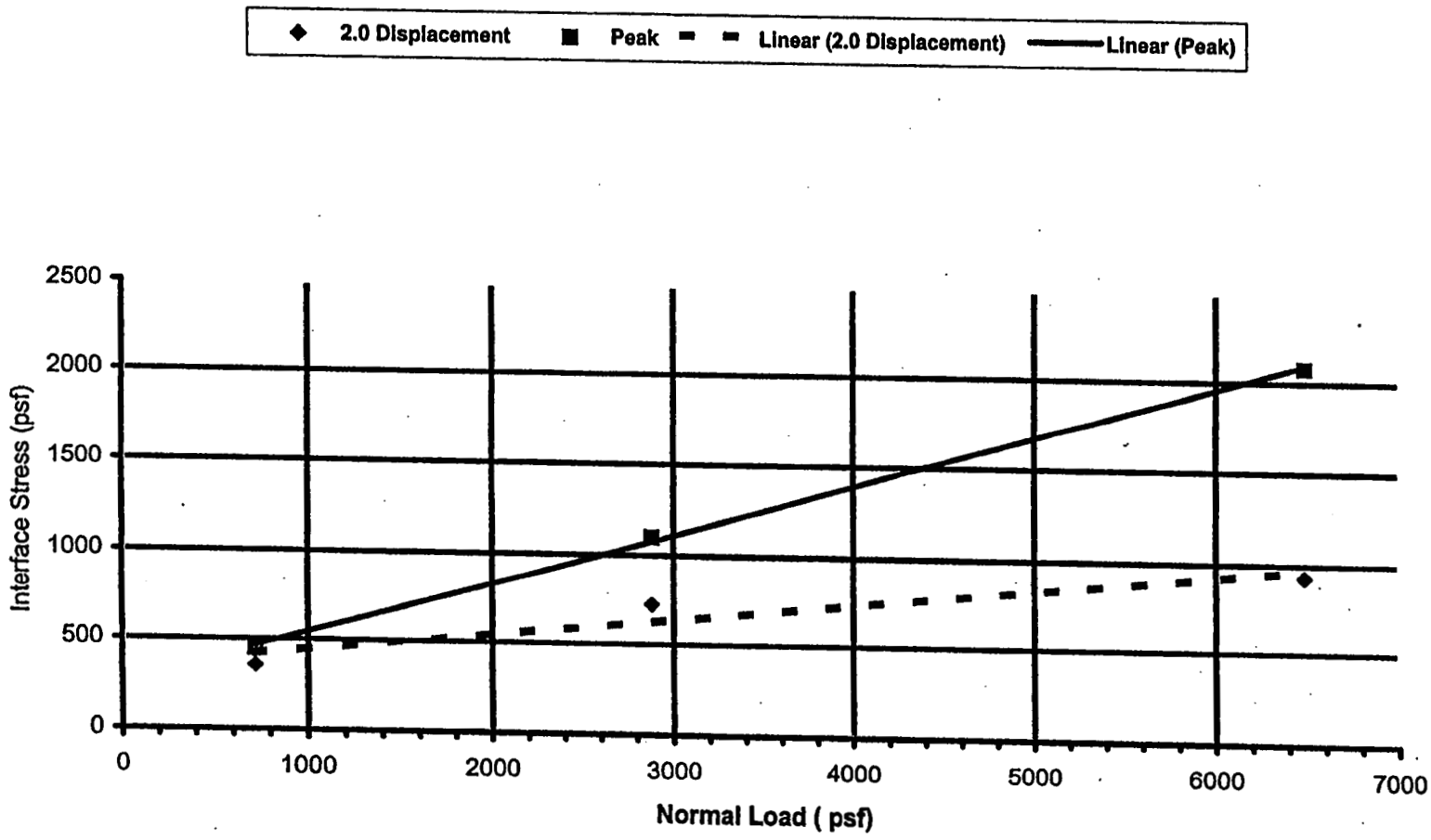


QC'd By: _____

Precision Geosynthetic Laboratories

ISO 9002

Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_2A
GCL Bentomat ST R#819 L#200203LO, C#74057 / Textured HDPE R#103114192, C#74089

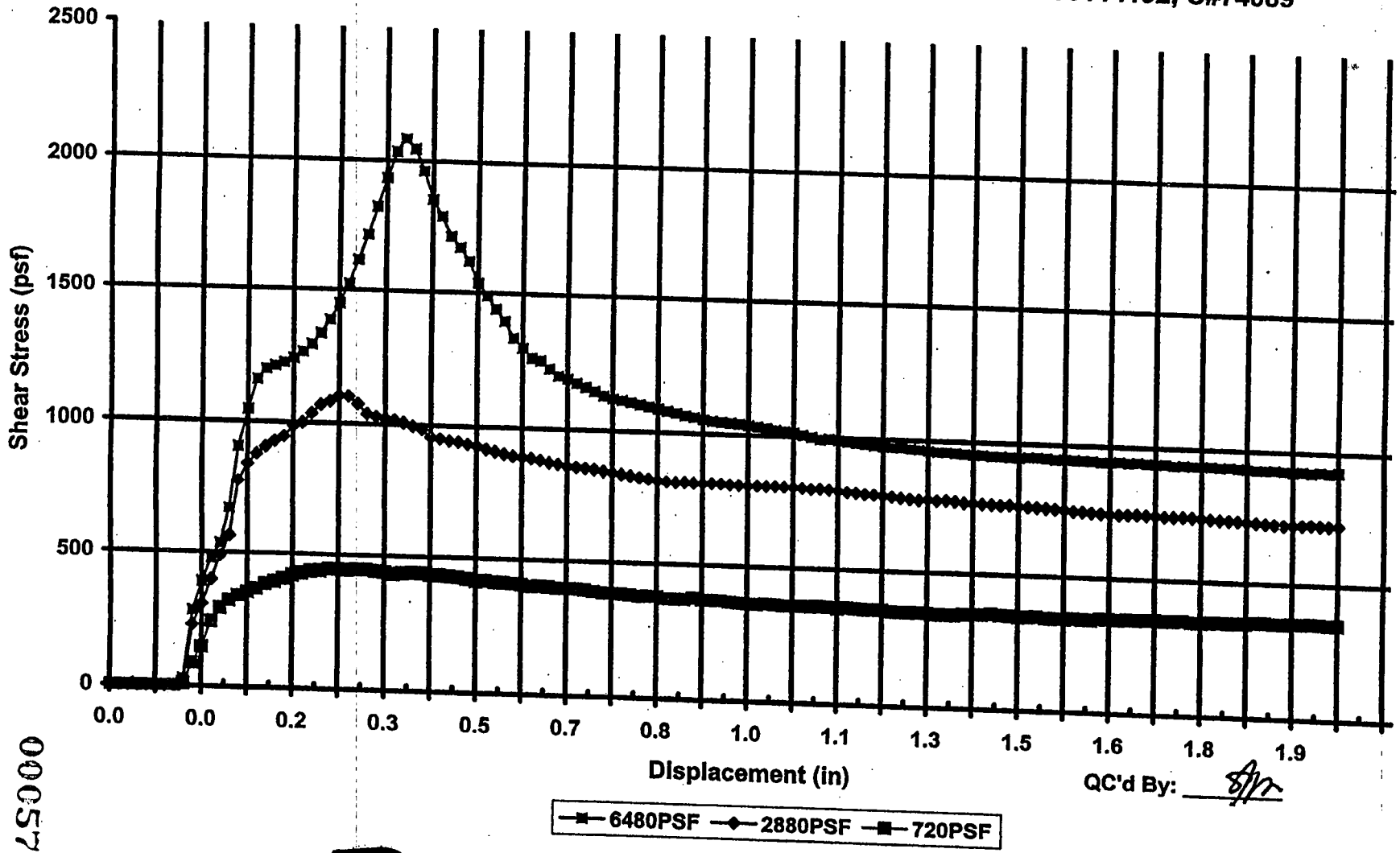


QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_2A
GCL Bentomat ST R#819 L#200203LO, C#74057 / Textured HDPE R#103114192, C#74089



QC'd By: _____

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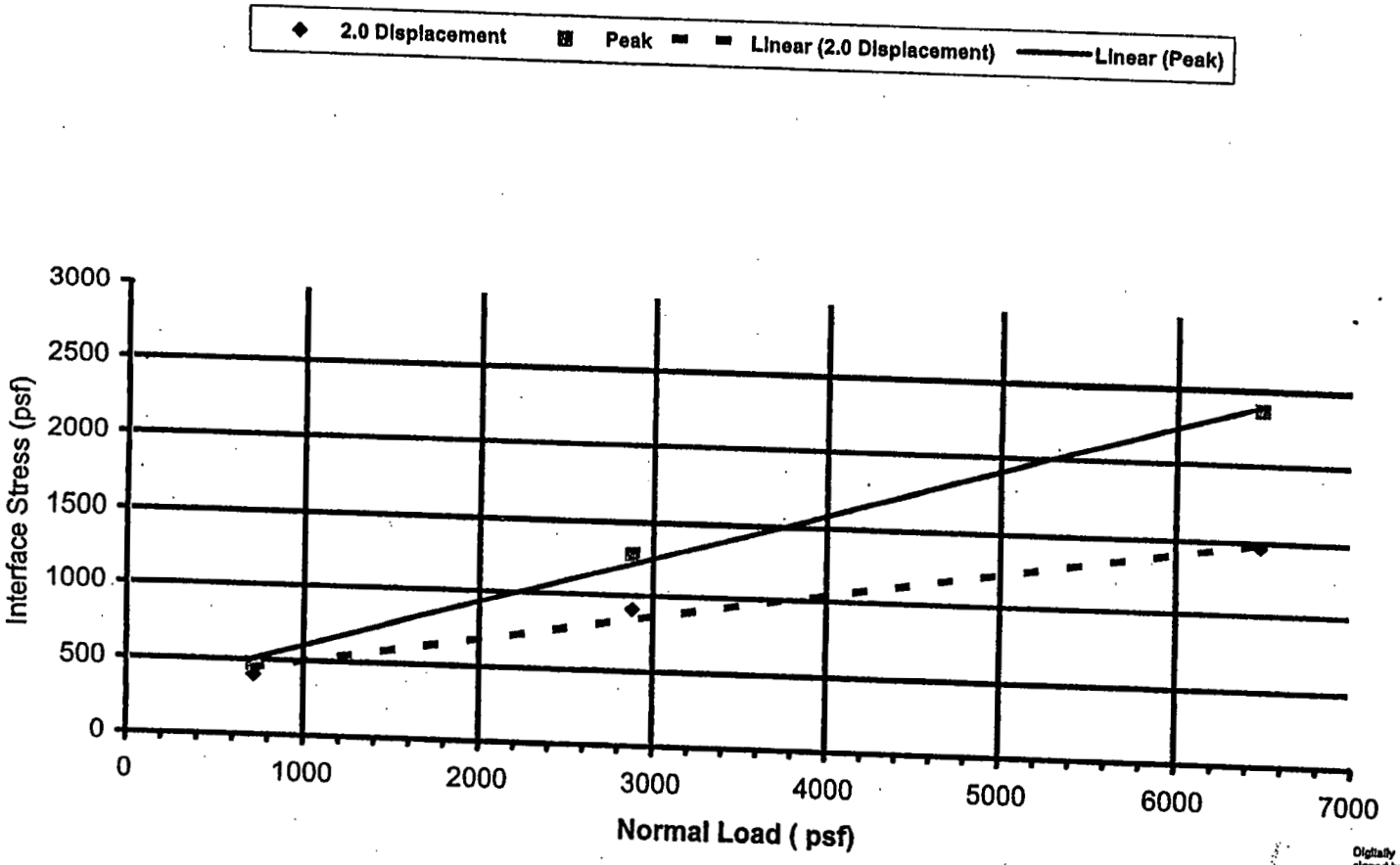
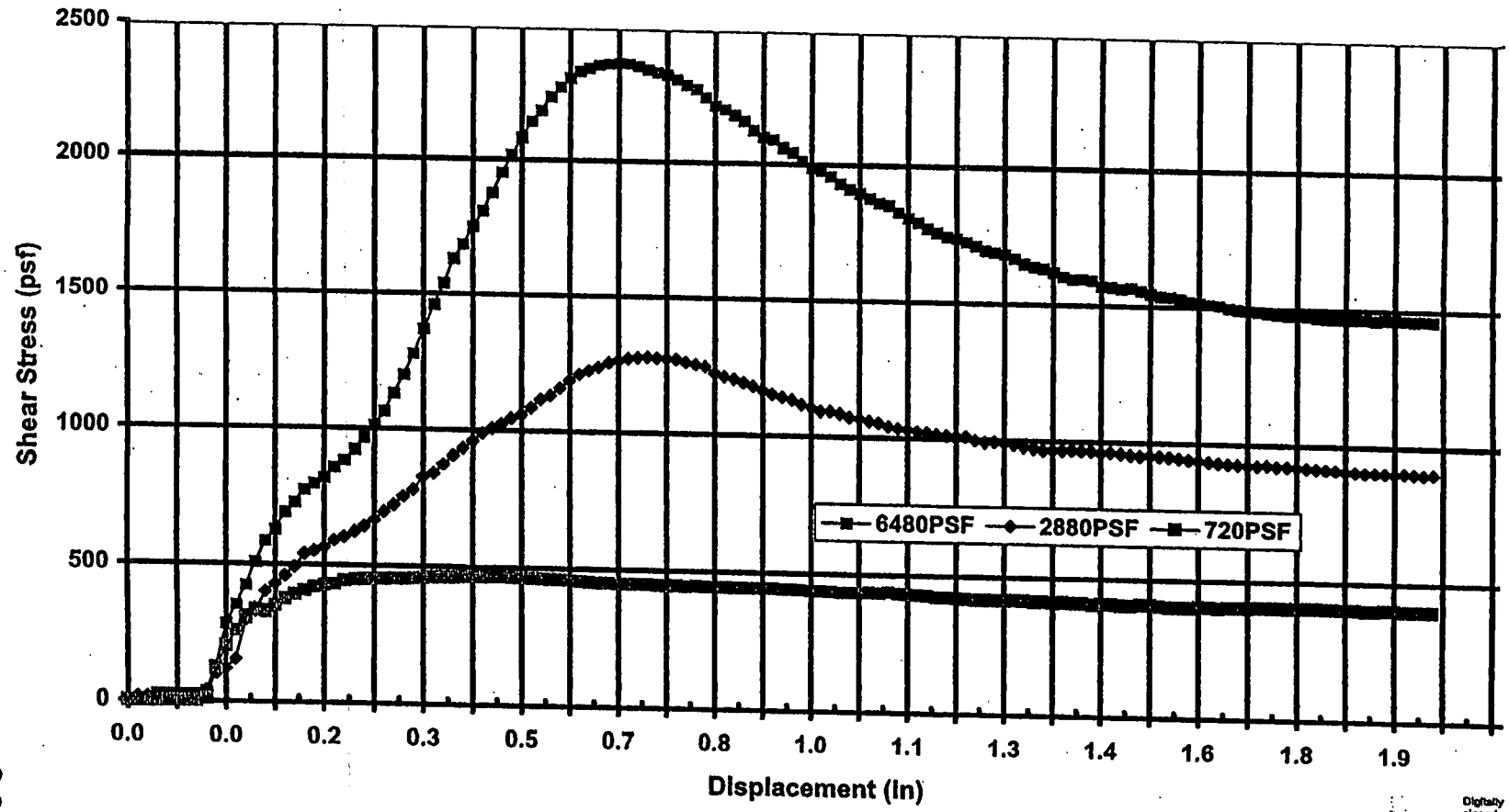
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020139_10
GCL Bentomat ST R#241 (Woven Side), C#74682 / Textured HDPE R#103114910, C#74500



QC'd By:

Digitally signed by Edith Pintor DN: cn=Edith Pintor, o=PGL, c=US Date: 2002.05.28 08:05:47 -07'00'

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020139_10
GCL Bentomat ST R#241 (Woven Side), C#74682 / Textured HDPE R#103114910, C#74500



Digitally signed by Edith Pintor
DN: cn=Edith Pintor, o=PGL, c=US
Date: 2002.08.28 08:05:22 -07'00'

TABLE 10
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: Digitally signed by Edith Pintor DN: cn=Edith Pintor, c=PGL, c=US Date: 2002.05.28 08:04:55 -07'00'

28-May-02

TEST CONFIGURATION # 10

TOP BOX

GCL Bentomat ST R#241 (Woven Side) / C#74682

Textured HDPE R#103114910 / C#74500

BOTTOM BOX

GCI stretched for about 1.0 - 1.5".

TABLE 10
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: Digitally signed by Edith Pinter DN: cn=Edith Pinter, o=PGL, c=US Date: 2002.05.28 08:04:30 -07'00'

28-May-02

TEST CONFIGURATION # 10

TOP BOX

GCL Bentomat ST R#241 (Woven Side) / C#74682

Textured HDPE R#103114910 / C#74500

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 13.98%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	121.9	469	33	400	29
20.00	2880	103.6	1281	24	905	17
45.00	6480	105.7	2368	20	1465	13

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	274	312
COEFFICIENT OF FRICTION:	0.33	0.18
FRICTION ANGLE(degrees):	18.1	10.3

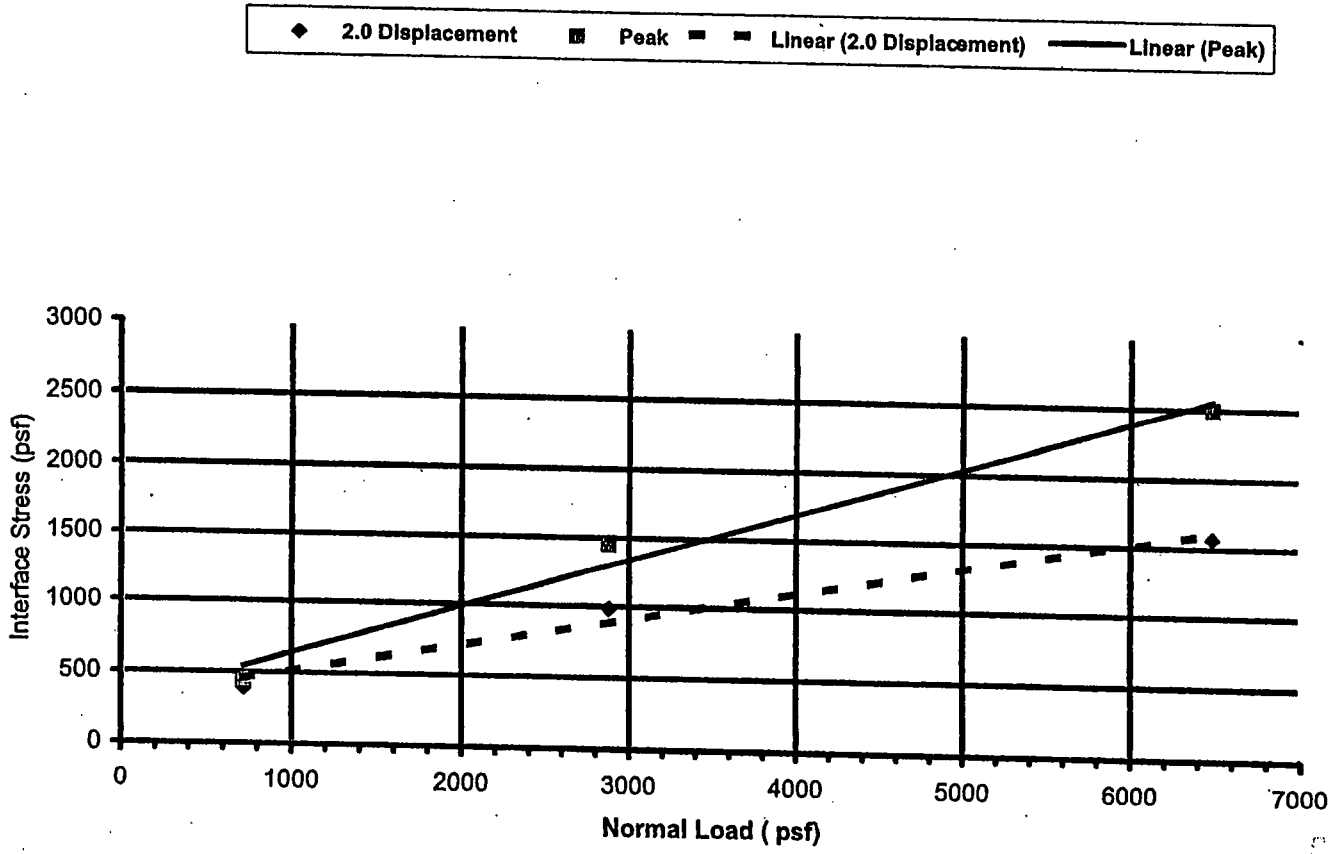
NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load,

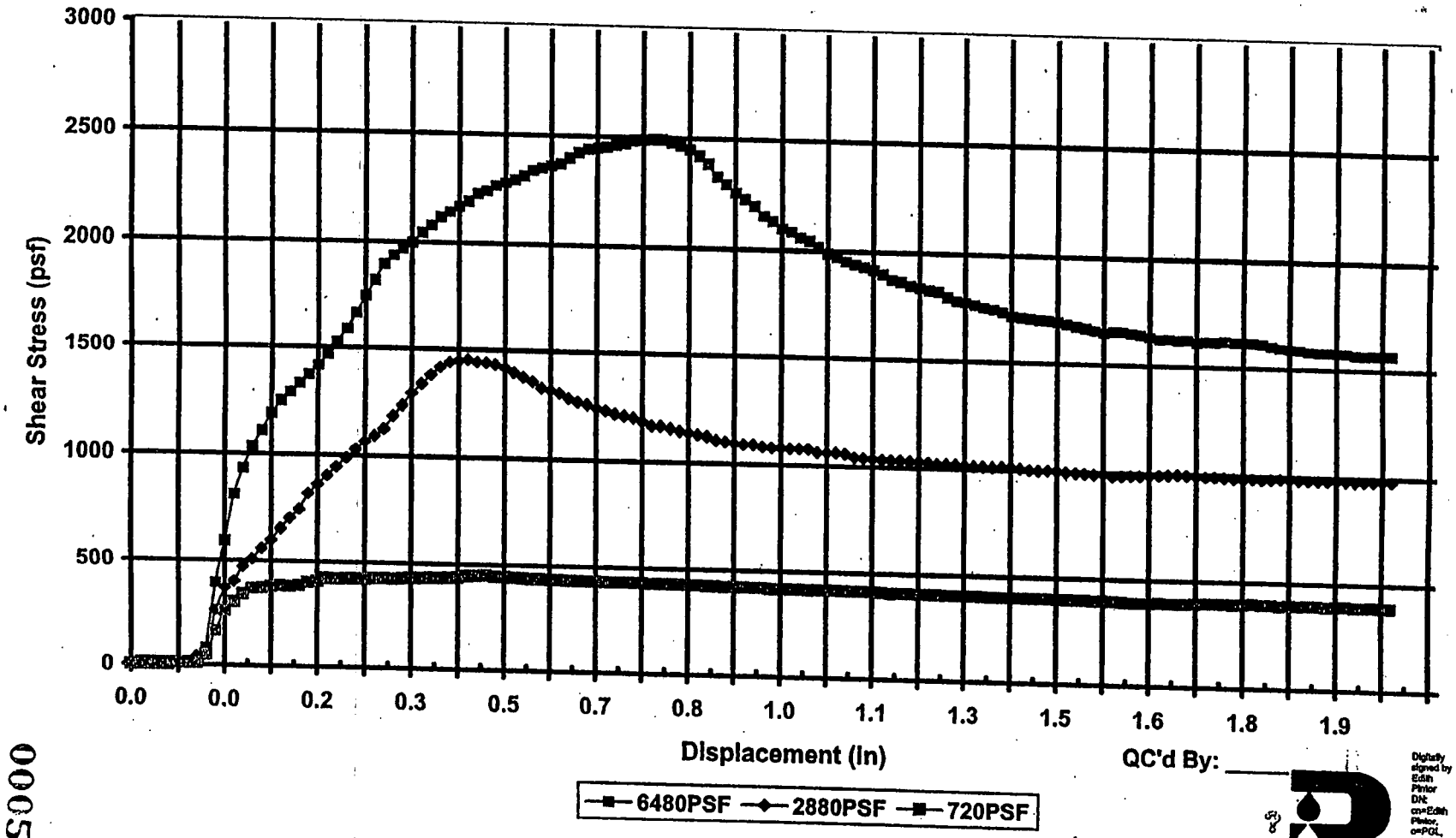
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020139_9
GCL Bentomat ST R#283 (Woven Side) , C#74683 / Textured HDPE R#103114899, C#74499



QC'd By:

Digitally signed by Edith Pintor DN: cn=Edith Pintor, o=PGL, c=US Date: 2002.05.21 08:10:47 -07'00'

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020139_9
GCL Bentomat ST R#283 (Woven Side), C#74683 / Textured HDPE R#103114899, C#74499



QC'd By: _____

Digitally signed by Edith Pintor DN: cn=Edith Pintor, o=PGL, c=US Date: 2003.08.21 08:11:57 -07'00'

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TABLE 9
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: _____ 20-May-02

TEST CONFIGURATION # 9

TOP BOX

GCL Bentomat ST R#283 (Woven Side) / C#74683

Textured HDPE R#103114899 / C#74499

BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCI stretched for about 0.5 - 0.75".

TABLE 9
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: _____
20-May-02

TEST CONFIGURATION # 9

TOP BOX

GCL Bentomat ST R#283 (Woven Side) / C#74683

Textured HDPE R#103114899 / C#74499

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 13.98%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	111.42	449	32	392	29
20.00	2880	90.87	1451	27	985	19
45.00	6480	74.39	2496	21	1569	14

COHESION (psf):	293.6	310
COEFFICIENT OF FRICTION:	0.35	0.20
FRICTION ANGLE(degrees):	19.2	11.3

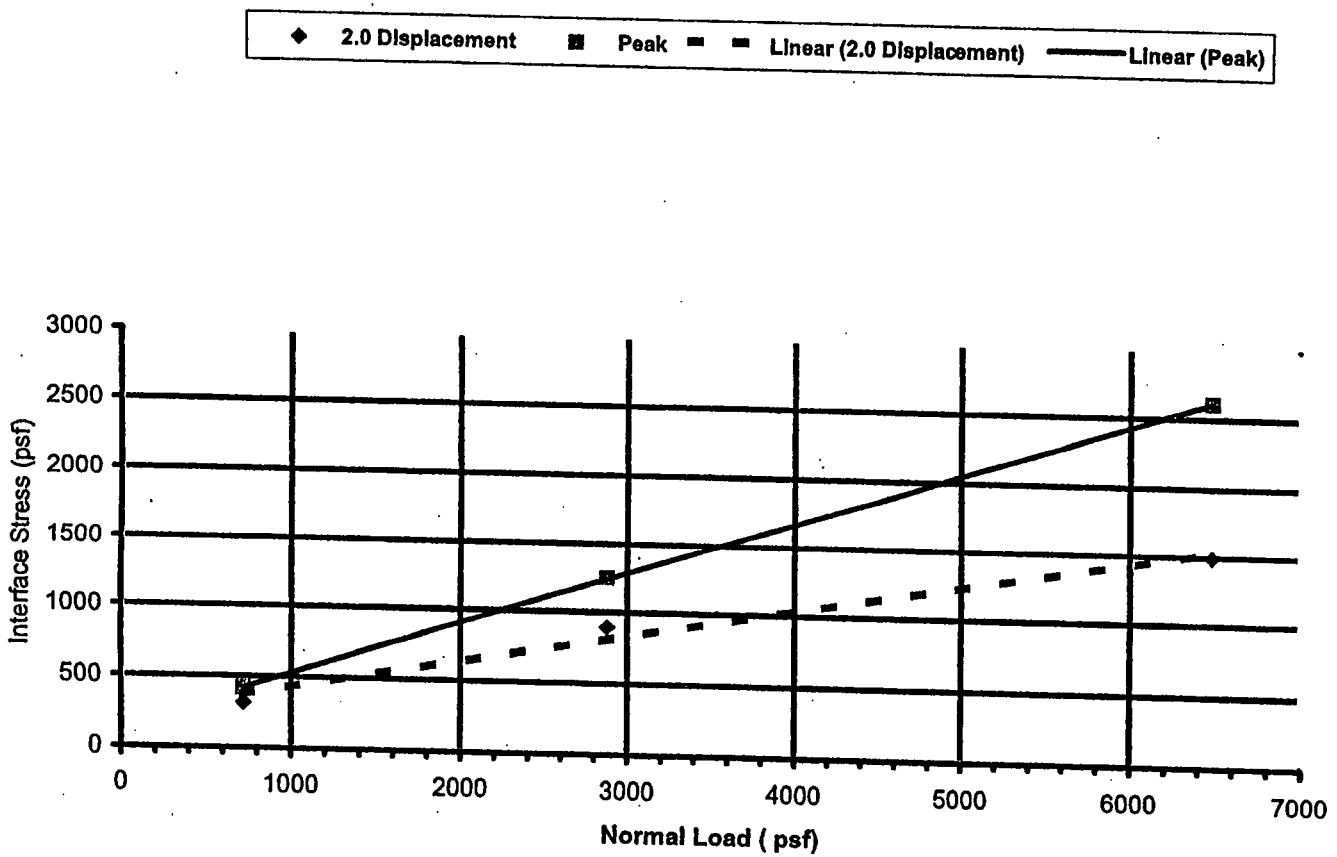
NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load,

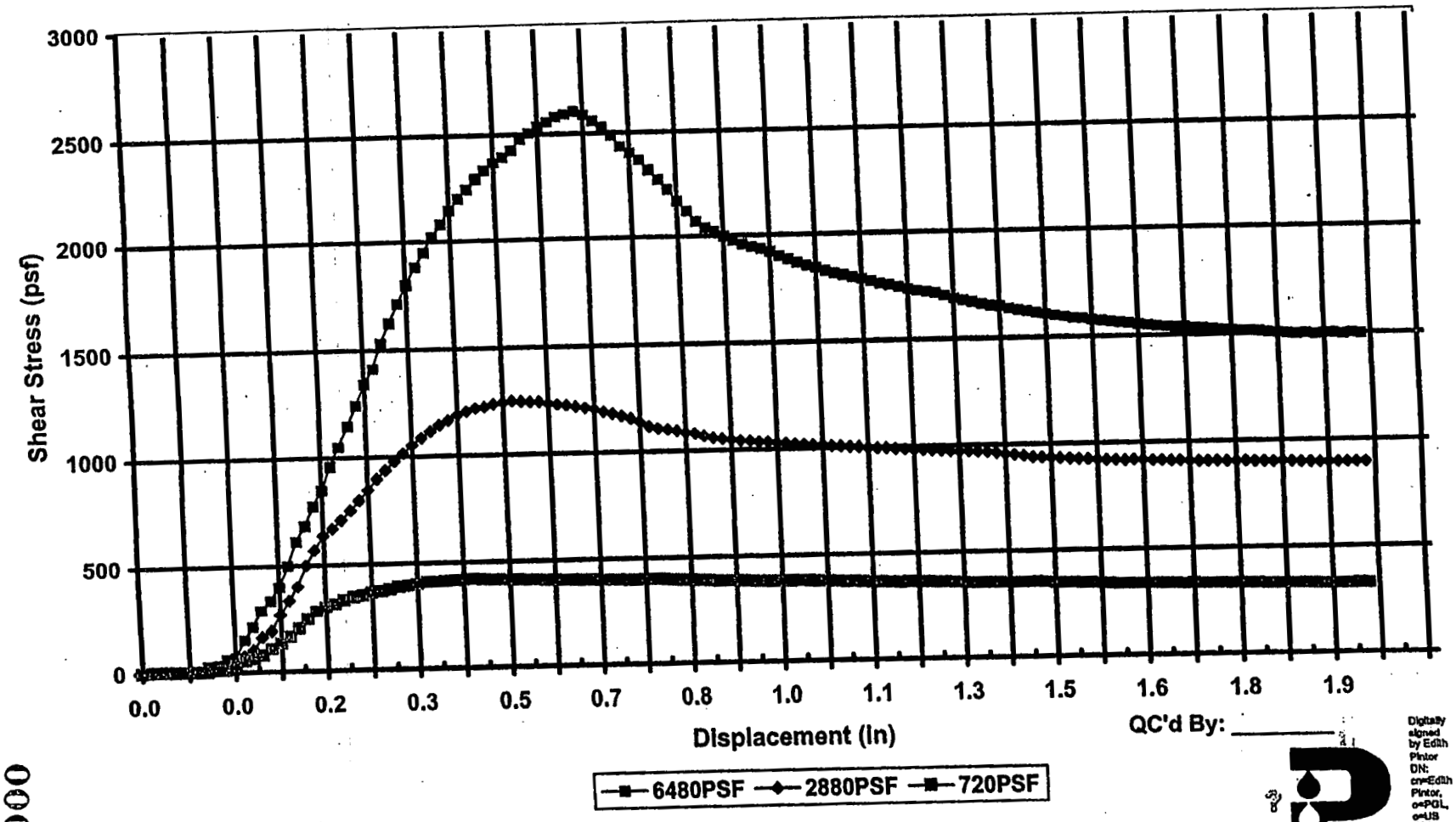
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020139_8
GCL Bentomat ST R#332 (Woven Side), C#74684 / Textured HDPE R#103114888, C#74498



QC'd By:

Digitally signed by Edith Pintor DN: cn=Edith Pintor, o=PGL, c=US Date: 2002.05.21 08:09:04 -07'00'

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020139_8
GCL Bentomat ST R#332 (Woven Side), C#74684 / Textured HDPE R#103114888, C#74498



QC'd By: _____

Digitally signed by Edith Pintor
DN: cn=Edith Pintor, o=PGL, c=US
Date: 2002.05.21 08:10:12 -07'00'

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TABLE 8
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: _____
13-May-02

TEST CONFIGURATION # 8

TOP BOX
GCL Bentomat ST R#332 (Woven Side) / C#74684
Textured HDPE R#103114888 / C#74498
BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 16.31%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	117.9	420	30	320	24
20.00	2880	112.60	1249	23	896	17
45.00	6480	115.7	2607	22	1495	13

COHESION (psf):	150.4	231.14
COEFFICIENT OF FRICTION:	0.38	0.20
FRICTION ANGLE(degrees):	20.8	11.3

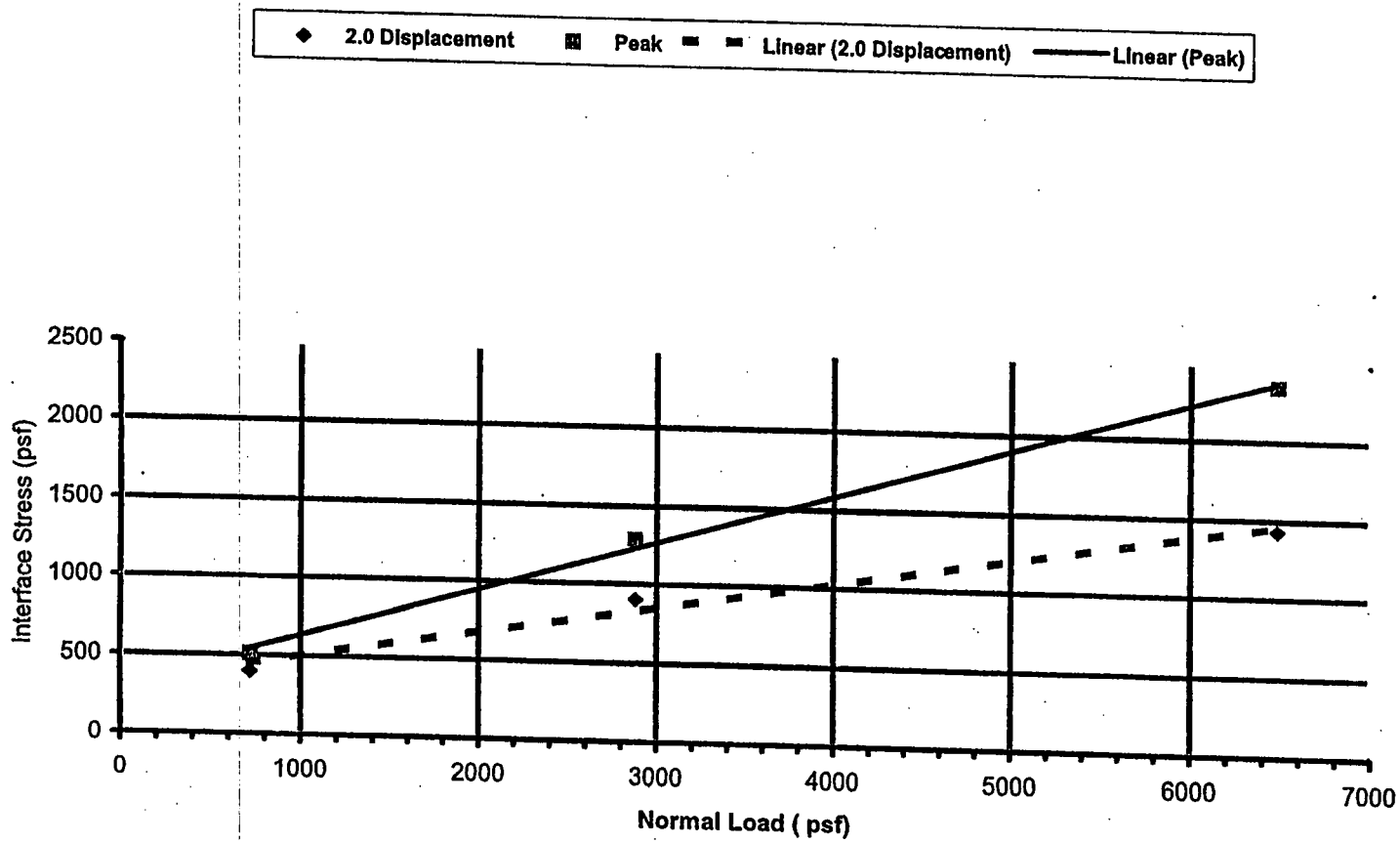
NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load,

Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020139_7
GCL Bentomat ST R#516 (Woven Side), C#74687 / Textured HDPE R#103114877, C#74497



QC'd By:

Digitally signed by Edith Pintor
DN: cn=Edith Pintor, o=PGL, c=US
Date: 2002.05.08 12:54:13 -07'00'

Signature Not Verified

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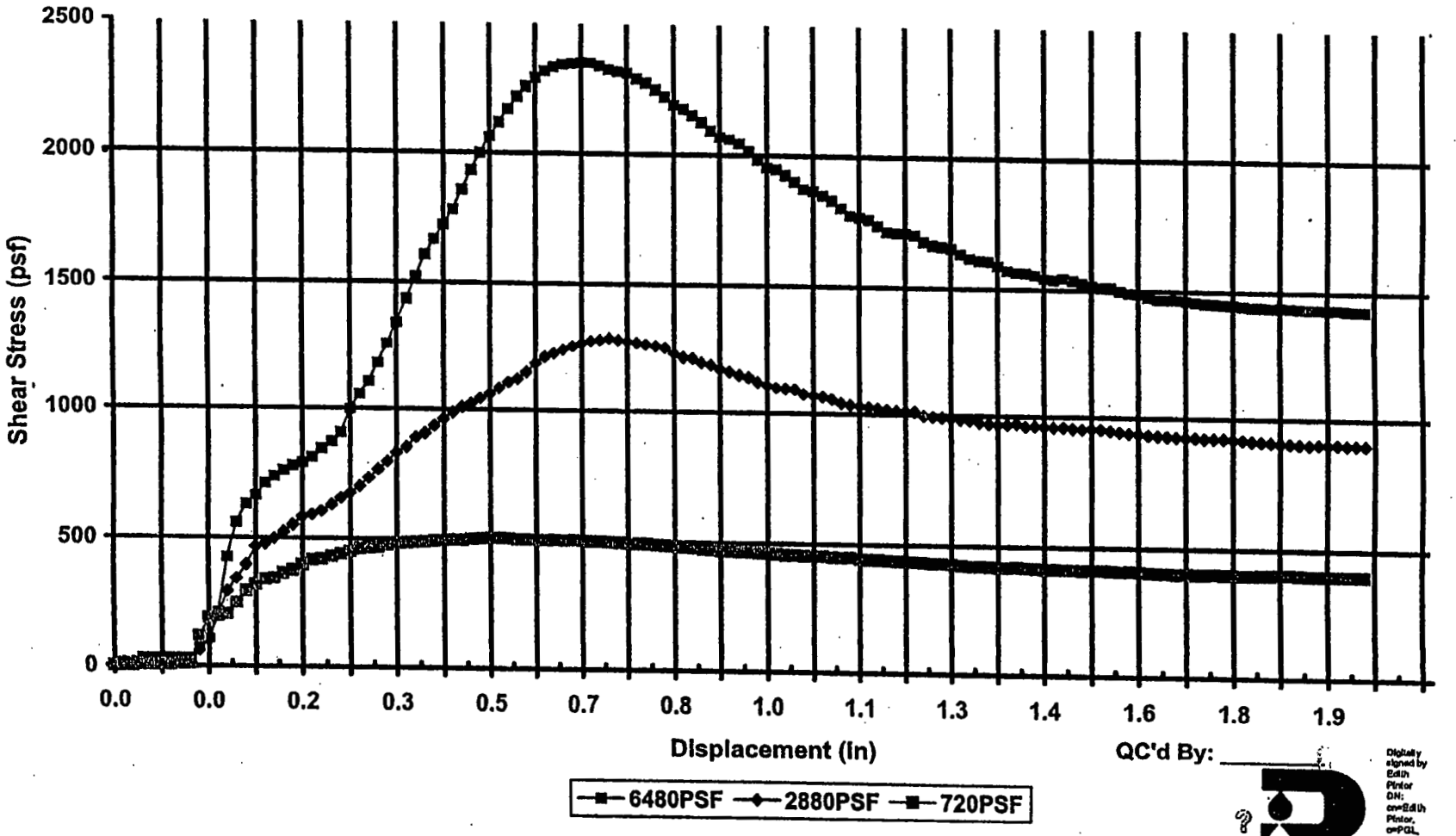
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020139_7
GCL Bentomat ST R#516 (Woven Side), C#74687 / Textured HDPE R#103114877, C#74497



QC'd By: _____

Digitally signed by Edith Pintor DN: cn=Edith Pintor, o=PGL, c=US Date: 2002.05.08 12:59:28 -07'00'

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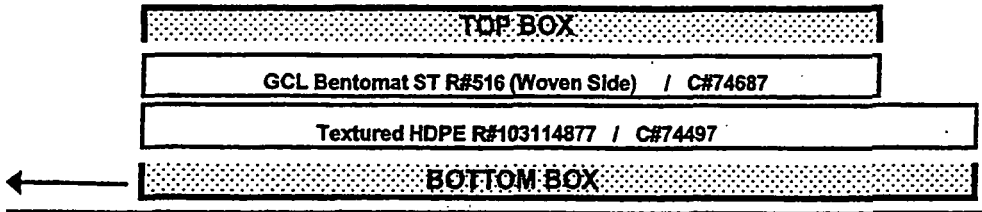
TABLE 7
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: _____
7-May-02

TEST CONFIGURATION # 7



GCI stretched for about 0.75 - 1".

TABLE 7
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: _____
7-May-02

TEST CONFIGURATION # 7

TOP BOX

GCL Bentomat ST R#516 (Woven Side) / C#74687

Textured HDPE R#103114877 / C#74497

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 12.93%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	129.6	509	35	402	29
20.00	2880	106.7	1287	24	905	17
45.00	6480	98.9	2348	20	1430	12

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	317	324
COEFFICIENT OF FRICTION:	0.32	0.18
FRICTION ANGLE(degrees):	17.6	9.9

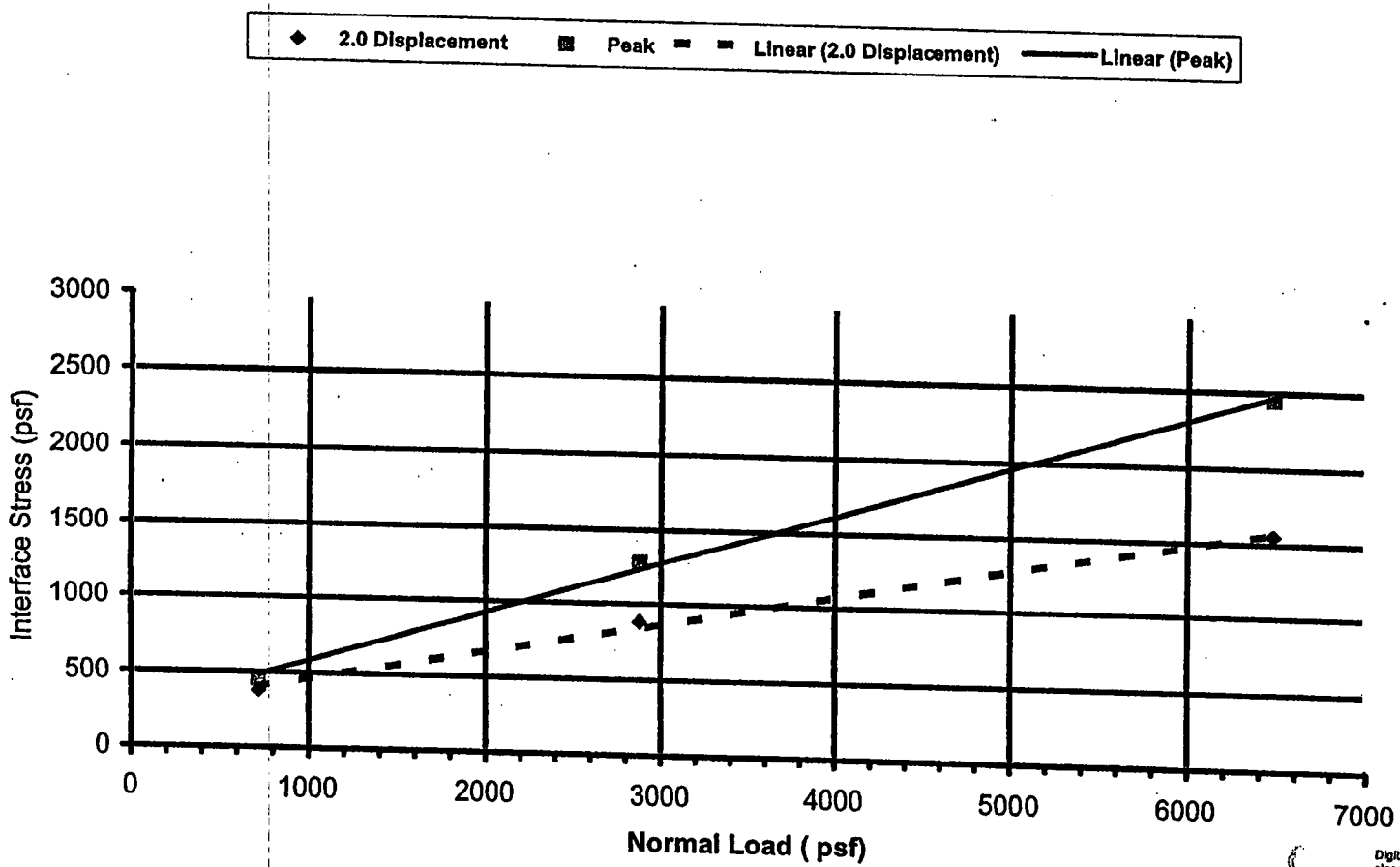
NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load,

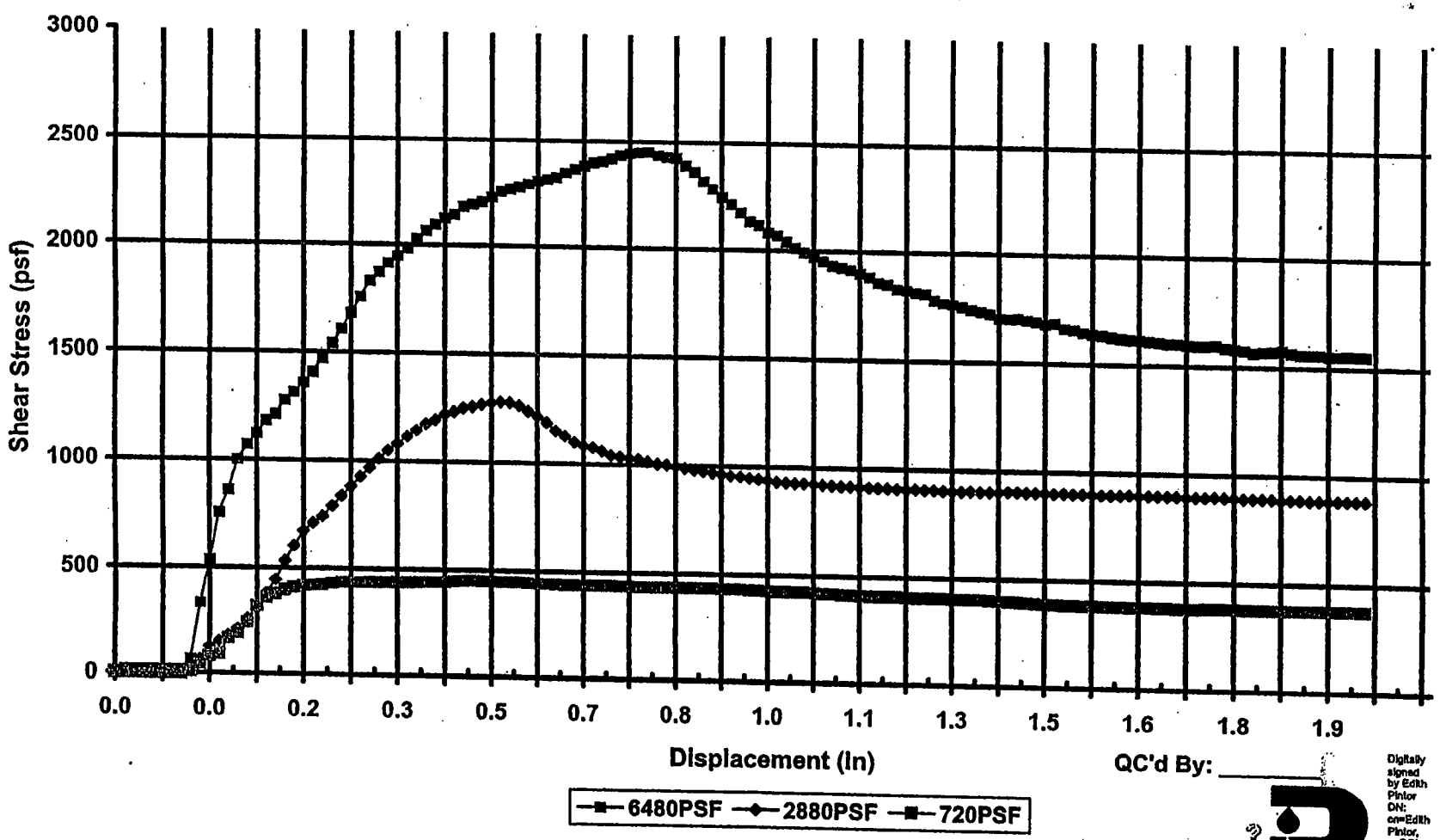
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020139_6
GCL Bentomat ST R#425 (Woven Side), C#74685 / Textured HDPE R#103114866, C#74496



QC'd By:

Digitally signed by Edith Pintor DN: cn=Edith Pintor, o=PGL, c=US Date: 2002.05.0 8 12:51:19 -07'00'

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020139_6
GCL Bentomat ST R#425 (Woven Side), C#74685 / Textured HDPE R#103114866, C#74496



QC'd By: _____

Digitally signed by Edith Pintor DN: cn=Edith Pintor, o=PGL, c=US Date: 2002.05.08 12:53:33 -07'00'

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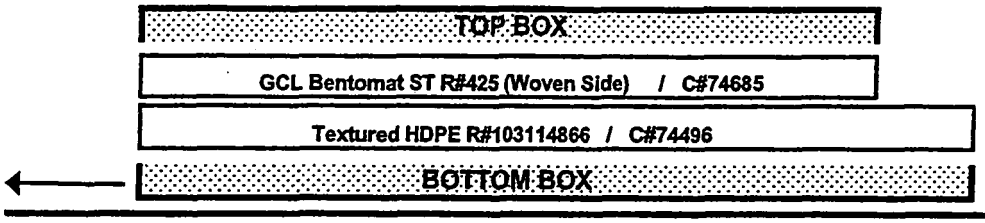
TABLE 6
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: _____
2-May-02

TEST CONFIGURATION # 6



GCl stretched for about 0.75 - 1".

TABLE 6
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: _____
2-May-02

TEST CONFIGURATION # 6

TOP BOX

GCL Bentomat ST R#425 (Woven Side) / C#74685

Textured HDPE R#103114866 / C#74496

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 15.71%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	126.7	453	32	375	28
20.00	2880	100.7	1279	24	884	17
45.00	6480	102.5	2452	21	1554	13

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	235.9	256
COEFFICIENT OF FRICTION:	0.34	0.20
FRICTION ANGLE(degrees):	19.0	11.5

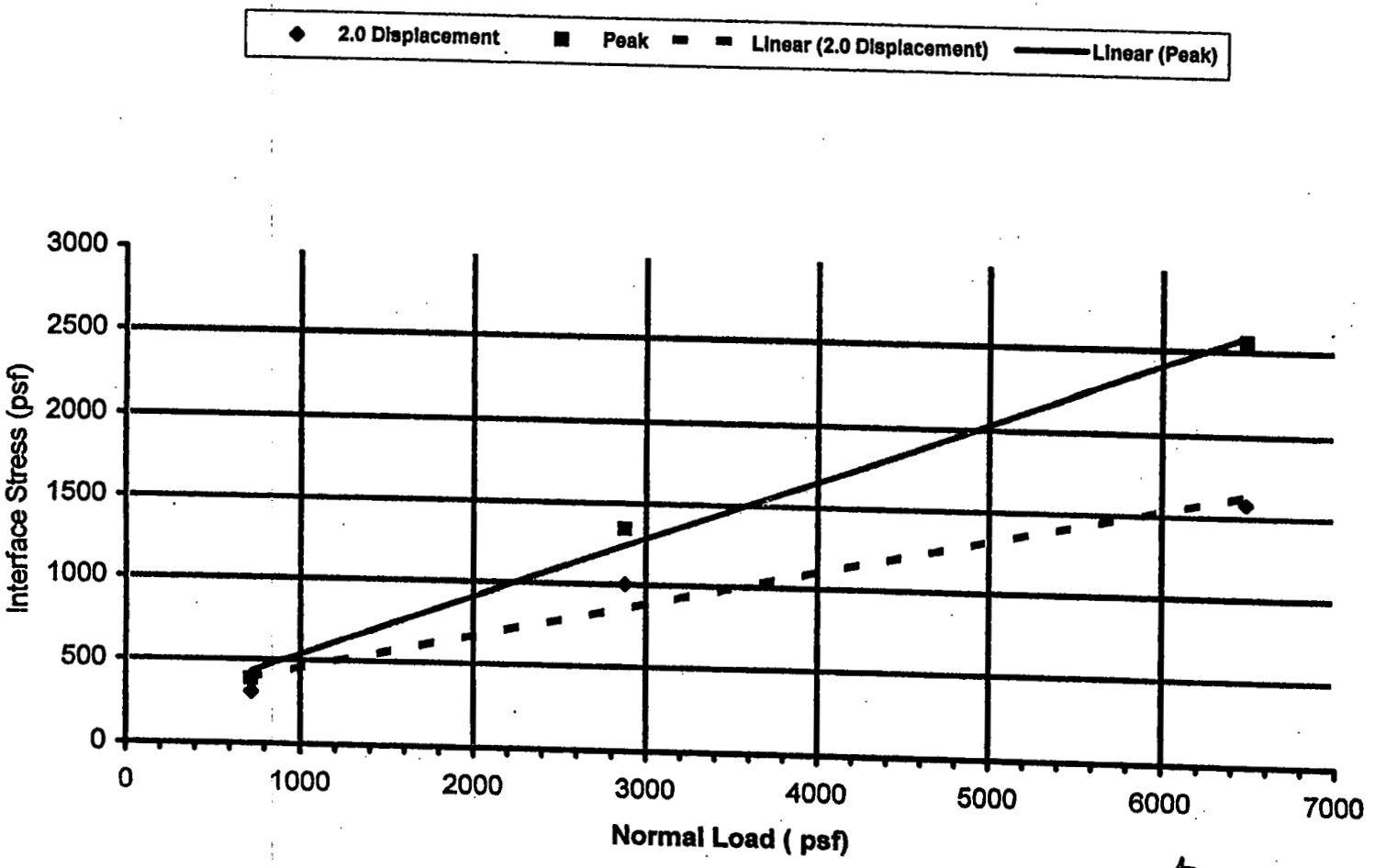
NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load,

Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020139_5
GCL Bentomat ST R#475 (Woven Side), C#74686 / Textured HDPE R#103114857, C#74495



QC'd By:

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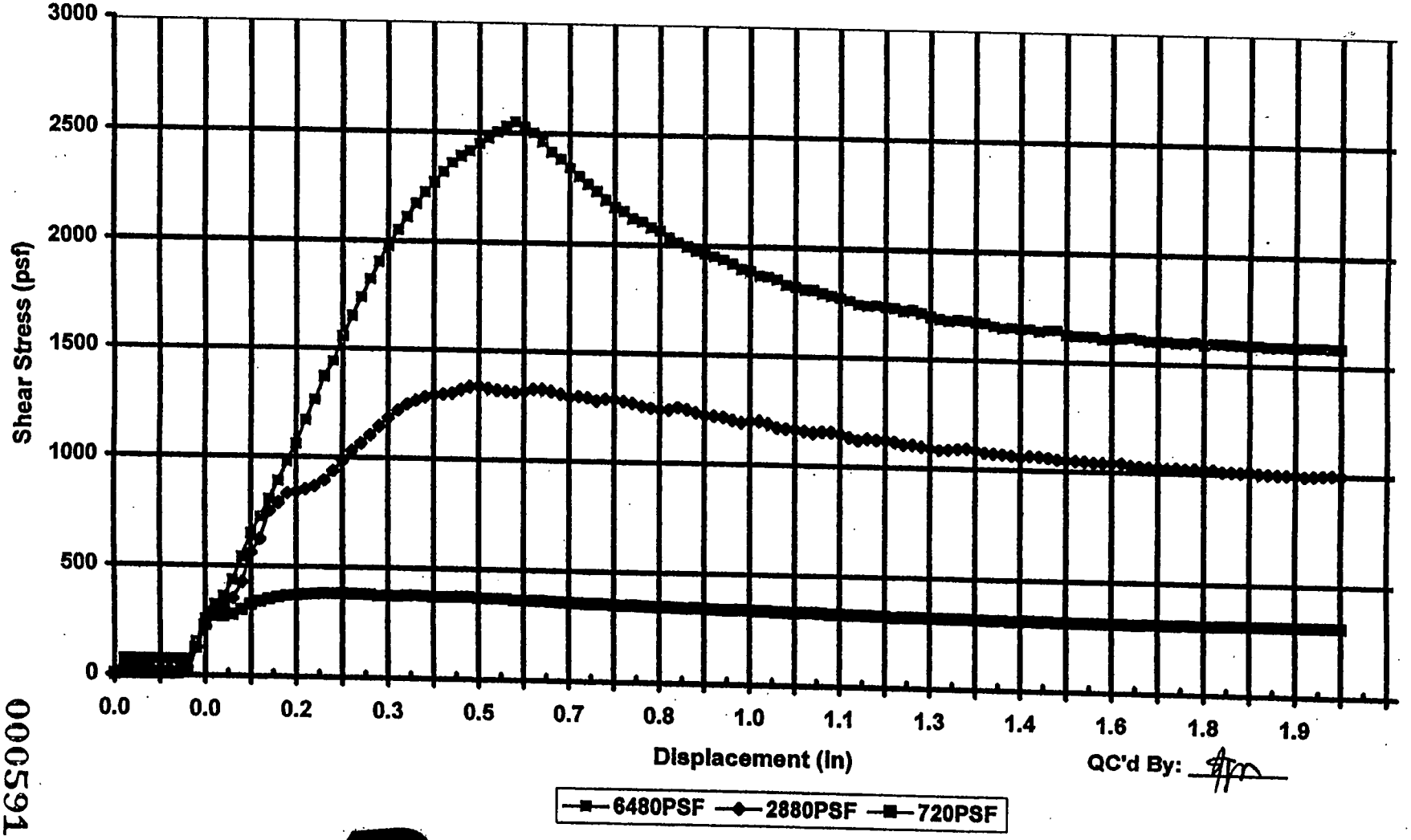
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020139_5
GCL Bentomat ST R#475 (Woven Side), C#74686 / Textured HDPE R#103114857, C#74495



QC'd By:

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TABLE 5
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: _____
29-Apr-02

TEST CONFIGURATION # 5

TOP BOX

GCL Bentomat ST R#475 (Woven Side) / C#74686

Textured HDPE R#103114857 / C#74495

BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCl stretched for about 0.75 - 1".

TABLE 5
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: _____ 29-Apr-02

TEST CONFIGURATION # 5

TOP BOX

GCL Bentomat ST R#475 (Woven Side) / C#74686

Textured HDPE R#103114857 / C#74495

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 12.33%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

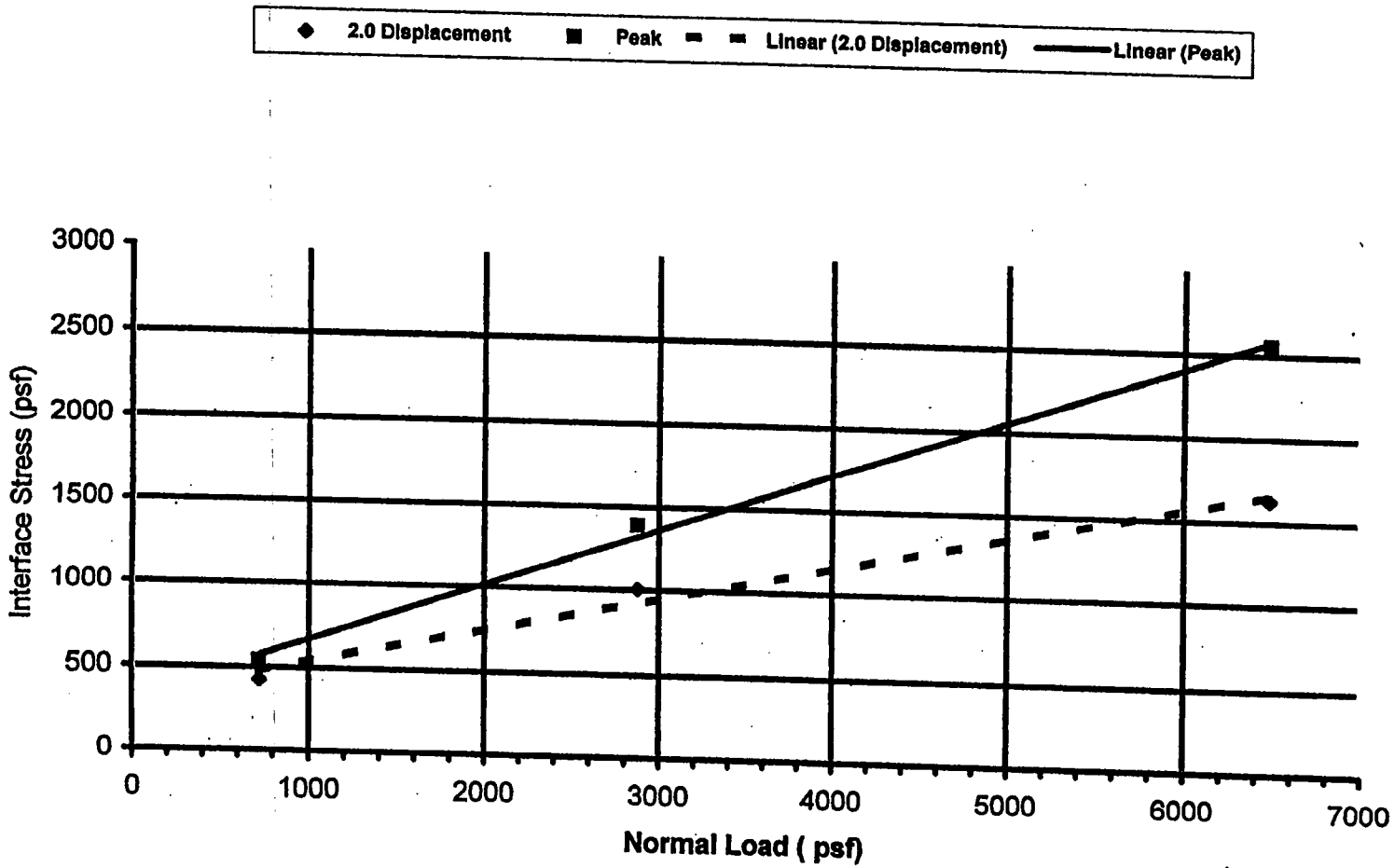
TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	117.28	376	28	303	23
20.00	2880	95.69	1336	25	1000	19
45.00	6480	90.13	2550	21	1582	14

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	166.3	236
COEFFICIENT OF FRICTION:	0.37	0.22
FRICTION ANGLE(degrees):	20.5	12.2

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020139_4
GCL Bentomat ST R#662 (Woven Side), C#74689 / Textured HDPE R#103114845, C#74494



QC'd By:

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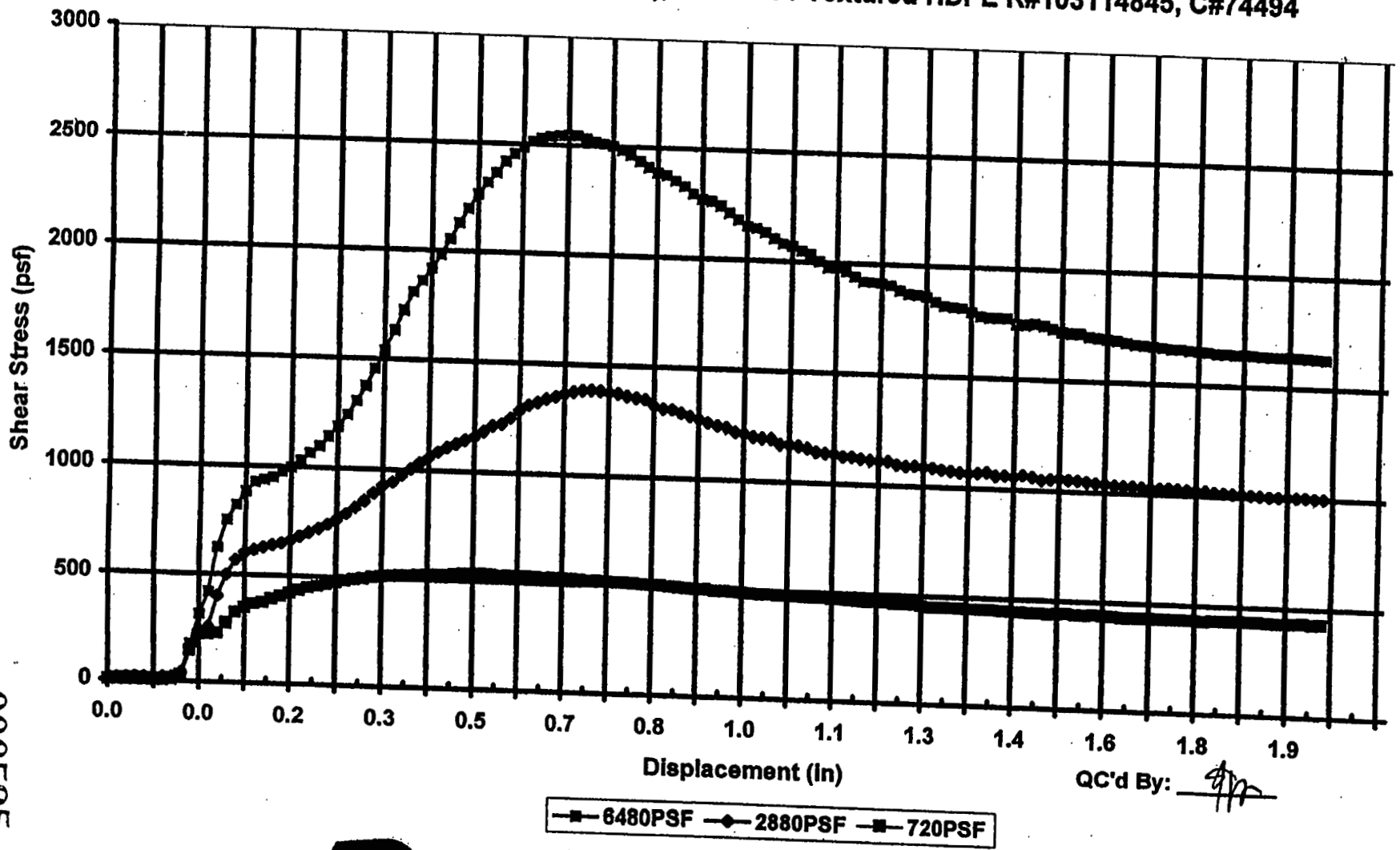
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020139_4
GCL Bentomat ST R#662 (Woven Side), C#74689 / Textured HDPE R#103114845, C#74494



QC'd By: _____

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TABLE 4
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: _____ 22-Apr-02

TEST CONFIGURATION # 4

TOP BOX

GCL Bentomat ST R#662 (Woven Side) / C#74689

Textured HDPE R#103114845 / C#74494

BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCI stretched for about 0.75 - 1".

