

DRILLING LOG (Continuation Sheet)		GANNETT FLEMING, INC.			Hole No. GF-3		
		Project St. Joseph Water Treatment Plant			Sheet 3 of 3		
					Elev. Top of Hole 822.07		
Elev. Depth	Legend	Description of Materials	Sample Depth	Blows or RQD	Recovery	Box or Sample No.	Remarks
65		Gray Poorly Graded Fine SAND; Dense to Very Dense; Wet.					
			64.0-66.0	19-14			
				18-18	0.9	S-16	
70		Gray MF SAND with Gravel; Dense to Very Dense; Wet.					
			69.0-71.0	12-24			
				35-37	1.8	S-17	
75							
			74.0-76.0	21-44			
				53-51	1.0	S-18	
80		Gray Gravelly CMF SAND					
			79.0-81.0	15-11			
				15-15		S-19	
85		Cobbles and Boulders - up to 3' thick (Size of coarse material increases w/depth; cobbles or small boulders 82 to 84.5, large boulder 84.5 to 87.5)					
			84.0-84.5	104/0.5	0.2	S-20	
90		Gray SHALE					
			89.0	50/0.0		S-21	
			89.0-92.0	0%	7%	R-1	
95		End of Boring					Augered to 89.0' Core barrel clogged @ catcher

Date Started	12/8/92	DRILLING LOG		Hole No.	GF-5		
Date Finished	12/9/92			Sheet	1	of	3
Soil Sampling	79.0 Ft.			Line & Station -			
Rock Sampling	8.5 Ft.	Project St. Joseph Water Treatment Plant		Offset -			
Total Depth of Hole	87.5 Ft.	Drilling Agency Layne Western		N Coordinate	16502.2		
No. of Undist. Sample	0	Driller Randy Crowl		E Coordinate	17589.2		
Total Number of Core Boxes	1	Size and Bit Type NX Casing Size Spoon Size 2" O.D. Hollow-Stem 6" O.D. Hammer Wt. 140# Drilling Fluid Quick Gel Hammer Drop 30"		Elev. Top of Hole 822.17			
Groundwater Observations				Direction of Hole			
At 23.0 Ft. After 0 Hrs.							
At 22.0 Ft. After 48 Hrs.		x Vertical Inclined					
Elev. 800.2 After 48 Hrs.		Inspector T. L. Dreese		Deg. From Vertical			
Elev. Depth	Legend	Description of Materials	Sample Depth	Blows or RQD	Recovery	Box or Sample No.	Remarks
1.5		Dark Brown Lean CLAY; Soft; Moist.	0.0-2.0	2-2 2-2	0.5	S-1	
			2.0-4.0	2-4			
5		Gray SILT; Damp. (ML)		2-7	1.0	S-2	
			4.0-6.0	3-5			
				5-6	1.5	S-3	
			6.0-8.0	6-5			
				6-5	2.0	S-4	
			8.0-10.0	3-3			
				3-4	2.0	S-5	
			15		Same, except Moist.	14.0-16.0	
	6-5	2.0				S-6	
20		Wet at 19.7'	19.0-21.0	3-2			
				4-3	1.9	S-7	
25			24.0-26.0	3-4			0.5' Gray Sandy Clay at top of spoon
				7-10	1.8	S-8	
REMARKS:							

DRILLING LOG (Continuation Sheet)		GANNETT FLEMING, INC.		Hole No. GF-5			
		Project St. Joseph Water Treatment Plant		Sheet 2 of 3			
				Elev. Top of Hole 822.17			
Elev. Depth	Legend	Description of Materials	Sample Depth	Blows or RQD	Recovery	Box or Sample No.	Remarks
27.0							
			29.0-31.0	7-11			
				14-21	1.8	S-9	
30		Gray Poorly Graded Fine SAND with Silt; Medium Dense to Very Dense; Wet. (SP-SM)					
			34.0-36.0	5-8			
				13-17	0.6	S-10	
35							Sand ran into augers. Washed w/water to elev. 34.0' prior to sampling
			39.0-41.0	12-30			
				37-54	1.5	S-11	
40							
			44.0-46.0	12-28			
				21-25	0.5	S-12	
45							
			49.0-51.0	9-14			
				13-16	1.8	S-13	Washed sand from augers prior to sampling S-12, S-13
50							
			54.0-56.0				
				-	-	S-14	Sample taken within augers
55							
60							

