APPENDIX E

GEOTECHNICAL LABORATORY TEST RESULTS (CONTINUED)

HYDRAULIC CONDUCTIVITY

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			
Height, inches	3.009	B-Value, f	1.00
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	627.87	Tot. B.P.	80.0
Moisture Content, %	19.60	Head, max.	87.22
Dry Density, pcf	108.67	Head, min.	87.22
Spec. Gravity (assumed)	2.720	Max. Grad.	11.44
Volume Solids, cm³	193.01	Min. Grad.	11.44
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: Deaired Tap Water

Flow Pump Rate: 2.33E-05 cm³/sec

USCS: (CL)

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.

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 **

DATE 7/3/02
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	023-3313
SAMPLE ID	LP-02-5
SAMPLE TYPE	Bag

BOARD #	6
CELL #	6
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	3.008	B-Value, f	0.97
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	301.35	Top Pres.	80.0
Mass, g	625.45	Tot. B.P.	80.0
Moisture Content, %	17.45	Head, max.	84.41
Dry Density, pcf	110.26	Head, min.	84.41
Spec. Gravity	2.720	Max. Grad.	10.99
Volume Solids, cm³	195.77	Min. Grad.	10.99
Volume Voids, cm³	105.58		
Void Ratio	0.54		
Saturation, %	88.0%		

Sample Data, Final	
Height, inches	3.025
Diameter, inches	2.799
Area, cm²	39.70
Volume, cm³	305.02
Mass, g	638.28
Moisture Content, %	19.86
Dry Density, pcf	108.94
Volume Solids, cm³	195.77
Volume Voids, cm³	109.24
Void Ratio	0.56
Saturation, %	96.8%

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%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace 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)
7/12/02	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 **

DATE 7/12/02
CHECK
REVIEW

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7-5369

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	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 **

DATE 7/28/02
CHECK BJS
REVIEW DWM

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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	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								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)
7/12/02	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
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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: Deaired Tap Water

Flow Pump Rate: 4.46E-05 cm³/sec

USCS: (CL)

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%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some medium to fine sand, trace 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)
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 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

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

DATE 7/28/02
CHECK BS
REVIEW PCM

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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	023-3313
SAMPLE ID	LP-02-23
SAMPLE TYPE	Bag

BOARD #	9
CELL #	9
Flow Pump Speed	8
Technician	JH

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 112.0 pcf at a Moisture Content of 16.0%

Sample Data, Initial

Height, inches	2.994	B-Value, f	1.00
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	299.95	Top Pres.	80.0
Mass, g	626.66	Tot. B.P.	80.0
Moisture Content, %	16.25	Head, max.	90.04
Dry Density, pcf	112.15	Head, min.	90.04
Spec. Gravity (assumed)	2.720	Max. Grad.	11.83
Volume Solids, cm³	198.19	Min. Grad.	11.83
Volume Voids, cm³	101.76		
Void Ratio	0.51		
Saturation, %	86.1%		

Sample Data, Final

Height, inches	2.997
Diameter, inches	2.794
Area, cm²	39.56
Volume, cm³	301.11
Mass, g	635.85
Moisture Content, %	17.95
Dry Density, pcf	111.71
Volume Solids, cm³	198.19
Volume Voids, cm³	102.92
Void Ratio	0.52
Saturation, %	94.0%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	626.66	692.01
Wt Soil & Tare, f	g	539.08	595.30
Wt Tare	g	0.00	56.53
Wt Moisture Lost	g	87.58	96.71
Wt Dry Soil	g	539.08	538.77
Water Content	%	16.25%	17.95%

Flow Pump Rate: 1.29E-04 cm³/sec

USCS: (CL)

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
8/1/02	37469	11	5	21.5	0	0	0	0	1.28	90.04	11.83	2.7E-07
8/1/02	37469	11	10	21.5	5	5	300	300	1.28	90.04	11.83	2.7E-07
8/1/02	37469	11	15	21.5	5	10	300	600	1.28	90.04	11.83	2.7E-07
8/1/02	37469	11	20	21.5	5	15	300	900	1.28	90.04	11.83	2.7E-07 *
8/1/02	37469	11	25	21.5	5	20	300	1200	1.28	90.04	11.83	2.7E-07 *
8/1/02	37469	11	30	21.5	5	25	300	1500	1.28	90.04	11.83	2.7E-07 *
8/1/02	37469	11	35	21.5	5	30	300	1800	1.28	90.04	11.83	2.7E-07 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 2.7E-07 cm/sec **

DATE 8/1/02
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
PROJECT NUMBER	023-3313
SAMPLE ID	LP-02-23A
SAMPLE TYPE	Bag

BOARD #	6
CELL #	6
Flow Pump Speed	9
Technician	JH

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 112.0 pcf at a Moisture Content of 16.0%

Sample Data, Initial

Height, inches	3.001	B-Value, f	0.99
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	625.37	Tot. B.P.	80.0
Moisture Content, %	16.41	Head, max.	139.98
Dry Density, pcf	111.49	Head, min.	139.98
Spec. Gravity (assumed)	2.720	Max. Grad.	18.25
Volume Solids, cm³	197.50	Min. Grad.	18.25
Volume Voids, cm³	103.16		
Void Ratio	0.52		
Saturation, %	85.5%		

Sample Data, Final

Height, inches	3.020
Diameter, inches	2.799
Area, cm²	39.70
Volume, cm³	304.51
Mass, g	636.25
Moisture Content, %	18.44
Dry Density, pcf	110.08
Volume Solids, cm³	197.50
Volume Voids, cm³	107.01
Void Ratio	0.54
Saturation, %	92.6%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	625.37	720.41
Wt Soil & Tare, f	g	537.19	621.41
Wt Tare	g	0.00	84.54
Wt Moisture Lost	g	88.18	99.00
Wt Dry Soil	g	537.19	536.87
Water Content	%	16.41%	18.44%

Flow Pump Rate: 5.19E-05 cm³/sec

USCS: (CL)

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
8/3/02	37471	10	5	21.4	0	0	0	0	1.99	139.98	18.25	6.9E-08
8/3/02	37471	10	10	21.4	5	5	300	300	1.99	139.98	18.25	6.9E-08
8/3/02	37471	10	15	21.4	5	10	300	600	1.99	139.98	18.25	6.9E-08
8/3/02	37471	10	20	21.4	5	15	300	900	1.99	139.98	18.25	6.9E-08 *
8/3/02	37471	10	25	21.4	5	20	300	1200	1.99	139.98	18.25	6.9E-08 *
8/3/02	37471	10	30	21.4	5	25	300	1500	1.99	139.98	18.25	6.9E-08 *
8/3/02	37471	10	35	21.4	5	30	300	1800	1.99	139.98	18.25	6.9E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 6.9E-08 cm/sec **

DATE 8/3/02
CHECK BSS
REVIEW PWM

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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	023-3313
SAMPLE ID	LP-02-29
SAMPLE TYPE	Bag

BOARD #	6
CELL #	6
Flow Pump Speed	9
Technician	FT

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 113 pcf at a Moisture Content of 15.2%

Sample Data, Initial

Height, inches	2.991	B-Value, f	0.97
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	299.65	Top Pres.	80.0
Mass, g	626.36	Tot. B.P.	80.0
Moisture Content, %	14.88	Head, max.	94.96
Dry Density, pcf	113.54	Head, min.	94.96
Spec. Gravity (assumed)	2.720	Max. Grad.	12.52
Volume Solids, cm³	200.45	Min. Grad.	12.52
Volume Voids, cm³	99.20		
Void Ratio	0.49		
Saturation, %	81.8%		

Sample Data, Final

Height, inches	2.986
Diameter, inches	2.809
Area, cm²	39.98
Volume, cm³	303.24
Mass, g	643.22
Moisture Content, %	17.97
Dry Density, pcf	112.20
Volume Solids, cm³	200.45
Volume Voids, cm³	102.78
Void Ratio	0.51
Saturation, %	95.3%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	626.36	728.01
Wt Soil & Tare, f	g	545.24	630.07
Wt Tare	g	0.00	85.08
Wt Moisture Lost	g	81.12	97.94
Wt Dry Soil	g	545.24	544.99
Water Content	%	14.88%	17.97%

DESCRIPTION

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

Flow Pump Rate: 5.19E-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)
8/9/02	37477	11	45	21.3	0	0	0	0	1.35	94.96	12.52	1.0E-07
8/9/02	37477	11	50	21.3	5	5	300	300	1.35	94.96	12.52	1.0E-07
8/9/02	37477	11	55	21.3	5	10	300	600	1.35	94.96	12.52	1.0E-07
8/9/02	37477	12	0	21.3	5	15	300	900	1.35	94.96	12.52	1.0E-07 *
8/9/02	37477	12	5	21.3	5	20	300	1200	1.35	94.96	12.52	1.0E-07 *
8/9/02	37477	12	10	21.3	5	25	300	1500	1.35	94.96	12.52	1.0E-07 *
8/9/02	37477	12	15	21.3	5	30	300	1800	1.35	94.96	12.52	1.0E-07 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

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

DATE 8/9/02
CHECK
REVIEW

000011

5369

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-02-32
SAMPLE TYPE	Bulk

BOARD #	2
CELL #	2
Flow Pump Speed	6
Technician	JH

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 115.9 pcf at a Moisture Content of 14.4%

Sample Data, Initial			
Height, inches	3.010	B-Value, f	0.96
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	301.55	Top Pres.	80.0
Mass, g	639.15	Tot. B.P.	80.0
Moisture Content, %	14.09	Head, max.	14.77
Dry Density, pcf	115.92	Head, min.	14.77
Spec. Gravity (assumed)	2.720	Max. Grad.	1.92
Volume Solids, cm³	205.96	Min. Grad.	1.92
Volume Voids, cm³	95.59		
Void Ratio	0.46		
Saturation, %	82.6%		

Sample Data, Final	
Height, inches	3.030
Diameter, inches	2.810
Area, cm²	40.01
Volume, cm³	307.93
Mass, g	656.03
Moisture Content, %	17.10
Dry Density, pcf	113.53
Volume Solids, cm³	205.96
Volume Voids, cm³	101.97
Void Ratio	0.50
Saturation, %	94.0%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	639.15	740.81
Wt Soil & Tare, f	g	560.21	645.03
Wt Tare	g	0.00	85.03
Wt Moisture Lost	g	78.94	95.78
Wt Dry Soil	g	560.21	560.00
Water Content	%	14.09%	17.10%

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

Flow Pump Rate: 5.15E-04 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	0.21	14.77	1.92	6.5E-06
8/6/02	37474	8	10	21.5	5	5	300	300	0.21	14.77	1.92	6.5E-06
8/6/02	37474	8	15	21.5	5	10	300	600	0.21	14.77	1.92	6.5E-06
8/6/02	37474	8	20	21.5	5	15	300	900	0.21	14.77	1.92	6.5E-06 *
8/6/02	37474	8	25	21.5	5	20	300	1200	0.21	14.77	1.92	6.5E-06 *
8/6/02	37474	8	30	21.5	5	25	300	1500	0.21	14.77	1.92	6.5E-06 *
8/6/02	37474	8	35	21.5	5	30	300	1800	0.21	14.77	1.92	6.5E-06 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 6.5E-06 cm/sec **

DATE	8/6/02
CHECK	BES
REVIEW	RWM

000012

5369

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-02-32A
SAMPLE TYPE	Bulk

BOARD #	1
CELL #	1
Flow Pump Speed	9
Technician	JH

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 110.5 pcf at a Moisture Content of 16.7%

Sample Data, Initial			
Height, inches	3.004	B-Value, f	0.98
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.95	Top Pres.	80.0
Mass, g	620.34	Tot. B.P.	80.0
Moisture Content, %	16.05	Head, max.	71.75
Dry Density, pcf	110.84	Head, min.	71.75
Spec. Gravity (assumed)	2.720	Max. Grad.	9.37
Volume Solids, cm³	196.53	Min. Grad.	9.37
Volume Voids, cm³	104.43		
Void Ratio	0.53		
Saturation, %	82.1%		

Sample Data, Final	
Height, inches	3.015
Diameter, inches	2.777
Area, cm²	39.08
Volume, cm³	299.25
Mass, g	629.94
Moisture Content, %	17.84
Dry Density, pcf	111.47
Volume Solids, cm³	196.53
Volume Voids, cm³	102.72
Void Ratio	0.52
Saturation, %	92.9%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	620.34	719.71
Wt Soil & Tare, f	g	534.55	624.37
Wt Tare	g	0.00	90.07
Wt Moisture Lost	g	85.79	95.34
Wt Dry Soil	g	534.55	534.30
Water Content	%	16.05%	17.84%

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

Flow Pump Rate: 5.19E-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)
8/7/02	37475	9	5	20.9	0	0	0	0	1.02	71.75	9.37	1.4E-07
8/7/02	37475	9	10	20.9	5	5	300	300	1.02	71.75	9.37	1.4E-07
8/7/02	37475	9	15	20.9	5	10	300	600	1.02	71.75	9.37	1.4E-07
8/7/02	37475	9	20	20.9	5	15	300	900	1.02	71.75	9.37	1.4E-07 *
8/7/02	37475	9	25	20.9	5	20	300	1200	1.02	71.75	9.37	1.4E-07 *
8/7/02	37475	9	30	20.9	5	25	300	1500	1.02	71.75	9.37	1.4E-07 *
8/7/02	37475	9	35	20.9	5	30	300	1800	1.02	71.75	9.37	1.4E-07 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.4E-07 cm/sec **

DATE 8/7/02
CHECK BGL
REVIEW [illegible]

000013

5369

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

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH		Using Pipettes Only	YES	
PROJECT NUMBER	023-3313		Using Pipettes & Burettes	NO	
SAMPLE ID	LP02-32A-1	-	BOARD# 13	TECH	JH
SAMPLE TYPE	Bag		CELL # 13	DATE	8/7/02

COMMENTS: Per client request, sample was targeted to be remolded to a Dry Density of 110.5 pcf at a Moisture Content of 16.7%.

Sample Data, Initial

Height, inches	3.004
Diameter, inches	2.790
Area, cm^2	39.44
Volume, cm^3	300.95
Mass, g	620.34
Moisture Content, %	16.05
Dry Density, pcf	110.84
Spec. Gravity	2.720
Volume Solids, cm^3	196.53
Volume Voids, cm^3	104.43
Void Ratio	0.53
Saturation	82.1%

B-Value,f	0.98
Cell Pres	85.00
Bot. Pres.	82.00
Top Pres.	80.00
Head, cm	140.68
Max. Grad	21.56
Min. Grad	20.74
Max. E.S.	5.00
Min. E.S.	3.00

Sample Data, Final

Height, inches	3.015
Diameter, inches	2.777
Area, cm^2	39.08
Volume, cm^3	299.25
Mass, g	629.94
Moisture Content %	17.84
Dry Density, pcf	111.47
Saturation	92.9%
Inflow Volume per (1 cc)	1.00
Outflow Volume per (1 cc)	1.00

Water Contents	Initial	Final
Wt soil&tare, i	620.34	719.71
Wt soil&tare, f	534.55	624.37
Wt Tare	0.00	90.07
Wt Moisture Lost	85.79	95.34
Wt Dry Soil	534.55	534.30
Water Content	16.05%	17.84%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
8/7/02	11	16	0.00	25.00	21.6	0.0	0	0	165.10		21.56	0.00	0.00	0.0
8/7/02	11	45	0.60	24.50	21.6	29.0	1740	1740	164.03	1.01	21.42	0.60	0.50	3.6E-07
8/7/02	13	11	1.30	23.60	21.6	86.0	5160	6900	162.47	1.01	21.21	0.70	0.90	1.8E-07
8/7/02	14	50	2.20	22.90	21.6	99.0	5940	12840	160.91	1.01	21.01	0.90	0.70	1.5E-07
8/7/02	16	35	2.90	21.50	21.6	105.0	6300	19140	158.86	1.01	20.74			
8/8/02	7	22	9.20	15.50	21.1	887.0	53220	72360	146.87	1.08	19.18	6.30	6.00	1.4E-07
8/8/02	9	13	9.80	14.80	21.1	111.0	6660	79020	145.60	1.01	19.01	0.60	0.70	1.3E-07
8/8/02	10	32	10.30	14.40	21.1	79.0	4740	83760	144.73	1.01	18.90	0.50	0.40	1.2E-07
8/8/02	14	12	11.60	13.10	21.7	220.0	13200	96960	142.19	1.02	18.57	1.30	1.30	1.3E-07
8/8/02	15	39	12.10	12.60	21.6	87.0	5220	102180	141.22	1.01	18.44	0.50	0.50	1.3E-07
8/8/02	17	48	12.70	11.80	21.6	129.0	7740	109920	139.85	1.01	18.26	0.60	0.80	1.2E-07
8/9/02	7	42	17.10	7.60	21.1	834.0	50040	159960	131.47	1.06	17.17	4.40	4.20	1.2E-07
8/9/02	10	45	18.00	6.70	21.6	183.0	10980	170940	129.72	1.01	16.94	0.90	0.90	1.2E-07
8/9/02	14	39	19.10	5.60	21.8	234.0	14040	184980	127.57	1.02	16.66	1.10	1.10	1.1E-07

Inflow Rate	0.0001
Outflow Rate	0.0001
Outflow/Inflow Ratio	0.98

PERMEABILITY REPORTED AS 1.2E-07 cm/sec

DATE 8/7/02
CHECK
REVIEW

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

000014

5369

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

Flow Pump Rate: 4.46E-05 cm³/sec

USCS: (CL)

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.

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 **

DATE 8/6/02
CHECK BES
REVIEW PLM

5369

000015

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	023-3313
SAMPLE ID	LP-02-37
SAMPLE TYPE	Bag

BOARD #	2
CELL #	2
Flow Pump Speed	10
Technician	FT

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 114.3 pcf at a Moisture Content of 16.4%

Sample Data, Initial			
Height, inches	3.015	B-Value, f	0.97
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	302.06	Top Pres.	80.0
Mass, g	640.81	Tot. B.P.	80.0
Moisture Content, %	15.85	Head, max.	139.98
Dry Density, pcf	114.27	Head, min.	139.98
Spec. Gravity (assumed)	2.720	Max. Grad.	18.21
Volume Solids, cm³	203.36	Min. Grad.	18.21
Volume Voids, cm³	98.70		
Void Ratio	0.49		
Saturation, %	88.8%		

Sample Data, Final	
Height, inches	3.026
Diameter, inches	2.785
Area, cm²	39.30
Volume, cm³	302.07
Mass, g	646.68
Moisture Content, %	16.91
Dry Density, pcf	114.26
Volume Solids, cm³	203.36
Volume Voids, cm³	98.71
Void Ratio	0.49
Saturation, %	94.8%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	640.81	732.48
Wt Soil & Tare, f	g	553.13	639.00
Wt Tare	g	0.00	86.25
Wt Moisture Lost	g	87.68	93.48
Wt Dry Soil	g	553.13	552.75
Water Content	%	15.85%	16.91%

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)
8/9/02	37477	8	10	21.1	0	0	0	0	1.99	139.98	18.21	3.4E-08
8/9/02	37477	8	15	21.1	5	5	300	300	1.99	139.98	18.21	3.4E-08
8/9/02	37477	8	20	21.1	5	10	300	600	1.99	139.98	18.21	3.4E-08
8/9/02	37477	8	25	21.1	5	15	300	900	1.99	139.98	18.21	3.4E-08 *
8/9/02	37477	8	30	21.1	5	20	300	1200	1.99	139.98	18.21	3.4E-08 *
8/9/02	37477	8	35	21.1	5	25	300	1500	1.99	139.98	18.21	3.4E-08 *
8/9/02	37477	8	40	21.1	5	30	300	1800	1.99	139.98	18.21	3.4E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

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

DATE 8/9/02
CHECK BES
REVIEW RWM

5369

000046

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	LP02-43 - - -
SAMPLE TYPE	Bag

BOARD #	2
CELL #	2
Flow Pump Speed	8
Technician	FT

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 115.0 pcf at a Moisture Content of 14.7%

Sample Data, Initial			
Height, inches	3.004	B-Value, f	0.98
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.95	Top Pres.	80.0
Mass, g	635.48	Tot. B.P.	80.0
Moisture Content, %	14.45	Head, max.	166.71
Dry Density, pcf	115.12	Head, min.	166.71
Spec. Gravity (assumed)	2.720	Max. Grad.	22.03
Volume Solids, cm³	204.13	Min. Grad.	22.03
Volume Voids, cm³	96.82		
Void Ratio	0.47		
Saturation, %	82.9%		

Sample Data, Final	
Height, inches	2.979
Diameter, inches	2.776
Area, cm²	39.05
Volume, cm³	295.46
Mass, g	648.03
Moisture Content, %	16.71
Dry Density, pcf	117.26
Volume Solids, cm³	204.13
Volume Voids, cm³	91.33
Void Ratio	0.45
Saturation, %	101.6%

Permeant: Deaired Tap Water

Flow Pump Rate 1.18E-04 cm³/sec

USCS (CL)

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	635.48	698.84
Wt Soil & Tare, f	g	555.24	606.08
Wt Tare	g	0.00	51.03
Wt Moisture Lost	g	80.24	92.76
Wt Dry Soil	g	555.24	555.05
Water Content	%	14.45%	16.71%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some medium to fine sand, trace 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)
8/15/02	37483	12	0	21.6	0	0	0	0	2.37	166.71	22.03	1.3E-07
8/15/02	37483	12	5	21.6	5	5	300	300	2.37	166.71	22.03	1.3E-07
8/15/02	37483	12	10	21.6	5	10	300	600	2.37	166.71	22.03	1.3E-07
8/15/02	37483	12	15	21.6	5	15	300	900	2.37	166.71	22.03	1.3E-07 *
8/15/02	37483	12	20	21.6	5	20	300	1200	2.37	166.71	22.03	1.3E-07 *
8/15/02	37483	12	25	21.6	5	25	300	1500	2.37	166.71	22.03	1.3E-07 *
8/15/02	37483	12	30	21.6	5	30	300	1800	2.37	166.71	22.03	1.3E-07 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.3E-07 cm/sec **

DATE 8/15/02
CHECK BSI
REVIEW [illegible]

000017

5369

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	023-3313
SAMPLE ID	LP-02-45
SAMPLE TYPE	Bag

BOARD #	2
CELL #	2
Flow Pump Speed	9
Technician	FT

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 114.3 pcf at a Moisture Content of 15.35%

Sample Data, Initial

Height, inches	2.987	B-Value, f	0.97
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	299.25	Top Pres.	80.0
Mass, g	634.59	Tot. B.P.	80.0
Moisture Content, %	15.22	Head, max.	144.90
Dry Density, pcf	114.85	Head, min.	144.90
Spec. Gravity (assumed)	2.720	Max. Grad.	19.02
Volume Solids, cm³	202.50	Min. Grad.	19.02
Volume Voids, cm³	96.76		
Void Ratio	0.48		
Saturation, %	86.6%		

Sample Data, Final

Height, inches	3.000
Diameter, inches	2.799
Area, cm²	39.70
Volume, cm³	302.49
Mass, g	647.50
Moisture Content, %	17.56
Dry Density, pcf	113.62
Volume Solids, cm³	202.50
Volume Voids, cm³	100.00
Void Ratio	0.49
Saturation, %	96.7%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	634.59	699.40
Wt Soil & Tare, f	g	550.79	602.73
Wt Tare	g	0.00	52.19
Wt Moisture Lost	g	83.80	96.67
Wt Dry Soil	g	550.79	550.54
Water Content	%	15.22%	17.56%

Flow Pump Rate: 5.19E-05 cm³/sec

USCS: (CL)

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
8/23/02	37491	8	0	21.4	0	0	0	0	2.06	144.90	19.02	6.7E-08
8/23/02	37491	8	5	21.4	5	5	300	300	2.06	144.90	19.02	6.7E-08
8/23/02	37491	8	10	21.4	5	10	300	600	2.06	144.90	19.02	6.7E-08
8/23/02	37491	8	15	21.4	5	15	300	900	2.06	144.90	19.02	6.7E-08 *
8/23/02	37491	8	20	21.4	5	20	300	1200	2.06	144.90	19.02	6.7E-08 *
8/23/02	37491	8	25	21.4	5	25	300	1500	2.06	144.90	19.02	6.7E-08 *
8/23/02	37491	8	30	21.4	5	30	300	1800	2.06	144.90	19.02	6.7E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 6.7E-08 cm/sec **

DATE 8/23/02
CHECK
REVIEW

000018

5369

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-02-51
SAMPLE TYPE	Bag

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

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 116.8 pcf at a Moisture Content of 14.8%

Sample Data, Initial			
Height, inches	2.981	B-Value, f	1.00
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	298.65	Top Pres.	80.0
Mass, g	646.84	Tot. B.P.	80.0
Moisture Content, %	15.17	Head, max.	149.82
Dry Density, pcf	117.35	Head, min.	149.82
Spec. Gravity (assumed)	2.720	Max. Grad.	19.90
Volume Solids, cm³	206.48	Min. Grad.	19.90
Volume Voids, cm³	92.17		
Void Ratio	0.45		
Saturation, %	92.5%		

Sample Data, Final	
Height, inches	2.964
Diameter, inches	2.804
Area, cm²	39.84
Volume, cm³	299.93
Mass, g	649.30
Moisture Content, %	15.61
Dry Density, pcf	116.84
Volume Solids, cm³	206.48
Volume Voids, cm³	93.45
Void Ratio	0.45
Saturation, %	93.8%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	646.84	692.11
Wt Soil & Tare, f	g	561.63	604.48
Wt Tare	g	0.00	43.13
Wt Moisture Lost	g	85.21	87.63
Wt Dry Soil	g	561.63	561.35
Water Content	%	15.17%	15.61%

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)
9/12/02	37511	13	0	21.7	0	0	0	0	2.13	149.82	19.90	3.0E-08
9/12/02	37511	13	5	21.7	5	5	300	300	2.13	149.82	19.90	3.0E-08
9/12/02	37511	13	10	21.7	5	10	300	600	2.13	149.82	19.90	3.0E-08
9/12/02	37511	13	15	21.7	5	15	300	900	2.13	149.82	19.90	3.0E-08 *
9/12/02	37511	13	20	21.7	5	20	300	1200	2.13	149.82	19.90	3.0E-08 *
9/12/02	37511	13	25	21.7	5	25	300	1500	2.13	149.82	19.90	3.0E-08 *
9/12/02	37511	13	30	21.7	5	30	300	1800	2.13	149.82	19.90	3.0E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.0E-08 cm/sec **

DATE 9/12/02
CHECK BSS
REVIEW NWA

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5369

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	023-3313
SAMPLE ID	LP-02-52
SAMPLE TYPE	Bag

BOARD #	1
CELL #	1
Flow Pump Speed	6
Technician	PWM

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 115.1 pcf at a Moisture Content of 15.0%

Sample Data, Initial

Height, inches	2.996	B-Value, f	0.99
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	637.06	Tot. B.P.	80.0
Moisture Content, %	14.96	Head, max.	64.01
Dry Density, pcf	115.20	Head, min.	64.01
Spec. Gravity (assumed)	2.720	Max. Grad.	8.39
Volume Solids, cm³	203.73	Min. Grad.	8.39
Volume Voids, cm³	96.42		
Void Ratio	0.47		
Saturation, %	86.0%		

Sample Data, Final

Height, inches	3.003
Diameter, inches	2.795
Area, cm²	39.58
Volume, cm³	301.93
Mass, g	647.10
Moisture Content, %	16.77
Dry Density, pcf	114.53
Volume Solids, cm³	203.73
Volume Voids, cm³	98.20
Void Ratio	0.48
Saturation, %	94.7%

WATER CONTENTS

		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	637.06	698.77
Wt Soil & Tare, f	g	554.15	605.88
Wt Tare	g	0.00	52.10
Wt Moisture Lost	g	82.91	92.89
Wt Dry Soil	g	554.15	553.78
Water Content	%	14.96%	16.77%

DESCRIPTION

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

Flow Pump Rate: 5.15E-04 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)
8/23/02	37491	8	25	21.4	0	0	0	0	0.91	64.01	8.39	1.5E-06
8/23/02	37491	8	30	21.4	5	5	300	300	0.91	64.01	8.39	1.5E-06
8/23/02	37491	8	35	21.4	5	10	300	600	0.91	64.01	8.39	1.5E-06
8/23/02	37491	8	40	21.4	5	15	300	900	0.91	64.01	8.39	1.5E-06 *
8/23/02	37491	8	45	21.4	5	20	300	1200	0.91	64.01	8.39	1.5E-06 *
8/23/02	37491	8	50	21.4	5	25	300	1500	0.91	64.01	8.39	1.5E-06 *
8/23/02	37491	8	55	21.4	5	30	300	1800	0.91	64.01	8.39	1.5E-06 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.5E-06 cm/sec **

DATE 8/23/02
CHECK
REVIEW

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5369

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 #	15
PROJECT NUMBER	023-3313	CELL #	15
SAMPLE ID	LP-02-52A	Flow Pump Speed	10
SAMPLE TYPE	Bag	Technician	FT

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 117.0 pcf at a Moisture Content of 15.0%

Sample Data, Initial			
Height, inches	2.986	B-Value, f	0.99
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	647.69	Tot. B.P.	80.0
Moisture Content, %	14.68	Head, max.	138.57
Dry Density, pcf	117.81	Head, min.	138.57
Spec. Gravity (assumed)	2.720	Max. Grad.	18.48
Volume Solids, cm³	207.64	Min. Grad.	18.48
Volume Voids, cm³	91.51		
Void Ratio	0.44		
Saturation, %	90.6%		

Sample Data, Final	
Height, inches	2.952
Diameter, inches	2.800
Area, cm²	39.73
Volume, cm³	297.87
Mass, g	653.22
Moisture Content, %	15.66
Dry Density, pcf	118.31
Volume Solids, cm³	207.64
Volume Voids, cm³	90.23
Void Ratio	0.43
Saturation, %	98.0%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	647.69	737.19
Wt Soil & Tare, f	g	564.77	648.78
Wt Tare	g	0.00	84.26
Wt Moisture Lost	g	82.92	88.41
Wt Dry Soil	g	564.77	564.52
Water Content	%	14.68%	15.66%

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)
8/26/02	37494	8	25	21.1	0	0	0	0	1.97	138.57	18.48	3.3E-08
8/26/02	37494	8	30	21.1	5	5	300	300	1.97	138.57	18.48	3.3E-08
8/26/02	37494	8	35	21.1	5	10	300	600	1.97	138.57	18.48	3.3E-08
8/26/02	37494	8	40	21.1	5	15	300	900	1.97	138.57	18.48	3.3E-08 *
8/26/02	37494	8	45	21.1	5	20	300	1200	1.97	138.57	18.48	3.3E-08 *
8/26/02	37494	8	50	21.1	5	25	300	1500	1.97	138.57	18.48	3.3E-08 *
8/26/02	37494	8	55	21.1	5	30	300	1800	1.97	138.57	18.48	3.3E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.3E-08 cm/sec **

DATE 8/26/02
CHECK
REVIEW

000021

5369

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	LP02-57 - - -
SAMPLE TYPE	Bag

BOARD #	8
CELL #	8
Flow Pump Speed	5
Technician	JH

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 116.7 pcf at a Moisture Content of 14.6%.

Sample Data, Initial			
Height, inches	3.000	B-Value, f	0.99
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	646.30	Tot. B.P.	80.0
Moisture Content, %	14.34	Head, max.	45.72
Dry Density, pcf	117.35	Head, min.	45.72
Spec. Gravity (assumed)	2.720	Max. Grad.	5.96
Volume Solids, cm³	207.81	Min. Grad.	5.96
Volume Voids, cm³	92.74		
Void Ratio	0.45		
Saturation, %	87.4%		

Sample Data, Final	
Height, inches	3.022
Diameter, inches	2.802
Area, cm²	39.78
Volume, cm³	305.37
Mass, g	658.40
Moisture Content, %	16.48
Dry Density, pcf	115.50
Volume Solids, cm³	207.81
Volume Voids, cm³	97.56
Void Ratio	0.47
Saturation, %	95.5%

Permeant: Deaired Tap Water

Flow Pump Rate: 1.19E-03 cm³/sec

USCS: (CL)

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	646.30	743.47
Wt Soil & Tare, f	g	565.24	650.37
Wt Tare	g	0.00	85.48
Wt Moisture Lost	g	81.06	93.10
Wt Dry Soil	g	565.24	564.89
Water Content	%	14.34%	16.48%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
9/12/02	37511	12	0	21.5	0	0	0	0	0.65	45.72	5.96	4.9E-06
9/12/02	37511	12	5	21.5	5	5	300	300	0.65	45.72	5.96	4.9E-06
9/12/02	37511	12	10	21.5	5	10	300	600	0.65	45.72	5.96	4.9E-06
9/12/02	37511	12	15	21.5	5	15	300	900	0.65	45.72	5.96	4.9E-06 *
9/12/02	37511	12	20	21.5	5	20	300	1200	0.65	45.72	5.96	4.9E-06 *
9/12/02	37511	12	25	21.5	5	25	300	1500	0.65	45.72	5.96	4.9E-06 *
9/12/02	37511	12	30	21.5	5	30	300	1800	0.65	45.72	5.96	4.9E-06 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 4.9E-06 cm/sec **

DATE 9/12/02
CHECK BSS
REVIEW RWM

000022

5369

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	023-3313
SAMPLE ID	LP-02-57A
SAMPLE TYPE	Bag

BOARD #	15
CELL #	15
Flow Pump Speed	10
Technician	JH

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 116.7 pcf at a Moisture Content of 14.6%. Specimen had a "honeycomb" structure; the sides were smoothed to prevent potential sidewall leakage.

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	643.78	Tot. B.P.	80.0
Moisture Content, %	14.55	Head, max.	147.71
Dry Density, pcf	116.84	Head, min.	147.71
Spec. Gravity (assumed)	2.720	Max. Grad.	19.44
Volume Solids, cm³	206.63	Min. Grad.	19.44
Volume Voids, cm³	93.53		
Void Ratio	0.45		
Saturation, %	87.4%		

Sample Data, Final	
Height, inches	2.992
Diameter, inches	2.799
Area, cm²	39.70
Volume, cm³	301.69
Mass, g	648.97
Moisture Content, %	15.47
Dry Density, pcf	116.25
Volume Solids, cm³	206.63
Volume Voids, cm³	95.06
Void Ratio	0.46
Saturation, %	91.5%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	643.78	733.32
Wt Soil & Tare, f	g	562.02	646.44
Wt Tare	g	0.00	84.85
Wt Moisture Lost	g	81.76	86.88
Wt Dry Soil	g	562.02	561.59
Water Content	%	14.55%	15.47%

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								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)
9/18/02	37517	13	20	21.4	0	0	0	0	2.1	147.71	19.44	3.1E-08
9/18/02	37517	13	25	21.4	5	5	300	300	2.1	147.71	19.44	3.1E-08
9/18/02	37517	13	30	21.4	5	10	300	600	2.1	147.71	19.44	3.1E-08
9/18/02	37517	13	35	21.4	5	15	300	900	2.1	147.71	19.44	3.1E-08 *
9/18/02	37517	13	40	21.4	5	20	300	1200	2.1	147.71	19.44	3.1E-08 *
9/18/02	37517	13	45	21.4	5	25	300	1500	2.1	147.71	19.44	3.1E-08 *
9/18/02	37517	13	50	21.4	5	30	300	1800	2.1	147.71	19.44	3.1E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

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

DATE 9/18/02
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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	023-3313
SAMPLE ID	LP-02-63
SAMPLE TYPE	Bag

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

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 118.0 pcf at a Moisture Content of 14.2%

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	648.74	Tot. B.P.	80.0
Moisture Content, %	13.86	Head, max.	135.76
Dry Density, pcf	118.41	Head, min.	135.76
Spec. Gravity (assumed)	2.720	Max. Grad.	17.82
Volume Solids, cm³	209.47	Min. Grad.	17.82
Volume Voids, cm³	90.78		
Void Ratio	0.43		
Saturation, %	87.0%		

Sample Data, Final	
Height, inches	3.000
Diameter, inches	2.791
Area, cm²	39.47
Volume, cm³	300.77
Mass, g	662.00
Moisture Content, %	16.19
Dry Density, pcf	118.21
Volume Solids, cm³	209.47
Volume Voids, cm³	91.30
Void Ratio	0.44
Saturation, %	101.0%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	648.74	745.53
Wt Soil & Tare, f	g	569.76	653.33
Wt Tare	g	0.00	83.80
Wt Moisture Lost	g	78.98	92.20
Wt Dry Soil	g	569.76	569.53
Water Content	%	13.86%	16.19%

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)
9/16/02	37515	10	40	21.4	0	0	0	0	1.93	135.76	17.82	3.4E-08
9/16/02	37515	10	45	21.4	5	5	300	300	1.93	135.76	17.82	3.4E-08
9/16/02	37515	10	50	21.4	5	10	300	600	1.93	135.76	17.82	3.4E-08
9/16/02	37515	10	55	21.4	5	15	300	900	1.93	135.76	17.82	3.4E-08 *
9/16/02	37515	11	0	21.4	5	20	300	1200	1.93	135.76	17.82	3.4E-08 *
9/16/02	37515	11	5	21.4	5	25	300	1500	1.93	135.76	17.82	3.4E-08 *
9/16/02	37515	11	10	21.4	5	30	300	1800	1.93	135.76	17.82	3.4E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

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

DATE 9/16/02
CHECK BJS
REVIEW [illegible]

000024

5369

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	LP02-68 - - -
SAMPLE TYPE	Bag

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

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 115 pcf at a Moisture Content of 14.5%.

Sample Data, Initial			
Height, inches	3.001	B-Value, f	1.00
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	636.42	Tot. B.P.	80.0
Moisture Content, %	14.35	Head, max.	49.24
Dry Density, pcf	115.51	Head, min.	49.24
Spec. Gravity (assumed)	2.720	Max. Grad.	6.41
Volume Solids, cm³	204.61	Min. Grad.	6.41
Volume Voids, cm³	96.04		
Void Ratio	0.47		
Saturation, %	83.2%		

Sample Data, Final	
Height, inches	3.026
Diameter, inches	2.804
Area, cm²	39.84
Volume, cm³	306.21
Mass, g	653.25
Moisture Content, %	17.38
Dry Density, pcf	113.41
Volume Solids, cm³	204.61
Volume Voids, cm³	101.60
Void Ratio	0.50
Saturation, %	95.2%

Permeant: Deaired Tap Water

Flow Pump Rate: 4.59E-03 cm³/sec

USCS: (CL)

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	636.42	695.36
Wt Soil & Tare, f	g	556.55	598.69
Wt Tare	g	0.00	42.34
Wt Moisture Lost	g	79.87	96.67
Wt Dry Soil	g	556.55	556.35
Water Content	%	14.35%	17.38%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
9/12/02	37511	13	0	21.7	0	0	0	0	0.7	49.24	6.41	1.7E-05
9/12/02	37511	13	5	21.7	5	5	300	300	0.7	49.24	6.41	1.7E-05
9/12/02	37511	13	10	21.7	5	10	300	600	0.7	49.24	6.41	1.7E-05
9/12/02	37511	13	15	21.7	5	15	300	900	0.7	49.24	6.41	1.7E-05 *
9/12/02	37511	13	20	21.7	5	20	300	1200	0.7	49.24	6.41	1.7E-05 *
9/12/02	37511	13	25	21.7	5	25	300	1500	0.7	49.24	6.41	1.7E-05 *
9/12/02	37511	13	30	21.7	5	30	300	1800	0.7	49.24	6.41	1.7E-05 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.7E-05 cm/sec **

DATE 9/12/02
CHECK
REVIEW

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5369

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	LP02-68A - - -
SAMPLE TYPE	Bag

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

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 115 pcf at a Moisture Content of 14.5%. Specimen had a "honeycomb" structure; the sides were smoothed to prevent potential sidewall leakage.

Sample Data, Initial			
Height, inches	2.996	B-Value, f	0.98
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	633.97	Tot. B.P.	80.0
Moisture Content, %	14.41	Head, max.	86.52
Dry Density, pcf	115.20	Head, min.	86.52
Spec. Gravity (assumed)	2.720	Max. Grad.	11.22
Volume Solids, cm³	203.73	Min. Grad.	11.22
Volume Voids, cm³	96.42		
Void Ratio	0.47		
Saturation, %	82.8%		

Sample Data, Final	
Height, inches	3.035
Diameter, inches	2.782
Area, cm²	39.22
Volume, cm³	302.32
Mass, g	647.38
Moisture Content, %	16.82
Dry Density, pcf	114.38
Volume Solids, cm³	203.73
Volume Voids, cm³	98.59
Void Ratio	0.48
Saturation, %	94.6%

Permeant: Deaired Tap Water

Flow Pump Rate 4.46E-05 cm³/sec

USCS (CL)

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	633.97	698.83
Wt Soil & Tare, f	g	554.15	605.64
Wt Tare	g	0.00	51.76
Wt Moisture Lost	g	79.82	93.19
Wt Dry Soil	g	554.15	553.88
Water Content	%	14.41%	16.82%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
9/18/02	37517	12	0	21.3	0	0	0	0	1.23	86.52	11.22	9.9E-08
9/18/02	37517	12	5	21.3	5	5	300	300	1.23	86.52	11.22	9.9E-08
9/18/02	37517	12	10	21.3	5	10	300	600	1.23	86.52	11.22	9.9E-08
9/18/02	37517	12	15	21.3	5	15	300	900	1.23	86.52	11.22	9.9E-08 *
9/18/02	37517	12	20	21.3	5	20	300	1200	1.23	86.52	11.22	9.9E-08 *
9/18/02	37517	12	25	21.3	5	25	300	1500	1.23	86.52	11.22	9.9E-08 *
9/18/02	37517	12	30	21.3	5	30	300	1800	1.23	86.52	11.22	9.9E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 9.9E-08 cm/sec **

DATE 9/18/02
CHECK
REVIEW

000026

5369

5369

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-02-69
SAMPLE TYPE	Bag

BOARD #	4
CELL #	4
Flow Pump Speed	9
Technician	FT

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 116.0 pcf at a Moisture Content of 14.5% Specimen had a "honeycomb" structure; the sides were smoothed to prevent potential sidewall leakage.

000027

Sample Data, Initial			
Height, inches	3.006	B-Value, f	0.97
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	641.15	Tot. B.P.	80.0
Moisture Content, %	13.90	Head, max.	102.70
Dry Density, pcf	116.64	Head, min.	102.70
Spec. Gravity (assumed)	2.720	Max. Grad.	13.27
Volume Solids, cm³	206.95	Min. Grad.	13.27
Volume Voids, cm³	94.20		
Void Ratio	0.46		
Saturation, %	83.1%		

Sample Data, Final	
Height, inches	3.046
Diameter, inches	2.806
Area, cm²	39.90
Volume, cm³	308.67
Mass, g	658.90
Moisture Content, %	17.05
Dry Density, pcf	113.80
Volume Solids, cm³	206.95
Volume Voids, cm³	101.72
Void Ratio	0.49
Saturation, %	94.4%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	641.15	710.70
Wt Soil & Tare, f	g	562.91	614.75
Wt Tare	g	0.00	52.07
Wt Moisture Lost	g	78.24	95.95
Wt Dry Soil	g	562.91	562.68
Water Content	%	13.90%	17.05%

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

Flow Pump Rate: 5.19E-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)	
9/23/02	37522	9	20	20.4	0	0	0	0	1.46	102.70	13.27	9.7E-08	
9/23/02	37522	9	25	20.4	5	5	300	300	1.46	102.70	13.27	9.7E-08	
9/23/02	37522	9	30	20.4	5	10	300	600	1.46	102.70	13.27	9.7E-08	
9/23/02	37522	9	35	20.4	5	15	300	900	1.46	102.70	13.27	9.7E-08	*
9/23/02	37522	9	40	20.4	5	20	300	1200	1.46	102.70	13.27	9.7E-08	*
9/23/02	37522	9	45	20.4	5	25	300	1500	1.46	102.70	13.27	9.7E-08	*
9/23/02	37522	9	50	20.4	5	30	300	1800	1.46	102.70	13.27	9.7E-08	*

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 9.7E-08 cm/sec **

DATE	9/23/02
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REVIEW	[illegible]

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-02-78
SAMPLE TYPE	Bag

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

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 114.4 pcf at a Moisture Content of 15.6%. Specimen had a "honeycomb" structure; the sides were smoothed to prevent potential sidewall leakage.

Sample Data, Initial			
Height, inches	2.997	B-Value, f	1.00
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	637.02	Tot. B.P.	80.0
Moisture Content, %	15.86	Head, max.	139.98
Dry Density, pcf	114.27	Head, min.	139.98
Spec. Gravity (assumed)	2.720	Max. Grad.	18.47
Volume Solids, cm³	202.15	Min. Grad.	18.47
Volume Voids, cm³	98.11		
Void Ratio	0.49		
Saturation, %	88.9%		

Sample Data, Final	
Height, inches	2.983
Diameter, inches	2.791
Area, cm²	39.47
Volume, cm³	299.06
Mass, g	642.72
Moisture Content, %	16.89
Dry Density, pcf	114.72
Volume Solids, cm³	202.15
Volume Voids, cm³	96.92
Void Ratio	0.48
Saturation, %	95.8%

Permeant: Deaired Tap Water

Flow Pump Rate: 2.50E-05 cm³/sec

USCS: (CL)

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	637.02	693.78
Wt Soil & Tare, f	g	549.84	600.96
Wt Tare	g	0.00	51.50
Wt Moisture Lost	g	87.18	92.82
Wt Dry Soil	g	549.84	549.46
Water Content	%	15.86%	16.89%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
9/27/02	37526	11	0	21.6	0	0	0	0	1.99	139.98	18.47	3.3E-08
9/27/02	37526	11	5	21.6	5	5	300	300	1.99	139.98	18.47	3.3E-08
9/27/02	37526	11	10	21.6	5	10	300	600	1.99	139.98	18.47	3.3E-08
9/27/02	37526	11	15	21.6	5	15	300	900	1.99	139.98	18.47	3.3E-08 *
9/27/02	37526	11	20	21.6	5	20	300	1200	1.99	139.98	18.47	3.3E-08 *
9/27/02	37526	11	25	21.6	5	25	300	1500	1.99	139.98	18.47	3.3E-08 *
9/27/02	37526	11	30	21.6	5	30	300	1800	1.99	139.98	18.47	3.3E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.3E-08 cm/sec **

000028

5369

DATE	9/27/02
CHECK	BSS
REVIEW	PWM

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	LP02-80 - - -
SAMPLE TYPE	Bag

BOARD #	7
CELL #	7
Flow Pump Speed	9
Technician	FT

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 115.2 pcf at a Moisture Content of 15.0%.

Sample Data, Initial			
Height, inches	2.986	B-Value, f	1.00
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	637.68	Tot. B.P.	80.0
Moisture Content, %	14.94	Head, max.	126.61
Dry Density, pcf	115.72	Head, min.	126.61
Spec. Gravity (assumed)	2.720	Max. Grad.	16.77
Volume Solids, cm³	203.97	Min. Grad.	16.77
Volume Voids, cm³	95.18		
Void Ratio	0.47		
Saturation, %	87.1%		

Sample Data, Final	
Height, inches	2.973
Diameter, inches	2.789
Area, cm²	39.41
Volume, cm³	297.63
Mass, g	646.56
Moisture Content, %	16.54
Dry Density, pcf	116.31
Volume Solids, cm³	203.97
Volume Voids, cm³	93.67
Void Ratio	0.46
Saturation, %	98.0%

Permeant: Deaired Tap Water

Flow Pump Rate: 4.46E-05 cm³/sec

USCS: (CL)

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	637.68	732.13
Wt Soil & Tare, f	g	554.79	640.43
Wt Tare	g	0.00	86.07
Wt Moisture Lost	g	82.89	91.70
Wt Dry Soil	g	554.79	554.36
Water Content	%	14.94%	16.54%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
9/16/02	37515	11	0	21.4	0	0	0	0	1.8	126.61	16.77	6.5E-08
9/16/02	37515	11	5	21.4	5	5	300	300	1.8	126.61	16.77	6.5E-08
9/16/02	37515	11	10	21.4	5	10	300	600	1.8	126.61	16.77	6.5E-08
9/16/02	37515	11	15	21.4	5	15	300	900	1.8	126.61	16.77	6.5E-08 *
9/16/02	37515	11	20	21.4	5	20	300	1200	1.8	126.61	16.77	6.5E-08 *
9/16/02	37515	11	25	21.4	5	25	300	1500	1.8	126.61	16.77	6.5E-08 *
9/16/02	37515	11	30	21.4	5	30	300	1800	1.8	126.61	16.77	6.5E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 6.5E-08 cm/sec **

DATE 9/16/02
CHECK
REVIEW

000029

5369

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	LP02-85 - - -
SAMPLE TYPE	Bag

BOARD #	7
CELL #	7
Flow Pump Speed	9
Technician	JH

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 115 pcf at a Moisture Content of 15.6% Specimen had a "honeycomb" structure; the sides were smoothed to prevent potential sidewall leakage.

Sample Data, Initial			
Height, inches	3.000	B-Value, f	1.00
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	640.79	Tot. B.P.	80.0
Moisture Content, %	15.72	Head, max.	144.90
Dry Density, pcf	114.96	Head, min.	144.90
Spec. Gravity (assumed)	2.720	Max. Grad.	19.30
Volume Solids, cm³	203.58	Min. Grad.	19.30
Volume Voids, cm³	96.97		
Void Ratio	0.48		
Saturation, %	89.8%		

Sample Data, Final	
Height, inches	2.956
Diameter, inches	2.793
Area, cm²	39.53
Volume, cm³	296.78
Mass, g	642.27
Moisture Content, %	15.99
Dry Density, pcf	116.43
Volume Solids, cm³	203.58
Volume Voids, cm³	93.20
Void Ratio	0.46
Saturation, %	95.0%

Permeant: Deaired Tap Water

Flow Pump Rate 4.46E-05 cm³/sec

USCS (CL)

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	640.79	697.12
Wt Soil & Tare, f	g	553.73	608.63
Wt Tare	g	0.00	55.19
Wt Moisture Lost	g	87.06	88.49
Wt Dry Soil	g	553.73	553.44
Water Content	%	15.72%	15.99%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some medium to fine sand, little 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)
10/16/02	37545	11	0	22	0	0	0	0	2.06	144.90	19.30	5.6E-08
10/16/02	37545	11	5	22	5	5	300	300	2.06	144.90	19.30	5.6E-08
10/16/02	37545	11	10	22	5	10	300	600	2.06	144.90	19.30	5.6E-08
10/16/02	37545	11	15	22	5	15	300	900	2.06	144.90	19.30	5.6E-08 *
10/16/02	37545	11	20	22	5	20	300	1200	2.06	144.90	19.30	5.6E-08 *
10/16/02	37545	11	25	22	5	25	300	1500	2.06	144.90	19.30	5.6E-08 *
10/16/02	37545	11	30	22	5	30	300	1800	2.06	144.90	19.30	5.6E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

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

DATE 10/16/02
CHECK
REVIEW

000030

5369

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-02-89
SAMPLE TYPE	Bulk

BOARD #	2
CELL #	2
Flow Pump Speed	10
Technician	JH

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 112.0 pcf at a Moisture Content of 17.0% Specimen had a "honeycomb" structure; the sides were smoothed to prevent potential sidewall leakage.

Sample Data, Initial			
Height, inches	2.994	B-Value, f	0.95
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	299.95	Top Pres.	80.0
Mass, g	633.35	Tot. B.P.	80.0
Moisture Content, %	17.11	Head, max.	159.67
Dry Density, pcf	112.51	Head, min.	159.67
Spec. Gravity (assumed)	2.720	Max. Grad.	20.98
Volume Solids, cm³	198.83	Min. Grad.	20.98
Volume Voids, cm³	101.12		
Void Ratio	0.51		
Saturation, %	91.5%		

Sample Data, Final	
Height, inches	2.997
Diameter, inches	2.805
Area, cm²	39.87
Volume, cm³	303.49
Mass, g	639.91
Moisture Content, %	18.32
Dry Density, pcf	111.20
Volume Solids, cm³	198.83
Volume Voids, cm³	104.66
Void Ratio	0.53
Saturation, %	94.7%

Permeant: Deaired Tap Water

Flow Pump Rate 2.50E-05 cm³/sec

USCS (CL)

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	633.35	724.89
Wt Soil & Tare, f	g	540.81	625.83
Wt Tare	g	0.00	85.21
Wt Moisture Lost	g	92.54	99.06
Wt Dry Soil	g	540.81	540.62
Water Content	%	17.11%	18.32%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
10/19/02	37548	8	0	20.7	0	0	0	0	2.27	159.67	20.98	2.9E-08
10/19/02	37548	8	5	20.7	5	5	300	300	2.27	159.67	20.98	2.9E-08
10/19/02	37548	8	10	20.7	5	10	300	600	2.27	159.67	20.98	2.9E-08
10/19/02	37548	8	15	20.7	5	15	300	900	2.27	159.67	20.98	2.9E-08 *
10/19/02	37548	8	20	20.7	5	20	300	1200	2.27	159.67	20.98	2.9E-08 *
10/19/02	37548	8	25	20.7	5	25	300	1500	2.27	159.67	20.98	2.9E-08 *
10/19/02	37548	8	30	20.7	5	30	300	1800	2.27	159.67	20.98	2.9E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

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

DATE	10/19/02
CHECK	BSS
REVIEW	PWM

0000031

5369

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	023-3313
SAMPLE ID	LP-02-89
SAMPLE TYPE	Bag

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

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 112.0 pcf at a Moisture Content of 16.5% Specimen had a "honeycomb" structure; the sides were smoothed to prevent potential sidewall leakage.

Sample Data, Initial			
Height, inches	3.008	B-Value, f	0.98
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	301.35	Top Pres.	80.0
Mass, g	628.36	Tot. B.P.	80.0
Moisture Content, %	16.16	Head, max.	76.67
Dry Density, pcf	112.01	Head, min.	76.67
Spec. Gravity (assumed)	2.720	Max. Grad.	9.99
Volume Solids, cm³	198.88	Min. Grad.	9.99
Volume Voids, cm³	102.48		
Void Ratio	0.52		
Saturation, %	85.3%		

Sample Data, Final	
Height, inches	3.022
Diameter, inches	2.802
Area, cm²	39.78
Volume, cm³	305.37
Mass, g	643.21
Moisture Content, %	18.90
Dry Density, pcf	110.54
Volume Solids, cm³	198.88
Volume Voids, cm³	106.49
Void Ratio	0.54
Saturation, %	96.0%

Permeant: Deaired Tap Water

Flow Pump Rate 1.29E-04 cm³/sec

USCS (CL)

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	628.36	727.87
Wt Soil & Tare, f	g	540.95	625.66
Wt Tare	g	0.00	84.98
Wt Moisture Lost	g	87.41	102.21
Wt Dry Soil	g	540.95	540.68
Water Content	%	16.16%	18.90%

DESCRIPTION

Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
10/16/02	37545	11	0	22	0	0	0	0	1.09	76.67	9.99	3.1E-07
10/16/02	37545	11	5	22	5	5	300	300	1.09	76.67	9.99	3.1E-07
10/16/02	37545	11	10	22	5	10	300	600	1.09	76.67	9.99	3.1E-07
10/16/02	37545	11	15	22	5	15	300	900	1.09	76.67	9.99	3.1E-07 *
10/16/02	37545	11	20	22	5	20	300	1200	1.09	76.67	9.99	3.1E-07 *
10/16/02	37545	11	25	22	5	25	300	1500	1.09	76.67	9.99	3.1E-07 *
10/16/02	37545	11	30	22	5	30	300	1800	1.09	76.67	9.99	3.1E-07 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.1E-07 cm/sec **

DATE 10/16/02
CHECK
REVIEW

5369

000032

5369

FLOW PUMP #2B

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

000033

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	023-3313
SAMPLE ID	LP02-90 - - -
SAMPLE TYPE	Bag

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

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 116.8 pcf at a Moisture Content of 14.9%. Specimen had a "honeycomb" structure; the sides were smoothed to prevent potential sidewall leakage.

Sample Data, Initial			
Height, inches	3.001	B-Value, f	0.96
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	648.00	Tot. B.P.	80.0
Moisture Content, %	14.61	Head, max.	151.93
Dry Density, pcf	117.34	Head, min.	151.93
Spec. Gravity (assumed)	2.720	Max. Grad.	19.87
Volume Solids, cm³	207.86	Min. Grad.	19.87
Volume Voids, cm³	92.79		
Void Ratio	0.45		
Saturation, %	89.0%		

Sample Data, Final	
Height, inches	3.010
Diameter, inches	2.796
Area, cm²	39.61
Volume, cm³	302.85
Mass, g	654.91
Moisture Content, %	15.84
Dry Density, pcf	116.49
Volume Solids, cm³	207.86
Volume Voids, cm³	94.99
Void Ratio	0.46
Saturation, %	94.3%

Permeant: Dealred Tap Water

Flow Pump Rate 4.46E-05 cm³/sec

USCS (CL)

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	648.00	706.43
Wt Soil & Tare, f	g	565.38	616.93
Wt Tare	g	0.00	51.77
Wt Moisture Lost	g	82.62	89.50
Wt Dry Soil	g	565.38	565.16
Water Content	%	14.61%	15.84%

DESCRIPTION

Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
9/23/02	37522	8	5	20.3	0	0	0	0	2.16	151.93	19.87	5.6E-08
9/23/02	37522	8	10	20.3	5	5	300	300	2.16	151.93	19.87	5.6E-08
9/23/02	37522	8	15	20.3	5	10	300	600	2.16	151.93	19.87	5.6E-08
9/23/02	37522	8	20	20.3	5	15	300	900	2.16	151.93	19.87	5.6E-08 *
9/23/02	37522	8	25	20.3	5	20	300	1200	2.16	151.93	19.87	5.6E-08 *
9/23/02	37522	8	30	20.3	5	25	300	1500	2.16	151.93	19.87	5.6E-08 *
9/23/02	37522	8	35	20.3	5	30	300	1800	2.16	151.93	19.87	5.6E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

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

DATE	9/23/02
CHECK	BSS
REVIEW	PWM

5369

FLOW PUMP #2B

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

000034

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH			BOARD #	7
PROJECT NUMBER	023-3313			CELL #	7
SAMPLE ID	LP02-91	-	-	-	Flow Pump Speed 9
SAMPLE TYPE	Bag				Technician FT

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 116.8 pcf at a Moisture Content of 14.6%. Specimen had a "honeycomb" structure; the sides were smoothed to prevent potential sidewall leakage.

Sample Data, Initial			
Height, inches	3.003	B-Value, f	0.99
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.85	Top Pres.	80.0
Mass, g	646.39	Tot. B.P.	80.0
Moisture Content, %	14.30	Head, max.	143.49
Dry Density, pcf	117.30	Head, min.	143.49
Spec. Gravity (assumed)	2.720	Max. Grad.	18.57
Volume Solids, cm³	207.92	Min. Grad.	18.57
Volume Voids, cm³	92.93		
Void Ratio	0.45		
Saturation, %	87.0%		

Sample Data, Final	
Height, inches	3.043
Diameter, inches	2.796
Area, cm²	39.61
Volume, cm³	306.17
Mass, g	657.54
Moisture Content, %	16.27
Dry Density, pcf	115.26
Volume Solids, cm³	207.92
Volume Voids, cm³	98.25
Void Ratio	0.47
Saturation, %	93.6%

Permeant: Deaired Tap Water

Flow Pump Rate 4.46E-05 cm³/sec

USCS (CL)

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	646.39	699.51
Wt Soil & Tare, f	g	565.54	607.56
Wt Tare	g	0.00	42.31
Wt Moisture Lost	g	80.85	91.95
Wt Dry Soil	g	565.54	565.25
Water Content	%	14.30%	16.27%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
9/23/02	37522	9	50	20.4	0	0	0	0	2.04	143.49	18.57	6.0E-08
9/23/02	37522	9	55	20.4	5	5	300	300	2.04	143.49	18.57	6.0E-08
9/23/02	37522	10	0	20.4	5	10	300	600	2.04	143.49	18.57	6.0E-08
9/23/02	37522	10	5	20.4	5	15	300	900	2.04	143.49	18.57	6.0E-08 *
9/23/02	37522	10	10	20.4	5	20	300	1200	2.04	143.49	18.57	6.0E-08 *
9/23/02	37522	10	15	20.4	5	25	300	1500	2.04	143.49	18.57	6.0E-08 *
9/23/02	37522	10	20	20.4	5	30	300	1800	2.04	143.49	18.57	6.0E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

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

DATE	9/23/02
CHECK	BSJ
REVIEW	[illegible]

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-02-96
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 112.0 pcf at a Moisture Content of 16.5%. Specimen had a "honeycomb" structure; the sides were smoothed to prevent potential sidewall leakage.

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	629.13	Tot. B.P.	80.0
Moisture Content, %	15.97	Head, max.	137.16
Dry Density, pcf	112.93	Head, min.	137.16
Spec. Gravity (assumed)	2.720	Max. Grad.	17.87
Volume Solids, cm³	199.44	Min. Grad.	17.87
Volume Voids, cm³	100.31		
Void Ratio	0.50		
Saturation, %	86.4%		

Sample Data, Final	
Height, inches	3.022
Diameter, inches	2.795
Area, cm²	39.58
Volume, cm³	303.84
Mass, g	641.71
Moisture Content, %	18.29
Dry Density, pcf	111.41
Volume Solids, cm³	199.44
Volume Voids, cm³	104.40
Void Ratio	0.52
Saturation, %	95.1%

Permeant: Deaired Tap Water

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	629.13	726.48
Wt Soil & Tare, f	g	542.47	627.28
Wt Tare	g	0.00	85.01
Wt Moisture Lost	g	86.66	99.20
Wt Dry Soil	g	542.47	542.27
Water Content	%	15.97%	18.29%

Flow Pump Rate: 5.19E-05 cm³/sec

USCS: (CL)

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
9/27/02	37526	9	5	21.1	0	0	0	0	1.95	137.16	17.87	7.2E-08
9/27/02	37526	9	10	21.1	5	5	300	300	1.95	137.16	17.87	7.2E-08
9/27/02	37526	9	15	21.1	5	10	300	600	1.95	137.16	17.87	7.2E-08
9/27/02	37526	9	20	21.1	5	15	300	900	1.95	137.16	17.87	7.2E-08 *
9/27/02	37526	9	25	21.1	5	20	300	1200	1.95	137.16	17.87	7.2E-08 *
9/27/02	37526	9	30	21.1	5	25	300	1500	1.95	137.16	17.87	7.2E-08 *
9/27/02	37526	9	35	21.1	5	30	300	1800	1.95	137.16	17.87	7.2E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 7.2E-08 cm/sec **

DATE	9/27/02
CHECK	BJS
REVIEW	PWM

000035

5369

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	LP02-97 - - -
SAMPLE TYPE	Bag

BOARD #	6
CELL #	6
Flow Pump Speed	9
Technician	JH

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 113.0 pcf at a Moisture Content of 16.0%. Specimen had a "honeycomb" structure; the sides were smoothed to prevent potential sidewall leakage.

Sample Data, Initial			
Height, inches	2.987	B-Value, f	1.00
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	299.25	Top Pres.	80.0
Mass, g	631.00	Tot. B.P.	80.0
Moisture Content, %	16.07	Head, max.	140.68
Dry Density, pcf	113.36	Head, min.	140.68
Spec. Gravity (assumed)	2.720	Max. Grad.	18.58
Volume Solids, cm³	199.86	Min. Grad.	18.58
Volume Voids, cm³	99.39		
Void Ratio	0.50		
Saturation, %	87.9%		

Sample Data, Final	
Height, inches	2.981
Diameter, inches	2.792
Area, cm²	39.50
Volume, cm³	299.08
Mass, g	640.19
Moisture Content, %	17.76
Dry Density, pcf	113.42
Volume Solids, cm³	199.86
Volume Voids, cm³	99.22
Void Ratio	0.50
Saturation, %	97.3%

Permeant: Deaired Tap Water

Flow Pump Rate: 4.46E-05 cm³/sec

USCS: (CL)

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	631.00	725.47
Wt Soil & Tare, f	g	543.62	628.95
Wt Tare	g	0.00	85.59
Wt Moisture Lost	g	87.38	96.52
Wt Dry Soil	g	543.62	543.36
Water Content	%	16.07%	17.76%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
9/27/02	37526	9	25	21.1	0	0	0	0	2	140.68	18.58	5.9E-08
9/27/02	37526	9	30	21.1	5	5	300	300	2	140.68	18.58	5.9E-08
9/27/02	37526	9	35	21.1	5	10	300	600	2	140.68	18.58	5.9E-08
9/27/02	37526	9	40	21.1	5	15	300	900	2	140.68	18.58	5.9E-08 *
9/27/02	37526	9	45	21.1	5	20	300	1200	2	140.68	18.58	5.9E-08 *
9/27/02	37526	9	50	21.1	5	25	300	1500	2	140.68	18.58	5.9E-08 *
9/27/02	37526	9	55	21.1	5	30	300	1800	2	140.68	18.58	5.9E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 5.9E-08 cm/sec **

DATE 9/27/02
CHECK
REVIEW

000036

5369

Golder Associates Inc.

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

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NUMBER	023-3313
SAMPLE ID	LP02-100 - - -
SAMPLE TYPE	Bag

BOARD #	15
CELL #	15
Flow Pump Speed	9
Technician	JH

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 111.0 pcf at a Moisture Content of 18.0% Specimen had a "honeycomb" structure; the sides were smoothed to prevent potential sidewall leakage.

Sample Data, Initial			
Height, inches	2.994	B-Value, f	0.98
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	299.95	Top Pres.	80.0
Mass, g	631.21	Tot. B.P.	80.0
Moisture Content, %	17.70	Head, max.	147.71
Dry Density, pcf	111.56	Head, min.	147.71
Spec. Gravity (assumed)	2.720	Max. Grad.	19.45
Volume Solids, cm³	197.16	Min. Grad.	19.45
Volume Voids, cm³	102.79		
Void Ratio	0.52		
Saturation, %	92.4%		

Sample Data, Final	
Height, inches	2.990
Diameter, inches	2.793
Area, cm²	39.53
Volume, cm³	300.20
Mass, g	634.82
Moisture Content, %	18.38
Dry Density, pcf	111.47
Volume Solids, cm³	197.16
Volume Voids, cm³	103.04
Void Ratio	0.52
Saturation, %	95.6%

Permeant: Dealred Tap Water

Flow Pump Rate: 4.46E-05 cm³/sec

USCS: (CL)

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	631.21	718.75
Wt Soil & Tare, f	g	536.27	620.25
Wt Tare	g	0.00	84.22
Wt Moisture Lost	g	94.94	98.50
Wt Dry Soil	g	536.27	536.03
Water Content	%	17.70%	18.38%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
10/16/02	37545	11	25	22.2	0	0	0	0	2.1	147.71	19.45	5.5E-08
10/16/02	37545	11	30	22.2	5	5	300	300	2.1	147.71	19.45	5.5E-08
10/16/02	37545	11	35	22.2	5	10	300	600	2.1	147.71	19.45	5.5E-08
10/16/02	37545	11	40	22.2	5	15	300	900	2.1	147.71	19.45	5.5E-08 *
10/16/02	37545	11	45	22.2	5	20	300	1200	2.1	147.71	19.45	5.5E-08 *
10/16/02	37545	11	50	22.2	5	25	300	1500	2.1	147.71	19.45	5.5E-08 *
10/16/02	37545	11	55	22.2	5	30	300	1800	2.1	147.71	19.45	5.5E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 5.5E-08 cm/sec **

DATE 10/16/02
CHECK BSS
REVIEW CWN

000037

5369

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-02-104
SAMPLE TYPE	Bag

BOARD #	2
CELL #	2
Flow Pump Speed	11
Technician	JH

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 114.7 pcf at a Moisture Content of 16.5%

Sample Data, Initial			
Height, inches	2.993	B-Value, f	0.98
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	299.85	Top Pres.	80.0
Mass, g	642.92	Tot. B.P.	80.0
Moisture Content, %	15.52	Head, max.	135.76
Dry Density, pcf	115.82	Head, min.	135.76
Spec. Gravity (assumed)	2.720	Max. Grad.	17.83
Volume Solids, cm³	204.61	Min. Grad.	17.83
Volume Voids, cm³	95.24		
Void Ratio	0.47		
Saturation, %	90.7%		

Sample Data, Final	
Height, inches	2.998
Diameter, inches	2.801
Area, cm²	39.75
Volume, cm³	302.73
Mass, g	653.91
Moisture Content, %	17.50
Dry Density, pcf	114.72
Volume Solids, cm³	204.61
Volume Voids, cm³	98.12
Void Ratio	0.48
Saturation, %	99.2%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	642.92	738.72
Wt Soil & Tare, f	g	556.53	641.38
Wt Tare	g	0.00	85.08
Wt Moisture Lost	g	86.39	97.34
Wt Dry Soil	g	556.53	556.30
Water Content	%	15.52%	17.50%

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

Flow Pump Rate: 1.28E-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)
11/4/02	37564	8	0	20.5	0	0	0	0	1.93	135.76	17.83	1.8E-08
11/4/02	37564	8	5	20.5	5	5	300	300	1.93	135.76	17.83	1.8E-08
11/4/02	37564	8	10	20.5	5	10	300	600	1.93	135.76	17.83	1.8E-08
11/4/02	37564	8	15	20.5	5	15	300	900	1.93	135.76	17.83	1.8E-08 *
11/4/02	37564	8	20	20.5	5	20	300	1200	1.93	135.76	17.83	1.8E-08 *
11/4/02	37564	8	25	20.5	5	25	300	1500	1.93	135.76	17.83	1.8E-08 *
11/4/02	37564	8	30	20.5	5	30	300	1800	1.93	135.76	17.83	1.8E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.8E-08 cm/sec **

DATE 11/4/02
CHECK
REVIEW

000038

5369

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

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	BOARD #	2	COMMENTS	Per client request, sample was targeted to be remold to a
PROJECT NUMBER	023-3313	CELL #	2		Dry Density of 111.7 pcf at a Moisture Content of 16.4%
SAMPLE ID	LP-02-111	Flow Pump Speed	8		Specimen had a "honeycomb" structure; the sides were
SAMPLE TYPE	Bag	Technician	JH		smoothed to prevent potential sidewall leakage.

Sample Data, Initial				Sample Data, Final	
Height, inches	2.990	B-Value, f	0.97	Height, inches	3.007
Diameter, inches	2.790	Cell Pres.	85.0	Diameter, inches	2.792
Area, cm²	39.44	Bot. Pres.	80.0	Area, cm²	39.50
Volume, cm³	299.55	Top Pres.	80.0	Volume, cm³	301.69
Mass, g	626.53	Tot. B.P.	80.0	Mass, g	639.18
Moisture Content, %	16.10	Head, max.	77.37	Moisture Content, %	18.44
Dry Density, pcf	112.42	Head, min.	77.37	Dry Density, pcf	111.62
Spec. Gravity (assumed)	2.720	Max. Grad.	10.13	Volume Solids, cm³	198.40
Volume Solids, cm³	198.40	Min. Grad.	10.13	Volume Voids, cm³	103.29
Volume Voids, cm³	101.15			Void Ratio	0.52
Void Ratio	0.51			Saturation, %	96.4%
Saturation, %	85.9%				

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	626.53	724.31
Wt Soil & Tare, f	g	539.65	624.82
Wt Tare	g	0.00	85.39
Wt Moisture Lost	g	86.88	99.49
Wt Dry Soil	g	539.65	539.43
Water Content	%	16.10%	18.44%

Flow Pump Rate 1.29E-04 cm³/sec

USCS (CL)

DESCRIPTION

Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
10/16/02	37545	8	0	22	0	0	0	0	1.1	77.37	10.13	3.1E-07
10/16/02	37545	8	5	22	5	5	300	300	1.1	77.37	10.13	3.1E-07
10/16/02	37545	8	10	22	5	10	300	600	1.1	77.37	10.13	3.1E-07
10/16/02	37545	8	15	22	5	15	300	900	1.1	77.37	10.13	3.1E-07 *
10/16/02	37545	8	20	22	5	20	300	1200	1.1	77.37	10.13	3.1E-07 *
10/16/02	37545	8	25	22	5	25	300	1500	1.1	77.37	10.13	3.1E-07 *
10/16/02	37545	8	30	22	5	30	300	1800	1.1	77.37	10.13	3.1E-07 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.1E-07 cm/sec **

DATE 10/16/02
CHECK BB
REVIEW [illegible]

000039

5369

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

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH		
PROJECT NUMBER	023-3313		
SAMPLE ID	LP02-111A	-	-
SAMPLE TYPE	Bulk		

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

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 111.7 pcf at a Moisture Content of 16.4% Specimen had a "honeycomb" structure; the sides were smoothed to prevent potential sidewall leakage.

Sample Data, Initial			
Height, inches	2.964	B-Value, f	0.97
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	296.95	Top Pres.	80.0
Mass, g	627.60	Tot. B.P.	80.0
Moisture Content, %	16.55	Head, max.	130.83
Dry Density, pcf	113.16	Head, min.	130.83
Spec. Gravity (assumed)	2.720	Max. Grad.	17.32
Volume Solids, cm³	197.98	Min. Grad.	17.32
Volume Voids, cm³	98.97		
Void Ratio	0.50		
Saturation, %	90.0%		

Sample Data, Final	
Height, inches	2.974
Diameter, inches	2.803
Area, cm²	39.81
Volume, cm³	300.73
Mass, g	635.10
Moisture Content, %	17.94
Dry Density, pcf	111.74
Volume Solids, cm³	197.98
Volume Voids, cm³	102.75
Void Ratio	0.52
Saturation, %	94.0%

Permeant: Dealred Tap Water

Flow Pump Rate 2.33E-05 cm³/sec

USCS (CL)

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	627.60	713.63
Wt Soil & Tare, f	g	538.50	617.08
Wt Tare	g	0.00	78.85
Wt Moisture Lost	g	89.10	96.55
Wt Dry Soil	g	538.50	538.23
Water Content	%	16.55%	17.94%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little 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)
10/19/02	37548	8	0	20.7	0	0	0	0	1.86	130.83	17.32	3.3E-08
10/19/02	37548	8	5	20.7	5	5	300	300	1.86	130.83	17.32	3.3E-08
10/19/02	37548	8	10	20.7	5	10	300	600	1.86	130.83	17.32	3.3E-08
10/19/02	37548	8	15	20.7	5	15	300	900	1.86	130.83	17.32	3.3E-08 *
10/19/02	37548	8	20	20.7	5	20	300	1200	1.86	130.83	17.32	3.3E-08 *
10/19/02	37548	8	25	20.7	5	25	300	1500	1.86	130.83	17.32	3.3E-08 *
10/19/02	37548	8	30	20.7	5	30	300	1800	1.86	130.83	17.32	3.3E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.3E-08 cm/sec **

DATE 10/19/02
CHECK
REVIEW

000040

5369

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

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH			BOARD #	3
PROJECT NUMBER	023-3313			CELL #	3
SAMPLE ID	LP02-112	-	-	-	Flow Pump Speed	8
SAMPLE TYPE	Bag				Technician	JH

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 112.2 pcf at a Moisture Content of 16.2% Specimen had a "honeycomb" structure; the sides were smoothed to prevent potential sidewall leakage.

Sample Data, Initial				Sample Data, Final	
Height, inches	2.997	B-Value, f	0.97	Height, inches	3.003
Diameter, inches	2.790	Cell Pres.	85.0	Diameter, inches	2.795
Area, cm²	39.44	Bot. Pres.	80.0	Area, cm²	39.58
Volume, cm³	300.25	Top Pres.	80.0	Volume, cm³	301.93
Mass, g	628.09	Tot. B.P.	80.0	Mass, g	641.30
Moisture Content, %	15.55	Head, max.	124.50	Moisture Content, %	17.98
Dry Density, pcf	112.97	Head, min.	124.50	Dry Density, pcf	112.34
Spec. Gravity (assumed)	2.720	Max. Grad.	16.32	Volume Solids, cm³	199.85
Volume Solids, cm³	199.85	Min. Grad.	16.32	Volume Voids, cm³	102.09
Volume Voids, cm³	100.41			Void Ratio	0.51
Void Ratio	0.50			Saturation, %	95.7%
Saturation, %	84.2%				

Permeant: Deaired Tap Water

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	628.09	716.26
Wt Soil & Tare, f	g	543.58	618.59
Wt Tare	g	0.00	75.29
Wt Moisture Lost	g	84.51	97.67
Wt Dry Soil	g	543.58	543.30
Water Content	%	15.55%	17.98%

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

Flow Pump Rate: 1.18E-04 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)
10/16/02	37545	8	0	22	0	0	0	0	1.77	124.50	16.32	1.7E-07
10/16/02	37545	8	5	22	5	5	300	300	1.77	124.50	16.32	1.7E-07
10/16/02	37545	8	10	22	5	10	300	600	1.77	124.50	16.32	1.7E-07
10/16/02	37545	8	15	22	5	15	300	900	1.77	124.50	16.32	1.7E-07 *
10/16/02	37545	8	20	22	5	20	300	1200	1.77	124.50	16.32	1.7E-07 *
10/16/02	37545	8	25	22	5	25	300	1500	1.77	124.50	16.32	1.7E-07 *
10/16/02	37545	8	30	22	5	30	300	1800	1.77	124.50	16.32	1.7E-07 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.7E-07 cm/sec **

DATE 10/16/02
CHECK
REVIEW

000041

5369

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-02-112A
SAMPLE TYPE	Bag

BOARD #	1
CELL #	1
Flow Pump Speed	10
Technician	JH

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 112.2 pcf at a Moisture Content of 16.7% Specimen had a "honeycomb" structure; the sides were smoothed to prevent potential sidewall leakage.

Sample Data, Initial			
Height, inches	2.996	B-Value, f	1.00
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	632.17	Tot. B.P.	80.0
Moisture Content, %	16.61	Head, max.	142.09
Dry Density, pcf	112.71	Head, min.	142.09
Spec. Gravity (assumed)	2.720	Max. Grad.	18.60
Volume Solids, cm³	199.32	Min. Grad.	18.60
Volume Voids, cm³	100.84		
Void Ratio	0.51		
Saturation, %	89.3%		

Sample Data, Final	
Height, inches	3.008
Diameter, inches	2.790
Area, cm²	39.44
Volume, cm³	301.35
Mass, g	638.36
Moisture Content, %	17.75
Dry Density, pcf	112.26
Volume Solids, cm³	199.32
Volume Voids, cm³	102.04
Void Ratio	0.51
Saturation, %	94.3%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	632.17	722.91
Wt Soil & Tare, f	g	542.14	626.73
Wt Tare	g	0.00	84.83
Wt Moisture Lost	g	90.03	96.18
Wt Dry Soil	g	542.14	541.90
Water Content	%	16.61%	17.75%

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)
10/19/02	37548	12	0	21.1	0	0	0	0	2.02	142.09	18.60	3.3E-08
10/19/02	37548	12	5	21.1	5	5	300	300	2.02	142.09	18.60	3.3E-08
10/19/02	37548	12	10	21.1	5	10	300	600	2.02	142.09	18.60	3.3E-08
10/19/02	37548	12	15	21.1	5	15	300	900	2.02	142.09	18.60	3.3E-08 *
10/19/02	37548	12	20	21.1	5	20	300	1200	2.02	142.09	18.60	3.3E-08 *
10/19/02	37548	12	25	21.1	5	25	300	1500	2.02	142.09	18.60	3.3E-08 *
10/19/02	37548	12	30	21.1	5	30	300	1800	2.02	142.09	18.60	3.3E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.3E-08 cm/sec **

DATE 10/19/02
CHECK BSS
REVIEW PWM

000042

5369

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 113.0 pcf at a Moisture Content of 16.0% Specimen had a "honeycomb" structure; the sides were smoothed to prevent potential sidewall leakage.
PROJECT NUMBER	023-3313	CELL #	6		
SAMPLE ID	LP-02-114	Flow Pump Speed	10		
SAMPLE TYPE	Bag	Technician	JH		

Sample Data, Initial				Sample Data, Final	
Height, inches	3.004	B-Value, f	0.99	Height, inches	3.039
Diameter, inches	2.790	Cell Pres.	85.0	Diameter, inches	2.800
Area, cm²	39.44	Bot. Pres.	80.0	Area, cm²	39.73
Volume, cm³	300.95	Top Pres.	80.0	Volume, cm³	306.65
Mass, g	632.99	Tot. B.P.	80.0	Mass, g	649.74
Moisture Content, %	15.46	Head, max.	125.21	Moisture Content, %	18.52
Dry Density, pcf	113.67	Head, min.	125.21	Dry Density, pcf	111.56
Spec. Gravity (assumed)	2.720	Max. Grad.	16.22	Volume Solids, cm³	201.55
Volume Solids, cm³	201.55	Min. Grad.	16.22	Volume Voids, cm³	105.09
Volume Voids, cm³	99.40			Void Ratio	0.52
Void Ratio	0.49			Saturation, %	96.6%
Saturation, %	85.3%				

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	632.99	734.04
Wt Soil & Tare, f	g	548.22	632.57
Wt Tare	g	0.00	84.60
Wt Moisture Lost	g	84.77	101.47
Wt Dry Soil	g	548.22	547.97
Water Content	%	15.46%	18.52%

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)	
11/11/2002	37571	9	0	21.5	0	0	0	0	1.78	125.21	16.22	3.8E-08	
11/11/2002	37571	9	5	21.5	5	5	300	300	1.78	125.21	16.22	3.8E-08	
11/11/2002	37571	9	10	21.5	5	10	300	600	1.78	125.21	16.22	3.8E-08	
11/11/2002	37571	9	15	21.5	5	15	300	900	1.78	125.21	16.22	3.8E-08	*
11/11/2002	37571	9	20	21.5	5	20	300	1200	1.78	125.21	16.22	3.8E-08	*
11/11/2002	37571	9	25	21.5	5	25	300	1500	1.78	125.21	16.22	3.8E-08	*
11/11/2002	37571	9	30	21.5	5	30	300	1800	1.78	125.21	16.22	3.8E-08	*

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

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

DATE 11/11/2002
CHECK BK
REVIEW PWM

5369

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

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	BOARD #	3	COMMENTS	Per client request, sample was targeted to be remold to a Dry Density of 114.0 pcf at a Moisture Content of 15.5%.
PROJECT NUMBER	023-3313	CELL #	3		
SAMPLE ID	LP02-115 - - -	Flow Pump Speed	10		
SAMPLE TYPE	Bag	Technician	JH		

Sample Data, Initial				Sample Data, Final	
Height, inches	2.994	B-Value, f	0.97	Height, inches	2.999
Diameter, inches	2.790	Cell Pres.	85.0	Diameter, inches	2.781
Area, cm^2	39.44	Bot. Pres.	80.0	Area, cm^2	39.19
Volume, cm^3	299.95	Top Pres.	80.0	Volume, cm^3	298.52
Mass, g	638.07	Tot. B.P.	80.0	Mass, g	648.08
Moisture Content, %	15.63	Head, max.	132.24	Moisture Content, %	17.44
Dry Density, pcf	114.80	Head, min.	132.24	Dry Density, pcf	115.35
Spec. Gravity (assumed)	2.720	Max. Grad.	17.36	Volume Solids, cm^3	202.88
Volume Solids, cm^3	202.88	Min. Grad.	17.36	Volume Voids, cm^3	95.64
Volume Voids, cm^3	97.07			Void Ratio	0.47
Void Ratio	0.48			Saturation, %	100.6%
Saturation, %	88.8%				

Permeant: Dealred Tap Water

Flow Pump Rate 2.33E-05 cm^3/sec

USCS (CL)

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	638.07	699.78
Wt Soil & Tare, f	g	551.84	603.58
Wt Tare	g	0.00	51.98
Wt Moisture Lost	g	86.23	96.20
Wt Dry Soil	g	551.84	551.60
Water Content	%	15.63%	17.44%

DESCRIPTION

Yellowish Brown, SILTY CLAY, some medium to fine sand, trace 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)
11/4/02	37564	8	0	20.5	0	0	0	0	1.88	132.24	17.36	3.4E-08
11/4/02	37564	8	5	20.5	5	5	300	300	1.88	132.24	17.36	3.4E-08
11/4/02	37564	8	10	20.5	5	10	300	600	1.88	132.24	17.36	3.4E-08
11/4/02	37564	8	15	20.5	5	15	300	900	1.88	132.24	17.36	3.4E-08 *
11/4/02	37564	8	20	20.5	5	20	300	1200	1.88	132.24	17.36	3.4E-08 *
11/4/02	37564	8	25	20.5	5	25	300	1500	1.88	132.24	17.36	3.4E-08 *
11/4/02	37564	8	30	20.5	5	30	300	1800	1.88	132.24	17.36	3.4E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

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

DATE 11/4/02
CHECK BS
REVIEW MM

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5369

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

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	BOARD #	4	COMMENTS	Per client request, sample was targeted to be remold to a Dry Density of 112.0 pcf at a Moisture Content of 16.5%
PROJECT NUMBER	023-3313	CELL #	4		
SAMPLE ID	LP-02-116	Flow Pump Speed	9		
SAMPLE TYPE	Bag	Technician	JH		

Sample Data, Initial				Sample Data, Final	
Height, inches	3.009	B-Value, f	0.97	Height, inches	3.043
Diameter, inches	2.790	Cell Pres.	85.0	Diameter, inches	2.795
Area, cm²	39.44	Bot. Pres.	80.0	Area, cm²	39.58
Volume, cm³	301.45	Top Pres.	80.0	Volume, cm³	305.95
Mass, g	630.26	Tot. B.P.	80.0	Mass, g	644.90
Moisture Content, %	16.04	Head, max.	120.98	Moisture Content, %	18.73
Dry Density, pcf	112.43	Head, min.	120.98	Dry Density, pcf	110.78
Spec. Gravity (assumed)	2.720	Max. Grad.	15.65	Volume Solids, cm³	199.69
Volume Solids, cm³	199.69	Min. Grad.	15.65	Volume Voids, cm³	106.27
Volume Voids, cm³	101.77			Void Ratio	0.53
Void Ratio	0.51			Saturation, %	95.7%
Saturation, %	85.6%				

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	630.26	728.80
Wt Soil & Tare, f	g	543.15	627.10
Wt Tare	g	0.00	84.20
Wt Moisture Lost	g	87.11	101.70
Wt Dry Soil	g	543.15	542.90
Water Content	%	16.04%	18.73%

DESCRIPTION

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

Flow Pump Rate 5.19E-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)	
11/4/02	37564	9	0	20.6	0	0	0	0	1.72	120.98	15.65	8.3E-08	
11/4/02	37564	9	5	20.6	5	5	300	300	1.72	120.98	15.65	8.3E-08	
11/4/02	37564	9	10	20.6	5	10	300	600	1.72	120.98	15.65	8.3E-08	
11/4/02	37564	9	15	20.6	5	15	300	900	1.72	120.98	15.65	8.3E-08	*
11/4/02	37564	9	20	20.6	5	20	300	1200	1.72	120.98	15.65	8.3E-08	*
11/4/02	37564	9	25	20.6	5	25	300	1500	1.72	120.98	15.65	8.3E-08	*
11/4/02	37564	9	30	20.6	5	30	300	1800	1.72	120.98	15.65	8.3E-08	*

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 8.3E-08 cm/sec **

DATE 11/4/02
CHECK
REVIEW

000045

5369

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-02-117
SAMPLE TYPE	Bag

BOARD #	2
CELL #	2
Flow Pump Speed	10
Technician	JH/TH

COMMENTS: Per client request, sample was targeted to be remold to a Dry Density of 112.5 pcf at a Moisture Content of 16.5% Specimen had a "honeycomb" structure; the sides were smoothed to prevent potential sidewall leakage.

Sample Data, Initial			
Height, inches	2.990	B-Value, f	0.98
Diameter, inches	2.790	Cell Pres.	85.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	299.55	Top Pres.	80.0
Mass, g	630.99	Tot. B.P.	80.0
Moisture Content, %	16.09	Head, max.	137.16
Dry Density, pcf	113.23	Head, min.	137.16
Spec. Gravity (assumed)	2.720	Max. Grad.	18.10
Volume Solids, cm³	199.84	Min. Grad.	18.10
Volume Voids, cm³	99.71		
Void Ratio	0.50		
Saturation, %	87.7%		

Sample Data, Final	
Height, inches	2.984
Diameter, inches	2.795
Area, cm²	39.58
Volume, cm³	300.02
Mass, g	640.24
Moisture Content, %	17.79
Dry Density, pcf	113.05
Volume Solids, cm³	199.84
Volume Voids, cm³	100.19
Void Ratio	0.50
Saturation, %	96.5%

WATER CONTENTS		Trimmings Initial	Sample Final
Wt Soil & Tare, i	g	630.99	691.22
Wt Soil & Tare, f	g	543.56	594.70
Wt Tare	g	0.00	52.06
Wt Moisture Lost	g	87.43	96.52
Wt Dry Soil	g	543.56	542.64
Water Content	%	16.09%	17.79%

DESCRIPTION: Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace 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)
11/14/02	37574	8	25	23.3	0	0	0	0	1.95	137.16	18.10	3.2E-08
11/14/02	37574	8	30	23.3	5	5	300	300	1.95	137.16	18.10	3.2E-08
11/14/02	37574	8	35	23.3	5	10	300	600	1.95	137.16	18.10	3.2E-08
11/14/02	37574	8	40	23.3	5	15	300	900	1.95	137.16	18.10	3.2E-08 *
11/14/02	37574	8	45	23.3	5	20	300	1200	1.95	137.16	18.10	3.2E-08 *
11/14/02	37574	8	50	23.3	5	25	300	1500	1.95	137.16	18.10	3.2E-08 *
11/14/02	37574	8	55	23.3	5	30	300	1800	1.95	137.16	18.10	3.2E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.2E-08 cm/sec **

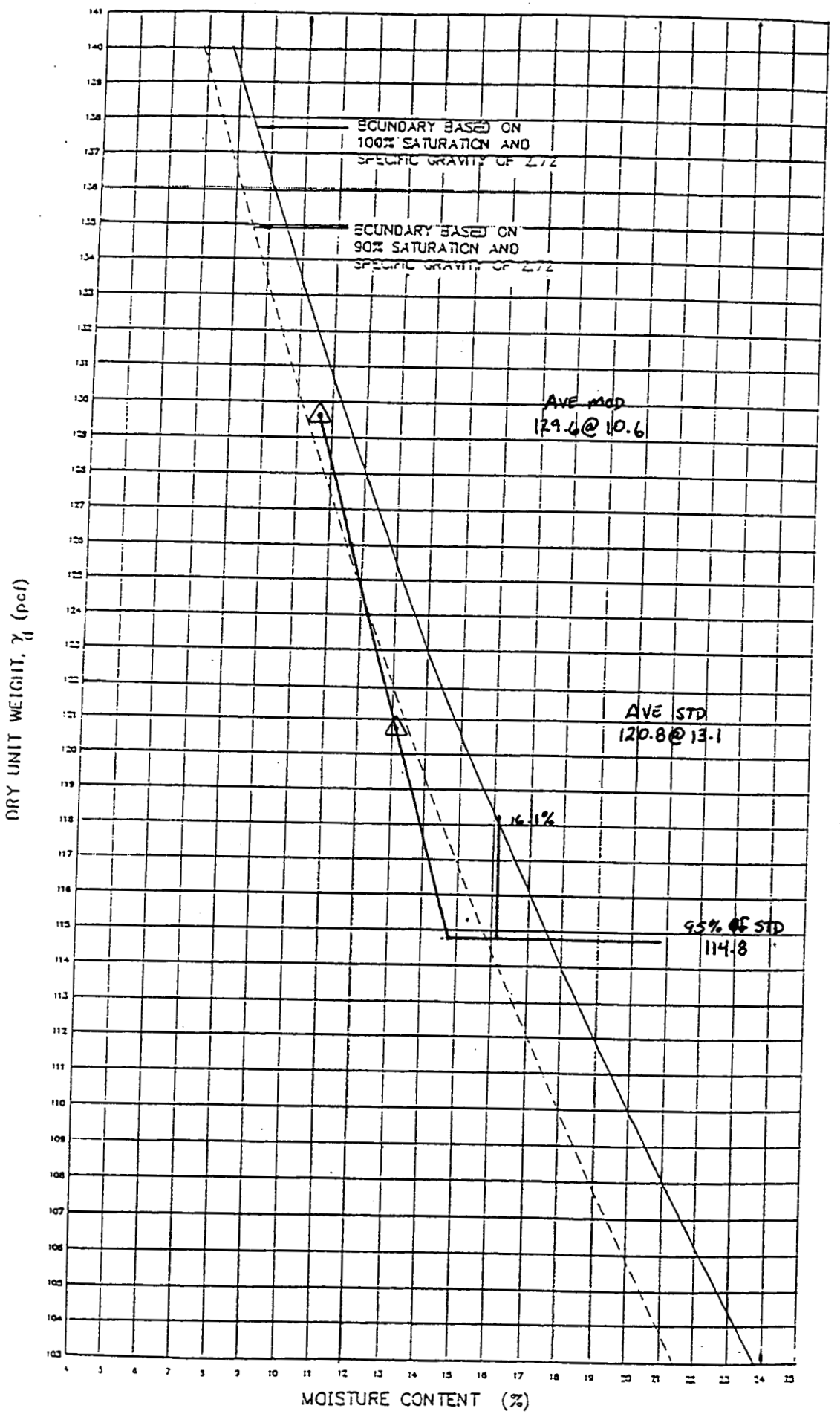
DATE	11/14/02
CHECK	BJS
REVIEW	RWN

000046

5369

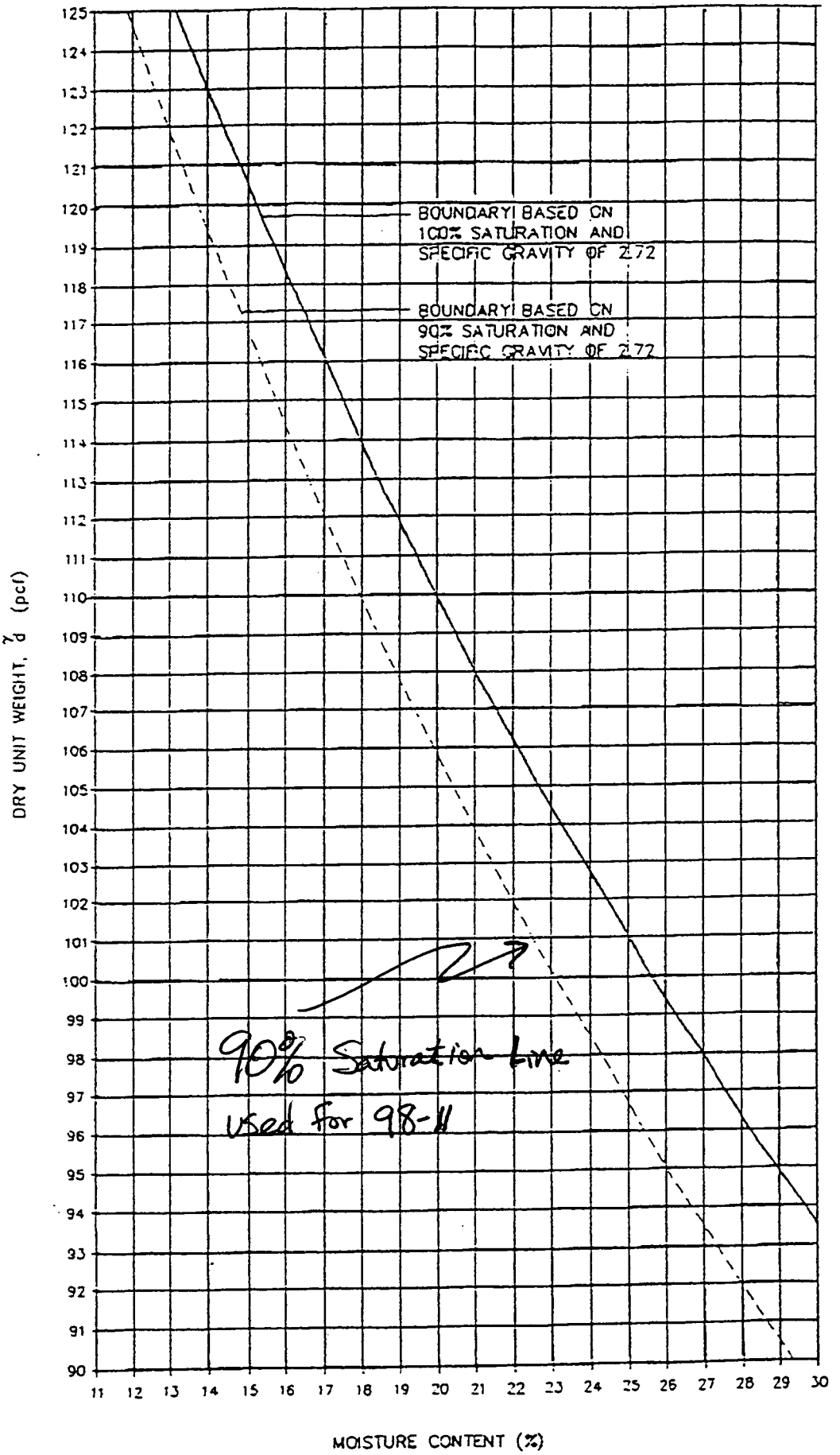
ACCEPTABLE PERMEABILITY ZONES (APZs)

5369



STOCKPILE
98-13

000048


BOUNDARY BASED ON 100% SATURATION AND SPECIFIC GRAVITY OF 2.72
BOUNDARY BASED ON 90% SATURATION AND SPECIFIC GRAVITY OF 2.72
90% Saturation Line
Used for 98-11
DRY UNIT WEIGHT, γ_d (pcf)
MOISTURE CONTENT (%)
125
124
123
122
121
120
119
118
117
116
115
114
113
112
111
110
109
108
107
106
105
104
103
102
101
100
99
98
97
96
95
94
93
92
91
90
11
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18
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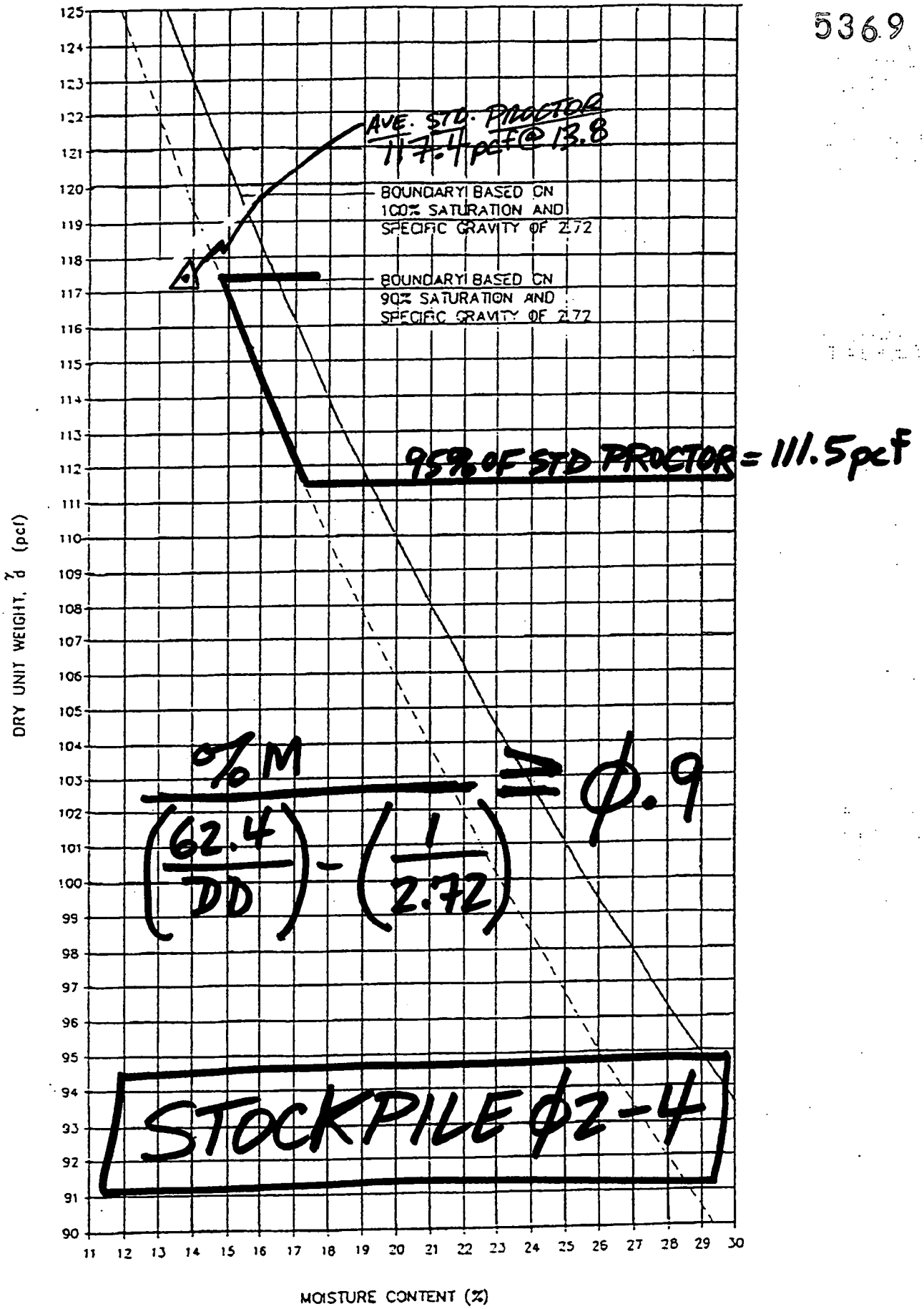
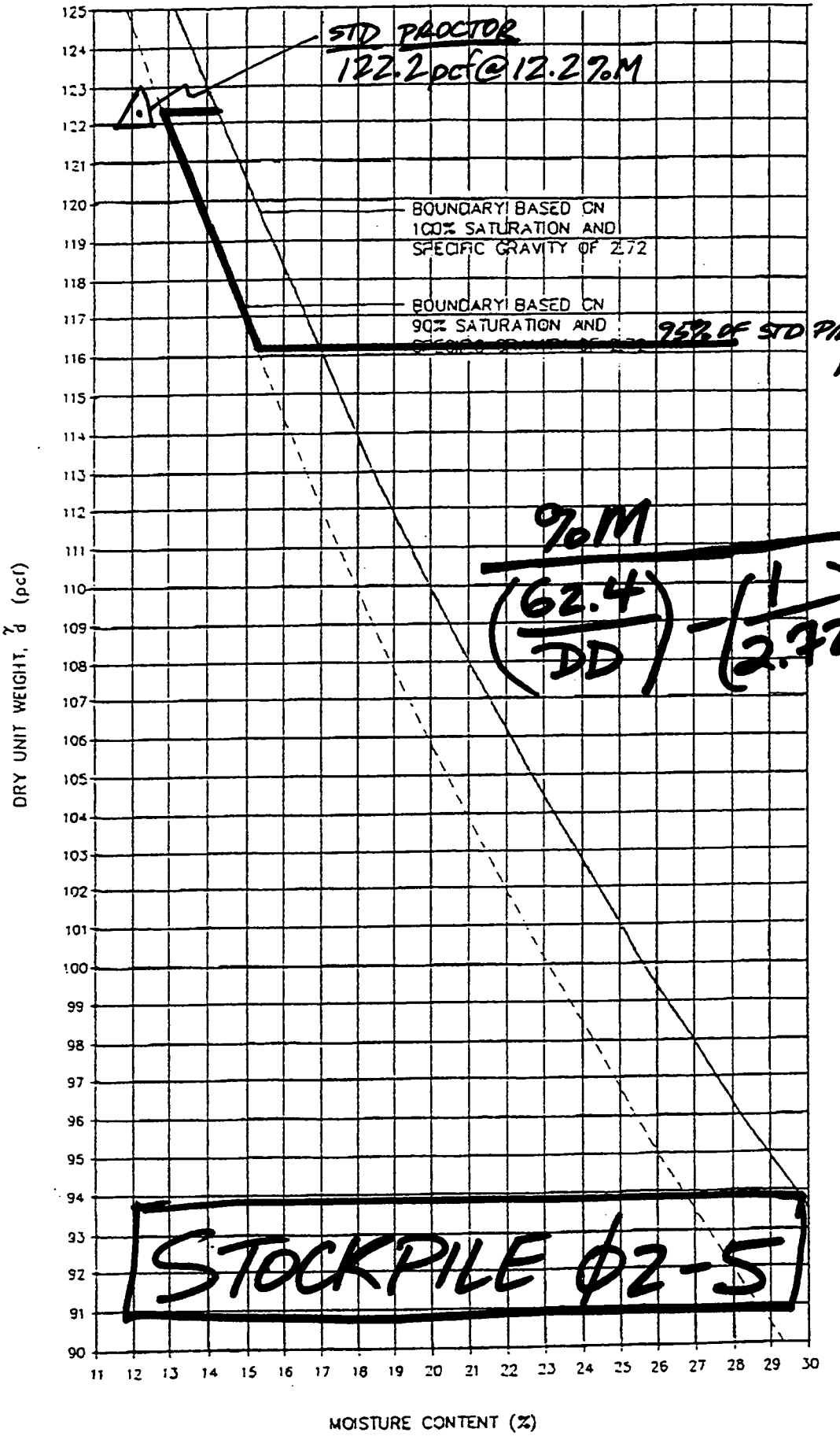
24
25
26
27
28
29
30

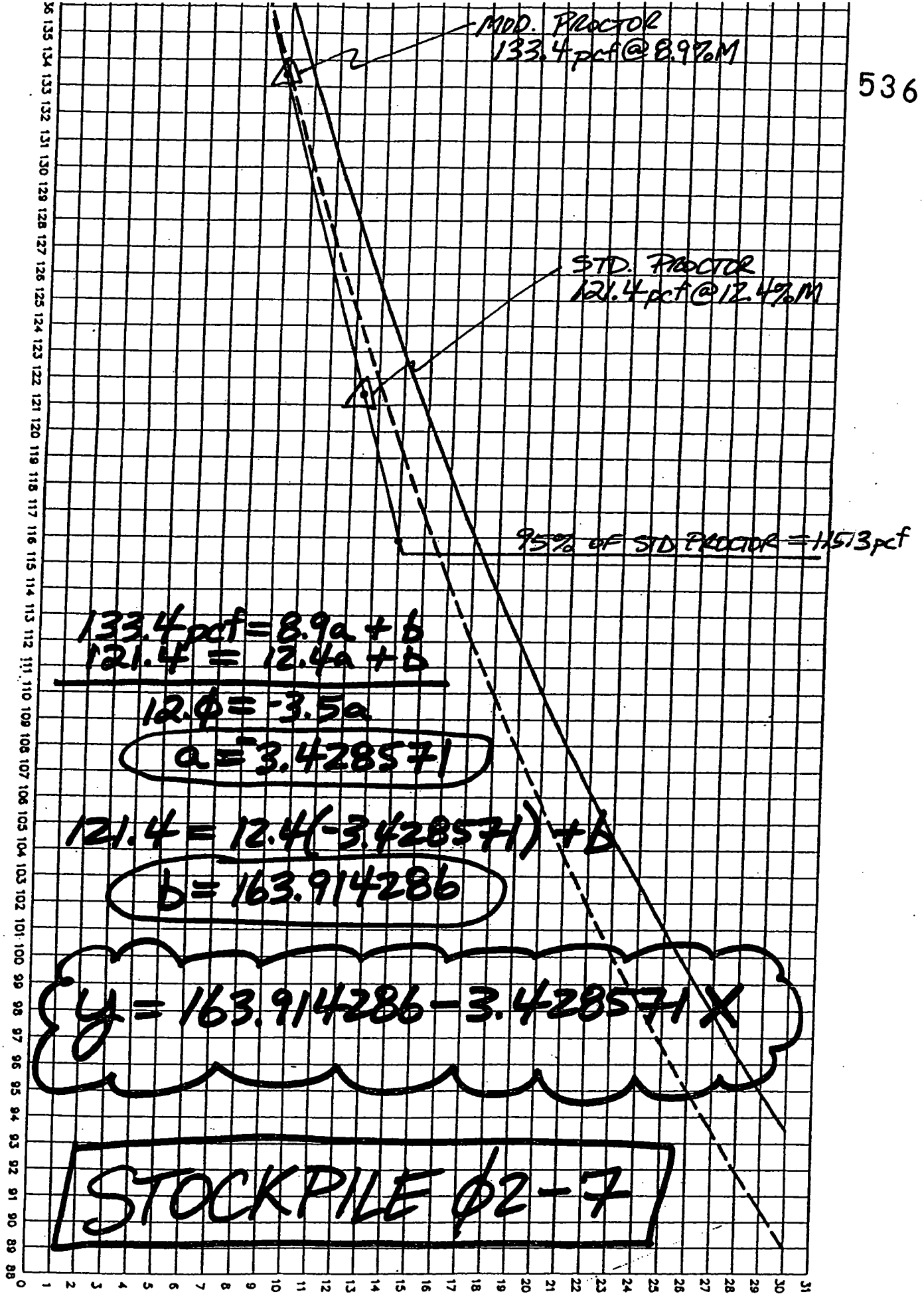


$$\frac{\%M}{\left(\frac{62.4}{DD}\right)-\left(\frac{1}{2.72}\right)} \geq \phi.9$$



$$\frac{\%M}{\left(\frac{62.4}{DD}\right)-\left(\frac{1}{2.72}\right)} \geq 0.9$$

5369



$133.4\,pcf = 8.9a + b$
$121.4 = 12.4a + b$

$12.4 = -3.5a$

$a = -3.428571$

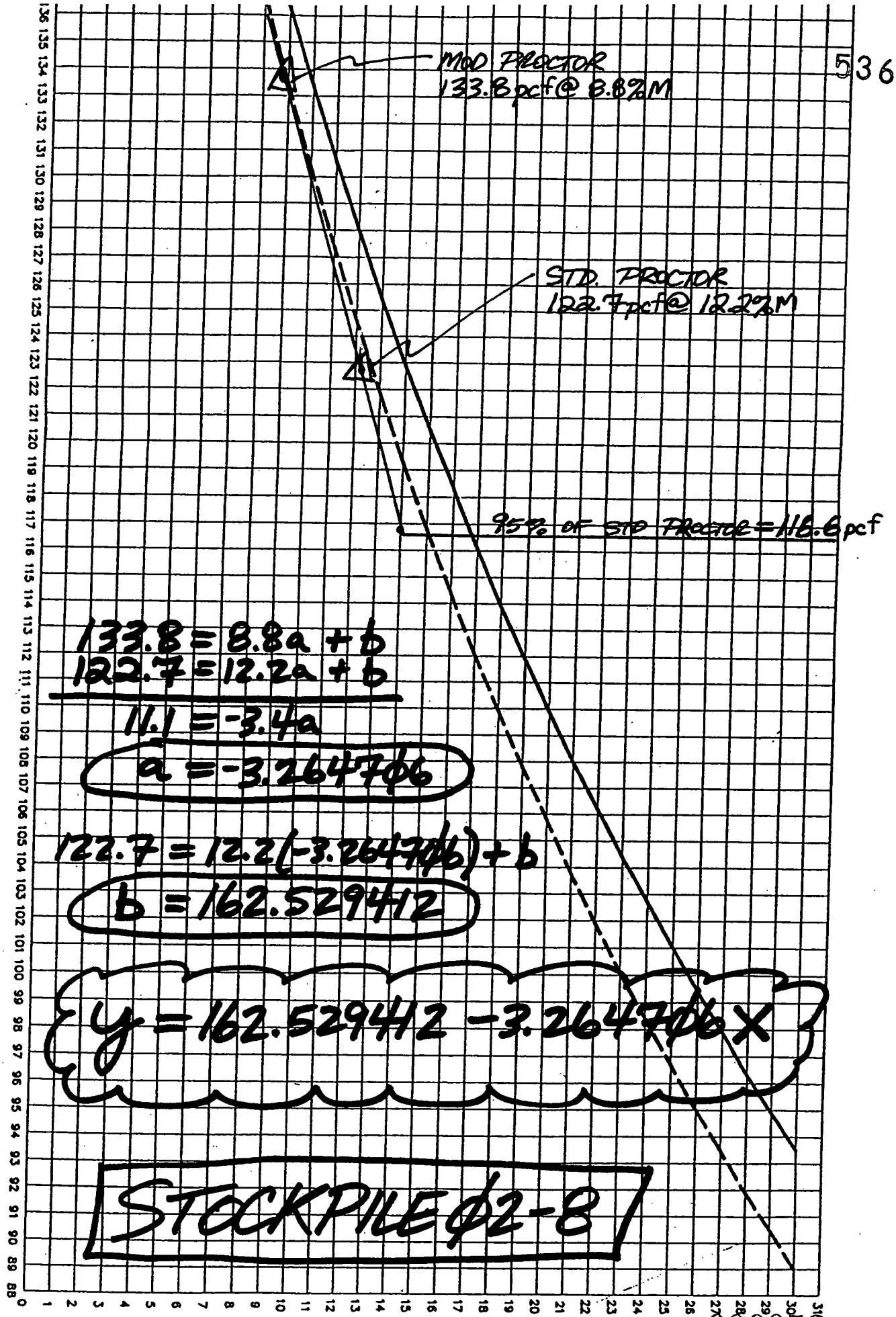
$121.4 = 12.4(-3.428571) + b$

$b = 163.914286$

$y = 163.914286 - 3.428571x$

STOCKPILE 02-7

000052



$133.8 = 8.8a + b$
$122.7 = 12.2a + b$

$11.1 = -3.4a$

$a = -3.264706$

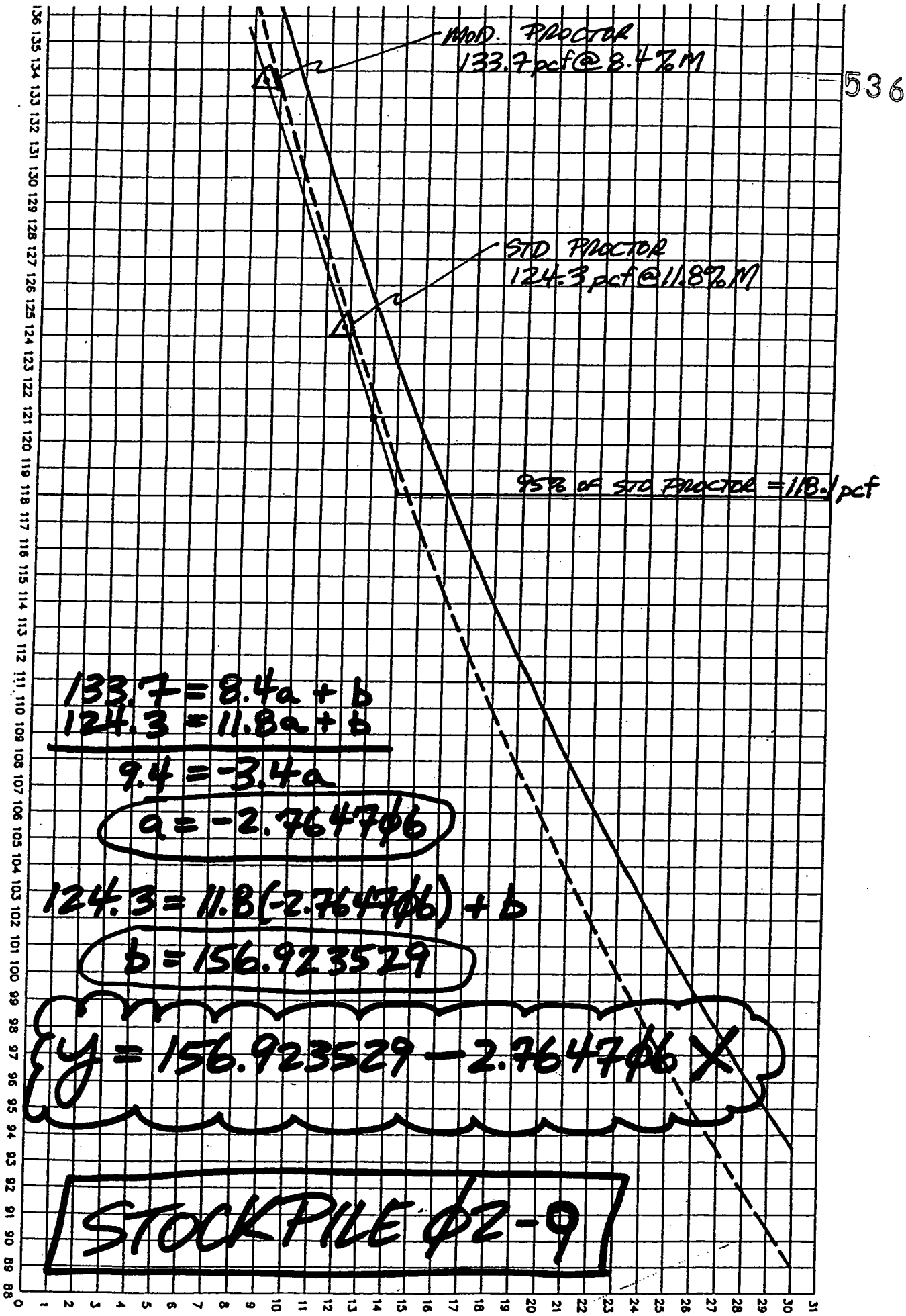
$122.7 = 12.2(-3.264706) + b$

$b = 162.529412$

$y = 162.529412 - 3.264706x$

STOCKPILE #2-8

5369



$133.7 = 8.4a + b$
$124.3 = 11.8a + b$

$9.4 = -3.4a$

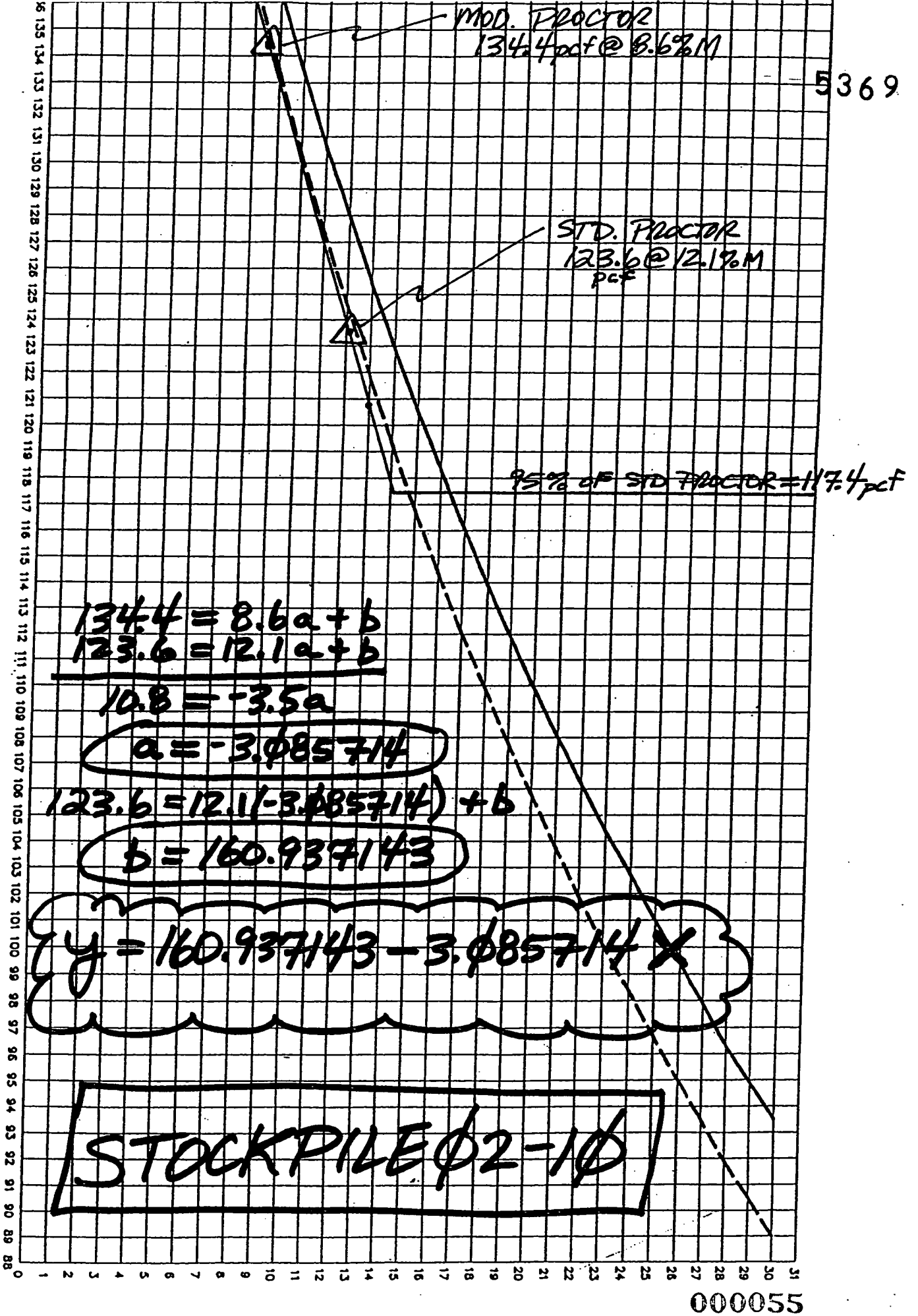
$a = -2.764706$

$124.3 = 11.8(-2.764706) + b$

$b = 156.923529$

$y = 156.923529 - 2.764706X$

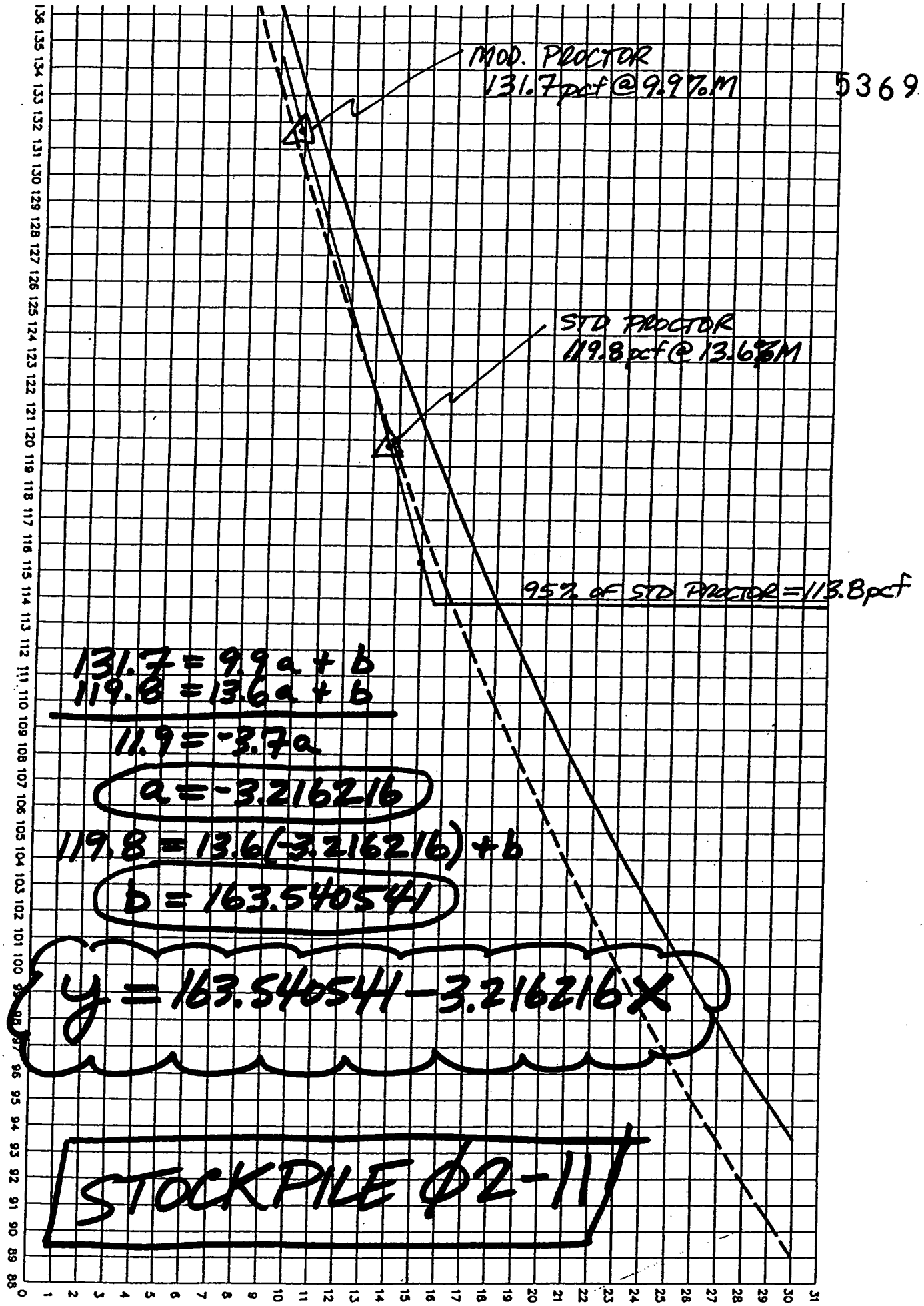
STOCKPILE Ø2-9



$$134.4 = 8.6a + b$$
$$123.6 = 12.1a + b$$
$$10.8 = -3.5a$$
$$a = -3.085714$$
$$123.6 = 12.1(-3.085714) + b$$
$$b = 160.937143$$
$$y = 160.937143 - 3.085714x$$

STOCKPILE 02-10

5369



$131.7 = 9.9a + b$
$119.8 = 13.6a + b$

$11.9 = -3.7a$

$a = -3.216216$

$119.8 = 13.6(-3.216216) + b$

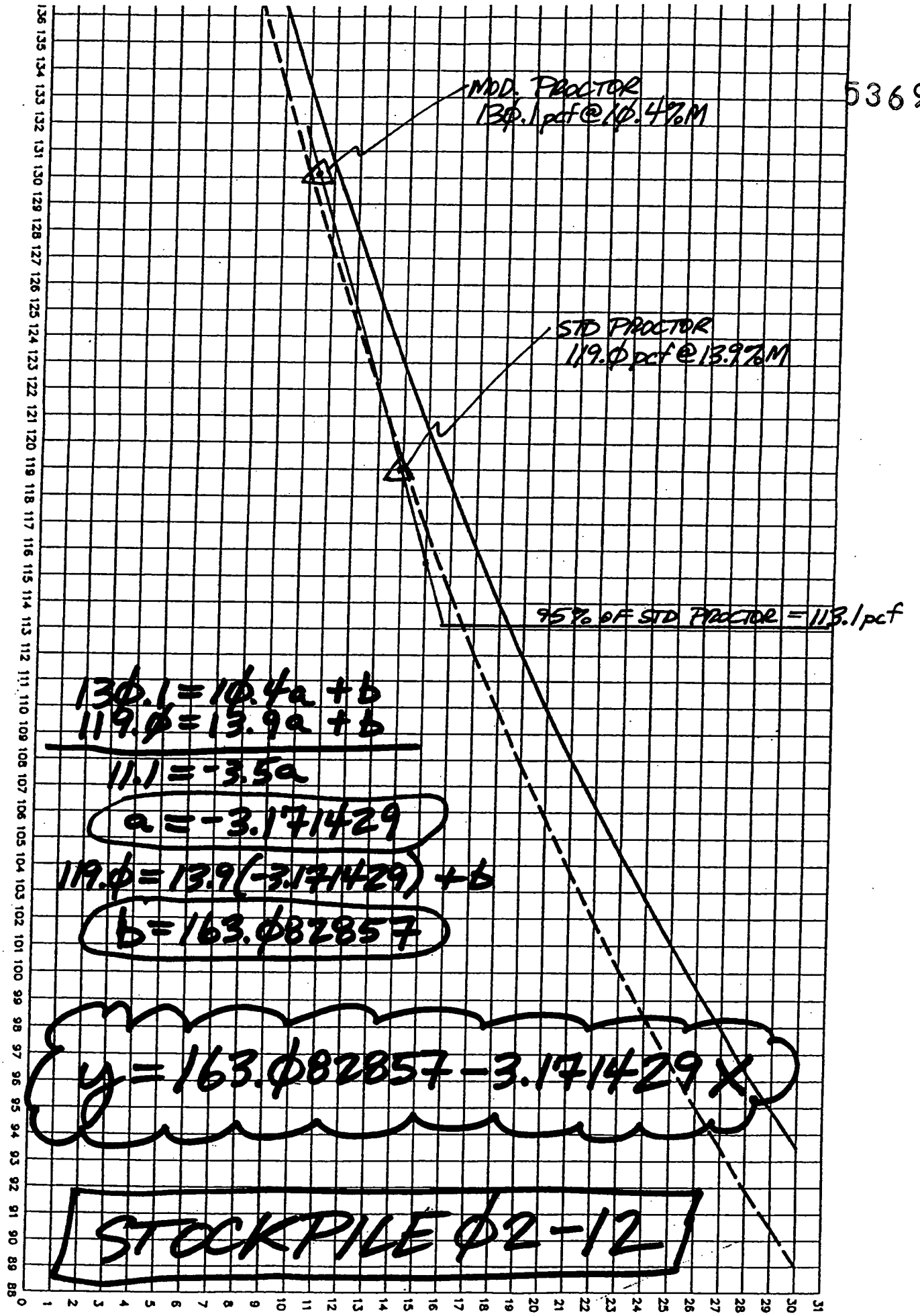
$b = 163.540541$

$y = 163.540541 - 3.216216x$

STOCKPILE Ø2-11

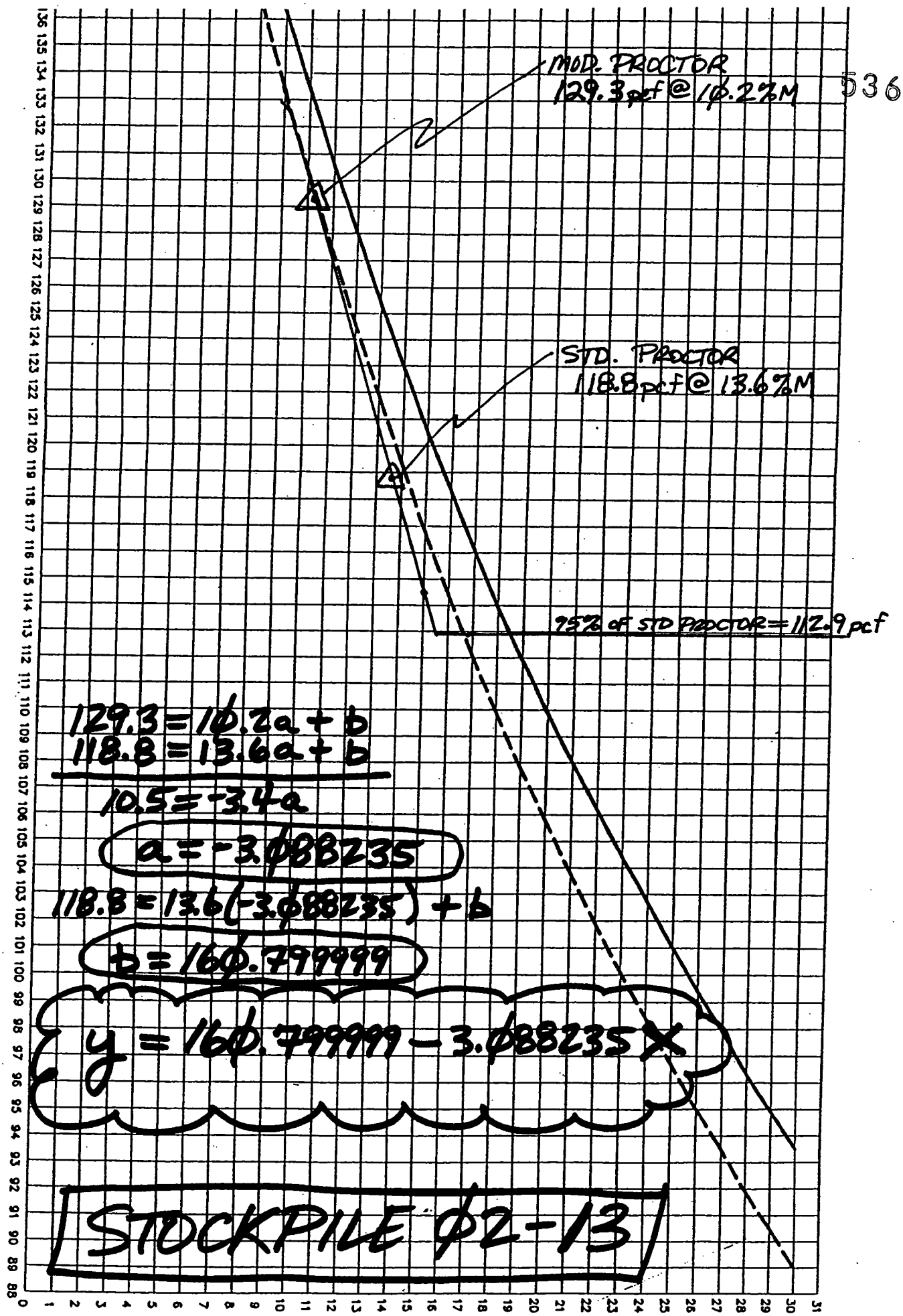
000056

5369


POUNDS PER CUBIC FOOT (lb/ft³)
% MOISTURE
MOD. PROCTOR
130.1 pcf @ 10.4% M
STD PROCTOR
119.0 pcf @ 13.9% M
95% OF STD PROCTOR = 113.1 pcf
130.1 = 10.4a + b
119.0 = 13.9a + b
11.1 = -3.5a
a = -3.171429
119.0 = 13.9(-3.171429) + b
b = 163.082857
y = 163.082857 - 3.171429 X
STOCKPILE 02-12

000057

5369



$129.3 = 10.2a + b$
$118.8 = 13.6a + b$

$10.5 = -3.4a$

$a = -3.088235$

$118.8 = 13.6(-3.088235) + b$

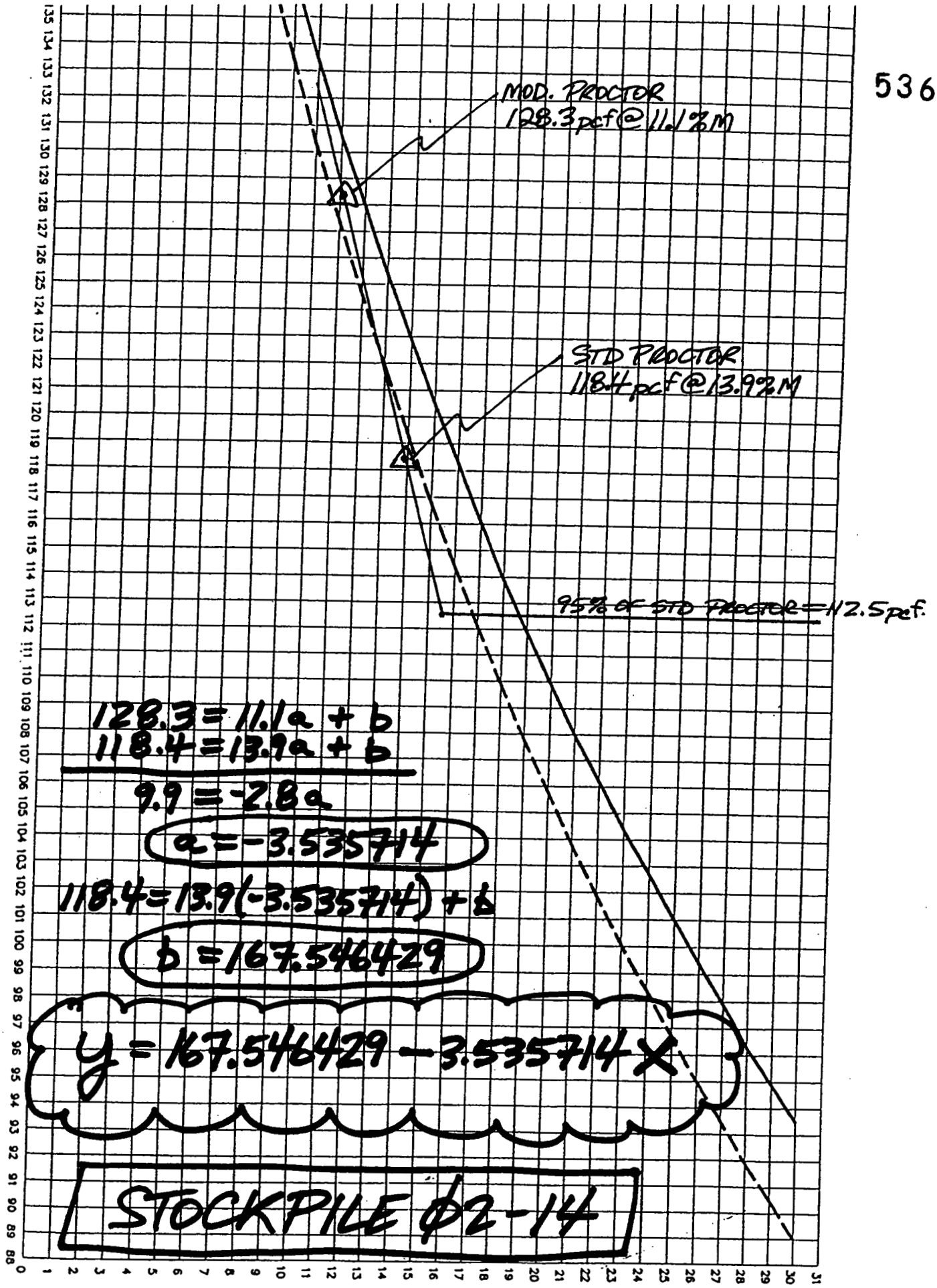
$b = 160.799999$

$y = 160.799999 - 3.088235x$

[STOCKPILE 02-13]

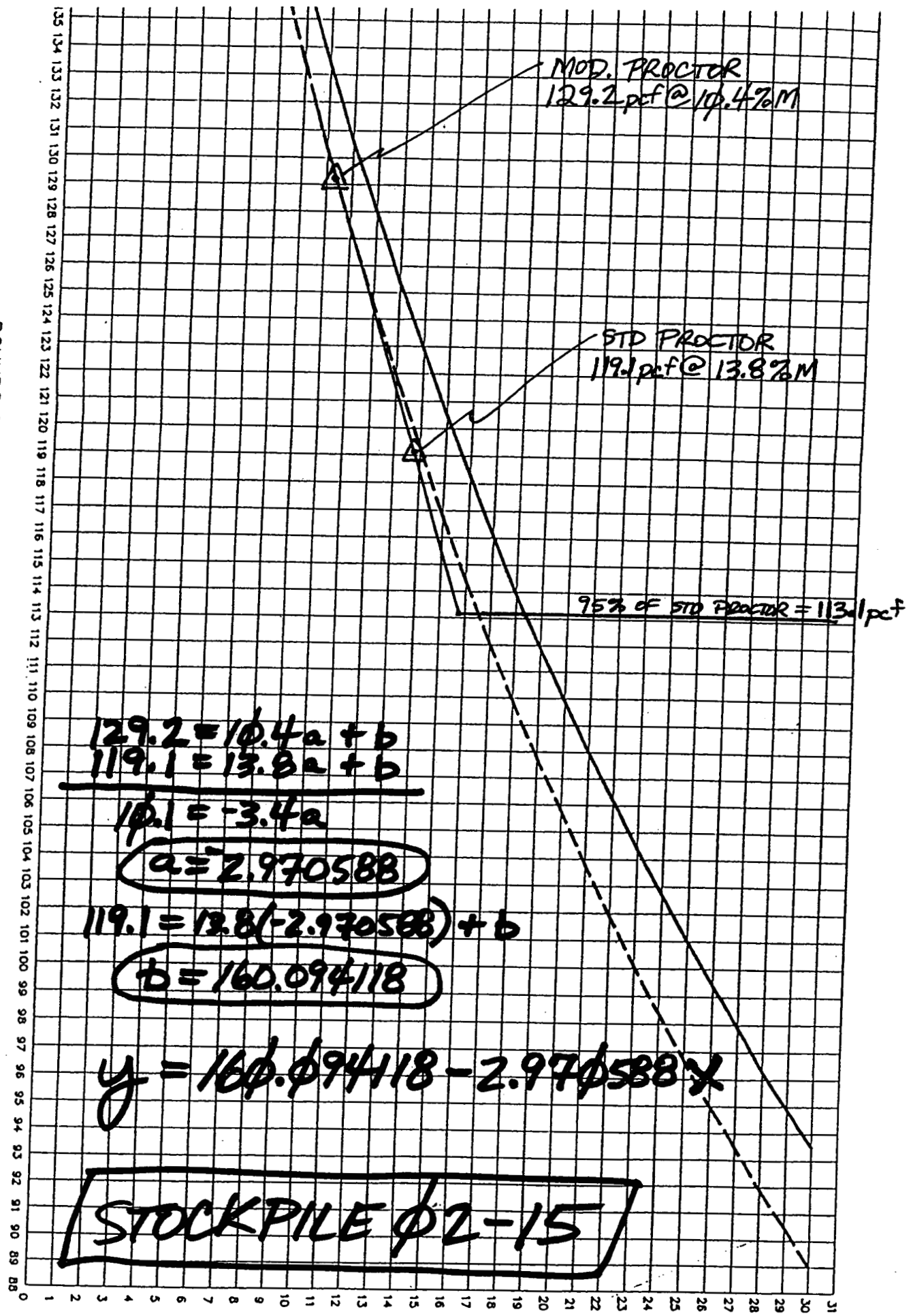
000058

5369


POUNDS PER CUBIC FOOT (lb/ft³)
% MOISTURE
MOD. PROCTOR
128.3pcf@11.1%M
STD PROCTOR
118.4pcf@13.9%M
95% OF STD PROCTOR=112.5pcf.
128.3=11.1a + b
118.4=13.9a + b
9.9=-2.8a
a=-3.535714
118.4=13.9(-3.535714)+b
b=167.546429
y=167.546429-3.535714X
STOCKPILE Ø2-14

000059

5369



$$129.2 = 10.4a + b$$
$$119.1 = 13.8a + b$$

$$10.1 = -3.4a$$

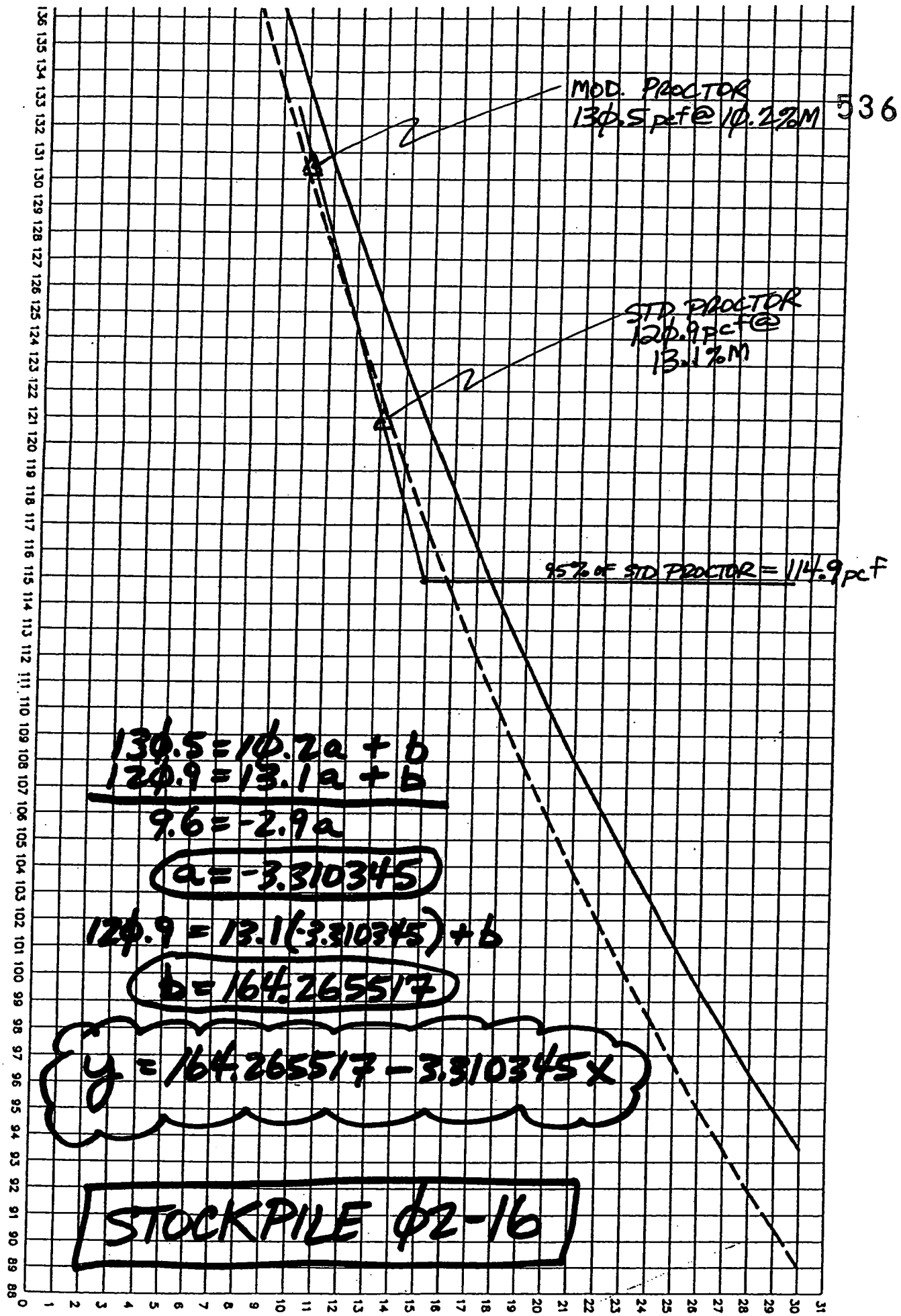
$$a = -2.970588$$

$$119.1 = 13.8(-2.970588) + b$$

$$b = 160.094118$$

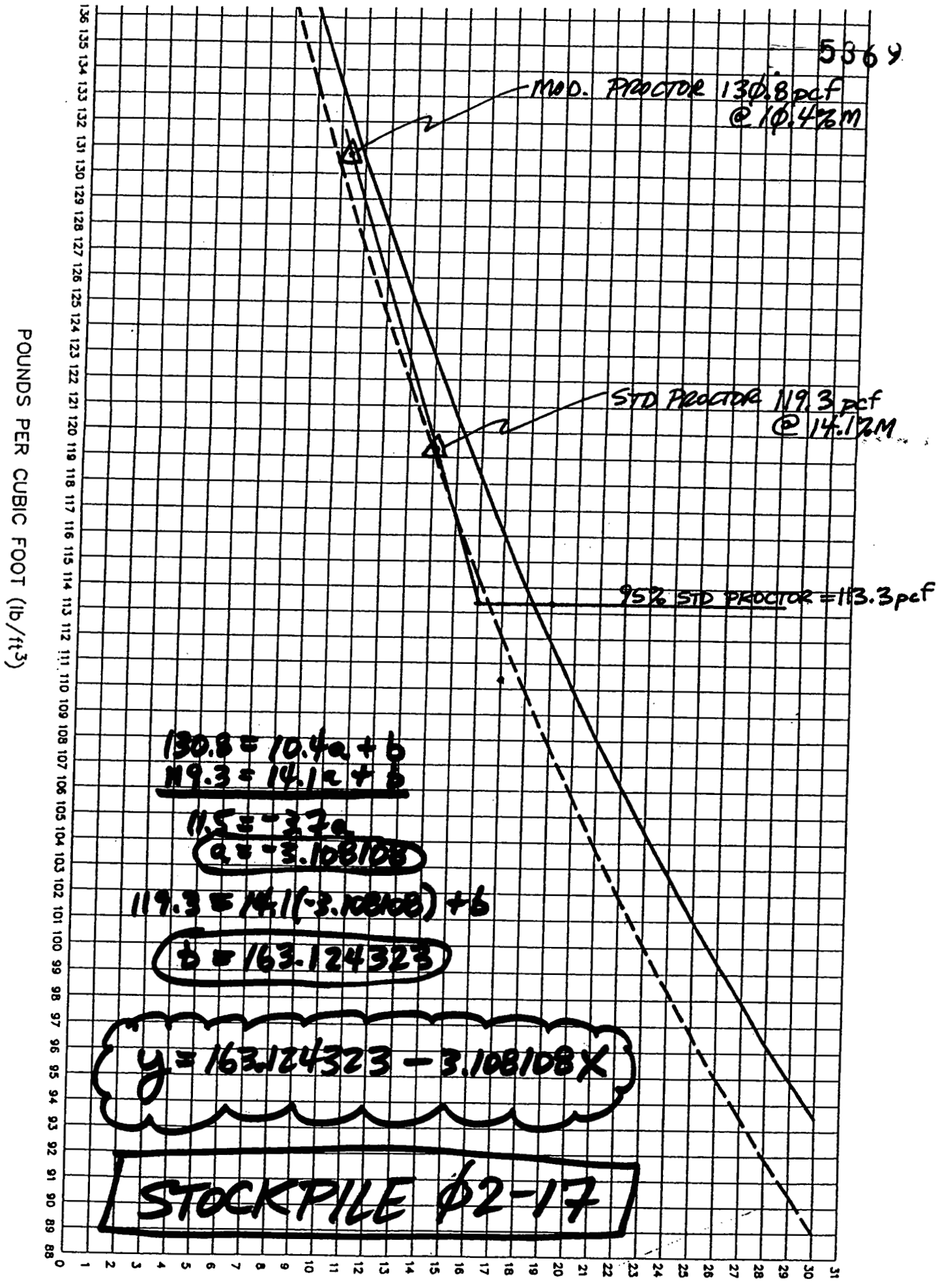
$$y = 160.094118 - 2.970588x$$

STOCKPILE 02-15


POUNDS PER CUBIC FOOT (lb/ft³)
% MOISTURE
MOD. PROCTOR
130.5 pcf @ 10.2%M
STD PROCTOR
120.9 pcf @
13.1%M
95% of STD PROCTOR = 114.9 pcf
130.5 = 10.2a + b
120.9 = 13.1a + b
9.6 = -2.9a
a = -3.310345
120.9 = 13.1(-3.310345) + b
b = 164.265517
y = 164.265517 - 3.310345x
STOCKPILE 02-16

5369

000061


5369
MOD. PROCTOR 130.8 pcf @ 10.4% M
STD PROCTOR 119.3 pcf @ 14.1% M
95% STD PROCTOR = 113.3 pcf
130.8 = 10.4a + b
119.3 = 14.1a + b
11.5 = -3.7a
a = -3.108108
119.3 = 14.1(-3.108108) + b
b = 163.124323
y = 163.124323 - 3.108108X
STOCKPILE Ø2-17
POUNDS PER CUBIC FOOT (lb/ft³)
% MOISTURE

290000

STOCKPILE 98-11

STOCKPILE 98-11

Sample No.	Frequency (Yds.)	STD. Proctor	LL/PL/PI	#200 %Pass	HYD. COND.	% CLAY
LPII-117		116.1 @ 14.5 118.1 @ 13.8	35/17/18	79.5	7.90E-09	27.3
LPII-121		114.2 @ 15.1 115.5 @ 14.6	37/18/19	81.8	3.30E-08	29.0

Average Corrected Standard = 116.8 @ 14.2

Reported Tons = Not Available

Composite Hydraulic Conductivity = Not Available*

*Note: This stockpile was screened in 1998 prior to the implementation of the Test Pad Addendum Report. Therefore, previous test samples were not kept for modified proctors or composite hydraulic conductivity testing. However, a remolded hydraulic conductivity test was run on each individual sample and the material was held to the "old APZ" or 90% saturation line. Individual test results are contained in the Phase II Cell 2 final report.

STOCKPILE 98-13

STOCKPILE 98-13

Sample No.	Frequency (Yds.)	STD.	MOD.	LL/PL/PI	#200 %PASS	HYD. COND.	% CLAY
LPII-133		119.5 @ 13.5 121.0 @ 13.0	— —	32/17/15	72.6	3.3×10^{-8}	18.8
LPII-134		118.5 @ 14.3 120.8 @ 13.5	— —	31/16/15	70	9.4×10^{-8}	19.5
LPII-139		118.1 @ 14.0 119.3 @ 13.6	126.1 @ 12.0 127.2 @ 11.7	33/17/16	74.8	7.1×10^{-8}	—
LPIII-45		121.0 @ 12.4 122.1 @ 12.1	131.0 @ 9.7 131.9 @ 9.5	32/16/16	73	2.5×10^{-8}	22.0

Average Corrected Standard = 120.8 @ 13.1

Average Corrected Modified = 129.6 @ 10.6

Reported Tons = Not Available

Estimated Total Yardage = 3000 from survey ~ 2400 in-place

Cumulative Yardage = 45,059

Composite Hydraulic Conductivity = Not Available*

*Note: This stockpile was screened in 1998 prior to the implementation of the Test Pad Addendum Report. Therefore, previous test samples were not kept for a composite hydrualic conductivity sample. However, a re-molded hydraulic conductivity test was run on each individual sample.

STOCKPILE 02-4

STOCKPILE 02-4

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
LP02-23	1500	11.4	117.4 @ 14.0 119.0 @ 13.4	129.2 @ 10.2 130.6 @ 9.8	27	16	11	70.3	24.0	(CL) Lean Clay w/sand	6.90E-08 —
LP02-24	3000	12.5	115.6 @ 14.8 116.6 @ 14.4	— —	30	16	14	72.1	25.0	(CL) Lean Clay w/sand	— —
LP02-25	4500	12.7	117.4 @ 13.9 118.8 @ 13.4	129.6 @ 9.5 130.8 @ 9.2	28	15	13	67.7	24.0	(CL) Sandy Lean Clay	— —
LP02-26	6000	11.6	120.8 @ 12.3 121.8 @ 12.0	— —	26	15	11	67.7	23.0	(CL) Sandy Lean Clay	— —
LP02-27	7500	12.0	112.2 @ 15.6 114.4 @ 14.9	124.1 @ 11.3 125.7 @ 10.8	30	17	13	73.2	28.5	(CL) Lean Clay w/sand	— —
LP02-28	9000	13.6	112.0 @ 15.1 113.5 @ 14.6	— —	31	15	16	68.1	25.5	(CL) Sandy Lean Caly	— —

Reported total yards, surveyed:	about 10,000
Converted total yards in place:	8,640
Average Stockpile Moisture:	12.3
Average Corrected Standard Proctor:	117.4 @ 13.8
Average Corrected Modified Proctor:	129.0 @ 9.9
Cumulative cubic yards:	35,509
Composite Hydraulic Conductivity:	3.40E-08
	* *1.40E-07*
	* *6.50E-06*

* Two samples failed remolded permeability testing within the line of optiums. The third sample passed permeability testing by being remolded to the 90% saturation line.

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STOCKPILE 02-5

STOCKPILE 02-5

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
LP02-29	1500	11.8	118.1 @ 13.1 119.3 @ 12.7	129.0 @ 9.7 130.0 @ 9.4	33	17	16	72.1	27.0	(CL) Lean Clay w/sand	1.00E-07 —
LP02-30	3000	13.9	122.3 @ 12.6 123.5 @ 12.2	— —	30	15	15	68.9	27.0	(CL) Sandy Lean Clay	— —
LP02-31	4500	11.7	117.3 @ 13.5 120.0 @ 12.6	132.0 @ 8.2 134.2 @ 7.7	28	15	13	64.8	25.0	(CL) Sandy Lean Clay	— —
LP02-34	6000	11.4	118.8 @ 12.0 120.8 @ 11.4	— —	26	15	11	67.4	19.0	(CL) Sandy Lean Clay	— —
LP02-35	7500	11.6	124.1 @ 12.4 125.4 @ 12.0	133.9 @ 9.0 135.0 @ 8.7	24	14	10	69.0	20.0	(CL) Sandy Lean Clay	— —
LP02-36	9000	11.5	123.6 @ 12.4 124.4 @ 12.2	— —	25	15	10	65.8	23.5	(CL) Sandy Lean Clay	— —

Reported total yards, surveyed:	10,367
Converted total yards in place:	8,957
Average Stockpile Moisture:	12.00%
Average Corrected Standard Proctor:	122.2 @ 12.2
Average Corrected Modified Proctor:	133.1 @ 8.6
Cumulative cubic yards:	44,466
Composite Hydraulic Conductivity:	3.30E-08

* Two samples failed remolded permeability testing within the line of optiums. The third sample passed permeability testing by being remolded to the 90% saturation line.

* *1.50E-06*

* *1.30E-07*

000070

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STOCKPILE 02-7

STOCKPILE 02-7

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
LP02-42	1500	12.7	121.1 @ 11.0 122.1 @ 10.7	133.8 @ 9.2 134.6 @ 9.0	26	16	10	65.2	25.0	(CL) Sandy Lean Clay	— —
LP02-44	3000	14.0	116.6 @ 14.4 117.3 @ 14.2	— —	34	17	17	74.6	29.0	(CL) Lean Clay w/sand	— —
LP02-45	4500	13.1	119.6 @ 13.4 120.3 @ 13.2	130.6 @ 10.0 131.2 @ 9.8	29	16	13	69.3	26.0	(CL) Sandy Lean Clay	6.70E-08 —
LP02-46	6000	11.6	120.8 @ 13.0 122.9 @ 12.3	— —	28	16	12	66.8	24.5	(CL) Sandy Lean Clay	— —
LP02-47	7500	11.8	119.9 @ 12.3 121.3 @ 11.9	132.5 @ 9.0 133.6 @ 8.7	27	15	12	67.9	25.0	(CL) Sandy Lean Clay	— —
LP02-48	9000	12.5	122.1 @ 12.9 123.5 @ 12.4	— —	28	15	13	67.8	25.0	(CL) Sandy Lean Clay	— —
LP02-55	9000+	11.2	120.0 @ 12.7 122.2 @ 12.0	132.5 @ 8.5 134.3 @ 8.1	28	16	12	68.1	25.0	(CL) Sandy Lean Clay	— —

Reported total yards, surveyed:	11,142
Converted total yards in place:	9,627
Average Stockpile Moisture:	12.40%
Average Corrected Standard Proctor:	121.4 @ 12.4
Average Corrected Modified Proctor:	133.4 @ 8.9
Cumulative cubic yards:	54,093
Composite Hydraulic Conductivity:	9.90E-08

STOCKPILE 02-8

STOCKPILE 02-8

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
LP02-49	1500	13.1	122.0 @ 12.3 123.7 @ 11.8	133.9 @ 9.1 135.3 @ 8.7	27	16	11	65.9	24.0	(CL) Sandy Lean Clay	— —
LP02-50	3000	14.9	121.4 @ 13.9 122.6 @ 13.5	— —	29	16	13	67.3	24.5	(CL) Sandy Lean Clay	— —
LP02-51	4500	11.5	122.6 @ 13.0 124.7 @ 12.3	132.4 @ 9.4 134.2 @ 8.9	27	15	12	64.9	22.0	(CL) Sandy Lean Clay	3.00E-08 —
LP02-53	6000	12.8	120.4 @ 11.8 121.4 @ 11.5	— —	28	16	12	68.0	26.0	(CL) Sandy Lean Clay	— —
LP02-54	7500	13.1	121.0 @ 13.0 122.1 @ 11.3	130.5 @ 9.0 131.9 @ 8.7	27	16	11	67.5	24.5	(CL) Sandy Lean Clay	— —
LP02-62	9000	12.9	120.4 @ 13.3 121.5 @ 12.9	— —	28	15	13	66.5	24.0	(CL) Sandy Lean Clay	— —

Reported total yards, surveyed:	9,200
Converted total yards in place:	7,949
Average Stockpile Moisture:	13.05%
Average Corrected Standard Proctor:	122.7 @ 12.2
Average Corrected Modified Proctor:	133.8 @ 8.8
Cumulative cubic yards:	62,042
Composite Hydraulic Conductivity:	6.50E-08

STOCKPILE 02-9

STOCKPILE 02-9

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
LP02-56	1500	12.4	123.9 @ 11.1 125.1 @ 10.8	— —	25	15	10	65.7	22.5	(CL) Sandy Lean Clay	— —
LP02-57	3000	10.8	122.5 @ 12.1 124.7 @ 11.4	132.5 @ 8.5 134.3 @ 8.1	27	16	11	62.8	21.0	(CL) Sandy Lean Clay	3.10E-08 *4.90E-06*
LP02-58	4500	11.4	124.6 @ 11.5 126.1 @ 11.1	133.3 @ 8.2 134.6 @ 7.9	*24* 27	*15* 16	*9* 11	65.9	25.5	(CL) Sandy Lean Clay	— —
LP02-59	6000	12.1	120.9 @ 12.6 123.1 @ 11.9	— —	29	16	13	66.2	25.0	(CL) Sandy Lean Clay	— —
LP02-60	7500	11.4	123.2 @ 12.2 124.7 @ 11.7	130.9 @ 9.5 132.3 @ 9.1	27	15	12	66.5	24.0	(CL) Sandy Lean Clay	— —
LP02-61	9000	11.4	119.5 @ 14.8 122.0 @ 13.9	— —	28	15	13	64.1	21.5	(CL) Sandy Lean Clay	— —

Reported total yards, surveyed:	9,114
Converted total yards in place:	7,874
Average Stockpile Moisture:	11.58%
Average Corrected Standard Proctor:	124.3 @ 11.8
Average Corrected Modified Proctor:	133.7 @ 8.4
Cumulative cubic yards:	69,916
Composite Hydraulic Conductivity:	5.70E-08

STOCKPILE 02-10

STOCKPILE 02-10

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
LP02-63	1500	12.1	123.5 @ 12.0 124.9 @ 11.6	134.0 @ 8.2 135.1 @ 7.9	27	15	12	66.0	25.0	(CL) Sandy Lean Clay	3.40E-08 —
LP02-64	3000	12.3	123.9 @ 12.5 126.2 @ 11.7	— —	27	15	12	67.5	24.5	(CL) Sandy Lean Clay	— —
LP02-65	4500	11.3	124.0 @ 12.0 124.5 @ 11.8	134.5 @ 9.0 134.9 @ 8.9	26	16	10	68.0	25.0	(CL) Sandy Lean Clay	— —
LP02-66	6000	11.1	123.2 @ 12.1 124.5 @ 11.7	— —	29	16	13	66.9	26.0	(CL) Sandy Lean Clay	— —
LP02-67	7500	11.1	119.5 @ 13.8 120.4 @ 13.5	132.4 @ 9.2 133.1 @ 9.0	29	16	13	69.1	26.5	(CL) Sandy Lean Clay	— —
LP02-75	9000	12.5	120.0 @ 12.8 121.1 @ 12.5	— —	29	16	13	66.7	27.0	(CL) Sandy Lean Clay	— —

Reported total yards, surveyed:	9,924
Converted total yards in place:	8,574
Average Stockpile Moisture:	11.73%
Average Corrected Standard Proctor:	123.6 @ 12.1
Average Corrected Modified Proctor:	134.4 @ 8.6
Cumulative cubic yards:	78,490
Composite Hydraulic Conductivity:	6.00E-08

STOCKPILE 02-11

STOCKPILE 02-11

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
LP02-69	1500	12.3	121.9 @ 12.5 122.9 @ 12.2	133.5 @ 9.2 134.3 @ 9.0	29	13	16	68.6	28.0	(CL) Sandy Lean Clay	9.70E-08 —
LP02-70	3000	13.6	120.1 @ 14.0 121.5 @ 13.5	— —	29	16	13	69.6	25.0	(CL) Sandy Lean Clay	— —
LP02-71	4500	11.4	122.1 @ 12.6 123.8 @ 12.1	133.4 @ 9.5 134.8 @ 9.1	28	15	13	65.9	25.0	(CL) Sandy Lean Clay	— —
LP02-72	6000	12.4	120.2 @ 13.2 121.5 @ 12.8	— —	28	15	13	63.8	27.0	(CL) Sandy Lean Clay	— —
LP02-73	7500	14.6	112.6 @ 16.5 114.2 @ 15.9	124.6 @ 12.0 126.0 @ 11.6	33	17	16	74.7	29.5	(CL) Lean Clay w/sand	— —
LP02-76	9000	13.7	114.6 @ 15.2 115.0 @ 15.1	— —	33	18	15	72.0	32.0	(CL) Lean Clay w/sand	— —

Reported total yards, surveyed:	10,000
Converted total yards in place:	8,640
Average Stockpile Moisture:	13.00%
Average Corrected Standard Proctor:	119.8 @ 13.6
Average Corrected Modified Proctor:	131.7 @ 9.9
Cumulative cubic yards:	87,130
Composite Hydraulic Conductivity:	7.20E-08

STOCKPILE 02-12

STOCKPILE 02-12

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
LP02-74	1500	15.2	113.6 @ 15.9 114.2 @ 15.7	125.1 @ 11.9 125.7 @ 11.7	35	17	18	69.8	30.0	(CL) Sandy Lean Clay	— —
LP02-77	3000	13.4	115.4 @ 14.9 116.2 @ 14.6	— —	31	16	15	68.1	29.5	(CL) Sandy Lean Clay	— —
LP02-78	4500	12.8	120.0 @ 13.5 121.6 @ 13.0	132.6 @ 9.5 133.9 @ 9.1	29	15	14	65.7	27.0	(CL) Sandy Lean Clay	3.30E-08 —
LP02-79	6000	13.2	120.2 @ 13.2 121.9 @ 12.6	— —	28	17	11	67.1	25.0	(CL) Sandy Lean Clay	— —
LP02-81	7500	13.0	119.9 @ 13.5 121.3 @ 13.0	129.6 @ 10.9 130.8 @ 10.5	29	17	12	67.9	28.0	(CL) Sandy Lean Clay	— —
LP02-82	9000	13.2	117.1 @ 15.0 119.0 @ 14.3	— —	30	16	14	67.2	27.0	(CL) Sandy Lean Clay	— —

Reported total yards, surveyed:	9,610
Converted total yards in place:	8,303
Average Stockpile Moisture:	13.47%
Average Corrected Standard Proctor:	119.0 @ 13.9
Average Corrected Modified Proctor:	130.1 @ 10.4
Cumulative cubic yards:	95,433
Composite Hydraulic Conductivity:	5.90E-08

STOCKPILE 02-13

STOCKPILE 02-13

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
LP02-83	1500	14.7	113.6 @ 15.0 114.4 @ 14.7	125.4 @ 12.1 126.1 @ 11.9	33	18	15	76.1	26.5	(CL) Lean Clay w/sand	— —
LP02-84	3000	13.3	119.0 @ 13.5 120.6 @ 13.0	— —	30	17	13	68.5	25.0	(CL) Sandy Lean Clay	— —
LP02-85	4500	11.8	120.5 @ 13.1 121.4 @ 12.8	130.3 @ 9.1 131.1 @ 8.9	27	16	11	68.7	25.0	(CL) Sandy Lean Clay	5.60E-08 —
LP02-86	6000	12.4	120.0 @ 12.6 120.6 @ 12.4	— —	29	17	12	68.2	25.0	(CL) Sandy Lean Clay	— —
LP02-87	7500	14.6	118.5 @ 14.4 119.6 @ 14.0	129.9 @10.0 130.8 @ 9.7	29	17	12	71.3	26.0	(CL) Lean Clay w/sand	— —
LP02-88	9000	14.8	115.1 @ 15.1 116.2 @ 14.7	— —	31	19	12	74.2	27.0	(CL) Lean Clay w/sand	— —

Reported total yards, surveyed:	6,900
Converted total yards in place:	5,962
Average Stockpile Moisture:	13.60%
Average Corrected Standard Proctor:	118.8 @ 13.6
Average Corrected Modified Proctor:	129.3 @ 10.2
Cumulative cubic yards:	101,395
Composite Hydraulic Conductivity:	3.30E-08

STOCKPILE 02-14

STOCKPILE 02-15

STOCKPILE 02-15

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
LP02-98	1500	14.6	120.0 @ 13.7 121.3 @ 13.3	129.1 @ 10.5 130.2 @ 10.2	31	16	15	68.3	27.0	(CL) Sandy Lean Clay	— —
LP02-99	3000	12.8	118.9 @ 13.0 120.9 @ 12.4	— —	29	16	13	67.1	27.0	(CL) Sandy Lean Clay	— —
LP02-100	4500	12.5	116.5 @ 15.0 118.0 @ 14.4	126.6 @ 10.2 127.9 @ 9.8	30	17	13	67.4	25.0	(CL) Sandy Lean Clay	5.50E-08 —
LP02-101	6000	12.9	119.9 @ 13.6 121.6 @ 13.0	— —	29	16	13	66.1	25.5	(CL) Sandy Lean Clay	— —
LP02-102	7500	13.5	118.0 @ 14.1 119.7 @ 13.5	128.0 @ 11.6 129.5 @ 11.1	30	17	13	70.7	26.0	(CL) Lean Clay w/sand	— —
LP02-103	9000	16.0	112.0 @ 17.0 113.2 @ 16.5	— —	40	19	21	69.1	32.0	(CL) Sandy Lean Clay	— —

Reported total yards, surveyed:	7,600
Converted total yards in place:	6,566
Average Stockpile Moisture:	13.72%
Average Corrected Standard Proctor:	119.1 @ 13.8
Average Corrected Modified Proctor:	129.2 @ 10.4
Cumulative cubic yards:	113,114
Composite Hydraulic Conductivity:	8.30E-08

STOCKPILE 02-16

STOCKPILE 02-16

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
LP02-104	1500	12.8	120.4 @ 13.9 121.3 @ 13.6	130.0 @ 10.0 130.8 @ 9.8	29	16	13	67.8	26.0	(CL) Sandy Lean Clay	1.80E-08 —
LP02-105	3000	13.6	120.0 @ 13.5 121.1 @ 13.1	— —	31	16	15	68.9	25.5	(CL) Sandy Lean Clay	— —
LP02-106	4500	12.7	118.5 @ 12.8 120.5 @ 12.3	129.3 @ 10.5 130.8 @ 10.1	27	16	11	63.2	25.0	(CL) Sandy Lean Clay	— —
LP02-107	6000	12.3	119.7 @ 13.9 121.2 @ 13.4	— —	29	16	13	67.4	24.0	(CL) Sandy Lean Clay	— —
LP02-108	7500	11.2	120.8 @ 12.8 122.0 @ 12.4	129.8 @ 10.5 130.9 @ 10.2	29	15	14	68.3	27.5	(CL) Sandy Lean Clay	— —
LP02-109	9000	12.5	119.7 @ 13.7 121.0 @ 13.2	— —	31	17	14	68.1	27.0	(CL) Sandy Lean Clay	— —
LP02-110	9000+	13.2	118.5 @ 14.1 119.4 @ 13.8	128.6 @ 11.1 129.4 @ 10.8	31	16	15	71.8	28.0	(CL) Lean Clay wsand	— —

Reported total yards, surveyed:	8,120
Converted total yards in place:	7,016
Average Stockpile Moisture:	12.61%
Average Corrected Standard Proctor:	120.9 @ 13.1
Average Corrected Modified Proctor:	130.5 @ 10.2
Cumulative cubic yards:	120,130
Composite Hydraulic Conductivity:	3.40E-08

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STOCKPILE 02-17

STOCKPILE 02-17

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
LP02-113	1500	12.7	117.2 @ 14.9 118.3 @ 14.5	— —	32	16	16	73.1	29.0	(CL) Lean Clay wsand	
LP02-114	3000	11.8	118.4 @ 14.2 120.2 @ 13.6	129.2 @ 10.9 130.8 @ 10.4	30	17	13	70.4	26.0	(CL) Lean Clay wsand	3.80E-08

Reported total yards, surveyed:	1,753
Converted total yards in place:	1,515
Average Stockpile Moisture:	12.25%
Average Corrected Standard Proctor:	119.3 @ 14.1
Average Corrected Modified Proctor:	130.8 @ 10.4
Cumulative cubic yards:	121,645
Composite Hydraulic Conductivity:	8.30E-08

GRANULAR DRAINAGE LAYER MATERIAL

NO. 78 STONE

SUPPLIER'S CERTIFICATIONS

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20[redacted]	CONTRACT NO: PHIV2	SUBMITTAL NO. 20104-PHIV2-02710-001	REV.: 0	DATE: 11/13/02	Page 1 of 2

FROM:
Martin Marietta Aggregates

SIGNATURE: Chuck C. VanArsdale 11/13/02

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

RECEIVED BY: Teresa Schwab DATE: 11/13/02

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	PHIV2-02710-001	0						X			Source of cover drainage layer		~~X~~	X	02710-1.04A1	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~~ or COMMENTS: (PLEASE USE SPACE BELOW FOR COMMENTS OR INDICATE IF ATTACHMENTS)

0- TEST METHOD IS TRANSPOSED ON LETTER.