TABLE 4
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: _____ 22-Apr-02

TEST CONFIGURATION # 4

TOP BOX

GCL Bentomat ST R#662 (Woven Side) / C#74689

Textured HDPE R#103114845 / C#74494

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 12.33%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

			PEAK STRENGTH		2.0 " DISPLACEMENT STRENGTH	
Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	SHEAR STRESS (psf)	PEAK SECANT ANGLE (degrees)	SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	138.1	529	36	423	30
20.00	2880	95.69	1385	26	1003	19
45.00	6480	90.13	2548	21	1628	14

COHESION (psf):	319	327
COEFFICIENT OF FRICTION:	0.35	0.21
FRICTION ANGLE(degrees):	19.2	11.6

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

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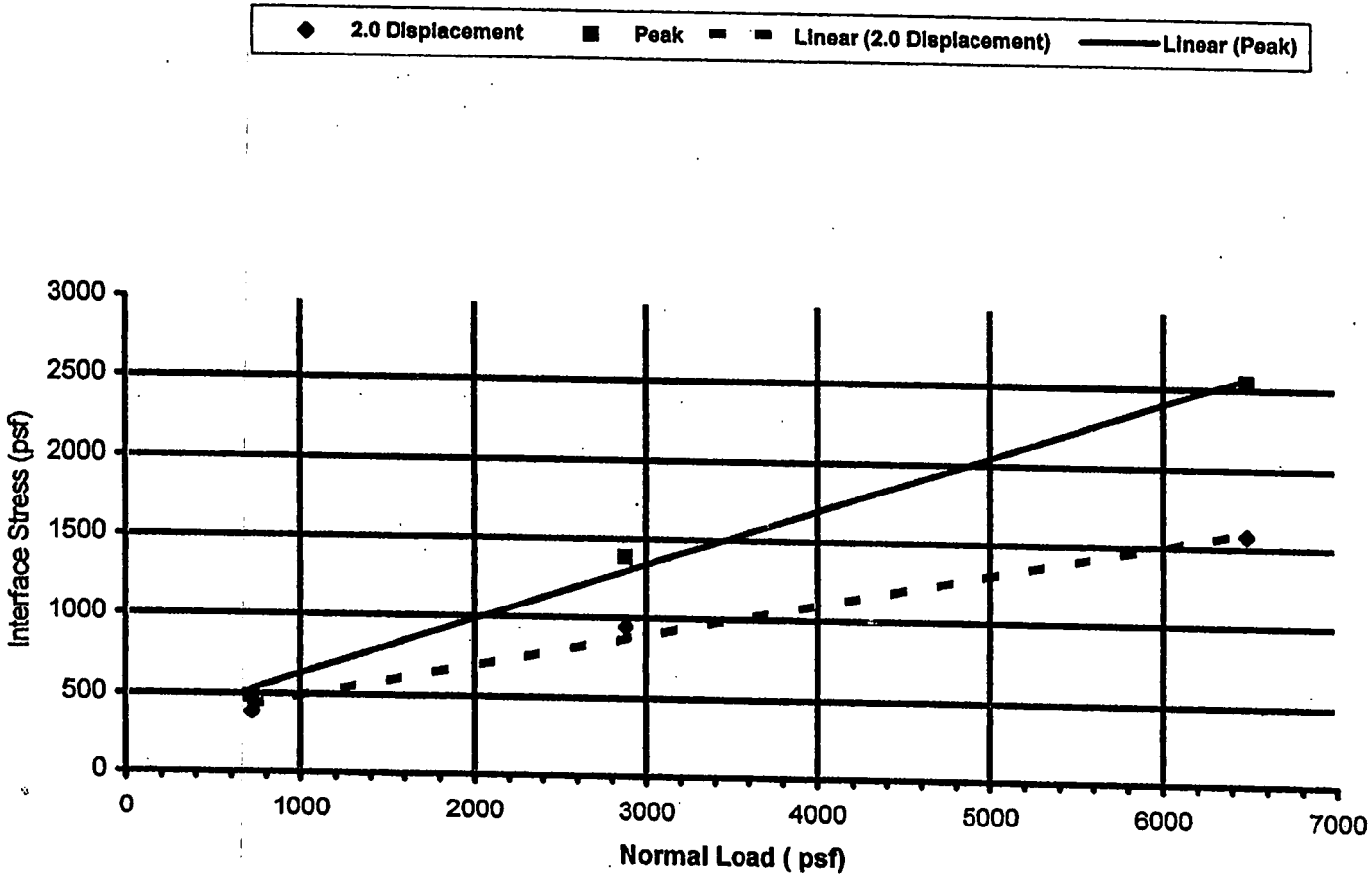
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020139_3
GCL Bentomat ST R#188 (Woven Side), C#74681 / Textured HDPE R#103114834, C#74493



QC'd By: [illegible]

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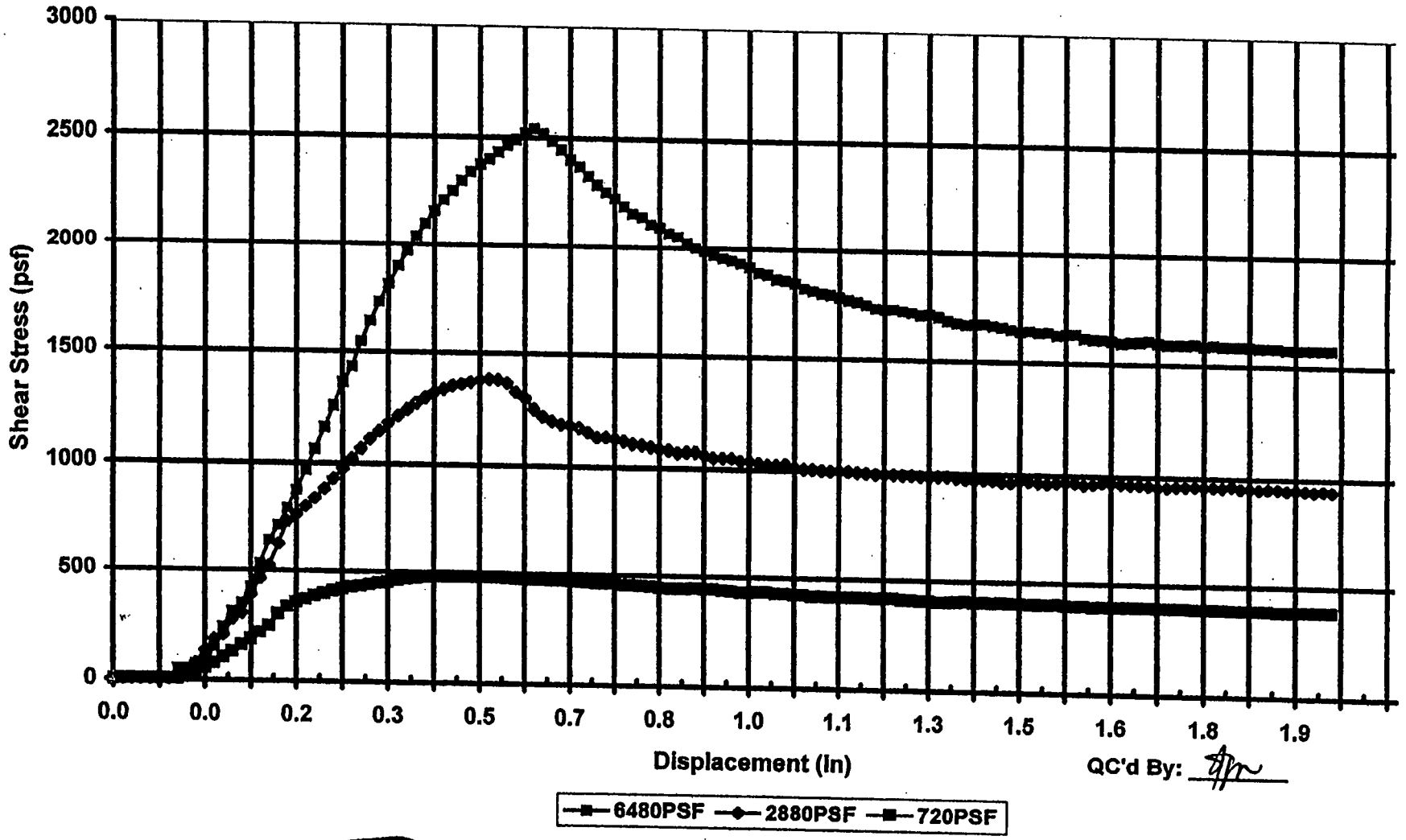
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020139_3
GCL Bentomat ST R#188 (Woven Side), C#74681 / Textured HDPE R#103114834, C#74493



QC'd By: _____

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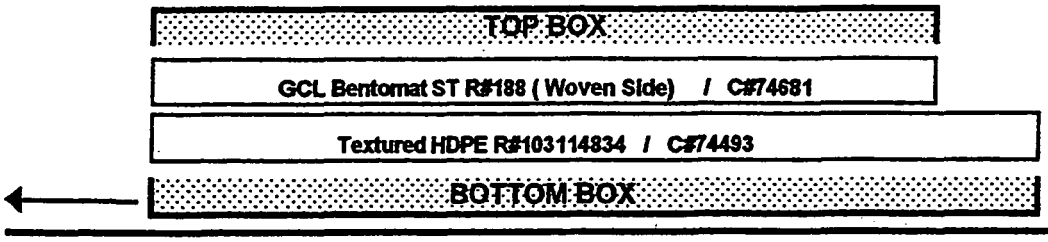
TABLE 3
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by:
16-Apr-02

TEST CONFIGURATION # 3



OBSERVATIONS:

See Figure #1 and #2
At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCl stretched for about 0.5 - 0.75".

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TABLE 3
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: 16-Apr-02

TEST CONFIGURATION # 3

TOP BOX

GCL Bentomat ST R#188 (Woven Side) / C#74681

Textured HDPE R#103114834 / C#74493

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 14.78%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	108.21	478	34	383	28
20.00	2880	112.80	1379	26	945	18
45.00	6480	114.68	2539	21	1576	14

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	275.3	283
COEFFICIENT OF FRICTION:	0.35	0.20
FRICTION ANGLE(degrees):	19.5	11.5

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

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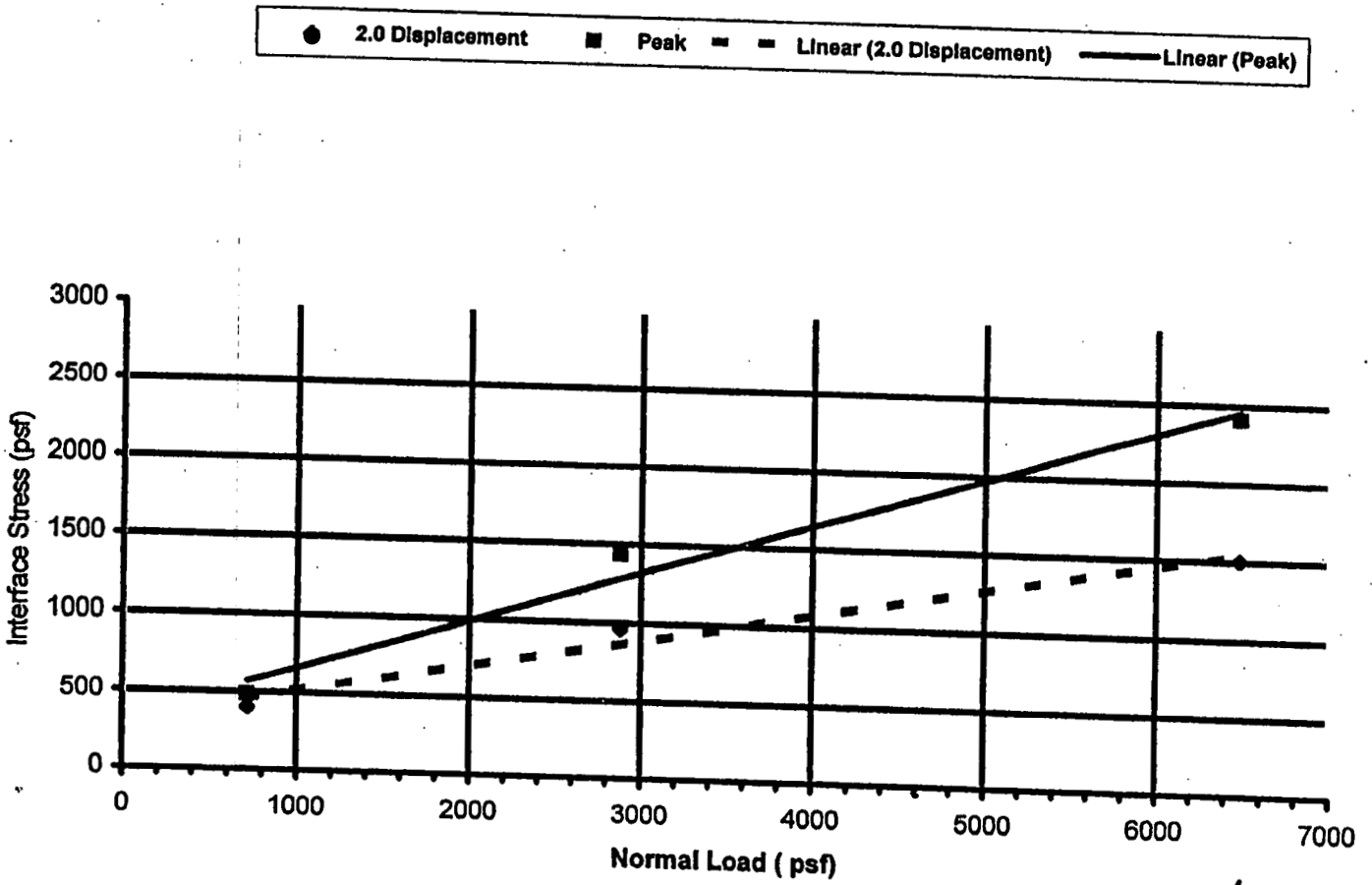
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020139_3
GCL Bentomat ST R#839 (Woven Side) , C#74691 / Textured HDPE R#103114822, C#74492



QC'd By:

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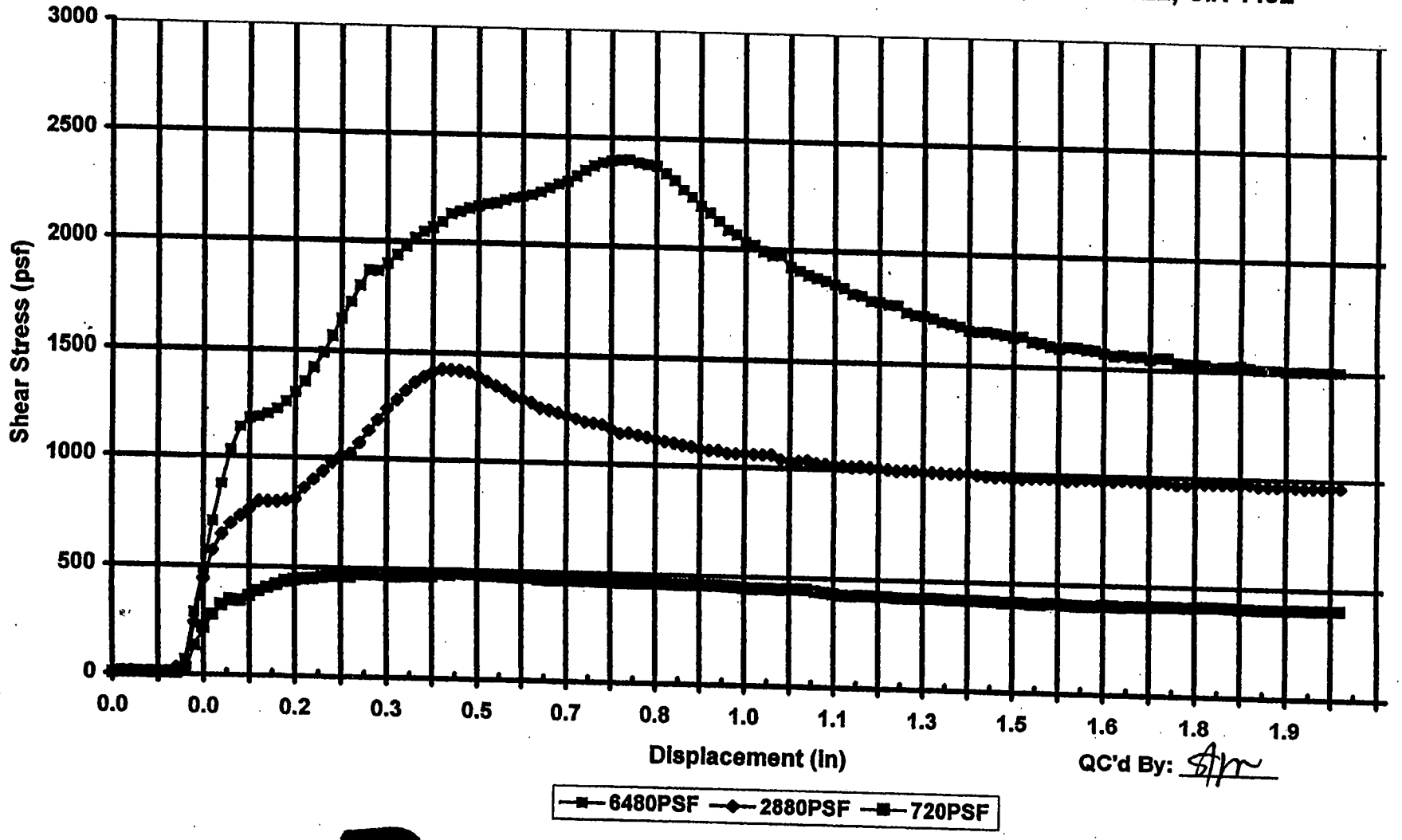
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020139_2
GCL Bentomat ST R#839 (Woven Side), C#74691 / Textured HDPE R#103114822, C#74492



QC'd By: SJM

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TABLE 2
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: 17-Apr-02

TEST CONFIGURATION # 2

TOP BOX

GCL Bentomat ST R#839 (Woven Side) / C#74691

Textured HDPE R#103114822 / C#74492

BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCl stretched for about 0.5 - 0.75".

TABLE 2
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: 17-Apr-02

TEST CONFIGURATION # 2

TOP BOX

GCL Bentomat ST R#839 (Woven Side) / C#74691

Textured HDPE R#103114822 / C#74492

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 13.98%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	111.42	479	34	402	29
20.00	2880	90.87	1425	26	963	18
45.00	6480	74.39	2402	20	1504	13

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	335	328
COEFFICIENT OF FRICTION:	0.33	0.19
FRICTION ANGLE(degrees):	18.1	10.6

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

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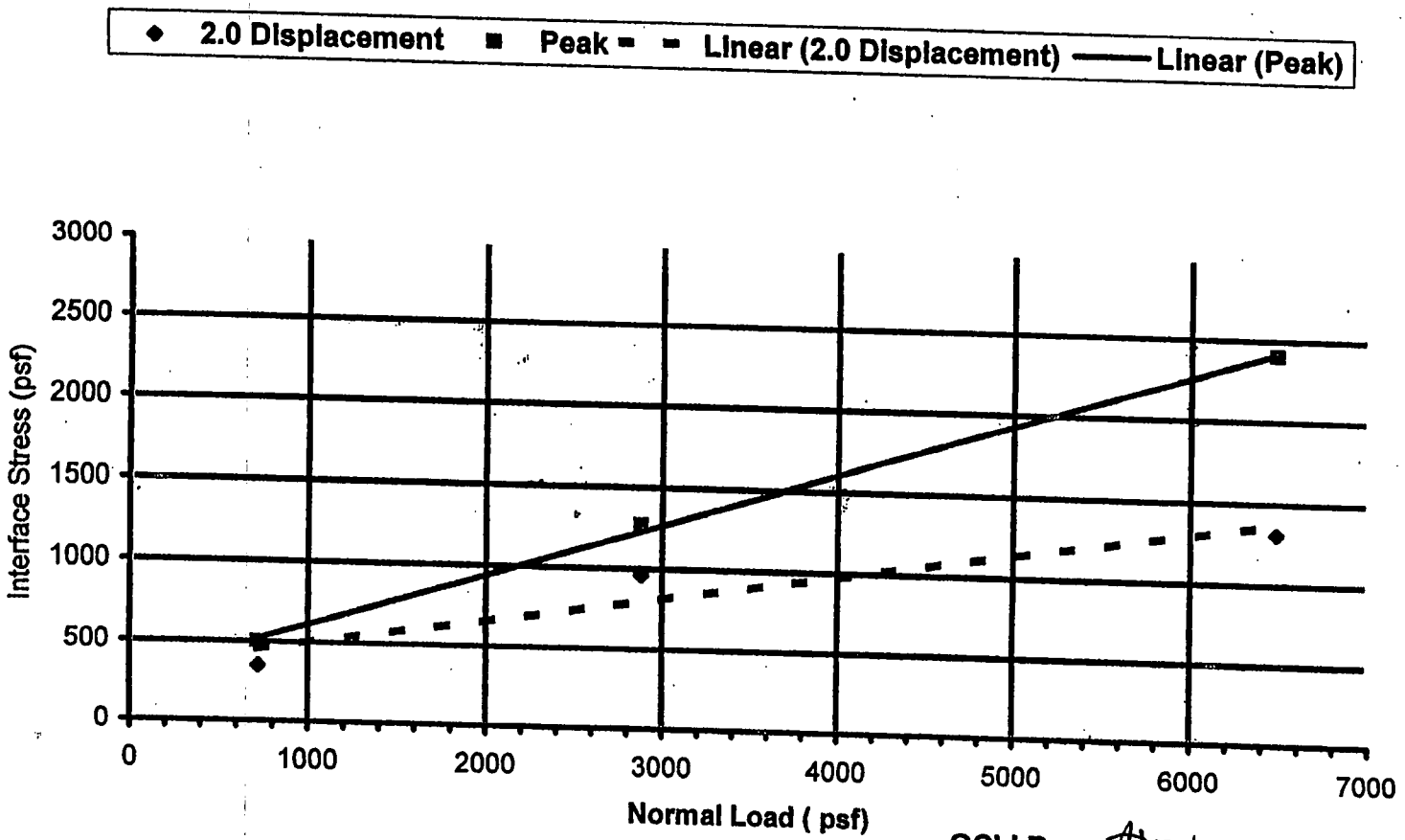
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020139_1
Bentomat ST R#888 (Woven Side), C#74692 / Textured HDPE R#103114811, C#74491



QC'd By:

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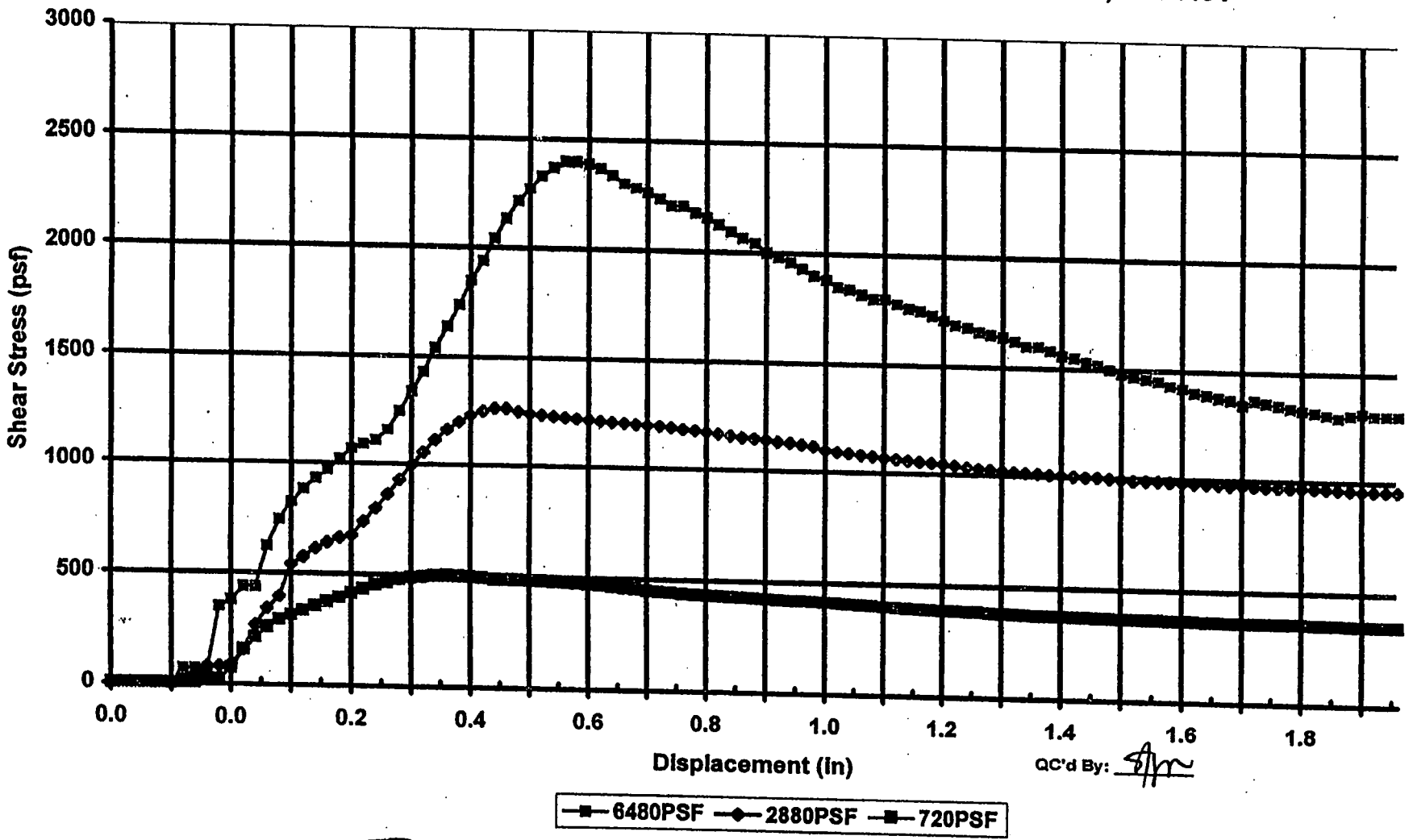
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020139_1
Bentomat ST R#888 (Woven Side), C#74692 / HDPE R#103114811, C#74491



QC'd By:

Precision Geosynthetic Laboratories

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TABLE 1
CLIENT: CETCO
PROJECT: Fluor Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: _____ 15-Apr-02

TEST CONFIGURATION # 1

TOP BOX
Bentomat ST GCL R#888 (Woven Side) / C#74692
Textured HDPE R#103114811 / C#74491
BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20 psi and 45 psi normal load, GCL stretched for about 0.75-1".

JAPA

TABLE 1
CLIENT: CETCO
PROJECT: Fluor Fernald

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INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020139

QC'd by: SJN
15-Apr-02

TEST CONFIGURATION # 1

TOP BOX

Bentomat ST GCL R#888 (Woven Side) / C#74692

Textured HDPE R#103114811 / C#74491

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE, and the non-woven side is in contact with wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 15.72%.

HYDRATION:

1. Each set of specimen was hydrated for 7days @ 432psf

CONSOLIDATION:

1. Each set of specimens were consolidated under drained condition for 48 hrs at normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH: SHEAR STRESS (psf)	PEAK STRENGTH: PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH: SHEAR STRESS (psf)	2.0 " DISPLACEMENT STRENGTH: DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	118.96	496	35	350	26
20.00	2880	100.28	1269	24	961	18
45.00	6480	101.6	2400	20	1310	11

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	283	338
COEFFICIENT OF FRICTION:	0.33	0.16
FRICTION ANGLE(degrees):	18.2	9.1

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

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CLIENT: CETCO
PROJECT: FERNALD 2002
INTERFACE SHEAR TEST RESULTS
(PGL Job No. 020139)

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER	DATE RECEIVED	ORIGIN OF MATERIAL
Textured HDPE R#103114811	74491	3/20/02	GSE Linings
Textured HDPE R#103114822	74492	3/20/02	GSE Linings
Textured HDPE R#103114834	74493	3/20/02	GSE Linings
Textured HDPE R#103114845	74494	3/20/02	GSE Linings
Textured HDPE R#103114857	74495	3/20/02	GSE Linings
Textured HDPE R#103114866	74496	3/20/02	GSE Linings
Textured HDPE R#103114877	74497	3/20/02	GSE Linings
Textured HDPE R#103114888	74498	3/20/02	GSE Linings
Textured HDPE R#103114899	74499	3/20/02	GSE Linings
Textured HDPE R#103114910 15a	74500	3/20/02	GSE Linings
ntomat ST R#138	74680	3/28/02	Cetco
Bentomat ST R#188	74681	3/28/02	Cetco
Bentomat ST R#241	74682	3/28/02	Cetco
Bentomat ST R#283	74683	3/28/02	Cetco
Bentomat ST R#332	74684	3/28/02	Cetco
Bentomat ST R#425	74685	3/28/02	Cetco
Bentomat ST R#475	74686	3/28/02	Cetco
Bentomat ST R#516	74687	3/28/02	Cetco
Bentomat ST R#610	74688	3/28/02	Cetco
Bentomat ST R#662	74689	3/28/02	Cetco
Bentomat ST R#796	74690	3/28/02	Cetco
Bentomat ST R#839	74691	3/28/02	Cetco
Bentomat ST R#888	74692	3/28/02	Cetco

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D6243	Interface Shear

1160 North Gilbert Street. Anaheim. CA 92801. Tel # 714-520-9631. Fax # 714-520-9637

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TEST CONDITIONS: The samples were conditioned for a minimum one hour in the laboratory at 22 ± 2°C (71.6 ± 3.6°F) and at 60 ± 10% relative humidity prior to test.

TEST RESULTS:

The test results are summarized in Tables 1 through 10. The units in which the data are reported are included on the tables.

PRECISION GEOSYNTHETIC LABORATORIES

CAL-LAB
Initials: #: 013
Date: 5/2/02

Edith Pintor
Quality Assurance

Cora B. Queja
Vice President

1160 North Gilbert Street. Anaheim. CA 92801. Tel # 714-520-9631. Fax # 714-520-9637

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Precision Geosynthetic Laboratories

May 2, 2001

Mr. Bill Urchick
CETCO
1500 W. Shure Drive
Arlington Heights, IL 60004

Dear Mr. Urchick: **RE: Fernald 2002**

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

Enclosed is the **initial** report for the testing of ten (10) textured HDPE, and ten (10) GCL received March 20, and 28, 2002.

It should be noted that the test specimen and test sample used for this report was believed to be representative of the material produced under the designation herein stated. However, these results are indicative of only the specimens 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.

It is a company policy to keep the physical records of each job for 2 years since the receipt of the samples and keep the electronic file for 7 years. We will dispose the samples two weeks after the final report is faxed to you. Should you want us to keep them for some period of time, please advise us immediately.

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

Edith Pintor
Quality Assurance

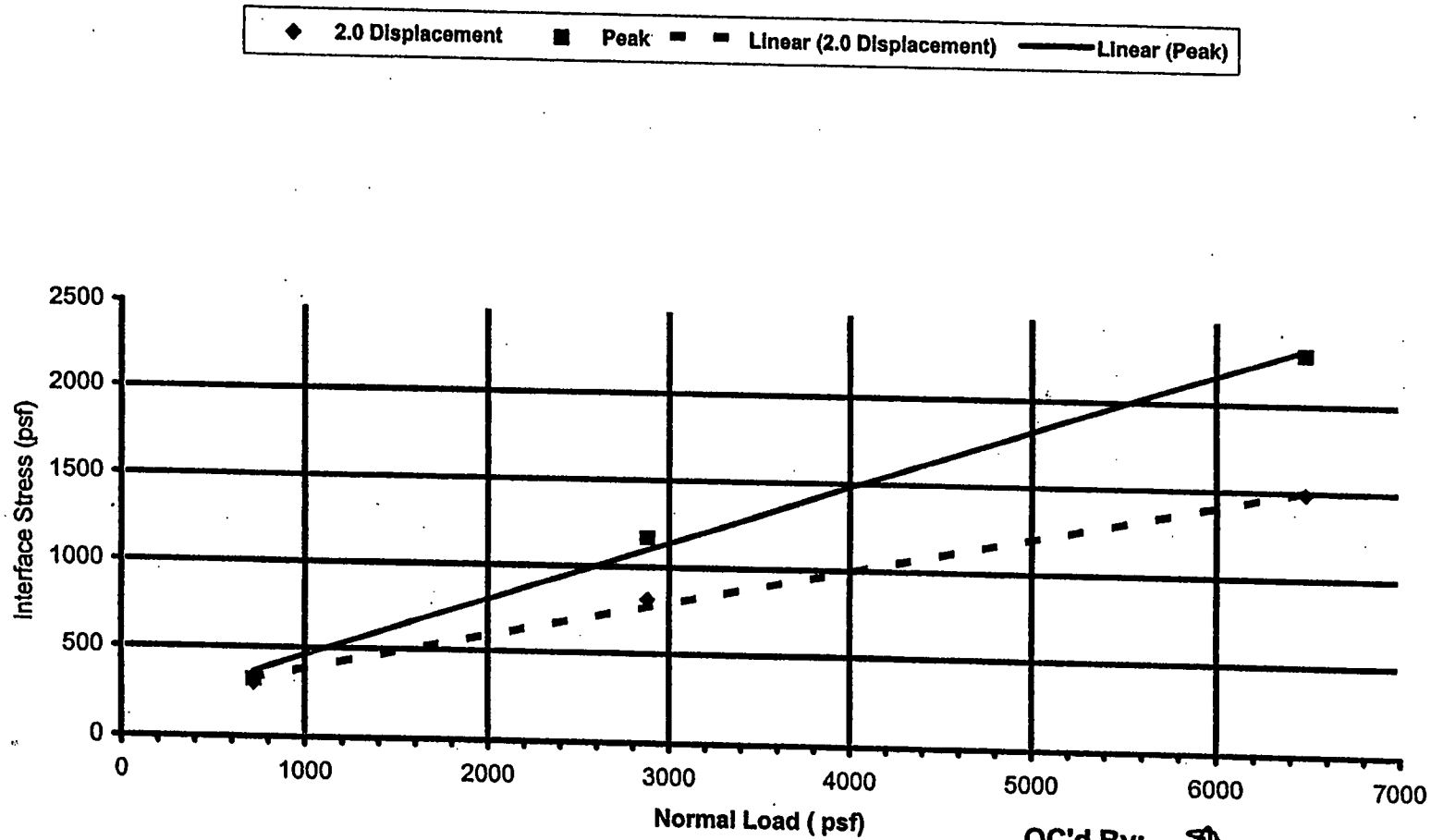
Cora B. Queja
Vice President

Enclosure: (Job No. 020139)

000612

1160 North Gilbert Street, Anaheim, CA 92801, Tel # 714-520-9631, Fax # 714-520-9637

Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_16A
GCL Bentomat ST R#162 L#200203LO, C#73954 / Textured HDPE R#103114266, C#74104



QC'd By:

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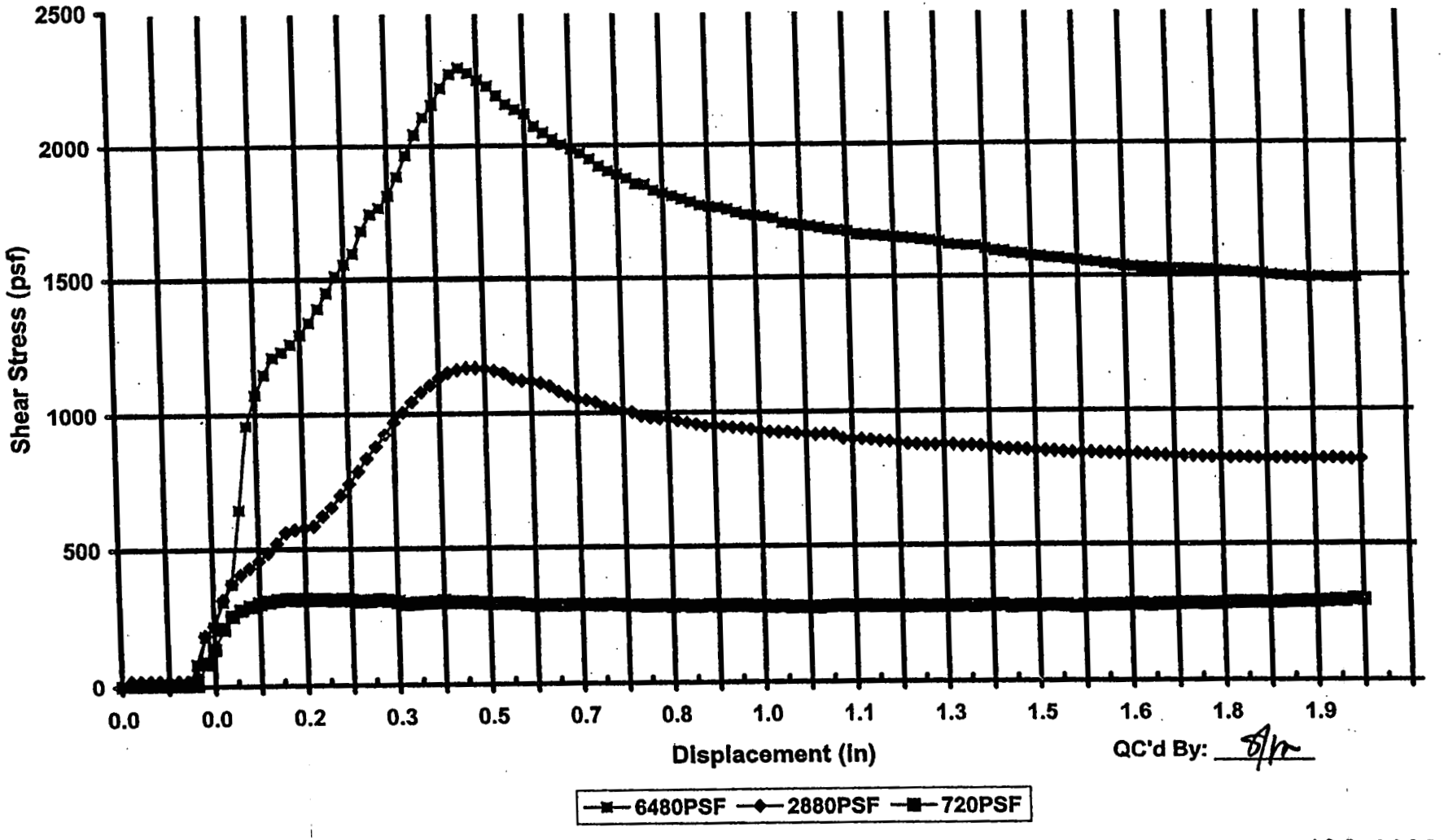
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_16A
GCL Bentomat ST R#162 L#200203LO, C#73954 / Textured HDPE R#103114266, C#74104



QC'd By: _____

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TABLE 16A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: 8/m
Feb. 13, 2002

TEST CONFIGURATION # 16A

TOP BOX

GCL Bentomat ST R#162 L#200203LO (Woven Side) / C#73954

Textured HDPE R#103114266 / C#74104

BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCl stretched for about 0.75 - 1". No tearing of the woven geotextile was observed at all normal loads.

TABLE 16A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: dm
Feb. 13, 2002

TEST CONFIGURATION # 16A

TOP BOX

GCL Bentomat ST R#162 L#200203LO (Woven Side) / C#73954

Textured HDPE R#103114266 / C#74104

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 7.3%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	128.83	319	24	295	22
20.00	2880	135.85	1172	22	812	16
45.00	6480	91.53	2295	20	1490	13

COHESION (psf):	120	175.14
COEFFICIENT OF FRICTION:	0.34	0.21
FRICTION ANGLE(degrees):	18.8	11.6

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

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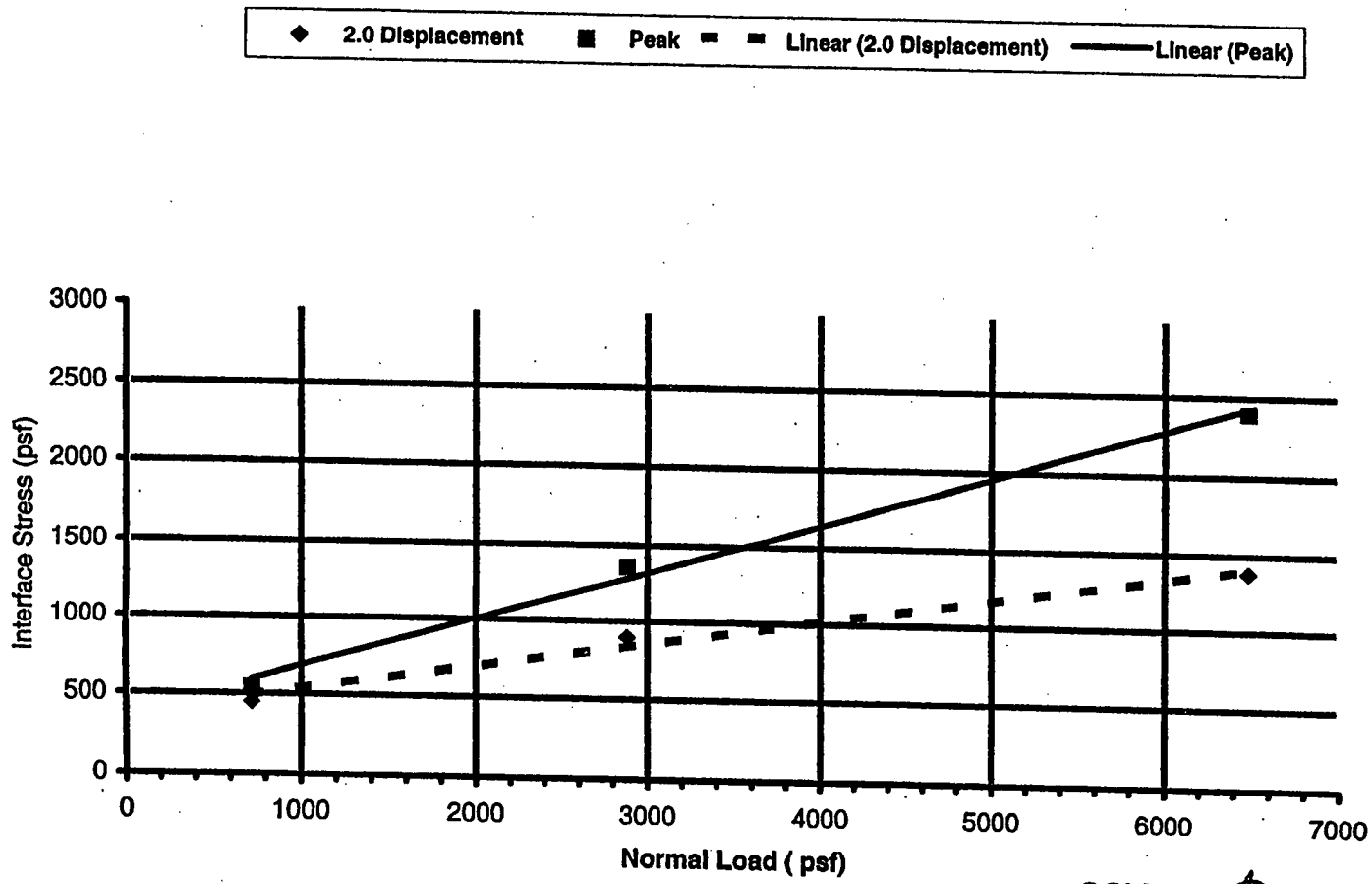
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_15A
GCL Bentomat ST R#210 L#200203LO, C#73973 / Textured HDPE R#103114192, C#74105



QC'd By:

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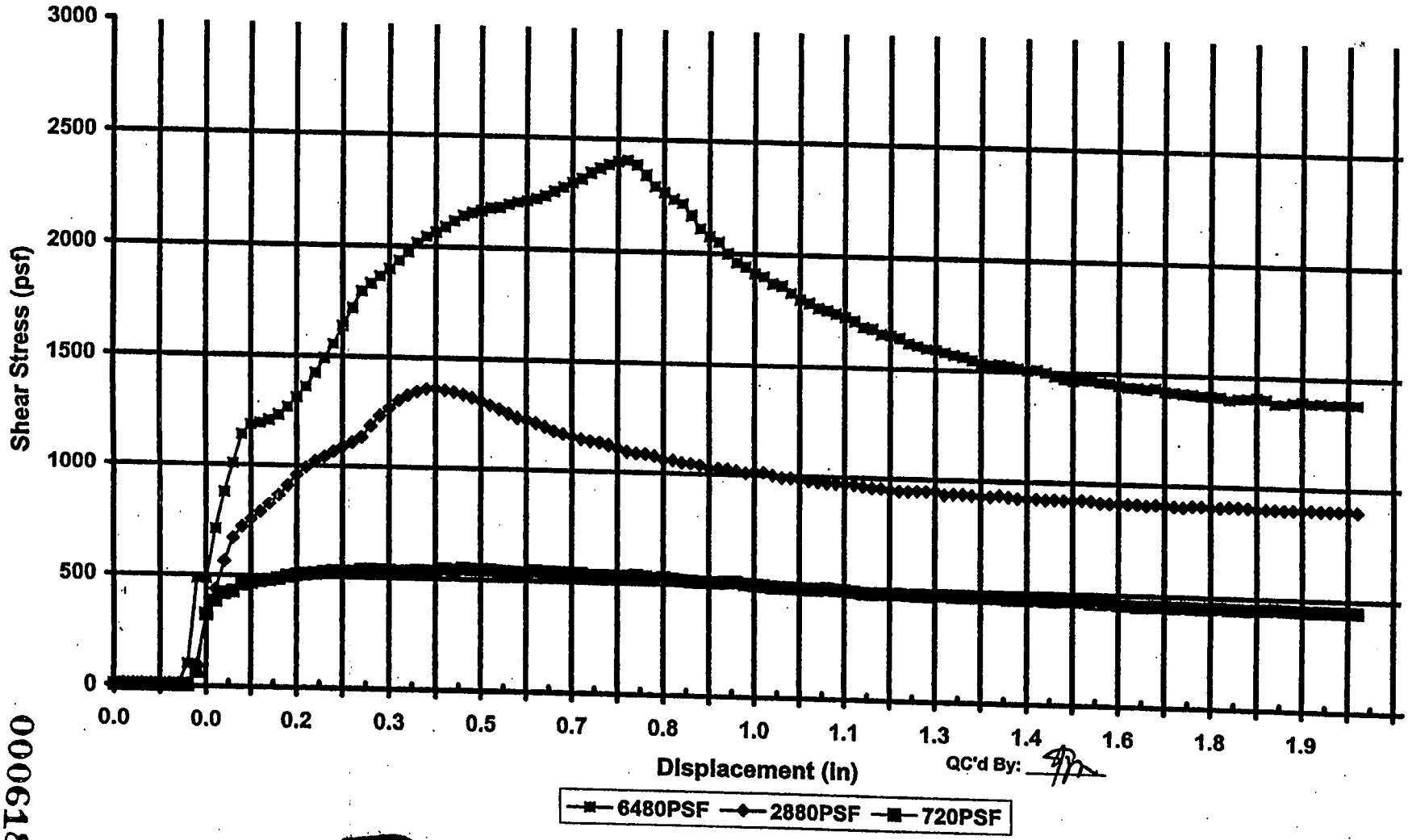
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_15A
GCL Bentomat ST R#210 L#200203LO, C#73973 / Textured HDPE R#103114192, C#74105



QC'd By:

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TABLE 15A

CLIENT: CETCO

PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)

PGL Job No. G020007

QC'd by: _____ 21-Mar-02

TEST CONFIGURATION # 15A

TOP BOX

GCL Bentomat ST R#210 L#200203LO (Woven Side) / C#73973

Textured HDPE R#103114192 / C#74105

BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCl stretched for about 0.5 - 0.75".

TABLE 15A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: 21-Mar-02

TEST CONFIGURATION # 15A

TOP BOX

GCL Bentomat ST R#210 L#200203LO (Woven Side) / C#73973

Textured HDPE R#103114192 / C#74105

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 15.13%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	118.9	548	37	450	32
20.00	2880	96.9	1359	25	897	17
45.00	6480	84.9	2406	20	1384	12

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	365	375
COEFFICIENT OF FRICTION:	0.32	0.16
FRICTION ANGLE(degrees):	17.7	9.1

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

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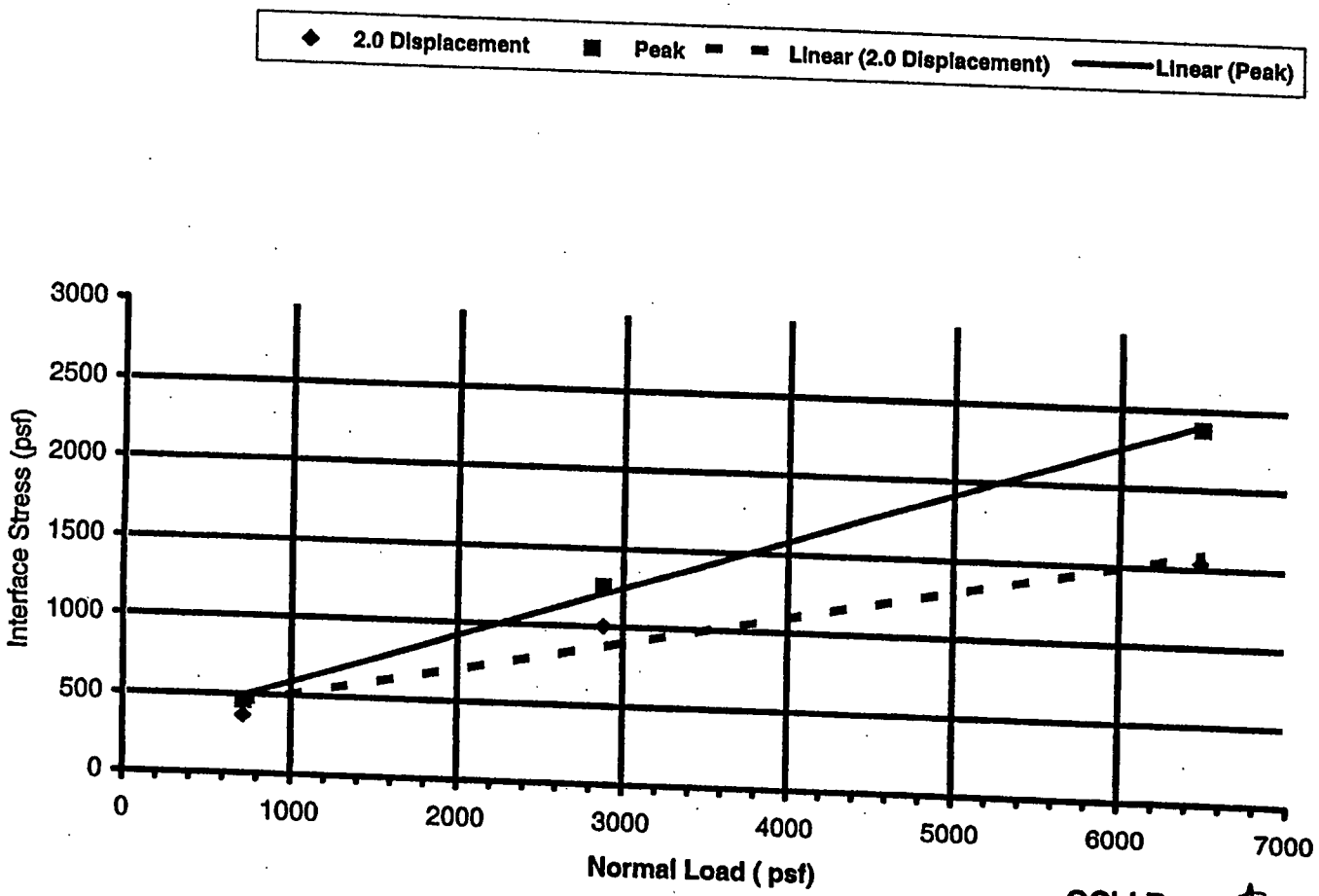
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_14A
GCL Bentomat ST R#252 L#200203LO, C#73974 / Textured HDPE R#103114337, C#74172



QC'd By:

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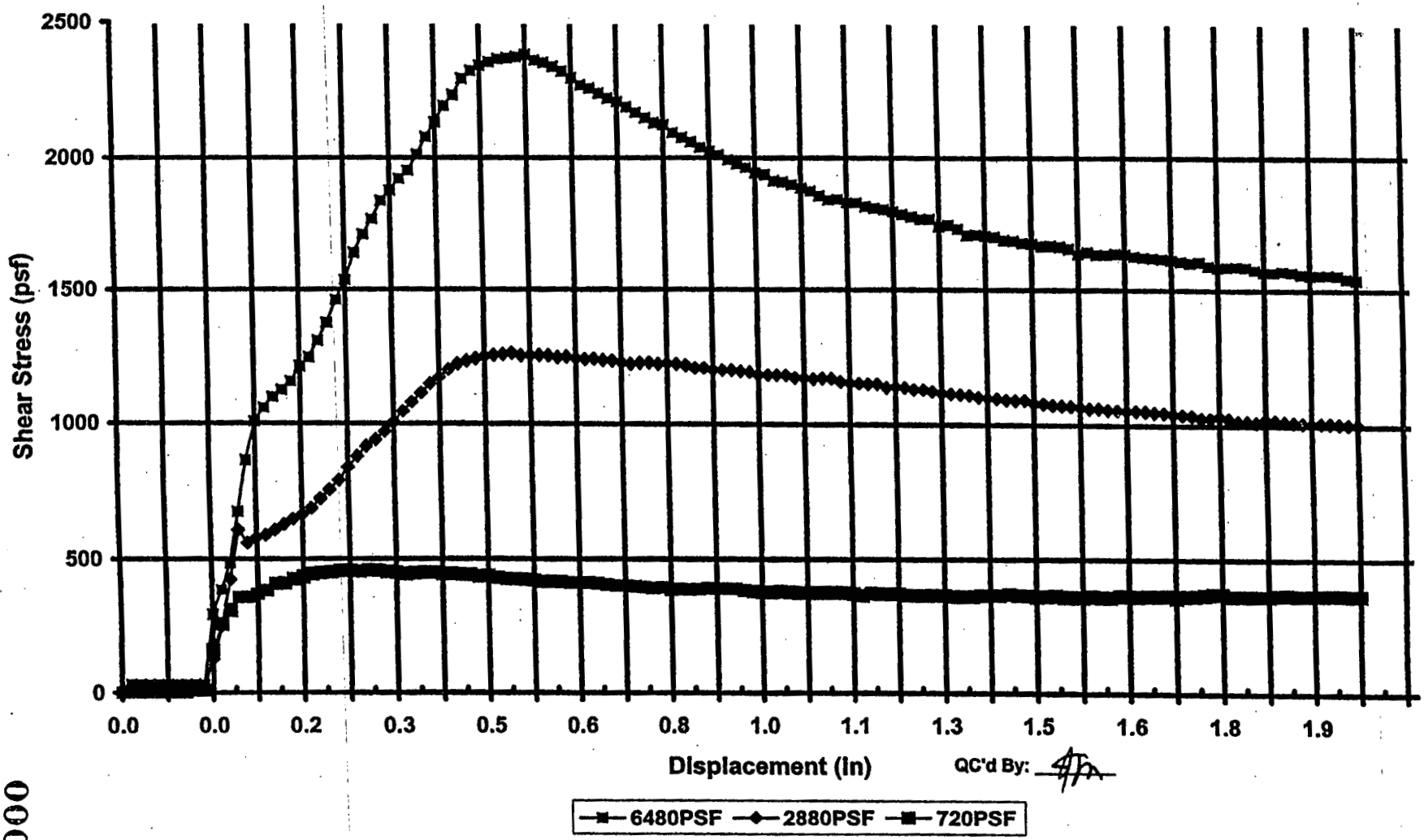
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_14A
GCL Bentomat ST R#252 L#200203LO, C#73974 / Textured HDPE R#103114337, C#74172



QC'd By:

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TABLE 14A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: 18-Mar-02

TEST CONFIGURATION # 14A

TOP BOX

GCL Bentomat ST R#252 L#200203LO (Woven Side) / C#73974

Textured HDPE R#103114337 / C#74172

BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCI stretched for about 0.5 - 0.75".

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TABLE 14A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____ 18-Mar-02

TEST CONFIGURATION # 14A

TOP BOX

GCL Bentomat ST R#252 L#200203LO (Woven Side) / C#73974

Textured HDPE R#103114337 / C#74172

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 17.05%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	123.26	460	33	366	27
20.00	2880	102.5	1261	24	1005	19
45.00	6480	91.6	2380	20	1540	13

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	255	304
COEFFICIENT OF FRICTION:	0.33	0.20
FRICTION ANGLE(degrees):	18.3	11.2

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

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Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_13A
GCL Bentomat ST R#302 L#200203LO, C#73990 / Textured HDPE R#103114348, C#74171

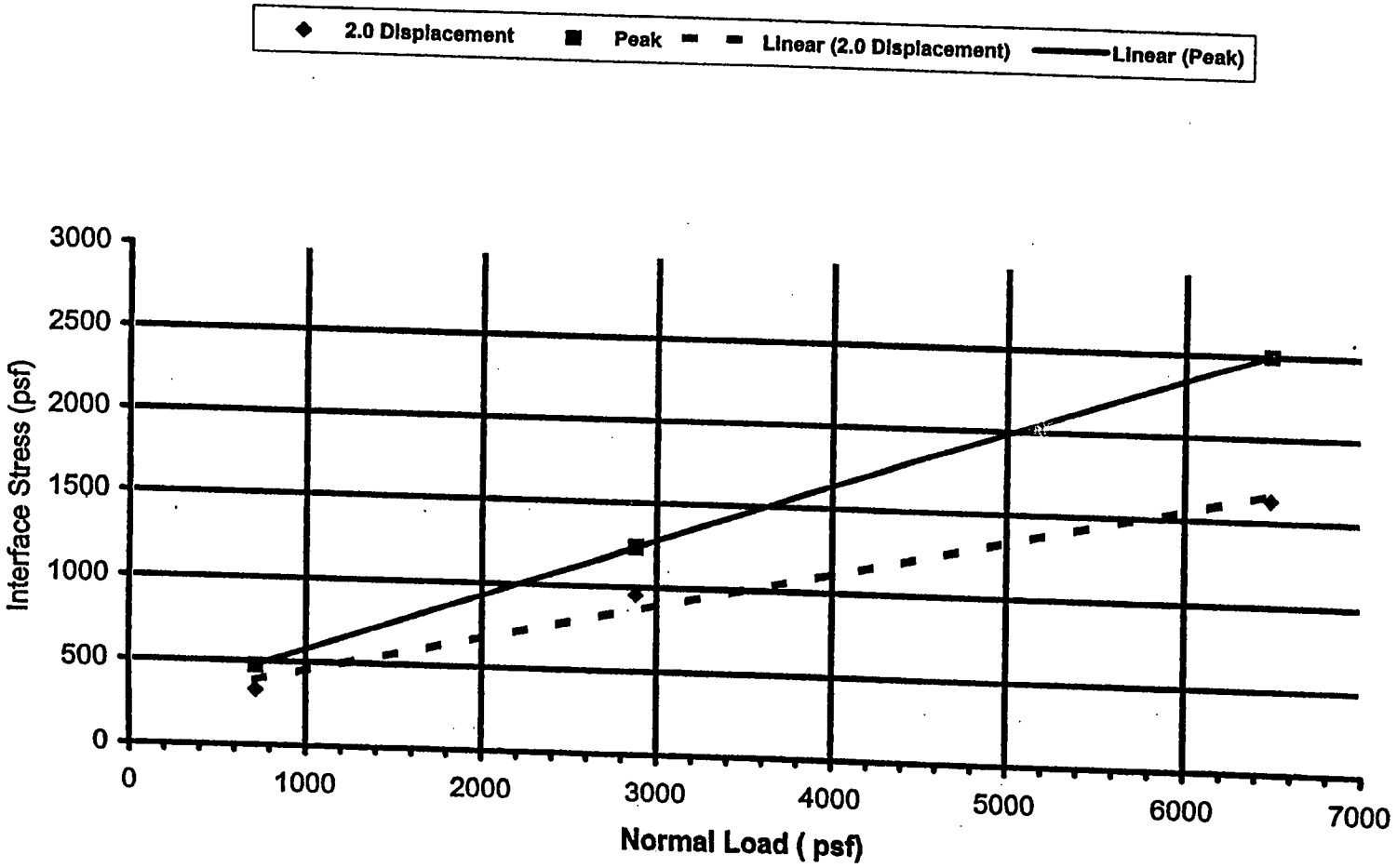

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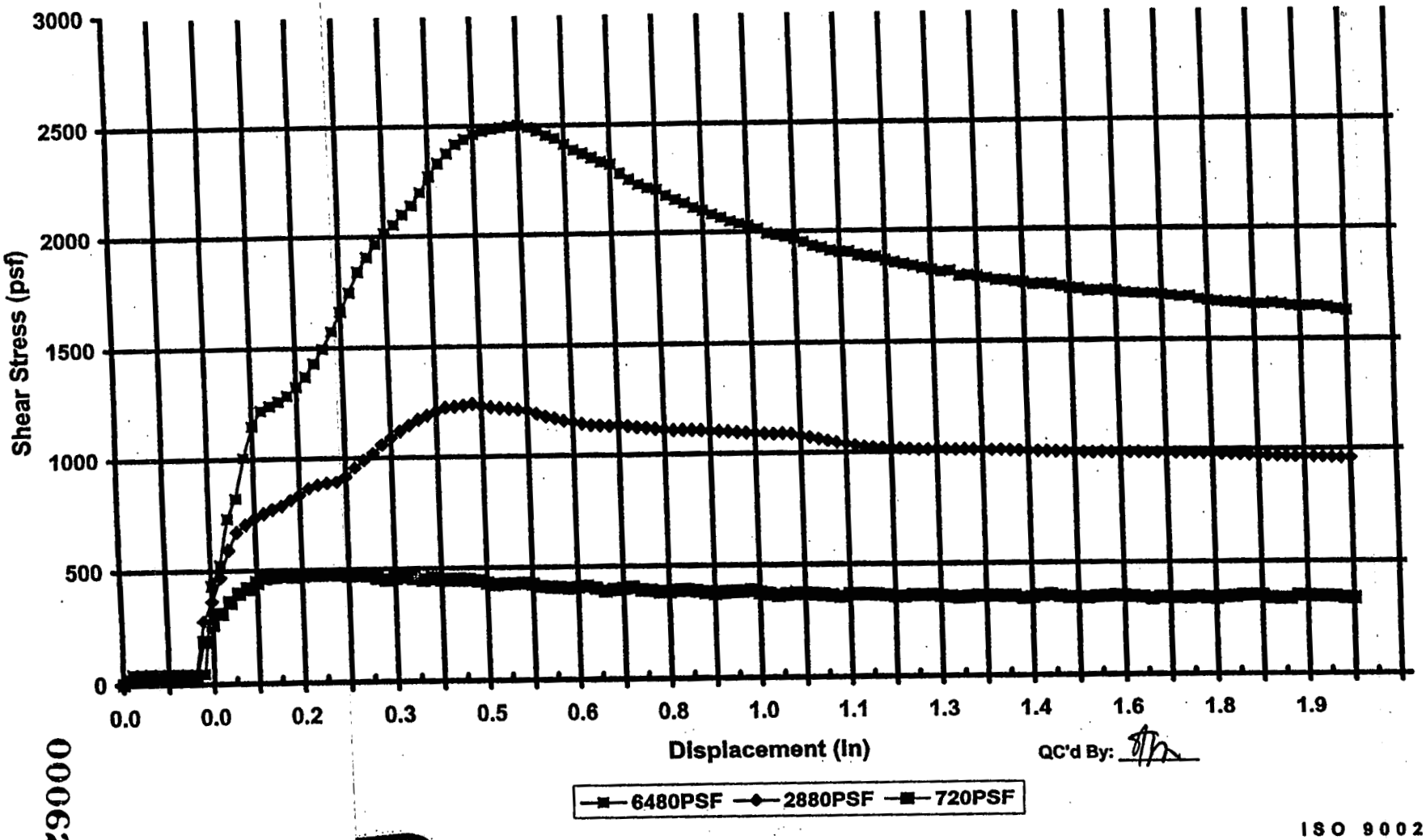
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_13A
GCL Bentomat ST R#302 L#200203LO, C#73990 / Textured HDPE R#103114348, C#74171



QC'd By: _____

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TABLE 13A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____ 15-Mar-02

TEST CONFIGURATION # 13A

TOP BOX

GCL Bentomat ST R#302 L#200203LO (Woven Side) / C#73990

Textured HDPE R#103114348 / C#74171

BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCI stretched for about 0.75 - 1".

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TABLE 13A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
15-Mar-02

TEST CONFIGURATION # 13A

TOP BOX

GCL Bentomat ST R#302 L#200203LO (Woven Side) / C#73990

Textured HDPE R#103114348 / C#74171

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 16.18%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT STRENGTH 2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	119.69	475	33	330	25
20.00	2880	93.06	1240	23	955	18
45.00	6480	104.5	2502	21	1627	14

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	224	227
COEFFICIENT OF FRICTION:	0.35	0.22
FRICTION ANGLE(degrees):	19.4	12.5

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

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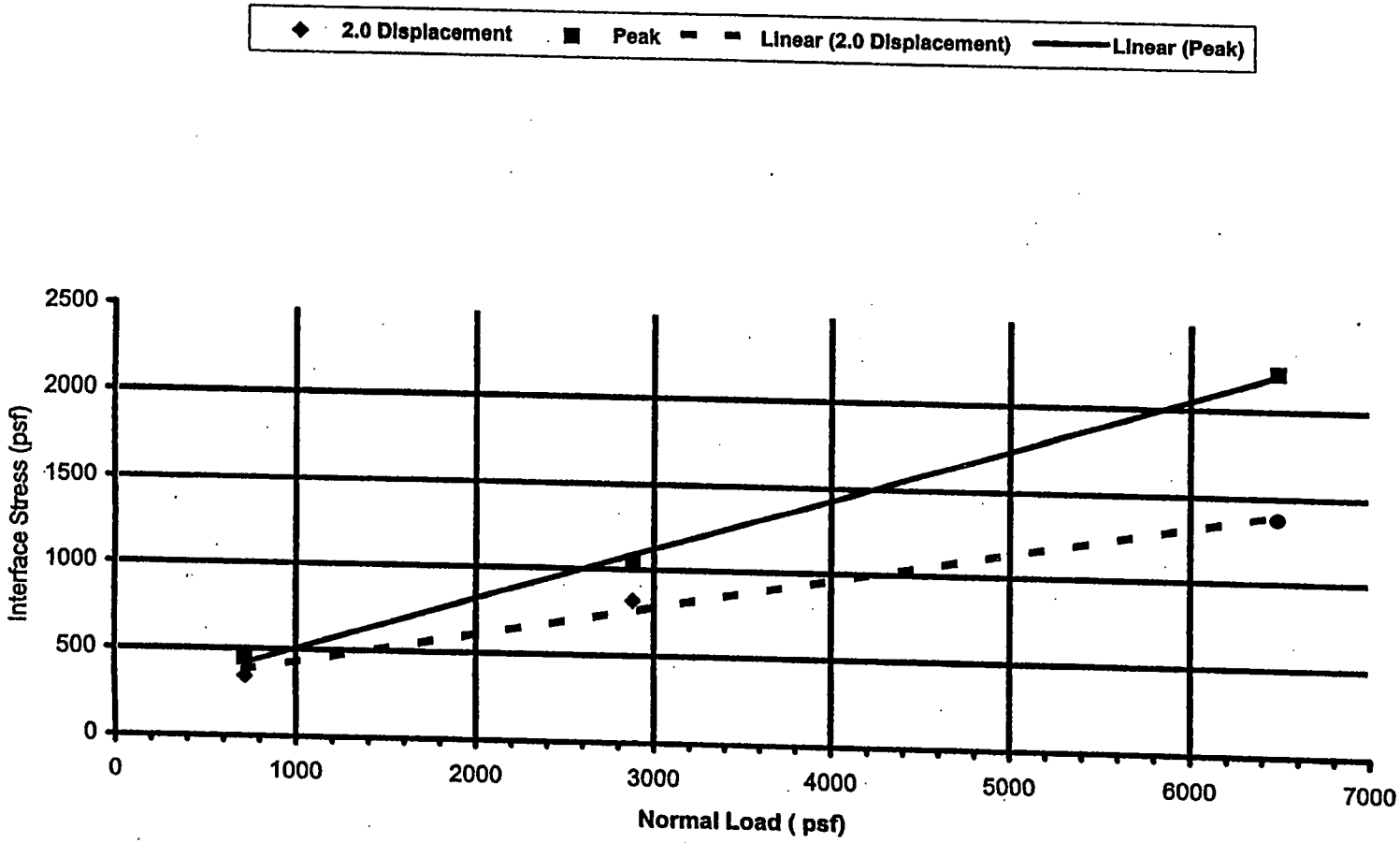
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_12A
GCL Bentomat ST R#347 L#200203LO, C#73991 / Textured HDPE R#103114370, C#74170



QC'd By:

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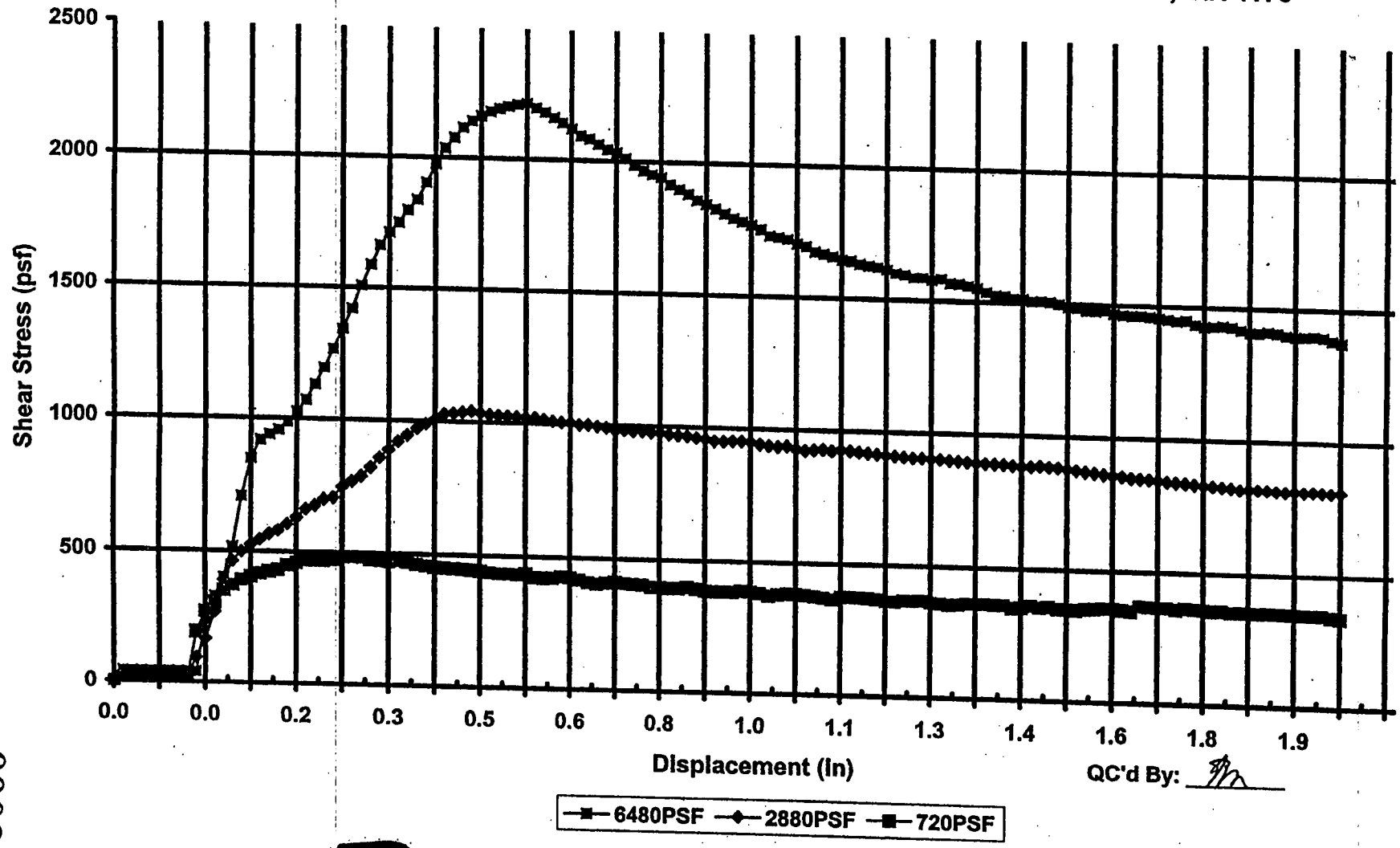
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_12A
GCL Bentomat ST R#347 L#200203LO, C#73991 / Textured HDPE R#103114370, C#74170



QC'd By: _____

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TABLE 12A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____ 12-Mar-02

TEST CONFIGURATION # 12A

TOP BOX

GCL Bentomat ST R#347 L#200203LO (Woven Side) / C#73991

Textured HDPE R#103114370 / C#74170

← BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCl stretched for about 0.75 - 1".

TABLE 12A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____ 12-Mar-02

TEST CONFIGURATION # 12A

TOP BOX

GCL Bentomat ST R#347 L#200203LO (Woven Side) / C#73991

Textured HDPE R#103114370 / C#74170

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 15.44%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	119.69	447	32	340	25
20.00	2880	93.06	1040	20	815	16
45.00	6480	104.5	2212	19	1377	12

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	196.9	247.29
COEFFICIENT OF FRICTION:	0.31	0.18
FRICTION ANGLE(degrees):	17.1	10.1

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

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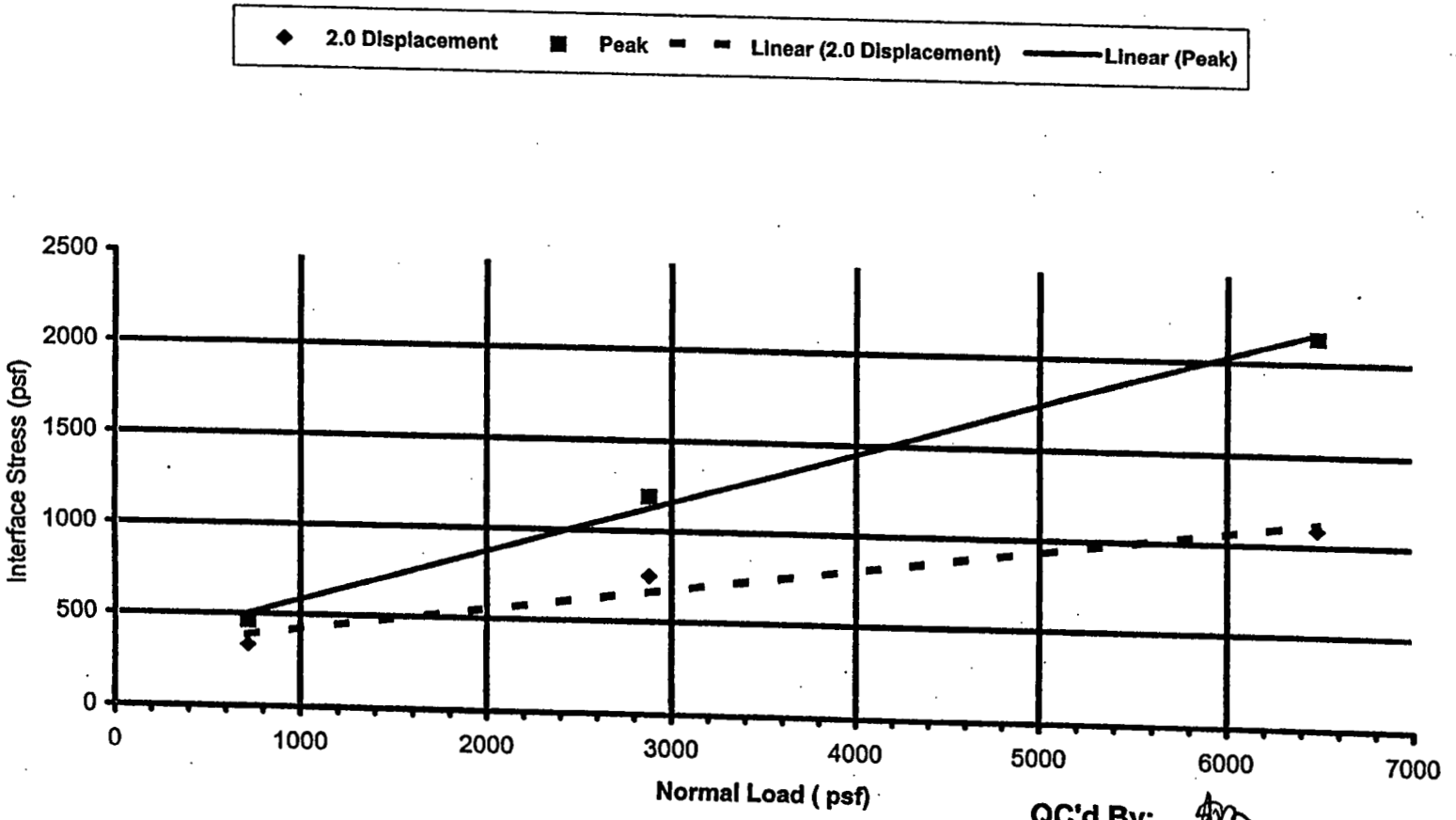
Precision Geosynthetic Laboratories

Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_11A
GCL Bentomat ST R#397 L#200203LO, C#73992 / Textured HDPE R#103114359, C#74169



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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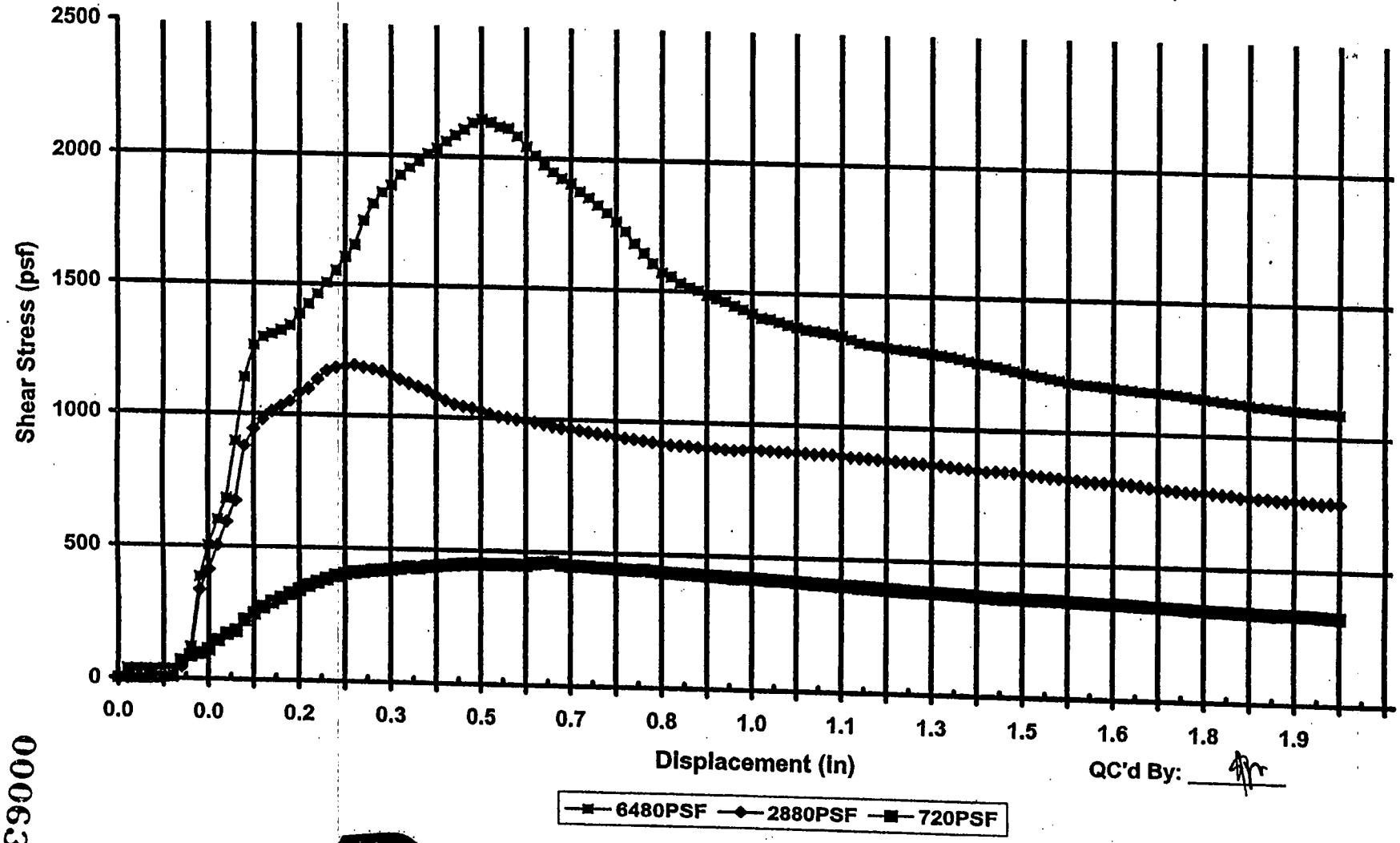
-4941

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_11A
GCL Bentomat ST R#397 L#200203LO, C#73992 / Textured HDPE R#103114359, C#74169



QC'd By: _____

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TABLE 11A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: 11-Mar-02

TEST CONFIGURATION # 11A

TOP BOX

GCL Bentomat ST R#397 L#200203LO (Woven Side) / C#73992

Textured HDPE R#103114359 / C#74169

BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCl stretched for about 0.75 - 1".