DRILLING LOG (Continuation Sheet)		GANNETT FLEMING, INC.		Hole No. GF-5			
		Project St. Joseph Water Treatment Plant		Sheet 3 of 3			
				Elev. Top of Hole 822.17			
Elev. Depth	Legend	Description of Materials	Sample Depth	Blows or RQD	Recovery	Box or Sample No.	Remarks
65		Gray Poorly Graded Fine SAND with Silt; Medium Dense to Very Dense; Wet.					
			64.0-66.0	6-12			
				19-23	1.8	S-15	
			69.0-71.0	16-25			
				19-60	1.7	S-16	
70		70.6' to 70.8' Clay Seam.					
71.5							
75		Cobbles and Boulders.					
			77.0				
80		Shale; Gray; Very Soft; Completely Weathered. RQD=0	79.0-83.0	5%	100%	R-1	Augered to 79' Lost water at 79'
85		SHALE, Gray; Very Soft; Highly Weathered; Very Intensely Bedded, RD 0" to 5".	83.0-87.5	73%	87%	R-2	R-1 Stopped at 83' Core barrel plugged
87.5							
90		End of Boring					
95							

Date Started	12/17/92	DRILLING LOG GANNETT FLEMING, INC. Harrisburg, PA 17105	Hole No.	GF-7
Date Finished	12/18/92		Sheet	1 of 3
Soil Sampling	79.4 Ft.		Line & Station	-
Rock Sampling	0 Ft.	Project	St. Joseph Water Treatment Plant	
Total Depth of Hole	79.4 Ft.	Drilling Agency	Layne Western	
No. of Undist. Sample	0	Driller	Randy Crowl	
Total Number of Core Boxes	0	Size and Bit Type	NX	
Groundwater Observations	Casing Size	Spoon Size 2" O.D.		
	Hollow-Stem 6" O.D.	Hammer Wt. 140#		
At Ft. After Hrs.	Drilling Fluid Quick Gel	Hammer Drop 30"		
Elev. After Hrs.	Inspector T. L. Dreese	Direction of Hole ☒ Vertical ☐ Inclined Deg. From Vertical		

Elev. Depth	Legend	Description of Materials	Sample Depth	Blows or RQD	Recovery	Box or Sample No.	Remarks
5 6.0		Dark Brown Fat CLAY; Moist.	0.0-2.0	2-4 3-4	0.8	S-1	PPR = 0.7 tsf PPR = 0.75 tsf
			2.0-4.0	3-2			
				3-6	0.7	S-2	
			4.0-6.0	3-3			
				3-5	0.6	S-3	
10 15		Tan Brown Silty Fine SAND; Moist.	6.0-8.0	6-6			0.2' Clay lense at top of S-5
				10-9	1.4	S-4	
			8.0-10.0	3-4			
				7-8	1.5	S-5	
			14.0-16.0	6-5			
				6-8	1.6	S-6	
19.5 20		Gray Poorly Graded Fine SAND with Silt; Wet.	19.0-21.0	2-2			
				3-3		S-7	
			24.0-26.0	1-1			
25				2-3		S-8	

REMARKS:

DRILLING LOG (Continuation Sheet)		GANNETT FLEMING, INC.			Hole No. GF-7		
		Project St. Joseph Water Treatment Plant			Sheet 2 of 3		
					Elev. Top of Hole 821.3		
Elev. Depth	Legend	Description of Materials	Sample Depth	Blows or RQD	Recovery	Box or Sample No.	Remarks
28.0							
			29.0-31.0				
					2.0	S-9	
30		Gray Poorly Graded Fine SAND; Medium Dense to Dense; Wet.					
			35.0-37.0	2-4			
35				9-13	2.0	S-10	Sample frozen
			40.0-42.0	15-24			
40				24-21	1.0	S-11	
			45.0-47.0	11-16			
45				23-42	1.4	S-12	
			50.0-52.0	16-22			
50				19-20	1.3	S-13	
			55.0-57.0	15-18			
55				25-30	0.9	S-14	
60							