ORIGINAL

RECEIVED BY: Chuck C. VanArsdale DATE: 12/4/02

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

SUBMITTAL TYPE: (BY SUPPLIER)	SUBMITTAL ACTION CODE: (BY FDF)
CFC - CERTIFIED FOR CONSTRUCTION	A - Conforms to the Subcontract Requirements
INF - INFORMATION/RECORD	B - Minor Comments - Incorporate and Resubmit
DRFT - DRAFT/PRELIMINARY	C - Revise and Resubmit (SEE COMMENTS)

ES-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

5369

Martin Marietta Aggregates

MidAmerica Division & Southwest Ohio District
4770 Duke Drive, Suite 200
Mason, OH 45040
Telephone (513) 701-1140
Fax (513) 701-1149

November 7, 2002

Mr. Chuck Van Arsdale
MS-64
P.O. Box 538704
Cincinnati, Ohio 45253-8704

INFORMATION ONLY

Project Reference: Fluor Fernald, Cover Drainage Material

Dear Chuck:

We herewith certify that the No. 78 Limestone produced at our Lynchburg, Ohio facility for the above referenced project conforms to Attachment 1, Page No.6, section "A. Cover Drainage Material Requirements" and that section "B. Submittals" requirements have been met. The attached Bowser Morner, Inc. report indicates compliance with the specifications. Specifically, the material was tested in accordance with ASTM C136, ASTM D2434, ASTM D2487, and ASTM D~~3024~~ (modified), and meets the grading requirements of AASHTO M43. A fifty pound sample of the material will be delivered to your site in the next few days.

3042
CV

Very truly yours,

MARTIN MARIETTA AGGREGATES

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: 12/4/02

SUPPLIER DOCUMENT SUBMITTAL

MW 5/5/03

FDF PROJECT NO.: 2[illegible]	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02710-001	REV.: 01	DATE: 05/01/03	Page 1 of 2

FROM:
Fluor Fernald

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

SIGNATURE: Anumar 5/5/03

RECEIVED BY: Teresa Schwab DATE: 5/5/03

			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	PHV-02710-001A	0						X			Source of granular drainage material Cell 6 - #78s		X		02710-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
MIKE GODBER	84				
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: 5/8/03

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

ORIGINAL

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)

5369

Martin Marietta Aggregates

5369

MidAmerica Division & Southwest Ohio District
4770 Duke Drive, Suite 200
Mason, OH 45040
Telephone (513) 701-1140
Fax (513) 701-1149

April 24, 2003

Mr. Chuck Van Arsdale
MS-64
P.O. Box 538704
Cincinnati, Ohio 45253-8704

Project Reference: Fluor Fernald, Granular Drainage Material (Modified #78)

Dear Chuck:

We herewith certify that the No. 78 Limestone produced at our Lynchburg, Ohio facility for the above referenced project conforms to the Solicitation/Contract/Order, Attachment I, Page No.6, section "3.0 MATERIAL SPECIFICATION" and that section "2.0 SUBMITALS" requirements have been met. The attached Bowser Morner, Inc. report indicates compliance with the specifications. Specifically, the material was tested in accordance with ASTM C136, ASTM D2434, ASTM D2487, and ASTM D3042. A fifty pound sample of the material will be delivered to your site in the next few days.

Very truly yours,

MARTIN MARIETTA AGGREGATES

James R. Martin

James R. Martin
Technical Projects Coordinator

[M] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: Chuck Van Arsdale Date: 5/8/03

INFORMATION ONLY

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SUPPLIER DOCUMENT SUBMITTAL

OF PROJECT NO.: 201	CONTRACT NO: PHIV2	SUBMITTAL NO. 20104-PHIV2-02710-002	REV.: 0	DATE: 11/13/02	Page 1 of 2

FROM:
Martin Marietta Aggregates

SIGNATURE: Chuck C. VanArsdale 11/13/02

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

RECEIVED BY: Teresa Schwab DATE: 11/13/02

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	PHIV2-02710-002	0						X			Test results for cover drainage layer		~~X~~	X	02710-1.04A3	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)

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ORIGINAL

53699

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)

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 Road
Fairfield, Ohio 45014

Date October 24, 2002
Report No. 011335
W.O. No. 126786
No. of Pages: 6

Report On: Laboratory Analysis of One Crushed Limestone Sample
Lynchburg, Ohio Quarry (46359) - Fernald Project

On October 15, 2002, one sample of No. 78 crushed limestone was submitted for selected laboratory analysis for the above referenced project. The sample was tested as specified by the client and in accordance with the following procedures.

ASTM C 117, "Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing".

ASTM C 136, "Sieve Analysis of Fine and Coarse Aggregates".

ASTM C 295, "Petrographic Examination of Aggregates for Concrete". (Basic Visual Examination)

ASTM D 2434, "Test Method for Permeability of Granular Soil (Constant Head)".

ASTM D 2487, "Classification of Soils for Engineering Purposes".

ASTM D 3042, "Insoluble Reside in Carbonate Aggregate". (Modified to pH 4)

Results are summarized in Tables I and detailed on the attached data sheets.

Should you have any questions or if we may be of further service, please contact me at (937) 236-8805 extension 329.

INFORMATION ONLY

Respectfully submitted,

BOWSER-MORNER, INC.

Scott D. Ruhkamp, Assistant Manager
Manager of Laboratory Services
Construction Services Division

SDR/jkk/cmb
011335
1-Client
1-File
1-Jim Martin

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: Date: 12/4/02

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Martin Marietta Aggregates

Lynchburg, Ohio Quarry (#46359)
Fernald Project

TABLE I
Summary of Results

Sieve Size	Percent Passing No. 78 Crushed Limestone
19.0 mm (3/4")	100
12.5 mm (1/2")	91
9.5 mm (3/8")	60
4.75 mm (#4)	11
2.36 mm (#8)	2
1.18 mm (#16)	1
0.075 mm (No. 200) Decant, %	1.1
USCS Classification:	GP[1]
Coal & Lignite, %:	0.0
Soft Pieces, %:	0.1
Shale & Shaly, %:	0.6
Acid Solubility @ pH 4:	0.1
Permeability, cm/sec:	19.5

[1] per ASTM D 2487, Table 1: GP = Poorly graded gravel

1.) No. 78 Crushed Limestone

A.) Sieve Analysis and Decant (ASTM C 136, C 117)

Sieve Size		Percent Passing	SPR No. 78 Specification, %
19.0 mm	(3/4")	100	100
12.5 mm	(1/2")	91	90-100
9.5 mm	(3/8")	60	40-75
4.75 mm	(#4)	11	5-25
2.36 mm	(#8)	2	0-10
1.18 mm	(#16)	1	0-5
0.075 mm	(No. 200) Decant, %	1.1	2.0 Max.

B.) Visual Deleterious Examination. No other categories were observed visually. Percentages as percent of size fraction, un-weighted for gradation. (ASTM C 295)

Size Fraction		Coal & Lignite	Soft Pieces	Shale & Shaly
19.0 mm to 12.5 mm	(3/4" to 1/2")	0.0	0.0	0.4
12.5 mm to 9.5 mm	(1/2" to 3/8")	0.0	0.2	1.1
9.5 mm to 4.75 mm	(3/8" to #4)	0.0	0.0	0.5

C.) Deleterious Material. Corrected for as-received gradation. (ASTM C 295)

Size Fraction		Coal & Lignite	Soft Pieces	Shale & Shaly
19.0 mm to 12.5 mm	(3/4" to 1/2")	0.0	0.0	0.0
12.5 mm to 9.5 mm	(1/2" to 3/8")	0.0	0.1	0.3
9.5 mm to 4.75 mm	(3/8" to #4)	0.0	0.0	0.3
Total		0.0	0.1	0.6

D.) Acid Solubility, Modified to pH 4 (ASTM D 3042)

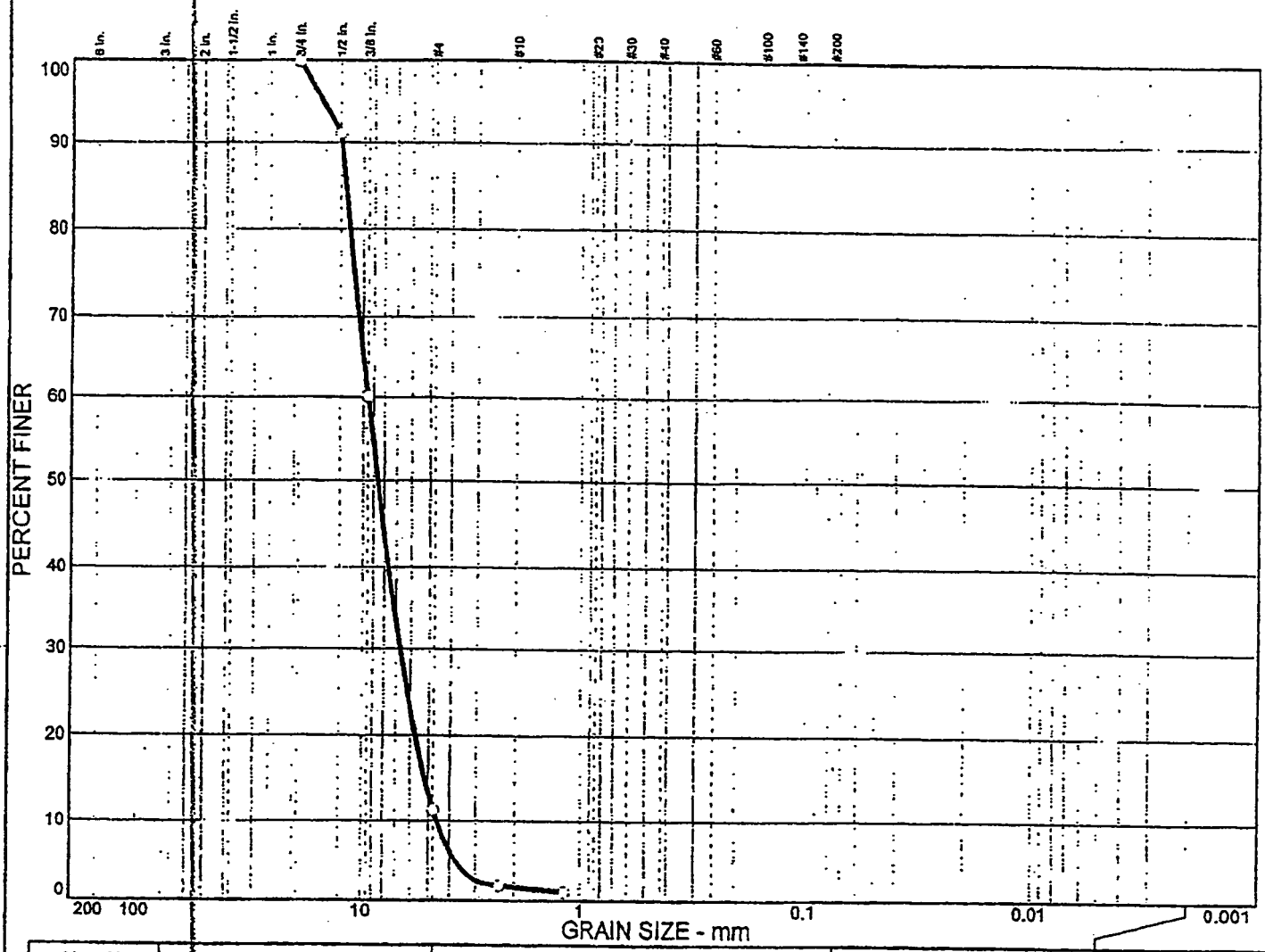
		Project Specifications % Max.
Acid Solubility, %:	0.1	5.0
Insoluble Residue, %:	99.9	---

E.) Constant Head Permeability (ASTM D 2434)

		Project Specifications cm/sec Min.
Dry Unit Wt., pcf:	95.87	---
Average Permeability, cm/sec:	19.5	1×10^{-1}

GRAIN SIZE DISTRIBUTION REPORT

5369



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	88.7	11.3		

LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
		12.0	9.52	8.57	6.70	5.19	4.58	1.03	2.08

MATERIAL DESCRIPTION	USCS	AASHTO
No. 78 Crushed Limestone	GP	

Project No. 126786 Client: Martin Marietta Aggregates

Project: Lynchburg

Source: 126786 Martin Marietta Aggregates

Remarks:

GRAIN SIZE DISTRIBUTION REPORT

BOWSER-MORNER, INC.

000104

CONSTANT HEAD PERMEABILITY TEST

ASTM D 2434, Permeability of Granular Soils (Constant Head)

5369

REMOLDED

Client:	**Martin Marietta Aggregate**
Project:	**Fernald Project**
BMI Work Order Number:	126786
Date:	October 23, 2002

SPECIMEN DATA:

Dimension, inches	
Height:	6.2
Diameter:	6.0
Sample Wt., gm:	4420.1
Hydroscopic Moisture Content, %	0.19
Dry Unit Weight, pcf:	95.87
Permeability (k), cm/sec:	**19.5**

BOWSER MORNER

SUPPLIER DOCUMENT SUBMITTAL

JDS 5/5/03

FDF PROJECT NO.: 2[illegible]	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02710-002	REV.: 01	DATE: 05/01/03	Page 1 of 2

FROM:
Fluor Fernald

SIGNATURE: BMumar 5/5/03

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

RECEIVED BY: Susan Schwab DATE: 5/5/03

			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	PHV-02710-002A	0						X			Test results and a 50- lb representative sample Granular drainage mat'l (#78s) – Cell 6		X		02710-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
MIKE GODBER	84				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

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

000105

5369

RECEIVED BY: Chuck C. VanArsdale DATE: 5/8/03

(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

5369

ON-SITE DISPOSAL FACILITY
PHASE V

Martin Marietta Aggregates
4770 Duke Drive, Suite 200
Mason, OH 45040

Submittal No. 20105-PHV-02710-002
Revision 0, 4/29/2003

Document No. PHV-02710-002A
Revision 0

Title/Description: 50-lb representative sample of granular drainage material (#78 stone) for Cell 6 activities (Delivered to GeoSyntec Consultants)

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: _____ Date: 5/8/03

INFORMATION ONLY

000107

BOWSER-MORNER, INC. 5369

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. Jim Martin
3503 Belleview Road
Petersburg, Kentucky 41080

Date: April 24, 2003
Report No.: 012014
W.O. No.: 128091
No. of Pages: 2

Report On: Laboratory Analysis of One No. 78 Crushed Limestone Sample
Lynchburg, Ohio Quarry

On April 17, 2003, the client submitted one crushed limestone sample for selected laboratory analysis from the Lynchburg, Ohio plant.

Testing was performed as specified by the client and in accordance with the following procedures:

ASTM C 136, "Sieve Analysis of Fine and Coarse Aggregates".

ASTM D 2434, "Permeability of Granular Soils (Constant Head)".

ASTM D 2487, "Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)".

ASTM D 3042, "Insoluble Residue in Carbonate Aggregate". (modified to a pH of 4)

Laboratory results are detailed 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 329.

Respectfully submitted,
BOWSER-MORNER, INC.

Scott D. Ruhkamp

Scott D. Ruhkamp, Manager
Construction Materials and
Geotechnical Laboratories

SDR/jkk/cmb
012014
1-Client
1-File
1-Sam Feltner

All Reports Remain The Confidential Property Of BOWSER-MORNER And No Publication Or Distribution Of Reports May Be Made Without Our Express Written Consent, Except As Authorized By Contract. Results Contained In This Report Are Reflective Only of The Items Calibrated or Tested. Unless Otherwise Agreed, Samples Or Specimens Will Be Discarded Or Returned At Bowser-Morner's Discretion.

1.) No. 78 Crushed Limestone

A. Decant and Gradation (ASTM C 117, C 136)

Sieve Size		Percent Passing	Project Specification, %
19.0 mm	(3/4")	100	100
12.5 mm	(1/2")	94	85-100
9.5 mm	(3/8")	64	40-75
4.75 mm	(#4)	12	5-25
2.36 mm	(#8)	2	0-10
1.18 mm	(#16)	1	0-5
0.075 mm	(No. 200) Decant, %:	0.9	0-2
USCS Classification:		GP	GP

B. Insoluble Residue (ASTM D 3042), pH of 4

Percent Loss	Project Specification, %:
0.0	5.0 Max.

C. Hydraulic Conductivity (ASTM D 2434)

	Project Specification, cm/sec
1.975×10^{-1} cm/sec	1×10^{-1} Min.

CONFORMANCE TEST RESULTS

GEOSYNTEC CONSULTANTS

5369

FLUOR 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 V DATE: 30 day April month 2003 year

MATERIAL TYPE: 78 STONE SAMPLE NO.: 78 GM03-1

SOIL SAMPLE SIZE Submittal Sample

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)	8010.6	19.5 LB's 7978.8
WT. OF TARE	(grams)	933.0	933.0
WT. OF DRY SAMPLE	(grams)	7071.6	7045.8

SIEVE ANALYSIS QA ID: D.L.E.

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	↑
1"	25.00	0	0	100	↓
3/4"	19.00	0	0	100	100
1/2"	12.50	571.9	8.1	91.9	85 To 100
3/8"	9.50	2781.4	39.3	60.7	40 To 75
#4	4.75	6482.3	91.7	8.3	5 To 25
#8	2.36	6970.2	98.6	1.4	0 To 10
#16	1.18	7033.4	99.5	0.5	0 To 5
#30	0.60	7041.0	99.6	0.4	↑
#50	0.30	7044.0	99.6	0.4	↓
#100	0.15	7045.3	99.6	0.4	
#200	0.075	7045.8	99.6	0.4	0 To 20
PAN					

000111

%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. GQ134/ TASK NO.: 04.1

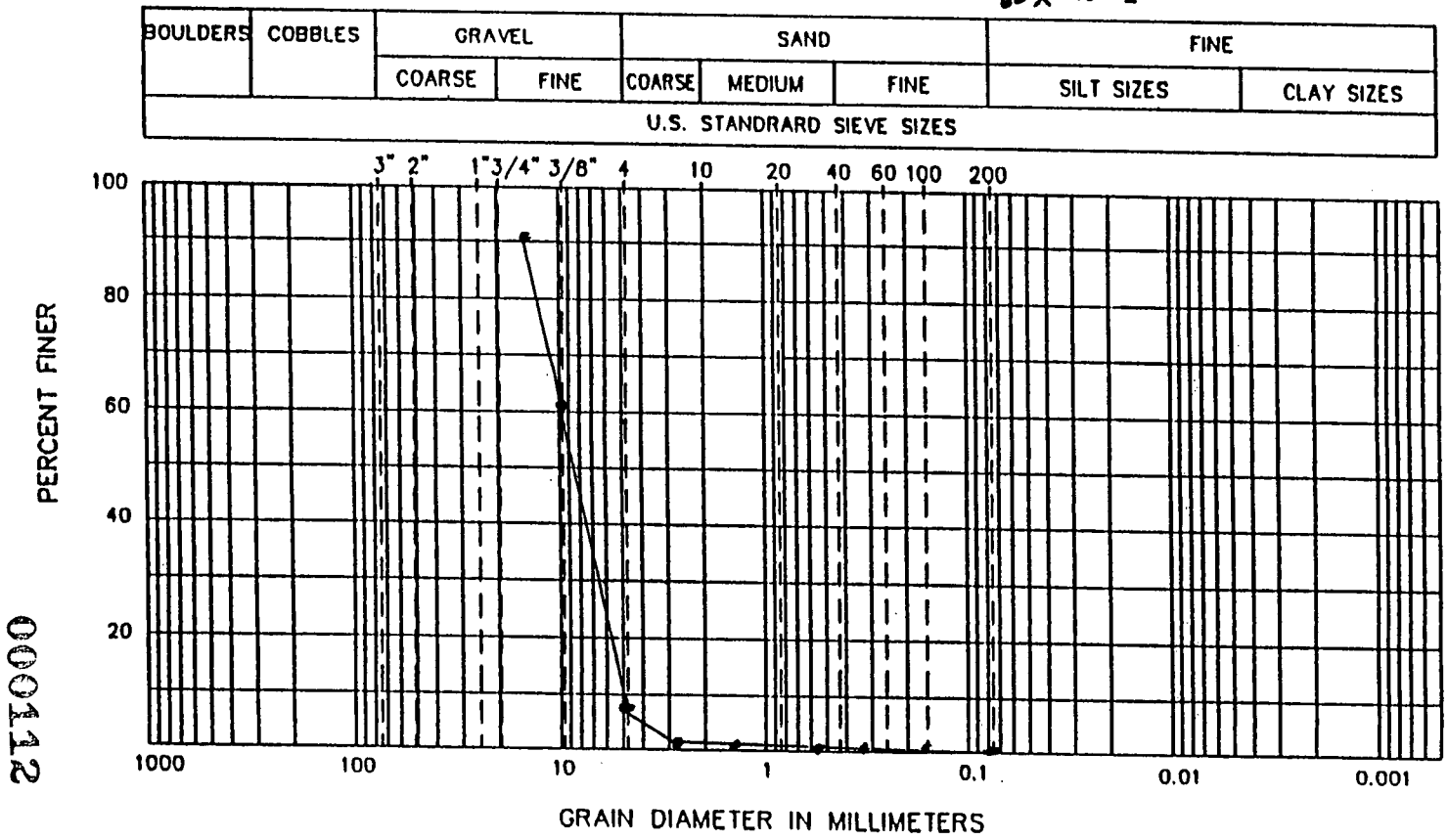
DESCRIPTION: Phase V

DATE: 30 day April month 2003 year

MATERIAL TYPE: 78 Stone Submitted Sample

SAMPLE NO.: _____ QA ID: DLE

CURVE COEFFICIENTS: $(C_U)\ \frac{D_{60}}{D_{10}} = \frac{10}{5} = 2$ $(C_C)\ \frac{D_{30}^2}{D_{60} \times D_{10}} = \frac{6.9^2}{50 \times 5} = \frac{44.89}{50} = .90$



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	0
2-in.	0
1 1/2-in.	0
1-in.	0
3/4-in.	0
1/2-in.	91.9
3/8-in.	60.7
NO. 4	8.3
NO. 8	1.4
NO. 16	0.5
NO. 30	0.4
NO. 50	0.4
NO. 100	0.4
NO. 200	0.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): GP Poorly Graded Gravel

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

CHECKED BY: CH

SHEET NO. 2 OF 2

000142

53369

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	GM-03-1	-
PROJECT NUMBER	033-3486	SAMPLE TYPE	Bag	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	47.75	5650	21.5	118.32	
2.	48.09	5650	21.5	117.49	*
3.	48.47	5650	21.0	116.57	*
4.	48.79	5650	21.0	115.80	*

INITIAL UNIT WEIGHT DETERMINATION

PPARATUS & WET SAMPLE (g):	11589.0
APPARATUS WEIGHT (g):	4445.0
WET SAMPLE WEIGHT (g):	7144.0
SAMPLE LENGTH (in):	9.9
SAMPLE DIAMETER (in):	6.0
SAMPLE AREA (in²):	28.27
SAMPLE AREA (cm²):	182.41
SAMPLE VOLUME (in³):	279.92
SAMPLE VOLUME (ft³):	0.162
WET DENSITY IN (pcf):	97.2
DRY DENSITY IN (pcf):	97.2

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):	9.9
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	116.62
AVERAGE TEMP (°C):	21.2
TEMPERATURE CORRECTION:	0.974
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

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

TECH	TJ/DW
DATE	4/30/2003
CHECK	BSS
REVIEW	[illegible]

000118

GEOSYNTEC CONSULTANTS

5369

FLUOR 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: 02 day May month 2003 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: GM 03-2

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		15.15 LBS X	14.89 LBS X
WT. OF DRY SAMPLE PLUS TARE	(grams)	6872.0	6754.1
WT. OF TARE	(grams)	939.0	939.0
WT. OF DRY SAMPLE	(grams)	5933.0	5815.1

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	764.8	12.9	87.1	85 To 100
⅜"	9.50	3124.4	52.7	47.3	40 To 75
#4	4.75	5538.0	93.3	6.7	5 To 25
#8	2.36	5761.2	97.1	2.9	0 To 10
#16	1.18	5792.1	97.6	2.4	0 To 5
#30	0.60	5801.9	97.8	2.2	↕
#50	0.30	5805.9	97.9	2.1	↕
#100	0.15	5809.0	97.9	2.1	↕
#200	0.075	5811.1	97.9	2.1	0 To 20
PAN		5815.1	98.0	2.0	

000114

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

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

DESCRIPTION: Phase IV

DATE: 05 day May month 2003 year

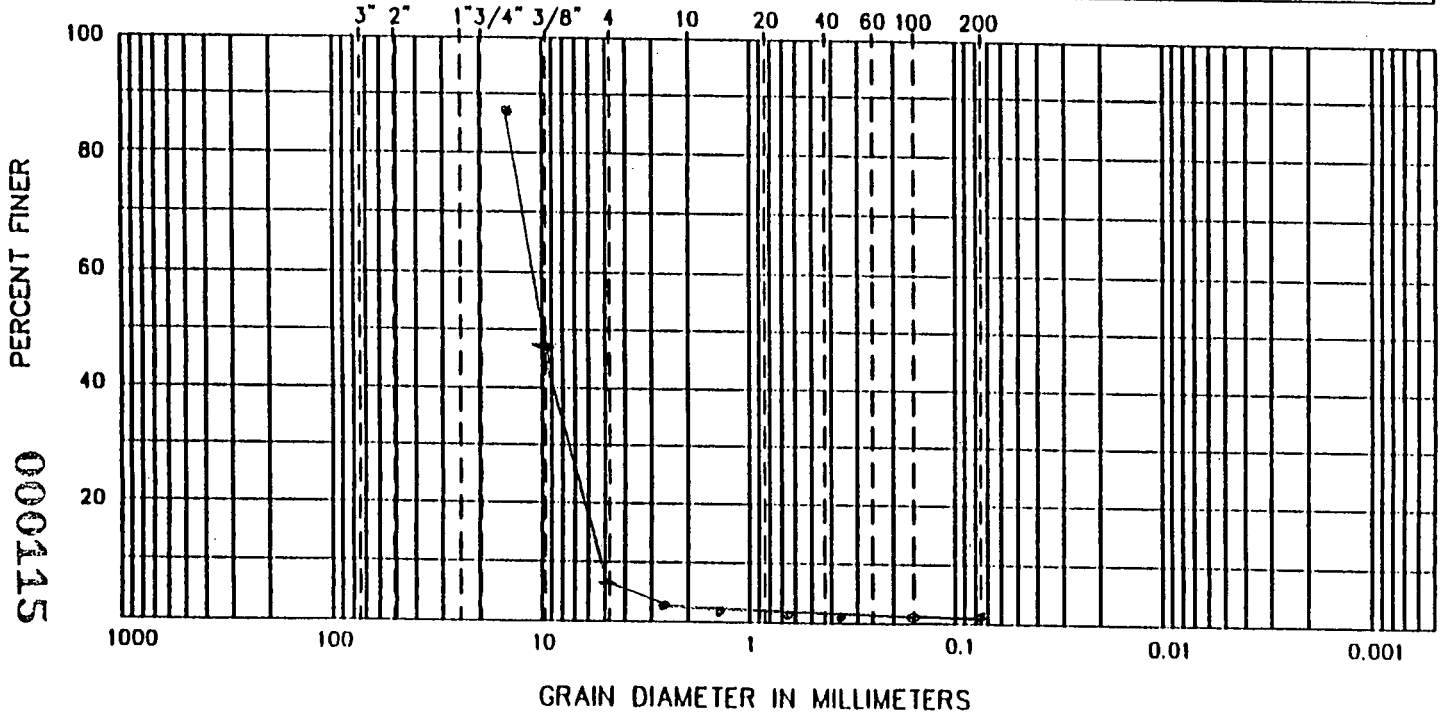
MATERIAL TYPE: 78 Stone C-136

SAMPLE NO.: 6M03-2 QA ID: DTE

CURVE COEFFICIENTS: $(C_u) = \left(\frac{D_{60}}{D_{10}}\right) = \frac{11}{5} = 2.2$ $(C_c)\left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{7.5}{5.5} = \frac{56.3}{5.5} = 1.0$

BOULDERS	COBBLES	GRAVEL		SAND			FINE	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

U.S. STANDARD SIEVE SIZES



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	Ø
2-in.	Ø
1 1/2-in.	Ø
1-in.	Ø
3/4-in.	Ø
1/2-in.	87.1
3/8-in.	47.3
NO. 4	6.7
NO. 8	2.9
NO. 16	2.4
NO. 30	2.2
NO. 50	2.1
NO. 100	2.1
NO. 200	2.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	5
	3
	6
	0

SOIL CLASSIFICATION (ASTM D 2487): GP Poorly Graded Gravel

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD CHECKED BY: CV

SHEET NO. 2 OF 2

STI0000145

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	GM-03-2 -
PROJECT NUMBER	033-3486	SAMPLE TYPE	Bulk
REMARKS	-	SAMPLE DEPTH	-

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	56.47	5650	20.0	100.05	
2.	56.94	5650	20.0	99.23	*
3.	56.91	5650	20.0	99.28	*
4.	57.17	5650	20.0	98.83	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	7642.0
APPARATUS WEIGHT (g):	3733.0
WET SAMPLE WEIGHT (g):	3909.0
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):	98.8
DRY DENSITY IN (pcf):	98.8

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):	99.11
AVERAGE TEMP (°C):	20.0
TEMPERATURE CORRECTION:	1.000
HEAD OF WATER (in):	5.7
HYDRAULIC GRADIENT (i):	0.48

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

NOTE: ASTM modified due to the large particles size
Due to the limitation of our laboratory equipment the permeability may be faster.

TECH	GH
DATE	5/27/2003
CHECK	BJS
REVIEW	PWS

000116

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5369

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 6-Q13V1 TASK NO.: Ø41

DESCRIPTION: DATE: Ø7 day May month 2003 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: GM03-3

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		X	X
WT. OF DRY SAMPLE PLUS TARE	(grams)	3520.2	3504.4
WT. OF TARE	(grams)	939.Ø	939.Ø
WT. OF DRY SAMPLE	(grams)	2581.2	2565.4

SIEVE ANALYSIS

QA ID: DJE

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	253.8	9.8	90.2	85 To 100
⅜"	9.50	1125.9	43.6	56.4	40 To 75
#4	4.75	2433.2	94.3	5.7	5 To 25
#8	2.36	2539.5	98.4	1.6	0 To 10
#16	1.18	2553.5	98.9	1.1	0 To 5
#30	0.60	2556.2	99.Ø	1.Ø	↕
#50	0.30	2557.4	99.1	Ø.9	↕
#100	0.15	2558.3	99.1	Ø.9	↕
#200	0.075	2561.9	99.3	Ø.7	0 To 20
PAN		2562.9			

000117

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

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

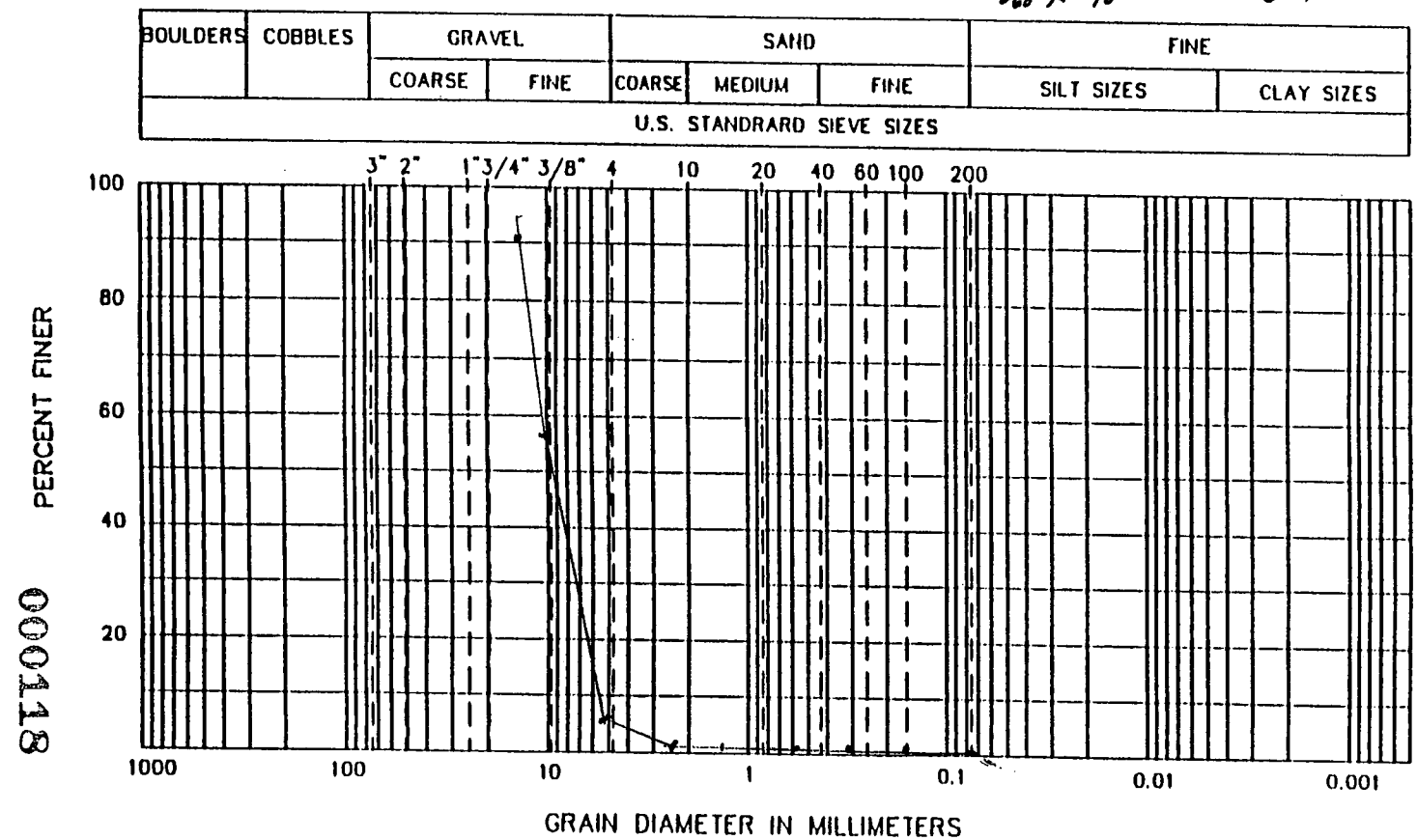
DESCRIPTION: Phase V

DATE: 07 day May month 2003 year

MATERIAL TYPE: 78 Stone C-136

SAMPLE NO.: GM 03-3 QA ID: D&E

CURVE COEFFICIENTS: $(C_u) = \left(\frac{D_{60}}{D_{10}}\right) = \frac{11}{5.8} = 1.90$ $(C_c) \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{7.7 = 49}{63.8} = .77$



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.	90.2
3/8-In.	56.4
NO. 4	5.7
NO. 8	1.6
NO. 16	1.1
NO. 30	1.0
NO. 50	0.9
NO. 100	0.9
NO. 200	0.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	5
	3
	6
	9

SOIL CLASSIFICATION (ASTM D 2487): GP Poorly Graded Gravel

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: [illegible]

SHEET NO. 2 OF 2

000118

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	GM-03-3 -
PROJECT NUMBER	033-3486	SAMPLE TYPE	Bulk
REMARKS	-	SAMPLE DEPTH	-

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	41.53	5650	21.5	136.05	
2.	41.16	5650	21.5	137.27	*
3.	41.53	5650	21.5	136.05	*
4.	41.41	5650	21.5	136.44	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	11954.0
APPARATUS WEIGHT (g):	4448.0
WET SAMPLE WEIGHT (g):	7506.0
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):	101.1
DRY DENSITY IN (pcf):	101.1

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):	136.59
AVERAGE TEMP (°C):	21.5
TEMPERATURE CORRECTION:	0.965
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 2.2E+00 cm/sec

NOTE: ASTM modified due to the large particles size
Due to the limitation of our laboratory equipment the permeability may be faster.

TECH	GH/TJ
DATE	5/27/2003
CHECK	BS
REVIEW	[illegible]

000119

GEOSYNTEC CONSULTANTS

5369

FLUOR FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G-Q1341 TASK NO.: 04.1

DESCRIPTION: DATE: 09 day MAY month 2003 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: GM03-4

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		bowl	Bowl
WT. OF DRY SAMPLE PLUS TARE	(grams)	2682.0	2652.0
WT. OF TARE	(grams)	292.3	292.0
WT. OF DRY SAMPLE	(grams)	2389.7	2360.0

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	↑
1"	25.00	0	0	100	↓
3/4"	19.00	0	0	100	100
1/2"	12.50	173.8	7.3	92.7	85 To 100
3/8"	9.50	789.2	33.0	67.0	40 To 75
#4	4.75	2183.0	91.4	8.6	5 To 25
#8	2.36	2322.0	97.2	2.8	0 To 10
#16	1.18	2345.1	98.1	1.9	0 To 5
#30	0.60	2350.4	98.4	1.6	↑
#50	0.30	2352.9	98.5	1.5	↓
#100	0.15	2354.9	98.6	1.4	
#200	0.075	2358.6	98.7	1.3	0 To 20
PAN		2359.9			

000120

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

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. GQ1341 TASK NO.: 041

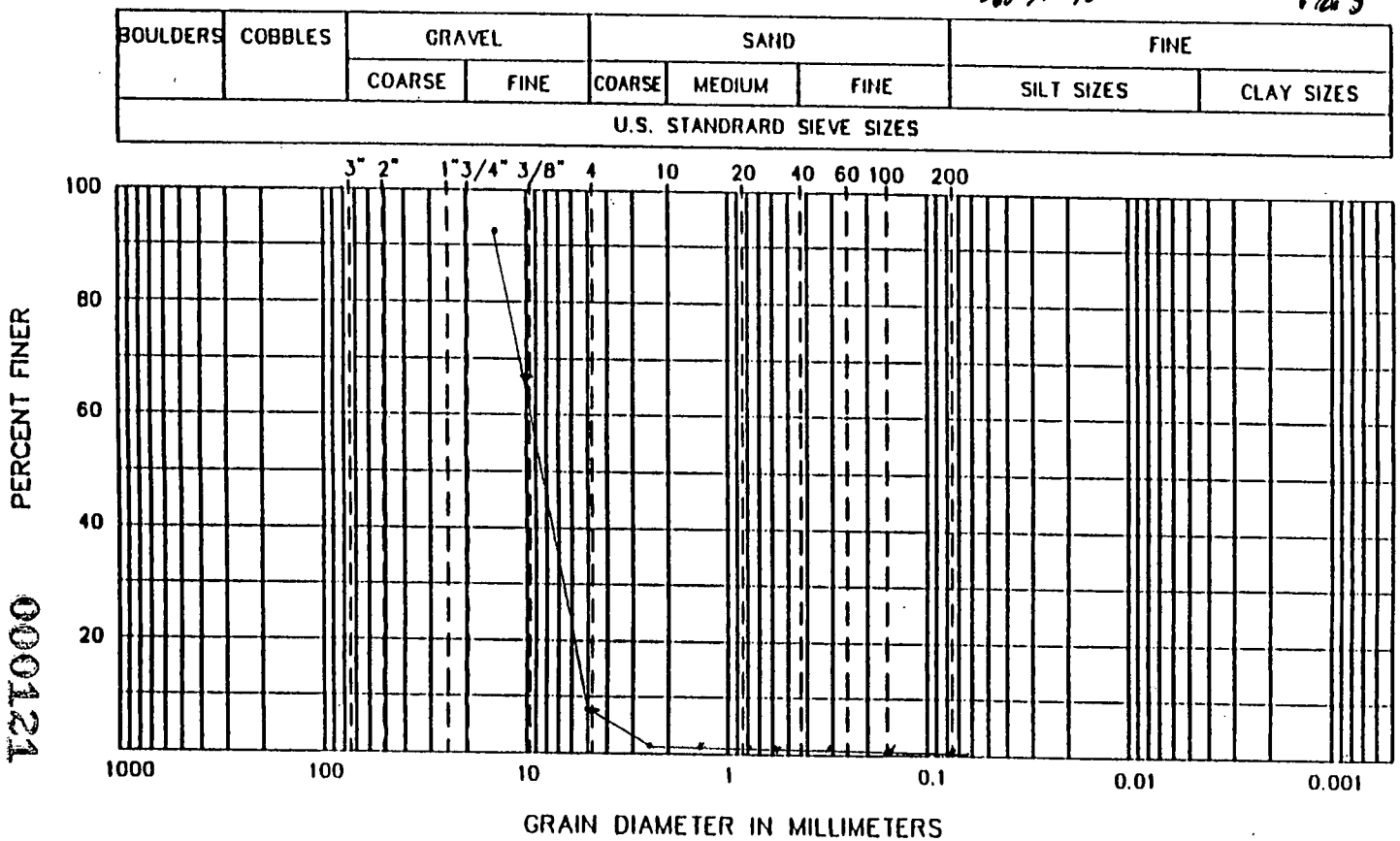
DESCRIPTION: Phase II

DATE: 09 day MAY month 2003 year

MATERIAL TYPE: 78 Stone C-136

SAMPLE NO.: GM03-4 QA ID: DLE

CURVE COEFFICIENTS: $(C_u) = \left(\frac{D_{60}}{D_{10}}\right) = \frac{9.5}{5} = 1.9$ $(C_c) \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{6.8}{47.5} = \frac{46.24}{47.5} = .97$



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.	92.7
3/8-In.	63.8
NO. 4	8.6
NO. 8	2.8
NO. 16	1.9
NO. 30	1.6
NO. 50	1.5
NO. 100	1.4
NO. 200	1.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	5.7
	3.3
	0.8
	0.8

SOIL CLASSIFICATION (ASTM D 2487): GP Poorly Graded Gravel

©GEOSYNTEC CONSULTANTS FILE NO. 2-18-PSD

CHECKED BY: CH

SHEET NO. 2 OF 2

001021

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	GM-03-4	-
PROJECT NUMBER	033-3486	SAMPLE TYPE	Bulk	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	59.09	5650	21.5	95.62	
2.	59.37	5650	21.5	95.17	*
3.	59.85	5650	21.5	94.40	*
4.	59.75	5650	21.5	94.56	*

INITIAL UNIT WEIGHT DETERMINATION

PPARATUS & WET SAMPLE (g):	7645.0
APPARATUS WEIGHT (g):	3727.0
WET SAMPLE WEIGHT (g):	3918.0
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):	99.0
DRY DENSITY IN (pcf):	99.0

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):	94.71
AVERAGE TEMP (°C):	21.5
TEMPERATURE CORRECTION:	0.965
HEAD OF WATER (in):	5.7
HYDRAULIC GRADIENT (i):	0.48

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

NOTE: ASTM modified due to the large particles size
Due to the limitation of our laboratory equipment the permeability may be faster.

TECH	GH
DATE	5/27/2003
CHECK	BS
REVIEW	KWM

000122

GEOSYNTEC CONSULTANTS

FLUOR FERNALD 5369

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: DATE: 09 day MAY month 2003 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: GM03-5

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)	3535.2	3513.7
WT. OF TARE	(grams)	939.0	939.0
WT. OF DRY SAMPLE	(grams)	2596.2	2574.7

SIEVE ANALYSIS

QA ID: _____

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	267.0	10.3	89.7	85 To 100
⅜"	9.50	1160.9	44.7	55.3	40 To 75
#4	4.75	2475.7	95.4	4.6	5 To 25
#8	2.36	2548.8	98.2	1.8	0 To 10
#16	1.18	2564.4	98.8	1.2	0 To 5
#30	0.60	2568.4	98.9	1.1	↑
#50	0.30	2570.8	99.0	1.0	↕
#100	0.15	2572.3	99.1	.9	↓
#200	0.075	2574.4	99.2	.8	0 To 20
PAN		2574.6			

000123

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

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

DESCRIPTION: Phase V

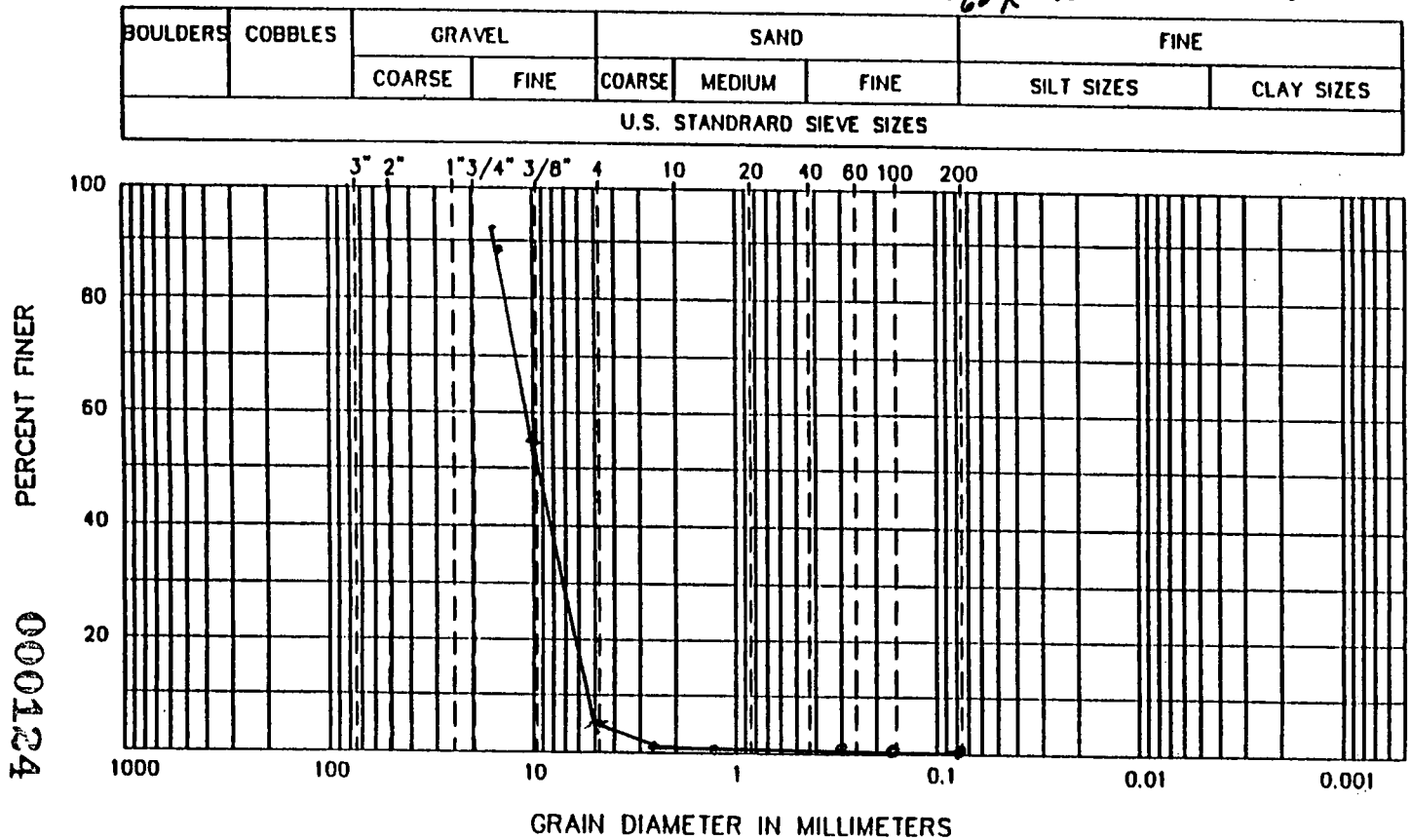
MATERIAL TYPE: 78 Stone

PROJECT NO. GQ1341 TASK NO.: 041

DATE: 09 day May month 2003 year

SAMPLE NO.: GM03-5 QA ID: DYE

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{11}{5.5} = 2$ $(C_c)\ \frac{D_{30}^2}{D_{60} \times D_{10}} = \frac{3}{66.5} = \frac{49}{66.5} = .81$



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.	89.7
3/8-in.	55.3
NO. 4	4.6
NO. 8	1.8
NO. 16	1.2
NO. 30	1.1
NO. 50	1.0
NO. 100	.9
NO. 200	.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	51
	32
	9
	8

SOIL CLASSIFICATION (ASTM D 2487): GP, Poorly Graded Gravel

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

CHECKED BY: [illegible]

SHEET NO. 2 OF 2

000124

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	GM-03-5	-
PROJECT NUMBER	033-3486	SAMPLE TYPE	Bulk	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	43.41	5650	21.0	130.15	
2.	43.84	5650	21.0	128.88	*
3.	43.81	5650	21.0	128.97	*
4.	43.56	5650	21.0	129.71	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	11868.0
APPARATUS WEIGHT (g):	4504.0
WET SAMPLE WEIGHT (g):	7364.0
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):	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):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	129.18
AVERAGE TEMP (°C):	21.0
TEMPERATURE CORRECTION:	0.976
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

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

NOTE: ASTM modified due to the large particles size
Due to the limitation of our laboratory equipment the permeability may be faster.

TECH	GH
DATE	5/27/2003
CHECK	BG
REVIEW	PWM

000125

GEOSYNTEC CONSULTANTS

FLUOR FERNALD 5369

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 62Q1341 TASK NO.: 04.1

DESCRIPTION: DATE: 13 day May month 2003 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: GM03-6

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		Small Bowl	Small Bowl
WT. OF DRY SAMPLE PLUS TARE	(grams)	3837.0	3767.0
WT. OF TARE	(grams)	285.6	285.6
WT. OF DRY SAMPLE	(grams)	3551.4	3481.4

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	↑
1"	25.00	0	0	100	↓
3/4"	19.00	0	0	100	100
1/2"	12.50	323.8	9.1	90.9	85 To 100
3/8"	9.50	1308.9	36.9	63.1	40 To 75
#4	4.75	3029.3	85.3	14.7	5 To 25
#8	2.36	3396.4	95.6	4.4	0 To 10
#16	1.18	3454.5	97.3	2.7	0 To 5
#30	0.60	3463.9	97.5	2.5	↑
#50	0.30	3469.5	97.7	2.3	↓
#100	0.15	3474.9	97.8	2.2	↓
#200	0.075	3480.8	98.0	2.0	0 To 20
PAN		3481.4			

000126

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

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. GQ1341 TASK NO.: 04.1

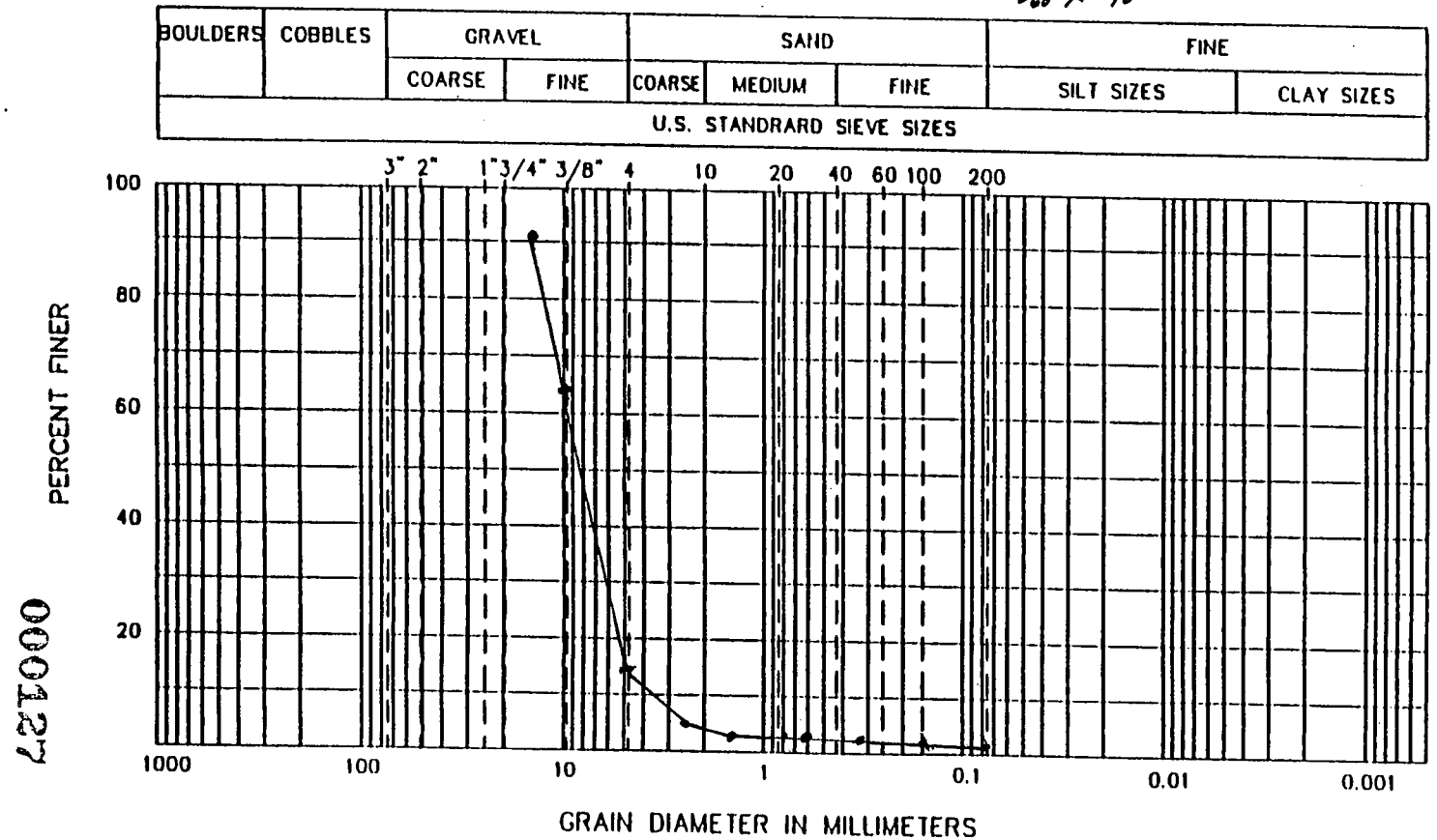
DESCRIPTION: Phase V

DATE: 14 day May month 2003 year

MATERIAL TYPE: 78 Stone C-136

SAMPLE NO.: GM 03-6 QA ID: OLE

CURVE COEFFICIENTS: $(C_u) = \left(\frac{D_{60}}{D_{10}}\right) = \frac{10}{3.8} = 2.6$ $(C_c) \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = 6 = \frac{36}{38}$ .95



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.	90.9
3/8-In.	63.1
NO. 4	14.7
NO. 8	4.4
NO. 16	2.7
NO. 30	2.5
NO. 50	2.3
NO. 100	2.2
NO. 200	2.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): GP Poorly Graded Gravel

©GEOSYNTEC CONSULTANTS FILE NO. 2-18-PSD

CHECKED BY: [illegible]

SHEET NO. 2 OF 2

000127

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	GM-03-6	-
PROJECT NUMBER	033-3486	SAMPLE TYPE	Bulk	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	57.66	5650	20.0	97.99	
2.	57.90	5650	20.0	97.58	*
3.	57.84	5650	20.0	97.68	*
4.	57.47	5650	20.0	98.31	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	7519.0
APPARATUS WEIGHT (g):	3673.0
WET SAMPLE WEIGHT (g):	3846.0
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):	97.2
DRY DENSITY IN (pcf):	97.2

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):	97.86
AVERAGE TEMP (°C):	20.0
TEMPERATURE CORRECTION:	1.000
HEAD OF WATER (in):	5.7
HYDRAULIC GRADIENT (i):	0.48

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

NOTE: ASTM modified due to the large particles size
Due to the limitation of our laboratory equipment the permeability may be faster.

TECH	GH
DATE	5/27/2003
CHECK	BJS
REVIEW	CWM

000128

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5369

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 5 DATE: 23 day May month 2003 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: GM 03-7

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		Small Bowl	Small Bowl
WT. OF DRY SAMPLE PLUS TARE	(grams)	3715.8	3644.5
WT. OF TARE	(grams)	285.6	285.6
WT. OF DRY SAMPLE	(grams)	3430.2	3358.9

SIEVE ANALYSIS

QA ID: DE/KH

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	–			100
1 1/2"	37.50	–			↕
1"	25.00	–			↓
3/4"	19.00	–			100
1/2"	12.50	~~56.7~~ 191.3	~~5.90~~ 5.6	~~94.3~~ 94.4	85 To 100
3/8"	9.50	~~461.4~~ 1072.4	~~31.90~~ 31.3	~~68.1~~ 68.7	40 To 75
#4	4.75	2914.5	~~86.80~~ 85.0	~~13.2~~ 15.0	5 To 25
#8	2.36	3284.2	~~97.60~~ 95.7	~~2.2~~ 4.3	0 To 10
#16	1.18	3330.9	~~99.20~~ 97.1	~~0.8~~ 2.9	0 To 5
#30	0.60	3343.8	~~99.60~~ 97.5	~~0.4~~ 2.5	↑
#50	0.30	3344.4	~~99.60~~ 97.5	~~0.4~~ 2.5	↕
#100	0.15	3346.8 ~~3354.5~~	~~99.70~~ 97.6	~~0.3~~ 2.4	↓
#200	0.075	3364.5	~~99.90~~ 98.1	~~0.1~~ 1.9	0 To 20
PAN		3366.4	~~99.90~~	~~0.1~~	

000129

%FINER = 100 − Σ% RETAINED

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CHECKED BY: CJ

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 V

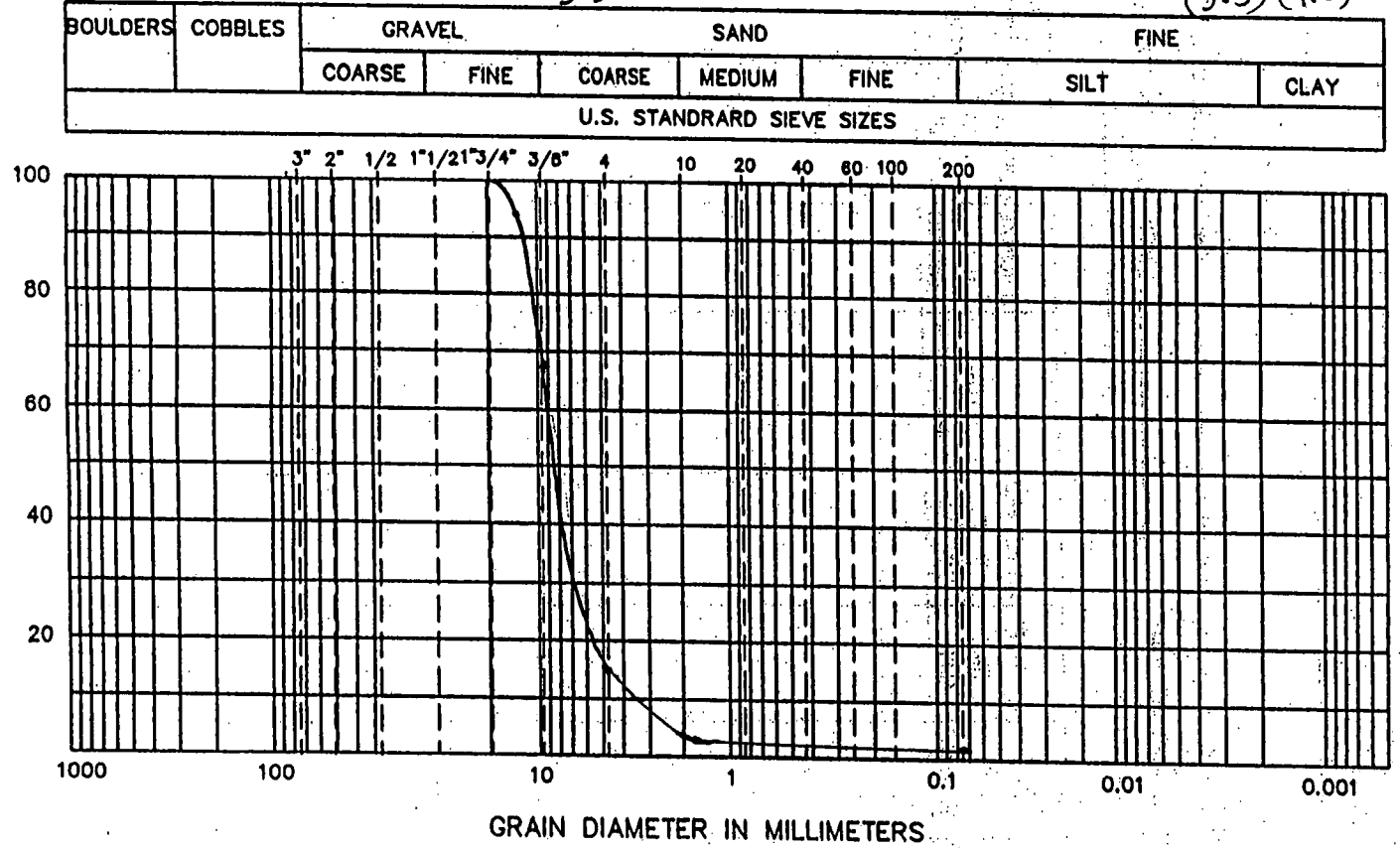
MATERIAL TYPE: 78 Stone

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 23 day May month 2003 year

SAMPLE NO.: GOM03-7 QA ID: CL

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{9}{3.5} = 2.57$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{(7)^2}{(3.5)(9.0)} = 1.56$



ATTERBERG LIMITS

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SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	
1/2-in.	94.4
3/8-in.	68.7
NO. 4	15.0
NO. 10	4.3
NO. 20.	2.9
NO. 40	2.5
NO. 60	2.5
NO. 100	2.4
NO. 200	1.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): GP- Poorly Graded Gravel

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

CHECKED BY: CL

SHEET NO. 2 OF 2

00130 00130

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	GM-03-7 -
PROJECT NUMBER	033-3586	SAMPLE TYPE	Bulk
REMARKS	-	SAMPLE DEPTH	-

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	109.02	5650	21.0	51.83	
2.	109.32	5650	21.0	51.68	*
3.	109.59	5650	21.0	51.56	*
4.	109.41	5650	21.0	51.64	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	7973.0
APPARATUS WEIGHT (g):	3947.0
WET SAMPLE WEIGHT (g):	4026.0
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):	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):	12.0
SAMPLE DIAMETER (in):	4.0
AVERAGE Q VALUE (ml/sec):	51.63
AVERAGE TEMP (°C):	21.0
TEMPERATURE CORRECTION:	0.976
HEAD OF WATER (in):	4.8
HYDRAULIC GRADIENT (i):	0.40

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 1.6E+00 cm/sec

NOTE: ASTM modified due to the large particles size
Due to the limitation of our laboratory equipment the permeability may be faster.

TECH	TJ
DATE	6/25/2003
CHECK	BFS
REVIEW	[illegible]

000131

GEOSYNTEC CONSULTANTS

FLUOR FERNALD 5369

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G03211 TASK NO.: 3

DESCRIPTION: Phase I DATE: 3 day June month 03 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: GM03-8

SOIL SAMPLE SIZE 12.08 = 5479.5 − 939.0 = 4540.5

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)	5629.2	5479.5
WT. OF TARE	(grams)	939.0	939.0
WT. OF DRY SAMPLE	(grams)	4690.2	4540.5

SIEVE ANALYSIS QA ID: ME

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	1206.7	26.0	74.0	85 To 100
⅜"	9.50	2845.9	61.0	39.0	40 To 75
#4	4.75	4134.6	88.0	12.0	5 To 25
#8	2.36	4391.8	94.0	6.0	0 To 10
#16	1.18	4460.7	95.0	5.0	0 To 5
#30	0.60	4488.0	96.0	4.0	↕
#50	0.30	4507.6	96.0	4.0	↕
#100	0.15	4526.2	97.0	3.0	↕
#200	0.075	4540.4	97.0	3.0	0 To 20
PAN					

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 V

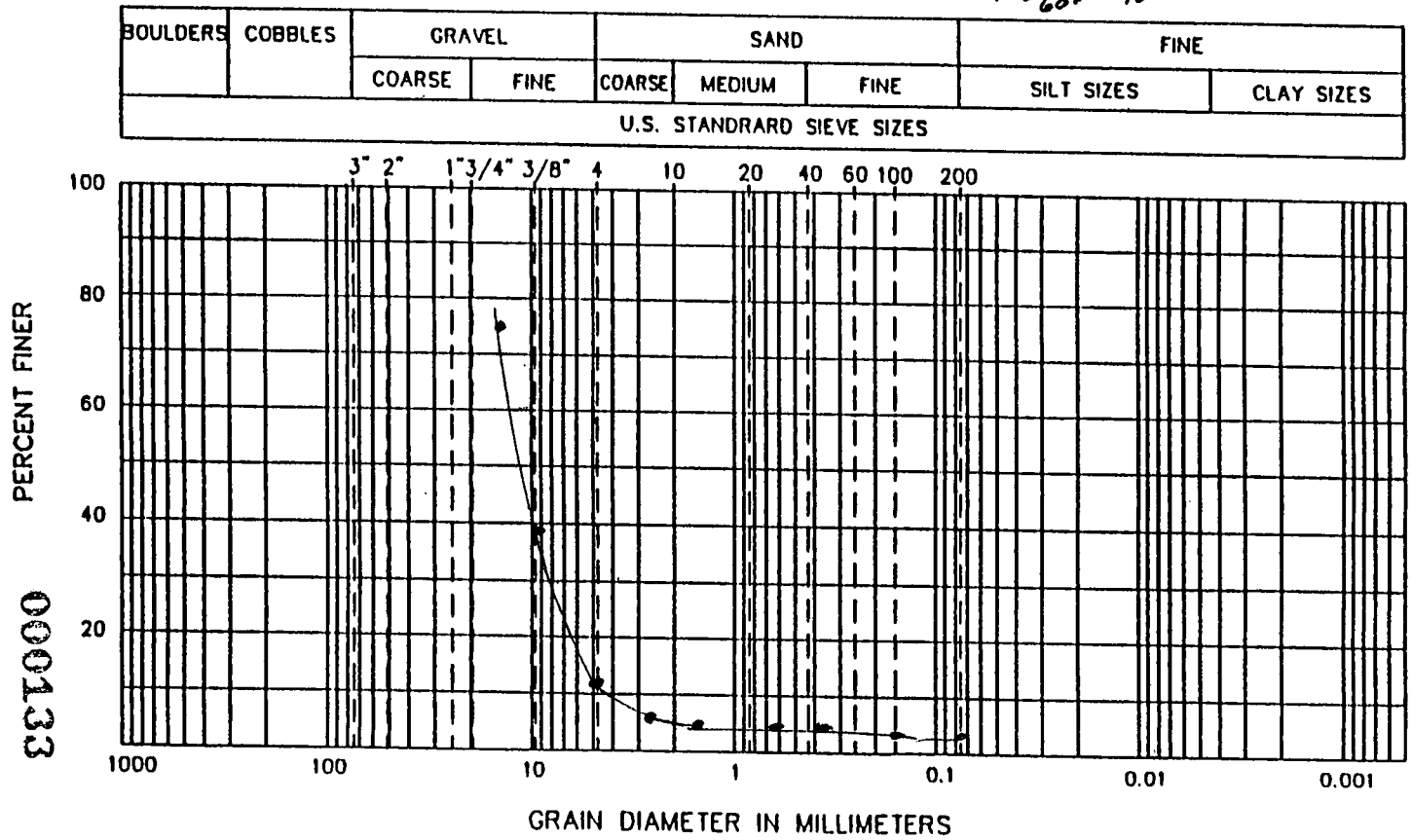
MATERIAL TYPE: 78 Stone

PROJECT NO. 6Q3211 TASK NO.: 3 04

DATE: 04 day June month 2003 year

SAMPLE NO.: GM 03-8 QA ID: DLE

CURVE COEFFICIENTS: $(C_u) = \left(\frac{D_{60}}{D_{10}}\right) = \frac{13}{4} = 3.3$ $(C_c) = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{8 \times 8}{52} = 1.2$



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.	84.0
3/8-in.	39.0
NO. 4	12.0
NO. 8	6.0
NO. 16	5.0
NO. 30	4.0
NO. 50	4.0
NO. 100	3.0
NO. 200	3.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): GP Poorly Graded Gravel

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: [illegible]

SHEET NO. 2 OF 2

000133

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	GM-03-8	-
PROJECT NUMBER	033-3586	SAMPLE TYPE	Bulk	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	35.03	5650	21.0	161.29	
2.	35.62	5650	21.0	158.62	*
3.	35.10	5650	21.0	160.97	*
4.	35.06	5650	21.0	161.15	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	7392.0
APPARATUS WEIGHT (g):	4011.0
WET SAMPLE WEIGHT (g):	3381.0
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):	85.4
DRY DENSITY IN (pcf):	85.4

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):	160.25
AVERAGE TEMP (°C):	21.0
TEMPERATURE CORRECTION:	0.976
HEAD OF WATER (in):	4.8
HYDRAULIC GRADIENT (i):	0.40

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 4.8E+00 cm/sec

NOTE: ASTM modified due to the large particles size
Due to the limitation of our laboratory equipment the permeability may be faster.

TECH	TJ
DATE	6/25/2003
CHECK	[illegible]
REVIEW	[illegible]

000134

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5369

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ3211 TASK NO.: 3

DESCRIPTION: PHASE V DATE: 06 day 06 month 03 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: GM03-9

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	Bowl
WT. OF DRY SAMPLE PLUS TARE	(grams)	5443.2	~~4600.6~~ 4701.1
WT. OF TARE	(grams)	939.0	296.4
WT. OF DRY SAMPLE	(grams)	4504.2	4404.7

SIEVE ANALYSIS

QA ID: KH

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	–			100
1½"	37.50	–			↕
1"	25.00	–			↕
¾"	19.00	134.8	2.9 KH	97.1	100
½"	12.50	421.8	~~90~~ 9.4	~~91.0~~ 90.6	85 To 100
⅜"	9.50	1771.9	~~37.9~~ 39.3	~~62.3~~ 60.7	40 To 75
#4	4.75	3820.3	~~81.4~~ 84.8	~~18.6~~ 15.2	5 To 25
#8	2.36	4325.9	~~92.1~~ 96.0	~~7.9~~ 4.0	0 To 10
#16	1.18	4380.8	~~93.3~~ 97.3	~~6.7~~ 2.7	0 To 5
#30	0.60	4386.1	~~93.4~~ 97.4	~~6.6~~ 2.6	↕
#50	0.30	4390.1	~~93.5~~ 97.5	~~6.5~~ 2.5	↕
#100	0.15	4393.4	~~93.6~~ 97.5	~~6.4~~ 2.5	↕
#200	0.075	4396.9	~~93.7~~ 97.6	~~6.3~~ 2.4	0 To 20
PAN		4399.1	~~93.7~~ 97.6	~~6.3~~ 2.4	

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

DESCRIPTION: Phase V

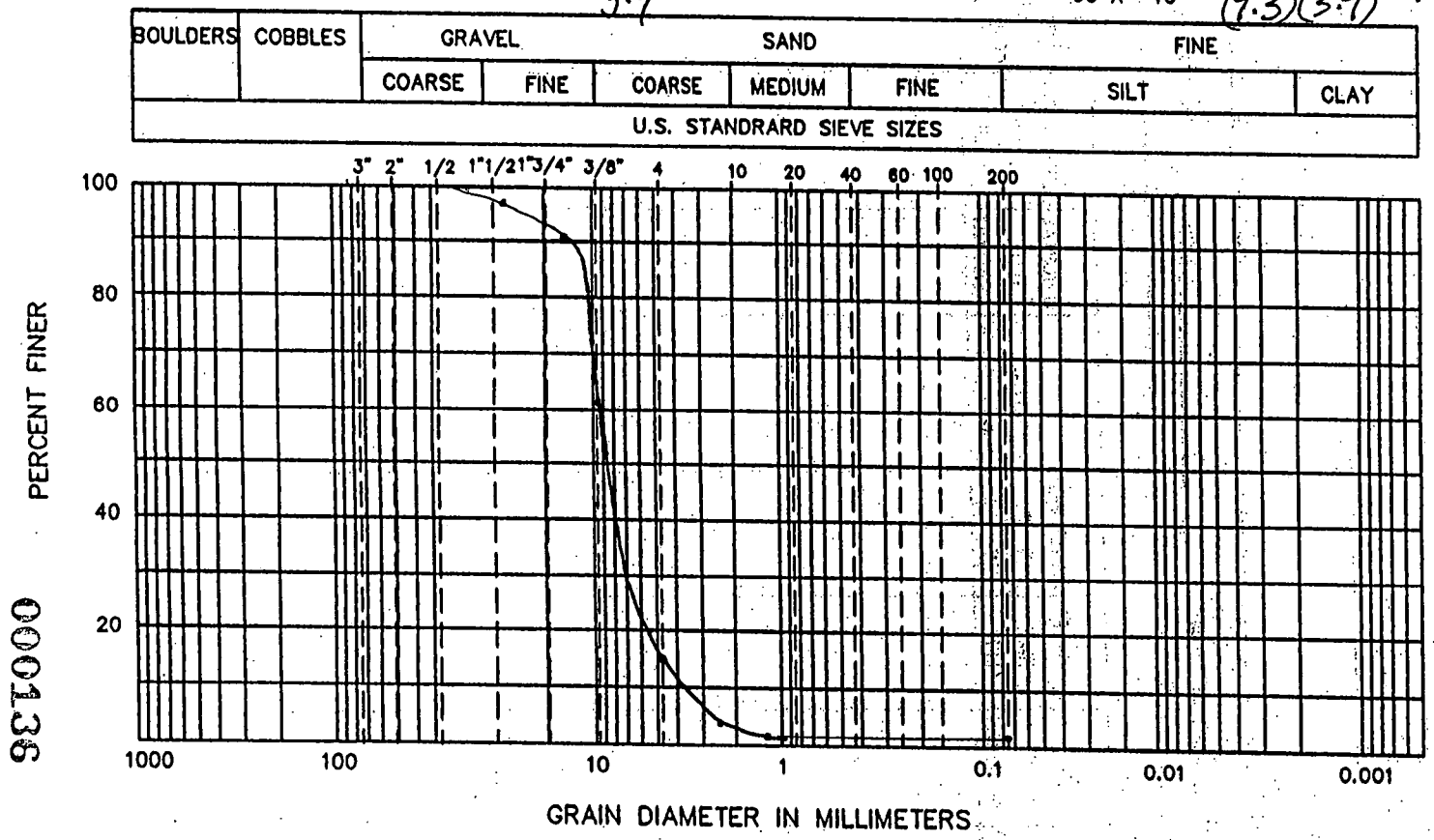
MATERIAL TYPE: 78 Stone

PROJECT NO.: G03211 TASK NO.: 03

DATE: 06 day June month 2003 year

SAMPLE NO.: GM03-9 QA ID: [illegible]

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{9.3}{3.9} = 2.38$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{(7)^2}{(9.3)(3.9)} = 1.35$



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	97.1
1/2-in.	90.6
3/8-in.	15.2
NO. 4	4.0
NO. 10	2.7
NO. 20.	2.6
NO. 40	2.5
NO. 60	2.5
NO. 100	2.4
NO. 200	2.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): GP Poorly Graded Gravel

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CHECKED BY: [illegible]

SHEET NO. 2 OF 2

000136

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	GM-03-9	-
PROJECT NUMBER	033-3586	SAMPLE TYPE	Bulk	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	52.62	5650	21.0	107.37	
2.	53.47	5650	21.0	105.67	*
3.	53.35	5650	21.0	105.90	*
4.	53.63	5650	21.0	105.35	*

INITIAL UNIT WEIGHT DETERMINATION

PPARATUS & WET SAMPLE (g):	7368.0
APPARATUS WEIGHT (g):	4052.0
WET SAMPLE WEIGHT (g):	3316.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	4.0
SAMPLE AREA (in²):	12.57
SAMPLE AREA (cm²):	81.07
SAMPLE VOLUME (in³):	125.66
SAMPLE VOLUME (ft³):	0.073
WET DENSITY IN (pcf):	100.5
DRY DENSITY IN (pcf):	100.5

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):	4.0
AVERAGE Q VALUE (ml/sec):	105.64
AVERAGE TEMP (°C):	21.0
TEMPERATURE CORRECTION:	0.976
HEAD OF WATER (in):	4.8
HYDRAULIC GRADIENT (i):	0.48

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

NOTE: ASTM modified due to the large particles size
Due to the limitation of our laboratory equipment the permeability may be faster.

TECH	DA
DATE	6/25/2003
CHECK	BSS
REVIEW	LWA

000137

GEOSYNTEC CONSULTANTS

5369

FLUOR FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 603211 TASK NO.:

DESCRIPTION: Phase IV DATE: 18 day June month 2003 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: GM03-10

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		SB-1	SB-1
WT. OF DRY SAMPLE PLUS TARE	(grams)	9.19 4168.6	9.98 4073.3
WT. OF TARE	(grams)	296.4	296.4
WT. OF DRY SAMPLE	(grams)	3872.2	3776.9

SIEVE ANALYSIS

QA ID: DJE

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	↕
1"	25.00	0	0	100	↕
3/4"	19.00	0	0	100	100
1/2"	12.50	324.5	8.4	91.6	85 To 100
3/8"	9.50	1398.0	36.1	63.9	40 To 75
#4	4.75	3219.8	83.2	16.8	5 To 25
#8	2.36	3639.0	94.0	6.0	0 To 10
#16	1.18	3722.0	96.1 ~~96.0~~	3.9 ~~4.0~~	0 To 5
#30	0.60	3741.4	96.6	3.4	↕
#50	0.30	3751.7	96.9	3.1	↕
#100	0.15	3761.2	97.1	2.9	↕
#200	0.075	3773.0	97.4	2.6	0 To 20
PAN		3775.1	—	—	

000138

%FINER = 100 − Σ% RETAINED

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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 V

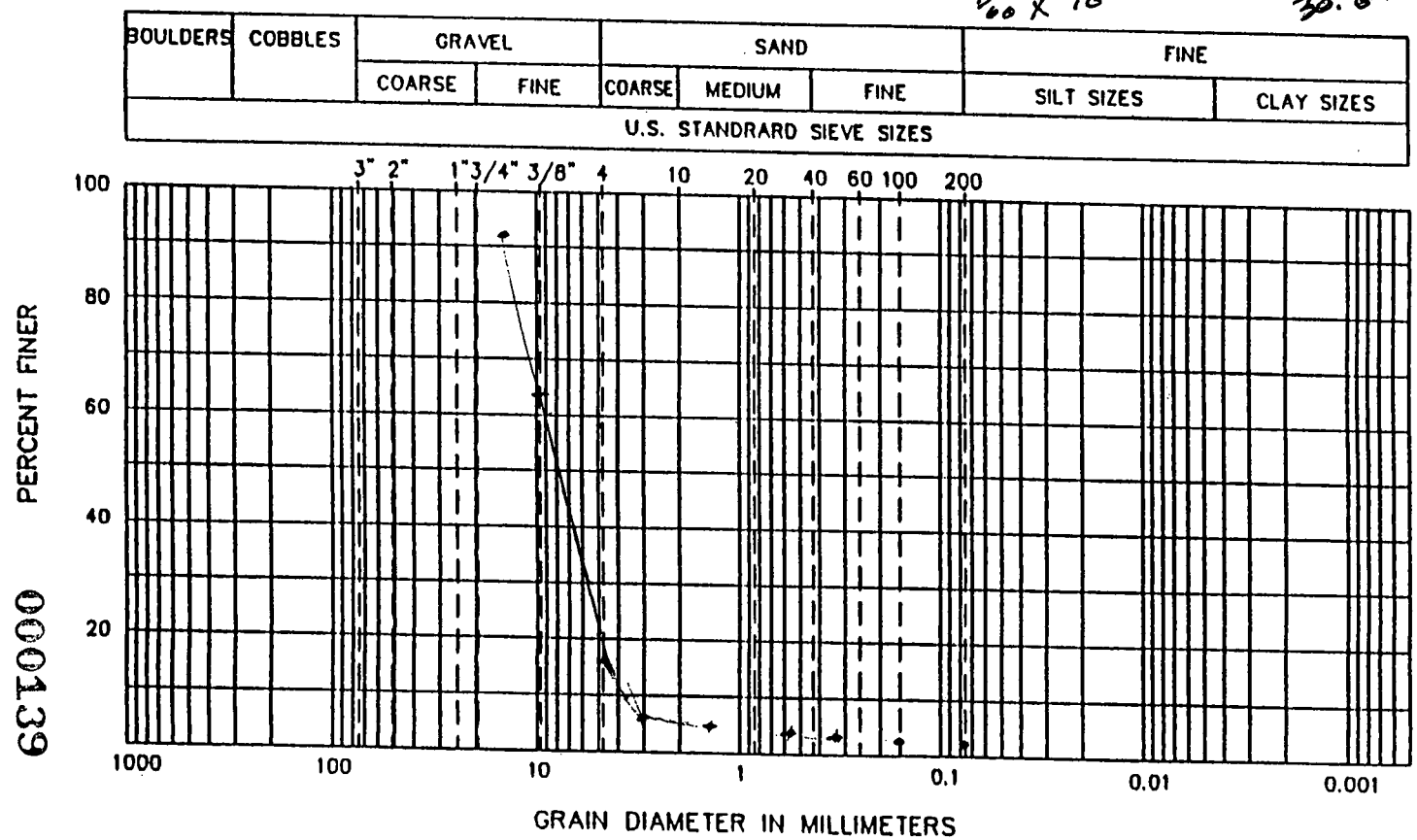
MATERIAL TYPE: 78 Stone

PROJECT NO.: GQ3211 TASK NO.: 3

DATE: 18 day June month 2003 year

SAMPLE NO.: GM 03-10 QA ID: ABE

CURVE COEFFICIENTS: (C_u) $\frac{D_{60}}{D_{10}} = \frac{9}{3.4} = 2.6$ (C_c) $\frac{D_{30}^2}{D_{60} \times D_{10}} = 5.5 = \frac{30.3}{30.6} = .99$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

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.	91.6
3/8-in.	63.9
NO. 4	16.8
NO. 8	6.0
NO. 16	4.0
NO. 30	3.4
NO. 50	3.1
NO. 100	2.9
NO. 200	2.6

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): GP Poorly Graded gravel w/ Sand

©GEOSYNTEC CONSULTANTS FILE NO. 2-18-RSD

000139

5369

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	GM-03-10	-
PROJECT NUMBER	033-3586	SAMPLE TYPE	Bulk	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	25.44	980	21.0	38.52	
2.	25.50	975	21.0	38.24	*
3.	26.31	985	21.0	37.44	*
4.	26.44	975	21.0	36.88	*

INITIAL UNIT WEIGHT DETERMINATION

PPARATUS & WET SAMPLE (g):	7350.0
APPARATUS WEIGHT (g):	4014.0
WET SAMPLE WEIGHT (g):	3336.0
SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	4.0
SAMPLE AREA (in²):	12.57
SAMPLE AREA (cm²):	81.07
SAMPLE VOLUME (in³):	125.66
SAMPLE VOLUME (ft³):	0.073
WET DENSITY IN (pcf):	101.1
DRY DENSITY IN (pcf):	101.1

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):	4.0
AVERAGE Q VALUE (ml/sec):	37.52
AVERAGE TEMP (°C):	21.0
TEMPERATURE CORRECTION:	0.976
HEAD OF WATER (in):	4.8
HYDRAULIC GRADIENT (i):	0.48

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 9.4E-01 cm/sec

NOTE: ASTM modified due to the large particles size
Due to the limitation of our laboratory equipment the permeability may be faster.

TECH	DA/TJ
DATE	6/25/2003
CHECK	BSJ
REVIEW	AWM

000140

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5369

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 6Q321L TASK NO.: 3

DESCRIPTION: Phase V DATE: 20 day June month 2003 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: GM 03-11

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		SB III	SB III
WT. OF DRY SAMPLE PLUS TARE	(grams)	3676.3	3565.4
WT. OF TARE	(grams)	296.4	296.4
WT. OF DRY SAMPLE	(grams)	3379.9	3269.0

SIEVE ANALYSIS

QA ID: _____

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	219.2	6.5	93.5	85 To 100
⅜"	9.50	1222.8	36.2	63.8	40 To 75
#4	4.75	2906.3	86.0	14.0	5 To 25
#8	2.36	3154.6	93.3	6.7	0 To 10
#16	1.18	3207.8	94.9	5.1	0 To 5
#30	0.60	3224.5	95.4	4.6	↕
#50	0.30	3235.5	95.7	4.3	↕
#100	0.15	3247.9	96.1	3.9	↕
#200	0.075	3264.2	96.6	3.4	0 To 20
PAN		3269.0			

000141

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

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

DESCRIPTION: Phase V

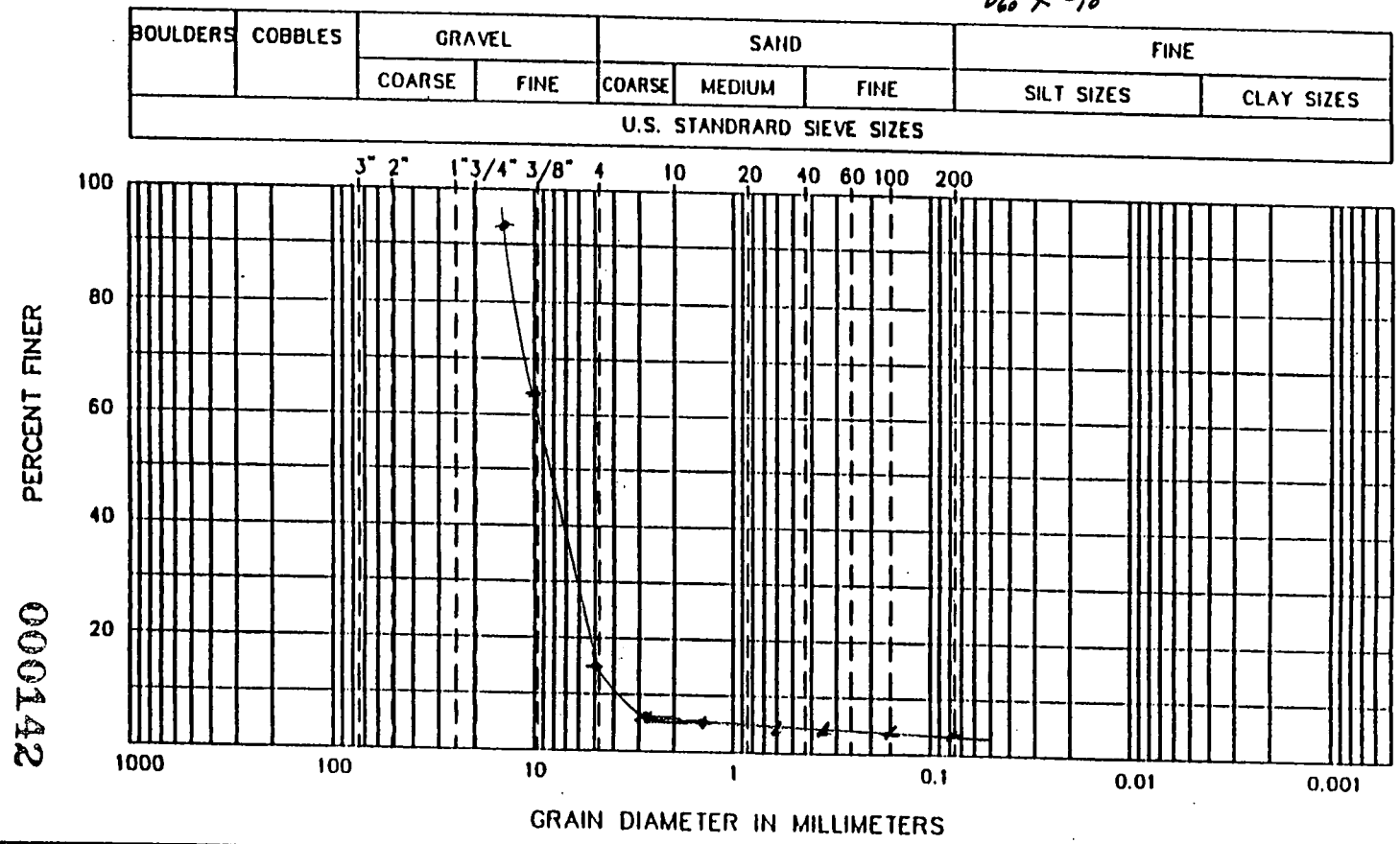
MATERIAL TYPE: 78 Stone C-136

PROJECT NO.: GQ3211 TASK NO.: 3

DATE: 24 day June month 2003 year

SAMPLE NO.: GM03-11 QA ID: DZC

CURVE COEFFICIENTS: $(C_u) = \left(\frac{D_{60}}{D_{10}}\right) = \frac{10}{4} = 2.5$ $(C_c) \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{6^2}{4.0} = \frac{36}{4.0}$ 0.9



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.	93.5
3/8-In.	63.8
NO. 4	14.6
NO. 8	6.7
NO. 16	5.1
NO. 30	4.6
NO. 50	4.3
NO. 100	3.9
NO. 200	3.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): Poorly Graded Gravel w/ Sand

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD CHECKED BY: [illegible]

000142

5369

CARBONATE CONTENT- AGGREGATES
ASTM D 3042 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA
PROJECT NUMBER	033-3486
REMARKS	Used pH-4 acid

SAMPLE ID	GM 03-02	GM 03-4	GM 03-6
Date	5/24/2003	5/24/2003	5/24/2003
Tested by	TJ	TJ	TJ
Checked by	BES	BES	BES
Reviewed by	BES	BES	BES
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.06	0.06	0.07
2	0.06	0.06	0.06
3	0.07	0.06	0.12
AVERAGE	0.06	0.06	0.08

SAMPLE ID	-	-	-
Date	-	-	-
Tested by	-	-	-
Checked by			
Reviewed by			
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	-	-	-
2	-	-	-
3	-	-	-
AVERAGE	#DIV/0!	#DIV/0!	-

000143

CARBONATE CONTENT- AGGREGATES
ASTM D 3042 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA
PROJECT NUMBER	033-3486
REMARKS	Used pH-4 acid

SAMPLE ID	GM 03-07	GM 03-09	GM 03-10
Date	6/24/2003	6/24/2003	6/24/2003
Tested by	GH	GH	GH
Checked by	BSJ	BSJ	BSJ
Reviewed by	PWM	PWM	PWM
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.06	0.13	0.09
2	0.03	0.05	0.08
3	0.11	0.1	0.08
AVERAGE	0.07	0.09	0.08

SAMPLE ID	-	-	-
Date	-	-	-
Tested by	-	-	-
Checked by			
Reviewed by			
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	-	-	-
2	-	-	-
3	-	-	-
AVERAGE	#DIV/0!	#DIV/0!	#DIV/0!

GEOSYNTEC CONSULTANTS

5369

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.: 01

DESCRIPTION: Phase IV DATE: 10 day Jan month 03 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: CDL 03-1

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		
WT. OF DRY SAMPLE PLUS TARE	(grams)	3483.6	3456.8
WT. OF TARE	(grams)	939.0	939.0
WT. OF DRY SAMPLE	(grams)	2544.6	2517.8

SIEVE ANALYSIS

QA ID: CHW

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	200.2	7.9	92.1	85 - 100
3/8"	9.50	1006.9	39.6	60.4	40 - 75
#4	4.75	2373.8	93.3	6.7	5 - 25
#8	2.36	2464.1	96.8	3.2	0 - 10
#16	1.18	2482.1	97.5	2.5	0 - 5
#30	0.60	2496.9	98.1	1.9	
#50	0.30	2510.9	98.7	1.3	
#100	0.15	2515.6	98.9	1.1	
#200	0.075	2517.2	98.9	1.1	0 - 2
PAN		2517.5	98.9	~~1.1~~	

000145

%FINER = 100 − Σ% RETAINED

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CHECKED BY: CH

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

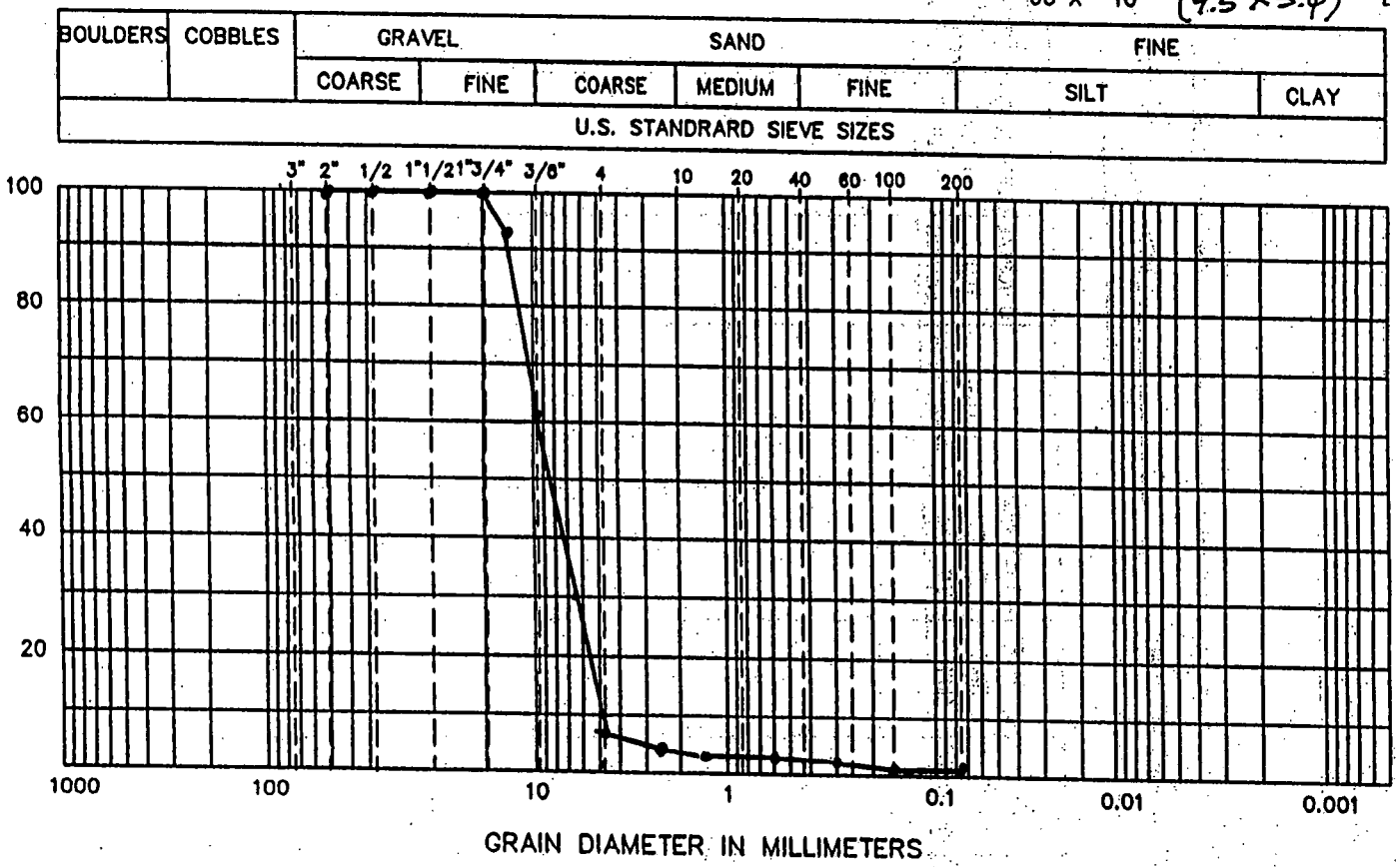
MATERIAL TYPE: COVER DRAINAGE LAYER CELL #2 CAP (#8 STONE)

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 14 day FEB month 2003 year

SAMPLE NO.: CDL03-1 QA ID: (TBD)

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{9.5mm}{5.0mm} = 1.9$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{(6.7^2)}{(9.5 \times 5.0)} = 0.95$



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.	100
1/2-In.	92.1
3/8-In.	60.4
NO. 4	6.7
NO. 8	3.2
NO. 16	2.5
NO. 30	1.9
NO. 50	1.3
NO. 100	1.1
NO. 200	1.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED GRAVEL (GP)

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SHEET NO. 2 OF 2

000146

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	CDL-03-1	-
PROJECT NUMBER	033-3486	SAMPLE TYPE	Bulk	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	17.12	5650	10.5	330.02	
2.	17.12	5650	10.5	330.02	*
3.	17.12	5650	10.5	330.02	*
4.	17.12	5650	10.5	330.02	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	11760.0
APPARATUS WEIGHT (g):	4441.0
WET SAMPLE WEIGHT (g):	7319.0
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):	98.6
DRY DENSITY IN (pcf):	98.6

INITIAL MOISTURE CONTENT

WET SAMPLE & TARE (g):	0.00
DRY SAMPLE & TARE (g):	0.00
WEIGHT OF TARE (g):	0.00
WEIGHT OF WATER (g):	0.00
DRY SAMPLE WEIGHT (g):	0.00
MOISTURE CONTENT (%):	0.00

FINAL DIMENSIONS

SAMPLE LENGTH (in):	10.0
SAMPLE DIAMETER (in):	6.0
AVERAGE Q VALUE (ml/sec):	330.02
AVERAGE TEMP (°C):	10.5
TEMPERATURE CORRECTION:	1.283
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

K VALUE CORRECTED FOR 20 DEGREES C = 7.0E+00 cm/sec

NOTE: ASTM modified due to the large particles size
Due to the limitation of our laboratory equipment the permeability may be faster.

TECH	TJ
DATE	1/15/03
CHECK	BS
REVIEW	PWM

000147

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

-5369

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 6Q1341 TASK NO.: 01

DESCRIPTION: Phase IV DATE: 15 day Jan month 03 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: CDL-03-2

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)	5463.7	5393.7
WT. OF TARE	(grams)	939.0	939.0
WT. OF DRY SAMPLE	(grams)	4524.7	4454.7

SIEVE ANALYSIS

QA ID: CHW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	0	0	100	
1½"	37.50	0	0	100	
1"	25.00	0	0	100	
3/4"	19.00	0	0	100	100
1/2"	12.50	220.8	4.9	95.1	85-100
3/8"	9.50	1250.4	27.6	~~67.5~~ 72.4	40-75
#4	4.75	3727.1	82.3	17.7	5-25
#8	2.36	4387.4	~~96.7~~ 97.0 CHW	3.0	0-10
#16	1.18	4433.5	98.0	2.0	0-5
#30	0.60	4440.3	98.1	1.9	
#50	0.30	4444.7	98.2	1.8	
#100	0.15	4448.0	98.3	1.7	
#200	0.075	4452.0	98.4	1.6	0-2
PAN		4454.6	98.5	~~1.5~~	

000148

%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

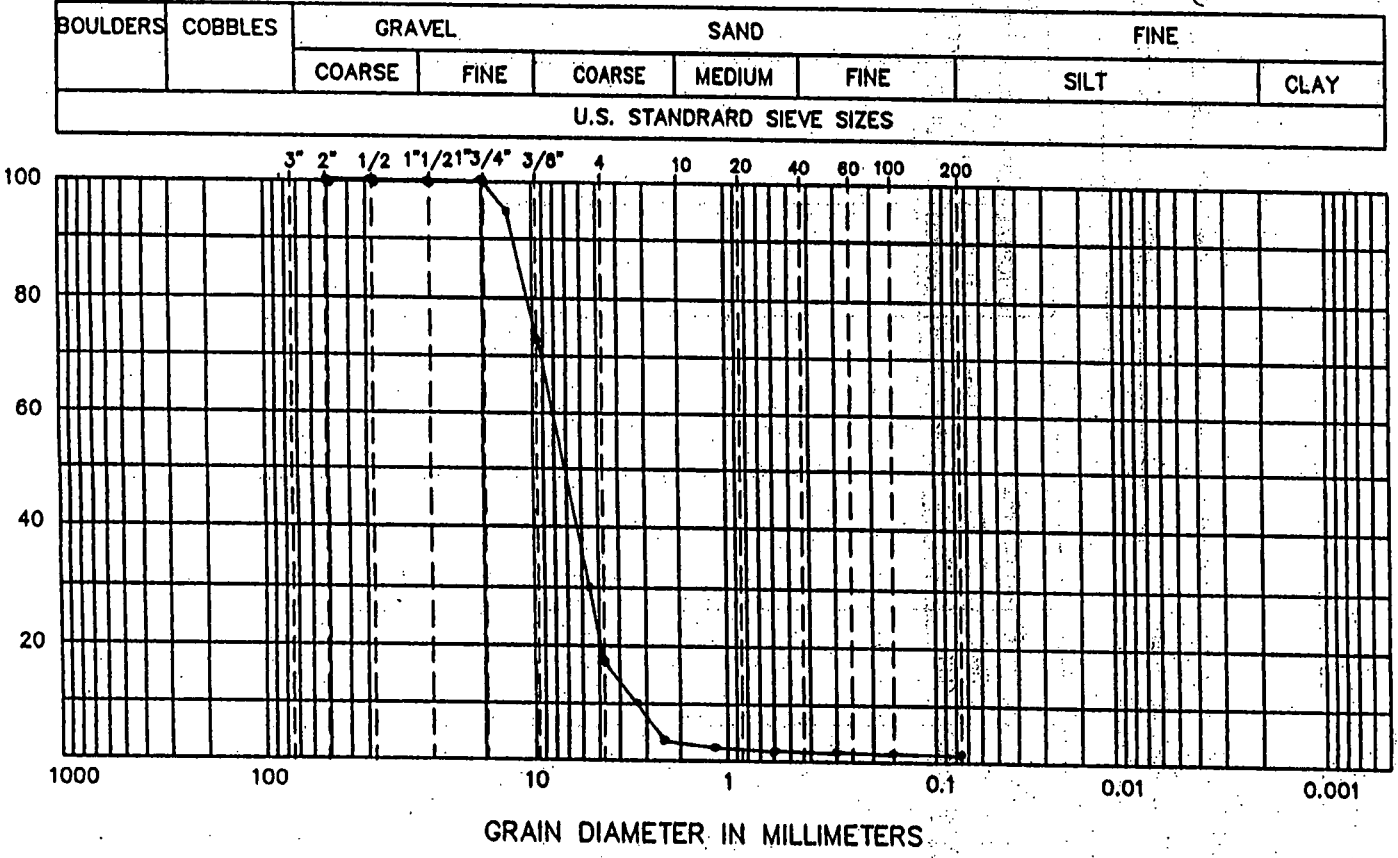
MATERIAL TYPE: COVER DRAINAGE LAYER CELL #2 CAP (#78 STONE)

PROJECT NO.: GQ134 TASK NO.: 041

DATE: 14 day FEB month 2003 year

SAMPLE NO.: CDL03-2 QA ID: [illegible]

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{8.0}{3.3} = 2.4$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{(5.82)}{(8.0 \times 3.3)} = 1.27$



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.	95.1
3/8-in.	72.4
NO. 4	17.7
NO. ~~10~~ 8	3.0
NO. ~~20~~ 16	2.0
NO. ~~40~~ 30	1.9
NO. ~~60~~ 50	1.8
NO. 100	1.7
NO. 200	1.6

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	93.6

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED GRAVEL (GP)

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SHEET NO. 2 OF 2

000149

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	CDL-03-2	-
PROJECT NUMBER	033-3486	SAMPLE TYPE	Bulk	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	35.66	5650	20.5	158.44	
2.	36.19	5650	20.5	156.12	*
3.	38.10	5650	20.5	148.29	*
4.	38.87	5650	20.5	145.36	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	11758.0
APPARATUS WEIGHT (g):	4445.0
WET SAMPLE WEIGHT (g):	7313.0
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):	98.5
DRY DENSITY IN (pcf):	98.5

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):	149.92
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

NOTE: ASTM modified due to the large particles size
Due to the limitation of our laboratory equipment the permeability may be faster.

TECH	DA
DATE	1/17/03
CHECK	BK
REVIEW	PWM

000150

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5369

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 III DATE: 22 day Jan month 03 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: CDL 03-3

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		X	X
WT. OF DRY SAMPLE PLUS TARE	(grams)	3343.6	3300.1
WT. OF TARE	(grams)	939.0	939.0
WT. OF DRY SAMPLE	(grams)	2404.6	2361.1

SIEVE ANALYSIS

QA ID: CHW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	0	0	100	
1½"	37.50	0	0	100	
1"	25.00	0	0	100	
3/4"	19.00	0	0	100	100
½"	12.50	78.3	3.3	96.7	85-100
3/8"	9.50	641.4	26.7	73.3	40-75
#4	4.75	2037.7	84.7	15.3	5-25
#8	2.36	2318.1	96.4	3.6	0-10
#16	1.18	2344.3	97.5	2.5	0-5
#30	0.60	2349.7	97.7	2.3	
#50	0.30	2352.9	97.8	2.2	
#100	0.15	2355.7	98.0	2.0	
#200	0.075	2359.7	98.1	1.9	0-2
PAN		2361.0	98.2		

000151

%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

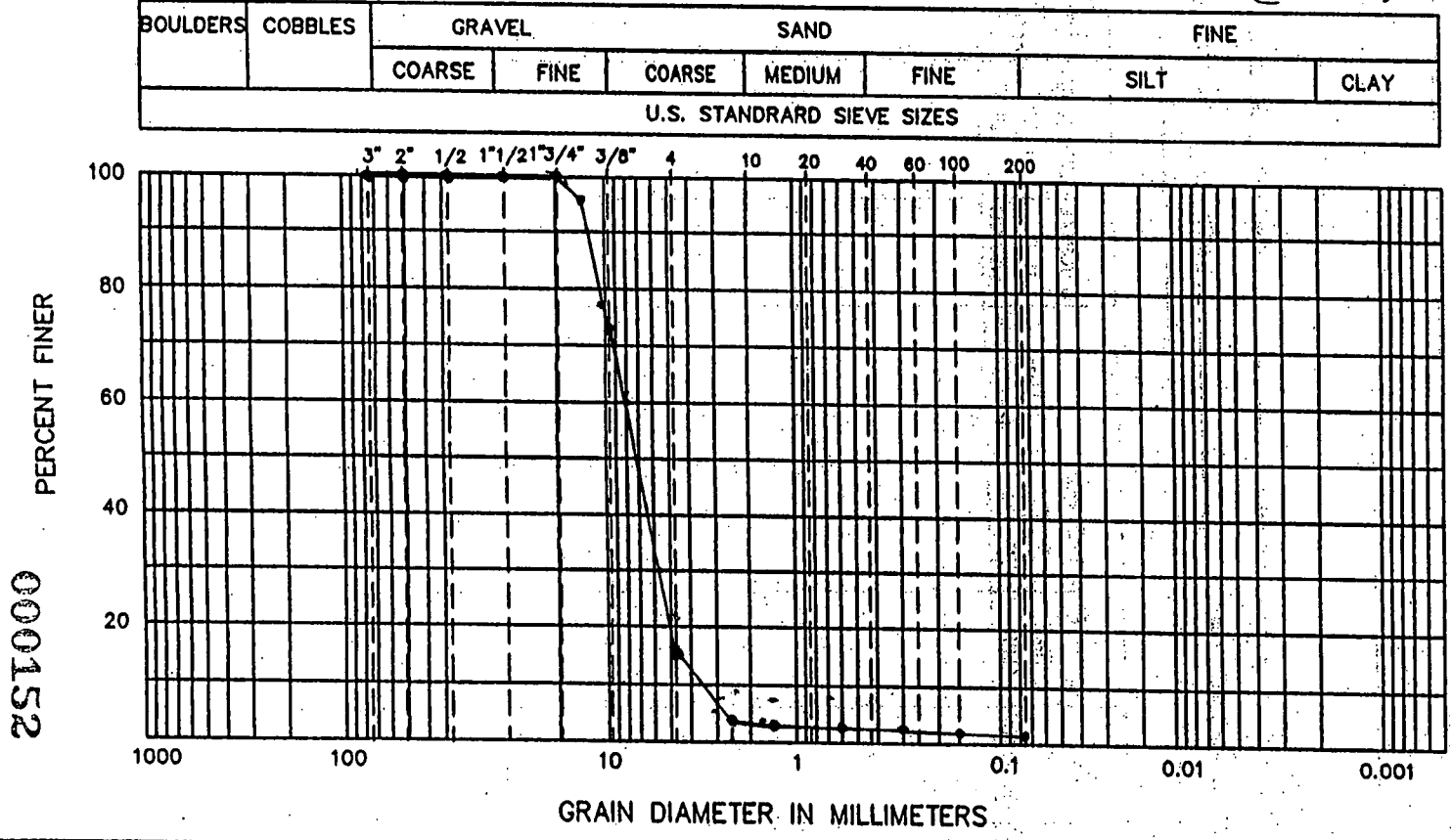
MATERIAL TYPE: COVER DRAINAGE LAYER CELL #2 CAP (#78 STONE)

PROJECT NO.: GR1341 TASK NO.: 04.1

DATE: 14 day FEB month 2003 year

SAMPLE NO.: CDL03-3 QA ID: TBD

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{8.0}{3.7} = 2.16$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{(5.9^2)}{(8.0)(3.7)} = 1.18$



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.	96.7
3/8-in.	73.3
NO. 4	15.3
NO. ~~10~~ 8	3.6
NO. ~~20~~ 16	2.5
NO. ~~40~~ 30	2.3
NO. ~~60~~ 50	2.2
NO. 100	2.0
NO. 200	1.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED GRAVEL (GP)

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

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SHEET NO. 2 OF 2

000152

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	CDL-03-3 -
PROJECT NUMBER	033-3486	SAMPLE TYPE	Bulk
REMARKS	-	SAMPLE DEPTH	-

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	53.03	5650	23.0	106.54	
2.	53.13	5650	23.0	106.34	*
3.	53.21	5650	23.0	106.18	*
4.	53.29	5650	23.0	106.02	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	12232.0
APPARATUS WEIGHT (g):	4442.0
WET SAMPLE WEIGHT (g):	7790.0
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):	106.18
AVERAGE TEMP (°C):	23.0
TEMPERATURE CORRECTION:	0.931
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

K VALUE CORRECTED FOR 20 DEGREES C = 1.6E+00 cm/sec

NOTE: ASTM modified due to the large particles size
Due to the limitation of our laboratory equipment the permeability may be faster.

TECH	TJ
DATE	1/27/03
CHECK	BG
REVIEW	FWM

000153

GEOSYNTEC CONSULTANTS

5369

FLUOR 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 IV DATE: 24 day Jan month 03 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: CDL 03-4

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	X
WT. OF DRY SAMPLE PLUS TARE	(grams)	3867.3	3802.1
WT. OF TARE	(grams)	939.0	939.0
WT. OF DRY SAMPLE	(grams)	2928.3	2863.1

SIEVE ANALYSIS

QA ID: CHW/DIE

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	↕
1"	25.00	0	0	100	↓
3/4"	19.00	0	0	100	100
1/2"	12.50	133.1	4.5	95.5	85 To 100
3/8"	9.50	851.9	29.1	70.9	40 To 75
#4	4.75	2551.4	87.1	12.9	5 To 25
#8	2.36	2804.1	95.8	4.2	0 To 10
#16	1.18	2833.2	~~95.8~~ 96.8	~~4.2~~ 3.2	0 To 5
#30	0.60	2842.0	97.1	2.9	↕
#50	0.30	2847.3	97.2	2.8	↓
#100	0.15	2851.9	97.4	2.6	0 To 5
#200	0.075	2858.4	97.6	2.1	0 To 2
PAN					

000154

%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

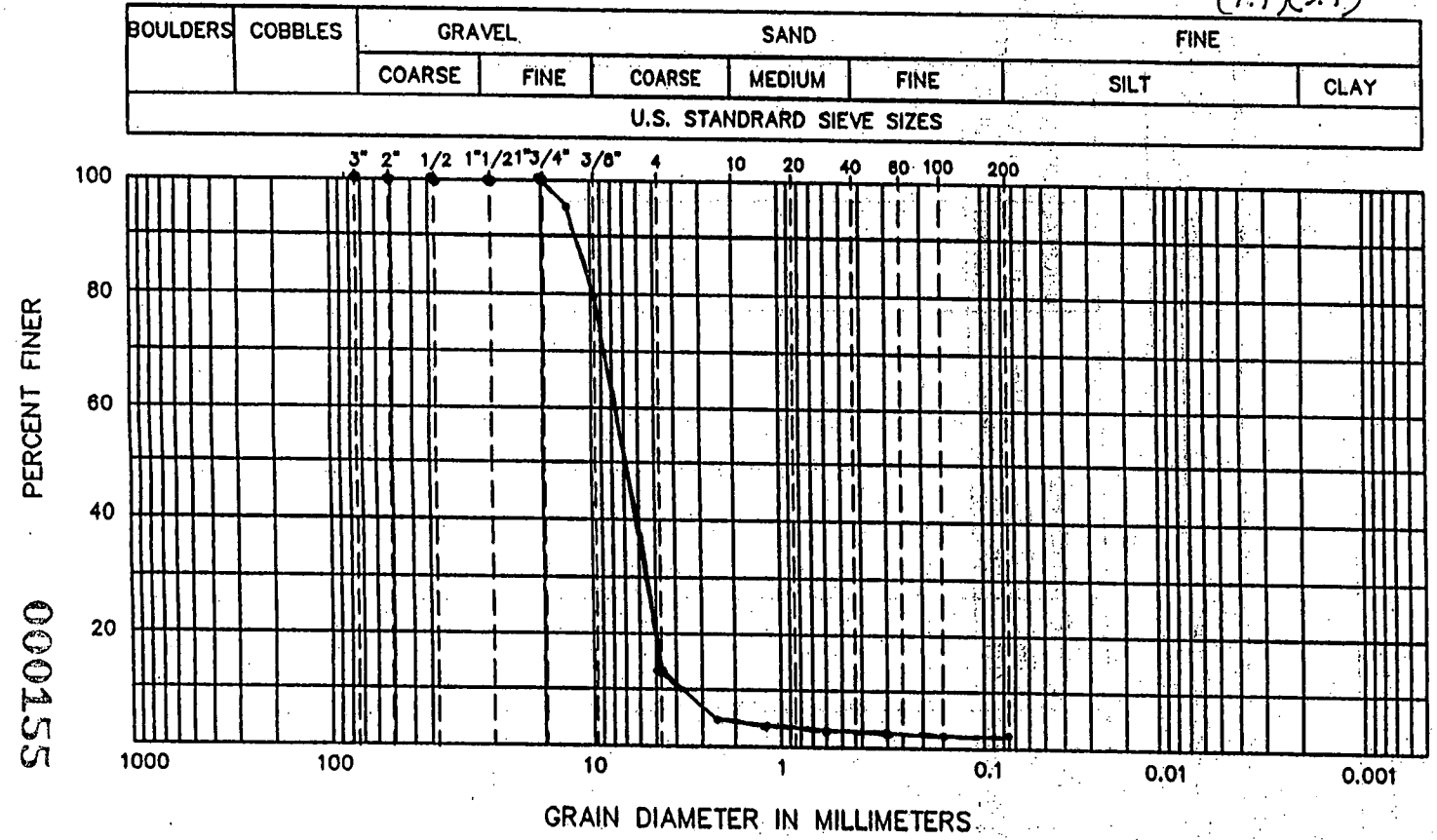
MATERIAL TYPE: COVER DRAINAGE LAYER CELL #2 CAP (#78 STONE)

PROJECT NO.: GQ134 TASK NO.: 04.1

DATE: 18 day FEB month 2003 year

SAMPLE NO.: CDL03-4 QA ID: (TBK)

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{7.9}{3.9} = 2.03$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{(5.8^2)}{(7.9)(3.9)} = 1.09$



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.	95.5
3/8-in.	70.9
NO. 4	12.9
NO. ~~10~~ 8	4.2
NO. ~~20~~ 16	3.2
NO. ~~40~~ 30	2.9
NO. ~~60~~ 50	2.8
NO. 100	2.6
NO. 200	2.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED GRAVEL (GP)

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

CHECKED BY: [illegible]

SHEET NO. 2 OF 2

000155

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	CDL-03-4	-
PROJECT NUMBER	033-3486	SAMPLE TYPE	Bulk	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1	49.47	5650	23.0	114.21	*
2	49.36	5650	23.0	114.47	*
3	49.43	5650	23.0	114.30	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	12218.0
APPARATUS WEIGHT (g):	4443.0
WET SAMPLE WEIGHT (g):	7775.0
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):	114.33
AVERAGE TEMP (°C):	23.0
TEMPERATURE CORRECTION:	0.931
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

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

NOTE: ASTM modified due to the large particles size
Due to the limitation of our laboratory equipment the permeability may be faster.

TECH	BES
DATE	1/29/03
CHECK	[illegible]
REVIEW	AK

000156

GEOSYNTEC CONSULTANTS

5369

FLUOR FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G01341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 5 day Feb month 03 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: CDL 03 - 5

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)	3486.7	3412.4
WT. OF TARE	(grams)	939.0	939.0
WT. OF DRY SAMPLE	(grams)	2547.7	2473.4

SIEVE ANALYSIS

QA ID: GHW

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	↕
1"	25.00	0	0	100	↕
3/4"	19.00	0	0	100	100
1/2"	12.50	256.9	10.1	89.9	85 To 100
3/8"	9.50	985.3	38.7	61.3	40 To 75
#4	4.75	2096.2	82.3	17.7	5 To 25
#8	2.36	2402.1	94.3	5.7	0 To 10
#16	1.18	2449.7	96.2	3.8	0 To 5
#30	0.60	2458.1	96.5	3.5	↕
#50	0.30	2462.0	96.6	3.4	↕
#100	0.15	2466.3	96.8	3.2	↕
#200	0.075	2472.7	97.1	2.9	0 To 2.0
PAN		2473.2			

000157

%FINER = 100 − Σ% RETAINED

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CHECKED BY: GH

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

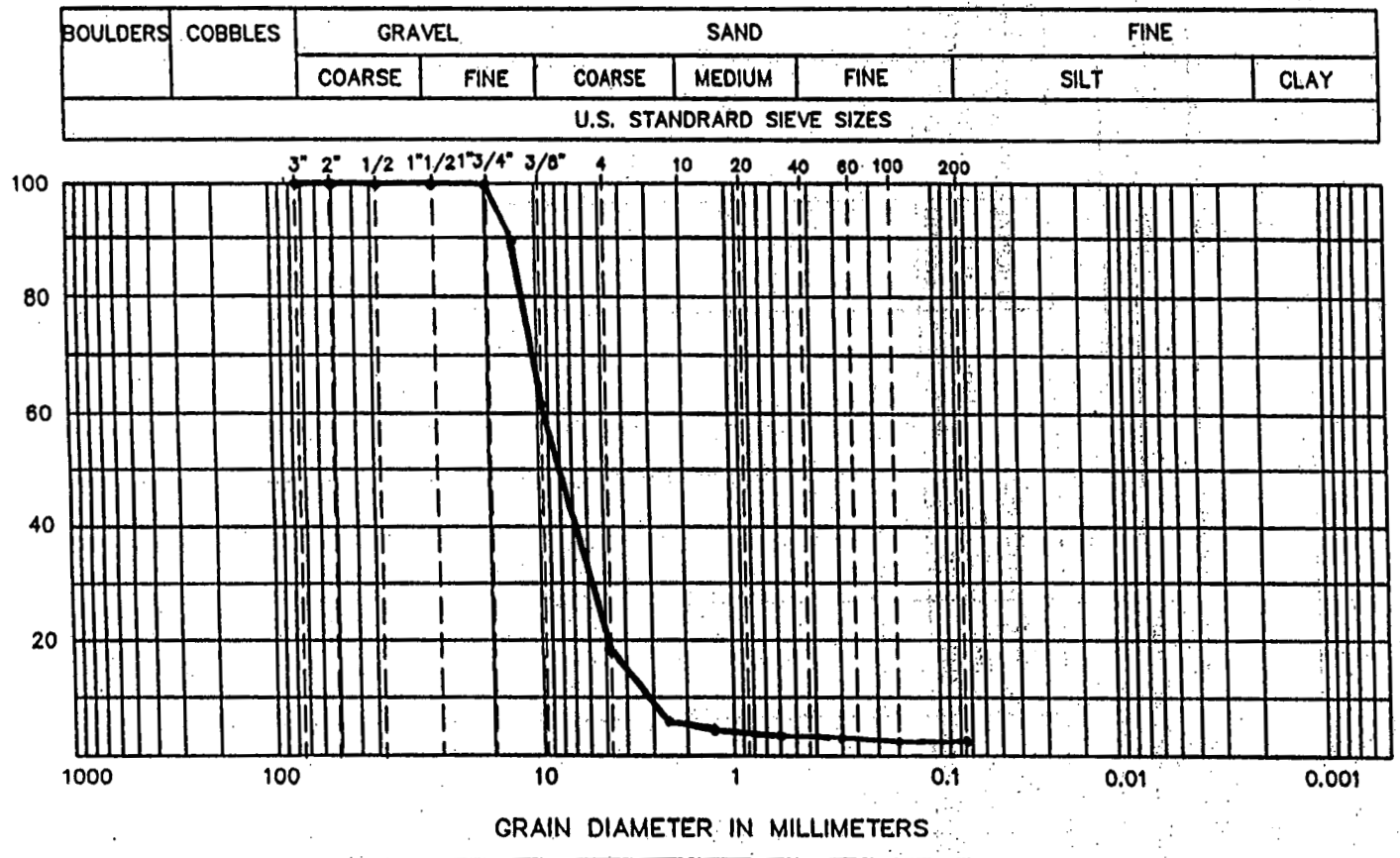
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE IV — DATE: 18 day FEB month 2003 year

MATERIAL TYPE: COVER DRAINAGE LAYER CELL #2 CAP (#78 STONE) — SAMPLE NO.: CDL03-5 QA ID: TBD

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{9.5}{3.1} = 3.06$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{(5.92)}{(9.5)(3.1)} = 1.13$



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.	89.9
3/8-in.	61.3
NO. 4	17.7
NO. ~~10~~8	5.7
NO. ~~20~~16	3.8
NO. ~~40~~30	3.5
NO. ~~60~~50	3.4
NO. 100	3.2
NO. 200	2.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED GRAVEL (GP)

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SHEET NO. 2 OF 2

000158

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	CDL-03-5	-
PROJECT NUMBER	033-3486	SAMPLE TYPE	Bulk	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1	41.31	5650	21.0	136.77	*
2	41.87	5650	21.0	134.94	*
3	41.55	5650	21.0	135.98	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	12529.0
APPARATUS WEIGHT (g):	4446.0
WET SAMPLE WEIGHT (g):	8083.0
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):	108.9
DRY DENSITY IN (pcf):	108.9

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):	135.90
AVERAGE TEMP (°C):	21.0
TEMPERATURE CORRECTION:	0.976
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

K VALUE CORRECTED FOR 20 DEGREES C = 2.2E+00 cm/sec

NOTE: ASTM modified due to the large particles size
Due to the limitation of our laboratory equipment the permeability may be faster.

TECH	TJ
DATE	2/5/03
CHECK	PKS
REVIEW	[illegible]

000159

GEOSYNTEC CONSULTANTS

FLUOR FERNALD 5369

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 6Q134 TASK NO.: 04

DESCRIPTION: Phase III DATE: Feb day ____ month 2003 year

MATERIAL TYPE: 78 STONE SAMPLE NO.: CDL03-6

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	5B
WT. OF DRY SAMPLE PLUS TARE	(grams)	3244.6	3211.1
WT. OF TARE	(grams)	292.30	292.3
WT. OF DRY SAMPLE	(grams)	2952.3	2918.8

SIEVE ANALYSIS

QA ID: CHW

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	↕
1"	25.00	0	0	100	↕
3/4"	19.00	0	0	100	100
1/2"	12.50	120.7	4.1	95.9	85 To 100
3/8"	9.50	877.3	29.7	70.3	40 To 75
#4	4.75	2633.9	89.2	10.8	5 To 25
#8	2.36	2891.3	97.9	2.1	0 To 10
#16	1.18	2908.2	98.5	1.5	0 To 5
#30	0.60	2911.5	98.6	1.4	↕
#50	0.30	2913.6	98.7	1.3	↕
#100	0.15	2915.4	98.8	1.2	↕
#200	0.075	2918.2	98.8	1.2	0 To 20
PAN		2918.6			

000160

%FINER = 100 − Σ% RETAINED

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34.44

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

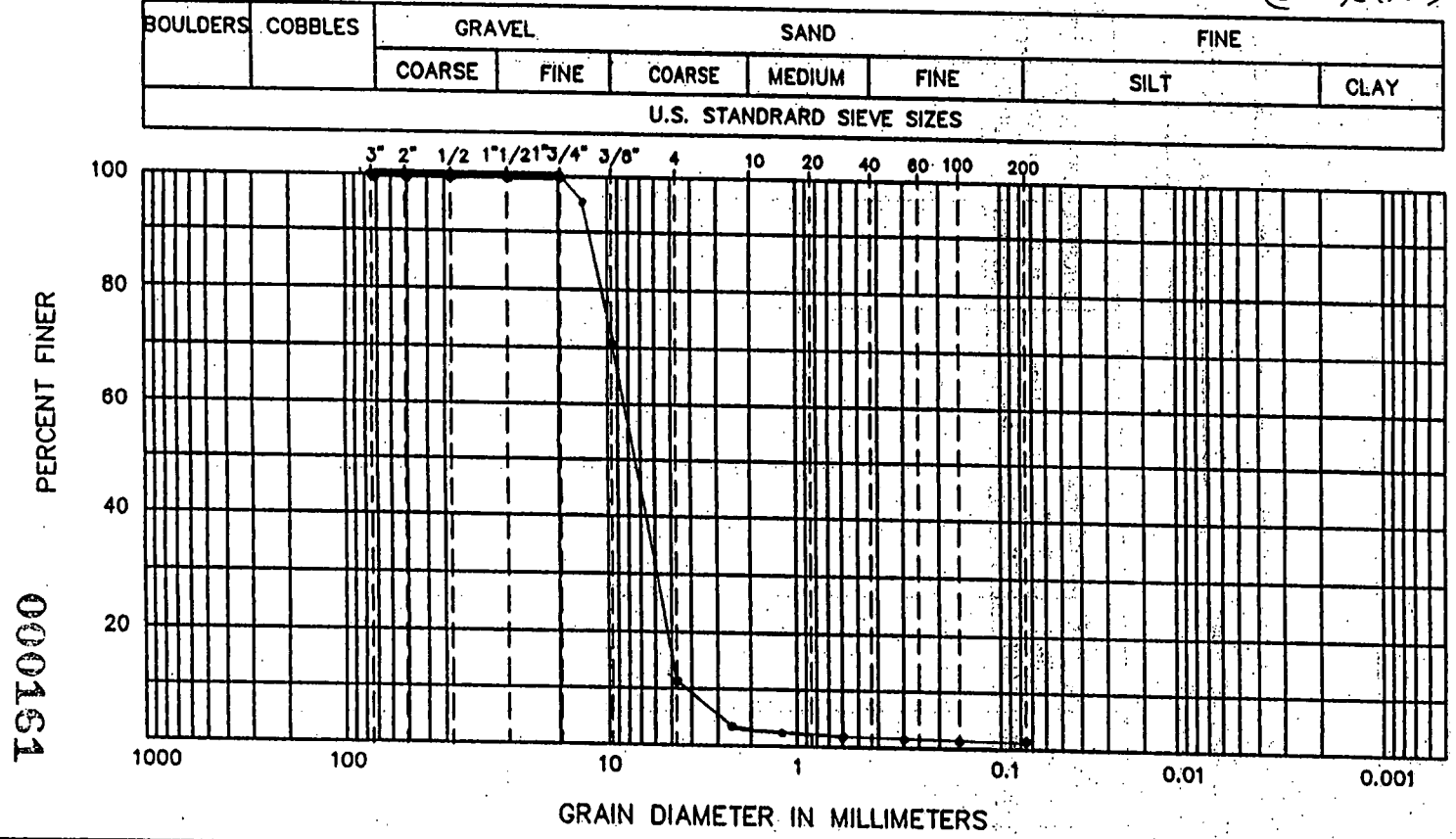
MATERIAL TYPE: COVER DRAINAGE LAYER CELL #2 CAP (#78 STONE)

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 18 day FEB month 2003 year

SAMPLE NO.: CDL03-6 QA ID: TBW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{8.2}{4.2} = 1.95$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{(6.0^2)}{(8.2)(4.2)} = 1.05$



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.	95.9
3/8-in.	70.3
NO. 4	10.8
NO. ~~10~~ 8	2.1
NO. ~~20~~ 16	1.5
NO. ~~30~~ 30	1.4
NO. ~~50~~ 50	1.3
NO. 100	1.2
NO. 200	1.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED GRAVEL (GP)

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

CHECKED BY: [illegible]

SHEET NO. 2 OF 2

1510000

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	CDL-03-6	-
PROJECT NUMBER	033-3486	SAMPLE TYPE	Bulk	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1	65.25	5650	23.0	86.59	*
2	65.16	5650	23.0	86.71	*
3	65.35	5650	23.0	86.46	*

INITIAL UNIT WEIGHT DETERMINATION

PPARATUS & WET SAMPLE (g):	11815.0
APPARATUS WEIGHT (g):	4442.0
WET SAMPLE WEIGHT (g):	7373.0
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):	99.3
DRY DENSITY IN (pcf):	99.3

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):	86.59
AVERAGE TEMP (°C):	23.0
TEMPERATURE CORRECTION:	0.931
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

K VALUE CORRECTED FOR 20 DEGREES C = 1.3E+00 cm/sec

NOTE: ASTM modified due to the large particles size
Due to the limitation of our laboratory equipment the permeability may be faster.

TECH	TJ
DATE	2/20/2003
CHECK	BK
REVIEW	PWM

000162

GEOSYNTEC CONSULTANTS

FLUOR FERNALD 5369

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 62134 TASK NO.: 04.1

DESCRIPTION: Phase II DATE: 03 day March month 2003 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: CDL 03-7

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		SB	X
WT. OF DRY SAMPLE PLUS TARE	(grams)	3319.6	3938.6
WT. OF TARE	(grams)	285.6	939.0
WT. OF DRY SAMPLE	(grams)	3034.0	2999.6

SIEVE ANALYSIS

QA ID: CHW

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	
1"	25.00	0	0	100	
3/4"	19.00	0	0	100	100
1/2"	12.50	131.2	4.3	95.7	85 To 100
3/8"	9.50	684.9	22.6	77.4	40 To 75
#4	4.75	2392.4	78.9	21.1	5 To 25
#8	2.36	2940.2	96.9	3.1	0 To 10
#16	1.18	2987.8	98.5	1.5	0 To 5
#30	0.60	2992.5	98.6	1.4	
#50	0.30	2994.3	98.7	1.3	
#100	0.15	2996.0	98.7	1.3	
#200	0.075	2999.0	98.8	1.2	0 To 20
PAN		2999.4			

000163

%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 V

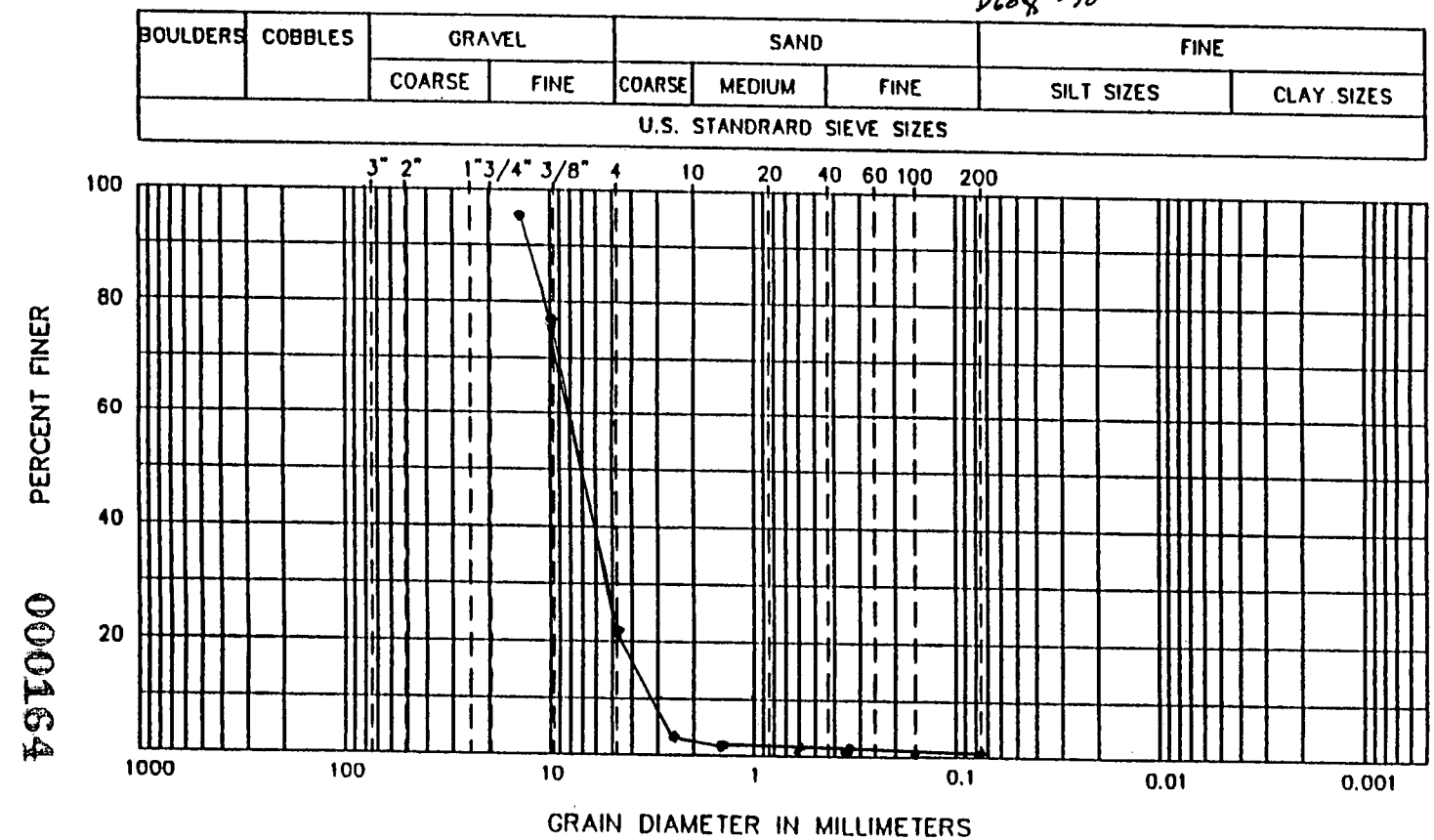
MATERIAL TYPE: 78 Stone

PROJECT NO. 6Q1341 TASK NO.: 041

DATE: 24 day April month 2003 year

SAMPLE NO.: CD2 Ø3-2 QA ID: DLE

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{8}{3.3} = 2.42$ $(C_c)\ \frac{D_{30}^2}{D_{60} \times D_{10}} = \frac{5.2}{26.4} = \frac{27.0}{26.4} = 1.02$



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.	95.7
3/8-in.	77.4
NO. 4	21.1
NO. 8	3.1
NO. 16	1.5
NO. 30	1.4
NO. 50	1.3
NO. 100	1.3
NO. 200	1.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	5
	3
	6
	9

SOIL CLASSIFICATION (ASTM D 2487): Poorly Graded Gravel GP

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: [illegible]

SHEET NO. 2 OF 2

000164

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	CDL-03-7 -
PROJECT NUMBER	033-3486	SAMPLE TYPE	Bulk
REMARKS	-	SAMPLE DEPTH	-

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1	45.43	5650	21.0	124.37	*
2	45.45	5650	21.0	124.31	*
3	45.30	5650	21.0	124.72	*

INITIAL UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	12251.0
APPARATUS WEIGHT (g):	4443.0
WET SAMPLE WEIGHT (g):	7808.0
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):	105.2
DRY DENSITY IN (pcf):	105.2

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):	124.47
AVERAGE TEMP (°C):	21.0
TEMPERATURE CORRECTION:	0.976
HEAD OF WATER (in):	3.3
HYDRAULIC GRADIENT (i):	0.33

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 2.0E+00 cm/sec

NOTE: ASTM modified due to the large particles size
Due to the limitation of our laboratory equipment the permeability may be faster.

TECH	TJ
DATE	3/5/2003
CHECK	BSS
REVIEW	[illegible]

000165

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5369

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ1341 TASK NO.: D4.1

DESCRIPTION: Phase IV DATE: 21 day March month 2003 year

MATERIAL TYPE: 78 Stone SAMPLE NO.: CDL03-8

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		N	N
WT. OF DRY SAMPLE PLUS TARE	(grams)	1743.6	1679.3
WT. OF TARE	(grams)	101.7	101.7
WT. OF DRY SAMPLE	(grams)	1641.9	1577.6

SIEVE ANALYSIS

QA ID: CHen

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	↕
1"	25.00	0	0	100	↕
3/4"	19.00	0	0	100	100
1/2"	12.50	79.7	4.9	95.1	85 To 100
3/8"	9.50	500.1	30.5	69.5	40 To 75
#4	4.75	1304.2	79.4	20.6	5 To 25
#8	2.36	1511.4	92.1	7.9	0 To 10
#16	1.18	1539.9	93.8	6.2	0 To 5
#30	0.60	1547.7	94.3	5.7	↕
#50	0.30	1553.3	94.6	5.4	↕
#100	0.15	1560.7	95.1	4.9	↕
#200	0.075	1573.0	95.8	4.2	0 To 2.0
PAN		1576.3			

000166

%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 II

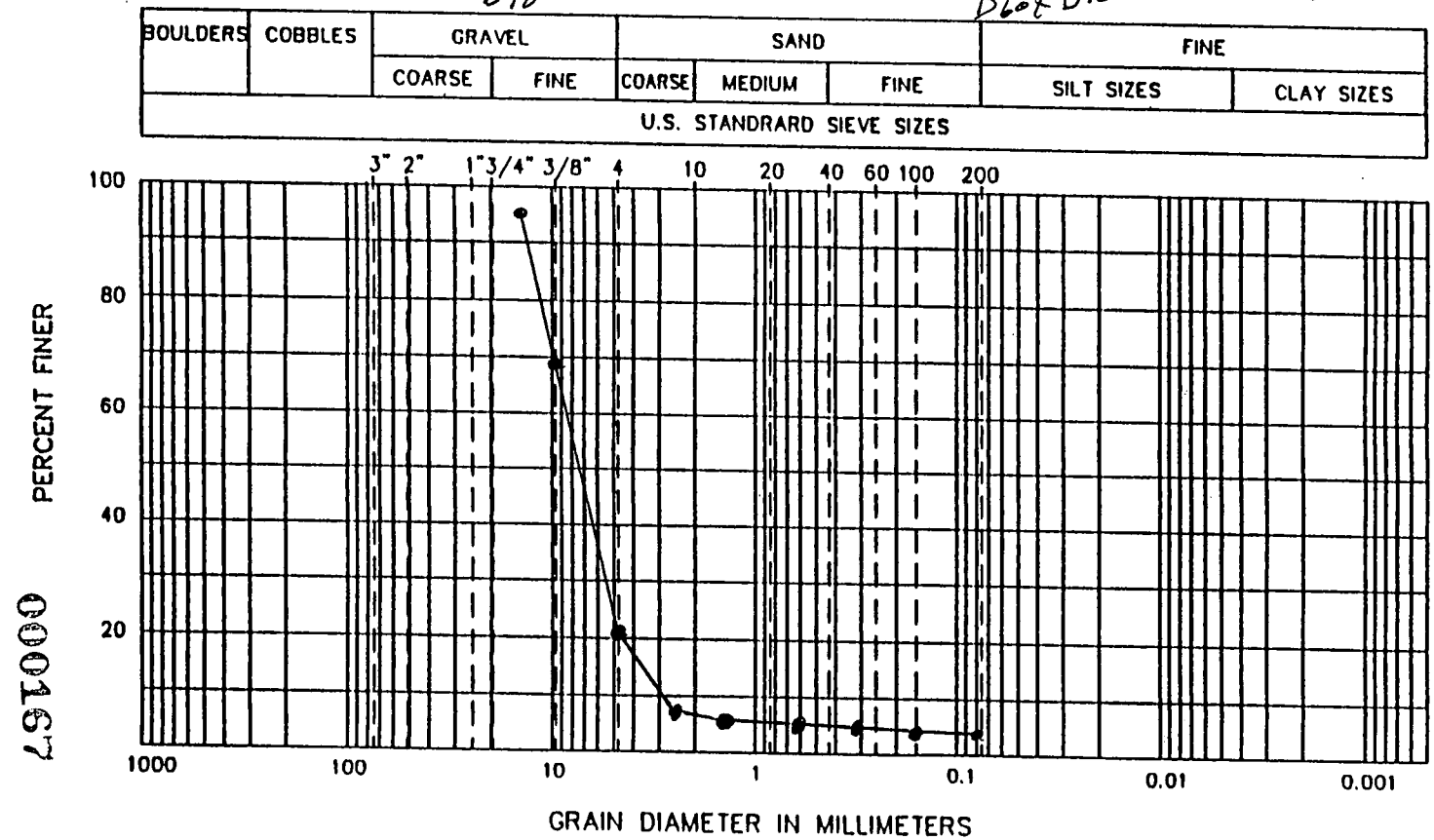
MATERIAL TYPE: 7 & 8 Stone

PROJECT NO. GR1341 TASK NO.: 04.1

DATE: 24 day April month 2003 year

SAMPLE NO.: CD4 Ø3-8 QA ID: D2F

CURVE COEFFICIENTS: $(C_u)\ \frac{D60}{D10} = \frac{8.5}{3} = 2.83$ $(C_c)\ \frac{D30^2}{D60 \times D10} = \frac{30.25}{25.5} = 1.19$



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.	95.1
3/8-in.	69.5
NO. 4	20.6
NO. 8	7.9
NO. 16	6.2
NO. 30	5.7
NO. 50	5.4
NO. 100	4.9
NO. 200	4.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): Poorly Graded Gravel GP

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: CH

SHEET NO. 2 OF 2

000157

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	CDL-03-8	-
PROJECT NUMBER	033-3486	SAMPLE TYPE	Bulk	
REMARKS	-	SAMPLE DEPTH	-	

	TIME IN SECONDS	VOLUME (ml)	TEMP. °C	Q (ml/sec)	
1.	143.10	5650	23.0	39.48	
2.	143.18	5650	23.0	39.46	*
3.	143.69	5650	23.0	39.32	*
4.	143.27	5650	23.0	39.44	*

INITIAL UNIT WEIGHT DETERMINATION

PPARATUS & WET SAMPLE (g):	7938.0
APPARATUS WEIGHT (g):	3716.0
WET SAMPLE WEIGHT (g):	4222.0
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):	106.7
DRY DENSITY IN (pcf):	106.7

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):	39.41
AVERAGE TEMP (°C):	23.0
TEMPERATURE CORRECTION:	0.931
HEAD OF WATER (in):	5.7
HYDRAULIC GRADIENT (i):	0.48

$K_{\text{VALUE CORRECTED FOR 20 DEGREES C}}$ = 9.5E-01 cm/sec

NOTE: ASTM modified due to the large particles size
Due to the limitation of our laboratory equipment the permeability may be faster.

TECH	TJ
DATE	3/27/2003
CHECK	BK
REVIEW	[illegible]

000168

CARBONATE CONTENT- AGGREGATES
ASTM D 3042

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA
PROJECT NUMBER	033-3486
REMARKS	

SAMPLE ID	CDL 03-1	CDL 03-2	CDL 03-4
Date	1/15/03	1/18/2003	1/27/2003
Tested by	TJ	DA	TJ
Checked by			
Reviewed by			
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.04	0.11	0.20
2	0.04	0.07	0.24
3	0.04	0.07	0.30
AVERAGE	0.04	0.08	0.25

SAMPLE ID	CDL 03-5	CDL 03-6	CDL 03-7
Date	2/5/2003	2/20/2003	3/5/2003
Tested by	TJ	TJ	TJ
Checked by			BK
Reviewed by			PWN
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.08	0.04	0.05
2	0.06	0.05	0.06
3	0.06	0.06	0.07
AVERAGE	0.07	0.05	0.06

000169

NO. 57 STONE

SUPPLIER'S CERTIFICATIONS

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02710-001	REV.: 0	DATE: 04/22/03	Page 1 of 2

FROM:
Welch Sand & Gravel, Inc.
10217 Columbia Street
Harrison, OH 45030-9751
SIGNATURE: [signature]

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

RECEIVED BY: Teresa Schwab DATE: 4/22/03

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	PHV-02710-001B	0						X			Source of granular drainage corridor material (#57 stone)		X		02710-1.04	Y		

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: 5/1/03

(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

001012

5369

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

5369

WELCH

SAND & GRAVEL, INC.
10217 COLUMBIA STREET, HARRISON, OHIO 45030-9751

PHONE (513) 353-3220
FAX (513) 353-3225

April 21, 2003

Fluor Daniel Fernald
P.O. box 538704
Cincinnati, OH 45253

Attn: Chuck VanArsdale

Dear Chuck:

Please be advised that Welch Sand & Gravel is supplying 2,530 tons of #57 gravel for Fernald Project, P.O. #03FF0584.

This #57 has been tested in accordance with ASTMC136, ASTMD 2434, ASTMD2487 and ASTMD3042 procedures and meets the gradation analysis enclosed for #57 gravel. The material will be supplied from our Ross Plant location. All certification test results are included.

Sincerely,

Gene Gillespie
Mgr., Aggregate Sales

Enclosure

76896

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: _____ Date: 5/1/03

Doc. # PHV-D2710-001B

SUPPLIER DOCUMENT SUBMITTAL

DF PROJECT NO.: 201	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02710-002	REV.: 0	DATE: 04/22/03	Page 1 of 2

ROM:
Welch Sand & Gravel, Inc.
0217 Columbia Street
Harrison, OH 45030-9751
SIGNATURE: [signature]

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

RECEIVED BY: Teresa Schwab DATE: 4/22/03

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	PHV-02710-002B	0						X			Test results on #57 granular drainage corridor material and a 50 lb representative sample		X		02710-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
MIKE GODBER	~~64~~	84			
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

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

000174

ORIGINAL

RECEIVED BY: [signature] DATE: 5/1/03

(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)

5369

5369

ON-SITE DISPOSAL FACILITY
PHASE V

Welch Sand & Gravel
10217 Columbia Street
Harrison, OH 45030-9751

Submittal No. 20105-PHV-02710-002
Revision 0, 4/22/03

Document No. PHV-02710-002B
Revision 0

Title/Description: 50-lb representative sample of #57 granular corridor drainage material for Cell 6 activities
(Delivered to GeoSyntec Consultants)

76896

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 5/1/03

000175

5369

ATC
ENGINEERING SERVICES OF OHIO L.P.
ENVIRONMENTAL, GEOTECHNICAL AND MATERIALS PROFESSIONALS

11121 Canal Road
Cincinnati, OH 45241-1861
(513) 771-2112
FAX (513) 782-6908

April 16, 2003

Mr. Gene Gillespie
Welch Sand & Gravel Inc.
10217 Columbia Street
Harrison, Ohio 45030

RE:
Welch Sand & Gravel
Ross, Ohio
ATC File Number 72.22652.0001

Dear Mr. Gillespie:

ATC Engineering Services of Ohio L.P. has completed the sieve analysis on the sample of ODOT Item #57 aggregate, taken from Welch Sand & Gravel, Ross, Ohio plant. This sample was taken from the on site stockpile as per ASTM Specifications. This sample was tested according to ASTM D 3042 (Standard Test Method for Insoluable Residue in Carbonate Aggregate). The results show that this sample has less than 1% Carbonate.

This sample was also tested according to ASTM D 2487 (Standard Classification of Soils for Engineering Purposes, Unified Soil Classification System). According to the gradation of this material, this sample classified as GP.

Please feel free to contact our office, at your convenience, with any questions you may have concerning this report.

Respectfully Submitted:

ATC Engineering Services of Ohio L.P.

Gene McVey
Project Manager

Thomas R. Baker
Construction Services Manager

5369

PROJECT: Laboratory Services

REPORT DATE: April 15, 2003
TOTAL PAGES: 2

Welch Sand & Gravel
c/o ATC Associates Inc.
11121 Canal Rd.
Cincinnati, Ohio 45241-1861

ATC PROJECT NO.: 72.22652.0001
ATC WORK ORDER NO.: 8048
FILE NUMBER: Cincinnati

SAMPLE RECEIVED: 04-09-03
SAMPLE DESCRIPTION:
#57 Gravel

Sieve Analysis of Fine & Coarse Aggregates (ASTM C 136) --

Sieve Size	Percent Finer	Specification
1 1/2" (37.5 mm)	100	100
1" (25.0 mm)	100	95 - 100
3/4" (19.0 mm)	87	——
1/2" (12.5 mm)	32	25 - 60
3/8" (9.5 mm)	6	——
#4 (4.75 mm)	2	0 - 10
#8 (2.36 mm)	1.3	0 - 5
#16 (1.18 mm)	1.1	——
#30 (0.600 mm)	0.9	——
#50 (0.300 mm)	0.6	——
#100 (0.150 mm)	0.4	——
#200 (0.075 mm)	0.3	0 - 2

Note: This material meets the specified gradation requirement.

000177

5369

ATC ASSOCIATES INC.
7988 Centerpoint Drive, Suite 10
Indianapolis, Indiana 46256-334
www.atc-enviro.cor
317.849.499
Fax 317.849.427

PROJECT: Laboratory Services

REPORT DATE: April 15, 2003
TOTAL PAGES: 2

Welch Sand & Gravel
c/o ATC Associates Inc.
11121 Canal Rd.
Cincinnati, Ohio 45241-1861

ATC PROJECT NO.: 72.22652.0001
ATC WORK ORDER NO.: 8048
FILE NUMBER: Cincinnati

SAMPLE RECEIVED: 04-09-03
SAMPLE DESCRIPTION:
#57 Gravel

LABORATORY HYDRAULIC CONDUCTIVITY TEST SUMMARY CONSTANT HEAD ASTM D2434				
TEST CHARACTERISTICS				
Boring No.:	-----			
Sample No.:	8048-1			
Depth (ft):	-----			
SAMPLE CHARACTERISTICS				
CHARACTERISTICS				
Length (cm)	30.5			
Diameter (cm)	10.2			
Dry Unit Weight (pcf)	98.0			
Moisture Content (%)	2.7			
SUMMARY OF FINAL FOUR MEASUREMENTS				
MEASUREMENT	1	2	3	4
Elapsed Time (sec)	29.2	30.5	30.1	29.4
Head (cm)	0.1	0.1	0.1	0.1
Flow Out Sample (cm^3)	900.00	900.00	900.00	900.00
Hydraulic Conductivity (cm/sec)	$1.2x10^2$	$1.1x10^2$	$1.1x10^2$	$1.2x10^2$
Average Hydraulic Conductivity (cm/sec)	$1.1x10^2$ (110 cm/sec)			
COMMENTS: Permeant: Tap Water Specification: 10 cm/sec minimum Note: This material meets the specified hydraulic conductivity requirement.				

Respectfully Submitted,
ATC Associates Inc.

Gordon L. Pickett
Laboratory Manager

Thomas J. Struewing, P.E.
Principal Engineer

copies: (2) Client

000178

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.:	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02710-003	REV.: 2	DATE: 10/9/03	Page 1 of 2

FROM:
Welch Sand & Gravel, Inc.
10217 Columbia Street
Harrison, OH 45030-9751
SIGNATURE: Brumar 10/9/03

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: Teresa Schwab DATE: 10/13/03

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	PHV-02710-003B	1						X			Supplier's certification that granular drainage material meets material requirements of 02710 for additional 150 Tons, #57 gravel		X		02710-1.04A2	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
REINHARD FRISKE	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

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

000179

5369

RECEIVED BY: [signature] DATE: 10/16/03
(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

Submittal # 20105-PHV-02710-003 Rev. 2
Document # PHV-02710-003B
5369 Rev. 1

WELCH

SAND & GRAVEL, INC.
10217 COLUMBIA STREET, HARRISON, OHIO 45030 (513) 353-3220

OCTOBER 2003

FLUOR DANIEL FERNALD
P.O.BOX 538704
CINCINNATI, OHIO 45253

ATTN: Chuck VanArsdale

Dear Chuck:

Please be advised that Welch Sand & Gravel is supplyong 150 tons#57 gravel river run of gravel for Fernald Project, P.O. #

04FF0014-0000-000This #57 has been tested in accordance with ASTMC136,ASTMD2434,ASTMD2487 and ASTMD3042 procedures and meets the gradation analsis enclosed for #57 gravel. The material will be supplied from our Ross Plant from the same source as shipped in April 2003.