TABLE 11A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____ 11-Mar-02

TEST CONFIGURATION # 11A

TOP BOX

GCL Bentomat ST R#397 L#200203LO (Woven Side) / C#73992

Textured HDPE R#103114359 / C#74169

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 15.7%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	115.3	462	33	328	24
20.00	2880	906.7	1193	23	752	15
45.00	6480	95.4	2143	18	1090	10

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	295	292
COEFFICIENT OF FRICTION:	0.29	0.13
FRICTION ANGLE(degrees):	16.1	7.3

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

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ISO 9002

Precision Geosynthetic Laboratories

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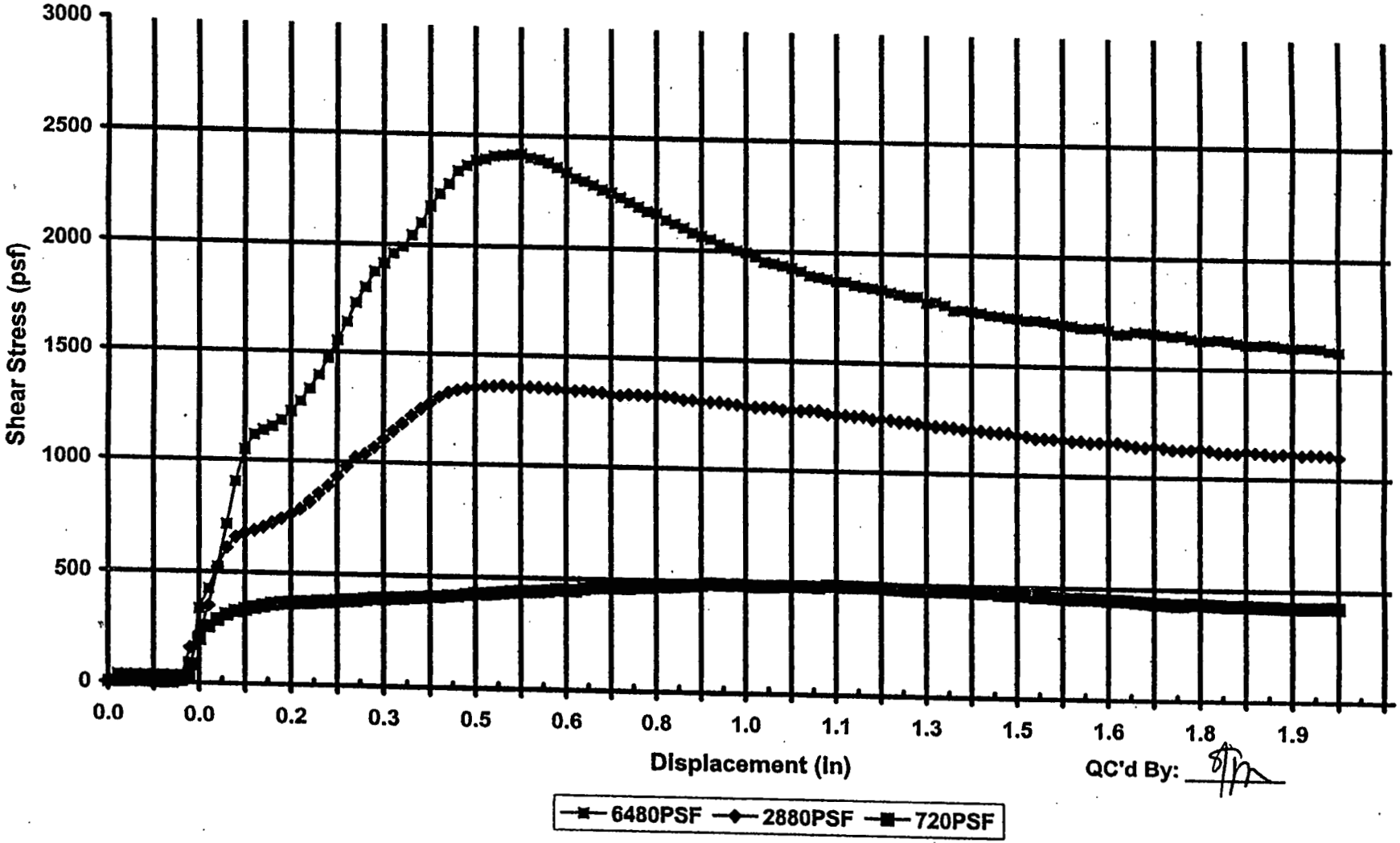
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_10A
GCL Bentomat ST R#442 L#200203LO, C#73997 / Textured HDPE R#103114310, C#74160

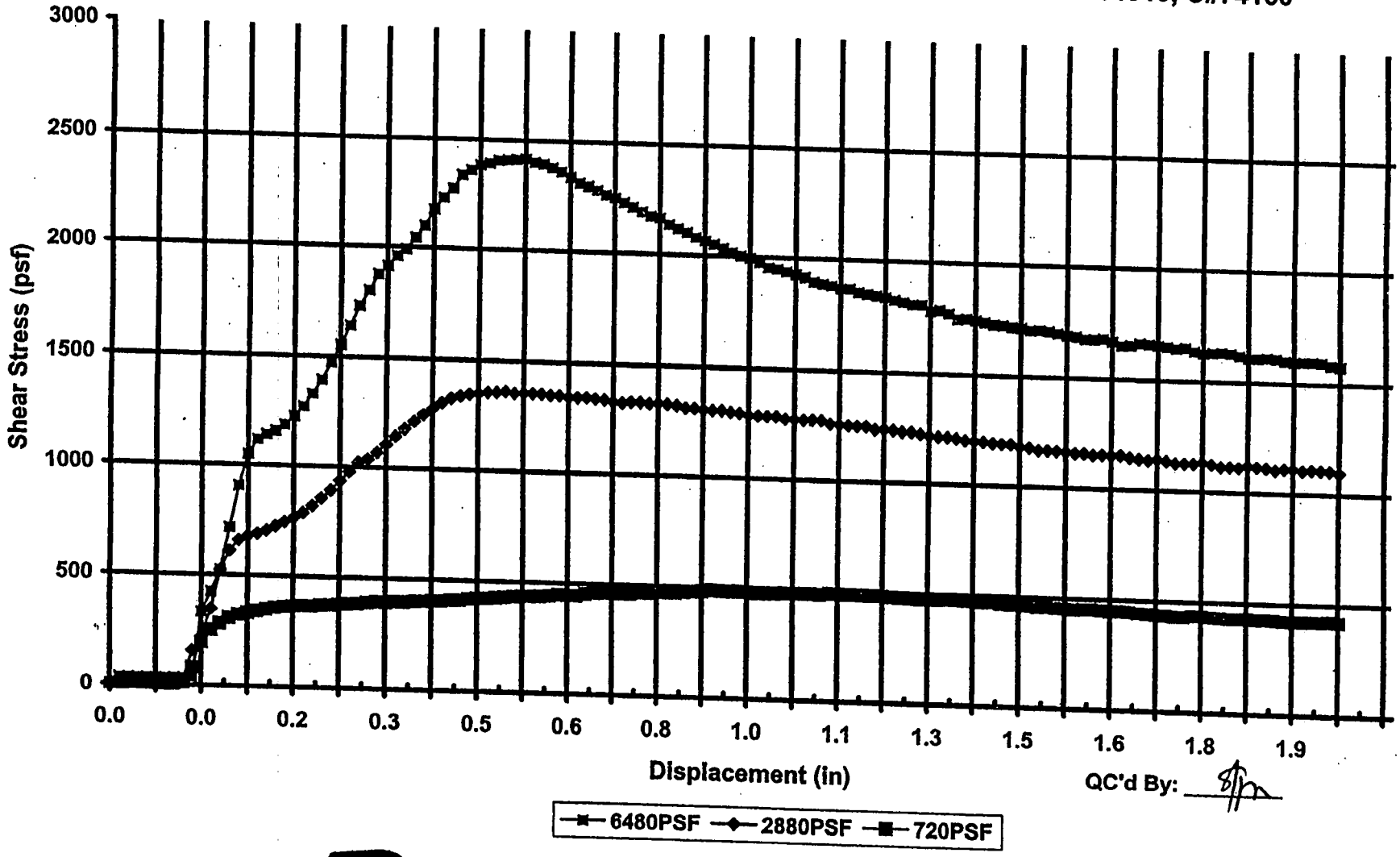


QC'd By: _____

Precision Geosynthetic Laboratories

ISO 9002

Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_10A
GCL Bentomat ST R#442 L#200203LO, C#73997 / Textured HDPE R#103114310, C#74160



QC'd By: _____

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TABLE 10A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____ 6-Mar-02

TEST CONFIGURATION # 10A

TOP BOX

GCL Bentomat ST R#442 L#200203LO (Woven Side) / C#73997

Textured HDPE R#103114310 / C#74160

BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCl stretched for about 0.5 - 0.75".

TABLE 10A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____ 6-Mar-02

TEST CONFIGURATION # 10A

TOP BOX

GCL Bentomat ST R#442 L#200203LO (Woven Side) / C#73997

Textured HDPE R#103114310 / C#74160

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 13.98%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	115.05	489	34	423	30
20.00	2880	93.84	1361	25	1098	21
45.00	6480	87.94	2416	20	1580	14

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	312.1	381.71
COEFFICIENT OF FRICTION:	0.33	0.19
FRICTION ANGLE(degrees):	18.3	11.0

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

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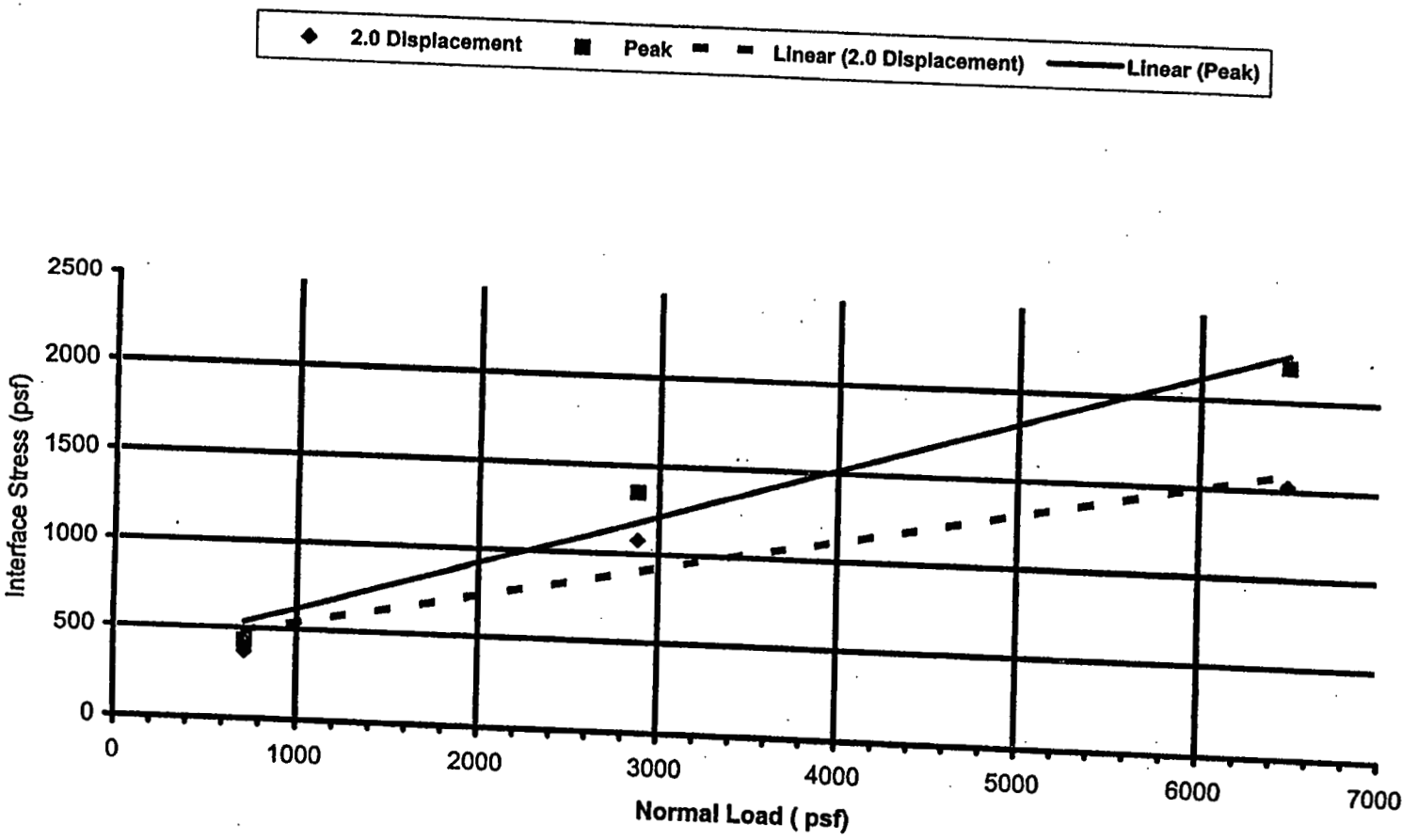
ISO 9002

Precision Geosynthetic Laboratories

Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_9A
GCL Bentomat ST R#492 L#200203LO, C#73998 / Textured HDPE R#103114321, C#74159



QC'd By:

Precision Geosynthetic Laboratories

ISO 9002

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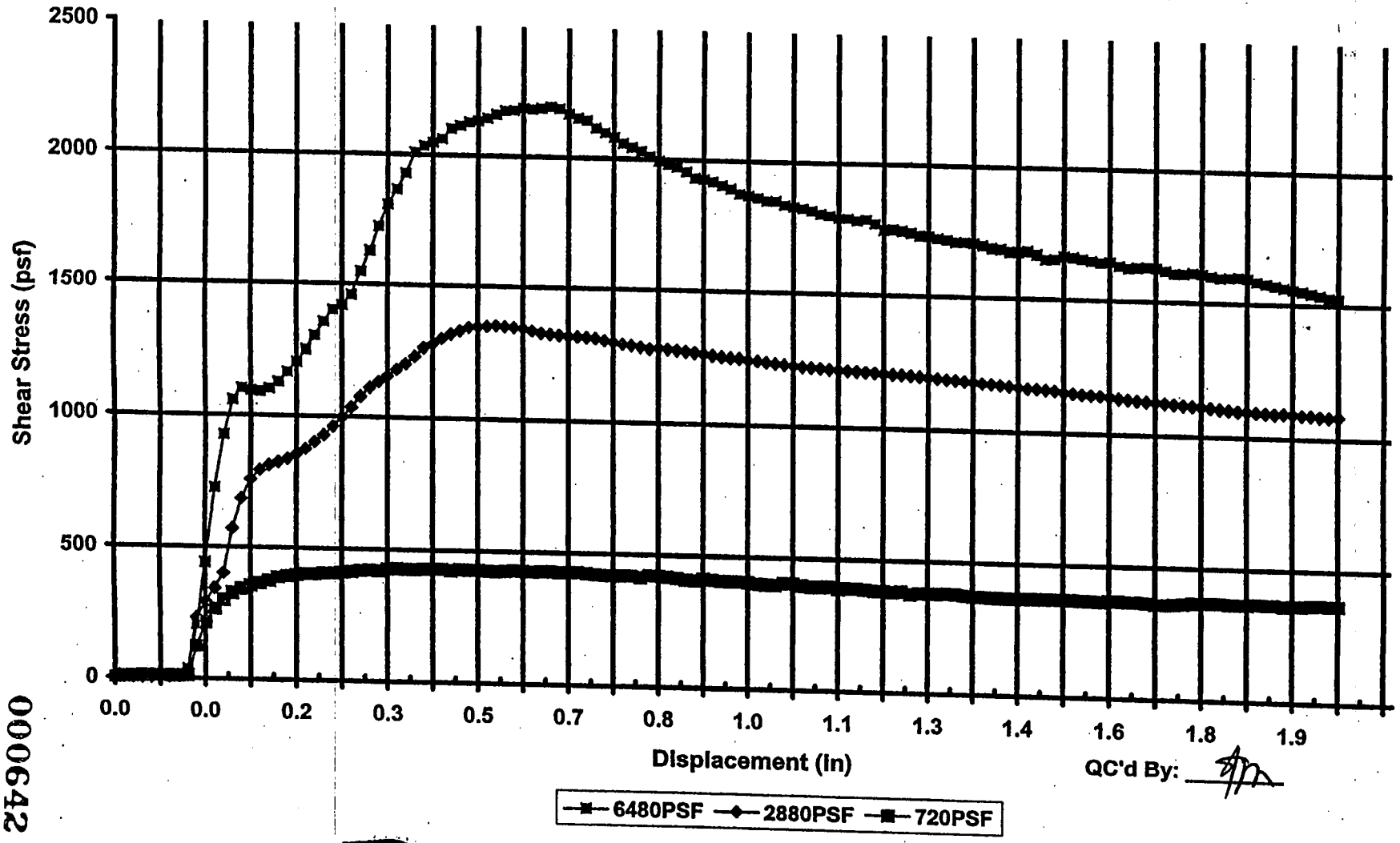
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_9A
GCL Bentomat ST R#492 L#200203LO, C#73998 / Textured HDPE R#103114321, C#74159



QC'd By: _____

Precision Geosynthetic Laboratories

ISO 9002

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TABPA

TABLE 9A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____ 4-Mar-02

TEST CONFIGURATION # 9A

TOP BOX

GCL Bentomat ST R#492 L#200203LO (Woven Side) / C#73998

Textured HDPE R#103114321 / C#74159

← BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCI stretched for about 0.75 - 1".

TABLE 9A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: 4-Mar-02

TEST CONFIGURATION # 9A

TOP BOX

GCL Bentomat ST R#492 L#200203LO (Woven Side) / C#73998

Textured HDPE R#103114321 / C#74159

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 15.84%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

			PEAK STRENGTH		2.0 " DISPLACEMENT STRENGTH	
Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	SHEAR STRESS (psf)	PEAK SECANT ANGLE (degrees)	SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	131.57	431	31	372	27
20.00	2880	103.6	1351	25	1082	21
45.00	6480	104.5	2194	19	1525	13

COHESION (psf):	321.6	346.86
COEFFICIENT OF FRICTION:	0.30	0.19
FRICTION ANGLE(degrees):	16.6	10.9

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

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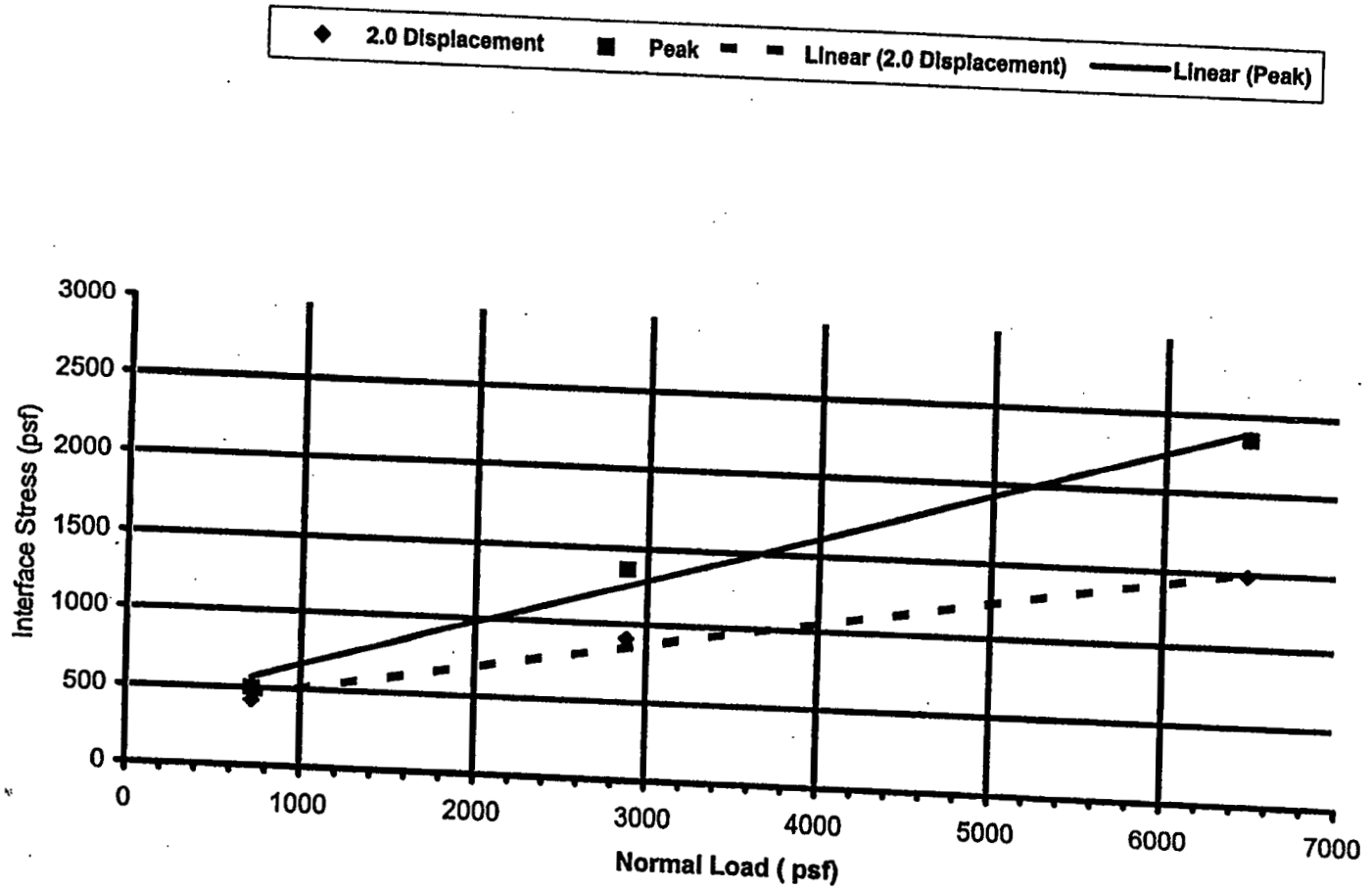
ISO 9002

Precision Geosynthetic Laboratories

Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_6A
GCL Bentomat ST R#638 L#200203LO, C#74014 / Textured HDPE R#1031104255, C#74107



QC'd By: AM

Precision Geosynthetic Laboratories

ISO 9002

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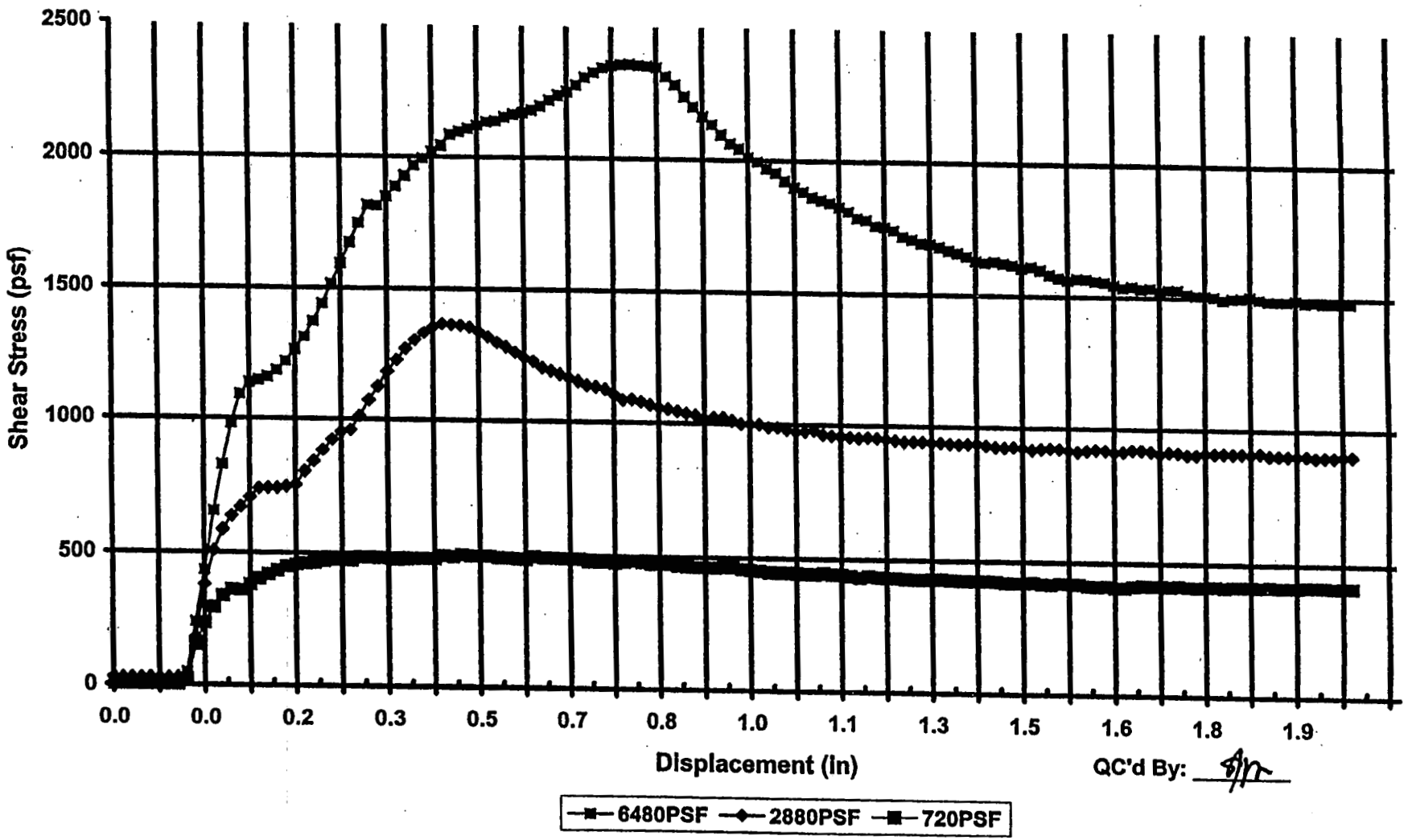
Figure #1
Shear Stress/ Displacement Curve
PGL Job No. 020007_6A
GCL Bentomat ST R#638 L#200203LO, C#74014 / Textured HDPE R#1031104255, C#74107



QC'd By: _____

Precision Geosynthetic Laboratories

ISO 9002

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TABLE 6A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: _____
Feb. 19, 2002

TEST CONFIGURATION # 6A

TOP BOX

GCL Bentomat ST R#638 L#200203LO (Woven Side) / C#74014

Textured HDPE R#1031104255 / C#74107

BOTTOM BOX

OBSERVATIONS:

See Figure #1 and #2

At 5psi normal load, there was no stretching of the GCL. At 20psi, and 45 psi normal load, GCl stretched for about 0.5 - 0.75".

ISO 9002

Precision Geosynthetic Laboratories

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TABLE 6A
CLIENT: CETCO
PROJECT: Fluor Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G020007

QC'd by: 8/m
Feb. 19, 2002

TEST CONFIGURATION # 6A

TOP BOX

GCL Bentomat ST R#638 L#200203LO (Woven Side) / C#74014

Textured HDPE R#1031104255 / C#74107

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
2. The woven side of the GCL is in contact with the textured HDPE , and the non- woven side is in contact with a wooden board with mending plates.
3. The textured HDPE is clamped at the bottom box with sand layer underneath.
4. Initial moisture content of the GCL was 13.98%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under drained condition for 48hrs @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 2.0 inch horizontal displacement.
3. The test specimens were sheared in drained condition.
4. Test were performed in general accordance with ASTM D6243-98 using Brainard-Kilman LG-112 Direct Shear machine with effective area of 12 in X 12 in.

TEST RESULTS:

Normal Stress (psi)	Normal Stress (psf)	FINAL MC (GCL) (%)	PEAK STRENGTH SHEAR STRESS (psf)	PEAK STRENGTH PEAK SECANT ANGLE (degrees)	2.0 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	2.0 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	111.42	499	35	415	30
20.00	2880	90.87	1365	25	903	17
45.00	6480	74.39	2352	20	1484	13

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	340.7	318.71
COEFFICIENT OF FRICTION:	0.32	0.18
FRICTION ANGLE(degrees):	17.6	10.4

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

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Precision Geosynthetic Laboratories

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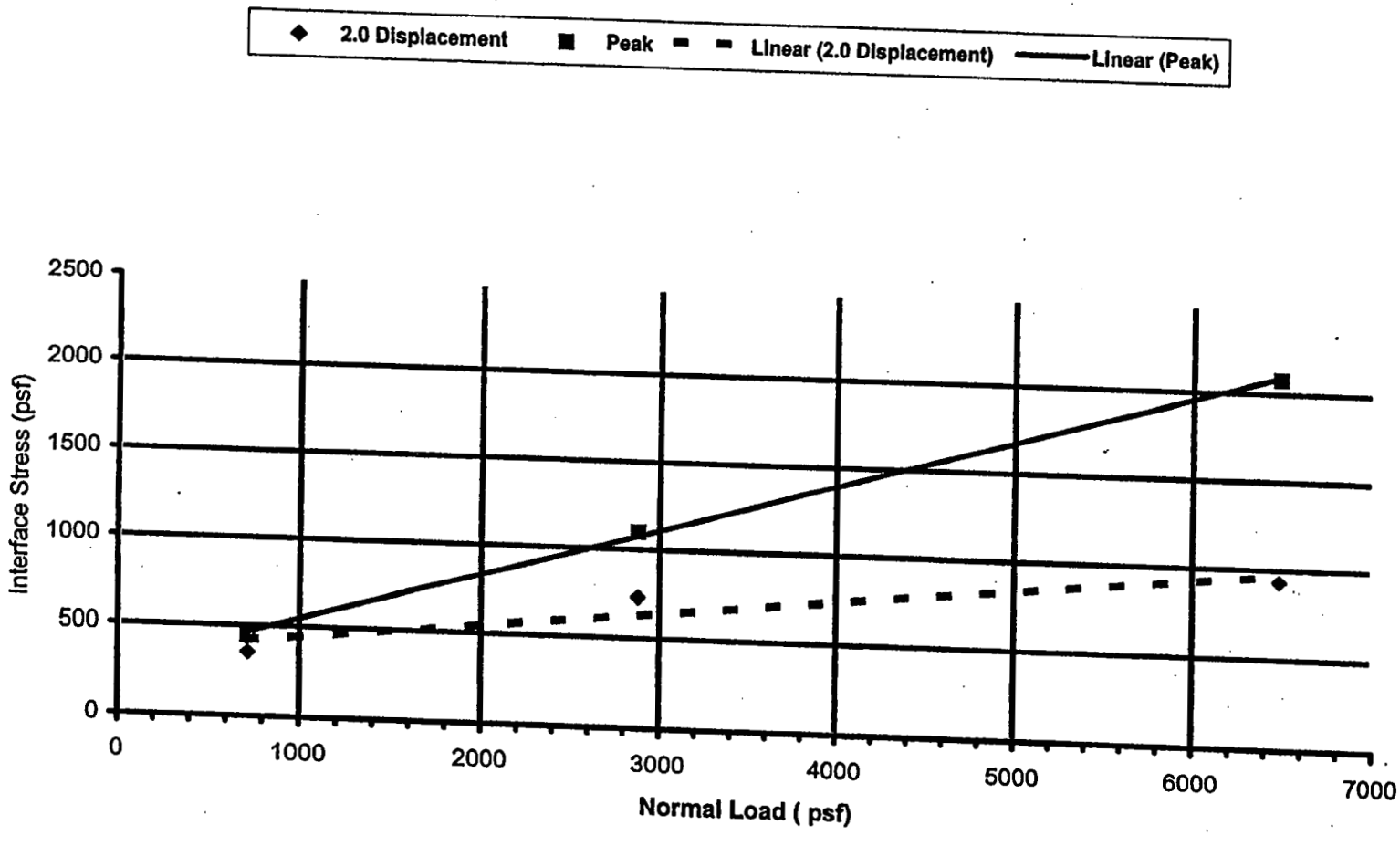
Figure #2
Normal Stress/ Interface Stress
PGL Job No. 020007_2A
GCL Bentomat ST R#819 L#200203LO, C#74057 / Textured HDPE R#103114192, C#74089



QC'd By:

Precision Geosynthetic Laboratories

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SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02772P-015	REV.: 0	DATE: 3/18/02	Page 1 of 114

FROM:
GSE LINING TECHNOLOGIES

SIGNATURE: [signature] 3/18/02 Sr. Bill Cochick

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

RECEIVED BY: Teresa Schwab DATE: 3/19/02

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02772P-015	0						X			MANUFACTURING CERTIFICATES FOR GCL		X		02772P.1.04.B.2	X		

REVIEW DISTRIBUTION

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Gregg Johnson	164				
Bill Zebick	164				
Mike Godbar	164				
Kwasi Badu-Tweneboah	38				
ECDC					

NO COMMENTS: COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

000050

RECEIVED BY: [signature] DATE: 4/15/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

#941

ORIGINAL

FS-F-4955

COLLOID ENVIRONMENTAL TECHNOLOGIES COMP.
P.O. Box 428 • Lovell, Wyoming 82431
(307) 548-6521 • Fax (307) 548-6413

494

Date: January 17, 2002
PO: 3285-000-OD
Order #: 151862

Sheri Sim Connell
GSE Lining Technology, Inc.
19103 Gundle Rd
Hoston, TX 77073
1-800-435-2008

Dear Sheri Sim Connell

Please find enclosed the MQA/MQC Data Package for GCL shipments to GSE Lining Technology, Inc. . These shipments left our CETCO - Lovell, Wy. plant on PRESCANE .

If you have any questions regarding the enclosed QA/QC information, please contact me at (800)322-1149 ext:423.

Sincerely,

Justin Bowers
Quality Assurance

(✓) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: Date: 4/15/02

INFORMATION ONLY

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA PACKAGE

PROJECT NAME:	**Flour Daniel Fernald** **Hamilton, OH. 45013**
CUSTOMER P.O.:	**3285-000-OD**
PREPARED FOR:	**GSE Lining Technology, Inc.** **19103 Gundle Rd** **Hoston, TX 77073**
Telephone # :	**1-800-435-2008**

PREPARED BY:	**Justin Bowers** **Quality Assurance** **CETCO** P.O. Box 428 92 Hwy. 37 Lovell, Wy. 82431
Telephone #:	800-322-1149 (Ext. 423)
Fax #:	(307)548-6927, (307)548-6413
E-Mail:	jbowe@cetco.com

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA

FOR ALL GCL MANUFACTURED ON:

Project Name:	Flour Daniel Fernald
Prepared For:	GSE Lining Technology, Inc.
Customer PO:	3285-000-OD
Order Number:	151862
Ship Date:	PRESCANE

CONTENTS:

1. PACKING LIST
2. DAILY GCL PRODUCTION CERTIFICATION
3. NEEDLE DETECTION CERTIFICATION
4. BENTONITE CLAY CERTIFICATION
5. WOVEN GEOTEXTILE MANUFACTURER'S CERTIFICATION
6. NON-WOVEN GEOTEXTILE MANUFACTURER'S CERTIFICATION
7. GCL MANUFACTURING CERTIFICATION AND TEST RESULTS
8. GCL MQA TRACKING FORM

P A C K I N G L I S T

4941 42 tests taken meets 1/40,000 req.

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

11 SAMPLES
LOT #2002020
495 x 2250
1,113,750
LOT #2002031
= 544,50
~ 6 SAMPLES

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF	200202L0	00000116	150.0	15.0	2250.0	2618.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000117	150.0	15.0	2250.0	2681.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000118	150.0	15.0	2250.0	2652.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000119	150.0	15.0	2250.0	2685.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000120	150.0	15.0	2250.0	2739.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000121	150.0	15.0	2250.0	2676.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000122	150.0	15.0	2250.0	2686.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000123	150.0	15.0	2250.0	2691.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000124	150.0	15.0	2250.0	2697.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000125	150.0	15.0	2250.0	2710.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000126	150.0	15.0	2250.0	2713.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000127	150.0	15.0	2250.0	2738.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000128	150.0	15.0	2250.0	2684.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000129	150.0	15.0	2250.0	2719.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000130	150.0	15.0	2250.0	2728.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000131	150.0	15.0	2250.0	2704.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000132	150.0	15.0	2250.0	2713.0
-BENTOMAT ST		SFT	SF	200202L0	00000133	150.0	15.0	2250.0	2720.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000134	150.0	15.0	2250.0	2709.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200202L0	00000135	150.0	15.0	2250.0	2693.0
LO-BENTOMAT ST	SFT SF	200202L0	00000136	150.0	15.0	2250.0	2720.0
LO-BENTOMAT ST	SFT SF	200202L0	00000137	150.0	15.0	2250.0	2747.0
LO-BENTOMAT ST	SFT SF	200202L0	00000138	150.0	15.0	2250.0	2691.0
LO-BENTOMAT ST	SFT SF	200202L0	00000139	150.0	15.0	2250.0	2694.0
LO-BENTOMAT ST	SFT SF	200202L0	00000140	150.0	15.0	2250.0	2688.0
LO-BENTOMAT ST	SFT SF	200202L0	00000141	150.0	15.0	2250.0	2677.0
LO-BENTOMAT ST	SFT SF	200202L0	00000142	150.0	15.0	2250.0	2682.0
LO-BENTOMAT ST	SFT SF	200202L0	00000143	150.0	15.0	2250.0	2670.0
LO-BENTOMAT ST	SFT SF	200202L0	00000144	150.0	15.0	2250.0	2664.0
LO-BENTOMAT ST	SFT SF	200202L0	00000145	150.0	15.0	2250.0	2645.0
LO-BENTOMAT ST	SFT SF	200202L0	00000151	150.0	15.0	2250.0	2822.0
LO-BENTOMAT ST	SFT SF	200202L0	00000152	150.0	15.0	2250.0	2830.0
LO-BENTOMAT ST	SFT SF	200202L0	00000153	150.0	15.0	2250.0	2829.0
LO-BENTOMAT ST	SFT SF	200202L0	00000154	150.0	15.0	2250.0	2756.0
LO-BENTOMAT ST	SFT SF	200202L0	00000155	150.0	15.0	2250.0	2733.0
LO-BENTOMAT ST	SFT SF	200202L0	00000156	150.0	15.0	2250.0	2713.0
LO-BENTOMAT ST	SFT SF	200202L0	00000157	150.0	15.0	2250.0	2704.0
LO-BENTOMAT ST	SFT SF	200202L0	00000158	150.0	15.0	2250.0	2701.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF	200202L0	00000159	150.0	15.0	2250.0	2715.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000161	150.0	15.0	2250.0	2723.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000162	150.0	15.0	2250.0	2732.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000163	150.0	15.0	2250.0	2746.0
O-BENTOMAT ST		SFT	SF	200202L0	00000164	150.0	15.0	2250.0	2727.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000165	150.0	15.0	2250.0	2735.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000166	150.0	15.0	2250.0	2721.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000167	150.0	15.0	2250.0	2717.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000168	150.0	15.0	2250.0	2719.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000169	150.0	15.0	2250.0	2730.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000170	150.0	15.0	2250.0	2763.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000171	150.0	15.0	2250.0	2773.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000172	150.0	15.0	2250.0	2743.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000173	150.0	15.0	2250.0	2740.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000174	150.0	15.0	2250.0	2746.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000175	150.0	15.0	2250.0	2766.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000176	150.0	15.0	2250.0	2672.0
O-BENTOMAT ST		SFT	SF	200202L0	00000177	150.0	15.0	2250.0	2653.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000178	150.0	15.0	2250.0	2641.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200202L0	00000179	150.0	15.0	2250.0	2656.0
LO-BENTOMAT ST	SFT SF	200202L0	00000180	150.0	15.0	2250.0	2661.0
LO-BENTOMAT ST	SFT SF	200202L0	00000181	150.0	15.0	2250.0	2668.0
LO-BENTOMAT ST	SFT SF	200202L0	00000182	150.0	15.0	2250.0	2656.0
LO-BENTOMAT ST	SFT SF	200202L0	00000183	150.0	15.0	2250.0	2646.0
LO-BENTOMAT ST	SFT SF	200202L0	00000184	150.0	15.0	2250.0	2665.0
LO-BENTOMAT ST	SFT SF	200202L0	00000185	150.0	15.0	2250.0	2656.0
LO-BENTOMAT ST	SFT SF	200202L0	00000186	150.0	15.0	2250.0	2661.0
LO-BENTOMAT ST	SFT SF	200202L0	00000187	150.0	15.0	2250.0	2670.0
LO-BENTOMAT ST	SFT SF	200202L0	00000188	150.0	15.0	2250.0	2673.0
LO-BENTOMAT ST	SFT SF	200202L0	00000189	150.0	15.0	2250.0	2711.0
LO-BENTOMAT ST	SFT SF	200202L0	00000190	150.0	15.0	2250.0	2687.0
LO-BENTOMAT ST	SFT SF	200202L0	00000191	150.0	15.0	2250.0	2637.0
LO-BENTOMAT ST	SFT SF	200202L0	00000192	150.0	15.0	2250.0	2663.0
LO-BENTOMAT ST	SFT SF	200202L0	00000193	150.0	15.0	2250.0	2657.0
LO-BENTOMAT ST	SFT SF	200202L0	00000194	150.0	15.0	2250.0	2670.0
LO-BENTOMAT ST	SFT SF	200202L0	00000195	150.0	15.0	2250.0	2665.0
LO-BENTOMAT ST	SFT SF	200202L0	00000197	150.0	15.0	2250.0	2624.0
LO-BENTOMAT ST	SFT SF	200202L0	00000198	150.0	15.0	2250.0	2649.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF 200202L0	00000199	150.0	15.0	2250.0	2629.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000200	150.0	15.0	2250.0	2632.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000201	150.0	15.0	2250.0	2640.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000205	150.0	15.0	2250.0	2638.0
O-BENTOMAT ST		SFT	SF 200202L0	00000209	150.0	15.0	2250.0	2708.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000210	150.0	15.0	2250.0	2789.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000211	150.0	15.0	2250.0	2741.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000212	150.0	15.0	2250.0	2732.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000213	150.0	15.0	2250.0	2748.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000214	150.0	15.0	2250.0	2765.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000215	150.0	15.0	2250.0	2731.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000216	150.0	15.0	2250.0	2766.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000217	150.0	15.0	2250.0	2782.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000218	150.0	15.0	2250.0	2761.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000219	150.0	15.0	2250.0	2729.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000220	150.0	15.0	2250.0	2762.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000221	150.0	15.0	2250.0	2781.0
-BENTOMAT ST		SFT	SF 200202L0	00000222	150.0	15.0	2250.0	2796.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000223	150.0	15.0	2250.0	2800.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200202L0	00000224	150.0	15.0	2250.0	2776.0
LO-BENTOMAT ST	SFT SF	200202L0	00000225	150.0	15.0	2250.0	2772.0
LO-BENTOMAT ST	SFT SF	200202L0	00000226	150.0	15.0	2250.0	2785.0
LO-BENTOMAT ST	SFT SF	200202L0	00000227	150.0	15.0	2250.0	2767.0
LO-BENTOMAT ST	SFT SF	200202L0	00000228	150.0	15.0	2250.0	2710.0
LO-BENTOMAT ST	SFT SF	200202L0	00000229	150.0	15.0	2250.0	2686.0
LO-BENTOMAT ST	SFT SF	200202L0	00000230	150.0	15.0	2250.0	2668.0
LO-BENTOMAT ST	SFT SF	200202L0	00000231	150.0	15.0	2250.0	2655.0
LO-BENTOMAT ST	SFT SF	200202L0	00000232	150.0	15.0	2250.0	2692.0
LO-BENTOMAT ST	SFT SF	200202L0	00000233	150.0	15.0	2250.0	2685.0
LO-BENTOMAT ST	SFT SF	200202L0	00000234	150.0	15.0	2250.0	2666.0
LO-BENTOMAT ST	SFT SF	200202L0	00000235	150.0	15.0	2250.0	2668.0
LO-BENTOMAT ST	SFT SF	200202L0	00000236	150.0	15.0	2250.0	2672.0
LO-BENTOMAT ST	SFT SF	200202L0	00000237	150.0	15.0	2250.0	2665.0
LO-BENTOMAT ST	SFT SF	200202L0	00000238	150.0	15.0	2250.0	2684.0
LO-BENTOMAT ST	SFT SF	200202L0	00000239	150.0	15.0	2250.0	2677.0
LO-BENTOMAT ST	SFT SF	200202L0	00000240	150.0	15.0	2250.0	2669.0
LO-BENTOMAT ST	SFT SF	200202L0	00000241	150.0	15.0	2250.0	2692.0
LO-BENTOMAT ST	SFT SF	200202L0	00000242	150.0	15.0	2250.0	2651.0

P A C K I N G L I S T

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

4941

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF	200202L0	00000243	150.0	15.0	2250.0	2654.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000244	150.0	15.0	2250.0	2661.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000245	150.0	15.0	2250.0	2647.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000246	150.0	15.0	2250.0	2628.0
-BENTOMAT ST		SFT	SF	200202L0	00000247	150.0	15.0	2250.0	2643.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000248	150.0	15.0	2250.0	2642.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000249	150.0	15.0	2250.0	2643.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000250	150.0	15.0	2250.0	2639.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000251	150.0	15.0	2250.0	2618.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000252	150.0	15.0	2250.0	2672.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000253	150.0	15.0	2250.0	2626.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000254	150.0	15.0	2250.0	2618.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000255	150.0	15.0	2250.0	2672.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000256	150.0	15.0	2250.0	2687.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000257	150.0	15.0	2250.0	2710.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000258	150.0	15.0	2250.0	2765.0
O-BENTOMAT ST		SFT	SF	200202L0	00000259	150.0	15.0	2250.0	2762.0
BENTOMAT ST		SFT	SF	200202L0	00000260	150.0	15.0	2250.0	2759.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000261	150.0	15.0	2250.0	2821.0

P A C K I N G L I S T

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200202L0	00000262	150.0	15.0	2250.0	2791.0
LO-BENTOMAT ST	SFT SF	200202L0	00000263	150.0	15.0	2250.0	2807.0
LO-BENTOMAT ST	SFT SF	200202L0	00000264	150.0	15.0	2250.0	2754.0
LO-BENTOMAT ST	SFT SF	200202L0	00000265	150.0	15.0	2250.0	2803.0
LO-BENTOMAT ST	SFT SF	200202L0	00000266	150.0	15.0	2250.0	2818.0
LO-BENTOMAT ST	SFT SF	200202L0	00000267	150.0	15.0	2250.0	2822.0
LO-BENTOMAT ST	SFT SF	200202L0	00000268	150.0	15.0	2250.0	2805.0
LO-BENTOMAT ST	SFT SF	200202L0	00000269	150.0	15.0	2250.0	2834.0
LO-BENTOMAT ST	SFT SF	200202L0	00000270	150.0	15.0	2250.0	2800.0
LO-BENTOMAT ST	SFT SF	200202L0	00000271	150.0	15.0	2250.0	2807.0
LO-BENTOMAT ST	SFT SF	200202L0	00000272	150.0	15.0	2250.0	2834.0
LO-BENTOMAT ST	SFT SF	200202L0	00000273	150.0	15.0	2250.0	2830.0
LO-BENTOMAT ST	SFT SF	200202L0	00000274	150.0	15.0	2250.0	2794.0
LO-BENTOMAT ST	SFT SF	200202L0	00000275	150.0	15.0	2250.0	2782.0
LO-BENTOMAT ST	SFT SF	200202L0	00000276	150.0	15.0	2250.0	2789.0
LO-BENTOMAT ST	SFT SF	200202L0	00000277	150.0	15.0	2250.0	2784.0
LO-BENTOMAT ST	SFT SF	200202L0	00000278	150.0	15.0	2250.0	2767.0
LO-BENTOMAT ST	SFT SF	200202L0	00000279	150.0	15.0	2250.0	2716.0
LO-BENTOMAT ST	SFT SF	200202L0	00000280	150.0	15.0	2250.0	2721.0

PACKING LIST

'941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200202L0	00000281	150.0	15.0	2250.0	2704.0
LO-BENTOMAT ST	SFT SF	200202L0	00000282	150.0	15.0	2250.0	2716.0
LO-BENTOMAT ST	SFT SF	200202L0	00000283	150.0	15.0	2250.0	2722.0
LO-BENTOMAT ST	SFT SF	200202L0	00000284	150.0	15.0	2250.0	2690.0
O-BENTOMAT ST	SFT SF	200202L0	00000285	150.0	15.0	2250.0	2669.0
LO-BENTOMAT ST	SFT SF	200202L0	00000286	150.0	15.0	2250.0	2707.0
LO-BENTOMAT ST	SFT SF	200202L0	00000292	150.0	15.0	2250.0	2754.0
LO-BENTOMAT ST	SFT SF	200202L0	00000293	150.0	15.0	2250.0	2737.0
LO-BENTOMAT ST	SFT SF	200202L0	00000294	150.0	15.0	2250.0	2781.0
LO-BENTOMAT ST	SFT SF	200202L0	00000295	150.0	15.0	2250.0	2772.0
LO-BENTOMAT ST	SFT SF	200202L0	00000296	150.0	15.0	2250.0	2709.0
LO-BENTOMAT ST	SFT SF	200202L0	00000297	150.0	15.0	2250.0	2668.0
LO-BENTOMAT ST	SFT SF	200202L0	00000298	150.0	15.0	2250.0	2689.0
LO-BENTOMAT ST	SFT SF	200202L0	00000299	150.0	15.0	2250.0	2691.0
LO-BENTOMAT ST	SFT SF	200202L0	00000300	150.0	15.0	2250.0	2730.0
LO-BENTOMAT ST	SFT SF	200202L0	00000301	150.0	15.0	2250.0	2718.0
LO-BENTOMAT ST	SFT SF	200202L0	00000302	150.0	15.0	2250.0	2741.0
O-BENTOMAT ST	SFT SF	200202L0	00000303	150.0	15.0	2250.0	2699.0
LO-BENTOMAT ST	SFT SF	200202L0	00000304	150.0	15.0	2250.0	2702.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF 200202L0	00000305	150.0	15.0	2250.0	2694.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000306	150.0	15.0	2250.0	2699.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000307	150.0	15.0	2250.0	2676.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000308	150.0	15.0	2250.0	2652.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000309	150.0	15.0	2250.0	2630.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000310	150.0	15.0	2250.0	2624.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000311	150.0	15.0	2250.0	2625.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000312	150.0	15.0	2250.0	2623.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000314	150.0	15.0	2250.0	2654.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000315	150.0	15.0	2250.0	2678.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000316	150.0	15.0	2250.0	2662.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000317	150.0	15.0	2250.0	2654.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000318	150.0	15.0	2250.0	2620.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000319	150.0	15.0	2250.0	2625.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000320	150.0	15.0	2250.0	2621.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000321	150.0	15.0	2250.0	2626.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000322	150.0	15.0	2250.0	2643.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000323	150.0	15.0	2250.0	2652.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000324	150.0	15.0	2250.0	2644.0

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

1941

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF	200202L0	00000325	150.0	15.0	2250.0	2651.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000326	150.0	15.0	2250.0	2646.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000327	150.0	15.0	2250.0	2642.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000328	150.0	15.0	2250.0	2702.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000329	150.0	15.0	2250.0	2652.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000330	150.0	15.0	2250.0	2647.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000331	150.0	15.0	2250.0	2629.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000332	150.0	15.0	2250.0	2659.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000333	150.0	15.0	2250.0	2671.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000334	150.0	15.0	2250.0	2623.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000335	150.0	15.0	2250.0	2614.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000336	150.0	15.0	2250.0	2601.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000337	150.0	15.0	2250.0	2597.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000338	150.0	15.0	2250.0	2596.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000339	150.0	15.0	2250.0	2590.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000340	150.0	15.0	2250.0	2600.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000341	150.0	15.0	2250.0	2617.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000342	150.0	15.0	2250.0	2623.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000343	150.0	15.0	2250.0	2603.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF 200202L0	00000344	150.0	15.0	2250.0	2608.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000345	150.0	15.0	2250.0	2631.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000346	150.0	15.0	2250.0	2623.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000347	150.0	15.0	2250.0	2672.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000348	150.0	15.0	2250.0	2631.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000349	150.0	15.0	2250.0	2622.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000350	150.0	15.0	2250.0	2624.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000351	150.0	15.0	2250.0	2596.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000352	150.0	15.0	2250.0	2613.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000353	150.0	15.0	2250.0	2665.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000354	150.0	15.0	2250.0	2683.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000355	150.0	15.0	2250.0	2687.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000356	150.0	15.0	2250.0	2678.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000357	150.0	15.0	2250.0	2697.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000358	150.0	15.0	2250.0	2709.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000359	150.0	15.0	2250.0	2736.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000360	150.0	15.0	2250.0	2664.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000361	150.0	15.0	2250.0	2641.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000362	150.0	15.0	2250.0	2674.0

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF	200202L0	00000363	150.0	15.0	2250.0	2658.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000364	150.0	15.0	2250.0	2660.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000365	150.0	15.0	2250.0	2665.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000366	150.0	15.0	2250.0	2653.0
O-BENTOMAT ST		SFT	SF	200202L0	00000367	150.0	15.0	2250.0	2662.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000368	150.0	15.0	2250.0	2682.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000369	150.0	15.0	2250.0	2703.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000370	150.0	15.0	2250.0	2700.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000371	150.0	15.0	2250.0	2701.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000372	150.0	15.0	2250.0	2714.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000373	150.0	15.0	2250.0	2755.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000374	150.0	15.0	2250.0	2753.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000375	150.0	15.0	2250.0	2814.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000376	150.0	15.0	2250.0	2913.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000382	150.0	15.0	2250.0	2743.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000383	150.0	15.0	2250.0	2730.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000384	150.0	15.0	2250.0	2727.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000385	150.0	15.0	2250.0	2735.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000386	150.0	15.0	2250.0	2791.0

PACKING LIST

-- 4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF 200202L0	00000387	150.0	15.0	2250.0	2781.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000388	150.0	15.0	2250.0	2720.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000389	150.0	15.0	2250.0	2767.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000390	150.0	15.0	2250.0	2766.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000391	150.0	15.0	2250.0	2762.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000392	150.0	15.0	2250.0	2747.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000393	150.0	15.0	2250.0	2731.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000394	150.0	15.0	2250.0	2736.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000395	150.0	15.0	2250.0	2654.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000396	150.0	15.0	2250.0	2659.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000397	150.0	15.0	2250.0	2684.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000398	150.0	15.0	2250.0	2657.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000399	150.0	15.0	2250.0	2648.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000400	150.0	15.0	2250.0	2720.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000401	150.0	15.0	2250.0	2742.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000402	150.0	15.0	2250.0	2746.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000403	150.0	15.0	2250.0	2784.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000404	150.0	15.0	2250.0	2847.0
LO-BENTOMAT ST		SFT	SF 200202L0	00000405	150.0	15.0	2250.0	2799.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF	200202L0	00000406	150.0	15.0	2250.0	2819.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000407	150.0	15.0	2250.0	2798.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000408	150.0	15.0	2250.0	2830.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000409	150.0	15.0	2250.0	2804.0
O-BENTOMAT ST		SFT	SF	200202L0	00000410	150.0	15.0	2250.0	2812.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000411	150.0	15.0	2250.0	2825.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000412	150.0	15.0	2250.0	2815.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000413	150.0	15.0	2250.0	2824.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000414	150.0	15.0	2250.0	2784.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000415	150.0	15.0	2250.0	2775.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000416	150.0	15.0	2250.0	2772.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000417	150.0	15.0	2250.0	2770.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000418	150.0	15.0	2250.0	2780.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000419	150.0	15.0	2250.0	2762.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000420	150.0	15.0	2250.0	2731.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000421	150.0	15.0	2250.0	2756.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000422	150.0	15.0	2250.0	2744.0
-BENTOMAT ST		SFT	SF	200202L0	00000423	150.0	15.0	2250.0	2742.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000424	150.0	15.0	2250.0	2791.0

PACKING LIST

4941

494'

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200202L0	00000425	150.0	15.0	2250.0	2770.0
LO-BENTOMAT ST	SFT SF	200202L0	00000426	150.0	15.0	2250.0	2778.0
LO-BENTOMAT ST	SFT SF	200202L0	00000427	150.0	15.0	2250.0	2718.0
LO-BENTOMAT ST	SFT SF	200202L0	00000428	150.0	15.0	2250.0	2736.0
LO-BENTOMAT ST	SFT SF	200202L0	00000429	150.0	15.0	2250.0	2742.0
LO-BENTOMAT ST	SFT SF	200202L0	00000430	150.0	15.0	2250.0	2723.0
LO-BENTOMAT ST	SFT SF	200202L0	00000431	150.0	15.0	2250.0	2731.0
LO-BENTOMAT ST	SFT SF	200202L0	00000432	150.0	15.0	2250.0	2612.0
LO-BENTOMAT ST	SFT SF	200202L0	00000434	150.0	15.0	2250.0	2659.0
LO-BENTOMAT ST	SFT SF	200202L0	00000435	150.0	15.0	2250.0	2608.0
LO-BENTOMAT ST	SFT SF	200202L0	00000436	150.0	15.0	2250.0	2644.0
LO-BENTOMAT ST	SFT SF	200202L0	00000437	150.0	15.0	2250.0	2612.0
LO-BENTOMAT ST	SFT SF	200202L0	00000438	150.0	15.0	2250.0	2616.0
LO-BENTOMAT ST	SFT SF	200202L0	00000439	150.0	15.0	2250.0	2604.0
LO-BENTOMAT ST	SFT SF	200202L0	00000440	150.0	15.0	2250.0	2596.0
LO-BENTOMAT ST	SFT SF	200202L0	00000441	150.0	15.0	2250.0	2610.0
LO-BENTOMAT ST	SFT SF	200202L0	00000442	150.0	15.0	2250.0	2678.0
LO-BENTOMAT ST	SFT SF	200202L0	00000443	150.0	15.0	2250.0	2710.0
LO-BENTOMAT ST	SFT SF	200202L0	00000444	150.0	15.0	2250.0	2698.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF	200202L0	00000445	150.0	15.0	2250.0	2716.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000446	150.0	15.0	2250.0	2731.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000447	150.0	15.0	2250.0	2740.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000453	150.0	15.0	2250.0	2677.0
O-BENTOMAT ST		SFT	SF	200202L0	00000454	150.0	15.0	2250.0	2670.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000455	150.0	15.0	2250.0	2832.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000456	150.0	15.0	2250.0	2810.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000457	150.0	15.0	2250.0	2837.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000458	150.0	15.0	2250.0	2771.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000459	150.0	15.0	2250.0	2775.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000460	150.0	15.0	2250.0	2770.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000461	150.0	15.0	2250.0	2784.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000462	150.0	15.0	2250.0	2779.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000463	150.0	15.0	2250.0	2772.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000464	150.0	15.0	2250.0	2784.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000465	150.0	15.0	2250.0	2746.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000466	150.0	15.0	2250.0	2771.0
O-BENTOMAT ST		SFT	SF	200202L0	00000467	150.0	15.0	2250.0	2688.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000468	150.0	15.0	2250.0	2661.0

P A C K I N G L I S T

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF	200202L0	00000469	150.0	15.0	2250.0	2659.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000470	150.0	15.0	2250.0	2657.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000471	150.0	15.0	2250.0	2646.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000472	150.0	15.0	2250.0	2640.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000473	150.0	15.0	2250.0	2649.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000474	150.0	15.0	2250.0	2685.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000475	150.0	15.0	2250.0	2687.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000476	150.0	15.0	2250.0	2631.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000477	150.0	15.0	2250.0	2632.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000478	150.0	15.0	2250.0	2629.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000479	150.0	15.0	2250.0	2611.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000480	150.0	15.0	2250.0	2596.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000481	150.0	15.0	2250.0	2594.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000482	150.0	15.0	2250.0	2592.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000483	150.0	15.0	2250.0	2635.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000484	150.0	15.0	2250.0	2590.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000485	150.0	15.0	2250.0	2570.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000486	150.0	15.0	2250.0	2576.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000487	150.0	15.0	2250.0	2599.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200202L0	00000488	150.0	15.0	2250.0	2613.0
LO-BENTOMAT ST	SFT SF	200202L0	00000489	150.0	15.0	2250.0	2615.0
LO-BENTOMAT ST	SFT SF	200202L0	00000490	150.0	15.0	2250.0	2592.0
LO-BENTOMAT ST	SFT SF	200202L0	00000491	150.0	15.0	2250.0	2622.0
O-BENTOMAT ST	SFT SF	200202L0	00000492	150.0	15.0	2250.0	2590.0
LO-BENTOMAT ST	SFT SF	200202L0	00000493	150.0	15.0	2250.0	2587.0
LO-BENTOMAT ST	SFT SF	200202L0	00000494	150.0	15.0	2250.0	2603.0
LO-BENTOMAT ST	SFT SF	200202L0	00000495	150.0	15.0	2250.0	2608.0
LO-BENTOMAT ST	SFT SF	200202L0	00000496	150.0	15.0	2250.0	2592.0
LO-BENTOMAT ST	SFT SF	200202L0	00000497	150.0	15.0	2250.0	2594.0
LO-BENTOMAT ST	SFT SF	200202L0	00000498	150.0	15.0	2250.0	2617.0
LO-BENTOMAT ST	SFT SF	200202L0	00000499	150.0	15.0	2250.0	2621.0
LO-BENTOMAT ST	SFT SF	200202L0	00000500	150.0	15.0	2250.0	2624.0
LO-BENTOMAT ST	SFT SF	200202L0	00000501	150.0	15.0	2250.0	2610.0
LO-BENTOMAT ST	SFT SF	200202L0	00000502	150.0	15.0	2250.0	2606.0
LO-BENTOMAT ST	SFT SF	200202L0	00000503	150.0	15.0	2250.0	2614.0
LO-BENTOMAT ST	SFT SF	200202L0	00000504	150.0	15.0	2250.0	2632.0
-BENTOMAT ST	SFT SF	200202L0	00000505	150.0	15.0	2250.0	2621.0
LO-BENTOMAT ST	SFT SF	200202L0	00000506	150.0	15.0	2250.0	2614.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200202L0	00000507	150.0	15.0	2250.0	2602.0
LO-BENTOMAT ST	SFT SF	200202L0	00000508	150.0	15.0	2250.0	2618.0
LO-BENTOMAT ST	SFT SF	200202L0	00000509	150.0	15.0	2250.0	2619.0
LO-BENTOMAT ST	SFT SF	200202L0	00000510	150.0	15.0	2250.0	2614.0
LO-BENTOMAT ST	SFT SF	200202L0	00000511	150.0	15.0	2250.0	2615.0
LO-BENTOMAT ST	SFT SF	200202L0	00000512	150.0	15.0	2250.0	2587.0
LO-BENTOMAT ST	SFT SF	200202L0	00000513	150.0	15.0	2250.0	2573.0
LO-BENTOMAT ST	SFT SF	200202L0	00000514	150.0	15.0	2250.0	2576.0
LO-BENTOMAT ST	SFT SF	200202L0	00000515	150.0	15.0	2250.0	2604.0
LO-BENTOMAT ST	SFT SF	200202L0	00000516	150.0	15.0	2250.0	2654.0
LO-BENTOMAT ST	SFT SF	200202L0	00000517	150.0	15.0	2250.0	2658.0
LO-BENTOMAT ST	SFT SF	200202L0	00000518	150.0	15.0	2250.0	2712.0
LO-BENTOMAT ST	SFT SF	200202L0	00000519	150.0	15.0	2250.0	2681.0
LO-BENTOMAT ST	SFT SF	200202L0	00000520	150.0	15.0	2250.0	2625.0
LO-BENTOMAT ST	SFT SF	200202L0	00000521	150.0	15.0	2250.0	2610.0
LO-BENTOMAT ST	SFT SF	200202L0	00000522	150.0	15.0	2250.0	2621.0
LO-BENTOMAT ST	SFT SF	200202L0	00000523	150.0	15.0	2250.0	2626.0
LO-BENTOMAT ST	SFT SF	200202L0	00000524	150.0	15.0	2250.0	2639.0
LO-BENTOMAT ST	SFT SF	200202L0	00000525	150.0	15.0	2250.0	2629.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200202L0	00000526	150.0	15.0	2250.0	2620.0
LO-BENTOMAT ST	SFT SF	200202L0	00000527	150.0	15.0	2250.0	2626.0
LO-BENTOMAT ST	SFT SF	200202L0	00000528	150.0	15.0	2250.0	2639.0
LO-BENTOMAT ST	SFT SF	200202L0	00000529	150.0	15.0	2250.0	2641.0
0-BENTOMAT ST	SFT SF	200202L0	00000530	150.0	15.0	2250.0	2647.0
LO-BENTOMAT ST	SFT SF	200202L0	00000531	150.0	15.0	2250.0	2654.0
LO-BENTOMAT ST	SFT SF	200202L0	00000532	150.0	15.0	2250.0	2666.0
LO-BENTOMAT ST	SFT SF	200202L0	00000533	150.0	15.0	2250.0	2664.0
LO-BENTOMAT ST	SFT SF	200202L0	00000534	150.0	15.0	2250.0	2658.0
LO-BENTOMAT ST	SFT SF	200202L0	00000535	150.0	15.0	2250.0	2680.0
LO-BENTOMAT ST	SFT SF	200202L0	00000536	150.0	15.0	2250.0	2632.0
LO-BENTOMAT ST	SFT SF	200202L0	00000543	150.0	15.0	2250.0	2790.0
LO-BENTOMAT ST	SFT SF	200202L0	00000544	150.0	15.0	2250.0	2706.0
LO-BENTOMAT ST	SFT SF	200202L0	00000545	150.0	15.0	2250.0	2702.0
LO-BENTOMAT ST	SFT SF	200202L0	00000546	150.0	15.0	2250.0	2707.0
LO-BENTOMAT ST	SFT SF	200202L0	00000547	150.0	15.0	2250.0	2705.0
LO-BENTOMAT ST	SFT SF	200202L0	00000548	150.0	15.0	2250.0	2699.0
-BENTOMAT ST	SFT SF	200202L0	00000549	150.0	15.0	2250.0	2703.0
LO-BENTOMAT ST	SFT SF	200202L0	00000550	150.0	15.0	2250.0	2715.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200202L0	00000551	150.0	15.0	2250.0	2719.0
LO-BENTOMAT ST	SFT SF	200202L0	00000552	150.0	15.0	2250.0	2719.0
LO-BENTOMAT ST	SFT SF	200202L0	00000553	150.0	15.0	2250.0	2685.0
LO-BENTOMAT ST	SFT SF	200202L0	00000554	150.0	15.0	2250.0	2684.0
LO-BENTOMAT ST	SFT SF	200202L0	00000555	150.0	15.0	2250.0	2661.0
LO-BENTOMAT ST	SFT SF	200202L0	00000556	150.0	15.0	2250.0	2654.0
LO-BENTOMAT ST	SFT SF	200202L0	00000557	150.0	15.0	2250.0	2658.0
LO-BENTOMAT ST	SFT SF	200202L0	00000558	150.0	15.0	2250.0	2657.0
LO-BENTOMAT ST	SFT SF	200202L0	00000559	150.0	15.0	2250.0	2646.0
LO-BENTOMAT ST	SFT SF	200202L0	00000560	150.0	15.0	2250.0	2653.0
LO-BENTOMAT ST	SFT SF	200202L0	00000561	150.0	15.0	2250.0	2646.0
LO-BENTOMAT ST	SFT SF	200202L0	00000562	150.0	15.0	2250.0	2647.0
LO-BENTOMAT ST	SFT SF	200202L0	00000563	150.0	15.0	2250.0	2645.0
LO-BENTOMAT ST	SFT SF	200202L0	00000564	150.0	15.0	2250.0	2669.0
LO-BENTOMAT ST	SFT SF	200202L0	00000565	150.0	15.0	2250.0	2674.0
LO-BENTOMAT ST	SFT SF	200202L0	00000566	150.0	15.0	2250.0	2679.0
LO-BENTOMAT ST	SFT SF	200202L0	00000567	150.0	15.0	2250.0	2675.0
LO-BENTOMAT ST	SFT SF	200202L0	00000568	150.0	15.0	2250.0	2697.0
LO-BENTOMAT ST	SFT SF	200202L0	00000569	150.0	15.0	2250.0	2685.0