DRILLING LOG (Continuation Sheet)		GANNETT FLEMING, INC.			Hole No. GF-7		
		Project St. Joseph Water Treatment Plant			Sheet 3 of 3		
					Elev. Top of Hole 821.3		
Elev. Depth	Legend	Description of Materials	Sample Depth	Blows or RQD	Recovery	Box or Sample No.	Remarks
65		Gray Poorly Graded Fine SAND; Medium Dense to Dense; Wet.	60.0-62.0	12-10 19-29	1.0	S-15	
70			65.0-67.0	13-12			
				23-23		S-16	
75		Gravel and Cobbles.	70.0-70.4	90/0.4	0	S-17	
80		Cobbles Boulder 75.5 to 76.7' Soft Seam 76.7 to 77.2' Boulder 77.2 to 78.8'					
85		SHALE.	75.0-75.9	41-50/0.4	0.2	S-18	
90		End of Boring	78.8				
95			79.0-79.4	100/0.4	0.3	S-19	

Date Started	12/10/92	DRILLING LOG GANNETT FLEMING, INC. Harrisburg, PA 17105	Hole No.	GF-8		
Date Finished	12/10/92		Sheet	1	of	3
Soil Sampling	52 Ft.		Line & Station	-		
Rock Sampling	10 Ft.	Project	St. Joseph Water Treatment Plant		Offset	-
Total Depth of Hole	62 Ft.	Drilling Agency	Layne Western		N Coordinate	16346.3
No. of Undist. Sample	3	Driller	Randy Crowl		E Coordinate	17897.3
Total Number of Core Boxes	1	Size and Bit Type	NX		Elev. Top of Hole	821.58
Groundwater Observations		Casing Size	Spoon Size 2" O.D.		Direction of Hole	
At 10.9 Ft. After 0 Hrs.		Hollow-Stem 6" O.D., 4" I.D.	Hammer Wt. 140#			
At Ft. After Hrs.		Drilling Fluid	Hammer Drop 30"		x Vertical	Inclined
Elev. 810.7 After 0 Hrs.		Inspector T. L. Dreese			Deg. From Vertical	

Elev. Depth	Legend	Description of Materials	Sample Depth	Blows or RQD	Recovery	Box or Sample No.	Remarks
		Dark Brown Fat CLAY; Soft to Stiff; Moist.	0.0-2.0	3-6 8-9	0.8	S-1	PPR = 2.1 tsf
			2.0-4.0	5-7			
				8-10	0.9	S-2	PPR = 2.1 tsf
			4.0-6.0	2-2			
				2-4	1.6	S-3	PPR = 0.9 tsf
			6.0-8.0	5-6			
				5-5	1.7	S-4	PPR = 1.0 tsf
		Gray Fat CLAY; Moist. (CH)	8.0-10.0				
					1.3/2.0	U-1	PPR = 1.5 tsf
		Same except wet.	10.0-12.0				
					2.0/2.0	U-2	PPR = 0.25 tsf
			12.0-14.0	2-1			
				1-2	1.7	S-5	PPR = 0.1 tsf
			14.0-16.0	1-2			
				1-1	2.0	S-6	PPR = 0.25 tsf
			19.0-21.0	1-2			
				1-3	1.8	S-7	PPR = 0.25 tsf
			24.0-26.0	5-6			
		Last 6" S-8 Moist; Top 18" Wet.		7-11	1.8	S-8	PPR = 0.85 tsf

REMARKS:

[illegible]

DRILLING LOG (Continuation Sheet)		GANNETT FLEMING, INC.	Hole No.	GF-8			
		Project	St. Joseph Water Treatment Plant				
				Sheet	3 of 3		
				Elev. Top of Hole	821.58		
Elev. Depth	Legend	Description of Materials	Sample Depth	Blows or RQD	Recovery	Box or Sample No.	Remarks
62.0							
		End of Boring					
65							
70							
75							
80							
85							
90							
95							