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: 10/16/03

INFORMATION ONLY

000180

CONFORMANCE TEST RESULTS

GEOSYNTEC CONSULTANTS

5369

FLUOR 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 V DATE: 11 day Apr month 2003 year

MATERIAL TYPE: 57 Stone SAMPLE NO.: GD03-1

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		Small Bowl #1	Small Bowl #1
WT. OF DRY SAMPLE PLUS TARE	(grams)	9.92 lbs 4499.7	9.77 lbs 4431.7
WT. OF TARE	(grams)	292.2	292.2
WT. OF DRY SAMPLE	(grams)	4207.5	4139.5

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	95 To 100
3/4"	19.00	753.7	17.9	82.1	
1/2"	12.50	3426.7	81.4	18.6	25 To 60
3/8"	9.50	4017.0	95.5	4.5	
#4	4.75	4086.8	97.1	2.9	0 To 10
#8	2.36	4096.3	97.4	2.6	0 To 5
#16	1.18	4105.4	97.6	2.4	
#30	0.60	4115.3	97.8	2.2	
#50	0.30	4129.6	98.1	1.9	
#100	0.15	4137.6	98.3	1.7	
#200	0.075	4139.0	98.4	1.6	0 To 2
PAN					

000182

%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

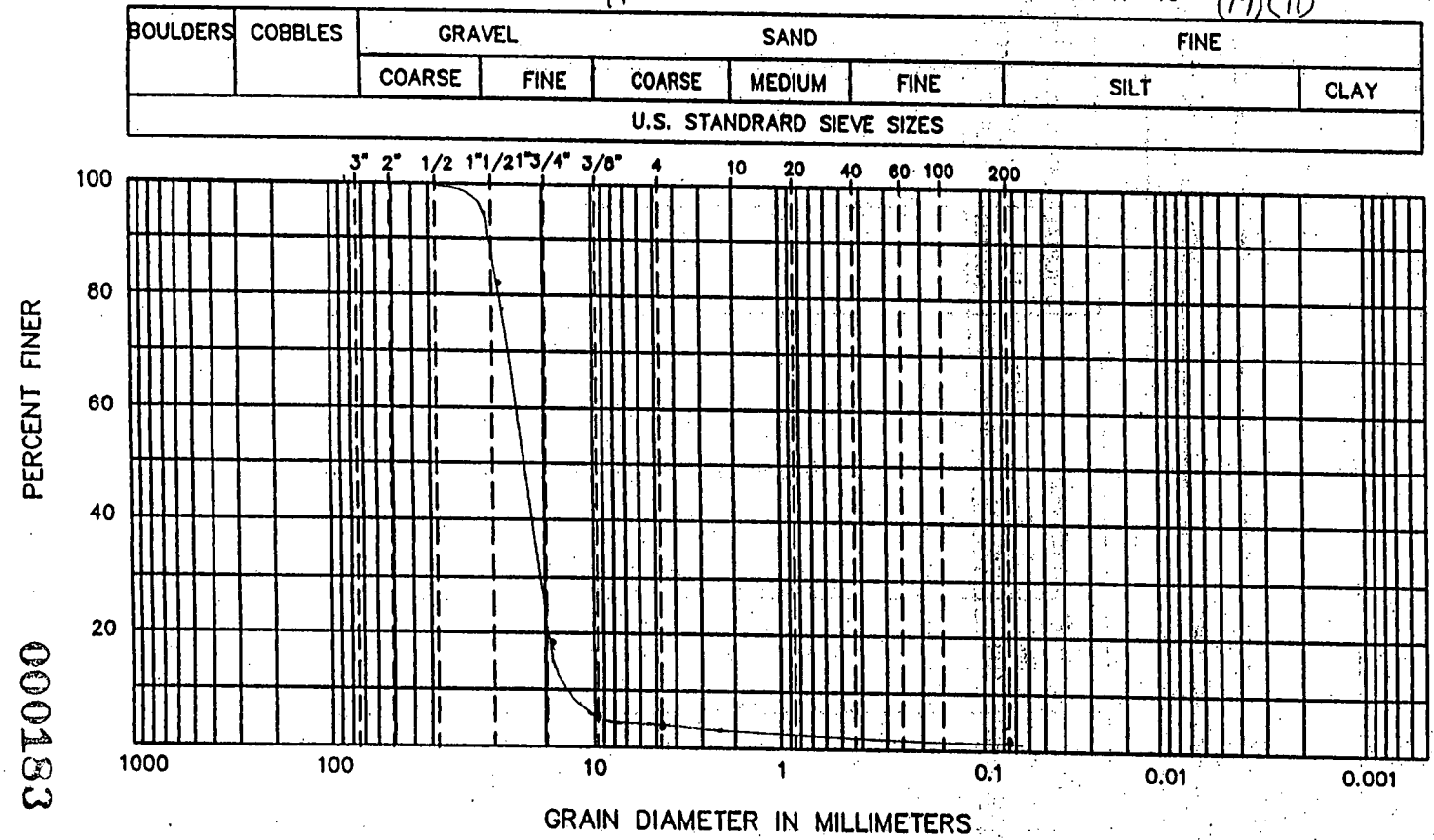
DESCRIPTION: Phase V

DATE: 11 day April month 2003 year

MATERIAL TYPE: 57 Stone / Granular Drainage Corridor

SAMPLE NO.: GQ03-1 QA ID: CL

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{17}{11} = 1.55$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{(13)^2}{(17)(11)} = 0.90$



ATTERBERG LIMITS

(LL) N/A

(PL)

(PI)

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	82.1
1/2-in.	18.6
3/8-in.	4.5
NO. 4	2.9
NO. 10	2.6
NO. 20.	2.4
NO. 40	2.2
NO. 60	1.9
NO. 100	1.7
NO. 200	1.6

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): GP - Poorly Graded Gravel

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

CHECKED BY: CL

SHEET NO. 2 OF 2

000183

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5369

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 V — DATE: 02 day May month 2003 year

MATERIAL TYPE: 57 Stone — SAMPLE NO.: GD03-2

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		Spl. He. Pan	LB's Small Bowl
WT. OF DRY SAMPLE PLUS TARE	(grams)	6958.2	12.93 5865.0
WT. OF TARE	(grams)	1324.5	285.6
WT. OF DRY SAMPLE	(grams)	5633.7	5579.4

SIEVE ANALYSIS

QA ID: KG DAC

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	95 To 100
3/4"	19.00	888.4	15.0	84.2	
1/2"	12.50	4128.0	73.3	26.7	25 To 60
3/8"	9.50	5275.4	93.6	6.4	
#4	4.75	5549.7	98.5	1.5	0 To 10
#8	2.36	5568.9	98.8	1.2	0 To 5
#16	1.18	5573.8	98.9	1.1	
#30	0.60	5576.7	99.0	1.0	
#50	0.30	5577.9	99.0	1.0	
#100	0.15	5578.5	99.0	1.0	
#200	0.075	5579.1	99.0	1.0	0 To 2
PAN					

000184

%FINER = 100 − Σ% RETAINED

©GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS

CHECKED BY: [illegible]

SHEET NO. 1 OF 1

GEOSYNTEC CONSULTANTS

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

DESCRIPTION: Phase V

MATERIAL TYPE: 57 Stone

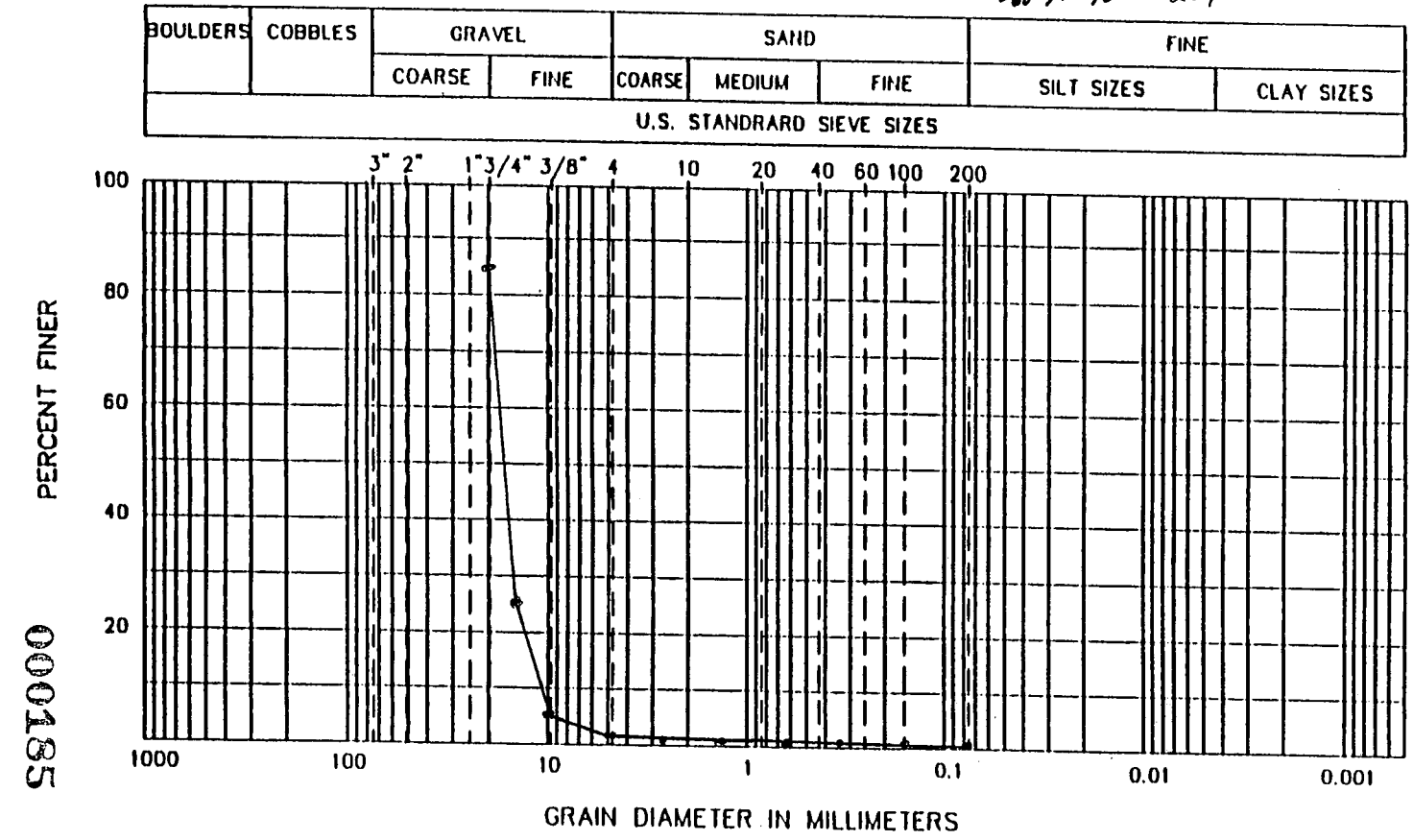
C-136

PROJECT NO. 6Q1341 TASK NO.: 04.1

DATE: 05 day May month 2003 year

SAMPLE NO.: GD 03.2 QA ID: DLE

CURVE COEFFICIENTS: $(C_u) = \left(\frac{D_{60}}{D_{10}}\right) = \frac{19}{11} = 1.73$ $(C_c) \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{17}{209} = \frac{238}{209} = 1.14$



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.	84.2
1/2-In.	26.7
3/8-In.	6.4
NO. 4	1.5
NO. 8	1.2
NO. 16	1.1
NO. 30	1.0
NO. 50	1.0
NO. 100	1.0
NO. 200	1.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): GP Poorly Graded Gravel

©GEOSYNTEC CONSULTANTS FILE NO. 2-18-PSD

CHECKED BY: [illegible]

SHEET NO. 2 OF 2

000185

000369

GeoTesting Express

5369

PERMEABILITY TEST - Constant Head
(ASTM D2434 - 68)

Project No GTX-G0448
Project Name Golder Large Diameter Perms
Location N/A
Sample No. GD03-2
Sample Depth N/A
Sample Description Gravel

Tested By HJ & SS
Test Date 5/29/03
Reviewed By JW
Review Date 5/29/03
Lab No. 10004

Sample Data

Length, in		Diameter, in		Pan No.	
Location 1	6.750	Location 1	13.000	Wet Soil + Pan, grams	23133.00
Location 2	6.750	Location 2	13.000	Dry Soil+Pan, grams	23133.00
Location3	6.750	Location 3	13.000	Pan Weight, grams	0.00
Average	6.750	Average	13.000	Moisture Content, %	0.0
		Sample wet weight, grams	23133.00	Wet Unit Wt, pcf	98.4
		Membrane, Cap weight, gram	0.00	Dry Unit Wt, pcf	98.4

Time (sec)	Q (cm³)	H (cm)	Temp °C	v (cm/sec)	k (cm/sec)	k (cm/sec) 20 °C	i (cm/cm)
13.03	3460.00	0.50	20.0	0.31	1.1E+01	1.1E+01	0.029
12.90	2160.00	0.20	20.0	0.20	1.7E+01	1.7E+01	0.012
12.83	1040.00	0.10	20.0	0.09	1.6E+01	1.6E+01	0.006

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 = 17.15 cm

Uncorrected k (cm/sec) = 1.2E+01

Permeability, k at 20 °C = **1.2E+01** cm/sec

000186

033-3486

GeoTesting Express

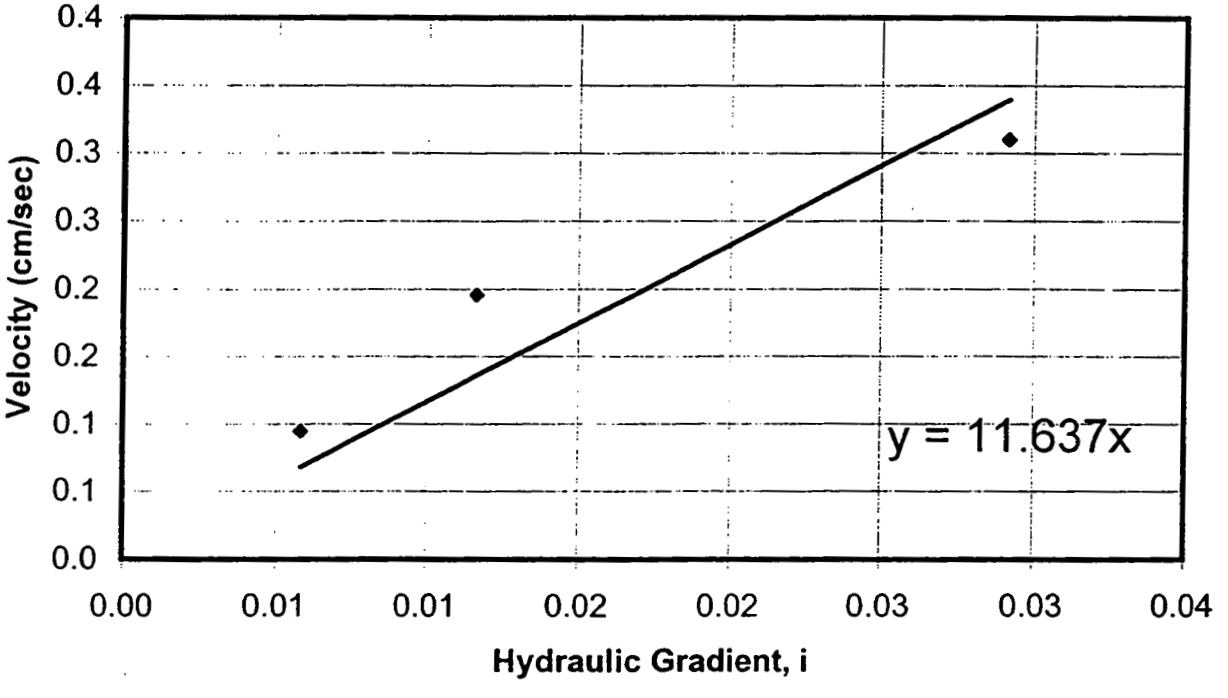
5369

HYDRAULIC CONDUCTIVITY

Project No.	*GTX-G0448*	Tested By	*HJ & SS*
Project Name	*Golder Large Diameter Perms*	Test Date	*5/29/03*
Boring No.	*N/A*	Reviewed By	*JW*
Sample No.	*GD03-2*	Review Date	*5/29/03*
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:	*98.4*
Dry Unit Weight, pcf:	*98.4*
Compaction, %:	*N/A*
Hydraulic Conductivity, cm/sec. @20° C:	***1.2E+01***



Remarks:

000187

GEOSYNTEC CONSULTANTS

FLUOR FERNALD 5369

ARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

OJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ3211 TASK NO.: 5

DESCRIPTION: Phase IV DATE: 18 day June month 2003 year

MATERIAL TYPE: 57 Stone SAMPLE NO.: GD03-3

SOIL SAMPLE SIZE

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

8.78 LBS	BEFORE WASH	8.10 LBS AFTER WASH
TARE NO.	SB-2	SB-2
WT. OF DRY SAMPLE PLUS TARE (grams)	3982.6	3909.8
WT. OF TARE (grams)	292.3	292.3
WT. OF DRY SAMPLE (grams)	3690.3	3617.5 ~~3608.7~~

SIEVE ANALYSIS

QA ID: PJE

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	35.6	.96	99.0	95 To 100
3/4"	19.00	777.3	21.1	78.9	—
1/2"	12.50	2586.1	70.1	29.9	25 To 60
3/8"	9.50	3221.2	87.3	12.7	—
#4	4.75	3596.9	97.5	2.5	Ø To 10
#8	2.36	3605.0	97.7	2.3	Ø To 5
#16	1.10	3607.9	97.8	2.2	—
#30	0.60	3609.4	97.8	2.2	—
#50	0.30	3611.0	97.9	2.1	—
#100	0.15	3613.1	97.9	2.1	—
#200	0.075	3615.8	98.0	2.0	Ø To 2
PAN		3616.9			

000188

%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 V

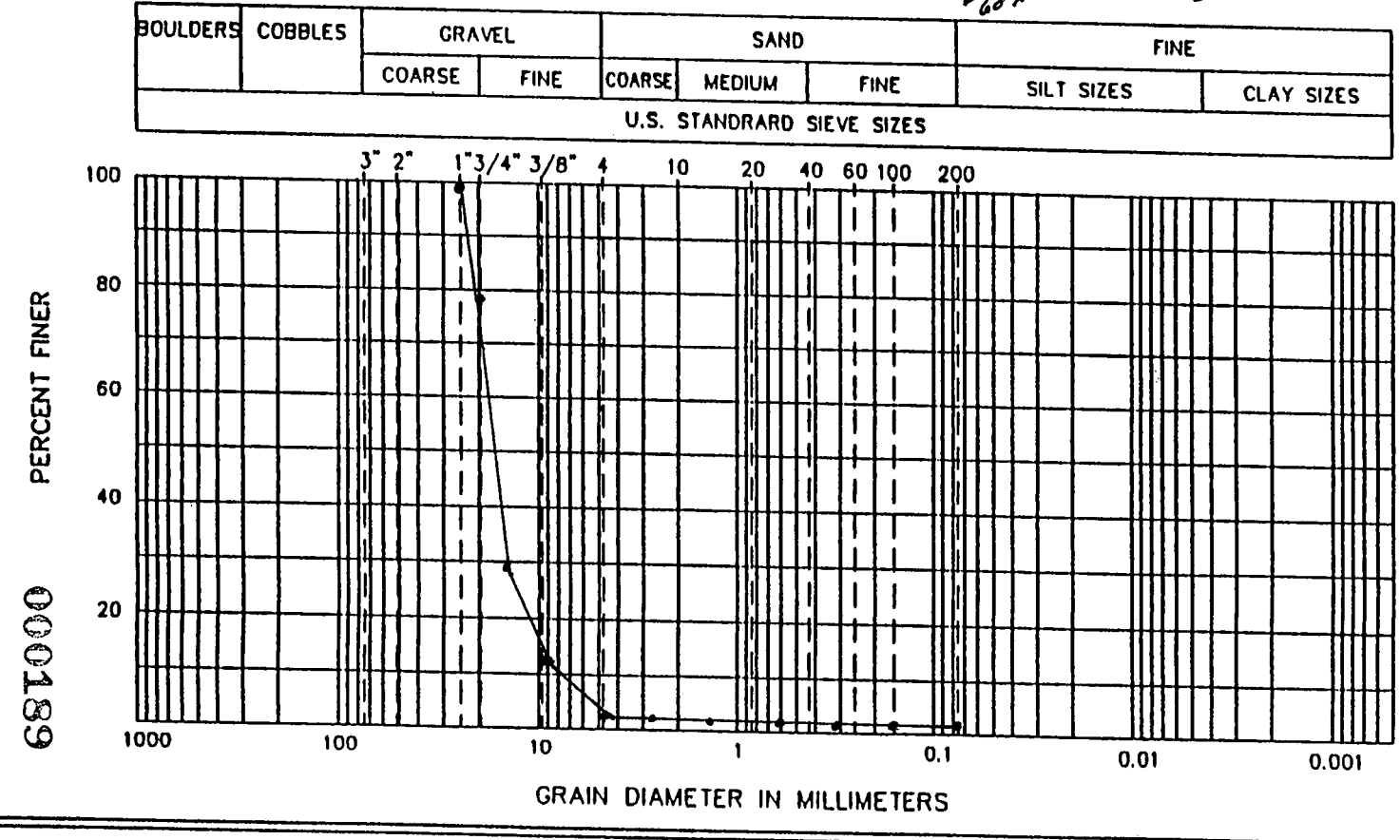
MATERIAL TYPE: 57 Stone

PROJECT NO.: GQ3211 TASK NO.: 3

DATE: 20 day June month 2003 year

SAMPLE NO.: GD03-3 QA ID: DLE

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{20}{8} = 2.5$ $(C_c)\ \frac{D_{30}^2}{D_{60} \times D_{10}} = \frac{16^2 = 256}{800} = .43$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.0
3/4-in.	78.9
1/2-in.	29.9
3/8-in.	12.7
NO. 4	2.5
NO. 8	2.3
NO. 16	2.2
NO. 30	2.2
NO. 50	2.1
NO. 100	2.1
NO. 200	2.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): GP- Poorly Graded Gravel w/ Sand

©GEOSYNTEC CONSULTANTS FILE NO. 2-18-PSD CHECKED BY

000189

5369

GeoTesting Express

5369

PERMEABILITY TEST - Constant Head
(ASTM D2434 - 68)

Project No. GTX-G0458
Project Name Golder
Location GD03-3
Sample No.
Sample Depth N/A
Sample Description Gravel

Tested By HJ
Test Date July 2,2003
Reviewed By SS
Review Date July 2,2003
Lab No.

Sample Data

Length, in		Diameter, in		Pan No.	
Location 1	6.750	Location 1	13.000	Wet Soil + Pan, grams	23587.00
Location 2	6.750	Location 2	13.000	Dry Soil+Pan, grams	23587.00
Location3	6.750	Location 3	13.000	Pan Weight, grams	0.00
Average	6.750	Average	13.000	Moisture Content, %	0.0
		Sample wet weight, grams	23587.00	Wet Unit Wt, pcf	100.3
		Membrane, Cap weight, gram	0.00	Dry Unit Wt, pcf	100.3

Time (sec)	Q (cm³)	H (cm)	Temp °C	v (cm/sec)	k (cm/sec)	k (cm/sec) 20 °C	i (cm/cm)
14.78	5180.00	0.30	21.5	0.41	2.3E+01	2.3E+01	0.02
15.44	3220.00	0.20	21.5	0.24	2.1E+01	2.0E+01	0.01
15.10	800.00	0.05	21.5	0.06	2.1E+01	2.1E+01	0.00

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 = 17.15 cm

Uncorrected k (cm/sec) = 2.3E+01

Permeability, k at 20 °C = **2.2E+01** cm/sec

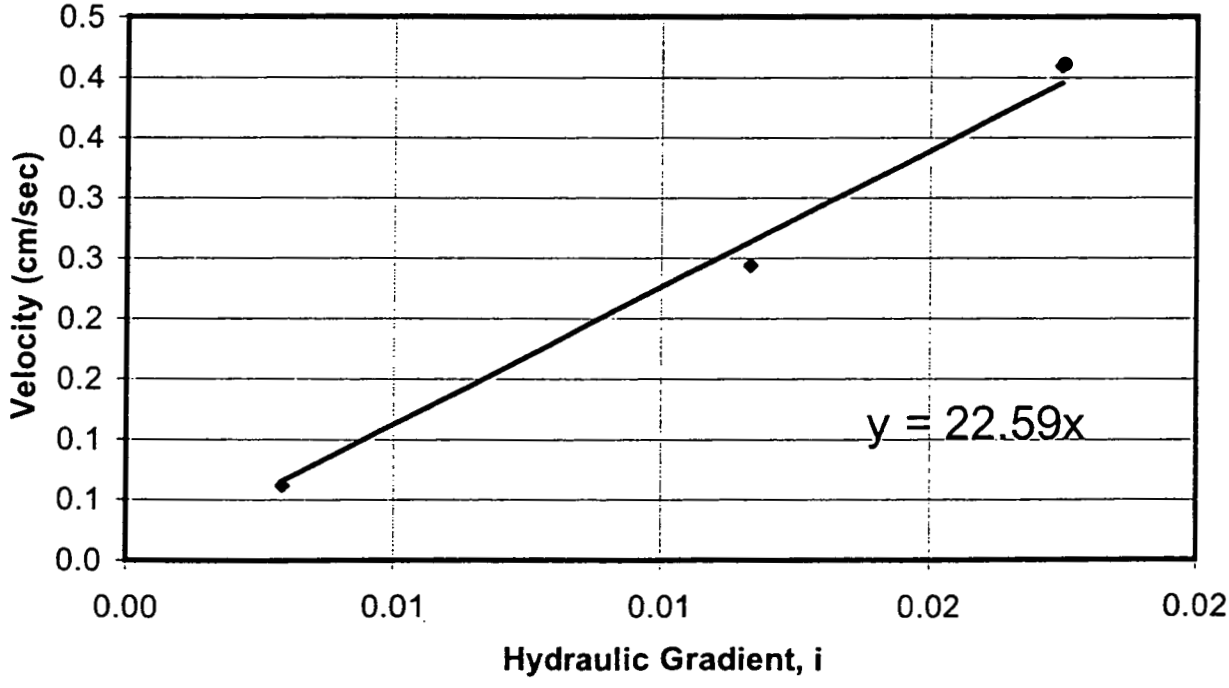
GeoTesting Express

HYDRAULIC CONDUCTIVITY

Project No.	*GTX-G0458*	Tested By	*HJ*
Project Name	*Golder*	Test Date	*July 1,2003*
Boring No.	*GD03-3*	Reviewed By	*SS*
Sample No.		Review Date	*July 1,2003*
Sample Depth	*N/A*	Lab No.	**10048**
Sample Description	*Gravel*		

ASTM D2434-68 Constant Head Permeability

Sample Type:	*Bag*
Sample Orientation:	*Vertical*
Initial Water Content, %:	*0.0*
Wet Unit Weight, pcf:	*100.3*
Dry Unit Weight, pcf:	*100.3*
Compaction, %:	*N/A*
Hydraulic Conductivity, cm/sec. @20° C:	***2.2E+01***



GEOSYNTEC CONSULTANTS

FLUOR FERNALD 5369

ARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

OJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ3211 TASK NO.: 3

DESCRIPTION: Phase V DATE: 10 day Oct month 2003 year

MATERIAL TYPE: 57 Stone SAMPLE NO.: GD03-4

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		SB3	SB3
WT. OF DRY SAMPLE PLUS TARE	(grams)	4889.8	4835.4
WT. OF TARE	(grams)	291.4	291.4
WT. OF DRY SAMPLE	(grams)	4598.4	4544.0

SIEVE ANALYSIS

QA ID: CHW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	0	0	100	
1½"	37.50	0	0	100	100
1"	25.00	25.1	0.5	~~100~~ CHW 99.5	95-100
3/4"	19.00	708.9	15.4	84.6	
1/2"	12.50	2795.8	60.8	39.2	25-60
3/8"	9.50	3856.7	83.9	16.1	
#4	4.75	4437.2	96.5	3.5	0-10
#8	2.36	4472.1	97.3	2.7	0-5
#16	1.18	4486.5	97.6	2.4	
#30	0.60	4496.4	97.8	2.2	
#50	0.30	4507.4	98.0	2.0	
#100	0.15	4514.5	98.2	1.8	
#200	0.075	4520.8	98.3	1.7	0-2
PAN		4523.4			

000192

%FINER = 100 − Σ% RETAINED

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CHECKED BY: CA

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.: GQ3211 TASK NO.: 3

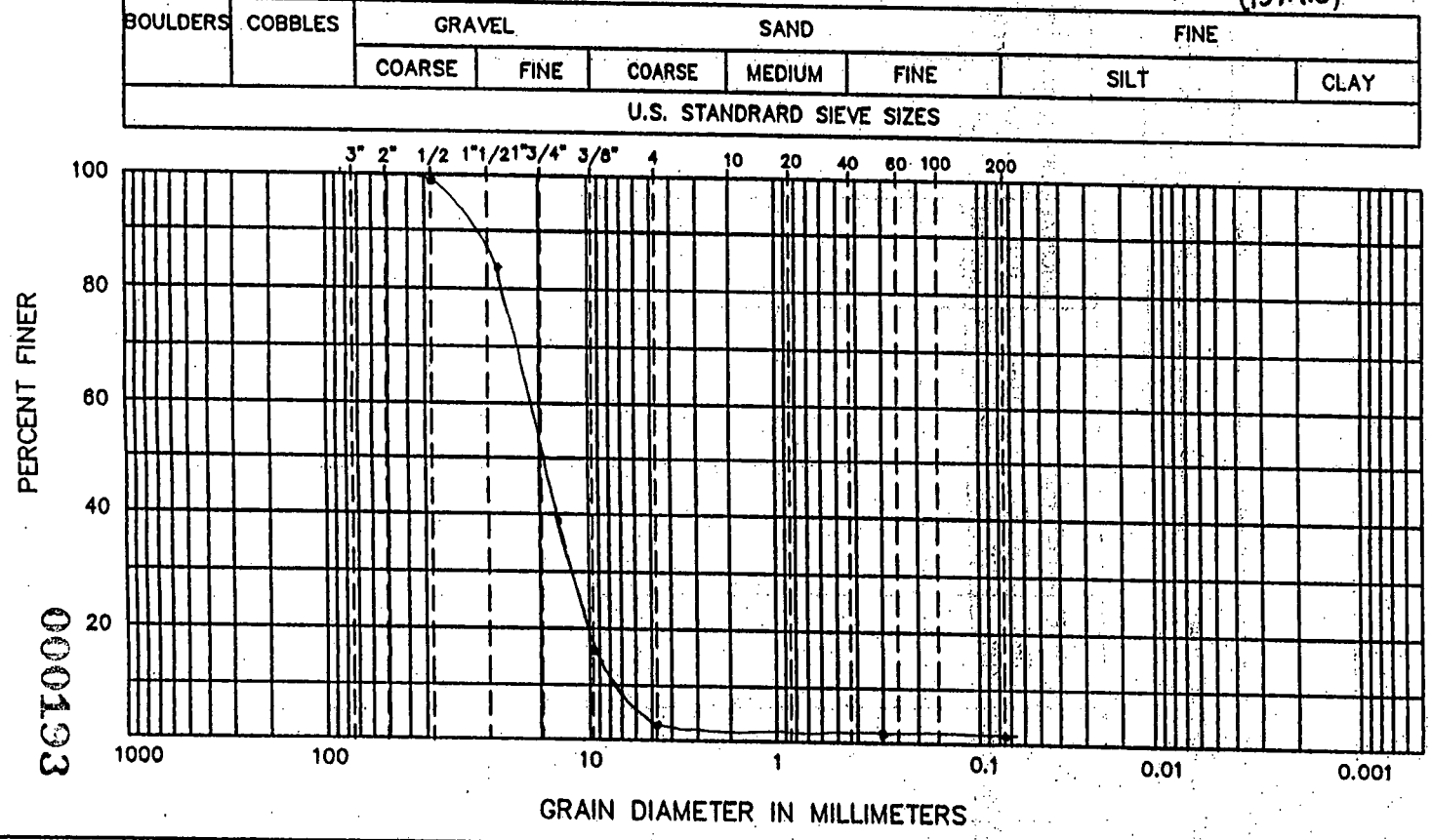
DESCRIPTION: Phase V

DATE: 10 day Oct month 2004 year

MATERIAL TYPE: 57 Stone

SAMPLE NO.: GB03-4 QA ID: CF

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{15}{7.6} = 1.97$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{(11.5)^2}{(15 \times 7.6)} = 1.16$



ATTERBERG LIMITS

(LL) —

(PL) —

(PI) —

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	99.5
3/4-in.	84.6
1/2-in.	39.2
3/8-in.	16.1
NO. 4	3.5
NO. 10	2.7
NO. 20.	2.4
NO. 40	2.2
NO. 60	2.0
NO. 100	1.8
NO. 200	1.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): GP Poorly Graded Gravel

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

CHECKED BY: CF

SHEET NO. 2 OF 2

0001193

5369

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5369

ARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ3211 TASK NO.: 3

DESCRIPTION: Phase V DATE: 20 day Nov month 2003 year

MATERIAL TYPE: 57 Stone SAMPLE NO.: ~~CFO~~ GD04 + 03-5

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		SB2	SB2
WT. OF DRY SAMPLE PLUS TARE	(grams)	7048.9	7012.7
WT. OF TARE	(grams)	292.3	292.3
WT. OF DRY SAMPLE	(grams)	6756.6	6720.4

SIEVE ANALYSIS

QA ID: GHW

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	140.1	2.1	97.9	95 to 100
¾"	19.00	989.9	14.7	85.3	
½"	12.50	3136.0	46.4	53.6	25 to 60
⅜"	9.50	5170.9	76.5	23.5	
#4	4.75	6645.4	98.4	1.6	0 to 10
#8	2.36	6698.9	99.1	0.9	0 to 5
#16	1.18	6710.1	99.3	0.7	
#30	0.60	6714.8	99.4	0.6	
#50	0.30	6718.3	99.4	0.6	
#100	0.15	6719.3	99.4	0.6	
#200	0.075	6719.9	99.5	0.5	0 to 2
PAN		6720.3			

000194

%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 V

MATERIAL TYPE: 57 Stone

PROJECT NO.: GQ3211 TASK NO.: 043

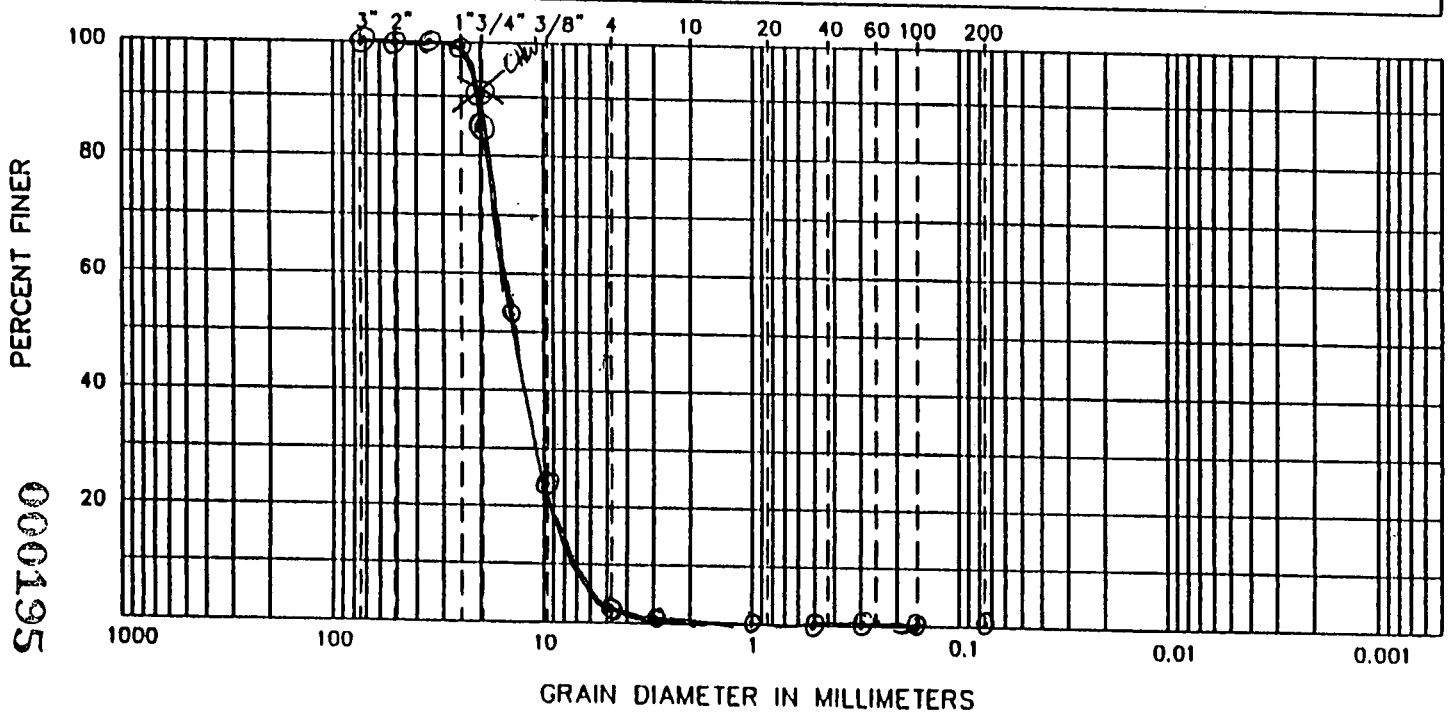
DATE: 21 day Nov month 2003 year

SAMPLE NO.: GD03-5 QA ID: CHW

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{16}{7.2} = 2.22$ ..... $(C_c)\ \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{11^2}{16 \times 7.2} = 1.05$

BOULDERS	COBBLES	GRAVEL		SAND			FINE	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

U.S. STANDRARD SIEVE SIZES



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	97.9
3/4-in.	85.3
1/2-in.	53.6
3/8-in.	23.5
NO. 4	1.6
NO. 8	0.9
NO. 16	0.7
NO. 30	0.6
NO. 50	0.6
NO. 100	0.6
NO. 200	0.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): GP Poorly Graded Gravel

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

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SHEET NO. 2 OF 2

000195

539

CARBONATE CONTENT- AGGREGATES
ASTM D 3042 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA
PROJECT NUMBER	033-3486
REMARKS	Used pH-4 acid

SAMPLE ID	GD 03-2	-	-
Date	5/24/2003	-	-
Tested by	TJ	-	-
Checked by			
Reviewed by			
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.07	-	-
2	0.08	-	-
3	0.07	-	-
AVERAGE	0.07	-	-

SAMPLE ID	-	-	-
Date	-	-	-
Tested by	-	-	-
Checked by			
Reviewed by			
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	-	-	-
2	-	-	-
3	-	-	-
AVERAGE	-	-	-

000196

CARBONATE CONTENT- AGGREGATES
ASTM D 3042 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA
PROJECT NUMBER	033-3486
REMARKS	Used pH-4 acid

SAMPLE ID	GD 03-2	-	-
Date	6/24/2003	-	-
Tested by	TJ	-	-
Checked by	BJS		
Reviewed by	PWM		
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.07	-	-
2	0.08	-	-
3	0.07	-	-
AVERAGE	0.07	-	-

SAMPLE ID	-	-	-
Date	-	-	-
Tested by	-	-	-
Checked by			
Reviewed by			
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	-	-	-
2	-	-	-
3	-	-	-
AVERAGE	-	-	-

000197

CARBONATE CONTENT- AGGREGATES
ASTM D 3042 - MODIFIED

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA
PROJECT NUMBER	033-3486
REMARKS	Used pH-4 acid

SAMPLE ID	GD 03-2	GM 03-02	GM 03-4
Date	5/24/2003	5/24/2003	5/24/2003
Tested by	TJ	TJ	TJ
Checked by			
Reviewed by			
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.07	0.06	0.06
2	0.08	0.06	0.06
3	0.07	0.07	0.06
AVERAGE	0.07	0.06	0.06

SAMPLE ID	GM 03-6	GD 03-3	-
Date	5/24/2003	6/23/2003	-
Tested by	TJ	TJ	-
Checked by			
Reviewed by			
SPECIMEN NUMBER	Carbonate Content %	Carbonate Content %	Carbonate Content %
1	0.07	0.03	-
2	0.06	0.05	-
3	0.12	0.02	-
AVERAGE	0.08	0.03	-

000198

BIOINTRUSION BARRIER MATERIAL

TYPE D RIPRAP

SUPPLIER'S CERTIFICATIONS

SUPPLIER DOCUMENT SUBMITTAL

OF PROJECT NO.: 20	CONTRACT NO: PHIV2	SUBMITTAL NO. 20104-PHIV2-02280-002	REV.: 0	DATE: 11/13/02	Page 1 of 2

FROM:
Hanson Aggregates

SIGNATURE: Chuck C. Van Arsdale 11/13/02

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

RECEIVED BY: Susan Schwab DATE: 11/13/02

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	PHIV2-02280-002A	0						X			Source of biointrusion barrier		~~X~~	X	02280-1.04A1	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)

ORIGINAL

60020292

5369

RECEIVED BY: Chuck C. Van Arsdale 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)

FS-E-4955
Rev. 3: 05/14/1999, CT-2.4.2

5369

Hanson

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

October 7, 2002

Mr. Chuck Van Arsdale – Mail Stop 64
Fluor Fernald, Inc.
P. O. Box 538704
Cincinnati, Ohio 45253-8704

Re: PURCHASE ORDER NO. 02FF1208, Type D DUMPED ROCK

Dear Chuck:

This letter is to certify that the Type D Rip Rap produced at both our Highland Quarry and our Eagle Quarry meets the material requirements for work at Fernald in accordance with Item 601.07 and 703.04(3) of the State of Ohio Department of Transportation, Construction and Material Specifications, Columbus, Ohio January 1, 2002.

We anticipate that we will ship approximately 1/3rd of the material from our Highland Quarry and 2/3rds of the total 65,000 ton from the Eagle quarry.

If anything further is required, let me know.

Yours truly,

Bob Backer

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

INFORMATION ONLY

[ ] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: _____ Date: 10/4/02

SUPPLIER DOCUMENT SUBMITTAL

OF PROJECT NO.: 20104	CONTRACT NO: PHIV2	SUBMITTAL NO. 20104-PHIV2--02280-001	Rev. 0	DATE: 11/13/02	Page 1 of 2

FROM:
Hanson Aggregates

SIGNATURE: Chuck C. VanArsdale 11/13/02

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

RECEIVED BY: Susan Schwab DATE: 11/13/02

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	PHIV2-02280-001A	0							X		Certification and test results from biointrusion barrier material		~~X~~	X	02280-1.04A2	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)

000204

5369

RECEIVED BY: [signature] DATE: 11/15/02

(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)

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

ORIGINAL

5369

Hanson

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

October 30, 2002

Mr. Chuck Van Arsdale
Fluor Danial Fernald
Mail Stop 64
P. O. Box 538704
Cincinnati, Ohio 45253-8704

Re: Certification of Type D to be furnished to you on P. 0. 02FF1208

Dear Chuck:

In accordance with our recent conversation about certification enclosed find two Bowser and Morner Laboratory Reports. They certify and give assurance that our Type D Rip Rap supplied from either the Highland Quarry or the Eagle Quarry meets your requirements for the On Site Disposal Facility at Fernald.

The original contract was to start shipments after January 1, 2003 but the field people and purchasing at Fernald has asked if we can start immediately. We would be glad to start the haul on the Type D right away.

If any thing else is required, let me know.

Yours truly,

Bob Backer

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

INFORMATION ONLY

Enclosures (2)

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 11/26/02

5369

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: Hanson Aggregates
Attn: Mr. Phil Young
1352 Overstake Road
Winchester, OH 45697

Date October 21, 2002
Report No. 011315
W.O. No. 126788
No of Pages: 1

Report On: Laboratory Determination of Specific Gravity and Absorption of No. 2 Crushed Limestone
Eagle Crushed Stone Plant

On October 15, 2002, one sample of No. 2 crushed limestone was submitted for laboratory analysis. Testing was performed as specified by the client and in accordance ASTM C 127, "Specific Gravity and Absorption of Coarse Aggregates".

Results are presented below:

Specific Gravity	
Bulk Dry:	2.694
Bulk SSD:	2.711
Apparent:	2.742
Absorption, %:	0.7

Should you have any questions, or if we may be of further service, please contact me at (937) 236-8805 extension 329.

Respectfully submitted,

BOWSER-MORNER, INC.

Scott D. Ruhkamp, Assistant Manager
Construction Materials and
Geotechnical Laboratories

SDR/jkk/cmb
011315
1-Client
1-File
1-Jim Elsea

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5369

BOWSER-MORNER, INC.

Delivery Address: 4518 Taylorsville Road • Dayton, Ohio 45424 Mailing Address: P. O. Box 51 • Dayton, Ohio 45401

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LABORATORY REPORT

Report To: Hanson Aggregates
Attn: Mr. Phil Young
1352 Overstake Road
Winchester, OH 45697

Date October 25, 2002
Report No. 011343
W.O. No. 126836
No of Pages: 1

Report On: Laboratory Determination of Specific Gravity and Absorption of No. 2 Crushed Limestone
Highland Stone Quarry

On October 21, 2002, one sample of No. 2 (Brassfield) crushed limestone was submitted for laboratory analysis. Testing was performed as specified by the client and in accordance ASTM C 127, "Specific Gravity and Absorption of Coarse Aggregates".

Results are presented below:

Specific Gravity	
Bulk Dry:	2.684
Bulk SSD:	2.699
Apparent:	2.725
Absorption, %:	0.6

Should you have any questions, or if we may be of further service, please contact me at (937) 236-8805 extension 329.

Respectfully submitted,

BOWSER-MORNER, INC.

Scott D. Ruhkamp, Assistant Manager
Construction Materials and
Geotechnical Laboratories

SDR/jkk/cmb
011343
1-Client
1-File
1-Jim Elsea

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CONFORMANCE TEST RESULTS

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

BULK SPECIFIC GRAVITY/ABSORPTION ASTM C-127

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Rip Rap

PROJECT NO. 641341 TASK NO.: 04.1

DATE: _____ day _____ month _____ year

SAMPLE NO.: RR 03-1

Specimen	1	2	3	4	5	6	7	8	9	10	(11)
Date Immersed in Water:	05 FEB 2003	→	→	→	→	→	→	→	→	→	
Time Immersed in Water:	24 hrs	→	→	→	→	→	→	→	→	→	
Date Weighed Wet:	06 FEB 2003	→	→	→	→	→	→	→	→	→	
Time Weighed Wet:	0836	0854	0858	0900	0902	0904	0906	0908	0911	0914	0917
A) Weight Wet (Lbs):	7.28	6.80	4.18	6.44	3.81	2.43	7.54	6.97	4.95	5.64	1.63
B) Weight in Water (Lbs):	4.50	4.24	2.61	4.07	2.37	1.50	4.72	4.36	3.08	3.55	1.01
Date Weighed Dry:	07 Feb 03	→	→	~~6.45~~	→	→	~~7.52~~	~~6.95~~	→	~~5.60~~	
Time Weighed Dry:	0830	→	→	→	→	→	→	→	→	→	
C) Dry Weight (Lbs):	7.22	6.73	4.14	6.43	3.80	2.41	7.52	6.95	4.93	5.60	1.62
Specific Gravity C/(A-B):	2.60	2.63	2.64	2.66	2.64	2.59	2.67	2.66	2.64	2.68	2.61
Absorption [(A-C)/C] %:	0.83	1.04	0.97	0.93	0.26	0.83	0.27	0.29	0.41	0.71	0.62

Average Specific Gravity: 2.64 Average Absorption: 0.65

Checked By: CL

Sheet No. 1 of 1

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

BULK SPECIFIC GRAVITY/ABSORPTION ASTM C-127

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Rip Rap

PROJECT NO. 6Q1341 TASK NO.: 04.1

DATE: 04 day Feb month 2003 year

SAMPLE NO.: RR03-2

Specimen	1	2	3	4	5	6	7	8	9	10
Date Immersed in Water:	30 JAN 2003	←							→	30 JAN 2003
Time Immersed in Water:	48+ hr	←							→	48+ hr
Date Weighed Wet:	3 Feb 03	←								3 Feb
Time Weighed Wet:	0850	0911	0903	0900	0907	08:55	08:58	08:59	08:58	08:56
A) Weight Wet (Lbs):	8.40	4.18	4.83	9.16	7.85	3.74	4.65	3.87	2.40	6.15
B) Weight in Water (Lbs):	5.23	2.57	3.00	5.72	4.90	2.32	2.87	2.39	1.48	3.82
Date Weighed Dry:	04 Feb 2003	04 Feb 2003	04 Feb 2003	04 Feb 2003	04 Feb 2003	04 Feb 2003	04 Feb 2003	04 Feb 2003	04 Feb 2003	04 Feb 2003
Time Weighed Dry:	0820	0817	0813	0824	0822	0821	0812	0814	0815	0822
C) Dry Weight (Lbs):	8.38	4.15	4.81	9.13	7.80	3.72	4.64	3.85	2.39	6.13
Specific Gravity C/(A-B):	2.64	2.58	2.63	2.65	2.64	2.62	2.61	2.60	2.60	2.63
Absorption [(A-C)/C] %:	0.23	0.72	0.42	0.33	0.64	0.54	0.22	0.52	0.42	0.33

Average Specific Gravity: 2.63 Average Absorption: 0.42

Checked By: CL

Sheet No. 1 of 1

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

BULK SPECIFIC GRAVITY/ABSORPTION ASTM C-127

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Rip Rap (Limestone)

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 14 day Feb month 03 year

SAMPLE NO.: RR 03-3

Specimen	1	2	3	4	5	6	7	8	9	10
Date Immersed in Water:	13 Feb	13 Feb	13 Feb	13 Feb	13 Feb	13 Feb	13 Feb	13 Feb	13 Feb	13 Feb
Time Immersed in Water:	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230
Date Weighed Wet:	14 Feb	14 Feb	14 Feb	14 Feb	14 Feb	14 Feb	14 Feb	14 Feb	14 Feb	14 Feb
Time Weighed Wet:	1250	1252	1254	1256	1258	1300	1302	1304	1306	1308
A) Weight Wet (Lbs):	4.91	2.66	1.60	4.81	8.51	7.29	5.16	4.36	1.70	5.52
B) Weight in Water (Lbs):	3.08	1.62	1.00	2.98	5.32	4.51	~~3.24~~ 3.21 CHW	2.72	1.03	3.44
Date Weighed Dry:	17 Feb	17 Feb	17 Feb	17 Feb	17 Feb	17 Feb	17 Feb	17 Feb	17 Feb	17 Feb
Time Weighed Dry:	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114
C) Dry Weight (Lbs): CHW	~~210.36~~ 4.86	2.65	1.60	4.80	8.47	7.26	5.14	4.35	1.69	5.50
Specific Gravity C/(A-B):	2.66	2.55	2.67	2.62	2.66	2.61	2.64	2.65	2.52	2.64
Absorption [(A-C)/C] %:	1.02	0.38	0	0.21	0.47	0.41	0.39	0.23	0.59 ~~0.41~~	0.36

Average Specific Gravity: 2.62 Average Absorption: 0.43

Checked By: [illegible]

Sheet No. 1 of 1

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

BULK SPECIFIC GRAVITY/ABSORPTION ASTM C-127

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Rip Rap

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 5 day March month 03 year

SAMPLE NO.: RR03-4

Specimen	1	2	3	4	5	6	7	8	9	10
Date Immersed in Water:	5 March	→	→	→	→	→	→	→	→	→
Time Immersed in Water:	1400	→	→	→	→	→	→	→	→	→
Date Weighed Wet:	7 March	→	→	→	→	→	→	→	→	→
Time Weighed Wet:	0810-0830	→	→	→	→	→	→	→	→	→
A) Weight Wet (Lbs):	4.37	7.81	3.91	3.81	2.15	3.40	2.94	2.59	3.57	8.77
B) Weight in Water (Lbs):	2.74	4.90	2.45	2.41	1.34	2.16	1.83	1.62	2.22	5.49
Date Weighed Dry:	7 March	→	→	→	→	→	→	→	→	→
Time Weighed Dry:	1400	→	→	→	→	→	→	→	→	→
C) Dry Weight (Lbs):	4.36	7.80	3.89	3.80	2.14	3.39	2.93	2.57	3.56	8.74
Specific Gravity C/(A-B):	2.67	2.68	2.66	2.71	2.64	2.73	2.64	2.65	2.64	2.66
Absorption [(A-C)/C] %:	0.2	0.1	0.5	0.3	0.5	0.6	0.3	0.8	0.3	0.3

Average Specific Gravity: 2.67 Average Absorption: 0.4

Checked By: [illegible]

Sheet No. 1 of 1

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

BULK SPECIFIC GRAVITY/ABSORPTION ASTM C-127

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Rip Rap

PROJECT NO. GQ1341 TASK NO.: 04-1

DATE: 17 day Mar month 2003 year

SAMPLE NO.: RR 03-5

Specimen	1	2	3	4	5	6	7	8	9	10
Date Immersed in Water:	17 Mar	17 Mar	17 Mar	17 Mar	17 Mar	17 Mar	17 Mar	17 Mar	17 Mar	17 Mar
Time Immersed in Water:	36 hr	36 hr	36 hr	36 hr	36 hr	36 hr	36 hr	36 hr	36 hr	36 hr
Date Weighed Wet:	19 Mar	19 Mar	19 Mar	19 Mar	19 Mar	19 Mar	19 Mar	19 Mar	19 Mar	19 Mar
Time Weighed Wet:	0940	0935	0920	0945	0952	0943	1006	1000	0955	1011
A) Weight Wet (Lbs):	3.46	5.06	4.35	3.17	4.13	2.99	3.53	5.81	6.09	3.99
B) Weight in Water (Lbs):	2.19	3.19	2.75	2.05	2.64	1.91	2.25	3.65	3.83	2.56
Date Weighed Dry:	20 Mar	20 Mar	20 Mar	20 Mar	20 Mar	20 Mar	20 Mar	20 Mar	20 Mar	20 Mar
Time Weighed Dry:	1418	1416	1422	1425	1422	1412	1414	1406	1420	1410
C) Dry Weight (Lbs):	3.44	5.04	4.31	3.16	4.12	2.98	3.52	5.76	6.07	3.94
Specific Gravity C/(A-B):	2.71	2.70	2.69	2.82	2.77	2.76	2.75	2.67	2.69	2.76
Absorption [(A-C)/C] %:	.58	.40	.93	.32	.24	.34	.28	.87	.33	1.27

Average Specific Gravity: 2.73 Average Absorption: 0.56

Checked By: [illegible]

Sheet No. 1 of 1

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

BULK SPECIFIC GRAVITY/ABSORPTION ASTM C-127

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase III

MATERIAL TYPE: Rip Rap

PROJECT NO.: 6Q134(TASK NO.: 04.1

DATE: 24 day Mar month 2003 year

SAMPLE NO.: RR03 6

Specimen	1	2	3	4	5	6	7	8	9	10
Date Immersed in Water:	21 Mar	21 Mar	21 Mar	21 Mar	21 Mar	21 Mar	21 Mar	21 Mar	21 Mar	21 Mar
Time Immersed in Water:	68 hr 11:30 AM	68 hr 11:30 AM	68 hr 1130 AM	68 hr 1130 AM	68 hr 1130 AM	68 hr 1130 AM	68 hr 1130 AM	68 hr 1130 AM	68 hr 1130 AM	68 hr 1130 AM
Date Weighed Wet:	24 Mar	24 Mar	24 Mar	24 Mar	24 Mar	24 Mar	24 Mar	24 Mar	24 Mar	24 Mar
Time Weighed Wet:	0855	0901	0920	0935	0925	0916	0906	0930	0911	0943
A) Weight Wet (Lbs):	4.95	4.88	4.06	8.15	7.72	2.33	3.94	4.42	11.08	10.75
B) Weight in Water (Lbs):	3.10	3.06	2.57	5.17	4.90	1.50	2.42	2.87	6.95	6.77
Date Weighed Dry:	25 Mar	25 Mar	25 Mar	25 Mar	25 Mar	25 Mar	25 Mar	25 Mar	25 Mar	25 Mar
Time Weighed Dry:	0908	0912	0925	0941	0930	0910	0914	0910	0902	0935
C) Dry Weight (Lbs):	4.93	4.84	4.02	8.13	7.68	2.32	3.91	4.39	11.02	10.67
Specific Gravity C/(A-B):	2.66	2.66	2.70	2.73	2.72	2.80	2.57	2.83	2.67	2.68
Absorption [(A-C)/C] %:	0.41	0.83	1.00	0.25	0.52	0.43	0.77	0.68	0.54	0.75

Average Specific Gravity: 2.70

Average Absorption: 0.62

Checked By: CA

Sheet No. 1 of 1

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NO. 57 CHOKE STONE

SUPPLIER'S CERTIFICATIONS

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20[illegible]	CONTRACT NO: PHIV2	SUBMITTAL NO. 20104-PHIV2-02280-001	REV.: 1	DATE: 03/31/03	1 of 2

FROM:
Fluor Fernald

SIGNATURE: Bhumar 03/31/03

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

RECEIVED BY: Susan Schwab DATE: 3/31/03

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	PHIV2-02280-001B	0						X			Supplier Certification		X		2280	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)

5369

RECEIVED BY: [signature] DATE: 4/8/03

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

ORIGINAL

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)

ES-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

Doc# PHIV2-02280-001B

Martin Marietta Aggregates

MidAmerica Division & Southwest Ohio District
4770 Duke Drive, Suite 200
Mason, OH 45040
Telephone (513) 701-1140
Fax (513) 701-1149

5369

March 20, 2003

Mr. Chuck Van Arsdale
MS-64
P.O. Box 538704
Cincinnati, Ohio 45253-8704

Project Reference: Fluor Fernald, Angular Choke Stone (6,700 Tons)

Dear Chuck:

We herewith certify that the No. 57 Limestone produced at our Lynchburg, Ohio facility for the above referenced project conforms to Attachment 1, Page No.6, section "A. Choke Stone Material Requirements (#57 Stone)" and that section "B. Submittals" requirements have been met. The attached Bowser Morner, Inc. report indicates compliance with the specifications. Specifically, the material was tested in accordance with ASTM C136, ASTM C127, and meets the grading requirements of AASHTO M43. A fifty pound sample of the material will be delivered to your site in the next few days.

Very truly yours,

MARTIN MARIETTA AGGREGATES

James R. Martin

James R. Martin
Technical Project Coordinator

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: Chuck Van Arsdale Date: 4/8/03

INFORMATION ONLY

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. Jim Martin
3503 Belleview Road
Petersburg, Kentucky 41080

Date: March 14, 2003
Report No.: 011774
W.O. No.: 127757
No. of Pages: 2

Report On: Laboratory Analysis of One Crushed Limestone Sample - Lynchburg, Ohio

On March 11,.2003, one sample of No. 57 crushed limestone was submitted for selected laboratory analysis.

Testing was performed as specified by the client and in accordance with the following procedures:

ASTM C 127, "Specific Gravity and Absorption of Coarse Aggregate".

ASTM C 136, "Sieve Analysis of Fine and Coarse Aggregates".

Should you have any questions, or if we may be of further service, please contact me at (937) 236-8805, extension 329.

Respectfully submitted,
BOWSER-MORNER, INC.

Scott D. Ruhkamp

Scott D. Ruhkamp, Manager
Construction Materials and
Geotechnical Laboratories

SDR/jkk/cmb
011774
1-Client
1-File
1-Sam Feltner
Fairfield, OH

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1.) No. 57 Crushed Limestone

A. Sieve Analysis (ASTM C 136)

Sieve Size		Percent Passing	ASTM C 33 Specification, %
37.5 mm	(1 1/2")	**100**	100
25.0 mm	(1")	**100**	95-100
19.0 mm	(3/4")	**79**	---
12.5 mm	(1/2")	**28**	25-60
9.5 mm	(3/8")	**11**	---
4.75 mm	(#4)	**4**	0-10
2.36 mm	(#8)	**2**	0-5

B. Specific Gravity and Absorption (ASTM C 127)

Bulk Dry	**2.685**
Bulk SSD	**2.702**
Apparent	**2.733**
Absorption, %	**0.7**

CONFORMANCE TEST RESULTS

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5369

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO.: 041

DESCRIPTION: Phase V DATE: 26 day Mar month 2003 year

MATERIAL TYPE: 57 Stone SAMPLE NO.: CH 03-1

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
~~[illegible]~~ 1367 − 2.07 (grams)	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		X Big Pan	X Big Pan
WT. OF DRY SAMPLE PLUS TARE	(grams)	6200.7	6110.0
WT. OF TARE	(grams)	939.0	939.0
WT. OF DRY SAMPLE	(grams)	5261.7	5171.0

SIEVE ANALYSIS

QA ID: _____

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	95 To 100
¾"	19.00	1354.1	25.5	74.5	
½"	12.50	3835.3	72.9	27.1	25 To 60
⅜"	9.50	4601.5	87.5	12.5	
#4	4.75	5060.6	96.2	3.8	0 To 10
#8	2.36	5132.9	97.6	2.4	0 To 5
#16	1.18	5149.7	97.9	2.1	
#30	0.60	5158.2	98.0	2.0	
#50	0.30	5164.5	98.2	1.8	
#100	0.15	5169.9	98.3	1.7	
#200	0.075	5170.9	98.3	1.7	0 To 2
PAN		5171.0			

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%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

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. 6Q134 TASK NO.: 04

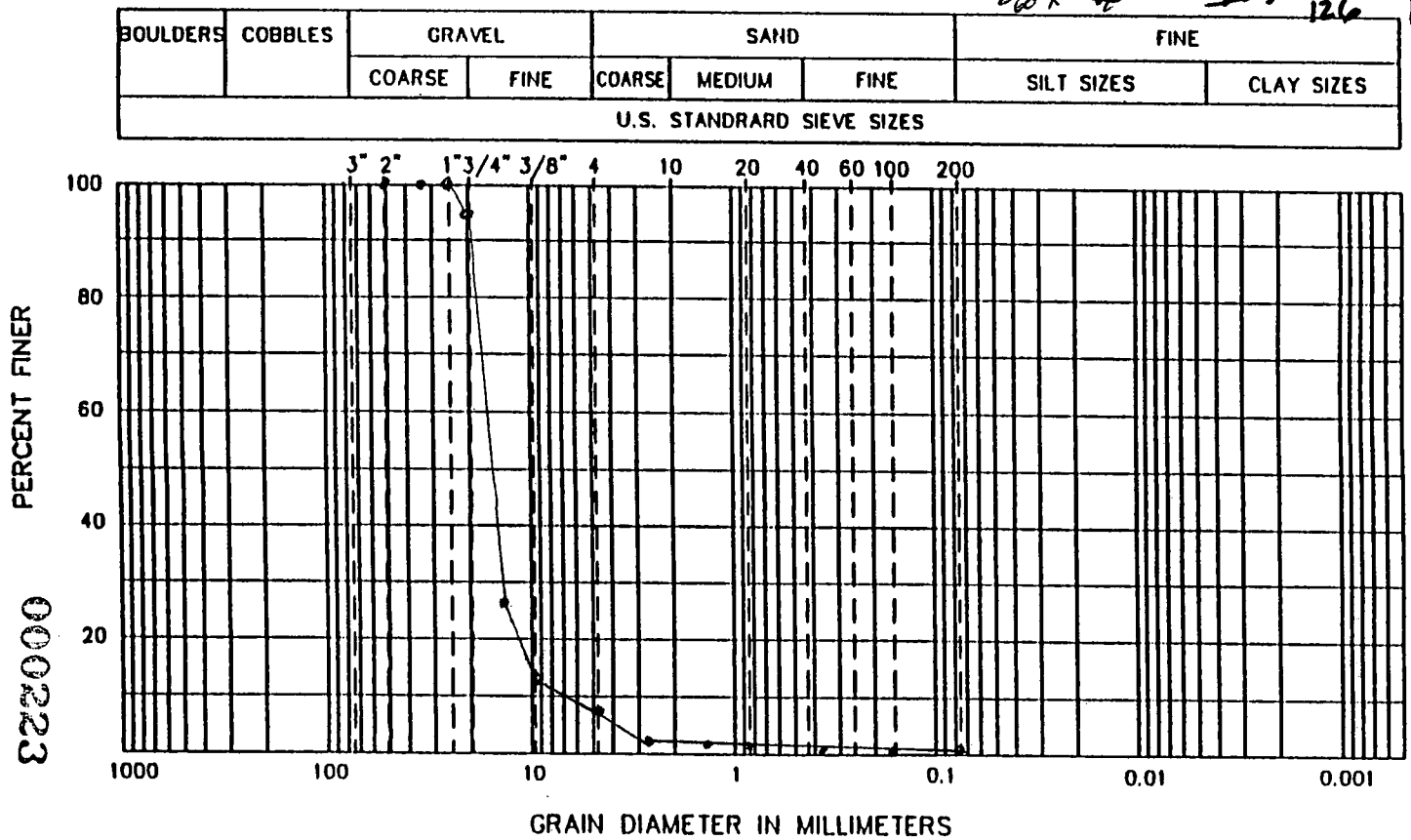
DESCRIPTION: Phase II

DATE: 02 day Apr month 2003 year

MATERIAL TYPE: 57 Stone

SAMPLE NO.: CH031 QA ID: ME

CURVE COEFFICIENTS: $(C_u) = \frac{D_{60}}{D_{10}} = \frac{18.0}{7} = 2.57$ (C_c) $\frac{D_{30}^3}{D_{60} \times D_{10}} = \frac{15.0}{105.0} = \frac{225}{126} = 1.79$



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.	74.5
1/2-In.	27.1
3/8-In.	12.5
NO. 4	3.8
NO. 8	2.4
NO. 16	2.1
NO. 30	2.0
NO. 50	1.8
NO. 100	1.7
NO. 200	1.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	51
	36
	9

SOIL CLASSIFICATION (ASTM D 2487): GP Poorly graded gravel.

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: CJ

SHEET NO. 2 OF 2

0002223

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

BULK SPECIFIC GRAVITY/ABSORPTION ASTM C-127

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase V

MATERIAL TYPE: 57 Stone

PROJECT NO. 62134 TASK NO.: 04.1

DATE: 26 day Mar month 2003 year

SAMPLE NO.: CH 03-1

Specimen	1	2	3	4	5	6	7	8	9	10
Date Immersed in Water:	03/28/03	←							→	03/28/03
Time Immersed in Water:	96+hr	←							→	96+hr
Date Weighed Wet:	02Apr 03	←							→	02Apr03
Time Weighed Wet:	1500									
A) Weight Wet (Lbs):	10.36									
B) Weight in Water (Lbs):	6.53									
Date Weighed Dry:	4Apr 03									
Time Weighed Dry:	0920									
C) Dry Weight (Lbs):	10.27									
Specific Gravity C/(A-B):	2.68									
Absorption [(A-C)/C] %:	0.88									

Average Specific Gravity: 2.68 Average Absorption: 0.88

Checked By: [illegible]

Sheet No. 1 of 1

0000224

5369

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5369

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 V DATE: 11 day Apr month 2003 year

MATERIAL TYPE: 57 Stone SAMPLE NO.: C1703-2

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		Small Bowl #2	Small Bowl #2
WT. OF DRY SAMPLE PLUS TARE	(grams)	10.32 Lbs 4708.4	10.20 Lbs 4626.7
WT. OF TARE	(grams)	296.3	296.3
WT. OF DRY SAMPLE	(grams)	4412.1	4330.4

SIEVE ANALYSIS

QA ID: DCE

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	95 To 100
¾"	19.00	1083.5	24.6	75.4	
½"	12.50	3505.1	79.4	20.6	25 To 60
⅜"	9.50	4147.6	94.0	6.0	
#4	4.75	4279.6	97.0	3.0	Ø To 10
#8	2.36	4300.7	97.5	2.5	Ø To 5
#16	1.18	4308.2	97.6	2.4	
#30	0.60	4313.7	97.8	2.2	
#50	0.30	4317.3	97.9	2.1	
#100	0.15	4322.4	98.0	2.0	
#200	0.075	4330.3	98.1	1.9	Ø to 2
PAN					

000225

%FINER = 100 − Σ% RETAINED

©GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS

CHECKED BY: CJ

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 V

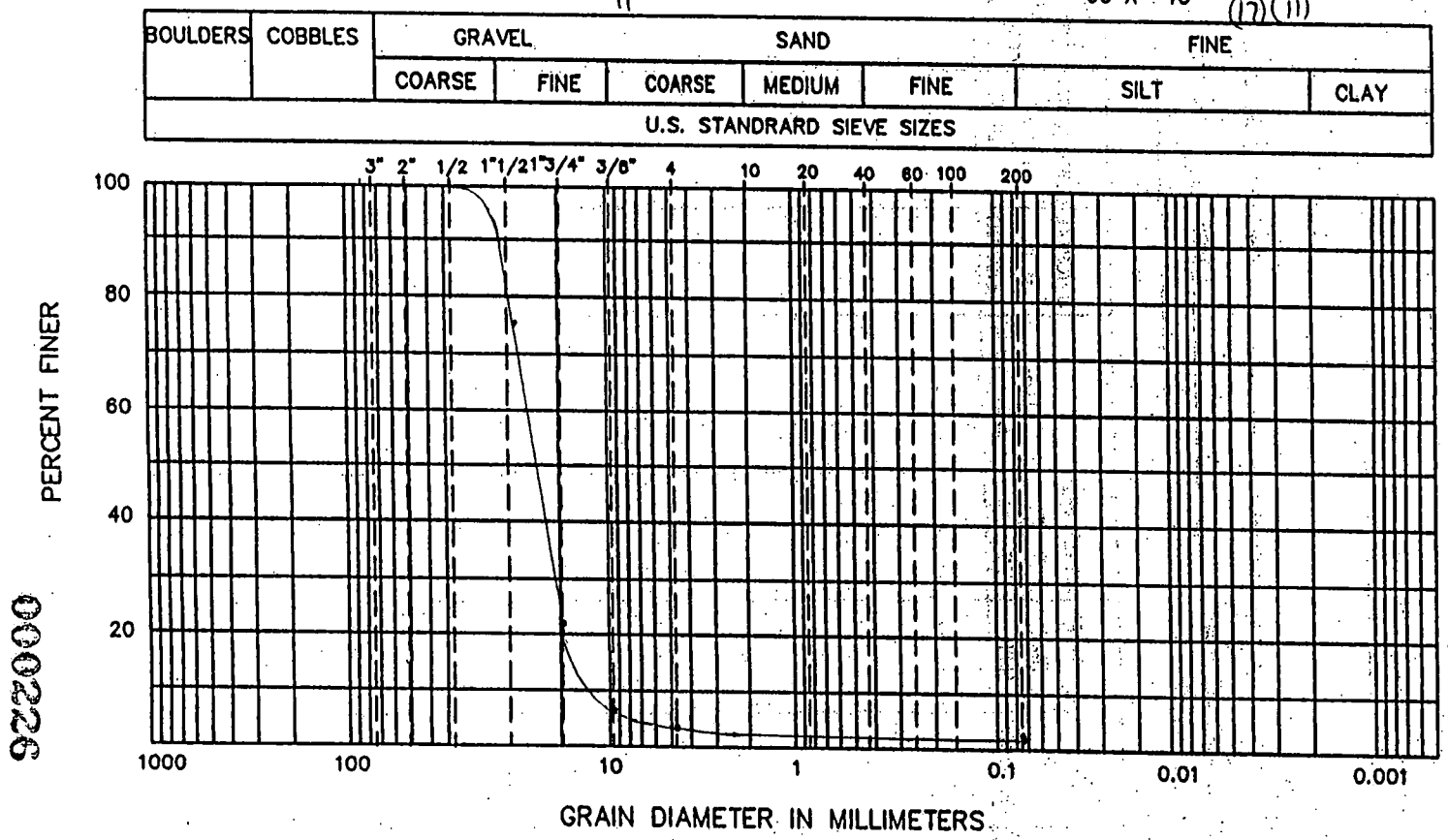
MATERIAL TYPE: 57 Stone / Choke Stone

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 11 day April month 2003 year

SAMPLE NO.: CH03-2 QA ID: CA

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{17}{11} = 1.55$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{(13)^2}{(17)(11)} = 0.90$



ATTERBERG LIMITS

(LL) N/A

(PL)

(PI)

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	75.4
1/2-in.	20.6
3/8-in.	6.0
NO. 4	3.0
NO. 10	2.5
NO. 20	2.4
NO. 40	2.2
NO. 60	2.1
NO. 100	2.0
NO. 200	1.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): GP - Poorly Graded Gravel

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

CHECKED BY: CA

SHEET NO. 2 OF 2

000226

GEOSYNTEC CONSULTANTS

5369

FLUOR 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 V DATE: 17 day April month 2003 year

MATERIAL TYPE: 57 Stone SAMPLE NO.: CH03-3

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		BSP X	BSP X
WT. OF DRY SAMPLE PLUS TARE	(grams)	7071.6	15:32 6949.2
WT. OF TARE	(grams)	939.0	939.0
WT. OF DRY SAMPLE	(grams)	6132.6	6010.2

SIEVE ANALYSIS

QA ID: DLE

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	95 To 100
3/4"	19.00	1669.9	27.2	72.8	=
1/2"	12.50	4612.1	75.2	24.8	25 To 60
3/8"	9.50	5503.3	89.7	10.3	=
#4	4.75	5916.4	96.5	3.5	0 To 10
#8	2.36	5969.9	97.3	2.7	0 To 5
#16	1.18	5983.4	97.6	2.4	
#30	0.60	5989.3	97.7	2.3	
#50	0.30	5994.3	97.7	2.3	
#100	0.15	6000.8	97.9	2.1	
#200	0.075	6008.9	98.0	2.0	0 To 2
PAN		6010.2			

000227

%FINER = 100 − Σ% RETAINED

©GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS

CHECKED BY: [illegible]

SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

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. 6Q134/ TASK NO.: 04.1

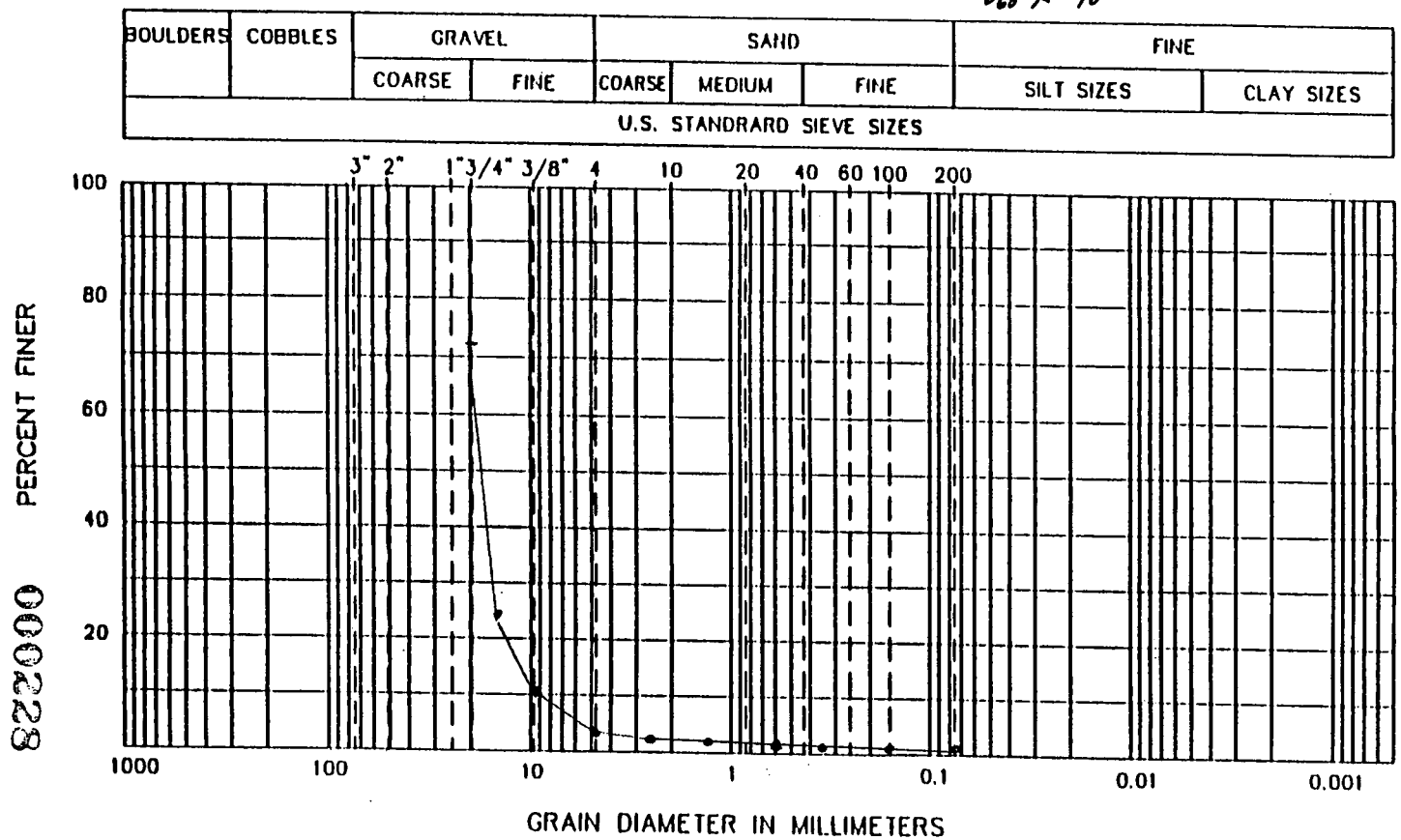
DESCRIPTION: Phase V

DATE: 18 day Apr. month 2003 year

MATERIAL TYPE: 57 Stone C-136

SAMPLE NO.: CH 03-3 QA ID: DLE

CURVE COEFFICIENTS: $(C_u) = \left(\frac{D_{60}}{D_{10}}\right) = \frac{18}{10} = 1.8$ $(C_c) \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{16 \times 16}{18 \times 10} = \frac{256}{180} = 1.4$



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.	72.8
1/2-In.	24.8
3/8-In.	10.3
NO. 4	3.5
NO. 8	2.7
NO. 16	2.4
NO. 30	2.3
NO. 50	2.3
NO. 100	2.1
NO. 200	2.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): GP Poorly Graded Gravel

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: CH

SHEET NO. 2 OF 2

000228

GRANULAR FILTER MATERIAL

SUPPLIER'S CERTIFICATIONS

SUPPLIER DOCUMENT SUBMITTAL

OF PROJECT NO.: 20	CONTRACT NO: PHIV2	SUBMITTAL NO. 20104-PHIV2-02712-001	REV.: 0	DATE: 03/12/03	Page 1 of 2

FROM:
Fluor Fernald

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

SIGNATURE: Sumar 03/13/03

RECEIVED BY: Susan Schwab DATE: 3/17/03

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	PHIV2-02712-001	0						X			Source of granular filter material			X	02712-1.04A1	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)

0002231

53969

RECEIVED BY: [signature] DATE: 3/20/03

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

ORIGINAL

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

20104-PHIV2-02712-001 5369

WELCH

SAND & GRAVEL, INC.
10217 COLUMBIA STREET, HARRISON, OHIO 45030-9751

PHONE (513) 353-3220
FAX (513) 353-3225

March 12, 2003

Koch Trucking
11753 Paddys Run
Hamilton, OH 45013

Attn: Ron Koch

Dear Ron:

Please be advised that Welch Sand & Gravel's 703.06 sand cover has been tested in accordance with ASTM136 gradation methods. This sand will be furnished for the Fernald Project and will be available from the Welch Ross Pit location.

Sincerely,

Gene Gillespie

Gene gillespie
Aggregate Technician

INFORMATION ONLY

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: _____ Date: 3/25/03

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: PHIV2	SUBMITTAL NO. 20104-PHIV2-02712-002	REV.: 1	DATE: 08/25/03	Page 1 of 2

FROM:
Fluor Fernald

SIGNATURE: Brumar 8/25/03

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

RECEIVED BY: Linda Schwab DATE: 8/25/03

			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	PHIV2-02712-002	1						X			Test results for sand cover (for additional quantity, delivered on 8/10/03)		X		02712-1.04A2,A3	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
REINHARD FRISKE	64				
KWASI BADU TWENEBOAH	38				
DON PFISTER - DOE	45				

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

0002332

5369

RECEIVED BY: [illegible] DATE: 9/2/03

(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

Welch Sand & Gravel, Inc.

10217 Columbia Street, Harrison, Ohio 45030-9751 Phone: (513)353-2220

AGGREGATE TEST DATA AND RESULTS

PROJECT NO. Fernald DATE 08/10/03
COUNTY Hamilton Plant Location
Contractor Fluor Fernald Source Sample No.
Coarse Agg. Size/Type Source Sample No.
Fine Agg. Size/Type 703.06 STOCKPILE

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				
			xxxxxxxx	xxxxxxxx
PAN			xxxxxxxx	xxxxxxxx
TOTAL				

Post-it® Fax Note 7671 | Date | # of pages ▶
To Chuck VanDrisdale | From DBG
Co./Dept. | Co.
Phone # x 5116 | Phone #
Fax # x 4528 | Fax #

☒ A-Conforms to the Subcontract Requirements
☐ B-Minor Comment - Incorporate and Resubmit
☐ C-Revise and Resubmit
Sig: [illegible] Date: 9/2/03

FINE AGGREGATE SIEVE ANALYSIS 703.06 Sand Cover

*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				meets requirements
No. 50	1681	61.9	32.3	7-40
No. 100				
No. 200	842	31.0	1.3	0-10
				xxxxxxxx
PAN	31	1.3	xxxxxxxx	xxxxxxxx
TOTAL	2712	100.0	xxxxxxxx	

FINENESS MODULUS (F.M.) =
OTHER TESTS OR REMARKS:

Sample Tested By: GENE GILLESPIE
Certification No. 977

*Note: Other sieve sizes may be written in if needed.

INFORMATION ONLY 000234

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20[illegible]	CONTRACT NO: PHIV2	SUBMITTAL NO. 20104-PHIV2-02712-003	REV.: 0	DATE: 03/12/03	Page 1 of 2

FROM:
Fluor Fernald

SIGNATURE: Anumar 03/13/03

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

RECEIVED BY: Linda Schwab DATE: 3/17/03

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	PHIV2-02712-003	0							X		Suppliers certification		X		02712-1.04A2	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)

002235

5369

RECEIVED BY: [signature] DATE: 3/20/03
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

ORIGINAL

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-E-4955
Rev. 3: 05/14/1999, CT-2.4.2

20104-PHIV2 -02712-003

5369

WELCH
SAND & GRAVEL, INC.
10217 COLUMBIA STREET, HARRISON, OHIO 45030-9751

PHONE (513) 353-3220
FAX (513) 353-3225

March 12, 2003

Koch Trucking
11753 Paddys Run
Hamilton, OH 45013

Attn: Ron Koch

Dear Ron:

Please be advised that Welch Sand & Gravel's 703.06 sand cover has been tested in accordance with ASTM136 gradation methods. This sand will be furnished for the Fernald Project and will be available from the Welch Ross Pit location.

Sincerely,

Gene Gillespie

Gene gillespie
Aggregate Technician

INFORMATION ONLY

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: Michael Wheeler Date: 3/20/03

SUPPLIER DOCUMENT SUBMITTAL

OF PROJECT NO.: 20[redacted]	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02215-001	REV.: 0	DATE: 03/13/03	[redacted] 1 of 2

FROM:
uor Fernald

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

SIGNATURE: Bkumar 03/13/03

RECEIVED BY: Susan Schwab DATE: 3/17/03

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	PHV-02215-001	0							X		Certification and test results		X		02215-1.04A2	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)

000234

5369

RECEIVED BY: [signature] DATE: 3/20/03

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

ORIGINAL

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

20105 - P4V-02215-001

5369

WELCH

SAND & GRAVEL, INC.
10217 COLUMBIA STREET, HARRISON, OHIO 45030-9751

PHONE (513) 353-3220
FAX (513) 353-3225

March 12, 2003

Koch Trucking
11753 Paddys Run
Hamilton, OH 45013

Attn: Ron Koch

Dear Ron:

Please be advised that Welch Sand & Gravel's 703.06 sand cover has been tested in accordance with ASTM136 gradation methods. This sand will be furnished for the Fernald Project and will be available from the Welch Ross Pit location.

Sincerely,

Gene Gillespie

Gene gillespie
Aggregate Technician

INFORMATION ONLY

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 3/20/03

000238

5369

Welch Sand & Gravel, Inc.

10217 Columbia Street, Harrison, Ohio 45030-9751 Phone: (513)353-2220

AGGREGATE TEST DATA AND RESULTS

PROJECT NO. Fernald
COUNTY Hamilton DATE 03/10/03
Contractor Fluor Fernald Plant Location
Coarse Agg. Size/Type Source Sample No.
Fine Agg. Size/Type 703.01 Source Stockpile 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			xxxxxxx	xxxxxxx
TOTAL			xxxxxxx	xxxxxxx

FINE AGGREGATE SIEVE ANALYSIS

703.06 Sand Cover

*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	9-40
No. 100				
No. 200	842	31.0	1.3	0-10
PAN	31	1.3	xxxxxxx	xxxxxxxx
TOTAL	2712	100.0	xxxxxxx	xxxxxxxx

FINENESS MODULUS (F.M.) =

OTHER TESTS OR REMARKS:

Sample Taken by: G. Ellesperg
Certified

*Note: Other sieve sizes may be written in if needed.

CONFORMANCE TEST RESULTS

GEOSYNTEC CONSULTANTS

5369

FLUOR 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: 14 day Mar month 2003 year

MATERIAL TYPE: Granular Filter Sand SAMPLE NO.: GF03-1

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		Sq Pan #1 NSP	Sq Pan #1 NSP
WT. OF DRY SAMPLE PLUS TARE	(grams)	2832.1	2815.0
WT. OF TARE	(grams)	248.1	248.1
WT. OF DRY SAMPLE	(grams)	2584.0	2566.9

SIEVE ANALYSIS

QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00				
1 1/2"	37.50				
1"	25.00				
3/4"	19.00				
1/2"	12.50				
3/8"	9.50	0	0	100	
#4	4.75	28.9	1.1	98.9	90-100
#8	2.36	235.7	~~32.2~~ 9.1	90.9	
#16	1.18	832.3	32.2	67.8	
#30	0.60	1536.5	59.5	40.5	
#50	0.30	2355.7	91.2	8.8	7-40
#100	0.15	2547.9	98.6	1.4	
#200	0.075	2565.0	99.3	0.7	
PAN		2566.7	99.3	0.7	0-10

000241

%FINER = 100 − Σ% RETAINED

©GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: CL 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 V

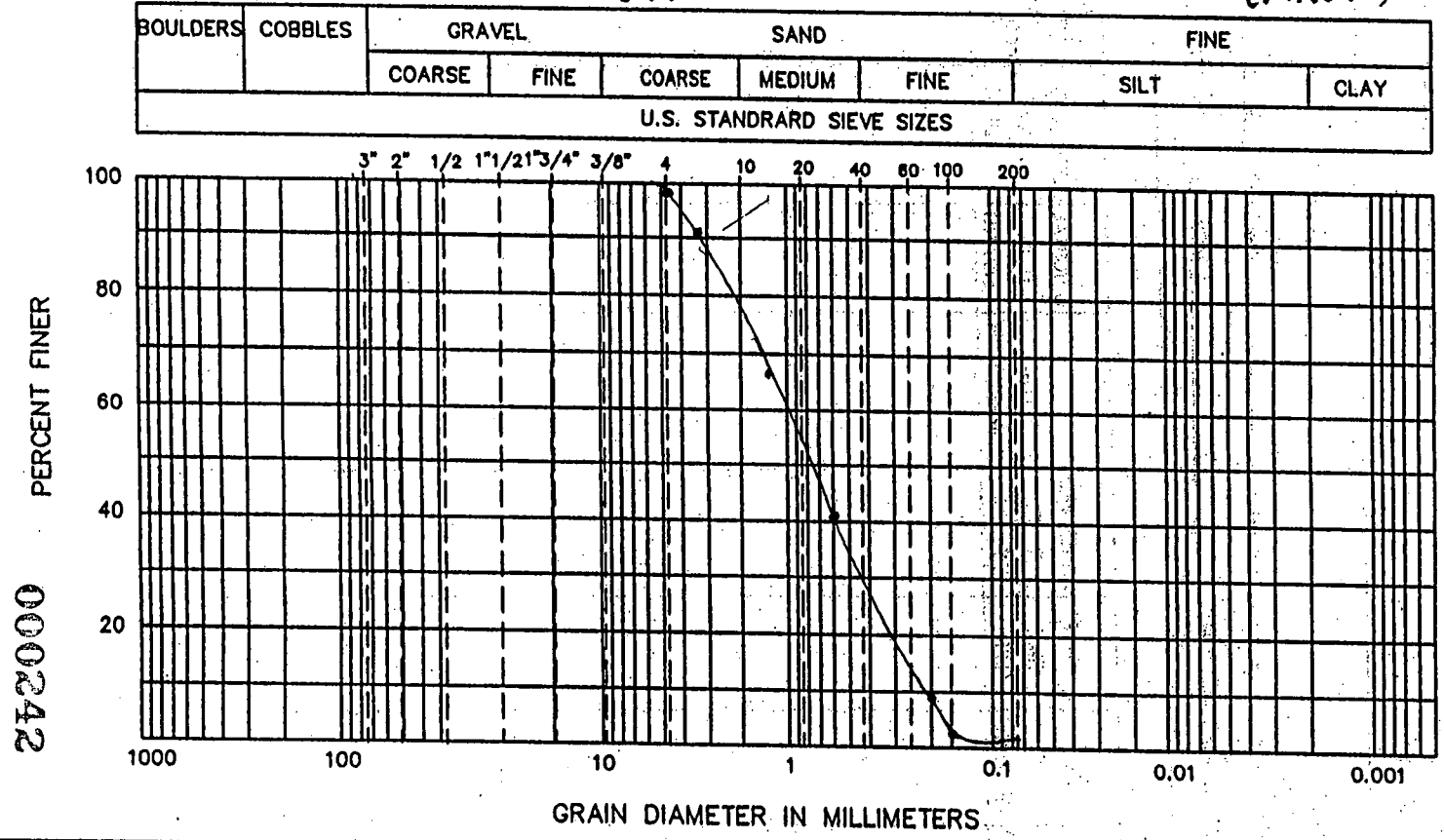
MATERIAL TYPE: Granular Filter Sand

PROJECT NO.: GER1341 TASK NO.: 04

DATE: 14 day March month 2003 year

SAMPLE NO.: GF03-1 QA ID: CJ

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) = \frac{1.0}{0.21} = 4.76$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{(0.44)^2}{(1.0)(0.21)} = 0.92$



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.	100
3/8-in.	100
NO. 4	98.9
NO. 10	90.9
NO. 20.	67.8
NO. 40	40.5
NO. 60	8.8
NO. 100	1.4
NO. 200	0.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	5.5
	3.8
	6.9
	6

SOIL CLASSIFICATION (ASTM D 2487): SP - Poorly Graded Sand

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SHEET NO. 2 OF 2

000242

GEOSYNTEC CONSULTANTS

FLUOR FERNALD 5369

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 V DATE: 15 day Apr month 2003 year

MATERIAL TYPE: SAND / Granular Filter SAMPLE NO.: GF03-2

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		N	N
WT. OF DRY SAMPLE PLUS TARE	(grams)	750.1	730.9
WT. OF TARE	(grams)	101.7	101.7
WT. OF DRY SAMPLE	(grams)	648.3	629.2

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	Ø	Ø	100	
3/8"	9.50	Ø	Ø	100	
#4	4.75	4.6	.7	99.3	90 To 100
#8	2.36	54.3	8.4	91.6	
#16	1.18	203.3	31.4	68.6	
#30	0.60	369.3	57.0	43.0	
#50	0.30	572.3	88.3	11.7	7 To 40
#100	0.15	624.7	96.4	3.6	
#200	0.075	629.1	97.0	3.0	Ø To 10
PAN	—	629.2	—	—	

000243

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

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.: 041

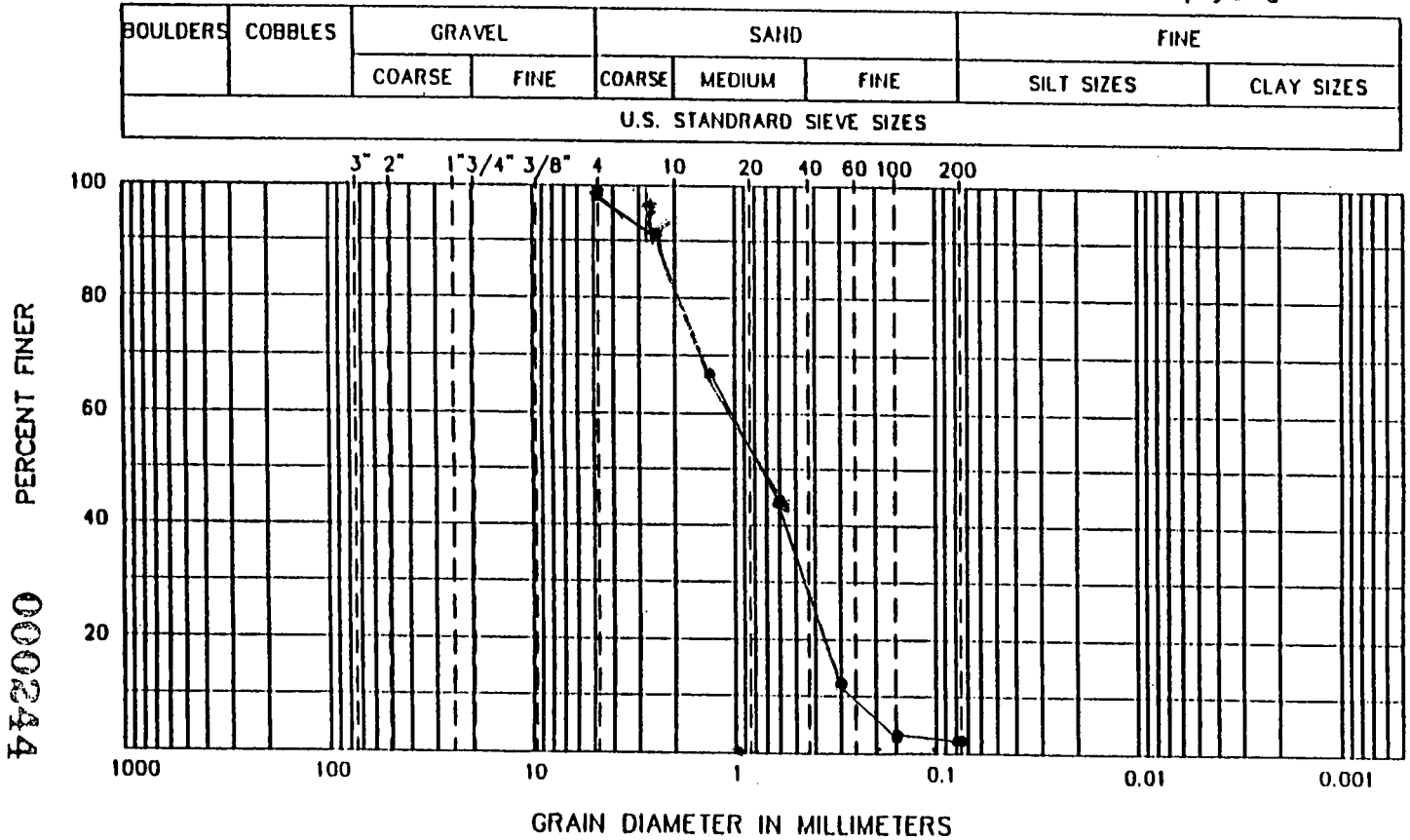
DESCRIPTION: Phase V

DATE: 17 day Apr. month 2003 year

MATERIAL TYPE: Sand C-136

SAMPLE NO.: GF03-2 QA ID: DLE

CURVE COEFFICIENTS: $(C_u) = \left(\frac{D_{60}}{D_{10}}\right) = \frac{1.1}{.28} = 3.92$ $(C_c) \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{.2025}{.308} = .66$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

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	99.3
NO. 8	91.6
NO. 16	68.6
NO. 30	43.0
NO. 50	11.7
NO. 100	3.6
NO. 200	3.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): SP Poorly-Graded Sand

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SHEET NO. 2 OF 2

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD 5369

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 V DATE: 18 day Apr month 2003 year

MATERIAL TYPE: SAND SAMPLE NO.: GF03-3

SOIL SAMPLE SIZE

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

	BEFORE WASH	AFTER WASH
TARE NO.	(N) ~~607.2~~ DLE	6 N 3.8
WT. OF DRY SAMPLE PLUS TARE (grams)	607.3	~~597.9~~ DLE
WT. OF TARE (grams)	101.6	101.6
WT. OF DRY SAMPLE (grams)	505.7	DLE ~~495.5~~ 502.2

SIEVE ANALYSIS

QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	Ø	Ø	100	
1 1/2"	37.50	Ø	Ø		
1"	25.00	Ø	Ø		
3/4"	19.00	Ø	Ø		
1/2"	12.50	Ø	Ø		
3/8"	9.50	Ø	Ø		
#4	4.75	Ø	Ø	100	90 To 100
#8	2.36	47.50	9.4	90.6	
#16	1.18	129.20	25.5	74.5	
#30	0.60	233.90	46.3	53.7	
#50	0.30	437.90	86.6	13.4	7 To 40
#100	0.15	498.90	98.7	1.3	
#200	0.075	502.10	99.3	Ø.7	Ø To 10
PAN		502.20			

000245

%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: Sand

PROJECT NO. 6-Q1341 TASK NO.: 04

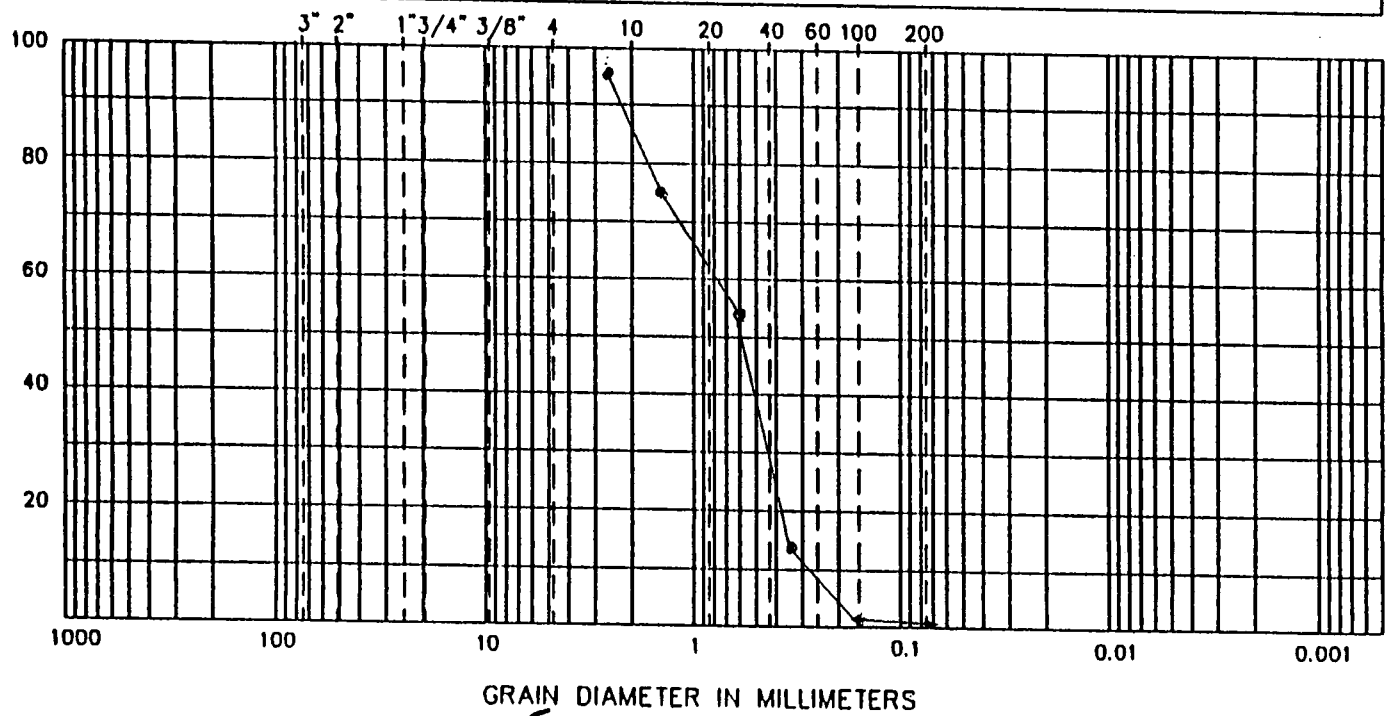
DATE: 21 day Apr month 2003 year

SAMPLE NO.: GF03-3 QA ID: PLS

CURVE COEFFICIENTS: $(C_u) \frac{D60}{D10} = \frac{.8}{.4} = 2$ $(C_c) \frac{D30^2}{D60 \times D10} = \frac{.6 = .36}{.36} = 1$

BOULDERS	COBBLES	GRAVEL		SAND			FINE	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

U.S. STANDRARD SIEVE SIZES



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	
1/2-in.	
3/8-in.	
NO. 4	100
NO. 8	90.6
NO. 16	74.5
NO. 30	53.9
NO. 50	13.4
NO. 100	1.3
NO. 200	0.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	51
	33
	19
	8

SOIL CLASSIFICATION (ASTM D 2487): ~~GP~~ SP poorly Graded Sand

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SHEET NO. 2 OF 2

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5369

ARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

OJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ3211 TASK NO.: 3

DESCRIPTION: Phase V DATE: 26 day Aug month 2003 year

MATERIAL TYPE: SAND SAMPLE NO.: GF03.4

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		SB-3	SB-3
WT. OF DRY SAMPLE PLUS TARE	(grams)	2458.6	2368.4
WT. OF TARE	(grams)	296.4	296.4
WT. OF DRY SAMPLE	(grams)	2162.2	2072.0

SIEVE ANALYSIS

QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
2"	50.00	0	0	100	
1½"	37.50	0	0	100	
1"	25.00	0	0	100	
¾"	19.00	0	0	100	
½"	12.50	0	0	100	
⅜"	9.50	0	0	100	
#4	4.75	0.7	0	0	90 To 100
#8	2.36	227.5	10.5	89.5	
#16	1.18	651.3	30.1	69.9	
#30	0.60	1167.8	54.0	46.0	
#50	0.30	1867.7	86.4	13.6	7 To 40
#100	0.15	2057.5	95.2	4.8	
#200	0.075	2071.9	95.8	4.2	0 To 10
PAN		2072.0			

000247

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

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

DESCRIPTION: Phase V

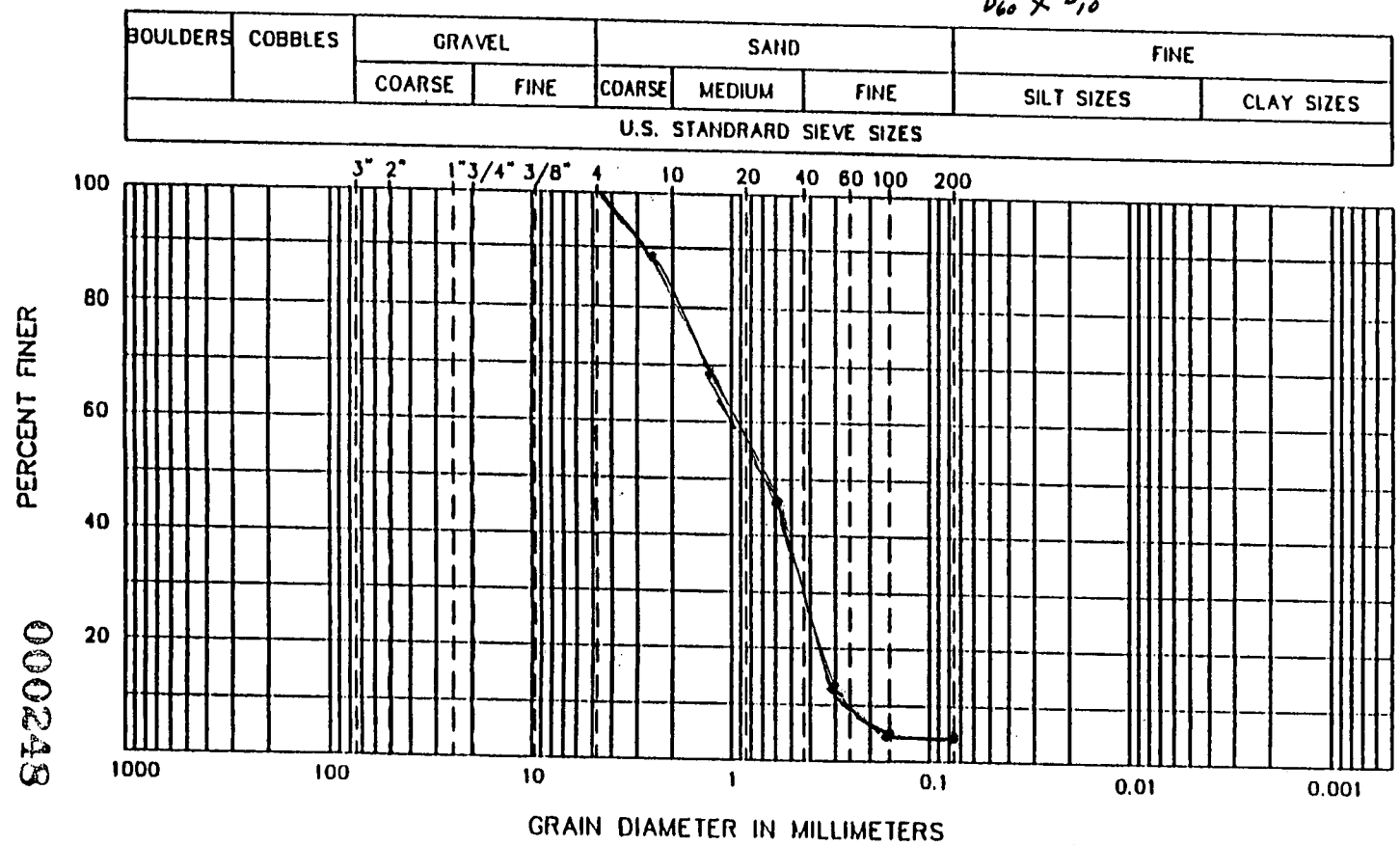
MATERIAL TYPE: Sand

PROJECT NO.: GQ3211 TASK NO.: 3

DATE: 27 day Aug month 2003 year

C-136 SAMPLE NO.: GF03-4 QA ID: DAE

CURVE COEFFICIENTS: $(C_u) = \left(\frac{D_{60}}{D_{10}}\right) = \frac{.96}{.27} = 3.5$ $(C_c) \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{.54.5 = .29}{.26} = .96$



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.	100
3/8-In.	100
NO. 4	100
NO. 8	89.5
NO. 16	69.9
NO. 30	46.0
NO. 50	13.6
NO. 100	4.8
NO. 200	4.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	5
	3
	0
	0

SOIL CLASSIFICATION (ASTM D 2487): SP Poorly Graded Sand

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2 - 2

002248

GEOSYNTEC CONSULTANTS

FLUOR FERNALD 5369

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM C 136)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ3211 TASK NO.: 3

DESCRIPTION: Phase V DATE: 26 day Aug month 2003 year

MATERIAL TYPE: SAND SAMPLE NO.: GF03-5

SOIL SAMPLE SIZE

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

		BEFORE WASH	AFTER WASH
TARE NO.		SB-2	SB-2
WT. OF DRY SAMPLE PLUS TARE	(grams)	3349.2	3299.3
WT. OF TARE	(grams)	292.2	292.2
WT. OF DRY SAMPLE	(grams)	3057.0	3007.1

SIEVE ANALYSIS

QA ID: [illegible]

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	
¾"	19.00	Ø	Ø	100	
½"	12.50	Ø	Ø	100	
⅜"	9.50	Ø	Ø	100	
#4	4.75	Ø	Ø	100	90 To 100
#8	2.36	320.7	10.5	89.5	
#16	1.18	930.9	30.5	69.5	
#30	0.60	1683.2	55.1	44.9	
#50	0.30	2722.3	89.1	10.9	7 To 40
#100	0.15	2987.2	97.7	2.3	
#200	0.075	3006.5	98.3	1.7	Ø To 10
PAN		3007.0			

000249

%FINER = 100 − Σ% RETAINED

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SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

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

DESCRIPTION: Phase IV

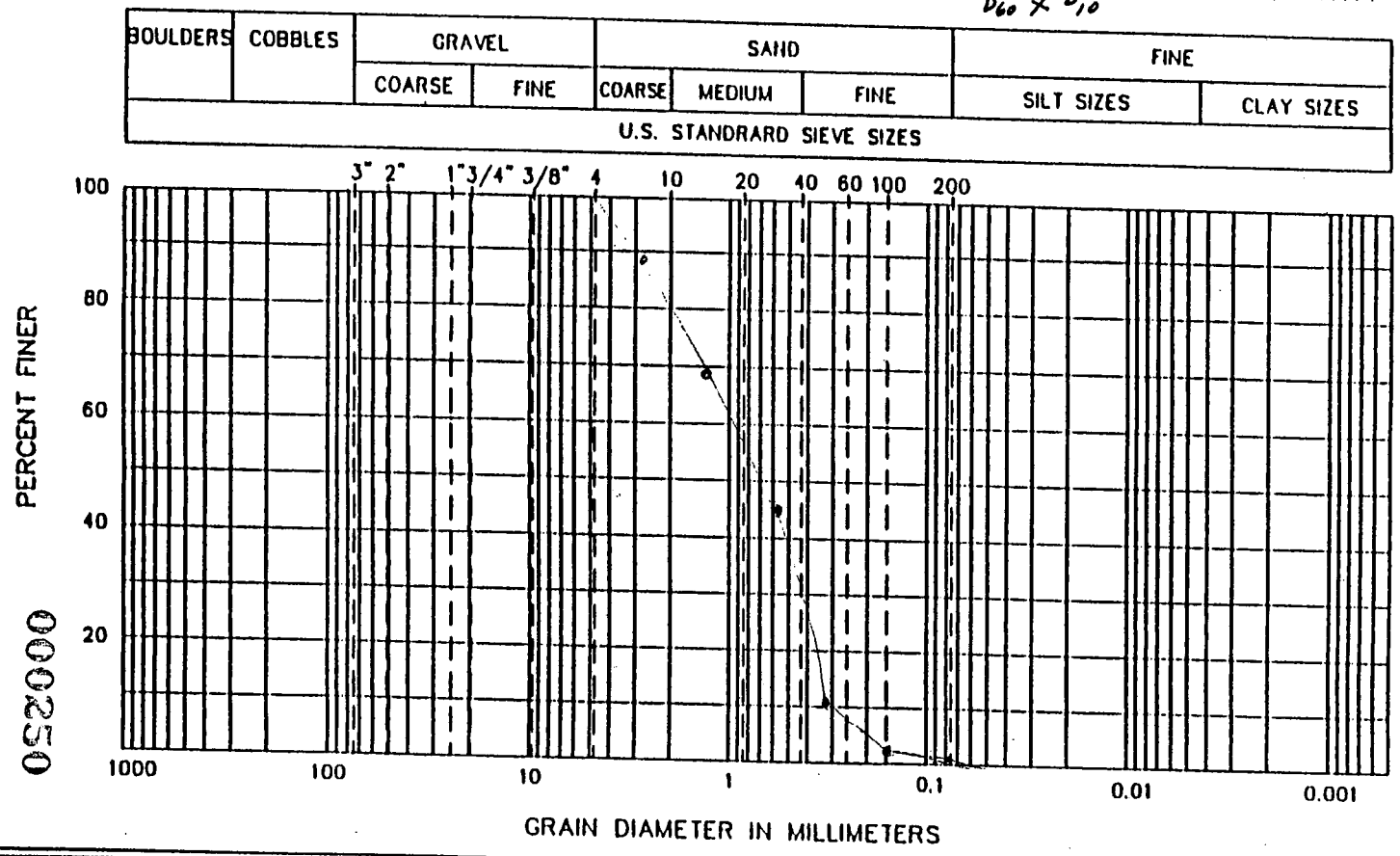
MATERIAL TYPE: Sand

PROJECT NO.: G03211 TASK NO.: 3

DATE: 27 day Aug month 2003 year

C-136 SAMPLE NO.: GF03-5 QA ID: DPC

CURVE COEFFICIENTS: $(C_u) = \left(\frac{D_{60}}{D_{10}}\right) = \frac{.41}{.01} = 2029$ $(C_c) \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) = \frac{.53^2}{.36} = .78$



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.	100
3/8-In.	100
NO. 4	100
NO. 8	89.5
NO. 16	69.5
NO. 30	44.9
NO. 50	10.9
NO. 100	2.3
NO. 200	1.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	5
	3
	0
	0

SOIL CLASSIFICATION (ASTM D 2487): SP Poorly Graded Sand

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: RL

000250

VEGETATIVE SOIL LAYER MATERIAL

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

536

ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Phase II DATE: 26 day Feb month 2003 year

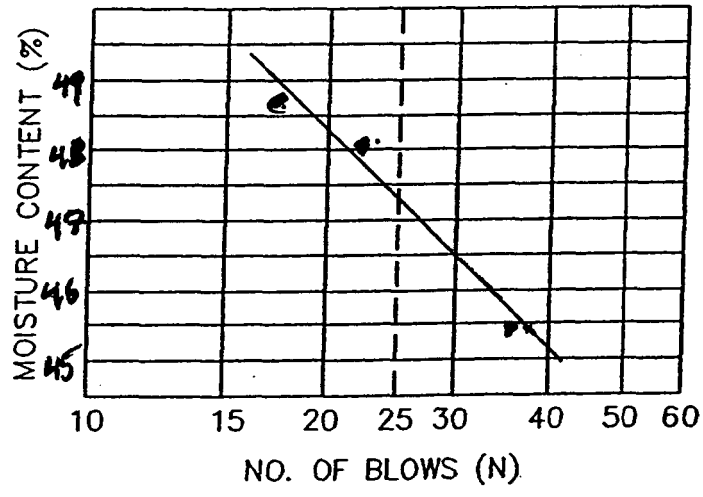
MATERIAL TYPE: Vegetative Cover MATERIAL SOURCE: Stockpile C&D Spoils SAMPLE NO.: VC03-1

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		3.1	2.6	2.1	
A	WT. OF TARE	(grams)	28.38	28.55	28.24	
B	WT. OF WET SOIL & TARE	(grams)	43.81	43.23	44.92	
C	WT. OF DRY SOIL & TARE	(grams)	38.99	38.43	39.52	
D	WT. OF WATER = B-C	(grams)	4.82	4.80	5.43	
E	WT. OF DRY SOIL = C-A	(grams)	10.61	9.88	11.28	
F	MOISTURE CONTENT = (D/E)X100	(%)	45.4	48.6	48.1	
N	NUMBER OF BLOWS		36	17	23	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.6	1.1		
A	WT. OF TARE	(grams)	28.87	28.82		
B	WT. OF WET SOIL & TARE	(grams)	37.71	38.62		
C	WT. OF DRY SOIL & TARE	(grams)	36.16	36.92		
D	WT. OF WATER = B-C	(grams)	1.55	1.70		
E	WT. OF DRY SOIL = C-A	(grams)	7.29	8.10		
	MOISTURE CONTENT = (D/E)X100	(%)	21.3	21.0		

LIQUID LIMIT (LL) = 47 PLASTIC LIMIT (PL) = 21.2 PLASTICITY INDEX (PI) = 25.8 26

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5369

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 24 day 02 month 03 year

MATERIAL TYPE: ~~Low Perm Clay~~ Vegetative Cover SAMPLE NO.: VC-03-1

SOIL SAMPLE SIZE	+3/8 =	MOISTURE =	TOTAL = 17250
	-3/8 = 17250		

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	~~LL9~~	LL9		LL9
WT. OF DRY SAMPLE PLUS TARE (grams)		682.8		175.0
WT. OF TARE (grams)		106.7		106.7
WT. OF DRY SAMPLE (grams)		576.1		68.3

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø		
2 in	50.8	Ø	Ø		1ØØ
1 1/2in	38.1	Ø	Ø		
1 in	25.4	Ø	Ø		
3/4 in	19.1	Ø	Ø		9Ø-1ØØ
1/2 in	12.7	Ø	Ø		
3/8 in	9.53	Ø	Ø		
No. 4	4.75	1.8	.3	99.7	
No. 10	2.00	7.4	1.3	98.7	
No. 20	0.850	18.8	3.3	96.7	
No. 40	0.425	3Ø.9	5.4	94.6	
No. 60	0.250	4Ø.6	7.1	92.9	
No. 100	0.125	52.3	9.1	90.9	
No. 200	0.075	66.9	11.6	88.4	5Ø-1ØØ
PAN	—	68.3	—	—	

COMMENTS:

000253

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: _____ 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

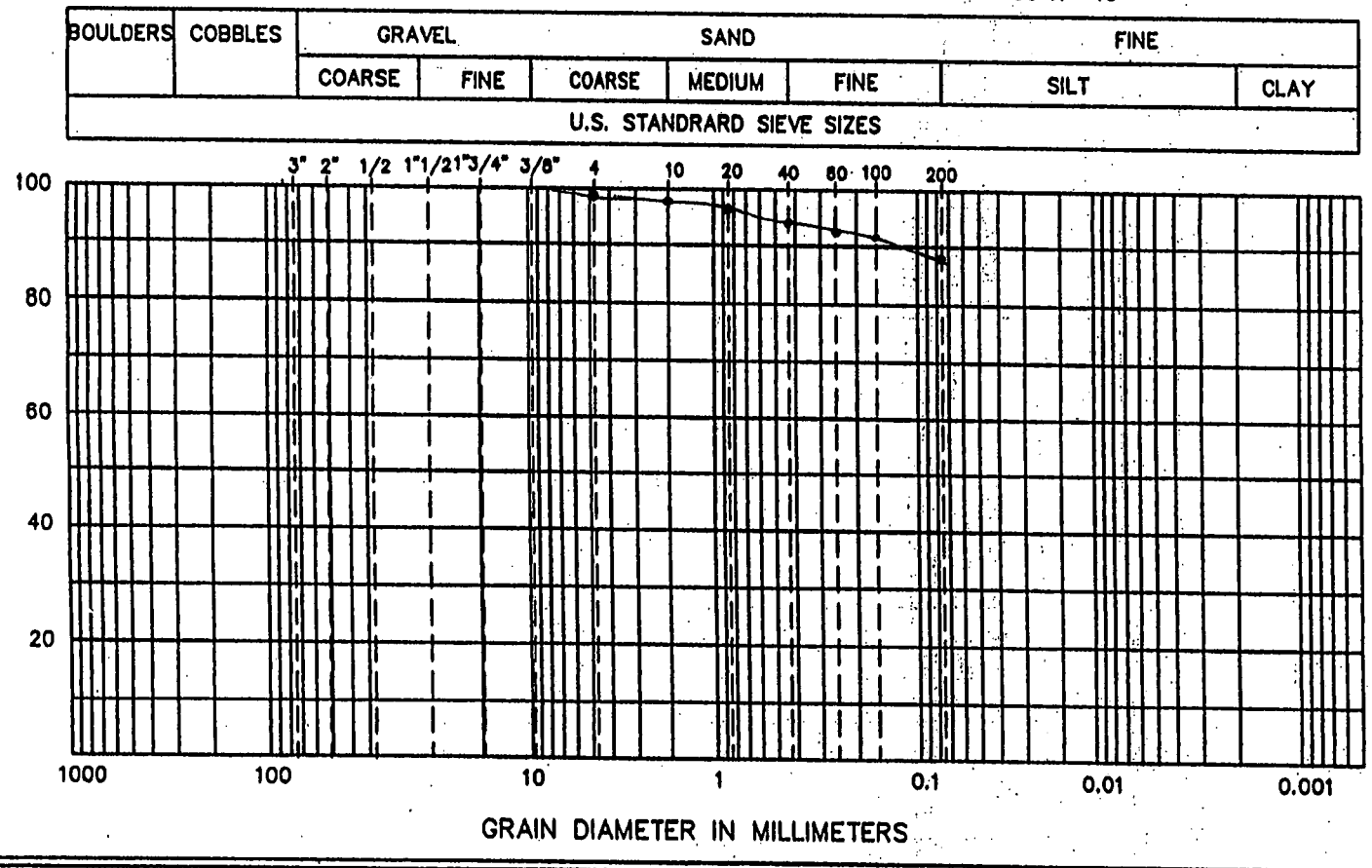
DESCRIPTION: Phase V

DATE: 24 day Feb month 2003 year

MATERIAL TYPE: Vegetative Cover

SAMPLE NO.: VC03-1 QA ID: CL

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



ATTERBERG LIMITS

(LL) 47

(PL) 21

(PI) 26

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	
1/2-in.	
3/8-in.	
NO. 4	99.7
NO. 10	98.7
NO. 20	96.7
NO. 40	94.6
NO. 60	92.9
NO. 100	90.9
NO. 200	88.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): CL - Lean Clay

©GEOSYNTEC CONSULTANTS FILE NO. 2-18-R90 CHECKED BY: CL

002254

3369

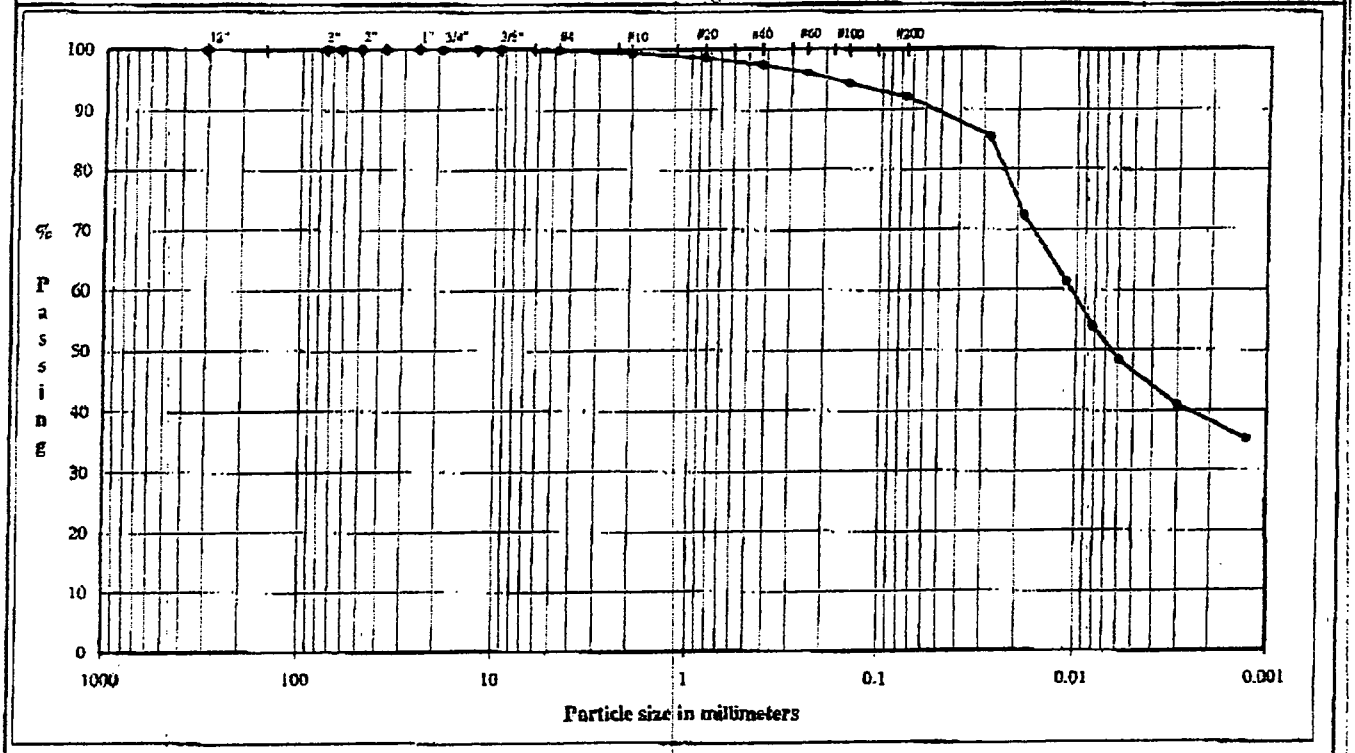
MARCH 2003 033-3486

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

5369

PROJECT NAME: GEOSYNTEC/FLUOR FERNALD/GA
SAMPLE ID: VC03-1 Depth: -
TYPE: Bag



COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

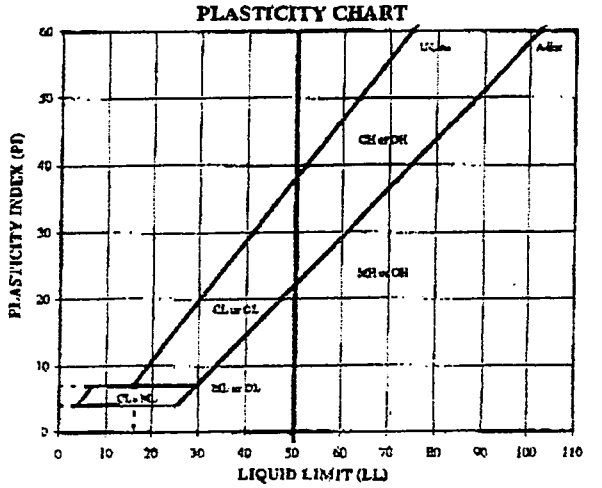
U.S. Standard Sieves Sizes and Numbers

Particle Size	(mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.00
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.00
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	99.7	Fine Gravel	0.27
#10	2.00	99.5	Coarse Sand	0.26
#20	0.85	98.6		
#40	0.43	97.4	Medium Sand	2.10
#60	0.25	96.1		
#100	0.15	94.4		
#200	0.075	92.2	Fine Sand	5.18

Hydrometer Analysis

(mm)	%Finer		
0.028	85.5		
0.019	72.5		
0.011	61.3	Fines	
0.0082	53.9	Silt or Clay	92.18
0.0059	48.3		
0.0030	40.9		
0.0013	35.3		

PLASTICITY CHART



ATTERBERG LIMITS

ML	LL	PL	PI	LI
15.6	-	-	-	-

DESCRIPTION: Olive Brown, CLAYEY SILT, little medium to fine sand, trace fine gravel.

USCS: (ML)

000255

TECH	TJ
DATE	03/05/03
CHECK	
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD A)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Phase II DATE: 24 day Feb month 03 year

MATERIAL TYPE: Vegetative Cover MATERIAL SOURCE: Cell 6 Stockpile SAMPLE NO.: VC03-1

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%,
AND IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS LESS THAN 20%
ALL MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 5.5-lb RAMMER / 12-in. DROP / 3 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL QA ID: CHW

			6%	8%	10%	12%	14%
	WATER ADDED	(ml)	150ml	200ml	250ml	300ml	350ml
A	WT. OF SOIL & MOLD	(grams)	5860.5	5806.1	5856.0	5969.4	6010.2
B	WT. OF MOLD	(grams)	4200.9	4200.9	4200.9	4200.9	4200.9
C	WT. OF SOIL = A − B	(grams)	1659.6	1605.2	1655.1	1768.8	1810.0
D	WET UNIT WT.(1) = C X 0.066	(pcf)	109.5	105.9	109.2	116.7	119.5
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	98.9	93.3	94.2	98.8	100.2

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216 QA ID: _____

	TARE NO.		36	52	21	31	664
F	WT. OF TARE	(grams)	8.4	8.1	8.4	8.4	8.3
G	WT. OF WET SOIL & TARE	(grams)	393.1	402.4	366.8	366.8	325.8
H	WT. OF DRY SOIL & TARE	(grams)	356.0	355.5	317.7	311.9	274.5
I	WT. OF WATER = G − H	(grams)	37.1	46.9	49.1	54.9	51.3
J	WT. DRY SOIL = H − F	(grams)	347.6	347.4	309.3	303.5	266.2
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.7	13.5	15.9	18.1	19.3

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GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC CHECKED BY: _____ SHEET NO. 1 OF 23

1.193

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD A)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Phase IV DATE: 25 day Feb month 03 year

MATERIAL TYPE: MATERIAL SOURCE: Cell 6 Stockpile SAMPLE NO.: VC 03-1

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%,
AND IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS LESS THAN 20%
ALL MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 5.5-lb RAMMER / 12-in. DROP / 3 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

16%

QA ID: [illegible]

	WATER ADDED	(ml)	400ml				
A	WT. OF SOIL & MOLD	(grams)	6032.9				
B	WT. OF MOLD	(grams)	4200.9				
C	WT. OF SOIL = A − B	(grams)	1832.0				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	120.9				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	98.8				

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT − ASTM D 2216

QA ID: [illegible]

	TARE NO.		657				
F	WT. OF TARE	(grams)	8.1				
G	WT. OF WET SOIL & TARE	(grams)	387.8				
H	WT. OF DRY SOIL & TARE	(grams)	318.3				
I	WT. OF WATER = G − H	(grams)	~~370.2~~ 69.5				
J	WT. DRY SOIL = H − F	(grams)	310.2				
K	MOISTURE CONTENT = (I/J) X 100	(%)	22.4				

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53969

GEO SYNTEC CONSULTANTS FILE NO. 2-04-FLC CHECKED BY: [illegible] SHEET NO. 2 OF 3

1.224

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5369

MOISTURE-DENSITY RELATIONSHIP

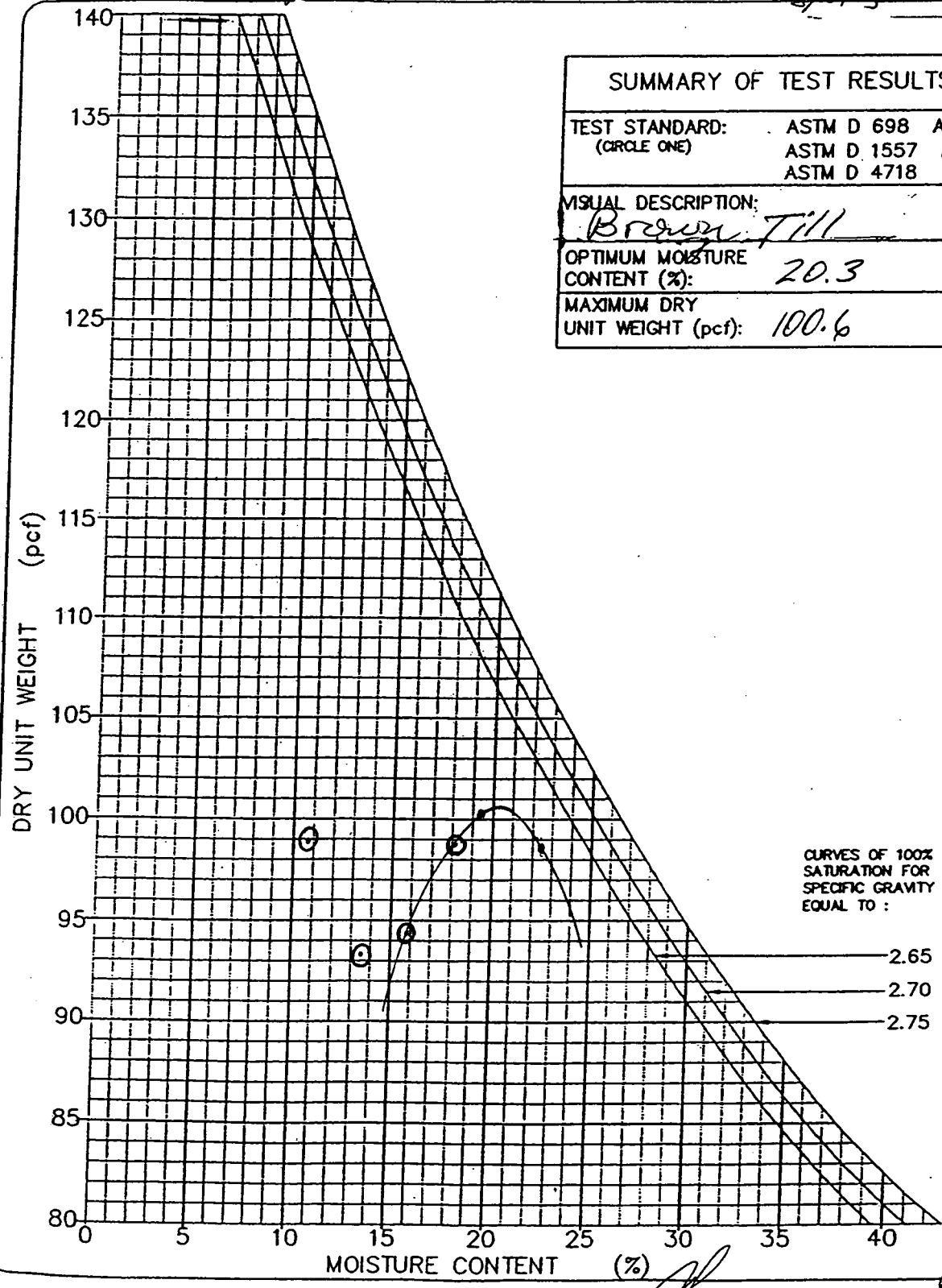
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G-Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 25 day Feb month 03 year

MATERIAL TYPE: Vegetative Cover MATERIAL SOURCE: Cell 6 Stockpile Soils SAMPLE NO.: VC03-1

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B), C ASTM D 1557 A, B, C ASTM D 4718	
VISUAL DESCRIPTION:	Brown Till	
OPTIMUM MOISTURE CONTENT (%):	20.3	
MAXIMUM DRY UNIT WEIGHT (pcf):	100.6	



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FLUOR FERNALD, INC.

536

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G01341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 26 day Feb month 03 year

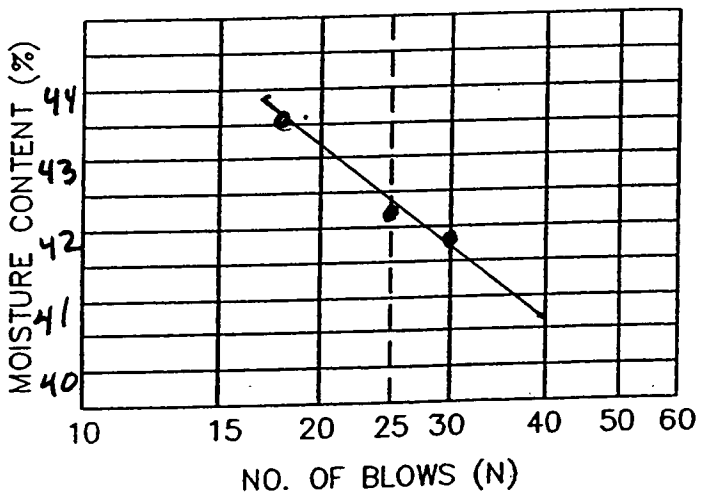
MATERIAL TYPE: Vegetative Cover MATERIAL SOURCE: Stockpile C SAMPLE NO.: VC 03-2

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.8	1.4	1.9	
A	WT. OF TARE	(grams)	28.79	28.50	28.55	
B	WT. OF WET SOIL & TARE	(grams)	45.95	43.70	43.56	
C	WT. OF DRY SOIL & TARE	(grams)	40.88	39.19	39.00	
D	WT. OF WATER = B-C	(grams)	5.07	4.51	4.56	
E	WT. OF DRY SOIL = C-A	(grams)	12.09	10.69	10.45	
F	MOISTURE CONTENT = (D/E)X100	(%)	41.9	42.2	43.6	
N	NUMBER OF BLOWS		30	25	18	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: 029

	TARE NO.		3.2	1.5		
A	WT. OF TARE	(grams)	27.82	28.59		
B	WT. OF WET SOIL & TARE	(grams)	41.36	41.73		
C	WT. OF DRY SOIL & TARE	(grams)	39.08	39.47		
D	WT. OF WATER = B-C	(grams)	2.28	2.26		
E	WT. OF DRY SOIL = C-A	(grams)	11.26	10.88		
	MOISTURE CONTENT = (D/E)X100	(%)	20.2	20.8		

LIQUID LIMIT (LL) = ~~42.5~~ 42 PLASTIC LIMIT (PL) = ~~20.5~~ 21 PLASTICITY INDEX (PI) = ~~22~~ 21

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5369

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: PHASE III DATE: 24 day 02 month 03 year

MATERIAL TYPE: ~~low Perm CLAY~~ Vegetative Cover SAMPLE NO.: VC-03-2

SOIL SAMPLE SIZE	+3/8 = 160.7	MOISTURE =	TOTAL = 16199.7
	-3/8 = 16039.0		

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-5	L-2	L-5	L-2
WT. OF DRY SAMPLE PLUS TARE (grams)	267.0	804.7	241.4	305.4
WT. OF TARE (grams)	106.3	190.9	106.3	190.9
WT. OF DRY SAMPLE (grams)	160.7	613.8	135.1	114.5

SIEVE ANALYSIS QA ID: CW/DJZ

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		100
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	0	0	100		
3/4 in	19.1	33.4	.2	99.8		90-100
1/2 in	12.7	98.0	.6	99.4		
3/8 in	9.53	135.1	.8	99.2		
No. 4	4.75	8.0	1.3	98.7	97.9	
No. 10	2.00	26.9	4.4	95.6	94.8	
No. 20	0.850	55.5	9.0	91.0	90.3	
No. 40	0.425	74.9	12.2	87.8	87.1	
No. 60	0.250	86.6	14.1	85.9	85.2	
No. 100	0.125	98.9	16.1	83.9	83.2	
No. 200	0.075	112.5	18.3	81.7	81.0	50-100
PAN	—	114.6	—	—		

COMMENTS:

000260

% FINER = 100 − Σ % RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: CH 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 IIC

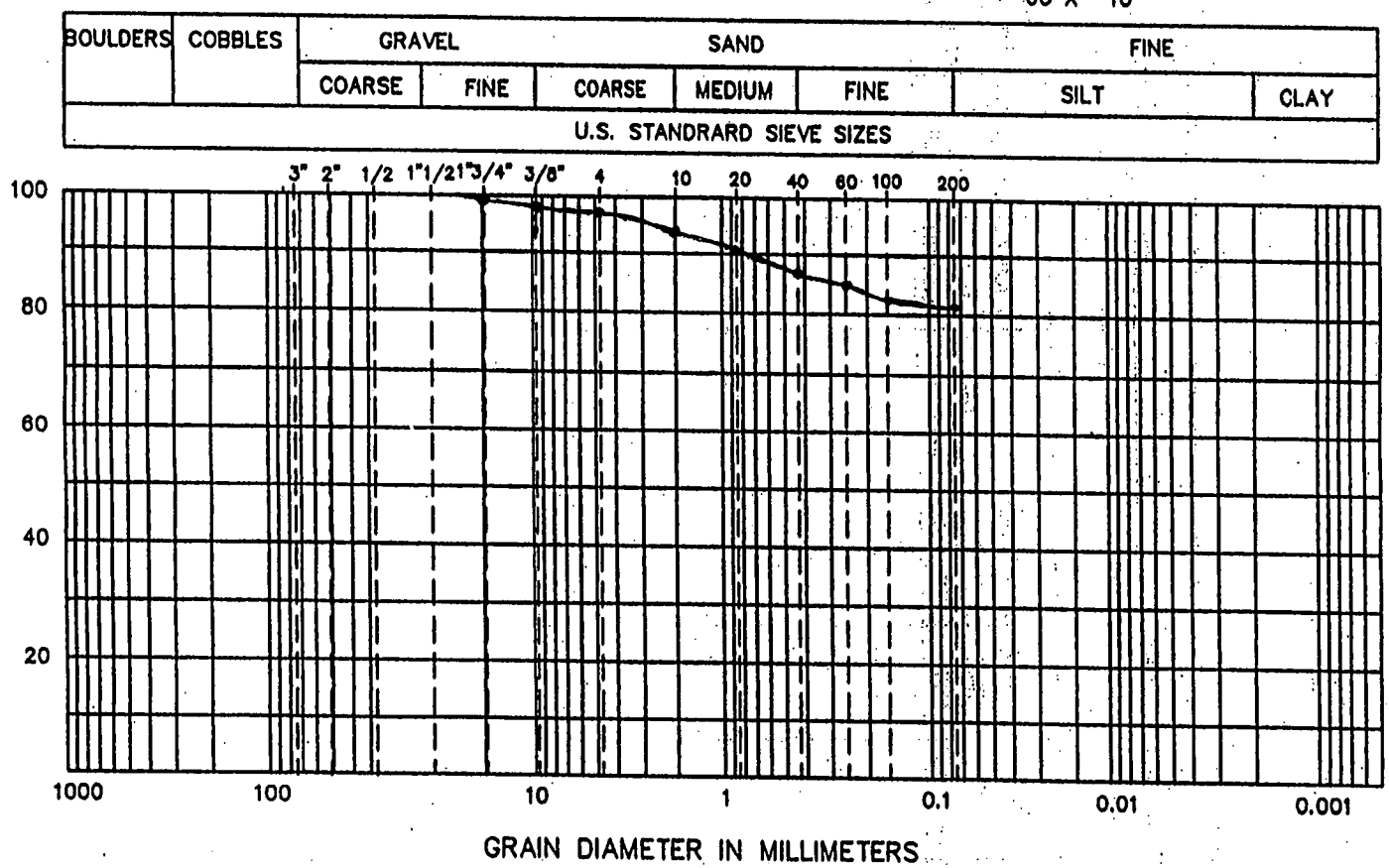
MATERIAL TYPE: Vegetative Cover

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 24 day Feb month 2003 year

SAMPLE NO.: VCØ3-2 QA ID: CL

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



ATTERBERG LIMITS

(LL) 42

(PL) 21

(PI) 21

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	↓
1 1/2-in.	
1-in.	
3/4-in.	99.8
1/2-in.	99.4
3/8-in.	99.2
NO. 4	97.9
NO. 10	94.8
NO. 20.	90.3
NO. 40	87.1
NO. 60	85.2
NO. 100	83.2
NO. 200	81.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): CL-lean Clay w/sand

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 28 day Feb month 03 year

MATERIAL TYPE: Vegatative Cover

MATERIAL SOURCE: Cell 6 Stockpile Spoils

SAMPLE NO.: VC03-2

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 5.5-lb RAMMER / 12-in. DROP / 3 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

			10%	12%	14%	16%	QA 18% CHW
	WATER ADDED	(ml)	250ml	300ml	350ml	400ml	450ml
A	WT. OF SOIL & MOLD	(grams)	5860.5	5960.3	6014.7	6078.2	6096.4
B	WT. OF MOLD	(grams)	4200.9	4200.9	4200.9	4200.9	4200.9
C	WT. OF SOIL = A − B	(grams)	1659.6	1759.4	1813.8	1877.3	1895.5
D	WET UNIT WT.(1) = C X 0.066	(pcf)	109.5	116.1	119.7	123.9	125.1
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	97.2	101.2	102.7	104.3	103.6

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

QA ID: CHW

	TARE NO.		36	52	21	31	25
F	WT. OF TARE	(grams)	8.4	8.2	8.4	8.3	8.3
G	WT. OF WET SOIL & TARE	(grams)	443.4	412.0	380.5	386.4	339.3
H	WT. OF DRY SOIL & TARE	(grams)	394.7	360.3	327.8	326.7	282.3
I	WT. OF WATER = G − H	(grams)	48.7	51.7	52.7	59.7	57.0
J	WT. DRY SOIL = H − F	(grams)	386.3	352.1	319.4	318.4	274.0
K	MOISTURE CONTENT = (I/J) X 100	(%)	12.6	14.7	16.5	18.8	20.8

1.126 1.147 1.165 1.188 1.206

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SHEET NO. 1 OF 2

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

5369

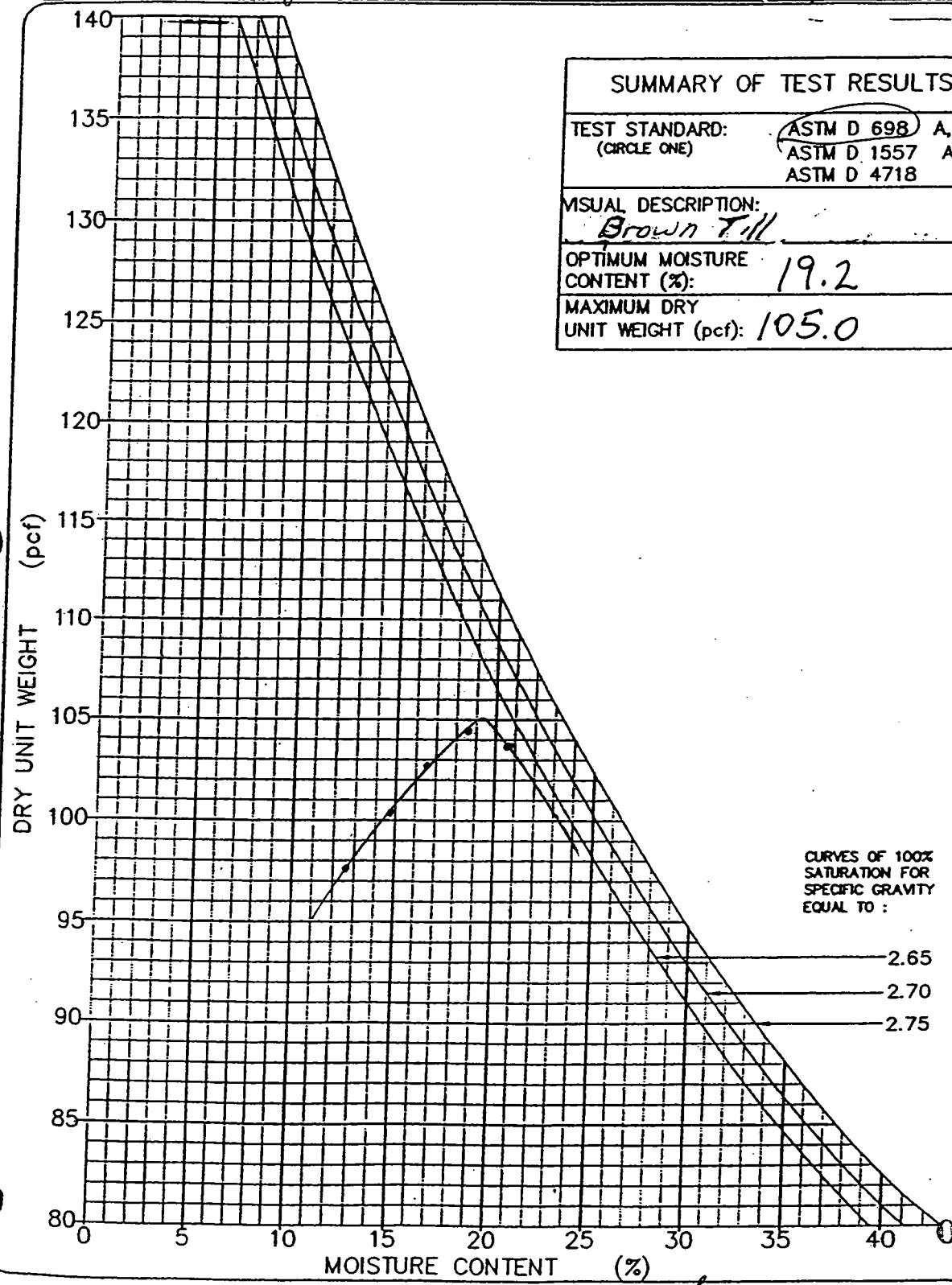
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Phase IV DATE: 03 day MAR month 2003 year

MATERIAL TYPE: Vegetative Cover MATERIAL SOURCE: Cell 6 Spoils SAMPLE NO.: VC072

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718	DHB
VISUAL DESCRIPTION:	Brown Till	CA
OPTIMUM MOISTURE CONTENT (%):	19.2	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	105.0	CA



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ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: Phase V DATE: 27 day June month 2003 year

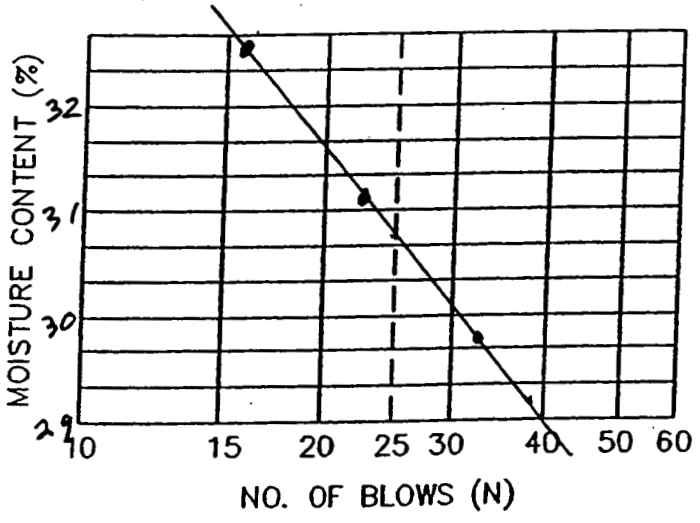
MATERIAL TYPE: Compacted Fill MATERIAL SOURCE: ~~SPD3-1~~ SPOILS FROM Cell 6 Ex. SAMPLE NO.: CFD3-9

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.9	2.5	2.4	
A	WT. OF TARE	(grams)	28.54	28.41	27.37	
B	WT. OF WET SOIL & TARE	(grams)	47.87	46.26	46.56	
C	WT. OF DRY SOIL & TARE	(grams)	43.13	42.03	42.16	
D	WT. OF WATER = B-C	(grams)	4.74	4.23	4.40	
E	WT. OF DRY SOIL = C-A	(grams)	14.59	13.62	14.79	
F	MOISTURE CONTENT = (D/E)X100	(%)	32.5	31.1	29.7	
N	NUMBER OF BLOWS		16	23	32	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		3.2	2.7		
A	WT. OF TARE	(grams)	27.82	28.67		
B	WT. OF WET SOIL & TARE	(grams)	35.94	35.81		
C	WT. OF DRY SOIL & TARE	(grams)	34.91	34.92		
D	WT. OF WATER = B-C	(grams)	1.03	0.89		
E	WT. OF DRY SOIL = C-A	(grams)	7.09	6.25		
F	MOISTURE CONTENT = (D/E)X100	(%)	14.5	14.2		

LIQUID LIMIT (LL) = 31 PLASTIC LIMIT (PL) = 14 PLASTICITY INDEX (PI) = 17

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5369

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: G03211 TASK NO.: 3

DESCRIPTION: PHASE V — DATE: 26 day June month 2003 year

MATERIAL TYPE: Compacted Fill — SAMPLE NO.: 1CF03-9

SOIL SAMPLE SIZE	+3/8 = 2598.8	MOISTURE =	TOTAL = 36772.8
	-3/8 = 34174		

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		LL6	LL4	LL-6	LL-4
WT. OF DRY SAMPLE PLUS TARE	(grams)	2796.8	~~916.0~~ 893.9 CAW	2734.1	392.8
WT. OF TARE	(grams)	198.0	145.0	198.0	145.0
WT. OF DRY SAMPLE	(grams)	2598.8	748.9	2536.1	247.8

SIEVE ANALYSIS — QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	547.6	1.5	98.5		100
2 in	50.8	547.6	1.5	98.5		
1 1/2in	38.1	733.1	2.0	98.0		
1 in	25.4	804.2	2.2	97.8		
3/4 in	19.1	1122.1	3.1	96.9		90 To 100
1/2 in	12.7	1899.9	5.2	94.8		
3/8 in	9.53	2528.4	6.9	93.1		.931
No. 4	4.75	45.5	6.1	93.9	87.4	
No. 10	2.00	86.9	11.6	88.4	82.3	
No. 20	0.850	124.0	16.6	83.4	77.6	
No. 40	0.425	156.3	20.9	79.1	73.6	
No. 60	0.250	183.8	24.5	75.5	70.3	
No. 100	0.125	215.5	28.8	71.2	66.3	
No. 200	0.075	246.8	33.0	67.0	62.4	50 To 100
PAN	—	247.7	—	—		

COMMENTS:

000265

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: CA — SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

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

DESCRIPTION: Phase IV

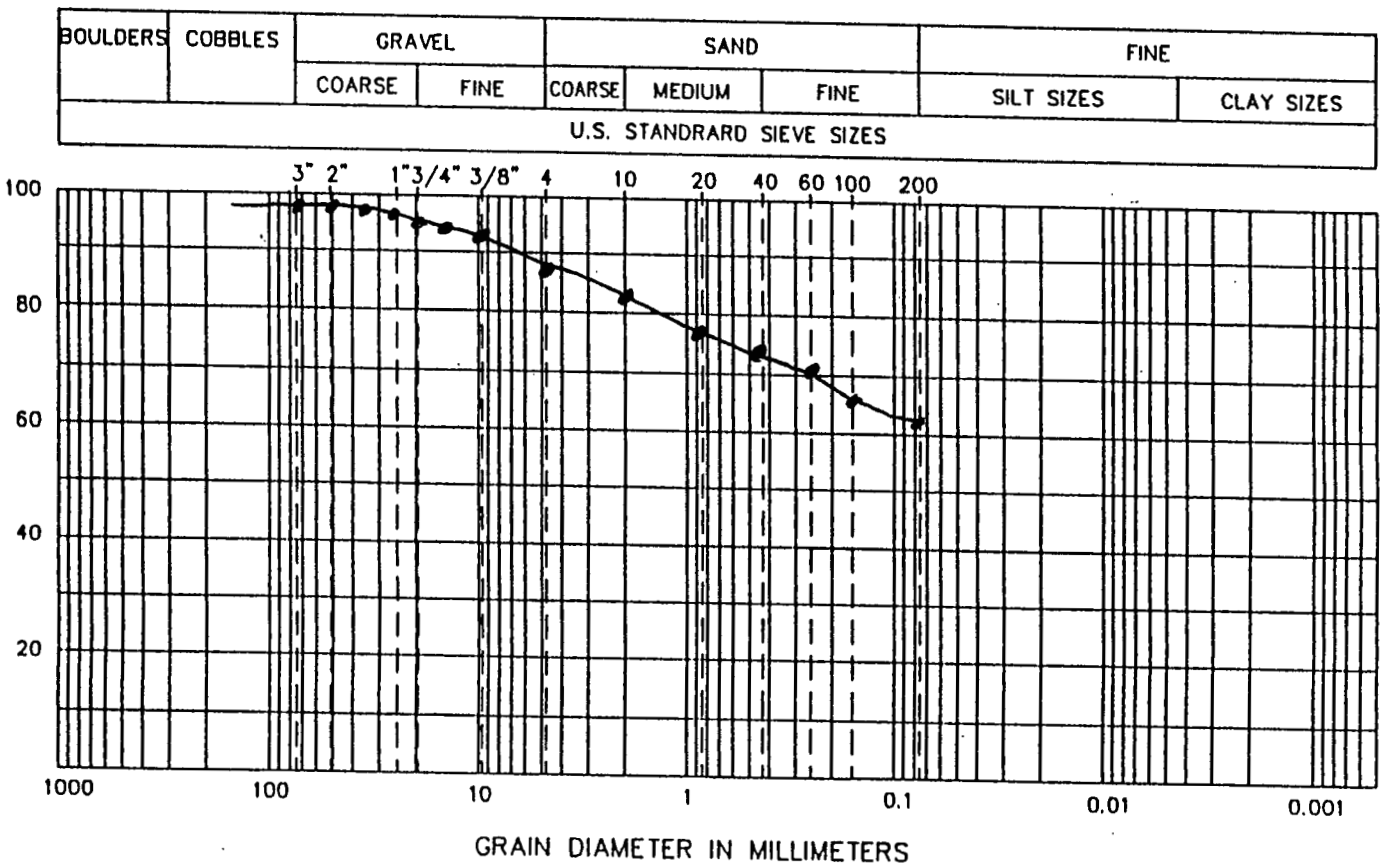
MATERIAL TYPE: Compacted fill

PROJECT NO.: GQ3211 TASK NO.: 3

DATE: 28 day June month 2003 year

SAMPLE NO.: CF03-9 QA ID: DLE

CURVE COEFFICIENTS: (C_u) ..... (C_c) .....



ATTERBERG LIMITS

(LL) 31

(PL) 14

(PI) 17

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	98.5
2-in.	98.5
1 1/2-in.	98.0
1-in.	97.8
3/4-in.	96.9
1/2-in.	94.8
3/8-in.	93.1
NO. 4	87.4
NO. 10	82.3
NO. 20	77.6
NO. 40	73.6
NO. 60	70.3
NO. 100	66.3
NO. 200	62.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	5
	3
	9
	6

SOIL CLASSIFICATION (ASTM D 2487): CL ~~Lean~~ Sandy Lean clay

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SHEET NO. 2 OF 2

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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase V

PROJECT NO.: GQ3211 TASK NO.: 3

MATERIAL TYPE: Compacted Fill

DATE: 29 day June month 2003 year

MATERIAL SOURCE: Spoils from stockpile south of Cell #6

SAMPLE NO.: CF03-9

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 5.5-lb RAMMER / 12-in. DROP / 3 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

			4% 13.22	6% 13.45	8% 13.68	10% 13.78	12% QA ID: CHW 13.93
	WATER ADDED	(ml)	100ml	150ml	200ml	250ml	300ml
A	WT. OF SOIL & MOLD	(grams)	5996.5	6100.9	6205.2	6250.6	6227.9
B	WT. OF MOLD	(grams)	4200.9	4200.9	4200.9	4200.9	4200.9
C	WT. OF SOIL = A − B	(grams)	1795.6	1900.0	2004.3	2049.7	2027
D	WET UNIT WT.(1) = C X 0.066	(pcf)	118.5	125.4	132.3	135.3	133.8
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	110.4	114.4	118.9	119.3	116.1

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL. THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

							QA ID: CHW
	TARE NO.		#47	#656	#653	#36	#678
F	WT. OF TARE	(grams)	8.1	8.2	8.3	8.4	8.2
G	WT. OF WET SOIL & TARE	(grams)	374.9	408.2	445.0	514.9	448.3
H	WT. OF DRY SOIL & TARE	(grams)	349.9	373.3	400.5	455.0	390.2
I	WT. OF WATER = G − H	(grams)	25.0	35.0	44.5	59.9	58.1
J	WT. DRY SOIL = H − F	(grams)	341.8	365.1	392.2	446.6	382.0
K	MOISTURE CONTENT = (I/J) X 100	(%)	7.3	9.6	11.3	13.4	15.2

1.073 1.096 1.113 1.134 1.152

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SHEET NO. 1 OF 3

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FLUOR FERNALD 5369

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6G3211 TASK NO. 03

DESCRIPTION: Phase V DATE: 15 day July month 2003 year

MATERIAL TYPE: Compacted Fill CF02-9

Weight of Total Sample	=	36772.8
Weight of Oversize Fraction	=	2528.4
Weight of Finer Fraction (- 3/8)	=	34244.4
Percentage of Oversize Fraction	= (P_C)	6.9
Percentage of Finer Fraction (- 3/8)	= (P_F)	93.1
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.122
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 11.5$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 122.5$$

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FLUOR FERNALD

5369

MOISTURE-DENSITY RELATIONSHIP

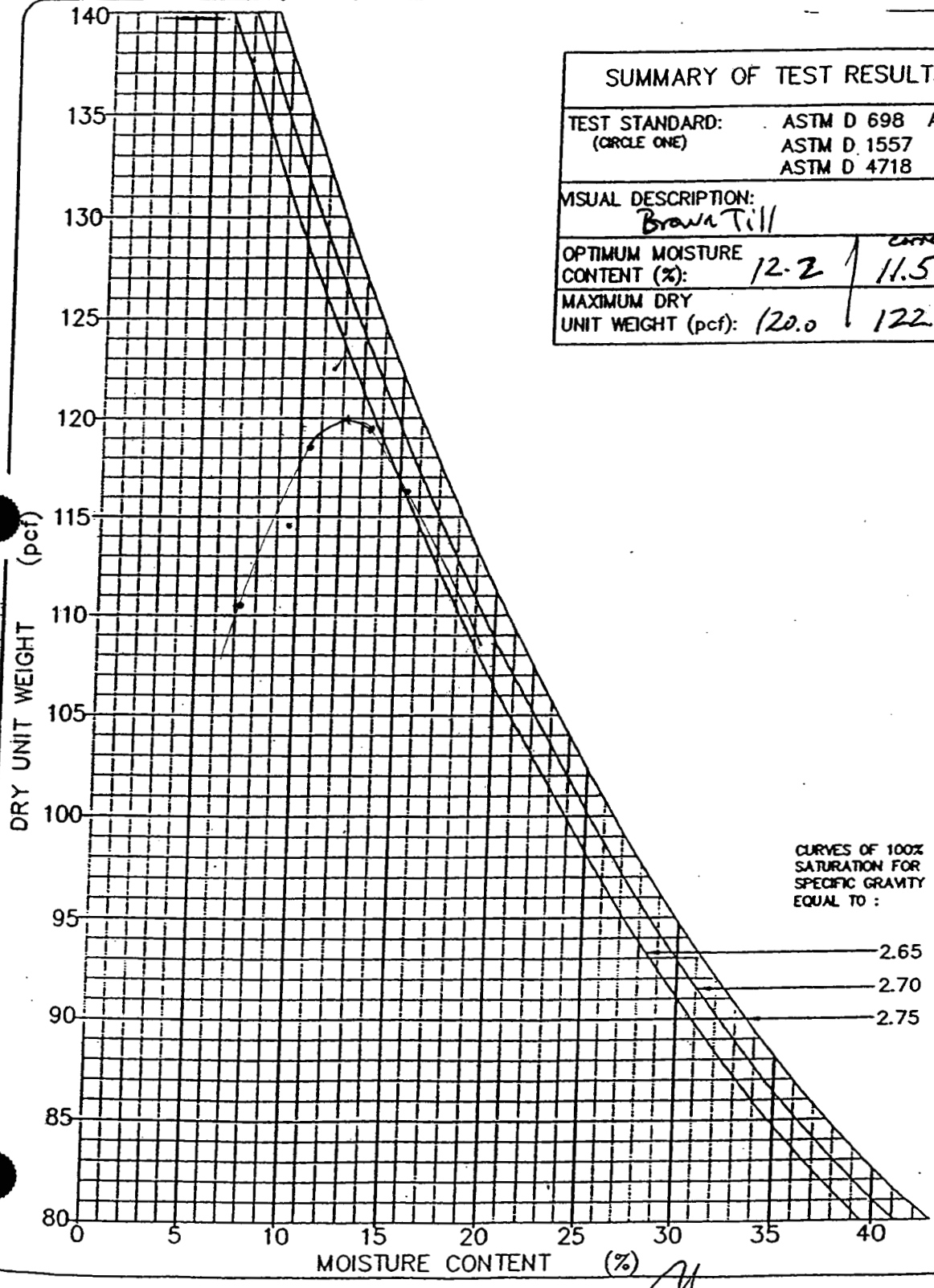
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GØ3211 TASK NO.: 3

DESCRIPTION: PHASE V DATE: 30 day Ø6 month Ø3 year

MATERIAL TYPE: Vegetative Cover MATERIAL SOURCE: STOCKPILE SAMPLE NO.: CFØ3-9

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A (B) C ASTM D 1557 A, B, C ASTM D 4718		KH
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	12.2	corrected 11.5	KH/CA
MAXIMUM DRY UNIT WEIGHT (pcf):	120.0	122.5	KH/CA



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase II — PROJECT NO. GB3211 TASK NO.: 3

MATERIAL TYPE: Compacted Fill — MATERIAL SOURCE: Cell 2 cap materials — DATE: 25 day Aug month 2003 year — SAMPLE NO.: CF03-9

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 5.5-lb RAMMER / 12-in. DROP / 3 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: ~~DHE/SS~~

	WATER ADDED	(ml)	13.77 0%				
A	WT. OF SOIL & MOLD	(grams)	6246.0				
B	WT. OF MOLD	(grams)	4272.0				
C	WT. OF SOIL = A − B	(grams)	1974.0				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	130.3				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	112.1				

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

QA ID: _____

	TARE NO.		#636				
F	WT. OF TARE	(grams)	8.3				
G	WT. OF WET SOIL & TARE	(grams)	456.8				
H	WT. OF DRY SOIL & TARE	(grams)	394.3				
I	WT. OF WATER = G − H	(grams)	62.5				
J	WT. DRY SOIL = H − F	(grams)	386.0				
K	MOISTURE CONTENT = (I/J) X 100	(%)	16.2				

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF) 5369

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: phase V DATE: 07 day Sept month 2003 year

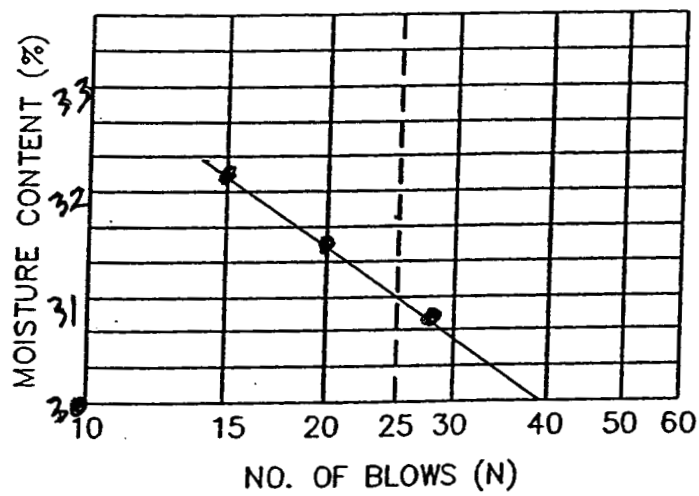
MATERIAL TYPE: Com. F.LL MATERIAL SOURCE: SP-Stock T.139 SAMPLE NO. CF03-10

LIQUID LIMIT DETERMINATION

QA ID: DE

	TARE NO.		2.7	1.8	2.1	
A	WT. OF TARE	(grams)	31.19	28.78	28.23	
B	WT. OF WET SOIL & TARE	(grams)	59.29	54.24	55.60	
C	WT. OF DRY SOIL & TARE	(grams)	52.45	48.13	49.16	
D	WT. OF WATER = B–C	(grams)	6.84	6.11	6.44	
E	WT. OF DRY SOIL = C–A	(grams)	21.26	19.35	20.93	
F	MOISTURE CONTENT = (D/E)X100	(%)	32.2	31.6	30.8	
N	NUMBER OF BLOWS		15	20	28	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DE

	TARE NO.		A-202	A-210		
A	WT. OF TARE	(grams)	3.55	3.55		
B	WT. OF WET SOIL & TARE	(grams)	12.83	14.35		
C	WT. OF DRY SOIL & TARE	(grams)	11.58	12.87		
D	WT. OF WATER = B–C	(grams)	1.25	1.48		
E	WT. OF DRY SOIL = C–A	(grams)	8.03	9.32		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.6	15.9		

LIQUID LIMIT (LL) = 31 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 15

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FLUOR FERNALD

5369

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: PHASE V — DATE: 26 day Aug month 2003 year

MATERIAL TYPE: Compacted Fill — SAMPLE NO.: ~~LP03-~~ CF03-10

SOIL SAMPLE SIZE	+3/8 = 22007.0 gm	MOISTURE = 274.61	22655.8	TOTAL = ~~4163.3~~
	-3/8 = 19580.0			

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	48.6 (grams)	SAND	FINE GRAIN
300/300 17500 600		115	65

AH. -3/8	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-1	L-7	L-1	L-7
WT. OF DRY SAMPLE PLUS TARE (grams)	2393.0	762.4	2237.3	
WT. OF TARE (grams)	192.3	192.9	192.3	192.9
WT. OF DRY SAMPLE (grams)	2200.7	569.5	2045.0	

SIEVE ANALYSIS — QA ID: DLE/CA

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	0		100
2 in	50.8	1049.0	0	95.4		
1 1/2in	38.1	1193.3	0	94.7		
1 in	25.4	1328.1	5.9	94.1		
3/4 in	19.1	1585.4	7.0	93.0		90 To 100
1/2 in	12.7	1896.7	8.4	91.6		
3/8 in	9.53	2033.3	9.0	91.0		
No. 4	4.75	137	2.4	97.6	88.8	
No. 10	2.00	391	6.9	93.1	84.8	
No. 20	0.850	66.5	11.7	88.3	80.4	
No. 40	0.425	91.3	16.0	84.0	76.4	
No. 60	0.250	111.2	19.5	80.5	73.3	
No. 100	0.125	134.2	23.6	76.4	69.6	
No. 200	0.075	161.9	28.4	71.6	65.1	50 To 100
PAN	—	164.3				

COMMENTS:

000272

%FINER = 100 − Σ% RETAINED

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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.: GQ3211 TASK NO.: 3

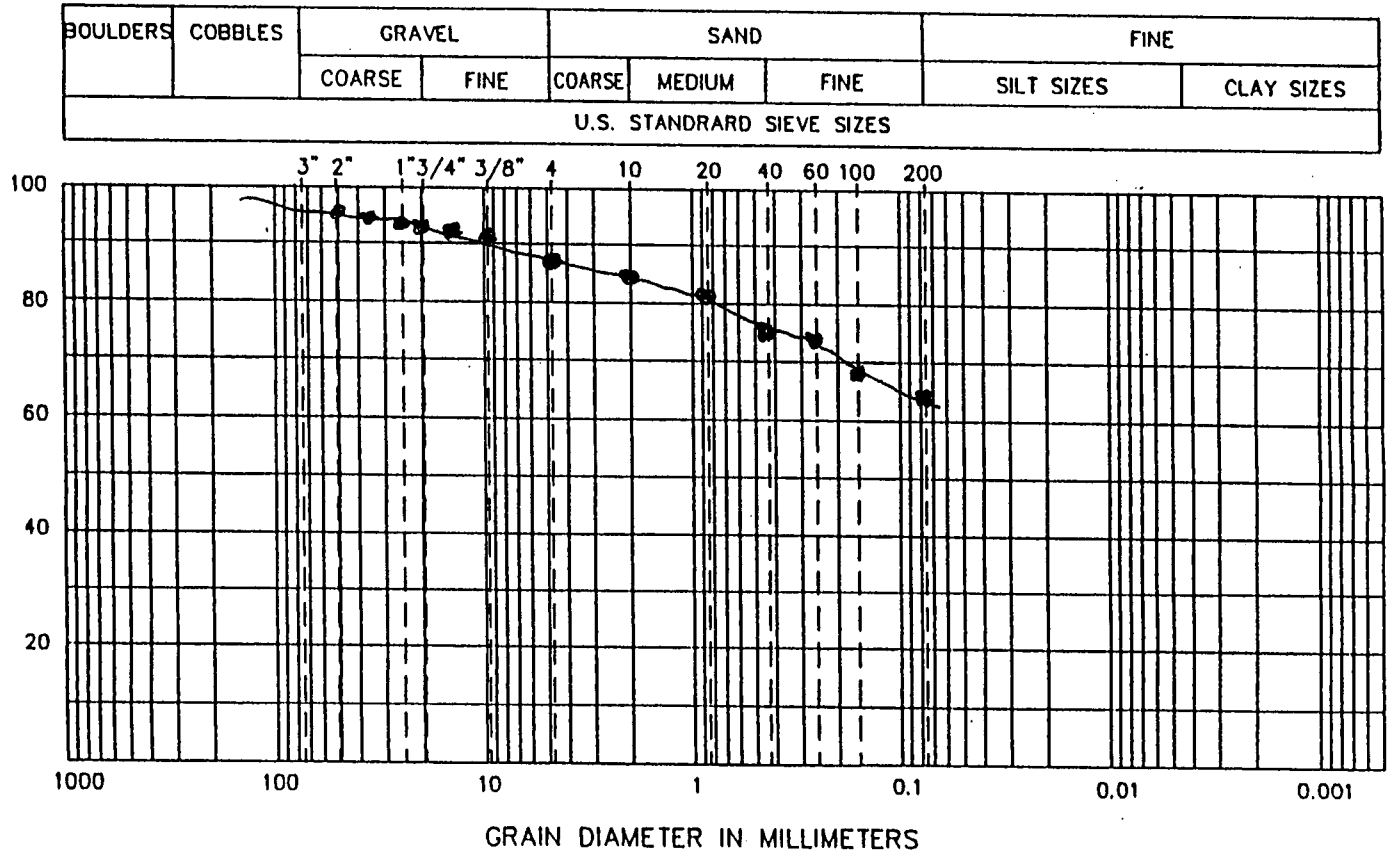
DESCRIPTION: Phase V

DATE: 02 day Sept month 2003 year

MATERIAL TYPE: Compacted Fill

SAMPLE NO.: CF03-10 QA ID: PTC

CURVE COEFFICIENTS: (C_u) ..... (C_c) .....