PACKING LIST

1941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF	200202L0	00000570	150.0	15.0	2250.0	2727.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000571	150.0	15.0	2250.0	2734.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000572	150.0	15.0	2250.0	2721.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000573	150.0	15.0	2250.0	2720.0
O-BENTOMAT ST		SFT	SF	200202L0	00000574	150.0	15.0	2250.0	2723.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000575	150.0	15.0	2250.0	2698.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000576	150.0	15.0	2250.0	2694.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000577	150.0	15.0	2250.0	2715.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000578	150.0	15.0	2250.0	2690.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000579	150.0	15.0	2250.0	2691.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000580	150.0	15.0	2250.0	2674.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000581	150.0	15.0	2250.0	2680.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000582	150.0	15.0	2250.0	2725.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000583	150.0	15.0	2250.0	2706.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000584	150.0	15.0	2250.0	2688.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000585	150.0	15.0	2250.0	2709.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000586	150.0	15.0	2250.0	2700.0
-BENTOMAT ST		SFT	SF	200202L0	00000587	150.0	15.0	2250.0	2649.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000588	150.0	15.0	2250.0	2732.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF	200202L0	00000589	150.0	15.0	2250.0	2626.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000590	150.0	15.0	2250.0	2635.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000591	150.0	15.0	2250.0	2642.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000592	150.0	15.0	2250.0	2636.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000593	150.0	15.0	2250.0	2639.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000594	150.0	15.0	2250.0	2687.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000595	150.0	15.0	2250.0	2717.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000596	150.0	15.0	2250.0	2687.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000597	150.0	15.0	2250.0	2676.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000598	150.0	15.0	2250.0	2643.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000599	150.0	15.0	2250.0	2640.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000600	150.0	15.0	2250.0	2646.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000601	150.0	15.0	2250.0	2642.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000602	150.0	15.0	2250.0	2657.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000603	150.0	15.0	2250.0	2643.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000604	150.0	15.0	2250.0	2670.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000605	150.0	15.0	2250.0	2645.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000606	150.0	15.0	2250.0	2649.0
LO-BENTOMAT ST		SFT	SF	200202L0	00000607	150.0	15.0	2250.0	2638.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200202L0	00000608	150.0	15.0	2250.0	2641.0
LO-BENTOMAT ST	SFT SF	200202L0	00000609	150.0	15.0	2250.0	2639.0
LO-BENTOMAT ST	SFT SF	200202L0	00000610	150.0	15.0	2250.0	2693.0
LO-BENTOMAT ST	SFT SF	200202L0	00000611	150.0	15.0	2250.0	2687.0
LO-BENTOMAT ST	SFT SF	200202L0	00000612	150.0	15.0	2250.0	2696.0
LO-BENTOMAT ST	SFT SF	200202L0	00000613	150.0	15.0	2250.0	2684.0
LO-BENTOMAT ST	SFT SF	200202L0	00000614	150.0	15.0	2250.0	2689.0
LO-BENTOMAT ST	SFT SF	200202L0	00000620	150.0	15.0	2250.0	2639.0
LO-BENTOMAT ST	SFT SF	200202L0	00000621	150.0	15.0	2250.0	2705.0
LO-BENTOMAT ST	SFT SF	200202L0	00000622	150.0	15.0	2250.0	2630.0
LO-BENTOMAT ST	SFT SF	200202L0	00000623	150.0	15.0	2250.0	2632.0
LO-BENTOMAT ST	SFT SF	200202L0	00000624	150.0	15.0	2250.0	2615.0
LO-BENTOMAT ST	SFT SF	200202L0	00000625	150.0	15.0	2250.0	2622.0
LO-BENTOMAT ST	SFT SF	200202L0	00000626	150.0	15.0	2250.0	2629.0
LO-BENTOMAT ST	SFT SF	200202L0	00000627	150.0	15.0	2250.0	2638.0
LO-BENTOMAT ST	SFT SF	200202L0	00000628	150.0	15.0	2250.0	2674.0
LO-BENTOMAT ST	SFT SF	200202L0	00000629	150.0	15.0	2250.0	2642.0
LO-BENTOMAT ST	SFT SF	200202L0	00000630	150.0	15.0	2250.0	2641.0
LO-BENTOMAT ST	SFT SF	200202L0	00000631	150.0	15.0	2250.0	2616.0

000678

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200202L0	00000632	150.0	15.0	2250.0	2607.0
LO-BENTOMAT ST	SFT SF	200202L0	00000633	150.0	15.0	2250.0	2599.0
LO-BENTOMAT ST	SFT SF	200202L0	00000634	150.0	15.0	2250.0	2675.0
LO-BENTOMAT ST	SFT SF	200202L0	00000635	150.0	15.0	2250.0	2650.0
LO-BENTOMAT ST	SFT SF	200202L0	00000636	150.0	15.0	2250.0	2627.0
LO-BENTOMAT ST	SFT SF	200202L0	00000637	150.0	15.0	2250.0	2675.0
LO-BENTOMAT ST	SFT SF	200202L0	00000638	150.0	15.0	2250.0	2681.0
LO-BENTOMAT ST	SFT SF	200202L0	00000640	150.0	15.0	2250.0	2602.0
LO-BENTOMAT ST	SFT SF	200202L0	00000641	150.0	15.0	2250.0	2594.0
LO-BENTOMAT ST	SFT SF	200202L0	00000642	150.0	15.0	2250.0	2581.0
LO-BENTOMAT ST	SFT SF	200202L0	00000643	150.0	15.0	2250.0	2583.0
LO-BENTOMAT ST	SFT SF	200202L0	00000644	150.0	15.0	2250.0	2590.0
LO-BENTOMAT ST	SFT SF	200202L0	00000645	150.0	15.0	2250.0	2742.0
LO-BENTOMAT ST	SFT SF	200202L0	00000646	150.0	15.0	2250.0	2724.0
LO-BENTOMAT ST	SFT SF	200202L0	00000647	150.0	15.0	2250.0	2641.0
LO-BENTOMAT ST	SFT SF	200202L0	00000648	150.0	15.0	2250.0	2632.0
LO-BENTOMAT ST	SFT SF	200202L0	00000649	150.0	15.0	2250.0	2587.0
LO-BENTOMAT ST	SFT SF	200202L0	00000650	150.0	15.0	2250.0	2594.0
LO-BENTOMAT ST	SFT SF	200202L0	00000651	150.0	15.0	2250.0	2596.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF	200202L0	00000652	150.0	15.0	2250.0	2583.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000653	150.0	15.0	2250.0	2622.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000655	150.0	15.0	2250.0	2563.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000656	150.0	15.0	2250.0	2646.0
O-BENTOMAT ST		SFT	SF	200203L0	00000657	150.0	15.0	2250.0	2689.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000658	150.0	15.0	2250.0	2666.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000659	150.0	15.0	2250.0	2679.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000660	150.0	15.0	2250.0	2690.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000661	150.0	15.0	2250.0	2697.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000662	150.0	15.0	2250.0	2754.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000663	150.0	15.0	2250.0	2699.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000664	150.0	15.0	2250.0	2713.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000665	150.0	15.0	2250.0	2733.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000666	150.0	15.0	2250.0	2721.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000667	150.0	15.0	2250.0	2725.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000668	150.0	15.0	2250.0	2737.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000669	150.0	15.0	2250.0	2729.0
-BENTOMAT ST		SFT	SF	200203L0	00000670	150.0	15.0	2250.0	2739.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000671	150.0	15.0	2250.0	2701.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200203L0	00000672	150.0	15.0	2250.0	2666.0
LO-BENTOMAT ST	SFT SF	200203L0	00000673	150.0	15.0	2250.0	2664.0
LO-BENTOMAT ST	SFT SF	200203L0	00000674	150.0	15.0	2250.0	2676.0
LO-BENTOMAT ST	SFT SF	200203L0	00000675	150.0	15.0	2250.0	2673.0
LO-BENTOMAT ST	SFT SF	200203L0	00000676	150.0	15.0	2250.0	2671.0
LO-BENTOMAT ST	SFT SF	200203L0	00000677	150.0	15.0	2250.0	2669.0
LO-BENTOMAT ST	SFT SF	200203L0	00000678	150.0	15.0	2250.0	2635.0
LO-BENTOMAT ST	SFT SF	200203L0	00000679	150.0	15.0	2250.0	2602.0
LO-BENTOMAT ST	SFT SF	200203L0	00000680	150.0	15.0	2250.0	2594.0
LO-BENTOMAT ST	SFT SF	200203L0	00000681	150.0	15.0	2250.0	2602.0
LO-BENTOMAT ST	SFT SF	200203L0	00000682	150.0	15.0	2250.0	2584.0
LO-BENTOMAT ST	SFT SF	200203L0	00000683	150.0	15.0	2250.0	2608.0
LO-BENTOMAT ST	SFT SF	200203L0	00000684	150.0	15.0	2250.0	2606.0
LO-BENTOMAT ST	SFT SF	200203L0	00000685	150.0	15.0	2250.0	2574.0
LO-BENTOMAT ST	SFT SF	200203L0	00000686	150.0	15.0	2250.0	2561.0
LO-BENTOMAT ST	SFT SF	200203L0	00000687	150.0	15.0	2250.0	2607.0
LO-BENTOMAT ST	SFT SF	200203L0	00000688	150.0	15.0	2250.0	2601.0
LO-BENTOMAT ST	SFT SF	200203L0	00000689	150.0	15.0	2250.0	2589.0
LO-BENTOMAT ST	SFT SF	200203L0	00000690	150.0	15.0	2250.0	2604.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF	200203L0	00000691	150.0	15.0	2250.0	2599.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000692	150.0	15.0	2250.0	2574.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000693	150.0	15.0	2250.0	2561.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000694	150.0	15.0	2250.0	2570.0
O-BENTOMAT ST		SFT	SF	200203L0	00000696	150.0	15.0	2250.0	2636.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000697	150.0	15.0	2250.0	2608.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000698	150.0	15.0	2250.0	2611.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000699	150.0	15.0	2250.0	2612.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000700	150.0	15.0	2250.0	2609.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000701	150.0	15.0	2250.0	2610.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000702	150.0	15.0	2250.0	2601.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000703	150.0	15.0	2250.0	2630.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000704	150.0	15.0	2250.0	2635.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000705	150.0	15.0	2250.0	2603.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000706	150.0	15.0	2250.0	2636.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000707	150.0	15.0	2250.0	2586.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000708	150.0	15.0	2250.0	2585.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000709	150.0	15.0	2250.0	2582.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000710	150.0	15.0	2250.0	2575.0

000682

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF 200203L0	00000711	150.0	15.0	2250.0	2579.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000712	150.0	15.0	2250.0	2570.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000713	150.0	15.0	2250.0	2588.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000714	150.0	15.0	2250.0	2586.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000715	150.0	15.0	2250.0	2575.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000716	150.0	15.0	2250.0	2583.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000717	150.0	15.0	2250.0	2581.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000718	150.0	15.0	2250.0	2577.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000719	150.0	15.0	2250.0	2576.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000720	150.0	15.0	2250.0	2584.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000721	150.0	15.0	2250.0	2623.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000722	150.0	15.0	2250.0	2611.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000723	150.0	15.0	2250.0	2625.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000724	150.0	15.0	2250.0	2619.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000725	150.0	15.0	2250.0	2582.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000726	150.0	15.0	2250.0	2581.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000727	150.0	15.0	2250.0	2613.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000728	150.0	15.0	2250.0	2621.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000729	150.0	15.0	2250.0	2593.0

PACKING LIST

1941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200203L0	00000730	150.0	15.0	2250.0	2592.0
LO-BENTOMAT ST	SFT SF	200203L0	00000731	150.0	15.0	2250.0	2587.0
LO-BENTOMAT ST	SFT SF	200203L0	00000732	150.0	15.0	2250.0	2607.0
LO-BENTOMAT ST	SFT SF	200203L0	00000733	150.0	15.0	2250.0	2604.0
O-BENTOMAT ST	SFT SF	200203L0	00000734	150.0	15.0	2250.0	2610.0
LO-BENTOMAT ST	SFT SF	200203L0	00000735	150.0	15.0	2250.0	2612.0
LO-BENTOMAT ST	SFT SF	200203L0	00000736	150.0	15.0	2250.0	2590.0
LO-BENTOMAT ST	SFT SF	200203L0	00000737	150.0	15.0	2250.0	2606.0
LO-BENTOMAT ST	SFT SF	200203L0	00000738	150.0	15.0	2250.0	2612.0
LO-BENTOMAT ST	SFT SF	200203L0	00000739	150.0	15.0	2250.0	2622.0
LO-BENTOMAT ST	SFT SF	200203L0	00000740	150.0	15.0	2250.0	2595.0
LO-BENTOMAT ST	SFT SF	200203L0	00000741	150.0	15.0	2250.0	2586.0
LO-BENTOMAT ST	SFT SF	200203L0	00000742	150.0	15.0	2250.0	2588.0
LO-BENTOMAT ST	SFT SF	200203L0	00000743	150.0	15.0	2250.0	2592.0
LO-BENTOMAT ST	SFT SF	200203L0	00000744	150.0	15.0	2250.0	2607.0
LO-BENTOMAT ST	SFT SF	200203L0	00000745	150.0	15.0	2250.0	2601.0
LO-BENTOMAT ST	SFT SF	200203L0	00000746	150.0	15.0	2250.0	2595.0
O-BENTOMAT ST	SFT SF	200203L0	00000747	150.0	15.0	2250.0	2609.0
LO-BENTOMAT ST	SFT SF	200203L0	00000748	150.0	15.0	2250.0	2589.0

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF	200203L0	00000749	150.0	15.0	2250.0	2584.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000751	150.0	15.0	2250.0	2670.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000752	150.0	15.0	2250.0	2720.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000753	150.0	15.0	2250.0	2715.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000754	150.0	15.0	2250.0	2697.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000755	150.0	15.0	2250.0	2678.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000756	150.0	15.0	2250.0	2667.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000757	150.0	15.0	2250.0	2665.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000758	150.0	15.0	2250.0	2659.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000759	150.0	15.0	2250.0	2661.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000760	150.0	15.0	2250.0	2631.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000761	150.0	15.0	2250.0	2657.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000762	150.0	15.0	2250.0	2659.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000763	150.0	15.0	2250.0	2633.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000764	150.0	15.0	2250.0	2643.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000765	150.0	15.0	2250.0	2639.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000766	150.0	15.0	2250.0	2653.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000767	150.0	15.0	2250.0	2647.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000768	150.0	15.0	2250.0	2640.0

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

1941

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200203L0	00000769	150.0	15.0	2250.0	2642.0
LO-BENTOMAT ST	SFT SF	200203L0	00000770	150.0	15.0	2250.0	2640.0
LO-BENTOMAT ST	SFT SF	200203L0	00000771	150.0	15.0	2250.0	2639.0
LO-BENTOMAT ST	SFT SF	200203L0	00000772	150.0	15.0	2250.0	2657.0
LO-BENTOMAT ST	SFT SF	200203L0	00000773	150.0	15.0	2250.0	2714.0
LO-BENTOMAT ST	SFT SF	200203L0	00000774	150.0	15.0	2250.0	2654.0
LO-BENTOMAT ST	SFT SF	200203L0	00000775	150.0	15.0	2250.0	2657.0
LO-BENTOMAT ST	SFT SF	200203L0	00000776	150.0	15.0	2250.0	2676.0
LO-BENTOMAT ST	SFT SF	200203L0	00000777	150.0	15.0	2250.0	2664.0
LO-BENTOMAT ST	SFT SF	200203L0	00000778	150.0	15.0	2250.0	2681.0
LO-BENTOMAT ST	SFT SF	200203L0	00000779	150.0	15.0	2250.0	2675.0
LO-BENTOMAT ST	SFT SF	200203L0	00000780	150.0	15.0	2250.0	2651.0
LO-BENTOMAT ST	SFT SF	200203L0	00000781	150.0	15.0	2250.0	2644.0
LO-BENTOMAT ST	SFT SF	200203L0	00000782	150.0	15.0	2250.0	2646.0
LO-BENTOMAT ST	SFT SF	200203L0	00000783	150.0	15.0	2250.0	2647.0
LO-BENTOMAT ST	SFT SF	200203L0	00000784	150.0	15.0	2250.0	2650.0
LO-BENTOMAT ST	SFT SF	200203L0	00000785	150.0	15.0	2250.0	2657.0
LO-BENTOMAT ST	SFT SF	200203L0	00000786	150.0	15.0	2250.0	2663.0
LO-BENTOMAT ST	SFT SF	200203L0	00000787	150.0	15.0	2250.0	2672.0

P A C K I N G L I S T

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF	200203L0	00000788	150.0	15.0	2250.0	2694.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000789	150.0	15.0	2250.0	2693.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000790	150.0	15.0	2250.0	2649.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000791	150.0	15.0	2250.0	2660.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000792	150.0	15.0	2250.0	2631.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000793	150.0	15.0	2250.0	2642.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000794	150.0	15.0	2250.0	2626.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000795	150.0	15.0	2250.0	2637.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000796	150.0	15.0	2250.0	2686.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000797	150.0	15.0	2250.0	2642.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000798	150.0	15.0	2250.0	2643.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000799	150.0	15.0	2250.0	2642.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000800	150.0	15.0	2250.0	2648.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000801	150.0	15.0	2250.0	2654.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000802	150.0	15.0	2250.0	2641.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000803	150.0	15.0	2250.0	2637.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000804	150.0	15.0	2250.0	2626.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000806	150.0	15.0	2250.0	2664.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000807	150.0	15.0	2250.0	2693.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF	200203L0	00000808	150.0	15.0	2250.0	2625.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000809	150.0	15.0	2250.0	2643.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000810	150.0	15.0	2250.0	2644.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000811	150.0	15.0	2250.0	2662.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000812	150.0	15.0	2250.0	2654.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000813	150.0	15.0	2250.0	2643.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000814	150.0	15.0	2250.0	2641.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000815	150.0	15.0	2250.0	2647.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000816	150.0	15.0	2250.0	2646.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000817	150.0	15.0	2250.0	2651.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000818	150.0	15.0	2250.0	2680.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000819	150.0	15.0	2250.0	2696.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000820	150.0	15.0	2250.0	2661.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000821	150.0	15.0	2250.0	2647.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000822	150.0	15.0	2250.0	2644.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000823	150.0	15.0	2250.0	2652.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000824	150.0	15.0	2250.0	2658.0
O-BENTOMAT ST		SFT	SF	200203L0	00000825	150.0	15.0	2250.0	2622.0
LO-BENTOMAT ST		SFT	SF	200203L0	00000826	150.0	15.0	2250.0	2620.0

000688

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200203L0	00000827	150.0	15.0	2250.0	2610.0
LO-BENTOMAT ST	SFT SF	200203L0	00000828	150.0	15.0	2250.0	2617.0
LO-BENTOMAT ST	SFT SF	200203L0	00000829	150.0	15.0	2250.0	2608.0
LO-BENTOMAT ST	SFT SF	200203L0	00000830	150.0	15.0	2250.0	2626.0
LO-BENTOMAT ST	SFT SF	200203L0	00000831	150.0	15.0	2250.0	2628.0
LO-BENTOMAT ST	SFT SF	200203L0	00000832	150.0	15.0	2250.0	2624.0
LO-BENTOMAT ST	SFT SF	200203L0	00000834	150.0	15.0	2250.0	2634.0
LO-BENTOMAT ST	SFT SF	200203L0	00000835	150.0	15.0	2250.0	2633.0
LO-BENTOMAT ST	SFT SF	200203L0	00000836	150.0	15.0	2250.0	2661.0
LO-BENTOMAT ST	SFT SF	200203L0	00000837	150.0	15.0	2250.0	2668.0
LO-BENTOMAT ST	SFT SF	200203L0	00000838	150.0	15.0	2250.0	2678.0
LO-BENTOMAT ST	SFT SF	200203L0	00000839	150.0	15.0	2250.0	2731.0
LO-BENTOMAT ST	SFT SF	200203L0	00000840	150.0	15.0	2250.0	2710.0
LO-BENTOMAT ST	SFT SF	200203L0	00000841	150.0	15.0	2250.0	2745.0
LO-BENTOMAT ST	SFT SF	200203L0	00000842	150.0	15.0	2250.0	2710.0
LO-BENTOMAT ST	SFT SF	200203L0	00000843	150.0	15.0	2250.0	2714.0
LO-BENTOMAT ST	SFT SF	200203L0	00000844	150.0	15.0	2250.0	2719.0
LO-BENTOMAT ST	SFT SF	200203L0	00000845	150.0	15.0	2250.0	2706.0
LO-BENTOMAT ST	SFT SF	200203L0	00000846	150.0	15.0	2250.0	2705.0

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

4941

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF 200203L0	00000847	150.0	15.0	2250.0	2710.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000848	150.0	15.0	2250.0	2711.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000849	150.0	15.0	2250.0	2681.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000850	150.0	15.0	2250.0	2662.0
O-BENTOMAT ST		SFT	SF 200203L0	00000851	150.0	15.0	2250.0	2717.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000852	150.0	15.0	2250.0	2666.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000853	150.0	15.0	2250.0	2651.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000854	150.0	15.0	2250.0	2662.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000855	150.0	15.0	2250.0	2652.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000856	150.0	15.0	2250.0	2646.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000857	150.0	15.0	2250.0	2696.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000858	150.0	15.0	2250.0	2677.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000859	150.0	15.0	2250.0	2639.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000860	150.0	15.0	2250.0	2645.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000861	150.0	15.0	2250.0	2664.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000862	150.0	15.0	2250.0	2650.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000863	150.0	15.0	2250.0	2708.0
-BENTOMAT ST		SFT	SF 200203L0	00000864	150.0	15.0	2250.0	2720.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000865	150.0	15.0	2250.0	2718.0

000690

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF 200203L0	00000866	150.0	15.0	2250.0	2725.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000867	150.0	15.0	2250.0	2741.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000868	150.0	15.0	2250.0	2643.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000869	150.0	15.0	2250.0	2638.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000870	150.0	15.0	2250.0	2641.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000876	150.0	15.0	2250.0	2634.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000877	150.0	15.0	2250.0	2632.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000878	150.0	15.0	2250.0	2627.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000879	150.0	15.0	2250.0	2671.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000880	150.0	15.0	2250.0	2642.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000881	150.0	15.0	2250.0	2624.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000882	150.0	15.0	2250.0	2618.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000883	150.0	15.0	2250.0	2625.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000884	150.0	15.0	2250.0	2609.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000885	150.0	15.0	2250.0	2605.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000886	150.0	15.0	2250.0	2612.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000887	150.0	15.0	2250.0	2611.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000888	150.0	15.0	2250.0	2672.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000889	150.0	15.0	2250.0	2677.0

PACKING LIST

4941

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000151862
ORDER DATE: 12/28/2001
SHIP DATE:. 1/16/2002

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

HOUSTON TX 77073

SHIP FROM:. LOVELL CETCO PLANT
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 34
GSE/FLOUR DANIEL FERNALD
7400 WILLEY ROAD
KATHY FISHER

HAMILTON OH 45013

PO: 3330-000-0D

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF 200203L0	00000890	150.0	15.0	2250.0	2675.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000891	150.0	15.0	2250.0	2661.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000892	150.0	15.0	2250.0	2658.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000893	150.0	15.0	2250.0	2663.0
O-BENTOMAT ST		SFT	SF 200203L0	00000894	150.0	15.0	2250.0	2626.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000895	150.0	15.0	2250.0	2614.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000896	150.0	15.0	2250.0	2646.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000897	150.0	15.0	2250.0	2654.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000898	150.0	15.0	2250.0	2650.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000899	150.0	15.0	2250.0	2681.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000900	150.0	15.0	2250.0	2660.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000901	150.0	15.0	2250.0	2665.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000902	150.0	15.0	2250.0	2635.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000903	150.0	15.0	2250.0	2630.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000904	150.0	15.0	2250.0	2625.0
LO-BENTOMAT ST		SFT	SF 200203L0	00000905	150.0	15.0	2250.0	2631.0

ORDER TOTALS.....	1660500.0	1972574.0
TOTAL ITEMS..... 738		

000692

4941

GEOSYNTHETIC CLAY LINER MANUFACTURING CERTIFICATION

GEOSYNTHETIC CLAY LINER

MANUFACTURING CERTIFICATION

Project Name:	Flour Daniel Fernald
Prepared For:	GSE Lining Technology, Inc.
Customer PO:	3285-000-OD
Order Number:	151862
Ship Date:	PRESCANE

Colloid Environmental Technologies Company (CETCO) hereby affirms and certifies that all of the BENTOMAT ST manufactured in this lot achieves the physical and chemical criteria listed on the attached analysis sheet.

Steve Wilkerson
Plant Manager

Subscribed and sworn to before me this 17 day of January 2001.

Notary-Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 12/18/04

NEEDLE DETECTION CERTIFICATION

CERTIFICATION STATEMENT

Project Name:	Flour Daniel Fernald
Prepared For:	GSE Lining Technology, Inc.
Customer PO:	3285-000-OD
Order Number:	151862
Ship Date:	PRESCANE

This statement is to certify that all components of the BENTOMAT ST manufactu
for the above project have been inspected continually for the presence of broken needles through the use of a magnetic removal system.

COLLOID ENVIRONMENTAL TECHNOLOGIES CO. (CETCO)

Subscribed and sworn to before me this 17 day of January 2001.

Notary-Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 12/8-01

BENTONITE CLAY CERTIFICATIONS

TECHNICAL DATA SHEET

ORIGIN INFORMATION

BENTONITE

Manufacturer: **AMERICAN COLLOID COMPANY**

PRODUCTION

Facility: **AMERICAN COLLOID COMPANY**
92 HWY. 37
Lovell, WY 82431

Contact: **Moses Briseno**
Quality Assurance Coordinator
(800)-322-1160

Brand Name: **CG 50**

4941

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: **CETCO - LOVELL PLANT**
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: **03-Jan-02**

ATTN: **NOE GARCIA**

Dear Sirs:

A shipment of **CG 50**
left our Lovell, WY plant on **010302A**
in **TANK A**
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 PERCENT	0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.5
Moisture	ASTM D 2216	12.0 % (MAX)	9.2
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	27.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	14.6

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: **B.M., D.M., C.L., I.G.**

Approved By: **MOSES BRISENO**
ACC

In any correspondence regarding this shipment, please refer to our
Order Number **NA**

4941

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: **CETCO - LOVELL PLANT**
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: **04-Jan-02**

ATTN: **NOE GARCIA**

Dear Sirs:

A shipment of **CG 50**
left our Lovell, WY plant on **010402A**
in **TANK A**
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 PERCENT	**0**
Passing 200 Mesh	ASTM D 421	1 % (Max)	**0.8**
Moisture	ASTM D 2216	12.0 % (MAX)	**9.6**
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	**28.0**
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	**15.0**

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: **B.M., D.M., C.L., I.G.**

Approved By: **MOSES BRISENO**
ACC

In any correspondence regarding this shipment, please refer to our
Order Number **NA**

4941

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: **CETCO - LOVELL PLANT**
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: **04-Jan-02**

ATTN: **NOE GARCIA**

Dear Sirs:

A shipment of **CG 50**
left our Lovell, WY plant on **010402B**
in **TANK A**
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 PERCENT	**0**
Passing 200 Mesh	ASTM D 421	1 % (Max)	**0.8**
Moisture	ASTM D 2216	12.0 % (MAX)	**9.2**
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	**28.0**
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	**15.0**

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: **B.M., D.M., C.L., I.G.**

Approved By: **MOSES BRISENO**
ACC

In any correspondence regarding this shipment, please refer to our
Order Number **NA**

4941

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: **CETCO - LOVELL PLANT**
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: **07-Jan-02**

ATTN: **NOE GARCIA**

Dear Sirs:

A shipment of **CG 50**
left our Lovell, WY plant on **010702A**
in **TANK A**
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 PERCENT	0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.4
Moisture	ASTM D 2216	12.0 % (MAX)	9.6
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	28.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	14.8

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: **B.M., D.M., C.L., I.G.**

Approved By: **MOSES BRISENO**
ACC

In any correspondence regarding this shipment, please refer to our
Order Number **NA**

000702

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: **CETCO - LOVELL PLANT**
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: **08-Jan-02**

ATTN: **NOE GARCIA**

Dear Sirs:

A shipment of **CG 50**
left our Lovell, WY plant on **010802A**
in **TANK A**
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 PERCENT	0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.9
Moisture	ASTM D 2216	12.0 % (MAX)	9.2
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	27.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	15.0

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: **B.M., D.M., C.L., I.G.**

Approved By: **MOSES BRISENO**
ACC

In any correspondence regarding this shipment, please refer to our
Order Number **NA**

4941

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: **CETCO - LOVELL PLANT**
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: **08-Jan-02**

ATTN: **NOE GARCIA**

Dear Sirs:

A shipment of **CG 50**
left our Lovell, WY plant on **010802B**
in **TANK A**
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 PERCENT	0
Passing 200 Mesh	ASTM D 421	1 % (Max)	1.0
Moisture	ASTM D 2216	12.0 % (MAX)	9.2
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	27.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	15.0

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: **B.M., D.M., C.L., I.G.**

Approved By: **MOSES BRISENO**
ACC

In any correspondence regarding this shipment, please refer to our
Order Number **NA**

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: **CETCO - LOVELL PLANT**
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: **09-Jan-02**

ATTN: **NOE GARCIA**

Dear Sirs:

A shipment of **CG 50**
left our Lovell, WY plant on **010902A**
in **TANK A**
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 PERCENT	**0**
Passing 200 Mesh	ASTM D 421	1 % (Max)	**0.5**
Moisture	ASTM D 2216	12.0 % (MAX)	**9.6**
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	**26.0**
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	**16.0**

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: **B.M., D.M., C.L., I.G.**

Approved By: **MOSES BRISENO**
ACC

In any correspondence regarding this shipment, please refer to our
Order Number **NA**

4941

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: **CETCO - LOVELL PLANT**
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: **09-Jan-02**

ATTN: **NOE GARCIA**

Dear Sirs:

A shipment of **CG 50**
left our Lovell, WY plant on **010902B**
in **TANK A**
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 PERCENT	0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.5
Moisture	ASTM D 2216	12.0 % (MAX)	8.8
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	26.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	16.0

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: **B.M., D.M., C.L., I.G.**

Approved By: **MOSES BRISENO**
ACC

In any correspondence regarding this shipment, please refer to our
Order Number **NA**

4941

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: CETCO - LOVELL PLANT
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: 09-Jan-02

ATTN: NOE GARCIA

Dear Sirs:

A shipment of CG 50
left our Lovell, WY plant on 010902C
in TANK A
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 PERCENT	0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.5
Moisture	ASTM D 2216	12.0 % (MAX)	8.8
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	26.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	16.0

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: B.M., D.M., C.L., I.G.

Approved By: MOSES BRISENO
ACC

In any correspondence regarding this shipment, please refer to our
Order Number NA

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: **CETCO - LOVELL PLANT**
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: **10-Jan-02**

ATTN: **NOE GARCIA**

Dear Sirs:

A shipment of **CG 50**
left our Lovell, WY plant on **011002A**
in **TANK A**
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 PERCENT	**0**
Passing 200 Mesh	ASTM D 421	1 % (Max)	**0.2**
Moisture	ASTM D 2216	12.0 % (MAX)	**9.2**
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	**26.0**
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	**15.8**

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: **B.M., D.M., C.L., I.G.**

Approved By: **MOSES BRISENO**
ACC

In any correspondence regarding this shipment, please refer to our
Order Number **NA**

1888

BENTONITE
CERTIFICATE OF ANALYSIS

4941

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: **CETCO - LOVELL PLANT**
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: **10-Jan-02**

ATTN: **NOE GARCIA**

Dear Sirs:

A shipment of **CG 50**
left our Lovell, WY plant on **011002B**
in **TANK A**
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 PERCENT	**0**
Passing 200 Mesh	ASTM D 421	1 % (Max)	**0.2**
Moisture	ASTM D 2216	12.0 % (MAX)	**9.2**
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	**26.0**
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	**15.8**

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: **B.M., D.M., C.L., I.G.**

Approved By: **MOSES BRISENO**
ACC

In any correspondence regarding this shipment, please refer to our
Order Number **NA**

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: **CETCO - LOVELL PLANT**
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: **19-Dec-01**

ATTN: **NOE GARCIA**

Dear Sirs:

A shipment of **CG 50**
left our Lovell, WY plant on **121901A**
in **TANK A**
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 PERCENT	0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.4
Moisture	ASTM D 2216	12.0 % (MAX)	8.8
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	26.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	14.8

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: **B.M., D.M., C.L., I.G.**

Approved By: **MOSES BRISENO**
ACC

In any correspondence regarding this shipment, please refer to our
Order Number **NA**

4941

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: **CETCO - LOVELL PLANT**
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: **20-Dec-01**

ATTN: **NOE GARCIA**

Dear Sirs:

A shipment of **CG 50**
left our Lovell, WY plant on **122001A**
in **TANK A**
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 PERCENT	**0**
Passing 200 Mesh	ASTM D 421	1 % (Max)	**0.6**
Moisture	ASTM D 2216	12.0 % (MAX)	**8.8**
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	**29.0**
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	**14.6**

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: **B.M., D.M., C.L., I.G.**

Approved By: **MOSES BRISENO**
ACC

In any correspondence regarding this shipment, please refer to our
Order Number **NA**

IAPA

4941

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: **CETCO - LOVELL PLANT**
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: **20-Dec-01**

ATTN: **NOE GARCIA**

Dear Sirs:

A shipment of **CG 50**
left our Lovell, WY plant on **122001B**
in **TANK A**
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 PERCENT	0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.7
Moisture	ASTM D 2216	12.0 % (MAX)	8.8
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	29.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	14.6

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: **B.M., D.M., C.L., I.G.**

Approved By: **MOSES BRISENO**
ACC

In any correspondence regarding this shipment, please refer to our
Order Number **NA**

4941

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: CETCO - LOVELL PLANT
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: 27-Dec-01

ATTN: NOE GARCIA

Dear Sirs:

A shipment of CG 50
left our Lovell, WY plant on 122701A
in TANK A
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 PERCENT	0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.8
Moisture	ASTM D 2216	12.0 % (MAX)	9.2
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	25.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	15.0

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: B.M., D.M., C.L., I.G.

Approved By: MOSES BRISENO
ACC

In any correspondence regarding this shipment, please refer to our
Order Number NA

4941

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: **CETCO - LOVELL PLANT**
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: **27-Dec-01**

ATTN: **NOE GARCIA**

Dear Sirs:

A shipment of **CG 50**
left our Lovell, WY plant on **122701B**
in **TANK A**
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 PERCENT	0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.8
Moisture	ASTM D 2216	12.0 % (MAX)	10.4
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	25.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	15.0

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: **B.M., D.M., C.L., I.G.**

Approved By: **MOSES BRISENO**
ACC

In any correspondence regarding this shipment, please refer to our
Order Number **NA**

4941

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: **CETCO - LOVELL PLANT**
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: **27-Dec-01**

ATTN: **NOE GARCIA**

Dear Sirs:

A shipment of **CG 50**
left our Lovell, WY plant on **122701C**
in **TANK A**
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 PERCENT	0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.6
Moisture	ASTM D 2216	12.0 % (MAX)	10.0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	25.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	15.0

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: **B.M., D.M., C.L., I.G.**

Approved By: **MOSES BRISENO**
ACC

In any correspondence regarding this shipment, please refer to our
Order Number **NA**

BENTONITE
CERTIFICATE OF ANALYSIS

AMERICAN COLLOID
92 HWY. 37
LOVELL, WY 82431

TO: **CETCO - LOVELL PLANT**
P.O. BOX 428
92 HWY 37
LOVELL, WY. 82431

DATE: **27-Dec-01**

ATTN: **NOE GARCIA**

Dear Sirs:

A shipment of **CG 50**
left our Lovell, WY plant on **122701D**
in **TANK A**
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 PERCENT	0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.4
Moisture	ASTM D 2216	12.0 % (MAX)	9.2
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	25.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	15.0

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: **B.M., D.M., C.L., I.G.**

Approved By: **MOSES BRISENO**
ACC

In any correspondence regarding this shipment, please refer to our
Order Number **NA**

WOVEN GEOTEXTILE MANUFACTURER'S CERTIFICATION

TECHNICAL DATA SHEET

ORIGIN INFORMATION

WOVEN GEOTEXTILE

Manufacturer: **Synthetic Industries Inc.**

PRODUCTION

Facility: **Synthetic Industries**
4019 Industry Drive
Chattanooga, TN. 37416

Contact: Randy Johnson

Brand Name: 82 Tex.

SI Geosolutions

4941

American Colloid Cetco WY
Noe Garcia
PO Box 428
Lovell WY 82431
BOL 80143613 PO 0-L15-33119
Ref:

1/9/2002

This is to certify that Product 82TEX , a woven polypropylene geotextile produced by S I Corporation, 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		MARV			SI Units		
Mass Per Unit Area	ASTM D-5261	oz/yd2 - (g/m2)	3.20			(108.48)		
Thickness	ASTM D-5199	mils - (m	16			(0.4064)		
Tensile Strength (Grab	ASTM D-4632	lb - (N)	155	X	135	(689.75)	X	(600.75)
Elongation	ASTM D-4632	%	15	X	15			
Trapezoidal Tear	ASTM D-4533	lb - (N)	45	X	45	(200.25	X	(200.25)
Mullen Burst	ASTM D-3786	psi - (Kpa	265			(1826.91		
Puncture Strength	ASTM D-4833	lb - (N)	70			(311.5)		
AOS	ASTM D-4751	US Sieve - (mm	40			0.425		
Permittivit	ASTM D-4491	SEC-1	0.08					
Permeability -	ASTM D-4491	cm - (sec)	0.004					
Water Flow Rate	ASTM D-4491	gpm/ft - (lpm/m2)	6			(244.4682		
UV Resistance-4	ASTM D-4355	% Retained	90					

Sincerely

John D. Cannon, P.E.
Regional Engineer
SI Geosolutions

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 specification stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND TO THE EXTENT THAT IF 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 S I Corporation current published specifications, and the Customer gives notice to S I Corporation before installing the product, then S I Corporation 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 11/1/2000

000719

6025 Lee Highway, Suite 435 • Chattanooga, TN 37421
Ph: 423-899-0444 • Fax: 423-899-7619

SI Geosolutions

4941

1/8/2002

American Colloid Cetco WY
Noe Garcia

PO Box 428
Lovell WY 82431
BOL 80143638 PO 0-L15-33119
Ref:

This is to certify that Product GEOTEX 650 , a nonwoven polypropylene geotextile produced by S I Corporation, 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. This geotextile has been continuously inspected for the presence of needles and none were detected.

Physical Property	Test Method	US Units		SI Unit	
Mass Per Unit Area	ASTM D-5261	6.0	oz/yd2	(203.4)	g/m2
Thickness	ASTM D-5199	120	mils lbs	(3.048)	mm
Tensile Strength	ASTM D-4632	45	%	(200.25	N
Elongation	ASTM D-4632	90	lbs	90	%
Trapezoidal Tear	ASTM D-4533	25	psi	(111.25	N
Mullen Burst	ASTM D-3786	190	lbs	(1309.8	kPa
Puncture Strength	ASTM D-4833	50	Sieve	(222.5)	N
A.O.S.	ASTM D-4751		sec-1		mm
Permittivity	ASTM D-4491		cm/secgp		sec-1
Permeability	ASTM D-4491		m/ft2 %		cm/sec
Water Flow Rate	ASTM D-4491				lpm/m2
UV Resistance	ASTM D-4355			()	%

Strength Retained after 500 hours exposure in Xenon Arc Weatherometer

Sincerely

John D. Cannon, P.E.
Regional Engineer
SI Geosolutions

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 specification stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND TO THE EXTENT THAT IF 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 S I Corporation current published specifications, and the Customer gives notice to S I Corporation before installing the product, then S I Corporation 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

1/23/2001

000720

[illegible] Lee Highway, Suite 435 • Chattanooga, TN 37421
[illegible] 423-899-0444 • Fax: 423-899-7619

Individual Roll Data
Bill of Lading 80143638

Roll #	Style	Batch	Weight	Thick	Tensile		Elongation		T.Tear		Burst	Punct
					MD	XMD	MD	XMD	MD	XMD		
			Osy	mils	lbs	lbs	%	%	lbs	lbs	psi	lbs
			D5261	D5199	D4632	D4632	D4632	D4632	D4533	D4533	D3786	D4833
A902477A	650	90298	6.6	143	110	161	108	124	61	51	259	64
B869588A	650	80445	8.1	166	104	133	126	122	55	42	271	82

000721

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 and rolls listed may or may not be the actual rolls tested. However, the data provided is the same production run as the rolls actually shipped on this bill of lading.

7-4941

SI Geosolutions

4941

1/9/2002

American Colloid Cetco WY
Noe Garcia

PO Box 428
Lovell WY 82431
BOL 80144292 PO 0-L15-33119
Ref:

This is to certify that Product GEOTEX 650 , a nonwoven polypropylene geotextile produced by S I Corporation, 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. This geotextile has been continuously inspected for the presence of needles and none were detected.

Physical Property	Test Method	US Units		SI Unit	
Mass Per Unit Area	ASTM D-5261	6.0	oz/yd2	(203.4)	g/m2
Thickness	ASTM D-5199	120	mils	(3.048)	mm
Tensile Strength	ASTM D-4632	45	lbs	(200.25)	N
Elongation	ASTM D-4632	90	%	90	%
Trapezoidal Tear	ASTM D-4533	25	lbs	(111.25)	N
Mullen Burst	ASTM D-3786	190	psi	(1309.8	kPa
Puncture Strength	ASTM D-4833	50	lbs	(222.5)	N
A.O.S.	ASTM D-4751		Sieve		mm
Permittivity	ASTM D-4491		sec-1		sec-1
Permeability	ASTM D-4491		cm/sec		cm/sec
Water Flow Rate	ASTM D-4491		gpm/ft2		lpm/m2
UV Resistance	ASTM D-4355		%	()	%

Strength Retained after 500 hours exposure in Xenon Arc Weatherometer

Sincerely

John D. Cannon, P.E.
Regional Engineer
SI Geosolutions

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 specification stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND TO THE EXTENT THAT IF 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 S I Corporation current published specifications, and the Customer gives notice to S I Corporation before installing the product, then S I Corporation 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

1/23/2001

000722

Highway, Suite 435 • Chattanooga, TN 37421
423-899-0444 • Fax: 423-899-7619

Individual Roll Data
Bill of Lading 80144292

Roll #	Style	Batch	Weight	Thick	Tensile		Elongation		T.Tear		Burst	Punct
					MD	XMD	MD	XMD	MD	XMD		
			Osy	mils	lbs	lbs	%	%	lbs	lbs	psi	lbs
			D5261	D5199	D4632	D4632	D4632	D4632	D4533	D4533	D3786	D4833
A902513A	650	90298	6.6	142	118	172	121	130	59	68	276	68
B851184A	650	80310	6.8	149	97	186	120	146	68	57	223	70
F400031A	650	F0002	7.4	143	110	185	129	120	58	80	217	78
F400085A	650	F0003	7	133	102	177	125	117	53	80	229	75
F400095A	650	F0003	6.9	141	102	177	113	121	65	77	246	72

000723

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 and listed may or may not be the actual rolls tested. However, the data provided is from the same production run as the rolls actually shipped on this bill of lading.

4941

SI Geosolutions

4941

1/8/2002

American Colloid Cetco WY
Noe Garcia

PO Box 428
Lovell WY 82431
BOL 80144405 PO 0-L15-33119
Ref:

This is to certify that Product GEOTEX 650 , a nonwoven polypropylene geotextile produced by S I Corporation, 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. This geotextile has been continuously inspected for the presence of needles and none were detected.

Physical Property	Test Method	US Units		SI Unit	
Mass Per Unit Area	ASTM D-5261	6.0	oz/yd2 mils	(203.4)	g/m2
Thickness	ASTM D-5199	120	lbs	(3.048)	mm
Tensile Strength	ASTM D-4632	45	%	(200.25)	N
Elongation	ASTM D-4632	90	lbs	90	%
Trapezoidal Tear	ASTM D-4533	25	psi	(111.25)	N
Mullen Burst	ASTM D-3786	190	lbs	(1309.8	kPa
Puncture Strength	ASTM D-4833	50	Sieve sec-	(222.5)	N
A.O.S.	ASTM D-4751		1		mm
Permittivity	ASTM D-4491		cm/secgpm/ft		sec-1
Permeability	ASTM D-4491		2 %		cm/sec
Water Flow Rate	ASTM D-4491				lpm/m2
UV Resistance	ASTM D-4355			()	%

Strength Retained after 500 hours exposure in Xenon Arc Weatherometer

Sincerely

John D. Cannon, P.E.
Regional Engineer
SI Geosolutions

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1/23/2001

000724

Lee Highway, Suite 435 • Chattanooga, TN 37421
423-899-0444 • Fax: 423-899-7619

Individual Roll Data
Bill of Lading 80144405

Roll #	Style	Batch	Weight	Thick	Tensile		Elongation		T.Tear		Burst	Punct
					MD	XMD	MD	XMD	MD	XMD		
			Osy	mils	lbs	lbs	%	%	lbs	lbs	psi	lbs
			D5261	D5199	D4632	D4632	D4632	D4632	D4533	D4533	D3786	D4833
A112855A	650	11789	6.8	137	70	108	110	124	28	35	253	65

000725

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 and listed may or may not be the actual rolls tested. However, the data provided is the same production run as the rolls actually shipped on this bill of lading.

4941

SI Geosolutions

1/8/2002 4941

American Colloid Cetco WY
Noe Garcia

PO Box 428
Lovell WY 82431
BOL 80144354 PO 0-L15-33119
Ref:

This is to certify that Product GEOTEX 650 , a nonwoven polypropylene geotextile produced by S I Corporation, 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. This geotextile has been continuously inspected for the presence of needles and none were detected.

Physical Property	Test Method	US Units		SI Unit	
Mass Per Unit Area	ASTM D-5261	6.0	oz/yd2 mils	(203.4)	g/m2
Thickness	ASTM D-5199	120	lbs	(3.048)	mm
Tensile Strength	ASTM D-4632	45	%	(200.25)	N
Elongation	ASTM D-4632	90	lbs	90	%
Trapezoidal Tear	ASTM D-4533	25	psi	(111.25)	N
Mullen Burst	ASTM D-3786	190	lbs	(1309.8	kPa
Puncture Strength	ASTM D-4833	50	Sieve sec-	(222.5)	N
A.O.S.	ASTM D-4751		1		mm
Permittivity	ASTM D-4491		cm/secgpm/ft		sec-1
Permeability	ASTM D-4491		2 %		cm/sec
Water Flow Rate	ASTM D-4491				lpm/m2
UV Resistance	ASTM D-4355			()	%

Strength Retained after 500 hours exposure in Xenon Arc Weatherometer

Sincerely

John D. Cannon, P.E.
Regional Engineer
SI Geosolutions

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1/23/2001

000726

Lee Highway, Suite 435 • Chattanooga, TN 37421
423 899-0444 • Fax: 423-899-7619

Individual Roll Data
Bill of Lading 80144354

Roll #	Style	Batch	Weight	Thick	Tensile		Elongation		T.Tear		Burst	Punct
					MD	XMD	MD	XMD	MD	XMD		
			Osy	mils	lbs	lbs	%	%	lbs	lbs	psi	lbs
			D5261	D5199	D4632	D4632	D4632	D4632	D4533	D4533	D3786	D4833
A112831A	650	11789	6.6	128	60	102	100	117	27	34	274	60

000727

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 or 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 the production sequence test results listed above may include data from rolls which were not shipped and listed may or may not be the actual rolls tested. However, the data provided is from the same production run as the rolls actually shipped on this bill of lading.

1-494

SI Geosolutions

4941
1/8/2002

American Colloid Cetco WY
Noe Garcia

PO Box 428
Lovell WY 82431
BOL 80143920 PO 0-L15-33119
Ref:

This is to certify that Product GEOTEX 650 , a nonwoven polypropylene geotextile produced by S I Corporation, 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. This geotextile has been continuously inspected for the presence of needles and none were detected.

Physical Property	Test Method	US Units		SI Unit	
Mass Per Unit Area	ASTM D-5261	6.0	oz/yd2	(203.4)	g/m2
Thickness	ASTM D-5199	120	mils lbs	(3.048)	mm
Tensile Strength	ASTM D-4632	45	%	(200.25	N
Elongation	ASTM D-4632	90	lbs	90	%
Trapezoidal Tear	ASTM D-4533	25	psi	(111.25	N
Mullen Burst	ASTM D-3786	190	lbs	(1309.8	kPa
Puncture Strength	ASTM D-4833	50	Sieve	(222.5)	N
A.O.S.	ASTM D-4751		sec-1		mm
Permittivity	ASTM D-4491		cm/secgp		sec-1
Permeability	ASTM D-4491		m/ft2 %		cm/sec
Water Flow Rate	ASTM D-4491				lpm/m2
UV Resistance	ASTM D-4355			()	%

Strength Retained after 500 hours exposure in Xenon Arc Weatherometer

Sincerely

John D. Cannon, P.E.
Regional Engineer
SI Geosolutions

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1/23/2001

000728

[illegible] Lee Highway, Suite 435 • Chattanooga, TN 37421
Ph. 423-899-0444 • Fax: 423-899-7619

SI Corporation
Individual Roll Data
Bill of Lading 80143920

Roll #	Style	Batch	Weight	Thick	Tensile		Elongation		T.Tear		Burst	Punct
					MD	XMD	MD	XMD	MD	XMD		
			Osy	mils	lbs	lbs	%	%	lbs	lbs	psi	lbs
			D5261	D5199	D4632	D4632	D4632	D4632	D4533	D4533	D3786	D4833
A529634A	650	51583	7.1	134	73	145	130	118	41	42	239	66
A529649A	650	51583	6.6	132	69	104	124	118	32	34	247	68

000729

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 [illegible] published minimum average roll values, approved rolls are shipped for storage until an order requir[illegible] material to be shipped. Since rolls are loaded at the warehouse independent o[illegible] production se[illegible] test results listed above may include data from rolls which were not shipped a[illegible] listed may or may not be the actual rolls tested. However, the data provided is [illegible] the same pr[illegible] run as the rolls actually shipped on this bill of lading.

1-4941

SI Geosolutions

4941

1/8/2002

American Colloid Cetco WY
Noe Garcia

PO Box 428
Lovell WY 82431
BOL 80143911 PO 0-L15-33119
Ref:

This is to certify that Product GEOTEX 650 , a nonwoven polypropylene geotextile produced by S I Corporation, 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. This geotextile has been continuously inspected for the presence of needles and none were detected.

Physical Property	Test Method	US Units		SI Unit	
Mass Per Unit Area	ASTM D-5261	6.0	oz/yd2	(203.4)	g/m2
Thickness	ASTM D-5199	120	mils lbs	(3.048)	mm
Tensile Strength	ASTM D-4632	45	%	(200.25	N
Elongation	ASTM D-4632	90	lbs	90	%
Trapezoidal Tear	ASTM D-4533	25	psi	(111.25	N
Mullen Burst	ASTM D-3786	190	lbs	(1309.8	kPa
Puncture Strength	ASTM D-4833	50	Sieve	(222.5)	N
A.O.S.	ASTM D-4751		sec-1		mm
Permittivity	ASTM D-4491		cm/secgp		sec-1
Permeability	ASTM D-4491		m/ft2 %		cm/sec
Water Flow Rate	ASTM D-4491			()	lpm/m2
UV Resistance	ASTM D-4355				%

Strength Retained after 500 hours exposure in Xenon Arc Weatherometer

Sincerely

John D. Cannon, P.E.
Regional Engineer
SI Geosolutions

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1/23/2001

000730

Highway, Suite 435 • Chattanooga, TN 37421
-0444 • Fax: 423-899-7619

SI Corporation
Individual Roll Data
Bill of Lading 80143911

Roll #	Style	Batch	Weight	Thick	Tensile		Elongation		T.Tear		Burst	Punct
					MD	XMD	MD	XMD	MD	XMD		
			Osy	mils	lbs	lbs	%	%	lbs	lbs	psi	lbs
			D5261	D5199	D4632	D4632	D4632	D4632	D4533	D4533	D3786	D4833
A529598A	650	51582	6.3	131	61	112	136	121	27	32	233	58
A902480A	650	90298	6.5	145	120	156	118	131	45	51	243	71

000731

4941

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 [illegible] of nonwoven geotextiles are produced, inspected and the test results from the fr[illegible]cy stated above indicates that materials produced during the production run me[illegible]ur published [illegible]um average roll values, approved rolls are shipped for storage until an order r[illegible] the material to be shipped. Since rolls are loaded at the warehouse independ[illegible] produc[illegible]nce test results listed above may include data from rolls which were not shi[illegible]lls listed may or may not be the actual rolls tested. However, the data provi[illegible] the sar[illegible]on run as the rolls actually shipped on this bill of lading

4941

SI Geosolutions

1/8/2002

American Colloid Cetco WY
Noe Garcia

PO Box 428
Lovell WY 82431
BOL 80143924 PO 0-L15-33119
Ref:

This is to certify that Product GEOTEX 650 , a nonwoven polypropylene geotextile produced by S I Corporation, 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. This geotextile has been continuously inspected for the presence of needles and none were detected.

Physical Property	Test Method	US Units		SI Unit	
Mass Per Unit Area	ASTM D-5261	6.0	oz/yd2 mils	(203.4)	g/m2
Thickness	ASTM D-5199	120	lbs	(3.048)	mm
Tensile Strength	ASTM D-4632	45	%	(200.25)	N
Elongation	ASTM D-4632	90	lbs	90	%
Trapezoidal Tear	ASTM D-4533	25	psi	(111.25)	N
Mullen Burst	ASTM D-3786	190	lbs	(1309.8	kPa
Puncture Strength	ASTM D-4833	50	Sieve sec-	(222.5)	N
A.O.S.	ASTM D-4751		1		mm
Permittivity	ASTM D-4491		cm/secgpm/ft		sec-1
Permeability	ASTM D-4491		2 %		cm/sec
Water Flow Rate	ASTM D-4491				lpm/m2
UV Resistance	ASTM D-4355			()	%

Strength Retained after 500 hours exposure in Xenon Arc Weatherometer

Sincerely

John D. Cannon, P.E.
Regional Engineer
SI Geosolutions

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1/23/2001

000732

Highway, Suite 435 • Chattanooga, TN 37421
423-899-0444 • Fax: 423-899-7619

1/9/2002

SI Corporation
Individual Roll Data
Bill of Lading 80143924

Roll #	Style	Batch	Weight	Thick	Tensile		Elongation		T.Tear		Burst	Punct
					MD	XMD	MD	XMD	MD	XMD		
			Osy	mils	lbs	lbs	%	%	lbs	lbs	psi	lbs
			D5261	D5199	D4632	D4632	D4632	D4632	D4533	D4533	D3786	D4833
A529630A	650	51883	7.1	139	72	139	136	143	34	58	226	89
A529658A	650	51883	6	124	63	114	127	114	27	36	233	58

000733

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 proje[illegible] specifications, it is the purchaser's responsibility to notify Synthetic Industries and ask for assista[illegible] calculating the costs for the additional tests.

Once [illegible] of nonwoven geotextiles are produced, inspected and the test results from the fr[illegible]cy stated above indicates that materials produced during the production run [illegible] published [illegible]um average roll values, approved rolls are shipped for storage until an order [illegible] e material to be shipped. Since rolls are loaded at the warehouse independ[illegible] product[illegible]ice test results listed above may include data from rolls which were not shi[illegible]lls listed may or may not be the actual rolls tested. However, the [illegible] the san[illegible]ion run as the rolls actually shipped on this bill of lading.

4941

SI Geosolutions

4941

1/8/2002

American Colloid Cetco WY
Noe Garcia

PO Box 428
Lovell WY 82431
BOL 80144097 PO 0-L15-33119
Ref:

This is to certify that Product GEOTEX 650 , a nonwoven polypropylene geotextile produced by S I Corporation, 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. This geotextile has been continuously inspected for the presence of needles and none were detected.

Physical Property	Test Method	US Units		SI Unit	
Mass Per Unit Area	ASTM D-5261	6.0	oz/yd2 mils	(203.4)	g/m2
Thickness	ASTM D-5199	120	lbs	(3.048)	mm
Tensile Strength	ASTM D-4632	45	%	(200.25)	N
Elongation	ASTM D-4632	90	lbs	90	%
Trapezoidal Tear	ASTM D-4533	25	psi	(111.25)	N
Mullen Burst	ASTM D-3786	190	lbs	(1309.8	kPa
Puncture Strength	ASTM D-4833	50	Sieve sec-	(222.5)	N
A.O.S.	ASTM D-4751		1		mm
Permittivity	ASTM D-4491		cm/secgpm/ft		sec-1
Permeability	ASTM D-4491		2 %		cm/sec
Water Flow Rate	ASTM D-4491				lpm/m2
UV Resistance	ASTM D-4355			()	%

Strength Retained after 500 hours exposure in Xenon Arc Weatherometer

Sincerely

John D. Cannon, P.E.
Regional Engineer
SI Geosolutions

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 specification stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND TO THE EXTENT THAT IF 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 S I Corporation current published specifications, and the Customer gives notice to S I Corporation before installing the product, then S I Corporation 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

1/23/2001

000734

[illegible] Lee Highway, Suite 435 • Chattanooga, TN 37421
[illegible] 899-0444 • Fax: 423-899-7619

1/9/2002

SI Corporation
Individual Roll Data
Bill of Lading 80144097

Roll #	Style	Batch	Weight	Thick	Tensile		Elongation		T.Tear		Burst	Punct
					MD	XMD	MD	XMD	MD	XMD		
			Osy	mils	lbs	lbs	%	%	lbs	lbs	psi	lbs
			D5261	D5199	D4632	D4632	D4632	D4632	D4533	D4533	D3786	D4833
A529595A	650	51582	6.6	138	87	111	144	115	27	41	247	61
A902513A	650	90298	6.6	142	116	172	121	130	59	68	276	68

000735

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 prior to the time of purchase. Once [illegible] of nonwoven geotextiles are produced, inspected and the test results from the [illegible] ncy stated above indicates that materials produced during the production run me[illegible] published [illegible] um average roll values, approved rolls are shipped for storage until an order r[illegible] the material to be shipped. Since rolls are loaded at the warehouse independ[illegible] produc[illegible] nce test results listed above may include data from rolls which were not shi[illegible] lls listed may or may not be the actual rolls tested. However, the data prov[illegible] the sa[illegible] on run as the rolls actually shipped on this bill of lading.

4941

SI Geosolutions

4941

1/8/2002

American Colloid Cetco WY
Noe Garcia

PO Box 428
Lovell WY 82431
BOL 80144337 PO 0-L15-33119
Ref:

This is to certify that Product GEOTEX 650 , a nonwoven polypropylene geotextile produced by S I Corporation, 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. This geotextile has been continuously inspected for the presence of needles and none were detected.

Physical Property	Test Method	US Units		SI Unit	
Mass Per Unit Area	ASTM D-5261	6.0	oz/yd2 mils	(203.4)	g/m2
Thickness	ASTM D-5199	120	lbs	(3.048)	mm
Tensile Strength	ASTM D-4632	45	%	(200.25)	N
Elongation	ASTM D-4632	90	lbs	90	%
Trapezoidal Tear	ASTM D-4533	25	psi	(111.25)	N
Mullen Burst	ASTM D-3786	190	lbs	(1309.8	kPa
Puncture Strength	ASTM D-4833	50	Sieve sec-	(222.5)	N
A.O.S.	ASTM D-4751		1		mm
Permittivity	ASTM D-4491		cm/secgpm/ft		sec-1
Permeability	ASTM D-4491		2 %		cm/sec
Water Flow Rate	ASTM D-4491				lpm/m2
UV Resistance	ASTM D-4355			()	%

Strength Retained after 500 hours exposure in Xenon Arc Weatherometer

Sincerely

John D. Cannon, P.E.
Regional Engineer
SI Geosolutions

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 specification stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND TO THE EXTENT THAT IF 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 S I Corporation current published specifications, and the Customer gives notice to S I Corporation before installing the product, then S I Corporation 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 wanout notice. The effective date for this product data is

1/23/2001

000736

Lee Highway, Suite 435 • Chattanooga, TN 37421
399-0444 • Fax: 423-899-7619

Individual Roll Data
Bill of Lading 80144337

Roll #	Style	Batch	Weight	Thick	Tensile		Elongation		T.Tear		Burst	Punct
					MD	XMD	MD	XMD	MD	XMD		
			Osy	mils	lbs	lbs	%	%	lbs	lbs	psi	lbs
			D5261	D5199	D4632	D4632	D4632	D4632	D4533	D4533	D3786	D4833
A112840A	650	11789	6.6	130	70	96	122	120	39	46	253	61
A112845A	650	11789	6.5	130	68	91	131	111	25	27	244	70
A112850A	650	11789	6.4	202	79	87	120	113	32	31	250	70

000737

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 a[illegible]s listed may or may not be the actual rolls tested. However, the data provided is the same prod[illegible] run as the rolls actually shipped on this bill of lading.

4941

Individu... ...oll Data
Bill of Lading 80143613

Roll #	Style	Weight	Tensile W	Tensile F	Elongation W	Elongation F	T.Tear W	T.Tear F	Burst
		Osy D5261	lbs D4632	lbs D4632	% D4632	% D4632	lbs D4533	lbs D4533	psi D3786
8481639	82TEX	3.6	161	135	21	17	77	99	360
8481642	82TEX	3.6	166	145	22	16	65	84	393
8484583	82TEX	3.6	167	156	23	15	89	114	377
8484584	82TEX	3.6	156	144	21	17	78	95	407
8484626	82TEX	3.7	155	135	23	15	70	70	283
8484797	82TEX	3.7	162	150	22	16	81	127	383
8494248	82TEX	3.7	161	135	21	15	77	51	303
8494454	82TEX	3.6	171	161	22	15	77	99	393
8494455	82TEX	3.9	164	136	22	19	66	61	367
8499818	82TEX	3.6	155	135	20	15	69	84	350
8506890	82TEX	3.7	155	135	21	15	68	62	287
8507082	82TEX	3.6	162	138	20	15	51	69	293
8509003	82TEX	3.7	340	274	21	15	70	45	353
8510124	82TEX	3.6	155	135	20	15	76	100	357
8542617	82TEX	3.8	155	137	23	16	73	80	360
8675583	82TEX	3.7	162	136	25	15	65	64	293
8679715	82TEX	3.6	155	149	15	19	81	71	303
8709737	82TEX	3.6	157	135	24	15	109	81	393

000738

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.

4941

Individu oll Data
Bill of Lading 80143613

Pac

Roll #	Style	Weight	Tensile		Elongation		T.Tear		Burst
			W	F	W	F	W	F	
		Osy	lbs	lbs	%	%	lbs	lbs	psi
		D5261	D4632	D4632	D4632	D4632	D4533	D4533	D3786
8779508	82TEX	3.7	159	149	23	15	73	140	357

mm

000739

4941

SI Geosolutions

4941

American Colloid Cetco WY
Noe Garcia
PO Box 428
Lovell WY 82431
BOL 80143613 PO 0-L15-33119
Ref:

1/9/2002

This is to certify that Product 82TEX , a woven polypropylene geotextile produced by S I Corporation, 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		MARV			SI Units		
Mass Per Unit Area	ASTM D-5261	oz/yd2 - (g/m2)	3.20			(108.48)		
Thickness	ASTM D-5199	mils - (m	16			(0.4064)		
Tensile Strength (Grab	ASTM D-4632	lb - (N)	155	X	135	(689.75)	X	(600.75)
Elongation	ASTM D-4632	%	15	X	15			
Trapezoidal Tear	ASTM D-4533	lb - (N)	45	X	45	(200.25	X	(200.25)
Mullen Burst	ASTM D-3786	psi - (Kpa	265			(1826.91		
Puncture Strength	ASTM D-4833	lb - (N)	70			(311.5)		
AOS	ASTM D-4751	US Sieve - (mm	40			0.425		
Permittivit	ASTM D-4491	SEC-1	0.08					
Permeability -	ASTM D-4491	cm - (sec)	0.004					
Water Flow Rate	ASTM D-4491	gpm/ft - (lpm/m2)	6			(244.4882		
UV Resistance-4	ASTM D-4355	% Retained	90					

Sincerely

John D. Cannon

John D. Cannon, P.E.
Regional Engineer
SI Geosolutions

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000740

6025 Lee Highway, Suite 435 • Chattanooga, TN 37421
Ph: 423-899-0444 • Fax: 423-899-7619

1/10/2002

SI Corporation
Individual Roll Data
Bill of Lading 80143613

Roll #	Style	Weight	Tensile		Elongation		T.Tear		Burst
			W	F	W	F	W	F	
		Osy	lbs	lbs	%	%	lbs	lbs	psi
		D5261	D4632	D4632	D4632	D4632	D4533	D4533	D3786
8481639	82TEX	3.6	161	135	21	17	77	99	360
8481642	82TEX	3.6	166	145	22	16	85	84	393
8484583	82TEX	3.6	167	156	23	15	89	114	377
8484584	82TEX	3.6	156	144	21	17	78	95	407
8484626	82TEX	3.7	165	135	23	15	70	70	283
8484797	82TEX	3.7	162	150	22	18	81	127	383
8494248	82TEX	3.7	161	135	21	15	77	51	303
8494454	82TEX	3.6	171	161	22	15	77	99	393
8494455	82TEX	3.9	164	136	22	19	66	61	367
8499818	82TEX	3.6	155	135	20	15	69	84	350
8506890	82TEX	3.7	155	135	21	15	68	62	287
8507082	82TEX	3.6	162	138	20	15	51	69	293
8509003	82TEX	3.7	340	274	21	15	70	45	353
8510124	82TEX	3.6	155	135	20	15	76	100	357
8542617	82TEX	3.8	155	137	23	16	73	80	360
8675583	82TEX	3.7	162	136	25	15	65	64	293
8679715	82TEX	3.6	155	149	15	19	81	71	303
8709737	82TEX	3.6	157	135	24	15	109	81	393

000741

4941

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.

1/10/2002

SI Corporation
Individual Roll Data
Bill of Lading 80143613

Roll #	Style	Weight	Tensile		Elongation		T.Tear		Burst
			W	F	W	F	W	F	
		Osy	lbs	lbs	%	%	lbs	lbs	psi
		D5261	D4632	D4632	D4632	D4632	D4533	D4533	D3786
8779508	82TEX	3.7	159	149	23	15	73	140	357

SI Geosolutions

4941

American Colloid Cetco WY
Noe Garcia
PO Box 428
Lovell WY 82431

11/15/2001

BOL 80135097 PO 0-L15-32758

Ref:

This is to certify that Product 82TEX , a woven polypropylene geotextile produced by S I Corporation, 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		MARV			SI Units		
Mass Per Unit Area	ASTM D-5261	oz/yd2 - (g/m2)	3.20			(108.48)		
Thickness	ASTM D-5199	mils - (m	16			(0.4064)		
Tensile Strength (Grab	ASTM D-4632	lb - (N)	155	X	135	(689.75)	X	(600.75)
Elongation	ASTM D-4632	%	15	X	15			
Trapezoidal Tear	ASTM D-4533	lb - (N)	45	X	45	(200.25	X	(200.25)
Mullen Burst	ASTM D-3786	psi - (Kpa	265			(1826.91		
Puncture Strength	ASTM D-4833	lb - (N)	70			(311.5)		
AOS	ASTM D-4751	US Sieve - (mm	40			0.425		
Permittivit	ASTM D-4491	SEC-1	0.08					
Permeability -	ASTM D-4491	cm - (sec)	0.004					
Water Flow Rate	ASTM D-4491	gpm/ft - (lpm/m2)	6			(244.4682		
UV Resistance-4	ASTM D-4355	% Retained	90					

Sincerely

John D. Cannon, P.E.
Regional Engineer
SI Geosolutions

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000743

6625 Lee Highway, Suite 435 • Chattanooga, TN 37421
Ph 423-899-0444 • Fax: 423-899-7619

Individual Data
Bill of Lading 60135097

Roll #	Style	Weight	Tensile		Elongation		T.Tear		Burst
			W	F	W	F	W	F	
		Osy	lbs	lbs	%	%	lbs	lbs	psi
		D5261	D4632	D4632	D4632	D4632	D4533	D4533	D3786
8470662	82TEX	3.8	159	155	21	15	75	108	390
8481640	82TEX	3.7	162	152	24	16	85	108	363
8481641	82TEX	3.7	165	140	23	15	78	110	363
8484585	82TEX	3.5	154	135	21	17	78	98	330
8484586	82TEX	3.8	156	138	20	19	82	79	353
8484623	82TEX	3.8	161	154	22	19	75	89	347
8485310	82TEX	3.7	161	139	22	19	71	78	373
8485358	82TEX	3.7	177	135	24	15	82	93	393
8494243	82TEX	3.7	173	137	22	16	75	79	393
8494244	82TEX	3.6	165	146	25	15	92	119	407
8503748	82TEX	3.6	154	143	19	18	74	77	367
8546968	82TEX	3.6	157	136	20	15	72	73	380
8697150	82TEX	4	178	209	22	23	73	91	313
8709742	82TEX	3.5	158	146	21	15	49	72	277
8756907	82TEX	3.7	165	158	28	17	77	169	390
8761860	82TEX	3.6	155	145	24	19	58	72	353
8764539	82TEX	3.7	168	137	28	21	78	120	320

000744

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.

4941

SI Geosolutions

4941

American Colloid Cetco WY
Noe Garcia
PO Box 428
Lovell WY 82431
BOL 80132348 PO 0-L15-32639
Ref:

11/7/2001

This is to certify that Product 82TEX , a woven polypropylene geotextile produced by S I Corporation, 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		MARV			SI Units		
Mass Per Unit Area	ASTM D-5261	oz/yd2 - (g/m2)	3.20			(108.48)		
Thickness	ASTM D-5199	mils - (m	16			(0.4064)		
Tensile Strength (Grab	ASTM D-4632	lb - (N)	155	X	135	(689.75)	X	(600.75)
Elongation	ASTM D-4632	%	15	X	15			
Trapezoidal Tear	ASTM D-4533	lb - (N)	45	X	45	(200.25	X	(200.25)
Mullen Burst	ASTM D-3786	psi - (Kpa	265			(1826.91		
Puncture Strength	ASTM D-4833	lb - (N)	70			(311.5)		
AOS	ASTM D-4751	US Sieve - (mm	40			0.425		
Permittivit	ASTM D-4491	SEC-1	0.08					
Permeability -	ASTM D-4491	cm - (sec)	0.004					
Water Flow Rate	ASTM D-4491	gpm/ft - (lpm/m2)	6			(244.4682		
UV Resistance-4	ASTM D-4355	% Retained	90					

Sincerely

John D. Cannon, P.E.
Regional Engineer
SI Geosolutions

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6025 Lee Highway, Suite 435 • Chattanooga, TN 37421
Ph 423-899-0444 • Fax: 423-899-7619

Individual Roll Data

Bill of Lading 80132348

Roll #	Style	Weight Osy D5261	Tensile W lbs D4632	Tensile F lbs D4632	Elongation W % D4632	Elongation F % D4632	T.Tear W lbs D4533	T.Tear F lbs D4533	Burst psi D3786
8538344	82TEX	3.5	158	137	22	15	67	61	363
8689872	82TEX	3.6	155	163	18	16	54	78	273
8696387	82TEX	4.1	155	175	24	23	89	95	330
8696599	82TEX	3.6	169	154	20	15	59	60	363
8697151	82TEX	3.4	155	159	19	24	78	85	317
8697250	82TEX	3.6	179	146	22	15	47	54	267
8701563	82TEX	3.7	155	185	22	24	90	114	303
8703214	82TEX	3.6	155	193	23	24	105	99	357
8703221	82TEX	3.6	165	161	20	16	73	158	387
8704405	82TEX	3.6	174	166	24	15	74	91	347
8704410	82TEX	3.6	155	165	22	21	74	95	303
8713021	82TEX	3.5	169	141	27	15	74	78	353
8714835	82TEX	3.6	158	153	23	19	50	68	273
8747810	82TEX	3.7	167	165	25	17	74	146	377
8750766	82TEX	3.5	159	135	23	15	79	83	350
8753112	82TEX	3.4	164	138	27	15	82	97	310

000746

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.