Date Started 12/17/92		DRILLING LOG GANNETT FLEMING, INC. Harrisburg, PA 17105		Hole No. GF-9			
Date Finished 12/17/92				Sheet 1 of 3			
Soil Sampling 56.0 Ft.				Line & Station -			
Rock Sampling 8.0 Ft.				Offset -			
Total Depth of Hole 64.0 Ft.		Project St. Joseph Water Treatment Plant		N Coordinate 16493.7			
No. of Undist. Sample 1		Drilling Agency Layne Western		E Coordinate 17892.0			
Total Number of Core Boxes 1		Driller Randy Crawl		Elev. Top of Hole 822.9			
Groundwater Observations		Size and Bit Type NX		Direction of Hole ☒ Vertical ☐ Inclined _____ Deg. From Vertical			
At 23.5 Ft. After 0 Hrs.		Casing Size					
At 3.0 Ft. After 16 Hrs.		Spoon Size 2" O.D.					
		Hollow-Stem 6" O.D.					
Elev. 819.9 After 16 Hrs.		Drilling Fluid					
		Inspector T. L. Dreese					
Elev. Depth	Legend	Description of Materials	Sample Depth	Blows or RQD	Recovery	Box or Sample No.	Remarks
5.0		Dark Brown Silty Fat CLAY with Gravel; Damp to Moist.	0.0-2.0	6-7 10-12	0.1	S-1	PPR = 3.0 tsf PPR = 1.5 tsf
			2.0-4.0	4-4			
				7-13	1.0	S-2	
			4.0-6.0	2-2			
				3-3	0.7	S-3	
10		Brown Fat CLAY with occasional Silt Lenses; Stiff to Very Soft; Moist.	6.0-8.0	2-4			PPR = 1.5 tsf PPR = 1.3 tsf
				5-6	1.1	S-4	
			8.0-10.0	2-3			
				5-4	2.0	S-5	
			15		Gray Fat CLAY; Moist. (CH)	14.0-16.0	
		1.6/2.0				U-1	
16.0-18.0	3-3						
	2-3	1.7				S-6	
23.0							Attempted tube 23.0-25.2 No recover (wet)
REMARKS: Wet at 6.0'							

DRILLING LOG (Continuation Sheet)		GANNETT FLEMING, INC.				Hole No. GF-9	
		Project St. Joseph Water Treatment Plant				Sheet 2 of 3	
						Elev. Top of Hole 822.9	
Elev. Depth	Legend	Description of Materials	Sample Depth	Blows or RQD	Recovery	Box or Sample No.	Remarks
		Piece of Gravel in bottom of S-7. Gray Lean to Fat CLAY with Silt; Very Soft to Soft; Moist to Wet.	27.0-29.0	4-8			Attempted tube
				11-8	1.8	S-7	25.0'-27.0' -
			29.0-31.0	3-3			No recovery
				3-5	1.9	S-8	PPR =
							0.25 tsf
			34.0-36.0	5-8			
				6-8	2.0	S-9	PPR =
							0.4 tsf
		Brown Lean to Fat CLAY with Silt and Gravel; Soft to Stiff; Moist to Wet.					
			39.0-41.0	6-9			PPR =
				11-17	1.8	S-10	0.75 tsf
			44.0-46.0	5-10			PPR =
				13-17	1.3	S-11	1.0 tsf
		Gray SHALE; Very Soft; Highly Weathered; Very Soft to Soft; Very Intensely to Intensely Bedded RD=0"-5" (Low RQD may be due to material stuck in barrel from GF-3.)					
			49.0-51.0	17-22			PPR =
				15-20	1.0	S-12	0.75 tsf
			54.0-54.8	34-50/0.3		S-13	PPR =
							1.0 tsf
			56.0-64.0	10%	100%		Augered to 56.0'

DRILLING LOG (Continuation Sheet)		GANNETT FLEMING, INC.		Hole No.	GF-9		
		Project St. Joseph Water Treatment Plant		Sheet	3	of	3
				Elev. Top of Hole	822.9		
Elev. Depth	Legend	Description of Materials	Sample Depth	Blows or RQD	Recovery	Box or Sample No.	Remarks
64.0		Gray SHALE; Very Soft; Highly Weathered; Very Soft to Soft; Very Intensely to Intensely Bedded RD 0°-5°					
65		End of Boring					
70							
75							
80							
85							
90							
95							

LOG OF BORING NO. B-1

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 1 OF 3

LOCATION: See Sketch
SURFACE ELEVATION: 812.5± feet
DEPTH TO WATER: 0.5 feet
DATE WATER MEASURED: 11/10/83

DRELLING DATE: 11/9/83 to 11/10/83
DRELLING COMPANY: Layne-Western
DRELLING RIG: Franks FA
COMPLETION DEPTH: 60.5 feet