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	95.4
1 1/2-in.	94.7
1-in.	94.1
3/4-in.	93.0
1/2-in.	91.6
3/8-in.	91.0
NO. 4	88.8
NO. 10	84.8
NO. 20	80.4
NO. 40	76.4
NO. 60	73.3
NO. 100	69.6
NO. 200	65.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	53
	36
	19

SOIL CLASSIFICATION (ASTM D 2487): _____

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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase V — PROJECT NO.: GQ321 TASK NO.: 3

MATERIAL TYPE: CFill — DATE: 27 day Aug month 2003 year

MATERIAL SOURCE: — SAMPLE NO.: CF03-11

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 5.5-lb RAMMER / 12-in. DROP / 3 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

			13.16	13.32	12.93	13.69	13.61
	WATER ADDED	(ml)	2%	4%	0%	8%	QA ID: 55 10%
A	WT. OF SOIL & MOLD	(grams)	5969.4	6042.0	5865.1	6209.8	~~6209.8~~ 6173.5
B	WT. OF MOLD	(grams)	4272.0				4272.0
C	WT. OF SOIL = A − B	(grams)	1697.4	1770	1593.1	1937.8	~~1937.8~~ 1901.5
D	WET UNIT WT.(1) = C X 0.066	(pcf)	112.0	116.8	105.1	127.9	~~127.9~~ 125.5
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	101.4	103.6	97.5	109.6	105.8

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL. THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

	TARE NO.		#657	#35	#31	#27	QA ID: #602
F	WT. OF TARE	(grams)	8.1	8.4	8.3	8.2	8.3
G	WT. OF WET SOIL & TARE	(grams)	395.1	439.2	428.1	374.5	403.8
H	WT. OF DRY SOIL & TARE	(grams)	358.2	390.8	397.7	322.2	341.7
I	WT. OF WATER = G − H	(grams)	36.9	48.4	30.4	52.3	62.1
J	WT. DRY SOIL = H − F	(grams)	350.1	382.4	389.4	314.0	333.4
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.5	12.7	7.8	16.7	18.6

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SHEET NO. 1 OF 3

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FLUOR FERNALD

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G03211 TASK NO. 03

DESCRIPTION: Phase V DATE: 2 day Sept month 2003 year

MATERIAL TYPE: Compacted Fill CF03-11

Weight of Total Sample	=	23788.5
Weight of Oversize Fraction	=	1601.1
Weight of Finer Fraction (- 3/8)	=	22187.4
Percentage of Oversize Fraction	= (P_C)	6.7
Percentage of Finer Fraction (- 3/8)	= (P_F)	93.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.169
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	109.9
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 15.9\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 112.6$ pcf

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FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

5369

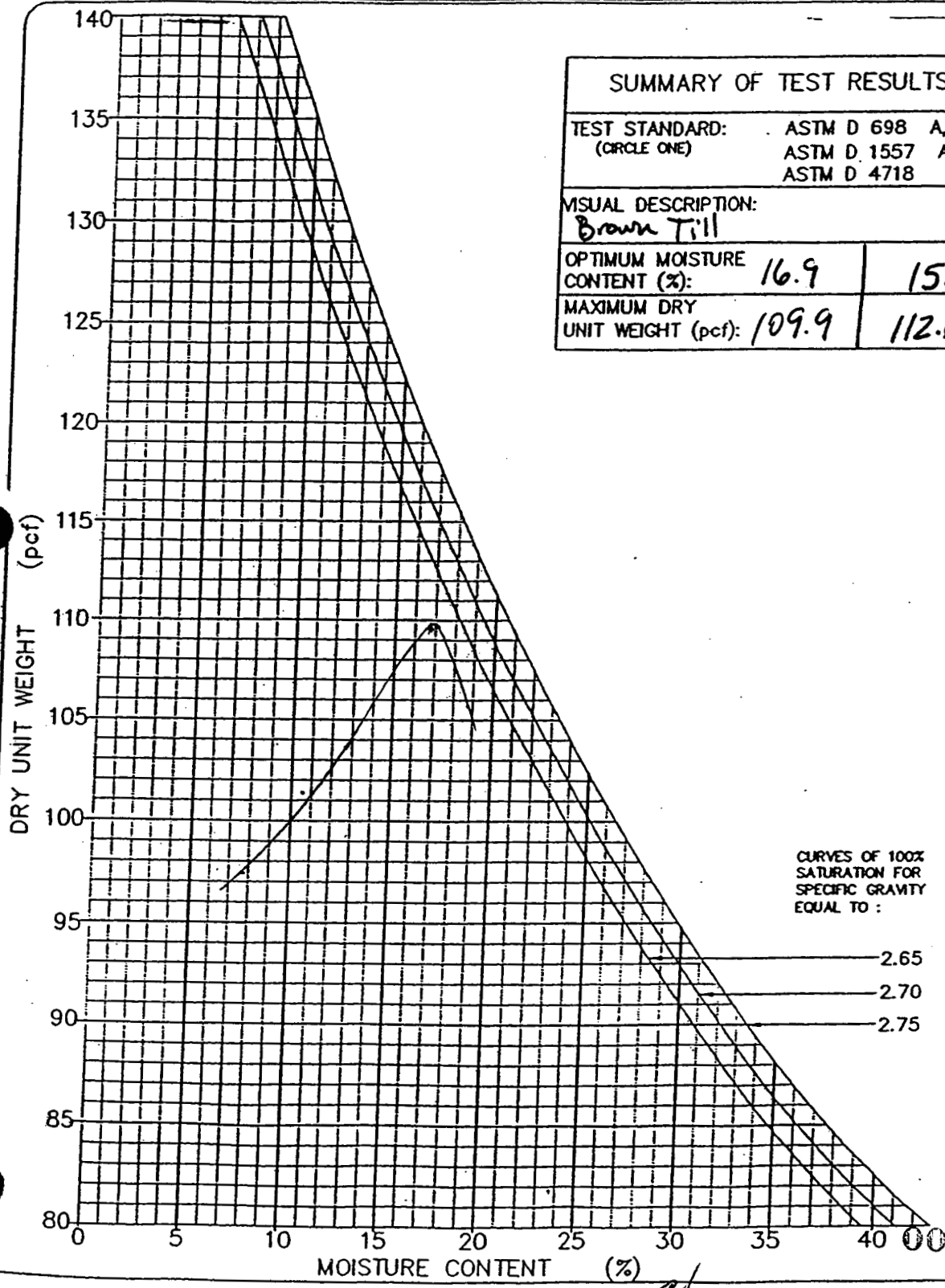
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: Phase V DATE: 2 day Sept month 2003 year

MATERIAL TYPE: CF MATERIAL SOURCE: SAMPLE NO.: CF03-11

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B), C ASTM D 1557 A, B, C ASTM D 4718		SS
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	16.9	15.9	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	109.9	112.6	CJ



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ATTERBERG LIMITS TEST

5369 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q3211 TASK NO.: 3

DESCRIPTION: Phase II DATE: 03 day Sept month 2005 year

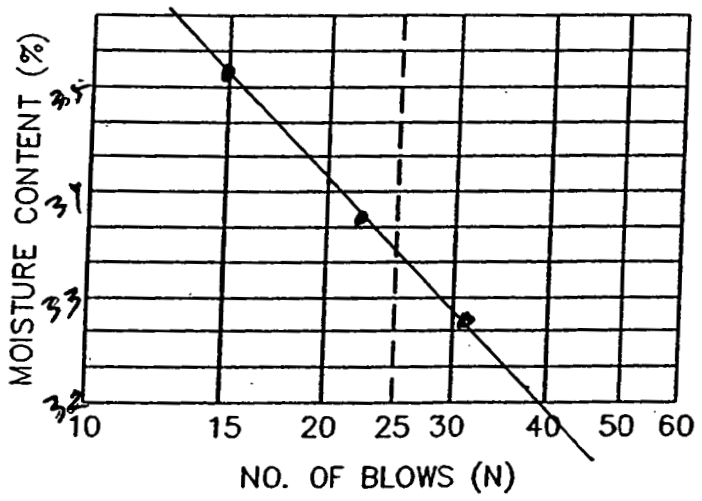
MATERIAL TYPE: Comp F.LL MATERIAL SOURCE: SP-S/W of T-139 SAMPLE NO. CF03011

LIQUID LIMIT DETERMINATION

QA ID: DJP

	TARE NO.		2.7	1.6	2.9	
A	WT. OF TARE	(grams)	28.68	28.86	31.46	
B	WT. OF WET SOIL & TARE	(grams)	57.40	56.31	60.45	
C	WT. OF DRY SOIL & TARE	(grams)	49.93	49.39	53.29	
D	WT. OF WATER = B-C	(grams)	7.47	6.92	7.16	
E	WT. OF DRY SOIL = C-A	(grams)	21.25	20.53	21.83	
F	MOISTURE CONTENT = (D/E)X100	(%)	35.2	33.7	32.8	
N	NUMBER OF BLOWS		15	27	31	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DJP

	TARE NO.		B-11	A.241		
A	WT. OF TARE	(grams)	3.43	3.20		
B	WT. OF WET SOIL & TARE	(grams)	11.61	11.27		
C	WT. OF DRY SOIL & TARE	(grams)	10.50	10.16		
D	WT. OF WATER = B-C	(grams)	1.11	1.11		
E	WT. OF DRY SOIL = C-A	(grams)	7.07 ~~7.16~~	6.96		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.7 ~~15.5~~	15.9		

LIQUID LIMIT (LL) = 33 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 17

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FLUOR FERNALD

5369

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ3211 — TASK NO.: 3

DESCRIPTION: PHASE V — DATE: 26 day Aug month 2003 year

MATERIAL TYPE: Compacted Fill — SAMPLE NO.: ~~LP~~ CF03-11

SOIL SAMPLE SIZE: +3/8 = 1685.1 gm; -3/8 = 21822.7; MOISTURE = 280.7 gm; TOTAL = 23788.5

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
49.85 − 1.74 = 48.11	115	65

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-7	L-1	L-7	L-1
WT. OF DRY SAMPLE PLUS TARE	(grams)	1877.3	746.3	1793.5	325.1
WT. OF TARE	(grams)	192.2	192.4	192.2	192.4
WT. OF DRY SAMPLE	(grams)	1685.1	554.9	1601.3	132.7

SIEVE ANALYSIS — QA ID: DLB

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	916.4	3.9	96.1		100
2 in	50.8	916.4	3.9	96.1		
1 1/2in	38.1	1039.1	4.4	95.6		
1 in	25.4	1206.2	5.1	94.9		
3/4 in	19.1	1287.5	5.4	94.6		90 To 100
1/2 in	12.7	1500.3	6.3	93.7		
3/8 in	9.53	1601.1	6.7	93.3		
No. 4	4.75	8.7	1.6	98.4	91.8	
No. 10	2.00	24.6	4.4	95.6	89.2	
No. 20	0.850	44.8	8.1	91.9	85.7	
No. 40	0.425	65.3	11.8	88.2	82.3	
No. 60	0.250	84.4	15.2	84.8	79.1	
No. 100	0.125	107.5	19.4	80.6	75.2	
No. 200	0.075	132.0	23.8	76.2	71.1	50 To 100
PAN	—	132.5	—	—		

.933

COMMENTS:

000278

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: [signature] — SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

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.: GQ3211 TASK NO.: 3

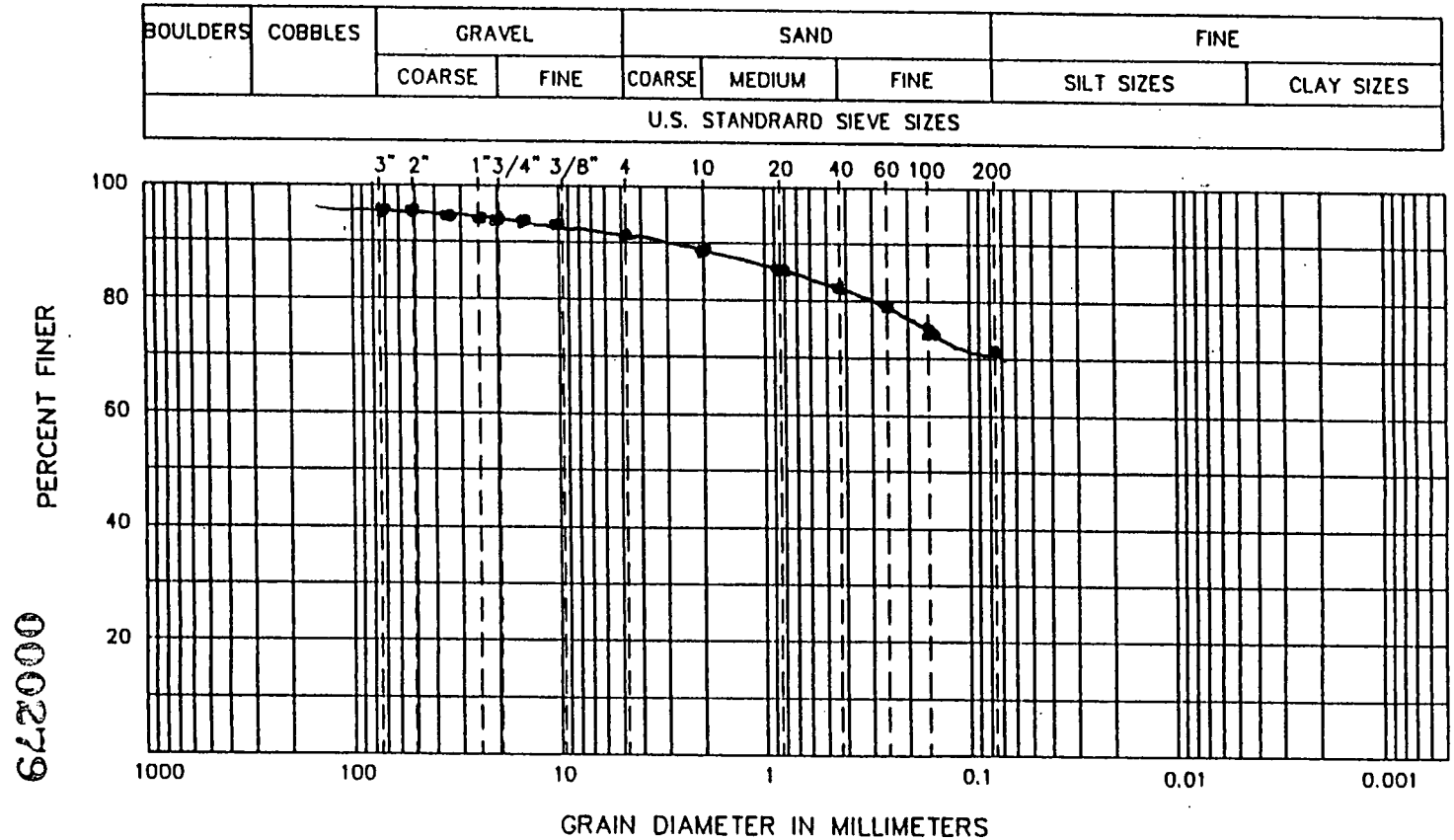
DESCRIPTION: Phase IV

DATE: 28 day Aug month 2003 year

MATERIAL TYPE: Compacted FILL

SAMPLE NO.: CF03-11 QA ID: DJC

CURVE COEFFICIENTS: (C_u) ..... (C_c) .....



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	96.1
2-in.	96.1
1 1/2-in.	95.6
1-in.	94.9
3/4-in.	94.6
1/2-in.	93.9
3/8-in.	93.3
NO. 4	91.8
NO. 10	89.2
NO. 20	85.7
NO. 40	82.3
NO. 60	79.1
NO. 100	75.2
NO. 200	71.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): _____

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO. GQ3211 TASK NO.: 3

MATERIAL TYPE: Comp. fill — MATERIAL SOURCE: — DATE: 28 day Aug month 2003 year

SAMPLE NO.: CF03-10

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 5.5-lb RAMMER / 12-in. DROP / 3 LAYERS / 25 BLOWS PER LAYER.

13.45

COMPACTION OF SOIL

QA ID: [illegible]

			13.75	13.87	13.86		
	WATER ADDED	(ml)	6% 150mL	8% 200mL	10% 250mL		4% 100mL
A	WT. OF SOIL & MOLD	(grams)	6237.0	6291.4	6286.9		6106.9
B	WT. OF MOLD	(grams)	4272.0	4272.0	4272.0	4272.0	4272.0
C	WT. OF SOIL = A − B	(grams)	1965.0	2019.4	2014.9		1828.9
D	WET UNIT WT.(1) = C X 0.066	(pcf)	129.7	133.3	133.0		120.7
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	117.1	117.3	114.7		111.0

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL. THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

QA ID: ____

	TARE NO.		#38	#57	#307		#617
F	WT. OF TARE	(grams)	8.1	8.2	8.3		8.2
G	WT. OF WET SOIL & TARE	(grams)	460.0	566.3	578.0		498.1
H	WT. OF DRY SOIL & TARE	(grams)	416.3	499.4	499.7		458.7
I	WT. OF WATER = G − H	(grams)	43.7	66.9	78.3		39.4
J	WT. DRY SOIL = H − F	(grams)	408.2	491.2	491.4		450.5
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.7	13.6	15.9		8.7

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5369

FLUOR FERNALD

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G03211 TASK NO. 03

DESCRIPTION: Phase V DATE: 28 day Aug month 2003 year

MATERIAL TYPE: Compacted Fill LP03-10

Weight of Total Sample	=	22655.3
Weight of Oversize Fraction	=	2033.3
Weight of Finer Fraction (- 3/8)	=	20622.0
Percentage of Oversize Fraction	= (P_C)	9.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	91.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.124
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 11.4\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 123.7 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

MOISTURE–DENSITY RELATIONSHIP

5369

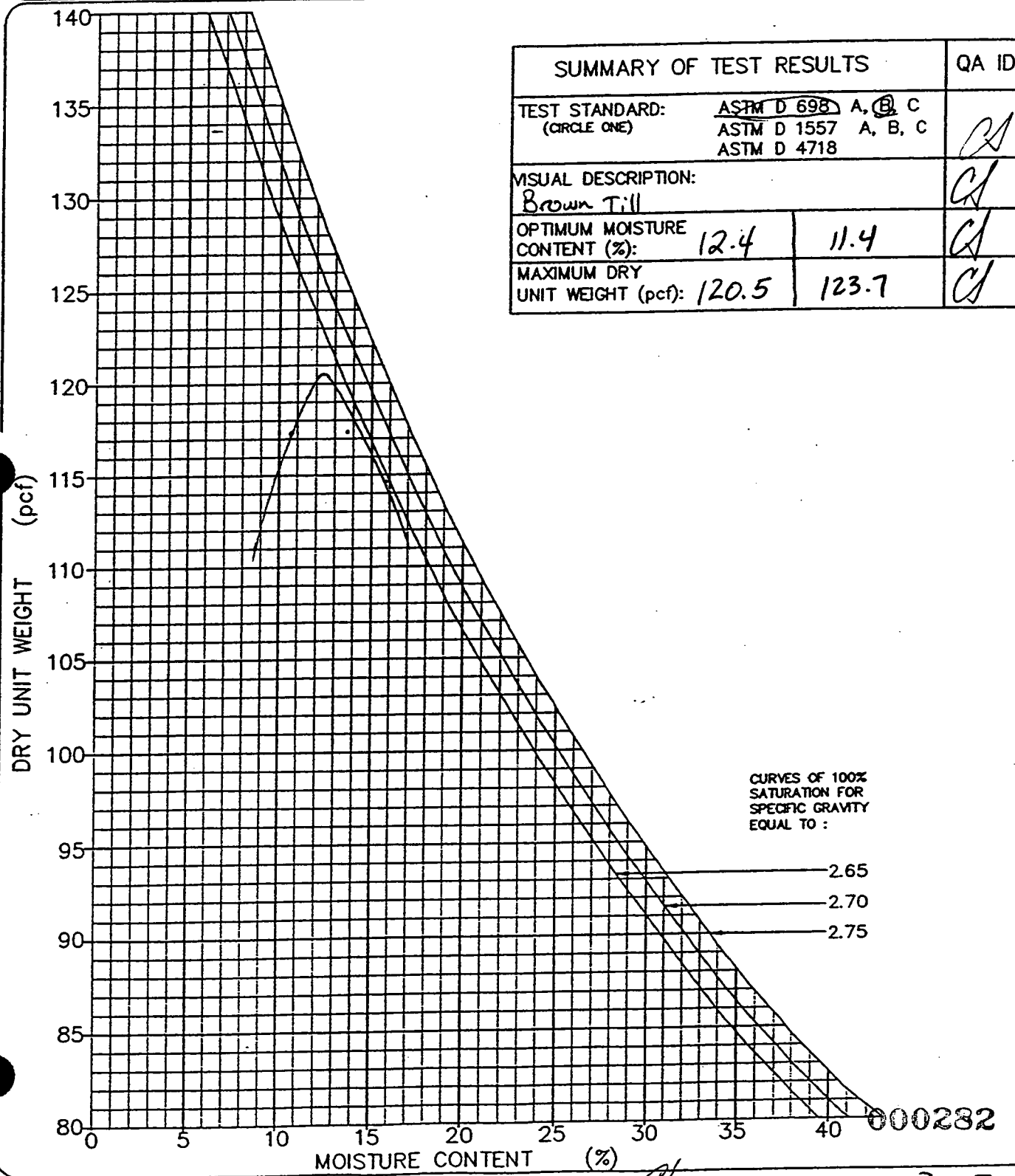
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G232 11 TASK NO.: 3

DESCRIPTION: Phase V DATE: 28 day Aug month 2003 year

MATERIAL TYPE: Compacted Fill MATERIAL SOURCE: SAMPLE NO.: CP43-10

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	12.4	11.4	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	120.5	123.7	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

5369

ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: Phase II DATE: 24 day Oct month 2003 year

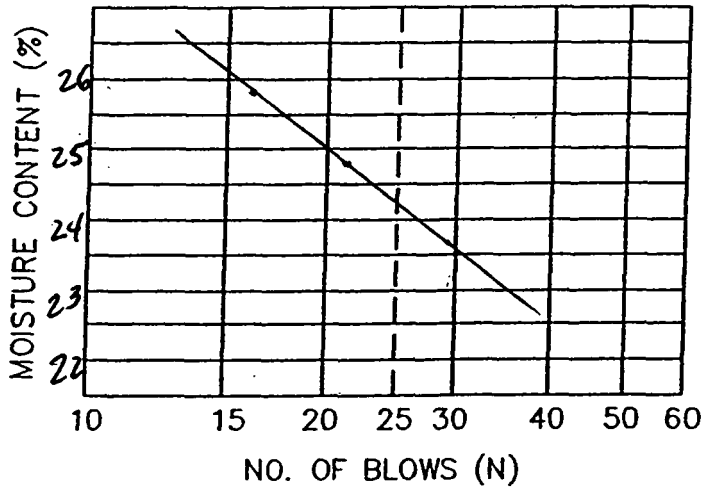
MATERIAL TYPE: ~~Gray Till~~ Compacted Fill MATERIAL SOURCE: Stockpile SW of T-139 SAMPLE NO.: CF03-12

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.7	2.5	2.2	
A	WT. OF TARE	(grams)	28.48	28.44	27.62	
B	WT. OF WET SOIL & TARE	(grams)	47.92	43.71	45.68	
C	WT. OF DRY SOIL & TARE	(grams)	43.93	40.67	42.22	
D	WT. OF WATER = B-C	(grams)	3.99	3.04	3.46	
E	WT. OF DRY SOIL = C-A	(grams)	15.45	12.25	14.6	
F	MOISTURE CONTENT = (D/E)X100	(%)	25.8	24.8	23.7	
N	NUMBER OF BLOWS		16	21	29	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.3	1.4		
A	WT. OF TARE	(grams)	28.64	28.49		
B	WT. OF WET SOIL & TARE	(grams)	38.02	40.94		
C	WT. OF DRY SOIL & TARE	(grams)	36.89	39.45		
D	WT. OF WATER = B-C	(grams)	1.13	1.49		
E	WT. OF DRY SOIL = C-A	(grams)	8.25	10.96		
	MOISTURE CONTENT = (D/E)X100	(%)	13.7	13.6		

000233

LIQUID LIMIT (LL) = 24 PLASTIC LIMIT (PL) = 14 PLASTICITY INDEX (PI) = 10

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5369

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: PHASE V DATE: 23 day October month 2003 year

MATERIAL TYPE: Compacted Fill SAMPLE NO.: CF03-12

SOIL SAMPLE SIZE: +3/8 = 1722.2 -3/8 = 21301.1 MOISTURE = ~ TOTAL = 23,023.3

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	SB3	L-9	SB3	L-9
WT. OF DRY SAMPLE PLUS TARE (grams)	2018.6	855.2	1917.5	404.6
WT. OF TARE (grams)	296.4	193.2	296.4	193.2
WT. OF DRY SAMPLE (grams)	1722.2	662.0	1621.1	211.4

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100%		
2 in	50.8	238.5	1.0	99%		
1 1/2in	38.1	~~0~~ 238.5	~~0~~ 1.0	~~100%~~ 99		
1 in	25.4	609.2	2.6	97.4		
3/4 in	19.1	815.5	3.5	96.5		
1/2 in	12.7	1298.0	5.6	94.4		
3/8 in	9.53	1612.8	7.0	93.0		.93
No. 4	4.75	33.0	5.0	95	88.4	
No. 10	2.00	68.4	10.3	89.7	83.4	
No. 20	0.850	99.2	15.0	85.0	79.1	
No. 40	0.425	125.7	19	81.0	75.3	
No. 60	0.250	147.3	22.3	77.7	72.3	
No. 100	0.125	174.5	26.4	73.6	68.4	
No. 200	0.075	208.3	31.5	~~31~~ 68.5	63.7	
PAN	—	211.0	—	—		

COMMENTS:

000284

%FINER = 100 − Σ% RETAINED

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

GEOSYNTEC CONSULTANTS

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

DESCRIPTION: Phase IV

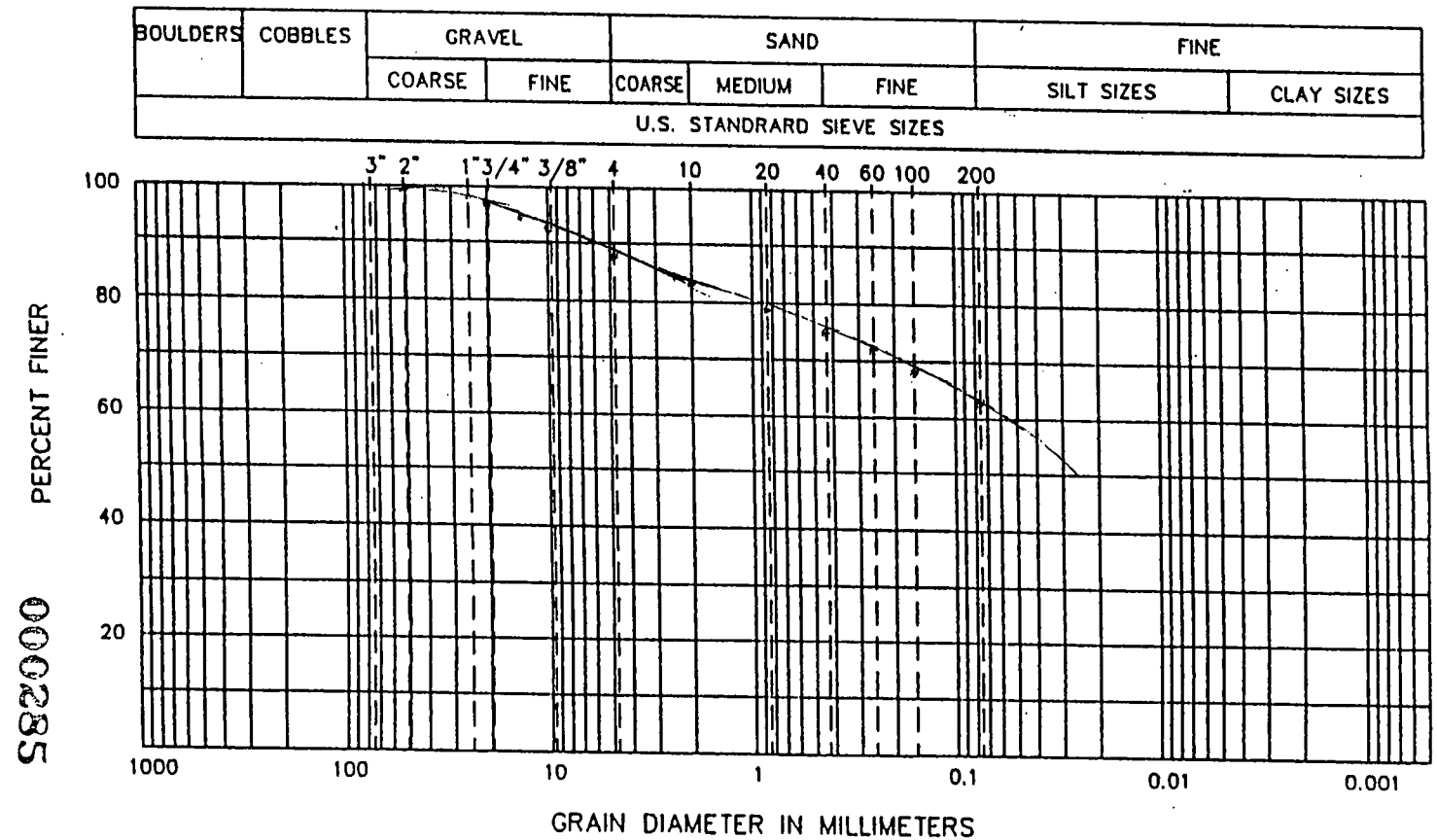
MATERIAL TYPE: Compacted Fill

PROJECT NO.: GQ3211 TASK NO.: 3

DATE: 27 day Oct month 2003 year

SAMPLE NO.: CF03-12 QA ID: 55

CURVE COEFFICIENTS: (C_u) ..... (C_c) .....



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	99
1 1/2-in.	100
1-in.	97.4
3/4-in.	96.5
1/2-in.	94.4
3/8-in.	93.0
NO. 4	88.4
NO. 10	83.4
NO. 20	79.1
NO. 40	75.3
NO. 60	72.3
NO. 100	68.4
NO. 200	63.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): Sandy Lean Clay

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SHEET NO. ___ OF ___

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase I — PROJECT NO.: GQ3211 TASK NO.: 2

MATERIAL TYPE: Gray Till / Compactal Fill — DATE: 28 day October month 2003 year

MATERIAL SOURCE: East Borrow area — SAMPLE NO.: CF03-12

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 5.5-lb RAMMER / 12-in. DROP / 3 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

			13.64	13.72	13.94	13.88	QA ID: CHW
	WATER ADDED	(ml)	100	150	200	250	~~13.46~~ 100
A	WT. OF SOIL & MOLD	(grams)	6187.1	6223.4	6323.2	6296.0	6105.5
B	WT. OF MOLD	(grams)	4200.9				4200.9
C	WT. OF SOIL = A − B	(grams)	1986.2	2022.5	2122.3	2095.1	1904.6
D	WET UNIT WT.(1) = C X 0.066	(pcf)	131.1	133.5	140.1	138.3	125.7
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	121.8	122.0	125.0	121.6	116.9

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

	TARE NO.		#47	#16	#664	#655	QA ID: CHW #4
F	WT. OF TARE	(grams)	8.1	8.5	8.3	8.0	8.1
G	WT. OF WET SOIL & TARE	(grams)	508.9	463.8	459.7	617.6	522.3
H	WT. OF DRY SOIL & TARE	(grams)	473.7	424.6	410.8	544.3	486.0
I	WT. OF WATER = G − H	(grams)	35.2	39.2	48.9	73.3	36.3
J	WT. DRY SOIL = H − F	(grams)	465.6	416.1	402.5	536.3	477.9
K	MOISTURE CONTENT = (I/J) X 100	(%)	7.6	9.4	12.1	13.7	7.6

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SHEET NO. 1 OF 3

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GeoSyntec Consultants

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FLUOR FERNALD

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES

(ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ3211 TASK NO. 03

DESCRIPTION: Phase V DATE: 30 day Oct month 2003 year

MATERIAL TYPE: Compacted Fill CF03-12 STD

Weight of Total Sample	=	23,023.3
Weight of Oversize Fraction	=	1612.8
Weight of Finer Fraction (-3/8)	=	21410.5
Percentage of Oversize Fraction	= (P_C)	7.0
Percentage of Finer Fraction (-3/8)	= (P_F)	93.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.115
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	126.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 10.8\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 128.3$ pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5369

MOISTURE-DENSITY RELATIONSHIP

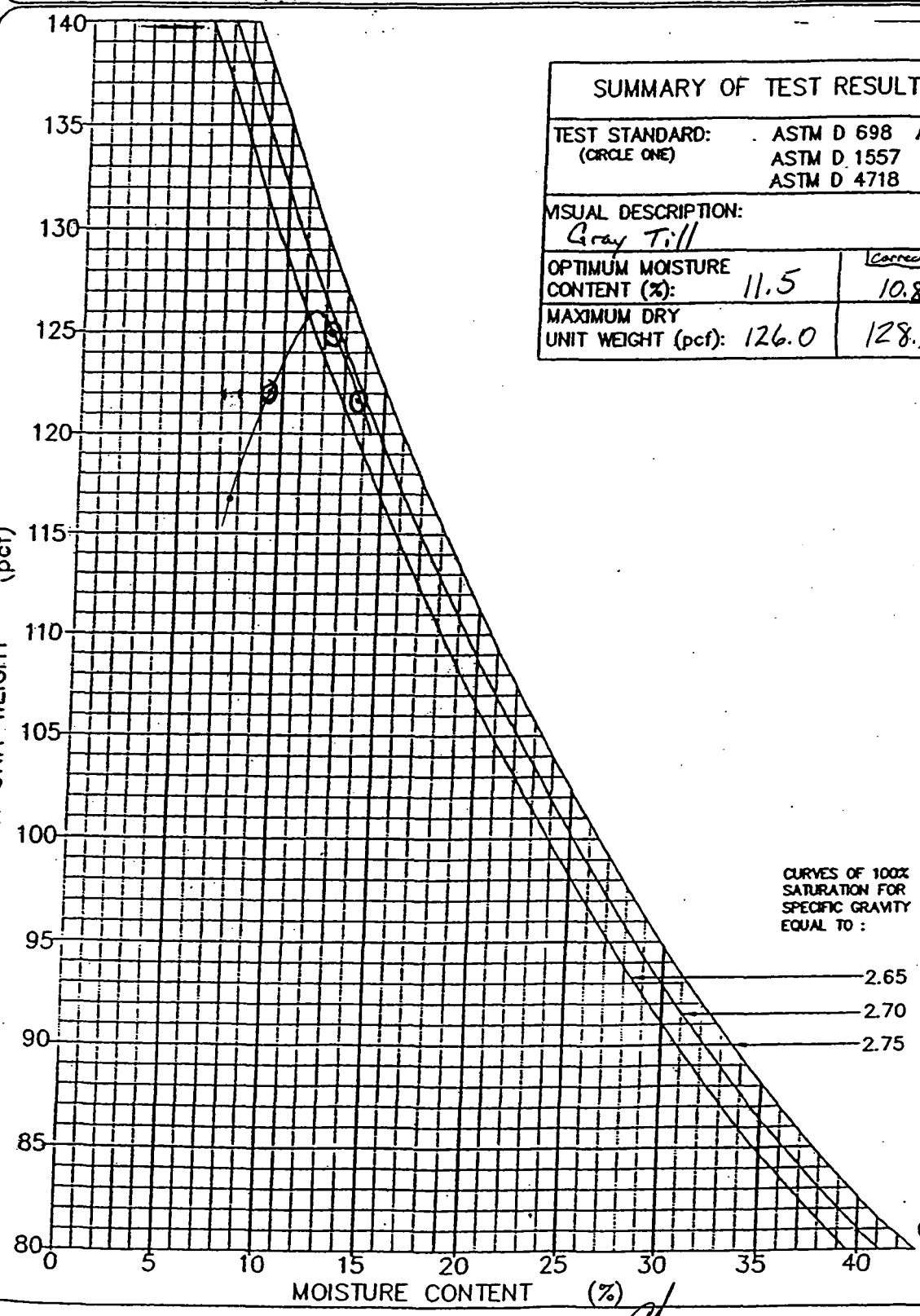
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 2

DESCRIPTION: Phase I DATE: 30 day Oct month 2003 year

MATERIAL TYPE: Compacted fill MATERIAL SOURCE: East Borrow area SAMPLE NO.: CF03-12

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Gray Till			CJ
OPTIMUM MOISTURE CONTENT (%):	11.5	Corrected 10.8	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	126.0	128.3	CJ



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TOPSOIL

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

5369

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: Phase V DATE: 24 day Oct month 2003 year

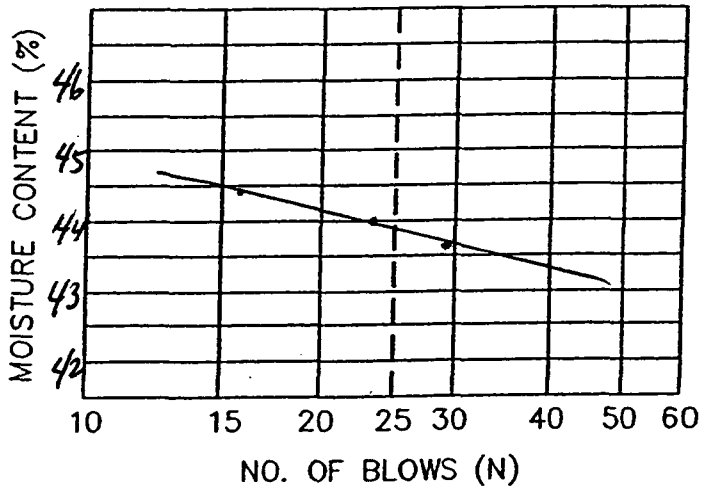
MATERIAL TYPE: Topsoil MATERIAL SOURCE: SAMPLE NO.: TS03-1

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.8	2.3	2.6	
A	WT. OF TARE	(grams)	28.80	31.21	28.55	
B	WT. OF WET SOIL & TARE	(grams)	48.21	48.82	46.37	
C	WT. OF DRY SOIL & TARE	(grams)	42.24	43.44	40.96	
D	WT. OF WATER = B-C	(grams)	5.97	5.38	5.41	
E	WT. OF DRY SOIL = C-A	(grams)	13.44	12.23	12.41	
F	MOISTURE CONTENT = (D/E)X100	(%)	44.4	44.0	43.6	
N	NUMBER OF BLOWS		16	23	29	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		2.1	1.5		
A	WT. OF TARE	(grams)	28.25	28.61		
B	WT. OF WET SOIL & TARE	(grams)	37.18	39.34		
C	WT. OF DRY SOIL & TARE	(grams)	35.73	37.58		
D	WT. OF WATER = B-C	(grams)	1.45	1.76		
	WT. OF DRY SOIL = C-A	(grams)	7.48	8.97		
	MOISTURE CONTENT = (D/E)X100	(%)	19.4	19.6		

000290

LIQUID LIMIT (LL) = 44 PLASTIC LIMIT (PL) = 20 PLASTICITY INDEX (PI) = 24

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD

5 3 6 (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GO321 — TASK NO.: 3

DESCRIPTION: PHASE V — DATE: 23 day October month 2003 year

MATERIAL TYPE: Topsoil — SAMPLE NO.: TS03-1

SOIL SAMPLE SIZE	+3/8 = 91.1	MOISTURE =	TOTAL = 3230.7
	-3/8 = 3139.6 g		

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-8	L-1	L-8	
WT. OF DRY SAMPLE PLUS TARE (grams)	284.1	806.3	335.2	335.2
WT. OF TARE (grams)	193.0	192.2	193.0	193.0
WT. OF DRY SAMPLE (grams)	91.1	(614.1)	85.9	142.2

SIEVE ANALYSIS — QA ID: 55

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		
1 1/2in	38.1	0	0	100		
1 in	25.4	0	0	100		
3/4 in	19.1	20.7	0.6	99.4		
1/2 in	12.7	75.3	2.3	97.7		
3/8 in	9.53	86.7	2.7	97.3		
No. 4	4.75	15.3	2.5	97.5	94.9	
No. 10	2.00	36.0	5.9	94.1	91.6	
No. 20	0.850	61.7	10	90.0	81.6	
No. 40	0.425	83.9	13.7	86.3	~~77.4~~ 84.0	
No. 60	0.250	100.0	16.3	83.7	~~74.4~~ 81.4	
No. 100	0.125	119.2	19.4	80.6	78.4	
No. 200	0.075	140.3	22.8	77.2	75.1	
PAN	—	143.0	—	—		

COMMENTS:

000291

% FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS

CHECKED BY: [signature]

SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

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

DESCRIPTION: Phase II

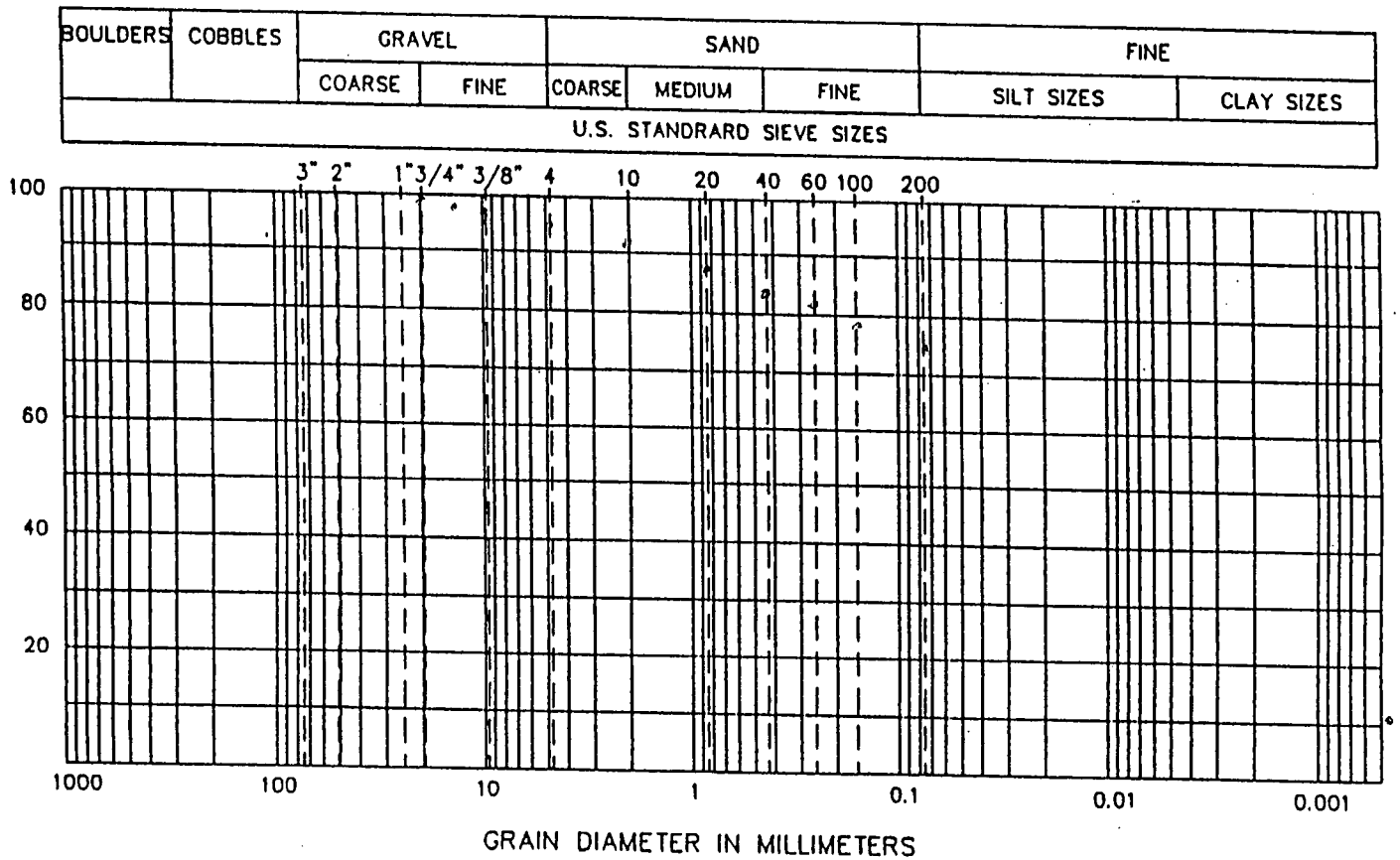
MATERIAL TYPE: Topsoil

PROJECT NO.: GQ3211 TASK NO.: 3

DATE: 27 day Oct month 2003 year

SAMPLE NO.: TS03-1 QA ID: SS

CURVE COEFFICIENTS: (C_u) ..... (C_c) .....



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.	99.4
1/2-in.	97.7
3/8-in.	97.3
NO. 4	94.9
NO. 10	91.6
NO. 20	87.6
NO. 40	84.0
NO. 60	81.4
NO. 100	78.4
NO. 200	75.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	53
	39
	9

SOIL CLASSIFICATION (ASTM D 2487): Lean Clay with Sand

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: [illegible]

SHEET NO. 2 OF 2

002092

OCTOBER 2003 033-3586

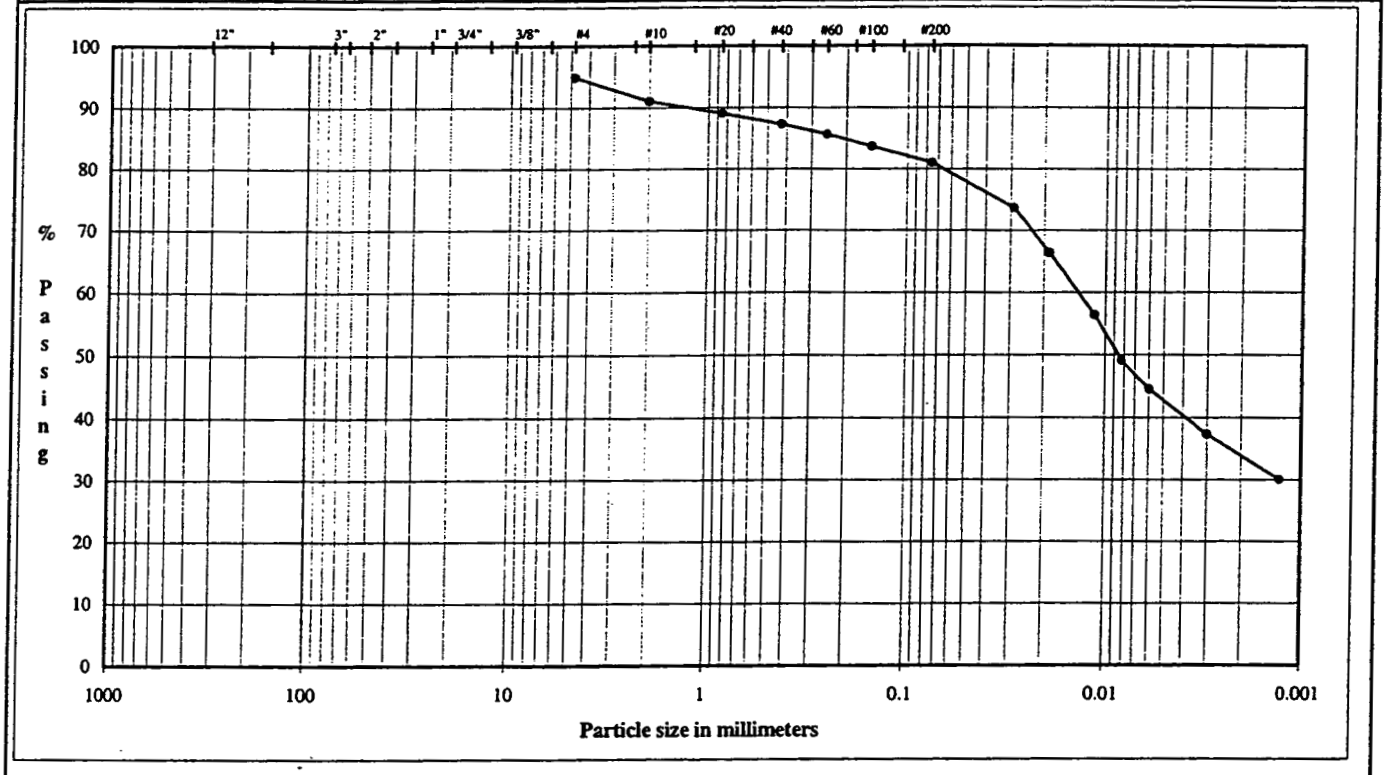
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: GEOSYNTEC/FLUOR FERNALD/GA

SAMPLE ID: TS03-1 Depth: 5369

TYPE: Bag



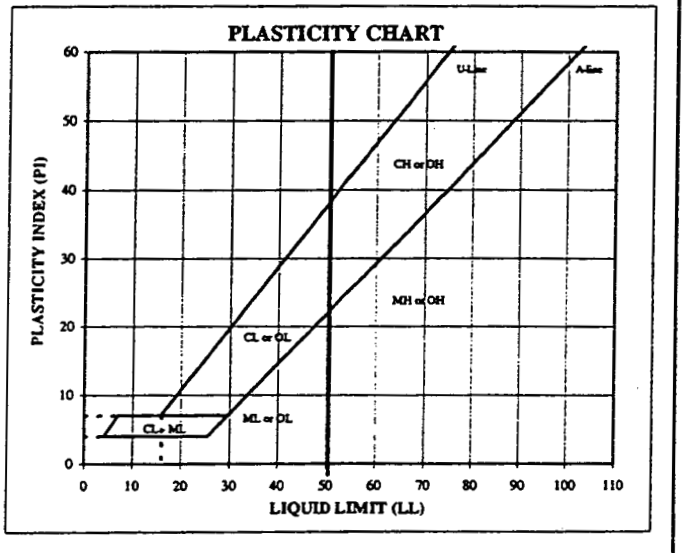
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8			
3.0"	75.0		Cobbles	
2.5"	63.5			
2.0"	50.0			
1.5"	37.5			
1.0"	25.0			
0.75"	19.0		Coarse Gravel	
0.50"	12.7			
0.375"	9.5			
#4	4.8	94.9	Fine Gravel	5.10
#10	2.00	91.0	Coarse Sand	3.86
#20	0.85	89.1		
#40	0.43	87.3	Medium Sand	3.75
#60	0.25	85.7		
#100	0.15	83.7		
#200	0.075	81.0	Fine Sand	6.27

Hydrometer Analysis

(mm)	%Finer		
0.029	73.7		
0.019	66.4		
0.011	56.4	Fines	
0.0083	49.1	Silt or Clay	81.03
0.0060	44.6		
0.0030	37.3		
0.0013	30.0		



ATTERBERG LIMITS

Method - A (Dry preparation)

M_c	LL	PL	PI	LI

LL (oven-dried)	
< 0.75 = ORGANIC (OL/OH)	

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

USCS: (CL)

TECH	BW
DATE	10/27/03
CHECK	BJS
REVIEW	[illegible]

000293

ORGANIC CONTENT (PERCENT ORGANICS)

ASTM D 2974

Method C

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	TS03-1
PROJECT NO.	033-3586	SAMPLE TYPE	Bag
REMARKS		SAMPLE DEPTH	-

Hygroscopic Moisture Content

Tare Number		80
Weight Of Wet Soil & Tare (gm)		34.80
Weight Of Dry Soil & Tare (gm)		34.53
Weight of Tare (gm)		0.99
Weight Of Water In (gm)		0.27
Weight Of Dry Soil (gm)		33.54
Moisture Content (%)	Mc_H	0.81

Crucible Number		-	-	-
Weight Of Soil Dry & Crucible	(W1)	49.66	49.90	51.56
Weight After Burning & Crucible	(W2)	48.20	48.43	50.10
Weight Of Crucible	(W3)	17.61	17.14	19.59
Weight Of Soil Dry	(W4 = W1-W3)/Mc_H	31.79	32.50	31.71
Weight After Burning	(W5 = W2-W3)	30.59	31.29	30.51
Weight Lost	(W6=W4-W5)	1.20	1.21	1.20
Ash Percent	W7 = (W5/W4)*100	96.2%	96.3%	96.2%
Organics Percent	(W8 = 100-W7)	3.8%	3.7%	3.8%

ORGANIC CONTENT = 3.8%

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

USCS: (CL)

TECH	TJ
DATE	10/27/2003
CHECK	BH
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

5369

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GB3211 TASK NO.: 3

DESCRIPTION: Phase V DATE: 24 day October month 2003 year

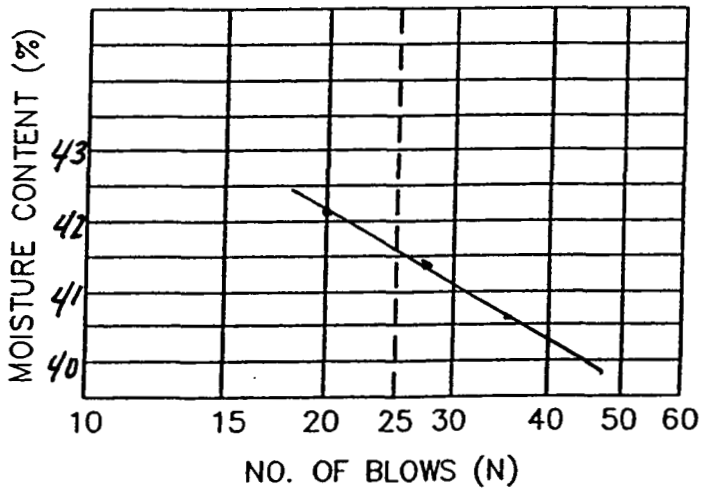
MATERIAL TYPE: Topsoil MATERIAL SOURCE: SAMPLE NO.: TS03-2

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		3.1	1.1	3.2	
A	WT. OF TARE	(grams)	28.39	28.77	27.84	
B	WT. OF WET SOIL & TARE	(grams)	46.66	45.27	48.73	
C	WT. OF DRY SOIL & TARE	(grams)	41.25	40.40	42.64	
D	WT. OF WATER = B-C	(grams)	5.41	4.87	6.09	
E	WT. OF DRY SOIL = C-A	(grams)	12.86	11.63	14.80	
F	MOISTURE CONTENT = (D/E)X100	(%)	42.1	41.9	41.1	
N	NUMBER OF BLOWS		20	27	35	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		2.8	1.9		
A	WT. OF TARE	(grams)	28.47	28.56		
B	WT. OF WET SOIL & TARE	(grams)	36.54	38.27		
C	WT. OF DRY SOIL & TARE	(grams)	35.22	36.70		
D	WT. OF WATER = B-C	(grams)	1.32	1.57		
	WT. OF DRY SOIL = C-A	(grams)	6.75	8.14		
	MOISTURE CONTENT = (D/E)X100	(%)	19.6	19.3		

000295

LIQUID LIMIT (LL) = 42 PLASTIC LIMIT (PL) = 19 PLASTICITY INDEX (PI) = 23

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

-5369

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: PHASE V DATE: 23 day Oct month 2003 year

MATERIAL TYPE: Topsoil SAMPLE NO.: TS 03-2

SOIL SAMPLE SIZE	+3/8 = (63) ~~675.3~~ 63.9	MOISTURE = ~	TOTAL = 3,456.7
	-3/8 = 3392.8g		

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	LL6	L-2	LL-6	L-2
WT. OF DRY SAMPLE PLUS TARE (grams)	261.9	~~892.0~~ 866.2	251.6	307.3
WT. OF TARE (grams)	198.0	190.9	198.0	190.9
WT. OF DRY SAMPLE (grams)	63.9	675.3	53.6	116.4

SIEVE ANALYSIS QA ID: SS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		
1 1/2in	38.1	0	0	100		
1 in	25.4	0	0	100		
3/4 in	19.1	11.9	0.3	99.7		
1/2 in	12.7	35.8	1.0	99.0		
3/8 in	9.53	54.4	1.6	98.4		.984
No. 4	4.75	9.3	1.4	98.6	97.0	
No. 10	2.00	23.0	3.4	96.6	95.1	
No. 20	0.850	40.3	6.0	94.0	92.5	
No. 40	0.425	56.4	8.4	91.6	90.1	
No. 60	0.250	71.0	10.5	89.5	88.1	
No. 100	0.125	91.6	13.6	86.4	85.0	
No. 200	0.075	114.2	16.9	83.1	81.8	
PAN	—	116.4	—	—		

COMMENTS:

000296

*%FINER = 100 − Σ% RETAINED

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

GEOSYNTEC CONSULTANTS

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

DESCRIPTION: Phase IV

MATERIAL TYPE: Topsoil

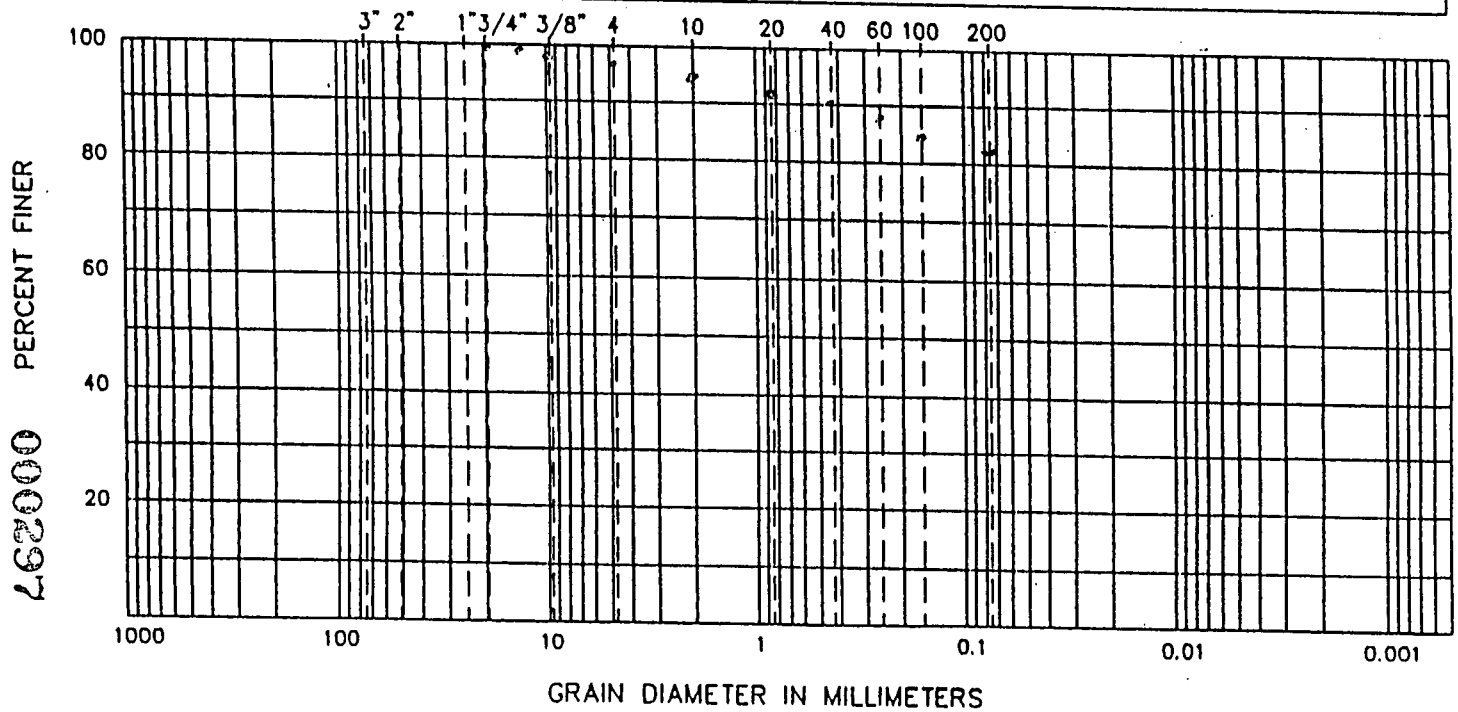
PROJECT NO.: GQ3211 TASK NO.: 3

DATE: 27 day Oct month 2003 year

SAMPLE NO.: TS03-2 QA ID: 55

CURVE COEFFICIENTS: (C_u) ..... (C_c) .....

BOULDERS	COBBLES	GRAVEL		SAND			FINE	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES
U.S. STANDRARD SIEVE SIZES								



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.	99.7
1/2-in.	99.0
3/8-in.	98.4
NO. 4	97.0
NO. 10	95.1
NO. 20	92.5
NO. 40	90.1
NO. 60	88.1
NO. 100	85.0
NO. 200	81.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	53
	36
	9

SOIL CLASSIFICATION (ASTM D 2487): Lean Clay with Sand

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: CA

SHEET NO. 2 of 2

000097

OCTOBER 2003

033-3586

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

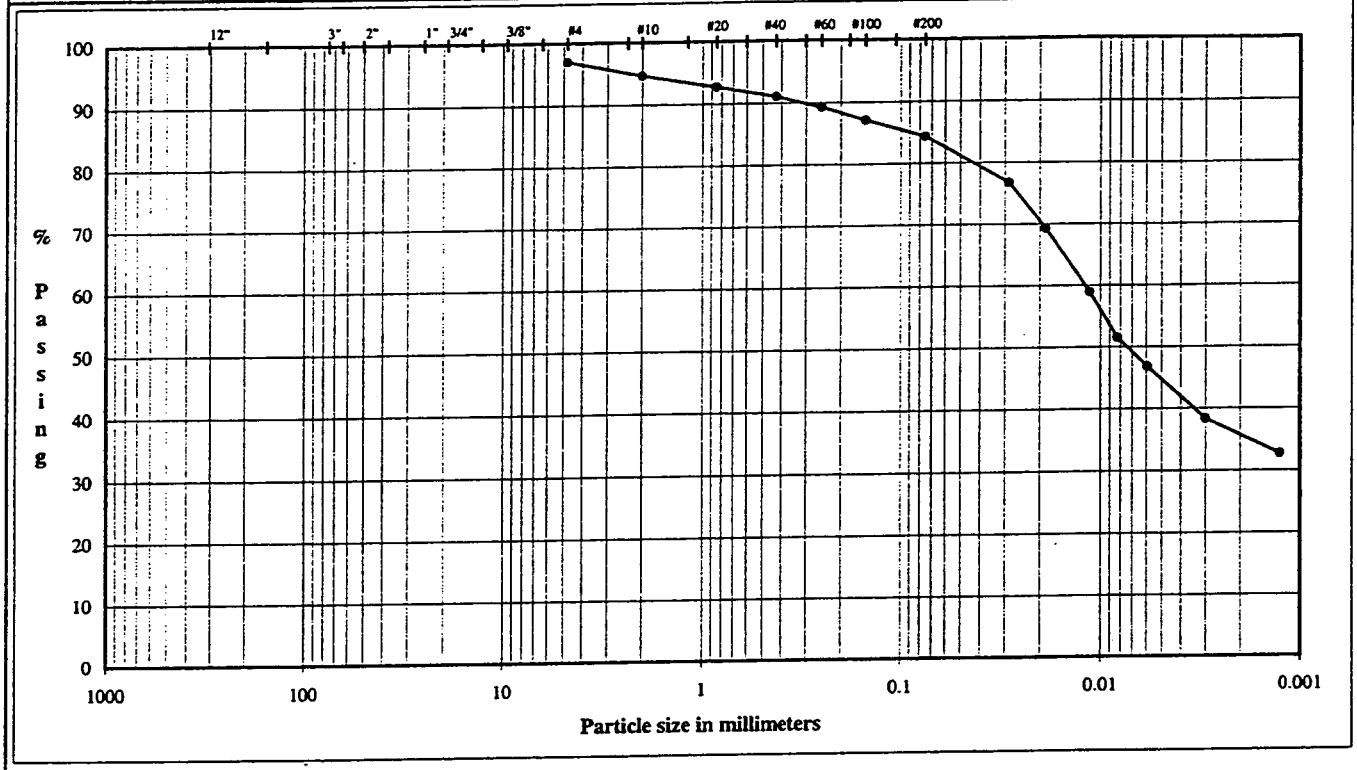
ASTM D421, D422, D4318

5369

PROJECT NAME: GEOSYNTEC/FLUOR FERNALD/GA

SAMPLE ID: TS03-2 Depth: -

TYPE: Bag



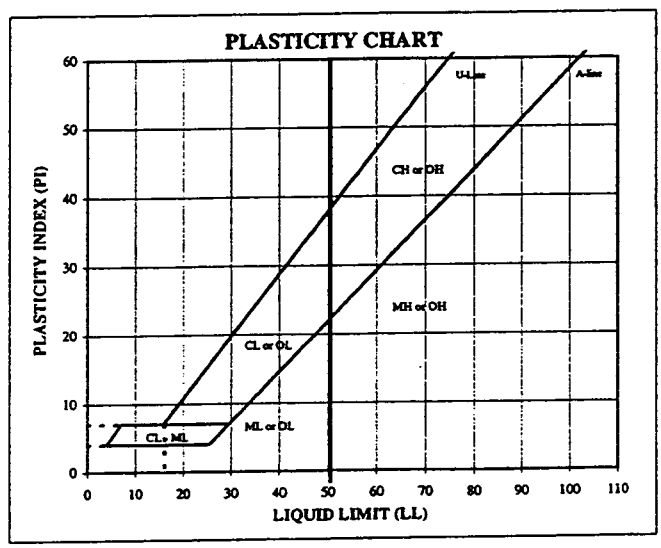
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8			
3.0"	75.0		Cobbles	
2.5"	63.5			
2.0"	50.0			
1.5"	37.5			
1.0"	25.0			
0.75"	19.0		Coarse Gravel	
0.50"	12.7			
0.375"	9.5			
#4	4.8	97.0	Fine Gravel	3.00
#10	2.00	94.7	Coarse Sand	2.32
#20	0.85	92.7		
#40	0.43	91.1	Medium Sand	3.61
#60	0.25	89.3		
#100	0.15	87.1		
#200	0.075	84.4	Fine Sand	6.71

Hydrometer Analysis

(mm)	%Finer		
0.029	76.7		
0.019	69.2		
0.011	58.9	Fines	
0.0083	51.5	Silt or Clay	84.36
0.0059	46.8		
0.0030	38.4		
0.0013	32.7		



ATTERBERG LIMITS

Method - A (Dry preparation)

M.	LL	PL	PI	LI

LL (oven-dried)	
< 0.75 = ORGANIC (OL/OH)	

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

USCS: (CL)

000298

TECH	BW
DATE	10/26/03
CHECK	BJS
REVIEW	PWM

ORGANIC CONTENT (PERCENT ORGANICS)

ASTM D 2974

Method C

5369

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/GA	SAMPLE ID	TS03-2
PROJECT NO.	033-3586	SAMPLE TYPE	Bag
REMARKS		SAMPLE DEPTH	-

Hygroscopic Moisture Content

Tare Number		98
Weight Of Wet Soil & Tare (gm)		32.18
Weight Of Dry Soil & Tare (gm)		31.98
Weight of Tare (gm)		1.00
Weight Of Water In (gm)		0.20
Weight Of Dry Soil (gm)		30.98
Moisture Content (%)	Mc_H	0.65

Crucible Number		-	-	-
Weight Of Soil Dry & Crucible	(W1)	51.51	49.38	50.02
Weight After Burning & Crucible	(W2)	50.06	48.00	48.47
Weight Of Crucible	(W3)	21.86	19.14	16.21
Weight Of Soil Dry	$(W4 = W1-W3)/Mc_H$	29.46	30.05	33.59
Weight After Burning	(W5 = W2-W3)	28.20	28.86	32.26
Weight Lost	(W6=W4-W5)	1.26	1.19	1.33
Ash Percent	W7 = (W5/W4)*100	95.7%	96.1%	96.0%
Organics Percent	(W8 = 100-W7)	4.3%	3.9%	4.0%

ORGANIC CONTENT = 4.1%

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

USCS: (CL)

TECH	TJ
DATE	10/27/2003
CHECK	BSK
REVIEW	PWK

000299

APPENDIX F

MANUFACTURERS'/SUPPLIERS' QUALITY CONTROL DOCUMENTATION

MANUFACTURER/SUPPLIER SUBMITTALS

GEOSYNTHETIC CLAY LINER AND CAP

SUPPLIER DOCUMENT SUBMITTAL

DF PROJECT NO.: 20105	CONTRACT NO: 9269	SUBMITTAL NO. 20105-9269-001	REV.: 1	DATE: 03/20/03	Page 1 of 1

FROM:
GETCO GCL
1500 West Shure Drive 5th Floor
Arlington Heights, IL 60004
SIGNATURE: 3/20/03

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: Susan Schwab DATE: 3/20/03

			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	9269-BASE-001	1						X			Submittal Register			X	ACR-001	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	38				
Don Pfister	45				

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

RECEIVED BY: Chris C. Van Arsdale DATE: 4/8/03
(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

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

Con[illegible]: F02PB09269
Contract Title: Supplier Contractor
Contractor: _____

Section J, Attachment

PROJECT 20105, BASE (CELL 6 LINER)
SUBMITTAL REGISTER
GEOSYNTHETIC CLAY LINER MANUFACTURING AND DELIVERY
Rev. 1, 03/20/03

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
20105-9269-001	0	9269-BASE-001	0		X	ENG	SUBMITTAL REGISTER	ACR-001	A 1/27/03	FLUOR FERNALD WILL UPDATE
20105-9269-02772P-001	0	9269-BASE-02772P-001	0		X	ENG	GCL PRODUCT NAME	02772P.1.04.A.1	A 1/27/03	A
20105-9269-02772P-002	0	9269-BASE-02772P-002	0		X	ENG	DAILY PRODUCTION CAPACITY	02772P.1.04.A.2	A 1/27/03	A
20105-9269-02772P-003	0	9269-BASE-02772P-003	0	X		QA	MANUFACTURER'S QUALITY CONTROL PROCEDURES	02772P.1.04.A.3	A 1/27/03	A
20105-9269-02772P-004	0	9269-BASE-02772P-004	0	X		ENG	REQUIREMENTS FOR GEOTEXTILE COMPONENT	02772P.1.04.A.4	A 1/27/03	A
20105-9269-02772P-005	0	9269-BASE-02772P-005	0	X		QA	CERTIFICATION OF GEOTEXTILE COMPONENT	02772P.1.04.A.5	A 1/27/03	A
20105-9269-02772P-006	0	9269-BASE-02772P-006	0	X		QA	CERTIFICATION OF MINIMUM AVERAGE ROLL VALUES	02772P.1.04.A.6	B 1/27/03	A
	1	9269-BASE-02772P-006	1	X		QA	CERTIFICATION OF MINIMUM AVERAGE ROLL VALUES	02772P.1.04.A.6	A 03/20/03	A
20105-9269-02772P-007	0	9269-BASE-02772P-007	0	X		ENG	RECOMMENDED INSTALLATION PROCEDURES	02772P.1.04.A.7	A 1/27/03	A
20105-9269-02772P-008	0	9269-BASE-02772P-008	0		X	ENG	RECOMMENDED STORAGE REQUIREMENTS AND LIMITATIONS	02772P.1.04.A.8	A 1/27/03	A
20105-9269-02772P-009	0	9269-BASE-02772P-009	0	X		CONST	PROJECTED DELIVERY DATES	02772P.1.04.A.9	A 02/05/03	A
20105-9269-02772P-010	0	9269-BASE-02772P-010	0	X		ENG	COMPLETED FORMS GCL-1	02772P.1.04.A.10	A 1/27/03	A
20105-9269-02772P-011	0	9269-BASE-02772P-011	0		X	H&S	MATERIAL SAFETY DATA SHEETS (GCL)	02772P.1.04.A.11	A 1/23/03	A & C
20105-9269-02772P-012	0	9269-BASE-02772P-012	0		X	PROC	WARRANTY FOR GCL	02772P.1.04.A.12	A 02/26/03	A
20105-9269-02772P-013	0	9269-BASE-02772P-013	0	X		ENG	MANUFACTURING QUALITY CONTROL TESTS FOR EACH GCL LOT	02772P.1.04.B.1	A 03/20/03	D
20105-9269-02772P-014		9269-BASE-02772P-014		X		ENG	INTERNAL AND INTERFACE SHEAR STRENGTH TEST RESULTS FOR EACH GCL LOT	02772P.1.04.B.1		D
20105-9269-02772P-015	0	9269-BASE-02772P-015	0	X		Q/A	MANUFACTURING CERTIFICATES FOR GCL	02772P.1.04.B.2	A 03/20/03	D

WITHIN 10 DAYS FROM RELEASE OF CONTRACT
A. AT LEAST 21 DAYS PRIOR TO SHIPMENT
B. WITH SHIPMENT
C. AT LEAST 14 DAYS PRIOR TO SHIPMENT

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 4/8/03

The supplier shall provide submittals in accordance with Administrative Contract Requirements ACR-001, attached.

INFORMATION ONLY

0003304

5369

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105 | CONTRACT NO: 9269 | SUBMITTAL NO. 20105-9269-001 | REV.: 1 | DATE: 03/20/03 | Page 1 of 1

FROM:
GETCO GCL
1500 West Shure Drive 5th Floor
Arlington Heights, IL 60004

SIGNATURE: 3/20/03

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

RECEIVED BY: Susan Schwab DATE: 3/20/03

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	9269-BASE-001	1						X			Submittal Register			X	ACR-001	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	38				
Don Pfister	45				

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

RECEIVED BY: Chuck C. VanArsdale DATE: 4/8/03

(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

000305

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FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9269	SUBMITTAL NO. 20105-9269-02772P-001	REV.: 0	DATE: 01/07/02	Page 1 of 1

FROM:
GETCO GCL
1500 West Shure Drive 5th Floor
Arlington Heights, IL 60004
SIGNATURE: [signature]

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: Teresa Schwab DATE: 1/9/03

			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	9269-BASE-02772P-001	0						X			GCL Product Name			X	02772P.1.04.A.1	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	38				
Don Pfister	45				

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

0002008

5369

RECEIVED BY: [signature] DATE: 1/27/03

(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

FS-F-4955
Rev. 3: 05/14/1999. CT-2.4.2

5369

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

1500 West Shure Drive 5th Floor
Arlington Heights, IL 60004

December 4, 2002

Alan Hohnhorst
Fluor Fernald, Inc.
7400 Willey Road
Hamilton, OH 45013

Subject: Solicitation Number F02PB09269

Dear Mr. Hohnhorst,

CETCO proposes to supply Bentomat® ST as the geosynthetic clay liner (GCL) for this project. Your contact person is Tom Hauck with Northern Geosystems. He can be contacted at 248-652-9274. Please find the enclosed submittal information requested in specification section 02772P – Geosynthetic Clay Liner and Cap Part 1.04 Submittals A 1-12:

1. *Product Name*

   Bentomat® ST Geosynthetic Clay Liner

2. *Daily Production Capacity and assurance that delivery of material will meet schedule for this contract*

   CETCO currently has two GCL production facilities with a combined manufacturing capacity of greater than 400,000 square feet of material per day. We will meet all delivery requirements for this project

3. *Manufacturing Quality Control Procedures*

   "CETCO GCL Manufacturing Quality Assurance and Quality Control Manual" is enclosed.

4. *Manufacturer's Requirements for any geotextile component of the geosynthetic clay liner and cap to include, as a minimum, mass per unit area, grab strength, and grab elongation*

   CETCO purchase specifications for the woven and non-woven geotextiles used to manufacture Bentomat® ST Geosynthetic Clay Liner are enclosed.

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 1/27/03

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5. *Certification that manufacturer's requirements for geotextile component of geosynthetic clay liner and cap are met*

   For this project, CETCO will use geotextile products manufactured by Synthetic Industries, Inc. Certified property sheets on the woven (82 TEX) and the non-woven (GEOTEX 650) are enclosed.

6. *Certification of Minimum Average Rolls Values with 95% lower confidence limits and corresponding test procedures for all geosynthetic clay liner and cap properties listed in Table 02772P-1*

   A Bentomat® ST Geosynthetic Clay Liner certified property sheet for this project is enclosed.

7. *Recommended procedures for installation of geosynthetic clay liner and cap and for overlapping adjacent geosynthetic clay liner and cap panels, including requirements (if any) for placement of granular bentonite*

   Three documents are enclosed: "Bentomat® GCL Installation Guidelines", "Bentomat® The GCL With The Winning Edge™", and "Bentomat® ST hydrostatic chamber seam testing data".

   CETCO has developed a two-part edge enhancement system that eliminates the need to use additional granular sodium bentonite within the overlap area of the seams. We call this edge enhancement, SuperGroove™, and it comes standard on both longitudinal edges of our Bentomat® geosynthetic clay liners. It should be noted that SuperGroove™ does not appear on the end-of-roll overlaps and recommend the continued use of supplemental bentonite for all end-of-roll seams.

8. *Recommended Storage Requirements and Limitations*

   The enclosed, "Bentomat® GCL Installation Guidelines" contains this information

9. *Projected Geosynthetic Clay Liner and Cap Delivery Dates*

   CETCO will meet all project delivery dates set forth in Tables 02A through 02D found in Solicitation Section J, Attachment III.

10. *Completed Form included with bid package indicating compliance with specified requirements*

    Please find this completed form enclosed.

11. *Material Safety Data Sheets (MSDS) for geosynthetic clay liner and bentonite*

    MSDS sheets for Bentomat® ST Geosynthetic Clay Liner and Volclay® CG-50 Soil Sealant are enclosed.

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12. Manufacturer Warranty

A sample project warranty is enclosed.

We appreciate the opportunity to provide our proposal and look forward to working with you once again towards the successful completion of the DOE/ Fluor Fernald project.

Best Regards,

Donald L. Carine
CETCO Lining Technologies

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9269	SUBMITTAL NO. 20105-9269-02772P-004	REV.: 0	DATE: 01/07/02	Page 1 of 1

FROM:
GETCO GCL
1500 West Shure Drive 5th Floor
Arlington Heights, IL 60004
SIGNATURE: [signature]

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

RECEIVED BY: Teresa Schwab DATE: 1/9/03

			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	9269-BASE-02772P-004	0						X			Requirements for Geotextile Component		~~X~~	X	02772P.1.04.A.4	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	38				
Don Pfister	45				

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

006310

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RECEIVED BY: [signature] DATE: 1/27/03

(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

CETCO Purchase Specification

Product: Bentomat ST Woven Base Fabric (BM-BW-3.2)
Issued : August 2001

Woven polypropylene geotextile produced must meet the following criteria. The ASTM methods specified must be followed. Certification for each lot of fabric, along with test data, must be received by Cetco prior to delivery. Electronic transmittal of certification and data is preferred.

Physical Properties (machine direction)	Unit of Measure	MARV	ASTM Method
Mass Per Unit Area	oz/yd2	3.2	ASTM D-5261
Grab Strength (Warp)	lbs	120	ASTM D-4632
Grab Elongation	%	20 nominal	ASTM D-4632
Puncture	lbs	70	ASTM D-4833
Color	visual	black	

Processing	Unit of Measure	Minimum	Maximum
Count Warp x Fill		24 x 16 nominal	
Warp overfill	%	10%	15%
Fill Overfill	%	10%	50%
Weave	Minimum amount of twisted yarns in both directions		

Packaging	Unit of Measure	Minimum	Maximum
Roll length	ft	3000	4000
Roll width	in	184 (-0/+3)	

The outside of each roll must clearly identify the product name, roll number, roll length (ly) and roll width (in). The core must also identify the roll number. Each roll must be packaged to protect the roll during outside storage.

Geotextile may not be attached to the core. There will be a maximum allowance of two seams per roll.

Miscellaneous
Shipping documentation must identify each lot and roll number in addition to roll weights (lbs), roll lengths (ly) and cost per ly. If different than invoice number, each invoice must reference the bill of lading number that the product was shipped under.

Qualified Suppliers	Supplier	Product Designation
	Synthetic Industries	82 Tex
	WayneTex	14802

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[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 1/27/02

CETCO Purchase Specification

Product: Bentomat Nonwoven Cover Fabric (BM-CNW-6.0)
Issued : August 2001

Nonwoven polypropylene geotextile produced must meet the following criteria. The ASTM methods specified must be followed. Certification for each lot of fabric, along with test data, must be received by Cetco prior to delivery. Electronic transmittal of certification and data is preferred.

Physical Properties (machine direction)	Unit of Measure	MARV	ASTM Method
Mass Per Unit Area	oz/yd2	6.0	ASTM D-5261
Thickness	mils	120	ASTM D-5199
Grab Strength (MD)	lbs	75	ASTM D-4632
Grab Elongation (MD)	%	90 min	ASTM D-4632
Puncture	lbs	55	ASTM D-4833
Color	visual	natural/white	

Processing	Unit of Measure	Minimum	Maximum
Denier		8	12
Length	inches	3.0	4.0
Calendaring/IR Heat Treatment	Product must not be calendared or treated to limit fiber availability for further needle punching in Cetco's process		

Packaging	Unit of Measure	Minimum	Maximum
Roll length	ft	1000	
Roll width	in	192	
Roll diameter	in	36	48

The outside of each roll must clearly identify the product name, roll number, roll length (ly) and roll width (in). The core must also identify the roll number. Each roll must be packaged to protect the roll during outside storage.

Geotextile may not be attached to the core. There will be a maximum allowance of two seams per roll.

Miscellaneous
Shipping documentation must identify each lot and roll number in addition to roll weights (lbs), roll lengths (ly) and cost per ly. If different than invoice number, each invoice must reference the bill of lading number that the product was shipped under.

Qualified Suppliers	Supplier	Product Designation
	Synthetic Industries	650
	Mirafi	BNMAT6oz
	TNS	N060
	American Synthetic	
	Fantex	

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9269	SUBMITTAL NO. 20105-9269-02772P-005	REV.: 0	DATE: 01/07/02	Page 1 of 1

FROM:
GETCO GCL
1500 West Shure Drive 5th Floor
Arlington Heights, IL 60004
SIGNATURE: [signature]

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: Teresa Schwab DATE: 1/9/03

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	9269-BASE-02772P-005	0							X		Certification of Geotextile Component		~~X~~	X	02772P.1.04.A.5	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
Chuck VanArsdale	64				
Bill Zebick	64				
Mike Godber (Approver)	64				
Kwasi Badu-Tweneboah	38				
Don Pfister	45				

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

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RECEIVED BY: [signature] DATE: ~~1/23/03~~ 1/27/03 MG
(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

SYNTHETIC INDUSTRIES

5369

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

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: Date: 1/22/03

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 offered 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 prior to 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 item and is subject to change without notice. The effective date for this product data is 11/1/2000

INFORMATION ONLY

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

SYNTHETIC INDUSTRIES

5369

Geosynthetic Products Division

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

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 noted 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 use or applications of said product are based on data 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 within 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

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

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9269	SUBMITTAL NO. 20105-9269-02772P-006	REV.: 1	DATE: 02/19/03	Page 1 of 1

FROM:
GETCO GCL
1500 West Shure Drive 5th Floor
Arlington Heights, IL 60004

SIGNATURE: 2/19/03

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

RECEIVED BY: Teresa Schwab DATE: 2/20/03

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	9269-BASE-02772P-006	1							X		Certification of Minimum Average Roll Values		X		02772P.1.04.A.6	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
Chuck VanArsdale	64				
Bill Zebick	64				
Mike Godber (Approver)	64				
Kwasi Badu-Tweneboah	38				
Don Pfister	45				

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

RECEIVED BY: Michael A. Yoder DATE: 3/20/03
(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

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FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

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CETCO LINING TECHNOLOGIES

Certified Properties

BENTOMAT® "ST" CERTIFIED PROPERTIES

Fluor Fernald, Inc./ US DOE Project

MATERIAL PROPERTY	TEST METHOD	TEST FREQUENCY, ft2 (m2)	REQUIRED VALUES
Bentonite Swell Index	ASTM D 5890	40,000 sf	24 mL/2g min.
Bentonite Fluid Loss	ASTM D 5891	40,000 sf	18 mL max.
Bentonite Mass/Area[1]	ASTM D 5993	40,000 sf	1.00 lb/sf
Moisture Content	ASTM D 4643	40,000 sf	25% max.
GCL Tensile Strength[2]	ASTM D 4595	40,000 sf	35 lbs/ inch min.
GCL Peel Strength[2]	ASTM D 4632	40,000 sf	15 lbs min.
GCL Permeability[3]	ASTM D 5887	40,000 sf	5×10^{-9} cm/sec max.
GCL Hydrated Internal Shear Strength[4]	ASTM D 6243	100,000 sf	500 psf (24 kPa) typical
Geotextiles Polymer Composition	n/a	n/a	95% min. polypropylene

Bentomat "ST" is a reinforced GCL consisting of a layer of sodium bentonite between a woven and a non-woven geotextile, which are needlepunched together.

Notes

1. Bentonite mass/area reported at 25 percent moisture content.
2. All tensile testing is performed in the machine direction, with results as minimum average roll values unless otherwise indicated.
3. 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.
4. Peak value measured at 200-psf (30 kPa) normal stress. Site-specific materials, GCL products, and test conditions must be used to verify internal and interface strength of the proposed design.

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

INFORMATION ONLY

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.

SUPPLIER DOCU[illegible] 'UBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9269	SUBMITTAL NO. 20105-9269-02772P-010	REV.: 0	DATE: 01/07/02	Page 1 of 1

FROM:
GETCO GCL
1500 West Shure Drive 5th Floor
Arlington Heights, IL 60004

SIGNATURE: [illegible]

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

RECEIVED BY: Teresa Schwab DATE: 1/9/03

			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	9269-BASE-02772P-010	0						X			Completed Forms GCL-1		~~X~~	X	02772P.1.04.A.10	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	38				
Don Pfister	45				

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

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RECEIVED BY: [illegible] DATE: 1/27/03

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CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

SUBMITTAL ACTION CODE: (BY FDF)
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B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

ORIGINAL

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

TABLE GCL-1 TECHNICAL INFORMATION GEOSYNTHETIC CLAY LINER
REQUISITION #F02PB09269

Section K, Attachment III
Refer to Specification Section 02772P

5369

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
ICAL PROPERTIES				
/ONITE CONTENT	D5993	1.0 lb/ft² 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 MIN	YES	
PEEL STRENGTH	D4632	15 LB/IN MIN	YES	
SHEAR STRENGTH (INTERNAL & INTERFACE)	D6243	SEE 02772P, 2.01.F.3	YES	INTERFACE IS DEPENDENT ON GEOMEMBRANE
ROLL SIZE		15 FT WIDE, (MIN) 100 FT LENGTH (MIN)	YES	15 FT WIDTH X 150 FT LENGTH
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 ✓			YES	REFER TO O2772P.1.04.A.1
NAME AND PHONE # OF CONTACT PERSON ✓			YES	
DAILY PRODUCTION CAPACITY AND ASSURANCE OF SCHEDULE ✓			YES	REFER TO O2772P.1.04.A.2
MQC PROCEDURES ✓			YES	REFER TO O2772P.1.04.A.3
MANUFACTURERS GEOTEXTILE REQUIREMENTS ✓			YES	REFER TO O2772P.1.04.A.4
CERTIFICATION OF MFG. REQUIREMENTS OF GEOTEXTILE COMPONENTS ✓			YES	REFER TO O2772P.1.04.A.5
CERTIFICATION OF MARV AND TEST PROCEDURES FOR GCL ✓			YES	REFER TO O2772P.1.04.A.6
RECOMMENDED INSTALLATION PROCEDURES ✓			YES	REFER TO O2772P.1.04.A.7
(INCLUDING NEED FOR POWDERED BENTONITE AT SEAMS)				
ORAGE REQUIREMENTS AND LIMITATIONS ✓			YES	REFER TO O2772P.1.04.A.8
ECTED DELIVERY DATES ✓			YES	REFER TO O2772P.1.04.A.9
✓			YES	REFER TO O2772P.1.04.A.11
UFACTURER WARRANTY ✓			YES	REFER TO O2772P.1.04.A.12
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	
HYDRAULIC CONDUCTIVITY	1/40,000 SF		YES	
BENTONITE FLUID LOSS	1/40,000 SF		YES	
TENSILE STRENGTH	1/40,000 SF		YES	
PEEL STRENGTH	1/40,000 SF		YES	
SHEAR STRENGTH (INTERNAL & INTERFACE)	1/100,000 SF		YES	
SCHEDULED DELIVERY DATES				
TOTAL QUANTITY	770,000 SF		YES	

Signature

DATE 12/4/2002

NAME OF BIDDER CETCO - LINING TECHNOLOGIES GROUP

Revised 11/1/2002

INFORMATION ONLY

x A

1/27/03

TABLE GCL-1 TECHNICAL INFORMATION GEOSYNTHETIC CLAY LINER

P.O. 99SC001440

Refer to Specification Section 02772P

SUBMIT THE FOLLOWING INFORMATION WITH THE PROPOSAL

5369

SPECIFIED REQUIREMENTS	SPECIFIED ASTM METHOD	SPECIFIED REQUIREMENT	CONFORMS TO SPECS YES/NO	REMARKS DOCUMENTATION OF THESE REQUIREMENTS TO BE SUBMITTED WITH BID
[illegible]ICAL PROPERTIES				
BENTONITE CONTENT	D5993	1.0 lb/ft² 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 MIN	YES	
PEEL STRENGTH	D4632	15 LB/IN MIN	YES	
SHEAR STRENGTH (INTERNAL & INTERFACE)	D6243	SEE 02772P, 2.01.F.3	YES	INTERFACE DEPENDENT ON GEOMEMBRANE
ROLL SIZE		15 FT WIDE, (MIN) 100 FT LENGTH (MIN)	YES	15FT WIDTH x 150FT LENGTH
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			YES	REFER TO 02772P.1.04.A.1
NAME AND PHONE # OF CONTACT PERSON			YES	
DAILY PRODUCTION CAPACITY AND ASSURANCE OF SCHEDULE			YES	REFER TO 02772P.1.04.A.2
MQC PROCEDURES			YES	REFER TO 02772P.1.04.A.3
MANUFACTURERS GEOTEXTILE REQUIREMENTS			YES	REFER TO 02772P.1.04.A.4
CERTIFICATION OF MFG. REQUIREMENTS OF GEOTEXTILE COMPONENTS			YES	REFER TO 02772P.1.04.A.5
CERTIFICATION OF MARV AND TEST PROCEDURES FOR GCL			YES	REFER TO 02772P.1.04.A.6
RECOMMENDED INSTALLATION PROCEDURES			YES	REFER TO 02772P.1.04.A.7
(INCLUDING NEED FOR POWDERED BENTONITE AT SEAMS)				
[illegible]ORAGE REQUIREMENTS AND LIMITATIONS			YES	REFER TO 02772P.1.04.A.8
[illegible]JECTED DELIVERY DATES			YES	REFER TO 02772P.1.04.A.9
[illegible]S			YES	REFER TO 02772P.1.04.A.11
MANUFACTURER WARRANTY			YES	REFER TO 02772P.1.04.A.12
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	
HYDRAULIC CONDUCTIVITY	1/40,000 SF		YES	
BENTONITE FLUID LOSS	1/40,000 SF		YES	
TENSILE STRENGTH	1/40,000 SF		YES	
PEEL STRENGTH	1/40,000 SF		YES	
SHEAR STRENGTH (INTERNAL & INTERFACE)	1/100,000 SF		YES	
SCHEDULED DELIVERY DATES				
TOTAL QUANTITY	415,000 SF		YES	

Signature Donald L Carine

DATE 01/07/2003

NAME OF BIDDER CETCO - LINING TECHNOLOGIES GROUP

Revised 01/7/2003

000319

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9269	SUBMITTAL NO. 20105-9269-02772P-012	REV.: 0	DATE: 01/07/02	Page 1 of 1

FROM:
GETCO GCL
1500 West Shure Drive 5th Floor
Arlington Heights, IL 60004
SIGNATURE: [signature]

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: Teresa Schwab DATE: 1/9/03

			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
5	9269-BASE-02772P-012	0	X								Warranty for GCL			X	02772P.1.04.A.12	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
Chuck VanArsdale (Approver)	64				
Randy Ector	44-0-S				
Bill Zebick	64				

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

Note: This warranty is in addition to the provisions contained in Solicitation #F02PB09269 and does not take precedence over other terms and conditions in the contract with Fluor Fernald

RECEIVED BY: [signature] DATE: 2/26/03
(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)

5369

ORIGINAL

FS-F-4955
Rev. 3: 05/14/1999 CT-2.4.2

5369

SAMPLE

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

Bentomat® ST
5 YEAR SAMPLE WARRANTY
Fluor Fernald, Inc./ US DOE Project
Hamilton, Ohio

Colloid Environmental Technologies Company "CETCO" warrants to the owner that all bentonite-coated fiber mat ("the product") supplied for the project will be free from manufacturing defects in material and workmanship for a period of FIVE (5) years, provided, however, that this warranty is subject to the conditions that neither the installing contractor nor any third party have used, misused, modified or damaged the Products after delivery to the project and that the back fill used in conjunction with the Products contains no calcium, magnesium, or other divalent cations, and is properly compacted. CETCO's liability hereunder in any case is expressly limited to, at CETCO's election, the replacement of defective Products, repair of the Products, or the repayment of an amount equal to the purchase price of such products, whether such claims are for breach of warranty or contract, negligence, tort, or otherwise. Owner agrees to inspect the Products promptly on delivery and notify CETCO in writing within fifteen (15) days of any alleged defects. In any event, any claim under this warranty shall be made within one month (30 days) after the cause of the action has occurred.

Note: Warranties with respect to workmanship regarding installation of the Products, if any, are provided by the installing contractor only.

THE FOREGOING WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES NOT EXPRESSLY SET FORTH HEREIN, WHETHER EXPRESSED OR IMPLIED BY OPERATIONS OF LAW OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, SUITABILITY FOR THE SPECIFIC APPLICATION, AND/OR PATENT AND TRADEMARK NON-INFRINGEMENT.

CETCO shall not be liable for installation, removal or re-installation cost, or for any other incidental or consequential losses, damages or expenses, lost profits, delays or slowdown, lost goodwill, damage to other property etc., directly or indirectly arising from the sale, handling or use of Products, or from any other cause relating thereto.

INFORMATION ONLY

Colloid Environmental Technologies Company

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: _____ Date: 7/26/03

EFFECTIVE DATE: 12/4/2002

SUPPLIER DOCUMENT SUBMITTAL

DF PROJECT NO.: 201[illegible]	CONTRACT NO: 9269	SUBMITTAL NO. 20105-9269-02772P-013	REV.: 0	DATE: 03/17/03	Page 1 of 1

FROM:
GETCO GCL
1500 West Shure Drive 5th Floor
Arlington Heights, IL 60004

SIGNATURE: 3/17/03

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

RECEIVED BY: DATE: 3/17/03

			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	9269-BASE-02772P-013	0						X			Manufacturing Quality Control Tests for each GCL Lo		X		02772P.1.04.B.1	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	38				
Don Pfister	45				

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

IS DENSITY REPORTED AT 25% MOISTURE CONTENT OR 0% ?

5369

0903322

RECEIVED BY: DATE: 3/20/03

(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

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

P A C K I N G L I S T

CETCO
-00 WEST SHURE DRIVE
INGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

5369

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200304LO	00000429	150.0	15.0	2250.0	2494.0
LO-BENTOMAT ST	SFT SF	200304LO	00000430	150.0	15.0	2250.0	2570.0
LO-BENTOMAT ST	SFT SF	200304LO	00000431	150.0	15.0	2250.0	2627.0
LO-BENTOMAT ST	SFT SF	200304LO	00000432	150.0	15.0	2250.0	2637.0
ENTOMAT ST	SFT SF	200304LO	00000433	150.0	15.0	2250.0	2707.0
LO-BENTOMAT ST	SFT SF	200304LO	00000434	150.0	15.0	2250.0	2688.0
LO-BENTOMAT ST	SFT SF	200304LO	00000435	150.0	15.0	2250.0	2681.0
LO-BENTOMAT ST	SFT SF	200304LO	00000436	150.0	15.0	2250.0	2700.0
LO-BENTOMAT ST	SFT SF	200304LO	00000437	150.0	15.0	2250.0	2741.0
LO-BENTOMAT ST	SFT SF	200304LO	00000438	150.0	15.0	2250.0	2692.0
LO-BENTOMAT ST	SFT SF	200304LO	00000439	150.0	15.0	2250.0	2678.0
LO-BENTOMAT ST	SFT SF	200304LO	00000440	150.0	15.0	2250.0	2730.0
LO-BENTOMAT ST	SFT SF	200304LO	00000441	150.0	15.0	2250.0	2726.0
LO-BENTOMAT ST	SFT SF	200304LO	00000442	150.0	15.0	2250.0	2739.0
LO-BENTOMAT ST	SFT SF	200304LO	00000443	150.0	15.0	2250.0	[illegible]
LO-BENTOMAT ST	SFT SF	200304LO	00000444	150.0	[illegible]	[illegible]	2717.0
BENTOMAT ST	SFT SF	200304LO	00000445	[illegible]	15.0	[illegible]	2695.0
BENTOMAT ST	SFT SF	200304LO	00000446	150.0	15.0	2250.0	2710.0
LO-BENTOMAT ST	SFT SF	200304LO	00000447	150.0	15.0	2250.0	2721.0

INFORMATION ONLY

X A-Conforms to the Subcontract Requirements
B-Minor Comment - Incorporate and Resubmit
C-Revise and Resubmit 2/20/03

000323

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

5369

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200304LO	00000448	150.0	15.0	2250.0	2687.0
LO-BENTOMAT ST	SFT SF	200304LO	00000449	150.0	15.0	2250.0	2684.0
LO-BENTOMAT ST	SFT SF	200304LO	00000450	150.0	15.0	2250.0	2724.0
LO-BENTOMAT ST	SFT SF	200304LO	00000451	150.0	15.0	2250.0	2684.0
LO-BENTOMAT ST	SFT SF	200304LO	00000452	150.0	15.0	2250.0	2712.0
LO-BENTOMAT ST	SFT SF	200304LO	00000453	150.0	15.0	2250.0	2697.0
LO-BENTOMAT ST	SFT SF	200304LO	00000454	150.0	15.0	2250.0	2700.0
LO-BENTOMAT ST	SFT SF	200304LO	00000455	150.0	15.0	2250.0	2705.0
LO-BENTOMAT ST	SFT SF	200304LO	00000456	150.0	15.0	2250.0	2740.0
LO-BENTOMAT ST	SFT SF	200304LO	00000457	150.0	15.0	2250.0	2721.0
LO-BENTOMAT ST	SFT SF	200304LO	00000458	150.0	15.0	2250.0	2745.0
LO-BENTOMAT ST	SFT SF	200304LO	00000459	150.0	15.0	2250.0	2745.0
LO-BENTOMAT ST	SFT SF	200304LO	00000460	150.0	15.0	2250.0	2707.0
LO-BENTOMAT ST	SFT SF	200304LO	00000461	150.0	15.0	2250.0	2691.0
LO-BENTOMAT ST	SFT SF	200304LO	00000462	150.0	15.0	2250.0	2700.0
LO-BENTOMAT ST	SFT SF	200304LO	00000463	150.0	15.0	2250.0	2737.0
LO-BENTOMAT ST	SFT SF	200304LO	00000464	150.0	15.0	2250.0	2748.0
LO-BENTOMAT ST	SFT SF	200304LO	00000465	150.0	15.0	2250.0	2695.0
LO-BENTOMAT ST	SFT SF	200304LO	00000466	150.0	15.0	2250.0	2690.0

PACKING LIST

5369

CETCO
500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200304LO	00000467	150.0	15.0	2250.0	2689.0
LO-BENTOMAT ST	SFT SF	200304LO	00000468	150.0	15.0	2250.0	2683.0
LO-BENTOMAT ST	SFT SF	200304LO	00000469	150.0	15.0	2250.0	2668.0
LO-BENTOMAT ST	SFT SF	200304LO	00000470	150.0	15.0	2250.0	2664.0
LO-BENTOMAT ST	SFT SF	200304LO	00000471	150.0	15.0	2250.0	2653.0
LO-BENTOMAT ST	SFT SF	200304LO	00000472	150.0	15.0	2250.0	2650.0
LO-BENTOMAT ST	SFT SF	200304LO	00000473	150.0	15.0	2250.0	2666.0
LO-BENTOMAT ST	SFT SF	200304LO	00000474	150.0	15.0	2250.0	2660.0
LO-BENTOMAT ST	SFT SF	200304LO	00000475	150.0	15.0	2250.0	2657.0
LO-BENTOMAT ST	SFT SF	200304LO	00000476	150.0	15.0	2250.0	2652.0
LO-BENTOMAT ST	SFT SF	200304LO	00000477	150.0	15.0	2250.0	2655.0
LO-BENTOMAT ST	SFT SF	200304LO	00000478	150.0	15.0	2250.0	2646.0
LO-BENTOMAT ST	SFT SF	200304LO	00000479	150.0	15.0	2250.0	2628.0
LO-BENTOMAT ST	SFT SF	200304LO	00000480	150.0	15.0	2250.0	2638.0
LO-BENTOMAT ST	SFT SF	200304LO	00000481	150.0	15.0	2250.0	2662.0
LO-BENTOMAT ST	SFT SF	200304LO	00000482	150.0	15.0	2250.0	2678.0
LO-BENTOMAT ST	SFT SF	200304LO	00000483	150.0	15.0	2250.0	2636.0
LO-BENTOMAT ST	SFT SF	200304LO	00000484	150.0	15.0	2250.0	2652.0
LO-BENTOMAT ST	SFT SF	200304LO	00000485	150.0	15.0	2250.0	2669.0

PACKING LIST

5369

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200304LO	00000486	150.0	15.0	2250.0	2680.0
LO-BENTOMAT ST	SFT SF	200304LO	00000487	150.0	15.0	2250.0	2706.0
LO-BENTOMAT ST	SFT SF	200304LO	00000488	150.0	15.0	2250.0	2701.0
LO-BENTOMAT ST	SFT SF	200304LO	00000489	150.0	15.0	2250.0	2797.0
LO-BENTOMAT ST	SFT SF	200304LO	00000490	150.0	15.0	2250.0	2812.0
LO-BENTOMAT ST	SFT SF	200304LO	00000491	150.0	15.0	2250.0	2802.0
LO-BENTOMAT ST	SFT SF	200304LO	00000492	150.0	15.0	2250.0	2776.0
LO-BENTOMAT ST	SFT SF	200304LO	00000493	150.0	15.0	2250.0	2750.0
LO-BENTOMAT ST	SFT SF	200304LO	00000494	150.0	15.0	2250.0	2745.0
LO-BENTOMAT ST	SFT SF	200304LO	00000495	150.0	15.0	2250.0	2816.0
LO-BENTOMAT ST	SFT SF	200304LO	00000496	150.0	15.0	2250.0	2760.0
LO-BENTOMAT ST	SFT SF	200304LO	00000497	150.0	15.0	2250.0	2747.0
LO-BENTOMAT ST	SFT SF	200304LO	00000498	150.0	15.0	2250.0	2769.0
LO-BENTOMAT ST	SFT SF	200304LO	00000499	150.0	15.0	2250.0	2723.0
LO-BENTOMAT ST	SFT SF	200304LO	00000500	150.0	15.0	2250.0	2718.0
LO-BENTOMAT ST	SFT SF	200304LO	00000501	150.0	15.0	2250.0	2706.0
LO-BENTOMAT ST	SFT SF	200304LO	00000502	150.0	15.0	2250.0	2702.0
LO-BENTOMAT ST	SFT SF	200304LO	00000503	150.0	15.0	2250.0	2711.0
LO-BENTOMAT ST	SFT SF	200304LO	00000504	150.0	15.0	2250.0	2710.0

PACKING LIST

CETCO
7500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

5369

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200304LO	00000505	150.0	15.0	2250.0	2715.0
LO-BENTOMAT ST	SFT SF	200304LO	00000506	150.0	15.0	2250.0	2721.0
LO-BENTOMAT ST	SFT SF	200304LO	00000507	150.0	15.0	2250.0	2707.0
LO-BENTOMAT ST	SFT SF	200304LO	00000508	150.0	15.0	2250.0	2763.0
LO-BENTOMAT ST	SFT SF	200304LO	00000509	150.0	15.0	2250.0	2771.0
LO-BENTOMAT ST	SFT SF	200304LO	00000510	150.0	15.0	2250.0	2760.0
LO-BENTOMAT ST	SFT SF	200304LO	00000511	150.0	15.0	2250.0	2768.0
LO-BENTOMAT ST	SFT SF	200304LO	00000512	150.0	15.0	2250.0	2750.0
LO-BENTOMAT ST	SFT SF	200304LO	00000513	150.0	15.0	2250.0	2745.0
LO-BENTOMAT ST	SFT SF	200304LO	00000514	150.0	15.0	2250.0	2747.0
LO-BENTOMAT ST	SFT SF	200304LO	00000515	150.0	15.0	2250.0	2771.0
LO-BENTOMAT ST	SFT SF	200304LO	00000516	150.0	15.0	2250.0	2716.0
LO-BENTOMAT ST	SFT SF	200304LO	00000517	150.0	15.0	2250.0	2670.0
LO-BENTOMAT ST	SFT SF	200304LO	00000518	150.0	15.0	2250.0	2660.0
LO-BENTOMAT ST	SFT SF	200304LO	00000519	150.0	15.0	2250.0	2725.0
LO-BENTOMAT ST	SFT SF	200304LO	00000520	150.0	15.0	2250.0	2717.0
LO-BENTOMAT ST	SFT SF	200304LO	00000521	150.0	15.0	2250.0	2708.0
LO-BENTOMAT ST	SFT SF	200304LO	00000522	150.0	15.0	2250.0	2700.0
LO-BENTOMAT ST	SFT SF	200304LO	00000523	150.0	15.0	2250.0	2720.0

PACKING LIST

5369

CETCO
[illegible]00 WEST SHURE DRIVE
[illegible]INGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200304LO	00000524	150.0	15.0	2250.0	2708.0
LO-BENTOMAT ST	SFT SF	200304LO	00000525	150.0	15.0	2250.0	2701.0
LO-BENTOMAT ST	SFT SF	200304LO	00000526	150.0	15.0	2250.0	2691.0
LO-BENTOMAT ST	SFT SF	200304LO	00000527	150.0	15.0	2250.0	2769.0
[illegible]ENTOMAT ST	SFT SF	200304LO	00000528	150.0	15.0	2250.0	2664.0
LO-BENTOMAT ST	SFT SF	200304LO	00000529	150.0	15.0	2250.0	2697.0
LO-BENTOMAT ST	SFT SF	200304LO	00000530	150.0	15.0	2250.0	2678.0
LO-BENTOMAT ST	SFT SF	200304LO	00000531	150.0	15.0	2250.0	2681.0
LO-BENTOMAT ST	SFT SF	200304LO	00000532	150.0	15.0	2250.0	2700.0
LO-BENTOMAT ST	SFT SF	200304LO	00000533	150.0	15.0	2250.0	2649.0
LO-BENTOMAT ST	SFT SF	200304LO	00000534	150.0	15.0	2250.0	2658.0
LO-BENTOMAT ST	SFT SF	200304LO	00000535	150.0	15.0	2250.0	2653.0
LO-BENTOMAT ST	SFT SF	200304LO	00000536	150.0	15.0	2250.0	2649.0
LO-BENTOMAT ST	SFT SF	200304LO	00000537	150.0	15.0	2250.0	2636.0
LO-BENTOMAT ST	SFT SF	200304LO	00000538	150.0	15.0	2250.0	2643.0
LO-BENTOMAT ST	SFT SF	200304LO	00000539	150.0	15.0	2250.0	2652.0
[illegible]BENTOMAT ST	SFT SF	200304LO	00000540	150.0	15.0	2250.0	2715.0
LO-BENTOMAT ST	SFT SF	200304LO	00000541	150.0	15.0	2250.0	2668.0
LO-BENTOMAT ST	SFT SF	200304LO	00000542	150.0	15.0	2250.0	2682.0

PACKING LIST

5369

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200304LO	00000543	150.0	15.0	2250.0	2685.0
LO-BENTOMAT ST	SFT SF	200304LO	00000544	150.0	15.0	2250.0	2669.0
LO-BENTOMAT ST	SFT SF	200304LO	00000545	150.0	15.0	2250.0	2670.0
LO-BENTOMAT ST	SFT SF	200304LO	00000546	150.0	15.0	2250.0	2650.0
LO-BENTOMAT ST	SFT SF	200305LO	00000547	150.0	15.0	2250.0	2596.0
LO-BENTOMAT ST	SFT SF	200305LO	00000548	150.0	15.0	2250.0	2610.0
LO-BENTOMAT ST	SFT SF	200305LO	00000549	150.0	15.0	2250.0	2616.0
LO-BENTOMAT ST	SFT SF	200305LO	00000550	150.0	15.0	2250.0	2606.0
LO-BENTOMAT ST	SFT SF	200305LO	00000551	150.0	15.0	2250.0	2642.0
LO-BENTOMAT ST	SFT SF	200305LO	00000552	150.0	15.0	2250.0	2643.0
LO-BENTOMAT ST	SFT SF	200305LO	00000553	150.0	15.0	2250.0	2635.0
LO-BENTOMAT ST	SFT SF	200305LO	00000554	150.0	15.0	2250.0	2643.0
LO-BENTOMAT ST	SFT SF	200305LO	00000555	150.0	15.0	2250.0	2676.0
LO-BENTOMAT ST	SFT SF	200305LO	00000556	150.0	15.0	2250.0	2687.0
LO-BENTOMAT ST	SFT SF	200305LO	00000557	150.0	15.0	2250.0	2684.0
LO-BENTOMAT ST	SFT SF	200305LO	00000558	150.0	15.0	2250.0	2666.0
LO-BENTOMAT ST	SFT SF	200305LO	00000559	150.0	15.0	2250.0	2651.0
LO-BENTOMAT ST	SFT SF	200305LO	00000560	150.0	15.0	2250.0	2643.0
LO-BENTOMAT ST	SFT SF	200305LO	00000561	150.0	15.0	2250.0	2635

PACKING LIST

5369

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000562	150.0	15.0	2250.0	2614.0
LO-BENTOMAT ST	SFT SF	200305LO	00000563	150.0	15.0	2250.0	2623.0
LO-BENTOMAT ST	SFT SF	200305LO	00000564	150.0	15.0	2250.0	2615.0
LO-BENTOMAT ST	SFT SF	200305LO	00000565	150.0	15.0	2250.0	2618.0
LO-BENTOMAT ST	SFT SF	200305LO	00000566	150.0	15.0	2250.0	2638.0
LO-BENTOMAT ST	SFT SF	200305LO	00000567	150.0	15.0	2250.0	2601.0
LO-BENTOMAT ST	SFT SF	200305LO	00000568	150.0	15.0	2250.0	2638.0
LO-BENTOMAT ST	SFT SF	200305LO	00000569	150.0	15.0	2250.0	2586.0
LO-BENTOMAT ST	SFT SF	200305LO	00000570	150.0	15.0	2250.0	2589.0
LO-BENTOMAT ST	SFT SF	200305LO	00000571	150.0	15.0	2250.0	2561.0
LO-BENTOMAT ST	SFT SF	200305LO	00000572	150.0	15.0	2250.0	2615.0
LO-BENTOMAT ST	SFT SF	200305LO	00000573	150.0	15.0	2250.0	2552.0
LO-BENTOMAT ST	SFT SF	200305LO	00000574	150.0	15.0	2250.0	2547.0
LO-BENTOMAT ST	SFT SF	200305LO	00000575	150.0	15.0	2250.0	2562.0
LO-BENTOMAT ST	SFT SF	200305LO	00000576	150.0	15.0	2250.0	2569.0
LO-BENTOMAT ST	SFT SF	200305LO	00000577	150.0	15.0	2250.0	2779.0
LO-BENTOMAT ST	SFT SF	200305LO	00000578	150.0	15.0	2250.0	2572.0
LO-BENTOMAT ST	SFT SF	200305LO	00000579	150.0	15.0	2250.0	2562.0
LO-BENTOMAT ST	SFT SF	200305LO	00000580	150.0	15.0	2250.0	2568.0

PACKING LIST

5369

CETCO
[illegible]00 WEST SHURE DRIVE
[illegible]INGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000581	150.0	15.0	2250.0	2542.0
LO-BENTOMAT ST	SFT SF	200305LO	00000582	150.0	15.0	2250.0	2580.0
LO-BENTOMAT ST	SFT SF	200305LO	00000583	150.0	15.0	2250.0	2599.0
LO-BENTOMAT ST	SFT SF	200305LO	00000584	150.0	15.0	2250.0	2557.0
[illegible]ENTOMAT ST	SFT SF	200305LO	00000585	150.0	15.0	2250.0	2550.0
LO-BENTOMAT ST	SFT SF	200305LO	00000586	150.0	15.0	2250.0	2560.0
LO-BENTOMAT ST	SFT SF	200305LO	00000587	150.0	15.0	2250.0	2545.0
LO-BENTOMAT ST	SFT SF	200305LO	00000588	150.0	15.0	2250.0	2592.0
LO-BENTOMAT ST	SFT SF	200305LO	00000589	150.0	15.0	2250.0	2555.0
LO-BENTOMAT ST	SFT SF	200305LO	00000590	150.0	15.0	2250.0	2576.0
LO-BENTOMAT ST	SFT SF	200305LO	00000591	150.0	15.0	2250.0	2560.0
LO-BENTOMAT ST	SFT SF	200305LO	00000592	150.0	15.0	2250.0	2563.0
LO-BENTOMAT ST	SFT SF	200305LO	00000593	150.0	15.0	2250.0	2564.0
LO-BENTOMAT ST	SFT SF	200305LO	00000594	150.0	15.0	2250.0	2570.0
LO-BENTOMAT ST	SFT SF	200305LO	00000595	150.0	15.0	2250.0	2575.0
LO-BENTOMAT ST	SFT SF	200305LO	00000596	150.0	15.0	2250.0	2560.0
[illegible]ENTOMAT ST	SFT SF	200305LO	00000597	150.0	15.0	2250.0	2548.0
[illegible]BENTOMAT ST	SFT SF	200305LO	00000598	150.0	15.0	2250.0	2540.0
LO-BENTOMAT ST	SFT SF	200305LO	00000599	150.0	15.0	2250.0	2542.0

PACKING LIST

5369

CETCO
[illegible]0 WEST SHURE DRIVE
[illegible]INGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000600	150.0	15.0	2250.0	2555.0
LO-BENTOMAT ST	SFT SF	200305LO	00000601	150.0	15.0	2250.0	2544.0
LO-BENTOMAT ST	SFT SF	200305LO	00000602	150.0	15.0	2250.0	2566.0
LO-BENTOMAT ST	SFT SF	200305LO	00000603	150.0	15.0	2250.0	2561.0
L[illegible]ENTOMAT ST	SFT SF	200305LO	00000604	150.0	15.0	2250.0	2570.0
LO-BENTOMAT ST	SFT SF	200305LO	00000605	150.0	15.0	2250.0	2566.0
LO-BENTOMAT ST	SFT SF	200305LO	00000606	150.0	15.0	2250.0	2541.0
LO-BENTOMAT ST	SFT SF	200305LO	00000607	150.0	15.0	2250.0	2574.0
LO-BENTOMAT ST	SFT SF	200305LO	00000608	150.0	15.0	2250.0	2579.0
LO-BENTOMAT ST	SFT SF	200305LO	00000609	150.0	15.0	2250.0	2584.0
LO-BENTOMAT ST	SFT SF	200305LO	00000610	150.0	15.0	2250.0	2567.0
LO-BENTOMAT ST	SFT SF	200305LO	00000611	150.0	15.0	2250.0	2516.0
LO-BENTOMAT ST	SFT SF	200305LO	00000612	150.0	15.0	2250.0	2648.0
LO-BENTOMAT ST	SFT SF	200305LO	00000613	150.0	15.0	2250.0	2654.0
LO-BENTOMAT ST	SFT SF	200305LO	00000614	150.0	15.0	2250.0	2651.0
LO-BENTOMAT ST	SFT SF	200305LO	00000615	150.0	15.0	2250.0	2628.0
L[illegible]ENTOMAT ST	SFT SF	200305LO	00000616	150.0	15.0	2250.0	2627.0
LO-BENTOMAT ST	SFT SF	200305LO	00000617	150.0	15.0	2250.0	2634.0
LO-BENTOMAT ST	SFT SF	200305LO	00000618	150.0	15.0	2250.0	2661.0

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

5369

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000619	150.0	15.0	2250.0	2620.0
LO-BENTOMAT ST	SFT SF	200305LO	00000620	150.0	15.0	2250.0	2636.0
LO-BENTOMAT ST	SFT SF	200305LO	00000621	150.0	15.0	2250.0	2614.0
LO-BENTOMAT ST	SFT SF	200305LO	00000622	150.0	15.0	2250.0	2613.0
LO-BENTOMAT ST	SFT SF	200305LO	00000623	150.0	15.0	2250.0	2616.0
LO-BENTOMAT ST	SFT SF	200305LO	00000624	150.0	15.0	2250.0	2600.0
LO-BENTOMAT ST	SFT SF	200305LO	00000625	150.0	15.0	2250.0	2598.0
LO-BENTOMAT ST	SFT SF	200305LO	00000626	150.0	15.0	2250.0	2615.0
LO-BENTOMAT ST	SFT SF	200305LO	00000627	150.0	15.0	2250.0	2635.0
LO-BENTOMAT ST	SFT SF	200305LO	00000628	150.0	15.0	2250.0	2644.0
LO-BENTOMAT ST	SFT SF	200305LO	00000629	150.0	15.0	2250.0	2525.0
LO-BENTOMAT ST	SFT SF	200305LO	00000630	150.0	15.0	2250.0	2617.0
LO-BENTOMAT ST	SFT SF	200305LO	00000631	150.0	15.0	2250.0	2599.0
LO-BENTOMAT ST	SFT SF	200305LO	00000632	150.0	15.0	2250.0	2619.0
LO-BENTOMAT ST	SFT SF	200305LO	00000633	150.0	15.0	2250.0	2629.0
LO-BENTOMAT ST	SFT SF	200305LO	00000634	150.0	15.0	2250.0	2665.0
LO-BENTOMAT ST	SFT SF	200305LO	00000635	150.0	15.0	2250.0	2614.0
LO-BENTOMAT ST	SFT SF	200305LO	00000636	150.0	15.0	2250.0	2657.0
LO-BENTOMAT ST	SFT SF	200305LO	00000637	150.0	15.0	2250.0	2670.0

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

5369

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000638	150.0	15.0	2250.0	2657.0
LO-BENTOMAT ST	SFT SF	200305LO	00000639	150.0	15.0	2250.0	2646.0
LO-BENTOMAT ST	SFT SF	200305LO	00000640	150.0	15.0	2250.0	2639.0
LO-BENTOMAT ST	SFT SF	200305LO	00000641	150.0	15.0	2250.0	2619.0
LO-BENTOMAT ST	SFT SF	200305LO	00000642	150.0	15.0	2250.0	2614.0
LO-BENTOMAT ST	SFT SF	200305LO	00000643	150.0	15.0	2250.0	2611.0
LO-BENTOMAT ST	SFT SF	200305LO	00000644	150.0	15.0	2250.0	2620.0
LO-BENTOMAT ST	SFT SF	200305LO	00000645	150.0	15.0	2250.0	2615.0
LO-BENTOMAT ST	SFT SF	200305LO	00000646	150.0	15.0	2250.0	2640.0
LO-BENTOMAT ST	SFT SF	200305LO	00000647	150.0	15.0	2250.0	2663.0
LO-BENTOMAT ST	SFT SF	200305LO	00000648	150.0	15.0	2250.0	2620.0
LO-BENTOMAT ST	SFT SF	200305LO	00000649	150.0	15.0	2250.0	2648.0
LO-BENTOMAT ST	SFT SF	200305LO	00000650	150.0	15.0	2250.0	2715.0
LO-BENTOMAT ST	SFT SF	200305LO	00000651	150.0	15.0	2250.0	2686.0
LO-BENTOMAT ST	SFT SF	200305LO	00000652	150.0	15.0	2250.0	2693.0
LO-BENTOMAT ST	SFT SF	200305LO	00000653	150.0	15.0	2250.0	2635.0
LO-BENTOMAT ST	SFT SF	200305LO	00000654	150.0	15.0	2250.0	2617.0
LO-BENTOMAT ST	SFT SF	200305LO	00000655	150.0	15.0	2250.0	2634.0
LO-BENTOMAT ST	SFT SF	200305LO	00000656	150.0	15.0	2250.0	2731.0

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

5369

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000657	150.0	15.0	2250.0	2631.0
LO-BENTOMAT ST	SFT SF	200305LO	00000658	150.0	15.0	2250.0	2667.0
LO-BENTOMAT ST	SFT SF	200305LO	00000659	150.0	15.0	2250.0	2657.0
LO-BENTOMAT ST	SFT SF	200305LO	00000660	150.0	15.0	2250.0	2643.0
LO-BENTOMAT ST	SFT SF	200305LO	00000661	150.0	15.0	2250.0	2668.0
LO-BENTOMAT ST	SFT SF	200305LO	00000662	150.0	15.0	2250.0	2744.0
LO-BENTOMAT ST	SFT SF	200305LO	00000663	150.0	15.0	2250.0	2710.0
LO-BENTOMAT ST	SFT SF	200305LO	00000664	150.0	15.0	2250.0	2645.0
LO-BENTOMAT ST	SFT SF	200305LO	00000665	150.0	15.0	2250.0	2642.0
LO-BENTOMAT ST	SFT SF	200305LO	00000666	150.0	15.0	2250.0	2651.0
LO-BENTOMAT ST	SFT SF	200305LO	00000667	150.0	15.0	2250.0	2667.0
LO-BENTOMAT ST	SFT SF	200305LO	00000668	150.0	15.0	2250.0	2676.0
LO-BENTOMAT ST	SFT SF	200305LO	00000669	150.0	15.0	2250.0	2674.0
LO-BENTOMAT ST	SFT SF	200305LO	00000670	150.0	15.0	2250.0	2721.0
LO-BENTOMAT ST	SFT SF	200305LO	00000671	150.0	15.0	2250.0	2666.0
LO-BENTOMAT ST	SFT SF	200305LO	00000672	150.0	15.0	2250.0	2679.0
LO-BENTOMAT ST	SFT SF	200305LO	00000673	150.0	15.0	2250.0	2716.0
LO-BENTOMAT ST	SFT SF	200305LO	00000674	150.0	15.0	2250.0	2664.0
LO-BENTOMAT ST	SFT SF	200305LO	00000675	150.0	15.0	2250.0	2602.0

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

5369

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000676	150.0	15.0	2250.0	2635.0
LO-BENTOMAT ST	SFT SF	200305LO	00000677	150.0	15.0	2250.0	2651.0
LO-BENTOMAT ST	SFT SF	200305LO	00000678	150.0	15.0	2250.0	2645.0
LO-BENTOMAT ST	SFT SF	200305LO	00000679	150.0	15.0	2250.0	2635.0
LO-BENTOMAT ST	SFT SF	200305LO	00000680	150.0	15.0	2250.0	2641.0
LO-BENTOMAT ST	SFT SF	200305LO	00000681	150.0	15.0	2250.0	2623.0
LO-BENTOMAT ST	SFT SF	200305LO	00000682	150.0	15.0	2250.0	2641.0
LO-BENTOMAT ST	SFT SF	200305LO	00000683	150.0	15.0	2250.0	2624.0
LO-BENTOMAT ST	SFT SF	200305LO	00000684	150.0	15.0	2250.0	2639.0
LO-BENTOMAT ST	SFT SF	200305LO	00000685	150.0	15.0	2250.0	2656.0
LO-BENTOMAT ST	SFT SF	200305LO	00000686	150.0	15.0	2250.0	2618.0
LO-BENTOMAT ST	SFT SF	200305LO	00000687	150.0	15.0	2250.0	2650.0
LO-BENTOMAT ST	SFT SF	200305LO	00000688	150.0	15.0	2250.0	2645.0
LO-BENTOMAT ST	SFT SF	200305LO	00000689	150.0	15.0	2250.0	2653.0
LO-BENTOMAT ST	SFT SF	200305LO	00000690	150.0	15.0	2250.0	2650.0
LO-BENTOMAT ST	SFT SF	200305LO	00000691	150.0	15.0	2250.0	2640.0
LO-BENTOMAT ST	SFT SF	200305LO	00000692	150.0	15.0	2250.0	2638.0
LO-BENTOMAT ST	SFT SF	200305LO	00000693	150.0	15.0	2250.0	2638.0
LO-BENTOMAT ST	SFT SF	200305LO	00000694	150.0	15.0	2250.0	2645.0

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

5369

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF 200305LO	00000695	150.0	15.0	2250.0	2649.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000696	150.0	15.0	2250.0	2640.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000697	150.0	15.0	2250.0	2644.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000698	150.0	15.0	2250.0	2639.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000699	150.0	15.0	2250.0	2618.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000700	150.0	15.0	2250.0	2665.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000701	150.0	15.0	2250.0	2690.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000702	150.0	15.0	2250.0	2765.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000703	150.0	15.0	2250.0	2660.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000704	150.0	15.0	2250.0	2676.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000705	150.0	15.0	2250.0	2679.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000706	150.0	15.0	2250.0	2651.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000707	150.0	15.0	2250.0	2718.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000708	150.0	15.0	2250.0	2701.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000709	150.0	15.0	2250.0	2640.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000710	150.0	15.0	2250.0	2615.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000711	150.0	15.0	2250.0	2626.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000712	150.0	15.0	2250.0	2620.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000713	150.0	15.0	2250.0	2624.0

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

5369

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000714	150.0	15.0	2250.0	2636.0
LO-BENTOMAT ST	SFT SF	200305LO	00000715	150.0	15.0	2250.0	2656.0
LO-BENTOMAT ST	SFT SF	200305LO	00000716	150.0	15.0	2250.0	2631.0
LO-BENTOMAT ST	SFT SF	200305LO	00000717	150.0	15.0	2250.0	2712.0
LO-BENTOMAT ST	SFT SF	200305LO	00000718	150.0	15.0	2250.0	2730.0
LO-BENTOMAT ST	SFT SF	200305LO	00000719	150.0	15.0	2250.0	2786.0
LO-BENTOMAT ST	SFT SF	200305LO	00000720	150.0	15.0	2250.0	2741.0
LO-BENTOMAT ST	SFT SF	200305LO	00000721	150.0	15.0	2250.0	2741.0
LO-BENTOMAT ST	SFT SF	200305LO	00000722	150.0	15.0	2250.0	2742.0
LO-BENTOMAT ST	SFT SF	200305LO	00000723	150.0	15.0	2250.0	2760.0
LO-BENTOMAT ST	SFT SF	200305LO	00000724	150.0	15.0	2250.0	2750.0
LO-BENTOMAT ST	SFT SF	200305LO	00000725	150.0	15.0	2250.0	2671.0
LO-BENTOMAT ST	SFT SF	200305LO	00000726	150.0	15.0	2250.0	2731.0
LO-BENTOMAT ST	SFT SF	200305LO	00000727	150.0	15.0	2250.0	2712.0
LO-BENTOMAT ST	SFT SF	200305LO	00000728	150.0	15.0	2250.0	2716.0
LO-BENTOMAT ST	SFT SF	200305LO	00000729	150.0	15.0	2250.0	2741.0
LO-BENTOMAT ST	SFT SF	200305LO	00000730	150.0	15.0	2250.0	2745.0
LO-BENTOMAT ST	SFT SF	200305LO	00000731	150.0	15.0	2250.0	2763.0
LO-BENTOMAT ST	SFT SF	200305LO	00000732	150.0	15.0	2250.0	2769.0

PACKING LIST

5369

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000733	150.0	15.0	2250.0	2758.0
LO-BENTOMAT ST	SFT SF	200305LO	00000734	150.0	15.0	2250.0	2760.0
LO-BENTOMAT ST	SFT SF	200305LO	00000735	150.0	15.0	2250.0	2780.0
LO-BENTOMAT ST	SFT SF	200305LO	00000736	150.0	15.0	2250.0	2790.0
LO-BENTOMAT ST	SFT SF	200305LO	00000737	150.0	15.0	2250.0	2752.0
LO-BENTOMAT ST	SFT SF	200305LO	00000738	150.0	15.0	2250.0	2715.0
LO-BENTOMAT ST	SFT SF	200305LO	00000739	150.0	15.0	2250.0	2739.0
LO-BENTOMAT ST	SFT SF	200305LO	00000740	150.0	15.0	2250.0	2731.0
LO-BENTOMAT ST	SFT SF	200305LO	00000741	150.0	15.0	2250.0	2728.0
LO-BENTOMAT ST	SFT SF	200305LO	00000742	150.0	15.0	2250.0	2728.0
LO-BENTOMAT ST	SFT SF	200305LO	00000743	150.0	15.0	2250.0	2720.0
LO-BENTOMAT ST	SFT SF	200305LO	00000744	150.0	15.0	2250.0	2646.0
LO-BENTOMAT ST	SFT SF	200305LO	00000745	150.0	15.0	2250.0	2645.0
LO-BENTOMAT ST	SFT SF	200305LO	00000746	150.0	15.0	2250.0	2734.0
LO-BENTOMAT ST	SFT SF	200305LO	00000747	150.0	15.0	2250.0	2763.0
LO-BENTOMAT ST	SFT SF	200305LO	00000748	150.0	15.0	2250.0	2698.0
LO-BENTOMAT ST	SFT SF	200305LO	00000749	150.0	15.0	2250.0	2697.0
LO-BENTOMAT ST	SFT SF	200305LO	00000750	150.0	15.0	2250.0	2737.0
LO-BENTOMAT ST	SFT SF	200305LO	00000751	150.0	15.0	2250.0	2726.0

P A C K I N G L I S T

5369

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000752	150.0	15.0	2250.0	2710.0
LO-BENTOMAT ST	SFT SF	200305LO	00000753	150.0	15.0	2250.0	2722.0
LO-BENTOMAT ST	SFT SF	200305LO	00000754	150.0	15.0	2250.0	2699.0
LO-BENTOMAT ST	SFT SF	200305LO	00000755	150.0	15.0	2250.0	2700.0
LO-BENTOMAT ST	SFT SF	200305LO	00000756	150.0	15.0	2250.0	2680.0
LO-BENTOMAT ST	SFT SF	200305LO	00000757	150.0	15.0	2250.0	2682.0
LO-BENTOMAT ST	SFT SF	200305LO	00000758	150.0	15.0	2250.0	2685.0
LO-BENTOMAT ST	SFT SF	200305LO	00000759	150.0	15.0	2250.0	2665.0
LO-BENTOMAT ST	SFT SF	200305LO	00000760	150.0	15.0	2250.0	2661.0
LO-BENTOMAT ST	SFT SF	200305LO	00000761	150.0	15.0	2250.0	2656.0
LO-BENTOMAT ST	SFT SF	200305LO	00000762	150.0	15.0	2250.0	2651.0
LO-BENTOMAT ST	SFT SF	200305LO	00000763	150.0	15.0	2250.0	2651.0
LO-BENTOMAT ST	SFT SF	200305LO	00000764	150.0	15.0	2250.0	2646.0
LO-BENTOMAT ST	SFT SF	200305LO	00000765	150.0	15.0	2250.0	2645.0
LO-BENTOMAT ST	SFT SF	200305LO	00000766	150.0	15.0	2250.0	2660.0
LO-BENTOMAT ST	SFT SF	200305LO	00000767	150.0	15.0	2250.0	2654.0
LO-BENTOMAT ST	SFT SF	200305LO	00000768	150.0	15.0	2250.0	2663.0
LO-BENTOMAT ST	SFT SF	200305LO	00000769	150.0	15.0	2250.0	2659.0
LO-BENTOMAT ST	SFT SF	200305LO	00000770	150.0	15.0	2250.0	2678.0

PACKING LIST

5369

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF 200305LO	00000771	150.0	15.0	2250.0	2671.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000772	150.0	15.0	2250.0	2666.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000773	150.0	15.0	2250.0	2657.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000774	150.0	15.0	2250.0	2628.0
[illegible]ENTOMAT ST		SFT	SF 200305LO	00000775	150.0	15.0	2250.0	2603.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000776	150.0	15.0	2250.0	2602.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000777	150.0	15.0	2250.0	2605.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000778	150.0	15.0	2250.0	2610.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000779	150.0	15.0	2250.0	2605.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000780	150.0	15.0	2250.0	2600.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000781	150.0	15.0	2250.0	2607.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000782	150.0	15.0	2250.0	2612.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000783	150.0	15.0	2250.0	2596.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000784	150.0	15.0	2250.0	2594.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000785	150.0	15.0	2250.0	2605.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000786	150.0	15.0	2250.0	2635.0
[illegible] BENTOMAT ST		SFT	SF 200305LO	00000787	150.0	15.0	2250.0	2658.0
[illegible]BENTOMAT ST		SFT	SF 200305LO	00000788	150.0	15.0	2250.0	2625.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000789	150.0	15.0	2250.0	2601.0

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
INGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

5369

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000790	150.0	15.0	2250.0	2660.0
LO-BENTOMAT ST	SFT SF	200305LO	00000791	150.0	15.0	2250.0	2628.0
LO-BENTOMAT ST	SFT SF	200305LO	00000792	150.0	15.0	2250.0	2608.0
LO-BENTOMAT ST	SFT SF	200305LO	00000793	150.0	15.0	2250.0	2653.0
LO-BENTOMAT ST	SFT SF	200305LO	00000794	150.0	15.0	2250.0	2650.0
LO-BENTOMAT ST	SFT SF	200305LO	00000795	150.0	15.0	2250.0	2675.0
LO-BENTOMAT ST	SFT SF	200305LO	00000796	150.0	15.0	2250.0	2664.0
LO-BENTOMAT ST	SFT SF	200305LO	00000797	150.0	15.0	2250.0	2649.0
LO-BENTOMAT ST	SFT SF	200305LO	00000798	150.0	15.0	2250.0	2658.0
LO-BENTOMAT ST	SFT SF	200305LO	00000799	150.0	15.0	2250.0	2637.0
LO-BENTOMAT ST	SFT SF	200305LO	00000800	150.0	15.0	2250.0	2643.0
LO-BENTOMAT ST	SFT SF	200305LO	00000801	150.0	15.0	2250.0	2659.0
LO-BENTOMAT ST	SFT SF	200305LO	00000802	150.0	15.0	2250.0	2651.0
LO-BENTOMAT ST	SFT SF	200305LO	00000803	150.0	15.0	2250.0	2670.0
LO-BENTOMAT ST	SFT SF	200305LO	00000804	150.0	15.0	2250.0	2697.0
LO-BENTOMAT ST	SFT SF	200305LO	00000805	150.0	15.0	2250.0	2694.0
LO-BENTOMAT ST	SFT SF	200305LO	00000806	150.0	15.0	2250.0	2701.0
LO-BENTOMAT ST	SFT SF	200305LO	00000807	150.0	15.0	2250.0	2700.0
LO-BENTOMAT ST	SFT SF	200305LO	00000808	150.0	15.0	2250.0	2658.0

PACKING LIST

5369

CETCO
-00 WEST SHURE DRIVE
INGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000809	150.0	15.0	2250.0	2642.0
LO-BENTOMAT ST	SFT SF	200305LO	00000810	150.0	15.0	2250.0	2643.0
LO-BENTOMAT ST	SFT SF	200305LO	00000811	150.0	15.0	2250.0	2640.0
LO-BENTOMAT ST	SFT SF	200305LO	00000812	150.0	15.0	2250.0	2636.0
ENTOMAT ST	SFT SF	200305LO	00000813	150.0	15.0	2250.0	2635.0
LO-BENTOMAT ST	SFT SF	200305LO	00000814	150.0	15.0	2250.0	2541.0
LO-BENTOMAT ST	SFT SF	200305LO	00000815	150.0	15.0	2250.0	2614.0
LO-BENTOMAT ST	SFT SF	200305LO	00000816	150.0	15.0	2250.0	2599.0
LO-BENTOMAT ST	SFT SF	200305LO	00000817	150.0	15.0	2250.0	2595.0
LO-BENTOMAT ST	SFT SF	200305LO	00000818	150.0	15.0	2250.0	2633.0
LO-BENTOMAT ST	SFT SF	200305LO	00000819	150.0	15.0	2250.0	2689.0
LO-BENTOMAT ST	SFT SF	200305LO	00000820	150.0	15.0	2250.0	2736.0
LO-BENTOMAT ST	SFT SF	200305LO	00000821	150.0	15.0	2250.0	2750.0
LO-BENTOMAT ST	SFT SF	200305LO	00000822	150.0	15.0	2250.0	2731.0
LO-BENTOMAT ST	SFT SF	200305LO	00000823	150.0	15.0	2250.0	2721.0
LO-BENTOMAT ST	SFT SF	200305LO	00000824	150.0	15.0	2250.0	2701.0
BENTOMAT ST	SFT SF	200305LO	00000825	150.0	15.0	2250.0	2681.0
LO-BENTOMAT ST	SFT SF	200305LO	00000826	150.0	15.0	2250.0	2689.0
LO-BENTOMAT ST	SFT SF	200305LO	00000827	150.0	15.0	2250.0	2700.0

PACKING LIST

CETCO
500 WEST SHURE DRIVE
INGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

5369

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000828	150.0	15.0	2250.0	21697.0
LO-BENTOMAT ST	SFT SF	200305LO	00000829	150.0	15.0	2250.0	2686.0
LO-BENTOMAT ST	SFT SF	200305LO	00000830	150.0	15.0	2250.0	2686.0
LO-BENTOMAT ST	SFT SF	200305LO	00000831	150.0	15.0	2250.0	2681.0
ENTOMAT ST	SFT SF	200305LO	00000832	150.0	15.0	2250.0	2675.0
LO-BENTOMAT ST	SFT SF	200305LO	00000833	150.0	15.0	2250.0	2687.0
LO-BENTOMAT ST	SFT SF	200305LO	00000834	150.0	15.0	2250.0	2419.0
LO-BENTOMAT ST	SFT SF	200305LO	00000835	150.0	15.0	2250.0	2674.0
LO-BENTOMAT ST	SFT SF	200305LO	00000836	150.0	15.0	2250.0	2685.0
LO-BENTOMAT ST	SFT SF	200305LO	00000837	150.0	15.0	2250.0	2689.0
LO-BENTOMAT ST	SFT SF	200305LO	00000838	150.0	15.0	2250.0	2690.0
LO-BENTOMAT ST	SFT SF	200305LO	00000839	150.0	15.0	2250.0	2712.0
LO-BENTOMAT ST	SFT SF	200305LO	00000840	150.0	15.0	2250.0	2640.0
LO-BENTOMAT ST	SFT SF	200305LO	00000841	150.0	15.0	2250.0	2650.0
LO-BENTOMAT ST	SFT SF	200305LO	00000842	150.0	15.0	2250.0	2630.0
LO-BENTOMAT ST	SFT SF	200305LO	00000843	150.0	15.0	2250.0	2626.0
LO-BENTOMAT ST	SFT SF	200305LO	00000844	150.0	15.0	2250.0	2630.0
LO-BENTOMAT ST	SFT SF	200305LO	00000845	150.0	15.0	2250.0	2628.0
LO-BENTOMAT ST	SFT SF	200305LO	00000846	150.0	15.0	2250.0	2641.0

PACKING LIST

5369

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000847	150.0	15.0	2250.0	2623.0
LO-BENTOMAT ST	SFT SF	200305LO	00000848	150.0	15.0	2250.0	2632.0
LO-BENTOMAT ST	SFT SF	200305LO	00000849	150.0	15.0	2250.0	2613.0
LO-BENTOMAT ST	SFT SF	200305LO	00000850	150.0	15.0	2250.0	2624.0
LO-BENTOMAT ST	SFT SF	200305LO	00000851	150.0	15.0	2250.0	2622.0
LO-BENTOMAT ST	SFT SF	200305LO	00000852	150.0	15.0	2250.0	2607.0
LO-BENTOMAT ST	SFT SF	200305LO	00000853	150.0	15.0	2250.0	2618.0
LO-BENTOMAT ST	SFT SF	200305LO	00000854	150.0	15.0	2250.0	2625.0
LO-BENTOMAT ST	SFT SF	200305LO	00000855	150.0	15.0	2250.0	2638.0
LO-BENTOMAT ST	SFT SF	200305LO	00000856	150.0	15.0	2250.0	2610.0
LO-BENTOMAT ST	SFT SF	200305LO	00000857	150.0	15.0	2250.0	2616.0
LO-BENTOMAT ST	SFT SF	200305LO	00000858	150.0	15.0	2250.0	2606.0
LO-BENTOMAT ST	SFT SF	200305LO	00000859	150.0	15.0	2250.0	2630.0
LO-BENTOMAT ST	SFT SF	200305LO	00000860	150.0	15.0	2250.0	2575.0
LO-BENTOMAT ST	SFT SF	200305LO	00000861	150.0	15.0	2250.0	2629.0
LO-BENTOMAT ST	SFT SF	200305LO	00000862	150.0	15.0	2250.0	2642.0
LO-BENTOMAT ST	SFT SF	200305LO	00000863	150.0	15.0	2250.0	2622.0
LO-BENTOMAT ST	SFT SF	200305LO	00000864	150.0	15.0	2250.0	2629.0
LO-BENTOMAT ST	SFT SF	200305LO	00000865	150.0	15.0	2250.0	2634.0

PACKING LIST

5369

CETCO
500 WEST SHURE DRIVE
INGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000866	150.0	15.0	2250.0	2615.0
LO-BENTOMAT ST	SFT SF	200305LO	00000867	150.0	15.0	2250.0	2632.0
LO-BENTOMAT ST	SFT SF	200305LO	00000868	150.0	15.0	2250.0	2622.0
LO-BENTOMAT ST	SFT SF	200305LO	00000869	150.0	15.0	2250.0	2616.0
ENTOMAT ST	SFT SF	200305LO	00000870	150.0	15.0	2250.0	2620.0
LO-BENTOMAT ST	SFT SF	200305LO	00000871	150.0	15.0	2250.0	2624.0
LO-BENTOMAT ST	SFT SF	200305LO	00000872	150.0	15.0	2250.0	2646.0
LO-BENTOMAT ST	SFT SF	200305LO	00000873	150.0	15.0	2250.0	2602.0
LO-BENTOMAT ST	SFT SF	200305LO	00000874	150.0	15.0	2250.0	2590.0
LO-BENTOMAT ST	SFT SF	200305LO	00000875	150.0	15.0	2250.0	2602.0
LO-BENTOMAT ST	SFT SF	200305LO	00000876	150.0	15.0	2250.0	2616.0
LO-BENTOMAT ST	SFT SF	200305LO	00000877	150.0	15.0	2250.0	2616.0
LO-BENTOMAT ST	SFT SF	200305LO	00000878	150.0	15.0	2250.0	2667.0
LO-BENTOMAT ST	SFT SF	200305LO	00000879	150.0	15.0	2250.0	2617.0
LO-BENTOMAT ST	SFT SF	200305LO	00000880	150.0	15.0	2250.0	2607.0
LO-BENTOMAT ST	SFT SF	200305LO	00000881	150.0	15.0	2250.0	2608.0
LO-BENTOMAT ST	SFT SF	200305LO	00000882	150.0	15.0	2250.0	2583.0
LO-BENTOMAT ST	SFT SF	200305LO	00000883	150.0	15.0	2250.0	2639.0
LO-BENTOMAT ST	SFT SF	200305LO	00000884	150.0	15.0	2250.0	2585.0

PACKING LIST

5369

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000885	150.0	15.0	2250.0	2593.0
LO-BENTOMAT ST	SFT SF	200305LO	00000886	150.0	15.0	2250.0	2596.0
LO-BENTOMAT ST	SFT SF	200305LO	00000887	150.0	15.0	2250.0	2618.0
LO-BENTOMAT ST	SFT SF	200305LO	00000888	150.0	15.0	2250.0	2623.0
LO-BENTOMAT ST	SFT SF	200305LO	00000889	150.0	15.0	2250.0	2637.0
LO-BENTOMAT ST	SFT SF	200305LO	00000890	150.0	15.0	2250.0	2600.0
LO-BENTOMAT ST	SFT SF	200305LO	00000891	150.0	15.0	2250.0	2610.0
LO-BENTOMAT ST	SFT SF	200305LO	00000892	150.0	15.0	2250.0	2620.0
LO-BENTOMAT ST	SFT SF	200305LO	00000893	150.0	15.0	2250.0	2610.0
LO-BENTOMAT ST	SFT SF	200305LO	00000894	150.0	15.0	2250.0	2617.0
LO-BENTOMAT ST	SFT SF	200305LO	00000895	150.0	15.0	2250.0	2602.0
LO-BENTOMAT ST	SFT SF	200305LO	00000896	150.0	15.0	2250.0	2618.0
LO-BENTOMAT ST	SFT SF	200305LO	00000897	150.0	15.0	2250.0	2585.0
LO-BENTOMAT ST	SFT SF	200305LO	00000898	150.0	15.0	2250.0	2577.0
LO-BENTOMAT ST	SFT SF	200305LO	00000899	150.0	15.0	2250.0	2580.0
LO-BENTOMAT ST	SFT SF	200305LO	00000900	150.0	15.0	2250.0	2575.0
LO-BENTOMAT ST	SFT SF	200305LO	00000901	150.0	15.0	2250.0	2602.0
LO-BENTOMAT ST	SFT SF	200305LO	00000902	150.0	15.0	2250.0	2635.0
LO-BENTOMAT ST	SFT SF	200305LO	00000903	150.0	15.0	2250.0	2653.0

PACKING LIST

5369

CETCO
[illegible]00 WEST SHURE DRIVE
[illegible]INGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000904	150.0	15.0	2250.0	2694.0
LO-BENTOMAT ST	SFT SF	200305LO	00000905	150.0	15.0	2250.0	2678.0
LO-BENTOMAT ST	SFT SF	200305LO	00000906	150.0	15.0	2250.0	2696.0
LO-BENTOMAT ST	SFT SF	200305LO	00000907	150.0	15.0	2250.0	2652.0
[illegible]ENTOMAT ST	SFT SF	200305LO	00000908	150.0	15.0	2250.0	2640.0
LO-BENTOMAT ST	SFT SF	200305LO	00000909	150.0	15.0	2250.0	2636.0
LO-BENTOMAT ST	SFT SF	200305LO	00000910	150.0	15.0	2250.0	2630.0
LO-BENTOMAT ST	SFT SF	200305LO	00000911	150.0	15.0	2250.0	2637.0
LO-BENTOMAT ST	SFT SF	200305LO	00000912	150.0	15.0	2250.0	2636.0
LO-BENTOMAT ST	SFT SF	200305LO	00000913	150.0	15.0	2250.0	2633.0
LO-BENTOMAT ST	SFT SF	200305LO	00000914	150.0	15.0	2250.0	2637.0
LO-BENTOMAT ST	SFT SF	200305LO	00000915	150.0	15.0	2250.0	2627.0
LO-BENTOMAT ST	SFT SF	200305LO	00000916	150.0	15.0	2250.0	2626.0
LO-BENTOMAT ST	SFT SF	200305LO	00000917	150.0	15.0	2250.0	2632.0
LO-BENTOMAT ST	SFT SF	200305LO	00000918	150.0	15.0	2250.0	2628.0
LO-BENTOMAT ST	SFT SF	200305LO	00000919	150.0	15.0	2250.0	2526.0
[illegible]ENTOMAT ST	SFT SF	200305LO	00000920	150.0	15.0	2250.0	2609.0
LO-BENTOMAT ST	SFT SF	200305LO	00000921	150.0	15.0	2250.0	2628.0
LO-BENTOMAT ST	SFT SF	200305LO	00000922	150.0	15.0	2250.0	2616.0

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

5369

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST		SFT	SF 200305LO	00000923	150.0	15.0	2250.0	2638.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000924	150.0	15.0	2250.0	2621.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000925	150.0	15.0	2250.0	2632.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000926	150.0	15.0	2250.0	2634.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000927	150.0	15.0	2250.0	2681.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000928	150.0	15.0	2250.0	2648.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000929	150.0	15.0	2250.0	2636.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000930	150.0	15.0	2250.0	2575.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000931	150.0	15.0	2250.0	2660.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000932	150.0	15.0	2250.0	2610.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000933	150.0	15.0	2250.0	2562.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000934	150.0	15.0	2250.0	2560.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000935	150.0	15.0	2250.0	2571.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000936	150.0	15.0	2250.0	2614.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000937	150.0	15.0	2250.0	2565.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000938	150.0	15.0	2250.0	2555.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000939	150.0	15.0	2250.0	2639.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000940	150.0	15.0	2250.0	2621.0
LO-BENTOMAT ST		SFT	SF 200305LO	00000941	150.0	15.0	2250.0	2660.0

PACKING LIST

5369

CETCO
1500 WEST SHURE DRIVE
INGTON HEIGHTS IL 60004

ORDER NO:.. 000167357
ORDER DATE: 1/21/2003
SHIP DATE:. 2/03/2003

SOLD TO: 4516
FLUOR FERNALD, INC.
P.O. BOX 538704

CINCINNATI OH 45253-8704

SHIP FROM:. CETCO LOVELL PLANT
FRT TERMS:. PREPAID & ABSORBED
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 01
U.S.DOE
C/O FLUOR FERNALD, INC.
(CELL 2 COVER & CELL 6 LINER)
7400 WILLEY ROAD
HAMILTON OH 45013

PO: 03FF0307-0000-001

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT ST	SFT SF	200305LO	00000942	150.0	15.0	2250.0	2625.0
LO-BENTOMAT ST	SFT SF	200305LO	00000943	150.0	15.0	2250.0	2629.0
LO-BENTOMAT ST	SFT SF	200305LO	00000944	150.0	15.0	2250.0	2626.0
LO-BENTOMAT ST	SFT SF	200305LO	00000945	150.0	15.0	2250.0	2635.0
ENTOMAT ST	SFT SF	200305LO	00000946	150.0	15.0	2250.0	2645.0
LO-BENTOMAT ST	SFT SF	200305LO	00000947	150.0	15.0	2250.0	2641.0
LO-BENTOMAT ST	SFT SF	200305LO	00000948	150.0	15.0	2250.0	2646.0
LO-BENTOMAT ST	SFT SF	200305LO	00000949	150.0	15.0	2250.0	2638.0
LO-BENTOMAT ST	SFT SF	200305LO	00000950	150.0	15.0	2250.0	2634.0
LO-BENTOMAT ST	SFT SF	200305LO	00000951	150.0	15.0	2250.0	2636.0
LO-BENTOMAT ST	SFT SF	200305LO	00000952	150.0	15.0	2250.0	2645.0
LO-BENTOMAT ST	SFT SF	200305LO	00000953	150.0	15.0	2250.0	2638.0
LO-BENTOMAT ST	SFT SF	200305LO	00000954	150.0	15.0	2250.0	2642.0
LO-BENTOMAT ST	SFT SF	200305LO	00000955	150.0	15.0	2250.0	2650.0

ORDER TOTALS.....	1185750.0	1417379.0

TOTAL ITEMS..... 527

GEOSYNTHETIC CLAY LINER QUALITY TEST RESULTS

GEOSYNTHETIC CLAY LINER

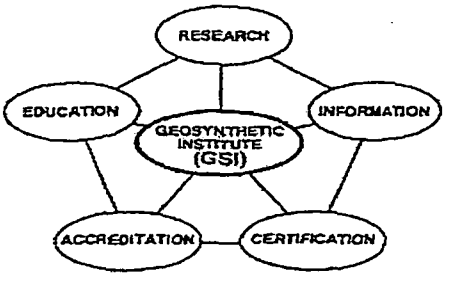
MANUFACTURING CERTIFICATION

Project Name:	Fluor Daniel Fernald
Prepared For:	Fluor Daniel Fernald, Inc.
Customer PO:	03FF0307-0000-001
Order Number:	167357
Ship Date:	PRE-SCANNED / 2-3-03

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
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	* 1.0 lb/sq.ft. @ 25 % Moist. (Min.)
Grab Strength	ASTM D 4632	90 lbs.
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 25 % 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.