4941

Bill Of Lading # 80132348

Roll #	ASTM D-4632 GRAB TENSILE (LBS) W X F	ASTM D-4632 GRAB 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	L(
Product :	82TEX					
8465594	167 X 144	21 X 15	353	71 X 73	3.37	10
8466464	160 X 174	20 X 15	353	71 X 84	3.83	10
8466465	163 X 151	20 X 15	340	67 X 81	3.64	10
8471992	155 X 146	19 X 16	343	67 X 75	3.57	10
8477402	162 X 154	22 X 15	390	78 X 79	3.54	101
8477996	178 X 155	23 X 15	347	75 X 76	3.52	101

SI Geosolutions

4941

12/11/2001

American Colloid Cetco WY
Noe Garcia
PO Box 428
Lovell WY 82431
BOL 80140127 PO 0-L15-32962
Ref:

This is to certify that Product 82TEX , a woven polypropylene geotextile produced by S I Corporation, 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		MARV			SI Units		
Mass Per Unit Area	ASTM D-5261	oz/yd2 - (g/m2)	3.20			(108.48)		
Thickness	ASTM D-5199	mils - (m	16			(0.4064)		
Tensile Strength (Grab	ASTM D-4632	lb - (N)	155	X	135	(689.75)	X	(600.75)
Elongation	ASTM D-4632	%	15	X	15			
Trapezoidal Tear	ASTM D-4533	lb - (N)	45	X	45	(200.25	X	(200.25)
Mullen Burst	ASTM D-3786	psi - (Kpa	265			(1826.91		
Puncture Strength	ASTM D-4833	lb - (N)	70			(311.5)		
AOS	ASTM D-4751	US Sieve - (mm	40			0.425		
Permittivit	ASTM D-4491	SEC-1	0.08					
Permeability -	ASTM D-4491	cm - (sec)	0.004					
Water Flow Rate	ASTM D-4491	gpm/ft - (lpm/m2)	6			(244.4682		
UV Resistance-4	ASTM D-4355	% Retained	90					

Sincerely

John D. Cannon

John D. Cannon, P.E.
Regional Engineer
SI Geosolutions

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 specification stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND TO THE EXTENT THAT IF 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 S I Corporation current published specifications, and the Customer gives notice to S I Corporation before installing the product, then S I Corporation 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 11/1/2000

000748

6025 Lee Highway, Suite 435 • Chattanooga, TN 37421
Ph 423-899-0444 • Fax 423-899-7619

12/11/2001

SI Corp tion
Individual Roll Data
Bill of Lading 80140127

Roll #	Style	Weight	Tensile W	Tensile F	Elongation W	Elongation F	T.Tear W	T.Tear F	Burst
		Osy D5261	lbs D4632	lbs D4632	% D4632	% D4632	lbs D4533	lbs D4533	psi D3786
8684186	994GC	3.2	160	135	22	17	99	96	250
8684191	82TEX	3.8	177	143	27	15	94	148	370
8687671	82TEX	3.6	156	140	26	15	78	110	423
8689867	82TEX	3.6	167	139	25	16	98	148	370
8697245	82TEX	3.7	155	171	19	17	53	81	273
8697246	82TEX	3.6	145	168	16	18	50	66	277
8701706	82TEX	3.5	170	149	24	15	83	107	330
8703222	82TEX	3.6	159	153	23	15	55	74	277
8719252	82TEX	3.6	162	146	25	15	52	71	277
8723778	82TEX	3.7	161	158	24	16	76	185	293
8723779	82TEX	3.5	178	137	26	17	75	155	333
8726177	82TEX	3.9	155	159	19	22	107	95	287
8726192	82TEX	3.6	155	149	22	16	75	84	293
8731403	82TEX	3.9	155	143	25	15	68	89	287
8731410	82TEX	3.6	156	140	24	15	69	90	313
8731444	82TEX	3.6	155	136	25	15	140	148	307
8736222	82TEX	3.6	155	141	25	15	74	128	293
8736374	82TEX	3.6	166	142	26	15	82	192	293
8736375	82TEX	3.6	157	150	26	15	68	85	297
8741255	82TEX	3.6	162	147	24	16	69	119	333
8741257	82TEX	3.6	160	146	25	17	75	110	310
8742478	82TEX	3.5	155	135	21	15	52	152	340
8761859	82TEX	3.8	155	138	26	15	72	144	363

000749

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SI Geosolutions

4941

8/21/2001

American Colloid Cetco WY
Noe Garcia
PO Box 428
Lovell WY 82431
BOL 80118690 PO 0-L15-31902
Ref:

This is to certify that Product 82TEX , a woven polypropylene geotextile produced by S I Corporation, 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		MARV			SI Units		
Mass Per Unit Area	ASTM D-5261	oz/yd2 - (g/m2)	3.20			(108.48)		
Thickness	ASTM D-5199	mils - (m	16			(0.4064		
Tensile Strength (Grab	ASTM D-4632	lb - (N)	155	X	135	(689.75	X	(600.75)
Elongation	ASTM D-4632	%	15	X	15			
Trapezoidal Tear	ASTM D-4533	lb - (N)	45	X	45	(200.25	X	(200.25)
Mullen Burst	ASTM D-3786	psi - (Kpa	265			(1826.9		
Puncture Strength	ASTM D-4833	lb - (N)	70			(311.5)		
AOS	ASTM D-4751	US Sieve - (mm	40			0.425		
Permittivit	ASTM D-4491	SEC-1	0.08					
Permeability -	ASTM D-4491	cm - (sec)	0.004					
Water Flow Rate	ASTM D-4491	gpm/ft - (lpm/m2)	6			(244.46		
UV Resistance-4	ASTM D-4355	% Retained	90					

Sincerely

John D. Cannon, P.E.
Regional Engineer
SI Geosolutions

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 specification stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND TO THE EXTENT THAT IF 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 S I Corporation current published specifications, and the Customer gives notice to S I Corporation before installing the product, then S I Corporation 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 11/1/2000

5025 Lee Highway, Suite 435 • Chattanooga, TN 37421
Ph: 423-899-0444 • Fax: 423-899-7619

Individual Rol ia
Bill of Lading 80118690

ll #	Style	Weight		Tensile		Elongation		T.Tear		Burst
			W	F	W	F	W	F	
		Osy	lbs	lbs	%	%	lbs	lbs	psi
		D5261	D4632	D4632	D4632	D4632	D4533	D4533	D3786
3749	82TEX	3.8	159	156	21	15	75	109	390
6896	82TEX	3.4	156	147	19	15	65	57	270
0778	82TEX	3.5	155	148	19	15	61	58	310
2172	82TEX	3.7	171	146	27	21	75	72	297
8373	82TEX	3.7	155	135	21	15	75	80	400
8374	82TEX	3.5	162	135	21	16	64	63	383
9142	82TEX	3.7	159	149	21	18	70	100	290
27193	82TEX	3.7	165	135	22	15	87	82	407
27194	82TEX	3.6	156	135	20	17	63	55	383
40612	82TEX	3.8	161	143	63	41	65	114	363
42615	82TEX	3.7	160	135	25	18	95	91	347
42619	82TEX	3.7	160	143	58	37	72	93	367
43258	82TEX	3.6	165	136	24	15	73	72	397
43260	82TEX	3.5	156	135	25	17	82	108	350
43262	82TEX	3.7	162	162	22	15	69	82	380
43644	82TEX	3.6	160	137	23	15	85	91	370
43646	82TEX	3.5	155	135	59	40	76	69	367
43648	82TEX	3.6	155	135	24	17	88	105	337
46288	82TEX	3.5	155	137	24	18	87	128	350
46290	82TEX	3.6	158	152	20	15	81	96	337
46292	82TEX	3.7	164	148	27	15	72	77	360
46970	82TEX	3.6	165	135	22	16	63	63	373
46973	82TEX	3.6	157	160	29	17	78	156	337
49168	82TEX	3.5	168	135	65	40	78	67	370
49172	82TEX	3.4	164	167	32	23	66	151	373
56267	82TEX	3.7	155	137	23	15	73	66	353
62655	82TEX	3.8	162	172	24	20	81	108	377
62660	82TEX	3.5	155	128	24	21	63	107	323
65632	82TEX	3.5	155	135	26	18	66	93	367
			min						

000751

4941

Roll#	Style	Weight	Tensile		Elongation		Trap Tear		Burst
BOL# 'S	80118690		MD	XMD	MD	XMD	MD	XMD	
8659603	82TEX	3.28	167	138	23	15	69	131	370

4941

Individual Ro ta
Bill of Lading 80118690

oll #	Style	Weight	Tensile W	Tensile F	Elongation W	Elongation F	T.Tear W	T.Tear F	Burst
		Osy D5261	lbs D4632	lbs D4632	% D4632	% D4632	lbs D4533	lbs D4533	psi D3786
59606	82TEX	3.7	180	150	25	15	84	89	387
59608	82TEX	3.6	165	146	26	15	92	156	317
59609	82TEX	3.7	170	159	28	16	67	133	383

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0007753

4941

SI Geosolutions

4941

American Colloid Cetco WY
Noe Garcia
PO Box 428
Lovell WY 82431
BOL 80143613 PO 0-L15-33119
Ref:

1/9/2002

This is to certify that Product 82TEX , a woven polypropylene geotextile produced by S I Corporation, 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		MARV			SI Units		
Mass Per Unit Area	ASTM D-5261	oz/yd2 - (g/m2)	3.20			(108.48)		
Thickness	ASTM D-5199	mils - (m	16			(0.4064)		
Tensile Strength (Grab	ASTM D-4632	lb - (N)	155	X	135	(689.75)	X	(600.75)
Elongation	ASTM D-4632	%	15	X	15			
Trapezoidal Tear	ASTM D-4533	lb - (N)	45	X	45	(200.25	X	(200.25)
Mullen Burst	ASTM D-3786	psi - (Kpa	265			(1826.91		
Puncture Strength	ASTM D-4833	lb - (N)	70			(311.5)		
AOS	ASTM D-4751	US Sieve - (mm	40			0.425		
Permittivit	ASTM D-4491	SEC-1	0.08					
Permeability -	ASTM D-4491	cm - (sec)	0.004					
Water Flow Rate	ASTM D-4491	gpm/ft - (lpm/m2)	6			(244.4882		
UV Resistance-4	ASTM D-4355	% Retained	90					

Sincerely

John D. Cannon

John D. Cannon, P.E.
Regional Engineer
SI Geosolutions

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11/1/2000

000754

6025 Lee Highway, Suite 435 • Chattanooga, TN 37421
Ph: 423-899-0444 • Fax: 423-899-7619

1/10/2002

SI Corporation
Individual Roll Data
Bill of Lading 80143613

Roll #	Style	Weight	Tensile		Elongation		T.Tear		Burst
			W	F	W	F	W	F	
		Osy	lbs	lbs	%	%	lbs	lbs	psi
		D5261	D4632	D4632	D4632	D4632	D4533	D4533	D3786
8481639	82TEX	3.6	161	135	21	17	77	99	360
8481642	82TEX	3.6	166	145	22	16	65	84	393
8484583	82TEX	3.6	167	156	23	15	69	114	377
8484584	82TEX	3.6	156	144	21	17	78	95	407
8484626	82TEX	3.7	155	135	23	15	70	70	283
8484797	82TEX	3.7	162	150	22	16	81	127	383
8494248	82TEX	3.7	161	135	21	15	77	51	303
8494454	82TEX	3.6	171	161	22	15	77	99	393
8494455	82TEX	3.9	164	136	22	19	66	61	367
8499818	82TEX	3.6	155	135	20	15	69	84	350
8506890	82TEX	3.7	155	135	21	15	68	62	287
8507082	82TEX	3.6	162	138	20	15	51	69	293
8509003	82TEX	3.7	340	274	21	15	70	45	353
8510124	82TEX	3.6	155	135	20	15	76	100	357
8542817	82TEX	3.8	155	137	23	16	73	80	360
8675583	82TEX	3.7	162	136	25	15	65	64	293
8679715	82TEX	3.6	155	149	15	19	81	71	303
8709737	82TEX	3.6	157	135	24	15	109	81	393

000755

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.

4941

1/10/2002

SI Corporation
Individual Roll Data
Bill of Lading 80143613

Roll #	Style	Weight	Tensile		Elongation		T.Tear		Burst
			W	F	W	F	W	F	
		Osy	lbs	lbs	%	%	lbs	lbs	psi
		D5261	D4632	D4632	D4632	D4632	D4533	D4533	D3786
8779508	82TEX	3.7	159	149	23	15	73	140	357

000756

4941

SI Geosolutions

4941

8/9/2001

American Colloid Cetco WY
Noe Garcia
PO Box 428
Lovell WY 82431
BOL 80117185 PO 0-I15-3789
Ref:

This is to certify that Product 82TEX , a woven polypropylene geotextile produced by S I Corporation, 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		MARV			SI Units		
Mass Per Unit Area	ASTM D-5261	oz/yd2 - (g/m2)	3.20			(108.48)		
Thickness	ASTM D-5199	mils - (m	16			(0.4064		
Tensile Strength (Grab	ASTM D-4632	lb - (N)	155	X	135	(689.75	X	(600.75)
Elongation	ASTM D-4632	%	15	X	15			
Trapezoidal Tear	ASTM D-4533	lb - (N)	45	X	45	(200.25	X	(200.25)
Mullen Burst	ASTM D-3786	psi - (Kpa	265			(1826.9		
Puncture Strength	ASTM D-4833	lb - (N)	70			(311.5)		
AOS	ASTM D-4751	US Sieve - (mm	40			0.425		
Permittivit	ASTM D-4491	SEC-1	0.08					
Permeability -	ASTM D-4491	cm - (sec)	0.004					
Water Flow Rate	ASTM D-4491	gpm/ft - (lpm/m2)	6			(244.46		
UV Resistance-4	ASTM D-4355	% Retained	90					

Sincerely

John P. Cannon, P.E.
Regional Engineer
SI Geosolutions

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 specification stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND TO THE EXTENT THAT IF IT IS CONTRARY TO THE FOREGOING SENTENCE ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any recommendations made by the Seller concerning manner or applications of said product are believed reliable and Seller makes no warranty of results to be obtained. If the product does not meet S I Corporation current published specifications, and the Customer gives notice to S I Corporation before installing the product, then S I Corporation 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 the product data is 10/1/2000

6025 Lee Highway, Suite 435 • Chattanooga, TN 37421
Ph: 423-899-0444 • Fax: 423-899-7619

Bill Of Lading # 80117185

Roll #	ASTM D-4632 GRAB TENSILE (LBS) W X F	ASTM D-4632 GRAB 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
Product : 82TEX						
8449042	171 X 174	22 X 16	385	79 X 84	3.59	1014
8449500	157 X 159	19 X 15	358	66 X 73	3.58	1014
8449912	161 X 150	21 X 15	352	68 X 69	3.53	1014
8458232	166 X 150	21 X 16	367	75 X 76	3.51	1014
8458330	157 X 138	20 X 15	360	74 X 76	3.41	1014
8458935	159 X 137	19 X 15	362	73 X 66	3.36	1014
8462896	181 X 151	22 X 15	370	88 X 96	3.45	1014
8465150	159 X 152	20 X 15	368	74 X 82	3.53	1014
8465595	179 X 144	22 X 15	358	80 X 79	3.41	1014
8465602	166 X 190	21 X 16	345	75 X 141	4.04	1014
8465869	157 X 147	20 X 16	357	68 X 78	3.48	1014
8466458	161 X 169	21 X 17	373	67 X 76	3.65	1014
8467291	165 X 140	21 X 15	365	75 X 75	3.45	1014

Individual Roll Data
Bill of Lading 80117185

Roll #	Style	Weight	Tensile		Elongation		T.Tear		Burst
			W	F	W	F	W	F	
		Osy	lbs	lbs	%	%	lbs	lbs	psi
		D5261	D4632	D4632	D4632	D4632	D4533	D4533	D3786
8493923	82TEX	4.1	178	155	34	15	151	126	297
8494250	8·TEX	3.7	172	135	30	15	107	125	300
8503750	8·TEX	3.7	161	135	21	15	74	52	303
8506789	82TEX	3.8	159	160	21	16	71	92	307
8506892	82TEX	3.7	155	135	23	15	70	75	290
8510122	82TEX	3.7	155	143	19	15	63	87	297
8510780	82TEX	3.6	155	144	19	15	73	74	363
8512169	81TEX	3.3	156	135	20	15	91	79	343
8527198	82TEX	3.5	155	136	21	16	63	68	347
8538342	82TEX	3.6	155	153	21	16	71	35	353
8538343	82TEX	3.4	158	135	22	19	76	66	353
8540607	82TEX	3.8	162	156	22	16	68	78	383
8543650	82TEX	3.4	157	145	25	17	75	70	367
8546287	82TEX	3.6	158	135	27	20	89	111	417
8546293	82TEX	3.5	155	147	23	17	69	70	350
8582659	82TEX	3.6	155	136	21	17	67	34	347
8565631	82TEX	3.6	155	145	21	17	73	79	347
8566061	82TEX	3.5	166	145	25	24	76	113	347
8659605	82TEX	3.3	167	138	23	15	69	131	370

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Roll#	Style	Weight	Tensile		Elongation		Trap Tear		Burst	Punct.
BOL# 'S	80117185		MD	XMD	MD	XMD	MD	XMD		
8549171	82TEX	4	162	147	25	15	76	76	370	99

4941

000760

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

4941

11/29/2000

American Colloid Cetco WY
Noe Garcia
PO Box 428
Lovell WY 82431

BOL 80080282 PO 0/L15-29803

Ref:

This is to certify that Product 82TEX , a woven polypropylene geotextile 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		MARV			SI Units		
Mass Per Unit Area	ASTM D-5261	oz/yd2 - (g/m2)	3.20			(108.48)		
Thickness	ASTM D-5199	mils - (mm	16			(0.4064		
Tensile Strength (Grab	ASTM D-4632	lb - (N)	135	X	135	(600.75	X	(600.75)
Elongation	ASTM D-4632	%	15	X	15			
Trapezoidal Tear	ASTM D-4533	lb - (N)	45	X	45	(200.25	X	(200.25)
Mullen Burst	ASTM D-3786	psi - (Kpa)	265			(1826.9		
Puncture Strength	ASTM D-4833	lb - (N)	70			(311 5)		
AOS	ASTM D-4751	US Sieve - (mm	40			0.425		
Permittivit	ASTM D-4491	SEC-1	0.08					
Permeability -	ASTM D-4491	cm - (sec)	0.004					
Water Flow Rate	ASTM D-4491	gpm/ft - (lpm/m2)	6			(244 46		
UV Resistance-4	ASTM D-4355	% Retained	90					

Sincerely

Patti Weaver
Technical Manager
Geosynthetics Products 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 specification 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 correct and Seller makes no warranty of results to be obtained. If the product does not meet Synthetic Industries' current published specifications, and the Purchaser gives notice to Synthetic Industries within ninety days of receiving 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 11/29/2000

000761

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

Bill Of Lading # 80080282

Roll #	ASTM D-4632 GRAB TENSILE (LBS) W X F	ASTM D-4632 GRAB ELONGATION (%) W x F	ASTM D-3786 MULLEN BURST PSI	ASTM D-5261 MASS/UNIT AREA OZ/SQ YARD
Product : 82TEX				
8371454	158 x 160	21 x 16	373	3.7
8371455	152 x 154	20 x 15	352	3.5
8374955	148 x 163	19 x 16	363	3.8
8377788	156 x 146	20 x 15	377	3.7
8378895	145 x 156	19 x 17	353	3.5
8378896	159 x 164	21 x 18	367	3.7
8378897	155 x 166	21 x 16	360	3.7
8379720	148 x 148	20 x 16	337	3.6
8379724	149 x 154	21 x 17	353	3.7
8381505	165 x 164	23 x 18	368	3.7
8381507	151 x 158	20 x 17	352	3.6
8388278	161 x 157	20 x 16	360	3.6
8388664	149 x 143	20 x 16	333	3.4
8388692	163 x 161	21 x 17	343	3.6
8388693	157 x 159	22 x 19	330	3.5
8389508	144 x 151	17 x 17	353	3.5
8390041	155 x 147	20 x 15	343	3.7
8392745	161 x 155	22 x 20	357	3.7
8392812	161 x 166	22 x 18	390	3.6
8394372	148 x 147	20 x 17	333	3.4
8394740	167 x 157	22 x 18	357	3.4
8395034	152 x 150	20 x 18	315	3.4
8395042	148 x 150	20 x 15	347	3.6
8395290	148 x 151	20 x 16	350	3.7

Patti Weaver

NON-WOVEN GEOTEXTILE MANUFACTURER'S CERTIFICATION

TECHNICAL DATA SHEET

ORIGIN INFORMATION

NON-WOVEN GEOTEXTILE

Manufacturer:	**Synthetic Industries Inc.**
PRODUCTION FACILITY:	**Synthetic Industries** **4019 Industry Drive** **Chattanooga, TN. 37416**
CONTACT:	Sid Weiser
BRAND NAME:	Geotex 650

Geomembrane Liner

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 1440/2-001	REV.: 3	DATE: 5/15/02	Page 1 of 3

FROM:
GSE LINING TECHNOLOGIES

SIGNATURE: Chuck Van Arsdale 5/15/02

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

RECEIVED BY: Susan Schwab DATE: 5/16/02

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-001	3						X			SUBMITTAL REGISTER			X	ACR-001	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Chuck Van Arsdale - Approver	604				
Gregg Johnson	604				
Bill Zebick	604				
Mike Godber	604				
Kwasi Badu-Tweneboah	38				

NO COMMENTS: 00496

COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

RECEIVED BY: Chuck Van Arsdale DATE: 5/23/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

FS-F-4955

ORIGINAL

Contract No.: 99SC001440
Contractor Title: Supplier Contractor
Contractor: GSE Lining Technology

PROJECT 20104, OPTION 2 (CELL 4 AND 5 LINER)
SUBMITTAL REGISTER
GEOMEMBRANE AND GEOSYNTHETIC CLAY LINER MANUFACTURING AND DELIVERY
Rev. 3, 5/15/02

Submittal No.	Rev. No.	Document No. & Rev.	Rev. No.	CFC	INF	Document Family	Document Title	Section-Paragraph Reference	STATUS Action Code (Date)	Remarks Submittal Due Date
20104-1440/2-001	0 1 2 3	1440-OPT2-001	0 1 2 3		X	ENG	SUBMITTAL REGISTER	ACR-001	A 11/01/01 A 12/6/01 A 1/4/02	FLUOR FERNALD WILL UPDATE
20104-1440/2-02770P-001	0 1	1440-OPT2-02770P-001	0 1		X	ENG	MANUFACTURING CAPABILITIES	02770P.1.05.A.1	B 11/15/01 A 11/20/01	A
20104-1440/2-02770P-002	0	1440-OPT2-02770P-002	0	X		ENG	LIST OF 10 COMPLETED FACILITIES	02770P.1.05.A.2	A 11/15/01	A
20104-1440/2-02770P-003	0	1440-OPT2-02770P-003	0	X		ENG	ORIGIN AND IDENTIFICATION OF RESIN	02770P.1.05A.3	A 11/16/01	A
20104-1440/2-02770P-004	0	1440-OPT2-02770P-004	0	X		QA	CERTIFICATION OF WELDING ROD	02770P.1.05.A.4	A 11/6/01	A
20104-1440/2-02770P-005	0	1440-OPT2-02770P-005	0	X		QA	CERTIFICATION OF MINIMUM AVERAGE ROLL VALUES	02770P.1.05.A.5	A 11/6/01	A
20104-1440/2-02770P-006	0	1440-OPT2-02770P-006	0		X	CONST	RECOMMENDED STORAGE REQUIREMENTS AND LIMITATIONS	02770P.1.05.A.6	A 11/14/01	A
20104-1440/2-02770P-007	0	1440-OPT2-02770P-007	0	X		ENG	RECOMMENDED INSTALLATION PROCEDURES	02770P.1.05.A.7	A 11/15/01	A
20104-1440/2-02770P-008	0 1	1440-OPT2-02770P-008	0 1		X	ENG	GEOMEMBRANE WARRANTY	02770P.1.05.A.8	B 11/15/01 A 11/20/01	A & B
20104-1440/2-02770P-009	0	1440-OPT2-02770P-009	0	X		ENG	COMPLETED FORMS GML- 80S, GML- 80T	02770P.1.05.A.9	A 11/15/01	A
20104-1440/2-02770P-010	0	1440-OPT2-02770P-010	0		X	H&S	MATERIAL SAFETY DATA SHEETS (GML)	02770P.1.05.A.10	A 11/5/01	A & C
20104-1440/2-02770P-011	0	1440-OPT2-02770P-011	0	X		QA	QUALITY CONTROL CERTIFICATES FOR RESIN	02770P.1.05.B.1	A 4/18/02	B
20104-1440/2-02770P-012	0	1440-OPT2-02770P-012	0	X		ENG	TEST REPORTS OF RESIN	02770P.1.05.B.2	A 4/18/02	B
20104-1440/2-02770P-013	0	1440-OPT2-02770P-013	0	X		QA	CERTIFICATION OF RESIN POLYMER	02770P.1.05.B.3	A 4/24/02	B
20104-1440/2-02770P-014	0	1440-OPT2-02770P-014	0	X		QA	MANUFACTURING CERTIFICATES PER SHIFT PRODUCTION OF GEOMEMBRANE	02770P.1.05.C	A 4/24/02	B
20104-1440/2-02772P-001	0	1440-OPT2-02772P-001	0		X	ENG	GCL PRODUCT NAME	02772P.1.04.A.1	A 11/16/01	A
20104-1440/2-02772P-002	0	1440-OPT2-02772P-002	0		X	ENG	DAILY PRODUCTION CAPACITY	02772P.1.04.A.2	A 11/16/01	A

INFORMATION ONLY

(X) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: [illegible] Date: 5/23/02

4941
00767

Contract No.: 99SC001440
Contractor Title: Supplier Contractor
Contractor: GSE Lining Technology

PROJECT 20104, OPTION 2 (CELL 4 AND 5 LINER)
SUBMITTAL REGISTER
GEOMEMBRANE AND GEOSYNTHETIC CLAY LINER MANUFACTURING AND DELIVERY
Rev. 3, 5/15/02

Submittal No.	Rev. No.	Document No. & Rev.	Rev. No.	CFC	INF	Document Family	Document Title	Section-Paragraph Reference	STATUS Action Code (Date)	Remarks Submittal Due Date
20104-1440/2-02772P-003	0	1440-OPT2-02772P-003	0	X		QA	MANUFACTURER'S QUALITY CONTROL PROCEDURES	02772P.1.04.A.3	A 11/19/01	A
20104-1440/2-02772P-004	0 1	1440-OPT2-02772P-004	0 1	X		ENG	REQUIREMENTS FOR GEOTEXTILE COMPONENT	02772P.1.04.A.4	C 11/19/01 A 12/10/01	A
20104-1440/2-02772P-005	0	1440-OPT2-02772P-005	0	X		QA	CERTIFICATION OF GEOTEXTILE COMPONENT	02772P.1.04.A.5	A 11/19/01	A
20104-1440/2-02772P-006	0	1440-OPT2-02772P-006	0	X		QA	CERTIFICATION OF MINIMUM AVERAGE ROLL VALUES	02772P.1.04.A.6	A 11/19/01	A
20104-1440/2-02772P-007	0	1440-OPT2-02772P-007	0	X		CONST	RECOMMENDED INSTALLATION PROCEDURES	02772P.1.04.A.7	A 11/26/01	A
20104-1440/2-02772P-008	0	1440-OPT2-02772P-008	0		X	CONST	RECOMMENDED STORAGE REQUIREMENTS AND LIMITATIONS	02772P.1.04.A.8	A 11/26/01	A
20104-1440/2-02772P-009	0	1440-OPT2-02772P-009	0	X		CONST	PROJECTED DELIVERY DATES	02772P.1.04.A.9	A 11/26/01	A
20104-1440/2-02772P-010	0	1440-OPT2-02772P-010	0	X		ENG	COMPLETED FORMS GCL-1	02772P.1.04.A.10	A 11/19/01	A
20104-1440/2-02772P-011	0	1440-OPT2-02772P-011	0		X	H&S	MATERIAL SAFETY DATA SHEETS (GCL)	02772P.1.04.A.11	A 11/15/01	A & C
20104-1440/2-02772P-012	0 1	1440-OPT2-02772P-012	0 1		X	PROC	WARRANTY FOR GCL	02772P.1.04.A.12	B 11/19/01 A 11/30/01	A
20104-1440/2-02772P-013	0	1440-OPT2-02772P-013	0	X		ENG	MANUFACTURING QUALITY CONTROL TESTS FOR EACH GCL LOT	02772P.1.04.B.1	A 4/15/02	D
20104-1440/2-02772P-014		1440-OPT2-02772P-014		X		ENG	INTERNAL AND INTERFACE SHEAR STRENGTH TEST RESULTS FOR EACH GCL LOT	02772P.1.04.B.1		D
20104-1440/2-02772P-015	0	1440-OPT2-02772P-015	0	X		Q/A	MANUFACTURING CERTIFICATES FOR GCL	02772P.1.04.B.2	A 4/15/02	D

A. WITHIN 10 DAYS FROM RELEASE OF CONTRACT
B. AT LEAST 21 DAYS PRIOR TO SHIPMENT
C. WITH SHIPMENT
D. AT LEAST 14 DAYS PRIOR TO SHIPMENT

The supplier shall provide submittals in accordance with Administrative Contractor Requirements ACR-001, attached.

000768

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SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02770P-001	REV.: 1	DATE: 11/16/01	Page 1 of 3
FROM: GSE LINING TECHNOLOGY, INC.		TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7			
SIGNATURE: John David Tiffin		RECEIVED BY: Erika Jarrett	DATE: 11/19/01		

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02770P-001	1						X			MANUFACTURING CAPABILITY			X		X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Chuck Van Arsdale - Approver	64				
Gregg Johnson	64				
Bill Zebick	64				
Mike Gadber	64				
Kwasi Badu-Twenebowah	38				

NO COMMENTS: COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

RECEIVED BY: [signature] DATE: 11/20/01

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

ORIGINAL

4941

GSE Lining Technology, Inc.

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

29 October 2001

Randy Ector
Fluor Fernald, Inc.
P. O. Box 538704
Cincinnati, Ohio 45253-8704

RE: REQUEST FOR APPROVAL OF GSE HD TEXTURED FOR FLUOR FERNALD, INC.

Dear Mr. Ector,

GSE is requesting approval of GSE HD Textured in lieu of GSE HyperFrictionFlex for the above referenced project. We are currently performing extended maintenance on the extrusion line that produces material for the FrictionFlex process. As such, we will not have this material available until late winter or spring at the earliest. In order to meet the proposed delivery schedule we are requesting GSE HD Textured be used for this project. The GSE HD Textured will have a minimum thickness of ≥76 mils, and 500 minimum hours on the notched constant tensile load test per the specification requirements. The material will meet all other project specifications. The switch to GSE HD Textured will not affect the unit cost. If you have any questions or require anything further, please let me know.

Sincerely,

Nathan Ivy
Product Manager – Geomembrane

Robert T. Nantz

Bob Nantz
VP Domestic Sales

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: _____ Date: 11/20/01

INFORMATION ONLY

xc: Chuck VanArsdale

For environmental lining solutions . . . the world comes to GSE.®
A Gundle/SLT Environmental, Inc. Company
www.gseworld.com

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02770P-001	REV.: 0	DATE: 10/30/01	Page 1 of 3

FROM:
GSE LINING TECHNOLOGY, INC.

SIGNATURE: John David Giffin

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

RECEIVED BY: Jennifer A. Short DATE: 10/31/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02770P-001	0						X			MANUFACTURING CAPABILITY			X			X	

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Chuck VanAssdale - Approver	64				
Gregg Johnson	64				
Bill Zebick	64				
Mike Godber	64				
Kwasi Badu-Twenboah	38				

NO COMMENTS: COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

Notched Tensile Load and Min. Thickness has been assured to meet our specifications in previous communications. Suggest sending that letter with this submittal to show compliance

ORIGINAL

RECEIVED BY: Chuck C. VanAssdale DATE: 11/15/01

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

0007172

4941

FS-F-4955

[ ] A - Conforms to the Subcontract Requirements
[X] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: [illegible] Date: 11/15/01

GSE®

GSE Lining Technology, Inc.

4941

INFORMATION ONLY

29 October 2001

Fluor Fernald, Inc.
P.O. Box 538704
Cincinnati, OH 45253-8704

Attn: Randy Ector, MS44-O-S

RE: Confirmation of Material
GSE Project Number 505905

This letter is to inform you that GSE Lining Technology, Inc. will provide geosynthetic materials that meet the delivery schedule for this project.

TYPE OF MATERIAL

Should you need more information or require further assistance, please contact me at your convenience. GSE looks forward to another successful project with you.

DAILY PROD. OF MATERIAL

Regards,

Robert T. Nantz

Robert Nantz
Vice President of Domestic Sales

cc: Sheri Sim-Connell, GSE Lining Technology, Inc.

GSE LINING TECHNOLOGY, INC.

MANUFACTURING CAPABILITIES

The GSE manufacturing facilities, located in Houston, Texas, are equipped with seven HDPE/LLDPE capable sheet production lines and two HDPE geonet/geocomposite production lines.

Both facilities operate two twelve-hour shifts daily. Each shift is fully staffed with Supervisor, Unit Operators, Quality Control and Maintenance personnel under the supervision of the Production Manager.

ORDERING 80 MIL

Daily production capacity of 60 mil HDPE is in excess of 1.5 million square feet per day.

Daily production capacity of geonet/geocomposite is in excess of 400,000 square feet per day.

GSE HD

Smooth HDPE Geomembrane

GSE HD is a high quality, high density polyethylene (HDPE) geomembrane produced from specially formulated, virgin polyethylene resin. This polyethylene resin is designed specifically for flexible geomembrane applications. It contains approximately 97.5% polyethylene, 2.5% carbon black and trace amounts of antioxidants and heat stabilizers; no other additives, fillers or extenders are used. GSE HD has outstanding chemical resistance, mechanical properties, environmental stress crack resistance, dimensional stability and thermal aging characteristics. GSE HD has excellent resistance to UV radiation and is suitable for exposed conditions.

Product Specifications

TESTED PROPERTY	TEST METHOD	MINIMUM VALUES				
Thickness, mils (mm)	ASTM D 5199	27 (0.69)	36 (0.91)	54 (1.4)	72 (1.8)	90 (2.3)
Density, g/cm³	ASTM D 1505	0.94	0.94	0.94	0.94	0.94
Tensile Properties (each direction)	ASTM D 638, Type IV					
Strength at Break, lb/in-width (N/mm)	Dumbell, 2 ipm	122 (21)	162 (28)	243 (43)	324 (57)	405 (71)
Strength at Yield, lb/in-width (N/mm)		63 (11)	84 (15)	130 (23)	173 (30)	216 (38)
Elongation at Break, %	G.L. 2.0 in (51 mm)	700	700	700	700	700
Elongation at Yield, %	G.L. 1.3 in (33 mm)	13	13	13	13	13
Tear Resistance, lb (N)	ASTM D 1004	21 (93)	28 (124)	42 (187)	56 (249)	70 (311)
Puncture Resistance, lb (N)	ASTM D 4833	59 (263)	79 (352)	119 (530)	158 (703)	198 (881)
Carbon Black Content, %	ASTM D 1603	2.0	2.0	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	+Note 1	+Note 1	+Note 1	+Note 1	+Note 1
Notched Constant Tensile Load, hrs	ASTM D 5397, Appendix	400	400	400	400	400
REFERENCE PROPERTY	**TEST METHOD**	**NOMINAL VALUES**				
Thickness, mils (mm)	ASTM D 5199	30 (0.75)	40 (1.0)	60 (1.5)	80 (2.0)	100 (2.5)
Roll Length (approximate), ft (m)		952 (290)	650 (198)	420 (128)	350 (107)	250 (76)
Low Temperature Brittleness, °F (°C)	ASTM D 746, Cond. B	<-107 (<-77)	<-107 (<-77)	<-107 (<-77)	<-107 (<-77)	<-107 (<-77)
Oxidative Induction Time, minutes	ASTM D 3895, 200° C; O_2, 1 atm	>100	>100	>100	>100	>100
Dimensional Stability (each direction), %	ASTM D 1204, 100° C, 1 hr	±2	±2	±2	±2	±2

NOTES:

+Note 1: Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

GSE HD is available in rolls approximately 22.5 ft (6.9 m) wide and weighing about 2,900 lb (1,315 kg).

This information is provided for reference purposes only and is not intended as a warranty or guarantee. GSE assumes no liability in connection with the use of this information. Please check with GSE for current, standard minimum quality assurance procedures and specifications.

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Americas
GSE Lining Technology, Inc.
Houston, Texas
Phone: 800-435-2008
281-443-8564
Fax: 281-230-8650

Asia/Pacific
GSE Lining Technology Company Ltd.
Bangkok, Thailand
Phone: 66-2-937-0091
Fax: 66-2-937-0097

Europe/Middle East
GSE Lining Technology GmbH
Hamburg, Germany
Phone: 49-40-767420
Fax: 49-40-7674233

A Gundle/SLT Environmental, Inc. Company
www.gseworld.com

Represented by:

000774

GSE

4941

GSE HD Textured

Textured HDPE Geomembrane

GSE HD Textured is the textured version of GSE HD. It is a high quality, high density polyethylene (HDPE) geomembrane with one or two coextruded, textured surfaces, and consisting of approximately 97.5% polyethylene, 2.5% carbon black and trace amounts of antioxidants and heat stabilizers; no other additives, fillers or extenders are used. The resin used is specially formulated, virgin polyethylene and is designed specifically for flexible geomembrane applications. GSE HD Textured has excellent resistance to UV radiation and is suitable for exposed conditions. This product allows projects with greater slopes to be designed since frictional characteristics are enhanced.

Product Specifications

TESTED PROPERTY	TEST METHOD	MINIMUM VALUES			
Thickness, mils (mm)	ASTM D 5994	27 (0.69)	36 (0.91)	54 (1.4)	72 (1.8)
Density, g/cm³	ASTM D 1505	0.94	0.94	0.94	0.94
Tensile Properties (each direction)[1]	ASTM D 638, Type IV				
Strength at Break, lb/in-width (N/mm)	Dumbell, 2 ipm	45 (8)	60 (11)	90 (16)	120(21)
Strength at Yield, lb/in-width (N/mm)		63 (11)	84 (15)	130 (23)	173 (30)
Elongation at Break, %	G.L. = 2.0 in (51 mm)	150	150	150	150
Elongation at Yield, %	G.L. = 1.3 in (33 mm)	13	13	13	13
Tear Resistance, lb (N)	ASTM D 1004	21 (93)	28 (124)	42 (187)	56 (249)
Puncture Resistance, lb (N)	ASTM D 4833	54 (240)	72 (320)	108 (480)	144 (641)
Carbon Black Content, %	ASTM D 1603	2.0	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	+Note 1	+Note 1	+Note 1	+Note 1
Notched Constant Tensile Load[2], hrs	ASTM D 5397, Appendix	400	400	400	400
REFERENCE PROPERTY	**TEST METHOD**	**NOMINAL VALUES**			
Thickness, mils (mm)	ASTM D 5994	30 (0.75)	40 (1.0)	60 (1.5)	80 (20)
Roll Length (approximate), ft (m)		830 (253)	700 (213)	520 (158)	400(122)
Low Temperature Brittleness, °F (°C)	ASTM D 746, Cond. B	<-107 (<-77)	<-107 (<-77)	<-107 (<-77)	<-107 (<-77)
Oxidative Induction Time, minutes	ASTM D 3895, 200° C; O_2, 1 atm	>100	>100	>100	>100
Dimensional Stability (each direction), %	ASTM D 1204, 100° C, 1 hr	±2	±2	±2	±2

NOTES:

+Note 1: Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

GSE HD Textured is available in rolls approximately 22.5 ft (6.9 m) wide and weighing about 3,700 lb (1,678 kg).

[1]The combination of stress concentrations due to coextrusion texture geometry and the small specimen size results in large variation of test results. Therefore, these tensile properties are minimum average values.

[2]Note: NCTL for HD Textured is conducted on representative smooth membrane samples.

This information is provided for reference purposes only and is not intended as a warranty or guarantee. GSE assumes no liability in connection with the use of this information. Please check with GSE for current, standard minimum quality assurance procedures and specifications.

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GSE MANUFACTURING

QUALITY ASSURANCE MANUAL

For environmental lining solutions... the world comes to GSE.®

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MN 002 R10/01/01

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GSE Lining Technology, Inc.

Manufacturing Quality Assurance
Policies and Procedures

This manual contains proprietary information belonging to GSE Lining Technology, Inc. This information is intended to provide a summary of standard quality procedures practiced by GSE's Manufacturing Quality Assurance Laboratories in Houston, Texas. These procedures apply to standard geomembrane and drainage materials only and do not explicitly address non-conforming materials.

This manual replaces in its entirety and supersedes all earlier versions issued by GSE Lining Technology, Inc. We suggest you maintain contact with your GSE representative to confirm the validity of this version at future dates.

GSE Lining Technology, Inc. reserves the right to change, modify, or discontinue the use of the policies and procedures described herein without notice or prior consent except as contractually obligated otherwise.

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I. GSE Lining Technology Quality Manifest

GSE Lining Technology, Inc. is committed to providing the highest quality products and services to our customers. This requires a firm, total quality commitment from all individuals within our organization that we will only supply materials that meet or exceed the requirements and specifications of GSE and our customers.

GSE's commitment to quality starts with the highest quality raw materials. The quality of incoming raw materials is controlled at the supplier level with a complete vendor evaluation program in place. This means purchasing only from suppliers who are committed to statistical process control thereby providing a consistent, high level of quality assurance of their products.

II. Overview of GSE Manufacturing Quality Assurance

GSE Lining Technology, Inc. has an on-site Manufacturing Quality Assurance Laboratory at each manufacturing plant. Having a fully equipped, well staffed, dedicated laboratory at each of the manufacturing facilities allows GSE to maintain a high level of quality and up-to-the-minute results on finished products. Each facility follows the same guidelines for evaluating the quality of GSE products and is capable of adapting to market-driven requirements.

A. Objective

The objective of the GSE Quality Assurance program is to define implementation of basic manufacturing quality assurance (MQA) procedures necessary to insure consistent production of quality products supplied to the geosynthetic market. Note that at this time, these procedures are limited to polyethylene and polypropylene geomembranes and drainage products including geonets and geocomposites.

B. Scope

In order to achieve GSE's stated purpose, a rigorous set of minimum standards and an effective test program to assure compliance has been established. These procedures and requirements are frequently reviewed and adjusted to assure compliance with current market demands and/or predetermined project specifications. These procedures assure that raw materials and process parameters are controlled to provide products complying with GSE's pre-defined minimum characteristics.

III. Manufacturing Quality Assurance Organization

This organization consists of the Manufacturing Quality Assurance Laboratories as well as the manufacturing personnel. The combination of expertise and experience from these groups provides GSE with the proper tools to maintain the highest level of quality and customer service in the industry.

The Quality Assurance Department at GSE is charged by the President to assure that only products meeting both GSE's and the customer's requirements are released for shipment. The Quality Assurance personnel are directly responsible for monitoring testing and providing feedback to the manufacturing department to ensure the production of the specified product quality. Each member of the Quality Assurance team must participate in detailed training that includes factory exposure.

IV. Staff and Scheduling

The Quality Assurance Laboratories are staffed whenever manufacturing is occurring; this is usually 24 hours per day, 365 days per year. This minimizes the amount of potentially inferior product produced before a manufacturing problem is identified.

V. Product Identification and Documentation

A. Roll Numbering

Each roll of geomembrane, geonet and geocomposite is assigned a unique roll number. The Quality Assurance Laboratory maintains records documenting the raw materials and resulting product quality information.

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B. Approval Procedure

Results for each tested roll of product is checked against both GSE and customer specifications for compliance. The Quality Assurance Laboratory approves those materials that meet both of these requirements for shipment.

C. Non-Conformance

Material that does not meet GSE minimum standards is given a roll number but is rejected and ***not*** placed into inventory. The material is identified as scrap and will not be utilized.

Material that meets GSE minimum standards but does not meet a stricter customer specification is not allocated to that customer but is placed into inventory as GSE standard material.

D. Documentation

Individual Quality Assurance Certificates are generated and supplied for each roll of geomembrane, geonet and geocomposite products to include all relevant quality assurance information about the material(s). The geotextile components (not manufactured by GSE) of the drainage geocomposite materials are tracked throughout the manufacturing process. Therefore, "traceability reports" are available.

VI. Records Retention

GSE maintains reports and/or samples for products produced and sold. Records and/or samples are maintained according to GSE's standard retention policy according to the item.

Material	Item	Years
Raw materials	Resin Supplier Test Reports and Certifications	≥2
	GSE Resin Test Reports	≥2
	Resin Sample Retain (Archive)	≥2
Geomembrane, geonet and geocomposite	Raw Test Data (in computer database)	≥5
	Quality Control Certificates	≥5
	Sample Retain (approximately one square foot)	≥5

VII. Testing Capabilities

GSE maintains high capacity, state-of-the-art laboratory equipment suitable for performing the procedures listed in Appendices A-D. GSE's Houston laboratories are accredited by the GAI-LAP program. GSE's quality assurance laboratories, as part of GSE's Product Division, also hold certification to ISO 9001. The appropriate certificates are maintained for review upon request by authorized parties.

A. Routine Testing

Through careful investigation, GSE has developed a strict and thorough Quality Assurance program that exceeds the vast majority of customer specifications including GRI GM13, "Test Properties, Testing Frequency and Recommended Warranty for High Density polyethylene (HDPE) Smooth and Textured Geomembranes" and GRI GM17 "Test Properties, Testing Frequency and Recommended Warranty for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes". The testing program covers raw materials (see Appendix A) and finished goods (see Appendix B & D) and is adhered to at all GSE laboratories. The laboratory equipment used by GSE represents the most modern equipment available and meets or exceeds the requirements of all the test standards used.

B. Other Testing Capabilities

In addition to routine testing, GSE laboratories are equipped to perform a wide variety of other tests as required for unusual requests or product development. Further, although the GSE Quality Assurance Laboratories are fully equipped and capable to perform most routinely specified tests in the industry, there are some tests that are more economically performed by a dedicated testing facility. GSE believes requirements for such testing should be carefully considered and defined in terms of specific design requirements if they are found to be necessary.

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VIII. MATERIAL QUALITY ASSURANCE

GSE Lining Technology, Inc. has established strict specifications for all raw materials and finished products. Test results must fall within the acceptable limits of GSE and customer specifications.

A. Raw Material

GSE primarily uses two types of raw materials, "natural resin" and "masterbatch" in the manufacture of geomembrane and geonet products. Natural resin is the base material (most commonly polyethylene) that is used to make a geomembrane or geonet. It contains stabilizers to prevent degradation from occurring before and after extrusion. "Masterbatch" is the term referring to the concentrated carbon black material used with the natural resin to produce the finished product. The natural resin and masterbatch are blended at the appropriate ratio at the manufacturing stage. The masterbatch can contain other additives depending upon the geomembrane or geonet product to be produced. GSE verifies the properties of each lot of raw materials prior to their utilization.

When natural resin is received, samples are taken and subjected to the tests outlined in Appendix A. All test data are entered into the computer database and checked for accuracy, consistency and compliance with GSE specifications. The material is not accepted unless all standard test requirements are met and the GSE test values meet the requirements set forth in the raw material specifications.

Copies of the supplier's certificate of analysis (COA) for each lot of resin utilized in the production of the materials supplied to a specific project are supplied as standard documentation. In addition, the GSE test results for each lot of resin is provided in a separate report.

Masterbatch (carbon black concentrate) is normally received in rail car lots. If resin is received by other transport and/or in other quantities, an equivalent suitable sampling procedure is provided (i.e. not less than one sample per shipment or one sample for each 50,000 lb., 23,000 kg)

B. Geomembrane Products

GSE has implemented a strict and thorough Quality Assurance program for all geomembrane products. The geomembrane product line can be broken into two primary categories: smooth and textured with two types of textured products. Tables containing GSE minimum properties and test frequencies for all GSE geomembrane products including specialty products such as GSE White™ (light-reflective geomembrane) and GSE Conductive™ (field spark-testable geomembrane) are in Appendix B.

1. *On-Line Manufacturing Quality Assurance*

The Quality Assurance program for finished product begins during the manufacturing process. Each manufacturing line is equipped with state-of-the-art monitoring devices that provide feedback on the physical quality of the materials being produced. Each geomembrane production line is equipped with both a thickness gage and spark-testing device.

a) *Thickness Measurement*

As geomembrane is being produced, thickness readings are taken continuously over the length and width of the roll. These data are used to establish the minimum, maximum and average thickness values for each roll and are verified by thickness testing upon sampling of the finished goods.

b) *Spark Testing*

An electrical spark detector is in place on each manufacturing sheet line. This apparatus provides immediate notification of holes in the finished product. If a hole is detected, an alarm is triggered and the hole is identified. Rolls containing holes are rejected from standard product inventory.

2. *Smooth Geomembrane Materials*

Smooth geomembrane products available include high density, linear low density polyethylene and polypropylene materials with 2-3% carbon black. Specialty materials include light-reflective and electrically conductive geomembranes.

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a) Sampling

Every roll of geomembrane is sampled for QA testing. An approximate one-foot by roll width sample is cut for Quality Assurance testing as each roll is completed. Specimens for testing are taken from two of five predetermined positions across the width of the roll. The five specimen positions are defined as a constantly repeating set of locations determined by the roll number. This enables the position from which any specimen was taken to be determined for future reference. Specimens for testing the machine direction are cut from one test sample and transverse direction specimens cut from the other. A "retain" or archive sample approximately 12 x 12 inch (30 x 30 cm) in size taken from the corresponding transverse direction position from the laboratory sample. The retain is labeled and kept for future reference (see Section VI).

b) Evaluation of Results

All data are entered into a computer database for calculation and comparison to GSE and customer-specific specifications. If materials do not meet GSE minimums and/or the customer specifications, the manufacturing personnel are immediately notified in order for the appropriate adjustments to be made. Only products meeting GSE minimums and customer specifications will be approved for shipment.

c) Reporting

Every roll of material has a quality assurance roll certificate or Roll Test Data Report (RTDR). This report identifies the standards on which the GSE approval is based along with the actual test results demonstrated by the material. QA personnel then review each report.

3. Coextruded Textured Geomembranes

This type of textured geomembrane is produced utilizing a round die with coextrusion technology. The texture is produced in a process in which one or two of the outer layers of a three-layer extrusion are blended with nitrogen gas. Nitrogen bubbles form in the molten resin and escape upon exiting the die, creating a rough, textured surface. Regular, light-reflective and conductive geomembranes are available with coextruded texturing.

Sampling, evaluation of results and reporting practices are the same as for smooth geomembranes.

4. FrictionFlex® (Spray-On) Textured Geomembranes

This type of textured geomembrane is produced in a 2-step process. The FrictionFlex process is a secondary texturing process in which molten polyethylene is sprayed onto one or both sides of a smooth geomembrane creating a textured surface. The smooth geomembrane used is tested according to standard GSE QA procedures prior to being textured. Once the material is textured, the roll is tested again.

C. Geonet Products

Geonet drainage products with bi-planar or tri-planer geometry are produced. Tables containing GSE properties and test frequencies for all GSE geonet and geocomposite products are located in Appendix D.

1. Sampling

A one-foot by roll width sample is cut for Quality Assurance testing from every fifth roll produced. An archive sample is cut from each tested roll. This sample is taken from a random location then it is labeled and stored for future reference (see Section VI).

2. Evaluation of Results

All data are entered into a computer database for calculation and comparison to established order specifications. If materials do not meet the required GSE standards and/or

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the customer specifications the manufacturing personnel are immediately notified in order for the appropriate adjustments to be made. Only products meeting GSE standards and customer specifications will be approved for shipment.

3. Reporting

A Quality Assurance Certificate is issued for every tested roll of finished product. This report identifies the standards on which the GSE approval is based along with the actual test results demonstrated by the material. QA personnel review each report.

D. Geocomposite Products

Geocomposite products are produced with a geonet and a nonwoven geotextile(s). This product is manufactured by heat bonding a geotextile to one or both sides of a geonet product. Sampling, evaluation of results and reporting practices are the same as for geonet products (Section B. above).

E. Third Party Conformance Sampling

Some specifications require independent Quality Assurance and/or conformance testing. GSE can provide assistance with the sampling of products by arranging for the conformance samples to be taken during production. By taking samples during production rather than on site, the customer can be assured that the samples are clean and available for conformance testing in a timely manner.

GSE encourages customers to audit GSE manufacturing and manufacturing quality assurance operations and/or to collect samples and conduct independent conformance testing prior to shipment of materials.

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APPENDIX A

TEST FREQUENCIES AND MINIMUM PROPERTIES FOR GSE RAW MATERIALS

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MINIMUM TESTING FREQUENCIES FOR GSE NATURAL RESIN

Property	Test Method[1]	Natural Resin
Density	ASTM D 1505	once per rail car compartment
Melt Flow Index	ASTM D 1238 (190/2.16)	once per rail car compartment
OIT	ASTM D 3895 (1 atm at 200 °C)	once per resin lot[2]
Carbon Black Content	ASTM D 1603, modified	N/A
Carbon Black Dispersion	ASTM D 3015	NA

[1] GSE utilizes test equipment and procedures that 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.
[3] OIT for LLDPE/VFPE resin is performed on a representative finished product for each lot of resin rather than on the natural (without carbon black) resin.

DOES NOT MEET OUR SPECS,

MINIMUM PROPERTIES FOR GSE NATURAL RESIN

Property	Test Method[1]	HDPE	LLDPE/VFPE
Density [g/cm^3]	ASTM D 1505	0.932	0.915
Melt Flow Index [g/10 min.]	ASTM D 1238 (190/2.16)	≤ 1.0	≤ 1.0
OIT [minutes]	ASTM D 3895 (1 atm at 200°C)	100	100[2]

[1] GSE utilizes test equipment and procedures that 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] OIT for LLDPE/VFPE resin is performed on a representative finished product for each lot of resin rather than on the natural (without carbon black) resin.

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APPENDIX B

TEST FREQUENCIES AND MINIMUM PROPERTIES FOR GSE GEOMEMBRANE PRODUCTS

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MINIMUM TESTING FREQUENCIES FOR STANDARD GSE GEOMEMBRANE PRODUCTS

Property	Test Method[1]	GSE Frequency	GRI Frequency[2]
Thickness	ASTM D 5199 or D 5994	every roll	per roll
Density	ASTM D 1505	every 5th roll (<20,000 lb, <9,000 kg)	200,000 lb, 90,000 kg
Tensile Properties	ASTM D 638 Type IV, 2 ipm	every roll (<20,000 lb, <9,000 kg)	20,000 lb, 9,000 kg
Tear Resistance	ASTM D 1004	every roll (<20,000 lb, <9,000 kg)	45,000 lb, 20,000 kg
Puncture Resistance	ASTM D 4833	every roll (<20,000 lb, <9,000 kg)	45,000 lb, 20,000
Stress Crack Resistance	ASTM D 5397, Appendix	per GRI-GM10	per GRI-GM10
Carbon Black Content	ASTM D 1603, modified	every 5th roll (<20,000 lb, <9,000 kg)	20,000 lb, 9,000 kg
Carbon Black Dispersion	ASTM D 5596	every 5th roll (<20,000 lb, <9,000 kg)	45,000 lb, 20,000 kg
Oxidative Induction Time	ASTM D 3895	per lot (<200,000 lb, <90,000 kg)	200,000 lb, 90,000 kg
Oven Aging at 85 °C	ASTM D 5721	per formulation	per formulation
UV Resistance	GRI-GM11	per formulation	per formulation

[1] GSE utilizes test equipment and procedures that 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] As published in GRI Test Methods GM13 and GM17. Available from Geosynthetic h Institute, 475 Kendron Avenue, Folsom, PA 19033-1208, USA, phone: 610/522-8440.

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Minimum Properties for Standard Smooth HDPE Geomembranes

GSE HD™

Property	Test Method[1]					
Thickness, mil (mm)	ASTM D 5199					
Minimum Average		40 (1.0)	60 (1.5)	80 (2.0)	100 (2.5)	120 (3.0)
Lowest Individual Reading		36 (0.91)	54 (1.4)	72 (1.8)	90 (2.3)	108 (2.7)
Density, g/cm^3	ASTM D 1505	0.94	0.94	0.94	0.94	0.94
Carbon Black Content, %	ASTM D 1603, modified	2.0	2.0	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	*Note 2*	*Note 2*	*Note 2*	*Note 2*	*Note 2*
Tensile Properties: (each direction)	ASTM D 638 Type IV, 2 ipm					
Strength at Yield, lb/in (kN/m)		84 (15)	130 (23)	173 (30)	216 (38)	259 (45)
Strength at Break, lb/in (kN/m)		162 (28)	243 (43)	324 (57)	405 (71)	486 (85)
Elongation at Yield, %	(1.3" gauge length)	13	13	13	13	13
Elongation at Break, %	(2.0" gauge length)	700	700	700	700	700
Tear Resistance, lb (N)	ASTM D 1004	28 (125)	42 (187)	56 (249)	70 (311)	84 (373)
Puncture Resistance, lb (N)	ASTM D 4833	79 (352)	119 (530)	158 (703)	198 (881)	238 (1059)
Notched Constant Tensile Load, hours	ASTM D 5397, appendix	400	400	400	400	400
Oxidative Induction Time, min.	ASTM D 3895	100	100	100	100	100

[1] GSE utilizes test equipment and procedures that 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] Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

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MINIMUM PROPERTIES FOR STANDARD SMOOTH WHITE-SURFACED HDPE GEOMEMBRANES

GSE WHITE™

Property	Test Method[1]					
Thickness, mil (mm)	ASTM D 5199					
Minimum Average		30 (0.75)	40 (1.0)	60 (1.5)	80 (2.0)	100 (2.5)
Lowest Individual Reading		27 (0.69)	36 (0.91)	54 (1.4)	72 (1.8)	90 (2.3)
Density, g/cm^3	ASTM D 1505	0.94	0.94	0.94	0.94	0.94
Carbon Black Content[2], %	ASTM D 1603	2.0	2.0	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	*Note 4*	*Note 4*	*Note 4*	*Note 4*	*Note 4*
Tensile Properties:(each direction)	ASTM D 638 Type IV, 2 ipm					
Strength at Yield, lb/in (kN/m)		63 (11)	84 (15)	130 (23)	173 (30)	216 (38)
Strength at Break, lb/in (kN/m)		122 (21)	162 (28)	243 (43)	324 (57)	405 (71)
Elongation at Yield, %	(1.3" gauge length)	13	13	13	13	13
Elongation at Break, %	(2.0" gauge length)	700	700	700	700	700
Tear Resistance, lb (N)	ASTM D 1004	21 (93)	28 (125)	42 (187)	56 (249)	70 (311)
Puncture Resistance, lb (N)	ASTM D 4833	59 (263)	79 (352)	119 (530)	158 (703)	198 (881)
Notched Constant Tensile Load, hours	ASTM D 5397, appendix	400	400	400	400	400
Oxidative Induction Time[3], min.	ASTM D 3895	100	100	100	100	100

[1] GSE utilizes test equipment and procedures that 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] GSE White may have an overall ash content greater than 3.0% due to the white layer.
[3] The OIT values apply to the black layer only.
[4] Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

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MINIMUM PROPERTIES FOR STANDARD SMOOTH CONDUCTIVE HDPE GEOMEMBRANES

GSE CONDUCTIVE™ AND GSE CONDUCTIVE WHITE™

Property	Test Method[1]				
Thickness, mil (mm)	ASTM D 5199				
Minimum Average		40 (1.0)	60 (1.5)	80 (2.0)	100 (2.5)
Lowest Individual Reading		36 (0.91)	54 (1.4)	72 (1.8)	90 (2.3)
Density, g/cm^3	ASTM D 1505	0.94	0.94	0.94	0.94
Carbon Black Content[2], %	ASTM D 1603, modified	2.0	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	*Note 5*	*Note 5*	*Note 5*	*Note 5*
Tensile Properties[3]: (each direction)	ASTM D 638 Type IV, 2 ipm				
Strength at Yield, lb/in (kN/m)		84 (15)	130 (23)	173 (30)	216 (38)
Strength at Break, lb/in (kN/m)		162 (28)	243 (43)	324 (57)	405 (71)
Elongation at Yield, %	(1.3" gauge length)	13	13	13	13
Elongation at Break, %	(2.0" gauge length)	700	700	700	700
Tear Resistance, lb (N)	ASTM D 1004	28 (125)	42 (187)	56 (249)	70 (311)
Puncture Resistance, lb (N)	ASTM D 4833	79 (352)	119 (530)	158 (703)	198 (881)
Notched Constant Tensile Load, hours	ASTM D 5397, appendix	400	400	400	400
Oxidative Induction Time[4], min.	ASTM D 3895	100	100	100	100

[1] GSE utilizes test equipment and procedures that 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] GSE Conductive and GSE Conductive White may have an overall ash content of greater than 3.0% due to the conductive and, when applicable, the white layer.
[3] Due to surface effects caused by the conductive layer, these tensile properties are minimum average values. [4] The OIT values apply to the non-conductive black layer only.
[5] Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

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MINIMUM PROPERTIES FOR STANDARD COEXTRUDED TEXTURED HDPE GEOMEMBRANES

GSE HD TEXTURED™

Property	Test Method[1]					
Thickness, mil (mm)	ASTM D 5994					
Minimum Average		30 (0.75)	40 (1.0)	60 (1.5)	80 (2.0)	100 (2.5)
Lowest Individual Reading		27 (0.69)	36 (0.91)	54 (1.4)	72 (1.8)	90 (2.3)
Density, g/cm^3	ASTM D 1505	0.94	0.94	0.94	0.94	0.94
Carbon Black Content, %	ASTM D 1603, modified	2.0	2.0	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	*Note 4*	*Note 4*	*Note 4*	*Note 4*	*Note 4*
Tensile Properties[2]: *(each direction)*	ASTM D 638 Type IV, 2 ipm					
Strength at Yield, lb/in (kN/m)		63 (11)	84 (15)	130 (23)	173 (30)	216 (38)
Strength at Break, lb/in (kN/m)		45 (8)	60 (11)	90 (16)	120 (21)	150 (27)
Elongation at Yield, %	(1.3" gauge length)	13	13	13	13	13
Elongation at Break, %	(2.0" gauge length)	150	150	150	150	150
Tear Resistance, lb (N)	ASTM D 1004	21 (93)	28 (124)	42 (187)	56 (249)	70 (311)
Puncture Resistance, lb (N)	ASTM D 4833	54 (240)	72 (320)	108 (480)	144 (641)	180 (801)
Notched Constant Tensile Load[3], hours	ASTM D 5397, appendix	400	400	400	400	400
Oxidative Induction Time, min.	ASTM D 3895	100	100	100	100	100

[1] GSE utilizes test equipment and procedures that 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] The combination of stress concentrations due to coextrusion texture geometry and the small specimen size results in large variations of test results. Therefore, these tensile properties are minimum average roll values.
[3] NCTL on coextruded textured product is conducted on representative smooth membrane samples.
[4] Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

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MINIMUM PROPERTIES FOR STANDARD COEXTRUDED TEXTURED WHITE-SURFACED HDPE GEOMEMBRANES

GSE WHITE TEXTURED™

Property	Test Method[1]					
Thickness, mil (mm)	ASTM D 5994					
Minimum Average		30 (0.75)	40 (1.0)	60 (1.5)	80 (2.0)	100 (2.5)
Lowest Individual Reading		27 (0.69)	36 (0.91)	54 (1.4)	72 (1.8)	90 (2.3)
Density, g/cm^3	ASTM D 1505	0.94	0.94	0.94	0.94	0.94
Carbon Black Content[2], %	ASTM D 1603, modified	2.0	2.0	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	*Note 6*	*Note 6*	*Note 6*	*Note 6*	*Note 6*
Tensile Properties[3]:	ASTM D 638					
(each direction)	Type IV, 2 ipm					
Strength at Yield, lb/in (kN/m)		63 (11)	84 (15)	130 (23)	173 (30)	216 (38)
Strength at Break, lb/in (kN/m)		45 (8)	60 (11)	90 (16)	120 (21)	150 (27)
Elongation at Yield, %	(1.3" gauge length)	13	13	13	13	13
Elongation at Break, %	(2.0" gauge length)	150	150	150	150	150
Tear Resistance, lb (N)	ASTM D 1004	21 (93)	28 (124)	42 (187)	56 (249)	70 (311)
Puncture Resistance, lb (N)	ASTM D 4833	54 (240)	72 (320)	108 (480)	144 (641)	180 (801)
Notched Constant Tensile Load[4], hours	ASTM D 5397, appendix	400	400	400	400	400
Oxidative Induction Time[5], min.	ASTM D 3895	100	100	100	100	100

[1] GSE utilizes test equipment and procedures that 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] GSE White Textured may have an overall ash content greater than 3.0% due to the white layer.
[3] The combination of stress concentrations due to coextrusion texture geometry and the small specimen size results in large variations of test results. Therefore, these tensile properties are minimum average roll values.
[4] NCTL on coextruded textured product is conducted on representative smooth membrane samples.
[5] The OIT values apply to the black layer only.
[6] Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

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MINIMUM PROPERTIES FOR STANDARD SMOOTH LLDPE/VFPE GEOMEMBRANES
GSE ULTRAFLEX®

Property	Test Method[1]					
Thickness, mil (mm)	ASTM D 5199					
Minimum Average		30 (0.75)	40 (1.0)	60 (1.5)	80 (2.0)	100 (2.5)
Lowest Individual Reading		27 (0.69)	36 (0.91)	54 (1.4)	72 (1.8)	90 (2.3)
Density, g/cm^3	ASTM D 1505	0.92	0.92	0.92	0.92	0.92
Carbon Black Content, %	ASTM D 1603, modified	2.0	2.0	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	*Note 2*	*Note 2*	*Note 2*	*Note 2*	*Note 2*
Tensile Properties: (each direction)	ASTM D 638 Type IV, 2 ipm					
Strength at Break, lb/in (kN/m)		114 (20)	152 (27)	228 (40)	304 (53)	380 (66)
Elongation at Break, %	(2.0" gauge length)	850	850	850	850	850
Tear Resistance, lb (N)	ASTM D 1004	16 (71)	22 (100)	33 (150)	44 (200)	55 (250)
Puncture Resistance, lb (N)	ASTM D 4833	46 (205)	62 (276)	92 (409)	123 (547)	154 (685)
Oxidative Induction Time, min.	ASTM D 3895	100	100	100	100	100

[1] *GSE utilizes test equipment and procedures that 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] Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

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MINIMUM PROPERTIES FOR STANDARD SMOOTH WHITE-SURFACED LLDPE/VFPE GEOMEMBRANES

GSE ULTRAFLEX WHITE

Property	Test Method[1]		
Thickness, mil (mm) Minimum Average Lowest Individual Reading	ASTM D 5199	40 (1.0) 36 (0.91)	60 (1.5) 54 (1.4)
Density, g/cm^3	ASTM D 1505	0.92	0.92
Carbon Black Content[2], %	ASTM D 1603, modified	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	*Note 4*	*Note 4*
Tensile Properties: *(each direction)* Strength at Break, lb/in (kN/m)	ASTM D 638 Type IV, 2 ipm	152 (27)	228 (40)
Elongation at Break, %	(2.0" gauge length)	850	850
Tear Resistance, lb (N)	ASTM D 1004	22 (100)	33 (150)
Puncture Resistance, lb (N)	ASTM D 4833	62 (276)	92 (409)
Oxidative Induction Time[3], min.	ASTM D 3895	100	100

[1] GSE utilizes test equipment and procedures that 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] GSE UltraFlex White may have an overall ash content greater than 3.0% due to the white layer.
[2] The OIT values apply to the black layer only.
[4] Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

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MINIMUM PROPERTIES FOR STANDARD COEXTRUDED TEXTURED LLDPE/VFPE GEOMEMBRANES

GSE ULTRAFLEX TEXTURED™

Property	Test Method[1]		
Thickness, mil (mm)	ASTM D 5994		
Minimum Average		40 (1.0)	60 (1.5)
Lowest Individual Reading		36 (0.91)	54 (1.4)
Density, g/cm^3	ASTM D 1505	0.92	0.92
Carbon Black Content, %	ASTM D 1603, modified	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	*Note 3*	*Note 3*
Tensile Properties[2]: (each direction)	ASTM D 638 Type IV, 2 ipm		
Strength at Break, lb/in (kN/m)		100 (18)	132 (23)
Elongation at Break, %	(2.0" gauge length)	500	500
Tear Resistance, lb (N)	ASTM D 1004	22 (100)	33 (150)
Puncture Resistance, lb (N)	ASTM D 4833	48 (214)	73 (325)
Oxidative Induction Time, min.	ASTM D 3895	100	100

[1] GSE utilizes test equipment and procedures that 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] The combination of stress concentrations due to coextrusion texture geometry and the small specimen size results in large variations of test results. Therefore, these tensile properties are average roll values.

[3] Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

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MINIMUM PROPERTIES FOR STANDARD COEXTRUDED TEXTURED WHITE-SURFACED LLDPE/VFPE GEOMEMBRANES

GSE ULTRAFLEX WHITE TEXTURED

Property	Test Method[1]		
Thickness, mil (mm)	ASTM D 5994		
Minimum Average		40 (1.0)	60 (1.5)
Lowest Individual Reading		36 (0.91)	54 (1.4)
Density, g/cm^3	ASTM D 1505	0.92	0.92
Carbon Black Content[2], %	ASTM D 1603, modified	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	*Note 5*	*Note 5*
Tensile Properties[3]: *(each direction)*	ASTM D 638 Type IV, 2 ipm		
Strength at Break, lb/in (kN/m)		100 (18)	132 (23)
Elongation at Break, %	(2.0" gauge length)	500	500
Tear Resistance, lb (N)	ASTM D 1004	22 (100)	33 (150)
Puncture Resistance, lb (N)	ASTM D 4833	48 (214)	73 (325)
Oxidative Induction Time[4], min.	ASTM D 3895	100	100

[1] GSE utilizes test equipment and procedures that 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] GSE UltraFlex White Textured may have an overall ash content greater than 3.0% due to the white layer.
[3] The combination of stress concentrations due to coextrusion texture geometry and the small specimen size results in large variations of test results. Therefore, these tensile properties are average roll values.
[4] The OIT values apply to the black layer only.
[5] Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

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MINIMUM PROPERTIES FOR STANDARD UNREINFORCED POLYPROPYLENE GEOMEMBRANES

GSE PROFLEX®

Property	Test Method[1]		
Thickness, mil (mm) Nominal	ASTM D 5199	30 (0.75)	40 (1.0)
Tensile Properties: (each direction)	ASTM D 638 Type IV, 2 ipm		
Strength at Break, lb/in (kN/m)		75 (13)	85 (15)
Elongation at Break, %	(2.0" gauge length)	700	700
Dimensional Stability	ASTM D 1204	±1% (max)	±1% (max)
Tear Resistance, lb (N)	ASTM D 1004	10 (44)	12 (53)
Puncture Resistance, lb (N)	ASTM D 4833	25 (111)	30 (133)

[1] GSE utilizes test equipment and procedures that 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] Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

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APPENDIX C

MINIMUM WELD PROPERTIES FOR GSE GEOMEMBRANE PRODUCTS

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Minimum Weld Properties for Standard Smooth HDPE Geomembranes[1]

Property	Test Method	30 (0.75)	40 (1.0)	60 (1.5)	80 (2.0)	100 (2.5)	120 (3.0)
Peel Strength (fusion), ppi (kN/m)	ASTM D 6392	49 (8.6)	65 (12)	98 (17)	130 (23)	162 (29)	196 (35)
Peel Strength (extrusion), ppi (kN/m)	ASTM D 6392	39 (6.9)	52 (9)	78 (14)	104 (18)	130 (23)	157 (28)
Shear Strength (fusion & ext.), ppi (kN/m)	ASTM D 6392	61 (11)	81 (14)	121 (21)	162 (29)	203 (36)	242 (43)

[1] These values apply to both coextruded and flat cast produced geomembranes and white-surfaced and conductive products.

Minimum Weld Properties for Standard Coextruded Textured HDPE Geomembranes[1]

Property	Test Method	30 (0.75)	40 (1.0)	60 (1.5)	80 (2.0)	100 (2.5)
Peel Strength (fusion), ppi (kN/m)	ASTM D 6392	49 (8.6)	65 (12)	98 (17)	130 (23)	162 (29)
Peel Strength (extrusion), ppi (kN/m)	ASTM D 6392	39 (6.9)	52 (9)	78 (14)	104 (18)	130 (23)
Shear Strength (fusion & ext.), ppi (kN/m)	ASTM D 6392	61 (11)	81 (14)	121 (21)	162 (29)	203 (36)

[1] These values also apply to both white-surfaced and conductive geomembrane products.

Minimum Weld Properties for Standard Smooth LLDPE Geomembranes[1]

Property	Test Method	30 (0.75)	40 (1.0)	60 (1.5)	80 (2.0)	100 (2.5)
Peel Strength (fusion & ext.), ppi (kN/m)	ASTM D 6392	36 (6.3)	48 (8.4)	72 (13)	96 (17)	120 (21)
Shear Strength (fusion & ext.), ppi (kN/m)	ASTM D 6392	40 (7.0)	56 (9.8)	84 (15)	112 (20)	140 (25)

[1] These values apply to both coextruded and flat cast produced geomembranes to include white-surfaced products. GSE UltraFlex White is available in thicknesses of 40 and 60 mil at this time. Therefore, values for other thicknesses in this table do not apply to white-surfaced products.

Minimum Weld Properties for Standard Coextruded Textured LLDPE Geomembranes[1]

Property	Test Method	40 (1.0)	60 (1.5)
Peel Strength (fusion & ext.), ppi (kN/m)	ASTM D 6392	40 (7.0)	60 (11)
Shear Strength (fusion & ext.), ppi (kN/m)	ASTM D 6392	48 (8.4)	72 (13)

[1] These values also apply to coextruded textured white-surfaced geomembrane products.

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APPENDIX D

TEST FREQUENCIES AND MINIMUM PROPERTIES FOR GSE GEONET AND GEOCOMPOSITE PRODUCTS

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MINIMUM AVERAGE[1] PROPERTIES FOR STANDARD GEOCOMPOSITE PRODUCTS
GSE FABRINET®

Property	Test Method[2]	with 6 oz/yd^2	with 8 oz/yd^2	with 10 oz/yd^2
GEOCOMPOSITE PROPERTIES				
Transmissivity[3], gpm/ft (m^3/sec·m)	ASTM D 4716 - 99	0.29 (6.0 x 10^{-5})	0.19 (4.0 x 10^{-5})	0.14 (3.0 x 10^{-5})
Peel Strength, Ply Adhesion	GRI GC7			
Average, ppi (g/cm)		1.0 (179)	1.0 (179)	1.0 (179)
Minimum, ppi (g/cm)		0.5 (90)	0.5 (90)	0.5 (90)
GEONET (HYPERNET) PROPERTIES				
Transmissivity[3], gpm/ft (m^3/sec·m)	ASTM D 4716 - 99	4.8 (1.0 x 10^{-3})	4.8 (1.0 x 10^{-3})	4.8 (1.0 x 10^{-3})
Thickness, mil (mm)	ASTM D 5199	200 (5)	200 (5)	200 (5)
Density, g/cm^3	ASTM D 1505	0.94	0.94	0.94
Tensile Strength (MD), ppi (N/mm)	ASTM D 5035	45 (7.9)	45 (7.9)	45 (7.9)
Carbon Black Content, %	ASTM D 1603, modified	2.0	2.0	2.0
GEOTEXTILE PROPERTIES[4]				
Mechanical Properties				
Mass Per Unit Area, oz/yd^2 (g/m^2)	ASTM D 5261	6.0 (200)	8.0 (270)	10.0 (335)
Grab Tensile, lb. (N)	ASTM D 4632	150 (710)	205 (911)	250 (1112)
Puncture Strength, lb. (N)	ASTM D 4833	85 (378)	110 (485)	150 (667)
Hydraulic Properties				
AOS, US Sieve (mm)	ASTM D 4751	70 (0.212)	80 (0.180)	100 (1.50)
Flow Rate, gpm/ft^2 (l/mm/m^2)	ASTM D 4491	110 (4480)	110 (4480)	85 (3460)

[1] These are minimum average roll values (MARV) and are based on the cumulative results of specimens tested as determined by GSE Quality Assurance practices.
[2] GSE utilizes test equipment and procedures that 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.
[3] Gradient of 1.0, normal load of 10,000 psf, (479 KPa) water at 70°F (21 °C) between stainless steel plates for 15 minutes. The conversion is: 1 m^3/sec·m = 4832 gpm/ft
[4] Other geotextiles are available and may be provided as agreed upon by GSE. All geotextile property values based on MARV's as determined by the supplier.