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS					
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCONFINED COMPRESSION PSF	LL	PL	PI
			Concrete slab (6" tri-cone)							
			Gray SILTY CLAY, moist, med. stiff (drilling w/4" Hawthorne bit)							
			Gray fine SILTY SAND, wet, loose		36.8	79.5				
5		11	-Same, very loose	5						
			(Set 10' surface casing)							
10		100	Gray SANDY SILT, wet, very soft	2						
15		100	-Same	2						
20		100	Gray SILTY CLAY, wet, very soft	2						
25			-Same							

LOG OF BORING NO. B-1

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 2 OF 3

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS						
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNOBTAINED COMPRESSION PSF	LL	PL	PI	
28											
29											
30											
31											
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LOG OF BORING NO. B-1

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 3 OF 3

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS						
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCONFINED COMPRESSION PSF	LL	PL	PI	
55			Gray & tan SANDY CLAY, w/lime- stone gravel	110							
			Cobbles & boulders (bit chatter)								
			Gray SANDY SHALE, hard drilling								
60			-Same, very hard	88 (6")							
			Boring Terminated at 60.5 feet								
65											
70											
75											
80											
85											

LOG OF BORING NO. B-2

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 1 OF 3

LOCATION: See Sketch
SURFACE ELEVATION: 812.5± feet
DEPTH TO WATER: 0.5 feet
DATE WATER MEASURED: 11/11/83

DRELLING DATE: 11/10/83 to 11/11/83
DRELLING COMPANY: Layne-Western
DRELLING RIG: Franks FA
COMPLETION DEPTH: 68.0 feet

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS					
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCONFINED COMPRESSION PSF	LL	PL	PI
			Concrete slab							
			Gray SANDY SILT, wet, soft							
8		No. Rec.	-Same w/trace fine gravel	4						
			(set 10' surface casing)							
10		100	Gray fine SANDY SILT, very soft	2						
			Gray SILTY CLAY, very soft							
15			Gray fine SILTY SAND, very loose							
20		66	-Same, med. dense	14						
			-Same, some interbedded clay seams							
25										

LOG OF BORING NO. B-2

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 2 OF 3

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS					
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCOMPACTION CORRECTION PSF	LL	PL	PI
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975										
980										
985										
990										
995										
1000										

LOG OF BORING NO. B-2

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 3 OF 3

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS						
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCOVERED COMPRESSION PSF	LL	PL	PI	
55			Gray fine SAND, very dense	64							
56											
57											
58											
59											
60			LIMESTONE								
61											
62											
63											
64											
65											
66											
67											
68			Gray SHALE, hard RQD 63%								
69											
70											
71											
72											
73											
74											
75											
76											
77											
78											
79											
80											
81											
82											
83											
84											
85											
86											
87											
88											
89											
90											
91											
92											
93											
94											
95											
96											
97											
98											
99											
100											

LOG OF BORING NO. B-3

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 1 OF 3

LOCATION: See Sketch
SURFACE ELEVATION: 812.5± feet
DEPTH TO WATER: 0.5 feet
DATE WATER MEASURED: 11/16/83

DRILLING DATE: 11/15/83 to 11/16/83
DRILLING COMPANY: Layne-Western
DRILLING RIG: Franks FA
COMPLETION DEPTH: 56.0 feet

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS					
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCONFINED COMPRESSION PSF	LL	PL	PI
			Concrete							
			Gray fine SANDY SILT, very soft, wet, w/some fine gravel							
5		66	-Same	3						
			Gray SILTY CLAY (set surface casing)							
10			-Same, increasing sand content							
15		100	Gray fine SANDY SILT, w/little clay	2						
20										
25										

LOG OF BORING NO. B-3

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 2 OF 3

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS						
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCONF. COMPRESSION PSF	LL	PL	PI	
25		100	Gray SILTY CLAY, very soft	3							
30			Gray SANDY SILT w/interbedded clay								
35		100	-Same, soft	7							
40			Gray fine SAND								
45		100	-Same w/trace silt, medium dense	19							
50			Coarse SAND, GRAVEL & COBBLES (Hard drilling)								
55			Gray SHALE, hard								

LOG OF BORING NO. B-3

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 3 OF 3

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS						
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCONFINED COMPRESSION PSF	LL	PL	PI	
56		33	Gray SHALE Boring Terminated at 56.0 feet	120							
57											
58											
59											
60											
61											
62											
63											
64											
65											
66											
67											
68											
69											
70											
71											
72											
73											
74											
75											
76											
77											
78											
79											
80											
81											
82											
83											
84											
85											
86											