Steve B. Wilkerson
Plant Manager
COLLOID ENVIRONMENTAL TECHNOLOGIES CO. (CETCO)

QCG#FT2 OCT#FT2
2/04/03 13:34:14

CETCO

GCL QUALITY DATA

CETCO LOVELL PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR
HAMILTON

O R D E R # 000167357

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 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	200305LO	00000955	1.11	248.90	39.30	23.80	28.00	15.00
LO-BENTOMAT ST	200305LO	00000954	1.11	248.90	39.30	23.80	28.00	15.00
LO-BENTOMAT ST	200305LO	00000953	1.11	248.90	39.30	23.80	28.00	15.00
LO-BENTOMAT ST	200305LO	00000952	1.11	248.90	39.30	23.80	28.00	15.00
LO-BENTOMAT ST	200305LO	00000951	1.11	248.90	39.30	23.80	28.00	15.00
LO-BENTOMAT ST	200305LO	00000950	1.11	248.90	39.30	23.80	28.00	15.00
LO-BENTOMAT ST	200305LO	00000949	1.11	248.90	39.30	23.80	28.00	15.00
LO-BENTOMAT ST	200305LO	00000948	1.11	248.90	39.30	23.80	28.00	15.00
LO-BENTOMAT ST	200305LO	00000947	1.11	248.90	39.30	23.80	28.00	15.00
LO-BENTOMAT ST	200305LO	00000946	1.11	248.90	39.30	23.80	28.00	15.00
LO-BENTOMAT ST	200305LO	00000945	1.11	248.90	39.30	23.80	28.00	15.00
LO-BENTOMAT ST	200305LO	00000944	1.11	248.90	39.30	23.80	28.00	15.00
LO-BENTOMAT ST	200305LO	00000943	1.11	248.90	39.30	23.80	28.00	15.00
LO-BENTOMAT ST	200305LO	00000942	1.11	248.90	39.30	23.80	28.00	15.00
LO-BENTOMAT ST	200305LO	00000941	1.11	248.90	39.30	23.80	28.00	15.00
LO-BENTOMAT ST	200305LO	00000940	1.11	248.90	39.30	23.80	28.00	15.00
LO-BENTOMAT ST	200305LO	00000939	1.11*	248.90	39.30*	23.80*	28.00*	15.00*
LO-BENTOMAT ST	200305LO	00000938	1.10	248.90	19.70	22.40	28.00	14.80
LO-BENTOMAT ST	200305LO	00000937	1.10	248.90	19.70	22.40	28.00	14.80
LO-BENTOMAT ST	200305LO	00000936	1.10	248.90	19.70	22.40	28.00	14.80
LO-BENTOMAT ST	200305LO	00000935	1.10	248.90	19.70	22.40	28.00	14.80
LO-BENTOMAT ST	200305LO	00000934	1.10	248.90	19.70	22.40	28.00	14.80
LO-BENTOMAT ST	200305LO	00000933	1.10	248.90	19.70	22.40	28.00	14.80
LO-BENTOMAT ST	200305LO	00000932	1.10	248.90	19.70	22.40	28.00	14.80
LO-BENTOMAT ST	200305LO	00000931	1.10	248.90	19.70	22.40	28.00	14.80
LO-BENTOMAT ST	200305LO	00000930	1.10	248.90	19.70	22.40	28.00	14.80
LO-BENTOMAT ST	200305LO	00000929	1.10	248.90	19.70	22.40	28.00	14.80
LO-BENTOMAT ST	200305LO	00000928	1.10	248.90	19.70	22.40	28.00	14.80
LO-BENTOMAT ST	200305LO	00000927	1.10	248.90	19.70	22.40	28.00	14.80
LO-BENTOMAT ST	200305LO	00000926	1.10	248.90	19.70	22.40	28.00	14.80
LO-BENTOMAT ST	200305LO	00000925	1.10	248.90	19.70	22.40	28.00	14.80
LO-BENTOMAT ST	200305LO	00000924	1.10	248.90	19.70	22.40	28.00	14.80
LO-BENTOMAT ST	200305LO	00000923	1.10	248.90	19.70	22.40	28.00	14.80
LO-BENTOMAT ST	200305LO	00000922	1.10*	248.90	19.70*	22.40*	28.00*	14.80*
LO-BENTOMAT ST	200305LO	00000921	1.08	248.90	34.60	22.00	28.00	15.00
LO-BENTOMAT ST	200305LO	00000920	1.08	248.90	34.60	22.00	28.00	15.00
LO-BENTOMAT ST	200305LO	00000919	1.08	248.90	34.60	22.00	28.00	15.00
LO-BENTOMAT ST	200305LO	00000918	1.08	248.90	34.60	22.00	28.00	15.00
LO-BENTOMAT ST	200305LO	00000917	1.08	248.90	34.60	22.00	28.00	15.00

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CETCO

GCL QUALITY DATA

CETCO LOVELL PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR
HAMILTON

O R D E R # 000167357

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 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	200305LO	00000916	1.08	248.90	34.60	22.00	28.00	15.00
LO-BENTOMAT ST	200305LO	00000915	1.08	248.90	34.60	22.00	28.00	15.00
LO-BENTOMAT ST	200305LO	00000914	1.08	248.90	34.60	22.00	28.00	15.00
LO-BENTOMAT ST	200305LO	00000913	1.08	248.90	34.60	22.00	28.00	15.00
LO-BENTOMAT ST	200305LO	00000912	1.08	248.90	34.60	22.00	28.00	15.00
LO-BENTOMAT ST	200305LO	00000911	1.08	248.90	34.60	22.00	28.00	15.00
LO-BENTOMAT ST	200305LO	00000910	1.08	248.90	34.60	22.00	28.00	15.00
LO-BENTOMAT ST	200305LO	00000909	1.08	248.90	34.60	22.00	28.00	15.00
LO-BENTOMAT ST	200305LO	00000908	1.08	248.90	34.60	22.00	28.00	15.00
LO-BENTOMAT ST	200305LO	00000907	1.08	248.90	34.60	22.00	28.00	15.00
LO-BENTOMAT ST	200305LO	00000906	1.08	248.90	34.60	22.00	28.00	15.00
LO-BENTOMAT ST	200305LO	00000905	1.08*	248.90	34.60*	22.00*	28.00*	15.00*
LO-BENTOMAT ST	200305LO	00000904	1.12	248.90	26.10	22.80	27.00	15.20
LO-BENTOMAT ST	200305LO	00000903	1.12	248.90	26.10	22.80	27.00	15.20
LO-BENTOMAT ST	200305LO	00000902	1.12	248.90	26.10	22.80	27.00	15.20
LO-BENTOMAT ST	200305LO	00000901	1.12	248.90	26.10	22.80	27.00	15.20
LO-BENTOMAT ST	200305LO	00000900	1.12	248.90	26.10	22.80	27.00	15.20
LO-BENTOMAT ST	200305LO	00000899	1.12	248.90	26.10	22.80	27.00	15.20
LO-BENTOMAT ST	200305LO	00000898	1.12	248.90	26.10	22.80	27.00	15.20
LO-BENTOMAT ST	200305LO	00000897	1.12	248.90	26.10	22.80	27.00	15.20
LO-BENTOMAT ST	200305LO	00000896	1.12	248.90	26.10	22.80	27.00	15.20
LO-BENTOMAT ST	200305LO	00000895	1.12	248.90	26.10	22.80	27.00	15.20
LO-BENTOMAT ST	200305LO	00000894	1.12	248.90	26.10	22.80	27.00	15.20
LO-BENTOMAT ST	200305LO	00000893	1.12	248.90	26.10	22.80	27.00	15.20
LO-BENTOMAT ST	200305LO	00000892	1.12	248.90	26.10	22.80	27.00	15.20
LO-BENTOMAT ST	200305LO	00000891	1.12	248.90	26.10	22.80	27.00	15.20
LO-BENTOMAT ST	200305LO	00000890	1.12	248.90	26.10	22.80	27.00	15.20
LO-BENTOMAT ST	200305LO	00000889	1.12	248.90	26.10	22.80	27.00	15.20
LO-BENTOMAT ST	200305LO	00000888	1.12*	248.90*	26.10*	22.80*	27.00*	15.20*
LO-BENTOMAT ST	200305LO	00000887	1.11	208.20	38.70	24.10	27.00	15.20
LO-BENTOMAT ST	200305LO	00000886	1.11	208.20	38.70	24.10	27.00	15.20
LO-BENTOMAT ST	200305LO	00000885	1.11	208.20	38.70	24.10	27.00	15.20
LO-BENTOMAT ST	200305LO	00000884	1.11	208.20	38.70	24.10	27.00	15.20
LO-BENTOMAT ST	200305LO	00000883	1.11	208.20	38.70	24.10	27.00	15.20
LO-BENTOMAT ST	200305LO	00000882	1.11	208.20	38.70	24.10	27.00	15.20
LO-BENTOMAT ST	200305LO	00000881	1.11	208.20	38.70	24.10	27.00	15.20
LO-BENTOMAT ST	200305LO	00000880	1.11	208.20	38.70	24.10	27.00	15.20
LO-BENTOMAT ST	200305LO	00000879	1.11	208.20	38.70	24.10	27.00	15.20
LO-BENTOMAT ST	200305LO	00000878	1.11	208.20	38.70	24.10	27.00	15.20

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CETCO

GCL QUALITY DATA

CETCO LOVELL PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR
HAMILTON

O R D E R # 000167357

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 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	200305LO	00000877	1.11	208.20	38.70	24.10	27.00	15.20
LO-BENTOMAT ST	200305LO	00000876	1.11	208.20	38.70	24.10	27.00	15.20
LO-BENTOMAT ST	200305LO	00000875	1.11	208.20	38.70	24.10	27.00	15.20
LO-BENTOMAT ST	200305LO	00000874	1.11	208.20	38.70	24.10	27.00	15.20
LO-BENTOMAT ST	200305LO	00000873	1.11	208.20	38.70	24.10	27.00	15.20
LO-BENTOMAT ST	200305LO	00000872	1.11	208.20	38.70	24.10	27.00	15.20
LO-BENTOMAT ST	200305LO	00000871	1.11*	208.20	38.70*	24.10*	27.00*	15.20*
LO-BENTOMAT ST	200305LO	00000870	1.10	208.20	40.20	24.20	29.00	14.80
LO-BENTOMAT ST	200305LO	00000869	1.10	208.20	40.20	24.20	29.00	14.80
LO-BENTOMAT ST	200305LO	00000868	1.10	208.20	40.20	24.20	29.00	14.80
LO-BENTOMAT ST	200305LO	00000867	1.10	208.20	40.20	24.20	29.00	14.80
LO-BENTOMAT ST	200305LO	00000866	1.10	208.20	40.20	24.20	29.00	14.80
LO-BENTOMAT ST	200305LO	00000865	1.10	208.20	40.20	24.20	29.00	14.80
LO-BENTOMAT ST	200305LO	00000864	1.10	208.20	40.20	24.20	29.00	14.80
LO-BENTOMAT ST	200305LO	00000863	1.10	208.20	40.20	24.20	29.00	14.80
LO-BENTOMAT ST	200305LO	00000862	1.10	208.20	40.20	24.20	29.00	14.80
LO-BENTOMAT ST	200305LO	00000861	1.10	208.20	40.20	24.20	29.00	14.80
LO-BENTOMAT ST	200305LO	00000860	1.10	208.20	40.20	24.20	29.00	14.80
LO-BENTOMAT ST	200305LO	00000859	1.10	208.20	40.20	24.20	29.00	14.80
LO-BENTOMAT ST	200305LO	00000858	1.10	208.20	40.20	24.20	29.00	14.80
LO-BENTOMAT ST	200305LO	00000857	1.10	208.20	40.20	24.20	29.00	14.80
LO-BENTOMAT ST	200305LO	00000856	1.10	208.20	40.20	24.20	29.00	14.80
LO-BENTOMAT ST	200305LO	00000855	1.10	208.20	40.20	24.20	29.00	14.80
LO-BENTOMAT ST	200305LO	00000854	1.10*	208.20	40.20*	24.20*	29.00*	14.80*
LO-BENTOMAT ST	200305LO	00000853	1.11	208.20	26.90	24.40	28.00	14.60
LO-BENTOMAT ST	200305LO	00000852	1.11	208.20	26.90	24.40	28.00	14.60
LO-BENTOMAT ST	200305LO	00000851	1.11	208.20	26.90	24.40	28.00	14.60
LO-BENTOMAT ST	200305LO	00000850	1.11	208.20	26.90	24.40	28.00	14.60
LO-BENTOMAT ST	200305LO	00000849	1.11	208.20	26.90	24.40	28.00	14.60
LO-BENTOMAT ST	200305LO	00000848	1.11	208.20	26.90	24.40	28.00	14.60
LO-BENTOMAT ST	200305LO	00000847	1.11	208.20	26.90	24.40	28.00	14.60
LO-BENTOMAT ST	200305LO	00000846	1.11	208.20	26.90	24.40	28.00	14.60
LO-BENTOMAT ST	200305LO	00000845	1.11	208.20	26.90	24.40	28.00	14.60
LO-BENTOMAT ST	200305LO	00000844	1.11	208.20	26.90	24.40	28.00	14.60
LO-BENTOMAT ST	200305LO	00000843	1.11	208.20	26.90	24.40	28.00	14.60
LO-BENTOMAT ST	200305LO	00000842	1.11	208.20	26.90	24.40	28.00	14.60
LO-BENTOMAT ST	200305LO	00000841	1.11	208.20	26.90	24.40	28.00	14.60
LO-BENTOMAT ST	200305LO	00000840	1.11	208.20	26.90	24.40	28.00	14.60
LO-BENTOMAT ST	200305LO	00000839	1.11	208.20	26.90	24.40	28.00	14.60

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CETCO

GCL QUALITY DATA

CETCO LOVELL PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR
HAMILTON

O R D E R # 000167357

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 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	200305LO	00000838	1.11	208.20	26.90	24.40	28.00	14.60
LO-BENTOMAT ST	200305LO	00000837	1.11*	208.20	26.90*	24.40*	28.00*	14.60*
LO-BENTOMAT ST	200305LO	00000836	1.15	208.20	28.00	22.90	27.00	15.00
LO-BENTOMAT ST	200305LO	00000835	1.15	208.20	28.00	22.90	27.00	15.00
LO-BENTOMAT ST	200305LO	00000834	1.15	208.20	28.00	22.90	27.00	15.00
LO-BENTOMAT ST	200305LO	00000833	1.15	208.20	28.00	22.90	27.00	15.00
LO-BENTOMAT ST	200305LO	00000832	1.15	208.20	28.00	22.90	27.00	15.00
LO-BENTOMAT ST	200305LO	00000831	1.15	208.20	28.00	22.90	27.00	15.00
LO-BENTOMAT ST	200305LO	00000830	1.15	208.20	28.00	22.90	27.00	15.00
LO-BENTOMAT ST	200305LO	00000829	1.15	208.20	28.00	22.90	27.00	15.00
LO-BENTOMAT ST	200305LO	00000828	1.15	208.20	28.00	22.90	27.00	15.00
LO-BENTOMAT ST	200305LO	00000827	1.15	208.20	28.00	22.90	27.00	15.00
LO-BENTOMAT ST	200305LO	00000826	1.15	208.20	28.00	22.90	27.00	15.00
LO-BENTOMAT ST	200305LO	00000825	1.15	208.20	28.00	22.90	27.00	15.00
LO-BENTOMAT ST	200305LO	00000824	1.15	208.20	28.00	22.90	27.00	15.00
LO-BENTOMAT ST	200305LO	00000823	1.15	208.20	28.00	22.90	27.00	15.00
LO-BENTOMAT ST	200305LO	00000822	1.15	208.20	28.00	22.90	27.00	15.00
LO-BENTOMAT ST	200305LO	00000821	1.15	208.20	28.00	22.90	27.00	15.00
LO-BENTOMAT ST	200305LO	00000820	1.15*	208.20	28.00*	22.90*	27.00*	15.00*
LO-BENTOMAT ST	200305LO	00000819	1.05	208.20	32.30	22.70	28.00	14.80
LO-BENTOMAT ST	200305LO	00000818	1.05	208.20	32.30	22.70	28.00	14.80
LO-BENTOMAT ST	200305LO	00000817	1.05	208.20	32.30	22.70	28.00	14.80
LO-BENTOMAT ST	200305LO	00000816	1.05	208.20	32.30	22.70	28.00	14.80
LO-BENTOMAT ST	200305LO	00000815	1.05	208.20	32.30	22.70	28.00	14.80
LO-BENTOMAT ST	200305LO	00000814	1.05	208.20	32.30	22.70	28.00	14.80
LO-BENTOMAT ST	200305LO	00000813	1.05	208.20	32.30	22.70	28.00	14.80
LO-BENTOMAT ST	200305LO	00000812	1.05	208.20	32.30	22.70	28.00	14.80
LO-BENTOMAT ST	200305LO	00000811	1.05	208.20	32.30	22.70	28.00	14.80
LO-BENTOMAT ST	200305LO	00000810	1.05	208.20	32.30	22.70	28.00	14.80
LO-BENTOMAT ST	200305LO	00000809	1.05	208.20	32.30	22.70	28.00	14.80
LO-BENTOMAT ST	200305LO	00000808	1.05	208.20	32.30	22.70	28.00	14.80
LO-BENTOMAT ST	200305LO	00000807	1.05	208.20	32.30	22.70	28.00	14.80
LO-BENTOMAT ST	200305LO	00000806	1.05	208.20	32.30	22.70	28.00	14.80
LO-BENTOMAT ST	200305LO	00000805	1.05	208.20	32.30	22.70	28.00	14.80
LO-BENTOMAT ST	200305LO	00000804	1.05	208.20	32.30	22.70	28.00	14.80
LO-BENTOMAT ST	200305LO	00000803	1.05*	208.20*	32.30*	22.70*	28.00*	14.80*
LO-BENTOMAT ST	200305LO	00000802	1.17	207.60	29.20	21.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000801	1.17	207.60	29.20	21.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000800	1.17	207.60	29.20	21.20	28.00	14.80

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QCG#FT2 QCT#FT2
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CETCO

GCL QUALITY DATA

CETCO LOVELL PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR
HAMILTON

O R D E R # 000167357

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 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	200305LO	00000799	1.17	207.60	29.20	21.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000798	1.17	207.60	29.20	21.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000797	1.17	207.60	29.20	21.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000796	1.17	207.60	29.20	21.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000795	1.17	207.60	29.20	21.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000794	1.17	207.60	29.20	21.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000793	1.17	207.60	29.20	21.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000792	1.17	207.60	29.20	21.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000791	1.17	207.60	29.20	21.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000790	1.17	207.60	29.20	21.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000789	1.17	207.60	29.20	21.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000788	1.17	207.60	29.20	21.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000787	1.17	207.60	29.20	21.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000786	1.17*	207.60	29.20*	21.20*	28.00*	14.80*
LO-BENTOMAT ST	200305LO	00000785	1.17	207.60	33.40	24.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000784	1.17	207.60	33.40	24.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000783	1.17	207.60	33.40	24.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000782	1.17	207.60	33.40	24.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000781	1.17	207.60	33.40	24.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000780	1.17	207.60	33.40	24.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000779	1.17	207.60	33.40	24.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000778	1.17	207.60	33.40	24.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000777	1.17	207.60	33.40	24.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000776	1.17	207.60	33.40	24.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000775	1.17	207.60	33.40	24.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000774	1.17	207.60	33.40	24.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000773	1.17	207.60	33.40	24.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000772	1.17	207.60	33.40	24.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000771	1.17	207.60	33.40	24.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000770	1.17	207.60	33.40	24.20	28.00	14.80
LO-BENTOMAT ST	200305LO	00000769	1.17*	207.60	33.40*	24.20*	28.00*	14.80*
LO-BENTOMAT ST	200305LO	00000768	1.08	207.60	43.40	24.60	28.00	13.80
LO-BENTOMAT ST	200305LO	00000767	1.08	207.60	43.40	24.60	28.00	13.80
LO-BENTOMAT ST	200305LO	00000766	1.08	207.60	43.40	24.60	28.00	13.80
LO-BENTOMAT ST	200305LO	00000765	1.08	207.60	43.40	24.60	28.00	13.80
LO-BENTOMAT ST	200305LO	00000764	1.08	207.60	43.40	24.60	28.00	13.80
LO-BENTOMAT ST	200305LO	00000763	1.08	207.60	43.40	24.60	28.00	13.80
LO-BENTOMAT ST	200305LO	00000762	1.08	207.60	43.40	24.60	28.00	13.80
LO-BENTOMAT ST	200305LO	00000761	1.08	207.60	43.40	24.60	28.00	13.80

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QCG#FT2 QCT#FT2
2/04/03 13:34:14

CETCO

GCL QUALITY DATA

CETCO LOVELL PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR
HAMILTON

O R D E R # 000167357

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 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	200305LO	00000760	1.08	207.60	43.40	24.60	28.00	13.80
LO-BENTOMAT ST	200305LO	00000759	1.08	207.60	43.40	24.60	28.00	13.80
LO-BENTOMAT ST	200305LO	00000758	1.08	207.60	43.40	24.60	28.00	13.80
LO-BENTOMAT ST	200305LO	00000757	1.08	207.60	43.40	24.60	28.00	13.80
LO-BENTOMAT ST	200305LO	00000756	1.08	207.60	43.40	24.60	28.00	13.80
LO-BENTOMAT ST	200305LO	00000755	1.08	207.60	43.40	24.60	28.00	13.80
LO-BENTOMAT ST	200305LO	00000754	1.08	207.60	43.40	24.60	28.00	13.80
LO-BENTOMAT ST	200305LO	00000753	1.08	207.60	43.40	24.60	28.00	13.80
LO-BENTOMAT ST	200305LO	00000752	1.08*	207.60	43.40*	24.60*	28.00*	13.80*
LO-BENTOMAT ST	200305LO	00000751	1.11	207.60	32.90	24.10	29.00	13.60
LO-BENTOMAT ST	200305LO	00000750	1.11	207.60	32.90	24.10	29.00	13.60
LO-BENTOMAT ST	200305LO	00000749	1.11	207.60	32.90	24.10	29.00	13.60
LO-BENTOMAT ST	200305LO	00000748	1.11	207.60	32.90	24.10	29.00	13.60
LO-BENTOMAT ST	200305LO	00000747	1.11	207.60	32.90	24.10	29.00	13.60
LO-BENTOMAT ST	200305LO	00000746	1.11	207.60	32.90	24.10	29.00	13.60
LO-BENTOMAT ST	200305LO	00000745	1.11	207.60	32.90	24.10	29.00	13.60
LO-BENTOMAT ST	200305LO	00000744	1.11	207.60	32.90	24.10	29.00	13.60
LO-BENTOMAT ST	200305LO	00000743	1.11	207.60	32.90	24.10	29.00	13.60
LO-BENTOMAT ST	200305LO	00000742	1.11	207.60	32.90	24.10	29.00	13.60
LO-BENTOMAT ST	200305LO	00000741	1.11	207.60	32.90	24.10	29.00	13.60
LO-BENTOMAT ST	200305LO	00000740	1.11	207.60	32.90	24.10	29.00	13.60
LO-BENTOMAT ST	200305LO	00000739	1.11	207.60	32.90	24.10	29.00	13.60
LO-BENTOMAT ST	200305LO	00000738	1.11	207.60	32.90	24.10	29.00	13.60
LO-BENTOMAT ST	200305LO	00000737	1.11	207.60	32.90	24.10	29.00	13.60
LO-BENTOMAT ST	200305LO	00000736	1.11	207.60	32.90	24.10	29.00	13.60
LO-BENTOMAT ST	200305LO	00000735	1.11*	207.60	32.90*	24.10*	29.00*	13.60*
LO-BENTOMAT ST	200305LO	00000734	1.12	207.60	34.70	21.70	28.00	15.40
LO-BENTOMAT ST	200305LO	00000733	1.12	207.60	34.70	21.70	28.00	15.40
LO-BENTOMAT ST	200305LO	00000732	1.12	207.60	34.70	21.70	28.00	15.40
LO-BENTOMAT ST	200305LO	00000731	1.12	207.60	34.70	21.70	28.00	15.40
LO-BENTOMAT ST	200305LO	00000730	1.12	207.60	34.70	21.70	28.00	15.40
LO-BENTOMAT ST	200305LO	00000729	1.12	207.60	34.70	21.70	28.00	15.40
LO-BENTOMAT ST	200305LO	00000728	1.12	207.60	34.70	21.70	28.00	15.40
LO-BENTOMAT ST	200305LO	00000727	1.12	207.60	34.70	21.70	28.00	15.40
LO-BENTOMAT ST	200305LO	00000726	1.12	207.60	34.70	21.70	28.00	15.40
LO-BENTOMAT ST	200305LO	00000725	1.12	207.60	34.70	21.70	28.00	15.40
LO-BENTOMAT ST	200305LO	00000724	1.12	207.60	34.70	21.70	28.00	15.40
LO-BENTOMAT ST	200305LO	00000723	1.12	207.60	34.70	21.70	28.00	15.40
LO-BENTOMAT ST	200305LO	00000722	1.12	207.60	34.70	21.70	28.00	15.40

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QCG#FT2 QCT#FT2
2/04/03 13:34:14

CETCO

GCL QUALITY DATA

CETCO LOVELL PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR
HAMILTON

O R D E R # 000167357

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 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	200305LO	00000721	1.12	207.60	34.70	21.70	28.00	15.40
LO-BENTOMAT ST	200305LO	00000720	1.12	207.60	34.70	21.70	28.00	15.40
LO-BENTOMAT ST	200305LO	00000719	1.12	207.60	34.70	21.70	28.00	15.40
LO-BENTOMAT ST	200305LO	00000718	1.12*	207.60*	34.70*	21.70*	28.00*	15.40*
LO-BENTOMAT ST	200305LO	00000717	1.06	231.20	35.80	23.00	27.00	15.60
LO-BENTOMAT ST	200305LO	00000716	1.06	231.20	35.80	23.00	27.00	15.60
LO-BENTOMAT ST	200305LO	00000715	1.06	231.20	35.80	23.00	27.00	15.60
LO-BENTOMAT ST	200305LO	00000714	1.06	231.20	35.80	23.00	27.00	15.60
LO-BENTOMAT ST	200305LO	00000713	1.06	231.20	35.80	23.00	27.00	15.60
LO-BENTOMAT ST	200305LO	00000712	1.06	231.20	35.80	23.00	27.00	15.60
LO-BENTOMAT ST	200305LO	00000711	1.06	231.20	35.80	23.00	27.00	15.60
LO-BENTOMAT ST	200305LO	00000710	1.06	231.20	35.80	23.00	27.00	15.60
LO-BENTOMAT ST	200305LO	00000709	1.06	231.20	35.80	23.00	27.00	15.60
LO-BENTOMAT ST	200305LO	00000708	1.06	231.20	35.80	23.00	27.00	15.60
LO-BENTOMAT ST	200305LO	00000707	1.06	231.20	35.80	23.00	27.00	15.60
LO-BENTOMAT ST	200305LO	00000706	1.06	231.20	35.80	23.00	27.00	15.60
LO-BENTOMAT ST	200305LO	00000705	1.06	231.20	35.80	23.00	27.00	15.60
LO-BENTOMAT ST	200305LO	00000704	1.06	231.20	35.80	23.00	27.00	15.60
LO-BENTOMAT ST	200305LO	00000703	1.06	231.20	35.80	23.00	27.00	15.60
LO-BENTOMAT ST	200305LO	00000702	1.06	231.20	35.80	23.00	27.00	15.60
LO-BENTOMAT ST	200305LO	00000701	1.06*	231.20	35.80*	23.00*	27.00*	15.60*
LO-BENTOMAT ST	200305LO	00000700	1.06	231.20	40.50	24.40	28.00	15.40
LO-BENTOMAT ST	200305LO	00000699	1.06	231.20	40.50	24.40	28.00	15.40
LO-BENTOMAT ST	200305LO	00000698	1.06	231.20	40.50	24.40	28.00	15.40
LO-BENTOMAT ST	200305LO	00000697	1.06	231.20	40.50	24.40	28.00	15.40
LO-BENTOMAT ST	200305LO	00000696	1.06	231.20	40.50	24.40	28.00	15.40
LO-BENTOMAT ST	200305LO	00000695	1.06	231.20	40.50	24.40	28.00	15.40
LO-BENTOMAT ST	200305LO	00000694	1.06	231.20	40.50	24.40	28.00	15.40
LO-BENTOMAT ST	200305LO	00000693	1.06	231.20	40.50	24.40	28.00	15.40
LO-BENTOMAT ST	200305LO	00000692	1.06	231.20	40.50	24.40	28.00	15.40
LO-BENTOMAT ST	200305LO	00000691	1.06	231.20	40.50	24.40	28.00	15.40
LO-BENTOMAT ST	200305LO	00000690	1.06	231.20	40.50	24.40	28.00	15.40
LO-BENTOMAT ST	200305LO	00000689	1.06	231.20	40.50	24.40	28.00	15.40
LO-BENTOMAT ST	200305LO	00000688	1.06	231.20	40.50	24.40	28.00	15.40
LO-BENTOMAT ST	200305LO	00000687	1.06	231.20	40.50	24.40	28.00	15.40
LO-BENTOMAT ST	200305LO	00000686	1.06	231.20	40.50	24.40	28.00	15.40
LO-BENTOMAT ST	200305LO	00000685	1.06	231.20	40.50	24.40	28.00	15.40
LO-BENTOMAT ST	200305LO	00000684	1.06*	231.20	40.50*	24.40*	28.00*	15.40*
LO-BENTOMAT ST	200305LO	00000683	1.06	231.20	28.10	22.00	28.00	15.20

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CETCO

GCL QUALITY DATA

CETCO LOVELL PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR
HAMILTON

O R D E R # 000167357

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 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	200305LO	00000682	1.06	231.20	28.10	22.00	28.00	15.20
LO-BENTOMAT ST	200305LO	00000681	1.06	231.20	28.10	22.00	28.00	15.20
LO-BENTOMAT ST	200305LO	00000680	1.06	231.20	28.10	22.00	28.00	15.20
LO-BENTOMAT ST	200305LO	00000679	1.06	231.20	28.10	22.00	28.00	15.20
LO-BENTOMAT ST	200305LO	00000678	1.06	231.20	28.10	22.00	28.00	15.20
LO-BENTOMAT ST	200305LO	00000677	1.06	231.20	28.10	22.00	28.00	15.20
LO-BENTOMAT ST	200305LO	00000676	1.06	231.20	28.10	22.00	28.00	15.20
LO-BENTOMAT ST	200305LO	00000675	1.06	231.20	28.10	22.00	28.00	15.20
LO-BENTOMAT ST	200305LO	00000674	1.06	231.20	28.10	22.00	28.00	15.20
LO-BENTOMAT ST	200305LO	00000673	1.06	231.20	28.10	22.00	28.00	15.20
LO-BENTOMAT ST	200305LO	00000672	1.06	231.20	28.10	22.00	28.00	15.20
LO-BENTOMAT ST	200305LO	00000671	1.06	231.20	28.10	22.00	28.00	15.20
LO-BENTOMAT ST	200305LO	00000670	1.06	231.20	28.10	22.00	28.00	15.20
LO-BENTOMAT ST	200305LO	00000669	1.06	231.20	28.10	22.00	28.00	15.20
LO-BENTOMAT ST	200305LO	00000668	1.06	231.20	28.10	22.00	28.00	15.20
LO-BENTOMAT ST	200305LO	00000667	1.06*	231.20	28.10*	22.00*	28.00*	15.20*
LO-BENTOMAT ST	200305LO	00000666	1.05	231.20	26.00	24.50	26.00	15.40
LO-BENTOMAT ST	200305LO	00000665	1.05	231.20	26.00	24.50	26.00	15.40
LO-BENTOMAT ST	200305LO	00000664	1.05	231.20	26.00	24.50	26.00	15.40
LO-BENTOMAT ST	200305LO	00000663	1.05	231.20	26.00	24.50	26.00	15.40
LO-BENTOMAT ST	200305LO	00000662	1.05	231.20	26.00	24.50	26.00	15.40
LO-BENTOMAT ST	200305LO	00000661	1.05	231.20	26.00	24.50	26.00	15.40
LO-BENTOMAT ST	200305LO	00000660	1.05	231.20	26.00	24.50	26.00	15.40
LO-BENTOMAT ST	200305LO	00000659	1.05	231.20	26.00	24.50	26.00	15.40
LO-BENTOMAT ST	200305LO	00000658	1.05	231.20	26.00	24.50	26.00	15.40
LO-BENTOMAT ST	200305LO	00000657	1.05	231.20	26.00	24.50	26.00	15.40
LO-BENTOMAT ST	200305LO	00000656	1.05	231.20	26.00	24.50	26.00	15.40
LO-BENTOMAT ST	200305LO	00000655	1.05	231.20	26.00	24.50	26.00	15.40
LO-BENTOMAT ST	200305LO	00000654	1.05	231.20	26.00	24.50	26.00	15.40
LO-BENTOMAT ST	200305LO	00000653	1.05	231.20	26.00	24.50	26.00	15.40
LO-BENTOMAT ST	200305LO	00000652	1.05	231.20	26.00	24.50	26.00	15.40
LO-BENTOMAT ST	200305LO	00000651	1.05	231.20	26.00	24.50	26.00	15.40
LO-BENTOMAT ST	200305LO	00000650	1.05*	231.20	26.00*	24.50*	26.00*	15.40*
LO-BENTOMAT ST	200305LO	00000649	1.06	231.20	38.50	23.10	27.00	15.40
LO-BENTOMAT ST	200305LO	00000648	1.06	231.20	38.50	23.10	27.00	15.40
LO-BENTOMAT ST	200305LO	00000647	1.06	231.20	38.50	23.10	27.00	15.40
LO-BENTOMAT ST	200305LO	00000646	1.06	231.20	38.50	23.10	27.00	15.40
LO-BENTOMAT ST	200305LO	00000645	1.06	231.20	38.50	23.10	27.00	15.40
LO-BENTOMAT ST	200305LO	00000644	1.06	231.20	38.50	23.10	27.00	15.40

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QCG#FT2 QCT#FT2
2/04/03 13:34:14

CETCO

GCL QUALITY DATA

CETCO LOVELL PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR
HAMILTON

O R D E R # 000167357

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 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	200305LO	00000643	1.06	231.20	38.50	23.10	27.00	15.40
LO-BENTOMAT ST	200305LO	00000642	1.06	231.20	38.50	23.10	27.00	15.40
LO-BENTOMAT ST	200305LO	00000641	1.06	231.20	38.50	23.10	27.00	15.40
LO-BENTOMAT ST	200305LO	00000640	1.06	231.20	38.50	23.10	27.00	15.40
LO-BENTOMAT ST	200305LO	00000639	1.06	231.20	38.50	23.10	27.00	15.40
LO-BENTOMAT ST	200305LO	00000638	1.06	231.20	38.50	23.10	27.00	15.40
LO-BENTOMAT ST	200305LO	00000637	1.06	231.20	38.50	23.10	27.00	15.40
LO-BENTOMAT ST	200305LO	00000636	1.06	231.20	38.50	23.10	27.00	15.40
LO-BENTOMAT ST	200305LO	00000635	1.06	231.20	38.50	23.10	27.00	15.40
LO-BENTOMAT ST	200305LO	00000634	1.06	231.20	38.50	23.10	27.00	15.40
LO-BENTOMAT ST	200305LO	00000633	1.06*	231.20*	38.50*	23.10*	27.00*	15.40*
LO-BENTOMAT ST	200305LO	00000632	1.06	201.10	29.20	24.70	28.00	15.00
LO-BENTOMAT ST	200305LO	00000631	1.06	201.10	29.20	24.70	28.00	15.00
LO-BENTOMAT ST	200305LO	00000630	1.06	201.10	29.20	24.70	28.00	15.00
LO-BENTOMAT ST	200305LO	00000629	1.06	201.10	29.20	24.70	28.00	15.00
LO-BENTOMAT ST	200305LO	00000628	1.06	201.10	29.20	24.70	28.00	15.00
LO-BENTOMAT ST	200305LO	00000627	1.06	201.10	29.20	24.70	28.00	15.00
LO-BENTOMAT ST	200305LO	00000626	1.06	201.10	29.20	24.70	28.00	15.00
LO-BENTOMAT ST	200305LO	00000625	1.06	201.10	29.20	24.70	28.00	15.00
LO-BENTOMAT ST	200305LO	00000624	1.06	201.10	29.20	24.70	28.00	15.00
LO-BENTOMAT ST	200305LO	00000623	1.06	201.10	29.20	24.70	28.00	15.00
LO-BENTOMAT ST	200305LO	00000622	1.06	201.10	29.20	24.70	28.00	15.00
LO-BENTOMAT ST	200305LO	00000621	1.06	201.10	29.20	24.70	28.00	15.00
LO-BENTOMAT ST	200305LO	00000620	1.06	201.10	29.20	24.70	28.00	15.00
LO-BENTOMAT ST	200305LO	00000619	1.06	201.10	29.20	24.70	28.00	15.00
LO-BENTOMAT ST	200305LO	00000618	1.06	201.10	29.20	24.70	28.00	15.00
LO-BENTOMAT ST	200305LO	00000617	1.06	201.10	29.20	24.70	28.00	15.00
LO-BENTOMAT ST	200305LO	00000616	1.06*	201.10	29.20*	24.70*	28.00*	15.00*
LO-BENTOMAT ST	200305LO	00000615	1.03	201.10	30.40	24.50	28.00	15.20
LO-BENTOMAT ST	200305LO	00000614	1.03	201.10	30.40	24.50	28.00	15.20
LO-BENTOMAT ST	200305LO	00000613	1.03	201.10	30.40	24.50	28.00	15.20
LO-BENTOMAT ST	200305LO	00000612	1.03	201.10	30.40	24.50	28.00	15.20
LO-BENTOMAT ST	200305LO	00000611	1.03	201.10	30.40	24.50	28.00	15.20
LO-BENTOMAT ST	200305LO	00000610	1.03	201.10	30.40	24.50	28.00	15.20
LO-BENTOMAT ST	200305LO	00000609	1.03	201.10	30.40	24.50	28.00	15.20
LO-BENTOMAT ST	200305LO	00000608	1.03	201.10	30.40	24.50	28.00	15.20
LO-BENTOMAT ST	200305LO	00000607	1.03	201.10	30.40	24.50	28.00	15.20
LO-BENTOMAT ST	200305LO	00000606	1.03	201.10	30.40	24.50	28.00	15.20
LO-BENTOMAT ST	200305LO	00000605	1.03	201.10	30.40	24.50	28.00	15.20

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QCG#FT2 QCT#FT2
2/04/03 13:34:14

CETCO

GCL QUALITY DATA

CETCO LOVELL PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR
HAMILTON

O R D E R # 000167357

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 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	200305LO	00000604	1.03	201.10	30.40	24.50	28.00	15.20
LO-BENTOMAT ST	200305LO	00000603	1.03	201.10	30.40	24.50	28.00	15.20
LO-BENTOMAT ST	200305LO	00000602	1.03	201.10	30.40	24.50	28.00	15.20
LO-BENTOMAT ST	200305LO	00000601	1.03	201.10	30.40	24.50	28.00	15.20
LO-BENTOMAT ST	200305LO	00000600	1.03	201.10	30.40	24.50	28.00	15.20
LO-BENTOMAT ST	200305LO	00000599	1.03*	201.10	30.40*	24.50*	28.00*	15.20*
LO-BENTOMAT ST	200305LO	00000598	1.03	201.10	31.10	24.70	27.00	15.20
LO-BENTOMAT ST	200305LO	00000597	1.03	201.10	31.10	24.70	27.00	15.20
LO-BENTOMAT ST	200305LO	00000596	1.03	201.10	31.10	24.70	27.00	15.20
LO-BENTOMAT ST	200305LO	00000595	1.03	201.10	31.10	24.70	27.00	15.20
LO-BENTOMAT ST	200305LO	00000594	1.03	201.10	31.10	24.70	27.00	15.20
LO-BENTOMAT ST	200305LO	00000593	1.03	201.10	31.10	24.70	27.00	15.20
LO-BENTOMAT ST	200305LO	00000592	1.03	201.10	31.10	24.70	27.00	15.20
LO-BENTOMAT ST	200305LO	00000591	1.03	201.10	31.10	24.70	27.00	15.20
LO-BENTOMAT ST	200305LO	00000590	1.03	201.10	31.10	24.70	27.00	15.20
LO-BENTOMAT ST	200305LO	00000589	1.03	201.10	31.10	24.70	27.00	15.20
LO-BENTOMAT ST	200305LO	00000588	1.03	201.10	31.10	24.70	27.00	15.20
LO-BENTOMAT ST	200305LO	00000587	1.03	201.10	31.10	24.70	27.00	15.20
LO-BENTOMAT ST	200305LO	00000586	1.03	201.10	31.10	24.70	27.00	15.20
LO-BENTOMAT ST	200305LO	00000585	1.03	201.10	31.10	24.70	27.00	15.20
LO-BENTOMAT ST	200305LO	00000584	1.03	201.10	31.10	24.70	27.00	15.20
LO-BENTOMAT ST	200305LO	00000583	1.03	201.10	31.10	24.70	27.00	15.20
LO-BENTOMAT ST	200305LO	00000582	1.03*	201.10	31.10*	24.70*	27.00*	15.20*
LO-BENTOMAT ST	200305LO	00000581	1.08	201.10	42.40	25.00	28.00	14.80
LO-BENTOMAT ST	200305LO	00000580	1.08	201.10	42.40	25.00	28.00	14.80
LO-BENTOMAT ST	200305LO	00000579	1.08	201.10	42.40	25.00	28.00	14.80
LO-BENTOMAT ST	200305LO	00000578	1.08	201.10	42.40	25.00	28.00	14.80
LO-BENTOMAT ST	200305LO	00000577	1.08	201.10	42.40	25.00	28.00	14.80
LO-BENTOMAT ST	200305LO	00000576	1.08	201.10	42.40	25.00	28.00	14.80
LO-BENTOMAT ST	200305LO	00000575	1.08	201.10	42.40	25.00	28.00	14.80
LO-BENTOMAT ST	200305LO	00000574	1.08	201.10	42.40	25.00	28.00	14.80
LO-BENTOMAT ST	200305LO	00000573	1.08	201.10	42.40	25.00	28.00	14.80
LO-BENTOMAT ST	200305LO	00000572	1.08	201.10	42.40	25.00	28.00	14.80
LO-BENTOMAT ST	200305LO	00000571	1.08	201.10	42.40	25.00	28.00	14.80
LO-BENTOMAT ST	200305LO	00000570	1.08	201.10	42.40	25.00	28.00	14.80
LO-BENTOMAT ST	200305LO	00000569	1.08	201.10	42.40	25.00	28.00	14.80
LO-BENTOMAT ST	200305LO	00000568	1.08	201.10	42.40	25.00	28.00	14.80
LO-BENTOMAT ST	200305LO	00000567	1.08	201.10	42.40	25.00	28.00	14.80
LO-BENTOMAT ST	200305LO	00000566	1.08	201.10	42.40	25.00	28.00	14.80

0000362

5369

QCG#FT2 QCT#FT2
2/04/03 13:34:14

CETCO

GCL QUALITY DATA

CETCO LOVELL PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR
HAMILTON

O R D E R # 000167357

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 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	200305LO	00000565	1.08*	201.10	42.40*	25.00*	28.00*	14.80*
LO-BENTOMAT ST	200305LO	00000564	1.06	201.10	42.70	24.70	30.00	14.60
LO-BENTOMAT ST	200305LO	00000563	1.06	201.10	42.70	24.70	30.00	14.60
LO-BENTOMAT ST	200305LO	00000562	1.06	201.10	42.70	24.70	30.00	14.60
LO-BENTOMAT ST	200305LO	00000561	1.06	201.10	42.70	24.70	30.00	14.60
LO-BENTOMAT ST	200305LO	00000560	1.06	201.10	42.70	24.70	30.00	14.60
LO-BENTOMAT ST	200305LO	00000559	1.06	201.10	42.70	24.70	30.00	14.60
LO-BENTOMAT ST	200305LO	00000558	1.06	201.10	42.70	24.70	30.00	14.60
LO-BENTOMAT ST	200305LO	00000557	1.06	201.10	42.70	24.70	30.00	14.60
LO-BENTOMAT ST	200305LO	00000556	1.06	201.10	42.70	24.70	30.00	14.60
LO-BENTOMAT ST	200305LO	00000555	1.06	201.10	42.70	24.70	30.00	14.60
LO-BENTOMAT ST	200305LO	00000554	1.06	201.10	42.70	24.70	30.00	14.60
LO-BENTOMAT ST	200305LO	00000553	1.06	201.10	42.70	24.70	30.00	14.60
LO-BENTOMAT ST	200305LO	00000552	1.06	201.10	42.70	24.70	30.00	14.60
LO-BENTOMAT ST	200305LO	00000551	1.06	201.10	42.70	24.70	30.00	14.60
LO-BENTOMAT ST	200305LO	00000550	1.06	201.10	42.70	24.70	30.00	14.60
LO-BENTOMAT ST	200305LO	00000549	1.06	201.10	42.70	24.70	30.00	14.60
LO-BENTOMAT ST	200305LO	00000548	1.06*	201.10*	42.70*	24.70*	30.00*	14.60*
LO-BENTOMAT ST	200305LO	00000547	1.11	219.80	28.40	23.70	27.00	15.00
LO-BENTOMAT ST	200304LO	00000546	1.11	219.80	28.40	23.70	27.00	15.00
LO-BENTOMAT ST	200304LO	00000545	1.11	219.80	28.40	23.70	27.00	15.00
LO-BENTOMAT ST	200304LO	00000544	1.11	219.80	28.40	23.70	27.00	15.00
LO-BENTOMAT ST	200304LO	00000543	1.11	219.80	28.40	23.70	27.00	15.00
LO-BENTOMAT ST	200304LO	00000542	1.11	219.80	28.40	23.70	27.00	15.00
LO-BENTOMAT ST	200304LO	00000541	1.11	219.80	28.40	23.70	27.00	15.00
LO-BENTOMAT ST	200304LO	00000540	1.11	219.80	28.40	23.70	27.00	15.00
LO-BENTOMAT ST	200304LO	00000539	1.11	219.80	28.40	23.70	27.00	15.00
LO-BENTOMAT ST	200304LO	00000538	1.11	219.80	28.40	23.70	27.00	15.00
LO-BENTOMAT ST	200304LO	00000537	1.11	219.80	28.40	23.70	27.00	15.00
LO-BENTOMAT ST	200304LO	00000536	1.11	219.80	28.40	23.70	27.00	15.00
LO-BENTOMAT ST	200304LO	00000535	1.11	219.80	28.40	23.70	27.00	15.00
LO-BENTOMAT ST	200304LO	00000534	1.11	219.80	28.40	23.70	27.00	15.00
LO-BENTOMAT ST	200304LO	00000533	1.11	219.80	28.40	23.70	27.00	15.00
LO-BENTOMAT ST	200304LO	00000532	1.11	219.80	28.40	23.70	27.00	15.00
LO-BENTOMAT ST	200304LO	00000531	1.11*	219.80	28.40*	23.70*	27.00*	15.00*
LO-BENTOMAT ST	200304LO	00000530	1.11	219.80	26.20	22.50	26.00	14.80
LO-BENTOMAT ST	200304LO	00000529	1.11	219.80	26.20	22.50	26.00	14.80
LO-BENTOMAT ST	200304LO	00000528	1.11	219.80	26.20	22.50	26.00	14.80
LO-BENTOMAT ST	200304LO	00000527	1.11	219.80	26.20	22.50	26.00	14.80

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QCG#FT2 QCT#FT2
2/04/03 13:34:14

CETCO

GCL QUALITY DATA

CETCO LOVELL PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR
HAMILTON

O R D E R # 000167357

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 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	200304LO	00000526	1.11	219.80	26.20	22.50	26.00	14.80
LO-BENTOMAT ST	200304LO	00000525	1.11	219.80	26.20	22.50	26.00	14.80
LO-BENTOMAT ST	200304LO	00000524	1.11	219.80	26.20	22.50	26.00	14.80
LO-BENTOMAT ST	200304LO	00000523	1.11	219.80	26.20	22.50	26.00	14.80
LO-BENTOMAT ST	200304LO	00000522	1.11	219.80	26.20	22.50	26.00	14.80
LO-BENTOMAT ST	200304LO	00000521	1.11	219.80	26.20	22.50	26.00	14.80
LO-BENTOMAT ST	200304LO	00000520	1.11	219.80	26.20	22.50	26.00	14.80
LO-BENTOMAT ST	200304LO	00000519	1.11	219.80	26.20	22.50	26.00	14.80
LO-BENTOMAT ST	200304LO	00000518	1.11	219.80	26.20	22.50	26.00	14.80
LO-BENTOMAT ST	200304LO	00000517	1.11	219.80	26.20	22.50	26.00	14.80
LO-BENTOMAT ST	200304LO	00000516	1.11	219.80	26.20	22.50	26.00	14.80
LO-BENTOMAT ST	200304LO	00000515	1.11	219.80	26.20	22.50	26.00	14.80
LO-BENTOMAT ST	200304LO	00000514	1.11*	219.80	26.20*	22.50*	26.00*	14.80*
LO-BENTOMAT ST	200304LO	00000513	1.12	219.80	26.50	24.40	28.00	14.80
LO-BENTOMAT ST	200304LO	00000512	1.12	219.80	26.50	24.40	28.00	14.80
LO-BENTOMAT ST	200304LO	00000511	1.12	219.80	26.50	24.40	28.00	14.80
LO-BENTOMAT ST	200304LO	00000510	1.12	219.80	26.50	24.40	28.00	14.80
LO-BENTOMAT ST	200304LO	00000509	1.12	219.80	26.50	24.40	28.00	14.80
LO-BENTOMAT ST	200304LO	00000508	1.12	219.80	26.50	24.40	28.00	14.80
LO-BENTOMAT ST	200304LO	00000507	1.12	219.80	26.50	24.40	28.00	14.80
LO-BENTOMAT ST	200304LO	00000506	1.12	219.80	26.50	24.40	28.00	14.80
LO-BENTOMAT ST	200304LO	00000505	1.12	219.80	26.50	24.40	28.00	14.80
LO-BENTOMAT ST	200304LO	00000504	1.12	219.80	26.50	24.40	28.00	14.80
LO-BENTOMAT ST	200304LO	00000503	1.12	219.80	26.50	24.40	28.00	14.80
LO-BENTOMAT ST	200304LO	00000502	1.12	219.80	26.50	24.40	28.00	14.80
LO-BENTOMAT ST	200304LO	00000501	1.12	219.80	26.50	24.40	28.00	14.80
LO-BENTOMAT ST	200304LO	00000500	1.12	219.80	26.50	24.40	28.00	14.80
LO-BENTOMAT ST	200304LO	00000499	1.12	219.80	26.50	24.40	28.00	14.80
LO-BENTOMAT ST	200304LO	00000498	1.12	219.80	26.50	24.40	28.00	14.80
LO-BENTOMAT ST	200304LO	00000497	1.12*	219.80	26.50*	24.40*	28.00*	14.80*
LO-BENTOMAT ST	200304LO	00000496	1.05	219.80	27.30	23.90	29.00	14.80
LO-BENTOMAT ST	200304LO	00000495	1.05	219.80	27.30	23.90	29.00	14.80
LO-BENTOMAT ST	200304LO	00000494	1.05	219.80	27.30	23.90	29.00	14.80
LO-BENTOMAT ST	200304LO	00000493	1.05	219.80	27.30	23.90	29.00	14.80
LO-BENTOMAT ST	200304LO	00000492	1.05	219.80	27.30	23.90	29.00	14.80
LO-BENTOMAT ST	200304LO	00000491	1.05	219.80	27.30	23.90	29.00	14.80
LO-BENTOMAT ST	200304LO	00000490	1.05	219.80	27.30	23.90	29.00	14.80
LO-BENTOMAT ST	200304LO	00000489	1.05	219.80	27.30	23.90	29.00	14.80
LO-BENTOMAT ST	200304LO	00000488	1.05	219.80	27.30	23.90	29.00	14.80

000364

5369

QCG#FT2 QCT#FT2
2/04/03 13:34:14

CETCO

GCL QUALITY DATA

CETCO LOVELL PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR
HAMILTON

O R D E R # 000167357

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 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	200304LO	00000487	1.05	219.80	27.30	23.90	29.00	14.80
LO-BENTOMAT ST	200304LO	00000486	1.05	219.80	27.30	23.90	29.00	14.80
LO-BENTOMAT ST	200304LO	00000485	1.05	219.80	27.30	23.90	29.00	14.80
LO-BENTOMAT ST	200304LO	00000484	1.05	219.80	27.30	23.90	29.00	14.80
LO-BENTOMAT ST	200304LO	00000483	1.05	219.80	27.30	23.90	29.00	14.80
LO-BENTOMAT ST	200304LO	00000482	1.05	219.80	27.30	23.90	29.00	14.80
LO-BENTOMAT ST	200304LO	00000481	1.05	219.80	27.30	23.90	29.00	14.80
LO-BENTOMAT ST	200304LO	00000480	1.05*	219.80	27.30*	23.90*	29.00*	14.80*
LO-BENTOMAT ST	200304LO	00000479	1.11	219.80	28.10	21.70	28.00	14.20
LO-BENTOMAT ST	200304LO	00000478	1.11	219.80	28.10	21.70	28.00	14.20
LO-BENTOMAT ST	200304LO	00000477	1.11	219.80	28.10	21.70	28.00	14.20
LO-BENTOMAT ST	200304LO	00000476	1.11	219.80	28.10	21.70	28.00	14.20
LO-BENTOMAT ST	200304LO	00000475	1.11	219.80	28.10	21.70	28.00	14.20
LO-BENTOMAT ST	200304LO	00000474	1.11	219.80	28.10	21.70	28.00	14.20
LO-BENTOMAT ST	200304LO	00000473	1.11	219.80	28.10	21.70	28.00	14.20
LO-BENTOMAT ST	200304LO	00000472	1.11	219.80	28.10	21.70	28.00	14.20
LO-BENTOMAT ST	200304LO	00000471	1.11	219.80	28.10	21.70	28.00	14.20
LO-BENTOMAT ST	200304LO	00000470	1.11	219.80	28.10	21.70	28.00	14.20
LO-BENTOMAT ST	200304LO	00000469	1.11	219.80	28.10	21.70	28.00	14.20
LO-BENTOMAT ST	200304LO	00000468	1.11	219.80	28.10	21.70	28.00	14.20
LO-BENTOMAT ST	200304LO	00000467	1.11	219.80	28.10	21.70	28.00	14.20
LO-BENTOMAT ST	200304LO	00000466	1.11	219.80	28.10	21.70	28.00	14.20
LO-BENTOMAT ST	200304LO	00000465	1.11	219.80	28.10	21.70	28.00	14.20
LO-BENTOMAT ST	200304LO	00000464	1.11	219.80	28.10	21.70	28.00	14.20
LO-BENTOMAT ST	200304LO	00000463	1.11*	219.80*	28.10*	21.70*	28.00*	14.20*
LO-BENTOMAT ST	200304LO	00000462	1.12	225.20	24.40	22.80	26.00	13.80
LO-BENTOMAT ST	200304LO	00000461	1.12	225.20	24.40	22.80	26.00	13.80
LO-BENTOMAT ST	200304LO	00000460	1.12	225.20	24.40	22.80	26.00	13.80
LO-BENTOMAT ST	200304LO	00000459	1.12	225.20	24.40	22.80	26.00	13.80
LO-BENTOMAT ST	200304LO	00000458	1.12	225.20	24.40	22.80	26.00	13.80
LO-BENTOMAT ST	200304LO	00000457	1.12	225.20	24.40	22.80	26.00	13.80
LO-BENTOMAT ST	200304LO	00000456	1.12	225.20	24.40	22.80	26.00	13.80
LO-BENTOMAT ST	200304LO	00000455	1.12	225.20	24.40	22.80	26.00	13.80
LO-BENTOMAT ST	200304LO	00000454	1.12	225.20	24.40	22.80	26.00	13.80
LO-BENTOMAT ST	200304LO	00000453	1.12	225.20	24.40	22.80	26.00	13.80
LO-BENTOMAT ST	200304LO	00000452	1.12	225.20	24.40	22.80	26.00	13.80
LO-BENTOMAT ST	200304LO	00000451	1.12	225.20	24.40	22.80	26.00	13.80
LO-BENTOMAT ST	200304LO	00000450	1.12	225.20	24.40	22.80	26.00	13.80
LO-BENTOMAT ST	200304LO	00000449	1.12	225.20	24.40	22.80	26.00	13.80

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5369

QCG#FT2 OCT#FT2
2/04/03 13:34:14

CETCO

GCL QUALITY DATA

CETCO LOVELL PLANT
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR
HAMILTON

O R D E R # 000167357

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 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	200304LO	00000448	1.12	225.20	24.40	22.80	26.00	13.80
LO-BENTOMAT ST	200304LO	00000447	1.12	225.20	24.40	22.80	26.00	13.80
LO-BENTOMAT ST	200304LO	00000446	1.12*	225.20	24.40*	22.80*	26.00*	13.80*
LO-BENTOMAT ST	200304LO	00000445	1.08	225.20	29.70	23.00	26.00	13.60
LO-BENTOMAT ST	200304LO	00000444	1.08	225.20	29.70	23.00	26.00	13.60
LO-BENTOMAT ST	200304LO	00000443	1.08	225.20	29.70	23.00	26.00	13.60
LO-BENTOMAT ST	200304LO	00000442	1.08	225.20	29.70	23.00	26.00	13.60
LO-BENTOMAT ST	200304LO	00000441	1.08	225.20	29.70	23.00	26.00	13.60
LO-BENTOMAT ST	200304LO	00000440	1.08	225.20	29.70	23.00	26.00	13.60
LO-BENTOMAT ST	200304LO	00000439	1.08	225.20	29.70	23.00	26.00	13.60
LO-BENTOMAT ST	200304LO	00000438	1.08	225.20	29.70	23.00	26.00	13.60
LO-BENTOMAT ST	200304LO	00000437	1.08	225.20	29.70	23.00	26.00	13.60
LO-BENTOMAT ST	200304LO	00000436	1.08	225.20	29.70	23.00	26.00	13.60
LO-BENTOMAT ST	200304LO	00000435	1.08	225.20	29.70	23.00	26.00	13.60
LO-BENTOMAT ST	200304LO	00000434	1.08	225.20	29.70	23.00	26.00	13.60
LO-BENTOMAT ST	200304LO	00000433	1.08	225.20	29.70	23.00	26.00	13.60
LO-BENTOMAT ST	200304LO	00000432	1.08	225.20	29.70	23.00	26.00	13.60
LO-BENTOMAT ST	200304LO	00000431	1.08	225.20	29.70	23.00	26.00	13.60
LO-BENTOMAT ST	200304LO	00000430	1.08	225.20	29.70	23.00	26.00	13.60
LO-BENTOMAT ST	200304LO	00000429	1.08*	225.20	29.70*	23.00*	26.00*	13.60*

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.
Bentonite Mass/Area is reported at 0% moisture content.
Grab Strength is tested a minimum of every 200,000sf.
Peel Strength is tested a minimum of every 40,000sf.
All tensile testing is in the machine direction

*** End of Report ***

000366

5369

GEOSYNTHETIC CLAY LINER MQA TRACKING FORMS

QCG#TF1 QCT#TF1
2/04/03 13:34:13

CETCO
GCL MQA/MQC TRACKING FORM

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
LOT# 200304LO									
00000429	LO-BENTOMAT ST	150	2250	2494	2000126872		8499824		011603A
00000430	LO-BENTOMAT ST	150	2250	2570	2000126872		8499824		011603A
00000431	LO-BENTOMAT ST	150	2250	2627	2000126872		8499824		011603A
00000432	LO-BENTOMAT ST	150	2250	2637	2000126872		8499824		011603A
00000433	LO-BENTOMAT ST	150	2250	2707	2000126872		8499824		011603A
00000434	LO-BENTOMAT ST	150	2250	2688	2000126872		8499824		011603A
00000435	LO-BENTOMAT ST	150	2250	2681	2000126872		8499824		011603A
00000436	LO-BENTOMAT ST	150	2250	2700	2000151487		8499824		011603A
00000437	LO-BENTOMAT ST	150	2250	2741	2000151487		8499824		011603A
00000438	LO-BENTOMAT ST	150	2250	2692	C832985A		8499824		011603A
00000439	LO-BENTOMAT ST	150	2250	2678	C832985A		8499824		011603A
00000440	LO-BENTOMAT ST	150	2250	2730	C832985A		9172030		011603A
00000441	LO-BENTOMAT ST	150	2250	2726	C832985A		9172030		011603A
00000442	LO-BENTOMAT ST	150	2250	2739	C832985A		9172030		011603A
00000443	LO-BENTOMAT ST	150	2250	2720	C832985A		9172030		011603A
00000444	LO-BENTOMAT ST	150	2250	2717	C832985A		9172030		011603A
00000445	LO-BENTOMAT ST	150	2250	2695	C832985A		9172030		011603A
00000446	LO-BENTOMAT ST	150	2250	2710	C832985A		9172030		011603A
00000447	LO-BENTOMAT ST	150	2250	2721	2000126857		9172030		011603A
00000448	LO-BENTOMAT ST	150	2250	2687	2000126857		9172030		011603A
00000449	LO-BENTOMAT ST	150	2250	2684	2000126857		9172030		011603A

000368

5369

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000450	LO-BENTOMAT ST	150	2250	2724	2000126857		9172030		011603A
00000451	LO-BENTOMAT ST	150	2250	2684	2000126857		9172030		011603A
00000452	LO-BENTOMAT ST	150	2250	2712	2000126857		9172030		011603A
00000453	LO-BENTOMAT ST	150	2250	2697	2000126857		9172030		011603A
00000454	LO-BENTOMAT ST	150	2250	2700	2000126857		9172030		011603A
00000455	LO-BENTOMAT ST	150	2250	2705	2000126857		9172030		011603A
00000456	LO-BENTOMAT ST	150	2250	2740	2000126869		9172030		011603A
00000457	LO-BENTOMAT ST	150	2250	2721	2000126869		9172030		011603A
00000458	LO-BENTOMAT ST	150	2250	2745	2000126869		9172030		011603B
00000459	LO-BENTOMAT ST	150	2250	2745	2000126869		9172030		011603B
00000460	LO-BENTOMAT ST	150	2250	2707	2000126846		9172875		011603B
00000461	LO-BENTOMAT ST	150	2250	2691	2000126846		9172875		011603B
00000462	LO-BENTOMAT ST	150	2250	2700	2000126846		9172875		011603B
00000463	LO-BENTOMAT ST	150	2250	2737	2000126846		9172875		011603B
00000464	LO-BENTOMAT ST	150	2250	2748	2000126846		9172875		011603B
00000465	LO-BENTOMAT ST	150	2250	2695	2000126846		9172875		011603B
00000466	LO-BENTOMAT ST	150	2250	2690	2000126846		9172875		011603B
00000467	LO-BENTOMAT ST	150	2250	2689	2000126863		9172875		011603B
00000468	LO-BENTOMAT ST	150	2250	2683	2000126863		9172875		011603B
00000469	LO-BENTOMAT ST	150	2250	2668	2000126863		9172875		011603B
00000470	LO-BENTOMAT ST	150	2250	2664	2000126863		9172875		011603B

000369

5369

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000471	LO-BENTOMAT ST	150	2250	2653	2000126863		9172875		011603B
00000472	LO-BENTOMAT ST	150	2250	2650	2000126863		9172875		011603B
00000473	LO-BENTOMAT ST	150	2250	2666	2000126863		9172875		011603B
00000474	LO-BENTOMAT ST	150	2250	2660	2000126863		9172875		011603B
00000475	LO-BENTOMAT ST	150	2250	2657	2000126863		9172875		011603A
00000476	LO-BENTOMAT ST	150	2250	2652	2000151486		9172875		011603B
00000477	LO-BENTOMAT ST	150	2250	2655	2000151486		9172875		011603B
00000478	LO-BENTOMAT ST	150	2250	2646	2000151486		9172875		011603B
00000479	LO-BENTOMAT ST	150	2250	2628	2000151486		9172025		011603B
00000480	LO-BENTOMAT ST	150	2250	2638	2000151486		9172025		011603B
00000481	LO-BENTOMAT ST	150	2250	2662	2000151486		9172025		011603B
00000482	LO-BENTOMAT ST	150	2250	2678	2000151486		9172025		011603B
00000483	LO-BENTOMAT ST	150	2250	2636	2000151486		9172025		011603B
00000484	LO-BENTOMAT ST	150	2250	2652	2000151486		9172025		011603B
00000485	LO-BENTOMAT ST	150	2250	2669	2000151556		9172025		011603B
00000486	LO-BENTOMAT ST	150	2250	2680	2000151556		9172025		011603B
00000487	LO-BENTOMAT ST	150	2250	2706	2000151556		9172025		011603B
00000488	LO-BENTOMAT ST	150	2250	2701	2000151556		9172025		011603B
00000489	LO-BENTOMAT ST	150	2250	2797	2000151556		9172025		011603B
00000490	LO-BENTOMAT ST	150	2250	2812	2000151556		9172025		011603B
00000491	LO-BENTOMAT ST	150	2250	2802	2000151556		9172025		011603B

000370

5369

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000492	LO-BENTOMAT ST	150	2250	2776	2000151556		9172025		011603B
00000493	LO-BENTOMAT ST	150	2250	2750	2000151556		9172025		011603B
00000494	LO-BENTOMAT ST	150	2250	2745	2000126873		9172025		011603B
00000495	LO-BENTOMAT ST	150	2250	2816	2000126873		9172025		011603B
00000496	LO-BENTOMAT ST	150	2250	2760	2000126873		9172025		011603B
00000497	LO-BENTOMAT ST	150	2250	2747	2000126873		9172025		011603B
00000498	LO-BENTOMAT ST	150	2250	2769	2000126873		9172025		011603B
00000499	LO-BENTOMAT ST	150	2250	2723	2000126873		9172025		011603B
00000500	LO-BENTOMAT ST	150	2250	2718	2000126873		9172025		011603B
00000501	LO-BENTOMAT ST	150	2250	2706	2000126873		9168154		011603B
00000502	LO-BENTOMAT ST	150	2250	2702	2000126873		9168154		011603B
00000503	LO-BENTOMAT ST	150	2250	2711	C832988A		9168154		011703A
00000504	LO-BENTOMAT ST	150	2250	2710	C832988A		9168154		011703A
00000505	LO-BENTOMAT ST	150	2250	2715	2000126864		9168154		011703A
00000506	LO-BENTOMAT ST	150	2250	2721	2000126864		9168154		011703A
00000507	LO-BENTOMAT ST	150	2250	2707	2000126864		9168154		011703A
00000508	LO-BENTOMAT ST	150	2250	2763	2000126864		9168154		011703A
00000509	LO-BENTOMAT ST	150	2250	2771	2000126864		9168154		011703A
00000510	LO-BENTOMAT ST	150	2250	2760	2000126864		9168154		011703A
00000511	LO-BENTOMAT ST	150	2250	2768	2000126864		9168154		011703A
00000512	LO-BENTOMAT ST	150	2250	2750	2000126864		9168154		011703A

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000513	LO-BENTOMAT ST	150	2250	2745	2000126864		9168154		011703A
00000514	LO-BENTOMAT ST	150	2250	2747	2000126883		9168154		011703A
00000515	LO-BENTOMAT ST	150	2250	2771	2000126883		9147034		011703A
00000516	LO-BENTOMAT ST	150	2250	2716	2000126883		9147034		011703A
00000517	LO-BENTOMAT ST	150	2250	2670	2000126883		9147034		011703A
00000518	LO-BENTOMAT ST	150	2250	2660	2000126883		9147034		011703A
00000519	LO-BENTOMAT ST	150	2250	2725	2000126883		9147034		011703A
00000520	LO-BENTOMAT ST	150	2250	2717	2000126883		9147034		011703A
00000521	LO-BENTOMAT ST	150	2250	2708	2000126883		9147034		011703A
00000522	LO-BENTOMAT ST	150	2250	2700	2000126883		9147034		011703A
00000523	LO-BENTOMAT ST	150	2250	2720	2000126836		9147034		011703A
00000524	LO-BENTOMAT ST	150	2250	2708	2000126836		9147034		011703A
00000525	LO-BENTOMAT ST	150	2250	2701	2000126836		9147034		011703A
00000526	LO-BENTOMAT ST	150	2250	2691	2000126836		9147034		011703A
00000527	LO-BENTOMAT ST	150	2250	2769	2000126836		9147034		011703A
00000528	LO-BENTOMAT ST	150	2250	2664	2000126836		9147034		011703A
00000529	LO-BENTOMAT ST	150	2250	2697	2000126836		9147034		011703A
00000530	LO-BENTOMAT ST	150	2250	2678	2000126836		9147034		011703A
00000531	LO-BENTOMAT ST	150	2250	2681	2000126836		9147034		011703A
00000532	LO-BENTOMAT ST	150	2250	2700	2000126833		9147034		011703A
00000533	LO-BENTOMAT ST	150	2250	2649	2000126833		9147034		011703A

000372

5369

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000534	LO-BENTOMAT ST	150	2250	2658	2000126833		9147034		011703A
00000535	LO-BENTOMAT ST	150	2250	2653	2000126833		9147034		011703A
00000536	LO-BENTOMAT ST	150	2250	2649	2000126833		9147034		011703A
00000537	LO-BENTOMAT ST	150	2250	2636	2000126833		9147039		011703A
00000538	LO-BENTOMAT ST	150	2250	2643	2000126833		9147039		011703A
00000539	LO-BENTOMAT ST	150	2250	2652	2000126833		9147039		011703A
00000540	LO-BENTOMAT ST	150	2250	2715	2000126833		9147039		011703A
00000541	LO-BENTOMAT ST	150	2250	2668	2000126839		9147039		011703A
00000542	LO-BENTOMAT ST	150	2250	2682	2000126839		9147039		011703A
00000543	LO-BENTOMAT ST	150	2250	2685	2000126839		9147039		011703A
00000544	LO-BENTOMAT ST	150	2250	2669	2000126839		9147039		011703A
00000545	LO-BENTOMAT ST	150	2250	2670	2000126839		9147039		011703A
00000546	LO-BENTOMAT ST	150	2250	2650	2000126839		9147039		011703A
LOT# 200305LO									
00000547	LO-BENTOMAT ST	150	2250	2596	2000126860		9147039		011703A
00000548	LO-BENTOMAT ST	150	2250	2610	2000126860		9147039		012303A
00000549	LO-BENTOMAT ST	150	2250	2616	2000126860		9147039		012303A
00000550	LO-BENTOMAT ST	150	2250	2606	2000126860		9147039		012303A
00000551	LO-BENTOMAT ST	150	2250	2642	2000126860		9147039		012303A
00000552	LO-BENTOMAT ST	150	2250	2643	2000126860		9147039		012303A
00000553	LO-BENTOMAT ST	150	2250	2635	2000126876		9147039		012303A
00000554	LO-BENTOMAT ST	150	2250	2643	2000126876		9176505		012303A

000373

5369

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000555	LO-BENTOMAT ST	150	2250	2676	2000126876		9176505		012303A
00000556	LO-BENTOMAT ST	150	2250	2687	2000126876		9176505		012303A
00000557	LO-BENTOMAT ST	150	2250	2684	2000126876		9176505		012303A
00000558	LO-BENTOMAT ST	150	2250	2666	2000126876		9176505		012303A
00000559	LO-BENTOMAT ST	150	2250	2651	2000126876		9176505		012303A
00000560	LO-BENTOMAT ST	150	2250	2643	2000126876		9176505		012303A
00000561	LO-BENTOMAT ST	150	2250	2635	2000126876		9176505		012303A
00000562	LO-BENTOMAT ST	150	2250	2614	2000151488		9176505		012303A
00000563	LO-BENTOMAT ST	150	2250	2623	2000151488		9176505		012303A
00000564	LO-BENTOMAT ST	150	2250	2615	2000151488		9176505		012303A
00000565	LO-BENTOMAT ST	150	2250	2618	2000151488		9176505		012303A
00000566	LO-BENTOMAT ST	150	2250	2638	2000151488		9176505		012303A
00000567	LO-BENTOMAT ST	150	2250	2601	2000151488		9176505		012303A
00000568	LO-BENTOMAT ST	150	2250	2638	2000151488		9176505		012303A
00000569	LO-BENTOMAT ST	150	2250	2586	2000151488		9176505		012303A
00000570	LO-BENTOMAT ST	150	2250	2589	2000151488		9168152		012303A
00000571	LO-BENTOMAT ST	150	2250	2561	2000126882		9168152		012303A
00000572	LO-BENTOMAT ST	150	2250	2615	2000126882		9168152		012303A
00000573	LO-BENTOMAT ST	150	2250	2552	2000126882		9168152		012303A
00000574	LO-BENTOMAT ST	150	2250	2547	2000126882		9168152		012303A
00000575	LO-BENTOMAT ST	150	2250	2562	2000126882		9168152		012303A

000374

5369

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000576	LO-BENTOMAT ST	150	2250	2569	2000126882		9168152		012303A
00000577	LO-BENTOMAT ST	150	2250	2779	2000126882		9168152		012303A
00000578	LO-BENTOMAT ST	150	2250	2572	2000126882		9168152		012303A
00000579	LO-BENTOMAT ST	150	2250	2562	2000126882		9168152		012303A
00000580	LO-BENTOMAT ST	150	2250	2568	2000126868		9168152		012303A
00000581	LO-BENTOMAT ST	150	2250	2542	2000126868		9168152		012303A
00000582	LO-BENTOMAT ST	150	2250	2580	2000126868		9168152		012303A
00000583	LO-BENTOMAT ST	150	2250	2599	2000126868		9168152		012303A
00000584	LO-BENTOMAT ST	150	2250	2557	2000126868		9168152		012303A
00000585	LO-BENTOMAT ST	150	2250	2550	2000126868		9168152		012303A
00000586	LO-BENTOMAT ST	150	2250	2560	2000126868		9168152		012303A
00000587	LO-BENTOMAT ST	150	2250	2545	2000126868		9168152		012303A
00000588	LO-BENTOMAT ST	150	2250	2592	2000126868		9168152		012303A
00000589	LO-BENTOMAT ST	150	2250	2555	2000126868		9168152		012303A
00000590	LO-BENTOMAT ST	150	2250	2576	2000126884		9168152		012303A
00000591	LO-BENTOMAT ST	150	2250	2560	2000126884		9188233		012303A
00000592	LO-BENTOMAT ST	150	2250	2563	2000126884		9188233		012303A
00000593	LO-BENTOMAT ST	150	2250	2564	2000126884		9188233		012403A
00000594	LO-BENTOMAT ST	150	2250	2570	2000126884		9188233		012403A
00000595	LO-BENTOMAT ST	150	2250	2575	2000126884		9188233		012403A
00000596	LO-BENTOMAT ST	150	2250	2560	2000126884		9188233		012403A

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000597	LO-BENTOMAT ST	150	2250	2548	2000126884		9188233		012403A
00000598	LO-BENTOMAT ST	150	2250	2540	2000126884		9188233		012403A
00000599	LO-BENTOMAT ST	150	2250	2542	2000151555		9188233		012403A
00000600	LO-BENTOMAT ST	150	2250	2555	2000151555		9188233		012403A
00000601	LO-BENTOMAT ST	150	2250	2544	2000151555		9188233		012403A
00000602	LO-BENTOMAT ST	150	2250	2566	2000151555		9188233		012403A
00000603	LO-BENTOMAT ST	150	2250	2561	2000151555		9188233		012403A
00000604	LO-BENTOMAT ST	150	2250	2570	2000151555		9188233		012403A
00000605	LO-BENTOMAT ST	150	2250	2566	2000151555		9188233		012403A
00000606	LO-BENTOMAT ST	150	2250	2541	2000151555		9188233		012403A
00000607	LO-BENTOMAT ST	150	2250	2574	2000151555		9188233		012403A
00000608	LO-BENTOMAT ST	150	2250	2579	2000126867		9188233		012403A
00000609	LO-BENTOMAT ST	150	2250	2584	2000126867		9188233		012403A
00000610	LO-BENTOMAT ST	150	2250	2567	2000126867		9188233		012403A
00000611	LO-BENTOMAT ST	150	2250	2516	2000126867		9188233		012403A
00000612	LO-BENTOMAT ST	150	2250	2648	2000126838		2000049021		012403A
00000613	LO-BENTOMAT ST	150	2250	2654	2000126838		2000049021		012403A
00000614	LO-BENTOMAT ST	150	2250	2651	2000126838		2000049021		012403A
00000615	LO-BENTOMAT ST	150	2250	2628	2000126838		2000049021		012403A
00000616	LO-BENTOMAT ST	150	2250	2627	2000126838		2000049021		012403A
00000617	LO-BENTOMAT ST	150	2250	2634	2000126838		2000049021		012403A

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000618	LO-BENTOMAT ST	150	2250	2661	2000126838		2000049021		012403A
00000619	LO-BENTOMAT ST	150	2250	2620	2000126835		2000049021		012403A
00000620	LO-BENTOMAT ST	150	2250	2636	2000126835		2000049021		012403A
00000621	LO-BENTOMAT ST	150	2250	2614	2000126835		2000049021		012403A
00000622	LO-BENTOMAT ST	150	2250	2613	2000126835		2000049021		012403A
00000623	LO-BENTOMAT ST	150	2250	2616	2000126835		2000049021		012403A
00000624	LO-BENTOMAT ST	150	2250	2600	2000126835		2000049021		012403A
00000625	LO-BENTOMAT ST	150	2250	2598	2000126835		2000049021		012403A
00000626	LO-BENTOMAT ST	150	2250	2615	2000126835		2000049021		012403A
00000627	LO-BENTOMAT ST	150	2250	2635	2000126835		2000049021		012403A
00000628	LO-BENTOMAT ST	150	2250	2644	2000126835		2000049021		012403A
00000629	LO-BENTOMAT ST	150	2250	2525	2000126831		2000049021		012403A
00000630	LO-BENTOMAT ST	150	2250	2617	2000126831		9187396		012403A
00000631	LO-BENTOMAT ST	150	2250	2599	2000126831		9187396		012403A
00000632	LO-BENTOMAT ST	150	2250	2619	2000126831		9187396		012403A
00000633	LO-BENTOMAT ST	150	2250	2629	2000126831		9187396		012403A
00000634	LO-BENTOMAT ST	150	2250	2665	2000126831		9187396		012403A
00000635	LO-BENTOMAT ST	150	2250	2614	2000126831		9187396		012403A
00000636	LO-BENTOMAT ST	150	2250	2657	2000126831		9187396		012403A
00000637	LO-BENTOMAT ST	150	2250	2670	2000126841		9187396		012403A
00000638	LO-BENTOMAT ST	150	2250	2657	2000126841		9187396		012403A

000377

5369

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000639	LO-BENTOMAT ST	150	2250	2646	2000126841		9187396		012403B
00000640	LO-BENTOMAT ST	150	2250	2639	2000126841		9187396		012403B
00000641	LO-BENTOMAT ST	150	2250	2619	2000126841		9187396		012403B
00000642	LO-BENTOMAT ST	150	2250	2614	2000126841		9187396		012403B
00000643	LO-BENTOMAT ST	150	2250	2611	2000126841		9187396		012403B
00000644	LO-BENTOMAT ST	150	2250	2620	2000126841		9187396		012403B
00000645	LO-BENTOMAT ST	150	2250	2615	2000126841		9187396		012403B
00000646	LO-BENTOMAT ST	150	2250	2640	2000126841		9187396		012403B
00000647	LO-BENTOMAT ST	150	2250	2663	2000126861		9187396		012403B
00000648	LO-BENTOMAT ST	150	2250	2620	2000126861		9187396		012403B
00000649	LO-BENTOMAT ST	150	2250	2648	2000126861		9187396		012403B
00000650	LO-BENTOMAT ST	150	2250	2715	2000126861		9187396		012403B
00000651	LO-BENTOMAT ST	150	2250	2686	2000126861		9187396		012403B
00000652	LO-BENTOMAT ST	150	2250	2693	2000126861		2000049001		012403B
00000653	LO-BENTOMAT ST	150	2250	2635	2000126861		2000049001		012403B
00000654	LO-BENTOMAT ST	150	2250	2617	2000126861		2000049001		012403B
00000655	LO-BENTOMAT ST	150	2250	2634	2000126861		2000049001		012403B
00000656	LO-BENTOMAT ST	150	2250	2731	2000126854		2000049001		012403B
00000657	LO-BENTOMAT ST	150	2250	2631	2000126854		2000049001		012403B
00000658	LO-BENTOMAT ST	150	2250	2667	2000126854		2000049001		012403B
00000659	LO-BENTOMAT ST	150	2250	2657	2000126854		2000049001		012403B

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000660	LO-BENTOMAT ST	150	2250	2643	2000126854		2000049001		012403B
00000661	LO-BENTOMAT ST	150	2250	2668	2000126854		2000049001		012403B
00000662	LO-BENTOMAT ST	150	2250	2744	2000126854		2000049001		012403B
00000663	LO-BENTOMAT ST	150	2250	2710	2000126854		2000049001		012403B
00000664	LO-BENTOMAT ST	150	2250	2645	2000126854		2000049001		012403B
00000665	LO-BENTOMAT ST	150	2250	2642	2000126854		2000049001		012403B
00000666	LO-BENTOMAT ST	150	2250	2651	2000126853		2000049001		012403B
00000667	LO-BENTOMAT ST	150	2250	2667	2000126853		2000049001		012403B
00000668	LO-BENTOMAT ST	150	2250	2676	2000126834		2000049001		012403B
00000669	LO-BENTOMAT ST	150	2250	2674	2000126834		2000049011		012403B
00000670	LO-BENTOMAT ST	150	2250	2721	2000126834		2000049011		012403B
00000671	LO-BENTOMAT ST	150	2250	2666	2000126834		2000049011		012403B
00000672	LO-BENTOMAT ST	150	2250	2679	2000126834		2000049011		012403B
00000673	LO-BENTOMAT ST	150	2250	2716	2000126834		2000049011		012403B
00000674	LO-BENTOMAT ST	150	2250	2664	2000126834		2000049011		012403B
00000675	LO-BENTOMAT ST	150	2250	2602	2000126834		2000049011		012403B
00000676	LO-BENTOMAT ST	150	2250	2635	2000126866		2000049011		012403B
00000677	LO-BENTOMAT ST	150	2250	2651	2000126866		2000049011		012403B
00000678	LO-BENTOMAT ST	150	2250	2645	2000126866		2000049011		012403B
00000679	LO-BENTOMAT ST	150	2250	2635	2000126866		2000049011		012403B
00000680	LO-BENTOMAT ST	150	2250	2641	2000126866		2000049011		012403B

000379

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CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000681	LO-BENTOMAT ST	150	2250	2623	2000126866		2000049011		012403B
00000682	LO-BENTOMAT ST	150	2250	2641	2000126866		2000049011		012403B
00000683	LO-BENTOMAT ST	150	2250	2624	2000126866		2000049011		012403B
00000684	LO-BENTOMAT ST	150	2250	2639	2000126866		2000049011		012403C
00000685	LO-BENTOMAT ST	150	2250	2656	2000126840		2000049011		012403C
00000686	LO-BENTOMAT ST	150	2250	2618	2000126840		2000049011		012403C
00000687	LO-BENTOMAT ST	150	2250	2650	2000126840		2000128706		012403C
00000688	LO-BENTOMAT ST	150	2250	2645	2000126840		2000128706		012403C
00000689	LO-BENTOMAT ST	150	2250	2653	2000126840		2000128706		012403C
00000690	LO-BENTOMAT ST	150	2250	2650	2000126840		2000128706		012403C
00000691	LO-BENTOMAT ST	150	2250	2640	2000126840		2000128706		012403C
00000692	LO-BENTOMAT ST	150	2250	2638	2000126840		2000128706		012403C
00000693	LO-BENTOMAT ST	150	2250	2638	2000126840		2000128706		012403C
00000694	LO-BENTOMAT ST	150	2250	2645	2000126840		2000128706		012403C
00000695	LO-BENTOMAT ST	150	2250	2649	C832982A		2000128706		012403C
00000696	LO-BENTOMAT ST	150	2250	2640	C832982A		2000128706		012403C
00000697	LO-BENTOMAT ST	150	2250	2644	C832982A		2000128706		012403C
00000698	LO-BENTOMAT ST	150	2250	2639	C832982A		2000128706		012403C
00000699	LO-BENTOMAT ST	150	2250	2618	C832982A		2000128706		012403C
00000700	LO-BENTOMAT ST	150	2250	2665	C832982A		2000128706		012403C
00000701	LO-BENTOMAT ST	150	2250	2690	C832982A		2000128706		012403C

000380

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CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000702	LO-BENTOMAT ST	150	2250	2765	C832982A		2000128706		012403C
00000703	LO-BENTOMAT ST	150	2250	2660	C832982A		2000128706		012403C
00000704	LO-BENTOMAT ST	150	2250	2676	E121530A		2000128706		012403C
00000705	LO-BENTOMAT ST	150	2250	2679	E121530A		2000128706		012403C
00000706	LO-BENTOMAT ST	150	2250	2651	E121530A		2000128706		012403C
00000707	LO-BENTOMAT ST	150	2250	2718	E121530A		2000128706		012403C
00000708	LO-BENTOMAT ST	150	2250	2701	E121530A		2000128706		012403C
00000709	LO-BENTOMAT ST	150	2250	2640	E121530A		2000128706		012403C
00000710	LO-BENTOMAT ST	150	2250	2615	E121530A		2000084049		012403C
00000711	LO-BENTOMAT ST	150	2250	2626	E121530A		2000084049		012403C
00000712	LO-BENTOMAT ST	150	2250	2620	E121354A		2000084049		012403C
00000713	LO-BENTOMAT ST	150	2250	2624	E121354A		2000084049		012403C
00000714	LO-BENTOMAT ST	150	2250	2636	E121354A		2000084049		012403C
00000715	LO-BENTOMAT ST	150	2250	2656	E121354A		2000084049		012403C
00000716	LO-BENTOMAT ST	150	2250	2631	E121354A		2000084049		012403C
00000717	LO-BENTOMAT ST	150	2250	2712	E121355A		2000084049		012403C
00000718	LO-BENTOMAT ST	150	2250	2730	E121355A		2000084049		012403C
00000719	LO-BENTOMAT ST	150	2250	2786	E121355A		2000084049		012403C
00000720	LO-BENTOMAT ST	150	2250	2741	E121355A		2000084049		012403C
00000721	LO-BENTOMAT ST	150	2250	2741	E121355A		2000084049		012403C
00000722	LO-BENTOMAT ST	150	2250	2742	E121355A		2000084049		012403C

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000723	LO-BENTOMAT ST	150	2250	2760	E121355A		2000084049		012403C
00000724	LO-BENTOMAT ST	150	2250	2750	E121339A		2000084049		012403C
00000725	LO-BENTOMAT ST	150	2250	2671	E121339A		2000084049		012403C
00000726	LO-BENTOMAT ST	150	2250	2731	E121339A		2000084049		012403C
00000727	LO-BENTOMAT ST	150	2250	2712	E121339A		2000084049		012403C
00000728	LO-BENTOMAT ST	150	2250	2716	E121339A		2000084049		012403D
00000729	LO-BENTOMAT ST	150	2250	2741	E121339A		9176501		012403D
00000730	LO-BENTOMAT ST	150	2250	2745	E121339A		9176501		012403D
00000731	LO-BENTOMAT ST	150	2250	2763	E121339A		9176501		012403D
00000732	LO-BENTOMAT ST	150	2250	2769	E121345A		9176501		012403D
00000733	LO-BENTOMAT ST	150	2250	2758	E121345A		9176501		012403D
00000734	LO-BENTOMAT ST	150	2250	2760	E121345A		9176501		012403D
00000735	LO-BENTOMAT ST	150	2250	2780	E121345A		9176501		012403D
00000736	LO-BENTOMAT ST	150	2250	2790	E121345A		9176501		012403D
00000737	LO-BENTOMAT ST	150	2250	2752	E121345A		9176501		012403D
00000738	LO-BENTOMAT ST	150	2250	2715	E121345A		9176501		012403D
00000739	LO-BENTOMAT ST	150	2250	2739	E121345A		9176501		012403D
00000740	LO-BENTOMAT ST	150	2250	2731	E121345A		9176501		012403D
00000741	LO-BENTOMAT ST	150	2250	2728	E121346A		9176501		012403D
00000742	LO-BENTOMAT ST	150	2250	2728	E121346A		9176501		012403D
00000743	LO-BENTOMAT ST	150	2250	2720	E121346A		2000049002		012403D

000382

5369

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000744	LO-BENTOMAT ST	150	2250	2646	E121335A		2000049002		012403D
00000745	LO-BENTOMAT ST	150	2250	2645	E121335A		2000049002		012403D
00000746	LO-BENTOMAT ST	150	2250	2734	E121335A		2000049002		012403D
00000747	LO-BENTOMAT ST	150	2250	2763	E121335A		2000049002		012403D
00000748	LO-BENTOMAT ST	150	2250	2698	E121335A		2000049002		012403D
00000749	LO-BENTOMAT ST	150	2250	2697	E121335A		2000049002		012403D
00000750	LO-BENTOMAT ST	150	2250	2737	E121335A		2000049002		012403D
00000751	LO-BENTOMAT ST	150	2250	2726	E121335A		2000049002		012403D
00000752	LO-BENTOMAT ST	150	2250	2710	E121336A		2000049002		012403D
00000753	LO-BENTOMAT ST	150	2250	2722	E121336A		2000049002		012403D
00000754	LO-BENTOMAT ST	150	2250	2699	E121336A		2000049002		012403D
00000755	LO-BENTOMAT ST	150	2250	2700	E121336A		2000049002		012403D
00000756	LO-BENTOMAT ST	150	2250	2680	E121336A		2000049002		012403D
00000757	LO-BENTOMAT ST	150	2250	2682	E121336A		2000049002		012403D
00000758	LO-BENTOMAT ST	150	2250	2685	E121336A		2000049002		012403D
00000759	LO-BENTOMAT ST	150	2250	2665	E121336A		2000049002		012403D
00000760	LO-BENTOMAT ST	150	2250	2661	E121336A		2000049002		012403D
00000761	LO-BENTOMAT ST	150	2250	2656	E121347A		2000049002		012403D
00000762	LO-BENTOMAT ST	150	2250	2651	E121347A		2000049002		012403D
00000763	LO-BENTOMAT ST	150	2250	2651	E121347A		2000049002		012403D
00000764	LO-BENTOMAT ST	150	2250	2646	E121347A		2000049002		012403D

000383

5369

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000765	LO-BENTOMAT ST	150	2250	2645	E121347A		2000049002		012403D
00000766	LO-BENTOMAT ST	150	2250	2660	E121347A		2000049002		012403D
00000767	LO-BENTOMAT ST	150	2250	2654	E121347A		2000049002		012403D
00000768	LO-BENTOMAT ST	150	2250	2663	E121347A		2000049002		012403D
00000769	LO-BENTOMAT ST	150	2250	2659	E121347A		2000049002		012403D
00000770	LO-BENTOMAT ST	150	2250	2678	2000126837		2000049002		012403D
00000771	LO-BENTOMAT ST	150	2250	2671	2000126837		2000049002		012403D
00000772	LO-BENTOMAT ST	150	2250	2666	2000126837		2000049002		012403D
00000773	LO-BENTOMAT ST	150	2250	2657	2000126837		2000049002		012403E
00000774	LO-BENTOMAT ST	150	2250	2628	2000126837		2000049010		012403E
00000775	LO-BENTOMAT ST	150	2250	2603	2000126837		2000049010		012403E
00000776	LO-BENTOMAT ST	150	2250	2602	2000126837		2000049010		012403E
00000777	LO-BENTOMAT ST	150	2250	2605	2000126837		2000049010		012403E
00000778	LO-BENTOMAT ST	150	2250	2610	2000126837		2000049010		012403E
00000779	LO-BENTOMAT ST	150	2250	2605	C832979A		2000049010		012403E
00000780	LO-BENTOMAT ST	150	2250	2600	C832979A		2000049010		012403E
00000781	LO-BENTOMAT ST	150	2250	2607	C832979A		2000049010		012403E
00000782	LO-BENTOMAT ST	150	2250	2612	C832979A		2000049010		012403E
00000783	LO-BENTOMAT ST	150	2250	2596	C832979A		2000049010		012403E
00000784	LO-BENTOMAT ST	150	2250	2594	C832979A		2000049010		012403E
00000785	LO-BENTOMAT ST	150	2250	2605	C832979A		2000049010		012403E

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000786	LO-BENTOMAT ST	150	2250	2635	C832979A		2000049000		012403E
00000787	LO-BENTOMAT ST	150	2250	2658	C832979A		2000049000		012403E
00000788	LO-BENTOMAT ST	150	2250	2625	2000126842		2000049000		012403E
00000789	LO-BENTOMAT ST	150	2250	2601	2000126842		2000049000		012403E
00000790	LO-BENTOMAT ST	150	2250	2660	2000126842		2000049000		012403E
00000791	LO-BENTOMAT ST	150	2250	2628	C832976A		2000049000		012403E
00000792	LO-BENTOMAT ST	150	2250	2608	C832976A		2000049000		012403E
00000793	LO-BENTOMAT ST	150	2250	2653	C832976A		2000049000		012403E
00000794	LO-BENTOMAT ST	150	2250	2650	C832976A		2000049000		012403E
00000795	LO-BENTOMAT ST	150	2250	2675	C832976A		2000049000		012403E
00000796	LO-BENTOMAT ST	150	2250	2664	C832976A		2000049000		012403E
00000797	LO-BENTOMAT ST	150	2250	2649	C832976A		2000049000		012403E
00000798	LO-BENTOMAT ST	150	2250	2658	C832976A		2000049000		012403E
00000799	LO-BENTOMAT ST	150	2250	2637	C832976A		2000049000		012403E
00000800	LO-BENTOMAT ST	150	2250	2643	E121362A		2000049000		012403E
00000801	LO-BENTOMAT ST	150	2250	2659	E121362A		2000049000		012403E
00000802	LO-BENTOMAT ST	150	2250	2651	E121362A		2000048999		012403E
00000803	LO-BENTOMAT ST	150	2250	2670	E121362A		2000048999		012403E
00000804	LO-BENTOMAT ST	150	2250	2697	E121362A		2000048999		012403E
00000805	LO-BENTOMAT ST	150	2250	2694	E121362A		2000048999		012403E
00000806	LO-BENTOMAT ST	150	2250	2701	E121362A		2000048999		012403E

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000807	LO-BENTOMAT ST	150	2250	2700	E121362A		2000048999		012403E
00000808	LO-BENTOMAT ST	150	2250	2658	E121362A		2000048999		012403E
00000809	LO-BENTOMAT ST	150	2250	2642	E121371A		2000048999		012403E
00000810	LO-BENTOMAT ST	150	2250	2643	E121371A		2000048999		012403E
00000811	LO-BENTOMAT ST	150	2250	2640	E121371A		2000048999		012403E
00000812	LO-BENTOMAT ST	150	2250	2636	E121371A		2000048999		012403E
00000813	LO-BENTOMAT ST	150	2250	2635	E121371A		2000048999		012403E
00000814	LO-BENTOMAT ST	150	2250	2541	E121371A		2000048999		012403E
00000815	LO-BENTOMAT ST	150	2250	2614	E121371A		2000048999		012403E
00000816	LO-BENTOMAT ST	150	2250	2599	E121371A		2000048999		012403E
00000817	LO-BENTOMAT ST	150	2250	2595	E121371A		2000048999		012403E
00000818	LO-BENTOMAT ST	150	2250	2633	E121317A		2000048999		012903A
00000819	LO-BENTOMAT ST	150	2250	2689	E121317A		2000048999		012903A
00000820	LO-BENTOMAT ST	150	2250	2736	E121317A		2000048999		012903A
00000821	LO-BENTOMAT ST	150	2250	2750	E121317A		2000048999		012903A
00000822	LO-BENTOMAT ST	150	2250	2731	E121317A		2000048999		012903A
00000823	LO-BENTOMAT ST	150	2250	2721	E121317A		9172881		012903A
00000824	LO-BENTOMAT ST	150	2250	2701	E121317A		9172881		012903A
00000825	LO-BENTOMAT ST	150	2250	2681	E121317A		9172881		012903A
00000826	LO-BENTOMAT ST	150	2250	2689	E121317A		9172881		012903A
00000827	LO-BENTOMAT ST	150	2250	2700	E121337A		9172881		012903A

000386

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CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000828	LO-BENTOMAT ST	150	2250	21697	E121337A		9172881		012903A
00000829	LO-BENTOMAT ST	150	2250	2686	E121337A		9172881		012903A
00000830	LO-BENTOMAT ST	150	2250	2686	E121337A		9172881		012903A
00000831	LO-BENTOMAT ST	150	2250	2681	E121337A		9172881		012903A
00000832	LO-BENTOMAT ST	150	2250	2675	E121337A		9172881		012903A
00000833	LO-BENTOMAT ST	150	2250	2687	E121337A		9172881		012903A
00000834	LO-BENTOMAT ST	150	2250	2419	E121337A		9172881		012903A
00000835	LO-BENTOMAT ST	150	2250	2674	E121337A		9172881		012903A
00000836	LO-BENTOMAT ST	150	2250	2685	C832978A		9172881		012903A
00000837	LO-BENTOMAT ST	150	2250	2689	C832978A		9172881		012903A
00000838	LO-BENTOMAT ST	150	2250	2690	C832978A		9172881		012903A
00000839	LO-BENTOMAT ST	150	2250	2712	C832978A		9172881		012903A
00000840	LO-BENTOMAT ST	150	2250	2640	C832978A		9172881		012903A
00000841	LO-BENTOMAT ST	150	2250	2650	E121349A		2000049012		012903A
00000842	LO-BENTOMAT ST	150	2250	2630	E121349A		2000049012		012903A
00000843	LO-BENTOMAT ST	150	2250	2626	E121349A		2000049012		012903A
00000844	LO-BENTOMAT ST	150	2250	2630	E121349A		2000049012		012903A
00000845	LO-BENTOMAT ST	150	2250	2628	E121349A		2000049012		012903A
00000846	LO-BENTOMAT ST	150	2250	2641	E121349A		2000049012		012903A
00000847	LO-BENTOMAT ST	150	2250	2623	E121349A		2000049012		012903A
00000848	LO-BENTOMAT ST	150	2250	2632	E121343A		2000049012		012903A

000387

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CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000849	LO-BENTOMAT ST	150	2250	2613	E121343A		2000049012		012903A
00000850	LO-BENTOMAT ST	150	2250	2624	E121343A		2000049012		012903A
00000851	LO-BENTOMAT ST	150	2250	2622	E121343A		2000049012		012903A
00000852	LO-BENTOMAT ST	150	2250	2607	E121343A		2000049012		012903A
00000853	LO-BENTOMAT ST	150	2250	2618	E121343A		2000049012		012903A
00000854	LO-BENTOMAT ST	150	2250	2625	E121343A		2000049012		012903A
00000855	LO-BENTOMAT ST	150	2250	2638	E121343A		2000049012		012903A
00000856	LO-BENTOMAT ST	150	2250	2610	E121343A		2000049012		012903A
00000857	LO-BENTOMAT ST	150	2250	2616	E121343A		2000049012		012903A
00000858	LO-BENTOMAT ST	150	2250	2606	E121315A		2000049012		012903A
00000859	LO-BENTOMAT ST	150	2250	2630	E121315A		2000049005		012903A
00000860	LO-BENTOMAT ST	150	2250	2575	E121315A		2000049005		012903A
00000861	LO-BENTOMAT ST	150	2250	2629	E121315A		2000049005		012903A
00000862	LO-BENTOMAT ST	150	2250	2642	E121315A		2000049005		012903A
00000863	LO-BENTOMAT ST	150	2250	2622	E121315A		2000049005		012903A
00000864	LO-BENTOMAT ST	150	2250	2629	E121315A		2000049005		012903B
00000865	LO-BENTOMAT ST	150	2250	2634	E121315A		2000049005		012903B
00000866	LO-BENTOMAT ST	150	2250	2615	E121315A		2000049005		012903B
00000867	LO-BENTOMAT ST	150	2250	2632	2000126844		2000049005		012903B
00000868	LO-BENTOMAT ST	150	2250	2622	2000126844		2000049005		012903B
00000869	LO-BENTOMAT ST	150	2250	2616	2000126844		2000049005		012903B

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P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000870	LO-BENTOMAT ST	150	2250	2620	2000126844		2000049005		012903B
00000871	LO-BENTOMAT ST	150	2250	2624	2000126844		2000049005		012903B
00000872	LO-BENTOMAT ST	150	2250	2646	2000126844		2000049005		012903B
00000873	LO-BENTOMAT ST	150	2250	2602	2000126844		2000049005		012903B
00000874	LO-BENTOMAT ST	150	2250	2590	2000126844		2000049005		012903B
00000875	LO-BENTOMAT ST	150	2250	2602	2000126844		2000049005		012903B
00000876	LO-BENTOMAT ST	150	2250	2616	E121358A		2000049005		012903B
00000877	LO-BENTOMAT ST	150	2250	2616	E121358A		2000049005		012903B
00000878	LO-BENTOMAT ST	150	2250	2667	E121358A		2000049005		012903B
00000879	LO-BENTOMAT ST	150	2250	2617	E121358A		2000049005		012903B
00000880	LO-BENTOMAT ST	150	2250	2607	E121358A		2000049005		012903B
00000881	LO-BENTOMAT ST	150	2250	2608	E121358A		2000049005		012903B
00000882	LO-BENTOMAT ST	150	2250	2583	E121358A		2000084051		012903B
00000883	LO-BENTOMAT ST	150	2250	2639	E121358A		2000084051		012903B
00000884	LO-BENTOMAT ST	150	2250	2585	E121358A		2000084051		012903B
00000885	LO-BENTOMAT ST	150	2250	2593	C832981A		2000084051		012903B
00000886	LO-BENTOMAT ST	150	2250	2596	C832981A		2000084051		012903B
00000887	LO-BENTOMAT ST	150	2250	2618	C832981A		2000084051		012903B
00000888	LO-BENTOMAT ST	150	2250	2623	C832981A		2000084051		012903B
00000889	LO-BENTOMAT ST	150	2250	2637	C832981A		2000084051		012903B
00000890	LO-BENTOMAT ST	150	2250	2600	C832981A		2000084051		012903B

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000891	LO-BENTOMAT ST	150	2250	2610	C832981A		2000084051		012903B
00000892	LO-BENTOMAT ST	150	2250	2620	C832981A		2000084051		012903B
00000893	LO-BENTOMAT ST	150	2250	2610	C832981A		2000084051		012903B
00000894	LO-BENTOMAT ST	150	2250	2617	C832970A		2000084051		012903B
00000895	LO-BENTOMAT ST	150	2250	2602	C832970A		2000084051		012903B
00000896	LO-BENTOMAT ST	150	2250	2618	C832970A		2000084051		012903B
00000897	LO-BENTOMAT ST	150	2250	2585	C832970A		2000084051		012903B
00000898	LO-BENTOMAT ST	150	2250	2577	C832970A		2000084051		012903B
00000899	LO-BENTOMAT ST	150	2250	2580	C832970A		2000084051		012903B
00000900	LO-BENTOMAT ST	150	2250	2575	C832970A		2000084051		012903B
00000901	LO-BENTOMAT ST	150	2250	2602	C832970A		2000084051		012903B
00000902	LO-BENTOMAT ST	150	2250	2635	C832970A		2000084051		012903B
00000903	LO-BENTOMAT ST	150	2250	2653	C832996A		2000084051		012903B
00000904	LO-BENTOMAT ST	150	2250	2694	C832996A		2000049008		012903B
00000905	LO-BENTOMAT ST	150	2250	2678	C832996A		2000049008		012903B
00000906	LO-BENTOMAT ST	150	2250	2696	C832995A		2000049008		012903B
00000907	LO-BENTOMAT ST	150	2250	2652	C832995A		2000049008		012903B
00000908	LO-BENTOMAT ST	150	2250	2640	C832995A		2000049008		013003A
00000909	LO-BENTOMAT ST	150	2250	2636	C832995A		2000049008		013003A
00000910	LO-BENTOMAT ST	150	2250	2630	C832995A		2000049008		013003A
00000911	LO-BENTOMAT ST	150	2250	2637	C832995A		2000049008		013003A

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CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000912	LO-BENTOMAT ST	150	2250	2636	C832995A		2000049008		013003A
00000913	LO-BENTOMAT ST	150	2250	2633	C832995A		2000049008		013003A
00000914	LO-BENTOMAT ST	150	2250	2637	C832995A		2000049008		013003A
00000915	LO-BENTOMAT ST	150	2250	2627	2000126797		2000049008		013003A
00000916	LO-BENTOMAT ST	150	2250	2626	2000126797		2000049008		013003A
00000917	LO-BENTOMAT ST	150	2250	2632	2000126797		2000049008		013003A
00000918	LO-BENTOMAT ST	150	2250	2628	2000126797		2000049008		013003A
00000919	LO-BENTOMAT ST	150	2250	2526	2000126797		2000049008		013003A
00000920	LO-BENTOMAT ST	150	2250	2609	2000126797		2000049008		013003A
00000921	LO-BENTOMAT ST	150	2250	2628	2000126797		2000049008		013003A
00000922	LO-BENTOMAT ST	150	2250	2616	2000126797		2000049008		013003A
00000923	LO-BENTOMAT ST	150	2250	2638	2000126797		2000049008		013003A
00000924	LO-BENTOMAT ST	150	2250	2621	C832980A		2000049008		013003A
00000925	LO-BENTOMAT ST	150	2250	2632	C832980A		2000049008		013003A
00000926	LO-BENTOMAT ST	150	2250	2634	C832980A		2000049008		013003A
00000927	LO-BENTOMAT ST	150	2250	2681	C832980A		2000049008		013003A
00000928	LO-BENTOMAT ST	150	2250	2648	C832980A		2000049008		013003A
00000929	LO-BENTOMAT ST	150	2250	2636	C832980A		2000049008		013003A
00000930	LO-BENTOMAT ST	150	2250	2575	2000220201		2000049016		013003A
00000931	LO-BENTOMAT ST	150	2250	2660	2000220201		2000049016		013003A
00000932	LO-BENTOMAT ST	150	2250	2610	2000220201		2000049016		013003A

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
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HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000933	LO-BENTOMAT ST	150	2250	2562	2000220201		2000049016		013003A
00000934	LO-BENTOMAT ST	150	2250	2560	2000220201		2000049016		013003A
00000935	LO-BENTOMAT ST	150	2250	2571	2000220201		2000049016		013003A
00000936	LO-BENTOMAT ST	150	2250	2614	2000220201		2000049016		013003A
00000937	LO-BENTOMAT ST	150	2250	2565	2000220201		2000049016		013003A
00000938	LO-BENTOMAT ST	150	2250	2555	2000220201		2000049016		013003A
00000939	LO-BENTOMAT ST	150	2250	2639	2000220201		2000049016		013003A
00000940	LO-BENTOMAT ST	150	2250	2621	2000126847		2000049016		013003A
00000941	LO-BENTOMAT ST	150	2250	2660	2000126847		2000049016		013003A
00000942	LO-BENTOMAT ST	150	2250	2625	2000126847		2000049016		013003A
00000943	LO-BENTOMAT ST	150	2250	2629	2000126847		2000049016		013003A
00000944	LO-BENTOMAT ST	150	2250	2626	2000126847		2000049016		013003A
00000945	LO-BENTOMAT ST	150	2250	2635	2000126847		2000049016		013003A
00000946	LO-BENTOMAT ST	150	2250	2645	2000126847		R9172028		013003A
00000947	LO-BENTOMAT ST	150	2250	2641	2000126847		R9172028		013003A
00000948	LO-BENTOMAT ST	150	2250	2646	2000126847		R9172028		013003A
00000949	LO-BENTOMAT ST	150	2250	2638	2000126849		R9172028		013003A
00000950	LO-BENTOMAT ST	150	2250	2634	2000126849		R9172028		013003A
00000951	LO-BENTOMAT ST	150	2250	2636	2000126849		R9172028		013003A
00000952	LO-BENTOMAT ST	150	2250	2645	2000126849		R9172028		013003A
00000953	LO-BENTOMAT ST	150	2250	2638	2000126849		R9172028		013003A

CETCO
P.O. BOX 428
LOVELL WY 82431

SHIP TO: U.S.DOE
C/O FLUOR FERNALD, INC.
HAMILTON OH

ORDER NUMBER 000167357

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
00000954	LO-BENTOMAT ST	150	2250	2642	2000126849		R9172028		013003B
00000955	LO-BENTOMAT ST	150	2250	2650	2000126849		R9172028		013003B

TOTAL SQUARE FEET..... 1,185,750

TOTAL PAGES 26

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Precision Geosynthetic Laboratories

February 4, 2003

Bill Urchick
Cetco
1500 W. Shure Dr.
Arlington Heights, IL 60004

Dear Mr. Urchick: RE: Fluor Daniel Fernald

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

Enclosed is the ***final*** laboratory report for the testing of two (2) GCL, Bentomat ST sample(s) received January 27, 2003.

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 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. ***Failed seam samples are kept for 7 years; good seam samples are disposed after 2 weeks and conformance samples are disposed after 1 month.*** Should you need us to keep them longer, please advise us in writing.

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

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Cora B. Queja
Vice President

Enclosure: (Job No. G030082)

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

Precision Geosynthetic Laboratories

CLIENT: Cetco
PROJECT: Fluor Daniel Fernald

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. G030082)

MATERIAL DESCRIPTION: GCL, Bentomat ST

SAMPLE(S) SENT BY: Noe Garcia / Cetco

DATE RECEIVED: January 27, 2003 DATE REPORTED: February 4, 2003

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER
R# 430 L# 200304LO	85354
R# 447 L# 200304LO	85355

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D5887	Index Flux
ASTM D4595	Wide-Width Strip Tensile

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 Table(s) 1 to 2. The units in which the data are reported are included on these tables.

PRECISION GEOSYNTHETIC LABORATORIES

Cora B. Queja
Vice President

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TABLE 1.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: **1/27/03**
Date Reported: **2/4/03**
Client Sample ID: **R# 430 L# 200304LO**
Material Description: **GCL, Bentomat ST**

QC'd By: _____
PGL Job No.: **G030082**
PGL Control No.: **85354**

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 Pressure: 5 psi													
		3.9E-09										3.9E-09	N/A	5×10^{-9} *max*
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in													
	Curtis Sure Grips was used. Full scale force range used for testing: 3,000 lbs													
	Tensile Strength (lbs/ in.)													
	MD	76	69	77	69	75	69					73	4	*35 min*
	Elongation at Break (percent)													
	MD	16	15	16	14	17	14					15	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

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TABLE 2.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: **1/27/03**
Date Reported: **2/4/03**
Client Sample ID: **R# 447 L# 200304LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No.: **G030082**
PGL Control No.: **85355**

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 Pressure: 5 psi													
		4.3E-09										4.3E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in Curtis Sure Grips was used. Full scale force range used for testing: 3,000 lbs													
	Tensile Strength (lbs/ in.)													
	MD	63	57	57	57	61	52					58	4	35 min
	Elongation at Break (percent)													
	MD	14	13	15	12	14	12					13	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000397

5369

Precision Geosynthetic Laboratories

February 4, 2003

Bill Urchick
Cetco
1500 W. Shure Dr.
Arlington Heights, IL 60004

Dear Mr. Urchick: RE: Fluor Daniel Fernald

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

Enclosed is the ***final*** laboratory report for the testing of five (5) GCL, Bentomat ST sample(s) received January 28, 2003.

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 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. ***Failed seam samples are kept for 7 years; good seam samples are disposed after 2 weeks and conformance samples are disposed after 1 month.*** Should you need us to keep them longer, please advise us in writing.

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

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Cora B. Queja
Vice President

Enclosure: (Job No. G030087)

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

Precision Geosynthetic Laboratories

CLIENT: Cetco
PROJECT: Fluor Daniel Fernald

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. G030087)

MATERIAL DESCRIPTION: GCL, Bentomat ST

SAMPLE(S) SENT BY: Noe Garcia / Cetco

DATE RECEIVED: January 28, 2003 DATE REPORTED: February 4, 2003

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER
R# 464 L# 200304LO	85361
R# 481 L# 200304LO	85362
R# 498 L# 200304LO	85363
R# 515 L# 200304LO	85364
R# 532 L# 200304LO	85365

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D5887	Index Flux
ASTM D4595	Wide-Width Strip Tensile

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 Table(s) 1 to 5. The units in which the data are reported are included on these tables.

PRECISION GEOSYNTHETIC LABORATORIES

Cora B. Queja
Vice President

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TABLE 1.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: 1/28/03
Date Reported: 2/4/03
Client Sample ID: R# 464 L# 200304LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No.: G030087
PGL Control No.: 85361

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 Pressure: 5 psi													
		4.5E-09										4.5E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	59	61	57	51	54	51					55	4	35 min
	Elongation at Break (percent)													
	MD	13	12	13	11	13	14					13	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000400

5369

TABLE 2.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: **1/28/03**
Date Reported: **2/4/03**
Client Sample ID: **R# 481 L# 200304LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No.: **G030087**
PGL Control No.: **85362**

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 Pressure: 5 psi													
		3.8E-09										3.8E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	60	62	65	62	63	64					63	2	35 min
	Elongation at Break (percent)													
	MD	16	15	13	14	16	15					15	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000401

5369

TABLE 3.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

QC'd By:

PGL Job No.: G030087

PGL Control No.: 85363

Date Received: 1/28/03

Date Reported: 2/4/03

Client Sample ID: R# 498 L# 200304LO

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 Pressure: 5 psi											4.6E-09	N/A	5×10^{-9} max
	4.6E-09													
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in													
	Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)											75	2	35 min
	MD	72	77	76	73	76	75							
	Elongation at Break (percent)											16	1	
	MD	15	16	17	18	15	15							

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000402

5369

TABLE 4.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: **1/28/03**
Date Reported: **2/4/03**
Client Sample ID: **R# 515 L# 200304LO**
Material Description: **GCL, Bentomat ST**

QC'd By: _____
PGL Job No.: **G030087**
PGL Control No.: **85364**

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 Pressure: 5 psi													
		4.8E-09										4.8E-09	N/A	5×10^{-9} *max*
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in													
	Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	57	59	59	61	60	61					60	2	*35 min*
	Elongation at Break (percent)													
	MD	12	13	14	13	12	14					13	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000403

5369

TABLE 5.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: **1/28/03**
Date Reported: **2/4/03**
Client Sample ID: **R# 532 L# 200304LO**
Material Description: **GCL, Bentomat ST**

QC'd By: _____
PGL Job No.: **G030087**
PGL Control No.: **85365**

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 Pressure: 5 psi													
		4.6E-09										4.6E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	74	73	72	76	71	73					73	2	35 min
	Elongation at Break (percent)													
	MD	15	15	15	15	15	15					15	0	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

0004404

5369

Precision Geosynthetic Laboratories

February 19, 2003

Bill Urchick
Cetco
1500 W. Shure Dr.
Arlington Heights, IL 60004

Dear Mr. Urchick:

RE: Fluor Daniel Fernald

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

Enclosed is the ***final*** laboratory report for the testing of five (5) GCL, Bentomat ST sample(s) received January 29, 2003.

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 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. ***Failed seam samples are kept for 7 years; good seam samples are disposed after 2 weeks and conformance samples are disposed after 1 month.*** Should you need us to keep them longer, please advise us in writing.

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

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Cora B. Queja
Vice President

Enclosure: (Job No. G030092)

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

Precision Geosynthetic Laboratories

CLIENT: Cetco
PROJECT: Fluor Daniel Fernald

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. G030092)

MATERIAL DESCRIPTION: GCL, Bentomat ST

SAMPLE(S) SENT BY: Noe Garcia / Cetco

DATE RECEIVED: January 29, 2003 DATE REPORTED: February 19, 2003

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER
R# 549 L# 200305LO	85379
R# 566 L# 200305LO	85380
R# 583 L# 200305LO	85381
R# 600 L# 200305LO	85382
R# 617 L# 200305LO	85383

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D5887	Index Flux
ASTM D4595	Wide-Width Strip Tensile

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 Table(s) 1 to 5. The units in which the data are reported are included on these tables.

PRECISION GEOSYNTHETIC LABORATORIES

Cora B. Queja
Vice President

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TABLE 1.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: **1/29/03**
Date Reported: **2/19/03**
Client Sample ID: **R# 549 L# 200305LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No.: **G030092**
PGL Control No.: **85379**

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 Pressure: 5 psi													
		4.0E-09										4.0E-09	N/A	5×10^{-9} *max*
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in													
	Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	50	55	54	56	51	53					53	2	*35 min*
	Elongation at Break (percent)													
	MD	12	13	13	12	13	12					13	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000407

5369

TABLE 2.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: 1/29/03
Date Reported: 2/19/03
Client Sample ID: R# 566 L# 200305LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No.: G030092
PGL Control No.: 85380

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 Pressure: 5 psi													
		3.8E-09										3.8E-09	N/A	6×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in													
	Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	61	61	60	58	57	57					59	2	35 min
	Elongation at Break (percent)													
	MD	13	14	13	13	11	14					13	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

TABLE 3.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: **1/29/03**
Date Reported: **2/19/03**
Client Sample ID: **R# 583 L# 200305LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No.: **G030092**
PGL Control No.: **85381**

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 Pressure: 5 psi													
		3.8E-09										3.8E-09	N/A	5×10^{-9} *max*
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	67	62	67	65	68	62					65	3	*35 min*
	Elongation at Break (percent)													
	MD	16	15	16	14	16	15					15	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000409

7-5369

TABLE 4.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: 1/29/03
Date Reported: 2/19/03
Client Sample ID: R# 600 L# 200305LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No.: G030092
PGL Control No.: 85382

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 Pressure: 5 psi													
		4.2E-09										4.2E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	69	70	71	68	64	68					69	2	35 min
	Elongation at Break (percent)													
	MD	14	15	13	13	13	16					14	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000410

5369

TABLE 5.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: **1/29/03**
Date Reported: **2/19/03**
Client Sample ID: **R# 617 L# 200305LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No.: **G030092**
PGL Control No.: **85383**

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 Pressure: 5 psi													
		5.0E-09										5.0E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	59	57	53	56	52	57					56	3	35 min
	Elongation at Break (percent)													
	MD	12	13	14	11	13	13					13	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000411

5369

Precision Geosynthetic Laboratories

February 19, 2003

Bill Urchick
Cetco
1500 W. Shure Dr.
Arlington Heights, IL 60004

Dear Mr. Urchick: RE: Fluor Daniel Fernald

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

Enclosed is the ***final*** laboratory report for the testing of five (5) GCL, Bentomat ST sample(s) received January 30, 2003.

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.

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

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Cora B. Queja
Vice President

Enclosure: (Job No. G030094)

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

Precision Geosynthetic Laboratories

CLIENT: Cetco
PROJECT: Fluor Daniel Fernald

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. G030094)

MATERIAL DESCRIPTION: GCL, Bentomat ST

SAMPLE(S) SENT BY: Noe Garcia / Cetco

DATE RECEIVED: January 30, 2003 DATE REPORTED: February 19, 2003

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER
R# 634 L# 200305LO	85391
R# 651 L# 200305LO	85392
R# 668 L# 200305LO	85394
R# 685 L# 200305LO	85395
R# 702 L# 200305LO	85396

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D5887	Index Flux
ASTM D4595	Wide-Width Strip Tensile

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 Table(s) 1 to 5. The units in which the data are reported are included on these tables.

PRECISION GEOSYNTHETIC LABORATORIES

Cora B. Queja
Vice President

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TABLE 1.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: **1/30/03**
Date Reported: **2/19/03**
Client Sample ID: **R# 634 L# 200305LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No.: **G030094**
PGL Control No.: **85391**

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 Pressure: 5 psi													
		4.9E-09										4.9E-09	N/A	5×10^{-9} *max*
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in													
	Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	56	63	59	63	63	66					62	4	*35 min*
	Elongation at Break (percent)													
	MD	14	12	14	14	14	14					14	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000414

7-5369

TABLE 2.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: **1/30/03**
Date Reported: **2/19/03**
Client Sample ID: **R# 651 L# 200305LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No.: **G030094**
PGL Control No.: **85392**

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 Pressure: 5 psi													
		4.8E-09										4.8E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in													
	Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	70	66	68	67	69	67					68	2	35 min
	Elongation at Break (percent)													
	MD	16	14	15	15	16	15					15	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000415

5369

TABLE 3.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: 1/30/03
Date Reported: 2/19/03
Client Sample ID: R# 668 L# 200305LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No.: G030094
PGL Control No.: 85394

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 Pressure: 5 psi													
		3.4E-09										3.4E-09	N/A	5×10^{-9} *max*
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in													
	Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	53	48	51	48	53	46					50	3	*35 min*
	Elongation at Break (percent)													
	MD	11	10	10	10	10	11					10	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000416

5369

TABLE 4.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: 1/30/03
Date Reported: 2/19/03
Client Sample ID: R# 685 L# 200305LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No.: G030094
PGL Control No.: 85395

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 Pressure: 5 psi													
		3.8E-09										3.8E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in													
	Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	60	59	60	57	57	58					58	1	36 min
	Elongation at Break (percent)													
	MD	15	12	14	13	14	14					14	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000417

5369

TABLE 5.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: **1/30/03**
Date Reported: **2/19/03**
Client Sample ID: **R# 702 L# 200305LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No.: **G030094**
PGL Control No.: **85396**

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 Pressure: 5 psi													
		2.8E-09										2.8E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in													
	Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	72	63	73	63	65	66					67	5	35 min
	Elongation at Break (percent)													
	MD	14	15	15	14	15	15					15	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000418

5369

Precision Geosynthetic Laboratories

February 20, 2003

Bill Urchick
Cetco
1500 W. Shure Dr.
Arlington Heights, IL 60004

Dear Mr. Urchick: RE: Fluor Daniel Fernald

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

Enclosed is the ***final*** laboratory report for the testing of five (5) GCL, Bentomat ST sample(s) received January 31, 2003.

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 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. ***Failed seam samples are kept for 7 years; good seam samples are disposed after 2 weeks and conformance samples are disposed after 1 month.*** Should you need us to keep them longer, please advise us in writing.

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

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Cora B. Queja
Vice President

Enclosure: (Job No. G030097)

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

Precision Geosynthetic Laboratories

CLIENT: Cetco
PROJECT: Fluor Daniel Fernald

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. G030097)

MATERIAL DESCRIPTION: GCL, Bentomat ST

SAMPLE(S) SENT BY: Noe Garcia / Cetco

DATE RECEIVED: January 31, 2003 DATE REPORTED: February 20, 2003

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER
R# 719 L# 200305LO	85403
R# 736 L# 200305LO	85404
R# 753 L# 200305LO	85405
R# 770 L# 200305LO	85406
R# 787 L# 200305LO	85407

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D5887	Index Flux
ASTM D4595	Wide-Width Strip Tensile

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 Table(s) 1 to 5. The units in which the data are reported are included on these tables.

PRECISION GEOSYNTHETIC LABORATORIES

Cora B. Queja
Vice President

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TABLE 1.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: 1/31/03
Date Reported: 2/20/03
Client Sample ID: R# 719 L# 200305LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No.: G030097
PGL Control No.: 85403

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 Pressure: 5 psi													
		4.9E-09										4.9E-09	N/A	5×10^{-9} *max*
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	46	57	63	58	61	51					56	6	35 *min*
	Elongation at Break (percent)													
	MD	12	13	14	13	12	12					13	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

0004421

5369

TABLE 2.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: **1/31/03**
Date Reported: **2/20/03**
Client Sample ID: **R# 736 L# 200305LO**
Material Description: **GCL, Bentomat ST**

QC'd By:
PGL Job No.: **G030097**
PGL Control No.: **85404**

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 Pressure: 5 psi													
		4.8E-09										4.8E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	69	69	68	66	65	68					67	2	35 min
	Elongation at Break (percent)													
	MD	14	14	13	14	12	14					13	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000422

TABLE 3.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: 1/31/03
Date Reported: 2/20/03
Client Sample ID: R# 753 L# 200305LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No.: G030097
PGL Control No.: 85405

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 Pressure: 5 psi													
		4.9E-09										4.9E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in													
	Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	54	56	60	57	59	55					57	2	35 min
	Elongation at Break (percent)													
	MD	13	12	12	12	13	11					12	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000423

5369

TABLE 4.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: 1/31/03
Date Reported: 2/20/03
Client Sample ID: R# 770 L# 200305LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No.: G030097
PGL Control No.: 85406

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 Pressure: 5 psi													
		4.2E-09										4.2E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	62	62	65	69	66	69					66	3	35 min
	Elongation at Break (percent)													
	MD	14	12	14	13	13	15					13	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000424

5369

TABLE 5.
MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: 1/31/03
Date Reported: 2/20/03
Client Sample ID: R# 787 L# 200305LO
Material Description: GCL, Bentomat ST

QC'd By:
PGL Job No.: G030097
PGL Control No.: 85407

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 Pressure: 5 psi													
		4.7E-09										4.7E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	71	68	66	69	72	69					69	2	35 min
	Elongation at Break (percent)													
	MD	15	15	13	15	15	14					15	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000425

5369

Precision Geosynthetic Laboratories

March 3, 2003

Bill Urchick
Cetco
1500 W. Shure Dr.
Arlington Heights, IL 60004

Dear Mr. Urchick: RE: Fluor Daniel Fernald

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

Enclosed is the ***final*** laboratory report for the testing of seven (7) GCL, Bentomat ST sample(s) received February 3, 2003.

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 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. ***Failed seam samples are kept for 7 years; good seam samples are disposed after 2 weeks and conformance samples are disposed after 1 month.*** Should you need us to keep them longer, please advise us in writing.

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

CB
QUEJA
Cora B. Queja
Vice President

Enclosure: (Job No. G030106)

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

Precision Geosynthetic Laboratories

CLIENT: Cetco
PROJECT: Fluor Daniel Fernald

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. G030106)

MATERIAL DESCRIPTION: GCL, Bentomat ST

SAMPLE(S) SENT BY: Noe Garcia / Cetco

DATE RECEIVED: February 3, 2003 DATE REPORTED: March 3, 2003

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER
R# 804 L# 200305LO	85433
R# 821 L# 200305LO	85434
R# 838 L# 200305LO	85435
R# 855 L# 200305LO	85436
R# 872 L# 200305LO	85437
R# 889 L# 200305LO	85438
R# 906 L# 200305LO	85439

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D5887	Index Flux
ASTM D4595	Wide-Width Strip Tensile

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 Table(s) 1 to 7. The units in which the data are reported are included on these tables.

PRECISION GEOSYNTHETIC LABORATORIES

CB QUEJA

Cora B. Queja
Vice President

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TABLE 1.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: **2/3/03**
Date Reported: **3/3/03**
Client Sample ID: **R# 804 L# 200305LO**
Material Description: **GCL, Bentomat ST**

QC'd By: CB / QUEJA
PGL Job No.: **G030106**
PGL Control No.: **85433**

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 Pressure: 5 psi													
		4.9E-09										4.9E-09	N/A	5×10^{-9} *max*
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	58	57	60	57	64	55					58	3	*35 min*
	Elongation at Break (percent)													
	MD	12	12	15	12	14	12					13	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000428

5369

TABLE 2.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: **2/3/03**
Date Reported: **3/3/03**
Client Sample ID: **R# 821 L# 200305LO**
Material Description: **GCL, Bentomat ST**

QC'd By: CB QUEJ A
PGL Job No.: **G030106**
PGL Control No.: **85434**

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 Pressure: 5 psi													
		3.7E-09										3.7E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in													
	Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	68	59	71	73	75	70					69	6	35 min
	Elongation at Break (percent)													
	MD	15	12	14	16	16	16					15	2	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000429

5369

TABLE 3.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: 2/3/03
Date Reported: 3/3/03
Client Sample ID: R# 838 L# 200305LO
Material Description: GCL, Bentomat ST

QC'd By: CB QUEJA
PGL Job No.: G030106
PGL Control No.: 85435

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 Pressure: 5 psi													
		4.1E-09										4.1E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	82	78	79	83	76	77					79	3	36 min
	Elongation at Break (percent)													
	MD	15	14	14	15	14	14					14	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000430

5369

TABLE 4.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: **2/3/03**
Date Reported: **3/3/03**
Client Sample ID: **R# 855 L# 200305LO**
Material Description: **GCL, Bentomat ST**

QC'd By: CB QUEJA
PGL Job No.: **G030106**
PGL Control No.: **85436**

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 Pressure: 5 psi													
		4.2E-09										4.2E-09	N/A	5×10^{-9} *max*
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	59	57	59	54	60	55					57	2	*35 min*
	Elongation at Break (percent)													
	MD	10	10	11	10	11	11					10	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000431

5369

TABLE 5.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: 2/3/03
Date Reported: 3/3/03
Client Sample ID: R# 872 L# 200305LO
Material Description: GCL, Bentomat ST

QC'd By: CB QUEJA
PGL Job No.: G030106
PGL Control No.: 85437

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 Pressure: 5 psi													
		3.1E-09										3.1E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in													
	Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	63	63	68	63	59	66					64	3	35 min
	Elongation at Break (percent)													
	MD	12	13	12	13	12	14					13	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

0000432

5369

TABLE 6.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: **2/3/03**
Date Reported: **3/3/03**
Client Sample ID: **R# 889 L# 200305LO**
Material Description: **GCL, Bentomat ST**

QC'd By: CB QUEJA
PGL Job No.: **G030106**
PGL Control No.: **85438**

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 Pressure: 5 psi													
		4.5E-09										4.5E-09	N/A	5×10^{-9} *max*
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in													
	Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	63	71	72	70	65	70					69	4	*35 min*
	Elongation at Break (percent)													
	MD	14	14	13	15	14	13					14	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

000433

5369

TABLE 7.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: 2/3/03
Date Reported: 3/3/03
Client Sample ID: R# 906 L# 200305LO
Material Description: GCL, Bentomat ST

QC'd By: CB QUEJA
PGL Job No.: G030106
PGL Control No.: 85439

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 Pressure: 5 psi													
		4.8E-09										4.8E-09	N/A	6×10^{-9} *max*
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in													
	Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	51	53	59	56	55	57					55	3	*35 min*
	Elongation at Break (percent)													
	MD	10	10	11	12	11	11					11	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Precision Geosynthetic Laboratories

0004434

5369

Precision Geosynthetic Laboratories

March 3, 2003

Bill Urchick
Cetco
1500 W. Shure Dr.
Arlington Heights, IL 60004

Dear Mr. Urchick:

RE: Fluor Daniel Fernald

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

Enclosed is the ***final*** laboratory report for the testing of two (2) GCL, Bentomat ST sample(s) received February 4, 2003.

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 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. ***Failed seam samples are kept for 7 years; good seam samples are disposed after 2 weeks and conformance samples are disposed after 1 month.*** Should you need us to keep them longer, please advise us in writing.

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

CB QUEJA

Cora B. Queja
Vice President

Enclosure: (Job No. G030109)

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

Precision Geosynthetic Laboratories

CLIENT: Cetco
PROJECT: Fluor Daniel Fernald

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. G030109)

MATERIAL DESCRIPTION: GCL, Bentomat ST

SAMPLE(S) SENT BY: Noe Garcia / Cetco

DATE RECEIVED: February 4, 2003 DATE REPORTED: March 3, 2003

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER
R# 923 L# 200305LO	85449
R# 940 L# 200305LO	85450

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D5887	Index Flux
ASTM D4595	Wide-Width Strip Tensile

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 Table(s) 1 to 2. The units in which the data are reported are included on these tables.

PRECISION GEOSYNTHETIC LABORATORIES

CB QUEJA

Cora B. Queja
Vice President

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TABLE 1.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: **2/4/03**
Date Reported: **3/3/03**
Client Sample ID: **R# 923 L# 200305LO**
Material Description: **GCL, Bentomat ST**

QC'd By: CB QUEJ EA
PGL Job No.: **G030109**
PGL Control No.: **85449**

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 Pressure: 5 psi													
		4.9E-09										4.9E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in													
	Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	60	59	63	62	60	61					61	1	35 min
	Elongation at Break (percent)													
	MD	15	16	15	13	13	15					14	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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TABLE 2.

MATERIAL PROPERTIES

CLIENT: Cetco

PROJECT: Fluor Daniel Fernald

Date Received: 2/4/03
Date Reported: 3/3/03
Client Sample ID: R# 940 L# 200305LO
Material Description: GCL, Bentomat ST

QC'd By: CB QUEJ EA
PGL Job No.: G030109
PGL Control No.: 85450

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 Pressure: 5 psi													
		4.9E-09										4.9E-09	N/A	5×10^{-9} max
ASTM D4595	Wide- Width Strip Tensile													
	Test was performed as directed in D4595, dry condition. Instron Tensile Testing Machine equipped with 2 in x 8 in Curtis Sure Grips was used. Full scale force range used for testing: 1,500 lbs													
	Tensile Strength (lbs/ in.)													
	MD	55	56	53	53	57	56					55	2	35 min
	Elongation at Break (percent)													
	MD	12	11	10	11	11	11					11	1	

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

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SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20[illegible]	CONTRACT NO: 9269	SUBMITTAL NO. 20105-9269-02772P-014	REV.: 0	DATE: 04/15/03	1 of 1

FROM:
GETCO GCL
1500 West Shure Drive 5th Floor
Arlington Heights, IL 60004
SIGNATURE: [signature] 4/15/03

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: Susan Schwab DATE: 4/16/03

			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	9269-BASE-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
ECDC	52-7				
Chuck VanArsdale (Approver)	64				
Gregg Johnson	60				
Bill Zebick	64				
Mike Godber	84				
Kwasi Badu-Tweneboah	38				
Don Pfister	45				

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

RECEIVED BY: [signature] DATE: 4/21/03
(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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ORIGINAL

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

TABLE 1
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERNAL ~~INTERFACE~~ SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

QC'd by: _____
Date: 2/20/2003

TEST CONFIGURATION # 1

TOP BOX

GCL, Bentomat ST (Roll# 437 L#200304LO), C#85356

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 18.59%.

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 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 / ASTM D5321-92 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	137.91	1823	68	1037	55
20.00	2880	122.03	2736	44	1532	28
45.00	6480	102.01	4932	37	2950	24

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	1326	702.57
COEFFICIENT OF FRICTION:	0.55	0.34
FRICTION ANGLE(degrees):	28.7	18.7

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 #1 and #2

INFORMATION ONLY

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: _____ Date: 4/21/03

PGL Job No. G030083_1
Project : Fernald
GCL, Bentomat ST.Roll# 437 L#200304LO , C#85356

Figure #1
Normal Stress/ Interface Stress

QC'd By: _____

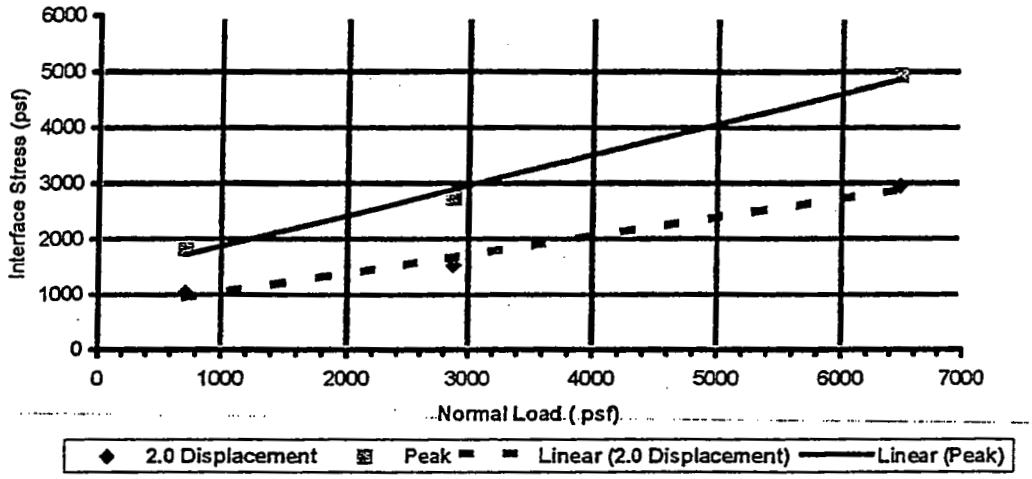

Figure #2
Shear Stress/ Displacement Curve

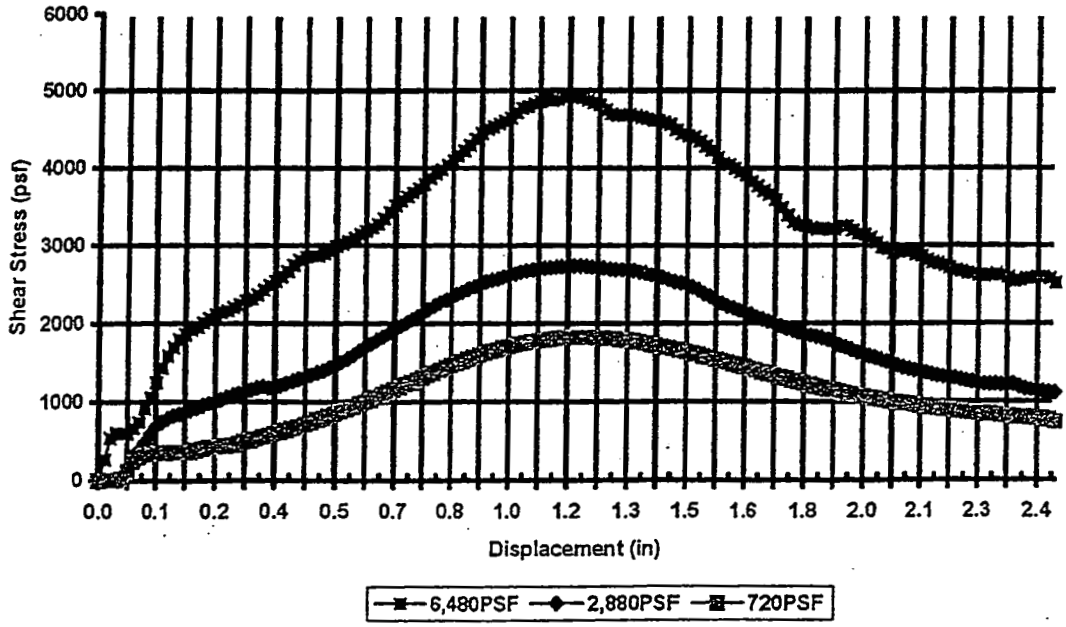

TABLE 1A
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

QC'd by:
Date: 2/20/2003

TEST CONFIGURATION # 1A

TOP BOX

GCL, Bentomat ST R# 437 (Woven Side) / C#85356

Textured HDPE (R#102103201) / C#85386

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 18.89%.

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 / ASTM D5321-92 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	151.00	358	26	271	21
20.00	2880	109.98	1090	21	791	15
45.00	6480	103.02	2372	20	1732	15

COHESION (psf):	96.29	76.429
COEFFICIENT OF FRICTION:	0.35	0.25
FRICTION ANGLE(degrees):	19.3	14.3

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 20 psi and 45 psi normal load, GCL stretched for about 0.75-1".

PGL Job No. G030083_1A
Project : Fernald
GCL (R#437 L#200304LO) ,C#85356 / HD (R#102103201 L#8221454) , C#85386

QC'd By: _____

Figure #1
Normal Stress/ Interface Stress

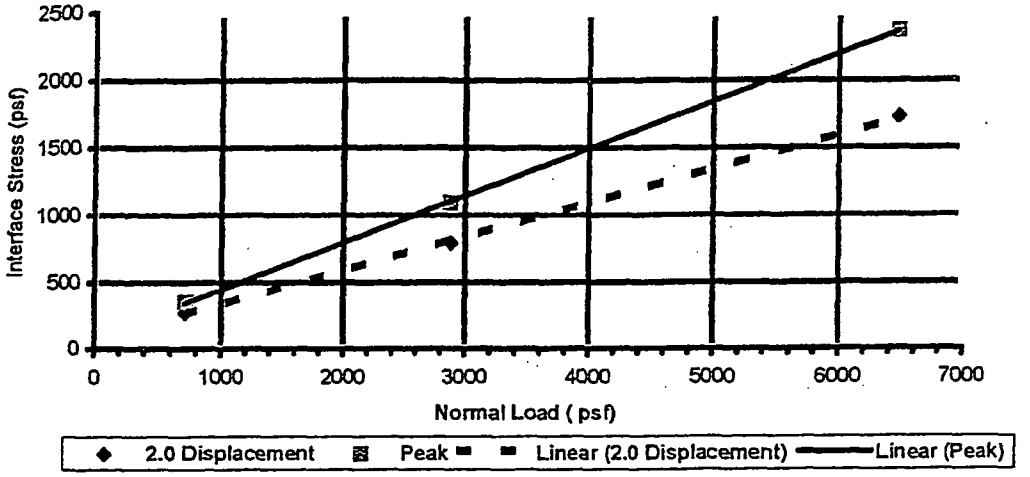

Figure #2
Shear Stress/ Displacement Curve

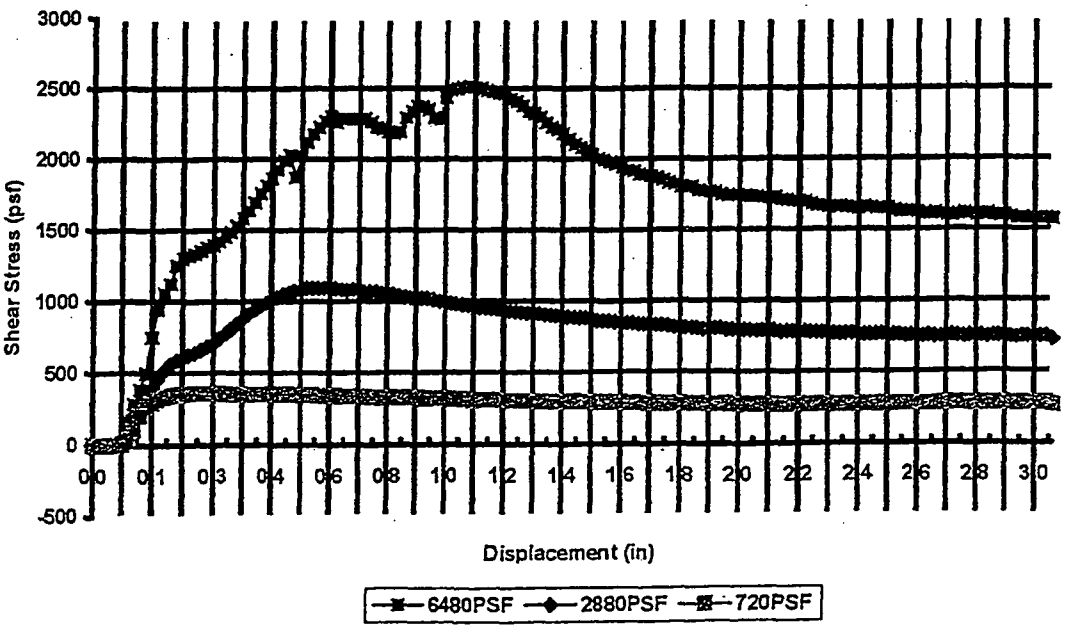

TABLE 2
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERNAL
~~INTERFACE~~ SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

QC'd by: _____
Date: 2/20/2003

TEST CONFIGURATION # 2

TOP BOX

GCL, Bentomat ST (Roll# 482 L#200304LO), C#85366

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 19.93%.

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 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 / ASTM D5321-92 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	134.03	1469	64	920	52
20.00	2880	112.9	2315	39	1695	30
45.00	6480	93.12	3867	31	2936	24

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	1146	676.14
COEFFICIENT OF FRICTION:	0.42	0.35
FRICTION ANGLE(degrees):	22.7	19.3

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 #1 and #2

PGL Job No. G030083_2
Project : Fernald
GCL, Bentomat ST Roll#482 L#200304LO, C#85366

Figure #1
Normal Stress/ Interface Stress

QC'd By: _____

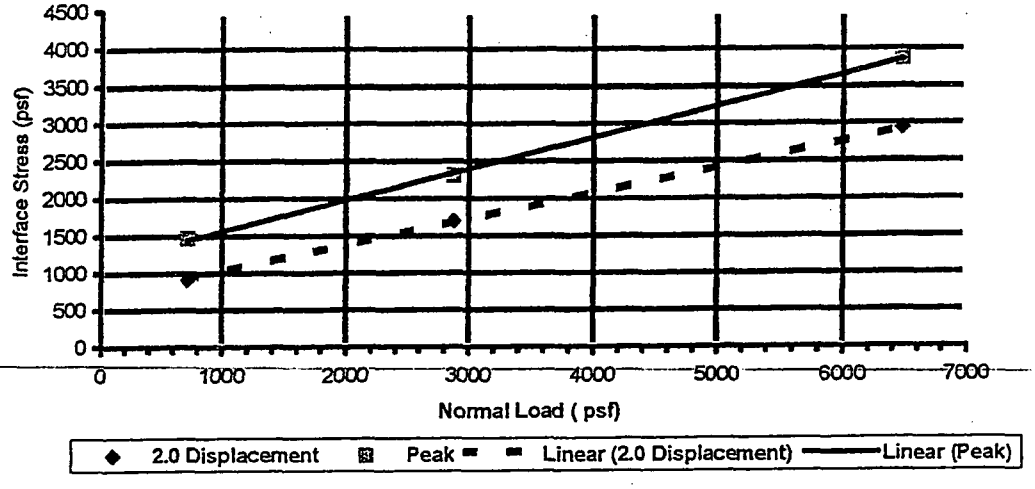

Figure #2
Shear Stress/ Displacement Curve

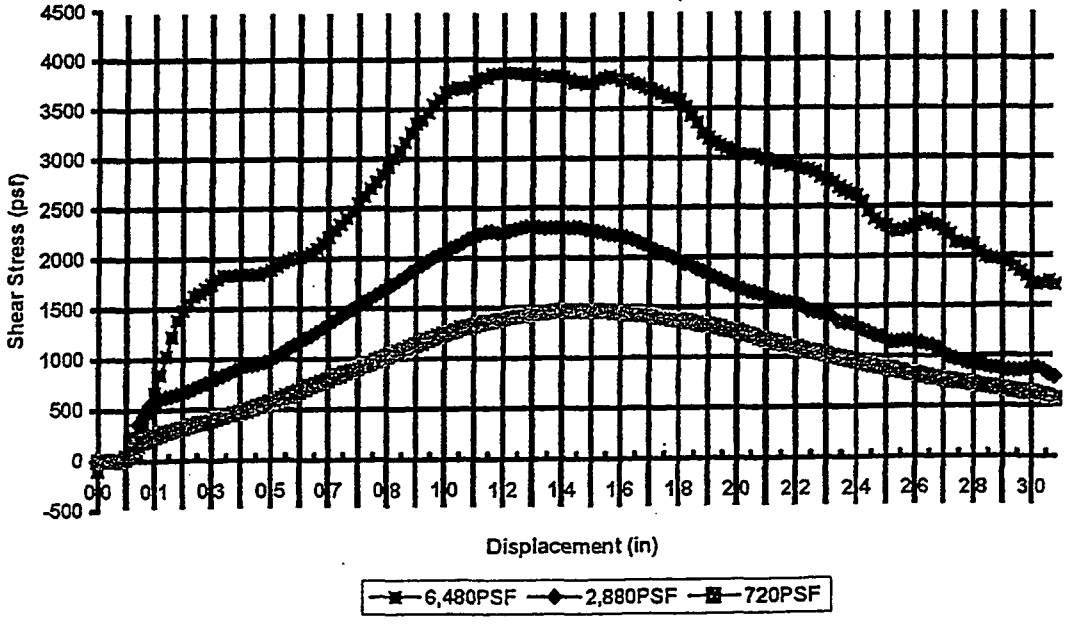

TABLE 2A
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

QC'd by: _____
Date: 2/24/03

TEST CONFIGURATION # 2A

TOP BOX

GCL, Bentomat ST R# 482 (Woven Side) / C#85366

Textured HDPE (R#102103212) / C#85387

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 17.86%.

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 / ASTM D5321-92 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	137.5	363	27	295	22
20.00	2880	110.23	1306	24	838	16
45.00	6480	87.87	2759	23	1687	15

COHESION (psf):	82.57	130
COEFFICIENT OF FRICTION:	0.41	0.24
FRICTION ANGLE(degrees):	22.5	13.6

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

No Tearing or stretching of the GCL al all normal loads

PGL Job No. G030083_2A
Project : Fernald
GCL, Bentomat ST (R#482 L#200304LO),C#85366
/ Textured HDPE (R#102103212), C#85387

QC'd By: _____

Figure #1
Normal Stress/ Interface Stress

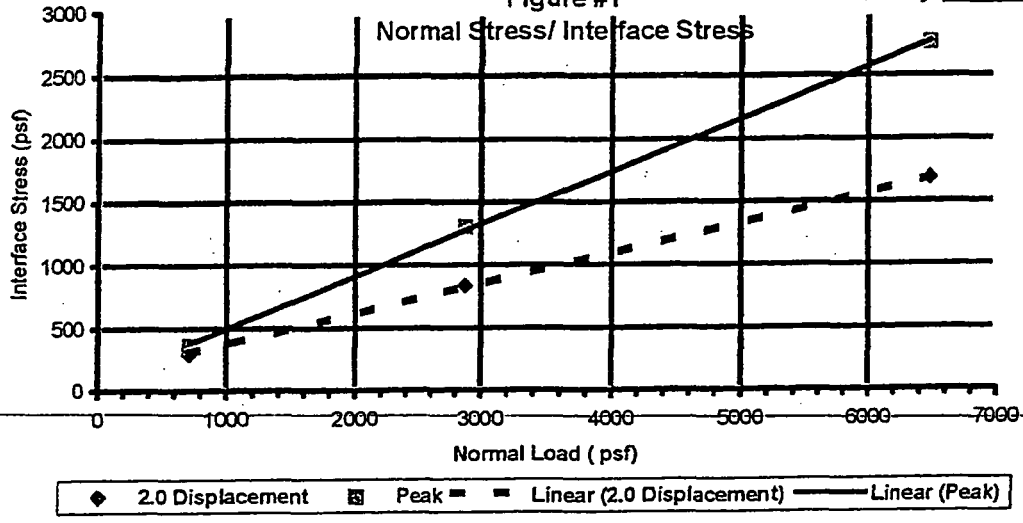

Figure #2
Shear Stress/ Displacement Curve

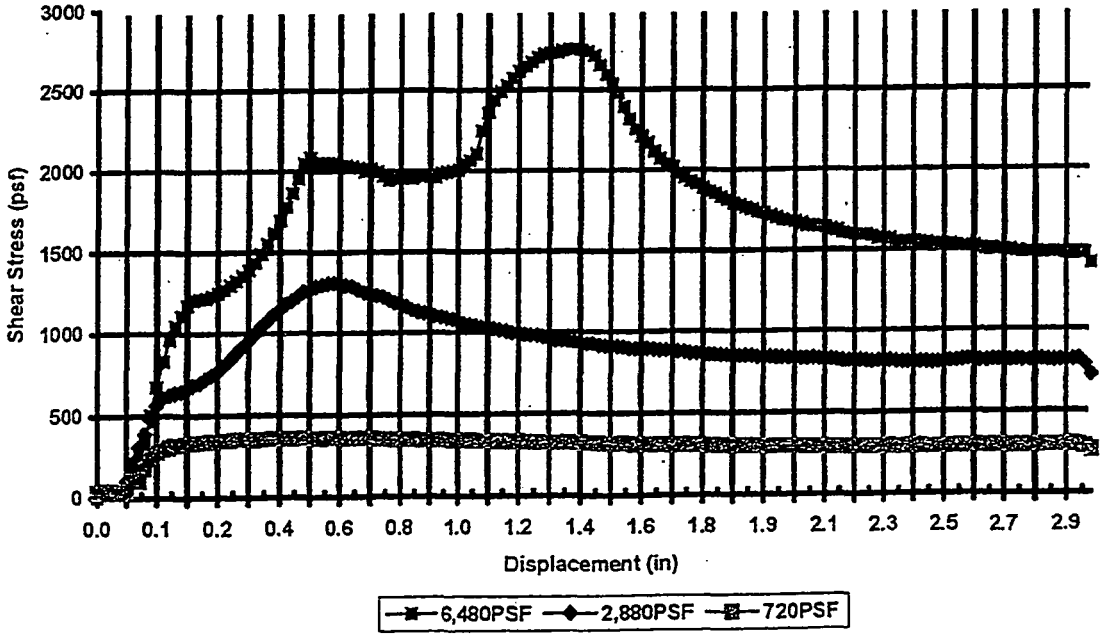

TABLE 3
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERNAL SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

QC'd by: CB QUEJ A
Date: 4/3/03

TEST CONFIGURATION # 3

TOP BOX

GCL, Bentomat ST (Roll #527 Lot #200304LO) C#85367

← 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 14.50%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ normal load before shearing.
2. Normal loads were applied using Bladder

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 / ASTM D5321-92 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) (%)	FINAL MC (Soil) (%)	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	130.34		1486	64	1457	64
20.00	2880	114.47		2349	39	2334	39
45.00	6480	92.72		3026	25	2968	25

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	1416	1401.1
COEFFICIENT OF FRICTION:	0.26	0.25
FRICTION ANGLE(degrees):	14.5	14.2

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

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PGL Job Number: G030083 Config.# 3
Project Name: Flour Daniel Fernald
GCL, Bentomat ST (Roll #527 Lot #200304LO) C#85367
QC'd By: CB QUEJA

Figure #1
Normal Stress/ Interface Stress

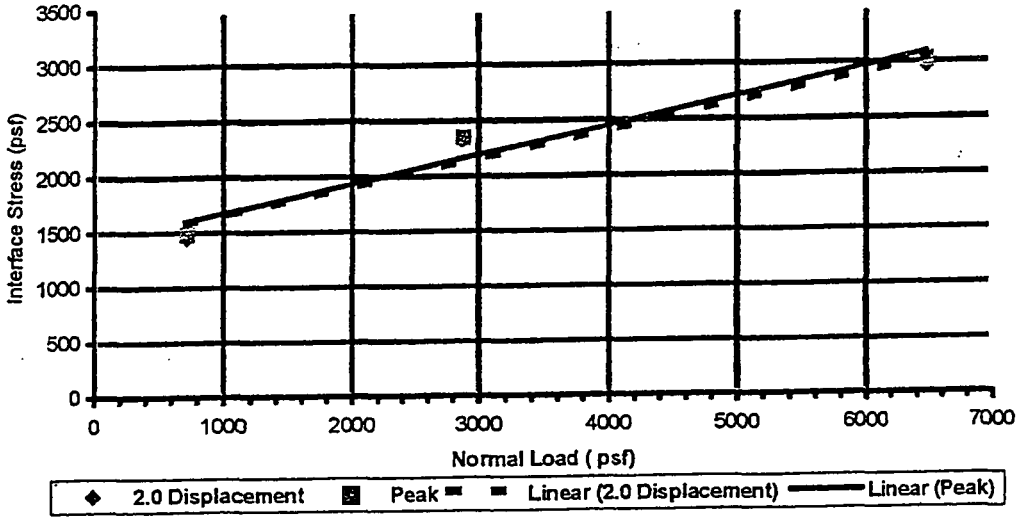

Figure #2
Shear Stress/ Displacement Curve

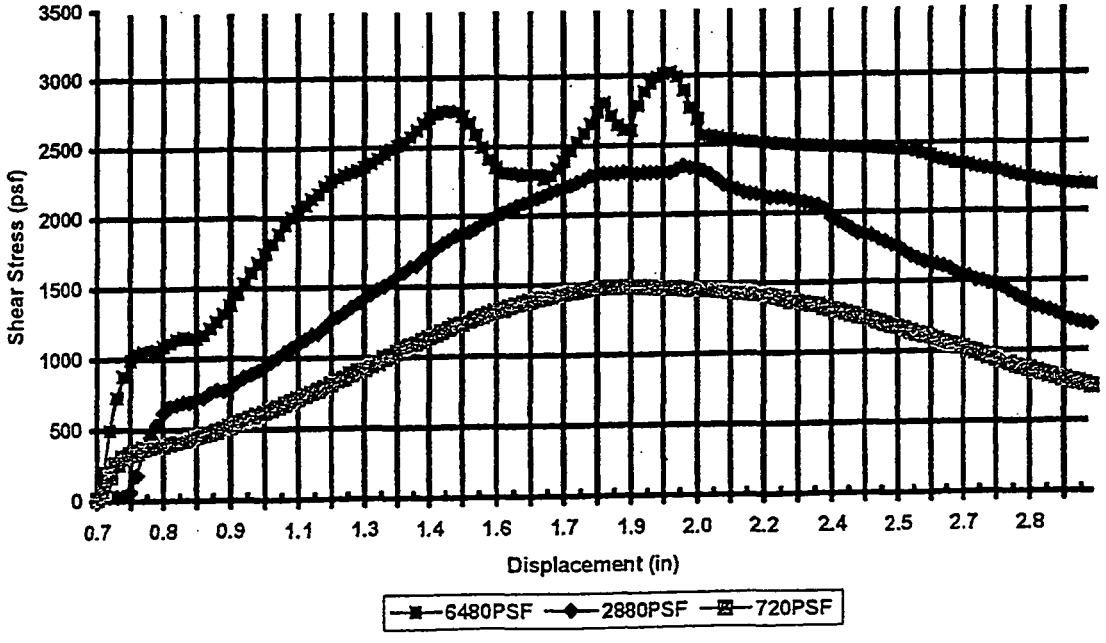

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TABLE 3A
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

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INTERFACE SHEAR TEST RESULT (ASTM D 5321)
PGL Job No. G030083A

QC'd by: CB
Date: 4/7/03

TEST CONFIGURATION # 3A

TOP BOX

GCL, Bentomat ST (R #527) C# 85367(Woven Side)

Textured HDPE (R#02103224) C#85388

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 14.50%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ normal load before shearing.
2. Normal loads were applied using Bladder

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 / ASTM D5321-92 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	173.91	427	31	392	29
20.00	2880	110.42	1198	23	1029	20
45.00	6480	73.58	2559	22	2539	21

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	148.3	51.571
COEFFICIENT OF FRICTION:	0.37	0.38
FRICTION ANGLE(degrees):	20.4	20.7

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

PGL Job Number: G030083A Config #: 3A
Project Name: Flour Daniel Fernald
GCL, Bentomat ST (R #527) C# 85367 (Woven Side) / Textured HDPE (R#02103224) C#85388
QC'd By: CB QUEJ A

Figure #1
Normal Stress/ Interface Stress

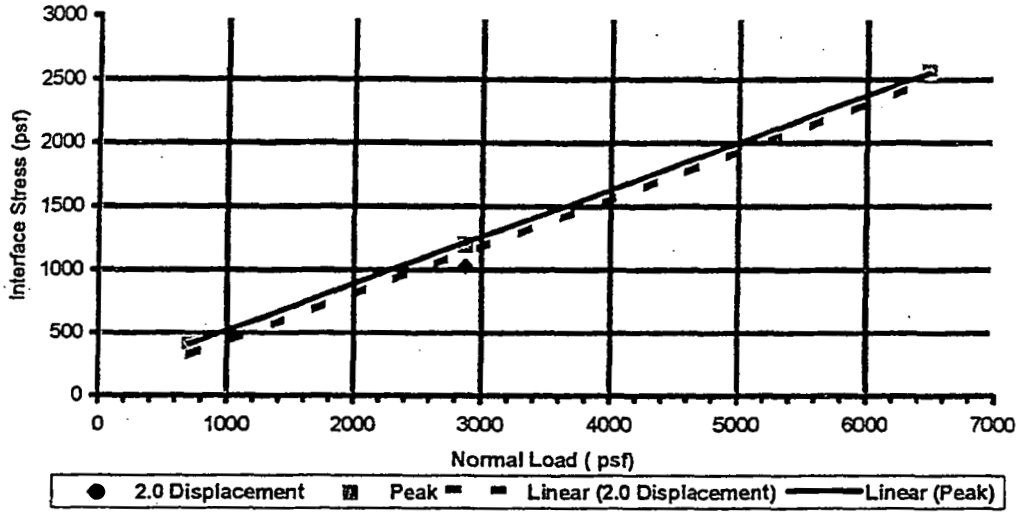


Figure #2
Shear Stress/ Displacement Curve

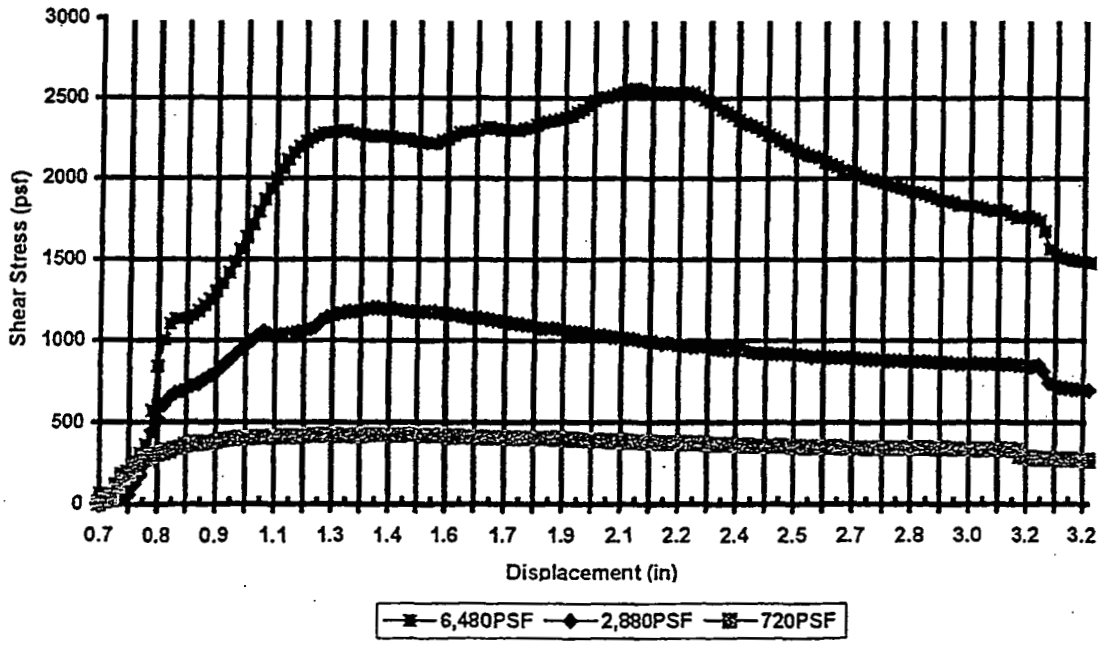


TABLE 4
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERNAL SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

QC'd by: CB ?QUEJ =A
Date: 4/3/03

TEST CONFIGURATION # 4

TOP BOX

GCL, Bentomat ST (Roll# 572 Lot #200305LO) / C#85384

← 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 16.24%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ normal load before shearing.
2. Normal loads were applied using Bladder

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 / ASTM D5321-92 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	112.59	1829	69	1746	68
20.00	2880	99.35	2739	44	2708	43
45.00	6480	86.9	3956	31	3011	25

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	1611	1796.9
COEFFICIENT OF FRICTION:	0.37	0.21
FRICTION ANGLE(degrees):	20.1	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

Precision Geosynthetic Laboratories

PGL Job Number: G030083 Config.# 4
Project Name: Flour Daniel Fernald
GCL, Bentomat ST (Roll# 572 Lot #200305LO) / C#85384
QC'd By: CB QUEJA

Figure #1
Normal Stress/ Interface Stress

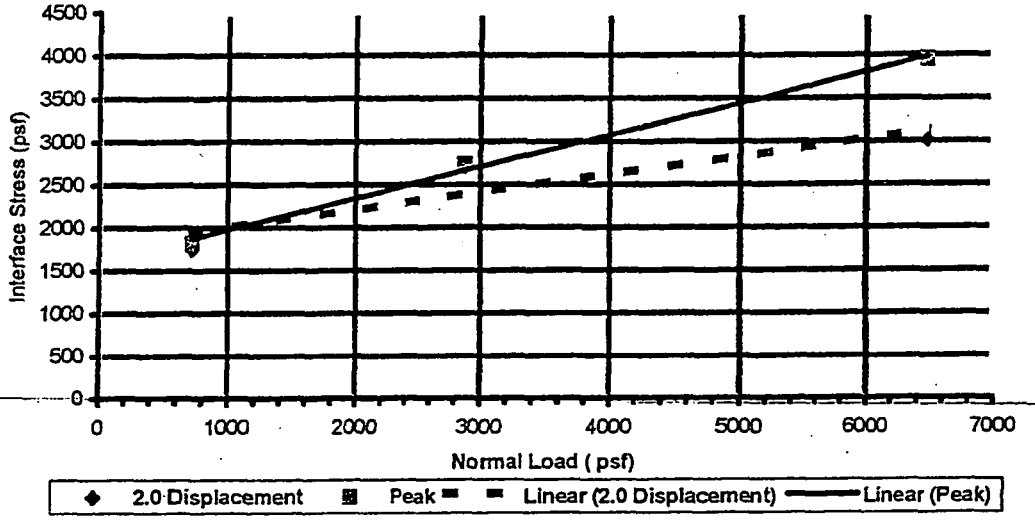
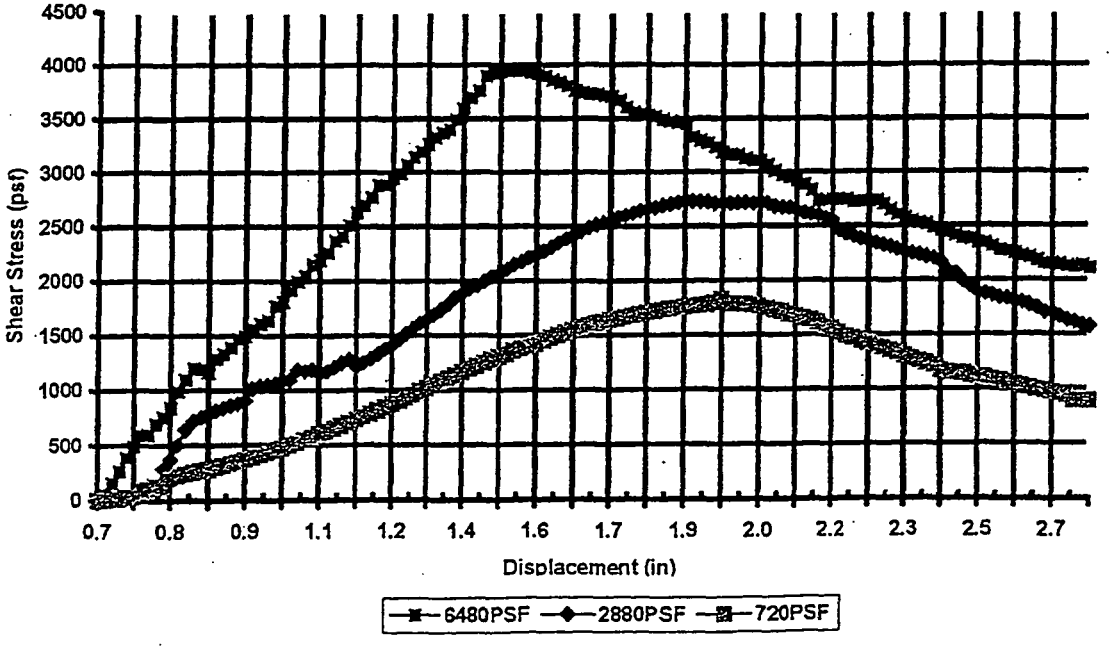


Figure #2
Shear Stress/ Displacement Curve



Precision Geosynthetic Laboratories

TABLE 4A
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 5321)
PGL Job No. G030083A

QC'd by: CB QUEJA
Date: 4/1/03

TEST CONFIGURATION # 4A

TOP BOX

GCL, Bentomat ST (R# 572) C#85384 (woven side)

80mil Textured HDPE R#102103237 C#85400 (High Textued Side)

BOTTOM BOX

TEST CONDITIONS:

SAMPLE PREPARATION:

1. Specimen were cut along machine direction to 14" x 18".
   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 14.12%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ normal load before shearing.
2. Normal loads were applied using Bladder

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 / ASTM D5321-92
   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 SECANT ANGLE (degrees)
5.00	720	111.52	586	39	521	36
20.00	2880	98.98	1838	33	1497	27
45.00	6480	87.62	2598	22	1898	16

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	547.7	545.86
COEFFICIENT OF FRICTION:	0.34	0.23
FRICTION ANGLE(degrees):	18.5	12.7

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

Precision Geosynthetic Laboratories

PGL Job Number: G030083A Config #: 4A
Project Name: Flour Daniel Fernald
GCL, Bentomat ST (R# 572) C#85384 / Textured HDPE R#102103237 C#85400 CB QUEJA
QC'd By: _____

Figure #1
Normal Stress/ Interface Stress

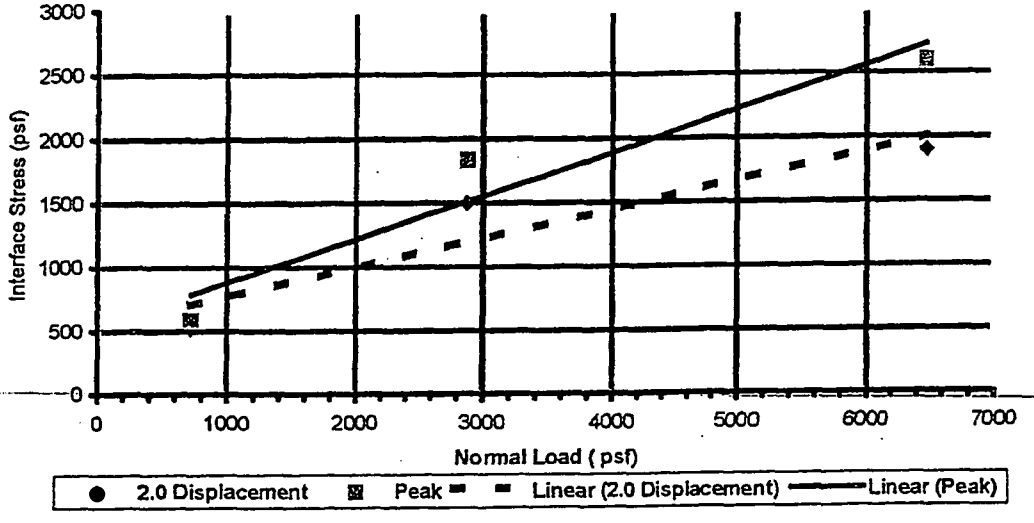
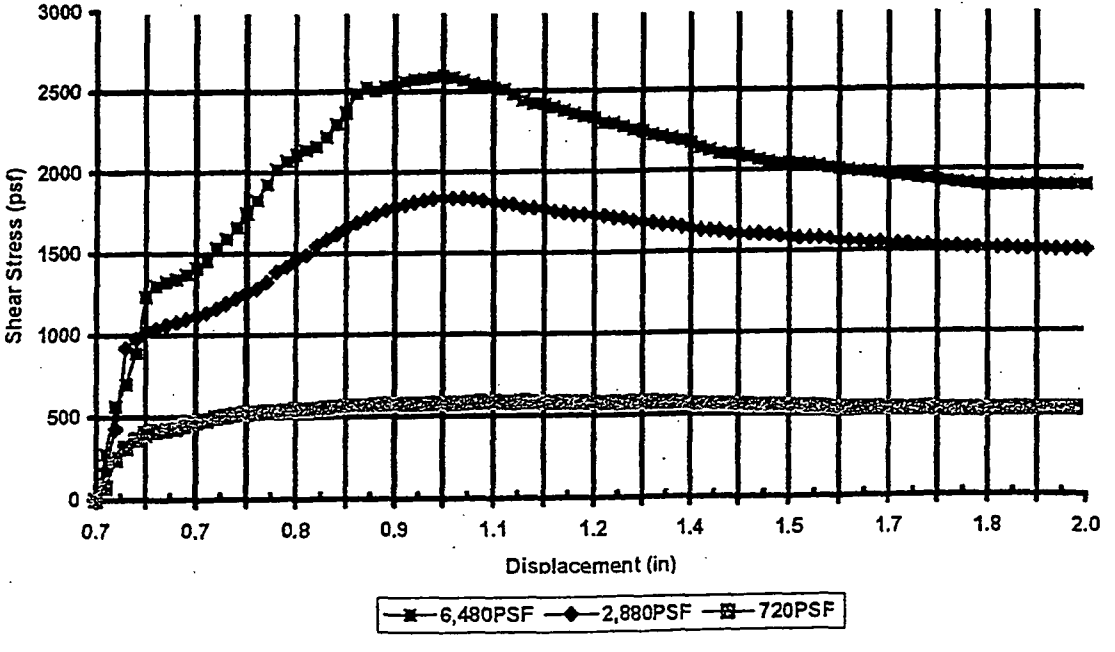


Figure #2
Shear Stress/ Displacement Curve



Precision Geosynthetic Laboratories

TABLE 5
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERNAL SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

CB
QUEJ
QC'd by: A
Date: 4/1/03

TEST CONFIGURATION # 5

TOP BOX

GCL, Bentomat ST (R#617 L#200305LO) / C#85385

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 13.59%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ normal load before shearing.
2. Normal loads were applied using Bladder

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 / ASTM D5321-92 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	110.23	1345	62	510	35
20.00	2880	95.68	2764	44	1342	25
45.00	6480	87.69	3521	29	1501	13

COHESION (psf):	1331	583.43
COEFFICIENT OF FRICTION:	0.36	0.16
FRICTION ANGLE(degrees):	19.8	9.0

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

Precision Geosynthetic Laboratories

PGL Job Number: G030083 Config.# 5
Project Name: Flour Daniel Fernald
GCL, Bentomat ST (R# 617 L# 200305LO) / C#85385
QC'd By: CB ? QUEJA