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MINIMUM AVERAGE[1] PROPERTIES FOR STANDARD GEOCOMPOSITE PRODUCTS
GSE FABRICAP®

Property	Test Method[2]	with 6 oz/yd^2	with 8 oz/yd^2
GEOCOMPOSITE PROPERTIES			
Transmissivity[3], gpm/ft (m^3/sec·m)	ASTM D 4716 - 95	0.48 (1.0 x 10^{-4})	0.43 (9.0 x 10^{-5})
Peel Strength, Ply Adhesion	GRI GC7		
Average, ppi (g/cm)		1.0 (179)	1.0 (179)
Minimum, ppi (g/cm)		0.5 (90)	0.5 (90)
GEONET (HYPERNET CP) PROPERTIES			
Transmissivity[3], gpm/ft (m^3/sec·m)	ASTM D 4716 - 99	4.8 (1.0 x 10^{-3})	4.8 (1.0 x 10^{-3})
Thickness, mil (mm)	ASTM D 5199	200 (5)	200 (5)
Density, g/cm^3	ASTM D 1505	0.94	0.94
Tensile Strength (MD), ppi (N/mm)	ASTM D 5035	32 (5.6)	32 (5.6)
Carbon Black Content, %	ASTM D 1603, modified	2.0	2.0
GEOTEXTILE PROPERTIES[4]			
Mechanical Properties			
Mass Per Unit Area, oz/yd^2 (g/m^2)	ASTM D 5261	6.0 (200)	8.0 (270)
Grab Tensile, lb. (N)	ASTM D 4632	150 (710)	205 (911)
Puncture Strength, lb. (N)	ASTM D 4833	85 (378)	110 (485)
Hydraulic Properties			
AOS, US Sieve (mm)	ASTM D 4751	70 (0.212)	80 (0.180)
Flow Rate, gpm/ft^2 (l/mm/m^2)	ASTM D 4491	110 (4480)	110 (4480)

[1] These are minimum average roll values (MARV) and are based on the cumulative results of specimens tested as determined by GSE Quality Assurance practices.
[2] GSE utilizes test equipment and procedures that 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.
[3] Gradient of 1.0, normal load of 4,000 psf, (192 KPa) water at 70°F (21 °C) between stainless steel plates for 15 minutes. The conversion is: 1 m^3/sec·m = 4832 gpm/ft
[4] Other geotextiles are available and may be provided as agreed upon by GSE. All geotextile property values based on MARV's as determined by the supplier.

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GSE

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A Gundle/SLT Environmental, Inc. Company

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SUPPLIER D MENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02770P-002	REV.: 0	DATE: 10/30/01	Page 1 of 3

FROM:
GSE LINING TECHNOLOGY, INC.

SIGNATURE: John David Siffin

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

RECEIVED BY: [illegible] DATE: 10/31/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02770P-002	0						X			LIST OF 10 COMPLETED FAC.		X			X		

REVIEW DISTRIBUTION

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Chuck VanArsdale-Approver	64				
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Kwasi Badu-Twenboah	38				
	1				

NO COMMENTS: X COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS) 11/7/01

ORIGINAL

0008054

RECEIVED BY: [illegible] DATE: 11/15/01

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

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FS-F-4955
Rev. 3: 05/14/1999 CT 2.4.2

[X] A - Conforms to the Subcontract Requiremen
[ ] B - Minor Comment - Incorporate and Resubm
[ ] C - Revise and Resubmit
Sig [signature] Date: 11/15/01

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GSE Lining Technology, Inc.
Reference List

Job Name:	Mineral Ridge	L1223
Location:	Silver Peak, NV	
Owner:	Mineral Ridge	
GC:	Don Short	
Installation:	60 LDPE Textured	900,000 sq. ft.
Completed:	May 1997	

Job Name:	Laidlaw Roxanna LF	O1078
Location:	Roxanna, IL	
Owner:	Laidlaw	
Engineer:	Golder	
Installation:	60 HDPE Textured	300,000 sq. ft.
	40 HDPE Textured	250,000 sq. ft.
Completed:	May 1997	

Job Name:	Front Range Cell II	K1198
Location:	Erie, CO	
Owner:	USA Waste of Colorado	
GC:	Ames Construction	
Installation:	HDPE Textured	800,000 sq. ft.
Completed:	April 1997	

Job Name:	Accomack County LF	C376
Location:	Accomack Co., VA	
Owner:	Accomack Co.	
GC:	HE Sargent	
Installation:	HDPE Textured	900,000 sq. ft.
	Claymax	450,000 sq. ft.
Completed:	April 1997	

Job Name:	Pegasus Pine Black Mine	J1184
Location:	Burley, CO	
Owner:	Crollin Scott	
Installation:	40 mil HDPE	80,000 sq. ft.
Completed:	March 1997	

INFORMATION ONLY

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Job Name:	Acmar Landfill Cell 2	E1122
Location:	Birmingham, AL	
Owner:	Acmar Landfill	
Engineer:	CQA Services	
Installation:	60 mil HDPE	421,000 sq. ft.
	Geotextile	231,000 sq. ft.
	60 mil HDPE Textured	66,000 sq. ft.
Completed:	February 1997	

Job Name:	Riverwood International	H1196
Location:	West Monroe, LA	
Owner:	Riverwood International	
Engineer:	Maxim	
GC:	Heber Costello	
Installation:	60 mil HDPE	2,090,000 sq. ft.
Completed:	January 1997	

Job Name:	BFI Gulf West	O1042
Location:	Anahuac, TX	
Owner:	BFI	
Engineer:	Golder	
GC:	Addicks	
Installation:	60 mil HDPE	154,000 sq. ft.
	60 mil HDPE Textured	88,000 sq. ft.
Completed:	December 1996	

Job Name:	BFI Benson Valley	O1054
Location:	Frankfort, KY	
Owner:	BFI	
Engineer:	Kevirons	
Installation:	Geocomposite	511,000 sq. ft.
	40 mil LDPE Textured	481,000 sq. ft.
Completed:	November 1996	

Job Name:	BFI Sinton	H1203
Location:	Sinton, TX	
Owner:	BFI	
Engineer:	Golder	
GC:	Addicks	
Installation:	60 mil HDPE	262,000 sq. ft.
Completed:	November 1996	

Job Name:	San Luis Canal	L1248
Location:	Los Banos, CA	
Owner:	San Luis Water District	
Installation:	40 mil HDPE Textured	1,763,000 sq. ft.
Completed:	November 1996	

Job Name:	Prince George	C1113
Location:	Upper Marlboro, MD	
Engineer:	EA Engineering	
GC:	Cherry Hill	
Installation:	Geotextile	1,500,000 sq. ft.
	60 mil HDPE	783,000 sq. ft.
	GeoNet	130,000 sq. ft.
Completed:	November 1996	

Job Name:	BFI North Shelby	D1108
Location:	Millington, TN	
Owner:	BFI	
Engineer:	STS	
Installation:	60 mil HDPE	172,000 sq. ft.
	60 mil HDPE Textured	172,000 sq. ft.
Completed:	November 1996	

Job Name:	BFI Middlepoint	O1026
Location:	Murfreesboro, TN	
Owner:	BFI	
Installation:	60 mil HDPE Textured	746,000 sq. ft.
	60 mil HDPE	59,000 sq. ft.
	Geocomposite	24,000 sq. ft.
Completed:	November 1996	

Job Name:	Cresson Phase II	K1131
Location:	Victor, CO	
GC:	Ames Construction	
Installation:	80 mil LDPE Textured	3,260,000 sq. ft.
	100 mil LDPE	640,000 sq. ft.
	100 mil LDPE Textured	640,000 sq. ft.
Completed:	November 1996	

Job Name:	Kennecott Pond	K1196
Location:	Salt Lake City, UT	
Owner:	Kennecott	
GC:	W.W. Clyde	
Installation:	80 mil HDPE White	5,000 sq. ft.
Completed:	November 1996	

Job Name:	Kennecott Repository	K1163
Location:	Salt Lake City, UT	
Owner:	Kennecott	
Installation:	Geonet	1,455,000 sq. ft.
	80 mil HDPE Conductive	1,369,000 sq. ft.
	60 mil HDPE Conductive	1,290,000 sq. ft.
	Geotextile	144,000 sq. ft.
	60 mil HDPE	79,000 sq. ft.
	GundFlow	73,000 sq. ft.
	60 mil HDPE Textured	50,000 sq. ft.
	80 mil HDPE Textured	50,000 sq. ft.
	Geocomposite	46,000 sq. ft.
	GCL	14,000 sq. ft.
	80 mil HDPE	8,700 sq. ft.
Completed:	November 1996	

Job Name:	McCain Foods	J1054
Location:	Othello, WA	
Owner:	McCain Foods	
Engineer:	JUB	
Installation:	60 mil HDPE	3,250,000 sq. ft.
Completed:	November 1996	

Job Name:	Cowlitz Co	J1149
Location:	Kelso, WA	
GC:	DelHur Industries	
Installation:	60 mil HDPE White	371,000 sq. ft.
	60 mil HDPE White Textured	61,000 sq. ft.
	60 mil HDPE	13,000 sq. ft.
Completed:	November 1996	

Job Name:	Round Mountain	L1211
Location:	Round Mountain, NV	
Engineer:	ICF Kaiser	
GC:	Ames Construction	
Installation:	60 mil HDPE	11,700,000 sq. ft.
	60 mil HDPE Textured	1,500,000 sq. ft.
	Geotextile	91,000 sq. ft.
Completed:	October 1996	

Job Name:	TS Ranch Dam & Channel	L1252
Location:	Carlin, NV	
Owner:	Barrick Goldstrike	
Installation:	60 mil HDPE	1,500,000 sq. ft.
	Geotextile	246,000 sq. ft.
Completed:	October 1996	

Job Name:	Umetco Minerals	K1180
Location:	Casper, WY	
Owner:	Umetco Minerals	
GC:	Umetco Minerals	
Installation:	60 mil HDPE	1,650,000 sq. ft.
	Geonet	821,000 sq. ft.
	Geotextile	19,000 sq. ft.
Completed:	October 1996	

Job Name:	BFI Golden Triangle	O1036
Location:	Bellmont, TX	
Owner:	BFI	
Engineer:	Golder	
GC:	Addicks	
Installation:	60 mil HDPE	420,000 sq. ft.
	60 mil HDPE Textured	32,000 sq. ft.
Completed:	October 1996	

Job Name:	Cortez Pipeline	L1209
Location:	Cressent Valley, NV	
GC:	Ames Construction	
Installation:	60 mil HDPE Textured	5,800,000 sq. ft.
	60 mil HDPE	4,000,000 sq. ft.
	Geotextile	329,000 sq. ft.
Completed:	October 1996	

Job Name:	Jefferson County Landfill	E418
Location:	Jefferson, AL	
GC:	BEC/Allwaste	
Installation:	60 mil HDPE	1,512,000 sq. ft.
Completed:	October 1996	

Job Name:	Port Washington	A339
Location:	Port Washington, NY	
GC:	Breco	
Installation:	60 mil HDPE Textured	1,100,000 sq. ft.
	60 mil HDPE	682,000 sq. ft.
Completed:	October 1996	

Job Name:	Dallas McCommas Landfill	H1174
Location:	Dallas, TX	
GC:	Association Remediation Services	
Installation:	Geotextile	1,000,000 sq. ft.
	60 mil HDPE	750,000 sq. ft.
	60 mil HDPE Textured	265,000 sq. ft.
Completed:	October 1996	

Job Name:	BFI Blue Ridge	H1205
Location:	Houston, TX	
Owner:	BFI	
Engineer:	Golder	
GC:	Addicks	
Installation:	60 mil HDPE	600,000 sq. ft.
	60 mil HDPE Textured	116,000 sq. ft.
Completed:	October 1996	

Job Name:	GE	41093
Location:	Burtville, AL	
Owner:	GE	
Installation:	100 mil HDPE Conductive	38,000 sq. ft.
	Geonet	38,000 sq. ft.
Completed:	September 1996	

Job Name:	Sunshine Canyon	L1193
Location:	Sylmar, CA	
Owner:	BFI	
Installation:	Geotextile	46,000 sq. ft.
	60 mil HDPE Textured	25,000 sq. ft.
	GCL	25,000 sq. ft.
	Geonet	25,000 sq. ft.
	60 mil HDPE Double Textured	22,000 sq. ft.
	30 mil HDPE	13,000 sq. ft.
Completed:	September 1996	

Job Name:	Barney's Canyon BC5	K1116
Location:	Bingham Canyon, UT	
GC:	W.W. Clyde Construction	
Installation:	60 mil HDPE	1,730,000 sq. ft.
Completed:	September 1996	

Job Name:	BFI-Chateau Fresno	O1035
Location:	Fresno, CA	
Owner:	BFI	
Engineer:	Vector	
Installation:	40 mil HDPE	2,000,000 sq. ft.
	40 mil HDPE Textured	1,500,000 sq. ft.
Completed:	September 1996	

Job Name:	BFI Kerrville	H1202
Location:	Kerville, TX	
Owner:	BFI	
Engineer:	Golder	
GC:	Addicks	
Installation:	60 mil HDPE Textured	368,000 sq. ft.
	Geocomposite	361,000 sq. ft.
	60 mil HDPE	23,000 sq. ft.
Completed:	September 1996	

Job Name:	Coeur Rochester Pad	L1142
Location:	Love Lock, NV	
GC:	AMI Construction	
Installation:	80 mil HDPE Textured	2,377,000 sq. ft.
Completed:	September 1996	

Job Name:	Empire Landfill, Pad 9	B1098
Location:	Scranton, PA	
Owner:	Empire Landfill	
Installation:	100 mil HDPE Textured	1,300,000 sq. ft.
Completed:	September 1996	

Job Name:	Lyondell Brine Pit	61276
Location:	Mt. Bellevieu, TX	
Owner:	Lyondell	
Installation:	40 mil HDPE	22,000 sq. ft.
	Geotextile	18,000 sq. ft.
	60 mil HDPE	15,000 sq. ft.
	Geonet	15,000 sq. ft.
Completed:	August 1996	

Job Name:	Reserve Environmental	C1081
Location:	Ashtabula, OH	
Owner:	Reserve Environmental	
Installation:	Geotextile	610,000 sq. ft.
	60 mil HDPE Textured	156,000 sq. ft.
	Geonet	156,000 sq. ft.
	60 mil HDPE	149,000 sq. ft.
Completed:	August 1996	

Job Name:	Sanifill/Citizen's Disposal	F1126
Location:	Grand Block, MI	
Owner:	Sanifill	
Engineer:	NTH	
Installation:	60 mil HDPE	615,000 sq. ft.
	Geotextile	612,000 sq. ft.
	Geonet	605,000 sq. ft.
	Geocomposite	15,000 sq. ft.
	60 mil HDPE	15,000 sq. ft.
Completed:	August 1996	

Job Name:	Webster Parish Landfill	H1173
Location:	Minden, LA	
GC:	Plaquemine Contractors	
Installation:	Geocomposite	400,000 sq. ft.
	60 mil HDPE	220,000 sq. ft.
	60 mil HDPE Textured	140,000 sq. ft.
Completed:	August 1996	

Job Name:	Al Turi	A1096
Location:	Goshen, NY	
Owner:	Al Turi	
Engineer:	Emcon	
Installation:	60 mil HDPE Textured	261,000 sq. ft.
	Geocomposite	261,000 sq. ft.
Completed:	August 1996	

Job Name:	BFI Sunset Farms	H1204
Location:	Travis County, TX	
Owner:	BFI	
Engineer:	Golder	
GC:	Addicks	
Installation:	60 mil HDPE	575,000 sq. ft.
	60 mil HDPE Textured	79,000 sq. ft.
Completed:	August 1996	

Job Name:	LaRoche	21192
Location:	Belvidere, NJ	
Owner:	LaRoche	
Installation:	80 mil HDPE Conductive Textured	44,000 sq. ft.
Completed:	August 1996	

Job Name:	Groose Creek	J1130
Location:	Stanley, ID	
GC:	Ledcon Industries Construction	
Installation:	60 mil LLD	1,250,000 sq. ft.
	Geotextile	291,000 sq. ft.
	Bentomat	80,000 sq. ft.
Completed:	July 1996	

Job Name:	Fort Howard Paper	F1097
Location:	Green Bar, WI	
Owner:	Fort Howard Paper Company	
Installation:	40 mil LDPE	807,000 sq. ft.
	40 mil LDPE Textured	60,000 sq. ft.
Completed:	July 1996	

Job Name:	Franklin Expansion Phase II	A1057
Location:	Tilton, NH	
Owner:	Town of Franklin	
GC:	Pike Industries	
Installation:	80 mil HDPE Textured	183,000 sq. ft.
	80 mil HDPE	57,000 sq. ft.
Completed:	July 1996	

Job Name:	Cortez Gold Acres	L1213
Location:	Cresscent Vale, NV	
GC:	Copeland Construction	
Installation:	60 mil HDPE	717,000 sq. ft.
	80 mil HDPE	41,000 sq. ft.
Completed:	July 1996	

Job Name:	Chesapeake Paper Company	C1117
Location:	Roanoke, VA	
Owner:	Black & Veatch	
GC:	Massie Contracting, Inc.	
Installation:	Geotextile	1,167,000 sq. ft.
	60 mil HDPE	268,000 sq. ft.
	60 mil HDPE Textured	122,000 sq. ft.
Completed:	July 1996	

Job Name:	Pit Area Closure	A1117
Location:	Brattleboro, VT	
Owner:	Windham Solid Waste	
Engineer:	Windham Solid Waste	
GC:	H.E. Sargent	
Installation:	40 mil LDPE	458,000 sq. ft.
	Geocomposite	411,000 sq. ft.
Completed:	June 1996	

Job Name:	Hoechst Celanese	61271
Location:	Bishop, TX	
Owner:	Hoechst Celanese	
Installation:	80 mil HDPE Textured	2,500 sq. ft.
	Geonet	750 sq. ft.
Completed:	June 1996	

Job Name:	Cyprus Bagdad	K1153
Location:	Bagdad, AZ	
GC:	Ames Construction	
Installation:	80 mil HDPE Textured	375,000 sq. ft.
	60 mil HDPE	57,000 sq. ft.
Completed:	May 1996	

Job Name:	Botetourt County Lanfill Cell2	C1146
Location:	Troutville, VA	
Owner:	Botetourt County	
GC:	Counts & Dobyns	
Installation:	Geotextile	189,000 sq. ft.
	60 mil HDPE Textured	189,000 sq. ft.
Completed:	May 1996	

Job Name:	Salt River Landfill	K1148
Location:	Scottsdale, AZ	
Owner:	Rich Allen	
Installation:	60 mil HDPE	250,000 sq. ft.
	60 mil HDPE Textured	250,000 sq. ft.
	Geocomposite	240,000 sq. ft.
Completed:	April 1996	

Job Name:	Huntsman Chemical	21158
Location:	Belpre, OH	
Owner:	Huntsman Chemcal	
Installation:	60 mil HDPE	64,000 sq. ft.
Completed:	April 1996	

Job Name:	Palm City Landfill	P7681
Location:	Palm City, FL	
Owner:	Martin County	
Engineer:	Hazen & Sawyer	
GC:	Hewitt Contracting	
Installation:	60 mil HDPE	969,000 sq. ft.
	HyperNet	450,000 sq. ft.
	GCL	28,000 sq. ft.
Completed:	March 1996	

Job Name:	Mira Mar	L1177
Location:	San Diego, CA	
Owner:	City of San Diego	
GC:	Rasmussen	
Installation:	80 mil HDPE Textured	110,000 sq. ft.
	Geotextile	30,000 sq. ft.
Completed:	March 1996	

Job Name:	City of Harlingen	H1176
Location:	Harlingen, TX	
Owner:	City of Harlingen	
Installation:	Geocomposite	180,000 sq. ft.
	60 mil HDPE	143,000 sq. ft.
	60 mil HDPE Textured	24,000 sq. ft.
Completed:	March 1996	

Job Name:	Upper SW Arkansas Landfill	H1152
Location:	Nashville, AR	
Owner:	Upper SW Arkansas Landfill	
Installation:	60 mil HDPE	14,000 sq. ft.
Completed:	February 1996	

Job Name:	North Star Steel	71058
Location:	Kingman, AZ	
Engineer:	Pat McMarrara	
Installation:	60 mil HDPE	163,000 sq. ft.
Completed:	January 1996	

Job Name:	Channelview Brine Pit	H1162
Location:	Mt. Bellevieu, TX	
Owner:	Lyondell Petrochemical	
Installation:	40 mil HDPE	89,000 sq. ft.
	60 mil HDPE	89,000 sq. ft.
	Geonet	89,000 sq. ft.
Completed:	December 1995	

Job Name:	Golden Sunlight	J1083
Location:	Jefferson, MT	
Owner:	Golden Sunlight Mine	
Installation:	60 mil HDPE	1,292,000 sq. ft.
	60 mil HDPE Textured	9,000 sq. ft.
Completed:	December 1995	

SUPPLIER I JMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02770P-003	REV.: 0	DATE: 10/30/01	Page 1 of 3

FROM:
GSE LINING TECHNOLOGY, INC.

SIGNATURE: John David Tiffin

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

RECEIVED BY: Jennifer [illegible] DATE: 10/31/01

			DOCUMENT FAMILY									SUBMITTAL TYPE				SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	DRFT	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
6	1440-OPT2-02770P-003	0						X			ORIGIN & ID OF RESIN		X			X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Chuck VanArsdale-Approver	64				
Gregg Johnson	64				
Bill Zebick	64				
Mike Godber	64				
Kwasi Badu-Twenboah	38				

NO COMMENTS: ~~X~~ CW COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS) CW 11/7/01

FLOW RATE SHOWN ON SAMPLE RESIN CERT DOES ~~NOT~~ MEET SPEC. ~~(MUST BE TYPO)~~ ON

SEE ATTACHED SHEET FOR EXPLANATION.

ORIGINAL

0028000

RECEIVED BY: Chuck C. VanArsdale DATE: 11/16/01

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: _____ Date: 11/16/01

4941

GSE®

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
713-443-8564
Fax: 281 - 230 - 8663

INFORMATION ONLY

29 OCTOBER 2001

Fluor Fernald, Inc.
Attn: ECDC, MS52-7, Project 20102
P.O. Box 538704
Cincinnati, Ohio 45253-8704

RE: 80 mil HD Textured Material Properties
GSE Project No. 505905

CERTIFICATION

The undersigned, being qualified and authorized to do so, hereby certifies that standard GSE 80 mil average HD Textured™ HDPE geomembrane will meet or exceed the following specified property values:

- GSE certifies that no reclaimed polymer will be used in the production of materials for the referenced project. Recycled material reworked from GSE's manufacturing process may be added, but will not exceed two percent (2%) by weight of the material.

Sincerely,

John David Griffin

John David Griffin
GSE Technical Supervisor

cc: Sheri Sim-Connell, GSE Lining Technology, Inc.

000821

4941

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

August 28, 2001

PSN# 20412-01

FAX: 281-230-2510

GSE Lining Technology, Inc.
19103 Gundle Road
Houston, TX 77073

Don Bohac

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	K306
Lot Number:	8210918
P.O. Number:	
Date Shipped:	08/28/01
Package:	PSPX 9166
Quantity:	179600 LBS
HLMI Flow Rate, ASTM D1238:	11.2 G/10 MIN
Density, ASTM D1505:	.936 G/CC

based on 21.6 Kg

Melt flow index conversion (2.16 Kg) equals approx. 0.05 → 0.3 g/min which meets Flow Fam specification

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

SAMPLE

Melissa Mulkey
FAX: 281-230-8630

Vanarsdale, Chuck

From: JD Griffin [jgriffin@gseworld.com]
Sent: Friday, November 16, 2001 10:25 AM
To: 'Chuck.Vanarsdale@fernald.gov'
Cc: Nathan Ivy; James Gussman
Subject: Submittal No. 20104-1440/2-02770P-003 Origin and Identification o f Resin

Chuck,

Nathan Ivy informs me that Chevron Phillips performs melt index testing using ASTM D 1238 with a weight of 21.6 Kg (approximately 48 lbs), whereas GSE performs in plant testing using ASTM D 1238 with a weigth of 2.16 Kg (approximately 5 lbs). If Chevron Phillips were to use the 2.16 Kg weight, the reported value for melt flow index would typically fall between 0.05 to 0.3 g/10 minutes which is in compliance with the project specifications. If you should have any questions, please call either myself (ext. 5851) or Nathan Ivy (ext. 6726) at 800 - 435 - 2008. Thanks.

SUPPLIER L[illegible]MENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02770P-004	REV.: 0	DATE: 10/30/01	Page 1 of 3

FROM:
GSE LINING TECHNOLOGY, INC.

SIGNATURE: John David Gilfoin

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

RECEIVED BY: [illegible] DATE: 10/31/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02770P-004	0							X		CERTIFICATION/WELD, ROD		X		02770P, 1.05, A, 4	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Mike Godber - Approver	64				
Chuck Vanhrsdale	64				
Kwasi Badu-Twenboah	38				
Bill Zebick	64				
[illegible] 13 Nov. 2001					
James L. Turner					
for Michael W. Godber					

NO COMMENTS: COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

ORIGINAL

0008824

RECEIVED BY: [illegible] DATE: 11/06/01

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubm
[ ] C - Revise and Resubmit
Sig: [illegible] Date: 11/15/01

GSE®

GSE Lining Technology, Inc.
Technical Support

4941

INFORMATION ONLY

October 29, 2001

Fluor Fernald, Inc.
Attn: ECDC, MS52-7, Project 20102
P.O. Box 538704
Cincinnati, OH 45253-8704

Re: Certification for Welding Rod
GSE Project No. 505905

CERTIFICATION

The undersigned, being qualified and authorized to do so, hereby certifies that the HDPE welding rod is of the same resin type and has the same properties as the GSE HD™ and HD Textured™ high-density polyethylene (HDPE) geomembranes to be supplied to the above project.

Regards,

John David Griffin

John David Griffin
Technical Support Supervisor

cc: Sheri Sim-Connell, GSE Lining Technology, Inc.

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02770P-005	REV.: 0	DATE: 10/30/01	Page 1 of 3

FROM:
GSE LINING TECHNOLOGY, INC.

SIGNATURE: [signature]

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

RECEIVED BY: [signature] DATE: 10/31/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02770P-005	0							X		CERTIFICATION OF MARV Minimum Average Roll Values 10/31/01		X		02770P, 1.05.A.5	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Mike Godber - Approver	64				
Chuck VanArsdale	64				
Kwasi Badu-Twenboah	38				
Bill Zebick	64				
14 Nov. 2001					
James T. Turner					
for Michael W. Godber					

NO COMMENTS: ✓ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

ORIGINAL

008326

RECEIVED BY: [signature] DATE: 11/6/01

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

FS-F-4955
Rev. 3: 05/14/1999. CT-2.4.2

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: [illegible] Date: 11/15/01

4941

GSE®

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
713-443-8564
Fax: 281 - 230 - 8663

29 OCTOBER 2001

INFORMATION ONLY

Fluor Fernald, Inc.
Attn: ECDC, MS52-7, Project 20102
P.O. Box 538704
Cincinnati, Ohio 45253-8704

RE: 80 mil HD Textured Material Properties
GSE Project No. 505905

CERTIFICATION

The undersigned, being qualified and authorized to do so, hereby certifies that standard GSE 80 mil average HD Textured™ HDPE geomembrane will meet or exceed the following specified property values:

- Minimum Average Roll Value (MARV) – GSE HPDE textured geomembrane physical and mechanical properties will meet the properties as listed in Table 02770P-1, Required HDPE Textured Geomembrane Properties with a 95% confidence level.

Sincerely,

John David Griffin

John David Griffin
GSE Technical Supervisor

cc: Sheri Sim-Connell, GSE Lining Technology, Inc.

000827

SUPPLIER D MENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02770P-006	REV.: 0	DATE: 10/30/01	Page 1 of 3

FROM:
GSE LINING TECHNOLOGY, INC.

SIGNATURE: John David Jeffrie

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

RECEIVED BY: Jennifer L. Short DATE: 10/31/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02770P-006	0					X				RECOMMENDED STORAGE Requirements and Limitations 10/31/01			X		X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Bill Zebick - Approver	64				
Kwasi Badu-Twenboah	38				
Gregg Johnson	64				
Chuck Van Arsdale	64				
Mike Godber	64				

NO COMMENTS: ✓ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

ORIGINAL

008028

RECEIVED BY: [signature] DATE: 11/14/01
FOR WA 2
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

4941

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: For Date Date: 11/5/01

GSE Lining Technology, Inc.

INFORMATION ONLY

RECOMMENDED HANDLING AND STORAGE PROCEDURES

HANDLING

1. Material manufactured by GSE Lining Technology, Inc. is provided on flat, wound rolls in three approximate sizes:
   22.5 ft (6.75 m) wide and 2 ft (600 mm) in diameter, 2800 lbs (1275 kg)
   24.0 ft (7.32 m) wide and 2 ft (600 mm) in diameter, 3500 lbs (1610 kg)
   34.5 ft (10.5 m) wide and 2 ft (600 mm) in diameter, 4400 lbs (2025 kg)
   Actual roll dimensions are provided when material is shipped.

2. To assist in handling, two (2) lifting straps are supplied with each roll. For effective handling, a lifting bar (not supplied) 8.2 ft (2.5 m) long must be used to lift the rolls for loading and unloading.

3. Extreme care must be used in crane handling so that damage to the edges of the rolls does not occur during handling.

4. If other handling equipment is used which could come into direct contact with the material, care should be exercised to assure the material is not damaged or punctured.

STORAGE

1. The material is manufactured to be suitable for outdoor installation; therefore, covered storage is not required. **Caution:** If high winds, hail or other adverse environmental conditions are expected, covered storage may be considered to assure the material is not damaged. Also, where local conditions warrant protection from theft or vandalism, consideration should be given to storage in a secured area.

2. The ground surface on which the material is stored should be similar in character to the area to be lined. It should be free of all debris, rocks and other protrusions which could damage the liner material.

3. Rolls can be stored by stacking one on top of the other. The recommended maximum number of rolls which can be stacked on top of one another is five (5) rolls, *i.e*, five high.

4. Boxes of welding rod should not be left outside but stored in a secure, dry, covered area.

SUPPLIER D MENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02770P-008	REV.: 1	DATE: 11/16/01	Page 1 of 3

FROM: GSE LINING TECHNOLOGY, INC.

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

SIGNATURE: John David Tuffin

RECEIVED BY: Erika Jarrett DATE: 11/19/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION A	B	C
6	1440-OPT2-02770P-008	1						X			GEOMEMBRANE WARRANTY			X		X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Chuck Van Arsdale - Approver	64				
Gregg Johnson	64				
Bill Zebick	64				
Mike Godber	64				
Bill Zebick	38				

NO COMMENTS: COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

RECEIVED BY: Chuck Van Arsdale DATE: 11/20/01

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

0008030

4941

ORIGINAL

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

1440 - OPT 2 - CE ... R/1

GSE Lining Technology, Inc.
GSE Domestic Sales Department
19103 Gundle Rd.
Houston, Texas 77037
Phone: 800 435-2008
Fax: 281 2308650

Page No: 1
GSE Project Number: 505905
GSE Customer Number: 40844
GSE Order Number: 6186 SO
Customer Purchase Order: Contract 99SC0014

ORDER ACKNOWLEDGEMENT

4941

Sold To: Fluor Daniel Fernald
P.O.Box 538704
Cincinnati OH 45253-8704

Ship To: Fluor Daniel Fernald
Option 2 - Cell 4 Liner System
Department of Energy
7400 Willey Road
Hamilton OH 45013

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: [signature] Date: 11/20/01

Phone: 513 6484661
Fax:

Phone:
Fax:

Payment Terms: Net 30
Shipping Terms: F.O.B. Jobsite

Delivery Instructions: (513) 648-3000.
Contact Kathy Fisher @

Line No.	Order Date	Requested on Site	Description	Item Number	UoM	Quantity	Unit Price	Extended Price
9.00	10/15/01	06/01/	Reinforced Clay Liner, 15' 1 side woven, 1 side non-woven	BENT0000ST	SF	1,660,000	.3390	562,740.00
10.00	10/15/01	06/01/	80 mil Avg GSE HD Textured Blk, HD, 2 Side Tex, 22.5'	HDT080A000	SF	1,660,000	.2980	494,680.00
11.00	10/15/01	06/01/	30 mil Avg GSE HD Blk, HD, Smooth, 22.5'	HDE030A000	SF	58,000	.1090	6,322.00
12.00	10/15/01	06/01/	5 mm HD Welding Rod HD Welding Rod	HDROD5MM	BX	270	22.5000	6,075.00
13.00	10/15/01	06/01/	80 mil Avg GSE HD Blk, HD, Smooth, 22.5'	HDE080A000	SF	20,000	.6010	12,020.00

Warranty Addition: "This warranty is in addition to the warranty priovisions contained in Subcontract No. 99SC001440 and does not negate any warranty provisions under Fluor Fernald Inc.'s general provisions contained in the subcontract.

Sub Total: 1,081,837.00
Tax Rate: 6 % Sales Tax: 64,910.22
Total Order US$ 1,146,747.22

Order Acceptance Conditions:

Price Escalation: The prices for products are firm for 30 days from the date of this Acknowledgment. A purchase order from the Customer must be received within the 30-day period and Customer must agree to take delivery of products within 30 days of issuance of a GSE Order Acknowledgment, or the prices for those products will escalate according to the following provisions:

a. Prices for GSE resin based products are subject to escalation based on changes in the price for resin as published in *Plastics News On The Web* under volume Thermoplastics HDPE & LLDPE Extrusion-Annual Volumes Greater Than 20 Million Pounds. Quoted prices are based on resin prices at the time of quotation, and are subject to change when *Plastics News* resin prices change. If the above protected period is not met, prices for products will change as published prices in *Plastics News* change. Price changes will be applied proportionally to each product based on that product's standard weight per unit.

b. Prices for non-GSE manufactured materials are subject to price changes based on supplier's increases.

Material Warranty: All products are sold with GSE's Standard Limited Material Warranty. GSE will "pass through" the original manufacturer's warranty for all products not manufactured by GSE.

Material Specifications: Unless otherwise agreed in writing by a GSE authorized representative, GSE's standard property values, quality control testing procedures, and documentation apply to the products supplied.

Shipping Policy: GSE Standard Inventory can be shipped in three (3) to five (5) working days after a GSE Order Acknowledgment is issued to Customer. All geocomposites and geonets will be delivered in covered vans and stacked horizontally. Delivery on flatbed trailers will incur a $ 0.005 per square foot surcharge.

Substitution of Products: GSE reserves the right to substitute material manufactured at any of its U.S. plants. If GSE elects to substitute comparable material, it will make reasonable efforts to notify Customer in advance of shipment.

Product Quantity Revisions: Any change in products, specifications, or quantities by Customer will require a revised quotation and Order Acknowledgment. If Customer elects to purchase only a portion of the products acknowledged, GSE shall have the right to adjust its pricing to reflect the impact of such election.

Roll Sizes: All roll sizes are approximate. Invoicing will be based on actual roll lengths shipped.

Taxes: Taxes are calculated separately at the prevailing jurisdiction's rates currently in effect. Properly signed exemption or direct pay permits must be presented to GSE and accepted by the Tax Authority in order to exempt your order from applicable taxes.

Terms and Conditions: GSE General Terms and Conditions of Sale, attached hereto, shall apply to all transactions. Acceptance of your purchase order is expressly made conditional on your acceptance of GSE General Terms and Conditions of Sale.

EEOC: GSE Lining Technology, Inc. is an Equal Employment Opportunity Employer.

Comments:

INFORMATION ONLY

000831

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2 02770P-008	REV.: 0	DATE: 10/30/01	Page 1 of 3

FROM:
GSE LINING TECHNOLOGY, INC.

SIGNATURE: John David Tiffin

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

RECEIVED BY: [illegible] DATE: 10/31/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-OPT2-02770P-008	0						X			GEOMEMBRANE WARRANTY			X			X	

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Chuck Van Arsdale-Approver	64				
Gregg Johnson	64				
Bill Zebick	64				
Mike Godber	64				
Kwasi Badu-Tiwenboah	~~36~~	38			

NO COMMENTS: COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

PLEASE ADD SAME ADDITIONAL VERBAGE REQUIRED WITH LAST TRADES SUBMITTAL. PROVIDE ON SEPARATE MEMO.
"THIS WARRANTY IS IN ADDITION TO THE WARRANTY PROVISIONS CONTAINED IN SUBCONTRACT NO. 995C001440 AND DOES NOT NEGATE ANY WARRANTY PROVISIONS UNDER FLUOR FERNALD INC.'S GENERAL PROVISIONS CONTAINED IN THE SUBCONTRACT.

ORIGINAL

RECEIVED BY: [illegible] DATE: 11/15/01
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

000832

FS-F-4955
Rev. 3: 05/14/1999. CT-2.4.2

[ ] A - Conforms to the Subcontract Requirements
[X] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: [illegible] Date: 11/15/01

4941

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

SAMPLE INFORMATION ONLY

Date:		Warranty No.:	
Purchaser Name:		Project No.:	
Address:		Effective Date:	
City, State:		Project Name:	
Product Type/Description:	GSE Liner Products	Project Address:	

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 five (5) 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.

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02770P-009	REV.: 0	DATE: 10/30/01	Page 1 of 3

FROM:
GSE LINING TECHNOLOGY, INC.

SIGNATURE: John David Siffin

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

RECEIVED BY: Jennifer Lockhart DATE: 10/31/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1440-0002-02770P-009	0						X			FORMS GML-80S & GML-80T		X			X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
[redacted]	[redacted]				
Gregg Johnson	64				
Bill Zebick	64				
Mike Godbes	64				
Kwasi Bodu Twenboah	38				

NO COMMENTS: ✓ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS) 11/7/01

ORIGINAL

RECEIVED BY: Chris C. Van Arsdale DATE: 11/15/01

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

0008834

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

TABLE GML-80S TECHNICAL INFORMATION 80 MIL SMOOTH GEOMEMBRANE LINER

REQUISITION #F99SC001440

Refer to Specification Section 02770P

4941

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	D5994	76 MILS	YES	
THICKNESS AVERAGE	D5994	80 MILS	YES	
DENSITY	D1505	0.94 g/cm^3 MIN	YES	
CARBON BLACK CONTENT	D1603	2-3%	YES	
CARBON BLACK DISPERSION	D5596	CAT 1 OR 2	YES	
~~ASPERITY HEIGHT~~	~~GRI-GM12~~	~~7 MILS MIN~~	~~YES~~	CV
MECHANICAL PROPERTIES				
STRENGTH AT YIELD	D638 - TYPE IV	168 lb/in	YES	
STRENGTH AT BREAK	D638 - TYPE IV	120 lb/in	YES	
ELONGATION AT YIELD	D638 - TYPE IV	12% MIN	YES	
ELONGATION AT BREAK	D638 - TYPE IV	100% MIN	YES	
LOW TEMP BRITTLENESS	D746-B	- 60° C MAX	YES	
DIMENSIONAL STABILITY	D1204	+/- 2% MAX	YES	212°F, 15 minutes
NOTCHED CONSTANT TENSILE LOAD	D5397	500 HRS MIN	YES	
TEAR RESISTANCE	D1004	56 LB MIN	YES	Die C Puncture
PUNCTURE RESISTANCE	D4833	120 LB MIN	YES	
ROLL SIZE		20 FT WIDE, (MIN), 390 FT LENGTH (MIN)	YES	
RESIN PROPERTIES				
PERCENT VIRGIN RESIN		98% MIN	YES	
DENSITY	D1505	0.934g/cm^3 MIN	YES	
MELT FLOW INDEX	D1238 E	1.0g/10 min MAX	YES	
MINIMUM LOT SIZE		100,000 SF	YES	
MAXIMUM ADDITIVES/FILLERS		1%	YES	
WELDING ROD RESIN SHALL BE COMPATIBLE WITH SPECIFIED REQUIREMENTS ON THIS PAGE				
SUBMITTALS REQUIRED TO BE PROVIDED WITH PROPOSAL				SUPPLIER MUST INDICATE WHERE REQUIRED SUBMITTALS ARE INCLUDED IN THE PROPOSAL
NAME AND PHONE # OF CONTACT PERSON			YES	
DAILY PRODUCTION CAPACITY			YES	
MQC PROCEDURES			YES	
LIST OF MATERIAL PROPERTIES			YES	
LIST OF 10 FACILITIES			YES	
RESIN INFORMATION			YES	
CERTIFICATION OF HDPE WELDING ROD COMPATIBILITY			YES	
CERTIFICATION OF MARV			YES	
STORAGE REQUIREMENTS AND LIMITATIONS			YES	
INSTALLATION PROCEDURES			YES	
MANUFACTURER WARRANTY			YES	
MSDS			YES	
TESTING FREQUENCY				
DENSITY	1/40,000 SF		YES	
THICKNESS	1/40,000 SF		YES	
TENSILE PROPERTIES	1/40,000 SF		YES	
CARBON BLACK PROPERTIES	1/40,000 SF		YES	
TEAR RESISTANCE	1/40,000 SF		YES	
PUNCTURE RESISTANCE	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				
TOTAL QUANTITY	20,000 SF		YES	

INFORMATION ONLY

John David Griffin

Signature

10/29/01

DATE

000835

[X] A - Conforms to the Subcontract Requirem

[ ] B - Minor Comment - Incorporate and Resu

[ ] C - Revise and Resubmit

Sig: Date: 11/15/0

NAME OF BIDDER

OPTION 2 TABLE GML-80S.xls

Revised 10/05/2001

TABLE GML-80T TECHNICAL INFORMATION GEOMEMBRANE LINER
REQUISITION #F99SC001440 TEXTURED

Refer to Specification Section 02770P 4941

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	D5994	76 MILS	YES	
THICKNESS AVERAGE	D5994	80 MILS	YES	
DENSITY	D1505	0.94 g/cm^3 MIN	YES	
CARBON BLACK CONTENT	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 - TYPE IV	168 lb/in	YES	
STRENGTH AT BREAK	D638 - TYPE IV	120 lb/in	YES	
ELONGATION AT YIELD	D638 - TYPE IV	12% MIN	YES	
ELONGATION AT BREAK	D638 - TYPE IV	100% MIN	YES	
LOW TEMP BRITTLENESS	D746-B	- 60° C MAX	YES	
DIMENSIONAL STABILITY	D1204	+/- 2% MAX	YES	212°F, 15 minutes
NOTCHED CONSTANT TENSILE LOAD	D5397	500 HRS MIN	YES	
TEAR RESISTANCE	D1004	56 LB MIN	YES	Die C Puncture
PUNCTURE RESISTANCE	D4833	120 LB MIN	YES	
ROLL SIZE		20 FT WIDE, (MIN), 390 FT LENGTH (MIN)	YES	
RESIN PROPERTIES				
PERCENT VIRGIN RESIN		98% MIN	YES	
DENSITY	D1505	0.934 g/cm^3	YES	
MELT FLOW INDEX	D1238 E	1.0g/10 min MAX	YES	
MINIMUM LOT SIZE		100,000 SF	YES	
MAXIMUM ADDITIVES/FILLERS		1%	YES	
SUBMITTALS REQUIRED TO BE PROVIDED WITH PROPOSAL				SUPPLIER MUST INDICATE WHERE REQUIRED SUBMITTALS ARE INCLUDED IN THE PROPOSAL
NAME AND PHONE # OF CONTACT PERSON			YES	
DAILY PRODUCTION CAPACITY			YES	
MQC PROCEDURES			YES	
LIST OF MATERIAL PROPERTIES			YES	
LIST OF 10 FACILITIES			YES	
RESIN INFORMATION			YES	
CERTIFICATION OF HDPE WELDING ROD COMPATIBILITY			YES	
CERTIFICATION OF MARV			YES	
STORAGE REQUIREMENTS AND LIMITATIONS			YES	
INSTALLATION PROCEDURES			YES	
MANUFACTURER WARRANTY			YES	
MSDS			YES	
TESTING FREQUENCY				
DENSITY	1/40,000 SF		YES	
THICKNESS	1/40,000 SF		YES	
ASPERITY HEIGHT	1/40,000 SF		YES	
TENSILE PROPERTIES	1/40,000 SF		YES	
CARBON BLACK PROPERTIES	1/40,000 SF		YES	
TEAR RESISTANCE	1/40,000 SF		YES	
PUNCTURE RESISTANCE	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				
TOTAL QUANTITY	1,660,000 SF		YES	

John David Tiffin
Signature

10/29/01
DATE

NAME OF BIDDER

000836

SUPPLIER D MENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1440	SUBMITTAL NO. 20104-1440/2-02770P-010	REV.: 0	DATE: 10/30/01	Page 1 of 3

FROM:
GSE LINING TECHNOLOGY, INC.

SIGNATURE: John David Tiffin

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

RECEIVED BY: DATE: 10/31/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION A	B	C
6	1440-OPT2-02770P-010	0		X							MATERIAL SAFETY DATA SHEETS			X		X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Gregg Johnson - Approver	64				
Chuck VanArsdale	64				
Kwasi Badu-Twenboah	38				
Bill Zebick	64				
Debra Grant	35				

NO COMMENTS: COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

ORIGINAL

000837

RECEIVED BY: DATE: 11/5/01
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

INFORMATION ONLY

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: Date: 11/5/01

4941

Material Information Sheet

GSE lining Technology, Inc.
19103 Gundle Road
Houston, Texas 77073
(800) 435-2008

Issued by: Chip Zogg
Safety Coordinator

Date: 11/01/01

NFPA 704:

Health	0
Flammability	1
Reactivity	0

Ratings use five divisions from 0 to 4
0 = no special hazard 4 = severe hazard

Division: Industry Products

I. Product Information

A. Product Names:

High Density Polyethylene 80 mil material

B. Description and Ingredient

2-3% Carbon Black
Approximately .5% antioxidants & heat stabilizers.

These products do not contain asbestos.

II. Miscellaneous Information

Each of these products is classified as an "article" according to Title 29 of the Code of Federal Regulations, OSHA Part 1916.1200(c). They are formed to a specific shape or design during manufacture, have end use functions dependent upon their shape or design, and do not release any hazardous chemical under normal conditions of use.

*This Material Information Sheet is provided in lieu of a Material Safety Data Sheet. An MSDS is required only for chemicals for products that are hazardous as defined by the OSHA Standard 1910.1200.

Material Information Sheet

GSE lining Technology, Inc.
19103 Gundle Road
Houston, Texas 77073
(800) 435-2008

Issued by: Chip Zogg
Safety Coordinator

Date: 11/01/01

NFPA 704:

Health	0
Flammability	1
Reactivity	0

Ratings use five divisions from 0 to 4
0 = no special hazard 4 = severe hazard

Division: Industry Products

I. Product Information

A. Product Names:

High Density Polyethylene 80 mil Textured

B. Description and Ingredient

2-3% Carbon Black
Approximately .5% antioxidants & heat stabilizers.

These products do not contain asbestos.

II. Miscellaneous Information

Each of these products is classified as an "article" according to Title 29 of the Code of Federal Regulations, OSHA Part 1916.1200(c). They are formed to a specific shape or design during manufacture, have end use functions dependent upon their shape or design, and do not release any hazardous chemical under normal conditions of use.

*This Material Information Sheet is provided in lieu of a Material Safety Data Sheet. An MSDS is required only for chemicals for products that are hazardous as defined by the OSHA Standard 1910.1200.

Material Information Sheet

GSE lining Technology, Inc.
19103 Gundle Road
Houston, Texas 77073
(800) 435-2008

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Date: 11/01/01

NFPA 704:

Health	0
Flammability	1
Reactivity	0

Ratings use five divisions from 0 to 4
0 = no special hazard 4 = severe hazard

Division: Industry Products

I. Product Information

A. Product Names:

High Density Rod

B. Description and Ingredient

2-3% Carbon Black
Approximately .5% antioxidants & heat stabilizers.

These products do not contain asbestos.

II. Miscellaneous Information

Each of these products is classified as an "article" according to Title 29 of the Code of Federal Regulations, OSHA Part 1916.1200(c). They are formed to a specific shape or design during manufacture, have end use functions dependent upon their shape or design, and do not release any hazardous chemical under normal conditions of use.

*This Material Information Sheet is provided in lieu of a Material Safety Data Sheet. An MSDS is required only for chemicals for products that are hazardous as defined by the OSHA Standard 1910.1200.

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT 20104	CONTRACT NO: PHIV	SUBMITTAL NO. 20104-1440/2-2770P-012	REV.: 0	DATE: 4/15/02	Page of

FROM:
FLUOR FERNALD

SIGNATURE: [signature]

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

RECEIVED BY: [signature] DATE: 4/16/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
7	1440-OPT2-02770P-012	0						X			TEST REPORTS FOR RESIN		X		2770	X		
7	1440-OPT2-02770P-011	0						X			QUALITY CONTROL CERTIFICATES		X		2770	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVAL)	64				
DON PFISTER - DOE	45				
BILL ZEBICK	64				
MIKE GODBER	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				

NO COMMENTS: COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

INFORMATION ONLY

0008841

RECEIVED BY: [signature] DATE: 4/18/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/REVIEW/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

ORIGINAL

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

January 03, 2002

PSN# 160-02

FAX: 281-230-2510

GSE Lining Technology, Inc.
19103 Gundle Road
Houston, TX 77073

Don Bohac

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	K306
Lot Number:	7111751
P.O. Number:	
Date Shipped:	01/03/02
Package:	PSPX 2381
Quantity:	189200 LBS.
HLMI Flow Rate,ASTM D1238:	11.2 G/10 MIN
Density, ASTM D1505:	.938 G/CC
Melt Index, ASTM D1238:	.080 G/10 MIN

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Sue Phouangsavanh
FAX: 281-230-8630

(X) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: [illegible] Date: 4/18/02

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

January 03, 2002

PSN# 162-02

FAX: 281-230-2510

GSE Lining Technology, Inc.
19103 Gundle Road
Houston, TX 77073

Don Bohac

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	K306
Lot Number:	7120001
P.O. Number:	
Date Shipped:	01/03/02
Package:	PSPX 8197
Quantity:	189400 LBS.
HLMI Flow Rate,ASTM D1238:	11.0 G/10 MIN
Density, ASTM D1505:	.938 G/CC
Melt Index, ASTM D1238:	.080 G/10 MIN

Paul S. Newbold
Sr. Certification Systems Specialist

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* Reg. U.S. Pat. Off.

cc: QA-File-RC

Sue Phouangsavanh
FAX: 281-230-8630

4941

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

January 03, 2002

PSN# 161-02

FAX: 281-230-2510

GSE Lining Technology, Inc.
19103 Gundle Road
Houston, TX 77073

Don Bohac

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	K306
Lot Number:	7111752
P.O. Number:	
Date Shipped:	01/03/02
Package:	PSPX 1305
Quantity:	189300 LBS.
HLMI Flow Rate,ASTM D1238:	11.3 G/10 MIN
Density, ASTM D1505:	.938 G/CC
Melt Index, ASTM D1238:	.100 G/10 MIN

Paul S. Newbold
Sr. Certification Systems Specialist

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cc: QA-File-RC

Sue Phouangsavanh
FAX: 281-230-8630

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

January 03, 2002

PSN# 158-02

FAX: 281-230-2510

GSE Lining Technology, Inc.
19103 Gundle Road
Houston, TX 77073

Don Bohac

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	K306
Lot Number:	7111748
P.O. Number:	
Date Shipped:	01/03/02
Package:	PSPX 6393
Quantity:	189800 LBS.
HLMI Flow Rate,ASTM D1238:	11.3 G/10 MIN
Density, ASTM D1505:	.938 G/CC
Melt Index, ASTM D1238:	.080 G/10 MIN

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Sue Phouangsavanh
FAX: 281-230-8630

4941

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

January 03, 2002

PSN# 159-02

FAX: 281-230-2510

GSE Lining Technology, Inc.
19103 Gundle Road
Houston, TX 77073

Don Bohac

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	K306
Lot Number:	7111749
P.O. Number:	
Date Shipped:	01/03/02
Package:	PSPX 6226
Quantity:	190700 LBS.
HLMI Flow Rate,ASTM D1238:	11.2 G/10 MIN
Density, ASTM D1505:	.938 G/CC
Melt Index, ASTM D1238:	.080 G/10 MIN

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Sue Phouangsavanh
FAX: 281-230-8630

Chevron Phillips Chemical Company LP
Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

4941

January 31, 2002

PSN# 2297-02

FAX: 281-230-2510

GSE Lining Technology, Inc.
19103 Gundle Road
Houston, TX 77073

Don Bohac

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	K306
Lot Number:	8220062
P.O. Number:	
Date Shipped:	01/31/02
Package:	PSPX 2204
Quantity:	190500 LBS.
HLMI Flow Rate,ASTM D1238:	10.8 G/10 MIN
Density, ASTM D1505:	.936 G/CC
Melt Index, ASTM D1238:	.060 G/10 MIN

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Sue Phouangsavanh
FAX: 281-230-8630

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

February 15, 2002

PSN# 3489-02

FAX: 281-230-2510

GSE Lining Technology, Inc.
19103 Gundle Road
Houston, TX 77073

Don Bohac

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	K306
Lot Number:	8220072
P.O. Number:	
Date Shipped:	02/14/02
Package:	PSPX 6747
Quantity:	184600 LBS.
HLMI Flow Rate,ASTM D1238:	11.4 G/10 MIN
Density, ASTM D1505:	.937 G/CC
Melt Index, ASTM D1238:	.090 G/10 MIN

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Sue Phouangsavanh
FAX: 281-230-8630

4941

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

February 15, 2002

PSN# 3491-02

FAX: 281-230-2510

GSE Lining Technology, Inc.
19103 Gundle Road
Houston, TX 77073

Don Bohac

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	K306
Lot Number:	8220074
P.O. Number:	
Date Shipped:	02/14/02
Package:	CPCX 2356
Quantity:	185400 LBS.
HLMI Flow Rate,ASTM D1238:	12.5 G/10 MIN
Density, ASTM D1505:	.936 G/CC
Melt Index, ASTM D1238:	.100 G/10 MIN

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Sue Phouangsavanh
FAX: 281-230-8630

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

February 15, 2002

PSN# 3493-02

FAX: 281-230-2510

GSE Lining Technology, Inc.
19103 Gundle Road
Houston, TX 77073

Don Bohac

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	K306
Lot Number:	8220076
P.O. Number:	
Date Shipped:	02/14/02
Package:	PSPX 6068
Quantity:	187200 LBS.
HLMI Flow Rate,ASTM D1238:	12.5 G/10 MIN
Density, ASTM D1505:	.937 G/CC
Melt Index, ASTM D1238:	.120 G/10 MIN

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Sue Phouangsavanh
FAX: 281-230-8630

4941

Chevron Phillips
Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

February 15, 2002

PSN# 3494-02

FAX: 281-230-2510

GSE Lining Technology, Inc.
19103 Gundle Road
Houston, TX 77073

Don Bohac

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	K306
Lot Number:	8220082
P.O. Number:	
Date Shipped:	02/14/02
Package:	PSPX 2608
Quantity:	183800 LBS.
HLMI Flow Rate,ASTM D1238:	11.6 G/10 MIN
Density, ASTM D1505:	.937 G/CC
Melt Index, ASTM D1238:	.100 G/10 MIN

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Sue Phouangsavanh
FAX: 281-230-8630

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT I :0104

CONTRACT NO: PHIV

SUBMITTAL NO. 20104-1440/2-2770P-013 | REV.: 0 | DATE: 4/10/02

~~Page 1 of 5~~

FROM:
FLUOR FERNALD

SIGNATURE: Michael W. Godber

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

MS 4/10/02

RECEIVED BY: Jelma Kraus DATE: 4/16/02

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
7	1440-OPT2-02770P-013	0							X		CERTIFICATION OF RESIN POLYMER		X		2770	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE	64				
DON PFISTER - DOE	45				
BILL ZEBICK	64				
MIKE GODBER (APPROVER)	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				

NO COMMENTS: _____ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

RECEIVED BY: Michael W. Godber DATE: 4/15/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATIONAL ONLY
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

ORIGINAL

000852

4941

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

4941

GSE®

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
713-443-8564
Fax 281 - 230 - 8663

29 OCTOBER 2001

Fluor Fernald, Inc.
Attn: ECDC, MS52-7, Project 20102
P.O. Box 538704
Cincinnati, Ohio 45253-8704

RE: 80 mil HD Textured Material Properties
GSE Project No. 505905

CERTIFICATION

The undersigned, being qualified and authorized to do so, hereby certifies that standard GSE 80 mil average HD Textured™ HDPE geomembrane will meet or exceed the following specified property values:

- GSE certifies that no reclaimed polymer will be used in the production of materials for the referenced project. Recycled material reworked from GSE's manufacturing process may be added, but will not exceed two percent (2%) by weight of the material.

INFORMATION ONLY

Sincerely,

INFORMATION ONLY

(✓) A - Conform to the Submittal Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: Date: 4/23/02

John David Griffin
GSE Technical Supervisor

cc: Sheri Sim-Connell, GSE Lining Technology, Inc.

000853

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104

CONTRACT NO: PHIV

SUBMITTAL NO. 20104-1440/2-2770P-014 | REV.: 0 | DATE: 4/10/02 | ~~Page 1 of 5~~

FROM:
FLUOR FERNALD

SIGNATURE: Michael W. Godber

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

RECEIVED BY: Juema Kraus DATE: 4/16/02

MS 4/16/02

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
7	1440-OPT2-02770P-014	0							X		MANUFACTURING CERTIFICATES PER SHIFT PRODUCTION OF GEOMEMBRANE		X		2770	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE	64				
DON PFISTER - DOE	45				
BILL ZEBICK	64				
MIKE GODBER (APPROVER)	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				

NO COMMENTS: _____ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

ORIGINAL

0008854

RECEIVED BY: Michael W. Godber DATE: 4/24/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

FS-F-4955

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104

CONTRACT NO: PHIV

SUBMITTAL NO. 20104-1440/2-2770P-014 | REV.: 0 | DATE: 4/10/02 | ~~Page 1 of 5~~

FROM:
FLUOR FERNALD

SIGNATURE: [signature]

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

RECEIVED BY: [signature] DATE: 4/16/02

MS 4/10/02

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
7	1440-OPT2-02770P-014	0							X		MANUFACTURING CERTIFICATES PER SHIFT PRODUCTION OF GEOMEMBRANE		X		2770	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE	64				
DON PFISTER - DOE	45				
BILL ZEBICK	64				
MIKE GODBER (APPROVER)	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				

NO COMMENTS:

COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

RECEIVED BY: [signature] DATE: 4/18/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
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C - Revise and Resubmit (SEE COMMENTS)

FS-F-4955

4941

GSE Roll Allocation

4941

Order 6186
Customer Fluor Fernald, Inc.
Site Fluor Fernald, Inc.

	Roll#	Resin Lot	Product Code	Description	Mfg. Date	Length	QA TESTS	LONG TE TESTS
1	103114197	7111749	HDT080A000	HDT080A000	1/22/02	400		
2	103114198	7111749	HDT080A000	HDT080A000	1/22/02	400		
3	103114199	7111749	HDT080A000	HDT080A000	1/23/02	400		
4	103114200	7111749	HDT080A000	HDT080A000	1/23/02	400		
5	103114201	7111749	HDT080A000	HDT080A000	1/23/02	400		
6	103114202	7111749	HDT080A000	HDT080A000	1/23/02	400		
7	103114203	7111748	HDT080A000	HDT080A000	1/23/02	400		
	103114204	7111748	HDT080A000	HDT080A000	1/23/02	400		
	103114205	7111748	HDT080A000	HDT080A000	1/23/02	400		
	103114206	7111748	HDT080A000	HDT080A000	1/23/02	400		
	103114207	7111748	HDT080A000	HDT080A000	1/23/02	400		
	103114208	7111748	HDT080A000	HDT080A000	1/23/02	400		
	103114209	7111748	HDT080A000	HDT080A000	1/23/02	400		
	103114210	7111748	HDT080A000	HDT080A000	1/23/02	400		
	103114213	7111748	HDT080A000	HDT080A000	1/24/02	400		
	103114214	7111748	HDT080A000	HDT080A000	1/24/02	400		
	103114215	7111748	HDT080A000	HDT080A000	1/24/02	400		
	103114216	7111748	HDT080A000	HDT080A000	1/24/02	400		
	103114218	7111748	HDT080A000	HDT080A000	1/24/02	400		
	103114219	7111748	HDT080A000	HDT080A000	1/24/02	400		
	103114220	7111748	HDT080A000	HDT080A000	1/24/02	400		
	103114221	7111748	HDT080A000	HDT080A000	1/24/02	400		
	103114222	7111748	HDT080A000	HDT080A000	1/24/02	400		
	103114223	7111748	HDT080A000	HDT080A000	1/24/02	400		
	103114224	7111748	HDT080A000	HDT080A000	1/24/02	400		
	103114225	7111748	HDT080A000	HDT080A000	1/24/02	400		
	103114226	7111748	HDT080A000	HDT080A000	1/24/02	400		
	103114227	7111748	HDT080A000	HDT080A000	1/24/02	400		
	103114228	7111748	HDT080A000	HDT080A000	1/25/02	400		
	103114229	7111748	HDT080A000	HDT080A000	1/25/02	400		
	103114230	7111748	HDT080A000	HDT080A000	1/25/02	400		
	103114231	7111748	HDT080A000	HDT080A000	1/25/02	400		
	103114232	7111748	HDT080A000	HDT080A000	1/25/02	400		
	103114233	7111748	HDT080A000	HDT080A000	1/25/02	400		
	103114234	7111748	HDT080A000	HDT080A000	1/25/02	400		

INFORMATION ONLY

INFORMATION ONLY

A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: ___ Date: 4/23/02

000856

35 ROLLS

Order 6186
Customer Fluor Fernald, Inc.
Site Fluor Fernald, Inc.

49411

Roll#	*Resin Lot*	*Product Code*	*Description*	*Mfg. Date*	*Length*
103114235	7111752	HDT080A000	HDT080A000	1/25/02	400
103114236	7111752	HDT080A000	HDT080A000	1/25/02	400
103114237	7111752	HDT080A000	HDT080A000	1/25/02	400
103114238	7111752	HDT080A000	HDT080A000	1/25/02	400
103114239	7111752	HDT080A000	HDT080A000	1/25/02	400
103114240	7111752	HDT080A000	HDT080A000	1/25/02	400
103114241	7111752	HDT080A000	HDT080A000	1/25/02	400
103114242	7111752	HDT080A000	HDT080A000	1/26/02	400
103114243	7111752	HDT080A000	HDT080A000	1/26/02	400
103114246	7111752	HDT080A000	HDT080A000	1/26/02	400
103114272	7120001	HDT080A000	HDT080A000	1/28/02	400
103114273	7120001	HDT080A000	HDT080A000	1/28/02	400
103114274	7120001	HDT080A000	HDT080A000	1/28/02	400
103114275	7120001	HDT080A000	HDT080A000	1/28/02	400
103114276	7120001	HDT080A000	HDT080A000	1/28/02	400
103114277	7120001	HDT080A000	HDT080A000	1/28/02	400
103114278	7120001	HDT080A000	HDT080A000	1/28/02	400
103114279	7120001	HDT080A000	HDT080A000	1/28/02	400
103114280	7120001	HDT080A000	HDT080A000	1/28/02	400
103114281	7120001	HDT080A000	HDT080A000	1/28/02	400
103114282	7120001	HDT080A000	HDT080A000	1/28/02	400
103114283	7120001	HDT080A000	HDT080A000	1/28/02	400
103114284	7120001	HDT080A000	HDT080A000	1/28/02	400
103114285	7120001	HDT080A000	HDT080A000	1/29/02	400
103114286	7120001	HDT080A000	HDT080A000	1/29/02	400
103114287	7120001	HDT080A000	HDT080A000	1/29/02	400
103114288	7120001	HDT080A000	HDT080A000	1/29/02	400
103114289	7120001	HDT080A000	HDT080A000	1/29/02	400
103114290	7120001	HDT080A000	HDT080A000	1/29/02	400
103114291	7120001	HDT080A000	HDT080A000	1/29/02	400
103114292	7120001	HDT080A000	HDT080A000	1/29/02	400
103114293	7120001	HDT080A000	HDT080A000	1/29/02	400
103114294	7120001	HDT080A000	HDT080A000	1/29/02	400
103114295	7120001	HDT080A000	HDT080A000	1/29/02	400
103114296	7120001	HDT080A000	HDT080A000	1/29/02	400
103114297	7120001	HDT080A000	HDT080A000	1/29/02	400
103114298	7120001	HDT080A000	HDT080A000	1/29/02	400

000857

Order 6186
Customer Fluor Fernald, Inc.
Site Fluor Fernald, Inc.

4941

Roll#	*Resin Lot*	*Product Code*	*Description*	*Mfg. Date*	*Length*
103114299	7120001	HDT080A000	HDT080A000	1/29/02	400
103114300	7120001	HDT080A000	HDT080A000	1/30/02	400
103114301	7120001	HDT080A000	HDT080A000	1/30/02	400
103114302	7120001	HDT080A000	HDT080A000	1/30/02	400
103114303	7120001	HDT080A000	HDT080A000	1/30/02	400
103114371	7111751	HDT080A000	HDT080A000	2/4/02	400
103114372	7111751	HDT080A000	HDT080A000	2/4/02	400
103114373	7111751	HDT080A000	HDT080A000	2/4/02	400
103114374	7111751	HDT080A000	HDT080A000	2/4/02	400
103114375	7111751	HDT080A000	HDT080A000	2/4/02	400
103114376	7111751	HDT080A000	HDT080A000	2/4/02	400
103114377	7111751	HDT080A000	HDT080A000	2/4/02	400
103114378	7111751	HDT080A000	HDT080A000	2/4/02	400
103114379	7111751	HDT080A000	HDT080A000	2/4/02	400
103114380	7111751	HDT080A000	HDT080A000	2/4/02	400
103114811	8220062	HDT080A000	HDT080A000	3/10/02	400
103114812	8220062	HDT080A000	HDT080A000	3/10/02	400
103114813	8220062	HDT080A000	HDT080A000	3/11/02	400
103114814	8220062	HDT080A000	HDT080A000	3/11/02	400
103114815	8220062	HDT080A000	HDT080A000	3/11/02	400
103114816	8220062	HDT080A000	HDT080A000	3/11/02	400
103114817	8220062	HDT080A000	HDT080A000	3/11/02	400
103114818	8220062	HDT080A000	HDT080A000	3/11/02	400
103114819	8220062	HDT080A000	HDT080A000	3/11/02	400
103114820	8220062	HDT080A000	HDT080A000	3/11/02	400
103114821	8220062	HDT080A000	HDT080A000	3/11/02	400
103114822	8220062	HDT080A000	HDT080A000	3/11/02	400
103114823	8220062	HDT080A000	HDT080A000	3/11/02	400
103114824	8220062	HDT080A000	HDT080A000	3/11/02	400
103114825	8220062	HDT080A000	HDT080A000	3/11/02	400
103114826	8220062	HDT080A000	HDT080A000	3/12/02	400
103114827	8220062	HDT080A000	HDT080A000	3/12/02	400
103114828	8220062	HDT080A000	HDT080A000	3/12/02	400
103114829	8220062	HDT080A000	HDT080A000	3/12/02	400
103114830	8220062	HDT080A000	HDT080A000	3/12/02	400
103114832	8220062	HDT080A000	HDT080A000	3/12/02	400
103114833	8220062	HDT080A000	HDT080A000	3/12/02	400

000858

37 ROLLS

Order 6186
Customer Fluor Fernald, Inc.
Site Fluor Fernald, Inc.

4941

Roll#	*Resin Lot*	*Product Code*	*Description*	*Mfg. Date*	*Length*
103114834	8220062	HDT080A000	HDT080A000	3/12/02	400
103114835	8220062	HDT080A000	HDT080A000	3/12/02	400
103114836	8220062	HDT080A000	HDT080A000	3/12/02	400
103114837	8220062	HDT080A000	HDT080A000	3/12/02	400
103114838	8220062	HDT080A000	HDT080A000	3/12/02	400
103114839	8220062	HDT080A000	HDT080A000	3/12/02	400
103114840	8220072	HDT080A000	HDT080A000	3/13/02	400
103114841	8220072	HDT080A000	HDT080A000	3/13/02	400
103114842	8220072	HDT080A000	HDT080A000	3/13/02	400
103114843	8220072	HDT080A000	HDT080A000	3/13/02	400
103114844	8220072	HDT080A000	HDT080A000	3/13/02	400
103114845	8220072	HDT080A000	HDT080A000	3/13/02	400
103114846	8220072	HDT080A000	HDT080A000	3/13/02	400
103114848	8220072	HDT080A000	HDT080A000	3/13/02	400
103114849	8220072	HDT080A000	HDT080A000	3/13/02	400
103114850	8220072	HDT080A000	HDT080A000	3/13/02	400
103114851	8220072	HDT080A000	HDT080A000	3/13/02	400
103114852	8220072	HDT080A000	HDT080A000	3/13/02	400
103114853	8220072	HDT080A000	HDT080A000	3/14/02	400
103114854	8220072	HDT080A000	HDT080A000	3/14/02	400
103114855	8220072	HDT080A000	HDT080A000	3/14/02	400
103114856	8220072	HDT080A000	HDT080A000	3/14/02	400
103114857	8220072	HDT080A000	HDT080A000	3/14/02	400
103114858	8220072	HDT080A000	HDT080A000	3/14/02	400
103114859	8220072	HDT080A000	HDT080A000	3/14/02	400
103114860	8220072	HDT080A000	HDT080A000	3/14/02	400
103114861	8220072	HDT080A000	HDT080A000	3/14/02	400
103114862	8220076	HDT080A000	HDT080A000	3/14/02	400
103114863	8220076	HDT080A000	HDT080A000	3/14/02	400
103114864	8220076	HDT080A000	HDT080A000	3/14/02	400
103114865	8220076	HDT080A000	HDT080A000	3/14/02	400
103114866	8220076	HDT080A000	HDT080A000	3/15/02	400
103114867	8220076	HDT080A000	HDT080A000	3/15/02	400
103114868	8220076	HDT080A000	HDT080A000	3/15/02	400
103114869	8220076	HDT080A000	HDT080A000	3/15/02	400
103114870	8220076	HDT080A000	HDT080A000	3/15/02	400
103114871	8220076	HDT080A000	HDT080A000	3/15/02	400

37 ROLLS

000859

Order 6186
Customer Fluor Fernald, Inc.
Site Fluor Fernald, Inc.

Roll#	*Resin Lot*	*Product Code*	*Description*	*Mfg. Date*	*Length*
103114872	8220076	HDT080A000	HDT080A000	3/15/02	400
103114873	8220076	HDT080A000	HDT080A000	3/15/02	400
103114874	8220076	HDT080A000	HDT080A000	3/15/02	400
103114875	8220076	HDT080A000	HDT080A000	3/15/02	400
103114876	8220076	HDT080A000	HDT080A000	3/15/02	400
103114877	8220076	HDT080A000	HDT080A000	3/15/02	400
103114878	8220076	HDT080A000	HDT080A000	3/15/02	400
103114879	8220076	HDT080A000	HDT080A000	3/15/02	400
103114880	8220076	HDT080A000	HDT080A000	3/16/02	400
103114881	8220076	HDT080A000	HDT080A000	3/16/02	400
103114882	8220082	HDT080A000	HDT080A000	3/16/02	400
103114883	8220082	HDT080A000	HDT080A000	3/16/02	400
103114884	8220082	HDT080A000	HDT080A000	3/16/02	400
103114885	8220082	HDT080A000	HDT080A000	3/16/02	400
103114886	8220082	HDT080A000	HDT080A000	3/16/02	400
103114887	8220082	HDT080A000	HDT080A000	3/16/02	400
103114888	8220082	HDT080A000	HDT080A000	3/16/02	400
103114889	8220082	HDT080A000	HDT080A000	3/16/02	400
103114890	8220082	HDT080A000	HDT080A000	3/16/02	400
103114891	8220082	HDT080A000	HDT080A000	3/16/02	400
103114892	8220082	HDT080A000	HDT080A000	3/17/02	400
103114893	8220082	HDT080A000	HDT080A000	3/17/02	400
103114894	8220082	HDT080A000	HDT080A000	3/17/02	400
103114895	8220082	HDT080A000	HDT080A000	3/17/02	400
103114896	8220082	HDT080A000	HDT080A000	3/17/02	400
103114897	8220082	HDT080A000	HDT080A000	3/17/02	400
103114898	8220082	HDT080A000	HDT080A000	3/17/02	400
103114899	8220082	HDT080A000	HDT080A000	3/17/02	400
103114900	8220082	HDT080A000	HDT080A000	3/17/02	400
103114901	8220074	HDT080A000	HDT080A000	3/17/02	400
103114902	8220074	HDT080A000	HDT080A000	3/17/02	400
103114903	8220074	HDT080A000	HDT080A000	3/17/02	400
103114904	8220074	HDT080A000	HDT080A000	3/17/02	400
103114905	8220074	HDT080A000	HDT080A000	3/17/02	400
103114906	8220074	HDT080A000	HDT080A000	3/17/02	400
103114907	8220074	HDT080A000	HDT080A000	3/18/02	400
103114908	8220074	HDT080A000	HDT080A000	3/18/02	400
103114909	8220074	HDT080A000	HDT080A000	3/18/02	400

37 ROLLS

000860

Order 6186

Customer Fluor Fernald, Inc.