LOG OF BORING NO. B-4

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 1 OF 3

LOCATION: <u>See Sketch</u>	DRELLING DATE: <u>11/15/83</u>
SURFACE ELEVATION: <u>812.5± feet</u>	DRELLING COMPANY: <u>Layne-Western</u>
DEPTH TO WATER: <u>3.0 feet</u>	DRELLING RIG: <u>Franks FA</u>
DATE WATER MEASURED: <u>11/15/83</u>	COMPLETION DEPTH: <u>60.0 feet</u>

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS					
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNOEDDED COMPRESSION POF	LL	PL	PI
			Concrete							
			Gray fine SANDY SILT, very soft							
0			-Same, very soft	2						
			-Same							
5			Gray fine SANDY SILT, very soft	5						
			-Same, w/interbedded clay							
10										
15										
20										
25										
100			Gray fine SANDY SILT w/inter-bedded clay, very soft		43.8	77.4		59	27	32
			-Same, increasing clay content							

LOG OF BORING NO. B-4

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 2 OF 3

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS						
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCONFINED COMPRESSION PSF	LL	PL	PI	
25			Gray fine SANDY SILT, increasing clay, very soft								
30		0	-Same								
35		100	Gray fine SANDY SILT w/trace clay	4							
39			Very hard drilling at 39 feet, changed to rock bit								
40			Hard white LIMESTONE (floater)								
45											
50		100	Gray fine SILTY SAND, increasing gray shale w/gravel to 1-1/2" size, lignite, wood fragments	13							
55			Gray SHALE, hard								

LOG OF BORING NO. B-4

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 3 OF 3

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS						
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCONFINED COMPRESSION PSF	LL	PL	PI	
55			Gray SHALE, hard								
60			Boring Terminated at 60.0 feet								
65											
70											
75											
80											
85											
90											
95											
100											

LOG OF BORING NO. B-5

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 1 OF 3

LOCATION: See Sketch
SURFACE ELEVATION: 812.5± feet
DEPTH TO WATER: 0.5 feet
DATE WATER MEASURED: 11/15/83

DRELLING DATE: 11/14/83 to 11/15/83
DRELLING COMPANY: Layne-Western
DRELLING RIG: Franks FA
COMPLETION DEPTH: 68.0 feet

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS					
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCOMFED COMPRESSION PSF	LL	PL	PI
			Gravel							
			Gray fine SANDY SILT, wet, soft							
5		11	-Same, very soft	3						
			-Same, w/trace clay (set 10' surface casing)							
10		55	Gray fine SANDY SILT, very soft w/little clay	3						
			-Same w/interbedded clay seams							
15		66	Gray fine SANDY SILT, very soft w/little clay	3						
20										
25										

LOG OF BORING NO. B-5

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 2 OF 3

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS						
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCONFINED COMPRESSION PSF	LL	PL	PI	
25		100	Gray SILTY CLAY, very soft	4							
30											
35			WOOD w/clay (buried tree)								
38		100	Gray fine SILTY SAND, medium dense	15							
40			-Same, w/wood								
40		100	Gray fine SILTY SAND, loose	4							
45											
45		100	-Same, medium dense	25							
50			Coarse SAND & GRAVEL, limestone gravel in top, w/trace clay (sub-rounded to angular)								
55			Coarse SAND & GRAVEL up to cobble size (rounded to angular)	72							
60											

LOG OF BORING NO. B-5

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 3 OF 3

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS					
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCONFINED COMPRESSION PSF	LL	PL	PI
55		0	Coarse SAND & GRAVEL	84						
60		50	Gray SHALE (set 54' NX casing)							
65			hard RQD = 24%							
70										
75										
80										
85										
90										
95										
100										
			Boring Terminated at 68.0 feet							

LOG OF BORING NO. B-6

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 1 OF 3

LOCATION: See Sketch
SURFACE ELEVATION: 812.5± feet
DEPTH TO WATER: 0.5 feet
DATE WATER MEASURED: 11/10/83

DRILLING DATE: 11/10/83
DRILLING COMPANY: Layne-Western
DRILLING RIG: Franks FA
COMPLETION DEPTH: 59.0 feet