Figure #1
Normal Stress/ Interface Stress

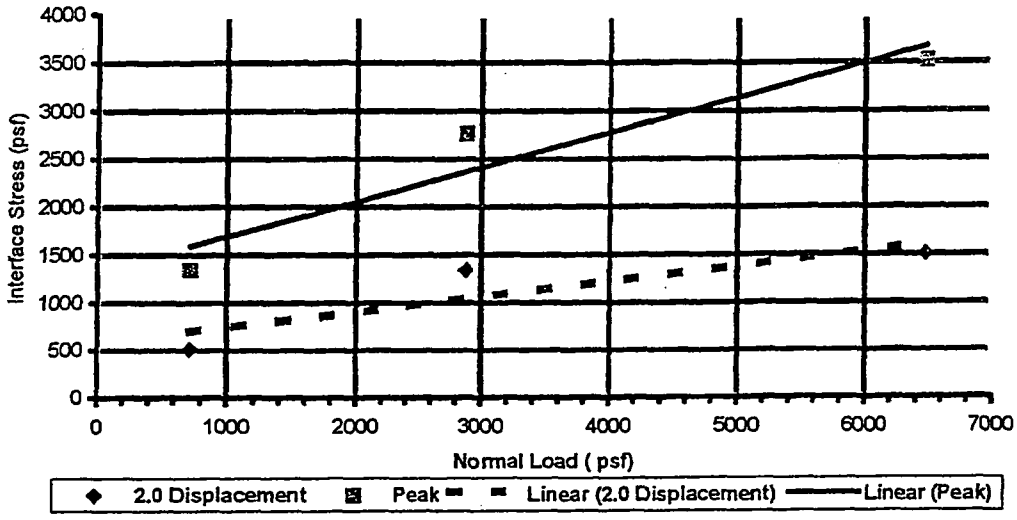
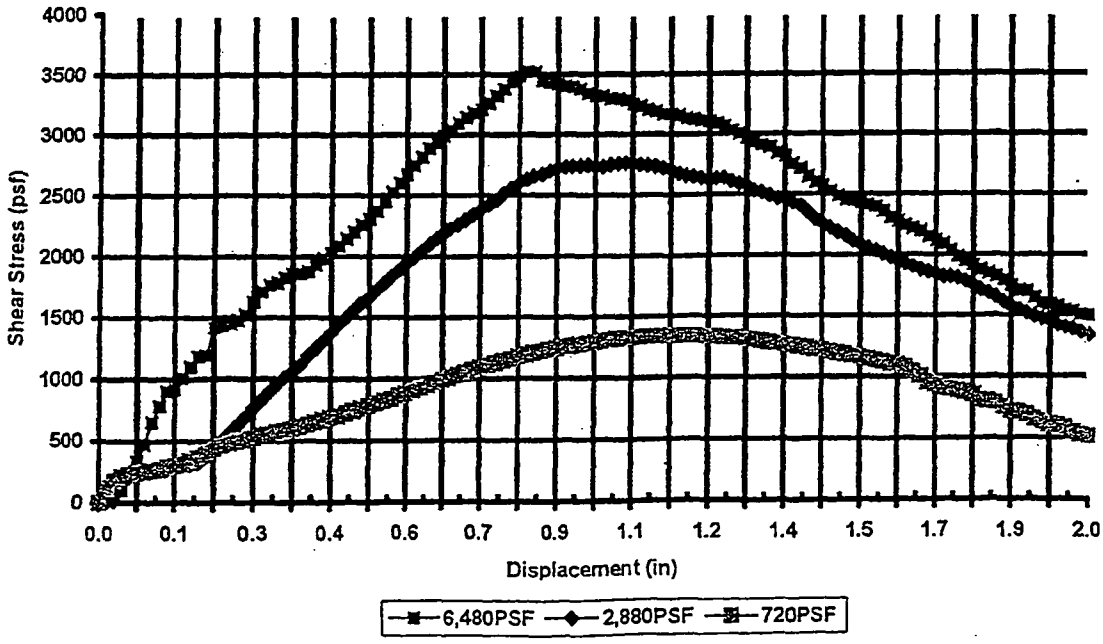


Figure #2
Shear Stress/ Displacement Curve



Precision Geosynthetic Laboratories

TABLE 5A
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

QC'd by: CB QUEJA
Date: 4/1/03

TEST CONFIGURATION # 5A

TOP BOX

GCL, Bentomat ST R#617 (woven side) / C#85385

Textured HDPE (R#102103259) / C#85444

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 13.42%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ 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 / ASTM D5321-92 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	111.24	498	35	406	29
20.00	2880	98.45	1330	25	909	18
45.00	6480	87.62	2214	19	1425	12

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	364.3	330.43
COEFFICIENT OF FRICTION:	0.29	0.17
FRICTION ANGLE(degrees):	16.3	9.8

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

Precision Geosynthetic Laboratories

PGL Job Number: G030083 Config.# 5A
Project Name: Flour Daniel Fernald
GCL, Bentomat ST R#617 (Woven Side) / C#85385 / Textured HDPE (R#102103259) C#85444
QC'd By: CB QUE JA

Figure #1
Normal Stress/ Interface Stress

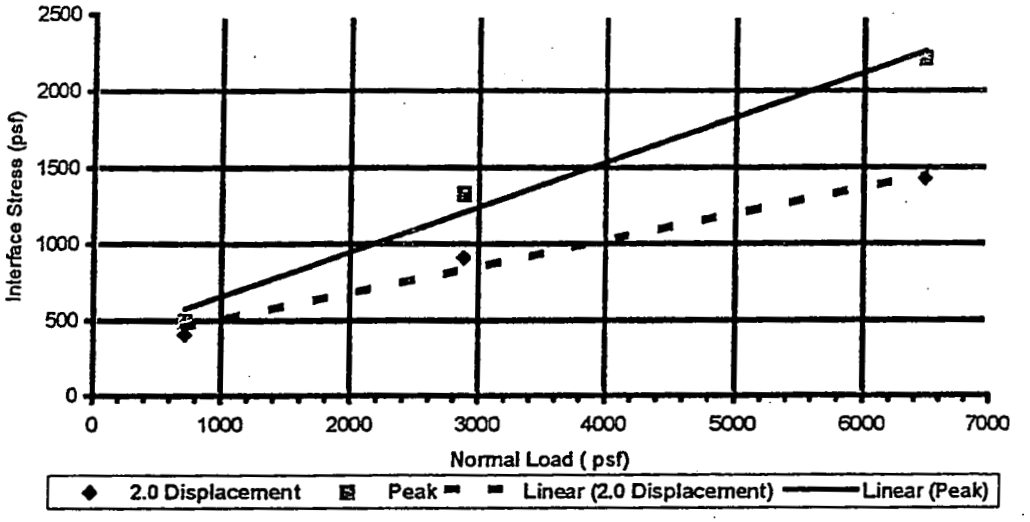
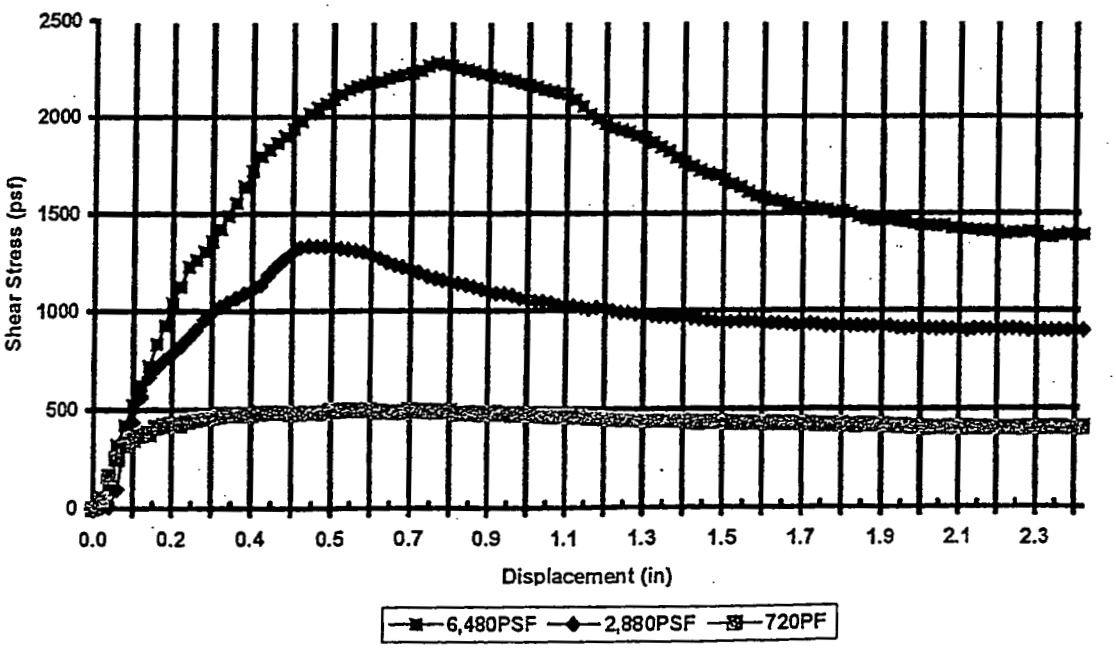


Figure #2
Shear Stress/ Displacement Curve



Precision Geosynthetic Laboratories

TABLE 6
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERNAL SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

QC'd by: CB ?QUEJA
Date: 4/2/03

TEST CONFIGURATION # 6

TOP BOX

GCL, Bentomat ST (R#662 L#200305LO) / C#85393

← 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 14.59%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ normal load before shearing.
2. Normal loads were applied using Bladder

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 / ASTM D5321-92 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	102.45	2399	73	1490	64
20.00	2880	86.78	3109	47	1915	34
45.00	6480	85.6	4218	33	2414	20

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	2184	1408.1
COEFFICIENT OF FRICTION:	0.32	0.16
FRICTION ANGLE(degrees):	17.5	9.0

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

Precision Geosynthetic Laboratories

PGL Job Number: G030083 Config.# 6
Project Name: Flour Daniel Fernald
GCL, Bentomat ST (R# 662 L# 200305LO) / C#85393
QC'd By: CB QUEJ A

Figure #1
Normal Stress/ Interface Stress

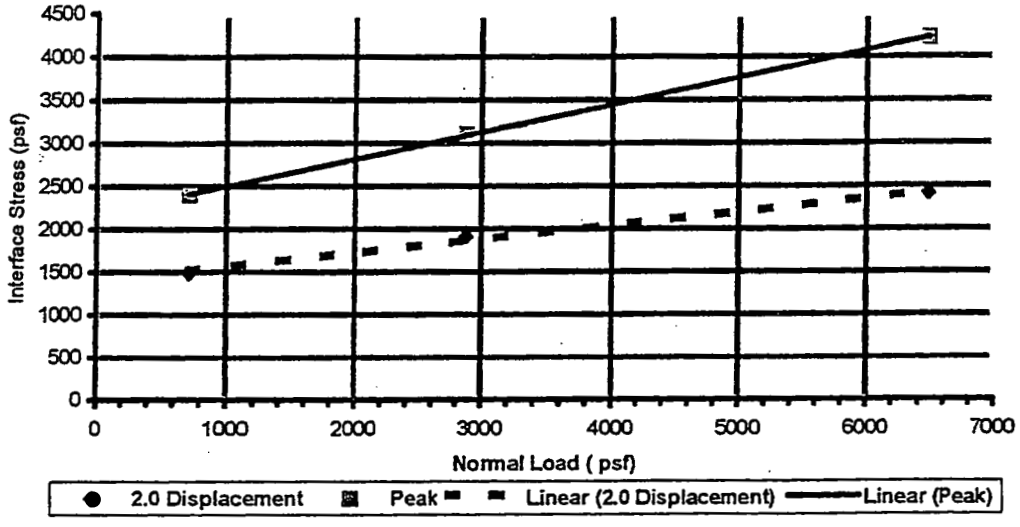
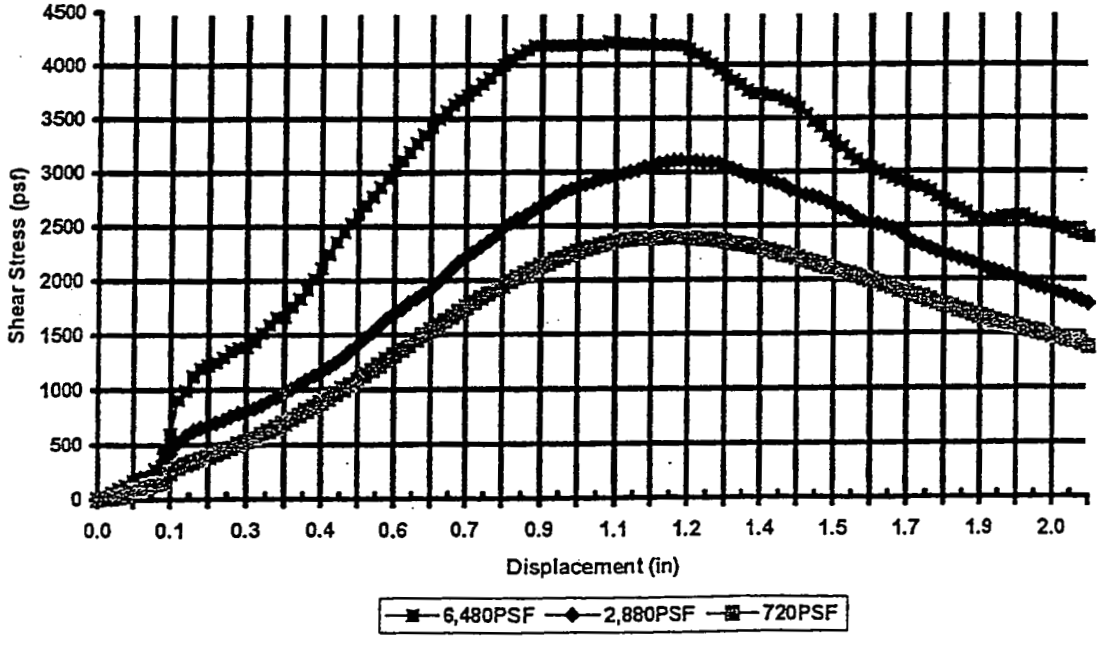


Figure #2
Shear Stress/ Displacement Curve



Precision Geosynthetic Laboratories

TABLE 6A
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

QC'd by: CB QUEJA
Date: 4/2/03

TEST CONFIGURATION # 6A

TOP BOX

GCL, Bentomat ST R#662 (woven side) / C#85393

Textured HDPE (R#102103270) / C#85445

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 12.89%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ 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 / ASTM D5321-92 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	105.75	433	31	297	22
20.00	2880	95.62	1132	21	966	19
45.00	6480	86.42	2389	20	1655	14

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	173.7	195.71
COEFFICIENT OF FRICTION:	0.34	0.23
FRICTION ANGLE(degrees):	18.8	13.0

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

Precision Geosynthetic Laboratories

PGL Job Number: G030083 Config.# 6A
Project Name: Flour Daniel Fernald
GCL, Bentomat ST R#662 (Woven Side) / C#85393 / Textured HDPE (R#102103270) C#85445
QC'd By: _____

Figure #1
Normal Stress/ Interface Stress

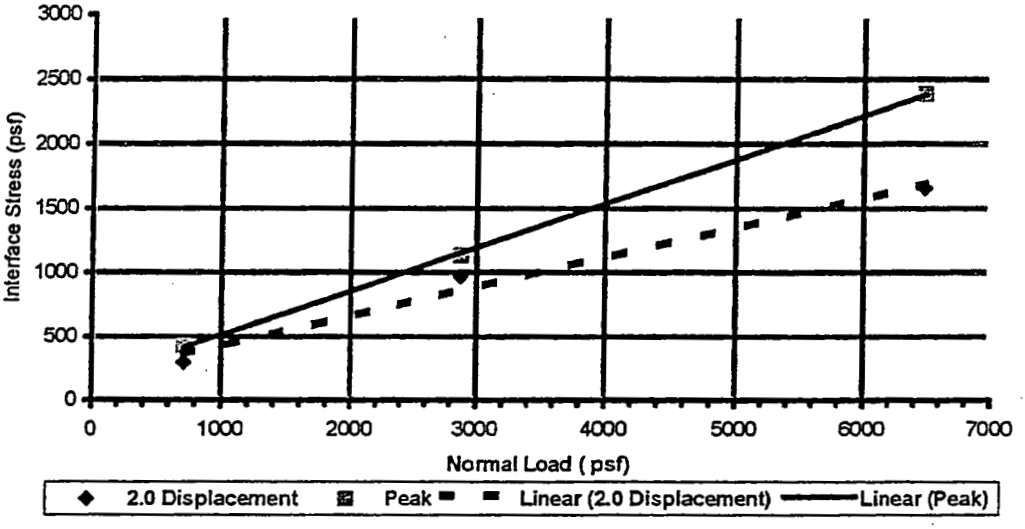
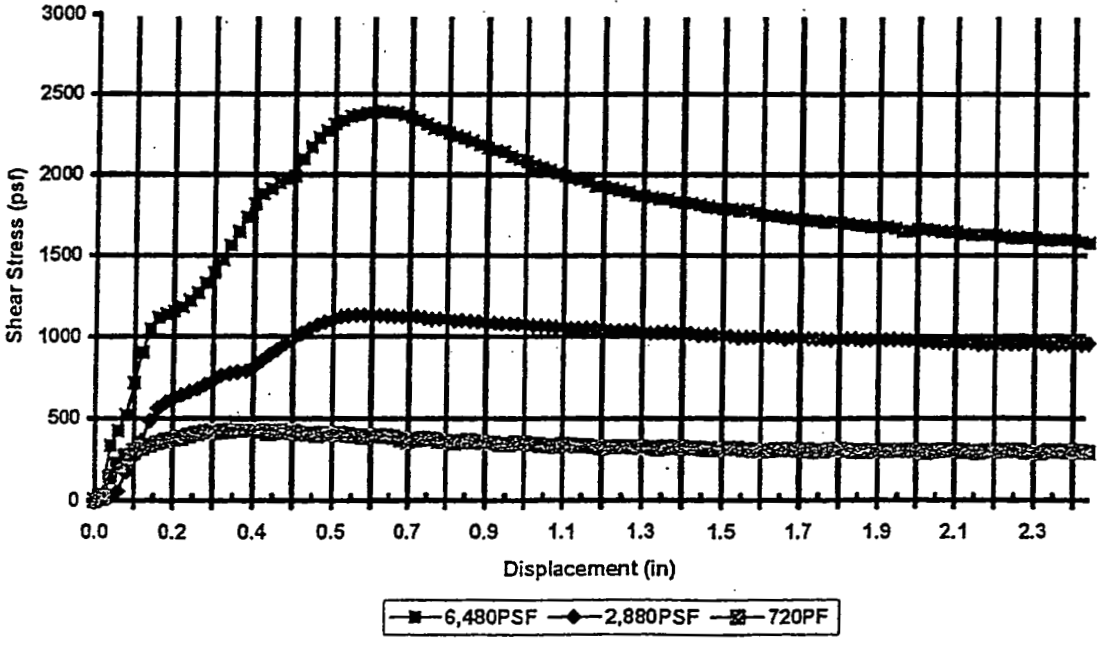


Figure #2
Shear Stress/ Displacement Curve



Precision Geosynthetic Laboratories

TABLE 7
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERNAL SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

QC'd by: _____
Date: 3/18/03

TEST CONFIGURATION # 7

TOP BOX

GCL, Bentomat ST (R# 707 Lot #200305LO) / C#85397

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 17.80%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ 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 / ASTM D5321-92 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	145.72	1495	64	1430	63
20.00	2880	93.98	2647	43	1962	34
45.00	6480	70.39	4090	32	2230	19

COHESION (psf):	1247	1429.4
COEFFICIENT OF FRICTION:	0.45	0.13
FRICTION ANGLE(degrees):	24.0	7.5

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

Precision Geosynthetic Laboratories

PGL Job Number: G030083 Config.# 7
Project Name: Flour Daniel Fernald
GCL, Bentomat ST (R# 707 Lot #200305LO) / C#85397
QC'd By:

Figure #1
Normal Stress/ Interface Stress

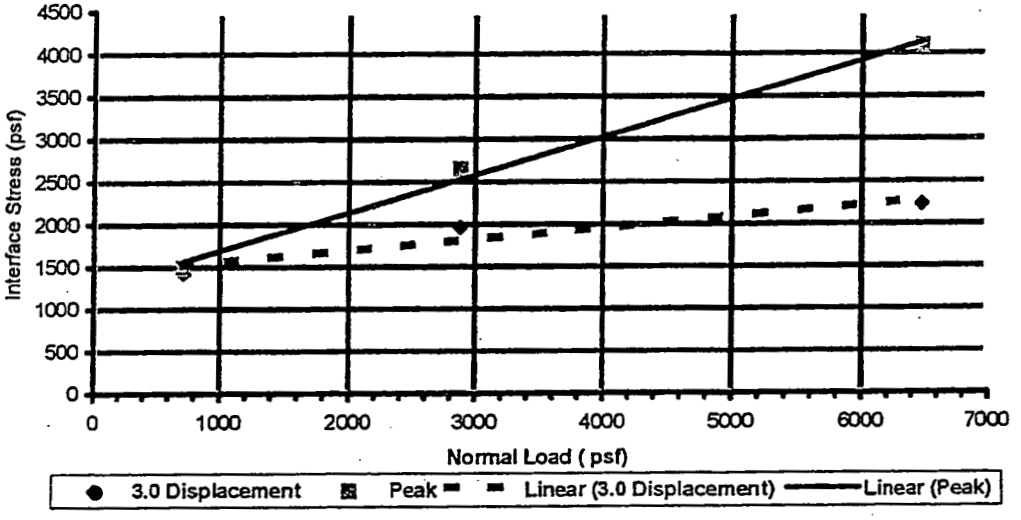


Figure #2
Shear Stress/ Displacement Curve

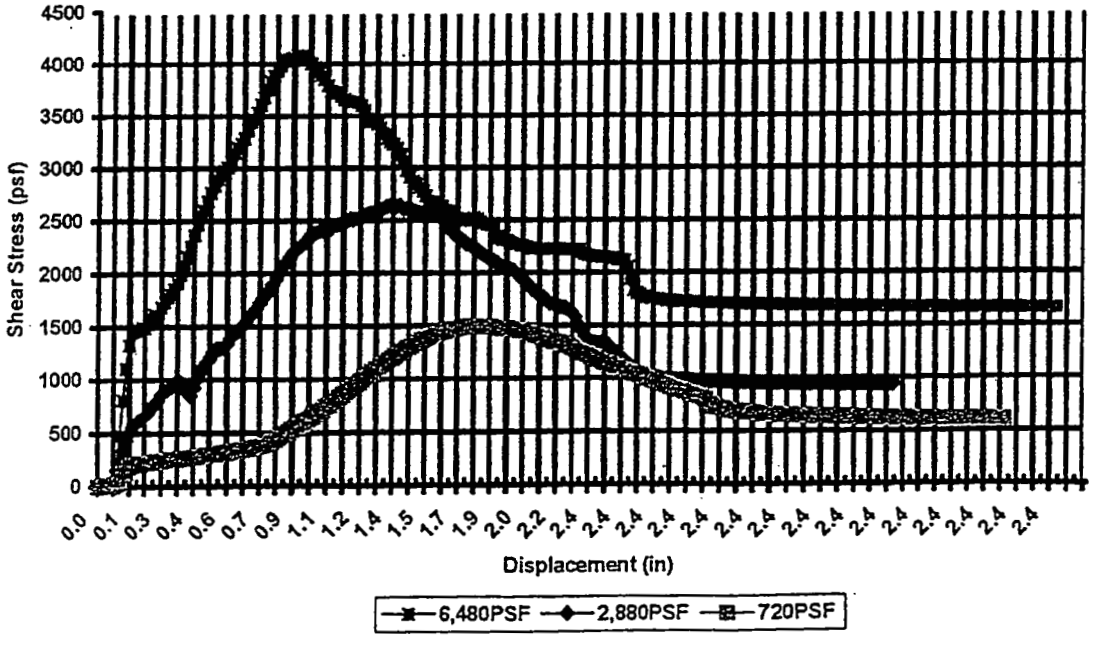


TABLE 7A
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083A

QC'd by: CB ? QUEJ =A
Date: 4/1/03

TEST CONFIGURATION # 7A

TOP BOX

GCL, Bentomat ST R#707 (Woven Side) C#85397

80mil Textured HDPE R#102103282 C#85446

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 14.79%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ normal load before shearing.
2. Normal loads were applied using Bladder

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 / ASTM D5321-92 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	108.95	316	24	279	21
20.00	2880	95.48	1135	22	870	17
45.00	6480	88.45	2109	18	1611	14

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	154.7	151.71
COEFFICIENT OF FRICTION:	0.31	0.23
FRICTION ANGLE(degrees):	17.1	12.9

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

Precision Geosynthetic Laboratories

PGL Job Number: G030083A Config. # 7A
Project Name: Flour Daniel Fernald
GCL, Bentomat ST R#707 (Woven Side) C#85397 / 80mil Textured HDPE R#102103282 C#85446
QC'd By: _____

Figure #1
Normal Stress/ Interface Stress

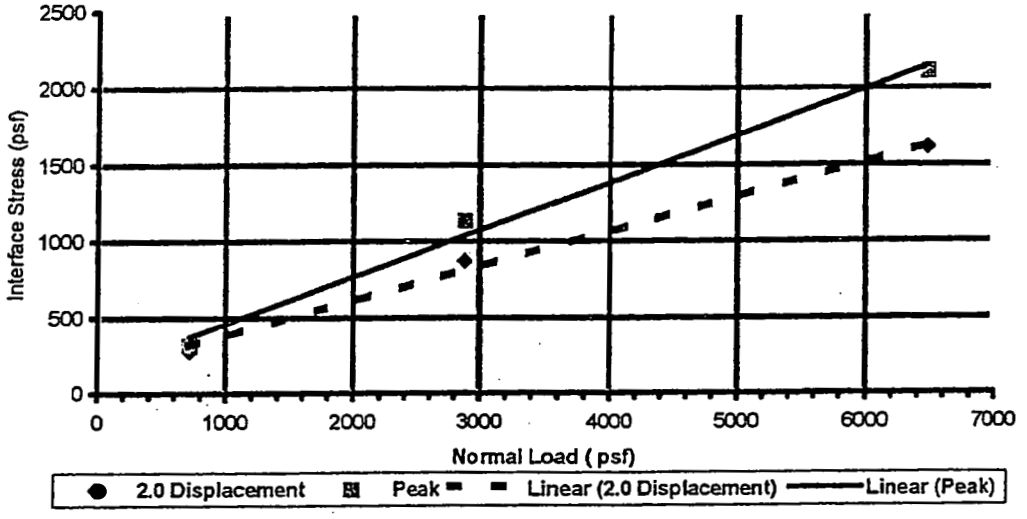
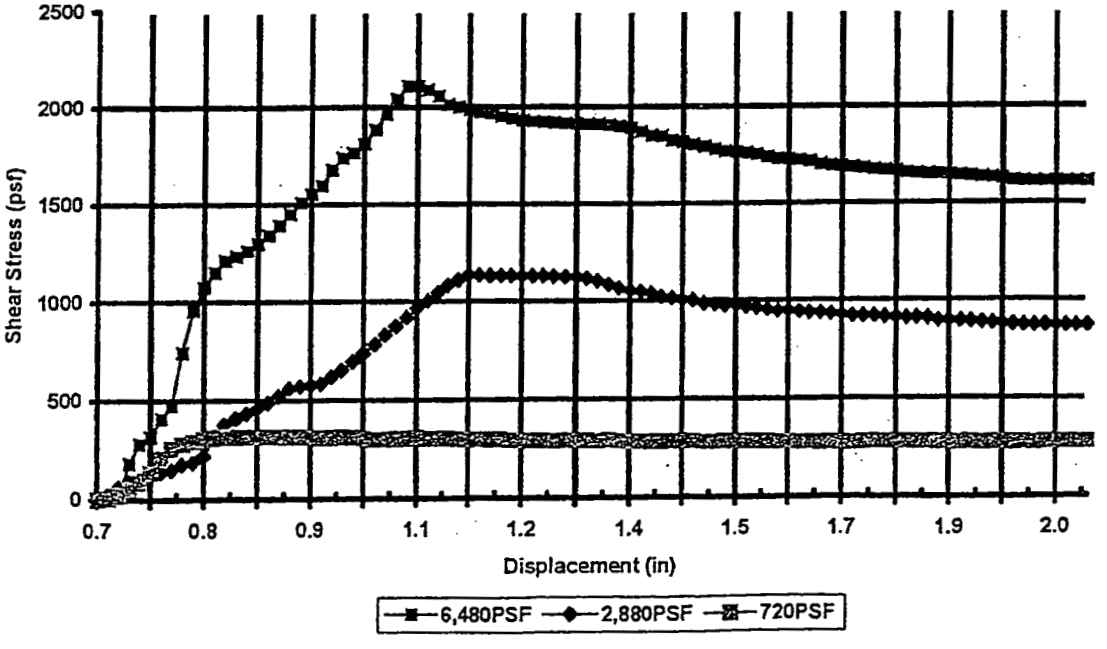


Figure #2
Shear Stress/ Displacement Curve



Precision Geosynthetic Laboratories

TABLE 8
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERNAL SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

QC'd by: _____
Date: 3/18/03

TEST CONFIGURATION # 8

TOP BOX

GCL, Bentomat ST (R#751 L#200305LO) / C#85408

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 17.10%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ 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 / ASTM D5321-92 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	150.88	2018	70	1337	62
20.00	2880	127.31	2731	43	1708	31
45.00	6480	102.82	3803	30	1970	17

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	1814	1315.1
COEFFICIENT OF FRICTION:	0.31	0.11
FRICTION ANGLE(degrees):	17.2	6.1

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

Precision Geosynthetic Laboratories

PGL Job Number: G030083 Config.# 8
Project Name: Flour Daniel Fernald
GCL, Bentomat ST (R#751, L#200305LO) / C#85408
QC'd By: _____

Figure #1
Normal Stress/ Interface Stress

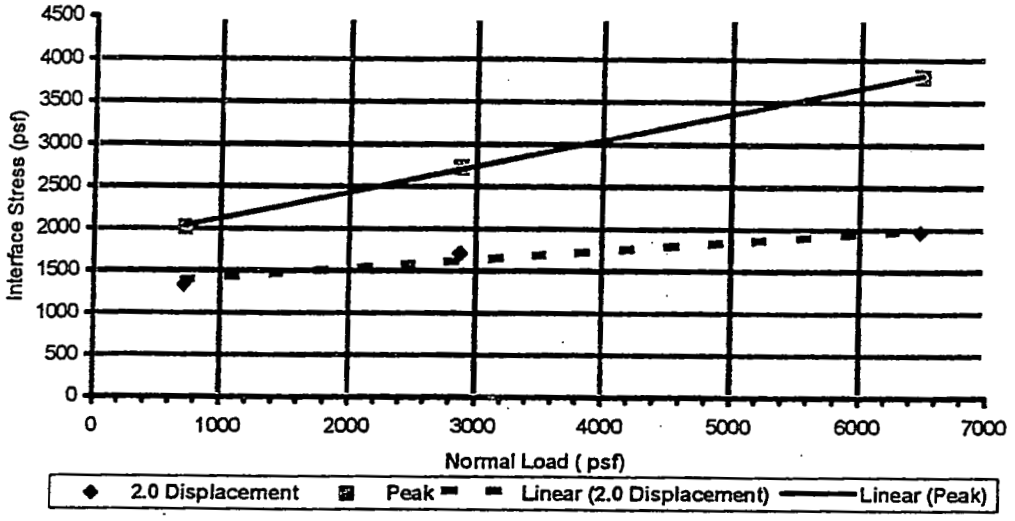
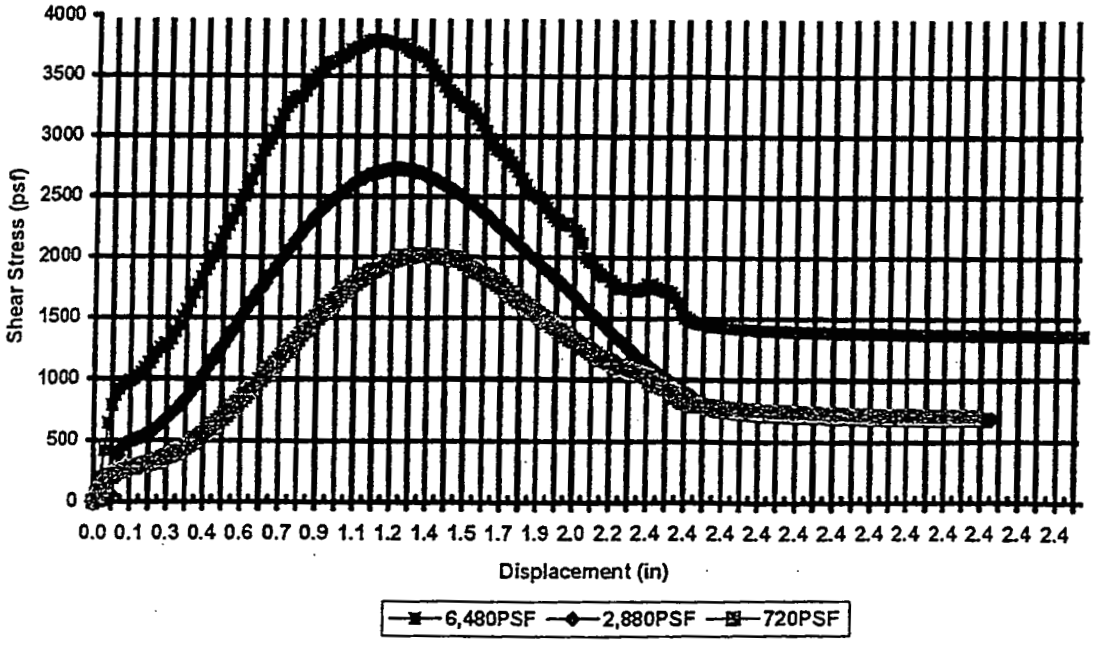


Figure #2
Shear Stress/ Displacement Curve



Precision Geosynthetic Laboratories

TABLE 8A
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 5321)
PGL Job No. G030083A

QC'd by: _____
Date: 3/22/03

TEST CONFIGURATION # 8A

TOP BOX

GCL, Bentomat ST R#751 (Woven Side) C# 85408

80mil Textured HDPE (R#102103297) C#85447

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 17.0%.

HYDRATION:
1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:
1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ normal load before shearing.
2. Normal loads were applied using Bladder

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 / ASTM D5321-92 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	113.32	410	30	344	26
20.00	2880	105.73	999	19	852	16
45.00	6480	92.73	2253	19	1424	12

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	135.9	253.14
COEFFICIENT OF FRICTION:	0.32	0.18
FRICTION ANGLE(degrees):	17.9	10.5

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

Precision Geosynthetic Laboratories

PGL Job Number: G030083A Config #: 8A
Project Name: Flour Daniel Fernald
GCL, Bentomat ST R#751 (Woven Side) C# 85408 / 80mil Textured HDPE (R#102103297) C#85447
QC'd By: _____

Figure #1
Normal Stress/ Interface Stress

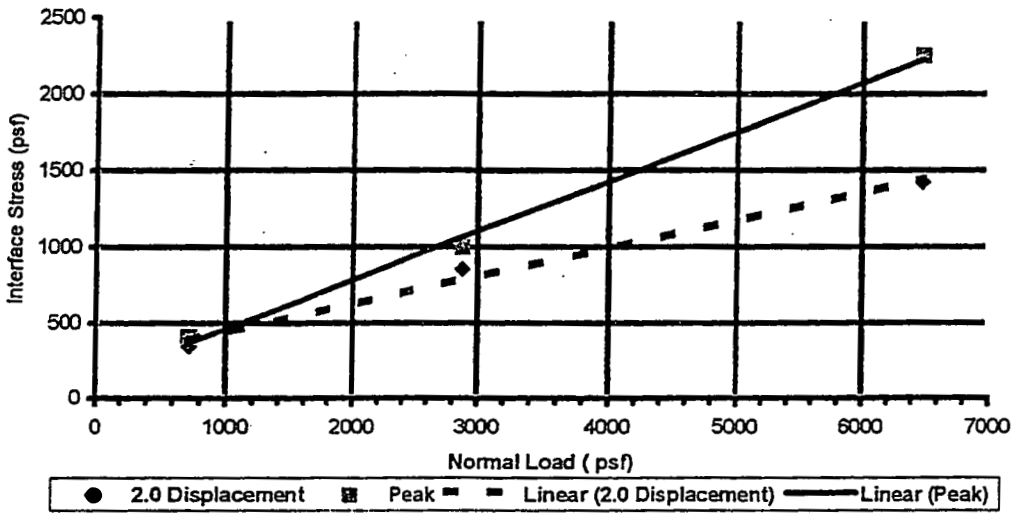
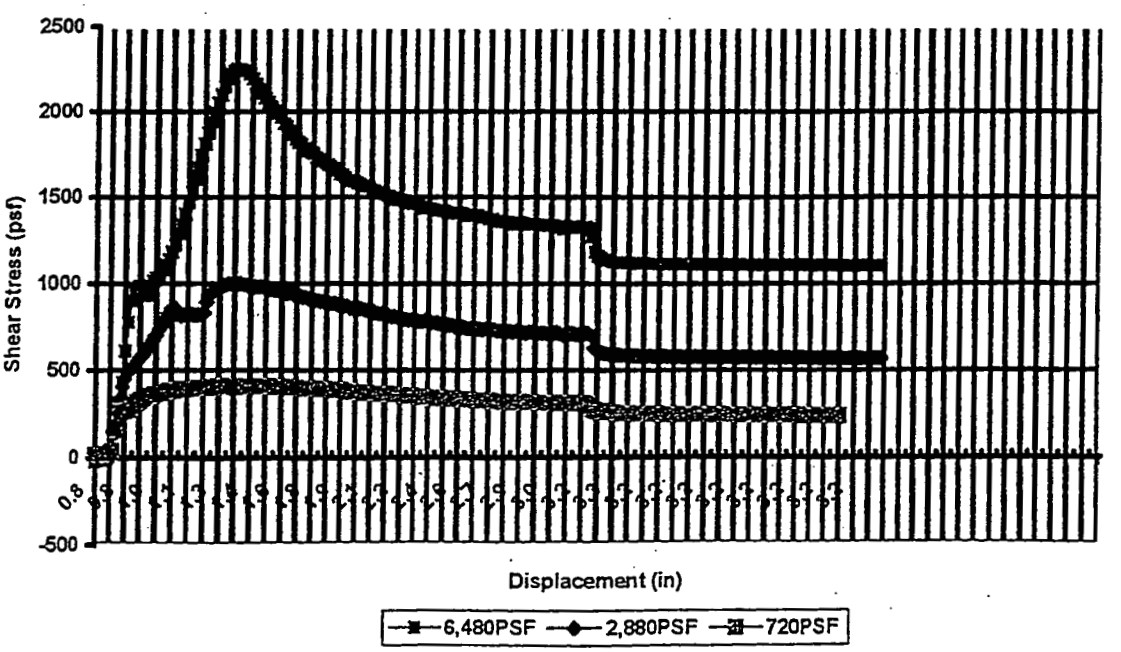


Figure #2
Shear Stress/ Displacement Curve



Precision Geosynthetic Laboratories

TABLE 9
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERNAL SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

QC'd by: CB QUEJA
Date: 4/3/03

TEST CONFIGURATION # 9

TOP BOX

GCL, Bentomat ST (R#795 L#200305LO) / C#85409

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 17.80%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ normal load before shearing.
2. Normal loads were applied using Bladder

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 / ASTM D5321-92 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	145.72	1486	64	1438	63
20.00	2880	93.98	2639	42	1979	34
45.00	6480	70.39	4116	32	2006	17

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	1229	1507.6
COEFFICIENT OF FRICTION:	0.45	0.09
FRICTION ANGLE(degrees):	24.3	5.1

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

Precision Geosynthetic Laboratories

PGL Job Number: G030083 Config.# 9
Project Name: Flour Daniel Fernald
GCL, Bentomat ST (R# 795 L# 200305LO) / C#85409
QC'd By: CB ? QUEJA

Figure #1
Normal Stress/ Interface Stress

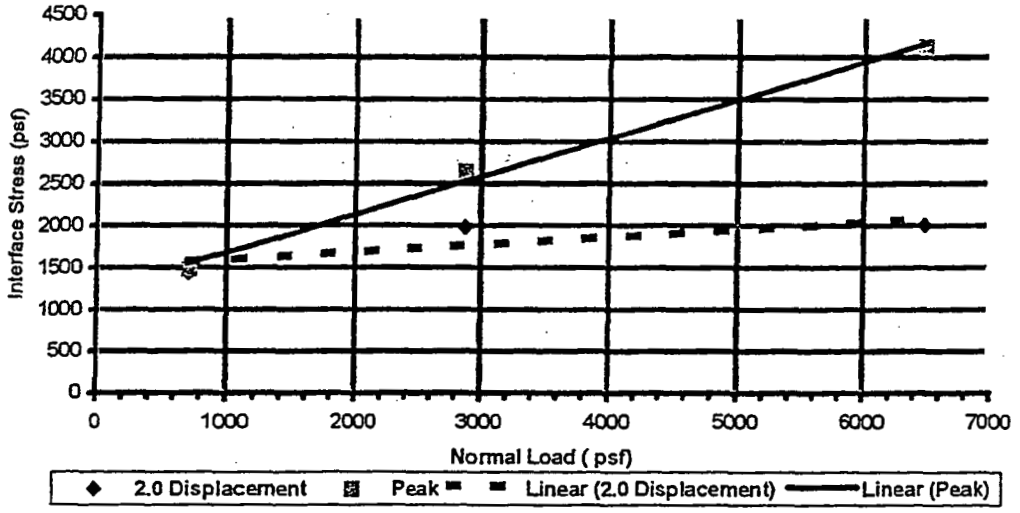
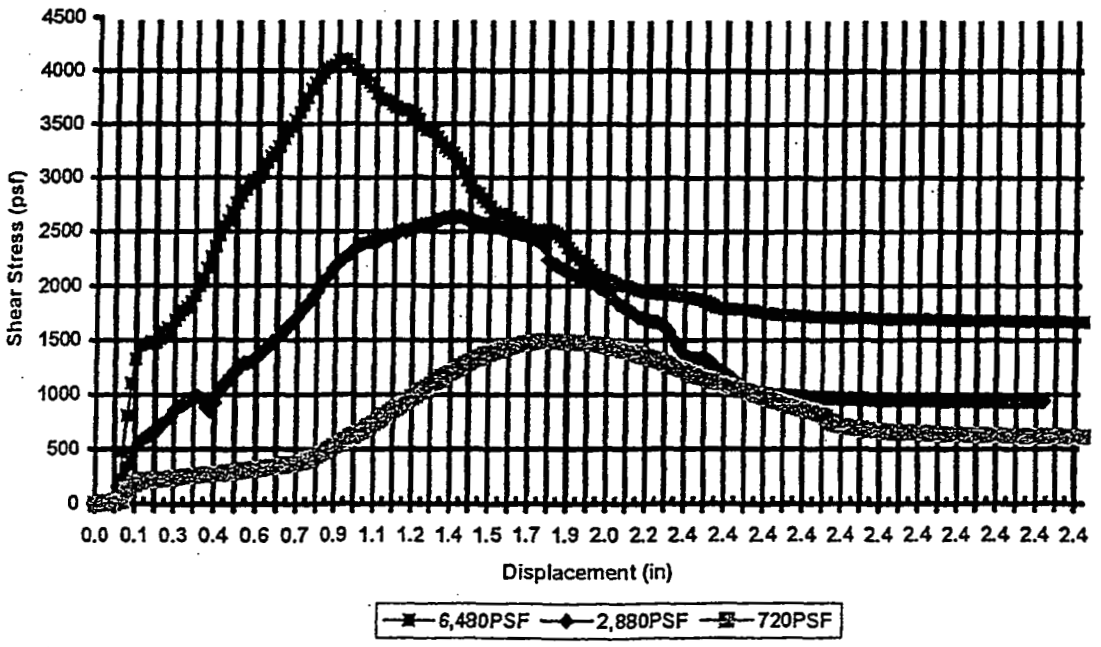


Figure #2
Shear Stress/ Displacement Curve



Precision Geosynthetic Laboratories

TABLE 9A
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

QC'd by: CB QUEJ A
Date: 4/3/03

TEST CONFIGURATION # 9A

TOP BOX

GCL, Bentomat ST R#795 (woven side) / C#85409

Textured HDPE (R#102103311) / C#85458

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 18.40%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ normal load before shearing.

SHEAR TEST:

1. Shear test was conducted @ 0.004 in/ min.
2. Sheared @ minimum 3.2 inch horizontal displacement.
3. The test specimens were sheared in Drained condition
4. Test were performed in general accordance with ASTM D6243-98 / ASTM D5321-92 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)	3.2 " DISPLACEMENT STRENGTH SHEAR STRESS (psf)	3.2 " DISPLACEMENT SECANT ANGLE (degrees)
5.00	720	144.61	391	29	288	22
20.00	2880	104.9	1489	27	712	14
45.00	6480	68.56	2996	25	1468	13

	PEAK STRENGTH	3.2 " DISPLACEMENT STRENGTH
COHESION (psf):	117.3	132.57
COEFFICIENT OF FRICTION:	0.45	0.21
FRICTION ANGLE(degrees):	24.2	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

Precision Geosynthetic Laboratories

PGL Job Number: G030083 Config.# 9A
Project Name: Flour Daniel Fernald
GCL, Bentomat ST R#795 (Woven Side) / C#85409 / Textured HDPE (R#102103311) C#85458
QC'd By: CB 7QUEJA

Figure #1
Normal Stress/ Interface Stress

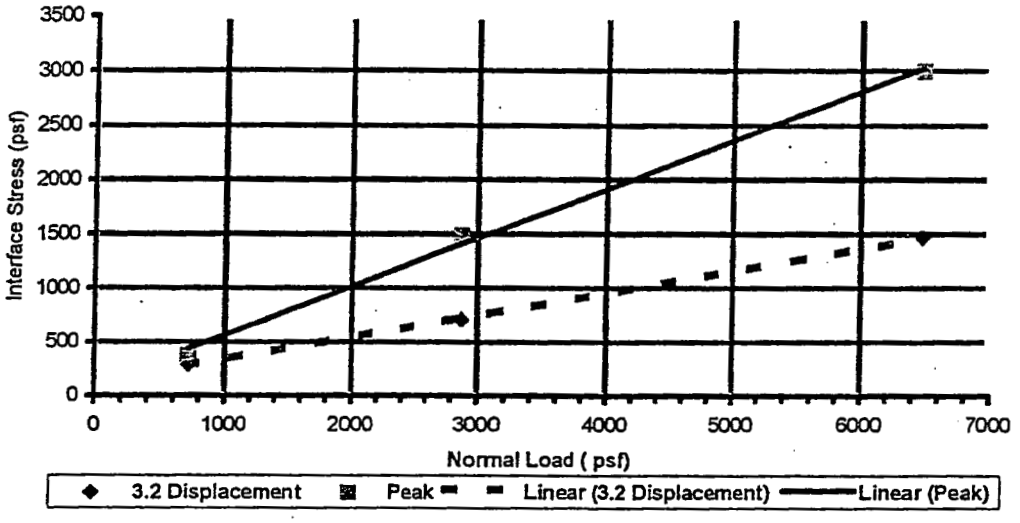
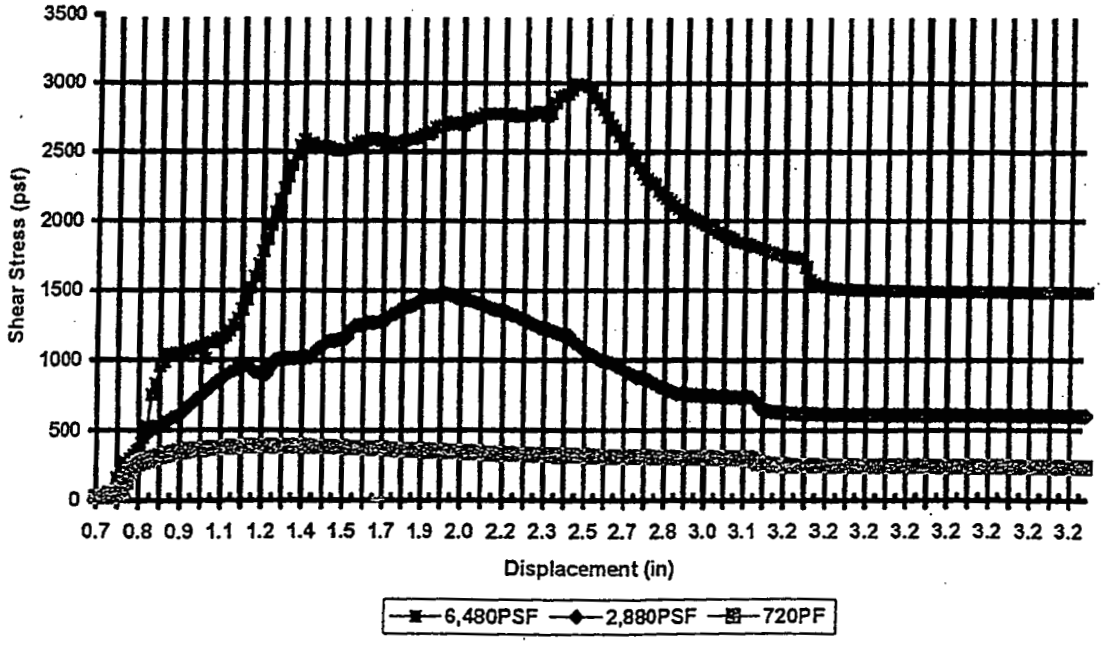


Figure #2
Shear Stress/ Displacement Curve



Precision Geosynthetic Laboratories

TABLE 10
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERNAL SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

QC'd by: CB QUEJA
Date: 4/3/03

TEST CONFIGURATION # 10

TOP BOX

GCL, Bentomat ST (R#839 L#200305LO) / C#85431

← 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 15.90%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ normal load before shearing.
2. Normal loads were applied using Bladder

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 / ASTM D5321-92 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	141.49	1646	66	1633	66
20.00	2880	106.15	2696	43	2691	43
45.00	6480	83.79	3979	32	3651	29

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	1429	1509.9
COEFFICIENT OF FRICTION:	0.40	0.34
FRICTION ANGLE(degrees):	21.8	18.9

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

Precision Geosynthetic Laboratories

PGL Job Number: G030083 Config.# 10
Project Name: Flour Daniel Fernald
GCL, Bentomat ST (R# 839 L# 200305LO) / C#85431
QC'd By: CB QUEJA

Figure #1
Normal Stress/ Interface Stress

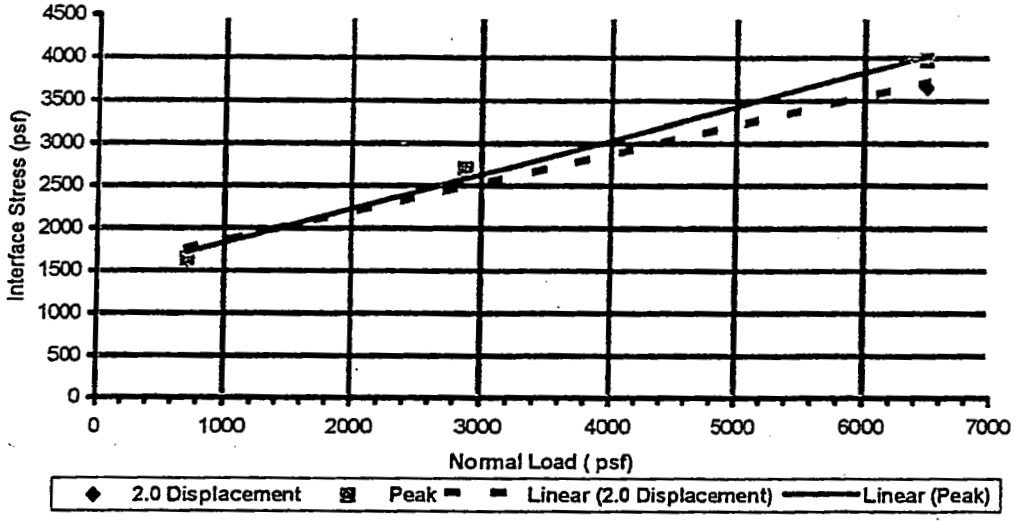
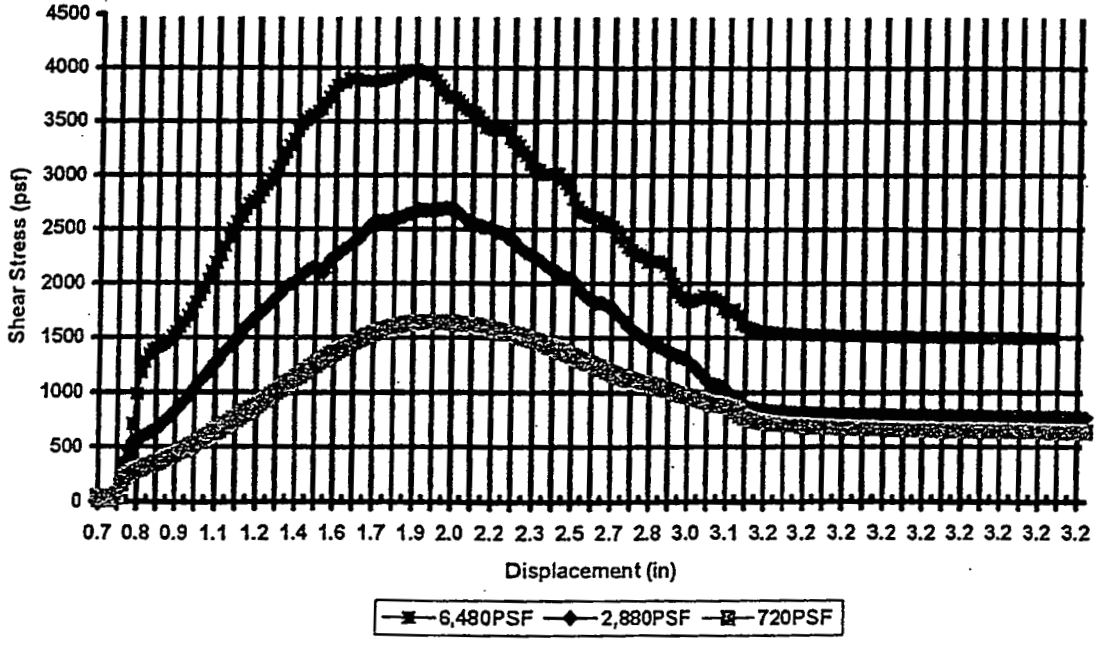


Figure #2
Shear Stress/ Displacement Curve



Precision Geosynthetic Laboratories

TABLE 10A
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083A

QC'd by: CB QUEJ
Date: 4/3/03

TEST CONFIGURATION # 10A

TOP BOX
GCL, Bentomat ST R#839 (woven side) / C#85431
Textured HDPE (R#102103319) / C#85481
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 15.90%.

HYDRATION:
1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:
1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ 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 / ASTM D5321-92 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	152	421	30	371	27
20.00	2880	99.8	879	17	742	14
45.00	6480	86.27	2189	19	1734	15

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	112.1	140.57
COEFFICIENT OF FRICTION:	0.31	0.24
FRICTION ANGLE(degrees):	17.4	13.5

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:
See Figure #1 and #2

Precision Geosynthetic Laboratories

PGL Job Number: G030083A Config.# 10A
Project Name: Flour Daniel Fernald
GCL, Bentomat ST R#839 (Woven Side) / C#85431 / Textured HDPE (R#102103319) C#85481
QC'd By: _____

Figure #1
Normal Stress/ Interface Stress

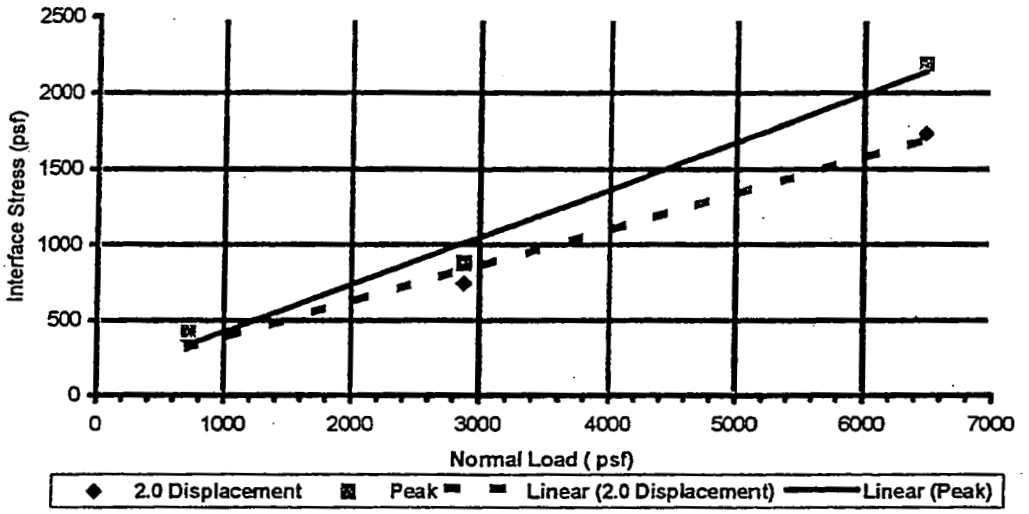
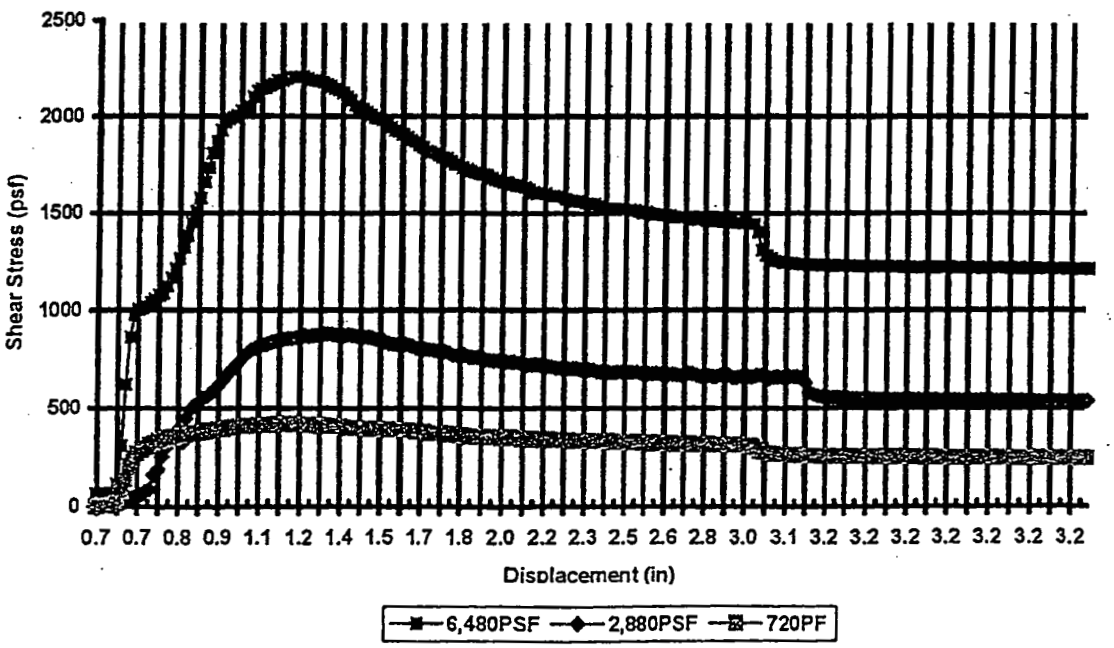


Figure #2
Shear Stress/ Displacement Curve



Precision Geosynthetic Laboratories

TABLE 11
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERNAL SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

QC'd by: _____
Date: 3/11/03

TEST CONFIGURATION # 11

TOP BOX

GCL, Bentomat ST (R#883 L#200305LO) / C#85432

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 15.70%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ normal load before shearing.
2. Normal loads were applied using Bladder

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 / ASTM D5321-92 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	126.76	1717	67	1423	63
20.00	2880	108.06	2276	38	1756	31
45.00	6480	90.36	3947	31	3042	25

	PEAK STRENGTH	2.0 " DISPLACEMENT STRENGTH
COHESION (psf):	1319	1103.1
COEFFICIENT OF FRICTION:	0.40	0.29
FRICTION ANGLE(degrees):	21.6	16.1

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

Precision Geosynthetic Laboratories

PGL Job Number: G030083 Config.# 11
Project Name: Flour Daniel Fernald
GCL, Bentomat ST (R# 883 L# 200305LO) / C#85432
QC'd By:

Figure #1
Normal Stress/ Interface Stress

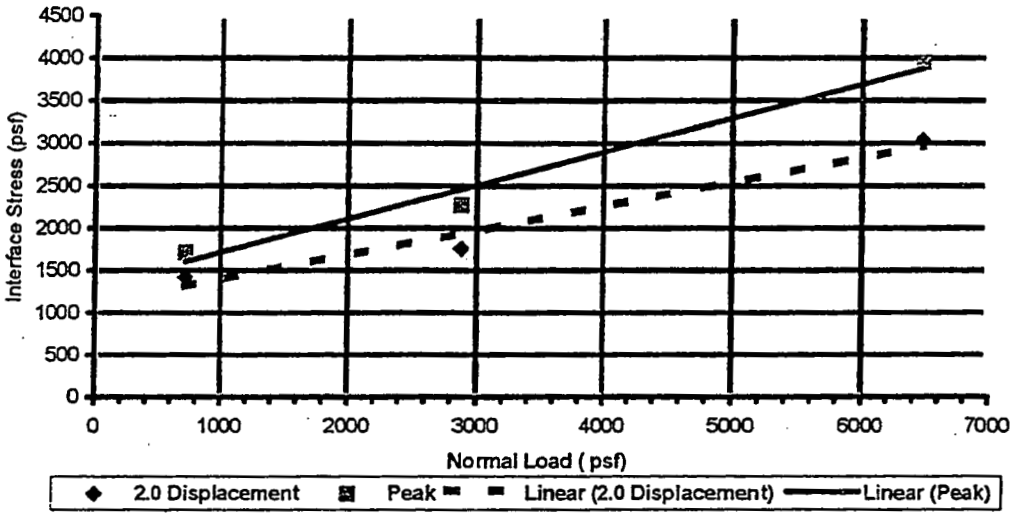
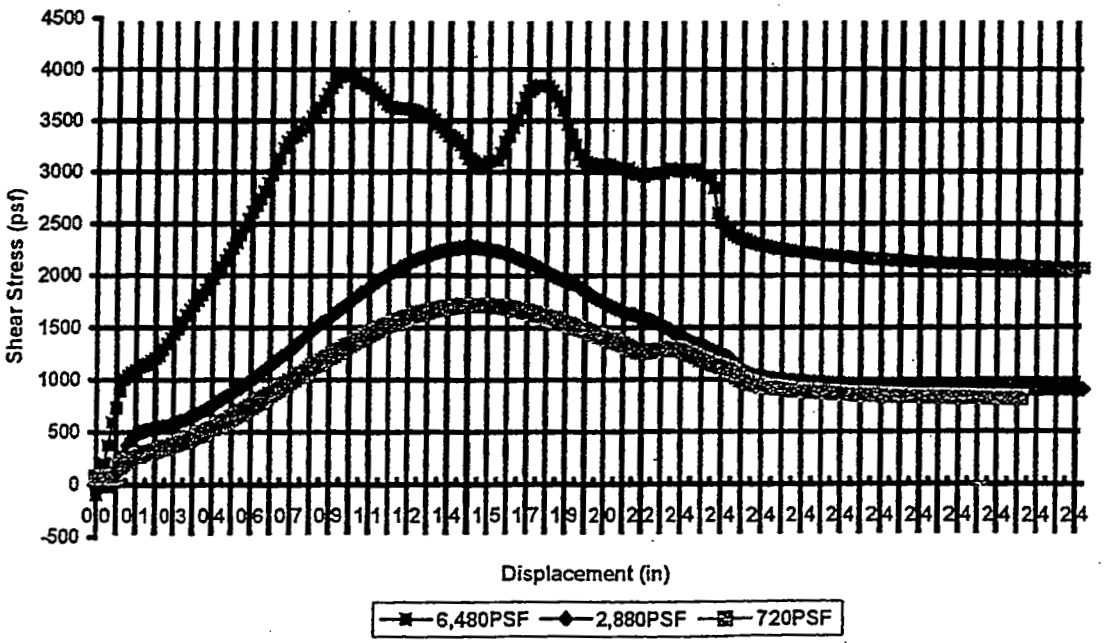


Figure #2
Shear Stress/ Displacement Curve



Precision Geosynthetic Laboratories

TABLE 11A
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

QC'd by: _____
Date: 3/15/03

TEST CONFIGURATION # 11A

TOP BOX
GCL, Bentomat ST R#883 (woven side) / C#85432
Textured HDPE (R#102103331) / C#85502
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 15.70%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ 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 / ASTM D5321-92 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	128.70	364	27	305	23
20.00	2880	100.2	1185	22	912	18
45.00	6480	63.64	2280	19	1664	14

COHESION (psf):	168.4	176.86
COEFFICIENT OF FRICTION:	0.33	0.23
FRICTION ANGLE(degrees):	18.2	13.1

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

Precision Geosynthetic Laboratories

PGL Job Number: G030083 Config.# 11A
Project Name: Flour Daniel Fernald
GCL, Bentomat ST R#883 (Woven Side) / C#85432 / Textured HDPE (R#102103331) C#85502
QC'd By: _____

Figure #1
Normal Stress/ Interface Stress

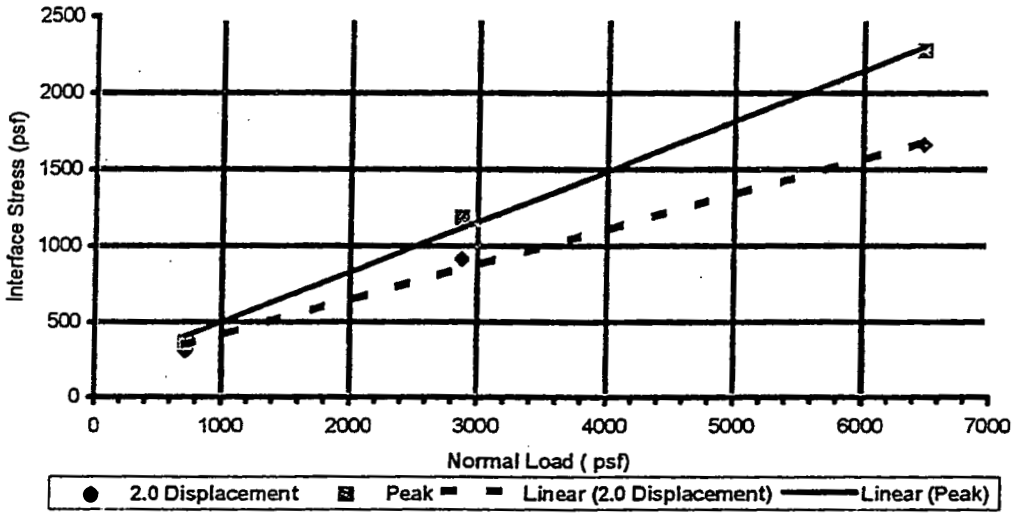
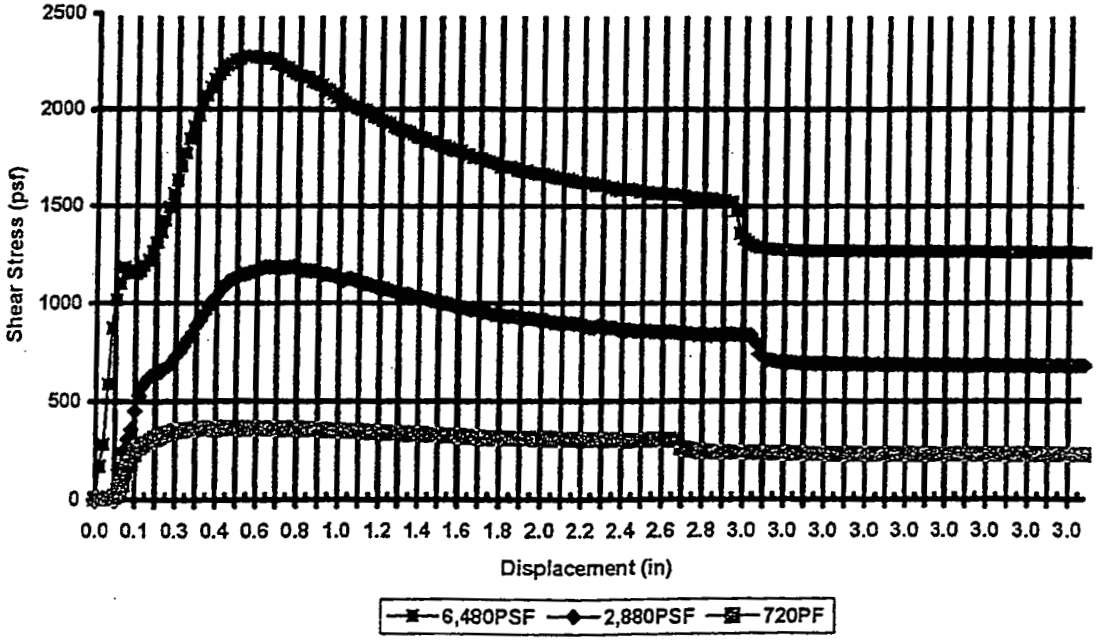


Figure #2
Shear Stress/ Displacement Curve



Precision Geosynthetic Laboratories

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Signature Not Verified

Digitally signed by Cora Quiejo
DN: cn=Cora Quiejo, o=PGL, c=US
Date: 2003.03.24 19:15:19 -08'00'

CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERNAL SHEAR TEST RESULT (ASTM D 6243)
PGL Job No. G030083

QC'd by: _____
Date: 3/15/03

TEST CONFIGURATION # 12

TOP BOX

GCL, Bentomat ST (R#927 L#200305LO) / C#85448

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 18.30%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ 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 / ASTM D5321-92 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	11.92	1466	64	1187	59
20.00	2880	90.89	2299	39	1675	30
45.00	6480	89.63	3697	30	3181	26

COHESION (psf):	1186	826.43
COEFFICIENT OF FRICTION:	0.39	0.35
FRICTION ANGLE(degrees):	21.2	19.5

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

See Figure #1 and #2

Precision Geosynthetic Laboratories

ISO 9001 - 2000

PGL Job Number: G030083 config.# 12
Project Name: Flour Daniel Fernald
GCL, Bentomat ST (R#927 L#200305LO) / C#85448
QC'd By: _____

Figure #1
Normal Stress/ Interface Stress

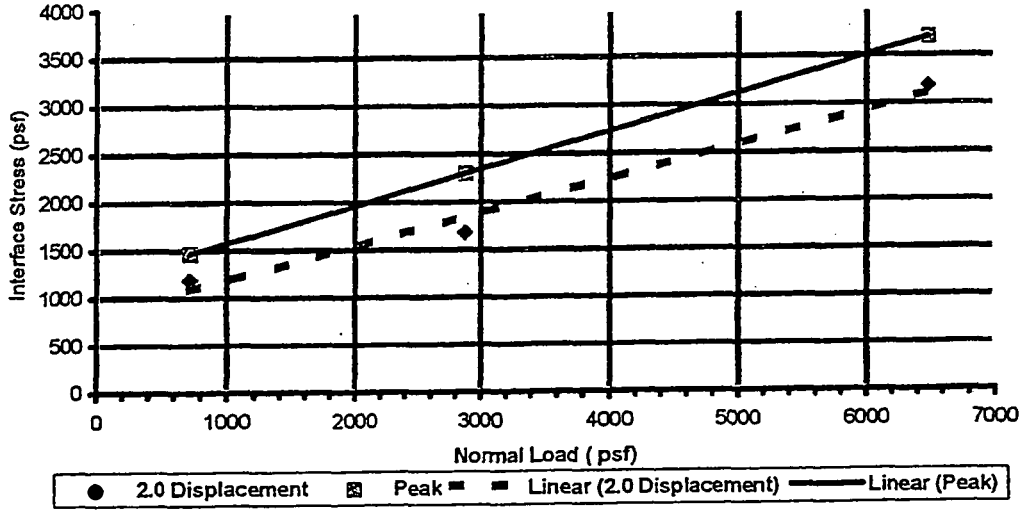


Figure #2
Shear Stress/ Displacement Curve

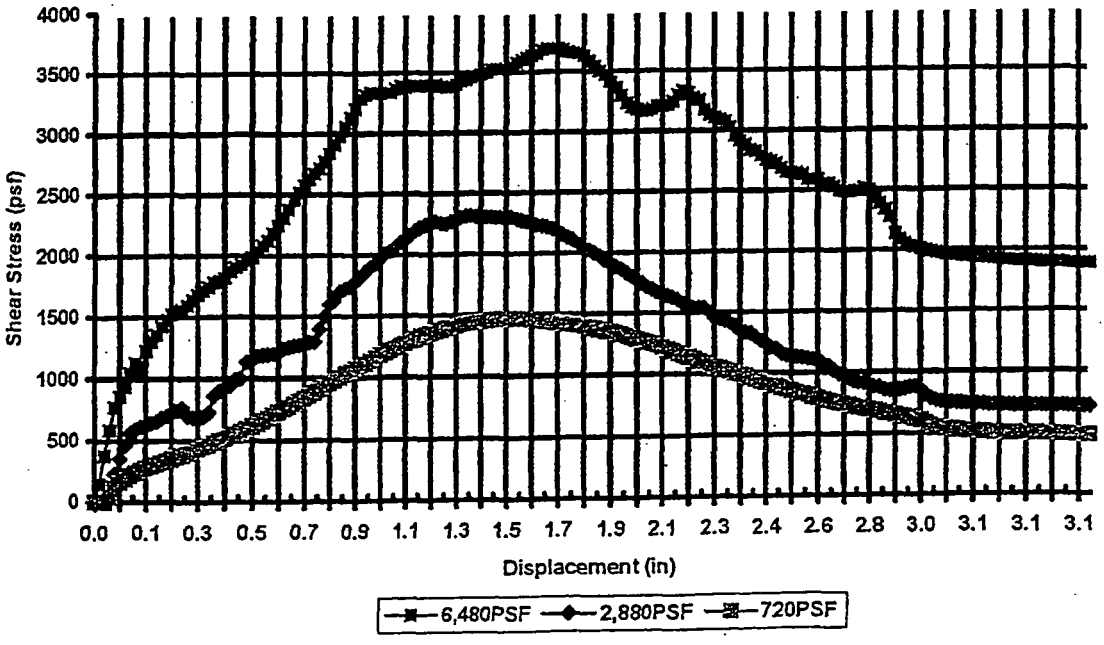


TABLE 12A
CLIENT: CETCO
PROJECT: Flour Daniel Fernald

INTERFACE SHEAR TEST RESULT (ASTM D 5321)
PGL Job No. G030083

Signature Not Verified

Digitally signed by Cora Gunde
Dn: cn=Cora Gunde, o=PGL, ou=
Date: 2003.03.24 12:12:07 -06'00'

QC'd by: _____
Date: 3/11/03

TEST CONFIGURATION # 12A

TOP BOX

GCL, Bentomat ST,(R#927 / C#85448) (Woven Side)

80mil Textured HDPE (R#102103342 / C#85501) (High text. Side)

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 18.30%.

HYDRATION:

1. GCL specimens were hydrated for 7 days @ 432 psf.

CONSOLIDATION:

1. Each set of specimen was consolidated under Drained condition for 48 hrs. @ normal load before shearing.
2. Normal loads were applied using Bladder

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 / ASTM D5321-92 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	110.92	426	31	391	29
20.00	2880	91.78	1119	21	865	17
45.00	6480	89.45	2578	22	1764	15

COHESION (psf):	108.1	201.86
COEFFICIENT OF FRICTION:	0.38	0.24
FRICTION ANGLE(degrees):	20.6	13.5

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line

OBSERVATIONS:

See Figure #1 and #2

Precision Geosynthetic Laboratories

PGL Job Number: G030083 Config #: 12A
Project Name: Flour Daniel Fernald
GCL, Bentomat ST C# 85448 / (High Textured Side) 80mil Textured HDPE C#85501
QC'd By: _____

Figure #1
Normal Stress/ Interface Stress

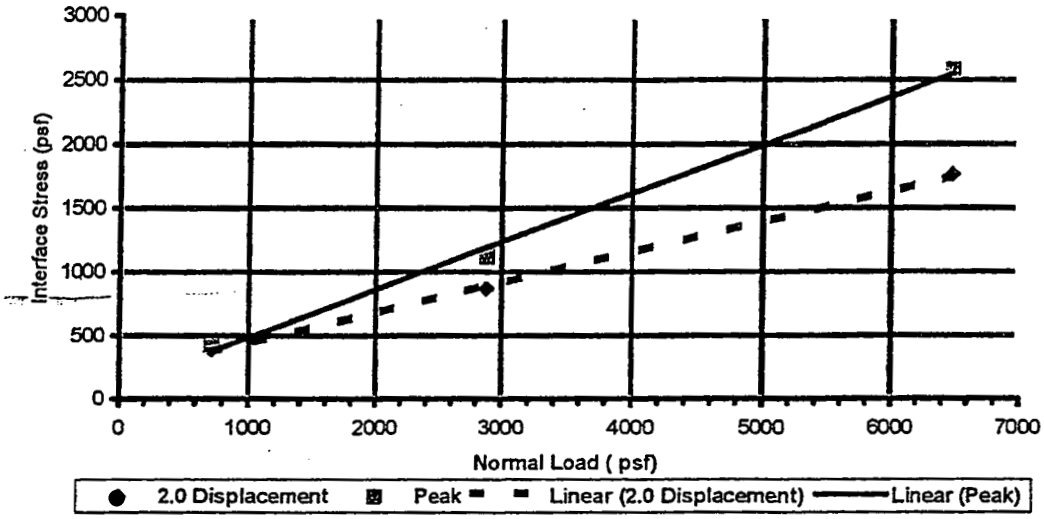
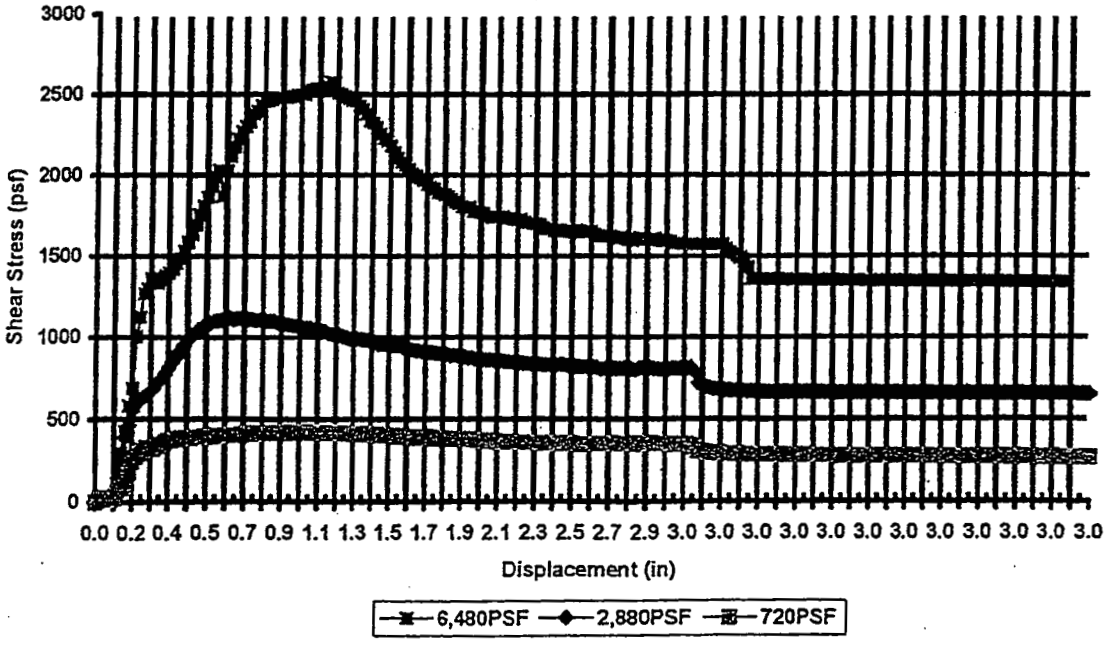


Figure #2
Shear Stress/ Displacement Curve



Precision Geosynthetic Laboratories

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9269	SUBMITTAL NO. 20105-9269-02772P-015	REV.: 0	DATE: 03/03/03	Page 1 of 1

FROM:
GETCO GCL
1500 West Shure Drive 5th Floor
Arlington Heights, IL 60004
SIGNATURE: 3/3/03

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: Susan Schwab DATE: 3/4/03

			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	9269-BASE-02772P-015	0							X		Manufacturing Certificates for GCL		X		02772P.1.04.B.2	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
Chuck VanArsdale	64				
Bill Zebick	64				
Mike Godber (Approver)	64				
Kwasi Badu-Tweneboah	38				
Don Pfister	45				

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

RECEIVED BY: Michael Godber 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)

00048 8

5369

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

ORIGINAL

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
P.O. Box 428 • Lovell, Wyoming 82431
(307) 548-6521 • Fax (307) 548-6413

5369

Date: February 3, 2003
PO: 03FF0307-0000-001
Order #: 167357

Chuck VanArsdale,
Fluor Daniel Fernald, Inc.
7400 Willey Road
Hamilton, OH. 45013
513-648-5116

Dear Chuck VanArsdale,

Please find enclosed the MQA/MQC Data Package for GCL shipments to Fluor Daniel Fernald, Inc. These shipments left our CETCO - Lovell, Wy. plant on PRE-SCANNED / 2-3-03.

If you have any questions regarding the enclosed QA/QC information, please contact me at (800)322-1149 ext:423.

Sincerely,

Noe Garcia
Quality Assurance Coordinator

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: Date: 3/20/03

INFORMATION ONLY

000489

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA PACKAGE

PROJECT NAME:	Fluor Daniel Fernald Hamilton, OH. 45013
CUSTOMER P.O.:	03FF0307-0000-001
PREPARED FOR:	Fluor Daniel Fernald, Inc. 7400 Willey Road Hamilton, OH. 45013
Telephone # :	513-648-5116

PREPARED BY:	Noe Garcia Quality Assurance Coordinator 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

5369

GEOSYNTHETIC CLAY LINER MANUFACTURING CERTIFICATION

GEOSYNTHETIC CLAY LINER

MANUFACTURING CERTIFICATION

Project Name:	Fluor Daniel Fernald
Prepared For:	Fluor Daniel Fernald, Inc.
Customer PO:	03FF0307-0000-001
Order Number:	167357
Ship Date:	PRE-SCANNED / 2-3-03

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 B. Wilkerson
Plant Manager
COLLOID ENVIRONMENTAL TECHNOLOGIES CO. (CETCO)

NEEDLE DETECTION CERTIFICATION

CERTIFICATION STATEMENT

Project Name:	Fluor Daniel Fernald
Prepared For:	Fluor Daniel Fernald, Inc.
Customer PO:	03FF0307-0000-001
Order Number:	167357
Ship Date:	PRE-SCANNED / 2-3-03

This statement is to certify that all components of the BENTOMAT ST manufactured for the above project have been inspected continually for the presence of broken needles through the use of a magnetic removal system.

Steve B. Wilkerson
Plant Manager
COLLOID ENVIRONMENTAL TECHNOLOGIES CO. (CETCO)

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

5369

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: 16-Jan-03

ATTN: Noe Garcia

Dear Sirs:

A shipment of CG 50
left our Lovell, WY plant on 011603A
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)	0.0
Moisture	ASTM D 2216	12.0 % (MAX)	10.4
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	26.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	13.6

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

000437

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: 16-Jan-03

ATTN: Noe Garcia

Dear Sirs:

A shipment of CG 50
left our Lovell, WY plant on 011603B
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)	0.0
Moisture	ASTM D 2216	12.0 % (MAX)	10.4
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	26.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	13.8

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: 17-Jan-03

ATTN: Noe Garcia

Dear Sirs:

shipment of CG 50
left our Lovell, WY plant on 011703A
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)	0.0
Moisture	ASTM D 2216	12.0 % (MAX)	10.0
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

5369

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: 23-Jan-03

ATTN: Noe Garcia

Dear Sirs:

shipment of CG 50
left our Lovell, WY plant on 012303A
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)	10.0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	30.0
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

000300

5369

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: 24-Jan-03

ATTN: Noe Garcia

Dear Sirs:

. shipment of CG 50
left our Lovell, WY plant on 012403A
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)	0.1
Moisture	ASTM D 2216	12.0 % (MAX)	10.8
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	27.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	15.2

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

Tests Conducted By: B.M., D.M., C.L., I.G.

Approved By: MOSES BRISENO
ACC

000501

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

5369

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: 24-Jan-03

ATTN: Noe Garcia

Dear Sirs:

A shipment of CG 50
left our Lovell, WY plant on 012403B
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)	0.0
Moisture	ASTM D 2216	12.0 % (MAX)	11.6
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	27.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	15.4

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: B.M., D.M., C.L., I.G.

Approved By: MOSES BRISENO
ACC

000502

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

5369

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: 24-Jan-03

ATTN: Noe Garcia

Dear Sirs:

A shipment of CG 50
left our Lovell, WY plant on 012403C
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)	0.0
Moisture	ASTM D 2216	12.0 % (MAX)	11.2
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	28.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	15.4

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: B.M., D.M., C.L., I.G.

Approved By: MOSES BRISENO
ACC

000503

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: 24-Jan-03

ATTN: Noe Garcia

Dear Sirs:

shipment of CG 50
left our Lovell, WY plant on 012403D
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)	0.0
Moisture	ASTM D 2216	12.0 % (MAX)	11.6
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	28.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	15.4

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: B.M., D.M., C.L., I.G.

Approved By: MOSES BRISENO
ACC

000504

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: **24-Jan-03**

ATTN: **Noe Garcia**

Dear Sirs:

shipment of **CG 50**
left our Lovell, WY plant on **012403E**
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)	0.0
Moisture	ASTM D 2216	12.0 % (MAX)	10.0
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

5369

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: **29-Jan-03**

ATTN: **Noe Garcia**

Dear Sirs:

: shipment of **CG 50**
left our Lovell, WY plant on **012903A**
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)	**0.0**
Moisture	ASTM D 2216	12.0 % (MAX)	**10.4**
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

000506

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: 29-Jan-03

ATTN: Noe Garcia

Dear Sirs:

. shipment of CG 50
left our Lovell, WY plant on 012903B
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)	0.0
Moisture	ASTM D 2216	12.0 % (MAX)	11.6
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	29.0
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.

pproved By: MOSES BRISENO
ACC

000507

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: 30-Jan-03

ATTN: Noe Garcia

Dear Sirs:

A shipment of CG 50
left our Lovell, WY plant on 013003A
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)	0.1
Moisture	ASTM D 2216	12.0 % (MAX)	10.6
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

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: 30-Jan-03

ATTN: Noe Garcia

Dear Sirs:

A shipment of CG 50
left our Lovell, WY plant on 013003B
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)	10.8
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

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

5369

Noe Garcia
American Colloid Cetco WY
PO Box 428
Lovell WY 82431
BOL: 80222165 PO:

1/29/2003

This is to Certify that Product 82TEX is a woven geotextile manufactured at one of the SI Corporations facilities that has acheived ISO-9002 certification for its systamic approach to quality 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, yeilding a 97.5 percent confidence level.

PROPERTY	TEST METHOD	UNITS	ENGLISH	METRIC
Mass per Unit Area	ASTM D-5261	oz/sy (g/sm)	3.2	109
Thickness	ASTM D-5199	mils (mm)	16	.41
Tensile Strength (Grab)	ASTM D-4632	lbs (N)	155 x 135	690 x 601
Elongation	ASTM D-4632	%	15	15
Wide Width Tensile	ASTM-D4595	lbs/ft (kN/m)	x	x
Wide Width Elongation	ASTM-D4595	%	N/A	N/A
Puncture	ASTM D-4833	lbs (N)	70	312
Mullen Burst	ASTM D-3786	psi (kPa)	265	1827
Trapezoidal Tear	ASTM D-4533	lbs (N)	45 x 45	200 x 200
UV Resistance	ASTM-D4355	%	90	90
Apparent Opening Size (AOS)	ASTM-D4751	US Std. Sieve (mm)	40	.425
Permittivity	ASTM-D4491	1/sec	.08	.08
Permeability	ASTM-D4491	cm/sec	.004	.004
Water Flow Rate	ASTM-D4491	gpm/ft² (l/min/m²)	6	244

Jack Rooke
SI Geosolutions
Director of Technology and R&D

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4019 Industry Drive Chattanooga TN, USA - (423)-899-0444 - (800)-621-0444 - FAX (423)-899-7619 - www.fixsoil.com

-5369

SI® Corporation

000513

Individual Roll Data
Project: *80222165*

HU#/Roll Number	Style	Prod.Order	Tensile MD lbs D4632	Tensile XMD lbs D4632	Elongation MD % D4632	Elongation XMD % D4632	Puncture lbs D4632	Burst psi D3786	T.Tear MD lbs D4533	T.Tear XMD lbs D4533
200004907	1002581	2000609	151	142	19	18	86	290	70	93
2000049017	1002581	2000605	140	148	20	16	78	337	75	82
2000048997	1002581	2000611	153	159	21	18	101	340	65	73
2000166292		2002022	155	106	30	25		295	125	100
2000049011	1002581	2000607	145	147	21	17	97	330	72	76
2000084052	1002581	2002022	154	144	23	18	79	347	76	90
2000049009	1002581	2000609	137	142	21	17	93	303	56	70
2000128706		2001878	141	139	22	19	103	300	68	75
2000128705	1002581	2001878	151	154	20	19	92	280	71	78
2000049008	1002581	2000609	141	141	19	16	87	320	69	81
2000084050	1002581	2002022	141	135	19	17	73	293	70	84
2000049000	1002581	2000611	136	135	18	18	104	287	61	66
2000049010	1002581	2000609	140	148	19	18	74	333	76	73

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 from the same production run as the rolls actually shipped on this bill of lading.

2/3/2003

SI® Geosolutions

American Colloid Cetco WY
Noe Garcia
PO Box 428
Lovell WY 82431
BOL 80215582 PO 0-L15-36219
Ref: Pick Up 161228

12/6/2002

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 · (mm	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		
Permittivity	ASTM D-4491	SEC-1	0.08					
Permeability -3	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

Jack Rooke

Jack Rooke
Director of Technology and R&D
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

5369

SI® Geosolutions

000515

Bol 80215582

ROLLNO	Product	TENSMA MD lbs D4632	TENSCR XMD lbs D4632	TTEARM MD lbs D4533	TTEARC XMD lbs D4533	BURST psi D3786
ROLLNO	STYLE	TENSMA	TENSCR	TTEARM	TTEARC	BURST
9087108	82TEX	166	175	79	83	367
9145804	82TEX	167	176	85	181	337
9161074	82TEX	165	157	90	95	317
9161075	82TEX	156	162	80	101	385
9162919	82TEX	158	156	75	115	357
9163487	82TEX	167	173	76	88	367

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5369

000516

SI® Geosolutions

ROLL DATA 80215582

ROLLNO	Product	WEIGHT	TENSMA MD	TENSCR XMD	TTEARM MD	TTEARC XMD	BURST
		os	lbs	lbs	lbs	lbs	psi
		D5261	D4632	D4632	D4533	D4533	D3786

ROLLNO	Product	WEIGHT	TENSMA	TENSCR	TTEARM	TTEARC	BURST
9168150	82TEX	3.7	155	152	62	85	370
9171417	82TEX	3.6	155	162	70	90	360
9172028	82TEX	3.7	155	168	100	115	347
9172873	82TEX	3.8	155	156	104	127	303

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-5368

SI® Corporation

Individual Roll Data

000517

.HU#/Roll Number	Style		Weight	Tensile		Elongation		Puncture	Burst	T.Tear	
				MD	XMD	MD	XMD			MD	XMD
			osy	lbs	lbs	%	%	lbs	psi	lbs	lbs
			D5261	D4632	D4632	D4632	D4632	D4632	D3786	D4533	D4533
2000049021		1002581	3.2	140	148	19	18	74	333	76	73
1600008072	8499824	1002581	3.6	140	148	20	16	78	337	75	82
1001145487	9147034	1002581	3.6	151	142	19	18	86	290	70	93
1001173919	9172881	1002581	3.6	153	159	21	18	101	340	65	73
1001179117	9176501	1002581	3.4	136	135	18	18	104	287	61	66
1001209203	9187396	1002581	3.5	137	142	21	17	93	303	56	70
1001208563	9188233	1002581	3.6	141	141	19	16	87	320	69	81

Once rolls of woven geotextiles are produced, inspected and the test results from the 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 from the same production run as the rolls actually shipped on this bill of lading.

2/6/2003

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

SI° Geosolutions

5369

American Colloid Cetco WY
Noe Garcia

10/25/2002

PO Box 428
Lovell WY 82431
BOL 80204032 PO 0-L15-35664
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	(1309.86)	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/ft-2	()	lpm/m2
UV Resistance	ASTM D-4355		%		%

Strength Retained after 500 hours exposure in Xenon Arc Weatherometer

Sincerely

Jack Rooke

Jack Rooke
Director of Technology and R&D
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

5369

SI® Geosolutions

000521

ROLL DATA
BOL: 80204032

ROLLNO	Product	BATCH_NO	WEIGHT	THICK	TENSMA	TENSCR	ELONGM	ELONGC	TTEARM	TTEARC	BURST	PUNCT
					MD	XMD	MD	XMD	MD	XMD		
			os	mils	lbs	lbs	%	%	lbs	lbs	psi	lbs
			D5261	D5199	D4632	D4632	D4632	D4632	D4533	D4533	D3786	D4833
E121383A	650	E1269	7.3	157	109	162	95	117	53	61	300	87
E121395A	650	E1270	7.3	154	128	160	93	106	92	84	250	85

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SI® Geosolutions

5369

American Colloid Cetco WY
Noe Garcia

10/8/2002

PO Box 428
Lovell WY 82431
BOL 80203022 PO 96641
Ref: Pick Up # 154672

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	(1309.86)	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/ft-2	()	lpm/m2
UV Resistance	ASTM D-4355		%		%

Strength Retained after 500 hours exposure in Xenon Arc Weatherometer

Sincerely

Jack Rooke

Jack Rooke
Director of Technology and R&D
SI Geosolutions

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1/23/2001

5369

000523

SI® Geosolutions

ROLL DATA
BOL: 80203022

ROLLNO	Product	BATCH_NO	WEIGHT	THICK	TENSMA	TENSCR	ELONGM	ELONGC	TTEARM	TTEARC	BURST	PUNCT
					MD	XMD	MD	XMD	MD	XMD		
			os	mils	lbs	lbs	%	%	lbs	lbs	psi	lbs
			D5261	D5199	D4632	D4632	D4632	D4632	D4533	D4533	D3786	D4833
E121296A	650	E1268	7.3	159	107	141	112	114	38	44	277	76
E121308A	650	E1268	7.1	154	98	128	98	99	45	44	254	83
E121312A	650	E1268	7.2	169	108	134	102	105	69	69	266	93

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5369

000524

SI® Geosolutions

1-7-03 ROLL DATA

ROLLNO	Product	BATCH_NO	WEIGHT	THICK	TENSMA	TENSCR	TTEARM	TTEARC	BURST	PUNCT
					MD	XMD	MD	XMD		
			os	mils	lbs	lbs	lbs	lbs	psi	lbs
			D5261	D5199	D4632	D4632	D4533	D4533	D3786	D4833
E121342A	650	E1268	7.4	155	118	145	48	50	279	75
E121346A	650	E1268	7.1	156	113	140	61	57	257	68
E121362A	650	E1269	6.8	154	93	123	42	39	227	71
E121366A	650	E1269	6.9	154	99	126	41	38	260	71

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SI® Geosolutions

5369

1/15/2003

Noe Garcia
American Colloid Cetco WY
PO Box 428
Lovell WY 82431
BOL: 80220615 PO: 0-L15-3

This is to Certify that Product 650 is a nonwoven geotextile manufactured at one of the SI Corporations facilities that has acheived ISO-9002 certification for its systamic approach to quality 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, yeilding a 97.5 percent confidence level.

PROPERTY	TEST METHOD	UNITS	ENGLISH	METRIC
Tensile Strength (Grab)	ASTM D-4632	lbs (N)	45	200
Elongation	ASTM D-4632	%	90	90
Puncture	ASTM D-4833	lbs (N)	50	222
Mullen Burst	ASTM D-3786	psi (kPa)	190	1310
Trapezoidal Tear	ASTM D-4533	lbs (N)	25	111
Wide Width Tensile		lbs/ft (kN/m)	N/A	N/A
UV Resistance		%	N/A	N/A
Apparent Opening Size (AOS)		US Std. Sieve (mm)	N/A	N/A
Permittivity		1/sec	N/A	N/A
Permeability		cm/sec	N/A	N/A
Water Flow Rate		gpm/ft² (l/min/m²)	N/A	N/A

Jack Rooke
SI Geosolutions
Director of Technology and R&D

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4019 Industry Drive Chattanooga TN, USA - (423)-899-0444 - (800)-621-0444 - FAX (423)-899-7619 - www.fixsoil.com

5369

SI® Corporation

Individual Roll Data

Bill of Lading: 80220615

000526

Roll Number	Style	Prod.Order	Tensile MD lbs D4632	Tensile XMD lbs D4632	Elongation MD % D4632	Elongation XMD % D4632	Puncture lbs D4632	Burst psi D3786	T.Tear MD lbs D4533	T.Tear XMD lbs D4533
01164082	650	00000314	108	93	102	119	69	209	37	57
01164314	650	00000314	138	117	114	120	78	223	50	33
01164543	650	00000314	102	114	100	112	79	223	49	48
01164726	650	00000314	90	94	103	127	78	211	36	36
01164900	650	00000314	82	105	91	111	83	247	38	42
01165278	650	00000314	115	112	104	119	75	244	49	30
01165703	650	00000314	105	111	91	124	78	259	49	40
01023877	650	00000426	86	131	105	104	64	236	49	38
01024084	650	00000426	100	124	107	109	72	266	43	29
01024089	650	00000426	91	100	97	110	74	267	42	50
01024354	650	00000426	87	112	94	101	78	241	44	61
01024587	650	00000426	93	137	106	120	81	277	48	56
01025193	650	00000426	95	121	107	115	72	273	36	39
01025429	650	00000426	94	132	110	123	74	250	52	51
01025653	650	00000426	107	141	112	114	76	277	38	44
01025951	650	00000426	114	128	109	114	77	253	40	45
01026197	650	00000426	107	118	105	123	86	286	42	48

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 from the same production run as the rolls actually shipped on this bill of lading.

1/22/2003

5369

SI® Corporation

Individual Roll Data
Bill of Lading: 80220615

000527

Roll Number	Style	Prod.Order	Tensile MD lbs D4632	Tensile XMD lbs D4632	Elongation MD % D4632	Elongation XMD % D4632	Puncture lbs D4632	Burst psi D3786	T.Tear MD lbs D4533	T.Tear XMD lbs D4533
01026551	650	00000426	98	128	98	99	83	254	45	44
01026754	650	00000426	108	134	102	105	93	266	69	69
01027017	650	00000426	87	121	103	109	83	254	45	38
01027548	650	00000426	82	103	100	117	66	263	33	35
01028509	650	00000426	88	136	99	109	73	281	40	37
01028744	650	00000426	87	146	97	107	85	273	47	48
01028745	650	00000426	104		100		91	242	48	
01029318	650	00000426	113	149	98	102	85	271	58	76
01029323	650	00000426	118	145	104	108	75	279	48	50
01029533	650	00000426	113	140	101	111	68	257	61	57

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.

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1/22/2003

SI Geosolutions

5369

2/3/2003

Noe Garcia
American Colloid Cetco WY
PO Box 428
Lovell WY 82431
BOL: 80222705 PO:

This is to Certify that Product 650 is a nonwoven geotextile manufactured at one of the SI Corporations facilities that has acheived ISO-9002 certification for its systamic approach to quality 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, yeilding a 97.5 percent confidence level.

PROPERTY	TEST METHOD	UNITS	ENGLISH	METRIC
Tensile Strength (Grab)	ASTM D-4632	lbs (N)	45	200
Elongation	ASTM D-4632	%	90	90
Puncture	ASTM D-4833	lbs (N)	50	222
Mullen Burst	ASTM D-3786	psi (kPa)	190	1310
Trapezoidal Tear	ASTM D-4533	lbs (N)	25	111
Wide Width Tensile		lbs/ft (kN/m)	N/A	N/A
UV Resistance		%	N/A	N/A
Apparent Opening Size (AOS)	ASTM-D4751	US Std. Sieve (mm)	N/A	N/A
Permittivity		1/sec	N/A	N/A
Permeability		cm/sec	N/A	N/A
Water Flow Rate		gpm/ft² (l/min/m²)	N/A	N/A

Jack Rooke
SI Geosolutions
Director of Technology and R&D

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5369

SI® Corporation

000529

Individual Roll Data

Project: *80222705*

HU#/Roll Number	Style	Prod.Order	Tensile		Elongation		Puncture	Burst	T.Tear	
			MD	XMD	MD	XMD			MD	XMD
			lbs	lbs	%	%	lbs	psi	lbs	lbs
			D4632	D4632	D4632	D4632	D4632	D3786	D4533	D4533
2000126869	650	2002870	77	113	108	140	55	224	33	40
2000220201	650	2004597	130	205	115	130	70	247	45	74
2002870450	650	2002870	95	118	124	135	60	221	38	42
2000126828	650	2002870	116	142	128	125	80	239	39	49
2000126832	650	2002870	103	109	128	130	70	291	36	37
2000126836	1004557	2002870	99	122	130	136	64	200	40	34
2000126840	1004557	2002870	108	120	119	140	67	220	43	45
2000126844	650	2002870	105	150	126	140	66	221	33	37
2000126848	650	2002870	89	122	123	131	53	201	30	52
2000126852	650	2002870	105	109	118	121	64	203	36	36
2000126856	650	2002870	84	112	113	123	57	216	57	49
2000126852	650	2002870	105	109	118	121	64	203	36	36
2000126864	650	2002870	81	87	116	110	51	226	33	36
2000126821	650	2002870	101	135	130	149	60	220	31	38

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 501 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.

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2/3/2003

5369

SI® Corporation

Individual Roll Data
Project: *80222705*

000530

HU#/Roll Number		Style	Prod.Order	Tensile MD lbs D4632	Tensile XMD lbs D4632	Elongation MD % D4632	Elongation XMD % D4632	Puncture lbs D4632	Burst psi D3786	T.Tear MD lbs D4533	T.Tear XMD lbs D4533
2000126874		650	2002870	74	90	102	118	65	243	34	30
2000126796		650	2002870	85	196	102	91	106	303	45	101
2000126818		650	2002870	123	139	131	127	74	237	42	54
2000126814		650	2002870	103	115	116	138	58	211	40	35
2000126810		1004557	2002870	109	137	134	145	63	209	37	36
2000126860		650	2002870	102	116	120	126	67	220	36	45
2000126802		650	2002870	117	134	130	131	71	230	43	53
2000126878		650	2002870	76	71	98	119	65	247	26	46
2000126792		650	2002870	152	163	148	124	79	253	49	58
2000126786		650	2002870	140	179	115	134	88	260	51	91
2000151487		650	2002870	71	86	100	130	69	249	35	26
2000126882		650	2002870	65	89	99	126	53	239	39	27
2000126806		1004557	2002870	118	121	140	140	56	211	43	34
01163293	C832967A	650	00000314	62	58	85	136	52	226	30	

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.

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2/3/2003

5369

SI® Corporation

Individual Roll Data
Project: *80222705*

000531

HU#/Roll Number		Style	Prod.Order	Tensile MD lbs D4632	Tensile XMD lbs D4632	Elongation MD % D4632	Elongation XMD % D4632	Puncture lbs D4632	Burst psi D3786	T.Tear MD lbs D4533	T.Tear XMD lbs D4533
01163601	C832969A	650	00000314	77		86		61	233	34	
01164082	C832981A	650	00000314	108	93	102	119	69	209	37	57
01164314	C832985A	650	00000314	138	117	114	120	78	223	50	33
01164543	C832989A	650	00000314	102	114	100	112	79	223	49	48
01164726	C832992A	650	00000314	90	94	103	127	78	211	36	36
01164900	C832996A	650	00000314	82	105	91	111	83	247	38	42
01165278	C833003A	650	00000314	115	112	104	119	75	244	49	30
01165703	C833009A	650	00000314	105	111	91	124	78	259	49	40

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.

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2/3/2003

SI Geosolutions

5369

1/15/2003

Noe Garcia
American Colloid Cetco WY
PO Box 428
Lovell WY 82431
BOL: 80220294 PO: 0-L15-3
Pick Up# 165803

This is to Certify that Product 650 is a nonwoven geotextile manufactured at one of the SI Corporations facilities that has acheived ISO-9002 certification for its systamic approach to quality 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, yeilding a 97.5 percent confidence level.

PROPERTY	TEST METHOD	UNITS	ENGLISH	METRIC
Tensile Strength (Grab)	ASTM D-4632	lbs (N)	45	200
Elongation	ASTM D-4632	%	90	90
Puncture	ASTM D-4833	lbs (N)	50	222
Mullen Burst	ASTM D-3786	psi (kPa)	190	1310
Trapezoidal Tear	ASTM D-4533	lbs (N)	25	111
Wide Width Tensile		lbs/ft (kN/m)	N/A	N/A
UV Resistance		%	N/A	N/A
Apparent Opening Size (AOS)		US Std. Sieve (mm)	N/A	N/A
Permittivity		1/sec	N/A	N/A
Permeability		cm/sec	N/A	N/A
Water Flow Rate		gpm/ft² (l/min/m²)	N/A	N/A

Jack Rooke
SI Geosolutions
Director of Technology and R&D

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5369

SI® Corporation

Individual Roll Data

Bill of Lading: 80220294

000533

Roll Number	Style	Prod.Order	Tensile MD lbs D4632	Tensile XMD lbs D4632	Elongation MD % D4632	Elongation XMD % D4632	Puncture lbs D4632	Burst psi D3786	T.Tear MD lbs D4533	T.Tear XMD lbs D4533
2000126848	650	2002870	89	122	123	131	53	201	30	52
2000126786	650	2002870	140	179	115	134	88	260	51	91
2000126792	650	2002870	152	163	148	124	79	253	49	58
2000126796	650	2002870	85	196	102	91	106	303	45	101
2000126802	650	2002870	117	134	130	131	71	230	43	53
2000126814	650	2002870	103	115	116	138	58	211	40	35
2000126818	650	2002870	123	139	131	127	74	237	42	54
2002870450	650	2002870	95	118	124	135	60	221	38	42
2000126828	650	2002870	116	142	128	125	80	239	39	49
2000126844	650	2002870	105	150	126	140	66	221	33	37
2000126844	650	2002870	105	150	126	140	66	221	33	37
2000151487	650	2002870	71	86	100	130	69	249	35	26
2000126852	650	2002870	105	109	118	121	64	203	36	36
2000126856	650	2002870	84	112	113	123	57	216	57	49
2000126860	650	2002870	102	116	120	126	67	220	36	45
2000126864	650	2002870	81	87	116	110	51	226	33	36
2000126869	650	2002870	77	113	108	140	55	224	33	40

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.

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1/22/2003

5369

SI® Corporation

Individual Roll Data

Bill of Lading: 80220294

000534

Roll Number	Style	Prod.Order	Tensile MD lbs D4632	Tensile XMD lbs D4632	Elongation MD % D4632	Elongation XMD % D4632	Puncture lbs D4632	Burst psi D3786	T.Tear MD lbs D4533	T.Tear XMD lbs D4533
2000126874	650	2002870	74	90	102	118	65	243	34	30
2000126878	650	2002870	76	71	98	119	65	247	26	46
2000126882	650	2002870	65	89	99	126	53	239	39	27
2000126832	650	2002870	103	109	128	130	70	291	36	37

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.

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1/22/2003

SI Geosolutions

5369

1/15/2003

Noe Garcia
American Colloid Cetco WY
PO Box 428
Lovell WY 82431
BOL: 80221081 PO: 0-L15-3
Pick Up # 165803

This is to Certify that Product 650 is a nonwoven geotextile manufactured at one of the SI Corporations facilities that has acheived ISO-9002 certification for its systamic approach to quality 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, yeilding a 97.5 percent confidence level.

PROPERTY	TEST METHOD	UNITS	ENGLISH	METRIC
Tensile Strength (Grab)	ASTM D-4632	lbs (N)	45	200
Elongation	ASTM D-4632	%	90	90
Puncture	ASTM D-4833	lbs (N)	50	222
Mullen Burst	ASTM D-3786	psi (kPa)	190	1310
Trapezoidal Tear	ASTM D-4533	lbs (N)	25	111
Wide Width Tensile		lbs/ft (kN/m)	N/A	N/A
UV Resistance		%	N/A	N/A
Apparent Opening Size (AOS)		US Std. Sieve (mm)	N/A	N/A
Permittivity		1/sec	N/A	N/A
Permeability		cm/sec	N/A	N/A
Water Flow Rate		gpm/ft² (l/min/m²)	N/A	N/A

Jack Rooke
SI Geosolutions
Director of Technology and R&D

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5369

SI® Corporation

Individual Roll Data

Bill of Lading: 80221081

000536

Roll Number	Style	Prod.Order	Tensile		Elongation		Puncture	Burst	T.Tear	
			MD	XMD	MD	XMD			MD	XMD
			lbs	lbs	%	%	lbs	psi	lbs	lbs
			D4632	D4632	D4632	D4632	D4632	D3786	D4533	D4533
2000126832	650	2002870	103	109	128	130	70	291	36	37
2000126864	650	2002870	81	87	116	110	51	226	33	36
2000126882	650	2002870	65	89	99	126	53	239	39	27
2000126786	650	2002870	140	179	115	134	88	260	51	91
2000126786	650	2002870	145	164	129	109	97		79	66
2000126792	650	2002870	152	163	148	124	79	253	49	58
2000126796	650	2002870	85	196	102	91	106	303	45	101
2000126802	650	2002870	117	134	130	131	71	230	43	53
2000126814	650	2002870	103	115	116	138	58	211	40	35
2000126818	650	2002870	123	139	131	127	74	237	42	54
2000126860	650	2002870	102	116	120	126	67	220	36	45
2000126828	650	2002870	116	142	128	125	80	239	39	49
2000151487	650	2002870	71	86	100	130	69	249	35	26
2000126844	650	2002870	105	150	126	140	66	221	33	37
2000126848	650	2002870	89	122	123	131	53	201	30	52
2000126852	650	2002870	105	109	118	121	64	203	36	36
2000126856	650	2002870	84	112	113	123	57	216	57	49

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.

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1/22/2003

5369

SI® Corporation

Individual Roll Data

Bill of Lading: 80221081

000537

Roll Number	Style	Prod.Order	Tensile		Elongation		Puncture	Burst	T.Tear	
			MD	XMD	MD	XMD			MD	XMD
			lbs	lbs	%	%	lbs	psi	lbs	lbs
			D4632	D4632	D4632	D4632	D4632	D3786	D4533	D4533
2000126860	650	2002870	102	116	120	126	67	220	36	45
2000126864	650	2002870	81	87	116	110	51	226	33	36
2000126869	650	2002870	77	113	108	140	55	224	33	40
2000126874	650	2002870	74	90	102	118	65	243	34	30
2000126878	650	2002870	76	71	98	119	65	247	26	46
2000126882	650	2002870	65	89	99	126	53	239	39	27
2002870450	650	2002870	95	118	124	135	60	221	38	42

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 from the same production run as the rolls actually shipped on this bill of lading.

1/22/2003

SI® Geosolutions

5369

1/15/2003

Noe Garcia
American Colloid Cetco WY
PO Box 428
Lovell WY 82431
BOL: 80220970 PO: 0-L15-3
Pick Up # 165803

This is to Certify that Product 650 is a nonwoven geotextile manufactured at one of the SI Corporations facilities that has acheived ISO-9002 certification for its systamic approach to quality 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, yeilding a 97.5 percent confidence level.

PROPERTY	TEST METHOD	UNITS	ENGLISH	METRIC
Tensile Strength (Grab)	ASTM D-4632	lbs (N)	45	200
Elongation	ASTM D-4632	%	90	90
Puncture	ASTM D-4833	lbs (N)	50	222
Mullen Burst	ASTM D-3786	psi (kPa)	190	1310
Trapezoidal Tear	ASTM D-4533	lbs (N)	25	111
Wide Width Tensile		lbs/ft (kN/m)	N/A	N/A
UV Resistance		%	N/A	N/A
Apparent Opening Size (AOS)		US Std. Sieve (mm)	N/A	N/A
Permittivity		1/sec	N/A	N/A
Permeability		cm/sec	N/A	N/A
Water Flow Rate		gpm/ft² (l/min/m²)	N/A	N/A

Jack Rooke
SI Geosolutions
Director of Technology and R&D

Seller makes no warranty expressed 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 SI Corporation current published specifications, and the Customer gives notice to SI Corporation before installing the product, then SI 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

4019 Industry Drive Chattanooga TN, USA - (423)-899-0444 - (800)-621-0444 - FAX (423)-899-7619 - www.fixsoil.com

5369

SI Corporation

Individual Roll Data

Bill of Lading: 80220970

000539

Roll Number	Style	Prod.Order	Tensile MD lbs D4632	Tensile XMD lbs D4632	Elongation MD % D4632	Elongation XMD % D4632	Puncture lbs D4632	Burst psi D3786	T.Tear MD lbs D4533	T.Tear XMD lbs D4533
2000126874	650	2002870	74	90	102	118	65	243	34	30
2000126878	650	2002870	76	71	98	119	65	247	26	46
2002870450	650	2002870	95	118	124	135	60	221	38	42
2000126828	650	2002870	116	142	128	125	80	239	39	49
2000126832	650	2002870	103	109	128	130	70	291	36	37
2000126844	650	2002870	105	150	126	140	66	221	33	37
2000126848	650	2002870	89	122	123	131	53	201	30	52
2000126852	650	2002870	105	109	118	121	64	203	36	36
2000126856	650	2002870	84	112	113	123	57	216	57	49
2000126860	650	2002870	102	116	120	126	67	220	36	45
2000126869	650	2002870	77	113	108	140	55	224	33	40
2000126869	650	2002870	77	113	108	140	55	224	33	40
2000126818	650	2002870	123	139	131	127	74	237	42	54
2000126786	650	2002870	140	179	115	134	88	260	51	91
2000126814	650	2002870	103	115	116	138	58	211	40	35
2000126802	650	2002870	117	134	130	131	71	230	43	53
2000126796	650	2002870	85	196	102	91	106	303	45	101

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 from the same production run as the rolls actually shipped on this bill of lading.

1/22/2003

5369

SI® Corporation

Individual Roll Data

Bill of Lading: 80220970

000540

Roll Number	Style	Prod.Order	Tensile MD lbs D4632	Tensile XMD lbs D4632	Elongation MD % D4632	Elongation XMD % D4632	Puncture lbs D4632	Burst psi D3786	T.Tear MD lbs D4533	T.Tear XMD lbs D4533
2000126864	650	2002870	81	87	116	110	51	226	33	36
2000126792	650	2002870	152	163	148	124	79	253	49	58
2000126878	650	2002870	76	71	98	119	65	247	26	46
2000151487	650	2002870	71	86	100	130	69	249	35	26
2000126882	650	2002870	65	89	99	126	53	239	39	27
01164082	650	00000314	108	93	102	119	69	209	37	57
01164314	650	00000314	138	117	114	120	78	223	50	33
01164543	650	00000314	102	114	100	112	79	223	49	48
01164726	650	00000314	90	94	103	127	78	211	36	36
01164900	650	00000314	82	105	91	111	83	247	38	42
	650	00000314	107	107	106	121	73	227	44	29
01165278	650	00000314	115	112	104	119	75	244	49	30
01165703	650	00000314	105	111	91	124	78	259	49	40

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 from the same production run as the rolls actually shipped on this bill of lading.

1/22/2003

SI° Geosolutions

1/15/2003

Noe Garcia
American Colloid Cetco WY
PO Box 428
Lovell WY 82431
BOL: 80220776 PO: 0-L15-3
Pick Up # 165803

This is to Certify that Product 650 is a nonwoven geotextile manufactured at one of the SI Corporations facilities that has acheived ISO-9002 certification for its systamic approach to quality 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, yeilding a 97.5 percent confidence level.

PROPERTY	TEST METHOD	UNITS	ENGLISH	METRIC
Tensile Strength (Grab)	ASTM D-4632	lbs (N)	45	200
Elongation	ASTM D-4632	%	90	90
Puncture	ASTM D-4833	lbs (N)	50	222
Mullen Burst	ASTM D-3786	psi (kPa)	190	1310
Trapezoidal Tear	ASTM D-4533	lbs (N)	25	111
Wide Width Tensile		lbs/ft (kN/m)	N/A	N/A
UV Resistance		%	N/A	N/A
Apparent Opening Size (AOS)		US Std. Sieve (mm)	N/A	N/A
Permittivity		1/sec	N/A	N/A
Permeability		cm/sec	N/A	N/A
Water Flow Rate		gpm/ft² (l/min/m²)	N/A	N/A

Jack Rooke
SI Geosolutions
Director of Technology and R&D

Seller makes no warranty expressed 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 SI Corporation current published specifications, and the Customer gives notice to SI Corporation before installing the product, then SI 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

5369

SI® Corporation

Individual Roll Data

Bill of Lading: 80220776

000542

Roll Number	Style	Prod.Order	Tensile MD lbs D4632	Tensile XMD lbs D4632	Elongation MD % D4632	Elongation XMD % D4632	Puncture lbs D4632	Burst psi D3786	T.Tear MD lbs D4533	T.Tear XMD lbs D4533
2000126848	650	2002870	89	122	123	131	53	201	30	52
2000126786	650	2002870	140	179	115	134	88	260	51	91
2000126792	650	2002870	152	163	148	124	79	253	49	58
2000126796	650	2002870	85	196	102	91	106	303	45	101
2000126802	650	2002870	117	134	130	131	71	230	43	53
2000126814	650	2002870	103	115	116	138	58	211	40	35
2000126818	650	2002870	123	139	131	127	74	237	42	54
2002870450	650	2002870	95	118	124	135	60	221	38	42
2000126828	650	2002870	116	142	128	125	80	239	39	49
2000151487	650	2002870	71	86	100	130	69	249	35	26
2000126844	650	2002870	105	150	126	140	66	221	33	37
2000151487	650	2002870	71	86	100	130	69	249	35	26
2000126852	650	2002870	105	109	118	121	64	203	36	36
2000126856	650	2002870	84	112	113	123	57	216	57	49
2000126860	650	2002870	102	116	120	126	67	220	36	45
2000126864	650	2002870	81	87	116	110	51	226	33	36
2000126869	650	2002870	77	113	108	140	55	224	33	40

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.

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1/22/2003

5369

SI® Corporation

Individual Roll Data
Bill of Lading: 80220776

000543

Roll Number	Style	Prod.Order	Tensile		Elongation		Puncture	Burst	T.Tear	
			MD	XMD	MD	XMD			MD	XMD
			lbs	lbs	%	%	lbs	psi	lbs	lbs
			D4632	D4632	D4632	D4632	D4632	D3786	D4533	D4533
2000126874	650	2002870	74	90	102	118	65	243	34	30
2000126878	650	2002870	76	71	98	119	65	247	26	46
2000126882	650	2002870	65	89	99	126	53	239	39	27
2000126832	650	2002870	103	109	128	130	70	291	36	37

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.

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1/22/2003

GEOMEMBRANE LINER AND CAP

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9268	SUBMITTAL NO. 20105-9268-001	REV.: 2	DATE: 05/08/03	Page 1 of 1

FROM:
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073-2598
SIGNATURE: [signature]

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: Teresa Schwab DATE: 5/8/03

			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	9268-BASE-001	2						X			SUBMITTAL REGISTER			X	ACR-001	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
Chuck VanArsdale (Approver)	64				
Gregg Johnson	60				
Bill Zebick	60				
Mike Godber	84				
Kwasi Badu-Tweneboah	38				
Don Pfister	45				

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

005545

53669

RECEIVED BY: [signature] DATE: 5/13/03
(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

PROJECT 20105, BASE (CELL 6 LINER)
SUBMITTAL REGISTER
GEOMEMBRANE MANUFACTURING AND DELIVERY
Rev. 2, 05/07/03

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
20105-9268-001	0	9268-BASE-001	0		X	ENG	SUBMITTAL REGISTER	ACR-001	A 02/11/03	FLUOR FERNALD WILL UPDATE
20105-9268-02770P-001	0	9268-BASE-02770P-001	0		X	ENG	MANUFACTURING CAPABILITIES	02770P.1.05.A.1	A 02/11/03	A
20105-9268-02770P-002	0	9268-BASE-02770P-002	0	X		ENG	LIST OF 10 COMPLETED FACILITIES	02770P.1.05.A.2	A 02/11/03	A
20105-9268-02770P-003	0	9268-BASE-02770P-003	0	X		ENG	ORIGIN AND IDENTIFICATION OF RESIN	02770P.1.05A.3	A 02/11/03	A
20105-9268-02770P-004	0	9268-BASE-02770P-004	0	X		QA	CERTIFICATION OF WELDING ROD	02770P.1.05.A.4	A 02/11/03	A
20105-9268-02770P-005	0	9268-BASE-02770P-005	0	X		QA	CERTIFICATION OF MINIMUM AVERAGE ROLL VALUES	02770P.1.05.A.5	B 02/11/03	A
	1	9268-BASE-02770P-005	1	X		QA	CERTIFICATION OF MINIMUM AVERAGE ROLL VALUES	02770P.1.05.A.5	A 03/20/03	A
20105-9268-02770P-006	0	9268-BASE-02770P-006	0		X	CONST	RECOMMENDED STORAGE REQUIREMENTS AND LIMITATIONS	02770P.1.05.A.6	A 02/25/03	A
20105-9268-02770P-007	0	9268-BASE-02770P-007	0	X		ENG	RECOMMENDED INSTALLATION PROCEDURES	02770P.1.05.A.7	A 02/11/03	A
20105-9268-02770P-008	0	9268-BASE-02770P-008	0		X	ENG	GEOMEMBRANE WARRANTY	02770P.1.05.A.8	A 01/31/03	A & B
20105-9268-02770P-009	0	9268-BASE-02770P-009	0	X		ENG	COMPLETED FORMS GML- 80S, GML- 80T, GML-30S	02770P.1.05.A.9	A 02/11/03	A
20105-9268-02770P-010	0	9268-BASE-02770P-010	0		X	H&S	MATERIAL SAFETY DATA SHEETS (GML)	02770P.1.05.A.10	A 02/11/03	A & C
20105-9268-02770P-011	0	9268-BASE-02770P-011	0	X		QA	QUALITY CONTROL CERTIFICATES FOR RESIN	02770P.1.05.B.1	A 03/20/03	B
20105-9268-02770P-012	0	9268-BASE-02770P-012	0	X		ENG	TEST REPORTS OF RESIN	02770P.1.05.B.2	A 03/20/03	B
20105-9268-02770P-013	0	9268-BASE-02770P-013	0	X		QA	CERTIFICATION OF RESIN POLYMER	02770P.1.05.B.3	A 03/20/03	B
20105-9268-02770P-014	0	9268-BASE-02770P-014	0	X		QA	MANUFACTURING CERTIFICATES PER SHIFT PRODUCTION OF GEOMEMBRANE	02770P.1.05.C	B 03/20/03	B
	1	9268-BASE-02770P-014	1	X		QA	MANUFACTURING CERTIFICATES PER SHIFT PRODUCTION OF GEOMEMBRANE	02770P.1.05.C	A 05/07/03	B

000546

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

INFORMATION ONLY

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [signature] Date: 5/13/03

5369

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9268	SUBMITTAL NO. 20105-9268-02770P-003	REV.: 0	DATE: 01/24/03	Page 1 of 1

FROM:
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073-3898
SIGNATURE: 1/24/03

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: DATE: 1/24/03

			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	9268-BASE-02770P-003	0						X			Origin and Identification of Resin		~~X~~	X	02770P.1.05.A.3	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	38				
Don Pfister	45				

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

RECEIVED BY: DATE: 2/11/03
(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)

0005547

5369

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

ORIGINAL

5369

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

X A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: Date: 2/11/03

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

INFORMATION ONLY

SAMPLE

Sue Phouangsavanh
FAX: 281-230-8630

Doc #9268 Base-02770P-003 Rev 0

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9268	SUBMITTAL NO. 20105-9268-02770P-004	REV.: 0	DATE: 01/24/03	Page 1 of 1

FROM:
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073-3598
SIGNATURE: 1/24/03

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: Teresa Schwab DATE: 1/27/03

			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	9268-BASE-02770P-004	0							X		Certification of Welding Rod		~~X~~	X	02770P.1.05.A.4	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
Chuck VanArsdale	64				
Bill Zebick	64				
Mike Godber (Approver)	64				
Kwasi Badu-Tweneboah	38				
Don Pfister	45				

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

RECEIVED BY: DATE: 2/10/03
(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)

009549

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-5369

GSE®

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
713-443-8564
Fax: 281-230-8651

18 December 2002

Fluor Fernald, Inc.
P.O. Box 538704
Cincinnati, OH 45253-8704

Attn: Alan Hohnhorst

RE: Certification for Welding Rod
GSE Project No. 511721

CERTIFICATION

The undersigned, being qualified and authorized to do so, hereby certifies that the high density polyethylene (HDPE) welding rod is of the same type and has the same properties as the GSE HD™ and HD Smooth Edge Textured™ high density polyethylene (HDPE) geomembranes to be supplied to this project.

Sincerely,

John David Griffin
GSE Technical Supervisor

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: Date: 2/11/03

cc: Henry Burgell, GSE Lining Technology, Inc.

INFORMATION ONLY

Doc # 9268-Base-02770P-004 Rev. 0

000550

SUPPLIER DOCUM[illegible] SUBMITTAL

DF PROJECT NO.: 20105

CONTRACT NO: 9268

SUBMITTAL NO. 20105-9268-02770P-005 | REV.: 1 | DATE: 02/13/03 | Page 1 of 1

ROM:
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073-3598

IGNATURE: [illegible] 2/13/03

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

RECEIVED BY: [illegible] DATE: 2/21/03

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	9268-BASE-02770P-005	1							X		Certification of Minimum Average Roll Values		X		02770P.1.05.A.5	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
CDC	52-7				
huck VanArsdale	64				
ill Zebick	64				
ike Godber (Approver)	64				
wasi Badu-Tweneboah	38				
on Pfister	45				

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

ORIGINAL

53699

ECEIVED BY: [illegible] DATE: 3/20/03
(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

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GSE Lining Technology, Inc.

--5369

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

11 February 2003

Chuck VanArsdale
USDOE
C/O Fluor Fernald Inc.
7400 Willey Road
Hamilton OH 45013

RE: **TEST METHODS AND CRITERIA**
FLUOR FERNALD
GSE PROJECT #511721

CERTIFICATION

All HDPE geomembrane supplied for the above project will meet the following criteria:

- Tensile properties tested via ASTM D 638
- Carbon Black Dispersion will meet a value of all 10 views in Categories 1 & 2 per ASTM D 5596.

Nathan Ivy
Product Manager - Geomembranes

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: Date: 3/20/03

INFORMATION ONLY

5369

Product Data Sheet

GSE STANDARD PRODUCTS

GSE HD Smooth Edge Textured

GSE HD Smooth Edge Textured is the textured version of GSE HD. It is a high quality, high density polyethylene (HDPE) geomembrane with 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, and the smooth edges allow for an easier, quicker welding process. *These product specifications meet or exceed GRI GM13.*

Product Specifications

TESTED PROPERTY	TEST METHOD	FREQUENCY	MINIMUM VALUE		
Product Code			HDT040AS03	HDT060AS03	HDT080AS03
Thickness, mils (mm)	ASTM D 5994	every roll	36 (0.91)	54 (1.4)	72 (1.8)
Density, g/cm³	ASTM D 1505	200,000 lb	0.94	0.94	0.94
Tensile Properties (each direction)[1]	ASTM D 6693, Type IV	20,000 lb			
Strength at Break, lb/in-width (N/mm)	Dumbell, 2 ipm		60 (11)	90 (16)	120 (21)
Strength at Yield, lb/in-width (N/mm)			84 (15)	130 (23)	173 (30)
Elongation at Break, %	G.L. = 2.0 in (51 mm)		150	150	150
Elongation at Yield, %	G.L. = 1.3 in (33 mm)		13	13	13
Tear Resistance, lb (N)	ASTM D 1004	45,000 lb	28 (125)	42 (187)	56 (249)
Puncture Resistance, lb (N)	ASTM D 4833	45,000 lb	72 (320)	108 (480)	144 (641)
Carbon Black Content, %	ASTM D 1603	20,000 lb	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	45,000 lb	+Note 1	+Note 1	+Note 1
Notched Constant Tensile Load[2], hrs	ASTM D 5397, Appendix	200,000 lb	400	400	400
REFERENCE PROPERTY	**TEST METHOD**	**FREQUENCY**	**NOMINAL VALUE**		
Thickness, mils (mm)	ASTM D 5994	every roll	40 (1.0)	60 (1.5)	80 (20)
Oxidative Induction Time, minutes	ASTM D 3895, 200° C; O_2, 1 atm	200,000 lb	>100	>100	>100
Roll Length (approximate), ft (m)	Smooth Edge Textured		740 (226)	490 (149)	375 (114)
Roll Width, ft (m)			23 (7.0)	23 (7.0)	23 (7.0)
Roll Area, ft² (m²)			17,020 (1,581)	11,270 (1,047)	8,625 (801)

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 Smooth Edge Textured is available in rolls weighing about 4,000 lb (1,800 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.
- All GSE geomembranes have dimensional stability of ±2% when tested with ASTM D 1204 and LTB of <-77° C when tested with ASTM D 746.

DS006SE R09/30/02

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.

GSE and other marks used in this document are trademarks and service marks of GSE Lining Technology, Inc. certain of which are registered in the U.S.A. and other countries.

000353

Americas	GSE Lining Technology, Inc.	Houston, Texas	800-435-2008	281-443-8564	Fax: 281-230-8650
Europe/Middle East/Africa	GSE Lining Technology GmbH	Hamburg, Germany		49-40-767420	Fax: 49-40-7674233
Asia/Pacific	GSE Lining Technology Company Ltd.	Bangkok, Thailand		66-2-937-0091	Fax: 66-2-937-0097

This product data sheet is also available on our website at:

5369

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GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
713-443-8564
Fax: 281-230-8863

18 December 2002

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

Attn: Alan Hohnhorst

RE: 80 mil HD Smooth Edge Textured Material Properties
GSE Project No. 511721

CERTIFICATION

The undersigned, being qualified and authorized to do so, hereby certifies that standard GSE 80 mil average HD Smooth Edge Textured™ high density polyethylene (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
GSE Technical Supervisor

cc: Henry Burgell, GSE Lining Technology, Inc.

000554

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GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
713-443-8564
Fax: 281-230-8883

18 December 2002

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

Attn: Alan Hohnhorst

RE: 80 mil HD Material Properties
GSE Project No. 511721

CERTIFICATION

The undersigned, being qualified and authorized to do so, hereby certifies that standard GSE 80 mil average HD™ high density polyethylene (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
GSE Technical Supervisor

cc: Henry Burgell, GSE Lining Technology, Inc.

For environmental lining solutions . . . the world comes to GSE™

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GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
713-443-8564
Fax 281-230-8653

18 December 2002

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

Attn: Alan Hohnhorst

RE: 30 mil HD Material Properties
GSE Project No. 511721

CERTIFICATION

The undersigned, being qualified and authorized to do so, hereby certifies that standard GSE 30 mil average HD™ high density polyethylene (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 GML-30S, Technical Information 30 mil Geomembrane Liner with a 95% confidence level.

Sincerely,

John David Griffin
GSE Technical Supervisor

cc: Henry Burgell, GSE Lining Technology, Inc.

000556

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GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
713-443-8564
Fax: 281 - 230 - 8651

18 December 2002

Fluor Fernald, Inc.
P.O. Box 538704
Cincinnati, OH 45253-8704

Attn: Alan Hohnhorst

RE: Certification for NCTL, Dimensional Stability, and Low Temperature Brittleness
GSE Project No. 511721

CERTIFICATION

The undersigned, being qualified and authorized to do so, hereby certifies that standard GSE 80 mil average HD™ and 80 mil average HD Smooth Edge Textured™ high density polyethylene (HDPE) geomembranes will meet or exceed the following specified material property values:

- A minimum thickness value of 76 mil if tested according to ASTM D 5199 (smooth HDPE geomembrane) and ASTM D 5994 (textured HDPE geomembrane).
- A Notched Constant Tensile Load (NCTL) value of 500 hours if tested according to ASTM D 5397, Appendix.
- A Dimensional Stability value of +/- 2% if tested according to ASTM D 1204.
- A Low Temperature Brittleness value of ≤ -60° Celsius if tested according to ASTM D 746.
- An Asperity Height value of 7 mil if tested per GRI Test Method GM12.

Sincerely,

John David Griffin
GSE Technical Supervisor

cc: Henry Burgell, GSE Lining Technology, Inc.

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GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
713-443-8564
Fax: 281 – 230 - 8651

18 December 2002

Fluor Fernald, Inc.
P.O. Box 538704
Cincinnati, OH 45253-8704

Attn: Alan Hollatheer

RE: Certification for NCTL, Dimensional Stability, and Low Temperature Brittleness
GSE Project No. 511721

CERTIFICATION

The undersigned, being qualified and authorized to do so, hereby certifies that standard GSE 80 mil average HD™ and 80 mil average HD Smooth Edge Textured™ high density polyethylene (HDPE) geomembranes will meet or exceed the following specified material property values:

- A Notched Constant Tensile Load (NCTL) value of 500 hours if tested according to ASTM D 5397, Appendix
- A Dimensional Stability value of +/- 2% if tested according to ASTM D 1204.
- A Low Temperature Brittleness value of ≤ -60° Celsius if tested according to ASTM D 746.

Sincerely,

John David Griffin
GSE Technical Supervisor

cc: Henry Burgess, GSE Lining Technology, Inc.

000558

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9268	SUBMITTAL NO. 20105-9268-02770P-008	REV.: 0	DATE: 01/24/03	Page 1 of 1

FROM:
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073-3598
SIGNATURE: [signature] 1/24/03

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: [signature] DATE: 1/27/03

			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	9268-BASE-02770P-008	0						X			Geomembrane Warranty			X	02770P.1.05.A.8	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	38				
Don Pfister	45				

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

Note: This warranty is in addition to the ~~warranty~~ provisions contained in Solicitation #F02PB09268 and does not take precedence over other terms and conditions in the contract with Fluor Fernald.

RECEIVED BY: [signature] DATE: 2/26/03
(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

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

5369

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

SAMPLE

Date:		Warranty No.:	
Purchaser Name:		Project No.:	
Address:		Effective Date:	
City, State:		Project Name:	
Product Type/Description:	GSE Geomembrane 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.

INFORMATION ONLY

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.

Doc # 9268-Base-02770P-008 Rev. 0

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 2/26/03

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9268	SUBMITTAL NO. 20105-9268-02770P-009	REV.: 0	DATE: 01/24/03	Page 1 of 1

FROM:
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073-3598
SIGNATURE: 1/24/03

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: DATE: 1/27/03

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	9268-BASE-02770P-009	0						X			Completed Forms GML-80S, GML-80T, GML-30s		X		02770P.1.05.A.9	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	38				
Don Pfister	45				

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

RECEIVED BY: DATE: 2/11/03
(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)

ORIGINAL

FS-F-4955
Rev. 3: 05/14/1999 CT-2.4.2

TABLE GML-80S TECHNICAL INFORMATION 60 MIL SMOOTH GEOMEMBRANE LINEI

Section K, Attachment III

REQUISITION #F02PB09268

Refer to Specification Section 02770P

5369

SUBMIT THE FOLLOWING INFORMATION WITH THE PROPOSAL

ECIFIED 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~~	78 MILS	YES	D5199
THICKNESS AVERAGE	~~D5994~~	80 MILS	YES	D5199
DENSITY	D1505	0.94 g/cm³ MIN	YES	
CARBON BLACK CONTENT	D1603	2-3%	YES	
CARBON BLACK DISPERSION	D5596	CAT 1 OR 2	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	- 80° 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/cm³ MIN	YES	
MELT FLOW INDEX	D1238 E	1.0g/10 min MAX	YES	
MINIMUM LOT SIZE		100,000 SF	YES	
...XIMUM ADDITIVES/FILLERS		1%	YES	
...DING ROD RESIN SHALL BE COMPATIBLE WITH SPECIFIED REQUIREMENTS ON THIS PAG				
...BMITTALS REQUIRED TO BE PROVIDED WITH PROPOSAL				SUPPLIER MUST INDICATE WHERE REQUIRED SUBMITTALS ARE INCLUDED IN THE PROPOSAL
NAME AND PHONE # OF CONTACT PERSON		Scott Biondi		609-584-0788
DAILY PRODUCTION CAPACITY			YES	REFER TO 02770P.1.05.A.1.a
MQC PROCEDURES			YES	REFER TO 02770P.1.05.A.1.b
LIST OF MATERIAL PROPERTIES			YES	REFER TO 02770P.1.05.A.1.c
LIST OF 10 FACILITIES			YES	REFER TO 02770P.1.05.A.2
RESIN INFORMATION			YES	REFER TO 02770P.1.05.A.3
CERTIFICATION OF HDPE WELDING ROD COMPATIBILITY			YES	REFER TO 02770P.1.05.A.4
CERTIFICATION OF MARV AND CORRESPONDING TEST PROCEDURES			YES	REFER TO 02770P.1.05.A.5
STORAGE REQUIREMENTS AND LIMITATIONS			YES	REFER TO 02770P.1.05.A.6
INSTALLATION PROCEDURES			YES	REFER TO 02770P.1.05.A.7
MANUFACTURER WARRANTY			YES	REFER TO 02770P.1.05.A.8
MSDS			YES	REFER TO 02770P.1.05.A.10
TESTING FREQUENCY				
DENSITY	1/40,000 SF		YES	
THICKNESS	1/40,000 SF		YES	[X] A-Conforms to the Subcontract Requirements
TENSILE PROPERTIES	1/40,000 SF		YES	[ ] B-Minor Comment - Incorporate and Resubmit
CARBON BLACK PROPERTIES	1/40,000 SF		YES	[ ] C-Revise and Resubmit
TEAR RESISTANCE	1/40,000 SF		YES	Sig. [signature] Date: 2/10/03
PUNCTURE RESISTANCE	1/40,000 SF		YES	
ENVIRO STRESS CRACK	1/400,000 SF		YES	INFORMATION
LOW TEMP BRITTLENESS	1/400,000 SF		YES	
DIMENSIONAL STABILITY	1/400,000 SF		YES	ONLY
...JECTED DELIVERY DATES				INDICATE DATE RANGE TO BE DELIVERED
...AL QUANTITY	30,000 SF			3/24/03 - 4/28/03

Doc# 9268-Base-02770P-009 Rev 0

Signature [signature]

DATE 22 Jan 2003

NAME OF BIDDER

TABLE GML-80SMOOTH

000562

Revised 1/14/2003

TABLE GML-80T TECHNICAL INFORMATION GEOMEMBRANE LINER
REQUISITION #F02PB09268

Section K, Attachment III
Refer to Specification Section 02770P

5369

SUBMIT THE FOLLOWING INFORMATION WITH THE PROPOSAL

ECIFIED 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/cm³ 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/cm³	YES	
MELT FLOW INDEX	D1238 E	1.0g/10 min MAX	YES	
MINIMUM LOT SIZE		100,000 SF	YES	
XIMUM ADDITIVES/FILLERS		1%	YES	
MITTALS REQUIRED TO BE PROVIDED WITH PROPOSAL				SUPPLIER MUST INDICATE WHERE REQUIRED SUBMITTALS ARE INCLUDED IN THE PROPOSAL
NAME AND PHONE # OF CONTACT PERSON		Scott Biondi		609-584-0788
DAILY PRODUCTION CAPACITY			YES	REFER TO 02770P.1.05.A.1.a
MQC PROCEDURES			YES	REFER TO 02770P.1.05.A.1.b
LIST OF MATERIAL PROPERTIES			YES	REFER TO 02770P.1.05.A.1.c
LIST OF 10 FACILITIES			YES	REFER TO 02770P.1.05.A.2
RESIN INFORMATION			YES	REFER TO 02770P.1.05.A.3
CERTIFICATION OF HDPE WELDING ROD COMPATIBILITY			YES	REFER TO 02770P.1.05.A.4
CERTIFICATION OF MARV AND CORRESPONDING TEST PROCEDURES			YES	REFER TO 02770P.1.05.A.5
STORAGE REQUIREMENTS AND LIMITATIONS			YES	REFER TO 02770P.1.05.A.6
INSTALLATION PROCEDURES			YES	REFER TO 02770P.1.05.A.7
MANUFACTURER WARRANTY			YES	REFER TO 02770P.1.05.A.8
MSDS			YES	REFER TO 02770P.1.05.A.10
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	
ROJECTED DELIVERY DATES				INDICATED DATE RANGE TO BE DELIVERED
TAL QUANTITY	1,175,000 SF			3/24/03 — 4/14/03

7 INCH ± 2 INCH SMOOTH EDGE.

TEXTURED GEOMEMBRANE MUST BE MANUFACTURED WITH ~~A 5 INCH +/- 1~~ INCH ~~SMOOTH EDGE~~.

Signature

DATE 22 January 2003

NAME OF BIDDER

000563

REQUISITION #F02PB09268 GML-30S

5369

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
CAL PROPERTIES				
THICKNESS MINIMUM	D5994	27 MILS	Yes	
THICKNESS AVERAGE	D5994	30 MILS	Yes	
DENSITY	D1505	0.94 g/cm³ MIN	Yes	
CARBON BLACK CONTENT	D1603	2-3%	Yes	
CARBON BLACK DISPERSION	D5596	CAT 1 OR 2	Yes	
MECHANICAL PROPERTIES				
STRENGTH AT YIELD	D638 - TYPE IV	65 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
TEAR RESISTANCE	D1004	20 LB MIN	Yes	Die C Puncture
ROLL SIZE		20 FT WIDE, (MIN), 390 FT LENGTH (MIN)	Yes	
RESIN PROPERTIES				
PERCENT VIRGIN RESIN		98% MIN	Yes	
DENSITY	D1505 or D792 A	0.934 g/cm³	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 CIFIED REQUIREMENTS ON THIS SHEET				
CTED DELIVERY DATES				INDICATED DATE RANGE TO BE DELIVERED
QUANTITY	28,000 SF			4/7/03 to 4/28/03

Signature

DATE 12/6/02

NAME OF BIDDER GSE Lining Technology, Inc.

Revised 11/1/2002

000564

SUPPLIER DOCUMENT SUBMITTAL

DF PROJECT NO.: 20105	CONTRACT NO: 9268	SUBMITTAL NO. 20105-9268-02770P-011	REV.: 0	DATE: 03/17/03	Page 1 of 1

ROM:
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073-3598
IGNATURE: 3/17/03

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: Susie Schwab DATE: 3/17/03

			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	9268-BASE-02770P-011	0							X		Quality Control Certificates for Resin		X		02770P.1.05.B.1	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
Chuck VanArsdale	64				
Bill Zebick	64				
Mike Godber (Approver)	64				
Kwasi Badu-Tweneboah	38				
Don Pfister	45				

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

RECEIVED BY: DATE: 3/18/03
(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

00059539

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

5369

CoA Date: 12/19/2002

Certificate of Analysis

Shipped To: GSE LINING TECHNO
WESTFIELD
WESTFIELD TX 77090
USA

Recipient: DON BOHAC
Fax: 281-230-8630

CPC Delivery #: 86275652
PO #:
Weight: 182500 LB
Ship Date: 12/19/2002
Package: BULK
Mode: Hopper Car
Car #: PSPX003151

Product:
MARLEX POLYETHYLENE K306 BULK

Lot Number: 8221454

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.080	g/10mi
HLMI Flow Rate	ASTM D1238	12.20	g/10ml
Density	ASTM D1505	0.9370	g/cm3

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

Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Peter Scheirman at 713-289-4799

INFORMATION ONLY

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: _____ Date: 3/20/03

000566

Chevron Phillips Chemical Company LP

CoA Date: 01/03/2003

5369

Certificate of Analysis

Shipped To: GSE LINING TECHNO
WESTFIELD
WESTFIELD TX 77090
USA

Recipient: DON BOHAC
Fax: 281-230-8630

CPC Delivery #: 86282754
PO #:
Weight: 147400 LB
Ship Date: 01/03/2003
Package: BULK
Mode: Hopper Car
Car #: PSPX006631

Product:
MARLEX POLYETHYLENE K306 BULK

Lot Number: 8221460

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.100	g/10mi
HLMI Flow Rate	ASTM D1238	13.50	g/10mi
Density	ASTM D1505	0.9370	g/cm3

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

Paul S. Newbold

Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Peter Scheirman at 713-289-4799

000567

80 MIL SMOOTH

CoA Date: 01/03/2003

5369

Certificate of Analysis

Shipped To: GSE LINING TECHNO
WESTFIELD
WESTFIELD TX 77090
USA

Recipient: DON BOHAC
Fax: 281-230-8630

CPC Delivery #: 86282756
PO #:
Weight: 182400 LB
Ship Date: 01/03/2003
Package: BULK
Mode: Hopper Car
Car #: PSPX005898

Product:
MARLEX POLYETHYLENE K306 BULK

Lot Number: 8221511

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.070	g/10mi
HLMI Flow Rate	ASTM D1238	10.90	g/10mi
Density	ASTM D1505	0.9370	g/cm3

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Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Peter Scheirman at 713-289-4799

000568

CoA Date: 01/08/2003

5369

Certificate of Analysis

Shipped To: GSE LINING TECHNO
WESTFIELD
WESTFIELD TX 77090
USA

Recipient: DON BOHAC
Fax: 281-230-8630

CPC Delivery #: 86286786
PO #:
Weight: 182900 LB
Ship Date: 01/08/2003
Package: BULK
Mode: Hopper Car
Car #: PSPX006135

Product:
MARLEX POLYETHYLENE K306 BULK

Lot Number: 8221514

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.080	g/10mi
HLMI Flow Rate	ASTM D1238	10.20	g/10mi
Density	ASTM D1505	0.9370	g/cm3

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Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Peter Scheirman at. 713-289-4799

000569

Chevron Phillips Chemical Company LP

CoA Date: 01/08/2003

5369

Certificate of Analysis

Shipped To: GSE LINING TECHNO
WESTFIELD
WESTFIELD TX 77090
USA

Recipient: DON BOHAC
Fax: 281-230-8630

CPC Delivery #: 86286788
PO #:
Weight: 181200 LB
Ship Date: 01/08/2003
Package: BULK
Mode: Hopper Car
Car #: PTLX042322

Product:
MARLEX POLYETHYLENE K306 BULK

Lot Number: 8221520

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.070	g/10mi
HLMI Flow Rate	ASTM D1238	10.10	g/10mi
Density	ASTM D1505	0.9370	g/cm3

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Paul S. Newbold

Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Peter Scheirman at 713-289-4799

000570

30 MIL SMOOTH

5369

BP SOLVAY Polyethylene

CERTIFICATE OF ANALYSIS
Batch: C020916L04

Information Provided to:	Shipped To:
GSE LINING TECHNOLOGY INC 19103 GUNDLE RD HOUSTON, TX 77073 *Contact:* DON BOHAC *Fax:* 281-230-8630	GSE LINING TECH - WESTFIELD UP TRACK 14732 WESTFIELD TX USA

Order information on Shipment of:	Sold-To:
FORTIFLEX™ G36-10-150 PE PELLETS	GSE LINING TECHNOLOGY INC

Customer Purchase Order No.:	Material Code:	Dry Short Tons:	Delivery / BOL No.:
21317	63885		80394688

Shipping Date:	Shipping Vehicle No.:	Net Weight	Number and Type of Package:
10/25/2002	ELTX003049	181,400 LB	1 RAIL CAR

Comment(s):

CUSTOMER SPECIFICATION ANALYSIS	METHOD	RESULT	UNIT	MIN	MAX
MI 2.16 (1X)	ASTM D1238-00	0.10	g/10mn		
MI 21.6 (HLMI)	ASTM D1238-00	10.6	g/10mn		
DENSITY (NATURAL RESIN)	ASTM D4883-99	0.9382	g/cm3		

Responsible Care™

ACCREDITED 308-01

SUPPLIER:	APPROVED BY:
BP SOLVAY POLYETHYLENE NORTH AME 3333 RICHMOND AVE 77098-3099 HOUSTON Phone: 800-527-5419	Olton Decuire Quality Assurance Manager BP SOLVAY PO BOX 1000 DEER PARK, TX 77536-1000 Phone: 713-307-3740

000571

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SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9268	SUBMITTAL NO. 20105-9268-02770P-012	REV.: 0	DATE: 03/17/03	Page 1 of 1

FROM:
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073-3598
SIGNATURE: 3/17/03

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: DATE: 3/17/03

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	9268-BASE-02770P-012	0						X			Test Reports of Resin		X		02770P.1.05.B.2	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	38				
Don Pfister	45				

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

OK 03-03-2

5369

RECEIVED BY: Charles C. Van Arsdale DATE: 3/20/03
(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

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

Chevron Phillips Chemical Company LP

CoA Date: 12/19/2002

Certificate of Analysis

Shipped To: GSE LINING TECHNO
WESTFIELD
WESTFIELD TX 77090
USA

Recipient: DON BOHAC
Fax: 281-230-8630

CPC Delivery #: 86275652
PO #:
Weight: 182500 LB
Ship Date: 12/19/2002
Package: BULK
Mode: Hopper Car
Car #: PSPX003151

Product:
MARLEX POLYETHYLENE K306 BULK

Lot Number: 8221454

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.080	g/10mi
HLMI Flow Rate	ASTM D1238	12.20	g/10ml
Density	ASTM D1505	0.9370	g/cm3

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

Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Peter Scheirman at 713-289-4799

INFORMATION ONLY

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: _____ Date: 3/20/03

Chevron Phillips Chemical Company LP

CoA Date: 01/03/2003

5369

Certificate of Analysis

Shipped To: GSE LINING TECHNO
WESTFIELD
WESTFIELD TX 77090
USA

Recipient: DON BOHAC
Fax: 281-230-8630

CPC Delivery #: 86282754
PO #:
Weight: 147400 LB
Ship Date: 01/03/2003
Package: BULK
Mode: Hopper Car
Car #: PSPX006631

Product:
MARLEX POLYETHYLENE K306 BULK

Lot Number: 8221460

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.100	g/10mi
HLMI Flow Rate	ASTM D1238	13.50	g/10mi
Density	ASTM D1505	0.9370	g/cm3

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Paul S. Newbold

Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Peter Scheirman at 713-289-4799

000574

80 MIL SMOOTH

CoA Date: 01/03/2003

5369

Certificate of Analysis

Shipped To: GSE LINING TECHNO
WESTFIELD
WESTFIELD TX 77090
USA

Recipient: DON BOHAC
Fax: 281-230-8630

CPC Delivery #: 86282756
PO #:
Weight: 182400 LB
Ship Date: 01/03/2003
Package: BULK
Mode: Hopper Car
Car #: PSPX005898

Product:
MARLEX POLYETHYLENE K306 BULK

Lot Number: 8221511

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.070	g/10mi
HLMI Flow Rate	ASTM D1238	10.90	g/10mi
Density	ASTM D1505	0.9370	g/cm3

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Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Peter Scheirman at 713-289-4799

000575

CoA Date: 01/08/2003

5369

Certificate of Analysis

Shipped To: GSE LINING TECHNO
WESTFIELD
WESTFIELD TX 77090
USA

Recipient: DON BOHAC
Fax: 281-230-8630

CPC Delivery #: 86286786
PO #:
Weight: 182900 LB
Ship Date: 01/08/2003
Package: BULK
Mode: Hopper Car
Car #: PSPX006135

Product:
MARLEX POLYETHYLENE K306 BULK

Lot Number: 8221514

operty	Test Method	Value	Unit
Melt Index	ASTM D1238	0.080	g/10mi
HLMI Flow Rate	ASTM D1238	10.20	g/10mi
Density	ASTM D1505	0.9370	g/cm3

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Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Peter Scheirman at 713-289-4799

000576

Chevron Phillips Chemical Company LP

CoA Date: 01/08/2003

5369

Certificate of Analysis

Shipped To: GSE LINING TECHNO
WESTFIELD
WESTFIELD TX 77090
USA

Recipient: DON BOHAC
Fax: 281-230-8630

CPC Delivery #: 86286788
PO #:
Weight: 181200 LB
Ship Date: 01/08/2003
Package: BULK
Mode: Hopper Car
Car #: PTLX042322

Product:
MARLEX POLYETHYLENE K306 BULK

Lot Number: 8221520

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.070	g/10mi
HLMI Flow Rate	ASTM D1238	10.10	g/10mi
Density	ASTM D1505	0.9370	g/cm3

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

Paul S. Newbold

Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Peter Scheirman at 713-289-4799

000577

30 MIL SMOOTH

5369

BP SOLVAY Polyethylene

CERTIFICATE OF ANALYSIS
Batch: C020916L04

Information Provided to:	Shipped To:
GSE LINING TECHNOLOGY INC 19103 GUNDLE RD HOUSTON, TX 77073 *Contact:* DON BOHAC *Fax:* 281-230-8630	GSE LINING TECH - WESTFIELD UP TRACK 14732 WESTFIELD TX USA

Order information on Shipment of:	Sold-To:
FORTIFLEX™ G36-10-150 PE PELLETS	GSE LINING TECHNOLOGY INC

Customer Purchase Order No.:	Material Code:	Dry Short Tons:	Delivery / BOL No.:
21317	63885		80394688

Shipping Date:	Shipping Vehicle No.:	Net Weight	Number and Type of Package:
10/25/2002	ELTX003049	181,400 LB	1 RAIL CAR

Comment(s):

CUSTOMER SPECIFICATION ANALYSIS	METHOD	RESULT	UNIT	MIN	MAX
MI 2.16 (1X)	ASTM D1238-00	0.10	g/10mn		
MI 21.6 (HLMI)	ASTM D1238-00	10.6	g/10mn		
DENSITY (NATURAL RESIN)	ASTM D4883-99	0.9382	g/cm3		

Responsible Care™

ACCREDITED 308-01

SUPPLIER:	APPROVED BY:
BP SOLVAY POLYETHYLENE NORTH AME 3333 RICHMOND AVE 77098-3099 HOUSTON Phone: 800-527-5419	Olton Decuire Quality Assurance Manager BP SOLVAY PO BOX 1000 DEER PARK, TX 77536-1000 Phone: 713-307-3740

THIS REPORT CANNOT BE COPIED OR REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF THE BP SOLVAY ANALYTICAL AND QUALITY SERVICES DEPARTMENT. RESULTS APPLY ONLY TO THE ITEMS TESTED. THIS DOCUMENT CONTAINS INFORMATION THAT MAY BE CONFIDENTIAL AND IS INTENDED ONLY FOR THE USE OF THE ADDRESSEE. USE OF THIS INFORMATION BY ANYONE ELSE IS STRICTLY PROHIBITED. IF YOU HAVE RECEIVED THIS IN ERROR, PLEASE NOTIFY US BY PHONE AT 713-307-3740.

000578

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9268	SUBMITTAL NO. 20105-9268-02770P-013	REV.: 0	DATE: 03/10/03	Page 1 of 1

FROM:
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073-3598
SIGNATURE: 3/10/03

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: Teresa Schwab DATE: 3/10/03

			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	9268-BASE-02770P-013	0							X		Certification of Resin Polymer		X		02770P.1.05.B.3	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
Chuck VanArsdale	64				
Bill Zebick	64				
Mike Godber (Approver)	64				
Kwasi Badu-Tweneboah	38				
Don Pfister	45				

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

003579

3/20/03
MG 3/17/03

53369

RECEIVED BY: DATE: 3/17/03
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

SUBMITTAL TYPE: (BY SUPPLIER)	SUBMITTAL ACTION CODE: (BY FDF)
CFC - CERTIFIED FOR CONSTRUCTION	A - Conforms to the Subcontract Requirements
INF - INFORMATION/RECORD	B - Minor Comments - Incorporate and Resubmit
DRFT - DRAFT/PRELIMINARY	C - Revise and Resubmit (SEE COMMENTS)

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

ORIGINAL

5369

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
713-443-8584
Fax: 281 - 230 - 8563

03 March 2003

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

RE: Certification of No Reclaimed Polymer
GSE Project No. 511721

CERTIFICATION

The undersigned, being qualified and authorized to do so, hereby certifies that standard GSE 80 mil average HD™ and 80 mil average HD Textured™ HDPE geomembranes will meet or exceed the following specified property values and/or conditions:

- GSE certifies that no reclaimed polymer will be used in the production of materials for the referenced project. 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
GSE Technical Supervisor

cc: Sheri Sim-Connell, GSE Lining Technology, Inc.

INFORMATION ONLY

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: Date: 3/20/03

000580

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9268	SUBMITTAL NO. 20105-9268-02770P-014	REV.: 1	DATE: 03/24/03	Page 1 of 1

FROM:
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073-3598
SIGNATURE: 3/24/03

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: DATE: 3/24/03

			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	9268-BASE-02770P-014	1							X		Manufacturing Certificates per Shift Production of Geomembrane		X		02770P.1.05.C	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
Chuck VanArsdale	64				
Bill Zebick	64				
Mike Godber (Approver) BH	64				
Kwasi Badu-Tweneboah	38				
Don Pfister	45				

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

RECEIVED BY: DATE: 5/7/03
(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

T8 5 0 0 5 9

53969

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

5369

Report Date
3/21/2003

Quality Assurance Laboratory Test Results

Job Name: Fluor Fernald Geomembrane Supply
SO Number: 27946

Test: ASTM D 5397 - Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load

Customer Criteria: 500 hrs

Lot Number	Test Result
8221454	Pass
8221460	Pass
8221514	Pass
8221520	Pass
8221511	Pass
C020916L04	Pass

x A

5/7/03

Approved By: Jane Allen
Date Approved: 3/21/2003

INFORMATION ONLY

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.

5369

Report Date
3/20/2003

Quality Assurance Laboratory Test Results

Job Name: Fluor Fernald Geomembrane Supply
Job Number: 27946

Test: ASTM D 1204 - Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting

Customer Frequency: 1/400,000 sf

Customer Criteria: +/- 2 %

Roll Number	Test Result
102103201	PASS
102103238	PASS
102103288	PASS
102103330	PASS
105114581	PASS
105114582	PASS
104116320	PASS
102103270	PASS
102103348	PASS

Approved By: Jane Allen
Date Approved: 3/20/2003

000583

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5369 Report Date 3/20/2003

Quality Assurance Laboratory Test Results

Job Name: Fluor Fernald Geomembrane Supply
SO Number: 27946

Test: D 746-Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.

Customer Frequency: 1/400,000

Customer Criteria: -60°C

Roll Number	Test Result
102103201	PASS
102103238	PASS
102103288	PASS
102103330	PASS
105114581	PASS
105114582	PASS
104116320	PASS
102103270	PASS
102103348	PASS

Approved By: Jane Allen
Date Approved: 20-Mar-03

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SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9268	SUBMITTAL NO. 20105-9268-02770P-014	REV.: 0	DATE: 03/17/03	Page 1 of 1

FROM:
GSE Lining Technology
19103 Gundle Road
Houston, TX 77073-3598
SIGNATURE: [signature] 3/17/03

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: [signature] DATE: 3/17/03

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	9268-BASE-02770P-014	0							X		Manufacturing Certificates per Shift Production of Geomembrane		X		02770P.1.05.C		X	

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
Chuck VanArsdale	64				
Bill Zebick	64				
Mike Godber (Approver)	64				
Kwasi Badu-Tweneboah	38				
Don Pfister	45				

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

R ALTHOUGH YOUR SUBMITTAL SHOWS THE TEST METHODS ASTM D5397, D746, + D1204 MEET THE 400,000 SF REQUIREMENT, THESE TESTS SHALL ALSO BE CONDUCTED ONCE PER RESIN LOT.

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)

Report Date
3/11/2003

5369

GSE

Quality Assurance Laboratory Test Results

Job Name: Fluor Fernald Geomembrane Supply
SO Number: 27946

Test: ASTM D 5397 - Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load

Customer Frequency: 1/400,000 sf

Customer Criteria: 500

ROLL NUMBER ~~Lot Number~~	Test Result
102103201	Pass
102103238	Pass
102103288	Pass
102103330	Pass
105114581	Pass
105114582	Pass
104116320	Pass

INFORMATION ONLY

[ ] A-Conforms to the Subcontract Requirements
[X] B-Minor Comments [illegible] and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 3/20/03

Approved By: Jane Allen
Date Approved: 3/12/2003

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5369 Report Date 3/11/2003

Quality Assurance Laboratory Test Results

Job Name: Fluor Fernald Geomembrane Supply
SO Number: 27946

Test: D 746-Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.

Customer Frequency: 1/400,000

Customer Criteria: -60°C

Roll Number	Test Result
102103201	PASS
102103238	PASS
102103288	PASS
102103330	PASS
105114581	PASS
105114582	PASS
104116320	PASS

Approved By: Jane Allen
Date Approved: 11-Mar-03

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5369

Report Date
3/11/2003

Quality Assurance Laboratory Test Results

Job Name: Fluor Fernald Geomembrane Supply
Job Number: 27946

Test: ASTM D 1204 - Standard Test Method for Linear Dimensional Changes of Non-Rigid Thermoplastic Sheeting

Customer Frequency: 1/400,000 sf

Customer Criteria: +/- 2 %

Roll Number	Test Result
102103201	PASS
102103238	PASS
102103288	PASS
102103330	PASS
105114581	PASS
105114582	PASS
104116320	PASS

Approved By: Jane Allen
Date Approved: 3/11/2003

000588

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30 MIL SMOOTH

GSE Roll Allocation

5369

Order 27946
Customer Fluor Fernald Geomembrane Supply
Site Fluor Fernald

Roll#	*Resin Lot*	*Product Code*	*Description*	*Mfg. Date*	*Length*
105114581	C020916L04	HDE030A000	HDE030A000	12/21/2002	1120
105114582	C020916L04	HDE030A000	HDE030A000	12/21/2002	1120

000589

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 105114581

ROLL IDENTIFICATION

Roll Number	105114581
Product Name	HDE030A000
Production Date	12/21/2002

Length ≈(+/-1%)	1,120 341	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	25,200 2,341	sq. feet sq. meters
Weight	3,790 1,719	pounds kilograms

RESIN INFORMATION

Lot Number	C020916L04
Type	G36-10-150 — 5369
Supplier	Solvay

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 5199 D5994					
Average		every roll	30	(0.75)	31	(0.78)
Minimum		every roll	27	(0.67)	29	(0.72)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	65	(114)	75	(132)
- MD		every roll	65	(114)	68	(119)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	176	(308)
- MD		every roll	120	(210)	162	(284)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		19	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		946	
- MD	(51 mm)	every roll	100		800	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	20	(89)	30	(135)
- MD		every roll	20	(89)	27	(119)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	59	(260)	83	(371)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 3rd	39	(174)	65	(289)
Density, g/cc	ASTM D 1505	every 3rd	0.940		0.940	
Carbon Black Content, %	ASTM D 1603*	every 3rd	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015	every 3rd	A2		A2	
Carbon Black Dispersion Views in Cat1 - Cat2	ASTM D 5596	every 3rd	9		10	
ESCR, (hr)	ASTM D 1693 Cond. B Start Date = 12/27/02	1/resin lot	1500		Pending	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

GSF-4.10-007 Rev - - 07/00

000590

APPROVED M.M. 12/21/2002 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 105114582

ROLL IDENTIFICATION

Roll Number	105114582
Product Name	HDE030A000
Production Date	12/21/2002

Length ≈(+/- 1%)	1,120 341	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	25,200 2,341	sq. feet sq. meters
Weight	3,825 1,735	pounds kilograms

RESIN INFORMATION

Lot Number	C020916L04
Type	G36-10-150
Supplier	Solvay

5369

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 5199					
Average		every roll	30	(0.75)	30	(0.77)
Minimum		every roll	27	(0.67)	29	(0.72)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	65	(114)	76	(132)
- M D		every roll	65	(114)	70	(123)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	176	(309)
- M D		every roll	120	(210)	169	(296)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		19	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		928	
- M D	(51 mm)	every roll	100		821	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	20	(89)	30	(134)
- M D		every roll	20	(89)	28	(124)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	59	(260)	84	(376)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 3rd	39	(174)	65	(289)
Density, g/cc	ASTM D 1505					
		every 3rd	0.940		0.940	
Carbon Black Content, %	ASTM D 1603*					
		every 3rd	2.0		2.5	
Carbon Black Dispersion	ASTM D 3015					
		every 3rd	A2		A2	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 3rd	9		10	
ESCR, (hr)	ASTM D 1693 Cond. B					
	Start Date = 12/27/02	1/resin lot	1500		Pending	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

GSE-4.10-007 Rev - - 07/00

000591

APPROVED M.M. 12/21/2002 QA

80 MIL SMOOTH

GSE Roll Allocation

5369

Order 27946
Customer Fluor Fernald Geomembrane Supply
Site Fluor Fernald

Roll#	*Resin Lot*	*Product Code*	*Description*	*Mfg. Date*	*Length*
104116320	8221511	HDE080A000	HDE080A000	2/5/2003	430
104116321	8221511	HDE080A000	HDE080A000	2/5/2003	430
104116322	8221511	HDE080A000	HDE080A000	2/5/2003	430
104116323	8221511	HDE080A000	HDE080A000	2/5/2003	430

000532

GSE Lining Technology, Inc.