Site Fluor Fernald, Inc.

4941

Roll#	*Resin Lot*	*Product Code*	*Description*	*Mfg. Date*	*Length*
103114910	8220074	HDT080A000	HDT080A000	3/18/02	400
103114911	8220074	HDT080A000	HDT080A000	3/18/02	400
103114912	8220074	HDT080A000	HDT080A000	3/18/02	400
103114913	8220074	HDT080A000	HDT080A000	3/18/02	400
~~103114914~~	~~8220074~~	~~HDT080A000~~	~~HDT080A000~~	~~3/18/02~~	~~400~~
~~103114915~~	~~8220074~~	~~HDT080A000~~	~~HDT080A000~~	~~3/18/02~~	~~400~~
~~103114916~~	~~8220074~~	~~HDT080A000~~	~~HDT080A000~~	~~3/18/02~~	~~400~~
~~103114917~~	~~8220074~~	~~HDT080A000~~	~~HDT080A000~~	~~3/18/02~~	~~400~~
~~103114918~~	~~8220074~~	~~HDT080A000~~	~~HDT080A000~~	~~3/18/02~~	~~400~~

9 ROLLS

35
37
37
37
37
9

~~195~~ 192 ROLLS x 9000 S.F. = 1,728,000 SF

000861

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114197

ROLL IDENTIFICATION

Roll Number	103114197
Product Name	HDT080A000
Production Date	1/22/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	3,887	pounds
	1,763	kilograms

RESIN INFORMATION

Lot Number	7111749
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	77	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	219	(383)
- MD		every roll	168	(294)	223	(391)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	222	(389)
- MD		every roll	120	(210)	268	(468)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		479	
- MD	(51 mm)	every roll	100		557	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	191	(850)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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000862

APPROVED L.T. 1/23/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114198

ROLL IDENTIFICATION

Roll Number	103114198
Product Name	HDT080A000
Production Date	1/22/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	3,879	pounds
	1,760	kilograms

RESIN INFORMATION

Lot Number	7111749
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	77	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	221	(387)
- MD		every roll	168	(294)	226	(395)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	246	(430)
- MD		every roll	120	(210)	225	(394)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		551	
- MD	(51 mm)	every roll	100		478	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	87	(387)
- MD		every roll	56	(249)	81	(362)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	186	(828)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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000863

APPROVED L.T. 1/23/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114199

ROLL IDENTIFICATION

Roll Number	103114199
Product Name	HDT080A000
Production Date	1/23/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,915 1,776	pounds kilograms

RESIN INFORMATION

Lot Number	7111749
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	77	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	229	(400)
- MD		every roll	168	(294)	226	(395)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	259	(454)
- MD		every roll	120	(210)	257	(449)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		554	
- MD	(51 mm)	every roll	100		490	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- MD		every roll	56	(249)	85	(378)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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000864

APPROVED L.T. 1/23/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114200

ROLL IDENTIFICATION

Roll Number	103114200
Product Name	HDT080A000
Production Date	1/23/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,916 1,776	pounds kilograms

RESIN INFORMATION

Lot Number	7111749
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	221	(387)
- MD		every roll	168	(294)	225	(394)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	230	(403)
- MD		every roll	120	(210)	245	(428)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		456	
- MD	(51 mm)	every roll	100		460	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	191	(850)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		22	

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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000865

APPROVED J.Y. 1/23/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114201

ROLL IDENTIFICATION

Roll Number	103114201
Product Name	HDT080A000
Production Date	1/23/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,910 1,774	pounds kilograms

RESIN INFORMATION

Lot Number	7111749
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	77	(1.9)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	219	(384)
- MD		every roll	168	(294)	215	(376)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	241	(423)
- MD		every roll	120	(210)	233	(408)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		525	
- MD	(51 mm)	every roll	100		485	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- MD		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	188	(837)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		22	

000866

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED J.Y. 1/23/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

49411

Roll No. 103114202

ROLL IDENTIFICATION

Roll Number	103114202
Product Name	HDT080A000
Production Date	1/23/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,937 1,786	pounds kilograms

RESIN INFORMATION

Lot Number	7111749
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	77	(1.9)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	228	(399)
- MD		every roll	168	(294)	225	(394)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	249	(437)
- MD		every roll	120	(210)	263	(460)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		513	
- MD	(51 mm)	every roll	100		508	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- MD		every roll	56	(249)	74	(329)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	191	(850)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	133	(592)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		16	

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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000867

APPROVED L.T. 1/23/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114203

ROLL IDENTIFICATION

Roll Number	103114203
Product Name	HDT080A000
Production Date	1/23/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,833 1,739	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	220	(386)
- MD		every roll	168	(294)	222	(389)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	243	(425)
- MD		every roll	120	(210)	261	(457)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		513	
- MD	(51 mm)	every roll	100		535	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	187	(832)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	133	(592)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		16	

000868

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114204

ROLL IDENTIFICATION

Roll Number	103114204
Product Name	HDT080A000
Production Date	1/23/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,950 1,792	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	77	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	230	(402)
- MD		every roll	168	(294)	221	(387)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	260	(455)
- MD		every roll	120	(210)	247	(433)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		556	
- MD	(51 mm)	every roll	100		527	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	190	(845)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	133	(592)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		25	

000869

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/23/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114205

ROLL IDENTIFICATION

Roll Number	103114205
Product Name	HDT080A000
Production Date	1/23/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,949 1,791	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	220	(386)
- MD		every roll	168	(294)	209	(366)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	214	(375)
- MD		every roll	120	(210)	255	(447)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		431	
- MD	(51 mm)	every roll	100		526	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	189	(841)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	133	(592)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		25	

000870

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified.

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APPROVED L.T. 1/23/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114206

ROLL IDENTIFICATION

Roll Number	103114206
Product Name	HDT080A000
Production Date	1/23/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,952 1,793	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	224	(392)
- MD		every roll	168	(294)	217	(380)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	238	(416)
- MD		every roll	120	(210)	252	(441)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		493	
- MD	(51 mm)	every roll	100		500	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- MD		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	190	(845)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	132	(587)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000871

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/23/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 4941 103114207

ROLL IDENTIFICATION

Roll Number	103114207
Product Name	HDT080A000
Production Date	1/23/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	3,898	pounds
	1,768	kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	219	(384)
- MD		every roll	168	(294)	219	(383)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	216	(377)
- MD		every roll	120	(210)	241	(422)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		376	
- MD	(51 mm)	every roll	100		478	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	187	(832)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	132	(587)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000872

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/23/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114208

ROLL IDENTIFICATION

Roll Number	103114208
Product Name	HDT080A000
Production Date	1/23/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,842 1,743	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	214	(375)
- MD		every roll	168	(294)	215	(376)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	170	(298)
- MD		every roll	120	(210)	169	(295)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		513	
- MD	(51 mm)	every roll	100		470	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(532)	181	(805)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	132	(587)
Density, g/cc	ASTM D 1505	every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*	every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A1	
Carbon Black Dispersion Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		21	

000873

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/23/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114209

ROLL IDENTIFICATION

Roll Number	103114209
Product Name	HDT080A000
Production Date	1/23/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	3,850	pounds
	1,746	kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	214	(374)
- MD		every roll	168	(294)	226	(396)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	170	(298)
- MD		every roll	120	(210)	185	(324)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		491	
- MD	(51 mm)	every roll	100		512	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- MD		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	185	(823)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	132	(587)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

000874

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/23/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114210

ROLL IDENTIFICATION

Roll Number	103114210
Product Name	HDT080A000
Production Date	1/23/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,876 1,758	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	215	(376)
- MD		every roll	168	(294)	204	(356)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	170	(298)
- MD		every roll	120	(210)	185	(323)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		479	
- MD	(51 mm)	every roll	100		548	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	186	(828)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	135	(601)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

000875

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED LT. 1/24/02 QA

1591

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114213

ROLL IDENTIFICATION

Roll Number	103114213
Product Name	HDT080A000
Production Date	1/24/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,000 1,814	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	215	(377)
- MD		every roll	168	(294)	217	(379)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	174	(304)
- MD		every roll	120	(210)	184	(323)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		520	
- MD	(51 mm)	every roll	100		525	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	189	(841)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	135	(601)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

000876

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/24/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114214

ROLL IDENTIFICATION

Roll Number	103114214
Product Name	HDT080A000
Production Date	1/24/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,928 1,782	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	77	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	203	(356)
- MD		every roll	168	(294)	202	(353)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	153	(269)
- MD		every roll	120	(210)	179	(314)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		476	
- MD	(51 mm)	every roll	100		549	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	178	(792)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	131	(583)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

000877

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/24/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

1941

Roll No. 103114215

ROLL IDENTIFICATION

Roll Number	103114215
Product Name	HDT080A000
Production Date	1/24/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,900 1,769	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	215	(377)
- MD		every roll	168	(294)	220	(386)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	175	(307)
- MD		every roll	120	(210)	193	(338)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		528	
- MD	(51 mm)	every roll	100		568	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	185	(823)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	131	(583)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

000878

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/24/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114216

ROLL IDENTIFICATION

Roll Number	103114216
Product Name	HDT080A000
Production Date	1/24/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,883 1,761	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	76	(1.9)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	218	(382)
- MD		every roll	168	(294)	218	(381)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	172	(300)
- MD		every roll	120	(210)	177	(310)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		515	
- MD	(51 mm)	every roll	100		500	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- MD		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	184	(819)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	131	(583)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

000879

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED D.S. 1/24/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114218

ROLL IDENTIFICATION

Roll Number	103114218
Product Name	HDT080A000
Production Date	1/24/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,845 1,744	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	81	(2.1)
Minimum		every roll	76	(1.9)	81	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	222	(389)
- MD		every roll	168	(294)	216	(377)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	219	(383)
- MD		every roll	120	(210)	256	(448)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		419	
- MD	(51 mm)	every roll	100		512	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	74	(329)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	188	(837)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	131	(583)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

000880

Order No.	6186
Customer Name	Fluor Femald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/24/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114219

ROLL IDENTIFICATION

Roll Number	103114219
Product Name	HDT080A000
Production Date	1/24/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	3,878	pounds
	1,759	kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	215	(377)
- MD		every roll	168	(294)	224	(392)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	218	(381)
- MD		every roll	120	(210)	233	(408)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		440	
- MD	(51 mm)	every roll	100		486	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	190	(845)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	131	(583)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

000881

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/24/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114220

ROLL IDENTIFICATION

Roll Number	103114220
Product Name	HDT080A000
Production Date	1/24/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,876 1,758	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	81	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	213	(373)
- MD		every roll	168	(294)	212	(371)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	249	(436)
- MD		every roll	120	(210)	253	(443)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		515	
- MD	(51 mm)	every roll	100		505	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- MD		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	186	(828)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	131	(583)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		16	

000882

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/24/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114222

ROLL IDENTIFICATION

Roll Number	103114222
Product Name	HDT080A000
Production Date	1/24/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,856 1,749	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	206	(361)
- MD		every roll	168	(294)	204	(358)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	225	(395)
- MD		every roll	120	(210)	243	(425)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		488	
- MD	(51 mm)	every roll	100		536	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	184	(819)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	131	(583)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		24	

000883

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/24/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114223

ROLL IDENTIFICATION

Roll Number	103114223
Product Name	HDT080A000
Production Date	1/24/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	3,904	pounds
	1,771	kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	204	(357)
- MD		every roll	168	(294)	212	(372)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	226	(396)
- MD		every roll	120	(210)	223	(390)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		505	
- MD	(51 mm)	every roll	100		461	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	73	(325)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	186	(828)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	131	(583)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		24	

000884

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/24/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114224

ROLL IDENTIFICATION

Roll Number	103114224
Product Name	HDT080A000
Production Date	1/24/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,896 1,767	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	207	(362)
- MD		every roll	168	(294)	221	(387)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	237	(415)
- MD		every roll	120	(210)	229	(402)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		513	
- MD	(51 mm)	every roll	100		455	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	191	(850)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	131	(583)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		22	

000885

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/24/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

- - 4941

Roll No. 103114225

ROLL IDENTIFICATION

Roll Number	103114225
Product Name	HDT080A000
Production Date	1/24/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	3,874	pounds
	1,757	kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	211	(368)
- MD		every roll	168	(294)	204	(358)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	171	(300)
- MD		every roll	120	(210)	232	(406)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		431	
- MD	(51 mm)	every roll	100		451	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- MD		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	185	(823)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	131	(583)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		22	

000886

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/25/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114226

ROLL IDENTIFICATION

Roll Number	103114226
Product Name	HDT080A000
Production Date	1/24/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,880 1,760	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	199	(349)
- MD		every roll	168	(294)	205	(359)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	231	(405)
- MD		every roll	120	(210)	251	(439)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		497	
- MD	(51 mm)	every roll	100		527	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	74	(329)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	183	(814)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	131	(583)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

000887

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114227

ROLL IDENTIFICATION

Roll Number	103114227
Product Name	HDT080A000
Production Date	1/24/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,850 1,746	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	210	(368)
- MD		every roll	168	(294)	215	(376)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	216	(379)
- MD		every roll	120	(210)	246	(430)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		481	
- MD	(51 mm)	every roll	100		522	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	75	(334)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	188	(837)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	131	(583)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

000888

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/25/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114228

ROLL IDENTIFICATION

Roll Number	103114228
Product Name	HDT080A000
Production Date	1/25/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,870 1,755	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	222	(389)
- MD		every roll	168	(294)	209	(366)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	204	(358)
- MD		every roll	120	(210)	261	(457)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		19	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		438	
- MD	(51 mm)	every roll	100		522	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	87	(387)
- MD		every roll	56	(249)	84	(374)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	187	(832)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	131	(583)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000889

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/25/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

1941

Roll No. 103114229

ROLL IDENTIFICATION

Roll Number	103114229
Product Name	HDT080A000
Production Date	1/25/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,896 1,767	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	206	(361)
- MD		every roll	168	(294)	202	(353)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	230	(402)
- MD		every roll	120	(210)	239	(418)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		468	
- MD	(51 mm)	every roll	100		511	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	85	(378)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	186	(828)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	131	(583)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000890

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/25/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114230

ROLL IDENTIFICATION

Roll Number	103114230
Product Name	HDT080A000
Production Date	1/25/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,890 1,765	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	206	(360)
- MD		every roll	168	(294)	212	(371)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	225	(393)
- MD		every roll	120	(210)	245	(428)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		486	
- MD	(51 mm)	every roll	100		513	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- MD		every roll	56	(249)	75	(334)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	186	(828)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.1	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		22	

000891

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/25/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114231

ROLL IDENTIFICATION

Roll Number	103114231
Product Name	HDT080A000
Production Date	1/25/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,898 1,768	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	209	(365)
- MD		every roll	168	(294)	203	(355)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	158	(277)
- MD		every roll	120	(210)	160	(279)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		366	
- MD	(51 mm)	every roll	100		469	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	173	(770)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.1	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		22	

000892

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/25/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114232

ROLL IDENTIFICATION

Roll Number	103114232
Product Name	HDT080A000
Production Date	1/25/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,857 1,750	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	201	(352)
- MD		every roll	168	(294)	211	(368)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	164	(286)
- MD		every roll	120	(210)	171	(298)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		535	
- MD	(51 mm)	every roll	100		463	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	75	(334)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	186	(828)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.1	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		26	

000893

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/25/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114233

ROLL IDENTIFICATION

Roll Number	103114233
Product Name	HDT080A000
Production Date	1/25/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,814 1,730	pounds kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	217	(380)
- MD		every roll	168	(294)	216	(377)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	210	(368)
- MD		every roll	120	(210)	222	(388)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		351	
- MD	(51 mm)	every roll	100		382	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	84	(374)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.1	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		26	

000894

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

GSE-4.10-007 Rev - - 07/00

APPROVED L.T. 1/25/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114234

ROLL IDENTIFICATION

Roll Number	103114234
Product Name	HDT080A000
Production Date	1/25/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	3,896	pounds
	1,767	kilograms

RESIN INFORMATION

Lot Number	7111748
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	221	(386)
- MD		every roll	168	(294)	218	(382)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	232	(407)
- MD		every roll	120	(210)	243	(426)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		471	
- MD	(51 mm)	every roll	100		503	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	87	(387)
- MD		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	193	(859)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		29	

000895

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/25/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114235

ROLL IDENTIFICATION

Roll Number	103114235
Product Name	HDT080A000
Production Date	1/25/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,912 1,774	pounds kilograms

RESIN INFORMATION

Lot Number	7111752
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	81	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	200	(350)
- MD		every roll	168	(294)	209	(365)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	213	(373)
- MD		every roll	120	(210)	242	(424)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		435	
- MD	(51 mm)	every roll	100		522	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	155	(690)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		29	

896

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 1/25/02 QA

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4941

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114236

ROLL IDENTIFICATION

Roll Number	103114236
Product Name	HDT080A000
Production Date	1/25/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,880 1,760	pounds kilograms

RESIN INFORMATION

Lot Number	7111752
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	220	(385)
- MD		every roll	168	(294)	219	(383)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	233	(408)
- MD		every roll	120	(210)	235	(412)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		472	
- MD	(51 mm)	every roll	100		512	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- MD		every roll	56	(249)	85	(378)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(532)	191	(850)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505	every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*	every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A1	
Carbon Black Dispersion Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		23	

000897

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/25/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114237

ROLL IDENTIFICATION

Roll Number	103114237
Product Name	HDT080A000
Production Date	1/25/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,853 1,748	pounds kilograms

RESIN INFORMATION

Lot Number	7111752
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	81	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	223	(391)
- MD		every roll	168	(294)	226	(396)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	158	(276)
- MD		every roll	120	(210)	175	(306)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		272	
- MD	(51 mm)	every roll	100		443	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	86	(383)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	189	(841)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		23	

000898

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/25/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114238

ROLL IDENTIFICATION

Roll Number	103114238
Product Name	HDT080A000
Production Date	1/25/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,852 1,747	pounds kilograms

RESIN INFORMATION

Lot Number	7111752
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	223	(391)
- MD		every roll	168	(294)	220	(384)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	159	(279)
- MD		every roll	120	(210)	171	(299)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		419	
- MD	(51 mm)	every roll	100		441	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- MD		every roll	56	(249)	85	(378)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	191	(850)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		22	

000899

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/25/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114239

ROLL IDENTIFICATION

Roll Number	103114239
Product Name	HDT080A000
Production Date	1/25/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,880 1,760	pounds kilograms

RESIN INFORMATION

Lot Number	7111752
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	81	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	221	(387)
- MD		every roll	168	(294)	216	(379)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	162	(284)
- MD		every roll	120	(210)	197	(344)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		416	
- MD	(51 mm)	every roll	100		580	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- MD		every roll	56	(249)	87	(387)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		22	

000900

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/25/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114240

ROLL IDENTIFICATION

Roll Number	103114240
Product Name	HDT080A000
Production Date	1/25/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,972 1,802	pounds kilograms

RESIN INFORMATION

Lot Number	7111752
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	223	(389)
- MD		every roll	168	(294)	227	(397)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	239	(419)
- MD		every roll	120	(210)	256	(448)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		487	
- MD	(51 mm)	every roll	100		441	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	87	(387)
- MD		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(532)	191	(850)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505	every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*	every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A1	
Carbon Black Dispersion Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		20	

000901

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/26/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114241

ROLL IDENTIFICATION

Roll Number	103114241
Product Name	HDT080A000
Production Date	1/25/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,942 1,788	pounds kilograms

RESIN INFORMATION

Lot Number	7111752
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	226	(396)
- MD		every roll	168	(294)	212	(371)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	206	(361)
- MD		every roll	120	(210)	229	(400)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		373	
- MD	(51 mm)	every roll	100		441	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	88	(392)
- MD		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(532)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505	every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*	every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A1	
Carbon Black Dispersion Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		20	

000902

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/26/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114242

ROLL IDENTIFICATION

Roll Number	103114242
Product Name	HDT080A000
Production Date	1/26/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	3,939	pounds
	1,787	kilograms

RESIN INFORMATION

Lot Number	7111752
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	227	(397)
- MD		every roll	168	(294)	221	(387)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	225	(393)
- MD		every roll	120	(210)	248	(435)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		463	
- MD	(51 mm)	every roll	100		441	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- MD		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	188	(837)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		18	

000903

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/26/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114243

ROLL IDENTIFICATION

Roll Number	103114243
Product Name	HDT080A000
Production Date	1/26/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,928 1,782	pounds kilograms

RESIN INFORMATION

Lot Number	7111752
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	217	(380)
- MD		every roll	168	(294)	221	(387)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	213	(373)
- MD		every roll	120	(210)	242	(423)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		435	
- MD	(51 mm)	every roll	100		486	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	87	(387)
- MD		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		18	

000904

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/26/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114246

ROLL IDENTIFICATION

Roll Number	103114246
Product Name	HDT080A000
Production Date	1/26/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,963 1,798	pounds kilograms

RESIN INFORMATION

Lot Number	7111752
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	225	(393)
- MD		every roll	168	(294)	224	(392)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	250	(437)
- MD		every roll	120	(210)	258	(452)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		517	
- MD	(51 mm)	every roll	100		518	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- MD		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	198	(881)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

000905

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/26/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114272

ROLL IDENTIFICATION

Roll Number	103114272
Product Name	HDT080A000
Production Date	1/28/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,918 1,777	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	222	(389)
- MD		every roll	168	(294)	228	(400)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	216	(379)
- MD		every roll	120	(210)	264	(463)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		469	
- MD	(51 mm)	every roll	100		542	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	194	(863)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	151	(672)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000906

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/28/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114273

ROLL IDENTIFICATION

Roll Number	103114273
Product Name	HDT080A000
Production Date	1/28/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,900 1,769	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	77	(1.9)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	222	(389)
- MD		every roll	168	(294)	224	(391)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	241	(422)
- MD		every roll	120	(210)	273	(478)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		505	
- MD	(51 mm)	every roll	100		571	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- MD		every roll	56	(249)	84	(374)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	151	(672)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

000907

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED LT. 1/28/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114274

ROLL IDENTIFICATION

Roll Number	103114274
Product Name	HDT080A000
Production Date	1/28/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,906 1,772	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	77	(1.9)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	217	(380)
- MD		every roll	168	(294)	216	(379)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	220	(385)
- MD		every roll	120	(210)	245	(429)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		417	
- MD	(51 mm)	every roll	100		511	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- MD		every roll	56	(249)	85	(378)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	189	(841)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	135	(601)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

000908

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 1/28/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114275

ROLL IDENTIFICATION

Roll Number	103114275
Product Name	HDT080A000
Production Date	1/28/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,918 1,777	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	77	(1.9)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	224	(391)
- MD		every roll	168	(294)	228	(400)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	231	(404)
- MD		every roll	120	(210)	228	(399)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		501	
- MD	(51 mm)	every roll	100		453	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	87	(387)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	188	(837)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	135	(601)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		17	

000909

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 1/28/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114276

ROLL IDENTIFICATION

Roll Number	103114276
Product Name	HDT080A000
Production Date	1/28/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	3,926	pounds
	1,781	kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	224	(393)
- MD		every roll	168	(294)	217	(379)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	237	(415)
- MD		every roll	120	(210)	243	(426)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		445	
- MD	(51 mm)	every roll	100		538	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	193	(859)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	135	(601)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		17	

000910

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114277

ROLL IDENTIFICATION

Roll Number	103114277
Product Name	HDT080A000
Production Date	1/28/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,920 1,778	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	231	(404)
- MD		every roll	168	(294)	221	(387)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	243	(425)
- MD		every roll	120	(210)	268	(468)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		485	
- MD	(51 mm)	every roll	100		519	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- MD		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	186	(828)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	135	(601)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		18	

000911

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/28/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114278

ROLL IDENTIFICATION

Roll Number	103114278
Product Name	HDT080A000
Production Date	1/28/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,917 1,777	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	215	(376)
- MD		every roll	168	(294)	218	(381)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	244	(428)
- MD		every roll	120	(210)	237	(414)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		531	
- MD	(51 mm)	every roll	100		478	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	184	(819)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		18	

000912

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 1/28/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114279

ROLL IDENTIFICATION

Roll Number	103114279
Product Name	HDT080A000
Production Date	1/28/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	3,888	pounds
	1,764	kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	226	(395)
- MD		every roll	168	(294)	222	(388)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	263	(460)
- MD		every roll	120	(210)	265	(465)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		19	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		554	
- MD	(51 mm)	every roll	100		524	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	84	(374)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	190	(845)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		14	

000913

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/28/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114280

ROLL IDENTIFICATION

Roll Number	103114280
Product Name	HDT080A000
Production Date	1/28/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	3,899	pounds
	1,769	kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	219	(384)
- MD		every roll	168	(294)	220	(385)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	245	(429)
- MD		every roll	120	(210)	229	(400)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		516	
- MD	(51 mm)	every roll	100		492	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	190	(845)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		14	

000914

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 1/28/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114281

ROLL IDENTIFICATION

Roll Number	103114281
Product Name	HDT080A000
Production Date	1/28/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,909 1,773	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	232	(405)
- MD		every roll	168	(294)	237	(415)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	296	(518)
- MD		every roll	120	(210)	231	(404)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		588	
- MD	(51 mm)	every roll	100		513	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- MD		every roll	56	(249)	84	(374)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	191	(850)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		16	

000915

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/29/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

--4941

Roll No. 103114282

ROLL IDENTIFICATION

Roll Number	103114282
Product Name	HDT080A000
Production Date	1/28/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,927 1,781	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	227	(397)
- MD		every roll	168	(294)	225	(393)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	232	(407)
- MD		every roll	120	(210)	268	(468)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		454	
- MD	(51 mm)	every roll	100		573	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	87	(387)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	187	(832)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		16	

000916

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 1/29/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114283 4941

ROLL IDENTIFICATION

Roll Number	103114283
Product Name	HDT080A000
Production Date	1/28/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,920 1,778	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	224	(393)
- MD		every roll	168	(294)	217	(379)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	204	(357)
- MD		every roll	120	(210)	243	(425)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		422	
- MD	(51 mm)	every roll	100		487	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	87	(387)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	188	(837)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000917

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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4941

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114284

ROLL IDENTIFICATION

Roll Number	103114284
Product Name	HDT080A000
Production Date	1/28/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,911 1,774	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	226	(395)
- MD		every roll	168	(294)	215	(377)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	225	(393)
- MD		every roll	120	(210)	250	(438)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		434	
- MD	(51 mm)	every roll	100		505	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	187	(832)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000918

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 1/29/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114285

ROLL IDENTIFICATION

Roll Number	103114285
Product Name	HDT080A000
Production Date	1/29/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,910 1,774	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	219	(384)
- MD		every roll	168	(294)	216	(377)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	202	(353)
- MD		every roll	120	(210)	249	(437)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		350	
- MD	(51 mm)	every roll	100		495	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	190	(845)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

000919

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/29/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114286

ROLL IDENTIFICATION

Roll Number	103114286
Product Name	HDT080A000
Production Date	1/29/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,903 1,770	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	216	(378)
- MD		every roll	168	(294)	210	(368)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	203	(356)
- MD		every roll	120	(210)	224	(392)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		428	
- MD	(51 mm)	every roll	100		444	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	186	(828)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	132	(587)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

000920

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 1/29/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114287

ROLL IDENTIFICATION

Roll Number	103114287
Product Name	HDT080A000
Production Date	1/29/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,885 1,762	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	77	(1.9)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	216	(377)
- MD		every roll	168	(294)	208	(364)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	227	(398)
- MD		every roll	120	(210)	249	(436)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		468	
- MD	(51 mm)	every roll	100		530	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	185	(823)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	132	(587)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000921

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/29/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114288

ROLL IDENTIFICATION

Roll Number	103114288
Product Name	HDT080A000
Production Date	1/29/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,894 1,766	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	76	(1.9)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	217	(380)
- MD		every roll	168	(294)	213	(372)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	210	(367)
- MD		every roll	120	(210)	237	(415)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		405	
- MD	(51 mm)	every roll	100		490	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	185	(823)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	132	(587)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000922

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/29/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114289

ROLL IDENTIFICATION

Roll Number	103114289
Product Name	HDT080A000
Production Date	1/29/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,907 1,772	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	77	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	223	(390)
- MD		every roll	168	(294)	217	(379)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	242	(424)
- MD		every roll	120	(210)	264	(462)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		513	
- MD	(51 mm)	every roll	100		533	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	85	(378)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	180	(801)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	132	(587)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000923

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/29/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114290

ROLL IDENTIFICATION

Roll Number	103114290
Product Name	HDT080A000
Production Date	1/29/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,946 1,790	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	219	(384)
- MD		every roll	168	(294)	213	(372)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	241	(422)
- MD		every roll	120	(210)	259	(453)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		524	
- MD	(51 mm)	every roll	100		545	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	87	(387)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	184	(819)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000924

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 1/29/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114291

ROLL IDENTIFICATION

Roll Number	103114291
Product Name	HDT080A000
Production Date	1/29/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,920 1,778	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	216	(378)
- MD		every roll	168	(294)	212	(370)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	214	(375)
- MD		every roll	120	(210)	260	(456)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		393	
- MD	(51 mm)	every roll	100		537	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000925

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/29/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114292

ROLL IDENTIFICATION

Roll Number	103114292
Product Name	HDT080A000
Production Date	1/29/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	3,863	pounds
	1,752	kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	211	(370)
- MD		every roll	168	(294)	209	(366)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	241	(422)
- MD		every roll	120	(210)	220	(385)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		534	
- MD	(51 mm)	every roll	100		457	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- MD		every roll	56	(249)	75	(334)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	181	(805)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000926

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 1/29/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 4941 103114293

ROLL IDENTIFICATION

Roll Number	103114293
Product Name	HDT080A000
Production Date	1/29/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,851 1,747	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	217	(379)
- MD		every roll	168	(294)	217	(380)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	196	(343)
- MD		every roll	120	(210)	232	(406)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		329	
- MD	(51 mm)	every roll	100		426	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	190	(845)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

000927

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/29/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114294

ROLL IDENTIFICATION

Roll Number	103114294
Product Name	HDT080A000
Production Date	1/29/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,863 1,752	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	216	(378)
- MD		every roll	168	(294)	220	(385)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	215	(376)
- MD		every roll	120	(210)	252	(441)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		489	
- MD	(51 mm)	every roll	100		496	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	186	(828)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	130	(579)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

000928

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/29/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114295

ROLL IDENTIFICATION

Roll Number	103114295
Product Name	HDT080A000
Production Date	1/29/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,880 1,760	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	220	(385)
- MD		every roll	168	(294)	218	(381)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	225	(393)
- MD		every roll	120	(210)	232	(406)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		397	
- MD	(51 mm)	every roll	100		495	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	188	(837)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	130	(579)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		14	

000929

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/29/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114296

ROLL IDENTIFICATION

Roll Number	103114296
Product Name	HDT080A000
Production Date	1/29/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,872 1,756	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	222	(389)
- MD		every roll	168	(294)	225	(394)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	174	(305)
- MD		every roll	120	(210)	260	(456)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		332	
- MD	(51 mm)	every roll	100		529	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- MD		every roll	56	(249)	84	(374)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	130	(579)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		14	

000930

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 1/29/02 QA

GSE-4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114297

ROLL IDENTIFICATION

Roll Number	103114297
Product Name	HDT080A000
Production Date	1/29/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,874 1,757	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	226	(396)
- MD		every roll	168	(294)	222	(389)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	198	(346)
- MD		every roll	120	(210)	261	(457)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		379	
- MD	(51 mm)	every roll	100		515	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	181	(805)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	130	(579)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

000931

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/30/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114298

ROLL IDENTIFICATION

Roll Number	103114298
Product Name	HDT080A000
Production Date	1/29/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,876 1,758	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	216	(378)
- MD		every roll	168	(294)	211	(370)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	210	(368)
- MD		every roll	120	(210)	237	(414)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		461	
- MD	(51 mm)	every roll	100		431	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	188	(837)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

000932

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/30/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114299

ROLL IDENTIFICATION

Roll Number	103114299
Product Name	HDT080A000
Production Date	1/29/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,876 1,758	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	215	(375)
- MD		every roll	168	(294)	215	(375)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	210	(368)
- MD		every roll	120	(210)	246	(431)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		390	
- MD	(51 mm)	every roll	100		476	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	189	(841)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		17	

000933

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/30/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114300

ROLL IDENTIFICATION

Roll Number	103114300
Product Name	HDT080A000
Production Date	1/30/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	3,896	pounds
	1,767	kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	222	(389)
- MD		every roll	168	(294)	218	(382)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	236	(413)
- MD		every roll	120	(210)	261	(457)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		481	
- MD	(51 mm)	every roll	100		537	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	186	(828)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		17	

000934

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 1/30/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114301

ROLL IDENTIFICATION

Roll Number	103114301
Product Name	HDT080A000
Production Date	1/30/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,897 1,768	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	226	(395)
- MD		every roll	168	(294)	218	(381)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	211	(370)
- MD		every roll	120	(210)	259	(454)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		402	
- MD	(51 mm)	every roll	100		525	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	92	(409)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	193	(859)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

000935

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 1/30/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114302

ROLL IDENTIFICATION

Roll Number	103114302
Product Name	HDT080A000
Production Date	1/30/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,898 1,768	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	226	(395)
- MD		every roll	168	(294)	222	(389)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	236	(413)
- MD		every roll	120	(210)	254	(44[illegible]
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		489	
- MD	(51 mm)	every roll	100		503	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	193	(859)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	131	(583)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

000936

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 1/30/02

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114303

ROLL IDENTIFICATION

Roll Number	103114303
Product Name	HDT080A000
Production Date	1/30/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,898 1,768	pounds kilograms

RESIN INFORMATION

Lot Number	7120001
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	222	(389)
- MD		every roll	168	(294)	222	(389)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	216	(379)
- MD		every roll	120	(210)	268	(469)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		474	
- MD	(51 mm)	every roll	100		547	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	191	(850)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	131	(583)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		16	

000937

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 1/30/02

GSE-4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114371

ROLL IDENTIFICATION

Roll Number	103114371
Product Name	HDT080A000
Production Date	2/4/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,841 1,742	pounds kilograms

RESIN INFORMATION

Lot Number	7111751
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	217	(380)
- MD		every roll	168	(294)	220	(385)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	226	(395)
- MD		every roll	120	(210)	258	(452)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		477	
- MD	(51 mm)	every roll	100		516	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	196	(872)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	133	(592)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000938

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED K.A. 2/5/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114372

ROLL IDENTIFICATION

Roll Number	103114372
Product Name	HDT080A000
Production Date	2/4/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,901 1,769	pounds kilograms

RESIN INFORMATION

Lot Number	7111751
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	215	(377)
- MD		every roll	168	(294)	222	(388)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	209	(367)
- MD		every roll	120	(210)	240	(419)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		438	
- MD	(51 mm)	every roll	100		468	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- MD		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	189	(841)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	133	(592)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

000939

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED K.A. 2/5/02

GSE-4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114373

ROLL IDENTIFICATION

Roll Number	103114373
Product Name	HDT080A000
Production Date	2/4/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,912 1,774	pounds kilograms

RESIN INFORMATION

Lot Number	7111751
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	205	(359)
- MD		every roll	168	(294)	209	(365)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	205	(359)
- MD		every roll	120	(210)	216	(377)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		359	
- MD	(51 mm)	every roll	100		416	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	181	(805)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	133	(592)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

000940

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

GSE-4.10-007 Rev - - 07/00

APPROVED K.A. 2/5/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114374 4941

ROLL IDENTIFICATION

Roll Number	103114374
Product Name	HDT080A000
Production Date	2/4/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,910 1,774	pounds kilograms

RESIN INFORMATION

Lot Number	7111751
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	204	(357)
- MD		every roll	168	(294)	198	(346)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	222	(389)
- MD		every roll	120	(210)	247	(433)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		414	
- MD	(51 mm)	every roll	100		509	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- MD		every roll	56	(249)	75	(334)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	184	(819)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		18	

000941

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED K.A. 2/4/02

GSE-4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114375

ROLL IDENTIFICATION

Roll Number	103114375
Product Name	HDT080A000
Production Date	2/4/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,904 1,771	pounds kilograms

RESIN INFORMATION

Lot Number	7111751
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	223	(391)
- MD		every roll	168	(294)	216	(378)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	216	(378)
- MD		every roll	120	(210)	268	(470)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		418	
- MD	(51 mm)	every roll	100		521	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- MD		every roll	56	(249)	85	(378)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	189	(841)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		18	

000942

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

GSE-4.10-007 Rev - - 07/00

APPROVED K.A. 2/4/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114376

ROLL IDENTIFICATION

Roll Number	103114376
Product Name	HDT080A000
Production Date	2/4/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,888 1,764	pounds kilograms

RESIN INFORMATION

Lot Number	7111751
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	202	(353)
- MD		every roll	168	(294)	212	(371)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	196	(343)
- MD		every roll	120	(210)	228	(399)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		432	
- MD	(51 mm)	every roll	100		474	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	186	(828)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		24	

000943

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED K.A. 2/5/02

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114377

ROLL IDENTIFICATION

Roll Number	103114377
Product Name	HDT080A000
Production Date	2/4/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,876 1,758	pounds kilograms

RESIN INFORMATION

Lot Number	7111751
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	83	(2.1)
Minimum		every roll	76	(1.9)	81	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	203	(355)
- MD		every roll	168	(294)	200	(350)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	201	(351)
- MD		every roll	120	(210)	255	(447)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		395	
- MD	(51 mm)	every roll	100		538	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	76	(338)
- MD		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	189	(841)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		24	

000944

Order No.	6186
Customer Name	Fluor Femald, Inc.
Location	Harrison, OH

*Modified

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APPROVED K.A. 2/4/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114378

ROLL IDENTIFICATION

Roll Number	103114378
Product Name	HDT080A000
Production Date	2/4/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,870 1,755	pounds kilograms

RESIN INFORMATION

Lot Number	7111751
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	204	(358)
- MD		every roll	168	(294)	205	(358)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	210	(368)
- MD		every roll	120	(210)	231	(404)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		470	
- MD	(51 mm)	every roll	100		472	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	182	(810)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		27	

000945

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED K.A. 2/4/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114379

ROLL IDENTIFICATION

Roll Number	103114379
Product Name	HDT080A000
Production Date	2/4/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	3,860 1,751	pounds kilograms

RESIN INFORMATION

Lot Number	7111751
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	211	(370)
- MD		every roll	168	(294)	215	(377)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	155	(271)
- MD		every roll	120	(210)	168	(29[illegible]
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		380	
- MD	(51 mm)	every roll	100		445	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	189	(841)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		27	

000946

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED K.A. 2/5/02

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114380

ROLL IDENTIFICATION

Roll Number	103114380
Product Name	HDT080A000
Production Date	2/4/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	3,870	pounds
	1,755	kilograms

RESIN INFORMATION

Lot Number	7111751
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	82	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	219	(384)
- MD		every roll	168	(294)	206	(360)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	183	(320)
- MD		every roll	120	(210)	254	(445)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		332	
- MD	(51 mm)	every roll	100		563	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	89	(396)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		24	

000947

Order No.	6186
Customer Name	Fluor Femald, Inc.
Location	Harrison, OH

*Modified

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APPROVED K.A. 2/5/02

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114811

ROLL IDENTIFICATION

Roll Number	103114811
Product Name	HDT080A000
Production Date	3/10/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,290 1,946	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	87	(2.2)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	222	(388)
- MD		every roll	168	(294)	219	(383)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	226	(395)
- MD		every roll	120	(210)	254	(445)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		457	
- MD	(51 mm)	every roll	100		536	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	74	(329)
- MD		every roll	56	(249)	74	(329)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	194	(863)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	130	(579)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		25	

000948

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/11/02

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114812

ROLL IDENTIFICATION

Roll Number	103114812
Product Name	HDT080A000
Production Date	3/10/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,243 1,925	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	81	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	223	(390)
- MD		every roll	168	(294)	216	(377)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	219	(383)
- MD		every roll	120	(210)	243	(425)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		19	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		434	
- MD	(51 mm)	every roll	100		499	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- MD		every roll	56	(249)	75	(334)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	193	(859)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	130	(579)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		25	

000949

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/11/02 QA

4941

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114813

ROLL IDENTIFICATION

Roll Number	103114813
Product Name	HDT080A000
Production Date	3/11/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,244 1,925	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	223	(390)
- MD		every roll	168	(294)	223	(390)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	242	(424)
- MD		every roll	120	(210)	261	(457)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		19	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		519	
- MD	(51 mm)	every roll	100		540	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.941	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		23	

000950

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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3/11/02
QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114814

ROLL IDENTIFICATION

Roll Number	103114814
Product Name	HDT080A000
Production Date	3/11/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,231 1,919	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	85	(2.2)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	222	(389)
- MD		every roll	168	(294)	219	(384)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	171	(299)
- MD		every roll	120	(210)	176	(309)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		536	
- MD	(51 mm)	every roll	100		460	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	62	(276)
- MD		every roll	56	(249)	60	(267)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	145	(645)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.941	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		23	

000951

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114815

ROLL IDENTIFICATION

Roll Number	103114815
Product Name	HDT080A000
Production Date	3/11/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,212 1,911	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	217	(380)
- MD		every roll	168	(294)	216	(377)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	216	(379)
- MD		every roll	120	(210)	262	(458)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		19	
- MD	(33 mm)	every roll	12		19	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		450	
- MD	(51 mm)	every roll	100		542	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	193	(859)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.941	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		15	

000952

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114816

ROLL IDENTIFICATION

Roll Number	103114816
Product Name	HDT080A000
Production Date	3/11/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,221 1,915	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	218	(382)
- MD		every roll	168	(294)	211	(370)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	224	(393)
- MD		every roll	120	(210)	248	(435)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		19	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		479	
- MD	(51 mm)	every roll	100		511	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	88	(392)
- MD		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.941	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		15	

000953

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 4941 103114817

ROLL IDENTIFICATION

Roll Number	103114817
Product Name	HDT080A000
Production Date	3/11/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,232	pounds
	1,920	kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	224	(391)
- MD		every roll	168	(294)	226	(395)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	225	(394)
- MD		every roll	120	(210)	256	(447)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		481	
- MD	(51 mm)	every roll	100		520	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	87	(387)
- MD		every roll	56	(249)	87	(387)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	200	(890)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	143	(636)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		14	

000954

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114818

ROLL IDENTIFICATION

Roll Number	103114818
Product Name	HDT080A000
Production Date	3/11/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,229 1,918	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	220	(385)
- MD		every roll	168	(294)	232	(406)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	176	(308)
- MD		every roll	120	(210)	192	(336)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		525	
- MD	(51 mm)	every roll	100		547	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	143	(636)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		14	

000955

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114819

ROLL IDENTIFICATION

Roll Number	103114819
Product Name	HDT080A000
Production Date	3/11/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,230 1,919	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	90	(2.3)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	226	(395)
- MD		every roll	168	(294)	231	(404)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	219	(382)
- MD		every roll	120	(210)	262	(458)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		427	
- MD	(51 mm)	every roll	100		497	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	77	(343)
- MD		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	200	(890)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	143	(636)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000956

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/11/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114820

ROLL IDENTIFICATION

Roll Number	103114820
Product Name	HDT080A000
Production Date	3/11/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,223 1,916	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	87	(2.2)
Minimum		every roll	76	(1.9)	81	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	226	(396)
- MD		every roll	168	(294)	235	(411)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	240	(420)
- MD		every roll	120	(210)	259	(453)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		480	
- MD	(51 mm)	every roll	100		500	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- MD		every roll	56	(249)	84	(374)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	198	(881)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	143	(636)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000957

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/12/02

GSE-4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114821

ROLL IDENTIFICATION

Roll Number	103114821
Product Name	HDT080A000
Production Date	3/11/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,235 1,921	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	83	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	225	(395)
- MD		every roll	168	(294)	228	(400)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	183	(321)
- MD		every roll	120	(210)	209	(36[illegible])
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		519	
- MD	(51 mm)	every roll	100		591	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	72	(320)
- MD		every roll	56	(249)	72	(320)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	149	(663)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		27	

000958

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/11/02

GSE-4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114822

ROLL IDENTIFICATION

Roll Number	103114822
Product Name	HDT080A000
Production Date	3/11/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,273 1,938	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	81	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	238	(417)
- MD		every roll	168	(294)	230	(402)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	237	(415)
- MD		every roll	120	(210)	255	(446)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		457	
- MD	(51 mm)	every roll	100		506	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- MD		every roll	56	(249)	74	(329)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	193	(859)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		27	

000959

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/11/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114823

ROLL IDENTIFICATION

Roll Number	103114823
Product Name	HDT080A000
Production Date	3/11/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,267 1,936	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	81	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	238	(416)
- MD		every roll	168	(294)	226	(395)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	184	(323)
- MD		every roll	120	(210)	192	(336)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		19	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		522	
- MD	(51 mm)	every roll	100		484	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	188	(837)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		11	

000960

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114824

ROLL IDENTIFICATION

Roll Number	103114824
Product Name	HDT080A000
Production Date	3/11/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,187 1,899	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	81	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	228	(399)
- MD		every roll	168	(294)	228	(399)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	185	(324)
- MD		every roll	120	(210)	183	(320)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		563	
- MD	(51 mm)	every roll	100		487	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- MD		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	200	(890)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		11	

000961

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114825

ROLL IDENTIFICATION

Roll Number	103114825
Product Name	HDT080A000
Production Date	3/11/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,178 1,895	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	84	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	230	(402)
- MD		every roll	168	(294)	234	(410)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	187	(327)
- MD		every roll	120	(210)	193	(337)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		482	
- MD	(51 mm)	every roll	100		534	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	75	(334)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	194	(863)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	146	(650)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		13	

000962

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114826

ROLL IDENTIFICATION

Roll Number	103114826
Product Name	HDT080A000
Production Date	3/12/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,212 1,911	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	221	(387)
- MD		every roll	168	(294)	227	(397)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	250	(438)
- MD		every roll	120	(210)	273	(478)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		522	
- MD	(51 mm)	every roll	100		554	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	77	(343)
- MD		every roll	56	(249)	75	(334)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	201	(894)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	146	(650)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		13	

000963

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114827

ROLL IDENTIFICATION

Roll Number	103114827
Product Name	HDT080A000
Production Date	3/12/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,145 1,880	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	85	(2.2)
Minimum		every roll	76	(1.9)	84	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	230	(402)
- MD		every roll	168	(294)	226	(395)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	254	(445)
- MD		every roll	120	(210)	270	(473)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		516	
- MD	(51 mm)	every roll	100		536	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	190	(845)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	146	(650)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		11	

000964

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/12/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114828

ROLL IDENTIFICATION

Roll Number	103114828
Product Name	HDT080A000
Production Date	3/12/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,122 1,870	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	81	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	229	(401)
- MD		every roll	168	(294)	224	(391)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	181	(317)
- MD		every roll	120	(210)	179	(31[illegible])
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		547	
- MD	(51 mm)	every roll	100		496	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	77	(343)
- MD		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	195	(868)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	146	(650)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		11	

000965

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114829

ROLL IDENTIFICATION

Roll Number	103114829
Product Name	HDT080A000
Production Date	3/12/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,135 1,876	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	92	(2.3)
Minimum		every roll	76	(1.9)	86	(2.2)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	220	(384)
- MD		every roll	168	(294)	224	(392)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	253	(442)
- MD		every roll	120	(210)	284	(497)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		19	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		530	
- MD	(51 mm)	every roll	100		571	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	191	(850)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		12	

000966

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/13/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114830

ROLL IDENTIFICATION

Roll Number	103114830
Product Name	HDT080A000
Production Date	3/12/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,144 1,880	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	91	(2.3)
Minimum		every roll	76	(1.9)	86	(2.2)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	230	(402)
- MD		every roll	168	(294)	222	(389)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	187	(327)
- MD		every roll	120	(210)	181	(317)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		536	
- MD	(51 mm)	every roll	100		497	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	77	(343)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	188	(837)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		12	

000967

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/13/02

GSE-4.10.007 Rev. - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114832

ROLL IDENTIFICATION

Roll Number	103114832
Product Name	HDT080A000
Production Date	3/12/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,210 1,910	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	81	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	230	(403)
- MD		every roll	168	(294)	228	(400)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	237	(414)
- MD		every roll	120	(210)	287	(502)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		19	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		476	
- MD	(51 mm)	every roll	100		549	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	195	(868)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		25	

000968

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/12/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114833

ROLL IDENTIFICATION

Roll Number	103114833
Product Name	HDT080A000
Production Date	3/12/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,256 1,931	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	87	(2.2)
Minimum		every roll	76	(1.9)	81	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	233	(408)
- MD		every roll	168	(294)	239	(417)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	175	(306)
- MD		every roll	120	(210)	195	(34[illegible])
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		420	
- MD	(51 mm)	every roll	100		491	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	190	(845)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		25	

000969

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/12/02

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114834

ROLL IDENTIFICATION

Roll Number	103114834
Product Name	HDT080A000
Production Date	3/12/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,270 1,937	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	239	(418)
- MD		every roll	168	(294)	228	(399)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	284	(497)
- MD		every roll	120	(210)	307	(537)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		555	
- MD	(51 mm)	every roll	100		584	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	195	(868)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		25	

000970

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114835

ROLL IDENTIFICATION

Roll Number	103114835
Product Name	HDT080A000
Production Date	3/12/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,272 1,938	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	243	(425)
- MD		every roll	168	(294)	226	(396)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	265	(464)
- MD		every roll	120	(210)	273	(478)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		512	
- MD	(51 mm)	every roll	100		529	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	198	(881)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		28	

000971

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/12/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114836

ROLL IDENTIFICATION

Roll Number	103114836
Product Name	HDT080A000
Production Date	3/12/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,294 1,948	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	84	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	215	(376)
- MD		every roll	168	(294)	213	(372)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	252	(441)
- MD		every roll	120	(210)	283	(495)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		491	
- MD	(51 mm)	every roll	100		553	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	193	(859)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		28	

000972

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114837

ROLL IDENTIFICATION

Roll Number	103114837
Product Name	HDT080A000
Production Date	3/12/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,298 1,950	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	234	(410)
- MD		every roll	168	(294)	233	(408)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	190	(333)
- MD		every roll	120	(210)	201	(351)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		490	
- MD	(51 mm)	every roll	100		552	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	199	(886)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		24	

000973

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 4941 103114838

ROLL IDENTIFICATION

Roll Number	103114838
Product Name	HDT080A000
Production Date	3/12/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,265 1,935	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	87	(2.2)
Minimum		every roll	76	(1.9)	83	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	226	(396)
- MD		every roll	168	(294)	218	(382)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	182	(318)
- MD		every roll	120	(210)	195	(341)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		517	
- MD	(51 mm)	every roll	100		533	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	76	(338)
- MD		every roll	56	(249)	75	(334)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	203	(903)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		24	

000974

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/13/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114839

ROLL IDENTIFICATION

Roll Number	103114839
Product Name	HDT080A000
Production Date	3/12/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,241 1,924	pounds kilograms

RESIN INFORMATION

Lot Number	8220062
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.06

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	224	(393)
- MD		every roll	168	(294)	219	(383)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	187	(326)
- MD		every roll	120	(210)	193	(337)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		538	
- MD	(51 mm)	every roll	100		523	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	199	(886)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		25	

000975

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED J.Y. 3/19/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114840

ROLL IDENTIFICATION

Roll Number	103114840
Product Name	HDT080A000
Production Date	3/13/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,249 1,927	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	228	(399)
- MD		every roll	168	(294)	229	(401)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	176	(308)
- MD		every roll	120	(210)	191	(334)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		437	
- MD	(51 mm)	every roll	100		534	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(532)	199	(886)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505	every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*	every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		25	

000976

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/13/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

- 4941

Roll No. 103114841

ROLL IDENTIFICATION

Roll Number	103114841
Product Name	HDT080A000
Production Date	3/13/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,252 1,929	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	227	(398)
- MD		every roll	168	(294)	226	(395)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	190	(333)
- MD		every roll	120	(210)	182	(31[illegible])
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		567	
- MD	(51 mm)	every roll	100		448	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- MD		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	198	(881)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		24	

000977

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED
L.T.
3/13/02

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114842

ROLL IDENTIFICATION

Roll Number	103114842
Product Name	HDT080A000
Production Date	3/13/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,250 1,928	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	222	(388)
- MD		every roll	168	(294)	221	(386)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	193	(338)
- MD		every roll	120	(210)	189	(332)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		569	
- MD	(51 mm)	every roll	100		537	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- MD		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	201	(894)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		24	

000978

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/13/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 4941 103114843

ROLL IDENTIFICATION

Roll Number	103114843
Product Name	HDT080A000
Production Date	3/13/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,265 1,935	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	84	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	229	(401)
- MD		every roll	168	(294)	231	(404)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	176	(308)
- MD		every roll	120	(210)	184	(32[illegible])
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		514	
- MD	(51 mm)	every roll	100		515	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	77	(343)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		26	

000979

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/13/02

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114844

ROLL IDENTIFICATION

Roll Number	103114844
Product Name	HDT080A000
Production Date	3/13/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,242 1,924	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	81	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	234	(409)
- MD		every roll	168	(294)	227	(397)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	254	(445)
- MD		every roll	120	(210)	273	(478)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		462	
- MD	(51 mm)	every roll	100		541	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	198	(881)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		26	

000980

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/13/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114845

ROLL IDENTIFICATION

Roll Number	103114845
Product Name	HDT080A000
Production Date	3/13/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,231 1,919	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	85	(2.2)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	238	(416)
- MD		every roll	168	(294)	234	(409)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	235	(412)
- MD		every roll	120	(210)	264	(462)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		483	
- MD	(51 mm)	every roll	100		533	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	77	(343)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	200	(890)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		27	

000981

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED
L.T.
3/13/02

4941

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114846

ROLL IDENTIFICATION

Roll Number	103114846
Product Name	HDT080A000
Production Date	3/13/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,208 1,909	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	85	(2.2)
Minimum		every roll	76	(1.9)	81	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	246	(431)
- MD		every roll	168	(294)	238	(417)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	256	(448)
- MD		every roll	120	(210)	245	(429)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		499	
- MD	(51 mm)	every roll	100		456	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- MD		every roll	56	(249)	75	(334)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	203	(903)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		27	

000982

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/13/02 QA

GSE 4.10.007 Rev. 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114848

ROLL IDENTIFICATION

Roll Number	103114848
Product Name	HDT080A000
Production Date	3/13/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,259 1,932	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	87	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	240	(419)
- MD		every roll	168	(294)	229	(400)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	260	(455)
- MD		every roll	120	(210)	285	(499)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		501	
- MD	(51 mm)	every roll	100		550	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	190	(845)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		23	

000983

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/14/02

GSE-4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114849

ROLL IDENTIFICATION

Roll Number	103114849
Product Name	HDT080A000
Production Date	3/13/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,298	pounds
	1,950	kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	84	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	243	(425)
- MD		every roll	168	(294)	246	(431)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	193	(338)
- MD		every roll	120	(210)	213	(373)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		511	
- MD	(51 mm)	every roll	100		570	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	200	(890)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		22	

000984

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/14/02

GSE-4.10-007 Rev.-- 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114850

ROLL IDENTIFICATION

Roll Number	103114850
Product Name	HDT080A000
Production Date	3/13/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,324 1,961	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	90	(2.3)
Minimum		every roll	76	(1.9)	85	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	233	(408)
- MD		every roll	168	(294)	239	(417)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	186	(326)
- MD		every roll	120	(210)	197	(3[illegible])
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		546	
- MD	(51 mm)	every roll	100		548	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		22	

000985

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/14/02

GSE-4.10.007 Rev. 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114851

ROLL IDENTIFICATION

Roll Number	103114851
Product Name	HDT080A000
Production Date	3/13/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,305 1,953	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	228	(400)
- MD		every roll	168	(294)	227	(398)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	185	(324)
- MD		every roll	120	(210)	190	(332)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		553	
- MD	(51 mm)	every roll	100		541	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	195	(868)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000986

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/14/02

GSE 4.10.007 Rev. 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114852

ROLL IDENTIFICATION

Roll Number	103114852
Product Name	HDT080A000
Production Date	3/13/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,250 1,928	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	90	(2.3)
Minimum		every roll	76	(1.9)	84	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	226	(396)
- MD		every roll	168	(294)	223	(390)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	167	(292)
- MD		every roll	120	(210)	218	(382)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		308	
- MD	(51 mm)	every roll	100		599	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	87	(387)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000987

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/14/02

GSE 4.10.007 Rev: 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114853

ROLL IDENTIFICATION

Roll Number	103114853
Product Name	HDT080A000
Production Date	3/14/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,268 1,936	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	93	(2.3)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	225	(394)
- MD		every roll	168	(294)	229	(401)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	187	(327)
- MD		every roll	120	(210)	204	(357)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		561	
- MD	(51 mm)	every roll	100		581	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	198	(881)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000988

Order No.	6186
Customer Name	Fluor Femald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114854

ROLL IDENTIFICATION

Roll Number	103114854
Product Name	HDT080A000
Production Date	3/14/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,275 1,939	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	93	(2.3)
Minimum		every roll	76	(1.9)	89	(2.3)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	235	(411)
- MD		every roll	168	(294)	231	(404)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	202	(353)
- MD		every roll	120	(210)	214	(374)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		581	
- MD	(51 mm)	every roll	100		581	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	191	(850)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000989

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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4941

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114855

ROLL IDENTIFICATION

Roll Number	103114855
Product Name	HDT080A000
Production Date	3/14/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,263 1,934	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	93	(2.3)
Minimum		every roll	76	(1.9)	89	(2.3)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	227	(398)
- MD		every roll	168	(294)	236	(413)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	274	(480)
- MD		every roll	120	(210)	298	(521)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		564	
- MD	(51 mm)	every roll	100		578	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	196	(872)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		25	

000990

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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4941

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114856

ROLL IDENTIFICATION

Roll Number	103114856
Product Name	HDT080A000
Production Date	3/14/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,254	pounds
	1,930	kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	93	(2.3)
Minimum		every roll	76	(1.9)	89	(2.3)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	218	(382)
- MD		every roll	168	(294)	226	(396)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	276	(483)
- MD		every roll	120	(210)	288	(50[illegible])
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		590	
- MD	(51 mm)	every roll	100		591	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	200	(890)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		25	

000991

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

1941

Roll No. 103114857

ROLL IDENTIFICATION

Roll Number	103114857
Product Name	HDT080A000
Production Date	3/14/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,248 1,927	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	93	(2.3)
Minimum		every roll	76	(1.9)	89	(2.3)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	238	(417)
- MD		every roll	168	(294)	240	(420)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	201	(351)
- MD		every roll	120	(210)	208	(365)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		588	
- MD	(51 mm)	every roll	100		583	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	133	(592)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000992

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/14/02

GSE 4.10.007 Rev. 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114858

ROLL IDENTIFICATION

Roll Number	103114858
Product Name	HDT080A000
Production Date	3/14/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,260 1,932	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	92	(2.3)
Minimum		every roll	76	(1.9)	87	(2.2)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	230	(402)
- MD		every roll	168	(294)	237	(414)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	281	(491)
- MD		every roll	120	(210)	291	(50[illegible])
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		566	
- MD	(51 mm)	every roll	100		566	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	133	(592)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		20	

000993

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114859

ROLL IDENTIFICATION

Roll Number	103114859
Product Name	HDT080A000
Production Date	3/14/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,250 1,928	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	84	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	243	(425)
- MD		every roll	168	(294)	228	(400)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	200	(349)
- MD		every roll	120	(210)	221	(387)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		544	
- MD	(51 mm)	every roll	100		590	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	75	(334)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	196	(872)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	133	(592)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		24	

000994

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114860

ROLL IDENTIFICATION

Roll Number	103114860
Product Name	HDT080A000
Production Date	3/14/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,260	pounds
	1,932	kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	237	(414)
- MD		every roll	168	(294)	222	(389)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	202	(354)
- MD		every roll	120	(210)	203	(356)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		593	
- MD	(51 mm)	every roll	100		585	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	195	(868)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	133	(592)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		24	

000995

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114861

ROLL IDENTIFICATION

Roll Number	103114861
Product Name	HDT080A000
Production Date	3/14/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,180 1,896	pounds kilograms

RESIN INFORMATION

Lot Number	8220072
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	87	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	229	(400)
- MD		every roll	168	(294)	226	(396)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	204	(357)
- MD		every roll	120	(210)	223	(391)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		599	
- MD	(51 mm)	every roll	100		616	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	191	(850)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	126	(561)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

000996

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114862

ROLL IDENTIFICATION

Roll Number	103114862
Product Name	HDT080A000
Production Date	3/14/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,176 1,894	pounds kilograms

RESIN INFORMATION

Lot Number	8220076
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	85	(2.2)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	217	(380)
- MD		every roll	168	(294)	211	(368)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	186	(325)
- MD		every roll	120	(210)	197	(34[illegible])
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		558	
- MD	(51 mm)	every roll	100		571	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	77	(343)
- MD		every roll	56	(249)	74	(329)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	189	(841)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	126	(561)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

000997

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114863

ROLL IDENTIFICATION

Roll Number	103114863
Product Name	HDT080A000
Production Date	3/14/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,170 1,892	pounds kilograms

RESIN INFORMATION

Lot Number	8220076
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	81	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	229	(401)
- MD		every roll	168	(294)	226	(395)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	270	(472)
- MD		every roll	120	(210)	303	(531)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		549	
- MD	(51 mm)	every roll	100		593	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	186	(828)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	126	(561)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		15	

000998

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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4941

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114864

ROLL IDENTIFICATION

Roll Number	103114864
Product Name	HDT080A000
Production Date	3/14/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,178 1,895	pounds kilograms

RESIN INFORMATION

Lot Number	8220076
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	87	(2.2)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	231	(405)
- MD		every roll	168	(294)	213	(373)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	188	(330)
- MD		every roll	120	(210)	190	(333)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		528	
- MD	(51 mm)	every roll	100		540	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	77	(343)
- MD		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	190	(845)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	126	(561)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		15	

000999

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114865

ROLL IDENTIFICATION

Roll Number	103114865
Product Name	HDT080A000
Production Date	3/14/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,187 1,899	pounds kilograms

RESIN INFORMATION

Lot Number	8220076
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	78	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	225	(393)
- MD		every roll	168	(294)	225	(393)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	180	(315)
- MD		every roll	120	(210)	184	(323)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		553	
- MD	(51 mm)	every roll	100		530	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- MD		every roll	56	(249)	75	(334)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	189	(841)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		18	

001000

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114866

ROLL IDENTIFICATION

Roll Number	103114866
Product Name	HDT080A000
Production Date	3/15/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,216 1,912	pounds kilograms

RESIN INFORMATION

Lot Number	8220076
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	88	(2.2)
Minimum		every roll	76	(1.9)	81	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	231	(405)
- MD		every roll	168	(294)	229	(401)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	271	(475)
- MD		every roll	120	(210)	285	(499)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		577	
- MD	(51 mm)	every roll	100		591	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	194	(863)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		18	

001001

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114867

ROLL IDENTIFICATION

Roll Number	103114867
Product Name	HDT080A000
Production Date	3/15/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,265 1,935	pounds kilograms

RESIN INFORMATION

Lot Number	8220076
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	87	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	226	(396)
- MD		every roll	168	(294)	224	(391)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	269	(471)
- MD		every roll	120	(210)	297	(520)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		19	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		561	
- MD	(51 mm)	every roll	100		598	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		24	

001002

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114868

ROLL IDENTIFICATION

Roll Number	103114868
Product Name	HDT080A000
Production Date	3/15/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,251 1,928	pounds kilograms

RESIN INFORMATION

Lot Number	8220076
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	86	(2.2)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	227	(397)
- MD		every roll	168	(294)	233	(408)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	263	(460)
- MD		every roll	120	(210)	292	(511)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		570	
- MD	(51 mm)	every roll	100		601	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	194	(863)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		24	

001003

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/15/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114869

ROLL IDENTIFICATION

Roll Number	103114869
Product Name	HDT080A000
Production Date	3/15/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,233 1,920	pounds kilograms

RESIN INFORMATION

Lot Number	8220076
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	83	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	219	(384)
- MD		every roll	168	(294)	221	(387)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	275	(481)
- MD		every roll	120	(210)	294	(514)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		563	
- MD	(51 mm)	every roll	100		595	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(532)	196	(872)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505	every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*	every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A1	
Carbon Black Dispersion Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		22	

001004

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/15/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114870

ROLL IDENTIFICATION

Roll Number	103114870
Product Name	HDT080A000
Production Date	3/15/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,236 1,921	pounds kilograms

RESIN INFORMATION

Lot Number	8220076
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	83	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	232	(406)
- MD		every roll	168	(294)	237	(414)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	251	(439)
- MD		every roll	120	(210)	257	(450)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		523	
- MD	(51 mm)	every roll	100		507	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	203	(903)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		22	

001005

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/15/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114871

ROLL IDENTIFICATION

Roll Number	103114871
Product Name	HDT080A000
Production Date	3/15/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,216 1,912	pounds kilograms

RESIN INFORMATION

Lot Number	8220076
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	231	(405)
- MD		every roll	168	(294)	228	(400)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	257	(449)
- MD		every roll	120	(210)	274	(480)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		19	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		524	
- MD	(51 mm)	every roll	100		546	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(532)	193	(859)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505	every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*	every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A1	
Carbon Black Dispersion Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		21	

001006

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/15/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114872

ROLL IDENTIFICATION

Roll Number	[redacted]
Product Name	HDT080A000
Production Date	3/15/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,218 1,913	pounds kilograms

RESIN INFORMATION

Lot Number	8220076
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	87	(2.2)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	241	(421)
- MD		every roll	168	(294)	240	(421)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	178	(311)
- MD		every roll	120	(210)	198	(346)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		492	
- MD	(51 mm)	every roll	100		526	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	195	(868)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

001007

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/15/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

1941

Roll No. 103114873

ROLL IDENTIFICATION

Roll Number	103114873
Product Name	HDT080A000
Production Date	3/15/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,212 1,911	pounds kilograms

RESIN INFORMATION

Lot Number	[redacted]
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	*Test Method*	*Results*
Density, g/cc	*ASTM D 1505*	0.937
Melt index, g/10 min.	*ASTM D 1238 (190/2.16)*	0.12

Physical Property	*Test Method*	*Test Frequency*	*Customer Minimum* English	Metric	*Test Results* English	Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	93	(2.4)
Minimum		every roll	76	(1.9)	90	(2.3)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	232	(406)
- MD		every roll	168	(294)	231	(405)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	185	(324)
- MD		every roll	120	(210)	195	(341)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		501	
- MD	(51 mm)	every roll	100		548	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	196	(872)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	143	(636)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

001008

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114874

ROLL IDENTIFICATION

Roll Number	[redacted]
Product Name	HDT080A000
Production Date	3/15/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,177	pounds
	1,895	kilograms

RESIN INFORMATION

Lot Number	8220076
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	93	(2.4)
Minimum		every roll	76	(1.9)	90	(2.3)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	225	(394)
- MD		every roll	168	(294)	228	(399)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	191	(333)
- MD		every roll	120	(210)	190	(332)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		581	
- MD	(51 mm)	every roll	100		552	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	196	(872)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	143	(636)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		24	

001009

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114875

ROLL IDENTIFICATION

Roll Number	103114875
Product Name	HDT080A000
Production Date	3/15/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,182 1,897	pounds kilograms

RESIN INFORMATION

Lot Number	8220076
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	94	(2.4)
Minimum		every roll	76	(1.9)	90	(2.3)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	229	(401)
- MD		every roll	168	(294)	226	(395)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	243	(426)
- MD		every roll	120	(210)	267	(467)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		504	
- MD	(51 mm)	every roll	100		553	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- MD		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	193	(859)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	143	(636)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		24	

001010

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/15/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

1941

Roll No. 103114876

ROLL IDENTIFICATION

Roll Number	103114876
Product Name	HDT080A000
Production Date	3/15/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,169	pounds
	1,891	kilograms

RESIN INFORMATION

Lot Number	8220875
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	81	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	244	(427)
- MD		every roll	168	(294)	240	(419)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	192	(336)
- MD		every roll	120	(210)	200	(349)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		555	
- MD	(51 mm)	every roll	100		557	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	76	(338)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	205	(912)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	143	(636)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

001011

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/16/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114877

ROLL IDENTIFICATION

Roll Number	103114877
Product Name	HDT080A000
Production Date	3/15/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,190	pounds
	1,901	kilograms

RESIN INFORMATION

Lot Number	8220076
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	84	(2.1)
Minimum		every roll	76	(1.9)	80	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	235	(411)
- MD		every roll	168	(294)	242	(424)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	190	(333)
- MD		every roll	120	(210)	193	(338)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		533	
- MD	(51 mm)	every roll	100		541	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	75	(334)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	200	(890)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

001012

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/16/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

^941

Roll No. 103114878

ROLL IDENTIFICATION

Roll Number	[redacted]
Product Name	HDT080A000
Production Date	3/15/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,186	pounds
	1,899	kilograms

RESIN INFORMATION

Lot Number	[redacted]
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	87	(2.2)
Minimum		every roll	76	(1.9)	79	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	232	(406)
- MD		every roll	168	(294)	237	(414)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	251	(439)
- MD		every roll	120	(210)	257	(450)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		523	
- MD	(51 mm)	every roll	100		807	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	203	(903)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		30	

001013

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/16/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114879

ROLL IDENTIFICATION

Roll Number	103114879
Product Name	HDT080A000
Production Date	3/15/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,196	pounds
	1,903	kilograms

RESIN INFORMATION

Lot Number	8220016
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	88	(2.2)
Minimum		every roll	76	(1.9)	83	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	242	(423)
- MD		every roll	168	(294)	247	(432)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	254	(445)
- MD		every roll	120	(210)	299	(523)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		523	
- MD	(51 mm)	every roll	100		520	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	77	(343)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	193	(859)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		30	

001014

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/16/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114880

ROLL IDENTIFICATION

Roll Number	[redacted]
Product Name	HDT080A000
Production Date	3/16/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,206 1,908	pounds kilograms

RESIN INFORMATION

Lot Number	[redacted]
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	83	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	238	(416)
- MD		every roll	168	(294)	240	(420)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	173	(302)
- MD		every roll	120	(210)	203	(355)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		497	
- MD	(51 mm)	every roll	100		557	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	201	(894)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		25	

001015

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/16/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114881

ROLL IDENTIFICATION

Roll Number	[redacted]
Product Name	HDT080A000
Production Date	3/16/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,212 1,911	pounds kilograms

RESIN INFORMATION

Lot Number	[redacted]
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.12

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	87	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	233	(407)
- MD		every roll	168	(294)	225	(394)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	166	(290)
- MD		every roll	120	(210)	176	(308)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		378	
- MD	(51 mm)	every roll	100		378	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- MD		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	135	(601)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		25	

001016

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/16/02 QA

GSF-4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114882

ROLL IDENTIFICATION

Roll Number	[redacted]
Product Name	HDT080A000
Production Date	3/16/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,226	pounds
	1,917	kilograms

RESIN INFORMATION

Lot Number	[redacted]
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	86	(2.2)
Minimum		every roll	76	(1.9)	77	(1.9)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	225	(393)
- MD		every roll	168	(294)	239	(418)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	228	(400)
- MD		every roll	120	(210)	287	(502)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		453	
- MD	(51 mm)	every roll	100		564	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	199	(886)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	135	(601)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		18	

001017

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/16/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114883

ROLL IDENTIFICATION

Roll Number	[redacted]
Product Name	HDT080A000
Production Date	3/16/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,218	pounds
	1,913	kilograms

RESIN INFORMATION

Lot Number	[redacted]
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	88	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	240	(420)
- MD		every roll	168	(294)	236	(414)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	192	(336)
- MD		every roll	120	(210)	185	(323)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		531	
- MD	(51 mm)	every roll	100		509	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- MD		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	189	(841)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	135	(601)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		18	

001018

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/16/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114884

ROLL IDENTIFICATION

Roll Number	[redacted]
Product Name	HDT080A000
Production Date	3/16/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,330	pounds
	1,964	kilograms

RESIN INFORMATION

Lot Number	[redacted]
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	92	(2.3)
Minimum		every roll	76	(1.9)	87	(2.2)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	219	(382)
- MD		every roll	168	(294)	217	(380)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	244	(426)
- MD		every roll	120	(210)	267	(466)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		20	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		496	
- MD	(51 mm)	every roll	100		554	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- MD		every roll	56	(249)	75	(334)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	185	(823)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		29	

001019

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/16/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114885

ROLL IDENTIFICATION

Roll Number	103114885
Product Name	HDT080A000
Production Date	3/16/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,326 1,962	pounds kilograms

RESIN INFORMATION

Lot Number	8220082
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	88	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	229	(401)
- MD		every roll	168	(294)	224	(392)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	192	(337)
- MD		every roll	120	(210)	200	(350)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		581	
- MD	(51 mm)	every roll	100		588	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		29	

001020

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/16/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114886

ROLL IDENTIFICATION

Roll Number	[redacted]
Product Name	HDT080A000
Production Date	3/16/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,325	pounds
	1,962	kilograms

RESIN INFORMATION

Lot Number	[redacted]
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	83	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	230	(402)
- MD		every roll	168	(294)	222	(388)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	184	(322)
- MD		every roll	120	(210)	204	(356)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		529	
- MD	(51 mm)	every roll	100		586	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	77	(343)
- MD		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	193	(859)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		27	

001021

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/16/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114887

ROLL IDENTIFICATION

Roll Number	103114887
Product Name	HDT080A000
Production Date	3/16/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,323 1,961	pounds kilograms