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS					
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCONFINED COMPRESSION PSF	LL	PL	PI
			Concrete slab (6" tricone)							
			Gray fine SANDY SILT, moist, soft							
5		33	-Same, very soft	3						
			(set 10' surface casing)							
10		100	Gray fine SILTY SAND, wet, very loose	2						
15										
			Gray SILTY CLAY, wet, very soft							
20		100	Gray fine SANDY SILT, wet, very soft	3						
25										

LOG OF BORING NO. B-6

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 2 OF 3

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS						
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCOMPACTED COMPRESSION PCF	LL	PL	PI	
25			Gray fine SANDY SILT, wet, very soft								
30		100	-Same, soft	6							
35			-Same w/trace interbedded clay seams								
40		100	Gray fine SANDY SILT, wet, soft	6							
45		100	Gray fine SAND, medium dense (hard drilling below 47 feet)	23							
50		100	Gray fine SAND, very dense	53							
55											

LOG OF BORING NO. B-6CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURIPAGE 3 OF 3

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS						
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCONFINED COMPRESSION PSF	LL	PL	PI	
55		100	Gray fine SAND, very dense	55							
			Gray SHALE, HARD								
			LIMESTONE, very hard								
60			Boring Terminated at 59.0 feet								
65											
70											
75											
80											
85											

LOG OF BORING NO. B-7

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 1 OF 3

LOCATION: See Sketch
SURFACE ELEVATION: 823.5± feet
DEPTH TO WATER: 14.0 feet
DATE WATER MEASURED: 11/16/83

DRELLING DATE: 11/16/83
DRELLING COMPANY: Layne-Western
DRELLING RIG: Franks FA
COMPLETION DEPTH: 80.5 feet

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS					
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCOMPACTED COMPRESSION PCF	LL	PL	PI
0			Topsoil - Dark brown CLAYEY SILT							
5			Brown SILTY CLAY, moist, stiff							
10		50	Brown CLAYEY SILT, moist, soft		39.2	80.8				
15			▽							
20		100	-Same, Gray		37.7	83.5				
25			-Same							
30		100	Gray fine SILTY SAND, very loose	3						
35			-Same w/interbedded clay seams							

LOG OF BORING NO. B-7

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 2 OF 3

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS						
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCONFIRMED COMPRESSION PSF	LL	PL	PI	
25			Gray fine SILTY SAND, very loose w/interbedded clay seams								
30		100	Gray fine SANDY SILT, very soft	2							
35			-Same w/trace clay								
40		100	-Same, less clay	2							
45			Gray fine to coarse SAND w/ little clay, loose								
50		67	Gray fine SAND, medium dense	22							
55											

LOG OF BORING NO. B-7

CLEARWATER STORAGE RESERVOIR BASIN
ST. JOSEPH, MISSOURI

PAGE 3 OF 3

DEPTH, FT.	LOG	SAMPLE (RECOVERY)	DESCRIPTION OF MATERIAL	SPT - N BLOWS / FOOT	LABORATORY TEST RESULTS						
					PERCENT MOISTURE	DRY UNIT WT. - PCF	UNCONFINED COMPRESSION PSF	LL	PL	PI	
55		100	Gray fine SAND, dense	36							
			Gray fine SAND w/trace lignite								
60		100	-Same, medium dense	27							
65											
			Gray SILTY SAND w/interbedded clay								
70		100	Gray fine to medium SAND, very dense	92							
75			GRAVEL w/cobbles, coarse sand, lignite, silt and clay								
80		100	Gray SHALE	100							
			Boring Terminated at 80.5 feet	(6)							
85											

LOG OF BORING NO. B-1

OWNER ST. JOSEPH WATER WORKS	ARCHITECT-ENGINEER AMERICAN WATER WORKS
SITE ST. JOSEPH, MISSOURI	PROJECT NAME PROPOSED CHEMICAL PLANT