Roll Test Data Report

5369

Roll No. 104116320

ROLL IDENTIFICATION

Roll Number	104116320
Product Name	HDE080A000
Production Date	2/5/2003

Length ≈(+/- 1%)	430 131	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,675 898	sq. feet sq. meters
Weight	4,027 1,827	pounds kilograms

RESIN INFORMATION

Lot Number	8221511
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)	0.07

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5199					
Average		every roll	80	(2.02)	81	(2.07)
Minimum		every roll	78	(1.97)	79	(2.01)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	200	(350)
- M D		every roll	168	(294)	191	(334)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	441	(772)
- M D		every roll	120	(210)	399	(699)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		19	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		928	
- M D	(51 mm)	every roll	100		848	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	66	(295)
- M D		every roll	56	(249)	70	(311)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	185	(823)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 4th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
Carbon Black Dispersion	ASTM D 3015					
		every 4th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

GSE-4.10-007 Rev - - 07/00

000593

APPROVED D.G. 2/6/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

5369

Roll No. 104116321

ROLL IDENTIFICATION

Roll Number	104116321
Product Name	HDE080A000
Production Date	2/5/2003

Length ≈(+/- 1%)	430 131	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,675 898	sq. feet sq. meters
Weight	4,046 1,835	pounds kilograms

RESIN INFORMATION

Lot Number	8221511
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)	0.07

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5199					
Average		every roll	80	(2.02)	83	(2.10)
Minimum		every roll	78	(1.97)	78	(1.98)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	203	(356)
- M D		every roll	168	(294)	196	(343)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	439	(769)
- M D		every roll	120	(210)	398	(697)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		917	
- M D	(51 mm)	every roll	100		835	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	66	(295)
- M D		every roll	56	(249)	71	(314)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	187	(831)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 4th	105	(467)	138	(614)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.943	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
Carbon Black Dispersion	ASTM D 3015					
		every 4th	A2		A1	
Carbon Black Dispersion	ASTM D 5596					
Views in Cat1 - Cat2		every 4th	10		10	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

GSE-4.10-007 Rev - - 07/00

000594

APPROVED D.G. 2/6/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

5369

Roll No. 104116322

ROLL IDENTIFICATION

Roll Number	104116322
Product Name	HDE080A000
Production Date	2/5/2003

Length ≈(+/- 1%)	430 131	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,675 898	sq. feet sq. meters
Weight	4,039 1,832	pounds kilograms

RESIN INFORMATION

Lot Number	8221511
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)	0.07

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5199					
Average		every roll	80	(2.02)	82	(2.09)
Minimum		every roll	78	(1.97)	79	(2.01)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	208	(364)
- M D		every roll	168	(294)	198	(347)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	441	(771)
- M D		every roll	120	(210)	396	(693)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		907	
- M D	(51 mm)	every roll	100		827	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	67	(298)
- M D		every roll	56	(249)	70	(313)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	186	(829)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 4th	105	(467)	137	(610)
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 4th	A2		A1	
Carbon Black Dispersion Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000595

APPROVED D.G. 2/6/2003 QA

GSE-4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

5369

Roll No. 104116323

ROLL IDENTIFICATION

Roll Number	104116323
Product Name	HDE080A000
Production Date	2/5/2003

Length ≈(+/- 1%)	430 131	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	9,675 898	sq. feet sq. meters
Weight	4,040 1,833	pounds kilograms

RESIN INFORMATION

Lot Number	8221511
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)	0.07

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 5199					
Average		every roll	80	(2.02)	83	(2.10)
Minimum		every roll	78	(1.97)	79	(2.01)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	207	(361)
- M D		every roll	168	(294)	198	(347)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	435	(762)
- M D		every roll	120	(210)	397	(695)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		894	
- M D	(51 mm)	every roll	100		827	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	66	(294)
- M D		every roll	56	(249)	70	(312)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	186	(828)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 4th	105	(467)	137	(610)
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 4th	A2		A1	
Carbon Black Dispersion Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000536

APPROVED D.G. 2/6/2003 QA

80 MIL TEXTURED

GSE Roll Allocation

5369

Order 27946
Customer Fluor Fernald Geomembrane Supply
Site Fluor Fernald

Roll#	Resin Lot	Product Code	Description	Mfg. Date	Length
102103201	8221454	HDT080AS03	HDT080AS03	1/27/2003	390
102103202	8221454	HDT080AS03	HDT080AS03	1/27/2003	390
102103203	8221454	HDT080AS03	HDT080AS03	1/27/2003	390
102103204	8221454	HDT080AS03	HDT080AS03	1/27/2003	390
102103205	8221454	HDT080AS03	HDT080AS03	1/28/2003	390
102103206	8221454	HDT080AS03	HDT080AS03	1/28/2003	390
102103207	8221454	HDT080AS03	HDT080AS03	1/28/2003	390
102103208	8221454	HDT080AS03	HDT080AS03	1/28/2003	390
102103209	8221454	HDT080AS03	HDT080AS03	1/28/2003	390
102103210	8221454	HDT080AS03	HDT080AS03	1/28/2003	390
102103211	8221454	HDT080AS03	HDT080AS03	1/28/2003	390
102103212	8221454	HDT080AS03	HDT080AS03	1/28/2003	390
102103213	8221454	HDT080AS03	HDT080AS03	1/28/2003	390
102103214	8221454	HDT080AS03	HDT080AS03	1/28/2003	390
102103215	8221454	HDT080AS03	HDT080AS03	1/28/2003	390
102103216	8221454	HDT080AS03	HDT080AS03	1/28/2003	390
102103217	8221454	HDT080AS03	HDT080AS03	1/28/2003	390
102103218	8221454	HDT080AS03	HDT080AS03	1/28/2003	390
102103220	8221454	HDT080AS03	HDT080AS03	1/29/2003	390
102103221	8221454	HDT080AS03	HDT080AS03	1/29/2003	390
102103222	8221454	HDT080AS03	HDT080AS03	1/29/2003	390
102103223	8221454	HDT080AS03	HDT080AS03	1/29/2003	390
102103224	8221454	HDT080AS03	HDT080AS03	1/29/2003	390
102103225	8221454	HDT080AS03	HDT080AS03	1/29/2003	390
102103226	8221454	HDT080AS03	HDT080AS03	1/29/2003	390
102103227	8221454	HDT080AS03	HDT080AS03	1/29/2003	390
102103228	8221454	HDT080AS03	HDT080AS03	1/29/2003	390
102103229	8221454	HDT080AS03	HDT080AS03	1/29/2003	390
102103230	8221454	HDT080AS03	HDT080AS03	1/29/2003	390
102103231	8221454	HDT080AS03	HDT080AS03	1/29/2003	390
102103234	8221454	HDT080AS03	HDT080AS03	1/29/2003	390
102103235	8221454	HDT080AS03	HDT080AS03	1/30/2003	390
102103236	8221454	HDT080AS03	HDT080AS03	1/30/2003	390
102103237	8221454	HDT080AS03	HDT080AS03	1/30/2003	390
102103238	8221454	HDT080AS03	HDT080AS03	1/30/2003	390

Order 27946
Customer Fluor Fernald Geomembrane Supply
Site Fluor Fernald

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Roll#	*Resin Lot*	*Product Code*	*Description*	*Mfg. Date*	*Length*
102103239	8221454	HDT080AS03	HDT080AS03	1/30/2003	390
102103240	8221454	HDT080AS03	HDT080AS03	1/30/2003	390
102103251	8221460	HDT080AS03	HDT080AS03	1/31/2003	390
102103252	8221460	HDT080AS03	HDT080AS03	1/31/2003	390
102103253	8221460	HDT080AS03	HDT080AS03	1/31/2003	390
102103254	8221460	HDT080AS03	HDT080AS03	1/31/2003	390
102103256	8221460	HDT080AS03	HDT080AS03	1/31/2003	390
102103257	8221460	HDT080AS03	HDT080AS03	1/31/2003	390
102103258	8221460	HDT080AS03	HDT080AS03	1/31/2003	390
102103259	8221460	HDT080AS03	HDT080AS03	1/31/2003	390
102103260	8221460	HDT080AS03	HDT080AS03	1/31/2003	390
102103261	8221460	HDT080AS03	HDT080AS03	1/31/2003	390
102103262	8221460	HDT080AS03	HDT080AS03	2/1/2003	390
102103263	8221460	HDT080AS03	HDT080AS03	2/1/2003	390
102103264	8221460	HDT080AS03	HDT080AS03	2/1/2003	390
102103265	8221460	HDT080AS03	HDT080AS03	2/1/2003	390
102103266	8221460	HDT080AS03	HDT080AS03	2/1/2003	390
102103267	8221460	HDT080AS03	HDT080AS03	2/1/2003	390
102103268	8221460	HDT080AS03	HDT080AS03	2/1/2003	390
102103269	8221460	HDT080AS03	HDT080AS03	2/1/2003	390
102103270	8221460	HDT080AS03	HDT080AS03	2/1/2003	390
102103271	8221460	HDT080AS03	HDT080AS03	2/1/2003	390
102103272	8221460	HDT080AS03	HDT080AS03	2/1/2003	390
102103273	8221460	HDT080AS03	HDT080AS03	2/1/2003	390
102103274	8221460	HDT080AS03	HDT080AS03	2/1/2003	390
102103275	8221460	HDT080AS03	HDT080AS03	2/1/2003	390
102103277	8221460	HDT080AS03	HDT080AS03	2/2/2003	390
102103278	8221460	HDT080AS03	HDT080AS03	2/2/2003	390
102103279	8221460	HDT080AS03	HDT080AS03	2/2/2003	390
102103280	8221460	HDT080AS03	HDT080AS03	2/2/2003	390
102103281	8221460	HDT080AS03	HDT080AS03	2/2/2003	390
102103282	8221460	HDT080AS03	HDT080AS03	2/2/2003	390
102103283	8221460	HDT080AS03	HDT080AS03	2/2/2003	390
102103285	8221514	HDT080AS03	HDT080AS03	2/2/2003	390
102103287	8221514	HDT080AS03	HDT080AS03	2/2/2003	390
102103288	8221514	HDT080AS03	HDT080AS03	2/2/2003	390
102103289	8221514	HDT080AS03	HDT080AS03	2/2/2003	390

Order 27946
Customer Fluor Fernald Geomembrane Supply
Site Fluor Fernald

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Roll#	*Resin Lot*	*Product Code*	*Description*	*Mfg. Date*	*Length*
102103290	8221514	HDT080AS03	HDT080AS03	2/2/2003	390
102103291	8221514	HDT080AS03	HDT080AS03	2/3/2003	390
102103292	8221514	HDT080AS03	HDT080AS03	2/3/2003	390
102103294	8221514	HDT080AS03	HDT080AS03	2/3/2003	390
102103295	8221514	HDT080AS03	HDT080AS03	2/3/2003	390
102103296	8221514	HDT080AS03	HDT080AS03	2/3/2003	390
102103297	8221514	HDT080AS03	HDT080AS03	2/3/2003	390
102103298	8221514	HDT080AS03	HDT080AS03	2/3/2003	390
102103299	8221514	HDT080AS03	HDT080AS03	2/3/2003	390
102103300	8221514	HDT080AS03	HDT080AS03	2/3/2003	390
102103301	8221514	HDT080AS03	HDT080AS03	2/3/2003	390
102103302	8221514	HDT080AS03	HDT080AS03	2/3/2003	390
102103303	8221514	HDT080AS03	HDT080AS03	2/3/2003	390
102103304	8221514	HDT080AS03	HDT080AS03	2/3/2003	390
102103305	8221514	HDT080AS03	HDT080AS03	2/4/2003	390
102103306	8221514	HDT080AS03	HDT080AS03	2/4/2003	390
102103308	8221514	HDT080AS03	HDT080AS03	2/4/2003	390
102103309	8221514	HDT080AS03	HDT080AS03	2/4/2003	390
102103310	8221514	HDT080AS03	HDT080AS03	2/4/2003	390
102103311	8221514	HDT080AS03	HDT080AS03	2/4/2003	390
102103312	8221514	HDT080AS03	HDT080AS03	2/4/2003	390
102103313	8221514	HDT080AS03	HDT080AS03	2/4/2003	390
102103314	8221514	HDT080AS03	HDT080AS03	2/4/2003	390
102103315	8221514	HDT080AS03	HDT080AS03	2/4/2003	390
102103316	8221514	HDT080AS03	HDT080AS03	2/4/2003	390
102103317	8221514	HDT080AS03	HDT080AS03	2/4/2003	390
102103318	8221514	HDT080AS03	HDT080AS03	2/4/2003	390
102103319	8221514	HDT080AS03	HDT080AS03	2/4/2003	390
102103320	8221514	HDT080AS03	HDT080AS03	2/5/2003	390
102103321	8221514	HDT080AS03	HDT080AS03	2/5/2003	390
102103322	8221514	HDT080AS03	HDT080AS03	2/5/2003	390
102103324	8221514	HDT080AS03	HDT080AS03	2/5/2003	390
102103325	8221514	HDT080AS03	HDT080AS03	2/5/2003	390
102103326	8221514	HDT080AS03	HDT080AS03	2/5/2003	390
102103327	8221514	HDT080AS03	HDT080AS03	2/5/2003	390
102103328	8221514	HDT080AS03	HDT080AS03	2/5/2003	390
102103329	8221514	HDT080AS03	HDT080AS03	2/5/2003	390

Order 27946
Customer Fluor Fernald Geomembrane Supply
Site Fluor Fernald

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Roll#	*Resin Lot*	*Product Code*	*Description*	*Mfg. Date*	*Length*
102103330	8221514	HDT080AS03	HDT080AS03	2/5/2003	390
102103331	8221514	HDT080AS03	HDT080AS03	2/5/2003	390
102103332	8221514	HDT080AS03	HDT080AS03	2/5/2003	390
102103333	8221514	HDT080AS03	HDT080AS03	2/5/2003	390
102103334	8221514	HDT080AS03	HDT080AS03	2/6/2003	390
102103335	8221514	HDT080AS03	HDT080AS03	2/6/2003	390
102103336	8221514	HDT080AS03	HDT080AS03	2/6/2003	390
102103337	8221514	HDT080AS03	HDT080AS03	2/6/2003	390
102103338	8221514	HDT080AS03	HDT080AS03	2/6/2003	390
102103339	8221514	HDT080AS03	HDT080AS03	2/6/2003	390
102103340	8221514	HDT080AS03	HDT080AS03	2/6/2003	390
102103341	8221514	HDT080AS03	HDT080AS03	2/6/2003	390
102103342	8221514	HDT080AS03	HDT080AS03	2/6/2003	390
102103343	8221514	HDT080AS03	HDT080AS03	2/6/2003	390
102103344	8221520	HDT080AS03	HDT080AS03	2/6/2003	390
102103345	8221520	HDT080AS03	HDT080AS03	2/6/2003	390
102103346	8221520	HDT080AS03	HDT080AS03	2/6/2003	390
102103347	8221520	HDT080AS03	HDT080AS03	2/6/2003	390
102103348	8221520	HDT080AS03	HDT080AS03	2/6/2003	390
102103352	8221520	HDT080AS03	HDT080AS03	2/7/2003	390
102103353	8221520	HDT080AS03	HDT080AS03	2/7/2003	390

GSE Roll Allocation

Order 27946
Customer Fluor Fernald Geomembrane Supply
Site Fluor Fernald

Roll#	*Resin*	*Product*	*Description*	*Mfg. Date*	*Lengt*
102103353	8221520	HDT080AS03	HDT080AS03	2/7/2003	390
102103354	8221520	HDT080AS03	HDT080AS03	2/7/2003	390

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103201

ROLL IDENTIFICATION

Roll Number	102103201
Product Name	HDT080AS03
Production Date	1/27/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,272 1,938	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	237	(415)
- M D		every roll	168	(294)	232	(406)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	242	(424)
- M D		every roll	120	(210)	209	(366)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		460	
- M D	(51 mm)	every roll	100		447	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- M D		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	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		0.946	
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 Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000602

APPROVED T.P 1/27/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103202

ROLL IDENTIFICATION

Roll Number	102103202
Product Name	HDT080AS03
Production Date	1/27/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,268 1,936	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	80	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	220	(385)
- M D		every roll	168	(294)	231	(404)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	237	(415)
- M D		every roll	120	(210)	273	(477)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		477	
- M D	(51 mm)	every roll	100		520	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- M D		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	189	(841)
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		2.5	
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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000603

APPROVED T.P 1/27/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103203

ROLL IDENTIFICATION

Roll Number	102103203
Product Name	HDT080AS03
Production Date	1/27/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,268	pounds
	1,936	kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	237	(415)
- M D		every roll	168	(294)	231	(404)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	242	(424)
- M D		every roll	120	(210)	269	(470)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		458	
- M D	(51 mm)	every roll	100		498	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	92	(409)
- M D		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		0.946	
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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

GSE-4.10-007 Rev - - 07/00

000604

APPROVED T.P 1/28/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103204

ROLL IDENTIFICATION

Roll Number	102103204
Product Name	HDT080AS03
Production Date	1/27/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,278	pounds
	1,941	kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	238	(417)
- M D		every roll	168	(294)	237	(414)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	241	(422)
- M D		every roll	120	(210)	262	(459)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		450	
- M D	(51 mm)	every roll	100		497	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	89	(396)
- M D		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		0.946	
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		31	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000605

APPROVED T.P 1/28/2003 QA

GSE-4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103205

ROLL IDENTIFICATION

Roll Number	102103205
Product Name	HDT080AS03
Production Date	1/28/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,274	pounds
	1,939	kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	222	(388)
- M D		every roll	168	(294)	228	(400)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	253	(443)
- M D		every roll	120	(210)	250	(438)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		15	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		538	
- M D	(51 mm)	every roll	100		477	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- M D		every roll	56	(249)	72	(320)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	196	(872)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
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		31	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

GSE-4.10-007 Rev - - 07/00

000606

APPROVED T.P 1/28/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103206

ROLL IDENTIFICATION

Roll Number	102103206
Product Name	HDT080AS03
Production Date	1/28/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,278	pounds
	1,941	kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	228	(399)
- M D		every roll	168	(294)	227	(397)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	244	(426)
- M D		every roll	120	(210)	256	(448)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		541	
- M D	(51 mm)	every roll	100		482	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	201	(894)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	133	(592)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.948	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

GSE-4.10-007 Rev - - 07/00

000607

APPROVED T.P 1/28/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103207

ROLL IDENTIFICATION

Roll Number	102103207
Product Name	HDT080AS03
Production Date	1/28/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,278 1,941	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	227	(397)
- M D		every roll	168	(294)	228	(399)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	198	(346)
- M D		every roll	120	(210)	252	(441)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		349	
- M D	(51 mm)	every roll	100		491	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- M D		every roll	56	(249)	86	(383)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	180	(801)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	133	(592)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.948	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000608

APPROVED T.P 1/28/2003 QA

GSE-4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103208

ROLL IDENTIFICATION

Roll Number	102103208
Product Name	HDT080AS03
Production Date	1/28/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,266 1,935	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	223	(390)
- MD		every roll	168	(294)	224	(392)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	249	(435)
- MD		every roll	120	(210)	264	(461)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		490	
- MD	(51 mm)	every roll	100		539	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- MD		every roll	56	(249)	73	(325)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	199	(886)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	133	(592)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.948	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000609

APPROVED T.P 1/28/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103209

ROLL IDENTIFICATION

Roll Number	102103209
Product Name	HDT080AS03
Production Date	1/28/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,262 1,933	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	236	(413)
- M D		every roll	168	(294)	223	(390)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	248	(435)
- M D		every roll	120	(210)	237	(414)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		508	
- M D	(51 mm)	every roll	100		463	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	188	(837)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	133	(592)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.948	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000610

APPROVED T.P 1/28/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103210

ROLL IDENTIFICATION

Roll Number	102103210
Product Name	HDT080AS03
Production Date	1/28/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,262 1,933	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	237	(415)
- M D		every roll	168	(294)	235	(412)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	219	(383)
- M D		every roll	120	(210)	270	(473)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		383	
- M D	(51 mm)	every roll	100		448	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	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		0.947	
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		29	

Order No.	27946
Customer Name	Fluor Femald Geomembrane Supply
Project Name	Fluor Femald
Location	Hamilton, OH

*Modified

000611

APPROVED T.P 1/28/2003 QA

GSE 4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103211

ROLL IDENTIFICATION

Roll Number	102103211
Product Name	HDT080AS03
Production Date	1/28/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,268 1,936	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	239	(418)
- M D		every roll	168	(294)	235	(412)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	254	(445)
- M D		every roll	120	(210)	282	(493)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		513	
- M D	(51 mm)	every roll	100		522	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	90	(401)
- M D		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		0.947	
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		29	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000612

APPROVED T.P 1/28/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103212

ROLL IDENTIFICATION

Roll Number	102103212
Product Name	HDT080AS03
Production Date	1/28/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,266 1,935	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	226	(396)
- M D		every roll	168	(294)	226	(396)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	265	(464)
- M D		every roll	120	(210)	260	(455)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		531	
- M D	(51 mm)	every roll	100		520	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		2.4	
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		29	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000613

APPROVED T.P 1/28/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103213

ROLL IDENTIFICATION

Roll Number	102103213
Product Name	HDT080AS03
Production Date	1/28/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,266	pounds
	1,935	kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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)	85	(2.1)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	239	(419)
- M D		every roll	168	(294)	228	(399)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	252	(440)
- M D		every roll	120	(210)	256	(448)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		493	
- M D	(51 mm)	every roll	100		558	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- M D		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		0.947	
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		29	

Order No.	27946
Customer Name	Fluor Femald Geomembrane Supply
Project Name	Fluor Femald
Location	Hamilton, OH

*Modified

000614

APPROVED T.P 1/28/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103214

ROLL IDENTIFICATION

Roll Number	102103214
Product Name	HDT080AS03
Production Date	1/28/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,270	pounds
	1,937	kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	227	(397)
- M D		every roll	168	(294)	234	(409)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	254	(444)
- M D		every roll	120	(210)	223	(391)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		509	
- M D	(51 mm)	every roll	100		519	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- M D		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	152	(676)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000615

APPROVED T.P 1/28/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103215

ROLL IDENTIFICATION

Roll Number	102103215
Product Name	HDT080AS03
Production Date	1/28/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,264 1,934	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	236	(412)
- M D		every roll	168	(294)	233	(408)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	236	(413)
- M D		every roll	120	(210)	242	(423)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		440	
- M D	(51 mm)	every roll	100		517	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	87	(387)
- M D		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	191	(850)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	152	(676)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000616

APPROVED T.P 1/28/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103216

ROLL IDENTIFICATION

Roll Number	102103216
Product Name	HDT080AS03
Production Date	1/28/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,306	pounds
	1,953	kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	240	(419)
- M D		every roll	168	(294)	236	(413)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	269	(472)
- M D		every roll	120	(210)	257	(450)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		536	
- M D	(51 mm)	every roll	100		506	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- M D		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	204	(908)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	152	(676)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
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		34	

Order No.	27946
Customer Name	Fluor Femald Geomembrane Supply
Project Name	Fluor Femald
Location	Hamilton, OH

*Modified

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000617

APPROVED T.P 1/29/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103217

ROLL IDENTIFICATION

Roll Number	102103217
Product Name	HDT080AS03
Production Date	1/28/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,258 1,931	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	80	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	232	(405)
- M D		every roll	168	(294)	219	(384)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	244	(428)
- M D		every roll	120	(210)	254	(445)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		501	
- M D	(51 mm)	every roll	100		471	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- M D		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	193	(859)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	133	(592)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
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		34	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000618

APPROVED T.P 1/29/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103218

ROLL IDENTIFICATION

Roll Number	102103218
Product Name	HDT080AS03
Production Date	1/28/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,290	pounds
	1,946	kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	228	(398)
- M D		every roll	168	(294)	220	(386)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	250	(438)
- M D		every roll	120	(210)	265	(464)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		15	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		531	
- M D	(51 mm)	every roll	100		525	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- M D		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	184	(819)
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		2.6	
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		32	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000619

APPROVED T.P 1/29/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103220

ROLL IDENTIFICATION

Roll Number	102103220
Product Name	HDT080AS03
Production Date	1/29/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,312 1,956	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	219	(384)
- M D		every roll	168	(294)	206	(361)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	234	(410)
- M D		every roll	120	(210)	264	(463)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		450	
- M D	(51 mm)	every roll	100		562	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	76	(338)
- M D		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	178	(792)
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		2.6	
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		32	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000620

APPROVED T.P 1/29/2003 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103221

ROLL IDENTIFICATION

Roll Number	102103221
Product Name	HDT080AS03
Production Date	1/29/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,274 1,939	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	217	(380)
- M D		every roll	168	(294)	219	(383)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	237	(414)
- M D		every roll	120	(210)	256	(447)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		512	
- M D	(51 mm)	every roll	100		568	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	77	(343)
- M D		every roll	56	(249)	71	(316)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	185	(823)
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		2.6	
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		29	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000621

APPROVED T.P 1/29/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103222

ROLL IDENTIFICATION

Roll Number	102103222
Product Name	HDT080AS03
Production Date	1/29/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,272 1,938	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	219	(383)
- M D		every roll	168	(294)	212	(371)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	194	(339)
- M D		every roll	120	(210)	278	(486)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		414	
- M D	(51 mm)	every roll	100		590	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	75	(334)
- M D		every roll	56	(249)	72	(320)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	174	(774)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
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		29	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000622

APPROVED T.P 1/29/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103223

ROLL IDENTIFICATION

Roll Number	102103223
Product Name	HDT080AS03
Production Date	1/29/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,256 1,931	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	227	(397)
- M D		every roll	168	(294)	232	(405)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	242	(424)
- M D		every roll	120	(210)	274	(479)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		453	
- M D	(51 mm)	every roll	100		535	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	74	(329)
- M D		every roll	56	(249)	72	(320)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	183	(814)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
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		34	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000623

APPROVED T.P 1/29/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103224

ROLL IDENTIFICATION

Roll Number	102103224
Product Name	HDT080AS03
Production Date	1/29/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,302 1,951	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	231	(404)
- M D		every roll	168	(294)	223	(391)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	247	(432)
- M D		every roll	120	(210)	247	(432)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		476	
- M D	(51 mm)	every roll	100		427	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- M D		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		0.944	
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		34	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000624

APPROVED T.P 1/29/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103225

ROLL IDENTIFICATION

Roll Number	102103225
Product Name	HDT080AS03
Production Date	1/29/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,306 1,953	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	240	(421)
- M D		every roll	168	(294)	236	(413)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	243	(425)
- M D		every roll	120	(210)	287	(501)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		429	
- M D	(51 mm)	every roll	100		478	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- M D		every roll	56	(249)	86	(383)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	196	(872)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	137	(610)
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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000625

APPROVED T.P 1/29/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103226

ROLL IDENTIFICATION

Roll Number	102103226
Product Name	HDT080AS03
Production Date	1/29/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,266	pounds
	1,935	kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	225	(394)
- M D		every roll	168	(294)	220	(385)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	205	(358)
- M D		every roll	120	(210)	247	(432)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		14	
- M D	(33 m m)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		264	
- M D	(51 m m)	every roll	100		519	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- M D		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000626

APPROVED T.P 1/29/2003 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103227

ROLL IDENTIFICATION

Roll Number	102103227
Product Name	HDT080AS03
Production Date	1/29/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,268	pounds
	1,936	kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	234	(410)
- M D		every roll	168	(294)	229	(401)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	257	(450)
- M D		every roll	120	(210)	269	(470)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		481	
- M D	(51 mm)	every roll	100		501	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- M D		every roll	56	(249)	84	(374)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	192	(854)
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		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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000627

APPROVED T.P 1/29/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103228

ROLL IDENTIFICATION

Roll Number	102103228
Product Name	HDT080AS03
Production Date	1/29/2003

Length ≈(+/-1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,256	pounds
	1,931	kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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)	85	(2.2)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	242	(423)
- M D		every roll	168	(294)	226	(396)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	227	(396)
- M D		every roll	120	(210)	273	(478)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		379	
- M D	(51 mm)	every roll	100		516	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- M D		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	191	(850)
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		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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000628

APPROVED T.P 1/29/2003 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103229

ROLL IDENTIFICATION

Roll Number	102103229
Product Name	HDT080AS03
Production Date	1/29/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,258 1,931	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	233	(408)
- M D		every roll	168	(294)	227	(397)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	249	(435)
- M D		every roll	120	(210)	255	(447)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		475	
- M D	(51 mm)	every roll	100		516	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	87	(387)
- M D		every roll	56	(249)	84	(374)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		0.945	
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		35	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000629

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GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103230

ROLL IDENTIFICATION

Roll Number	102103230
Product Name	HDT080AS03
Production Date	1/29/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,250	pounds
	1,928	kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	237	(415)
- M D		every roll	168	(294)	228	(400)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	246	(430)
- M D		every roll	120	(210)	241	(421)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		469	
- M D	(51 mm)	every roll	100		385	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- M D		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	196	(872)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	151	(672)
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		35	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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APPROVED T.P 1/29/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103231

ROLL IDENTIFICATION

Roll Number	102103231
Product Name	HDT080AS03
Production Date	1/29/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,262	pounds
	1,933	kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	234	(410)
- M D		every roll	168	(294)	233	(408)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	188	(330)
- M D		every roll	120	(210)	186	(325)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		540	
- M D	(51 mm)	every roll	100		496	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- M D		every roll	56	(249)	84	(374)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	196	(872)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	151	(672)
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		27	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000631

APPROVED T.P 1/29/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103234

ROLL IDENTIFICATION

Roll Number	102103234
Product Name	HDT080AS03
Production Date	1/29/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,290 1,946	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	231	(404)
- M D		every roll	168	(294)	233	(407)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	230	(403)
- M D		every roll	120	(210)	283	(496)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		456	
- M D	(51 mm)	every roll	100		543	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- M D		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	141	(627)
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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000632

APPROVED
T.P
1/30/2003
QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103235

ROLL IDENTIFICATION

Roll Number	102103235
Product Name	HDT080AS03
Production Date	1/30/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,250	pounds
	1,928	kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	228	(399)
- M D		every roll	168	(294)	236	(412)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	259	(453)
- M D		every roll	120	(210)	273	(478)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		498	
- M D	(51 mm)	every roll	100		494	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- M D		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	198	(881)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	140	(623)
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 Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		24	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000633

APPROVED T.P 1/30/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103236

ROLL IDENTIFICATION

Roll Number	102103236
Product Name	HDT080AS03
Production Date	1/30/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,280 1,941	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	225	(394)
- M D		every roll	168	(294)	230	(403)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	248	(434)
- M D		every roll	120	(210)	289	(506)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		477	
- M D	(51 mm)	every roll	100		565	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- M D		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	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		0.944	
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 Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		24	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000634

APPROVED T.P 1/30/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103237

ROLL IDENTIFICATION

Roll Number	102103237
Product Name	HDT080AS03
Production Date	1/30/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,290 1,946	pounds kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	228	(399)
- M D		every roll	168	(294)	236	(413)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	233	(408)
- M D		every roll	120	(210)	263	(460)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 m m)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		516	
- M D	(51 m m)	every roll	100		531	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	89	(396)
- M D		every roll	56	(249)	84	(374)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		0.944	
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		28	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000635

APPROVED T.P 1/30/2003 QA

GSE 4.10.007 Rev. 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103238

ROLL IDENTIFICATION

Roll Number	102103238
Product Name	HDT080AS03
Production Date	1/30/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,300	pounds
	1,950	kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	232	(406)
- M D		every roll	168	(294)	235	(411)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	244	(427)
- M D		every roll	120	(210)	268	(469)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		446	
- M D	(51 mm)	every roll	100		514	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	88	(392)
- M D		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	195	(868)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
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		28	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000636

APPROVED T.P 1/30/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103239

ROLL IDENTIFICATION

Roll Number	102103239
Product Name	HDT080AS03
Production Date	1/30/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,272	pounds
	1,938	kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	243	(426)
- M D		every roll	168	(294)	240	(419)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	262	(458)
- M D		every roll	120	(210)	233	(408)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		543	
- M D	(51 mm)	every roll	100		394	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- M D		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	191	(850)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	155	(690)
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		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		26	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000637

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GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103240

ROLL IDENTIFICATION

Roll Number	102103240
Product Name	HDT080AS03
Production Date	1/30/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,260	pounds
	1,932	kilograms

RESIN INFORMATION

Lot Number	8221454
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	237	(415)
- M D		every roll	168	(294)	236	(413)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	243	(425)
- M D		every roll	120	(210)	236	(412)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		498	
- M D	(51 mm)	every roll	100		481	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- M D		every roll	56	(249)	74	(329)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	198	(881)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	155	(690)
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		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		26	

000638

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

APPROVED T.P 1/30/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103251

ROLL IDENTIFICATION

Roll Number	102103251
Product Name	HDT080AS03
Production Date	1/31/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,252	pounds
	1,929	kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	82	(2.1)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	229	(401)
- M D		every roll	168	(294)	218	(382)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	208	(364)
- M D		every roll	120	(210)	283	(496)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		396	
- M D	(51 mm)	every roll	100		538	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- M D		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	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		0.940	
Carbon Black Content, %	ASTM D 1603*	every 4th	2.0		2.7	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A2	
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		30	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000639

APPROVED D.G. 1/31/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103252

ROLL IDENTIFICATION

Roll Number	102103252
Product Name	HDT080AS03
Production Date	1/31/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,262 1,933	pounds kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	82	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	225	(394)
- M D		every roll	168	(294)	240	(421)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	226	(396)
- M D		every roll	120	(210)	263	(461)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		14	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		533	
- M D	(51 mm)	every roll	100		484	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- M D		every roll	56	(249)	74	(329)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	186	(828)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	146	(650)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.940	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
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		35	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000640

APPROVED D.G. 1/31/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103253

ROLL IDENTIFICATION

Roll Number	102103253
Product Name	HDT080AS03
Production Date	1/31/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,254 1,930	pounds kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	82	(2.1)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	245	(428)
- M D		every roll	168	(294)	241	(421)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	174	(304)
- M D		every roll	120	(210)	179	(313)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		21	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		300	
- M D	(51 mm)	every roll	100		468	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	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		0.940	
Carbon Black Content, %	ASTM D 1603*	every 4th	2.0		2.7	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A2	
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		35	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000641

APPROVED D.G. 1/31/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103254

ROLL IDENTIFICATION

Roll Number	102103254
Product Name	HDT080AS03
Production Date	1/31/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,258	pounds
	1,931	kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	82	(2.1)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	241	(421)
- M D		every roll	168	(294)	232	(405)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	210	(367)
- M D		every roll	120	(210)	266	(466)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		307	
- M D	(51 mm)	every roll	100		503	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- M D		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		0.940	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
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		35	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000642

APPROVED D.G. 1/31/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103256

ROLL IDENTIFICATION

Roll Number	102103256
Product Name	HDT080AS03
Production Date	1/31/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,250	pounds
	1,928	kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	81	(2.1)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	239	(418)
- M D		every roll	168	(294)	233	(408)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	222	(388)
- M D		every roll	120	(210)	258	(451)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		460	
- M D	(51 mm)	every roll	100		437	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- M D		every roll	56	(249)	84	(374)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	200	(890)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	154	(685)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000643

APPROVED D.G. 1/31/2003

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103257

ROLL IDENTIFICATION

Roll Number	102103257
Product Name	HDT080AS03
Production Date	1/31/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,272	pounds
	1,938	kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	82	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	233	(408)
- M D		every roll	168	(294)	233	(408)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	229	(401)
- M D		every roll	120	(210)	218	(382)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		370	
- M D	(51 mm)	every roll	100		379	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- M D		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	205	(912)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	154	(685)
Density, g/cc	ASTM D 1505	every 4th	0.940		0.942	
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 Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000644

APPROVED D.G. 1/31/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103258

ROLL IDENTIFICATION

Roll Number	102103258
Product Name	HDT080AS03
Production Date	1/31/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,276	pounds
	1,940	kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	83	(2.1)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	225	(393)
- M D		every roll	168	(294)	235	(411)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	208	(364)
- M D		every roll	120	(210)	279	(488)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		379	
- M D	(51 mm)	every roll	100		529	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	186	(828)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	154	(685)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.942	
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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000645

APPROVED D.G. 1/31/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103259

ROLL IDENTIFICATION

Roll Number	102103259
Product Name	HDT080AS03
Production Date	1/31/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,268 1,936	pounds kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	82	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	231	(404)
- M D		every roll	168	(294)	228	(399)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	246	(430)
- M D		every roll	120	(210)	290	(508)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		469	
- M D	(51 mm)	every roll	100		559	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- M D		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	196	(872)
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		2.4	
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		28	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000646

APPROVED D.G. 2/1/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103260

ROLL IDENTIFICATION

Roll Number	102103260
Product Name	HDT080AS03
Production Date	1/31/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,287 1,945	pounds kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	82	(2.1)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	221	(387)
- M D		every roll	168	(294)	221	(388)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	235	(411)
- M D		every roll	120	(210)	287	(502)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		495	
- M D	(51 mm)	every roll	100		612	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- M D		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		2.4	
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		28	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000647

APPROVED D.G. 2/1/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103261

ROLL IDENTIFICATION

Roll Number	102103261
Product Name	HDT080AS03
Production Date	1/31/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,278	pounds
	1,941	kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	83	(2.1)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	226	(396)
- M D		every roll	168	(294)	227	(397)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	256	(448)
- M D		every roll	120	(210)	210	(367)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		533	
- M D	(51 mm)	every roll	100		332	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		2.4	
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		31	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

GSE-4.10-007 Rev - - 07/00

000648

APPROVED D.G. 2/1/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103262

ROLL IDENTIFICATION

Roll Number	102103262
Product Name	HDT080AS03
Production Date	2/1/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,282 1,942	pounds kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	82	(2.1)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	231	(405)
- M D		every roll	168	(294)	235	(411)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	283	(495)
- M D		every roll	120	(210)	277	(484)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		555	
- M D	(51 mm)	every roll	100		580	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- M D		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	187	(832)
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		2.4	
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		31	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000649

APPROVED D.G. 2/1/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103263

ROLL IDENTIFICATION

Roll Number	102103263
Product Name	HDT080AS03
Production Date	2/1/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,289 1,945	pounds kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	82	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	228	(398)
- M D		every roll	168	(294)	231	(405)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	257	(450)
- M D		every roll	120	(210)	280	(490)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		14	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		533	
- M D	(51 mm)	every roll	100		590	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	91	(405)
- M D		every roll	56	(249)	85	(378)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	198	(881)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.947	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
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.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000650

APPROVED D.G. 2/1/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103264

ROLL IDENTIFICATION

Roll Number	102103264
Product Name	HDT080AS03
Production Date	2/1/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,296	pounds
	1,949	kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	82	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	232	(405)
- M D		every roll	168	(294)	207	(363)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	229	(401)
- M D		every roll	120	(210)	272	(476)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		15	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		418	
- M D	(51 mm)	every roll	100		537	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	91	(405)
- M D		every roll	56	(249)	87	(387)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	195	(868)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.947	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
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.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

GSE-4.10-007 Rev - - 07/00

000651

APPROVED D.G. 2/1/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103265

ROLL IDENTIFICATION

Roll Number	102103265
Product Name	HDT080AS03
Production Date	2/1/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,278	pounds
	1,941	kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	82	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	237	(416)
- M D		every roll	168	(294)	235	(411)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	242	(424)
- M D		every roll	120	(210)	289	(506)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		484	
- M D	(51 mm)	every roll	100		561	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- M D		every roll	56	(249)	85	(378)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	190	(845)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	140	(623)
Density, g/cc	ASTM D 1505	every 4th	0.940		0.947	
Carbon Black Content, %	ASTM D 1603*	every 4th	2.0		2.7	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A2	
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		28	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000652

APPROVED D.G. 2/1/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103266

ROLL IDENTIFICATION

Roll Number	102103266
Product Name	HDT080AS03
Production Date	2/1/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,270 1,937	pounds kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	84	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	239	(419)
- M D		every roll	168	(294)	239	(418)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	243	(425)
- M D		every roll	120	(210)	236	(414)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		461	
- M D	(51 mm)	every roll	100		500	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- M D		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	187	(832)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.947	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
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		28	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000653

APPROVED D.G. 2/1/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103267

ROLL IDENTIFICATION

Roll Number	102103267
Product Name	HDT080AS03
Production Date	2/1/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,288 1,945	pounds kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	84	(2.1)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	239	(419)
- M D		every roll	168	(294)	246	(431)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	225	(393)
- M D		every roll	120	(210)	249	(436)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		427	
- M D	(51 mm)	every roll	100		516	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- M D		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	188	(837)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	157	(699)
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 Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		27	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000654

APPROVED D.G. 2/1/2003 QA

GSE-4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103268

ROLL IDENTIFICATION

Roll Number	102103268
Product Name	HDT080AS03
Production Date	2/1/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,292	pounds
	1,947	kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	84	(2.1)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	239	(418)
- M D		every roll	168	(294)	232	(406)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	228	(400)
- M D		every roll	120	(210)	249	(436)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		339	
- M D	(51 mm)	every roll	100		543	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	75	(334)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	175	(779)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	157	(699)
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		27	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

GSE-4.10-007 Rev - - 07/00

000655

APPROVED D.G. 2/1/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103269

ROLL IDENTIFICATION

Roll Number	102103269
Product Name	HDT080AS03
Production Date	2/1/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,286 1,944	pounds kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	84	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	237	(415)
- M D		every roll	168	(294)	241	(422)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	209	(366)
- M D		every roll	120	(210)	243	(426)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		434	
- M D	(51 mm)	every roll	100		430	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- M D		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	187	(832)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	157	(699)
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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

GSE-8.2.4-007 Rev - - 02/03

000656

APPROVED D.G. 2/1/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103270

ROLL IDENTIFICATION

Roll Number	102103270
Product Name	HDT080AS03
Production Date	2/1/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,274 1,939	pounds kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	83	(2.1)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	234	(409)
- M D		every roll	168	(294)	240	(420)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	229	(401)
- M D		every roll	120	(210)	262	(459)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		461	
- M D	(51 mm)	every roll	100		506	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- M D		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	177	(788)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000657

APPROVED D.G. 2/1/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103271

ROLL IDENTIFICATION

Roll Number	102103271
Product Name	HDT080AS03
Production Date	2/1/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,268 1,936	pounds kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	83	(2.1)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	239	(419)
- M D		every roll	168	(294)	231	(404)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	205	(360)
- M D		every roll	120	(210)	245	(429)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		247	
- M D	(51 mm)	every roll	100		434	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- M D		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	180	(801)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
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		32	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000658

APPROVED D.G. 2/1/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103272

ROLL IDENTIFICATION

Roll Number	102103272
Product Name	HDT080AS03
Production Date	2/1/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,258 1,931	pounds kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	84	(2.1)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	234	(410)
- M D		every roll	168	(294)	234	(410)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	199	(347)
- M D		every roll	120	(210)	209	(366)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		445	
- M D	(51 mm)	every roll	100		509	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- M D		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	184	(819)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	140	(623)
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		32	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000659

APPROVED D.G. 2/1/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103273

ROLL IDENTIFICATION

Roll Number	102103273
Product Name	HDT080AS03
Production Date	2/1/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,274	pounds
	1,939	kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	83	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	239	(419)
- M D		every roll	168	(294)	245	(429)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	198	(347)
- M D		every roll	120	(210)	285	(499)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		409	
- M D	(51 mm)	every roll	100		536	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	88	(392)
- M D		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	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		0.946	
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 Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		31	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000660

APPROVED D.G. 2/2/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103274

ROLL IDENTIFICATION

Roll Number	102103274
Product Name	HDT080AS03
Production Date	2/1/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,290 1,946	pounds kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	82	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	223	(390)
- M D		every roll	168	(294)	224	(391)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	256	(448)
- M D		every roll	120	(210)	248	(434)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		544	
- M D	(51 mm)	every roll	100		522	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- M D		every roll	56	(249)	74	(329)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	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		0.947	
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 Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		31	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000661

APPROVED D.G. 2/2/2003 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103275

ROLL IDENTIFICATION

Roll Number	102103275
Product Name	HDT080AS03
Production Date	2/1/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,290	pounds
	1,946	kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	83	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	236	(412)
- M D		every roll	168	(294)	228	(400)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	236	(414)
- M D		every roll	120	(210)	280	(490)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		446	
- M D	(51 mm)	every roll	100		537	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- M D		every roll	56	(249)	89	(396)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		0.947	
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		30	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000662

APPROVED D.G. 2/2/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103277

ROLL IDENTIFICATION

Roll Number	102103277
Product Name	HDT080AS03
Production Date	2/2/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,310	pounds
	1,955	kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	83	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	234	(409)
- M D		every roll	168	(294)	232	(405)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	238	(417)
- M D		every roll	120	(210)	254	(444)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		428	
- M D	(51 mm)	every roll	100		494	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- M D		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		0.947	
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		29	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000663

APPROVED D.G. 2/2/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103278

ROLL IDENTIFICATION

Roll Number	102103278
Product Name	HDT080AS03
Production Date	2/2/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,295	pounds
	1,948	kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	84	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	226	(396)
- M D		every roll	168	(294)	216	(379)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	240	(419)
- M D		every roll	120	(210)	260	(454)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		443	
- M D	(51 mm)	every roll	100		462	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- M D		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	185	(823)
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		2.5	
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		29	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000664

APPROVED D.G. 2/2/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103279

ROLL IDENTIFICATION

Roll Number	102103279
Product Name	HDT080AS03
Production Date	2/2/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,298	pounds
	1,950	kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	83	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	227	(397)
- M D		every roll	168	(294)	222	(389)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	238	(416)
- M D		every roll	120	(210)	271	(474)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		443	
- M D	(51 mm)	every roll	100		553	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		2.5	
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		28	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000665

APPROVED D.G. 2/2/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103280

ROLL IDENTIFICATION

Roll Number	102103280
Product Name	HDT080AS03
Production Date	2/2/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,262 1,933	pounds kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	83	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	237	(415)
- M D		every roll	168	(294)	235	(411)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	233	(407)
- M D		every roll	120	(210)	261	(457)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		428	
- M D	(51 mm)	every roll	100		495	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- M D		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		2.5	
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		28	

Order No.	27946
Customer Name	Fluor Femald Geomembrane Supply
Project Name	Fluor Femald
Location	Hamilton, OH

*Modified

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000666

APPROVED D.G. 2/2/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103281

ROLL IDENTIFICATION

Roll Number	102103281
Product Name	HDT080AS03
Production Date	2/2/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,272	pounds
	1,938	kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	84	(2.1)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	235	(412)
- M D		every roll	168	(294)	234	(410)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	233	(407)
- M D		every roll	120	(210)	267	(467)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		433	
- M D	(51 mm)	every roll	100		491	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		2.5	
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		34	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000667

APPROVED D.G. 2/2/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103282

ROLL IDENTIFICATION

Roll Number	102103282
Product Name	HDT080AS03
Production Date	2/2/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,274 1,939	pounds kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	83	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	241	(422)
- M D		every roll	168	(294)	236	(413)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	226	(395)
- M D		every roll	120	(210)	223	(390)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		385	
- M D	(51 mm)	every roll	100		397	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- M D		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	194	(863)
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		2.5	
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		34	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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APPROVED D.G. 2/2/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103283

ROLL IDENTIFICATION

Roll Number	102103283
Product Name	HDT080AS03
Production Date	2/2/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,268	pounds
	1,936	kilograms

RESIN INFORMATION

Lot Number	8221460
Type	K306
Supplier	Phillips

5369

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)	83	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	237	(414)
- M D		every roll	168	(294)	231	(403)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	223	(390)
- M D		every roll	120	(210)	262	(459)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		476	
- M D	(51 mm)	every roll	100		541	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	77	(343)
- M D		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	186	(828)
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		2.5	
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		34	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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APPROVED D.G. 2/2/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103285

ROLL IDENTIFICATION

Roll Number	102103285
Product Name	HDT080AS03
Production Date	2/2/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,244 1,925	pounds kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	241	(421)
- M D		every roll	168	(294)	230	(402)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	186	(326)
- M D		every roll	120	(210)	253	(442)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		468	
- M D	(51 mm)	every roll	100		419	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	77	(343)
- M D		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	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		2.5	
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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000670

APPROVED D.G. 2/2/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103287

ROLL IDENTIFICATION

Roll Number	102103287
Product Name	HDT080AS03
Production Date	2/2/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,236	pounds
	1,921	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	246	(431)
- M D		every roll	168	(294)	235	(411)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	185	(324)
- M D		every roll	120	(210)	288	(503)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		267	
- M D	(51 mm)	every roll	100		513	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- M D		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	187	(832)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	148	(659)
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		30	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000671

APPROVED D.G. 2/2/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103288

ROLL IDENTIFICATION

Roll Number	102103288
Product Name	HDT080AS03
Production Date	2/2/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,250	pounds
	1,928	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	232	(405)
- M D		every roll	168	(294)	230	(403)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	232	(407)
- M D		every roll	120	(210)	271	(474)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		408	
- M D	(51 mm)	every roll	100		508	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	199	(886)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	148	(659)
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		30	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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APPROVED D.G. 2/2/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103289

ROLL IDENTIFICATION

Roll Number	102103289
Product Name	HDT080AS03
Production Date	2/2/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,290	pounds
	1,946	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	229	(400)
- M D		every roll	168	(294)	232	(405)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	263	(460)
- M D		every roll	120	(210)	272	(476)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		537	
- M D	(51 mm)	every roll	100		505	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- M D		every roll	56	(249)	75	(334)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	198	(881)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	148	(659)
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		29	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000673

APPROVED D.G. 2/2/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103290

ROLL IDENTIFICATION

Roll Number	102103290
Product Name	HDT080AS03
Production Date	2/2/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,270 1,937	pounds kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	228	(399)
- M D		every roll	168	(294)	233	(407)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	227	(397)
- M D		every roll	120	(210)	267	(467)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		529	
- M D	(51 mm)	every roll	100		516	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- M D		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	188	(837)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	148	(659)
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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000674

APPROVED D.G. 2/3/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103291

ROLL IDENTIFICATION

Roll Number	102103291
Product Name	HDT080AS03
Production Date	2/3/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,260	pounds
	1,932	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	224	(392)
- M D		every roll	168	(294)	224	(392)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	227	(397)
- M D		every roll	120	(210)	273	(478)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		478	
- M D	(51 mm)	every roll	100		552	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	90	(401)
- M D		every roll	56	(249)	85	(378)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	148	(659)
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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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APPROVED D.G. 2/3/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103292

ROLL IDENTIFICATION

Roll Number	102103292
Product Name	HDT080AS03
Production Date	2/3/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,320	pounds
	1,960	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	80	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	234	(409)
- M D		every roll	168	(294)	229	(401)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	272	(476)
- M D		every roll	120	(210)	257	(449)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		542	
- M D	(51 mm)	every roll	100		465	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- M D		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	205	(912)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	148	(659)
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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000676

APPROVED D.G. 2/3/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103294

ROLL IDENTIFICATION

Roll Number	102103294
Product Name	HDT080AS03
Production Date	2/3/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,280 1,941	pounds kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	226	(395)
- M D		every roll	168	(294)	226	(395)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	195	(341)
- M D		every roll	120	(210)	180	(315)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		15	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		538	
- M D	(51 mm)	every roll	100		504	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- M D		every roll	56	(249)	86	(383)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	194	(863)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	152	(676)
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		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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000677

APPROVED D.G. 2/3/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103295

ROLL IDENTIFICATION

Roll Number	102103295
Product Name	HDT080AS03
Production Date	2/3/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,274 1,939	pounds kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	233	(407)
- M D		every roll	168	(294)	242	(423)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	250	(438)
- M D		every roll	120	(210)	234	(410)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		507	
- M D	(51 mm)	every roll	100		383	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	193	(859)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	152	(676)
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		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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000678

APPROVED D.G. 2/3/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103296

ROLL IDENTIFICATION

Roll Number	102103296
Product Name	HDT080AS03
Production Date	2/3/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,260 1,932	pounds kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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)	85	(2.2)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	244	(427)
- M D		every roll	168	(294)	247	(432)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	279	(488)
- M D		every roll	120	(210)	273	(477)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		539	
- M D	(51 mm)	every roll	100		493	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	88	(392)
- M D		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	205	(912)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	152	(676)
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		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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000679

APPROVED D.G. 2/3/2003 QA

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Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103297

ROLL IDENTIFICATION

Roll Number	102103297
Product Name	HDT080AS03
Production Date	2/3/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,300	pounds
	1,950	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	80	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	247	(433)
- M D		every roll	168	(294)	238	(417)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	238	(416)
- M D		every roll	120	(210)	277	(484)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		438	
- M D	(51 mm)	every roll	100		501	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	91	(405)
- M D		every roll	56	(249)	90	(401)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	200	(890)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	152	(676)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
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		38	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000680

APPROVED D.G. 2/3/2003 QA

GSE-4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103298

ROLL IDENTIFICATION

Roll Number	102103298
Product Name	HDT080AS03
Production Date	2/3/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,276	pounds
	1,940	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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)	86	(2.2)
Minimum		every roll	78	(2.0)	81	(2.1)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	246	(431)
- M D		every roll	168	(294)	240	(420)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	229	(400)
- M D		every roll	120	(210)	271	(473)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		425	
- M D	(51 mm)	every roll	100		441	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	78	(347)
- M D		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		0.944	
Carbon Black Content, %	ASTM D 1603*					
		every 4th	2.0		2.7	
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		38	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000681

APPROVED D.G. 2/3/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103299

ROLL IDENTIFICATION

Roll Number	102103299
Product Name	HDT080AS03
Production Date	2/3/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,300	pounds
	1,950	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	80	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	235	(412)
- M D		every roll	168	(294)	236	(413)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	178	(312)
- M D		every roll	120	(210)	196	(342)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		502	
- M D	(51 mm)	every roll	100		528	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	90	(401)
- M D		every roll	56	(249)	86	(383)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	196	(872)
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		2.7	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A2	
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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000682

APPROVED D.G. 2/3/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103300

ROLL IDENTIFICATION

Roll Number	102103300
Product Name	HDT080AS03
Production Date	2/3/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,294 1,948	pounds kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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)	85	(2.2)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	243	(425)
- M D		every roll	168	(294)	234	(409)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	181	(317)
- M D		every roll	120	(210)	184	(322)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		433	
- M D	(51 mm)	every roll	100		455	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- M D		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		2.7	
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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000683

APPROVED D.G. 2/3/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103301

ROLL IDENTIFICATION

Roll Number	102103301
Product Name	HDT080AS03
Production Date	2/3/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,274	pounds
	1,939	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	238	(416)
- M D		every roll	168	(294)	237	(416)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	223	(391)
- M D		every roll	120	(210)	248	(434)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		400	
- M D	(51 mm)	every roll	100		465	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- M D		every roll	56	(249)	84	(374)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	141	(627)
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		34	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000684

APPROVED D.G. 2/4/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103302

ROLL IDENTIFICATION

Roll Number	102103302
Product Name	HDT080AS03
Production Date	2/3/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,290	pounds
	1,946	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	243	(425)
- M D		every roll	168	(294)	233	(407)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	250	(437)
- M D		every roll	120	(210)	267	(468)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		441	
- M D	(51 mm)	every roll	100		452	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	76	(338)
- M D		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	189	(841)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	141	(627)
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		34	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000685

APPROVED D.G. 2/4/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103303

ROLL IDENTIFICATION

Roll Number	102103303
Product Name	HDT080AS03
Production Date	2/3/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,300 1,950	pounds kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	231	(404)
- M D		every roll	168	(294)	237	(415)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	249	(436)
- M D		every roll	120	(210)	280	(491)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		475	
- M D	(51 mm)	every roll	100		542	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	77	(343)
- M D		every roll	56	(249)	78	(347)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	141	(627)
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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000686

APPROVED D.G. 2/4/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103304

ROLL IDENTIFICATION

Roll Number	102103304
Product Name	HDT080AS03
Production Date	2/3/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,306	pounds
	1,953	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	242	(424)
- M D		every roll	168	(294)	240	(420)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	274	(480)
- M D		every roll	120	(210)	291	(509)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		555	
- M D	(51 mm)	every roll	100		562	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- M D		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	141	(627)
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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000687

APPROVED D.G. 2/4/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103305

ROLL IDENTIFICATION

Roll Number	102103305
Product Name	HDT080AS03
Production Date	2/4/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,300	pounds
	1,950	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	237	(415)
- M D		every roll	168	(294)	236	(413)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	276	(483)
- M D		every roll	120	(210)	285	(499)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		564	
- M D	(51 mm)	every roll	100		530	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	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		2.5	
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		35	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

GSE-4.10-007 Rev - - 07/00

000688

APPROVED D.G. 2/4/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103306

ROLL IDENTIFICATION

Roll Number	102103306
Product Name	HDT080AS03
Production Date	2/4/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,320	pounds
	1,960	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	225	(394)
- M D		every roll	168	(294)	230	(402)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	268	(469)
- M D		every roll	120	(210)	280	(491)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		562	
- M D	(51 mm)	every roll	100		554	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- M D		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	206	(917)
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		2.5	
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		35	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

GSE-4.10-007 Rev - - 07/00

000689

APPROVED D.G. 2/4/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103308

ROLL IDENTIFICATION

Roll Number	102103308
Product Name	HDT080AS03
Production Date	2/4/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,324	pounds
	1,961	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	236	(414)
- M D		every roll	168	(294)	235	(411)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	248	(435)
- M D		every roll	120	(210)	273	(479)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		548	
- M D	(51 mm)	every roll	100		527	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	74	(329)
- M D		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	193	(859)
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		2.5	
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		28	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000690

APPROVED D.G. 2/4/2003 QA

GSE-A 10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103309

ROLL IDENTIFICATION

Roll Number	102103309
Product Name	HDT080AS03
Production Date	2/4/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,316	pounds
	1,958	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	234	(409)
- M D		every roll	168	(294)	242	(424)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	240	(419)
- M D		every roll	120	(210)	276	(484)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		558	
- M D	(51 mm)	every roll	100		563	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	75	(334)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	195	(868)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	151	(672)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.948	
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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000691

APPROVED D.G. 2/4/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103310

ROLL IDENTIFICATION

Roll Number	102103310
Product Name	HDT080AS03
Production Date	2/4/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,312 1,956	pounds kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	235	(412)
- M D		every roll	168	(294)	231	(403)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	261	(458)
- M D		every roll	120	(210)	277	(485)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		523	
- M D	(51 mm)	every roll	100		541	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- M D		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	209	(930)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	151	(672)
Density, g/cc	ASTM D 1505	every 4th	0.940		0.948	
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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000692

APPROVED D.G. 2/4/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103311

ROLL IDENTIFICATION

Roll Number	102103311
Product Name	HDT080AS03
Production Date	2/4/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,325	pounds
	1,962	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	224	(393)
- M D		every roll	168	(294)	235	(411)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	252	(440)
- M D		every roll	120	(210)	257	(450)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		530	
- M D	(51 mm)	every roll	100		463	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	206	(917)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	151	(672)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.948	
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		35	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000693

APPROVED D.G. 2/4/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103312

ROLL IDENTIFICATION

Roll Number	102103312
Product Name	HDT080AS03
Production Date	2/4/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,350 1,973	pounds kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	234	(410)
- M D		every roll	168	(294)	237	(415)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	187	(327)
- M D		every roll	120	(210)	200	(350)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		499	
- M D	(51 mm)	every roll	100		566	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- M D		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	203	(903)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	151	(672)
Density, g/cc	ASTM D 1505	every 4th	0.940		0.948	
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 Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		35	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000694

APPROVED D.G. 2/4/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103313

ROLL IDENTIFICATION

Roll Number	102103313
Product Name	HDT080AS03
Production Date	2/4/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,330 1,964	pounds kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	239	(418)
- M D		every roll	168	(294)	248	(434)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	238	(416)
- M D		every roll	120	(210)	290	(508)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		452	
- M D	(51 mm)	every roll	100		521	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	210	(934)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	166	(739)
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		A2	
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		32	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

GSE-4.10-007 Rev - - 07/00

000635

APPROVED D.G. 2/4/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103314

ROLL IDENTIFICATION

Roll Number	102103314
Product Name	HDT080AS03
Production Date	2/4/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,315	pounds
	1,957	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	227	(396)
- M D		every roll	168	(294)	235	(412)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	263	(460)
- M D		every roll	120	(210)	303	(530)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		545	
- M D	(51 mm)	every roll	100		558	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- M D		every roll	56	(249)	88	(392)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	206	(917)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	166	(739)
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		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		32	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000696

APPROVED D.G. 2/4/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103315

ROLL IDENTIFICATION

Roll Number	102103315
Product Name	HDT080AS03
Production Date	2/4/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,305	pounds
	1,953	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	232	(406)
- M D		every roll	168	(294)	235	(411)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	274	(480)
- M D		every roll	120	(210)	263	(460)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		539	
- M D	(51 mm)	every roll	100		469	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- M D		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	201	(894)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	166	(739)
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		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		26	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000697

APPROVED D.G. 2/4/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103316

ROLL IDENTIFICATION

Roll Number	102103316
Product Name	HDT080AS03
Production Date	2/4/2003

Length ≈ (+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,296	pounds
	1,949	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	227	(397)
- M D		every roll	168	(294)	229	(401)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	226	(396)
- M D		every roll	120	(210)	272	(476)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		473	
- M D	(51 mm)	every roll	100		540	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	89	(396)
- M D		every roll	56	(249)	90	(401)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	211	(939)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	166	(739)
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		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		26	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000698

APPROVED D.G. 2/4/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103317

ROLL IDENTIFICATION

Roll Number	102103317
Product Name	HDT080AS03
Production Date	2/4/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,288	pounds
	1,945	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	227	(397)
- M D		every roll	168	(294)	233	(408)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	254	(444)
- M D		every roll	120	(210)	289	(506)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- M D	(33 m m)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		548	
- M D	(51 m m)	every roll	100		571	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	87	(387)
- M D		every roll	56	(249)	76	(338)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	220	(979)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	146	(650)
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		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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000699

APPROVED D.G. 2/5/2003 QA

GSE 4.10.007 Rev. 07/00

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103318

ROLL IDENTIFICATION

Roll Number	102103318
Product Name	HDT080AS03
Production Date	2/4/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,282 1,942	pounds kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	233	(408)
- M D		every roll	168	(294)	223	(391)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	274	(480)
- M D		every roll	120	(210)	270	(472)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		552	
- M D	(51 mm)	every roll	100		576	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	146	(650)
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		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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000700

APPROVED D.G. 2/5/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103319

ROLL IDENTIFICATION

Roll Number	102103319
Product Name	HDT080AS03
Production Date	2/4/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,286	pounds
	1,944	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	229	(401)
- M D		every roll	168	(294)	230	(403)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	275	(482)
- M D		every roll	120	(210)	294	(515)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		566	
- M D	(51 mm)	every roll	100		574	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- M D		every roll	56	(249)	90	(401)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	146	(650)
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		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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000701

APPROVED D.G. 2/5/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103320

ROLL IDENTIFICATION

Roll Number	102103320
Product Name	HDT080AS03
Production Date	2/5/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,284	pounds
	1,943	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	227	(397)
- M D		every roll	168	(294)	235	(411)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	256	(448)
- M D		every roll	120	(210)	302	(529)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		469	
- M D	(51 mm)	every roll	100		594	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	88	(392)
- M D		every roll	56	(249)	82	(365)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	200	(890)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	146	(650)
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		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	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000702

APPROVED D.G. 2/5/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103321

ROLL IDENTIFICATION

Roll Number	102103321
Product Name	HDT080AS03
Production Date	2/5/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,284	pounds
	1,943	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	231	(405)
- M D		every roll	168	(294)	226	(396)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	267	(466)
- M D		every roll	120	(210)	281	(493)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		550	
- M D	(51 mm)	every roll	100		564	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- M D		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	193	(859)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	158	(703)
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		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		29	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000703

APPROVED D.G. 2/5/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103322

ROLL IDENTIFICATION

Roll Number	102103322
Product Name	HDT080AS03
Production Date	2/5/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,289	pounds
	1,945	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	228	(399)
- M D		every roll	168	(294)	224	(391)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	264	(463)
- M D		every roll	120	(210)	282	(493)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		558	
- M D	(51 mm)	every roll	100		559	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- M D		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	158	(703)
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		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		29	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000704

APPROVED D.G. 2/5/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103324

ROLL IDENTIFICATION

Roll Number	102103324
Product Name	HDT080AS03
Production Date	2/5/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,302	pounds
	1,951	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	80	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	229	(401)
- M D		every roll	168	(294)	232	(406)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	262	(459)
- M D		every roll	120	(210)	267	(467)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		511	
- M D	(51 mm)	every roll	100		494	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- M D		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	206	(917)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	158	(703)
Density, g/cc	ASTM D 1505					
		every 4th	0.940		0.948	
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		31	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000705

APPROVED D.G. 2/5/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103325

ROLL IDENTIFICATION

Roll Number	102103325
Product Name	HDT080AS03
Production Date	2/5/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,288	pounds
	1,945	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	232	(406)
- M D		every roll	168	(294)	241	(422)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	268	(468)
- M D		every roll	120	(210)	274	(480)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		530	
- M D	(51 mm)	every roll	100		534	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	204	(908)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	162	(721)
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		32	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000706

APPROVED D.G. 2/5/2003 QA

GSE-4.10-007 Rev - - 07/00

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103326

ROLL IDENTIFICATION

Roll Number	102103326
Product Name	HDT080AS03
Production Date	2/5/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,300	pounds
	1,950	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	234	(409)
- M D		every roll	168	(294)	242	(424)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	270	(472)
- M D		every roll	120	(210)	251	(440)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		525	
- M D	(51 mm)	every roll	100		488	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	88	(392)
- M D		every roll	56	(249)	87	(387)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	204	(908)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	162	(721)
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		32	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

GSE-4.10-007 Rev - - 07/00

000707

APPROVED D.G. 2/5/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103327

ROLL IDENTIFICATION

Roll Number	102103327
Product Name	HDT080AS03
Production Date	2/5/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,310	pounds
	1,955	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	239	(418)
- M D		every roll	168	(294)	235	(412)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	270	(472)
- M D		every roll	120	(210)	303	(530)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 m m)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		551	
- M D	(51 m m)	every roll	100		567	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	87	(387)
- M D		every roll	56	(249)	88	(392)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	209	(930)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	162	(721)
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		35	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000708

APPROVED D.G. 2/6/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103328

ROLL IDENTIFICATION

Roll Number	102103328
Product Name	HDT080AS03
Production Date	2/5/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,310 1,955	pounds kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	236	(413)
- M D		every roll	168	(294)	243	(425)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	246	(431)
- M D		every roll	120	(210)	261	(456)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		435	
- M D	(51 mm)	every roll	100		530	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- M D		every roll	56	(249)	86	(383)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	218	(970)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	162	(721)
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		35	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000709

APPROVED D.G. 2/5/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103329

ROLL IDENTIFICATION

Roll Number	102103329
Product Name	HDT080AS03
Production Date	2/5/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,318	pounds
	1,959	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	234	(410)
- M D		every roll	168	(294)	236	(413)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	282	(494)
- M D		every roll	120	(210)	291	(509)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		569	
- M D	(51 mm)	every roll	100		563	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	91	(405)
- M D		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	191	(850)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	146	(650)
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		34	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000710

APPROVED D.G. 2/6/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103330

ROLL IDENTIFICATION

Roll Number	102103330
Product Name	HDT080AS03
Production Date	2/5/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,302	pounds
	1,951	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	239	(418)
- M D		every roll	168	(294)	245	(429)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	260	(455)
- M D		every roll	120	(210)	292	(511)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		528	
- M D	(51 mm)	every roll	100		550	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- M D		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	200	(890)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	146	(650)
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		34	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000711

APPROVED D.G. 2/6/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103331

ROLL IDENTIFICATION

Roll Number	102103331
Product Name	HDT080AS03
Production Date	2/5/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,302 1,951	pounds kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

-5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	237	(415)
- M D		every roll	168	(294)	252	(441)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	270	(473)
- M D		every roll	120	(210)	281	(492)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		514	
- M D	(51 mm)	every roll	100		569	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- M D		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	146	(650)
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		31	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

GSE-4.10-007 Rev - - 07/00

000712

APPROVED D.G. 2/6/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103332

ROLL IDENTIFICATION

Roll Number	102103332
Product Name	HDT080AS03
Production Date	2/5/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,320 1,960	pounds kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	234	(410)
- MD		every roll	168	(294)	234	(410)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	243	(425)
- MD		every roll	120	(210)	264	(463)
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		509	
- MD	(51 mm)	every roll	100		506	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	84	(374)
- MD		every roll	56	(249)	86	(383)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	203	(903)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	146	(650)
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 Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		31	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000713

APPROVED D.G. 2/6/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103333

ROLL IDENTIFICATION

Roll Number	102103333
Product Name	HDT080AS03
Production Date	2/5/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,297 1,949	pounds kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	230	(403)
- M D		every roll	168	(294)	231	(404)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	258	(451)
- M D		every roll	120	(210)	262	(459)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		527	
- M D	(51 mm)	every roll	100		487	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	200	(890)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	160	(712)
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 Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		26	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000714

APPROVED D.G. 2/6/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103334

ROLL IDENTIFICATION

Roll Number	102103334
Product Name	HDT080AS03
Production Date	2/6/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,286 1,944	pounds kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	225	(394)
- M D		every roll	168	(294)	228	(398)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	252	(441)
- M D		every roll	120	(210)	281	(492)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		484	
- M D	(51 mm)	every roll	100		547	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	88	(392)
- M D		every roll	56	(249)	88	(392)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	189	(841)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	160	(712)
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		26	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000715

APPROVED D.G. 2/6/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103335

ROLL IDENTIFICATION

Roll Number	102103335
Product Name	HDT080AS03
Production Date	2/6/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,310	pounds
	1,955	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	238	(416)
- M D		every roll	168	(294)	222	(389)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	249	(436)
- M D		every roll	120	(210)	245	(428)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		441	
- M D	(51 mm)	every roll	100		470	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	80	(356)
- M D		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	208	(926)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	160	(712)
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 Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		31	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000716

APPROVED D.G. 2/6/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103336

ROLL IDENTIFICATION

Roll Number	102103336
Product Name	HDT080AS03
Production Date	2/6/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,298	pounds
	1,950	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	234	(410)
- MD		every roll	168	(294)	227	(397)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	234	(409)
- MD		every roll	120	(210)	272	(476)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		441	
- MD	(51 mm)	every roll	100		469	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- MD		every roll	56	(249)	84	(374)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	201	(894)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	160	(712)
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		31	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000717

APPROVED D.G. 2/6/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103337

ROLL IDENTIFICATION

Roll Number	102103337
Product Name	HDT080AS03
Production Date	2/6/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,276	pounds
	1,940	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

--5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	229	(401)
- M D		every roll	168	(294)	235	(411)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	244	(427)
- M D		every roll	120	(210)	246	(431)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		508	
- M D	(51 mm)	every roll	100		409	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	81	(360)
- M D		every roll	56	(249)	77	(343)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	193	(859)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	158	(703)
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		31	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000718

APPROVED D.G. 2/6/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103338

ROLL IDENTIFICATION

Roll Number	102103338
Product Name	HDT080AS03
Production Date	2/6/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,294	pounds
	1,948	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	234	(409)
- MD		every roll	168	(294)	229	(401)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	179	(313)
- MD		every roll	120	(210)	198	(347)
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		470	
- MD	(51 mm)	every roll	100		561	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	85	(378)
- MD		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	199	(886)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	158	(703)
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 Views in Cat1 - Cat2	ASTM D 5596	every 4th	10		10	
Asperity Height Average (mils) - Side A	GRI GM 12	every 2nd	7		31	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000719

APPROVED D.G. 2/6/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103339

ROLL IDENTIFICATION

Roll Number	102103339
Product Name	HDT080AS03
Production Date	2/6/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,306	pounds
	1,953	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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)	85	(2.1)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	230	(403)
- M D		every roll	168	(294)	222	(389)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	188	(328)
- M D		every roll	120	(210)	176	(308)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		466	
- M D	(51 mm)	every roll	100		437	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	82	(365)
- M D		every roll	56	(249)	79	(352)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	190	(845)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	158	(703)
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		34	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000720

APPROVED D.G. 2/6/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103340

ROLL IDENTIFICATION

Roll Number	102103340
Product Name	HDT080AS03
Production Date	2/6/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,312	pounds
	1,956	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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)	85	(2.2)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	235	(411)
- MD		every roll	168	(294)	228	(399)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	258	(451)
- MD		every roll	120	(210)	279	(489)
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		503	
- MD	(51 mm)	every roll	100		523	
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	(534)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	158	(703)
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		34	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000721

APPROVED D.G. 2/6/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103341

ROLL IDENTIFICATION

Roll Number	102103341
Product Name	HDT080AS03
Production Date	2/6/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,322	pounds
	1,960	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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)	85	(2.2)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	237	(414)
- MD		every roll	168	(294)	225	(394)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	229	(401)
- MD		every roll	120	(210)	264	(461)
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		438	
- MD	(51 mm)	every roll	100		508	
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	(534)	192	(854)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	158	(703)
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		28	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000722

APPROVED D.G. 2/6/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103342

ROLL IDENTIFICATION

Roll Number	102103342
Product Name	HDT080AS03
Production Date	2/6/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,310	pounds
	1,955	kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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)	85	(2.2)
Minimum		every roll	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	241	(422)
- M D		every roll	168	(294)	236	(412)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	244	(427)
- M D		every roll	120	(210)	288	(505)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		478	
- M D	(51 mm)	every roll	100		517	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	87	(387)
- M D		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	201	(894)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	158	(703)
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		28	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000723

APPROVED D.G. 2/6/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103343

ROLL IDENTIFICATION

Roll Number	102103343
Product Name	HDT080AS03
Production Date	2/6/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,304 1,952	pounds kilograms

RESIN INFORMATION

Lot Number	8221514
Type	K306
Supplier	Phillips

5369

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)	0.08

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	245	(428)
- M D		every roll	168	(294)	228	(398)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	255	(446)
- M D		every roll	120	(210)	297	(519)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		470	
- M D	(51 mm)	every roll	100		564	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	88	(392)
- M D		every roll	56	(249)	85	(378)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	215	(957)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	158	(703)
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		25	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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APPROVED D.G. 2/6/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103344

ROLL IDENTIFICATION

Roll Number	102103344
Product Name	HDT080AS03
Production Date	2/6/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,314 1,957	pounds kilograms

RESIN INFORMATION

Lot Number	8221520
Type	K306
Supplier	Phillips

5369

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)	0.07

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	78	(2.0)	78	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	235	(412)
- M D		every roll	168	(294)	233	(408)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	276	(483)
- M D		every roll	120	(210)	274	(480)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		18	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		523	
- M D	(51 mm)	every roll	100		530	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- M D		every roll	56	(249)	87	(387)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	198	(881)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	158	(703)
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		25	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000725

APPROVED D.G. 2/6/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103345

ROLL IDENTIFICATION

Roll Number	102103345
Product Name	HDT080AS03
Production Date	2/6/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,312	pounds
	1,956	kilograms

RESIN INFORMATION

Lot Number	8221520
Type	K306
Supplier	Phillips

5369

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)	0.07

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	228	(399)
- M D		every roll	168	(294)	235	(411)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	264	(462)
- M D		every roll	120	(210)	298	(522)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		496	
- M D	(51 mm)	every roll	100		584	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	93	(414)
- M D		every roll	56	(249)	92	(409)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	191	(850)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	141	(627)
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		28	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000726

APPROVED D.G. 2/7/2003 QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103346

ROLL IDENTIFICATION

Roll Number	102103346
Product Name	HDT080AS03
Production Date	2/6/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,308	pounds
	1,954	kilograms

RESIN INFORMATION

Lot Number	8221520
Type	K306
Supplier	Phillips

5369

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)	0.07

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	78	(2.0)	80	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	230	(403)
- M D		every roll	168	(294)	232	(405)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	243	(425)
- M D		every roll	120	(210)	277	(484)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		455	
- M D	(51 mm)	every roll	100		539	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	79	(352)
- M D		every roll	56	(249)	80	(356)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	197	(877)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	141	(627)
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		28	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000727

APPROVED D.G. 2/7/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103347

ROLL IDENTIFICATION

Roll Number	102103347
Product Name	HDT080AS03
Production Date	2/6/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,298	pounds
	1,950	kilograms

RESIN INFORMATION

Lot Number	8221520
Type	K306
Supplier	Phillips

5369

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)	0.07

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	226	(396)
- M D		every roll	168	(294)	229	(401)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	251	(439)
- M D		every roll	120	(210)	270	(472)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		510	
- M D	(51 mm)	every roll	100		520	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- M D		every roll	56	(249)	86	(383)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	195	(868)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	141	(627)
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		36	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000728

APPROVED D.G. 2/7/2003 QA

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GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103348

ROLL IDENTIFICATION

Roll Number	102103348
Product Name	HDT080AS03
Production Date	2/6/2003

Length ≈(+/- 1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,304	pounds
	1,952	kilograms

RESIN INFORMATION

Lot Number	8221520
Type	K306
Supplier	Phillips

5369

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)	0.07

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	229	(401)
- M D		every roll	168	(294)	236	(413)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	255	(447)
- M D		every roll	120	(210)	302	(529)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		526	
- M D	(51 mm)	every roll	100		571	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- M D		every roll	56	(249)	83	(369)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	193	(859)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	141	(627)
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		36	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000729

APPROVED D.G. 2/7/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103352

ROLL IDENTIFICATION

Roll Number	102103352
Product Name	HDT080AS03
Production Date	2/7/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,274 1,939	pounds kilograms

RESIN INFORMATION

Lot Number	8221520
Type	K306
Supplier	Phillips

5369

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)	0.07

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	232	(406)
- M D		every roll	168	(294)	238	(416)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	250	(438)
- M D		every roll	120	(210)	256	(448)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		490	
- M D	(51 mm)	every roll	100		505	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	83	(369)
- M D		every roll	56	(249)	87	(387)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	210	(934)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	153	(681)
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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

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000730

APPROVED D.G. 2/7/2003 QA

GSE Lining Technology, Inc.

Roll Test Data Report

Roll No. 102103353

ROLL IDENTIFICATION

Roll Number	102103353
Product Name	HDT080AS03
Production Date	2/7/2003

Length ≈(+/-1%)	390	feet
	119	meters
Width (Nominal)	23.0	feet
	7.0	meters
Sheet Area	8,970	sq. feet
	833	sq. meters
Weight	4,286	pounds
	1,944	kilograms

RESIN INFORMATION

Lot Number	8221520
Type	K306
Supplier	Phillips

5369

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)	0.07

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	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	225	(394)
- M D		every roll	168	(294)	222	(388)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	274	(479)
- M D		every roll	120	(210)	272	(477)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- M D	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		562	
- M D	(51 mm)	every roll	100		530	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	86	(383)
- M D		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	120	(534)	194	(863)
Puncture Resistance, lb. (N)	FTMS 101C/2065	every 5th	105	(467)	149	(663)
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		A2	
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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000731

APPROVED D.G. 2/7/2003

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 102103354

ROLL IDENTIFICATION

Roll Number	102103354
Product Name	HDT080AS03
Production Date	2/7/2003

Length ≈(+/- 1%)	390 119	feet meters
Width (Nominal)	23.0 7.0	feet meters
Sheet Area	8,970 833	sq. feet sq. meters
Weight	4,320 1,960	pounds kilograms

RESIN INFORMATION

Lot Number	8221520
Type	K306
Supplier	Phillips

5369

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)	0.07

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	(2.1)
Minimum		every roll	78	(2.0)	79	(2.0)
Tensile Properties:	ASTM D638,Type IV / D6693					
Yield Strength, ppi (N/cm) - TD		every roll	168	(294)	244	(426)
- M D		every roll	168	(294)	235	(412)
Break Strength, ppi (N/cm) - TD		every roll	120	(210)	251	(439)
- M D		every roll	120	(210)	283	(495)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		14	
- M D	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		478	
- M D	(51 mm)	every roll	100		538	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	56	(249)	90	(401)
- M D		every roll	56	(249)	81	(360)
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	120	(534)	203	(903)
Puncture Resistance, lb. (N)	FTMS 101C/2065					
		every 5th	105	(467)	149	(663)
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		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		33	

Order No.	27946
Customer Name	Fluor Fernald Geomembrane Supply
Project Name	Fluor Fernald
Location	Hamilton, OH

*Modified

000732

APPROVED
D.G.
2/7/2003

GEOTEXTILES

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9270	SUBMITTAL NO. 20105-9270-02714P-001	REV.: 0	DATE: 01/15/03	Page 1 of 1

FROM:
TNS Advanced Technologies
405 Hood Road
Lilburn, GA 30047

SIGNATURE: 1/15/03

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

RECEIVED BY: DATE: 1/16/03

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	9270-BASE-02714P-001	0						X			Product Name			X	02714P.1.04.A.1	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	38				
Don Pfister	45				

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

0007734

53169

RECEIVED BY: DATE: 1/27/03

(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

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

Geotextile Product Description Sheet

STYLE TNS E070

TNS E070 is a superior quality, nonwoven geotextile produced by needlepunching together 100% polypropylene staple fibers in a random network to form a high strength dimensionally stable fabric. The polypropylene fibers are specially formulated to resist ultraviolet light deterioration, and are inert to commonly encountered soil chemicals. The fabric will not rot or mildew, is non-biodegradable, and is resistant to damage from insects and rodents. Polypropylene is stable within a ph range of 2 to 13. TNS E070 conforms to the physical property values listed below:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V. Minimum Average Roll Value
Weight	ASTM D 5261	oz/yd^2	7.0
Grab Tensile	ASTM D 4632	lbs	180
Trap Tear	ASTM D 4533	lbs	75
Puncture	ASTM D 4833	lbs	75
Permittivity	ASTM D 4491	1/sec	0.5
AOS	ASTM D 4751	US Sieve	80
Mullen Burst	ASTM D 3786	psi	350
UV Resistance, after 500 hrs	ASTM D 4355	% Strength Retained	70

* At the time of manufacturing. Handling may change these properties.

To the best of our knowledge, the information contained herein is accurate. However, TNS Advanced Technologies, Inc. cannot anticipate all conditions under which TNS's product information and our products, or the products of other manufacturers in combination with our products, may be used. We accept no responsibility for results obtained by the application of this information or the safety or suitability of our products either alone or in combination with other products. Final determination of the suitability of any information or material for the use contemplated, of its manner of use, and whether the suggested use infringes any patents is the sole responsibility of the user.

INFORMATION ONLY

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 1/27/03

TNS ADVANCED TECHNOLOGIES
A Nevown Company

Geotextile Product Description Sheet

STYLE TNS E080

TNS E080 is a superior quality, nonwoven geotextile produced by needlepunching together 100% polypropylene staple fibers in a random network to form a high strength dimensionally stable fabric. The polypropylene fibers are specially formulated to resist ultraviolet light deterioration, and are inert to commonly encountered soil chemicals. The fabric will not rot or mildew, is non-biodegradable, and is resistant to damage from insects and rodents. Polypropylene is stable within a ph range of 2 to 13. TNS E080 conforms to the physical property values listed below:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V. Minimum Average Roll Value
Weight	ASTM D 5261	oz/yd^2	8.0
Grab Tensile	ASTM D 4632	lbs	200
Trap Tear	ASTM D 4533	lbs	75
Puncture	ASTM D 4833	lbs	90
Mullen Burst	ASTM D 3786	psi	350
UV Resistance, after 500 hrs	ASTM D 4355	% Strength Retained	70

* At the time of manufacturing. Handling may change these properties.

To the best of our knowledge, the information contained herein is accurate. However, TNS Advanced Technologies, Inc. cannot anticipate all conditions under which TNS's product information and our products, or the products of other manufacturers in combination with our products, may be used. We accept no responsibility for results obtained by the application of this information or the safety or suitability of our products either alone or in combination with other products. Final determination of the suitability of any information or material for the use contemplated, of its manner of use, and whether the suggested use infringes any patents is the sole responsibility of the user.

Geotextile Product Description Sheet

STYLE TNS E100

TNS E100 is a superior quality, nonwoven geotextile produced by needlepunching together 100% polypropylene staple fibers in a random network to form a high strength dimensionally stable fabric. The polypropylene fibers are specially formulated to resist ultraviolet light deterioration, and are inert to commonly encountered soil chemicals. The fabric will not rot or mildew, is non-biodegradable, and is resistant to damage from insects and rodents. Polypropylene is stable within a ph range of 2 to 13. TNS E100 conforms to the physical property values listed below:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V. Minimum Average Roll Value
Weight	ASTM D 5261	oz/yd^2	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
UV Resistance, after 500 hrs	ASTM D 4355	% Strength Retained	70

* At the time of manufacturing. Handling may change these properties.

To the best of our knowledge, the information contained herein is accurate. However, TNS Advanced Technologies, Inc. cannot anticipate all conditions under which TNS's product information and our products, or the products of other manufacturers in combination with our products, may be used. We accept no responsibility for results obtained by the application of this information or the safety or suitability of our products either alone or in combination with other products. Final determination of the suitability of any information or material for the use contemplated, of its manner of use, and whether the suggested use infringes any patents is the sole responsibility of the user.

Geotextile Product Description Sheet

STYLE TNS E160

TNS E160 is a superior quality, nonwoven geotextile produced by needlepunching together 100% polypropylene staple fibers in a random network to form a high strength dimensionally stable fabric. The polypropylene fibers are specially formulated to resist ultraviolet light deterioration, and are inert to commonly encountered soil chemicals. The fabric will not rot or mildew, is non-biodegradable, and is resistant to damage from insects and rodents. Polypropylene is stable within a ph range of 2 to 13. TNS E160 conforms to the physical property values listed below:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V. Minimum Average Roll Value
Weight	ASTM D 5261	oz/yd^2	16.0
Grab Tensile	ASTM D 4632	lbs	350
Trap Tear	ASTM D 4533	lbs	120
Puncture	ASTM D 4833	lbs	180
Mullen Burst	ASTM D 3786	psi	700
UV Resistance, after 500 hrs	ASTM D 4355	% Strength Retained	70

* At the time of manufacturing. Handling may change these properties.

To the best of our knowledge, the information contained herein is accurate. However, TNS Advanced Technologies, Inc. cannot anticipate all conditions under which TNS's product information and our products, or the products of other manufacturers in combination with our products, may be used. We accept no responsibility for results obtained by the application of this information or the safety or suitability of our products either alone or in combination with other products. Final determination of the suitability of any information or material for the use contemplated, of its manner of use, and whether the suggested use infringes any patents is the sole responsibility of the user.

SUPPLIER DOCUMENT SUBMITTAL

OF PROJECT NO.: 20105	CONTRACT NO: 9270	SUBMITTAL NO. 20105-9270-02714P-003	REV.: 0	DATE: 01/15/03	Page 1 of 1

FROM:
TNS Advanced Technologies
405 Hood Road
Lilburn, GA 30047

SIGNATURE: 1/15/03

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

RECEIVED BY: Teresa Schwab DATE: 1/16/03

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	9270-BASE-02714P-003	0							X		Certification of Minimum Average Roll Values		X		02714P.1.04.A.3	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
CDC	52-7				
huck VanArsdale	64				
ill Zebick	64				
ike Godber (Approver)	64				
wasi Badu-Tweneboah	38				
on Pfister	45				

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

RECEIVED BY: DATE: 1/27/03
(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)

000239

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ORIGINAL

5369

TNS ADVANCED TECHNOLOGIES, INC.

A Nevown Company

December 4, 2002
REF: TNS E070

Fluor Fernald, Inc
Fernald, OH

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 3776	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	U.S. Sieve	80
Permittivity	ASTM D 4491	1/sec	0.5
U.V. Resistance @ 500 Hrs.	ASTM D 4355	% retained	70

Sincerely,

Marshall Gaddy
TNS Advanced Technologies

INFORMATION ONLY

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: Date: 1/27/03

000740

TNS Advanced Technologies, Inc.

A Nevown Company

December 4, 2002
REF: TNS E080

Fluor Fernald,
Fernald, OH

Dear Sir/Madam:

This is to certify that TNS E080 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E080 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 E080 conforms to the physical properties in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	8.0
Grab Tensile	ASTM D 4632	lbs	200
Trap Tear	ASTM D 4533	lbs	75
Puncture	ASTM D 4833	lbs	90
Mullen Burst	ASTM D 3786	psi	350
UV Resistance after 500 hrs	ASTM D 4355	%	70

Sincerely,

Marshall Gaddy
TNS Advanced Technologies

TNS Advanced Technologies, Inc.

A Nevown Company

December 4, 2002
REF: TNS E100

Fluor Fernald,
Fernald, OH

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 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
UV Resistance after 500 hrs	ASTM D 4355	%	70

Sincerely,

Marshall Gaddy
TNS Advanced Technologies

TNS Advanced Technologies, Inc.

A Nevown Company

December 4, 2002
REF: TNS E160

Fluor Fernald
Fernald, OH

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
Trap Tear	ASTM D 4533	lbs	120
Puncture	ASTM D 4833	lbs	180
Mullen Burst	ASTM D 3786	psi	700
U.V. Resistance after 500 hrs.	ASTM D 4355	%	70

Sincerely,

Marshall Gaddy
TNS Advanced Technologies

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: 9270	SUBMITTAL NO. 20105-9270-02714P-006	REV.: 0	DATE: 02/13/03	Page 1 of 1

FROM:
TNS Advanced Technologies
405 Hood Road
Lilburn, GA 30047
SIGNATURE: 2/13/03

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: DATE: 2/21/03

			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	9270-BASE-02714P-006	0						X			Completed Forms GT-7, GT-8, GT-10, GT-16		X		02714P.1.04.A.6	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	38				
Don Pfister	45				

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

00027400

5369

RECEIVED BY: Bxumar for CV DATE: 03/06/03
(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

TABLE GT-7. TECHNICAL INFO FOR 7.0 OZ/SY GEOTEXTILE FILTER
REQUISITION #F02PB09270

Section K, Attachment 3
Refer to Specification Section 02714P
Table 02714P-1

5369

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	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				X A-Conforms to the Subcontract Requirements
GRAB STRENGTH	D4632	180 lb, min	YES	B-Minor Comment - Incorporate and Resubmit
TEAR STRENGTH	D4533	75 lb, min	YES	C-Revise and Resubmit
PUNCTURE STRENGTH	D4833	75 lb, min	YES	Sig: Anumar for CV Date: 03/06/03
BURST STRENGTH	D3786	350 psi, min	YES	
DURABILITY				
ULTRAVIOLET RESISTANCE	D4355	70%, min	YES	
MATION REQUIRED TO BE PROVIDED WITH PROPOSAL				SUPPLIER MUST INDICATE WHERE REQUIRED SUBMITTALS ARE INCLUDED IN THE PROPOSAL
PRODUCT NAME				REFER TO 02714P.1.04.A.1 TPS 070
NAME & PHONE # OF CONTACT PERSON	Rick FRANKLIN 770-564-1857			
MANUFACTURING CAPABILITIES INCLUDING DAILY PRODUCTION CAPACITY				REFER TO 02714P.1.04.A.2
ASSURANCE THAT DELIVERY OF MATERIAL WILL MEET SCHEDULE,			YES	
AND MANUFACTURING QUALITY CONTROL PROCEDURES.			YES	
CERTICATION OF MARV AND CORRESPONDING TEST PROCEDURES			YES	REFER TO 02714P.1.04.A.3
PROJECTED DELIVERY SCHEDULE			YES	REFER TO 02714P.1.04.A.4
STORAGE REQUIREMENTS			YES	REFER TO 02714P.1.04.A.5
MATERIAL SAFETY DATA SHEETS			YES	REFER TO 02714P.1.04.A.7
MANUFACTURER WARRANTY			YES	REFER TO 02714P.1.04.A.8
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	
APPARENT OPENING SIZE	1/100,000 SF		YES	
PERMITTIVITY	1/100,000 SF		YES	
Total Quantity	460,000 SF		YES	

INFORMATION ONLY

Richard J. Franklin
Signature

Dec. 4, 2002
Date

RICHARD J. FRANKLIN
NAME OF OFFEROR

TABLE GT-7.xls

Revised: 11/1/2002

TABLE GT-8 ICAL INFORMATION FOR 8.0 OZ/SY GEOTEXTILE
REQUISITION #99SC001441

Section K, nent 3
Refer to Specification Section 02714P
Table 02714P-2

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		85% Polypropylene or polyester by wgt, min		YES
MASS PER UNIT AREA	D5261	8oz/sy, min		YES
ROLL SIZE		15ft wide, min		Preferred length 450 feet YES
RECLAIMED POLYMER		<20%		YES
LOT SIZE		>100,000 SF		YES
MECHANICAL PROPERTIES				
GRAB STRENGTH	D4632	200 lb, min		YES
TEAR STRENGTH	D4533	75 lb, min		YES
PUNCTURE STRENGTH	D4833	90 lb, min		YES
BURST STRENGTH	D3786	350 psi, min		YES
DURABILITY				
ULTRAVIOLET RESISTANCE	D4355	70%, min		YES
INFORMATION REQUIRED TO BE PROVIDED WITH PROPOSAL				SUPPLIER MUST INDICATE WHERE REQUIRED SUBMITTALS ARE INCLUDED IN THE PROPOSAL
PRODUCT NAME				REFER TO 02714P.1.04.A.1
NAME & PHONE # OF CONTACT PERSON				
MANUFACTURING CAPABILITIES INCLUDING DAILY PRODUCTION CAPACITY				REFER TO 02714P.1.04.A.2
ASSURANCE THAT DELIVERY OF MATERIAL WILL MEET SCHEDULE,				
AND MANUFACTURING QUALITY CONTROL PROCEDURES.				
CERTICATION OF MARV AND CORRESPONDING TEST PROCEDURES				REFER TO 02714P.1.04.A.3
PROJECTED DELIVERY SCHEDULE				REFER TO 02714P.1.04.A.4
STORAGE REQUIREMENTS				REFER TO 02714P.1.04.A.5
MATERIAL SAFETY DATA SHEETS				REFER TO 02714P.1.04.A.7
MANUFACTURER WARRANTY				REFER TO 02714P.1.04.A.8
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
Total Quantity	400,000 SF			YES

Richard J. Franklin 1-27-03
Signature Date

RICHARD J FRANKLIN
NAME OF OFFEROR TDS MILLS INC.

TABLE GT-8.xls
Revised: 1/23/03

FEB-03-2003 09:15 E.S.P. Inc. 908 245 9 P.02/07

5369

TABLE GT-10 TECHNICAL INFORMATION FOR 10.0 OZ/SY GEOTEXTILE
REQUISITION #F02PB09270

Section K, Attachment 3
Refer to Specification Section 02714P
Table 02714P-3

5369

SUBMIT THE FOLLOWING INFORMATION WITH THE PROPOSAL

CIFIED 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	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				SUPPLIER MUST INDICATE WHERE REQUIRED SUBMITTALS ARE INCLUDED IN THE PROPOSAL
PRODUCT NAME				REFER TO 02714P.1.04.A.1
E & PHONE # OF CONTACT PERSON	RICK FRANKLIN 770-564-1857			
UFACTURING CAPABILITIES INCLUDING DAILY PRODUCTION CAPACITY				REFER TO 02714P.1.04.A.2
SURANCE THAT DELIVERY OF MATERIAL WILL MEET SCHEDULE,			YES	
AND MANUFACTURING QUALITY CONTROL PROCEDURES.			YES	
CERTICATION OF MARV AND CORRESPONDING TEST PROCEDURES			YES	REFER TO 02714P.1.04.A.3
PROJECTED DELIVERY SCHEDULE			YES	REFER TO 02714P.1.04.A.4
STORAGE REQUIREMENTS			YES	REFER TO 02714P.1.04.A.5
MATERIAL SAFETY DATA SHEETS			YES	REFER TO 02714P.1.04.A.7
MANUFACTURER WARRANTY			YES	REFER TO 02714P.1.04.A.8
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	
Total Quantity	790,000 SF		YES	

Richard J. Franklin
ature

Dec. 4, 2002
Date

RICHARD J. FRANKLIN
NAME OF OFFEROR

Revised: 11/1/2002

000747

TABLE GT-1[illegible]NICAL INFORMATION FOR 16.0 OZ/SY GEOTEXTILE
REQUISITION #F02PB09270 & REQUISITION #99SC001441

Section [illegible] ment 3
Refer to Specification Section 02714P
Table 02714P-4

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		85% Polypropylene or polyester by wgt, min		
MASS PER UNIT AREA	D5261	16 oz/sy, min		YES
ROLL SIZE		15ft wide, min		Preferred length 450 feet YES
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				SUPPLIER MUST INDICATE WHERE REQUIRED SUBMITTALS ARE INCLUDED IN THE PROPOSAL
PRODUCT NAME				REFER TO 02714P.1.04.A.1
NAME & PHONE # OF CONTACT PERSON				
MANUFACTURING CAPABILITIES INCLUDING DAILY PRODUCTION CAPACITY				REFER TO 02714P.1.04.A.2
ASSURANCE THAT DELIVERY OF MATERIAL WILL MEET SCHEDULE, AND MANUFACTURING QUALITY CONTROL PROCEDURES.				
CERTICATION OF MARV AND CORRESPONDING TEST PROCEDURES				REFER TO 02714P.1.04.A.3
PROJECTED DELIVERY SCHEDULE				REFER TO 02714P.1.04.A.4
STORAGE REQUIREMENTS				REFER TO 02714P.1.04.A.5
MATERIAL SAFETY DATA SHEETS				REFER TO 02714P.1.04.A.7
MANUFACTURER WARRANTY				REFER TO 02714P.1.04.A.8
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			
Total Quantity	129,500 SF			YES

Richard J. Franklin 1-27-03
Signature Date

RICHARD J FRANKLIN
NAME OF OFFEROR TNS MILLS INC.

TABLE GT-16.xls

Revised: 1/23/03

FEB-03-2003 09:15 E.S.P. Inc. 770 564 1818 P.03/07

0740

-5369

SUPPLIER DOCUMENT SUBMITTAL

DF PROJECT NO.: 20105	CONTRACT NO: 9270	SUBMITTAL NO. 20105-9270-02714P-008	REV.: 0	DATE: 01/15/03	Page 1 of 1

FROM:
TNS Advanced Technologies
405 Hood Road
Lilburn, GA 30047
SIGNATURE: [signature] 1/15/03

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: [signature] DATE: 1/16/03

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
5	9270-BASE-02714P-008	0	X								Warranty for Geotextiles			X	02714P.1.04.A.8	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
Chuck VanArsdale (Approver)	64				
Bill Zebick	64				
Randy Ector	44-0-S				
Don Pfister	45				

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

Note: This warranty is in addition to the ~~warranty~~ provisions contained in ~~Subcontract~~ Solicitation # F02PB09270 and does not take precedence over other terms and conditions in the ~~Eco~~ contract with Eluor Fernald.

5369

RECEIVED BY: [signature] DATE: 2/26/03
(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

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

TNS Advanced Technologies
405 Hood Rd.
Lilburn, GA 30047
Phone: 770/564-1857Fax: 770/564-1818

5369

December 04, 2002

Twenty Year Material Warranty Only
PROJECT: Fluor Fernald
Fernald, OH
MATERIAL: TNS E160, TNS E100, TNS E080 & TNS E070

T.N.S. Advanced Technologies hereby warrants that, at the time of installation completion, all T.N.S. Advanced Technologies manufactured materials will conform to the respective T.N.S. Advanced Technologies published material specifications for such materials. Excluded from the warranty given herein shall be any damage to or failure of the material caused by, but not limited to: acts of God; casualty; catastrophe or severe weather conditions, such as earthquakes, tornadoes, hurricanes, floods, high winds, piercing hail, lightening and fire; the exposure of the material to sharp objects, chemicals acids, gases or vapors, either known or unknown, or combinations, or specified by the manufacturer as being harmful thereto; physical abuse to the material caused by vandalism, sabotage, machinery, equipment, people and animals; damage to the material during the transportation, unloading, handling, storage or installation thereof by parties other than T.N.S. Advanced Technologies; excessive pressure or stress from any source, both above and below the material; after installation; subsidence or subgrade settlement; improper site preparation and engineering, and any use of the material which the manufacturer never intended. As used throughout this warranty, the term "sale" shall mean the date on which the material is shipped from T.N.S. Advanced Technologies' manufacturing facility.

Should any significant deterioration or premature loss in use of the material occur during the term hereof which is believed to be covered by this warranty, then T.N.S. Advanced Technologies shall be given prompt written notice of the alleged claim within 30 days after such facts are first observed. Said notice shall be sent by registered or certified mail, return receipt requested, and addressed to T.N.S. Advanced Technologies, 681 DeYoung Road, Greer, South Carolina, 29651, Attention: Contracts Administrator.

The warranty described above is strictly limited to sales of the material for commercial or industrial uses only in accordance with T.N.S. Advanced Technologies published material specifications. Said warranty also is the sole and exclusive warranty given for such material and all other warranties; either express or implied, including but not limited to any warranty of merchantability or fitness for a particular purpose, are hereby disclaimed. In no event shall T.N.S. Advanced Technologies be liable for any direct, indirect, incidental, specific or consequential damages of any kind or any loss or profits resulting from failure of the material or the breach of this warranty; it being further understood that should said warranty fail in its essential purpose, and in that event only, T.N.S. Advanced Technologies' liability hereunder shall in no event exceed the sales price of the material actually received from T.N.S. by the Original Purchaser thereof.

INFORMATION ONLY

Sincerely,

Robyn Howell

Robyn Howell
TNS Advanced Technologies

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 2/26/03

000750

SUPPLIER DOCUMENT SUBMITTAL -009

PROJECT NO.: 20105	CONTRACT NO. 9270	SUBMITTAL NO. 20105-9270-02714P	REV.: 0	DATE: 3-26-03	Page ___ of ___

FROM: TPS ADVANCED TECHNOLOGIES, INC.

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 32-7

SIGNATURE: Richard J. Frankel

RECEIVED BY: Susan Schwab DATE: 4/1/03

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	~~9270-02714P-007~~							X			QUALITY CONTROL			X	–	X		
	9270-BASE-02714P-009	0									CERTIFICATES							

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
Chuck Van Hasdale - Approver	64				
Gregg Johnson	64				
Bill Zebick	64				
Mike Godber	64				
Kwasi Badu-Tweneboah	38				
Don Pfister	45				

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

000471

53996

RECEIVED BY: [signature] DATE: 4/3/03

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 32-7)

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

Nevown, Inc.
681 DeYoung Road Greer, SC 29651
Ph: (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) 949-5222

03/18/03
REF: TNS E160
Quantity Shipped: 20 rolls

Fluor Fernald

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
Thickness	ASTM D 5199	mills	175
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

*modified

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 4/3/03

Marshall O. Gaddy
Marshall O. Gaddy
Quality Control Manager

INFORMATION ONLY

TNS

Advanced Technlogies

Nonwoven Quality Data

Fluor Fernald

Date 3/19

Roll #'s	Style	Weight	Thick-ness	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
300102159	E160	17.7	180	484	574	93	108	176	269	281	800
300102166	E160	17.3	185	476	597	93	89	178	216	294	800
300102173	E160	16.7	183	440	540	81	88	183	207	272	800

* BURST TEST GAUGE MAXIMUM IS 800 LBS
** ALL BURST TEST VALUES EXCEED 800 LBS

000753

5369

Nevown, Inc.
681 DeYoung Road Greer, SC 29651
Ph: (864)968-0392 Fax (864) 879-4639

TNS Advanced Technologies
A Nevown Company
9855 Greenville Highway Building F Spartanburg, SC 29301
Phone (864) 949-1006 (800) 857-5181 Fax (864) 949-6222

03/21/2003
REF: TNS E070
Quantity Shipped: 69 rolls

Fluor Fernald

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
Thickness	ASTM D 5199	mils	90
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	0.212 (MAX)
Permittivity	ASTM D 4491	1/sec	0.5
U.V. Resistance	ASTM D 4355	% retained	70

*modified

Marshall O. Gaddy
Marshall O. Gaddy
Quality Control Manager

TNS

Advanced Technlogies

Nonwoven Quality Data

Fluor Fernald

Date 3/19

Roll #'s	Style	Weight ASTM D 5261	Thick-ness 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	Perm-ttivity ASTM D 4491	AOS ASTM D 4751
300102179	E070	8.4	123	225	272	87	94	89	120	124	436	1.34	0.212
300102186	E070	8.0	127	213	251	89	89	89	112	130	422	1.86	0.212
300102194	E070	7.0	121	206	231	84	91	86	102	119	408	2.05	0.212
300102201	E070	7.7	127	215	250	82	94	110	126	127	427	1.35	0.212
300102208	E070	8.5	134	237	276	85	88	98	129	147	429	1.61	0.212
300102215	E070	7.2	120	202	232	89	99	80	109	115	407	1.84	0.212
300102222	E070	7.4	123	200	225	92	99	94	115	119	416	1.71	0.212
300102229	E070	7.5	117	208	241	80	94	90	126	122	404	1.84	0.212
300102236	E070	7.6	119	200	250	86	92	87	137	131	406	1.85	0.212
300102243	E070	7.9	119	210	257	85	91	85	140	129	410	1.79	0.212

* AOS REPORTS THE MAXIMUM OPENING SIZE VALUE

000755

5369

Nevown, Inc.
81 DeYoung Road Greer, SC 29651
Ph: (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

03/24/2003
REF: TNS E100
Quantity Shipped: 117 rolls

Fluor Fernald

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
Thickness	ASTM D 5199	mils	110
Grab Tensile	ASTM D 4632	lbs	225
Grab Elongation	ASTM D 4632	%	50
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

*modified

Marshall O. Gaddy
Marshall O. Gaddy
Quality Control Manager

TNS

Advanced Technlogies

Nonwoven Quality Data

Fluor Fernald

Date 3/19

Roll #'s	Style	Weight ASTM D 5261	Thick-ness 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
300101978	E100	10.4	146	293	360	70	69	122	193	197	595
300101985	E100	11.0	149	333	357	76	75	122	193	194	593
300101992	E100	10.8	147	322	350	75	78	122	193	179	581
300101999	E100	11.2	149	332	350	74	80	122	193	165	562
300102006	E100	10.0	144	300	321	74	79	122	193	173	558
300102013	E100	10.2	137	299	330	80	86	122	193	170	543
300102020	E100	10.5	144	296	341	81	88	110	164	173	563
300102027	E100	10.0	145	280	328	81	87	110	164	168	556
300102034	E100	10.3	145	279	339	82	83	110	164	169	560
300102045	E100	11.6	153	328	366	78	86	120	176	181	628
300102052	E100	10.8	149	311	344	76	89	120	176	169	562
300102059	E100	10.2	148	288	330	79	90	105	158	181	559
300102066	E100	10.9	149	312	336	75	93	105	158	182	608
300102073	E100	10.5	149	300	327	75	93	105	158	192	563
300102080	E100	10.4	145	296	303	70	82	119	151	169	558
300102087	E100	11.3	155	317	334	74	82	119	151	169	558
300102094	E100	10.9	154	310	330	75	84	118	161	181	556

0007757

5369

Nevown, Inc.
681 DeYoung Road Greer, SC 29651
Ph: (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

03/1903
REF: TNS E080
Quantity Shipped: 60 rolls

Fluor Fernald

Dear Sir/Madam:

This is to certify that TNS E080 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E080 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 E080 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	8.0
Thickness	ASTM D 5199	mils	100
Grab Tensile	ASTM D 4632	lbs	200
Grab Elongation	ASTM D 4632	%	50
Trap Tear	ASTM D 4533	lbs	75
Puncture	ASTM D 4833	lbs	90
Mullen Burst	ASTM D 3786*	psi	350
U.V. Resistance	ASTM D 4355	% strength retained at 500 hrs.	70 %

*modified

Marshall O. Gaddy
Marshall O. Gaddy
Quality Control Manager

TNS

Advanced Technlogies

Nonwoven Quality Data

Fluor Fernald

Date 3/19

Roll #'s	Style	Weight ASTM D 5261	Thick-ness 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
300102099	E080	9.2	143	249	273	76	88	107	149	155	467
300102106	E080	9.0	139	257	263	78	86	98	130	157	485
300102113	E080	8.7	135	237	256	73	85	102	120	134	436
300102120	E080	8.7	135	241	258	72	82	100	149	148	464
300102127	E080	8.8	136	248	278	77	97	90	131	150	475
300102134	E080	8.9	135	241	292	71	84	94	126	136	475
300102141	E080	8.6	130	234	271	73	89	105	135	147	457
300102148	E080	8.0	126	225	260	73	98	93	113	136	449
300102155	E080	8.3	126	229	260	84	96	112	120	140	454

000759

5369

HDPE PIPE

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.:	CONTRACT NO: PHV	JBMITTAL NO. 20105-PHV-02605-001	REV.: 0	DATE: 05/01/03	Page 1 of 2

FROM:
Fluor Fernald

SIGNATURE: Bnumar 5/5/03

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

RECEIVED BY: Laura Schwab DATE: 5/5/03

			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	PHV-02605-001	0						X			Shop drawings of HDPE pipes		X		02605-1.04	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE(APPROVER)	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
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)

0007261

5369

RECEIVED BY: Chuck C. VanArsdale DATE: 5/12/03

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

ORIGINAL

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

SUBMITTAL # 20105 - [illegible]-02605-001 Rev-0

CPChem
PERFORMANCE PIPE
a division of Chevron Phillips Chemical Company LP

LEE SUPPLY CO. INC.
• DIVERSIFIED PIPE & PUMP SYSTEMS
• INDUSTRIAL • MINING • ENVIRONMENTAL PRODUCTS
• MUNICIPAL PRODUCTS

DOC# PLV-02605-001 Rev-0

P.O. Box 35 Charleroi, PA 15022
Phone: 724-483-3543 FAX: 724-483-0577

PERFORMANCE PIPE™ Municipal & Industrial Series/IPS Pipe Data

Pipe weights are calculated in accordance with PPI TR-7. Average inside diameter calculated using nominal OD and minimum wall plus 6% for use in estimating fluid flows. Actual ID will vary. When designing components to fit the pipe ID, refer to pipe dimensions and tolerances in applicable pipe specifications.

Pressure Ratings are for water at 73.4 °F. For other fluid and service temperature, ratings may differ. Refer to Engineering Manual for Chemical and Environmental Considerations.

Pressure Rating		255 psi DR 7.3			200 psi DR 9.0			160 psi DR 11.0			130 psi DR 13.5			
IPS Pipe Size	Nominal OD (in)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	IPS Pipe Size
1 1/4"	1.660	0.227	1.179	0.44	0.184	1.270	0.37	0.151	1.340	0.31	0.123	1.399	0.26	1 1/4"
1 1/2"	1.900	0.260	1.349	0.58	0.211	1.453	0.49	0.173	1.533	0.41	0.141	1.601	0.34	1 1/2"
2"	2.375	0.325	1.686	0.91	0.264	1.815	0.76	0.216	1.917	0.64	0.176	2.002	0.53	2"
3"	3.500	0.479	2.485	1.98	0.389	2.675	1.66	0.318	2.826	1.39	0.259	2.951	1.15	3"
4"	4.500	0.616	3.194	3.27	0.500	3.440	2.74	0.409	3.633	2.29	0.333	3.794	1.90	4"
5 3/8"	5.375	0.736	3.815	4.66	0.597	4.109	3.90	0.489	4.338	3.27	0.398	4.531	2.72	5 3/8"
5"	5.563	0.762	3.948	5.00	0.618	4.253	4.18	0.506	4.490	3.51	0.412	4.690	2.91	5"
6"	6.625	0.908	4.700	7.09	0.736	5.065	5.93	0.602	5.349	4.97	0.491	5.584	4.13	6"
7 1/8"	7.125	0.976	5.056	8.20	0.792	5.446	6.86	0.648	5.751	5.75	0.528	6.006	4.78	7 1/8"
8"	8.625	1.182	6.119	12.01	0.958	6.594	10.05	0.784	6.963	8.42	0.639	7.270	7.00	8"
10"	10.750	1.473	7.627	18.66	1.194	8.219	15.61	0.977	8.679	13.09	0.796	9.062	10.87	10"
12"	12.750	1.747	9.046	26.25	1.417	9.746	21.97	1.159	10.293	18.41	0.944	10.749	15.29	12"
13 3/8"	13.375	1.832	9.491	28.88	1.486	10.225	24.18	1.216	10.797	20.26	0.991	11.274	16.84	13 3/8"
14"	14.000	1.918	9.934	31.64	1.556	10.701	26.50	1.273	11.301	22.20	1.037	11.802	18.44	14"
16"	16.000	2.192	11.353	41.33	1.778	12.231	34.60	1.455	12.916	29.00	1.185	13.488	24.09	16"
18"	18.000	2.466	12.772	52.31	2.000	13.760	43.79	1.636	14.532	36.69	1.333	15.174	30.48	18"
20"	20.000	2.740	14.191	64.58	2.222	15.289	54.05	1.818	16.146	45.30	1.481	16.860	37.63	20"
22"	22.000	3.014	15.610	78.14	2.444	16.819	65.40	2.000	17.760	54.82	1.630	18.544	45.56	22"
24"	24.000	3.288	17.029	93.00	2.667	18.346	77.85	2.182	19.374	65.24	1.778	20.231	54.21	24"
26"	26.000				2.889	19.875	91.36	2.364	20.988	76.57	1.926	21.917	63.62	26"
28"	28.000				3.111	21.405	105.95	2.545	22.605	88.78	2.074	23.603	73.78	28"
30"	30.000				3.333	22.934	121.62	2.727	24.219	101.92	2.222	25.289	84.69	30"
32"	32.000							2.909	25.833	115.97	2.370	26.976	96.35	32"
34"	34.000							3.091	27.447	130.93	2.519	28.660	108.81	34"
36"	36.000							3.273	29.061	146.60	2.667	30.346	121.98	36"
42"	42.000										3.111	35.405	166.00	42"
48"	48.000													48"
54"	54.000													54"

Performance Pipe can produce to specialized pipe dimensions. Check with your Performance Pipe contact for availability of dimensions not listed.

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[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 5/12/03

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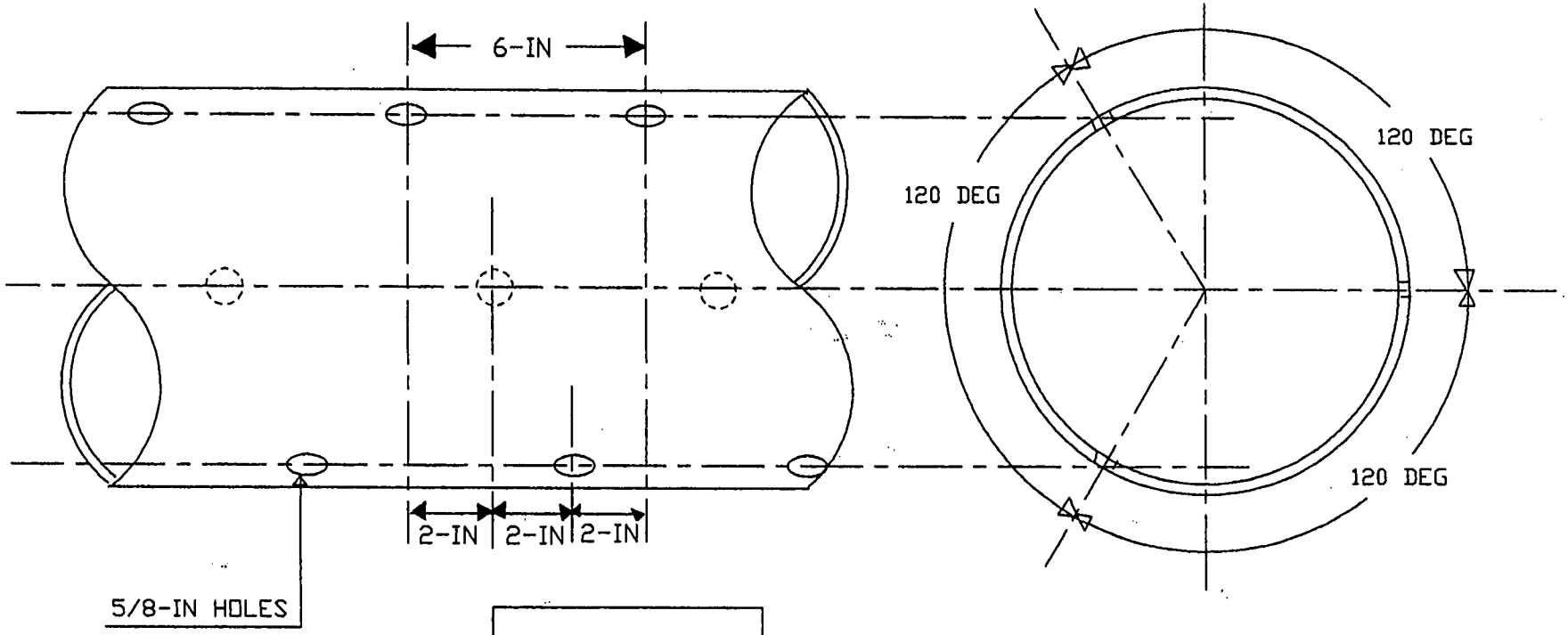
SHOP SKETCH - NOT TO SCALE



6-IN SDR-11

PERFORATION PATTERN:	3 ROWS 120 DEGREES APART 6-IN CENTERS 5/8-IN HOLES STAGGERED	LEE SUPPLY COMPANY INC FIRST & LINCOLN AVE CHARLEROI, PA 15022
		DRAWING NUMBER 3612058S

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A PLOT

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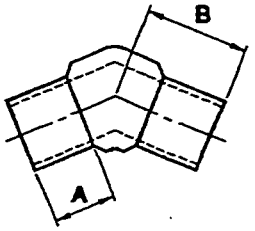

Molded Butt 45

ALL PE 3408 ELBOWS 2" AND LARGER NOW PRODUCED TO AWWA C906-99 AT NO ADDITIONAL COST

Butt 45 Degree Ells	DR/Wall	Dimensions A x B (in)	Package Weight (lbs.)	CSA[1]	IAPMO[1]	FM 150	FM 200	Reference Number
2" IPS	DR 7	2.45 x 3.20	20.0					*M020*L45D*
	DR 9		18.6					
	DR 11		15.2					
	DR 17		13.0					
3" IPS	DR 7	3.10 x 5.38	11.4					*M030*L45D*
	DR 9		10.8				x	
	DR 11 / 11.5		9.0	(x)		x		
	DR 13.5							
	DR 17							
4" IPS	DR 7	3.00 x 5.38	15.1					*M040*L45D*
	DR 9						x	
	DR 11 / 11.5	3.00 x 4.93	9.4	x		x		
	DR 13.5			x				
	DR 17							
6" IPS	DR 7	4.25 x 7.12	20.4					*M060*L45D*
	DR 9						x	
	DR 11 / 11.5	4.00 x 6.38	13.3	x	x	x		
	DR 13.5			x				
	DR 17							
8" IPS	DR 7	6.00 x 10.00	22.7					*M080*L45D*
	DR 9						x	
	DR 11		17.0	x		x		
	DR 13.5		16.3	x				
	DR 17							

[1] - CSA and IAPMO available as DriscoPlex™ 6500 PE2406 materials ONLY.
x - Indicates certification/approval for application or test.
( ) - Currently under evaluation at CSA, approval pending.
- All fittings produced to ASTM D2513 and D3261.
- Drawing No. CU70B257
- Packaging - 20 per box 2" IPS
  - 4 per box 3-4" IPS
  - 2 per box 6" IPS
  - 1 per box 8" IPS

PERFORMANCE PIPE, a division of
Chevron Phillips Chemical Company LP
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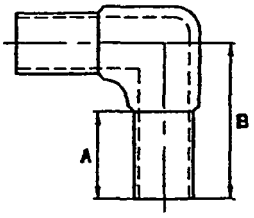

Molded Butt 90

Butt 90 Degree Ells	DR/Wall	Dimensions A x B (in)	Package Weight (lbs.)	CSA[1]	IAPMO	FM 150	FM 200	Reference Number
1/2" CTS	DR 0.090	1.69 x 1.79	0.4	(x)				*M005*L90D*
3/4" CTS	DR 0.090	1.72 x 2.94	0.8					*M007*L90D*
1" CTS	DR 0.102	1.69 x 2.94	0.9					*M011*L90D*
	DR 0.125							
3/4" IPS	DR 11	1.72 x 2.94	0.9	(x)				*M006*L90D*
1" IPS	DR 11	1.72 x 3.06	1.3	x	x			*M010*L90D*
1 1/4" IPS	DR 9	2.50 x 3.88	3.2					*M012*L90D*
	DR 10	3.13 x 4.50		x				
	DR 11			(x)				
1 1/2" IPS	DR 11	3.00 x 4.50	5.0	(x)				*M014*L90D*
2" IPS	DR 7	2.88 x 5.06	10.8					*M020*L90D*
	DR 9		9.3				x	
	DR 11		7.6	x	x	x		
3" IPS	DR 7	3.00 x 6.00	11.7					*M030*L90D*
	DR 9						x	
	DR 11 / 11.5	3.00 x 5.63	7.3	x	x	x		
	DR 13.5			x				
	DR 17							
4" IPS	DR 7	3.00 x 6.00	16.2					*M040*L90D*
	DR 9						x	
	DR 11 / 11.5	3.00 x 6.75	16.3	x	x	x		
	DR 13.5			x				
	DR 17							
6" IPS	DR 7	4.25 x 8.63	27.2					*M060*L90D*
	DR 9		26.8				x	
	DR 11 / 11.5	4.00 x 8.25	17.3	x	x	x		
	DR 13.5		16.6	x				
	DR 17							
8" IPS	DR 7	6.00 x 11.81	26.5					*M080*L90D*
	DR 9						x	
	DR 11 / 11.5		20.2	x		x		
	DR 13.5			x				
	DR 17							

All Fittings produced to ASTM D2513 and D3261. All elbows 2" and larger can be produced to AWWA C906 at no additional cost.
[1]CSA available as DriscoPlex™ 6500 PE2406 materials ONLY
x - Indicates certification/approval for appropriate application or test.
( ) - Currently under evaluation at CSA, approval pending.
Packaging - 10 per box 2" IPS and smaller
- 4 per box 3-4" IPS
- 2 per box 6" IPS
- 1 per box 8" IPS
- Drawing Nos. FP70B255 for IPS & FP70B247 for CTS

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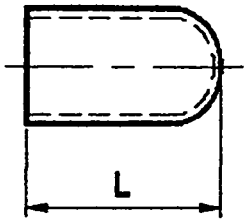

BUTT END CAP

ALL PE3408 ENDS CAPS 2" AND LARGER NOW PRODUCED TO AWWA C906-99 AT NO ADDITIONAL COST

Butt End Cap	DR/Wall	Dimension L (in)	Package Weight (lbs.)	CSA[1]	IAPMO[1]	FM 150	FM 200	Reference Number
1/2" CTS	0.090	2.00	0.2	x				*M005*CPST*
3/4" CTS	0.090	2.30	0.2					*M006*CPST*
1" CTS	0.102	2.30	0.3					*M011*CPST*
	0.125							
1/2" IPS	DR 9.3	2.20	0.2	x				*M004*CPST*
3/4" IPS	DR 11	2.30	0.3	(x)				*M006*CPST*
1" IPS	DR 9	2.40	0.5					*M010*CPST*
	DR 11			x	x			
1 1/4" IPS	DR 9	3.31	1.2					*M012*CPST*
	DR 10	3.94		x				
	DR 11			x				
1 1/2" IPS	DR 11	3.70	1.3	(x)				*M014*CPST*
2" IPS	DR 7	4.25	3.2					*M020*CPST*
	DR 9		2.6		x		x	
	DR 11			x		x		
	DR 17							
3" IPS	DR 7	4.80	10.0					*M030*CPST*
	DR 9		8.1				x	
	DR 11 / 11.5	3.94	5.6	x	x	x		
	DR 13.5			x				
	DR 17							
4" IPS	DR 7	8.50	23.7					*M040*CPST*
	DR 9						x	
	DR 11 / 11.5	4.25	9.0	x	x	x		
	DR 13.5			x				
	DR 17							
6" IPS	DR 7	9.88	27.9					*M060*CPST*
	DR 9						x	
	DR 11 / 11.5	5.20	14.1	x	x	x		
	DR 13.5			x				
	DR 17							
8" IPS	DR 7	5.00	5.6					*M080*CPST*
	DR 9						x	
	DR 11		4.3	x		x		
	DR 13.5			x				
	DR 17							

[1] - CSA and IAPMO available as DriscoPlex™ 6500 PE2406 materials ONLY
x - Indicates certification/approval for application or test.
( ) - Currently under evaluation at CSA, approval pending.
- All Fittings produced to ASTM D2513 and D3261.
- Drawing Nos. CU70B258 for IPS & CU70B248 for CTS
- Packaging - 10 per box 4" IPS and smaller
- 6 per box 6" IPS
- 1 per box 8" IPS and above

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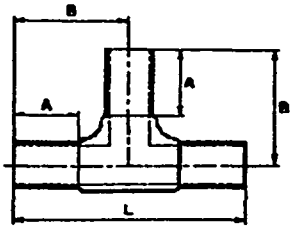

MOLDED BUTT TEE

ALL PE 3408 TEES 2" AND LARGER NOW PRODUCED TO AWWA C906-99 AT NO ADDITIONAL COST

Molded Butt Tee	DR/Wall	Dimensions A x B x L (in)	Package Weight (lbs.)	CSA[1]	IAPMO[1]	FM 150	FM 200	Reference Number
1/2" CTS	0.090	1.69 x 2.83 x 5.65	0.6	x				*M005*TSTR*
3/4" CTS	0.090	1.72 x 2.94 x 5.88	1.1					*M007*TSTR*
1" CTS	0.102	1.72 x 2.94 x 5.88	1.3					*M011*TSTR*
	0.125							
1/2" IPS	DR 9.3	1.72 x 2.94 x 5.88	0.8					*M004*TSTR*
3/4" IPS	DR 11	1.72 x 2.94 x 5.88	1.2	(x)				*M006*TSTR*
1" IPS	DR 11	1.72 x 3.06 x 6.12	1.8	x				*M010*TSTR*
1 1/4" IPS	DR 9	2.50 x 3.90 x 7.80	4.4					*M012*TSTR*
	DR 10	2.75 x 4.53 x 9.25	5.2	(x)				
	DR 11			(x)				
1 1/2" IPS	DR 11	3.02 x 4.62 x 9.24	6.6	(x)	x			*M014*TSTR*
2" IPS	DR 7	2.88 x 5.125 x 10.25	14.0					*M020*TSTR*
	DR 9		11.8				x	
	DR 11		10.4	x	x	x		
	DR 17		10.0					
3" IPS	DR 7	3.00 x 6.06 x 12.13	15.3					*M030*TSTR*
	DR 9		14.9				x	
	DR 11 / 11.5	3.00 x 5.72 x 11.44	10.4	x	x	x		
	DR 13.5			x				
	DR 17							
4" IPS	DR 7	3.00 x 6.22 x 12.44	23.0					*M040*TSTR*
	DR 9		22.0				x	
	DR 11 / 11.5	3.00 x 6.75 x 13.50	21.0	x	x	x		
	DR 13.5		20.0	x				
	DR 17		19.9					
6" IPS	DR 7	4.25 x 8.63 x 17.25	16.7					*M060*TSTR*
	DR 9						x	
	DR 11 / 11.5	4.06 x 8.31 x 16.62	11.6	x	x	x		
	DR 13.5			x				
	DR 17							
8" IPS	DR 7	6.00 x 12.09 x 24.18	37.6					*M080*TSTR*
	DR 9		36.6				x	
	DR 11		27.5	x		x		
	DR 13.5		26.3	x				
	DR 17							

[1] - CSA and IAPMO available as DriscoPlex™ 6500 PE2406 materials ONLY.
x - Indicates certification/approval for application or test.
( ) - Currently under evaluation at CSA, approval pending.
- All Fittings produced to ASTM D2513 and D3261.
- Drawing No. CU70B256 for IPS & CU70B246 for CTS
- Packaging - 10 per box 2" IPS and smaller
- 4 per box 3 - 4" IPS
- 1 per box for greater than 4" IPS

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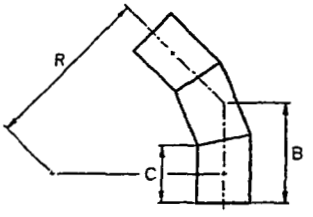

Fabricated IPS 3-Segment 45 Ell

ALL M&I ELBOWS 2" - 24" NOW PRODUCED TO AWWA C906-99 & D2513 AT NO ADDITIONAL COST

Nominal Size Actual OD	Pressure Class (psi)	Feed Stock	Dimensions R x C x B (in)	Std Item	Weight per Item (lbs.)	FM 150	FM 200	Plant	Reference Code
2" 2.375"	100	DR 11	13 1/8 x 4 x 7	N	1			AB/WX	*F02*L45D*
	128	DR 11		N	1				
	160	DR 9		Y	1	x			
	200	DR 7		Y	1		x		
3" 3.500"	100	DR 11	13 5/8 x 4 x 7 1/4	N	2			AB/WX	*F03*L45D*
	128	DR 11		N	2				
	160	DR 9		N	2	x			
	200	DR 7		N	3		x		
4" 4.500"	100	DR 11	14 1/4 x 5 x 8 1/2	N	3			AB/WX	*F04*L45D*
	128	DR 11		N	3				
	160	DR 9		N	4	x			
	200	DR 7		N	5		x		
6" 6.625"	100	DR 11	15 1/4 x 6 x 10	N	8			AB/WX	*F06*L45D*
	128	DR 11		N	8				
	160	DR 9		Y	10	x			
	200	DR 7		N	12		x		
8" 8.625"	100	DR 11	16 1/4 x 6 1/2 x 10 7/8	N	15			AB/WX	*F08*L45D*
	128	DR 11		N	15				
	160	DR 9		Y	18	x			
	200	DR 7		N	22		x		
10" 10.750"	80	DR 17	17 1/4 x 6 1/2 x 11 1/4	Y	16			AB/WX	*F10*L45D*
	100	DR 11		N	24				
	128	DR 11		Y	24				
	160	DR 9		Y	29	x			
	200	DR 7		Y	35		x		
12" 12.750"	80	DR 17	19 1/2 x 8 x 13 1/2	Y	27			AB/WX	*F12*L45D*
	100	DR 11		N	40				
	128	DR 11		Y	40				
	160	DR 9		Y	48	x			
	200	DR 7		Y	60		x		
14" 14.000"	80	DR 17	21 x 8 x 13 7/8	Y	34			AB/WX	*F14*L45D*
	100	DR 11		N	50				
	128	DR 11		Y	50				
	160	DR 9		Y	60	x			
	200	DR 7		Y	74		x		

† - Fittings 26" -42" are produced to dimensional requirements of F-714 and can be manufactured to meet AWWA standards for a premium.
†† - Dimensions and weights are approximate and subject to change.
x - Indicates certification/approval for application or test.
- Drawing No. - CU708413

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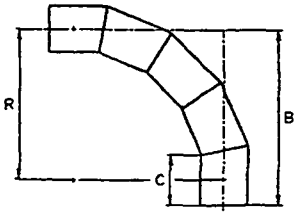

Fabricated IPS 5-Segment 90 Ell

ALL M&I ELBOWS 2" - 24" NOW PRODUCED TO AWWA C906-99 & D2513 AT NO ADDITIONAL COST

Nominal Size Actual OD	Pressure Class (psi)	Feed Stock	Dimensions R x C x B (in)	Std. Item	Weight per Item (lbs.)	FM 150	FM 200	Plant	Reference Code
2" 2.375"	100	DR 11	13 1/8 x 4 x 14 3/4	N	2			AB/WX	*F02*L90D*
	128	DR 11		N	2				
	160	DR 9		Y	2	x			
	200	DR 7		N	2		x		
3" 3.500"	100	DR 11	13 5/8 x 4 x 15 1/4	N	3			AB/WX	*F03*L90D*
	128	DR 11		N	3				
	160	DR 9		Y	4	x			
	200	DR 7		N	4		x		
4" 4.500"	100	DR 11	14 1/4 x 5 x 16 7/8	N	6			AB/WX	*F04*L90D*
	128	DR 11		N	6				
	160	DR 9		N	7	x			
	200	DR 7		N	8		x		
6" 6.625"	100	DR 11	15 1/4 x 6 x 18 7/8	N	13			AB/WX	*F06*L90D*
	128	DR 11		N	13				
	160	DR 9		Y	16	x			
	200	DR 7		N	19		x		
8" 8.625"	100	DR 11	16 1/4 x 6 1/2 x 20 3/8	N	24			AB/WX	*F08*L90D*
	128	DR 11		Y	24				
	160	DR 9		Y	29	x			
	200	DR 7		N	35		x		
10" 10.750"	80	DR 17	17 1/4 x 6 1/2 x 21 3/8	Y	26			AB/WX	*F10*L90D*
	100	DR 11		N	39				
	128	DR 11		Y	39				
	160	DR 9		Y	47	x			
	200	DR 7		Y	58		x		
12" 12.750"	80	DR 17	19 1/2 x 8 x 24 7/8	Y	43			AB/WX	*F12*L90D*
	100	DR 11		N	64				
	128	DR 11		Y	64				
	160	DR 9		Y	77	x			
	200	DR 7		Y	95		x		
14" 14.000"	80	DR 17	21 x 8 x 26 1/4	Y	54			AB/WX	*F14*L90D*
	100	DR 11		N	81				
	128	DR 11		Y	81				
	160	DR 9		Y	97	x			
	200	DR 7		Y	120		x		

† - Fittings 26" - 42" are produced to dimensional requirements of F-714 and can be manufactured to meet AWWA standards for a premium.
†† - Dimensions and weights are approximate and subject to change.
x - Indicates certification/approval for application or test.
- Drawing No. - CU708413

Jan. 2002 Supercedes all previous publications
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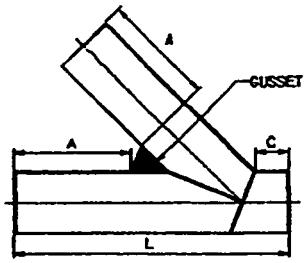

Fabricated IPS 3-Segment 45 Lateral

1000 Series Only

Nominal Size Actual OD	Pressure Class (psi)	Feed Stock	Dimensions L x A x C (in)	Standard Item	Weight per Item (lbs.)	Plant	Reference Code
2" 2.375"	100	DR 11	23 x 8 x 4	N	2	WX	*F*LAT*
	128	DR 11		Y	2		
	160	DR 9			3		
3" 3.500"	100	DR 11	23 x 8 x 4	N	4	WX	*F*LAT*
	128	DR 11		Y	4		
	160	DR 9			5		
4" 4.500"	80	DR 17	24 3/8 x 8 x 4	N	8	WX	*F*LAT*
	100	DR 11			8		
	128	DR 11		Y	8		
	160	DR 9			10		
6" 6.625"	80	DR 17	31 3/8 x 10 x 6	N	21	WX	*F*LAT*
	100	DR 11			21		
	128	DR 11		Y	21		
	160	DR 9			28		
8" 8.625"	80	DR 17	36 1/4 x 10 x 8	N	45	WX	*F*LAT*
	100	DR 11			45		
	128	DR 11		Y	45		
	160	DR 9			54		
10" 10.750"	80	DR 17	41 1/4 x 12 x 8	Y	55	WX	*F*LAT*
	100	DR 11		N	81		
	128	DR 11		Y	81		
	160	DR 9			97		
12" 12.750"	80	DR 17	44 x 12 x 8	Y	82	WX	*F*LAT*
	100	DR 11		N	122		
	128	DR 11		Y	122		
	160	DR 9			146		
14" 14.000"	80	DR 17	63 x 27 x 8	N	111	WX	*F*LAT*
	100	DR 11			165		
	128	DR 11			165		
	160	DR 9			197		
16" 16.000"	Non Pressure	DR 17	70 x 28 1/2 x 10 1/2	N	160	WX	*F*LAT*
		DR 11			239		
18" 18.000"	Non Pressure	DR 17	71 x 27 1/2 x 10 1/2	N	215	WX	*F*LAT*
		DR 11			320		
20" 20.000"	Non Pressure	DR 17	78 x 30 x 12	N	325	WX	*F*LAT*
		DR 11			485		
22" 22.000"	Non Pressure	DR 17	80 x 29 x 12	N	411	WX	*F*LAT*
		DR 11			613		
24" 24.000"	Non Pressure	DR 17	82 x 24 x12	N	510	WX	*F*LAT*
		DR 11			760		

- Dimensions and weights are approximate and subject to change.
- Drawing No. - CU70B847 & CU70D283

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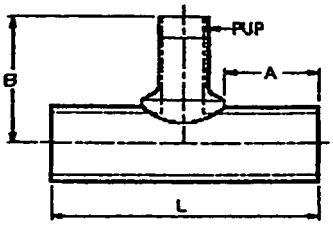
DRISCOPLEX

Please visit www.driscoplex.com for the most up to date information

www.driscoplex.com



IPS SADDLE REDUCING TEES 6" BRANCH

ALL SADDLE REDUCING TEES THRU 24" MAINS NOW PRODUCED TO AWWA C906-99 & D2513 AT NO ADDITIONAL COST

Nominal Size	Pressure Class (psi)	Feed Stock	Dimensions A x B x L (in)	Std. Item	Weight per Item (lbs.)	FM 150	FM 200	Plant	Reference Code
10" x 10" x 6"	100	DR 11	6 1/2 x 38 3/8 x 21 5/8	N	47			WX	*F*REDT*
	160	DR 11			47	x			
	200	DR 9			54		x		
12" x 12" x 6"	100	DR 17	8 x 39 3/8 x 24 5/8	N	45			WX	*F*REDT*
	160	DR 11			61	x			
	200	DR 9			71		x		
14" x 14" x 6"	100	DR 17	8 x 40 x 24 5/8	N	50			WX	*F*REDT*
	160	DR 11			69	x			
	200	DR 9			80		x		
16" x 16" x 6"	100	DR 17	8 x 41 x 24 5/8	N	60			WX	*F*REDT*
	160	DR 11			83	x			
	200	DR 9			97		x		
18" x 18" x 6"	100	DR 17	8 x 42 x 24 5/8	N	71			WX	*F*REDT*
	160	DR 11			99	x			
	200	DR 9			117		x		
20" x 20" x 6"	100	DR 17	8 x 43 x 24 5/8	N	83			WX	*F*REDT*
	160	DR 11			118	x			
	200	DR 9			138		x		
22" x 22" x 6"	100	DR 17	8 x 44 x 24 5/8	N	96			WX	*F*REDT*
	160	DR 11			138	x			
	200	DR 9			162		x		
24" x 24" x 6"	100	DR 17	8 x 45 x 24 5/8	N	111			WX	*F*REDT*
	160	DR 11			159	x			
	200	DR 9			188		x		
28" x 28" x 6"†	100	DR 17	22 x 47 x 52 5/8	N	283			WX	*F*REDT*
	160	DR 11			416				
	200	DR 9			494				
30" x 30" x 6"†	100	DR 17	21 x 48 x 50 5/8	N	311			WX	*F*REDT*
	160	DR 11			457				
	200	DR 9			543				
32" x 32" x 6"†	100	DR 17	21 x 49 x 50 5/8	N	350			WX	*F*REDT*
	160	DR 11			517				
36" x 36" x 6"†	100	DR 17	21 x 51 x 50 5/8	N	439			WX	*F*REDT*
	160	DR 11			648				

† - Fittings 28" - 42" are produced to dimensional requirements of F-714 and can be manufactured to meet AWWA standards for a premium.
x - Indicates certification/approval for application or test.
- Dimensions and weights are approximate and subject to change.
- Drawing No. - CU70D268

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CHARLEROI, PA 15022

FULL COUPLINGS

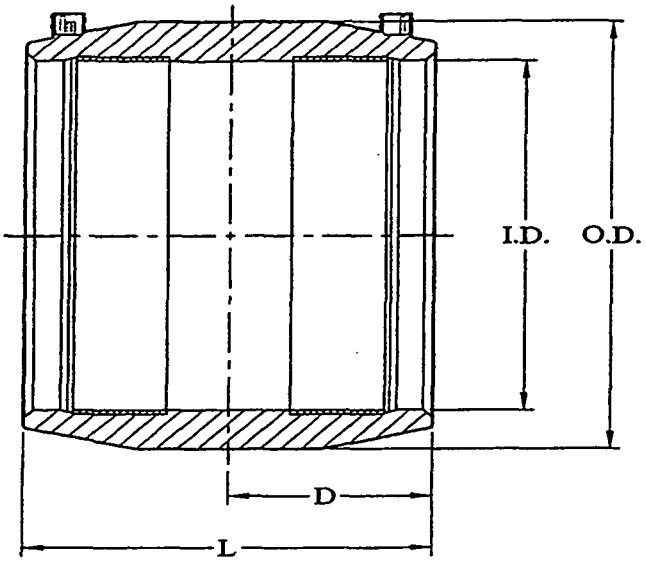
5369

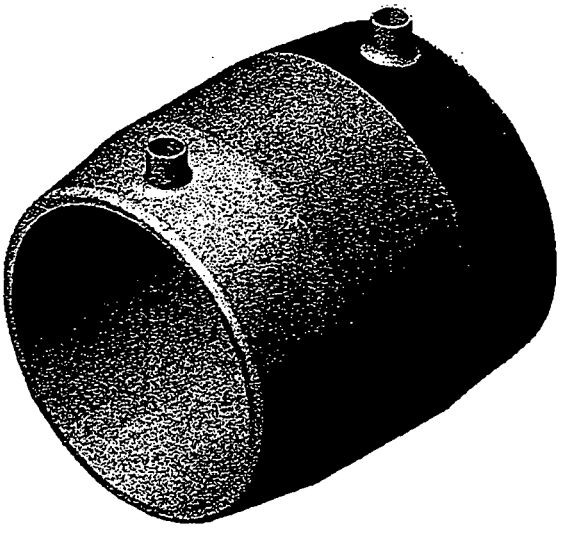
ELECTROFUSION FITTINGS

ASTM F1055 IPS

FOR REFERENCE ONLY

NEW STYLE





NOMINAL SIZE	INSIDE DIA. (MAXIMUM) I.D.	INSIDE DIA. (MINIMUM) I.D.	OUTSIDE DIA. (NOMINAL) O.D.	STAB DEPTH (NOMINAL) "D"	OVERALL LENGTH (NOMINAL) "L"
4" IPS	4.545	4.510	5.57	3.00	6.14
114.30mm	115.44mm	114.55mm	141.48mm	76.20mm	155.96mm
6" IPS	6.690	6.670	8.17	4.10	8.35
168.28mm	169.93mm	169.42mm	207.52mm	104.22mm	212.09mm
8" IPS	8.700	8.680	10.63	4.70	9.48
219.08mm	220.98mm	220.47mm	270.00mm	119.38mm	240.79mm
10" IPS	10.800	10.766	13.25	5.00	10.50
273.05mm	274.32mm	273.46mm	336.55mm	127.00mm	266.70mm
12 IPS	12.860	12.800	15.70	5.50	11.50
323.85mm	326.64mm	325.12mm	398.78mm	139.70mm	292.10mm

000772

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NEWCOUP.xls
6/30/99

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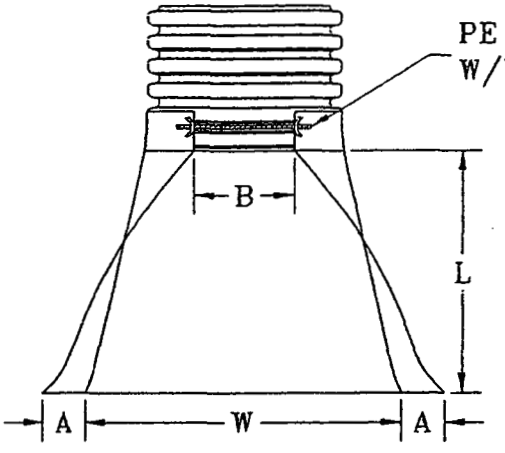
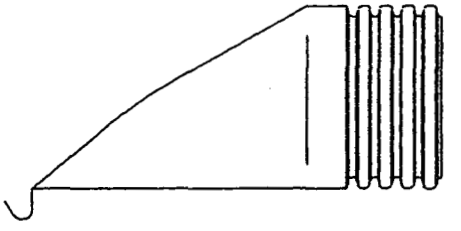
FLARED END SECTIONS

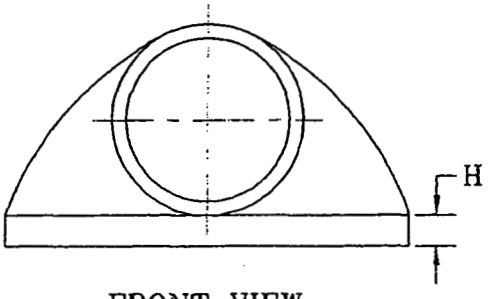
5369



TOP VIEW



RIGHT SIDE VIEW



FRONT VIEW

PART Nº	PIPE SIZE	A	B (MAX)	H	L	W
1210-NP	12" 300 mm	6.5" 165 mm	10" 254 mm	6.5" 165 mm	25" 635 mm	29" 735 mm
1210-NP	15" 375 mm	6.5" 165 mm	10" 254 mm	6.5" 165 mm	25" 635 mm	29" 735 mm
1810-NP	18" 450 mm	7.5" 190 mm	15" 380 mm	6.5" 165 mm	32" 812 mm	35" 890 mm
2410-NP	24" 600 mm	7.5" 190 mm	18" 450 mm	6.5" 165 mm	36" 900 mm	45" 1140 mm
3010-NP	30" 750 mm	10.5" 266 mm	N/A	7.0" 178 mm	53" 1345 mm	68" 1725 mm
3610-NP	36" 900 mm	10.5" 266 mm	N/A	7.0" 178 mm	53" 1345 mm	68" 1725 mm

NOTE: PE THREADED ROD W/WING NUTS PROVIDED FOR END SECTIONS 12"-24". 30" & 36" END SECTIONS TO BE WELDED TO PIPE PER MANUFACTURER'S RECOMMENDATIONS.

NOTE: ALL DIMENSIONS ARE NOMINAL

ADS
ADVANCED DRAINAGE SYSTEMS, INC.

DRAWN BY	APPROVED BY	DRAWING #
D.P.K. 10-6-97	N.E.K. 10-6-97	DW-272

REVISIONS	
BY	DATE

000773

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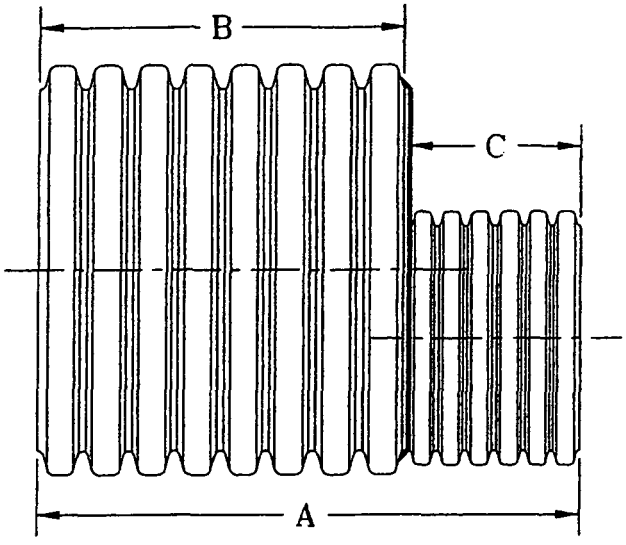
P. O. BOX #35
CHARLEROI, PA 15022

N12 FABRICATED REDUCERS

5369



PART №	PIPE SIZE	A	B	C
0670-AN	6" x 4" 150 mm x 100 mm	10.5" 267 mm	5.5" 140 mm	5" 127 mm
0870-AN	8" x 4" 200 mm x 100 mm	12" 305 mm	7" 178 mm	5" 127 mm
0871-AN	8" x 6" 200 mm x 150 mm	13" 330 mm	7" 178 mm	6" 152 mm
1070-AN	10" x 4" 250 mm x 100 mm	13" 330 mm	8" 203 mm	5" 127 mm
1071-AN	10" x 6" 250 mm x 150 mm	14" 356 mm	8" 203 mm	6" 152 mm
1072-AN	10" x 8" 250 mm x 200 mm	14.5" 368 mm	8" 203 mm	6.5" 165 mm
1270-AN*	12" x 4" 300 mm x 100 mm	15" 381 mm	10" 254 mm	5" 127 mm
1271-AN	12" x 6" 300 mm x 150 mm	16" 406 mm	10" 254 mm	6" 152 mm
1272-AN	12" x 8" 300 mm x 200 mm	17" 432 mm	10" 254 mm	7" 178 mm
1273-AN	12" x 10" 300 mm x 250 mm	18" 457 mm	10" 254 mm	8" 203 mm

* DENOTES NON-STOCK ITEMS
AN = ANNULAR
AS = SPIRAL
NOTE: ALL DIMENSIONS ARE NOMINAL

ADS. ADVANCED DRAINAGE SYSTEMS, INC.

000774

ISSUED	REVISED	DRAWING #
D.Y. 4-13-89	M.D.S. 6-10-95	DW-251

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 2	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02605-002	REV.: 0	DATE: 05/07/03	Page 1

FROM:
Fluor Fernald

SIGNATURE: Bnumar 5/7/03

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

RECEIVED BY: Juna Schwab DATE: 5/8/03

			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	PHV-02605-002	0					X				List of materials for HDPE pipes		X		02605-1.04A2	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE	64				
GREGG JOHNSON	60				
BILL ZEBICK(APPROVER)	60				
MIKE GODBER	84				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

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

RECEIVED BY: [signature] DATE: 05/23/03

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

FOR BILL ZEBICK

ORIGINAL

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

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SUBMITTAL # 2605-PHV-02605-0
Rev-0

DOC # PHV-02605-002
Rev-0

Gilman Fernald Inc.

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Phone: (724) 483-3543 Fax: (724) 483-0577

6 IPS DR 11 PC160 Driscoplex™ PW4100
1000 AWWA C906-99 PE3408 ASTM F714 NSF
61 C3 HG 003 TC 2 023
1 Pcs x 20 ft. 08 MAR 03

---

6 IPS DR 11 PC160 Driscoplex™ PW4100
AWWA C906-99 PE3408 ASTM F714 NSF
1000 61 C3 HG 003 TC3 011
13 Pcs x 40 ft 07 MAR 03

---

6 IPS DR 11 PC160 Driscoplex™ PW4100
1000 AWWA C906-99 PE3408 ASTM F714 NSF
61 C3 HG 003T 13I 035
13 Pcs x 40 ft. 11 MAR 03

---

6 IPS DR 11 PC160 Driscoplex™ PW4100
AWWA C906-99 PE3408 ASTM F714 NSF
61 C3 HG 003 T D1 026
1000
13 Pcs x 40 ft 8 MAR 03

WE SUPPLY SOLUTIONS

INFORMATION ONLY

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[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [signature] Date: 05/29/03
For Bill Zepick

000776

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1000 6 IPS DR 11 PC160 Driscoplex™ PW4100
AWWA C906-99 PE3408 ASTM F714
NSF 61 C3 HG 003 T C2 011
13 Pcs x 40 Ft 07 MAR 03

1000 6 IPS DR 11 PC160 Driscoplex™ PW4100
AWWA C906-99 PE3408 ASTM F714
NSF 61 C3 HG 003 T C2 023
3 Pcs x 40 Ft
D/C Pipe 08 MAR 03

6229 10 IPS DR 11 PC160 Driscoplex™ PW4100
AWWA C906-99 PE3408 F714 NSF
61 C3 HG 0025 132-019
3 Pcs x 40 Ft 22 Oct 02
D/C Pipe

6229 10 IPS DR 11 PC160 Driscoplex™ PW4100
AWWA C906-99 PE3408 F714 NSF
61 C3 HG 0025 132-019
2 Pcs x 40 Ft 22 Oct 02

WE SUPPLY SOLUTIONS

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6502

10 IPS OR 11 PC160 Driscoplex™ PL4100
AWWA C906-99 PE3408 Astm F714 NSF
61 C3 HG 001 T
1 Pcs x 40 ft 18 Dec 02

WE SUPPLY SOLUTIONS

TOTAL P.04

000778

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.:	CONTRACT NO: PHV	JBMITTAL NO. 20105-PHV-02605-004	REV.: 1	DATE: 05/13/03	. age 1

FROM:
Fluor Fernald

SIGNATURE: Bnumar 5/14/03

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

RECEIVED BY: Tunia Schwab DATE: 5/14/03

			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	PHV-02605-004	1							X		Origin and identification of polyethylene resin		X		02605-1.04A4	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
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BILL ZEBICK	60				
MIKE GODBER (APPROVER)	84				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

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RECEIVED BY: Michael Godber DATE: 5/15/03

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ORIGINAL

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)

5369

BP SOLVAY Polyethylene

CERTIFICATE OF ANALYSIS
Batch: C020527P03

Information Provided to:	Shipped To:
PERFORMANCE PIPE - HAGERSTOWN 11711 HOPEWELL RD HAGERSTOWN, MD 21740	PERFORMANCE PIPE - HAGERSTOWN 11711 HOPEWELL RD HAGERSTOWN MD 21740 USA

Contact: SHERI ECKLES-PETRUCCI
Fax: 301-582-6628

Order information on Shipment of:	Sold-To
FORTIFLEX™ K44-06-123 BLACK PE PELLETS	PERFORMANCE PIPE

Customer Purchase Order No	Material Code	Dry Short Tons	Delivery / BOL No.
C3	64070		80380499

Shipping Date	Shipping Vehicle No	Net Weight	Number and Type of Package:
09/11/2002	ELTX002201	194,300 LB	1 RAIL CAR

Comment(s):

CUSTOMER SPECIFICATION ANALYSIS	METHOD	RESULT	UNIT	MIN	MAX
MI 21.6 (HLMI)	ASTM D1238-00	6.8	g/10min	4.0	9.0
DENSITY (NATURAL RESIN)	ASTM D4883-99	0.9448	g/cm3		
DENSITY (BLACK)	CALCULATED	0.9555	g/cm3		

X A-Conforms to the Subcontract Requirements
B-Minor Comment - Incorporate and Resubmit
C-Revise and Resubmit
Sig: Michael Wyatt Date: 5/15/03

Responsible Care

ACCREDITED 208-01

INFORMATION ONLY

SUPPLIER:	APPROVED BY:
BP SOLVAY POLYETHYLENE NORTH AMERICA 3333 RICHMOND AVE 77098-3099 HOUSTON Phone: 800-527-5419	Olton Decuire Quality Assurance Manager BP SOLVAY PO BOX 1000 DEER PARK, TX 77536-1000 Phone: 713-307-3740

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000780

CoA Date. 01/30/2003

5369

Certificate of Analysis

Shipped To: PERFORMANCE PIPE LEASE TRACK
11700 HOPEWELL
HAGERSTOWN MD 21741
USA

Recipient: SHERI ECKLES-PETRUCCI
Fax: 1-301-582-6670

CPC Delivery #: 85298546
PO #: REL 18
Weight: 190900 LB
Ship Date: 01/30/2003
Package: BULK
Mode: Hopper Car
Car #: CHVX889116

Product:
MARLEX POLYETHYLENE HHM TR-480X BULK

This is to confirm that HHM TR-480X, when used with the proper color concentrate, meets or exceeds the requirements of cell classification 345464C in accordance with ASTM D3350. This resin is a PE34 grade material.

Lot Number: 7130053

Property	Test Method	Lower Limit	Upper Limit	Value	Unit
HLMI Flow Rate	ASTM D1238	8.00	14.00	10.80	g/10mi
Density	ASTM D1505	0.9420	0.9450	0.9440	g/cm3
Pellet Count	P02.08.03	35.000	65.000	46.000	pel/g
Ultranox 3367A		0.26	0.39	0.31	WT%

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

Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Paula Carter at 832-813-4807

000781

CoA Date: 02/11/2003

5369

Certificate of Analysis

Shipped To: PERFORMANCE PIPE LEASE TRACK
11700 HOPEWELL
HAGERSTOWN MD 21741
USA

Recipient: SHERI ECKLES-PETRUCCI
Fax: 1-301-582-6670

CPC Delivery #: 86308902
PO #: REL 22
Weight: 187200 LB
Ship Date: 02/11/2003
Package: BULK
Mode: Hopper Car
Car #: PSPX001257

Product:
MARLEX POLYETHYLENE HHM TR-480X BULK

This is to confirm that HHM TR-480X, when used with the proper color concentrate, meets or exceeds the requirements of cell classification 345464C in accordance with ASTM D3350. This resin is a PE34 grade material.

Lot Number: 8130109

Property	Test Method	Lower Limit	Upper Limit	Value	Unit
HLMI Flow Rate	ASTM D1238	8.00	14.00	8.70	g/10mi
Density	ASTM D1505	0.9420	0.9450	0.9440	g/cm3
Pellet Count	P02.08.03	35.000	65.000	45.000	pel/g
Ultranox 3367A		0.26	0.39	0.32	WT%

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

Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Paula Carter at 832-813-4807

000782

CoA Date: 02/07/2003

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Certificate of Analysis

Shipped To: PERFORMANCE PIPE LEASE TRACK
11700 HOPEWELL
HAGERSTOWN MD 21741
USA

Recipient: SHERI ECKLES-PETRUCCI
Fax: 1-301-582-6670

CPC Delivery #: 86305918
PO #: REL 20
Weight 136200 LB
Ship Date: 02/07/2003
Package: BULK
Mode: Hopper Car
Car #: PSPX008112

Product:
MARLEX POLYETHYLENE HHM TR-480X BULK

This is to confirm that HHM TR-480X, when used with the proper color concentrate, meets or exceeds the requirements of cell classification 345464C in accordance with ASTM D3350. This resin is a PE34 grade material.

Lot Number: 8130107

Property	Test Method	Lower Limit	Upper Limit	Value	Unit
HLMI Flow Rate	ASTM D1238	8.00	14.00	8.90	g/10mi
Density	ASTM D1505	0.9420	0.9450	0.9450	g/cm3
Pellet Count	P02.08.03	35.000	65.000	46.000	pel/g
Ultranox 3367A		0.26	0.39	0.32	WT%

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

Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Paula Carter at 832-813-4807

000783

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 2	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02605-005	REV.: 0	DATE: 05/07/03	Page 1

FROM: Fluor Fernald

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

SIGNATURE: Anumar 5/7/03

RECEIVED BY: Susan Schwab DATE: 5/8/03

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	PHV-02605-005	0							X		Manufacturer's certifiable values for HDPE material properties		X		02605-1.04A5	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
MIKE GODBER (APPROVER)	84				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

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

0002784

53369

RECEIVED BY: Michael W. Fuller DATE: 5/10/03

(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

SUBMITTAL #20105-PHV-02605-005 Rev 0
Doc #[illegible]-PHV-02605-006 Rev 0

5369

DRISCOPLEX

www.driscoplex.com

DriscoPlex™ PE 3408 HDPE Data Sheet

Typical Material Physical Properties of DriscoPlex™ HDPE High Density Polyethylene Materials

Property		Unit	Standard	Typical Value†
Material Designation		–	ASTM F 412	PE 3408
Cell Classification		–	ASTM D-3350	345464C (black) 345464E (color)
Density	[3]	gm/cm^3	ASTM D-1505	0.955 (black) 0.947 (color)
Melt Index	[4]	g/10 minutes	ASTM D-1238	0.1
Flexural Modulus	[5]	lb/in^2	ASTM D-790	> 130,000
Tensile Strength	[4]	lb/in^2	ASTM D-638	3200
SCG (PENT)	[6]	hours	ASTM F 1473	> 100
HDB at 73°F (23°C)	[4]	lb/in^2	ASTM D-2837	1600
Color; UV Stabilizer	[C] [E]	– –	ASTM D-3350	Black with minimum 2% carbon black Color with UV stabilizer
Linear Thermal Expansion		inch/inch/°F	ASTM D-696	9 x 10^{-5}
Elastic Modulus		lb/in^2	ASTM D-638	110,000
Brittleness Temperature		°F (°C)	ASTM D-746	< -180 (< -118)
Hardness		Shore D	ASTM D-2240	65

†NOTICE. This data sheet provides typical physical property information for polyethylene resins used to manufacture PERFORMANCE PIPE polyethylene piping products. It is intended for comparing polyethylene-piping resins. It is not a product specification, and it does not establish minimum or maximum values or manufacturing tolerances for resins or for piping products. These typical physical property values were determined using compression-molded plaques prepared from resin. Values obtained from tests of specimens taken from piping products can vary from these typical values. Performance Pipe has made every reasonable effort to ensure the accuracy of this data sheet, but this data sheet may not provide all necessary information, particularly with respect to special or unusual applications. This data sheet may be changed from time to time without notice. Contact Performance Pipe to determine if you have the most recent edition.

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [signature] Date: 5/10/03

LEE SUPPLY CO., INC.
P. O. BOX #35
CHARLEROI, PA 15022

INFORMATION ONLY

Oct. 2002 Supercedes all previous publications
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000785

Table 4-1 ASTM D 3350 Properties and Cell Classification Limits

Property	Test Method	0	1	2	3	4	5	6	7
Density, gm/cm³	D 1505	(a)	0.910-0.925	0.926-0.941	0.941-0.955	>0.955	–	–	(b)
Melt Index, gm/10 min	D 1238	(a)	>1.0	1.0 - 0.4	<0.4 – 0.15	<0.15	(c)	(d)	(b)
Flexural Modulus, MPa, (1000 psi)	D 790	(a)	<138 (<20)	138 - <276 (20 - <40)	276 - <552 (40 - <80)	552 - <758 (980 - <110)	758 - <1103 (110 - <160)	>1103 (>160)	(b)
Tensile Strength, MPa (1000 psi)	D 638	(a)	<15 (<2.2)	15 - <18 (2.2 - <2.6)	18 - <21 (2.6 - <3.0)	21 - <24 (3.0 - <3.5)	24 - <28) (3.5 - <4.0	>28 (>4.0)	(b)
Slow Crack Growth Resistance (e)									
1. ESCR a. Test Condition b. Test Duration c. Failure, max, %	D 1698	(a)	A 48 50	B 24 50	C 192 20	C 600 20	–	–	(b)
2. PENT (hours) Molded plaque; 80°C; 2.4 MPa; Notch depth per Table 1 F 1473	F 1473	(a)	0.1	1	3	10	30	100	(b)
Hydrostatic Design Basis, MPa (psi)	D 2837	NPR (f)	5.22 (800)	6.89 (1000)	8.62 (1250)	11.03 (1600)			
Cell Classification Letter (g)		A	B	C	D	E			
Color & UV Stabilizer	D 3350	Natural	Color	Black; 2% min. carbon black	Natural with UV stabilizer	Color with UV stabilizer			

(a) Unspecified.

(b) Specify value.

(c) Classify materials having a melt index <0.15 as Cell 5 only if they have a flow rate not greater than 4.0 g/10 min when tested in accordance with Test Method D 1238, Condition 190/21.6.

(d) Classify materials having a melt index <0.15 as Cell 6 only if they have a flow rate not greater than 0.30 g/10 min when tested in accordance with Test Method D 1238, Condition 310/21.5.

(e) Slow Crack Growth Resistance is classified using either ESCR per D 1693 or PENT using F 1248, but not both. Where there are cell values for ESCR per D 1693 and PENT per F 1473, equivalency of material performance between D 1693 and F 1473 is not implied.

(f) NPR = not pressure rated.

(g) The letter denoting the classification for color and UV stabilizer is added at the end of the cell classification number.

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000786

53969

DriscoPlex™ PE 3408 HDPE Data Sheet

Municipal and Industrial Applications & Standards

Typical Markets for Pipe and Fittings	DriscoPlex™ Series	Typical Features
FMA Approved Underground Fire Main	DriscoPlex™ 1500	2, 8, 10
		2, 8, 17
	DriscoPlex™ 1600	6, 10, 18
		6, 17, 18
Mining	DriscoPlex™ 1700	1, 3
Perforated Pipe	DriscoPlex™ 1900	1, 4
Water Distribution	DriscoPlex™ 4000	5, 6, 7
Municipal & Industrial, Water Distribution	DriscoPlex™ 4100	1, 8, 19, 20
Sanitary Sewer & Trenchless Rehabilitation	DriscoPlex™ 4200	8, 9
	DriscoPlex™ 4300	5, 6, 9
Treated/Reclaimed Water	DriscoPlex™ 4400	8, 11
	DriscoPlex™ 4500	5, 6, 11
Industrial Sewer, Municipal Sewer, Sliplining & Trenchless Rehabilitation	DriscoPlex™ 4600	1, 12
	DriscoPlex™ 4700	5, 6, 12, 15
	DriscoPlex™ 1200	1, 13
	DriscoPlex™ 1400	5, 13
Dual Containment	DriscoPlex™ 2400	1, 14
Industrial Specialty	DriscoPlex™ 1000	1, 16

NOTICE. *Capabilities vary from manufacturing plant to manufacturing plant. Contact Performance Pipe to determine the availability of specific products and the availability of particular stripe or shell colors, striping patterns, and IPS or DIPS sizing.*

Legend for Typical Features:

1. IPS sizing system.
2. FMR Approved Class 150 or Class 200 in 2" - 24" IPS pipe sizes.
3. A single longitudinal color stripe is extruded into the pipe OD to identify DR.
4. Various perforation patterns are available.
5. DIPS sizing system.
6. The DIPS longitudinal color stripe pattern is three equally spaced pairs of color stripes extruded into the pipe OD.
7. Blue color stripes are standard. A blue color shell is available on special order.
8. The IPS longitudinal color stripe pattern is four equally spaced single color stripes extruded into the pipe OD.
9. Green color stripes are standard. A green color shell is available on special order.
10. Red color stripes standard.
11. Purple color stripes are standard. A lavender color shell is available on special order.
12. Solid light gray color.
13. Light gray color lining extruded into pipe ID.
14. Factory assembled casing and carrier.
15. Green color stripes are standard.
16. 1-1/2" IPS and smaller sizes only. Black is standard.
17. FMR & NSF Approved Class 150 or Class 200. Blue color stripes standard.
18. FMR Approved Class 150 or Class 200 in 4" - 24" DIPS pipe sizes.
19. Black is standard. Blue color stripes or blue color shell available on special order.
20. 2" IPS and 3" IPS made to ASTM D 3035, AWWA C901 and NSF 61. 4" IPS and larger made to ASTM F 714, AWWA C906 and NSF 61.