RESIN INFORMATION

Lot Number	8220082
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	84	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	227	(397)
- MD		every roll	168	(294)	228	(400)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	242	(424)
- MD		every roll	120	(210)	278	(486)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		19	
- MD	(33 mm)	every roll	12		19	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		478	
- MD	(51 mm)	every roll	100		559	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	196	(872)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	139	(619)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		27	

001022

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/16/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114888

ROLL IDENTIFICATION

Roll Number	103114888
Product Name	HDT080A000
Production Date	3/16/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,336	pounds
	1,967	kilograms

RESIN INFORMATION

Lot Number	8220082
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	83	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	232	(407)
- MD		every roll	168	(294)	226	(396)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	263	(460)
- MD		every roll	120	(210)	279	(487)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		483	
- MD	(51 mm)	every roll	100		547	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- MD		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	198	(881)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	145	(645)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		25	

001023

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/16/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114889

ROLL IDENTIFICATION

Roll Number	103114889
Product Name	HDT080A000
Production Date	3/16/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,360	pounds
	1,978	kilograms

RESIN INFORMATION

Lot Number	8220082
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	91	(2.3)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	229	(401)
- MD		every roll	168	(294)	222	(388)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	196	(343)
- MD		every roll	120	(210)	208	(365)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		561	
- MD	(51 mm)	every roll	100		613	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	87	(387)
- MD		every roll	56	(249)	84	(374)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	190	(845)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	145	(645)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		25	

001024

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/16/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

-4941

Roll No. 103114891

ROLL IDENTIFICATION

Roll Number	103114891
Product Name	HDT080A000
Production Date	3/16/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,381 1,987	pounds kilograms

RESIN INFORMATION

Lot Number	8220082
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	88	(2.2)
Minimum		every roll	76	(1.9)	84	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	240	(420)
- MD		every roll	168	(294)	231	(404)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	189	(331)
- MD		every roll	120	(210)	194	(339)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		507	
- MD	(51 mm)	every roll	100		513	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	*56	(249)	86	(383)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	199	(886)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	145	(645)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		25	

001025

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/16/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114892

ROLL IDENTIFICATION

Roll Number	103114892
Product Name	HDT080A000
Production Date	3/16/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,358 1,977	pounds kilograms

RESIN INFORMATION

Lot Number	8220082
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	88	(2.2)
Minimum		every roll	76	(1.9)	81	(2.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	226	(395)
- MD		every roll	168	(294)	225	(394)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	189	(331)
- MD		every roll	120	(210)	201	(351)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		476	
- MD	(51 mm)	every roll	100		545	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	200	(890)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	135	(601)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

001026

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/17/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114893

ROLL IDENTIFICATION

Roll Number	103114893
Product Name	HDT080A000
Production Date	3/17/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,261 1,933	pounds kilograms

RESIN INFORMATION

Lot Number	8220082
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	83	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	230	(403)
- MD		every roll	168	(294)	232	(407)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	187	(327)
- MD		every roll	120	(210)	203	(356)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		554	
- MD	(51 mm)	every roll	100		572	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	199	(886)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	135	(601)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

001027

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114894

ROLL IDENTIFICATION

Roll Number	103114894
Product Name	HDT080A000
Production Date	3/17/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,270	pounds
	1,937	kilograms

RESIN INFORMATION

Lot Number	8220082
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	88	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	237	(415)
- MD		every roll	168	(294)	237	(415)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	190	(333)
- MD		every roll	120	(210)	190	(333)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		539	
- MD	(51 mm)	every roll	100		504	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	200	(890)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	135	(601)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		28	

001028

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114895

ROLL IDENTIFICATION

Roll Number	103114895
Product Name	HDT080A000
Production Date	3/17/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,259 1,932	pounds kilograms

RESIN INFORMATION

Lot Number	8220082
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	88	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	231	(404)
- MD		every roll	168	(294)	224	(392)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	177	(310)
- MD		every roll	120	(210)	208	(363)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		523	
- MD	(51 mm)	every roll	100		586	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	198	(881)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	135	(601)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		28	

001029

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/17/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114896

ROLL IDENTIFICATION

Roll Number	103114896
Product Name	HDT080A000
Production Date	3/17/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,277	pounds
	1,940	kilograms

RESIN INFORMATION

Lot Number	8220082
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	235	(411)
- MD		every roll	168	(294)	234	(409)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	196	(344)
- MD		every roll	120	(210)	191	(334)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		548	
- MD	(51 mm)	every roll	100		509	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	195	(868)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		18	

001030

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/17/02 QA

GSE-4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114897

ROLL IDENTIFICATION

Roll Number	103114897
Product Name	HDT080A000
Production Date	3/17/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,258 1,931	pounds kilograms

RESIN INFORMATION

Lot Number	8220082
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	90	(2.3)
Minimum		every roll	76	(1.9)	86	(2.2)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	230	(402)
- MD		every roll	168	(294)	245	(430)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	199	(349)
- MD		every roll	120	(210)	200	(349)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		571	
- MD	(51 mm)	every roll	100		536	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		18	

001031

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

GSE-4.10-007 Rev - - 07/00

APPROVED L.T. 3/17/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114898

ROLL IDENTIFICATION

Roll Number	103114898
Product Name	HDT080A000
Production Date	3/17/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,262	pounds
	1,933	kilograms

RESIN INFORMATION

Lot Number	8220082
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	88	(2.2)
Minimum		every roll	76	(1.9)	81	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	234	(409)
- MD		every roll	168	(294)	232	(406)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	185	(324)
- MD		every roll	120	(210)	201	(35[illegible])
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		550	
- MD	(51 mm)	every roll	100		578	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		24	

001032

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/17/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114899

ROLL IDENTIFICATION

Roll Number	103114899
Product Name	HDT080A000
Production Date	3/17/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,258 1,931	pounds kilograms

RESIN INFORMATION

Lot Number	8220082
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	85	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	232	(406)
- MD		every roll	168	(294)	235	(411)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	261	(456)
- MD		every roll	120	(210)	277	(485)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		19	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		532	
- MD	(51 mm)	every roll	100		479	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- MD		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		24	

001033

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED L.T. 3/17/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 103114900

ROLL IDENTIFICATION

Roll Number	103114900
Product Name	HDT080A000
Production Date	3/17/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,254 1,930	pounds kilograms

RESIN INFORMATION

Lot Number	8220082
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.937
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	88	(2.2)
Minimum		every roll	76	(1.9)	83	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	237	(415)
- MD		every roll	168	(294)	244	(426)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	195	(342)
- MD		every roll	120	(210)	208	(365)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		561	
- MD	(51 mm)	every roll	100		571	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- MD		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	199	(886)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.947	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

001034

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/17/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114901

ROLL IDENTIFICATION

Roll Number	103114901
Product Name	HDT080A000
Production Date	3/17/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,268 1,936	pounds kilograms

RESIN INFORMATION

Lot Number	8220074
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	83	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	236	(414)
- MD		every roll	168	(294)	236	(412)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	212	(371)
- MD		every roll	120	(210)	208	(363)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		607	
- MD	(51 mm)	every roll	100		567	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- MD		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	201	(894)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.947	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		19	

001035

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED LT. 3/17/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114902

ROLL IDENTIFICATION

Roll Number	103114902
Product Name	HDT080A000
Production Date	3/17/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,289 1,945	pounds kilograms

RESIN INFORMATION

Lot Number	8220074
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	84	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	233	(409)
- MD		every roll	168	(294)	231	(404)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	196	(344)
- MD		every roll	120	(210)	193	(338)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		516	
- MD	(51 mm)	every roll	100		518	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.947	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

001036

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/17/02 QA

GSE-4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114903

ROLL IDENTIFICATION

Roll Number	103114903
Product Name	HDT080A000
Production Date	3/17/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,264 1,934	pounds kilograms

RESIN INFORMATION

Lot Number	8220074
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	85	(2.2)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	245	(428)
- MD		every roll	168	(294)	234	(409)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	193	(338)
- MD		every roll	120	(210)	204	(357)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		533	
- MD	(51 mm)	every roll	100		552	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	203	(903)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	136	(605)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.947	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

001037

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/18/02 QA

GSF-4 10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114904

ROLL IDENTIFICATION

Roll Number	103114904
Product Name	HDT080A000
Production Date	3/17/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,276 1,940	pounds kilograms

RESIN INFORMATION

Lot Number	8220074
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	88	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	231	(404)
- MD		every roll	168	(294)	233	(408)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	227	(396)
- MD		every roll	120	(210)	217	(380)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		549	
- MD	(51 mm)	every roll	100		508	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	88	(392)
- MD		every roll	56	(249)	85	(378)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	202	(899)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	144	(641)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.947	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		18	

1038

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED L.T. 3/18/02 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

--4941

Roll No. 103114905

ROLL IDENTIFICATION

Roll Number	103114905
Product Name	HDT080A000
Production Date	3/17/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,270 1,937	pounds kilograms

RESIN INFORMATION

Lot Number	8220074
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	87	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	230	(402)
- MD		every roll	168	(294)	241	(423)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	268	(469)
- MD		every roll	120	(210)	309	(541)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		599	
- MD	(51 mm)	every roll	100		616	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	199	(886)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	144	(641)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.947	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		18	

001039

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

GSE-4.10-007 Rev - - 07/00

APPROVED L.T. 3/18/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114906

ROLL IDENTIFICATION

Roll Number	103114906
Product Name	HDT080A000
Production Date	3/17/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,260	pounds
	1,932	kilograms

RESIN INFORMATION

Lot Number	8220074
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	88	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	228	(400)
- MD		every roll	168	(294)	229	(402)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	262	(458)
- MD		every roll	120	(210)	292	(512)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		529	
- MD	(51 mm)	every roll	100		575	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	198	(881)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	144	(641)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.947	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		22	

001040

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

GSE-4.10-007 Rev - - 07/00

APPROVED L.T. 3/18/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114907

ROLL IDENTIFICATION

Roll Number	103114907
Product Name	HDT080A000
Production Date	3/18/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,256	pounds
	1,931	kilograms

RESIN INFORMATION

Lot Number	8220074
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	87	(2.2)
Minimum		every roll	76	(1.9)	81	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	230	(402)
- MD		every roll	168	(294)	222	(388)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	259	(453)
- MD		every roll	120	(210)	295	(515)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		527	
- MD	(51 mm)	every roll	100		585	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	196	(872)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	144	(641)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.947	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.6	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		22	

001041

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

GSE-4.10-007 Rev - - 07/00

APPROVED L.T. 3/18/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114908

ROLL IDENTIFICATION

Roll Number	103114908
Product Name	HDT080A000
Production Date	3/18/02

Length ≈(+/- 1%)	400	feet
	122	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	9,000	sq. feet
	836	sq. meters
Weight	4,248	pounds
	1,927	kilograms

RESIN INFORMATION

Lot Number	8220074
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	88	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	228	(399)
- MD		every roll	168	(294)	224	(393)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	257	(450)
- MD		every roll	120	(210)	285	(498)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		527	
- MD	(51 mm)	every roll	100		560	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- MD		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	199	(886)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

001042

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

GSE-4.10-007 Rev - - 07/00

APPROVED K.A. 3/18/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114909

ROLL IDENTIFICATION

Roll Number	103114909
Product Name	HDT080A000
Production Date	3/18/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,236 1,921	pounds kilograms

RESIN INFORMATION

Lot Number	8220074
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	88	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	231	(404)
- MD		every roll	168	(294)	227	(397)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	252	(442)
- MD		every roll	120	(210)	310	(543)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		503	
- MD	(51 mm)	every roll	100		619	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- MD		every roll	56	(249)	75	(334)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	202	(899)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		21	

001043

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED K.A. 3/18/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114910

ROLL IDENTIFICATION

Roll Number	103114910
Product Name	HDT080A000
Production Date	3/18/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,241 1,924	pounds kilograms

RESIN INFORMATION

Lot Number	8220074
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	88	(2.2)
Minimum		every roll	76	(1.9)	82	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	229	(401)
- MD		every roll	168	(294)	216	(379)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	256	(447)
- MD		every roll	120	(210)	281	(491)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		498	
- MD	(51 mm)	every roll	100		568	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	77	(343)
- MD		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		27	

001044

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED K.A. 3/18/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114911

ROLL IDENTIFICATION

Roll Number	103114911
Product Name	HDT080A000
Production Date	3/18/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,228 1,918	pounds kilograms

RESIN INFORMATION

Lot Number	8220074
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	88	(2.2)
Minimum		every roll	76	(1.9)	83	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	236	(413)
- MD		every roll	168	(294)	233	(407)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	275	(482)
- MD		every roll	120	(210)	285	(499)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		565	
- MD	(51 mm)	every roll	100		562	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	198	(881)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		27	

001045

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

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APPROVED K.A. 3/18/02 QA

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114912

ROLL IDENTIFICATION

Roll Number	103114912
Product Name	HDT080A000
Production Date	3/18/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,224 1,916	pounds kilograms

RESIN INFORMATION

Lot Number	8220074
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	88	(2.2)
Minimum		every roll	76	(1.9)	85	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	227	(397)
- MD		every roll	168	(294)	236	(412)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	274	(480)
- MD		every roll	120	(210)	270	(472)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		568	
- MD	(51 mm)	every roll	100		539	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- MD		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(532)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	142	(632)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		26	

T046

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

APPROVED K.A. 3/18/02 QA

GSE-4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

4941

Roll No. 103114913

ROLL IDENTIFICATION

Roll Number	103114913
Product Name	HDT080A000
Production Date	3/18/02

Length ≈(+/- 1%)	400 122	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,000 836	sq. feet sq. meters
Weight	4,213 1,911	pounds kilograms

RESIN INFORMATION

Lot Number	8220074
Type	K306
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.10

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5994					
Average		every roll	80	(2.0)	89	(2.3)
Minimum		every roll	76	(1.9)	83	(2.1)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	246	(431)
- MD		every roll	168	(294)	229	(400)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	147	(258)
- MD		every roll	120	(210)	215	(375)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		384	
- MD	(51 mm)	every roll	100		601	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- MD		every roll	56	(249)	85	(378)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(532)	202	(899)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	142	(632)
Density, g/cc	ASTM D 1505	every 4th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603*	every 4th	2.0		2.7	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	
Asperity Height	GRI GM 12					
Average (mils) - Side A		every 2nd	7		26	

001047

Order No.	6186
Customer Name	Fluor Fernald, Inc.
Location	Harrison, OH

*Modified

GSE-4.10-007 Rev - - 07/00

APPROVED K.A. 3/18/02 QA

Report Date
3/27/02

GSE

Quality Assurance Laboratory Test Results

Job Name: Fluor Fernald
SO Number: 6186

Test: D 746-Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.

Customer Frequency: 1/400,000 ft^2

Customer Criteria: -60°C

Roll No.	Results
103114228	Pass
103114276	Pass
103114812	Pass
103114858	Pass
103114903	Pass

Approved By: Jimmy Youngblood
Date Approved: 3/27/02

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Report Date
3/27/02

4941

Quality Assurance Laboratory Test Results

Job Name: Fluor Fernald
SO Number: 6186

Test: ASTM D 1204 - Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting

Customer Frequency: 1/400,000 ft^2

Customer Criteria: +/- 2 %

Roll No.	Results
103114228	Pass
103114276	Pass
103114812	Pass
103114858	Pass
103114903	Pass

Approved By: Jimmy Youngblood
Date Approved: 3/27/02

001049

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Report Date
3/27/02

GSE

Quality Assurance Laboratory Test Results

Job Name: Fluor Fernald
SO Number: 6186

Test: ASTM D 5397 - Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load

Customer Frequency: 1/400,000ft^2

Customer Criteria: >500 Hours

Roll Number	Test Result
103114228	Pass
103114276	Pass
103114812	Pass
103114858	Pass
103114903	Pass

Approved By: Jimmy Youngblood
Date Approved: 3/27/02

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Geotextile

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INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

FS-F-4955

ORIGINAL

Contract No.: 99SC001441
Contractor Title: Supplier Contractor
Contractor: TNS Advanced Technologies

PROJECT 20104, OPTION 2 (CELL 4 AND 5 LINER)
SUBMITTAL REGISTER
GEOTEXTILE MANUFACTURING AND DELIVERY
Rev. 4, 5/15/02

Submittal No.	Rev. No.	Document No. & Rev.	Rev. No.	CFC	INF	Document Family	Document Title	Section-Paragraph Reference	STATUS Action Code (Date)	Remarks Submittal Due Date
20104-1441/2-001	0 1 2 3 4	1441-OPT2-001	0 1 2 3 4		X	ENG	SUBMITTAL REGISTER	ACR-001	A 11/1/01 A 12/6/01 A 1/4/02 A 1/23/02 A 5/23/02	FLUOR FERNALD WILL UPDATE
20104-1441/2-02714P-001	0 1	1441-OPT2-02714P-001	0 1		X	ENG	PRODUCT NAME	02714P.1.04.A.1	C 11/16/01 A 11/29/01	A
20104-1441/2-02714P-002	0 1	1441-OPT2-02714P-002	0 1		X	ENG	MANUFACTURING CAPABILITIES	02714P.1.04.A.2	C 11/16/01 A 1/9/02	A
20104-1441/2-02714P-003	0 1 2	1441-OPT2-02714P-003	0 1 2	X		QA	CERTIFICATION OF MINIMUM AVERAGE ROLL VALUES	02714P.1.04.A.3	C 11/19/01 B 12/10/01 A 1/7/02	A
20104-1441/2-02714P-004	0	1441-OPT2-02714P-004	0	X		CONST	PROJECTED DELIVERY DATES	02714P.1.04.A.4	A 12/6/01	A
20104-1441/2-02714P-005	0	1441-OPT2-02714P-005	0		X	CONST	RECOMMENDED STORAGE REQUIREMENTS AND LIMITATIONS	02714P.1.04.A.5	A 11/26/01	A
20104-1441/2-02714P-006	0 1	1441-OPT2-02714P-006	0 1	X		ENG	COMPLETED FORM GT-7, GT-10 AND GT-16	02714P.1.04.A.6	C 11/16/01 A 12/12/01	A
20104-1441/2-02714P-007	0 1 2	1441-OPT2-02714P-007	0 1 2		X	H&S	MATERIAL SAFETY DATA SHEETS	O2714P.1.04.A.7	B 11/15/01 B 12/3/01 A 12/31/01	A & C
20104-1441/2-02714P-008	0 1	1441-OPT2-02714P-008	0 1		X	PROC	WARRANTY FOR GEOTEXTILE	02714P.1.04.A.8	B 11/19/01 A 12/10/01	A
20104-1441/2-02714P-009	0	1441-OPT2-02714P-009	0	X		QA	QUALITY CONTROL CERTIFICATES	02714P.1.04.B	A 4/15/02	B

A. WITHIN 10 DAYS FROM RELEASE OF CONTRACT
B. AT LEAST 21 DAYS PRIOR TO SHIPMENT
C. WITH SHIPMENT

The supplier shall provide submittals in accordance with Administrative Contractor Requirements ACR-001, attached.

001053

INFORMATION ONLY

(X) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: [signature] Date: 5/23/02

4941

SUPPLIER DOCUMENT SUBMITTAL ACR-001

FLUOR FERNALD, PROJECT NO.: (1) 20104

CONTRACT NO: (2) 1441

SUBMITTAL NO.:(3) 1441/2-9914P.od

REV.:(4) 01 JAC 11/26/00

DATE:(5) 10-31-01

Page — of — (6)

FROM: TNS ADVANCED TECHNOLOGIES

TO: FLUOR FERNALD ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7(8)

SIGNATURE: Richard J Franklin (7)

RECEIVED BY: Jelma Kraus DATE: 11/20/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION A	B	C
(9)	(10)	(11)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(13)	(14)	(14)	(14)	(15)	(16)	(16)	(16)
6	1441-OPT2-001	01	11/26/01					X			PRODUCT NAME			X		X		

REVIEW DISTRIBUTION

NAME (17)	MS (18)	NAME (17)	MS (18)	NAME (17)	MS (18)
Chuck Van Arsdale - Approver	64				
Gregg Johnson	64				
Bill Zebrick	64				
Mike Godber	64				
Kwasi Badu-Tuuneborh	38				

NO COMMENTS: ✓ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS) (19)

ORIGINAL

4941

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7) Chuck Van Arsdale 11/26/01

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD

SUBMITTAL ACTION CODE: (BY FLUOR FERNALD)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit

8001054

4941

TNS
ADVANCED TECHNOLOGIES

9855 Greenville Highway
Building F
Spartanburg, SC 29301
800-867-5181
fax: 864-949-6222

PRODUCT NAMES:

TNS E160

TNS E070

TNS E100

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: [illegible] Date: 11/29/01

INFORMATION ONLY

qd 01/03/02

SUPPLIER DOCUMENT SUBMITTAL 1441/2-027148-002 qd 1/3/02

FDF PROJECT NO.: 20104

CONTRACT NO: 1441

SUBMITTAL NO. ~~1441/027148-002~~ REV.: ~~2~~ 1 DATE 12-20-01

Page 1 of 2

FROM:
TNS ADVANCED TECHNOLOGIES

SIGNATURE: [signature] for Rick Fraser 1/3/02

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

RECEIVED BY: [signature] DATE: 1/3/02

QTY	DOCUMENT NUMBER qd 01/03/02	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1441-027148-002	1.						X			MANUFACTURING CAPABILITIES			X	—	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Chuck VanArsdale - Approver	64				
Gregg Johnson	64				
Bill Zebick	64				
Mike Godbes	64				
Kwasi Badu-Tweneboah	38				

NO COMMENTS:

COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

ORIGINAL

RECEIVED BY: [signature] DATE: 1/9/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

4941

001056

FS F 4056

1441-OPT2-008

4941

TNS ADVANCED TECHNOLOGIES
QUALITY CONTROL PLAN

The Quality Control Department tests the E Series fabrics at the following frequencies. The tests for these properties are routine with test results reported representing each roll of fabric produced.

Test Frequency in Square Feet

Property	Units	Test Method	180"
Weight	oz/yd	ASTM D 5261	50,000
Grab Tensile	lbs	ASTM D 4632	50,000
Grab Elongation	%	ASTM D 4632	50,000
Mullen Burst	lbs/in	ASTM D 3786	50,000
Puncture	lbs	ASTM D 4833	50,000
Trapezoid Tear	lbs	ASTM D 4533	50,000
Apparent Opening Size	U.S. Sieve	ASTM D 4751	50,000
Permittivity	sec^{-1}	ASTM D 4491	50,000
Water Flow Rate	gal/ft min	ASTM D 4491	50,000

Additional testing is conducted on non-routine properties in the Advanced Technologies' Quality Control Lab or at a reputable independent test lab. Examples of non-routine tests include:

Property	Units	Test Method
Abrasion-Sliding Block	% strength retention	ASTM D 4886
Abrasion-Rotary Platform	lbs	ASTM D 3884
U.V. Resistance-Fluorescent Type	% strength retention	ASTM G 53
U.V. Resistance-Xenon Type	% strength retention	ASTM D 4355
Wide Width	lbs/in	ASTM D 4595

Advanced Technologies conforms and adheres to the following additional ASTM test methods relating to fabric identification, sampling and specification conformance:

ASTM D 4873 Identification, Storage and Handling of Geotextiles
ASTM D 4354 Sampling of Geosynthetics for Testing
ASTM D 4759 Determining Specification Conformance of Geosynthetics

INFORMATION ONLY

(✓) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: [signature] Date: 1/09/02

Typically, the first shipment roll from each line will be sampled. It will be necessary to consider the minimum planned production quantity to determine if more frequent sampling and testing is required.

Quality Control Testing of Each Sample

Each quality control sample shall be sent to the Quality Control Lab before the end of the shift during which the sample was taken. Full identification of the sampled roll will be provided with the sample.

The following tests shall be run on every sample received in the QC Lab:

TEST PROPERTY	TEST METHOD
Weight	ASTM D 5261
Thickness	ASTM D 1777
Grab Tensile	ASTM D 4632
Grab Elongation	ASTM D 4632
Trapezoid Tear Strength	ASTM D 4533
Puncture Resistance	ASTM D 4833
Mullen Burst Strength	ASTM D 3786
Water Flow Rate	ASTM D 4491
Permeability	ASTM D 4491
Permittivity	ASTM D 4491
U.V. Resistance	ASTM D 4355
Apparent Opening Size (A.O.S.)	ASTM D 4751

Quality Control Test Results

All Quality Control test results shall be maintained by the Quality Control Manager with the corresponding shipment roll identification.

The Quality Control Manager will make lot testing summaries available upon request detailing the individual test results and aggregate mean, minimum and standard deviations of each test property for the shipment rolls under consideration.

TNS ADVANCED TECHNOLOGIES

QUALITY CONTROL
PROGRAM OUTLINE

Raw Material Quality Control

All raw materials used in the manufacturing of Advanced Technologies' products are certified by the supplier to meet the most stringent production standards in the industry. Each truckload of fiber received is certified by the resin supplier's Quality Control Manager to meet specifications set by Advanced Technologies. Upon delivery and unloading to Advanced Technologies, each bale is entered into the plant's computer tracking system. All fiber releases to production can be tracked by supplier and individual bale number for up to one year after the fiber is processed.

Definition of Lot

A planned production quantity satisfying all of the following:

- Manufactured under the same material specification.
- Identified as the same style (fabric designation).
- When tested, having physical characteristics consistent with published values.

Quality Control Sampling of Each Lot

As a minimum, a number of production units shall be selected at random from each lot in accordance with TABLE 1.

TABLE 1
Number of Units to be Selected as Lot Sample
Specification Conformance

Number of Units in Lot	Number of Units Selected
1 to 2	1
3 to 8	2
9 to 27	3
28 to 64	4
65 to 125	5
126 to 216	6
217 to 343	7
344 to 512	8
513 to 729	9
730 to 1000	10
1001 or more	11

Note: A production unit is considered to be a shipment roll.

1441-OPT2-002

TNS Advanced Technologies

405 Hood Rd.
Lilburn, GA 30047
Phone: 770/564-1857 Fax: 770/564-1818

TNS ADVANCED TECHNOLOGIES

TNS Advanced Technologies, a subsidiary of TNS Mills has been manufacturing nonwoven needlepunched polypropylene geotextiles in Greer, South Carolina since 1992. Our modern facility features the finest, most advanced nonwoven manufacturing equipment available in the world today. Three nonwoven geotextile lines produce up to 32 million pounds of finished product per yer. Daily production rates for the plant are up to 84,000 pounds of material.

1441-OPT2-002

TNS
ADVANCED TECHNOLOGIES

9855 Greenville Highway
Building F
Spartanburg, SC 29301
800-867-5181
fax: 864-949-6222

941

November 13, 2001

ECDC
7400 Willey Road
Fernald, OH 45013

Re: Project 20104, Option #2
(Cell 4 and 5 Liner)

Gentlemen:

With respect to Supplier Contract E99SC001441, TNS Advanced Technologies hereby certifies to deliver all required nonwoven geotextiles to this site beginning March 24, 2002 and finishing no later than April 21, 2002.

Sincerely,

Richard J. Franklin
TNS Advanced Technologies, Inc.

SUPPLIER DOCUMENT SUBMITTAL ACR-001

FLUOR FERNALD, PROJECT NO.: (1)	CONTRACT NO: (2)	SUBMITTAL NO.:(3)	REV.:(4)	DATE:(5)	Page ___ of ___ (6)
20104	1441	1441/2-02714P-003	2	12-20-01	

FROM: AJS ADVANCED TECHNOLOGIES, INC.

TO: FLUOR FERNALD ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7(8)

(7) SIGNATURE: Richard J. Franklin

RECEIVED BY: Jilma Kraus DATE: 12/27/01

QTY (9)	DOCUMENT NUMBER (10)	REV (11)	PRO (12)	H&S (12)	MED (12)	TRG (12)	CON (12)	ENG (12)	QAC (12)	OPER (12)	TITLE/DESCRIPTION (13)	SUBMITTAL TYPE DRFT (14)	CFC (14)	INF (14)	ASSOCIATED SPECIFICATION (15)	SUBMITTAL ACTION A (16)	B (16)	C (16)
			DOCUMENT FAMILY															
6	1441-OPT2-003	2							X		CERTIFICATION OF MINIMUM AVERAGE ROLL VALUES		X		02714P, 1.04.A.3	X		

REVIEW DISTRIBUTION

NAME (17)	MS (18)	NAME (17)	MS (18)	NAME (17)	MS (18)
Mike Godber (Approver)	64				
Chuck Van Arsdale ✓	64				
Kwasi Badu-Tweneboah ✓	38				
Bill Zebick	64				

NO COMMENTS: ✓ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS) (19)

ORIGINAL

4941

001062

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

James T. Turner for Michael W. Godber 07 January 2002

SUBMITTAL TYPE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD

SUBMITTAL ACTION CODE: (BY FLUOR FERNALD)

A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit

1441-OPT2-003

TNS
ADVANCED TECHNOLOGIES

9855 Greenville Highway
Building F
Spartanburg, SC 29301
800-867-5181
fax: 864-949-6222

4941

November 16, 2001
REF: TNS E100

Flour Fernald, Inc.

Dear Sir/Madam:

This is to certify that TNS E100 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E100 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E100 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	10.0
Grab Tensile	ASTM D 4632	lbs	225
Trap Tear	ASTM D 4533	lbs	90
Puncture	ASTM D 4833	lbs	120
Mullen Burst	ASTM D 3786	psi	450
U.V. Resistance	ASTM D 4355	% retained	70

Sincerely,
Marshall O. Gaddy
Marshall O. Gaddy
Quality Control Manager

(X) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: Date: 07 January 2002

INFORMATION ONLY

001063

1441-OPT2-003

TNS
ADVANCED TECHNOLOGIES

9855 Greenville Highway
Building F
Spartanburg, SC 29301
800-867-5181
fax: 864-949-6222

4941

November 6, 2001
REF: TNS E070

Flour Fernald, Inc.

Dear Sir/Madam:

This is to certify that TNS E070 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E070 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E070 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D5261	oz/sy	7.0
Grab Tensile	ASTM D4632	lbs	180
Trap Tear	ASTM D4533	lbs	75
Puncture	ASTM D4833	lbs	75
Mullen Burst	ASTM D3786	psi	350
A.O.S.	ASTM D4751	mm	.212 (max)
Permittivity	ASTM D4491	1/sec	0.5
U.V. Resistance	ASTM D4355	% retained	70

Sincerely,

Marshall O. Gaddy

Marshall O. Gaddy
Quality Control Manager

1441-OPT2-003

TNS
ADVANCED TECHNOLOGIES

9855 Greenville Highway
Building F
Spartanburg, SC 29301
800-867-5181
fax: 864-949-6222

4941

November 6, 2001
REF: TNS E160

Fluor Fernald, Inc.

Dear Sir/Madam:

This is to certify that TNS E160 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E160 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E160 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D5261	oz/sy	16.0
Grab Tensile	ASTM D4632	lbs	350
Grab Elongation	ASTM D4632	%	50
Trap Tear	ASTM D4533	lbs	120
Puncture	ASTM D4833	lbs	180
Mullen Burst	ASTM D3786	psi	700
U.V. Resistance	ASTM D4355	%	70

Sincerely,

Marshall O. Gaddy

Marshall O. Gaddy
TNS Advanced Technologies

SUPPLIER DOCUMENT SUBMITTAL ACR-001

QA 11/16/01

FLUOR FERNALD, PROJECT NO.: (1)	CONTRACT NO: (2)	SUBMITTAL NO.:(3)	REV.:(4)	DATE:(5)	Page (6) of
20104	1441	1441/2-2714P-004	0	10-31-01	—

FROM: TRS ADVANCED TECHNOLOGIES, INC. (7)

SIGNATURE: Richard J Franklin

TO: FLUOR FERNALD ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7(8)

RECEIVED BY: Jelma Kraus DATE: 11/20/01

QTY (9)	DOCUMENT NUMBER (10)	REV (11)	DOCUMENT FAMILY PRO (12)	H&S (12)	MED (12)	TRG (12)	CON (12)	ENG (12)	QAC (12)	OPER (12)	TITLE/DESCRIPTION (13)	SUBMITTAL TYPE DRFT (14)	CFC (14)	INF (14)	ASSOCIATED SPECIFICATION (15)	SUBMITTAL ACTION A (16)	B (16)	C (16)
		02714P JAC 11/26/01																
6	1441-OPT2-004	0					X				PROJECTED DELIVERY DATES			X		X		

REVIEW DISTRIBUTION

NAME (17)	MS (18)	NAME (17)	MS (18)	NAME (17)	MS (18)
Bill Zebick - Approver	64				
Kwasi Badu - Fluorboard	38				
Greg Johnson	64				
Chuck Van Arsdale	64				
Mike Hodber	64				

NO COMMENTS: ✓ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS) (19)

001066

ORIGINAL

4941

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

For WAB 12/05/01

SUBMITTAL TYPE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD

SUBMITTAL ACTION CODE: (BY FLUOR FERNALD)

A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit

4941

TNS
ADVANCED TECHNOLOGIES

9855 Greenville Highway
Building F
Spartanburg, SC 29301
800-867-5181
fax: 864-949-6222

November 13, 2001

ECDC
7400 Willey Road
Fernald, OH 45013

Re: Project 20104, Option #2
(Cell 4 and 5 Liner)

Gentlemen:

With respect to Supplier Contract E99SC001441, TNS Advanced Technologies hereby certifies to deliver all required nonwoven geotextiles to this site beginning March 24, 2002 and finishing no later than April 21, 2002.

Sincerely,

Richard J. Franklin
TNS Advanced Technologies, Inc.

[ ]A - Conforms to the Subcontract Requirements
[ ]B - Minor Comment - Incorporate and Resubmit
[ ]C - Revise and Resubmit
Sig: _____ Date: 12/06/01

INFORMATION ONLY

001067

SUPPLIER DOCUMENT SUBMITTAL ACR-001

FLUOR FERNALD, PROJECT NO.: (1)	CONTRACT NO: (2)	SUBMITTAL NO.:(3)	REV.:(4)	DATE:(5)	Page (6) of
20104	1441	1441/2-027148-005	0	10-31-01	

FROM: TRS ADVANCED TECHNOLOGIES, INC.

SIGNATURE: Richard J. Franklin (7)

TO: FLUOR FERNALD ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7(8)

RECEIVED BY: [signature] DATE: 11/13/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION A	B	C
(9)	(10) 9A 11/13/01 -027148	(11)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(13)	(14)	(14)	(14)	(15)	(16)	(16)	(16)
6	1441-OPT2-005	0					X				LONG TERM STORAGE REQUIREMENTS			X		X		

REVIEW DISTRIBUTION

NAME (17)	MS (18)	NAME (17)	MS (18)	NAME (17)	MS (18)
Bill Zebick-Approver	64				
Kwasi Badu-Tweneboah	38				
Gregg Johnson	64				
Chuck VanArsdale	64				
Mike Godber	64				

NO COMMENTS: ✓ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS) (19)

ORIGINAL

001068

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

Bill Zebick 11/28/01

SUBMITTAL TYPE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD

SUBMITTAL ACTION CODE: (BY FLUOR FERNALD)

A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit

4941

1441-OPT9-005

4941

[✓] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: Date: 11/26/01

TNS MILLS, INC.

Geotextile Division

INFORMATION ONLY

Installation Procedure
Geotextile Fabrics

I. Geotextile Unloading & Storage:

A. The geotextile shall be labeled, stored, and handled in accordance with ASTM D 4873, "Guide for Identification, Storage and Handling of Geotextiles".

B. Geotextile rolls are to be unloaded under supervision of the geotextile installer using straps or other devices that will prevent damage to the geotextile material.

C. The geotextile shall be kept dry and wrapped in a waterproof wrapping so that it is protected from UV light and the elements during shipping and storage. Torn wrapping shall be repaired within 48 hours using an approved protective covering.

D. Rolls should be stored on supports that will not damage the material. The material must be elevated at least 2 inches above the sub grade.

E. If any material is found to be damaged during unloading, a notation should be made as to the roll number, location of damage and type. This information should be given to the Project Manager.

SUPPLIER DOCUMENT SUBMITTAL ACR-001

FLUOR FERNALD PROJECT NO.: (1) 20124

CONTRACT NO: (2) 1441

SUBMITTAL NO.:(3) 1441/2-27HP-006

REV.:(4) 10 11/26

DATE:(5) 10-31-01

Page (6) — of

FROM: TDS INNOVATED TECHNOLOGIES, INC. (7)

SIGNATURE: Richard J Frankl

TO: FLUOR FERNALD ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7(8)

RECEIVED BY: Jelma Kraus DATE: 11/20/01

QTY (9)	DOCUMENT NUMBER (10)	REV (11)	DOCUMENT FAMILY PRO (12)	H&S (12)	MED (12)	TRG (12)	CON (12)	ENG (12)	QAC (12)	OPER (12)	TITLE/DESCRIPTION (13)	SUBMITTAL TYPE DRFT (14)	CFC (14)	INF (14)	ASSOCIATED SPECIFICATION (15)	SUBMITTAL ACTION A (16)	B (16)	C (16)
6	1441-OPT2-006 (02HP JAK 11/26/01)	01	11/26/01					X			Completed Form GT 10		X			X		

REVIEW DISTRIBUTION

NAME (17)	MS (18)	NAME (17)	MS (18)	NAME (17)	MS (18)
Chuck Van Ausdale-Appauer	64				
Peggy Johnson	64				
Bill Zebnick	64				
Mike Hooker	64				
Kwasi-Badu-Duneboah	38				

NO COMMENTS: ✓ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS) (19)

001070

12/12/01

ORIGINAL

4941

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD

SUBMITTAL ACTION CODE: (BY FLUOR FERNALD)

A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit

1441-OPT2-006

TABLE GT-10 TECHNICAL INFORMATION FOR 10.0 OZ GEOTEXTILE
REQUISITION #F99SC001441

Refer to Specification Section 02714P

4941

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				
NONWOVEN NEEDLEPUNCHED				
POLYMER COMPOSITION		95% Polypropylene or polyester by wgt, min	YES	
MASS PER UNIT AREA	D5261	10 oz/sy, min	YES	
ROLL SIZE		15ft wide, min	YES	Preferred length 450 feet
RECLAIMED POLYMER		<20%	YES	
LOT SIZE		>100,000 SF	YES	
MECHANICAL PROPERTIES				
GRAB STRENGTH	D4632	225 lb, min	YES	
TEAR STRENGTH	D4533	90 lb, min	YES	
PUNCTURE STRENGTH	D4833	120 lb, min	YES	
BURST STRENGTH	D3786	450 psi, min	YES	
DURABILITY				
ULTRAVIOLET RESISTANCE	D4355	70%, min	YES	
INFORMATION REQUIRED TO BE PROVIDED WITH PROPOSAL				
PRODUCT NAME				
NAME & PHONE # OF CONTACT PERSON				
MANUFACTURING CAPABILITIES				
CERTICATION OF MARV AND				
CORRESPONDING TEST PROCEDURES				
STORAGE REQUIREMENTS				
MATERIAL SAFETY DATA SHEETS				
MANUFACTURER WARRANTY				
TESTING INTERVAL	MAX		YES	
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	1,600,000 SF			

Richard J. Franklin — Signature

11-14-01 — Date

001071

NAME OF OFFEROR

INFORMATION ONLY

Revised: 10/5/2001

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit

Sig: [illegible] Date: 12/12/01

SUPPLIER DOCUMENT SUBMITTAL ACR-001

FLUOR FERNALD, PROJECT NO.: (1)	CONTRACT NO: (2)	SUBMITTAL NO.:(3)	REV.:(4)	DATE:(5)	Page (6) of
20104	1441	1441/2-08714P-006	0	10-31-01	

FROM: TRS ADVANCED TECHNOLOGIES, INC. (7)

SIGNATURE: Richard J. Franklin

TO: FLUOR FERNALD ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7(8)

RECEIVED BY: Jennifer L. Short DATE: 11/13/01

QTY	DOCUMENT NUMBER 11/13/01	REV	DOCUMENT FAMILY: PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
(9)	(10) -D2714P	(11)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(13)	(14)	(14)	(14)	(15)	(16)	(16)	(16)
6	1441-OPT2-006	0						X			COMPLETED FORM GT-7 AND GT16			X				X

REVIEW DISTRIBUTION

NAME (17)	MS (18)	NAME (17)	MS (18)	NAME (17)	MS (18)
Chuck VanArsdale - Approver	64				
Gregg Johnson	64				
Bill Zebick	64				
Mike Godber	64				
Kwasi Badu-Tweneboah	38				

NO COMMENTS: _____ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS) (19)

No data on 10 oz. geotextile, Fill out all lines on forms.

ORIGINAL

001072

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

Chuck VanArsdale 11/16/01

SUBMITTAL TYPE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD

SUBMITTAL ACTION CODE: (BY FLUOR FERNALD)

A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit

4941

TABLE GT-16 TECHNICAL INFORMATION FOR 16.0 OZ GEOTEXTILE
REQUISITION #F99SC001441

1441-OPT2-006

Refer to Specification Section 02714P

4941

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				
NONWOVEN NEEDLEPUNCHED			YES	
POLYMER COMPOSITION		95% Polypropylene or polyester by wgt, min	YES	
MASS PER UNIT AREA	D5261	16 oz/sy, min	YES	
ROLL SIZE		15ft wide, min	YES	Preferred length 450 feet
RECLAIMED POLYMER		<20%	YES	
LOT SIZE		>100,000 SF	YES	
MECHANICAL PROPERTIES				
GRAB STRENGTH	D4632	350 lb, min	YES	
TEAR STRENGTH	D4533	120 lb, min	YES	
PUNCTURE STRENGTH	D4833	180 lb, min	YES	
BURST STRENGTH	D3786	700 psi, min	YES	
DURABILITY				
ULTRAVIOLET RESISTANCE	D4355	70%, min	YES	
INFORMATION REQUIRED TO BE PROVIDED WITH PROPOSAL				
PRODUCT NAME				
NAME & PHONE # OF CONTACT PERSON				
MANUFACTURING CAPABILITIES				
CERTICATION OF MARV AND				
CORRESPONDING TEST PROCEDURES				
STORAGE REQUIREMENTS				
MATERIAL SAFETY DATA SHEETS				
MANUFACTURER WARRANTY				
TESTING INTERVAL	MAX			
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	136,000 SF			

Richard J Franklin — 10-31-01

Signature — Date

NAME OF OFFEROR

Revised: 10/5/2001

001073

INFORMATION ONLY

[ ] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[X] C - Revise and Resubmit
Sig: [illegible] Date: 11/16/01

TABLE GT-16.xls

1741-UP72-006

TABLE GT-7 TECHNICAL INFORMATION FOR 7.0 OZ GEOTEXTILE FILTER
REQUISITION #F99SC001441

Refer to Specification Section 02714P

4941

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				
NONWOVEN NEEDLEPUNCHED				
POLYMER COMPOSITION		95% Polypropylene or polyester by wgt, min	YES	
MASS PER UNIT AREA	D5261	7 oz/sy, min	YES	
ROLL SIZE		15ft wide, min	YES	Preferred length 450 feet
RECLAIMED POLYMER		<20%	YES	
LOT SIZE		>100,000 SF	YES	
FILTER PROPERTIES				
APPARENT OPENING SIZE	D4751	0.212 mm, max	YES	
PERMITTIVITY	D4491	0.5 sec^{-1}, min	YES	
MECHANICAL PROPERTIES				
GRAB STRENGTH	D4632	180 lb, min	YES	
TEAR STRENGTH	D4533	75 lb, min	YES	
PUNCTURE STRENGTH	D4833	75 lb, min	YES	
BURST STRENGTH	D3786	350 psi, min	YES	
DURABILITY				
ULTRAVIOLET RESISTANCE	D4355	70%, min	YES	
INFORMATION REQUIRED TO BE PROVIDED WITH PROPOSAL				
PRODUCT NAME				
[illegible] & PHONE # OF CONTACT PERSON				
[illegible]UFACTURING CAPABILITIES				
CERTICATION OF MARV AND				
CORRESPONDING TEST PROCEDURES				
STORAGE REQUIREMENTS				
MATERIAL SAFETY DATA SHEETS				
MANUFACTURER WARRANTY				
TESTING INTERVAL	MAX		YES	
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			
Scheduled Delivery Dates				
Total Quantity	970,000 SF			

Richard J. Franklin 10-31-01

Signature Date

001074

NAME OF OFFEROR

Revised: 10/5/2001

SUPPLIER DOCUMENT SUBMITTAL ACR-001

FLUOR FERNALD PROJECT NO.: (1)	CONTRACT NO: (2)	SUBMITTAL NO.:(3)	REV.:(4)	DATE:(5)	Page (6) of
20104	1441	1441/2-2714P-007	2	12-26-01	—

FROM: TDS ADVANCED TECHNOLOGIES, INC.

SIGNATURE: Richard J Franklin (7)

TO: FLUOR FERNALD ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7(8)

RECEIVED BY: Jerma Kraus DATE: 12/26/01

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION A	B	C
(9)	(10)	(11)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(13)	(14)	(14)	(14)	(15)	(16)	(16)	(16)
6	1441-OPT2-007 (2714P JAK 12/27/01)	2		X							MATERIAL SAFETY DATA SHEETS			X		X		

REVIEW DISTRIBUTION

NAME (17)	MS (18)	NAME (17)	MS (18)	NAME (17)	MS (18)
Gregg Johnson (Approver)	64				
Chuck Van Arsdale	64				
Kyasi Badu-Tweneboah	38				
Bill Zebroe	64				
Debra Grant	35				

NO COMMENTS ✓ COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS) (19)

001075

ORIGINAL

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

D. Grant for G. Johnson 12/31/01

SUBMITTAL TYPE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD

SUBMITTAL ACTION CODE: (BY FLUOR FERNALD)

A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit

4941

1441-OPT2-007

4941

TNS ADVANCED TECHNOLOGIES

9855 Greenville Highway
Building F
Spartanburg, SC 29301
800-867-5181
fax: 864-949-6222

November 6, 2001
REF: TNS E070

Flour Fernald, Inc.

Dear Sir/Madam:

This is to certify that TNS E070 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E070 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E070 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D5261	oz/sy	7.0
Grab Tensile	ASTM D4632	lbs	180
Trap Tear	ASTM D4533	lbs	75
Puncture	ASTM D4833	lbs	75
Mullen Burst	ASTM D3786	psi	350
A.O.S.	ASTM D4751	mm	.212 (max)
Permittivity	ASTM D4491	1/sec	0.5
U.V. Resistance	ASTM D4355	% retained	70

Sincerely,

Marshall O. Gaddy

Marshall O. Gaddy
Quality Control Manager

(X) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: S. Grant for G. Johnson Date: 12-31-01

INFORMATION ONLY

1441-OPD 2-a
4941

TNS Advanced Technologies, Inc.

Material Safety Data Sheet for Nonwoven Geotextiles

Section 1–Product Identification

Manufacturer's Name:

TNS Advanced Technologies, Inc.
681 DeYoung Road
Greer, South Carolina 29651

Emergency Phone Number: 800-867-5181 [864-968-0592]

Date prepared: May 29, 1997

Section 2–Hazardous Ingredients

No hazardous components in geotextile fabrics at or above threshold limit values.

Section 3–Physical/Chemical Characteristics

Boiling Point:	Not Applicable
Vapor Pressure:	Not Applicable
Specific Gravity:	0.90 – 0.905
Melting Point:	120 – 170 Degrees (C)
Vapor Density:	Not Applicable
Evaporation Rate:	Not Applicable
Solubility in Water:	Not Applicable
Appearance and Odor:	Essentially Odorless

1441-OPT2-0

Section 4—Fire and Explosion Hazard Data

Flash Point:	>600 degrees (F)
Extinguishing Media:	Dry Chemical, CO^2, Foam, Water, Halon
Special Fire Fighting Procedures:	Avoid inhalation of vapors, use self contained breathing apparatus when fire fighting in confined areas.
Unusual Fire and Explosion Hazards:	Treat as a solid that can burn. Generally burns slowly with low smoke density and flaming drips. Burns with high smoke density under certain conditions.

Section 5—Reactivity Data

Material is stable.

Hazardous Polymerization will not occur.

Section 6—Health Hazard Data

Primary Routes of Entry:	Inhalation-Negligible Skin Contact-Negligible Indigestion-Not Applicable
Carcinogen:	Not a carcinogen
Emergency and First Aid Procedure:	Eye Contact: flush with water. Skin Contact: treat as thermal burn if contact with molten.

Section 7—Precautions for Handling and Use

Practice reasonable care and caution in handling.

Waste Disposal:	Place in appropriate disposal facility in compliance with local regulations.
Storage:	In cool, dry location away from oxidizing materials.

Section—8 Control Measures

Use NIOSH respirators when hot/molten product.

Protective Gloves:	Required when handling molten product.

Practice general hygiene by washing hands and clothes after handling.

1441-OPT2-00
4941

TNS
ADVANCED TECHNOLOGIES

9855 Greenville Highway
Building F
Spartanburg, SC 29301
800-867-5181
fax: 864-949-6222

November 16, 2001
REF: TNS E100

Flour Fernald, Inc.

Dear Sir/Madam:

This is to certify that TNS E100 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E100 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E100 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	10.0
Grab Tensile	ASTM D 4632	lbs	225
Trap Tear	ASTM D 4533	lbs	90
Puncture	ASTM D 4833	lbs	120
Mullen Burst	ASTM D 3786	psi	450
U.V. Resistance	ASTM D 4355	% retained	70

Sincerely,
Marshall O. Gaddy
Marshall O. Gaddy
Quality Control Manager

1441-OPT 2-00

TNS Advanced Technologies, Inc.

4941

Material Safety Data Sheet for Nonwoven Geotextiles

Section 1–Product Identification

Manufacturer's Name:

TNS Advanced Technologies, Inc.
681 DeYoung Road
Greer, South Carolina 29651

Emergency Phone Number: 800-867-5181 [864-968-0592]

Date prepared: May 29, 1997

Section 2–Hazardous Ingredients

No hazardous components in geotextile fabrics at or above threshold limit values.

Section 3–Physical/Chemical Characteristics

Boiling Point:	Not Applicable
Vapor Pressure:	Not Applicable
Specific Gravity:	0.90 – 0.905
Melting Point:	120 – 170 Degrees (C)
Vapor Density:	Not Applicable
Evaporation Rate:	Not Applicable
Solubility in Water:	Not Applicable
Appearance and Odor:	Essentially Odorless

1441-OPT2-0C

Section 4—Fire and Explosion Hazard Data

Flash Point:	>600 degrees (F)
Extinguishing Media:	Dry Chemical, CO^2, Foam, Water, Halon
Special Fire Fighting Procedures:	Avoid inhalation of vapors, use self contained breathing apparatus when fire fighting in confined areas.
Unusual Fire and Explosion Hazards:	Treat as a solid that can burn. Generally burns slowly with low smoke density and flaming drips. Burns with high smoke density under certain conditions.

Section 5—Reactivity Data

Material is stable.

Hazardous Polymerization will not occur.

Section 6—Health Hazard Data

Primary Routes of Entry:	Inhalation-Negligible Skin Contact-Negligible Indigestion-Not Applicable
Carcinogen:	Not a carcinogen
Emergency and First Aid Procedure:	Eye Contact: flush with water. Skin Contact: treat as thermal burn if contact with molten.

Section 7—Precautions for Handling and Use

Practice reasonable care and caution in handling.

Waste Disposal:	Place in appropriate disposal facility in compliance with local regulations.
Storage:	In cool, dry location away from oxidizing materials.

Section—8 Control Measures

Use NIOSH respirators when hot/molten product.

Protective Gloves:	Required when handling molten product.

Practice general hygiene by washing hands and clothes after handling.

1441-OPT2-007

4941

TNS ADVANCED TECHNOLOGIES

9855 Greenville Highway
Building F
Spartanburg, SC 29301
800-867-5181
fax: 864-949-6222

November 6, 2001
REF: TNS E160

Fluor Fernald, Inc.

Dear Sir/Madam:

This is to certify that TNS E160 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E160 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E160 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D5261	oz/sy	16.0
Grab Tensile	ASTM D4632	lbs	350
Grab Elongation	ASTM D4632	%	50
Trap Tear	ASTM D4533	lbs	120
Puncture	ASTM D4833	lbs	180
Mullen Burst	ASTM D3786	psi	700
U.V. Resistance	ASTM D4355	%	70

Sincerely,

Marshall O. Gaddy

Marshall O. Gaddy
TNS Advanced Technologies

1441-OPT 2-a

TNS Advanced Technologies, Inc.

4941

Material Safety Data Sheet for Nonwoven Geotextiles

Section 1–Product Identification

Manufacturer's Name:

TNS Advanced Technologies, Inc.
681 DeYoung Road
Greer, South Carolina 29651

Emergency Phone Number: 800-867-5181 [864-968-0592]

Date prepared: May 29, 1997

Section 2–Hazardous Ingredients

No hazardous components in geotextile fabrics at or above threshold limit values.

Section 3–Physical/Chemical Characteristics

Boiling Point:	Not Applicable
Vapor Pressure:	Not Applicable
Specific Gravity:	0.90 – 0.905
Melting Point:	120 – 170 Degrees (C)
Vapor Density:	Not Applicable
Evaporation Rate:	Not Applicable
Solubility in Water:	Not Applicable
Appearance and Odor:	Essentially Odorless

1441-OPT2-0

Section 4—Fire and Explosion Hazard Data

Flash Point:	>600 degrees (F)
Extinguishing Media:	Dry Chemical, CO^2, Foam, Water, Halon
Special Fire Fighting Procedures:	Avoid inhalation of vapors, use self contained breathing apparatus when fire fighting in confined areas.
Unusual Fire and Explosion Hazards:	Treat as a solid that can burn. Generally burns slowly with low smoke density and flaming drips. Burns with high smoke density under certain conditions.

Section 5—Reactivity Data

Material is stable.

Hazardous Polymerization will not occur.

Section 6—Health Hazard Data

Primary Routes of Entry:	Inhalation-Negligible Skin Contact-Negligible Indigestion-Not Applicable
Carcinogen:	Not a carcinogen
Emergency and First Aid Procedure:	Eye Contact: flush with water. Skin Contact: treat as thermal burn if contact with molten.

Section 7—Precautions for Handling and Use

Practice reasonable care and caution in handling.

Waste Disposal:	Place in appropriate disposal facility in compliance with local regulations.
Storage:	In cool, dry location away from oxidizing materials.

Section—8 Control Measures

Use NIOSH respirators when hot/molten product.

Protective Gloves:	Required when handling molten product.

Practice general hygiene by washing hands and clothes after handling.

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104

CONTRACT NO: 1441

SUBMITTAL NO: 1441/2-2774P-009 REV.: 2 DATE: 3-27-02 Page 1 of 1

FROM: THE ADVANCED TECHNOLOGIES

SIGNATURE: FOR: RICK FRANKLIN

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 527

RECEIVED BY: Teresa Schwab DATE: 4/2/02

QTY	DOCUMENT NUMBER	REV	PRO	MAS	MED	TRO	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	SUBMITTAL TYPE: DRFT	CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION: A	B	C
6	1441/2-2774P-009								X		QUALITY CONTROL CERTIFICATES - CONCRETE -				—	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Mike Godber - Approver	104				
Chuck VanArsdale	104				
Kwasi Badu-Tweneboah	33				
Bill Zebick	104				

NO COMMENTS COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR DUPLICATE ATTACHMENTS)

RECEIVED BY: Michael [illegible] DATE: 4/6/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 527)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Submittal Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

ORIGINAL

4941

Nevown, Inc.

[illegible]1 DeYoung Road Greer, SC 29651
[illegible]: (864)968-0592 Fax: (864) 879-4639

TNS Advanced Technologies
A Nevown Company
9855 Greenville Highway Building F Spartanburg, SC 29301
Phone: (864) 949-1006 (800) 867-5181 Fax: (864) 949-6222

03/19/2002
REF: TNS E070

Flour Fernald, Inc.

Dear Sir/Madam:

This is to certify that TNS E070 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E070 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E070 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	7.0
Grab Tensile	ASTM D 4632	lbs	180
Trap Tear	ASTM D 4533	lbs	75
Puncture	ASTM D 4833	lbs	75
Mullen Burst	ASTM D 3786	psi	350
A.O.S.	ASTM D 4751	mm	.212 (max)
Permittivity	ASTM D 4491	1/sec	0.5
U.V. Resistance	ASTM D 4355	% retained	70

INFORMATION ONLY

Marshall O. Gaddy
Marshall O. Gaddy
Quality Control Manager

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: [signature] Date: 4/15/02

001086

Nevown, Inc.
DeYoung Road Greer, SC 29651
(864)968-0592 Fax: (864) 879-4639

TNS Advanced Technologies
A Nevown Company
9855 Greenville Highway Building F Spartanburg, SC 29301
Phone: (864) 949-1006 (800) 867-5181 Fax: (864) 949-6222

4941

03/19/2002
REF: TNS E100

Flour Fernald, Inc

Dear Sir/Madam:

This is to certify that TNS E100 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E100 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E100 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	10.0
Grab Tensile	ASTM D 4632	lbs	225
Trap Tear	ASTM D 4533	lbs	90
Puncture	ASTM D 4833	lbs	120
Mullen Burst	ASTM D 3786	psi	450
U.V. Resistance	ASTM D 4355	% retained	70

Marshall O. Gaddy
Marshall O. Gaddy
Quality Control Manager

001087

Nevown, Inc.
DeYoung Road Greer, SC 29651
(864)968-0592 Fax: (864) 879-4639

TNS Advanced Technologies
A Nevown Company
9855 Greenville Highway Building F Spartanburg, SC 29301
Phone: (864) 949-1006 (800) 867-5181 Fax: (864) 949-6222

03/19/2002
REF: TNS E160

Flour Fernald, Inc.

Dear Sir/Madam:

This is to certify that TNS E160 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E160 meets or exceeds the project specifications for the above referenced project. TNS E160 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E160 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	16.0
Grab Tensile	ASTM D 4632	lbs	350
Grab Elongation	ASTM D 4632	%	50
Trap Tear	ASTM D 4533	lbs	120
Puncture	ASTM D 4833	lbs.	180
Mullen Burst	ASTM D 3786	psi	700
U.V. Resistance	ASTM D 4355	%	70

Marshall O. Gaddy
Marshall O. Gaddy
Quality Control Manager

E070 180" 450'

Roll List
Flour Fernald

4941

1	300083066	51	300083116	101	300083168
2	300083067	52	300083117	102	300083169
3	300083068	53	300083118	103	300083170
4	300083069	54	300083119	104	300083171
5	300083070	55	300083120	105	300083172
6	300083071	56	300083121	106	300083173
7	300083072	57	300083122	107	300083174
8	300083073	58	300083123	108	300083175
9	300083074	59	300083124	109	300083176
10	300083075	60	300083125	110	300083177
11	300083076	61	300083126	111	300083178
12	300083077	62	300083127	112	300083179
13	300083078	63	300083128	113	300083180
14	300083079	64	300083129	114	300083181
15	300083080	65	300083130	115	300083182
16	300083081	66	300083131	116	300083183
17	300083082	67	300083132	117	300083184
18	300083083	68	300083133	118	300083185
19	300083084	69	300083135	119	300083186
20	300083085	70	300083137	120	300083187
21	300083086	71	300083138	121	300083188
22	300083087	72	300083139	122	300083189
23	300083088	73	300083140	123	300083190
24	300083089	74	300083141	124	300083191
25	300083090	75	300083142	125	300083192
26	300083091	76	300083143	126	300083193
27	300083092	77	300083144	127	300083194
28	300083093	78	300083145	128	300083195
29	300083094	79	300083146	129	300083196
30	300083095	80	300083147	130	300083197
31	300083096	81	300083148	131	300083198
32	300083097	82	300083149	132	300083199
33	300083098	83	300083150	133	300083200
34	300083099	84	300083151	134	300083201
35	300083100	85	300083152	135	300083202
36	300083101	86	300083153	136	300083203
37	300083102	87	300083154	137	300083204
38	300083103	88	300083155	138	300083205
39	300083104	89	300083156	139	300083206
40	300083105	90	300083157	140	300083207
41	300083106	91	300083158	141	300083208
42	300083107	92	300083159	142	300083209
43	300083108	93	300083160	143	300083210
44	300083109	94	300083161	144	300083211
45	300083110	95	300083162		
46	300083111	96	300083163		
47	300083112	97	300083164		
48	300083113	98	300083165		
49	300083114	99	300083166		
50	300083115	100	300083167		

E100 180" 450' Koll List
Flour Fernald

4941

1	200120839	51	200120890	101	200120942	151	300083259	201	300083310
2	200120840	52	200120891	102	200120943	152	300083260	202	300083311
3	200120841	53	200120892	103	200120944	153	300083261	203	300083312
4	200120842	54	200120893	104	200120945	154	300083262	204	300083313
5	200120843	55	200120894	105	200120946	155	300083263	205	300083314
6	200120845	56	200120895	106	200120947	156	300083264	206	300083315
7	200120846	57	200120896	107	200120948	157	300083265	207	300083316
8	200120847	58	200120897	108	200120949	158	300083266	208	300083317
9	200120848	59	200120898	109	200120950	159	300083267	209	300083318
10	200120849	60	200120899	110	200120951	160	300083268	210	300083319
11	200120850	61	200120900	111	200120952	161	300083269	211	300083320
12	200120851	62	200120901	112	200120953	162	300083270	212	300083321
13	200120852	63	200120902	113	200120954	163	300083271	213	300083322
14	200120853	64	200120903	114	200120955	164	300083272	214	300083323
15	200120854	65	200120905	115	200120956	165	300083273	215	300083324
16	200120855	66	200120906	116	200120957	166	300083274	216	300083325
17	200120856	67	200120907	117	200120960	167	300083275	217	300083326
18	200120857	68	200120908	118	200120961	168	300083276	218	300083327
19	200120858	69	200120909	119	200120962	169	300083278	219	300083328
20	200120859	70	200120910	120	200120963	170	300083279	220	300083329
21	200120860	71	200120911	121	200120964	171	300083280	221	300083330
22	200120861	72	200120912	122	200120965	172	300083281	222	300083331
23	200120862	73	200120913	123	200120966	173	300083282	223	300083332
24	200120863	74	200120914	124	200120967	174	300083283	224	300083333
25	200120864	75	200120915	125	200120968	175	300083284	225	300083334
26	200120865	76	200120916	126	200120969	176	300083285	226	300083335
27	200120866	77	200120917	127	200120970	177	300083286	227	300083336
28	200120867	78	200120918	128	200120971	178	300083287	228	300083337
29	200120868	79	200120919	129	200120972	179	300083288	229	300083338
30	200120869	80	200120920	130	200120973	180	300083289	230	300083339
31	200120870	81	200120921	131	200120974	181	300083290	231	300083340
32	200120871	82	200120922	132	200120975	182	300083291	232	300083341
33	200120872	83	200120923	133	200120976	183	300083292	233	300083342
34	200120873	84	200120924	134	200120977	184	300083293	234	300083343
35	200120874	85	200120925	135	200120978	185	300083294	235	300083344
36	200120875	86	200120926	136	200120980	186	300083295	236	300083345
37	200120876	87	200120927	137	200120981	187	300083296	237	300083346
38	200120877	88	200120928	138	200120982	188	300083297		
39	200120878	89	200120929	139	200120983	189	300083298		
40	200120879	90	200120930	140	200120984	190	300083299		
41	200120880	91	200120931	141	200120985	191	300083300		
42	200120881	92	200120933	142	200120986	192	300083301		
43	200120882	93	200120934	143	200120987	193	300083302		
44	200120883	94	200120935	144	200120988	194	300083303		
45	200120884	95	200120936	145	200120989	195	300083304		
46	200120885	96	200120937	146	200120990	196	300083305		
47	200120886	97	200120938	147	200120991	197	300083306		
48	200120887	98	200120939	148	300083256	198	300083307		
49	200120888	99	200120940	149	300083257	199	300083308		
50	200120889	100	200120941	150	300083258	200	300083309		

E160 180" 450' Roll List

Flour Fernald

4941

1 300083039
2 300083040
3 300083041
4 300083042
5 300083043
6 300083044
7 300083045
8 300083046
9 300083047
10 300083048
11 300083049
12 300083050
13 300083051
14 300083052
15 300083053
16 300083054
17 300083055
18 300083056
19 300083057
20 300083058
21 300083059

4941

TNS
Advanced Technologies

NONWOVEN QUALITY DATA

001092

Roll #'s	Style	Weight ASTM D 5261	Thck ASTM D 5199	Grab Tensile MD ASTM D 4632	Grab Tensile XMD ASTM D 4632	Elng MD ASTM D 4632	Elng XMD ASTM D 4632	Trap MD ASTM D4533	Trap XMD ASTM D4533	Punc Rest ASTM D 4833	Brst Strg ASTM D 3786	Permi-tivity ASTM D 4491	AOS ASTM D 4751
300083066	E070	7.0	116	192	185	72	78	116	119	118	385	2.83	0.212
300083073	E070	7.2	118	194	215	70	79	106	127	114	403		0.212
300083081	E070	7.3	119	190	203	67	77	122	133	125	411	2.4	
300083088	E070	7.1	118	185	238	76	73	99	139	131	396		0.212
300083095	E070	7.5	124	200	232	69	79	104	143	132	406	2.83	
300083102	E070	7.4	125	201	229	78	76	104	137	118	413		0.212
300083109	E070	7.1	118	183	220	73	77	90	135	133	365		
300083117	E070	7.2	119	184	225	99	78	90	135	111	391	1.79	0.212
300083124	E070	8.5	124	199	246	73	79	90	78	133	415	2.48	
300083132	E070	7.9	124	218	251	80	88	78	76	129	430		0.212
300083139	E070	7.9	133	220	242	85	87	111	163	136	433	2.34	
300083146	E070	7.7	133	188	240	77	81	103	157	116	413		
300083154	E070	8.0	130	193	258	74	83	114	153	140	434	2.36	
300083161	E070	8.2	129	208	273	80	79	101	156	144	444		0.212
300083169	E070	8.0	122	192	271	77	74	98	149	130	422	2.32	
300083176	E070	7.9	125	212	269	82	84	101	158	135	443		0.212
300083183	E070	7.8	121	213	275	80	88	96	142	125	428	2.86	
300083191	E070	7.9	122	204	259	87	83	105	169	147	431		0.212
300083198	E070	8.0	125	214	265	83	79	114	169	141	457	2.47	
300083204	E070	8.2	126	219	280	87	82	117	169	136	463		0.212
300083208	E070	8.2	126	215	260	85	78	113	186	148	442	2.62	

**AOS reports the maximum opening size value

1941

TNS
Advanced Technologies

NONWOVEN QUALITY DATA

001093

Roll #'s	Style	Weight ASTM D 5261	Thck ASTM D 5199	Grab Tensile MD ASTM D 4632	Grab Tensile XMD ASTM D 4632	Elng MD ASTM D 4632	Elng XMD ASTM D 4632	Trap MD ASTM D 4533	Trap XMD ASTM D 4533	Punc Rest ASTM D 4833	Brst Strg ASTM D 3786
300083039	E160	20.1	202	558	667	79	79	252	325	350	800
300083043	E160	17.0	181	437	570	75	74	190	310	300	800
300083049	E160	16.6	180	432	563	79	81	184	200	292	800
300083054	E160	16.8	191	435	554	75	75	127	182	289	800

***Burst test gauge maximum is 800 lbs.
***All test values exceed 800 lbs.

4941

TNS
Advanced Technologies

NONWOVEN QUALITY DATA

001094

Roll #'s	Style	Weight ASTM D 5261	Thck ASTM D 5199	Grab Tensile MD ASTM D 4632	Grab Tensile XMD ASTM D 4632	Elng MD ASTM D 4632	Elng XMD ASTM D 4632	Trap MD ASTM D 4533	Trap XMD ASTM D 4533	Punc Rest ASTM D 4833	Brst Strg ASTM D 3786
200120839	E100	10.4	145	260	306	65	68	127	185	201	613
200120846	E100	10.9	146	284	330	69	70	125	189	206	617
200120853	E100	10.3	144	265	316	67	72	145	174	187	556
200120861	E100	10.6	145	270	331	70	69	105	125	191	506
200120868	E100	10.5	147	288	320	72	70	139	175	190	519
200120875	E100	10.6	140	262	317	63	65	141	182	195	467
200120882	E100	10.7	146	255	315	68	80	133	186	198	630
200120890	E100	11.5	146	287	346	71	89	149	187	194	648
200120897	E100	10.7	147	271	347	78	84	133	174	194	594
200120905	E100	10.3	145	270	321	75	91	129	182	178	583
200120912	E100	11.0	110	272	357	84	96	95	107	188	589
200120920	E100	11.4	168	286	355	87	89	145	199	202	653
200120927	E100	10.6	168	270	319	67	92	153	177	161	614
200120935	E100	10.7	167	282	306	72	90	141	164	172	598
200120942	E100	11.0	168	301	320	73	91	132	168	197	610
200120950	E100	10.5	164	271	307	70	92	133	166	200	603
200120957	E100	10.5	167	297	295	74	91	121	153	210	586
200120964	E100	10.9	162	300	305	78	100	125	159	188	591
200120971	E100	10.4	153	290	287	73	93	125	153	190	581
200120980	E100	10.1	151	256	296	79	84	137	183	182	534
200120986	E100	10.8	151	294	317	75	86	153	197	184	590
300083256	E100	10.7	136	288	348	74	76	147	205	167	547
300083263	E100	10.6	136	306	320	67	81	145	182	174	568

4941

Roll #'s	Style	Weight	Thck	Grab Tensile MD	Grab Tensile XMD	Elng MD	Elng XMD	Trap MD	Trap XMD	Punc Rest	Brst Strg
		ASTM D 5261	ASTM D 5199	ASTM D 4632	ASTM D 4632	ASTM D 4632	ASTM D 4632	ASTM D 4533	ASTM D 4533	ASTM D 4833	ASTM D 3786
300083270	E100	10.2	132	304	266	56	86	152	153	171	563
300083278	E100	10.3	141	293	321	73	83	123	170	169	548
300083285	E100	10.1	139	312	302	68	96	138	156	167	527
300083292	E100	10.5	144	323	305	69	91	159	168	173	550
300083299	E100	10.1	143	303	303	75	90	153	171	172	529
300083307	E100	10.0	139	275	295	71	85	119	153	164	486
300083314	E100	10.1	140	281	307	71	87	110	157	178	523
300083322	E100	10.5	142	291	323	79	89	120	167	175	531
300083329	E100	10.5	146	294	305	78	84	108	147	177	549
300083337	E100	10.2	150	285	297	73	83	151	175	151	551
300083344	E100	10.3	150	290	291	73	86	142	183	173	559
300083346	E100	10.4	146	298	315	72	92	168	181	168	561

001095

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: 1441	SUBMITTAL NO. 20104-1441/2-02714P-009	REV.: 1	DATE: 7/9/02	Page 1 of 3

FROM:
TNS ADVANCED TECHNOLOGIES

SIGNATURE: Chuck Van Arsdale for Rick Franklin

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

RECEIVED BY: Teresa Schwab DATE: 7/9/02

			DOCUMENT FAMILY									SUBMITTAL TYPE				SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	DRFT	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
6	1441-OPT2-02714P-009	1							X		QUALITY CONTROL CERTS. (REPLACEMENT OF DAMAGED FILTER MATERIAL)		X		02714P.1.04.B	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Mike Grodber Approver	64				
Chuck VanArsdale	64				
Kwasi Badu-Tweneboah	38				
Bill Zebick	64				

NO COMMENTS: X COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

001096

RECEIVED BY: [signature] DATE: 7/14/02

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

ORIGINAL

49

Nevown, Inc.
601 DeYoung Road Greer, SC 29651
Ph: (864)968-0592 Fax: (864) 879-4639

TNS Advanced Techno
A Nevown Co
9855 Greenville Highway Building F Spartanburg, S
Phone: (864) 949-1006 (800) 867-5181 Fax: (864) 9

07/09/2002
REF: TNS E070

Flour Fernald, Inc.

This is to certify that TNS E070 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E070 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E070 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	7.0
Grab Tensile	ASTM D 4632	lbs	180
Grab Elongation	ASTM D 4632	%	50
Trap Tear	ASTM D 4533	lbs	75
Puncture	ASTM D 4833	lbs	75
Mullen Burst	ASTM D 3786	psi	350
A.O.S.	ASTM D 4751	mm	.212 (max)
Permittivity	ASTM D 4491	1/sec	0.5
U.V. Resistance	ASTM D 4355	% retained	70

INFORMATION ONLY

Marshall O. Gaddy
Marshall O. Gaddy
Quality Control Manager

(X) A - Conforms to the Subcontract Requirements
( ) B - Minor Comment - Incorporate and Resubmit
( ) C - Revise and Resubmit
Sig: Date: 7/31/02

001097

Advanced Technologies

NONWOVEN Q. . ITY DATA

Roll #'s	Style	Weight ASTM D 5261	Thick ASTM D 5199	Grab Tensile MD ASTM D 4632	Grab Tensile XMD ASTM D 4632	Elng MD ASTM D 4632	Elng XMD ASTM D 4632	Trap MD ASTM D4533	Trap XMD ASTM D4533	Punc Rest ASTM D 4833	Brst Strg ASTM D 3786	Permi-tivity ASTM D 4491	AOS ASTM D 4751
*300089586	E070	9.0	135	240	230	76	95	137	162	136	452	2.44	0.212
300089587	E070	9.0	135	240	230	76	95	137	162	136	452	2.44	0.212
300089588	E070	9.0	135	240	230	76	95	137	162	136	452	2.44	0.212
300089589	E070	9.0	135	240	230	76	95	137	162	136	452	2.44	0.212
300089590	E070	9.0	135	240	230	76	95	137	162	136	452	2.44	0.212

* Denotes tested roll

** AOS reports the maximum opening size value