Performance Pipe, a division of
Chevron Phillips Chemical Company LP
PO Box 269006
Plano, TX 75026-9006
Phone: 800-527-0662
Fax: 972-599-7348
www.driscoplex.com

Members of:

LEE SUPPLY CO., INC.
P. O. BOX #35
CHARLEROI, PA 15022

Oct. 2002 Supercedes all previous publications
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SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.:	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02605-010	REV.: 1	DATE: 05/13/03	Page 1

FROM:
Fluor Fernald

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

SIGNATURE: Anumay 5/14/03

RECEIVED BY: Susan Arnold DATE 5/14/03

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	PHV-02605-010	1							X		Resin supplier's quality control certificates for resin used in the manufacture of HDPE pipes		X		02605-1.04B1	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE	64				
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BILL ZEBICK	60				
MIKE GODBER (APPROVER)	84				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

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

RECEIVED BY: Michael W. Godber DATE: 5/15/03

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

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

ORIGINAL

00078

53369

ES-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

5369

BP SOLVAY Polyethylene

CERTIFICATE OF ANALYSIS
Batch: C020527P03

Information Provided to:

PERFORMANCE PIPE - HAGERSTOWN
11711 HOPEWELL RD
HAGERSTOWN, MD 21740

Contact: SHERI ECKLES-PETRUCCI
Fax: 301-582-6628

Shipped To:

PERFORMANCE PIPE - HAGERSTOWN
11711 HOPEWELL RD
HAGERSTOWN MD 21740
USA

Order information on Shipment of:
FORTIFLEX™ K44-06-123 BLACK PE PELLETS

Sold-To
PERFORMANCE PIPE

Customer Purchase Order No	Material Code	Dry Short Tons	Delivery / BOL No.
C3	64070		90380499

Shipping Date	Shipping Vehicle No	Net Weight	Number and Type of Package:
09/11/2002	ELTX002201	194,300 LB	1 RAIL CAR

Comment(s):

CUSTOMER SPECIFICATION ANALYSIS	METHOD	RESULT	UNIT	MIN	MAX
MI 21.6 (HLMI)	ASTM D1238-00	6.8	g/10min	4.0	9.0
DENSITY (NATURAL RESIN)	ASTM D4883-99	0.9448	g/cm3		
DENSITY (BLACK)	CALCULATED	0.9555	g/cm3		

A-Conforms to the Subcontract Requirements
B-Minor Comment - Incorporate and Resubmit
C-Revise and Resubmit
Sig: Michael Wilfolley Date: 5/14/03

Responsible Care

ACCREDITED 209-01

INFORMATION ONLY

SUPPLIER:

BP SOLVAY POLYETHYLENE NORTH AMRE
3333 RICHMOND AVE
77098-3099 HOUSTON
Phone: 800-527-5419

APPROVED BY:

Olton Decuire
Quality Assurance Manager
BP SOLVAY
PO BOX 1000
DEER PARK, TX 77536-1000
Phone: 713-307-3740

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CoA Date. 01/30/2003

-5369

Certificate of Analysis

Shipped To: PERFORMANCE PIPE LEASE TRACK
11700 HOPEWELL
HAGERSTOWN MD 21741
USA

Recipient: SHERI ECKLES-PETRUCCI
Fax: 1-301-582-6570

CPC Delivery #: 86298546
PO #: REL 18
Weight: 190900 LB
Ship Date: 01/30/2003
Package: BULK
Mode: Hopper Car
Car #: CHVX889116

Product:
MARLEX POLYETHYLENE HHM TR-480X BULK

This is to confirm that HHM TR-480X, when used with the proper color concentrate, meets or exceeds the requirements of cell classification 345464C in accordance with ASTM D3350. This resin is a PE34 grade material.

Lot Number: 7130053

Property	Test Method	Lower Limit	Upper Limit	Value	Unit
HLMI Flow Rate	ASTM D1238	8.00	14.00	10.80	g/10mi
Density	ASTM D1505	0.9420	0.9450	0.9440	g/cm3
Pellet Count	P02.08.03	35.000	65.000	46.000	pel/g
Ultranox 3367A		0.26	0.39	0.31	WT%

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

Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Paula Carter at 832-813-4807

CoA Date: 02/11/2003

5369

Certificate of Analysis

Shipped To: PERFORMANCE PIPE LEASE TRACK
11700 HOPEWELL
HAGERSTOWN MD 21741
USA

Recipient: SHERI ECKLES-PETRUCCI
Fax: 1-301-582-6670

CPC Delivery #: 86308902
PO #: REL 22
Weight: 187200 LB
Ship Date: 02/11/2003
Package: BULK
Mode: Hopper Car
Car #: PSPX001257

Product:
MARLEX POLYETHYLENE HHM TR-480X BULK

This is to confirm that HHM TR-480X, when used with the proper color concentrate, meets or exceeds the requirements of cell classification 345464C in accordance with ASTM D3350. This resin is a PE34 grade material.

Lot Number: 8130109

Property	Test Method	Lower Limit	Upper Limit	Value	Unit
HLMI Flow Rate	ASTM D1238	8.00	14.00	8.70	g/10mi
Density	ASTM D1505	0.9420	0.9450	0.9440	g/cm3
Pellet Count	P02.08.03	35.000	65.000	45.000	pel/g
Ultranox 3367A		0.26	0.39	0.32	WT%

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Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Paula Carter at 832-813-4807

CoA Date: 02/07/2003

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11700 HOPEWELL
HAGERSTOWN MD 21741
USA

Recipient: SHERI ECKLES-PETRUCCI
Fax: 1-301-582-6670

CPC Delivery #: 86305918
PO #: REL 20
Weight: 186200 LB
Ship Date: 02/07/2003
Package: BULK
Mode: Hopper Car
Car #: PSPX008112

Product:
MARLEX POLYETHYLENE HHM TR-480X BULK

This is to confirm that HHM TR-480X, when used with the proper color concentrate, meets or exceeds the requirements of cell classification 345464C in accordance with ASTM D3350. This resin is a PE34 grade material.

Lot Number: 8130107

Property	Test Method	Lower Limit	Upper Limit	Value	Unit
HLMI Flow Rate	ASTM D1238	8.00	14.00	8.90	g/10mi
Density	ASTM D1505	0.9420	0.9450	0.9450	g/cm3
Pellet Count	P02.08.03	35.000	65.000	46.000	pel/g
Ultranox 3367A		0.26	0.39	0.32	WT%

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Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Paula Carter at 832-813-4807

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.:	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02605-011	REV.: 1	DATE: 05/13/03	Page 1

FROM:
Fluor Fernald

SIGNATURE: Jnumay 5/14/03

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

RECEIVED BY: Linda Schwab DATE: 5/14/03

			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	PHV-02605-011	1						X			Manufacturer's test results for Cell 6 HDPE pipes		X		02605-1.04B2	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE(APPROVER)	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
MIKE GODFER	84				
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 VanArsdale DATE: 5/19/03

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SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
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SUBMITTAL ACTION CODE: (BY FDF)
A - Conforms to the Subcontract Requirements
B - Minor Comments - Incorporate and Resubmit
C - Revise and Resubmit (SEE COMMENTS)

0007393

53369

5369

BP SOLVAY Polyethylene

CERTIFICATE OF ANALYSIS
Batch: C020527P03

Information Provided to:	Shipped To:
PERFORMANCE PIPE - HAGERSTOWN 11711 HOPEWELL RD HAGERSTOWN, MD 21740 Contact: SHERI ECKLES-PETRUCCI Fax: 301-582-6628	PERFORMANCE PIPE - HAGERSTOWN 11711 HOPEWELL RD HAGERSTOWN MD 21740 USA

Order information on Shipment of:	Sold-To
FORTIFLEX™ K44-06-123 BLACK PE PELLETS	PERFORMANCE PIPE

Customer Purchase Order No	Material Code	Dry Short Tons	Delivery / BOL No.
C3	64070		80380499

Shipping Date	Shipping Vehicle No	Net Weight	Number and Type of Package:
09/11/2002	ELTX002201	194,300 LB	1 RAIL CAR

Comment(s):

CUSTOMER SPECIFICATION ANALYSIS	METHOD	RESULT	UNIT	MIN	MAX
MI 21.6 (HLMI)	ASTM D1238-00	6.8	g/10min	4.0	9.0
DENSITY (NATURAL RESIN)	ASTM D4883-99	0.9448	g/cm3		
DENSITY (BLACK)	CALCULATED	0.9555	g/cm3		

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [signature] Date: 5/19/03

Responsible Care

ACCREDITED 208-01

INFORMATION ONLY

SUPPLIER:	APPROVED BY:
BP SOLVAY POLYETHYLENE NORTH AME 3333 RICHMOND AVE 77098-3099 HOUSTON Phone: 800-527-5419	Olton Decuire Quality Assurance Manager BP SOLVAY PO BOX 1000 DEER PARK, TX 77536-1000 Phone: 713-307-3740

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CoA Date. 01/30/2003

5369

Certificate of Analysis

Shipped To: PERFORMANCE PIPE LEASE TRACK
11700 HOPEWELL
HAGERSTOWN MD 21741
USA

Recipient: SHERI ECKLES-PETRUCCI
Fax: 1-301-582-6570

CPC Delivery #: 86298546
PO #: REL 18
Weight: 190900 LB
Ship Date: 01/30/2003
Package: BULK
Mode: Hopper Car
Car #: CHVX889116

Product:
MARLEX POLYETHYLENE HHM TR-480X BULK

This is to confirm that HHM TR-480X, when used with the proper color concentrate, meets or exceeds the requirements of cell classification 345464C in accordance with ASTM D3350. This resin is a PE34 grade material.

Lot Number: 7130053

Property	Test Method	Lower Limit	Upper Limit	Value	Unit
HLMI Flow Rate	ASTM D1238	8.00	14.00	10.80	g/10mi
Density	ASTM D1505	0.9420	0.9450	0.9440	g/cm3
Pellet Count	P02.08.03	35.000	65.000	46.000	pel/g
Ultranox 3387A		0.26	0.39	0.31	WT%

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

Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Paula Carter at 832-813-4807

CoA Date: 02/11/2003

5369

Certificate of Analysis

Shipped To: PERFORMANCE PIPE LEASE TRACK
11700 HOPEWELL
HAGERSTOWN MD 21741
USA

Recipient: SHERI ECKLES-PETRUCCI
Fax: 1-301-582-6670

CPC Delivery #: 86308902
PO #: REL 22
Weight: 187200 LB
Ship Date: 02/11/2003
Package: BULK
Mode: Hopper Car
Car #: PSPX001257

Product:
MARLEX POLYETHYLENE HHM TR-480X BULK

This is to confirm that HHM TR-480X, when used with the proper color concentrate, meets or exceeds the requirements of cell classification 345464C in accordance with ASTM D3350. This resin is a PE34 grade material.

Lot Number: 8130109

Property	Test Method	Lower Limit	Upper Limit	Value	Unit
HLMI Flow Rate	ASTM D1238	8.00	14.00	8.70	g/10mi
Density	ASTM D1505	0.9420	0.9450	0.9440	g/cm3
Pellet Count	P02.08.03	35.000	65.000	45.000	pel/g
Ultranox 3367A		0.26	0.39	0.32	WT%

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

Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Paula Carter at 832-813-4807

CoA Date: 02/07/2003

5369

Certificate of Analysis

Shipped To: PERFORMANCE PIPE LEASE TRACK
11700 HOPEWELL
HAGERSTOWN MD 21741
USA

Recipient: SHERI ECKLES-PETRUCCI
Fax: 1-301-582-6670

CPC Delivery #: 86305918
PO #: REL 20
Weight: 186200 LB
Ship Date: 02/07/2003
Package: BULK
Mode: Hopper Car
Car #: PSPX008112

Product:
MARLEX POLYETHYLENE HHM TR-480X BULK

This is to confirm that HHM TR-480X, when used with the proper color concentrate, meets or exceeds the requirements of cell classification 345464C in accordance with ASTM D3350. This resin is a PE34 grade material.

Lot Number: 8130107

Property	Test Method	Lower Limit	Upper Limit	Value	Unit
HLMI Flow Rate	ASTM D1238	8.00	14.00	8.90	g/10mi
Density	ASTM D1505	0.9420	0.9450	0.9450	g/cm3
Pellet Count	P02.08.03	35.000	65.000	46.000	pel/g
Ultranox 3367A		0.26	0.39	0.32	WT%

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

Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Paula Carter at 832-813-4807

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.:	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02605-014	REV.: 0	DATE: 05/13/03	Page 1

FROM:
Fluor Fernald

SIGNATURE: _____

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

RECEIVED BY: Teresa Schwab DATE: 5/14/03

			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	PHV-02605-014	0						X			Results of all tests for HDPE piping specified in section 02605		X		02605-1.04E	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE(APPROVER)	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
MIKE GODEER	84				
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: 5/19/03

(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

DEC 1 2 2002

5369

PERFORMANCE PIPE
A DIVISION OF CHEVRON PHILLIPS CHEMICAL COMPANY LP

11711 Hopewell Road
Hagerstown, Md 21740

December 3, 2002

DriscoPlex™ 4100 PRODUCT QUALITY CERTIFICATION

CUSTOMER: Lee Supply Company Incorporate
PO Box 35
Charleroi, Pa 15022

ATTENTION: Jerry Biagini

CUSTOMER ORDER NO: 6229
PERFORMANCE PIPE ORDER NO: 5624711
SHIPPING DATE: 11/08/2002
QUANTITY: 2,880' FT
EXTRUSION DATE(S): 10/2002

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 5/19/03

PRODUCT: 10" DR 11 4100 40' JT

This product quality certification letter for DriscoPlex™ 4100 series pipe has been prepared at your request. DriscoPlex™ 4100 series pipe is manufactured from polyethylene resin that meets Grade PE34 and a cell classification of 345464C in accordance with ASTM D 3350. DriscoPlex™ 4100 series pipe material is listed by the Plastic Pipe Institute in PPI TR-4 with a standard grade recommended hydrostatic design basis of 1600 psi at 73°F (23°C), and a recommended hydrostatic design basis of 800 psi at 140°F (60°C).

DriscoPlex™ 4100 series pipe is manufactured in accordance with the requirements of AWWA C906 and ASTM F714 or AWWA C901 and ASTM D3035. Each length of DriscoPlex 4100 pipe is marked in accordance with the applicable standards. DriscoPlex™ 4100 series meets NSF standards 14 and/or 61 requirements for potable water piping systems, and AWWA requirements for water distribution.

Sincerely,

QA Supervisor

INFORMATION ONLY

000799

CHEVRON PHILLIPS PERFORMANCE PIPE

PAGE 1

PRINT OUT DATE: 11/26/2002

End Date 10/23/2002

'LANT Hagerstown Product Description: 41P 10.00" SDR 11.00 0040'JT BLK I 61

'RODUCTION ORDER NUMBER 100247257

Start Date 10/22/2002

Minimum Wall (IN):	1.001	Minimum Toe-In (%):	0.512
Maximum Wall (IN):	1.090	Maximum Toe-In (%):	0.606
Minimum OD (IN):	10.725	Minimum Ring Tensile (PSI):	3083.845
Maximum OD (IN):	10.770	Maximum Ring Tensile (PSI):	3232.239
Minimum ID (IN):	8.570	Minimum Density:	0.953
Maximum ID (IN):	8.726	Maximum Density:	0.953
Minimum Eccentricity (%):	2.294	Minimum Carbon Black (%):	2.370
Maximum Eccentricity (%):	6.884	Maximum Carbon Black (%):	2.400
Minimum Out of Round (IN):	0.047	Minimum Melt Index:	7.000
Maximum Out of Round (IN):	0.064	Maximum Melt Index:	7.000
Minimum Ovality (%):	0.437	Resin	K44-6-123
Maximum Ovality (%):	0.595	Lot	C020527P03

Number of Samples: 33

Ash is recorded under Carbon Black when Carbon Black is not present

000300

5369

5369

APR 0 9 2003

PERFORMANCE PIPE
A DIVISION OF CHEVRON PHILLIPS CHEMICAL COMPANY LP

11711 Hopewell Rd
Hagerstown MD 21740

April 1, 2003

DriscoPlex™ 4100 PRODUCT QUALITY CERTIFICATION

CUSTOMER: Lee Supply Company
PO Box 35
Charleroi PA 15022

ATTENTION: Jerry Biagini

CUSTOMER ORDER NO: 1000
PERFORMANCE PIPE ORDER NO: 5656495
SHIPPING DATE: 03/17/03
QUANTITY: 7,280'
EXTRUSION DATE(S): 03/03

PRODUCT: 6" dr 11 4100

This product quality certification letter for DriscoPlex™ 4100 series pipe has been prepared at your request. DriscoPlex™ 4100 series pipe is manufactured from polyethylene resin that meets Grade PE34 and a cell classification of 345464C in accordance with ASTM D 3350. DriscoPlex™ 4100 series pipe material is listed by the Plastic Pipe Institute in PPI TR-4 with a standard grade recommended hydrostatic design basis of 1600 psi at 73°F (23°C), and a recommended hydrostatic design basis of 800 psi at 140°F (60°C).

DriscoPlex™ 4100 series pipe is manufactured in accordance with the requirements of AWWA C906 and ASTM F714 or AWWA C901 and ASTM D3035. Each length of DriscoPlex 4100 pipe is marked in accordance with the applicable standards. DriscoPlex™ 4100 series meets NSF standards 14 and/or 61 requirements for potable water piping systems, and AWWA requirements for water distribution.

Sincerely,

Sheri Eckles-Petrucci

000801

T Hagerstown
Product Description: 4IP 06.00" SDR 11.00 0040'JT BLK I 61
UCTION ORDER NUMBER 100262773
Start Date 3/6/2003
End Date 3/9/2003

Minimum Wall (IN):	0.612	Minimum Toe-In (%):	0.438
Maximum Wall (IN):	0.688	Maximum Toe-In (%):	0.558
Minimum OD (IN):	6.610	Minimum Hoop Stress (PSI):	3348
Maximum OD (IN):	6.638	Maximum Hoop Stress (PSI):	3583
Minimum ID (IN):	5.267	Minimum Burst Pressure:	694.000
Maximum ID (IN):	5.381	Maximum Burst Pressure:	745.000
Minimum Eccentricity (%):	1.890	Minimum Density:	0.951
Maximum Eccentricity (%):	5.087	Maximum Density:	0.952
Minimum Out of Round (IN):	0.057	Minimum Carbon Black (%):	2.370
Maximum Out of Round (IN):	0.077	Maximum Carbon Black (%):	2.470
Minimum Ovality (%):	0.861	Minimum Melt Index:	9.000
Maximum Ovality (%):	1.164	Maximum Melt Index:	9.000
Resin	TR480X	Lot	8130109 8130107 7130053

Number of Samples: 282

Ash is recorded under Carbon Black when Carbon Black is not present

000802

5369

LINER PENETRATION BOXES

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-13005-001	REV.: 0	DATE: 03/27/03	Page 1 of 2

FROM:
Plastic Fusion Fabricators, Inc.
3455 Stanwood Blvd.
Huntsville, AL 35811
SIGNATURE: Dnumar for Jeanice Yant

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: Linda Schwartz DATE: 4/2/03

			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	PHV-13005-001	0						X			Name and Qualifications of Fabricator of liner penetration boxes		X		13005-1.04	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)

5369

000804

RECEIVED BY: Chuck C. Vanarsdale DATE: 4/10/03

(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

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

Plastic Fusion Fabricators, Inc.
Corporate Profile

Introduction

Plastic Fusion Fabricators, Inc. (PFF) is a corporation formed in 1981 by Mr. Terry Ragsdale. It is a privately held corporation and is headquartered in Huntsville, Alabama. Regional sales offices are located in Atlanta, Georgia, Houston, Texas and Mobile, Alabama.

PFF has a long history in the geomembrane industry. PFF pioneered the "Total" approach to containment with High Density Polyethylene (HDPE) lining systems in combination with custom fabricated pipe systems and structures. All systems are designed and installed for the prevention of groundwater contamination.

Today, PFF is the largest independent installer for GSE Lining Technology, Inc., the world's largest manufacturer of geomembranes.

PFF fabricates and installs a variety of containment systems and associated materials primarily for the containment of wastes, liquids (potable, sanitary or hazardous) and industrial products in ponds, pits and lagoons. The materials used meet the highest design criteria in the industry.

Products & Services

PFF provides a wide variety of products which are described here. PFF offers design assistance, consulting, fabrication and installation services for all systems.

Products

INFORMATION ONLY

Geomembrane Liners

Used for ponds, landfills, tanks, ditches and floating covers. These liners are available in seamless widths from approximately 16 to 34.5 feet and thicknesses ranging from 20 to 240 mils. Materials include High Density Polyethylene (HDPE) and polypropylene (PP) and liners are available with a smooth or textured surface.

Other Geosynthetics

PFF installs geosynthetic clay liners (GCL), geonets and geocomposites in combination with the geomembranes to provide extra leak protection, drainage systems, leak detection systems, leachate collection systems and liner protection (cushion).

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 4/10/03

High Density Polyethylene Fabricated Structures
Applications include manholes, junction boxes, tanks, sumps, u-drains, lift stations and trenches.

Polypropylene Fabricated Structures
For applications that require materials with advanced chemical resistance features, PFF offers polypropylene structures for a variety of custom solutions. Applications include manholes, junction boxes, tanks, sumps, u-drains, lift stations and trenches.

High Density Polyethylene Piping Systems
PFF fabricates and installs both single and dual wall containment piping systems for chemical & process sewers, methane gas collection and leachate collection. Materials used include HDPE and Polypropylene.

Concrete Protective Liners
A unique plastic lining system for concrete structures. A patented anchoring system insures secure containment and corrosion protection. Material is used to line catch basins, tanks, trenches, manholes, clarifiers and other structures which require protection.

Services

In addition to the fabrication and installation services offered with our products, PFF also offers the following to complete the containment solution:

Design Assistance & Consulting
Services include computer aided design, technical assistance, research & development, cost feasibility and project consulting.

Field Services & Quality Control
PFF offers destructive and non-destructive testing, application assistance, inspections, on-site testing, fusion technicians and field/shop repair.

Equipment Rental
Equipment available for rent includes electrofusion equipment, pipe fusion machines, extrusion welders and hot air welders. PFF also offers some equipment for sale including pipe fusion machines and electrofusion equipment.

Fabrication Capabilities

PFF operates fabrication facilities at the corporate headquarters in Huntsville, Alabama. Fabrication work space totals 35,000 square feet.

Installation Capabilities

PFF offers comprehensive installation services for all of the products described. Each PFF installation team is comprised of experienced and well trained supervisors and welding technicians.

5369

GSE

GSE Lining Technology, Inc.

May 10, 2000

To Whom it May Concern:

This authorizes that Plastic-Fusion Fabricators and their employees are authorized to install GSE Lining Technology, Inc. products.

Sincerely,

David Leggett

David Leggett
Manager - Dealer Accounts

/tms

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-13005-006	REV.: 0	DATE: 03/31/03	Page 1 of 1

FROM:
Plastic Fusion Fabricators, Inc.
3455 Stanwood Blvd.
Huntsville, AL 35811
SIGNATURE: Brumar for Jeanice Yant

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: Linda Schwab DATE: 4/2/03

			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
7	PHV-13005-006	0						X			Name of Manufacturer of HDPE flat stock used to fabricate liner penetration boxes		X		13005-1.04	X	

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	M
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)

~~– Question Conformance to ASTM D2350 (Cat Class. PE 345434C)~~

ORIGINAL

008009

5369

RECEIVED BY: Che C. VanAre DATE: 4/10/03

(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)

5369

COMPRESSION POLYMERS GROUP

801 Corey Street • Moosic, PA 18507 • (570) 346-8797 • Fax: (570) 346-5080

April 17, 2002

Plastic Fusion Fab
3455 Stanwood Blvd
Huntsville, AL 35811

Attn: Mickey

This is to certify that on your PO# 5446, our invoice #057611 we shipped 46 sheets of 1" x 48 x 120", HDPE pipe grade Union Carbide resin DGDB-2480 Black 3408. These sheets conform to ASTM 1248, Type III, Grade P34, Class C, Category 5. This material was manufactured in Moosic, Pennsylvania.

If you have any further questions, please feel free to contact me.

Sincerely,

Jenn Arzie
Customer Service

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: _____ Date: 4/16/03

INFORMATION ONLY

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-13005-007	REV.: 0	DATE: 03/31/03	Page 1 of 1

FROM:
Plastic Fusion Fabricators, Inc.
3455 Stanwood Blvd.
Huntsville, AL 35811
SIGNATURE: Brumar for Jeanice Yant

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: Irma Schwab DATE: 4/2/03

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
7	PHV-13005-007	0							X		Certification that HDPE flat stock meets material requirements per section 13005		X		13005-1.04	X	

REVIEW DISTRIBUTION

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

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

ORIGINAL

RECEIVED BY: Michael W. Godber DATE: 4/04/03
(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~~

1 of 1

00081

5369

5369

COMPRESSION POLYMERS GROUP
801 Corey Street • Moosic, PA 18507 • (570) 346-8797 • Fax: (570) 346-5080

April 17, 2002

Plastic Fusion Fab
3455 Stanwood Blvd
Huntsville, AL 35811

Attn: Mickey

This is to certify that on your PO# 5446, our invoice #057611 we shipped 46 sheets of 1" x 48 x 120", HDPE pipe grade Union Carbide resin DGDB-2480 Black 3408. These sheets conform to ASTM 1248, Type III, Grade P34, Class C, Category 5. This material was manufactured in Moosic, Pennsylvania.

If you have any further questions, please feel free to contact me.

Sincerely,

Jenn Arzie
Customer Service

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: Michael Hoffer Date: 4/04/03

INFORMATION ONLY

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-13005-008	REV.: 0	DATE: 03/31/03	Page 1 of 1

FROM:
Plastic Fusion Fabricators, Inc.
3455 Stanwood Blvd.
Huntsville, AL 35811
SIGNATURE: Bruman for Jeanice Yant

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL (ECDC), MS 52-7
RECEIVED BY: Susa Schwab DATE: 4/2/03

			DOCUMENT FAMILY									SUBMITTAL TYPE				SUBMITT ACTIO	
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRO	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	DRFT	CFC	INF	ASSOCIATED SPECIFICATION	A	B
7	PHV-13005-008	0							X		Certification that no reclaimed polymer was added to resin during manufacturing of the products used for this project		X		13005-1.04	X	

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	M
ECDC	52-7				
CHUCK VANARSDALE	64				
GREGG JOHNSON	64				
BILL ZEBICK	64				
MIKE GOLDBERG approved	64				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

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

ORIGINAL

00083

53 69

RECEIVED BY: Michael W Goller DATE: 4/08/03
(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 3.4.2~~

5369

COMPRESSION POLYMERS GROUP
801 Corey Street • Moosic, PA 18507 • (570) 346-8797 • Fax: (570) 346-5080

May 7, 2002

Plastic Fusion Fab
3455 Stanwood Blvd
Huntsvill, Al 35811

Attn: Mickey

This is to certify that on your PO# 5446, our invoice #057611 we shipped 46 sheets of 1" x 48 x 120 virgin HDPE pipe grade Union Carbide resin DGDB-2480 Black 3408. These Sheets conform to ASTM 1248, Type III, Grade P34, Class C, Category 5. This material was manufactured in Moosic, Pennsylvania.

If you have any further questions, please feel free to contact me.

Sincerely,

Jenn Arzie
Customer Service

INFORMATION ONLY

xA

4/6/07
For M. Gudner

Rinker Materials
PolyPipe®
1050 Industrial Drive South
Erwin, TN 37650

5369

Phone: 423-743-9116 Fax: 423-743-8419

PRODUCT CERTIFICATION

Delivery / Picking Number: 8005485621

Ship To:	SAME		Customer:	PLASTIC FUSION FABRICATORS
				3455 Stanwood Blvd.
				Huntsville, AL 35811
				256/852-0378
				256/852-0388

Dear Customer:

Rinker Materials PolyPipe® certifies that the listed piping products were produced from resins and concentrates as determined by and defined in ASTM D3350. Routine in-plant inspection, quality control sampling, and long term testing meets or exceeds the customer specifications or standards listed below:

____ API Spec 15LE
____ AWWA C901 / C906
____ Factory Mutual per Rinker Materials PolyPipe® MS-1116
____ NSF 14 / 61
____ NSF 61
____ IAPMO
X ASTM D2513
____ Customer Specification
X PPI Rating for PE 3408
____ PE2406 Type II, Grade P24 Category 5 with Cell Classification of 234363C, D or E HDB 1250 @ 23° C
X PE3408 Type III, Grade P34 Category 5 with Cell Classification of 345464C, D or E HDP 1600 @ 23° C

Deleted:

Products: P.O. #P05518 SHIP DATE: 04/09/02
1,200.00 FT. 6"IPS SDR 11.0 BLK 40'

Certified By: Tim Moore Position: Q.A. Lab Tech Date: 04/16/02

Deleted: 08/28/2001

7.10.12
Issued by: Terry L. Bryant
Approved by: Allison Crabtree
Issue Date: 10/13/1998
Revision: 09/05/2001

Rinker Materials
PolyPipe®
1050 Industrial Drive South
Erwin, TN 37650

5369

Phone: 423-743-9116 Fax: 423-743-8419

PRODUCT CERTIFICATION

Delivery / Picking Number: 8004018838

Ship To:	SAME		Customer:	PLASTIC FUSION FABRICATORS
				3455 Stanwood Blvd.
				Huntsville, AL 35811
				256/852-0378
				256/852-0388

Dear Customer:

Rinker Materials PolyPipe® certifies that the listed piping products were produced from resins and concentrates as determined by and defined in ASTM D3350. Routine in-plant inspection, quality control sampling, and long term testing meets or exceeds the customer specifications or standards listed below:

____ API Spec 15LE
____ AWWA C901 / C906
____ Factory Mutual per Rinker Materials PolyPipe® MS-1116 Deleted:
____ NSF 14 / 61
____ NSF 61
____ IAPMO
X ASTM D2513
____ Customer Specification
X PPI Rating for PE 3408
____ PE2406 Type II, Grade P24 Category 5 with Cell Classification of 234363C, D or E HDB 1250 @ 23° C
X PE3408 Type III, Grade P34 Category 5 with Cell Classification of 345464C, D or E HDP 1600 @ 23° C

Products: P.O. #PO5121 SHIP DATE: 11/19/01
640.00 FT. 10"IPS SDR 11.0 BLK 40'

Certified By: Tim Moore Position: Q.A. Lab Tech Date: 04/16/02

Deleted: 08/28/2001

7.10.12
Issued by: Terry L. Bryant
Approved by: Allison Crabtree
Issue Date: 10/13/1998
Revision: 09/05/2001

SUPPLIER DOCUMENT SUBMITTAL

PROJECT NO.: 20105	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-13005-010	REV. R2	DATE: 04/16/03	Page 1 of 2

FROM:
ic Fusion Fabricators, Inc.
5 Stanwood Blvd.
ntsville, AL 35811
SIGNATURE: Brumar for Jeanice Yant

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

RECEIVED BY: Susan Schwab DATE: 4/21/03

			DOCUMENT FAMILY									SUBMITTAL TYPE				SUBMITTAL ACTION		
Y	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	DRFT	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
	PHV-13005-010	R2						X			Detailed shop drawings for liner boxes Type I, Type II, Type III, Type IV showing box component dimensions, location of welds, weld types and material tolerances.		X		13005-1.04	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				

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

ORIGINAL

RECEIVED BY: [signature] DATE: 4/29/03

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

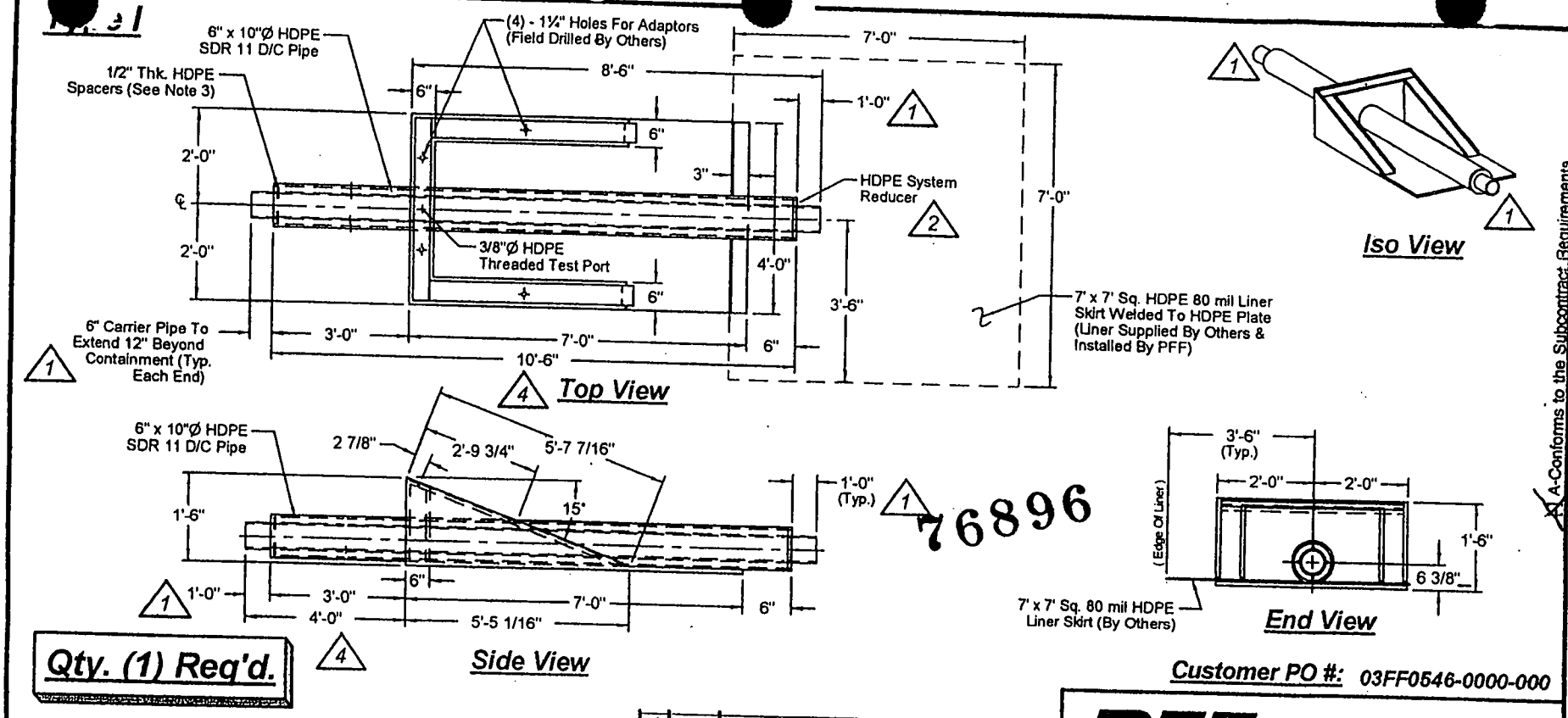
SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
DRFT - DRAFT/PRELIMINARY

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

ES-E-4055
Rev. 3: 05/14/1999, CT-2.4.2

00081213

5969



76896

Qty. (1) Req'd.

Customer PO #: 03FF0546-0000-000

Notes:
1. All Material Consists Of 1" Thk. HDPE Plate Stock.
2. Skirt To Be Tested With 5 PSI Gauge Suction Pressure.
3. 1/2" Thk. HDPE Spacers To Be Welded To O.D. Of Carrier Pipe, But Not To I.D. Of The Containment Pipe.
4. Vacuum Test Box Prior To Shipment. The Vacuum Testing Shall Be Maintained For 30 Minutes At 21.9 Hg Of Vacuum, Applied Through The Air Pressure Port.

NO.	DATE		BY
4	4/15/03	Changed Dimensions (Type 1 & 2)	JY
3	4/11/03	Added (min.)Note To 3" Dimension (Type 3)	JY
2	4/11/03	Revised System Stop To System Reducer (Typ. 1&2)	JY
1	4/11/03	Chgd. Extension Of Carrier Pipe From 6" To 12" (Type 1&2)	JY

REVISIONS

Drawn By: J. Yoder	Date: 3/28/03
Technician:	Date:
PFF Estimator:	Date:
Q/C:	Date:
Customer Approval:	Date:

PFF
Plastic Fusion Fabricators, Inc.
Your Total Containment Resource
3455 Stanwood Blvd. - Huntsville Alabama 35811
Tel: 256-852-0378 / Fax: 256-852-0388 / http://www.pffinc.com

Fluor Fernald Environment Mgt. Project / Hamilton, Ohio

HDPE Liner Penetration Assembly Layout Details

PFF Drawing No: 01758 a	Scale: 1 : 30	REV. B
Job No:	Sheet: 1 of 4	

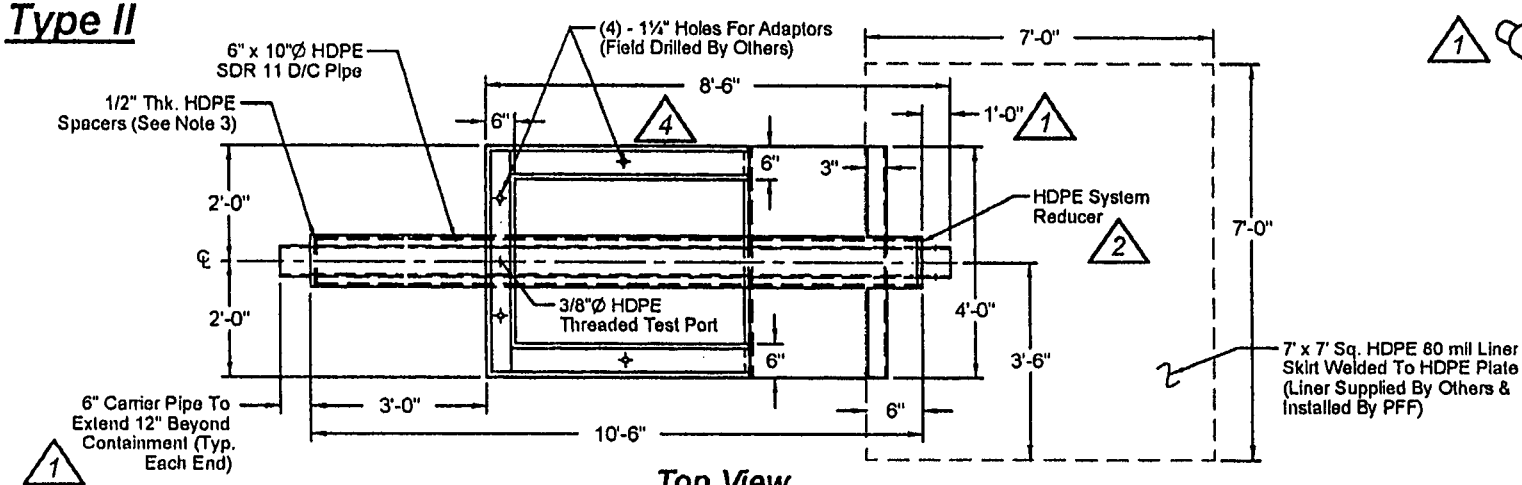
PFF Drawing Legal Form

A-Conforms to the Subcontract Requirements
B-Minor Comment - Incorporate and Resubmit
C-Revise and Resubmit
Sig: Date: 4/29/03

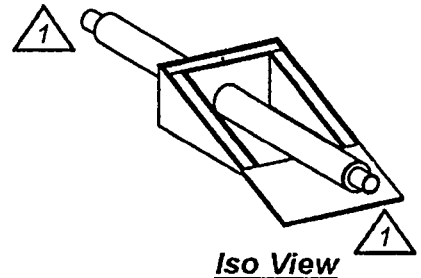
000818

5369

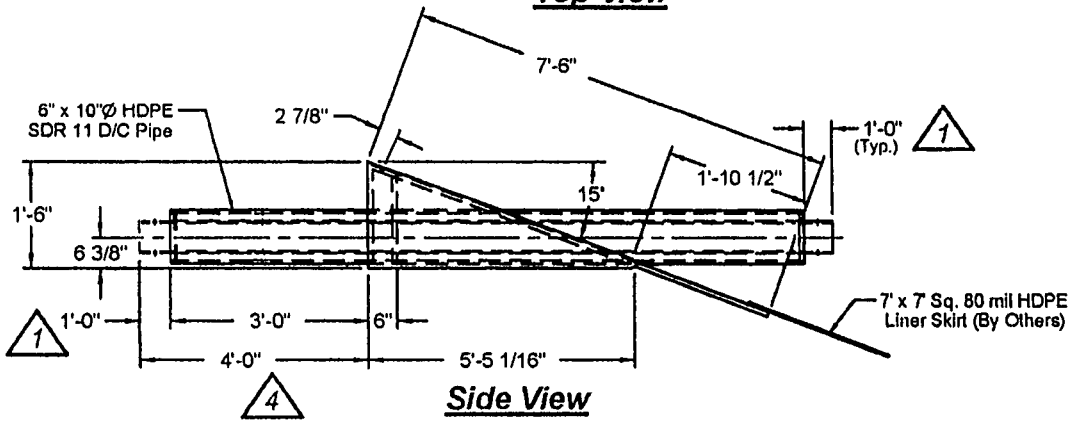
Type II



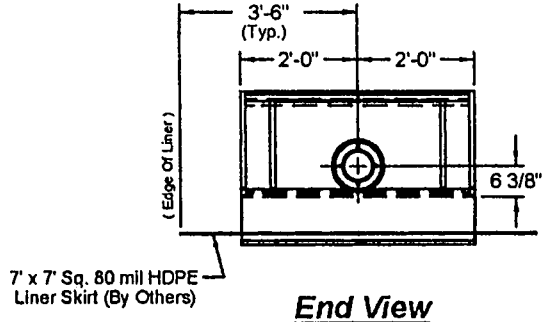
Top View



Iso View



Side View



End View

Notes:
1. *All Material Consists Of 1" Thk. HDPE Plate Stock.*
2. *Skirt To Be Tested With 5 PSI Gauge Suction Pressure.*
3. *1/2" Thk. HDPE Spacers To Be Welded To O.D. Of Carrier Pipe, But Not To I.D. Of The Containment Pipe.*
4. *Vacuum Test Box Prior To Shipment. The Vacuum Testing Shall Be Maintained For 30 Minutes At 21.9 Hg Of Vacuum, Applied Through The Air Pressure Port.*

Qty. (2) Req'd.

PFF — Plastic Fusion Fabricators, Inc.
Your Total Containment Resource

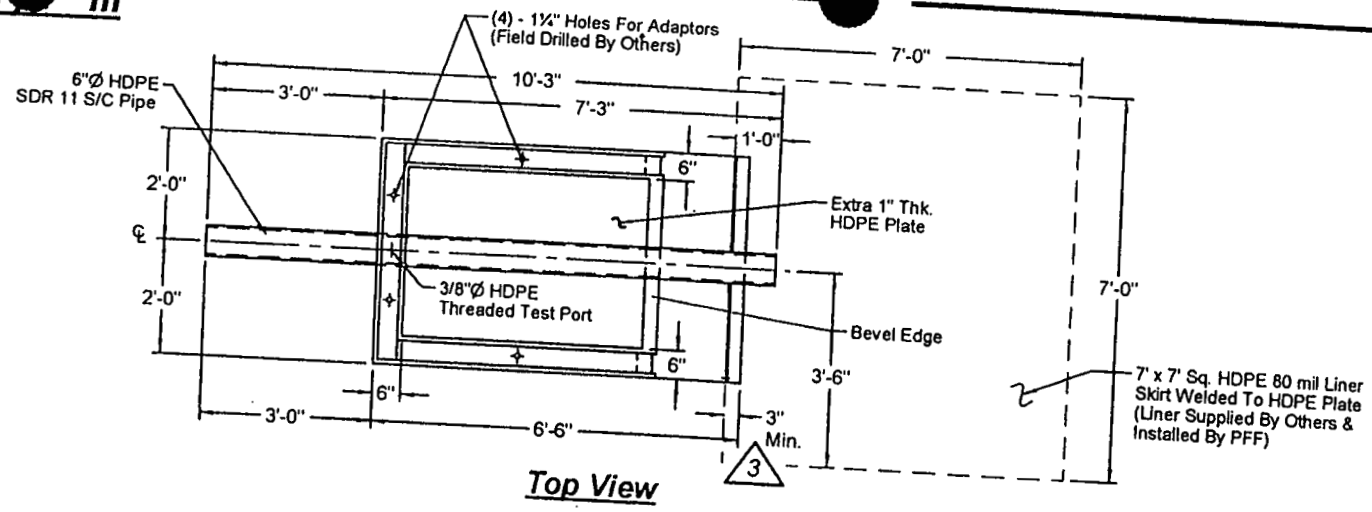
PFF Drawing No: 01758 b		Scale: 1 : 30	REV. B
Job No:		Sheet: 2 of 4	
Customer Approval:	Date:		

PFF Drawing Legal Form

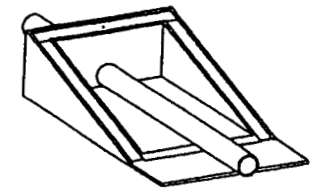
001819

5369

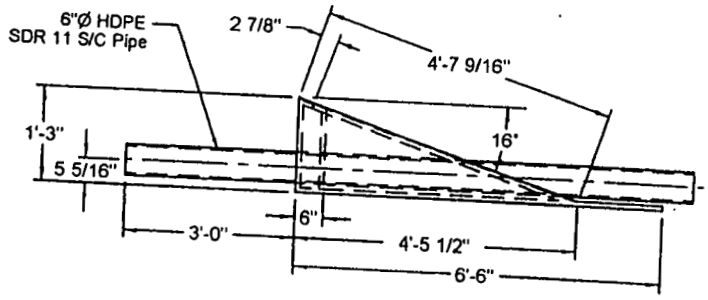
III



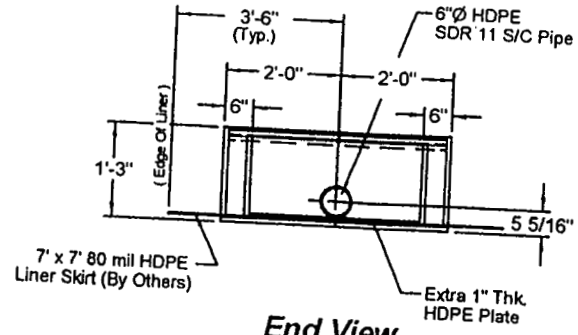
Top View



Iso View



Side View



End View

Notes:
1. All Material Consists Of 1" Thk. HDPE Plate Stock.
2. Skirt To Be Tested With 5 PSI Gauge Suction Pressure.
3. Vacuum Test Box Prior To Shipment. The Vacuum Testing Shall Be Maintained For 30 Minutes At 21.9 Hg Of Vacuum, Applied Through The Air Pressure Port.

Qty. (1) Req'd.

PFF Plastic Fusion Fabricators, Inc.
Your Total Containment Resource

Customer Approval:	Date:	PFF Drawing No: 01758 c	Scale: 1 : 30
		Job No:	Sheet: 3 of 4

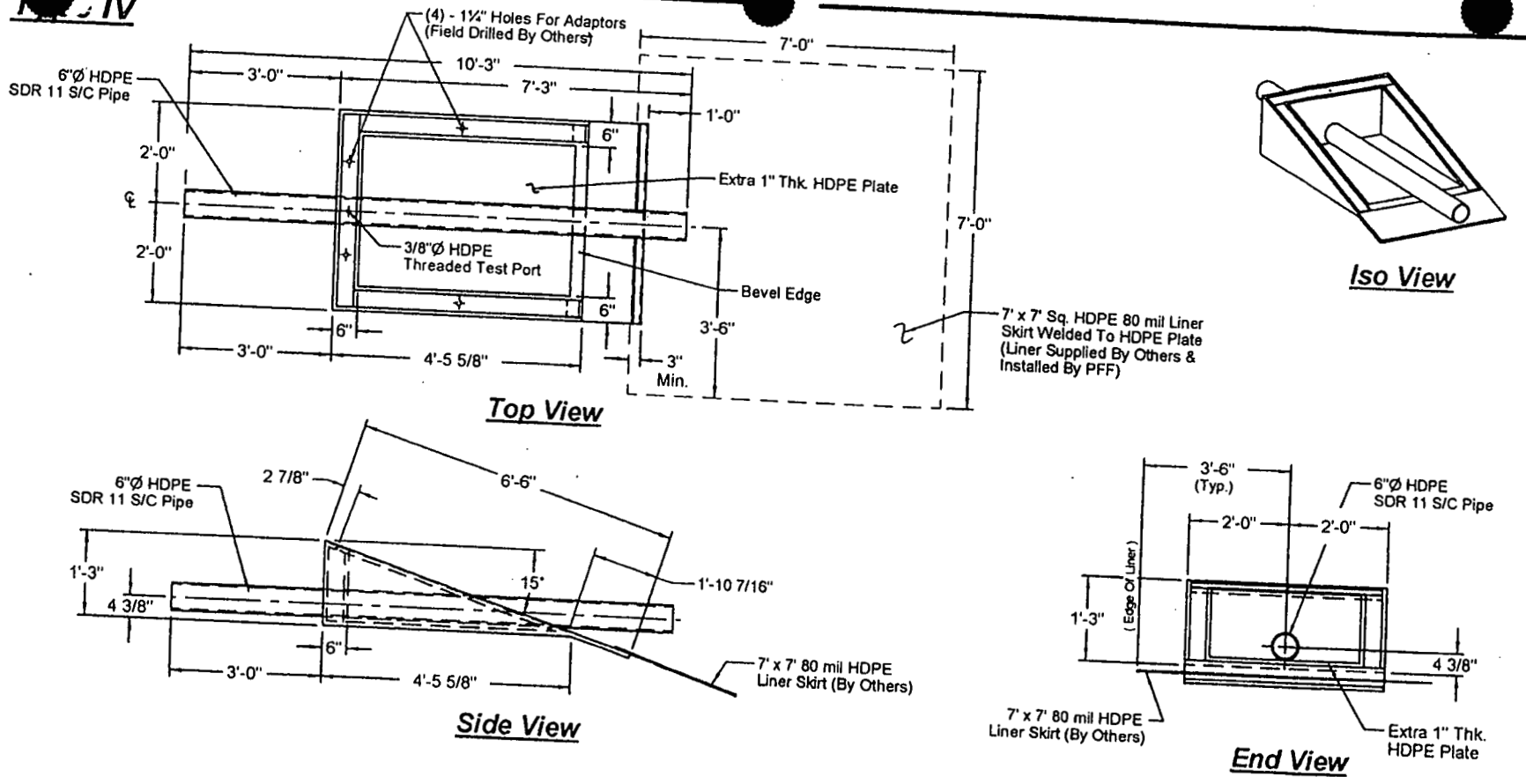
REV. A

PFF Drawing Form A

000820

5369

IV



Notes:
1. All Material Consists Of 1" Thk. HDPE Plate Stock.
2. Skirt To Be Tested With 5 PSI Gauge Suction Pressure.
3. Vacuum Test Box Prior To Shipment. The Vacuum Testing Shall Be Maintained For 30 Minutes At 21.9 Hg Of Vacuum, Applied Through The Air Pressure Port.

Qty. (1) Req'd.

PFF Plastic Fusion Fabricators, Inc.
Your Total Containment Resource

Customer Approval:	Date:	PFF Drawing No: 01758 d	Scale: 1 : 30
		Job No:	Sheet: 4 of 4

REV. A

PFF Drawing Form A

000821

5369

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-13005-015	REV.: 0	DATE: 03/31/03	Page 1 of 1

FROM:
Plastic Fusion Fabricators, Inc.
3455 Stanwood Blvd.
Huntsville, AL 35811
SIGNATURE: Jeanie M Yant

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

RECEIVED BY: Teresa Schwab DATE: 5/19/03

			DOCUMENT FAMILY									SUBMITTAL TYPE				SUBMITT ACTIO	
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRG	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	DRFT	CFC	INF	ASSOCIATED SPECIFICATION	A	B
7	PHV-13005-015	0						X			Results of Fabricator quality control tests		X		13005-1.04	X	

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	M
ECDC	52-7				
CHUCK VANARSDALE - Approver	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
MIKE GODBER	84 60				
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: 5/20/03

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

ORIGINAL

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 05/14/1998, CT 9-13~~

PLASTIC FUSION FABRICATORS, INC.
THERMOPLASTIC CONSULTING FABRICATION INSTALLATION
3455 STANWOOD BLVD.
HUNTSVILLE, AL 35811
256/852/0378 BUS
256/852/0388 FAX

Date: May 15, 2003
FLUOR FERNALD
PFF Job F3121

The following are the testing methods used for the liner penetration boxes and the results of these test.

Each liner skirt was spark and vacuum tested. The spark test was performed using a Wegner spark tester model Weg 20 (PPM MK3). The vacuum test was performed using an American Testing vacuum box at five psi.

The vacuum test of the box was performed using a Dayton pump. The test was held for thirty minutes at twenty three inches mercury.

Results as follows:

01758d; drawing type 4; PFF designation A: Liner was spark and vacuum tested on 05/08/03 by Randy Nickelson. No defects were found during testing. The box was vacuum tested on 05/15/03 by John Yant. No defects were found during testing.

01758c; drawing type 3; PFF designation B: Liner was spark and vacuum tested on 5/08/03 by Randy Nickelson. No defects were found during testing. The box was vacuum tested on 05/15/03 by John Yant. No defects were found during testing.

01758b; drawing type 2; PFF designation C: Liner was spark and vacuum tested on 05/08/03 by Randy Nickelson. No defects were found during testing. The box was vacuum tested on 05/15/03 by John Yant. No defects were found during testing.

01758b; drawing type 2; PFF designation D: Liner was spark and vacuum tested on 05/08/03 by Randy Nickelson. No defects were found during testing. The box was vacuum tested on 05/08/03 by John Yant. No defects were found during testing.

INFORMATION ONLY

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 5/20/03

01758a; drawing type 1; PFF designation E: Liner was spark and vacuum tested on 5/08/03 by Randy Nickelson. No defects were found during testing. The box was vacuum tested on 05/15/03 by John Yant. No defects were found during testing.

Supervisor

Randy Nickelson

Plant Manager

John Yant

01758a; drawing type 1; PFF designation E: Liner was spark and vacuum tested on 5/08/03 by Randy Nickelson. No defects were found during testing. The box was vacuum tested on 05/15/03 by John Yant. No defects were found during testing.

Supervisor

Randy Nickelson

Plant Manager

John Yant

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-13005-017	REV.: 0	DATE: 03/31/03	Page 1 of 1

FROM:
Plastic Fusion Fabricators, Inc.
3455 Stanwood Blvd.
Huntsville, AL 35811
SIGNATURE: Jeanie M Yant

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

RECEIVED BY: Teresa Schwab DATE: 5/19/03

			DOCUMENT FAMILY									SUBMITTAL TYPE				SUBMITT ACTIO	
QTY	DOCUMENT NUMBER	REV	PRO	H&S	MED	TRO	CON	ENG	QAC	OPER	TITLE/DESCRIPTION	DRFT	CFC	INF	ASSOCIATED SPECIFICATION	A	B
7	PHV-13005-017	0							X		Certification from the Fabricator that material and fabricated liner penetration boxes meet the requirements of section 13005		X		13005-1.04	X	

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	M
ECDC	52-7				
CHUCK VANARSDALE	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
MIKE GODBER Approver	84 ~~64~~				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

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

008226

T-53369

RECEIVED BY: Michael Wolles DATE: 5/20/03
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 52-7)

ORIGINAL

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, 05/11/1999, CF 2-4.2~~

PLASTIC FUSION FABRICATORS, INC.
THERMOPLASTIC CONSULTING FABRICATION INSTALLATION
3455 STANWOOD BLVD.
HUNTSVILLE, AL 35811
256/852/0378 BUS
256/852/0442 FAX

CERTIFICATION ON SHOP FABRICATION

Job No. F3121

Owner: D.O.E.

G.C.: Fluor Femald, Inc. – P.O. # 03FF0546-0000-000

Project: U. S. Department of Energy

Site Location: 7400 Willey Road, Hamilton, OH 45013-9402

Plastic Fusion Fabricators, Inc. has completed a final inspection on this 15 day of May, 2003. PFF hereby certifies that all components related to this project have been fabricated as specified in strict accordance with job requirements and specifications for the liner penetration boxes per drawing numbers: 01758a, 01758b, 01758c, 01758d.

John Yant
PFF Designated Representative

5/15/03
Date

INFORMATION ONLY

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: Michael Jolly Date: 6/20/03

SUPPLIER DOCUMENT SUBMITTAL

SUBMITTAL NO. 20105-PHV-13005-018 | REV.: 0 | DATE: 03/31/03

CONTRACT NO: PHV

FDF PROJECT NO.: 20105

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

RECEIVED BY: Teresa Schwab DATE: 5/19/03

FROM:
Plastic Fusion Fabricators, Inc.
3455 Stanwood Blvd.
Huntsville, AL 35811
SIGNATURE: Janice M Hart

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
7	PHV-13005-018	0							X		Certification that welders are qualified to perform extrusion welding		X		13005-1.04	X	

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	M
ECDC	52-7				
CHUCK VANARSDALE	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
MIKE GODBER Approver	84				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

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

RECEIVED BY: Michael W Godber DATE: 5/20/03

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

ORIGINAL

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. 7, 05/14/1998, CH-1-1-2~~

00088009

5369

421 London Road
Delaware, OH 43015

Acroline Weld Testing

5369

Company: PFF
Welder: Kevin Knoell
Plastic: HDPE
Weld Type: Extruder
tested by: Jim
date: 12/11/02

Sample Number	Width in	Thk in	CS Area in²	Max lbf	Max psi	
C1	1.039	0.192	0.1995	575	2880	2926
C2	0.975	0.194	0.1892	566	2990	
C3	1.038	0.192	0.1993	588	2950	
C4	1.028	0.196	0.201	597	2960	
C5	1.013	0.192	0.1945	554	2850	
1	1.054	0.192	0.202	567	2800	96 ?
2	1.013	0.192	0.1945	522	2690	92
2	1.03	0.19	0.1957	548	2800	96
3	1.032	0.192	0.1981	545	2750	94
4	1.026	0.192	0.197	532	2700	92
5	1.044	0.192	0.2	561	2800	96
6	1.039	0.193	0.201	557	2780	95
7	1.052	0.193	0.203	564	2780	95
8	1.035	0.191	0.1977	546	2760	94
9	1.037	0.192	0.1991	552	2770	95
10	1.037	0.192	0.1991	561	2820	96
Ave.			0.1982	558	2820	
SD			0.0035	18.77	88.8	

10/10 ≥ 80 % of [illegible]

(all ≥ 92 % · [illegible]

INFORMATION ONLY

Page 1

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment · Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 5/20/03

000829

421 London Road
Delaware, OH 43015

Acroline Weld Testing

5369

Company: PFF
Welder: Tommy Harris
Plastic: HDPE
Weld Type: Triac
tested by: Jim
date: 12/16/02

Sample Number	Width in	Thk in	CS Area in²	Max lbf	Max psi	
C1	1.048	0.19	0.1991	501	2520	2656
C2	1.005	0.191	0.192	490	2550	
C3	1.032	0.19	0.1961	512	2610	
C4	1.042	0.192	0.2	561	2810	
C5	1.009	0.194	0.1957	546	2790	
1	1.034	0.19	0.1965	500	2550	91%
2	1.025	0.192	0.1968	506	2570	92
3	0.957	0.191	0.1828	459	2510	89
4	1.05	0.191	0.201	510	2540	91
5	1.03	0.19	0.1957	499	2550	91
6	1.05	0.193	0.203	513	2530	91
7	1.04	0.191	0.1986	506	2550	91
8	1.039	0.192	0.1995	512	2560	91
9	1.003	0.19	0.1906	487	2560	91
10	1.034	0.191	0.1975	511	2590	92
Ave.			0.1963	508	2590	
SD			0.00488	23.4	89.7	

1/1 ≥ 80% of Control = PASS

421 London Road
Delaware, OH 43015
Acroline Weld Testing

5369

Company:	PFF
Welder:	Jerry Salard
Plastic:	HDPE
Weld Type:	Extruder
tested by:	Jim
date:	12/16/02

Sample Number	Width in	Thk/Wd2 in	CS Area in²	Max lbf	Max psi	
C1	0.994	0.198	0.1968	531	2700	2726
C2	1.046	0.194	0.203	552	2720	
C3	1	0.2	0.2	540	2700	
C4	1.014	0.196	0.1987	548	2760	
C5	1.044	0.198	0.207	568	2750	
1	0.984	0.194	0.1909	502	2630	96%
2	1.004	0.198	0.1988	533	2680	98
3	1.02	0.192	0.1958	537	2740	101
4	1.018	0.197	0.201	541	2700	99
5	1.056	0.193	0.204	550	2700	99
6	1.032	0.194	0.2	549	2740	101
7	0.994	0.198	0.1968	534	2710	99
8	1.016	0.198	0.201	535	2660	98
9	1.02	0.196	0.1999	540	2700	99
10	0.968	0.198	0.1917	525	2740	101
Avg.			0.199	539	2710	
SD			0.00421	14.84	35.9	

10/10 ≥ 80% of Control = PASS

(all 98 - 101% = excellent)

000831

421 London Road
Delaware, OH 43015
Acroline Weld Testing

5369

Company: PFF
Welder: Anthony Wilson
Plastic: HDPE
Weld Type: Extruder
tested by: Jim
date: 12/17/02

Sample Number	Width in	Thk in	CS Area in²	Max lbf	Max psi	
C1	1.019	0.194	0.1977	509	2580	2,538
C2	1.044	0.192	0.2	516	2570	
C3	1.055	0.19	0.2	496	2470	
C4	1.058	0.192	0.203	521	2570	
C5	1.048	0.192	0.201	503	2500	
1	1.053	0.19	0.2	510	2550	100%
2	1.058	0.192	0.203	501	2460	97
3	1.028	0.191	0.1963	495	2520	99
4	1.034	0.194	0.201	500	2490	98
5	1.036	0.192	0.1989	505	2540	100
6	1.024	0.192	0.1966	493	2510	99
7	1.056	0.192	0.203	515	2540	100
8	1.061	0.192	0.204	513	2520	99
9	0.941	0.192	0.1807	462	2560	101
10	1.007	0.194	0.1954	490	2510	99
Ave.			0.1987	502	2530	
SD			0.00564	14.41	35	

10/10 ≥ 80% of control = PASS

all ≥ 97% = excellent

421 London Road
Delaware, OH 43015

Acroline Weld Testing

5369

Company: PFF
Welder: George Wade
Plastic: HDPE
Weld Type: Extruder
tested by: Jim
date: 12/18/02

Sample Number	Width in	Thk in	CS Area in²	Max lbf	Max psi	
C1	1.071	0.194	0.208	525	2530	2550
C2	1.065	0.195	0.208	530	2550	
C3	1.056	0.194	0.205	523	2550	
C4	1.052	0.194	0.204	519	2540	
C5	1.027	0.192	0.1972	509	2580	
1	1.076	0.194	0.209	506	2420	95%
2	1.046	0.19	0.1987	498	2510	98
3	1.036	0.194	0.201	493	2450	96
4	1.058	0.192	0.203	497	2450	96
5	1025	0.192	196.8	493	2,510	98
6	1.054	0.192	0.202	510	2520	99
7	1.051	0.195	0.205	492	2400	94
8	1.064	0.193	0.205	493	2400	94
9	1.033	0.189	0.1952	484	2480	97
10	1.045	0.193	0.202	489	2420	95
Ave.			13.31	504	2320	
SD			50.8	14.59	644	

10/10 ≥ 80% of control = PASS

(all 94-99% : excellent)

EROSION MAT

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: PHIV2	SUBMITTAL NO. 20104-PHIV2-02270-001	REV.: 0	DATE: 9/9/03	Page 1 of 2

FROM:
Fluor Fernald

SIGNATURE: Zmumar 9/10/03

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

RECEIVED BY: Jura Schwab DATE: 9/10/03

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	PHIV2-02270-001	0						X			Manufacturer's product data and recommendations for installation of SWM & EC materials		X		02270-1.04B1	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
REINHARD FRISKE	64				
KWASI BADU TWENEBOAH	38				
DON PFISTER - DOE	45				

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

COIR OPEN AREA IS A BETTERMENT TO SPEC. REQUIRING 55%/10. THIS IS A BETTER EROSION CONTROL MEASURE. THE SMALLER OPENING WILL NOT DETER SEED GROWTH THRU OPENINGS

5369

000835

RECEIVED BY: Chris C. Van Ness DATE: 9/23/03

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

ORIGINAL

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

Indian Valley Industries, Inc.

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www.iviindustries.com

5369

IVI JUTE MESH SPECIFICATIONS

roperty		Test Method	Typical Value	English / Metric Units
arn Fiber		-	Woven jute, undyed & unbleached	
arn Count-	Warp	-	78 per width minimum	
	Weft	-	42 per linear yard, minimum	
olor		-	Natural (Brown, Earth Tone)	
abric Width		-	48" / 1.23m	Inches / Meters
abric Weight		-	.92lbs / 417g	lbs/sq. yd. - g/sq. m
rands per ft/mt-	Warp	ASTM D-3775	19.5 / 63.5	-
	Weft	ASTM D-3775	14.0 / 45.0	-
[a per Unit Area		ASTM D-3776 Warp	14.7 / 400	oz/sq. yd g/sq. m
rab Tensile - Dry		ASTM D-4632 Warp	300/1.38	lbs/ft - KN
		(modified) Fill	175/.70	lbs/ft - KN
rab Tensile - Wet		ASTM D-4632 Warp	125/.50	lbs/ft - KN
		(modified) Fill	65/.28	lbs/ft - KN
longation at Break		ASTM D-4632 Warp	10	%
		(modified) Fill	10	%
pen Area		C.O.E. CW 002215.	60-65	%
urability		Field Experience	1-2	Years
Vater Velocity		University Channel Test	8/2.4	ft/sec - m/sec
nit Shear Test		University Channel Test	2.76	lbs/sq. ft.
			132	n/sq. meter
C" Factor (1.5:1 Slope)		-	0.3	-
Iannings N		University Channel Test	0.0237	-

INFORMATION ONLY

Minimum Mesh Opening: 0.5 inches

rosion mat shall resist degradation for a minimum 6 month period after installation

[ ] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: _____ Date: 9/23/03

Indian Valley Industries, Inc.

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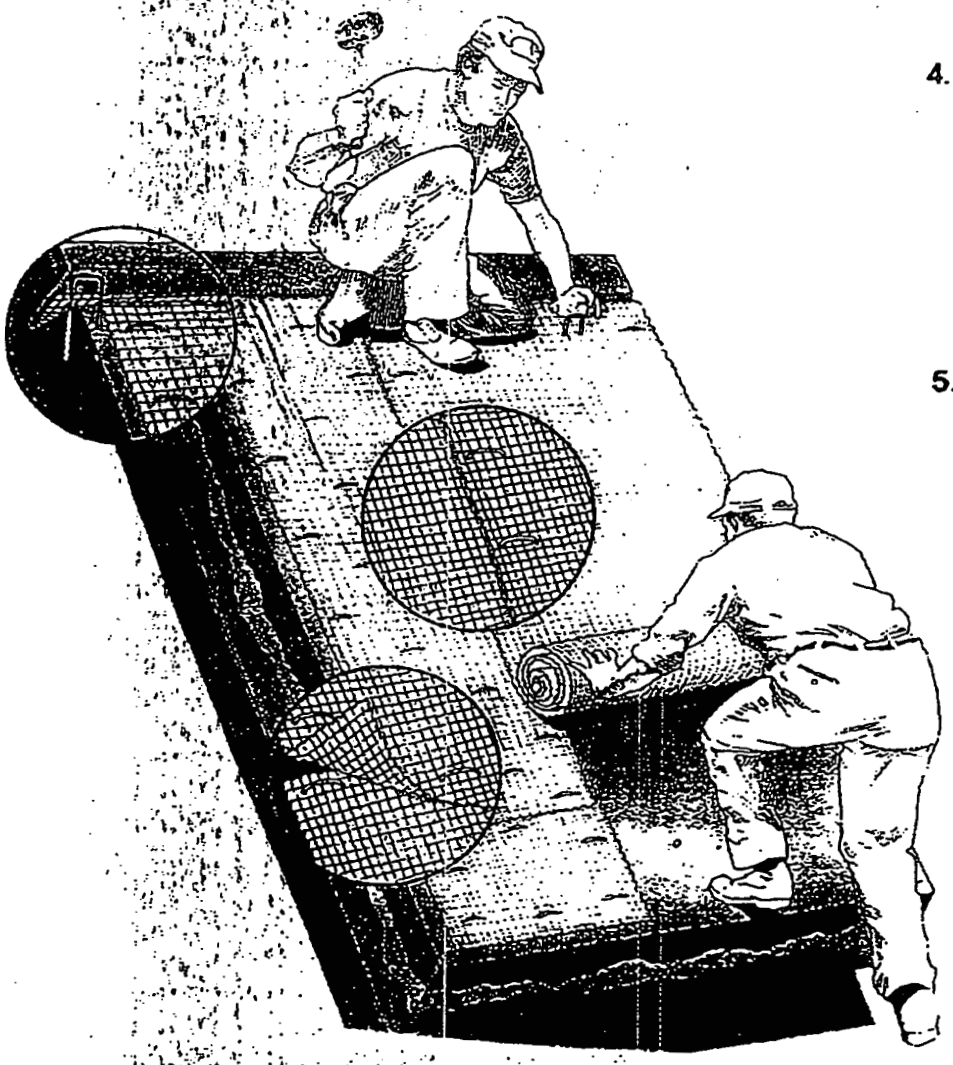
6 Easy Steps to Install JUTE

1. Prepare the soil by grading or raking area free of clods and large stones. Do not compact. If using fertilizer, add it to soil before grading.
2. Seeds and mulch (if required) should be distributed evenly over the prepared soil
3. JUTE should be applied by unrolling down the slope or in the direction of water flow. Always bring JUTE down to level area before terminating, fold 6" under, and secure with staples
4. Secure JUTE at the top of the slope by toeing it in 6" deep. Reinforce with a row of at least five (5) staples,, spacing each about a foot apart, and cover with dirt.
5. Place staples 18" to 24" apart throughout to secure mat to ground. All staples must be driven flush with soil surface
6. Always overlap the sides 2"-6". At the end of each roll, fold back 4" - 8" of the netting. Overlap this 4" - 8" over the beginning of the next roll. Securely staple the two layers to the ground.



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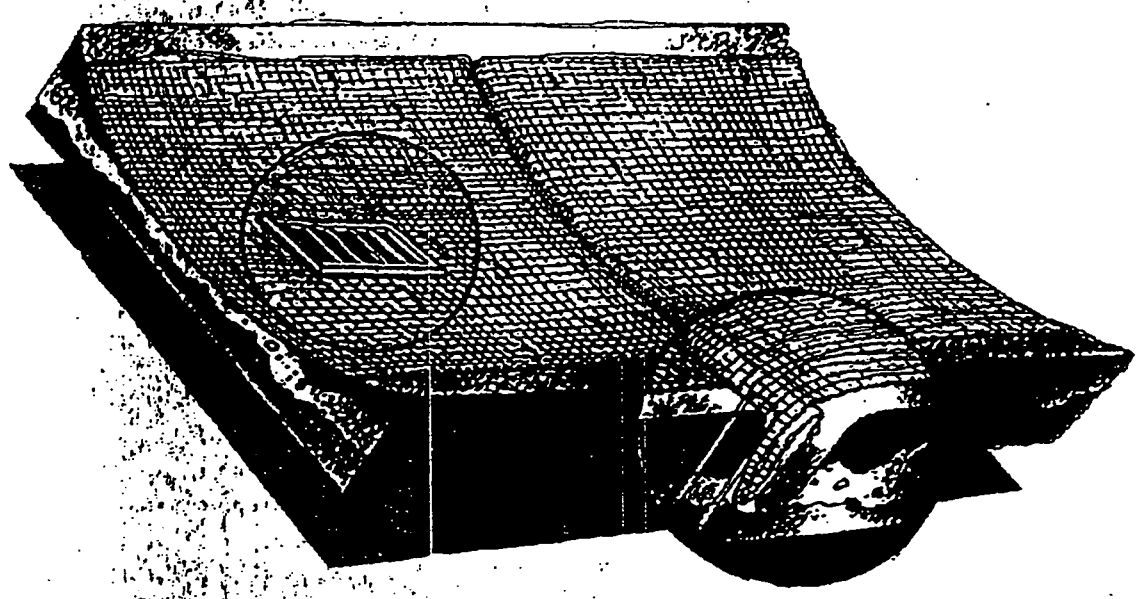
Waterway Installation

1. Always lay jute in the direction of water flow.
2. Extra staples are needed in waterways, and staples must be driven flush with soil surface.
3. Check slots should be placed every 25' to 50' depending on the velocity of water flow. A row of staples should be placed on either side of the check slot.
4. Provide drains as needed



Helpful Hints:

* Keep in dry storage
* Remember to lay JUTE MATTING loosely, do not stretch. JUTE MATTING must conform to the contour of the ground.
* Check slots may be needed on steep slopes to prevent subsurface movement of soil during prolonged or heavy rains. To establish a check slot:
  1- Dig 6" deep trench perpendicular to water flow.
  2- Roll JUTE MATTING in two or three folds (see diagram) and set into trench
  3- Staple fabric securely in bottom of trench and continue rolling down hill
* Because JUTE MATTING has 60 to 65% of open area, additional seeds can be broadcast over the netting to cover bare spots that may appear due to improper seeding or poor germination.

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P.O. BOX 681 • 28-38 CRANDALL STREET • BINGHAMTON, N.Y. 13902
Phone 607-724-1847, 724-1892 FAX 607-722-4940

5369

IVI COIR

roperties	Test Method	400	700	900	2307
arn	ANJENGO; wheel spun, well cleaned, evenly spun and uniformly twisted; scoragos from 12 to 20				
aterial		100% spun coir	100% spun coir	100% spun coir	100% spun coir
eight / S.Y. /S.M.	ASTM-3776C	11.8 OZ. 400 grams	20.6OZ. 700 grams	26.6OZ. 900 grams	6OZ. / L.Y. 8"/20cm high
pen Area		65%	50%	39%	24%
'ide Width Tensile	ASTM D 4595-86				
Dry	lbs./in. (KN)	51/31(0.23/0.14)	112/54(0.50/0.24)	159/53(0.71/0.24)	163/N.A.(0.73/N.A.)
Wet	lbs./in. (KN)	38/24(0.17/0.11)	86/41 (0.38/0.18)	122/39(0.54/0.17)	130/N.A.(0.58/N.A.)
longation at failure %					
Dry	(MD/CD)	35/30	51/36	68/32	56/-
Wet	(MD/CD)	47/44	64/48	82/49	84/-
i[illegible]m Shear Stress lbs/ft2 (N/M2)		3.1(148.72)	4.46(213.96)	4.63(222.11)	N.A.
hezy-Manning's Coefficient of Roughness*		0.0254	0.0294	0.0334	N.A.
:" Factor (1.5:1 slope)		N.A.	0.003	0.002	N.A.
'ater Flow Velocity		8 ft/sec-2.4 m/sec	10 ft/sec - 3.0m/sec	15 ft/sec-4.0m/sec	N.A.

university performance testing done in flat channels

	Width		Length		Weight		Area / Roll	
Style	Meters	Inches	Meters	Yards	Lbs	Kg	Sq. Mtr	Sq. Yd
400	2.0	78.7	50	55	88	40	100	120
	4.0	157.5	50	55	176	79.8	200	240
700	1.0	39.3	50	55	77	34.7	50	60
	2.0	78.7	50	55	154	69.8	100	120
	3.0	118.1	50	55	231	164.8	150	180
	4.0	157.5	50	55	309	140.2	200	240
900	1.0	39.3	50	55	99	44.9	50	60
	2.0	78.7	50	55	198	89.8	100	120
	3.0	118.1	50	55	298	135.2	150	180
	4.0	157.5	50	55	397	180.1	200	240
2307	20 cm	8.0	50	55	20.4	9.3	10.0	11.96

Indian Valley Industries, Inc.

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53 69

COIR BLANKET INSTALLATION GUIDE

Slopes

- Grade slope and remove large rocks,wood, etc.
- Apply fertilizer and seed *prior* to installing blankets
- Anchor blankets at top of slope as in Fig.1, Fig. 2 or Fig. 3 using five evenly spaced staples,according to specifiers instructions.
- Walking backward down the slope, allow the blanket to unroll slowly; ideally the blanket roll will rest against your shin as you walk.
- Staple blanket according to recommended staple pattern for specific product and slope. (See staple pattern guide)
- Place blankets *loosely* and in full contact with the soil.
- Overlap blanket edges approximately 2" (5 cm) and staple according to Fig. 4. Note: install blankets so edge overlaps are shingled away from prevailing winds.
- Overlap blanket ends 6" (15 cm), with upper blanket over lower blanket, and staple using five staples (see Fig. 5 and Fig. A).
- Cut excess blanket with scissors and anchor at end of slope (see Fig. 2).
- If installation plan specifies "check slot(s)", see Fig. 6.

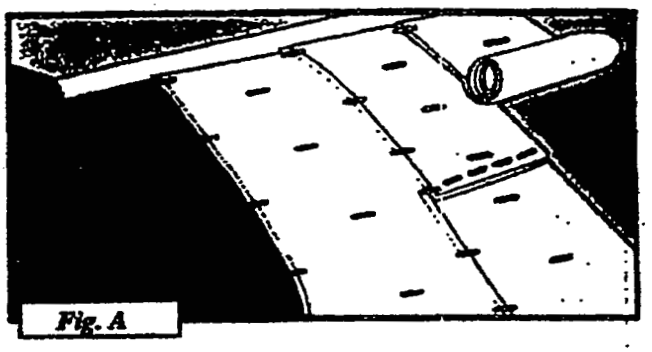
Fig. A

Anchoring Instructions Fig(s) 1 - 3

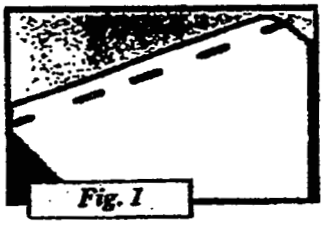
Fig. 1

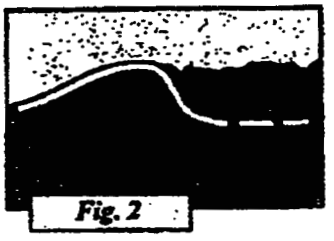
Fig. 2

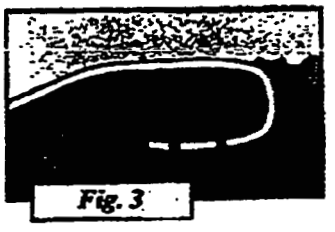
Fig. 3

Stapling Instructions Fig(s) 4-6

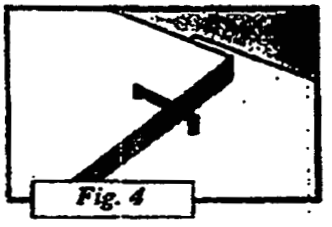
Fig. 4

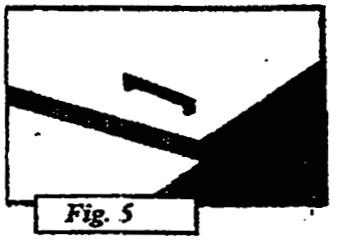
Fig. 5

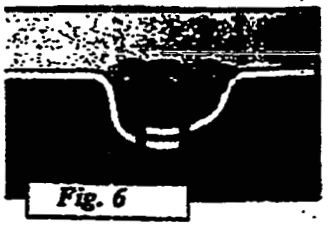
Fig. 6

Indian Valley Industries, Inc.

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Channels

- Grade and contour channel. Apply fertilizer and seed *prior* to installing blankets.
- Anchor blankets at top of channel (Fig.2) or (fig.3). Back fill with check slot material (Fig. 6). For culvert outfalls, place blanket under pipe at least 12" (30 cm) up stream from pipe opening.
- Install a blanket in the center of the channel, in the direction of water flow (Fig. B). Additional blankets are installed at the edges of this centered blanket.
- Construct check slots with soil, gravel, or stone in the middle (45 ft.) and at the end of each blanket (Fig. 6).
- Overlap side channel blanket edges 6" (15 cm) over the center channel blanket and staple (Fig. 4).
- Anchor the top edge of side channel blankets (Fig. 2).
- Anchor the terminal ends of blankets in a check slot according to Fig. 6.

Shorelines

- Grade and contour shoreline. Apply fertilizer and seed *prior* to installing blankets.
- Install blankets during lowest possible water level.
- Install blankets horizontally along shoreline *if one width is sufficient* (Fig. C).
- Secure top edge of blanket (Fig. 2).
- Overlap blanket ends and staple (Fig. 5).
- For shorelines with steeper than 3:1 slope or where one blanket width is insufficient, install blankets vertically using slope instructions.

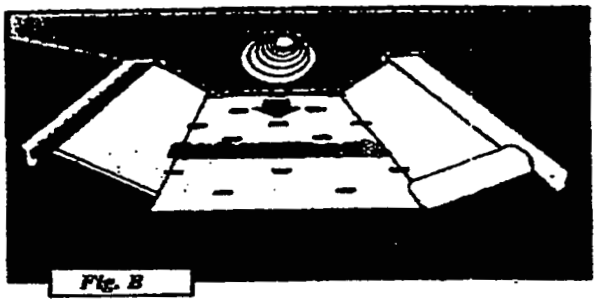
Fig. B

Anchoring Instructions Fig(s) 1 - 3

Stapling Instructions Fig(s) 4 - 6

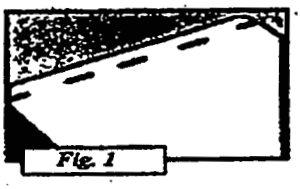
Fig. 1

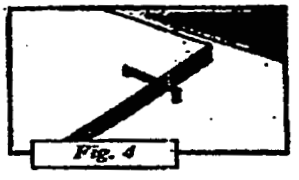
Fig. 4

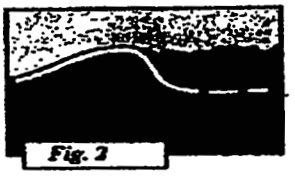
Fig. 2

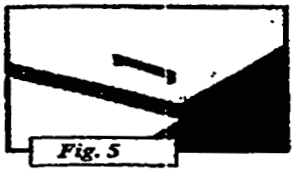
Fig. 5

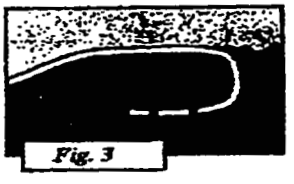
Fig. 3

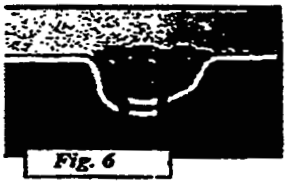
Fig. 6

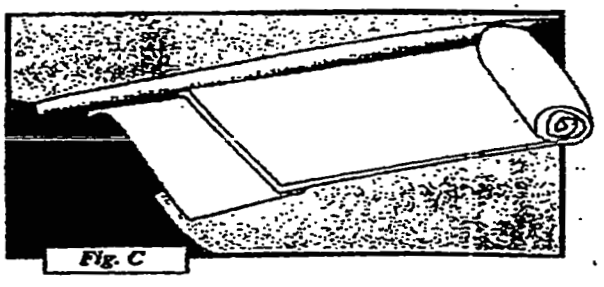
Fig. C

Indian Valley Industries, Inc.

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September 8, 2003

Fernald Closure Project
Letter No. C:CONT(CA):2003-0630

Fluor Fernald, Inc.
Attn: Alan Hohnhorst
Mail Stop 64
PO Box 538704
Cincinnati, OH 45253-8704

Dear Alan,

This letter certifies that the sod staples supplied by Indian Valley Industries, Inc. conform to the following specifications:

Metal staples for fastening coir and jute erosion control mats.
Size: 6" x 1" x 6", 11 gauge
U-shaped

PO# 03FF0977

Sincerely,

Karen L. Rozen

Karen L. Rozen
Indian Valley Industries, Inc.

VEGETATION

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.:	CONTRACT NO: PHIV2	SUBMITTAL NO. 20104-PHIV2-02930-001	REV.: 0	DATE: 9/26/03	Page 1 of 2

FROM:
Fluor Fernald

SIGNATURE: Y Kumar 9/30/03

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

RECEIVED BY: Teresa Schwartz DATE: 9/30/03

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	PHIV2-02930-001	0						X			Mixes and application rate for seed, mulch, fertilizers and crusting agents		X		02930-1.04A1			X

RECEIVED
OCT 0 2 2003

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
REINHARD FRISKE	64				
KWASI BADU TWENEBOAH	38				
DON PFISTER - DOE	45				

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

WHY DID WE MAKE OR ACCEPT SUBSTITUTIONS W/O AN REQ. OF DOE? PERCENT OF PURE SEEDS DO NOT MEET 95% BY WEIGHT. NEED CLARIFICATIONS.

RECEIVED BY: [signature] DATE: 10/3/03

(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)

00084469

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

ORIGINAL

ERNST Conservation Seeds

9006 Mercer Pike, Meadville, PA 16335

(814) 336-2404 (800) 873-3321 FAX (814) 336-5191

e-mail: ernst@ernstseed.com Website: www.ernstseed.com

=> 5369

August 29, 2003

Fluor Fernald, Inc.
Attn: Alan Hohnhorst
Mail Stop 64
PO Box 538704
Cincinnati, OH 425253-8704

RE: Seed Submittal

To Whom It May Concern,

Ernst Conservation Seeds will supply the following mixes upon request to Fluor Fernald. Some substitutions have been made due to our availability.

what does this mean? Are these approved equal??

Upland Mix

3 LB	Camper Little Bluestem
5 LB	Butte Side Oats Grama
25 LB	Canada Wild Rye
1 LB	Sunburst Switchgrass ???
1.5 LB	Prairie Dropseed
1 LB	Texoka Buffalo Grass
10 LB	Annual Ryegrass

Upland Forb Mix

.1875 LB	Butterfly Milkweed
.0156 LB	Bigleaf Aster - **Sub for Aster laevis** ??
.2188 LB	Wild Blue False Indigo
.125 LB	Partridge Pea
.125 LB	Purple Coneflower
.1094 LB	Ox-eye Sunflower/False
.0156 LB	Wild Bergamot
.0625 LB	Tall White Beard Tongue - **Sub for Penstemon grandiflorus** ??
.0234 LB	Grey Headed/Yellow Coneflower
.0078 LB	Black Eye Susan
.0469 LB	Stiff Goldenrod
.0625 LB	Ohio Spiderwort
.0313 LB	Hoary Vervain

Please note that there may be a charge for a small amounts fee and all mixes must be ordered in full pound increments. Please contact Plant Health Care for the Mycomihizae and Khyzobium Inoculants at 800-421-9051 ext 114. We will inoculate any mixes that require it with the inoculant that we have on hand. If you have any further questions please feel free to contact me.

Best regards,

Stacy Charles

Stacy Charles
Ernst Conservation Seeds
Sales

000845

Sorghastrum nutans (Indian Grass PLS) / Acre

Genetic Origin: Sherburne Co MN — Tested: 04/06/2002

Lotcode:PM	572Y	Germination %:	15.00 ??
Pure Seed %:	83.40	Hard Seed %:	0.00
Inert %:	16.60	Dormant Seed %:	67.00
Other Crop %:	0.00	TZ %:	0.00
Weed Seed %:	0.00	Total Viable %:	82.00
Bulk Weight:	11.699 LB	PLS %:	68.38
Pls Content:	8.000 OZ		

Noxious Weeds:

Prairie Moon Nursery, R.R. 3 Box 1633, Winona, MN 55987

This is less than 25%

Andropogon gerardii (Big Bluestem)

Genetic Origin: SE MN

Lotcode:PM 499Y

Pure Seed %:

MISSING DATA!!

Big Bluestem

5369

PM 499Y 00 SEMN ~~5570~~ 500.01 PLS

SPECIES: Andropogon gerardii (Big Bluestem)
ORIGIN: SEMN
LOT #: ANDGER010AMN TESTED: 12/23/2000
PURE SEED %: 88.87% GERMINATION %: —
INERT %: 11.13% HARD SEED %: —
OTHER CROP %: 0.0% DORMANT SEED %: —
WEED SEED %: 0.0% TZ %: 96.0%
NET WEIGHT: TOTAL VIABLE %: —
PLS CONTENT: 8.00 oz/acre PLS %: 85.32%
NOXIOUS WEEDS: NONE

Prairie Moon Nursery
Route 3 Box 163
Winona, MN 55987
507-452-1362

PM499Y

~~SSN~~

NATIVE SEEDS Prairie Moon
Spring Grove, MN 55974

LOT NUMBER	ANDGER010AMN	Wild Type	
BLUESTEM, BIG		*ANDROPOGON GERARDII*	
GENETIC ORIGIN:	SE MN	INERT:	11.13%
PURITY:	88.87%	OTHER CROP:	0.00%
TZ TEST:	96.00%	WEED:	0.00%
TESTED:	12/23/00	NOXIOUS WEEDS:	0
PLS %:	85.32%		
PLS LBS:	42.66	NET WT. LBS:	50.00

PM 499Y

000847

Ernst Conservation Seeds

9006 Mercer Pike, Meadville, PA 16335-9299

PACKING SLIP

5369

ORDER #: 024462
CUSTOMER #: FLUO001 PO #: PC74379

TO: Fluor Fernald
Attn: Harold Swiger (PC74379)
7400 Willey Road
Hamilton OH 45013
(513) 648-5191 Ext. 0000

2416

12186225 03 44116077

QUANTITY (FOR 9 ACRES)		ALT QUANTITY	ITEMS	BOTANICAL NAME
1.125 lb	BLK		Pale Purple Coneflower	*Echinacea pallida*
0.281 lb	BLK		Purple Node Joe Pye Weed	*Eupatorium purpureum*
2.390 lb	BLK		White False Indigo	*Baptisia alba (B.leucantha)*
0.563 lb	BLK		Round Head Lespedeza	*Lespedeza capitata*
1.000 EA	BLK		Lespedeza 100# - Separate	
17.000 lb	BLK		Partridge Pea	*Chamaecrista fasciculata*
1.000 EA	BLK		Pea & Vetch 100# Inoculant Sepa	

Total Packages in Shipment: 1

Date Shipped: 9.18.3

000848

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20104	CONTRACT NO: PHIV2	SUBMITTAL NO. 20104-PHIV2-02930-002	REV.: 0	DATE: 9/26/03	Page 1 of 2

FROM:
Fluor Fernald

SIGNATURE: Zmumar 9/30/03

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

RECEIVED BY: Teresa Schwab DATE: 9/30/03

			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	PHIV2-02930-002	0						X			Manufacturer's product data and recommended methods of application for seed		X		02930-1.04A2	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
REINHARD FRISKE	64				
KWASI BADU TWENEBOAH	38				
DON PFISTER - DOE	45				

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

0008356

53669

RECEIVED BY: [signature] DATE: 10/10/03

(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

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

5369

Establishing Upland Sites

Catalog | Company Info | Price List | Catalog Request

Search

UPLAND SITES are characterized by being dry most of the time, with very little sandy, shale-like topsoil. They are subject to drought. Upland sites are generally exposed to full sun and have good air circulation. Examples of UPLAND SITES:

- Naturally rocky soils that have been subject to erosion or steep road cuts

-Abandoned building & industrial sites

INFORMATION ONLY

SITE PREPARATION

Removing and controlling existing weedy growth is the first step in creating a natural habitat. The primary way to control weeds is to spray them with Glyphosate (Roundup) or tilling them into the soil. Deep-rooted perennials and woody species may require special removal and/or control measures. High potential for erosion exists after removing the existing vegetation. Soil should be tilled to a depth of 2 in. followed by rolling or tracking to create a firm seedbed as light, fluffy soil will dry out rapidly. Return any available topsoil to the site.

FERTILITY: Adding organic matter is most important to improve soil fertility. Lime and fertilizer should be added per soil test.

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 10/10/03

SEEDING METHODS

BROADCAST SEEDING: The broadcast spreader consists of a unit with a hopper for holding seed, fertilizer, pelletized limestone or other granular products and a mechanism which will spread the product uniformly over an area. Filler such as kitty litter, sawdust or sand can be added to help proportion the seed. Spread half of the seed in one direction (horizontally) and the remaining seed in the other direction (vertically). Follow by rolling or tracking the seed for good seed to soil contact. Do not roll or track the seed if the soil is wet. Cover with a light layer of straw mulch.

HYDROSEEDING: The hydroseeder combines water, seed, fertilizer and sometimes hydromulch into a mixture which is then pumped through a nozzle and sprayed uniformly over the area to be seeded. Hydroseeders can distribute this mixture up to 150 ft. or more, which allows for seeding on terrain which may not be accessible by other seeding methods such as steep slopes, roadside cuts or sites too wet for other methods. Using hydromulch assists in seed placement and on slopes to help reduce erosion. Depending on your site condition, you may want to use erosion control blankets or straw mulch to cover the seed.

DRILL SEEDING: The drill seeder can be used for seeding various species of grasses and grain. A

000850

specialized seed box is required for handling small or fluffy seed like that of many wildflowers and native grasses. Drill seeders are practical for several acres or more where slopes are not too steep. It generally has a minimum width of 8 ft. and contains a seed hopper capable of seeding a 6 ft. width, with row spacing of approximately 7 in. The unit also contains discs equipped with springs to aid in loosening the soil.

5369

FIRST YEAR MAINTENANCE

Observation of the growth of desired species and weed competition is essential to making maintenance decisions. When vegetation reaches 12 in. to 18 in. tall, mow to no less than 6 in. by rotary mowing or weed eater to prevent the weeds from going to seed. Most native plants will grow deeper root systems than tops in the first year and mowing to 6 in. or 8 in. will not hurt them. This allows sunlight to reach desired species. DO NOT MOW WITH A LAWN MOWER. Mowing too close encourages weedy species.

SECOND YEAR MAINTENANCE

Mow once, as close to the ground as possible, in early spring. This allows the soil to warm more quickly and young native plants to emerge. During the winter, birds and other wildlife can enjoy your native site if you postpone mowing until early spring.

SUGGESTED SEEDING MIXES FOR UPLAND SITES

Home • Up • Establishing Meadow Sites • Establishing Wet Meadow Sites • Establishing Wetland Sites • Establishing Shaded Sites • Establishing Upland Sites

Send mail to Webmaster with questions or comments about this web site.
Last modified: 08/22/03

000851

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT N

CONTRACT NO: PHIV2

SUBMITTAL NO. 20104-PHIV2-02930-004 | REV.: 0 | DATE: 12/17/03

FROM:
Fluor Fernald

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

SIGNATURE: 12/17/03

RECEIVED BY: Jannie Rodden DATE: 12-16-03

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
8	PHJV2-02930-004	0							X		Inoculant information for permanent seed mixes		X		02930-1.04A5			

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7	ERIC WOODS	65-2		
CHUCK VANARSDALE	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
REINHARD FRISKE(APPROVER)	64				
KWASI BADU TWENEBOAH	38				
DON PFISTER - DOE	45				

RECEIVED
DEC 23 2003
ORIGINAL

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

5369

RECEIVED BY: DATE: 12/30/03

(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

Rhizobium Inoculum for Legumes

Manufacturer has discontinued making inoculum for native species. Most native legumes will grow fine without being inoculated and may attach to natural strains existing in the soil.

Mycorrhizal Inoculum for Exposed Subsoil

For use on sites where topsoil is missing or highly disturbed from construction or erosion; forms symbiotic relationship with most species of plants, allowing healthier growth.

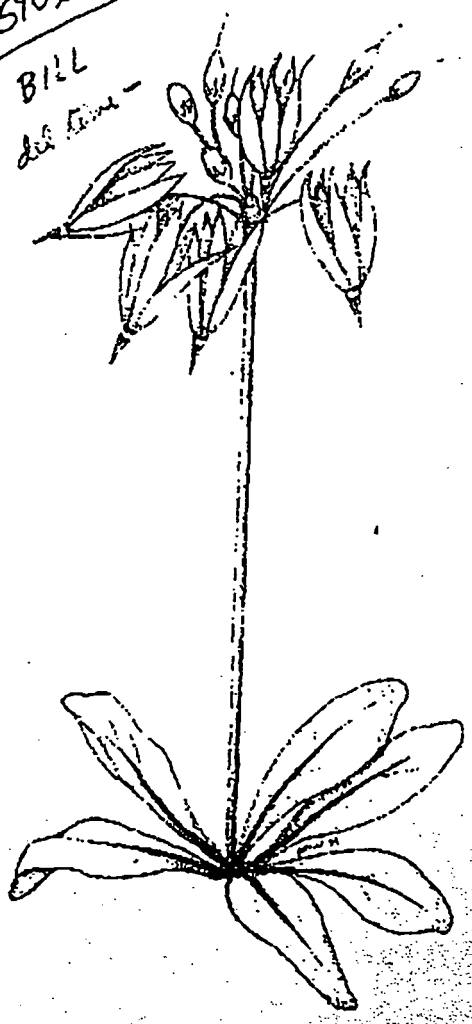
Use: 1.4 lbs per 1000 sq. ft; 60 lbs per acre

Item #AM120

1 to 9 lbs. . . . . $15/lb postpaid
10 to 19 lbs. . . . . $13/lb postpaid
20 to 60 lbs. . . . . $12/lb postpaid

(Call for prices on orders over 60 lbs)

540 lbs
BILL
dis Kim



Custom Designed Seed Mixes for Large Areas

See next page 5369

Natural prairies, savannas, and wetlands are an inspiration for our customiz mixes. But an authentic restoration of a natural area with over 200 species mig prohibitive financial burden. With balance of cost and diversity in mind, we of range of options. You can select a mix based on your budget or your desire for sity. And you can choose from our forb and grass mixes or from a mix of forbs if you have grass seed from another source.

Cover Crop Seed

If you feel you need a cover crop, the following are recommended.

Oats (Avena sativa)
Annual; for wet mesic to dry soils; do not use with fall or dormant seeding.
Use 20 lbs per acre (12,800 seeds per lb). Item #AVECC $

Regreen™
Sterile, short-lived perennial; for mesic to dry soils, best for fall or dormant s
Use 10 lbs per acre (9,600 seeds per lb). Item #REGCC $

Barnyard Grass (Echinochloa crusgalli)
Annual; for wet and wet mesic soils; best for wetland seeding, spring or fall.
Use 1 lb per acre (131,200 seeds per lb) Item #ECHCC $

Annual Rye Grass (Lolium multiflorum)
Annual; for any soil that needs extra erosion control. May be allelopathic and germination or slow the growth of other species. Use in combination with a cover crop. *Use 5 lbs per acre (147,200 seeds per lb).*
Item #LOLCC $

Eco-Grass

A *non-native* blend of fine fescue grasses that works well in borders for areas between prairies and homes. ***It saves water, saves fertilizer, and saves mowing.***

Pros	Cons
• *Regular mowing is not required*	• *Not completely maintenance-fre*
• *Tolerates dry conditions better than other lawns*	• *Does not tolerate wet soils*
• *Grows in a variety of conditions (sand to clay)*	• *Good site preparation is very im tant*
• *Slow-growing and tends to lay over*	• *Weeds could grow faster than E Grass*
• *Forms a 4-inch-thick flow of lawn*	• *Does not stand up to heavy traffi*
• *Thrives in full sun to partial shade*	• *Does not support much biologic activity*

Unless you prefer a more manicured look, this is the lawn grass for low-main nance landscapes. Eco-Grass, unlike our native mixes, is best planted in early fa properly prepared weed-free area (see pages 35–37). Spring planting is an accep second choice. Overall, while not maintenance-free, Eco-Grass requires less att than traditional lawns.

Seeding rate: 5 lbs per 1000 sq. ft; 220 lbs per acre

Item #ECOG $4.50/lb
(Call for prices on orders over 50 lbs)

000853

Toll-free 866-417-8156 / Fax 507-4

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO. 1	CONTRACT NO: PHIV2	SUBMITTAL NO. 20104-PHIV2-02930-005	REV.: 1	DATE: 11/3/03	Page 1 of 2

FROM: Fluor Fernald

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

SIGNATURE: Sinumar 11/3/03

RECEIVED BY: Teresa Schwab DATE: 11/4/03

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
8	PHIV2-02930-005	1						X			Manufacturer's certificates for seed mixture, guaranteed percentages of weed control, germination of seed, seed seller's name and seed test date (with additional clarification on purity , germination and substitution of seed)		X		02930-1.04B1	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7	ERIC WOODS	65-2		
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
REINHARD FRISKE	64				
KWASI BADU TWENEBOAH	38				
DON PFISTER - DOE	45				

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

RECEIVED BY: Chuck C. VanArsdale DATE: 11/20/03

(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

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

Clarification on Cell 2 Cap Seed Submittals

The following information provides an explanation of the Purity and Germination issues related to the seed received for use on the cell. The issues are whether the seed we received for the Cell 2 Cap meets the specification requirements for Purity and Germination.

PURITY

The labels that were submitted with each seed type included two types of information related to the Purity of the seed. The vendor identified the percentage of each seed in the upland grass and forb mixtures that made up the total amount of pure live seed as "PURITY". The true meaning of the column is that the value listed is the percent of pure seed for that species in the mix. We have no requirement to measure the percentage of each seed type making up the sum total of pure live seed. The sum total of the column discussed above provides the percent of pure seed in the mix and is the only percentage that is relevant in determining whether the requirements of our specification have been met. The individual percentages by species should be ignored for the purposes of calculating the amount of live seed in the mix.

On each label, the vendor also provides percentages for other material in the mixture. They include: "OTHER CROP", "INERT MATTER", and "WEED SEED". The total percentage of these materials should not exceed 10% of the seed mix, meaning that the remaining 90% of the mix should be pure live seed. The percentage of the impurities, along with the total pure live seed in the mix, will equal 100%. These are values that should be considered in calculating whether the 90% Purity requirement has been met.

The purity for each of the mixtures and individual seeds purchased are greater than the required values of the specifications with the exception of the Sweet Joe-Pye Weed. The Pure Seed percentage was only 81.89%. Additional seed was available in stock and added to the mix to bring the total PLS (pure live seed) up to the requested amount. The additional seed added to the mix brought the mix up the requirements of the specification.

The PLS percentage for the Big Bluestem and Indian Grass that we had in stock was also below the 90% PLS required. I recognized that prior to weighing up the seed and used the Pure Seed percentage to calculate the weight of seed required to provide sufficient seed. Instead of putting 8 ounces of seed in the mix; I put approximately 9.5 ounces of each grass seed in the grass mixture. The additional seed of both grasses coupled with the additional pound of Switchgrass provided by Ernst will assure that we have more than the required number of seeds for grasses on the Cell 2 Cap.

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [signature] Date: 11/20/03

GERMINATION

The seed mix acquired for the Cell 2 Cap will not have the required 80% germination for the first growing season for either the grasses or the forbs. There is no realistic expectation that native grass seed and forbs will have 80% germination in the first growing season. The problem related to this requirement is in the wording of the specification. Many of the species that we are requesting have hard seed coats or have a dormancy period. We would not normally see all of these species

INFORMATION ONLY

germinate within the first weeks after planting. Some of these species will not be evident in large numbers for up to two years.

The cover crop species are specifically added to the mix to address the low initial germination rates of the native grasses and forbs. The cover crop used in the mix will germinate within three weeks of seeding and will provide the required 80% coverage of the seeded area. The Germination rates for all of the cover crops used in the mix were above the 80% requirement.

SEED SUBSTITUTIONS

Current Section 02930 specification does not list options for substitution of species when listed/requested species are not available from the vendor. Change the specification to allow the Construction Manager to approve appropriate substitutions to species of the seed mix. The specification does allow substitutions in other seed mixes (e.g., wet mix) and should have the same language present for the OSDF Cell Cap mix. The substitution language was inadvertently omitted from the specification and should be added back in.

Vendor made submittal of listing the seed mixture for use on the Cell 2 Cap along with the price. The list included substitutions for two wildflower species. The substitutions were evaluated by Natural Resource Restoration to determine the appropriateness of the species for use on the Cell Cap; since the specified species were not available from the vendor. Both species occupied similar habitat and demonstrated comparable draught tolerance. Their use on the Cell 2 Cap would provide species diversity and function comparatively to stabilize the soil. It was determined that the seed mix with the substitutions would function as well as the specified seed mix to provide the coverage and functionality for the Cell 2 Cap. Acceptance of the substitutions was recommended to the Construction Manager.

ERNST Conservation Seeds

9006 Mercer Pike, Meadville, PA 16335
(814) 336-2404 (800) 873-3321 FAX (814) 336-5191
e-mail: ernst@ernstseed.com Website: www.ernstseed.com

53-69

August 29, 2003

Fluor Fernald, Inc.
Attn: Alan Hohnhorst
Mail Stop 64
PO Box 538704
Cincinnati, OH 425253-8704

RE: Seed Submittal

To Whom It May Concern,

Ernst Conservation Seeds will supply the following mixes upon request to Fluor Fernald. Some substitutions have been made due to our availability.

Upland Mix / Acre

3 LB	Camper Little Bluestem
5 LB	Butte Side Oats Grama
25 LB	Canada Wild Rye
1 LB	Sunburst Switchgrass
1.5 LB	Prairie Dropseed
1 LB	Texoka Buffalo Grass
10 LB	Annual Ryegrass

Upland Forb Mix / Acre

.1875 LB	Butterfly Milkweed
.0156 LB	Bigleaf Aster - **Sub for Aster laevis**
.2188 LB	Wild Blue False Indigo
.125 LB	Partridge Pea
.125 LB	Purple Coneflower
.1094 LB	Ox-eye Sunflower/False
.0156 LB	Wild Bergamot
.0625 LB	Tall White Beard Tongue - **Sub for Penstemon grandiflorus**
.0234 LB	Grey Headed/Yellow Coneflower
.0078 LB	Black Eye Susan
.0469 LB	Stiff Goldenrod
.0625 LB	Ohio Spiderwort
.0313 LB	Hoary Vervain

Please note that there may be a charge for a small amounts fee and all mixes must be ordered in full pound increments. Please contact Plant Health Care for the Mycomihizae and Khyzobium Inoculants at 800-421-9051 ext 114. We will inoculate any mixes that require it with the inoculant that we have on hand. If you have any further questions please feel free to contact me.

Best regards,

Stacy Charles

Stacy Charles
Ernst Conservation Seeds
Sales

000857

5369

ERNST *Conservation Seeds*

9006 Mercer Pike, Meadville, PA 16335 (814) 336-2404 fax: (814) 336-5191

e-mail: ernst@ernstseed.com (800) 873-3321 web:www.ernstseed.com

Upland Mixture

ITEM	PURITY	GERM	HARD	DORM	ORIGIN
Canada Wild Rye	50.19%	92%		4%	IA
Annual Ryegrass	21.40%	98%			OR
Butte Side Oats Grama	9.08%	83%			MO
Camper Little Bluestem	4.81%	92%			NE
Prairie Dropseed	3.22%	4%		54%	WI
Sunburst Switch Grass	2.14%	98%			NE
Texoka Buffalo Grass	2.13%	90%			TX

OTHER CROP: 0.05%

INERT MATTER: 0.87%

WEED SEED: 0.20%

NET WEIGHT: 50 LB

LOT NUMBER: PLUC00101

DATE TESTED: July 2003

Seeds for Conservation Use.

Sorghastrum nutans (Indian Grass PLS) /Acre

Genetic Origin:	Sherburne Co MN	Tested:	04/06/2002
Lotcode:PM	572Y	Germination %:	15.00
Pure Seed %:	83.40	Hard Seed %:	0.00
Inert %:	16.60	Dormant Seed %:	67.00
Other Crop %:	0.00	TZ %:	0.00
Weed Seed %:	0.00	Total Viable %:	82.00
Bulk Weight:	11.699 LB	PLS %:	68.38
Pls Content:	8.000 OZ		

Noxious Weeds:

Prairie Moon Nursery, R.R. 3 Box 1633, Winona, MN 55987

Andropogon gerardii (Big Bluestem)

Genetic Origin: SE MN

LotcodePM 499Y

Pure Seed %:

5369

Big Bluestem

PM 499Y 00 SEMN ~~35/0~~ 500 0# PLS

SPECIES: Andropogon gerardii (Big Bluestem)
ORIGIN: SEMN
LOT #: ANDGER010AMN TESTED: 12/23/2000
PURE SEED %: 88.87% GERMINATION %: —
INERT %: 11.13% HARD SEED %: —
OTHER CROP %: 0.0% DORMANT SEED %: —
WEED SEED %: 0.0% TZ %: 96.0%
NET WEIGHT: TOTAL VIABLE %: —
PLS CONTENT: 8.00 oz/acre PLS %: 85.32%
NOXIOUS WEEDS: NONE

Prairie Moon Nursery
Route 3 Box 163
Winona, MN 55987
507-452-1362

PM499Y

SSN

NATIVE SEEDS
Spring Grove, MN 55974

Prairie Moon

LOT NUMBER	ANDGER010AMN	Wild Type	
BLUESTEM, BIG		*ANDROPOGON GERARDII*	
GENETIC ORIGIN:	SE MN	INERT:	11.13%
PURITY:	88.87%	OTHER CROP:	0.00%
TZ TEST:	96.00%	WEED:	0.00%
TESTED:	12/23/00	NOXIOUS WEEDS:	0
PLS %:	85.32%		
PLS LBS:	42.66	NET WT. LBS:	50.00

PM 499Y

000860

Ernst Conservation Seed

9006 Mercer Pike, Meadville, PA 16335-9299

(814) 336-2404 or (800) 873-3321

-53 69

Upland Forbs Mix

ITEM	BOTANICAL NAME	PURITY	GERM	HARD	DORM	ORIGIN
Wild Blue False Indigo, WV ec	*Baptisia australis*	21.20%	8%	81%		WV
Butterfly Milkweed	*Asclepias tuberosa*	17.90%	84%			CA
Partridge Pea	*Chamaecrista fasciculata*	12.12%	64%	17%		PA
Purple Coneflower	*Echinacea purpurea*	11.91%	51%		42%	CA
Ox Eye Sunflower/False	*Heliopsis helianthoides*	10.46%	62%		28%	PA
Ohio Spiderwort	*Tradescantia ohiensis*	6.04%	12%		56%	PA
Tall White Beard Tongue	*Penstemon digitalis*	5.42%	12%		74%	PA
Stiff Goldenrod	*Solidago rigida*	3.97%	25%		65%	PA
Hoary Vervain	*Verbena stricta*	2.83%	9%		68%	NE
Grey Headed Coneflower	*Ratibida pinnata*	2.17%	51%		17%	CA/OR
Wild Bergamot	*Monarda fistulosa*	1.49%	44%		38%	WI
B[illegible]eaf Aster	*Aster macrophyllus (Eurybia m*	1.11%	66%			PA
[illegible]k Eyed Susan	*Rudbeckia hirta*	0.76%	87%		3%	NC

OTHER CROP:	0.01%	NET WEIGHT:	10 LB
INERT MATTER:	2.59%	LOT NUMBER:	FLUO00102
WEED SEED:	0.02%	DATE TESTED:	JULY 2003

000861

5369

ERNST Conservation Seeds
9006 Mercer Pike, Meadville, PA 16335 (814) 336-2404 fax: (814) 336-5191
e-mail: ernst@ernstseed.com (800) 873-3321 web:www.ernstseed.com

Pale Purple Coneflower
Echinacea pallida

NET WEIGHT:	1.135 lb	PURE SEED:	94.40%
		OTHER CROP:	0.01%
LOT NUMBER:	02299	INERT MATTER:	5.57%
		WEED SEED:	0.02%
DATE TESTED:	February 2002	GERMINATION:	22.50%
ORIGIN:	WI	HARD SEED:	0.00%
		DORMANT:	69.50%

NOXIOUS WEED: 12 Giant Foxtail: 117 Velvetleaf

Seeds for Conservation Use.

000862

ERNST Conservation Seeds
9006 Mercer Pike, Meadville, PA 16335 (814) 336-2404 fax: (814) 336-5191
e-mail: ernst@ernstseed.com (800) 873-3321 web:www.ernstseed.com

5369

White False Indigo
Baptisia alba (B.leucantha)

NET WEIGHT:	2.391 lb (2,391)	PURE SEED:	99.97%
		OTHER CROP:	0.00%
LOT NUMBER:	F-300	INERT MATTER:	0.03%
		WEED SEED:	0.00%
DATE TESTED:	January 2000	GERMINATION:	5.50%
ORIGIN:	MO	HARD SEED:	82.00%
		DORMANT:	0.00%

Seeds for Conservation Use.

ERNST Conservation Seeds
9006 Mercer Pike, Meadville, PA 16335 (814) 336-2404 fax: (814) 336-5191
e-mail: ernst@ernstseed.com (800) 873-3321 web:www.ernstseed.com

Purple Node Joe Pye Weed
Eupatorium purpureum

NET WEIGHT:	0.292 lb	PURE SEED:	81.88%
		OTHER CROP:	0.12%
LOT NUMBER:	02144	INERT MATTER:	17.96%
		WEED SEED:	0.02%
DATE TESTED:	May 2003	GERMINATION:	46.00%
ORIGIN:	WI	HARD SEED:	0.00%
		DORMANT:	30.00%

e-mail: ernst@ernstseed.com (800) 873-3321 web:www.ernstseed.com

5369

Round Head Lespedeza
Lespedeza capitata

NET WEIGHT: 0.563 lb
(0.563)

LOT NUMBER: M-PB-01

DATE TESTED: February 2003

ORIGIN: MB

PURE SEED: 96.28%
OTHER CROP: 2.46%
INERT MATTER: 0.57%
WEED SEED: 0.69%
GERMINATION: 80.00%
HARD SEED: 0.00%
DORMANT: 60.50%

Seeds for Conservation Use.

ERNST Conservation Seeds
9006 Mercer Pike, Meadville, PA 16335 (814) 336-2404 fax: (814) 336-5191
e-mail: ernst@ernstseed.com (800) 873-3321 web:www.ernstseed.com

Partridge Pea
Chamaecrista fasciculata

NET WEIGHT: 17 lb

LOT NUMBER: TXAPA901-01

DATE TESTED: January 2003

ORIGIN: TX

PURE SEED: 99.96%
OTHER CROP: 0.00%
INERT MATTER: 1.04%
WEED SEED: 0.00%
GERMINATION: 86.50%
HARD SEED: 5.00%
DORMANT: 0.00%

000864

Seeds for Conservation Use.

BENTONITE GRANULES

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: [illegible]04	CONTRACT NO: PHIV2	SUBMITTAL NO. 20104-PHIV2-02225-001	REV.: 0	DATE: 08/04/03	Page 1 of 2

FROM:
Fluor Fernald

SIGNATURE: [illegible] 8/5/03

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

RECEIVED BY: Teresa Schwab DATE: 8/5/03

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	PHIV2-02225-001	0						X			Specification sheet for Bentonite Powder for Cell 6 liner & Cell 2 cap construction		X		02225-1.04D	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	60				
BILL ZEBICK	60				
REINHARD FRISKE	64				
KWASI BADU TWENEBOAH	38				
DON PFISTER - DOE	45				

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

53369

00088056

RECEIVED BY: [signature] DATE: 8/7/03

(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

geosynthetic clay liners • geosynthetic clay liners • geosynthetic clay liners

CETCO LINING TECHNOLOGIES

Physical Properties

Volclay ® CG-50
CETCO Reference Number

Description:	Volclay CG-50 is a natural, granular, high-swelling Wyoming sodium bentonite recommended for lining/sealing applications involving moist soils or those where it is necessary to minimize dust generation.
Applications:	Soil/bentonite liners; general sealing applications
Composition:	Sodium bentonite is a hydrous silicate of alumina primarily consisting of the clay mineral montmorillonite, which swells several times its own volume when, wetted. 85% minimum montmorillonite content.
Free Swell	24 ml/2g minimum (ACC 1010)
Filtrate Loss:	18 ml maximum (API 13A)
Moisture Content:	12 percent maximum as shipped
Particle Sizing:	1 percent max. retained on a #10 mesh (2.00 mm) sieve 15 percent max. passing a #200 mesh (75 mm) sieve (ASTM D422)
Dry Bulk Density:	65 lbs/ft^3 (1,040 kg/m^3) typical
Packaging:	50 lb (22.5 kg) multi-wall paper bags; 2000-lb (900 kg) or 4,000 lb (1,800 kg) super sacks; or bulk.
Availability:	F.O.B. Lovell, WY. Quantities less than 1 ton may be available locally.
Application Information:	

Primary Soil Type	Typical Application Rate*
Sand	8-10 lbs/ft^2 (40-50 kg/m^2)
Silt	4-8 lbs/ft^2 (20-50 kg/m^2)
Clay	2-4 lbs/ft^2 (10-20 kg/m^2)

*Application rates are for a soil/bentonite liner mixed in a layer 6 inches (150mm) in thickness with a permeability of 1 x 10^{-7} cm/sec. Application rates above are shown for informational purposes only. All soils should be tested to determine specific application rates.

Wm Urchik

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: _____ Date: 8/7/03

William Urchik
Project Engineer
CETCO

INFORMATION ONLY

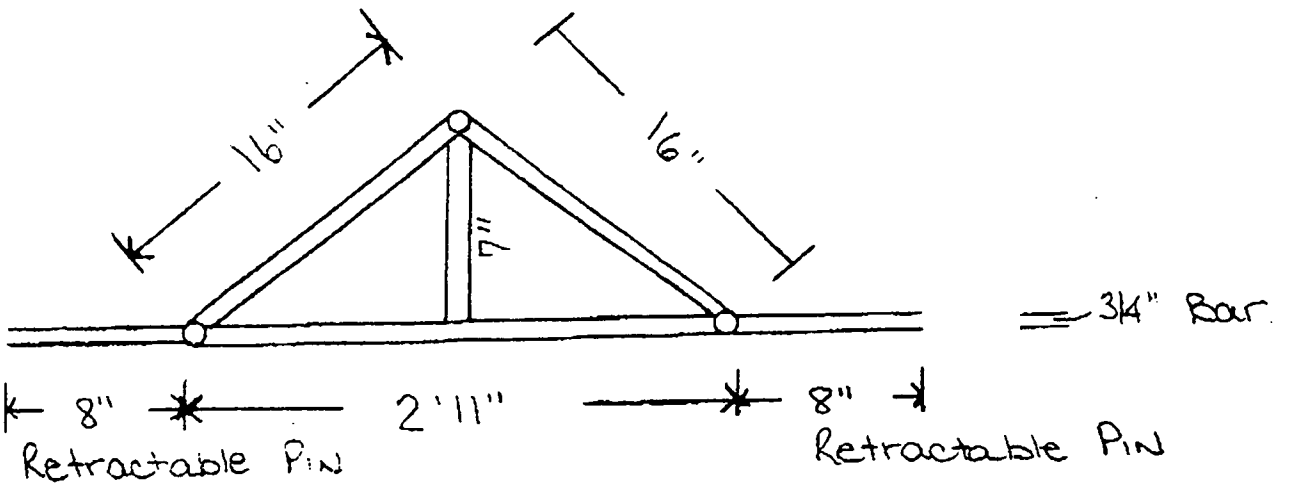
Revised 8/03

1500 W. Shure Drive • Arlington Heights, IL 60004 • USA • (847) 392-5800 • FAX (847) 577-5571 /www.CETCO.com
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.

GRAVITY INLET STRUCTURES (GIS)

3' dia manhole Bar



Pin will stick 2 1/2" into manhole wall

COIL THREAD BOLT

CN-49 CAST EYE BOLT

The CN-49 Cast Eye Bolt is made from a ductile iron cast eye nut and Medco's Hi-strength coil rod. The coil rod is properly welded to the cast eye nut.

Caution: When installing an eye bolt into an insert, make sure the eye nut is threaded into the insert such that the eye nut shoulder is tight against the concrete.

[redacted]

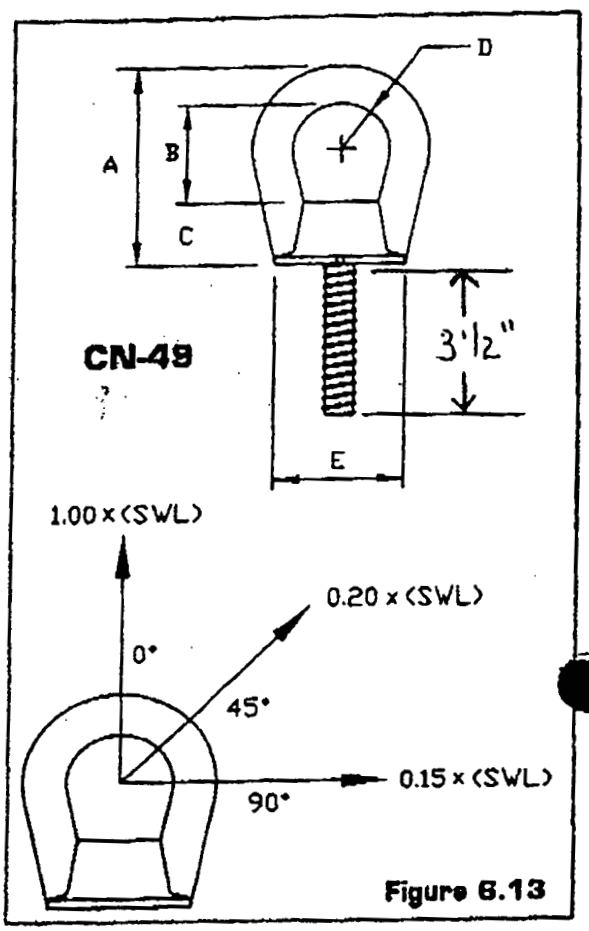


Figure 6.13

Reduction factors when an angle pull is required. Multiply the Safe Work Load from table 6-19 times the reduction factor for the appropriate angle.

CN-49 CAST EYE BOLT SELECTION TABLE

Bolt Diameter		Safe Work Load (Tension)		A		B		C		D		E	
in.	[redacted]	lbs.	[redacted]	in.	[redacted]	in.	[redacted]	in.	[redacted]	in.	[redacted]	in.	[redacted]
1/2	[redacted]	2700	[redacted]	3-1/4	[redacted]	1-5/8	[redacted]	1	[redacted]	3/4	[redacted]	2	[redacted]
3/4	[redacted]	3600	[redacted]	3-1/2	[redacted]	1-3/4	[redacted]	1	[redacted]	3/4	[redacted]	2	[redacted]
1	[redacted]	7200	[redacted]	5	[redacted]	2-3/4	[redacted]	1-1/4	[redacted]	1	[redacted]	3	[redacted]
1-1/4	[redacted]	10600	[redacted]	6-1/4	[redacted]	3-1/2	[redacted]	1-1/2	[redacted]	1-1/4	[redacted]	4	[redacted]

a) Safety factor is approximately 5:1 for lifting application

Table 6.19

MATERIAL CERTIFICATION

[redacted]

HOW TO ORDER

[redacted]

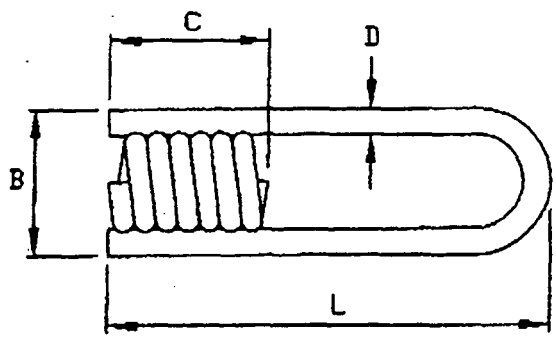
53 69

COIL THREAD INSERTS

CX-2 STRAIGHT COIL LOOP INSERT

The CX-2 Straight Coil Loop Insert is one of the most widely used in the precast industry. Extremely economical to the user and versatile in its applications. Used primarily to lift small precast sections or as an insert for small load bolted connection.

Special or custom variations of standard sizes is readily available. Longer, shorter, heavier, or smaller loops or other variations can be made to fill a particular need when necessary.



CX-2

CX-2 STRAIGHT LOOP INSERT SELECTION TABLE

Bolt Diameter		Insert Length L		Safe Work Load (Tension)		B		Coil Length C		Wire Diameter D	
in.	mm	in	mm	lbs	kN	in.	mm	in.	mm	in.	mm
1/2	13	4	100	2250	15	1-3/16	30	1-3/16	30	.225	[illegible]
1/2	13	6	150	3600	16	1-3/8	35	1-3/16	30	.306	[illegible]
3/4	19	4	100	3750	17	1-11/16	43	1-5/8	41	.306	[illegible]
3/4	19	6	150	4500	20	1-7/8	48	1-5/8	41	.375	[illegible]
1	25	6	150	4500	20	2-1/8	54	2-1/16	52	.375	[illegible]
1	25	8	200	4500	20	2-1/8	54	2-1/16	52	.375	[illegible]
1 1/4	32	8	2000	6000	27	2-1/2	63	2-1/16	52	.440	[illegible]

Table 6.2

a) SWL based on 1/2" (13mm) set-back from concrete surface.
b) Minimum concrete compressive strength, f'c = 3000 psi (21 MPa).
c) Safety factor is approximately 4:1 for lifting.
d) See minimum coil bolt penetration, page 77.

HOW TO ORDER

SPEC:
Quantity, type, bolt diameter, insert length or height, finish.

MATERIAL CERTIFICATION

Quality Control Certificate

000871

5369

THELEN ASSOCIATES, INC.
Geotechnical • Testing Engineers
1398 Cox Avenue / Erlanger, Kentucky 41018-1002 / 859-746-9400 / Fax 859-746-9408
2140 Waycross Road / Cincinnati, Ohio 45240-2719 / 513-825-4350 / Fax 513-825-4756
www.thelenassoc.com

CONSTRUCTION REVIEW SERVICES REPORT
CONCRETE TEST CYLINDERS

Client:	**Aerocrete Precast Corp.**	Report Number:	4
Contractor	--	**Project Number:**	**020959 T**
Project:	**Misc. Concrete Tests 2002**	Report Date:	01/22/03
Pour Location:	Misc		

FIELD DATA

Slump ASTM C143(in.):	--	Quantity (cyds):	--
Air Content ASTM C231(%):	--	Temp. & Weather (°F):	-- --
Concrete Company:	--	Temp. of Concrete ASTM C1064 (°F):	--
Truck Number:	--	Curing Method:	--
Ticket Number:	--	Cylinders By:	CLIENT
Time Left Plant:		Samples Taken From:	--
Time Sampled:		**Specified Strength (psi):**	**4000**
Mixing Time (minutes):		Date Received at Lab:	01/24/03

LABORATORY DATA FOR 6 " DIAMETER SPECIMEN ASTM C31 and ASTM C39

Lab No.	Cyl. Wt (lbs.)	Cross Sect. Area (sq. in.)	Total Load (lbs.)	L/D Correction	**Unit Load (psi)**	Fracture Type	Test Date	**Cyl. Test Age(days)**
70221	28.9	28.26	123000	0	**4350**	1	01/24/03	**2**
70222	28.7	28.26	187500	0	**6630**	4	01/29/03	**7**
70223	28.9	28.26	234000	0	**8280**	3	02/19/03	**28**

Type of Fracture: 1 = Cone 2 = Cone & Split 3 = Cone & Shear 4 = Shear 5 = Columnar

Remarks:

Distribution: Aerocrete Precast Corp. (1)

Thelen Associates, Inc.

By: Butch Angelo

000872

FEB 2 2 2003

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO:	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02721-001	REV.: 0	DATE: 04/14/03	Page 1 of 2

FROM:
Fluor Fernald

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

SIGNATURE: Bnumar 4/14/03

RECEIVED BY: Teresa Schwab DATE: 4/14/03

			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	PHV-02721-001A	0						X			Manufacturer's product data		X		02721-1.04A1	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	60				
BILL ZEBICK	64				
MIKE GODBER	84 ~~83~~				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

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

ORIGINAL

53699

00083

RECEIVED BY: Chuck C. Van Arsdale DATE: 4/21/03

(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

encore precast, llc

11111 Guard Lane
North Bend, Ohio 45052
(513) 353-5678
(513) 353-5679 Fax

5369

April 10, 2003

Fluor Fernald, Inc.
P.O. Box 538704
Cincinnati, OH 45253-8704

Dear Chuck Van Arsdale:

The reinforced concrete pipe ordered is 112'. It is 18" in diameter, and comes with gaskets. We also ordered reinforced concrete pipe that is 8' and 30" in diameter with gaskets. The pipe we are supplying is Class IV Reinforced Concrete Pipe with Wall B. The gaskets are Type A culvert gaskets.

If you have any questions, please give me a call.

Sincerely,

Jim Maloney

INFORMATION ONLY

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: [illegible] Date: 4/21/03

encore precast, llc

11111 Guard Lane
North Bend, Ohio 45052
(513)353-5678
(513)353-5679 Fax

5369

Storage – On flat level ground. you can stack the concrete pipe up to 8' tall. When you are stacking, be sure to blocking at the end of each stack.

Handling – Unload the concrete pipe with your forklift forks, or with nylon straps.

Installation – Install the concrete pipe with cables or nylon straps. You need to run the cable or straps around each end. When putting the gasketted pipe together. it is recommended to use a lubricant.

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: 20105	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02721-002	REV.: 0	DATE: 02/19/03	Page 1 of 2

FROM:
Fluor Fernald

SIGNATURE: Brumar 02/19/03

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

RECEIVED BY: Teresa Schwab DATE: 2/21/03

			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	PHV-02721-002(CMP)	0							X		Manufacturer's Certfication		X		02721-1.04A3			
																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)

ORIGINAL

0008076

53669

RECEIVED BY: Michael W. Golter DATE: 2/27/03 03/03/03 MG 03/03/03

(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)

ES-F-4955
Rev. 3: 05/14/1999. CT-2.4.2

ST REGIS CULVERT INC.
1101 S. Kitley • Indianapolis, IN 46203

-5369

Gentlemen:

By means of this letter we certify that the Aluminized Type II corrugated steel pipe supplied by St. Regis Culvert, Inc. to Discount Drainage for the Fluoremnald Job in the State of Ohio Conforms to AASHTO M-36 and M-274. The round pipe shall be manufactured with 16 gauge (.064) steel and the arch pipe will be manufactured with 14 gauge (.079) steel and have 2 2/3" x ½" corrugations.

The one-foot wide annular bands with rubber o-rings shall conform to AASHTO M-36 and are fabricated with Aluminized Type II steel sheets.

Material to be supplied:

- 8 ea. 49" x 33" 14 gauge (.079) 2 2/3" x ½" corrugations x 25'
- 7 ea. 1 ft. annular bands
- 4 ea. 24" 16 gauge (.064) 2 2/3" x ½" corrugations X 20'
- 3 ea. 24" 1 ft. annular bands

Best regards,

Chris Mooney
Sales Manager
St. Regis Culvert, Inc.

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: _____ Date: 2/27/03

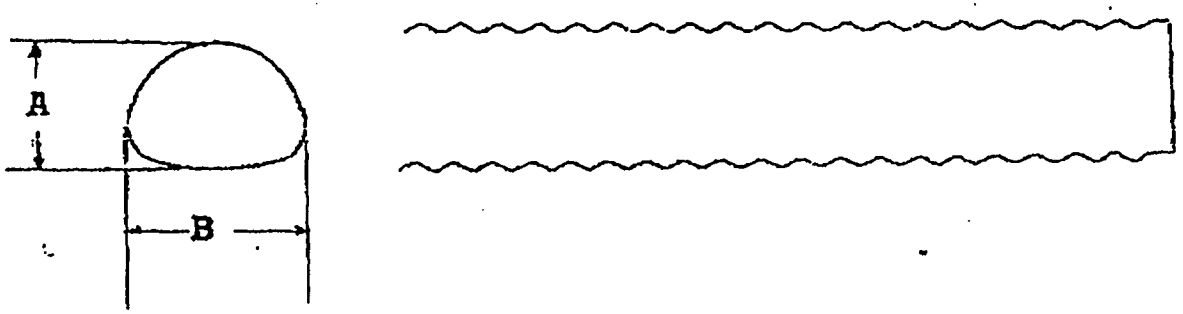
INFORMATION ONLY

(800) 428-8030 • (317) 353-8065 • Fax (317) 356-0925

000877

-5369

Aluminized Type II Corrugated Steel Pipe

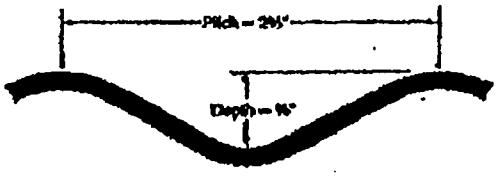


000878

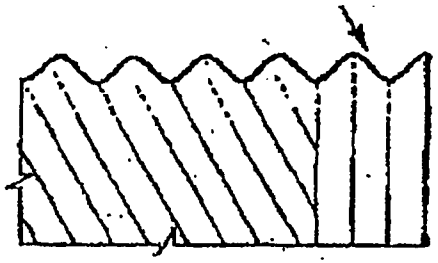
Corrugated steel pipe manufactured in accordance with AASHTO M 36. The aluminized type II steel used in the manufacture of this pipe shall conform to AASHTO M 274.

A	B	GAUGE	CORRUGATION
33"	49"	14	2 2/3"X½"

Corrugation Size



Reformed Pipe End

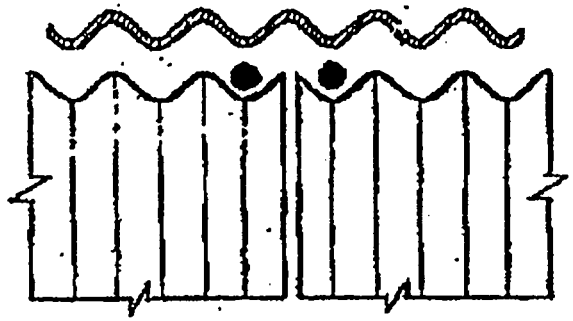


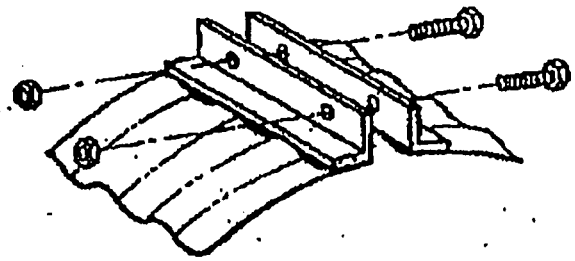
ST REGIS CULVERT INC.

-5369

ANNULAR BAND

0008779





Band Angle Connector

O-Ring Gasket

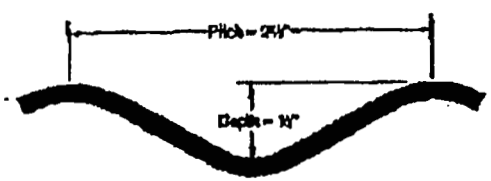
7 each 49" x 33" 1ft. annular bands

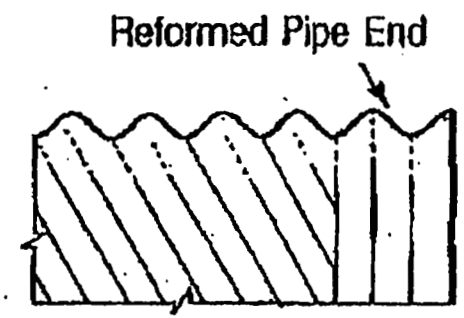
3 each 24" 1ft. annular bands

ST REGIS CULVERT INC.

Aluminized Type II Corrugated Steel Pipe

Corrugation Size





A	GAUGE	CORRUGATIONS
24"	16	2 2/3"X ½"

Corrugated steel pipe manufactured in accordance with AASHTO M 36. The alumminized type II steel used in the manufacture of this pipe shall conform to AASHTO M 274.

ST REGIS CULVERT INC.

SUPPLIER DOCUMENT SUBMITTAL

JS 4/30/03

FDF PROJECT NO.: 20[redacted]	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02721-002	REV.: 0 2	DATE: 04/29/03	1 of 2

FROM:
Fluor Fernald

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

SIGNATURE: Sumar 4129103

RECEIVED BY: Susa Schwab DATE: 4/30/03

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	PHV-02721-002 C	0							X		Manufacturer,s certification		X		02721-1.04A3			
																X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE	64				
GREGG JOHNSON	64				
BILL ZEBICK	64				
MIKE GODBER (APPROVER) 84	[redacted]				
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: 5/02/03

(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

FS-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

00088

5369

C478 CERTIFICATION

See attached letter from Aerocrete's engineers

5369

CARDINAL

ENGINEERING
ARCHITECTURE
LAND SURVEYING

April 22, 2003

Mr. Bill Hasank
Aerocrete Precast Corporation
5660 Limaburg Road
Burlington, Kentucky 41005

RE: Anti Vortex Device

Dear Mr. Hasank:

It is our opinion that the attached plan Drawing # AV-1 and dated April 22, 2003,of the "ANTI-VORTEX" outlet structure meets the requirements of ASTM section C478. Your construction should incorporate the reinforcing into your construction practice.

Respectfully

David K. Noran, PE, PLS
President

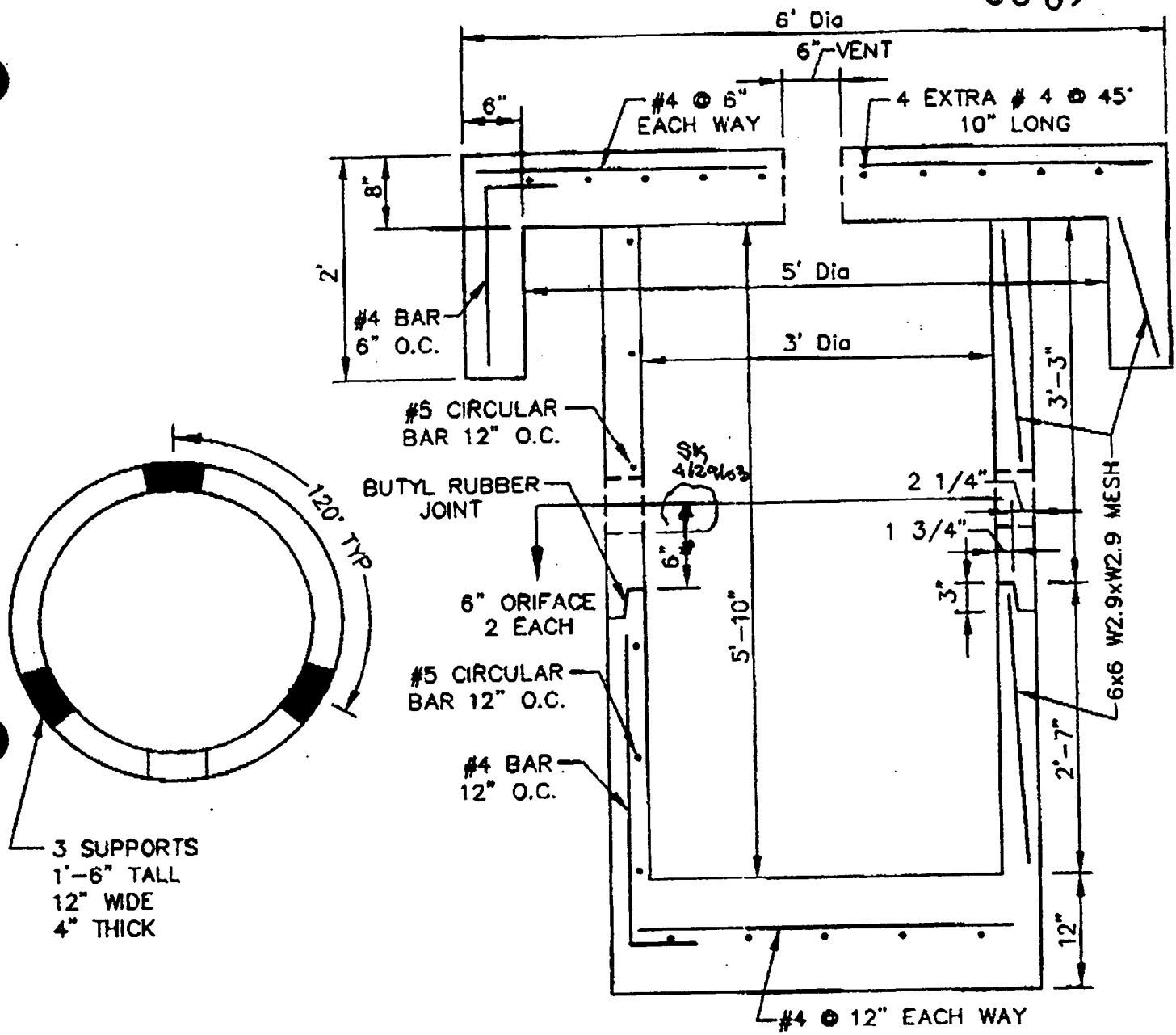
76896 1

[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: Date: 5/02/03

000883

ONE MOOCK ROAD
WILDER, KENTUCKY
41071 (859) 581-9600
FAX: (859) 581-9636

5369



SPECIFICATIONS

4000 MIX CONCRETE
REINFORCEMENT (PER ASTM C478)
4 REBAR
6x6 W2.9 x W2.9 WIRE MESH

LIFTING & HANDLING DEVICES

(SUPPLIED BY AEROCRETE IF NEEDED)
BASE – 3 EACH 1" LIFT EYE & SLING
SECTION – MANHOLE BAR
TOP – 3 EACH 1" LIFT EYE & SLING

APPROXIMATE WEIGHTS

BASE – 2,720 LB
SECTION – 1,680 LB
TOP – 4,800 LB

AEROCRETE
5660 LIMABURG ROAD, BURLINGTON, KY. 41005

ANTI-VORTEX STRUCTURE 800884

DR. BY TRP	APP. BY	SCALE: 3/4" = 1'
DATE: 4-22-03	DWG. NO. AV-1	

04/22/2003 05:58 FAX 6089618636 CAND/INAL ENGINEERING 005/005

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.:	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02721-003	REV.: 0	DATE: 04/14/03	Page 1 of 2

FROM:
Fluor Fernald

SIGNATURE: B Kumar 4/14/03

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

RECEIVED BY: Teresa Schwab DATE: 4/14/03

			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	PHV-02721-003A	0							X		Shop drawings for culverts etc.		X		02721-1.04A2	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	60				
BILL ZEBICK	64				
MIKE GODBER	84				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

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

ORIGINAL

5369

000885

RECEIVED BY: [signature] DATE: 4/21/03

(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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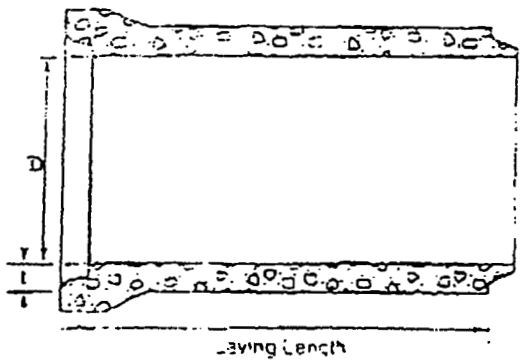
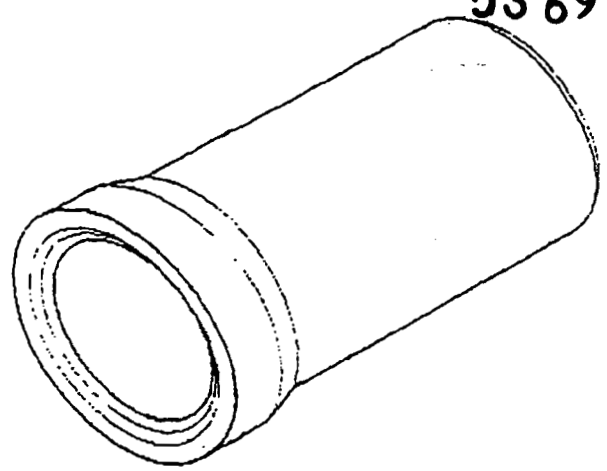
FS-E-4955
Rev. 3: 05/14/1999, CT-2.4.2

REINFORCED CONCRETE PIPE

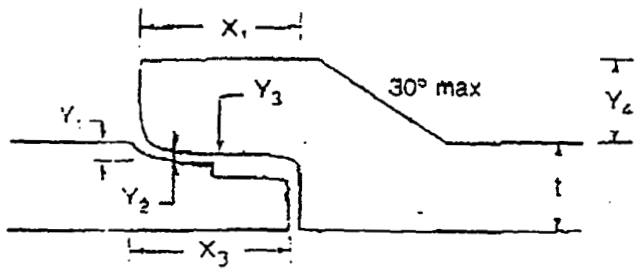
53 69





[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: _____ Date: 4/21/03

Tongue & Groove Joint Detail
(ASTM C-76)



B-Wall Expanded Bell

"D" (in)	Weight (lbs / ft)	"t" (in)	X1 (in)	X2 (in)	X3 (in)	Bell Slope °	Y1 (in)	Y2 (in)	Y3 (in)	Y4 (in)
12	96	2	4	1.125	2.5	2	.860	.09375	.234375	1.125
15	135	2.25	4	1.125	2.5	5	.860	.09375	.234375	1.375
18	175	2.5	4.5	1.125	2.75	2	.860	.09375	.234375	1.625
21	220	2.75	4.75	1.125	2.75	2	.860	.09375	.234375	1.875
24	274	3	5	1.5625	3	2	.860	.09375	.234375	2.125
27	330	3.25	6	2.1875	4	2	.875	.09375	.234375	2.25
30	392	3.5	7	2.1875	4	2	1.125	.09375	.234375	2
33	461	3.75	6.75	2.1875	4	2	1.375	.09375	.234375	1.75
36	530	4	6.75	2.1875	4	2	1.625	.09375	.234375	1.5

NOTE: Standard Laying Lengths are 8'-0". Pipe is manufactured to ASTM C-76 and C.S.D.T. 705.02

DATE: 5-19-00 (C)

INFORMATION ONLY

000886

SUPPLIER DOCUMENT SUBMITTAL

JLW 4/30/03

FDF PROJECT NO.: 20105	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02721-003	REV.: 0 1	DATE: 04/29/03	1 of 2

FROM:
Fluor Fernald

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

SIGNATURE: Sivumar 4/29/03

RECEIVED BY: Susan Schwab DATE: 4/30/03

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	PHV-02721-003	0						X			Shop drawings		X		02721-1.04A2	X		

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ECDC	52-7				
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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)

0008372

5369

RECEIVED BY: [signature] DATE: 5/1/03

(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)
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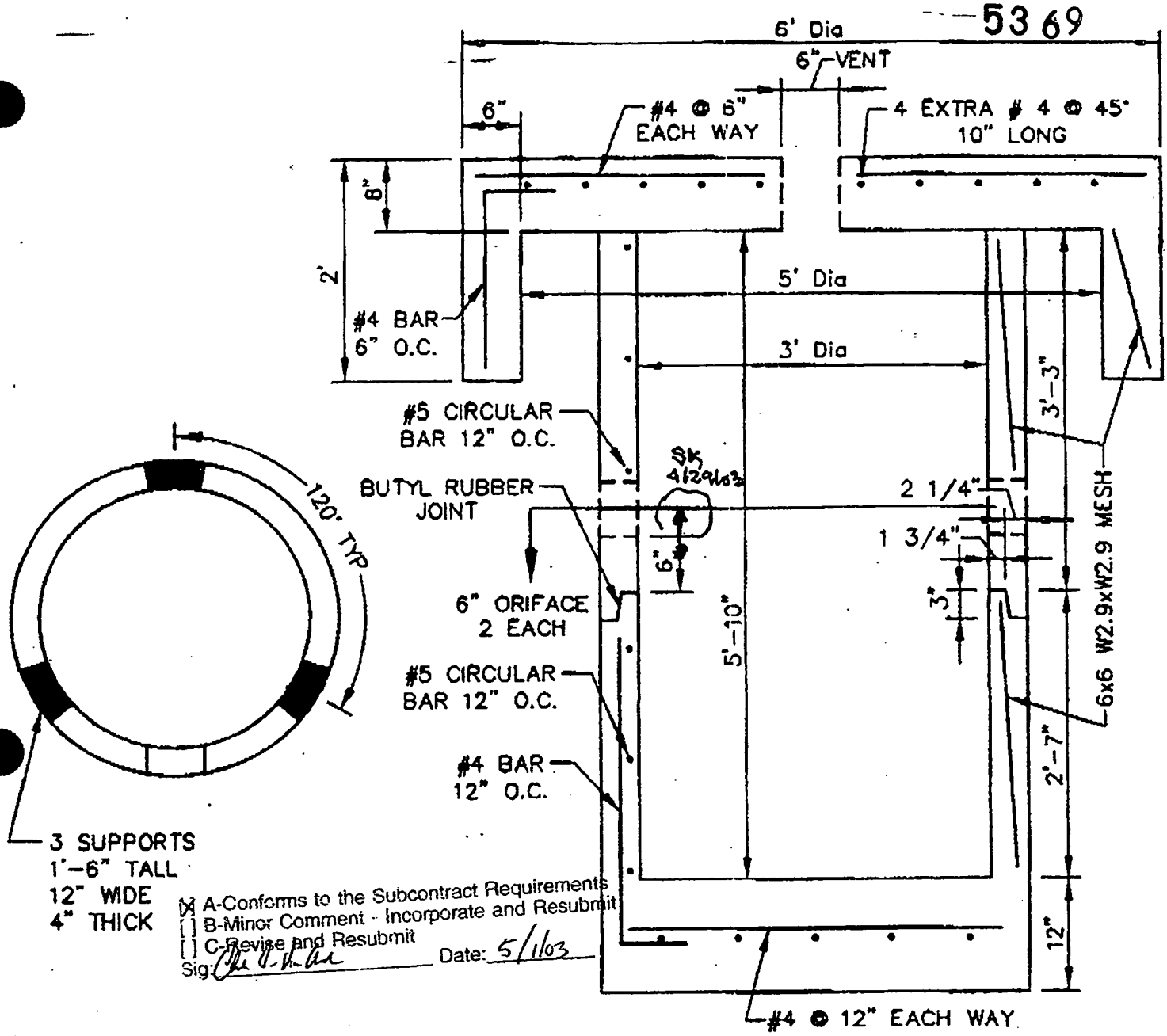
C - Revise and Resubmit (SEE COMMENTS)

ORIGINAL

5369



[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: _____ Date: 5/1/03

SPECIFICATIONS

4000 MIX CONCRETE
REINFORCEMENT (PER ASTM C478)
4 REBAR
6x6 W2.9 x W2.9 WIRE MESH

LIFTING & HANDLING DEVICES

(SUPPLIED BY AEROCRETE IF NEEDED)
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SECTION - MANHOLE BAR
TOP - 3 EACH 1" LIFT EYE & SLING

APPROXIMATE WEIGHTS

BASE - 2,720 LB
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76896

AEROCRETE
5660 LIMABURG ROAD, BURLINGTON, KY. 41005

ANTI-VORTEX STRUCTURE 000888

DR. BY TRP	APP. BY	SCALE: 3/4" = 1'
DATE: 4-22-03	DWG. NO. AV-1	

04/22/2003 03:38 FAX 8589518858 CARDINAL ENGINEERING 005/005

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.: [redacted]	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02721-001	REV.: 0 1	DATE: 04/29/03	Page 1 of 2

FROM:
Fluor Fernald

SIGNATURE: Bnumar 4/29/03

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

RECEIVED BY: Teresa Schwab DATE: 4/30/03

			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	PHV-02721-001C	0						X			Manufacturer's product data		X		02721-1.04A1	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: 5/1/03

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

SUBMITTAL TYPE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
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SUBMITTAL ACTION CODE: (BY FDF)
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C - Revise and Resubmit (SEE COMMENTS)

ORIGINAL

PRODUCT DATA AND RECCOMMENDED METHODS OF STORAGE, HANDLING AND INSTALLATION

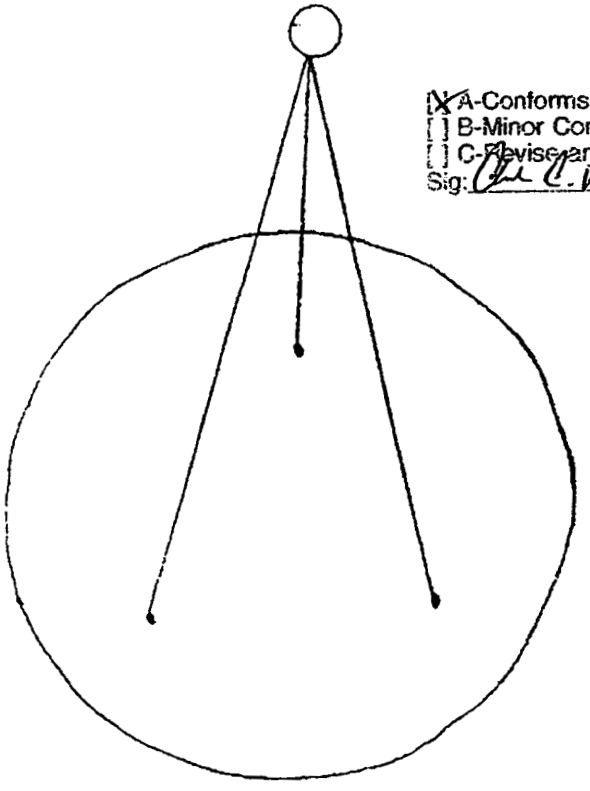
Product Data None

Storage Can be stored outside, out of way, until ready to be set in ground

Handling Base section will require (3) 1" lift eyes and sling
Barrel section will require a manhole bar
Top section will require (3) 1" lift eyes and sling

Lift eyes and manhole bar can be borrowed from Aerocrete upon request

INSTALLATION Per engineers plan



[X] A-Conforms to the Subcontract Requirements
[ ] B-Minor Comment - Incorporate and Resubmit
[ ] C-Revise and Resubmit
Sig: _____ Date: 5/1/03

76896

RIPRAP
(TYPE C DUMPED ROCKFILL)

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.:	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02271-001	REV.: 0	DATE: 04/10/03	Page 1 of 2

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

FROM:
Fluor Fernald

SIGNATURE: Jrumar 4/10/03

RECEIVED BY: [illegible] DATE: 4/14/03

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	PHV-02271-001A	0						X			Source of riprap and test results Type C		X		02271-1.04A1,A2	X	CV X	

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE (APPROVER)	64				
GREGG JOHNSON	60				
BILL ZEBICK	64				
MIKE GODBER	84				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

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

MATERIAL MEETS REQUIREMENTS BY CERTIFICATION
LETTER SHOULD STATE MAX ABSORPTION OF 0.83%
NOT 2.0% — THIS SUBMITTAL
MEETS REQUIREMENT

ORIGINAL

53 69

0008822

RECEIVED BY: [signature] DATE: 4/21/03

(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)

ES-F-4955
Rev. 3: 05/14/1999, CT-2.4.2

53 69

Hanson

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

March 10, 2003

Mr. Chuck Van Arsdale
Fluor Fernald, Inc.
P. O. Box 538704 MS. 64
Cincinnati, Ohio 45253-8704

Reference: 03FF0475-0000-00, Type C Rip Rap for Cell 2 and Cell 5
Revised Letter #2

Dear Chuck:

In accordance with your submittal requirements, we submit the following:

The source of the rip rap is Hanson Aggregates Eagle Quarry located at 13526 Overstake Road, Winchester, Ohio 45697.

The material we offer meets material requirements for Type C Rock Fill specified in Item 601.07 and 703.04(3) of the ODOT Specification.

We certify that the Type C Rip Rap we offer has a minimum bulk Specific Gravity of 2.60 and a maximum absorption of 2.0 percent when measured in accordance with ASTM C 127.

Note that the Type C Rip Rap we offer is from the same quarry approved for the Type D Rip Rap that we have been hauling to the site on P. O. 02FF1208 and the same test data was furnished for the Type D rock.

The Construction Manager and CQC Consultant needs to conduct a visual inspection of the rip rap at the Eagle Quarry right away if we have any chance to meet the delivery requirements for this project. Please advise me when this inspection will take place.

Thank you for this order and your help putting the details together.

Yours truly,

76896

Bob 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: [illegible] Date: 4/21/03

-5369

Hanson

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

March 11, 2003

Mr. Chuck Van Arsdale
Fluor Fernald, Inc.
P. O. Box 538704, MS64
Cincinnati, Ohio 45253-8704

Reference: Freeze Thaw Testing on Eagle Quarry Material

Dear Chuck:

Enclosed with this letter is an ODOT Aggregate Test Report on the freeze thaw results on #57 Limestone submitted to the state. The report at the bottom of the page indicates this report is valid until 1/24/2003. However, the Engineer of Test at District 9 indicated this test is valid until the sample currently in testing supercedes this test.

If anything further is required, let me know.

Yours truly,

Robert R. Backer

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

Enclosures

5369

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
AGGREGATE TEST
R E P O R T

Sample Id: 00567261 01
Sample Date: 09/19/00 PID Nbr:
Matl Name: 57 CR ST 451-452-453
P/S Name: HANSON-WINCHESTER
Rep Qty: TON
Sampled From: S.P.

Proj/Item/Ref:
Cnty/Rt/Sect:
Fed Aid Nbr:
Inspector Name: HOGGARD
Consign To:
Mfg Control Nbr: G#5759

Sample Weight: 14699.0 Wt P- # 4: Dried Wt + # 4: 14699.0
Washed Dry Wt: Split Wt P- # 4: Washed Wt + # 4: 14699.0
Test Spec Year: 97 Washed Oven Dried Wt - # 4:

Sieve	Wt	%Pass	Specs	In/Out
4			-	
3.5			-	
3			-	
2.5			-	
2			-	
1.5	0.0	100	100 - 100	
1	0.0	100	95 - 100	
3/4	1085.0	93	-	
1/2	8633.0	34	25 - 60	
3/8	3785.0	8	-	
# 4	993.0	1	0 - 10	

Sieve	Wt	%Pass	Specs	In/Out
# 8	44.0	1	0 - 5	
# 10			-	
# 16			-	
# 30			-	
# 40			-	
# 50			-	
# 70			-	
# 100			-	
# 200			-	
PAN	149.0			

Fineness Modulus:

CA P- 200: FA P- 200:
Liquid Limit:
Plastic Index:
Fractured %:
Abrasion Loss %: B - 26
Soundness Loss %: 5
Dry Rod Wt
As Rec'd Wt
Coef Of Perm
Max Dry Wt
Siliceous Particles:
Opt Moist %:
Silicon Dioxide:
Freeze/Thaw Area: 0.0

Sample Id:
DELETERIOUS

Shale Matl %:
Chert %: 0.01
Limonitic Matl %:
Soft Pieces %:
Clay Lumps %:
Coal %:
Total %:

		Avg	Sample Id	Value	Sample Id	Value
Specific Gr:	2.700	2.707	00558515 01	2.710	00536152 01	2.710
Absorption %:	0.54	0.52	00558515 01	0.52	00536152 01	0.50

Test Remarks: APPROVED/FOR USE IN 451/452/453 CONCRETE PAVEMENTS - MEETS REQMTS. OF ASTM C-666 "B" EXPANSION AREA UNDER THE CURVE = 0.00 MAX ALLOWED = 2.05 BASED ON THIS TEST RESULT AND AS LON LONG AS QC TESTS REMAIN CONSISTENT THIS SIZE/SOURCE WILL BE VALID UNTIL 01/24/2003 W/OUT ANY FURTHER FREEZE THAW TESTS

PO Number/Reference:
Requisition Number:
Waiver Number:
Invitation Number:

Signature: Rocky D. Bayer TM3
Date: 01-24-03

FREEZE-THAW STATUS REPORT (11/20/01)

53 69

As referenced in *"Kentucky 2000, Standard Specifications for Road and Bridge Construction," Section 805, subsection 805.04.01; The Department will subject coarse aggregates that are to be used in PCC base, PCC pavement, PCC shoulders, and bridge decks to freeze-thaw testing according to KM 64-626. The Department will allow sources having expansions of 0.06 percent or less to supply any size coarse aggregate listed in the Aggregate Size Use table, providing that size or a larger size has tested satisfactorily. When sources have expansions of more than 0.06 percent the Department will:*

1) *Reject the material.*
2) *Limit to the permitted sizes determined from acceptable freeze-thaw testing.*
3) *Allow the submittal of a proposal to the Engineer for production of acceptable coarse aggregate. The Department will require acceptable freeze-thaw test results before approving any proposal.*

Producer Number and Name: *P022901 Hanson (Eagle Crushed Stone)*

Location Ledge/Bench	Size	Expansion % 0.06 max.	Restrictions/Comments
L 1-4	57	0.02	57's or smaller permissible.
L 1B-4 40:60 blend bencher A & B	57	0.05	57's or smaller permissible.

Remarks: For concrete use, 57's or smaller may be supplied from ledges 1-4 and/or from ledges 1B-4 (manually blended in 40:60 ratio of Bench A – L1B and 1A and Bench B – L 1-4 respectively). Ledges 1B and 1A cannot be supplied separately for any concrete use.
Date: 11/20/01

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.:	CONTRACT NO: PHV	SUBMITTAL NO. 20105-PHV-02271-002	REV.: 1	DATE: 05/08/03	Page 1

FROM:
Fluor Fernald

SIGNATURE: Anumar 5/8/03

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

RECEIVED BY: Susan Schwab DATE: 5/8/03

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	PHV-02271-002A	1						X			Supplier certification ~~Source of riprap and test results~~ for riprap, Type 'C'		X		02271-1.04A	X		

REVIEW DISTRIBUTION

NAME	MS	NAME	MS	NAME	MS
ECDC	52-7				
CHUCK VANARSDALE(APPROVER)	64				
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BILL ZEBICK	60				
MIKE GODBER	84				
KWASI BADU-TWENEBOAH - GEOSYNTEC	38				
DON PFISTER - DOE	45				

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

RECEIVED BY: Chris C. Van Ark DATE: 5/13/03

(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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ORIGINAL

008087

53969

-5369

Hanson

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

May 6, 2003

Mr. Chuck Van Arsdale
Fluor Fernald , Inc.
P. O. Box 538704 MS64
Cincinnati, Ohio 45253-8704

Reference: 03FF0475-0000-00, Type C Rip Rap for Cell 2 and Cell 5
Revised Submittal Letter 3

Dear Chuck:

In accordance with your submittal requirements, we submit the following:

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The material we offer meets material requirements for Type C Rock Fill specified in Item 601.07 and 703.04(3) of the ODOT Specification.

We certify that the Type C Rip Rap we offer has a minimum bulk Specific Gravity of 2.60 and a maximum absorption of 0.83 percent when measured in accordance with ASTM C 127.

Note that the Type C Rip Rap we offer is from the same quarry approved for the Type D Rip Rap that we hauled to the site on P. O. 02FF1208 and the same test Data was furnished for the Type D Rock.

The CQC Consultant visually inspected the material for appearance and approved the material . Further, additional testing was done by Bowser Morner at our request to assure the compliance with the Absorption requirement for this product.

Thank you for this order and if anything further is needed, let me know.

Yours truly,

Bob Backer

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

INFORMATION ONLY

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

000898

BOWSER-MORNER, INC.

5369

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: Hanson Aggregates
Attn: Mr. Phil Young
848 Plum Run Road
Peebles, Ohio 45660

Date: May 2, 2003
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Report On: Laboratory Determination of Specific Gravity and Absorption of Two ODOT Type C Riprap Limestone Samples - Eagle Crushed Stone

On April 24, 2003, the client submitted two samples of riprap limestone for laboratory determination of specific gravity and absorption.

Testing was performed as specified by the client and in accordance with the following procedure:

ASTM C 127, "Specific Gravity and Absorption of Coarse Aggregate".

Results are presented below:

	Specific Gravity			Absorption, %
	Bulk Dry	Bulk SSD	Apparent	
Type C Brassfield Limestone	2.707	2.715	2.728	0.3
Type C Dayton Limestone	2.710	2.727	2.758	0.6

Should you have any questions, or if I may be of further service, please contact me at (937) 236-8805 extension 329.

Respectfully submitted,

BOWSER-MORNER, INC.

Scott D. Ruhkamp

Scott D. Ruhkamp, Manager
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SDR/jkk/cmb
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1-Client
1-File
1-Jim Elsea

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