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2
					SURFACE ELEVATION → 822.4		
	1	SS			CLAYEY SILT, TRACE SAND, CINDERS, AND RUBBLE - DARK BROWN (FILL)		
	2	ST			SILTY CLAY, - GRAY AND BROWN TOUGH (CL)	81	
	3	ST			SILT SEAM AT 6.8'		
10.0	4	3" ST					
	5	3" ST			CLAYEY SILT WITH PIECES OF BROKEN LIMESTONE - GRAY AND BROWN - SOFT TO TOUGH (ML-CL)		
20.0	6	ST				94	
	7	ST					
30.0	8	ST				78	
	9	ST			CLAYEY SILT WITH PIECES OF BROKEN LIMESTONE - BROWN MOTTLED WITH YELLOW - TOUGH (ML-CL)		
40.0	10	SS					
	11	SS			SILTY CLAY, TRACE SAND - GRAY AND BROWN - VERY TOUGH TO HARD (CL-ML)		
50.0	12	SS					
					END OF BORING		*CALIBRATED PENETROMETER

WATER LEVEL OBSERVATIONS	SOIL TESTING SERVICES INC.	BORING STARTED 11/20/67
W.L. 11.0' W.S. OR W.D.	111 PFINGSTEN ROAD	BORING COMPLETED 11/28/67
W.L. B.C.R. A.C.R.	NORTHBROOK, ILLINOIS	RIG FOREMAN
W.L. 9.0' A.B.		DRAWN MP APPROVED CNE
		JOB # 8908-D SHEET 1 OF 1

LOG OF BORING NO. B-2

OWNER ST. JOSEPH WATER WORKS	ARCHITECT-ENGINEER AMERICAN WATER WORKS
SITE ST. JOSEPH, MISSOURI	PROJECT NAME PROPOSED CHEMICAL PLANT

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LB./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2	PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %	STANDARD "N" PENETRATION (BLOWS/FT.)
×					SURFACE ELEVATION → 221.9						
	1	ST			"A"	93					
	2	ST			SILTY CLAY - GRAY AND BROWN - VERY TOUGH (CL-CH)	87					
	3	ST			SILT, TRACE CLAY AND FINE SAND - GRAY AND BROWN - LOOSE (ML)	86					
10.0	4	ST				91					
					SILTY CLAY - DARK BROWN - TOUGH (CL)						
	5	ST				93					
20.0	6	3" ST									
	7	3" ST									
	8	ST									
30.0	9	ST			SANDY CLAYEY SILT WITH PIECES OF BROKEN LIMESTONE - BROWN MOTTLED WITH YELLOW - MEDIUM DENSE (SC-SM)	107					
40.0	10	ST				90					
	11	SS			SILTY CLAY, TRACE SAND AND GRAVEL - GRAY AND BROWN - VERY TOUGH (CL)						
49.5	12	SS									
					END OF BORING						
					"A": FILL, CLAYEY SILT, TRACE SAND, CINDERS, AND RUBBLE - DARK BROWN						

WATER LEVEL OBSERVATIONS			
W.L.	11.5'	W.S. OR W.D.	
W.L.	B.C.R.	A.C.R.	
W.L.	11.0' A.B.		

SOIL TESTING SERVICES
INC.
111 PFINGSTEN ROAD
NORTHBROOK, ILLINOIS

BORING STARTED	11/28/67
BORING COMPLETED	11/28/67
RIG	FOREMAN
DRAWN MP	APPROVED CNE
JOB # 8906-D	SHEET 1 OF 1

LOG OF BORING NO. B-3

OWNER	ARCHITECT-ENGINEER
ST. JOSEPH WATER WORKS	AMERICAN WATER WORKS
PROJECT NAME	PROPOSED CHEMICAL PLANT
ST. JOSEPH, MISSOURI	

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LB./FT.³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²	PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %	STANDARD "N" PENETRATION (BLOWS/FT.)
82.4					SURFACE ELEVATION → 82.4						
	1	ST			FILL, CLAYEY SILT, TRACE SAND, CINDERS AND RUBBLE - DARK BROWN (FILL)						
	2	ST			SILT, TRACE CLAY AND FINE SAND - GRAY AND BROWN - LOOSE (ML)	87					
10.0	3	ST				85					
	4	ST									
	4A	ST									
	5	ST			CLAYEY SILT WITH PIECES OF BROKEN LIMESTONE - GRAY - LOOSE TO MEDIUM DENSE (ML-CL)	94					
20.0	6	ST				91					
	7	ST				91					
30.9	8	ST			SANDY CLAYEY SILT WITH PIECES OF BROKEN LIMESTONE - BROWN, MOTTLED WITH YELLOW-MEDIUM DENSE TO DENSE (SC-SM)	94					
	9	ST				97					
40.0	10	ST				107					
	11	ST			SILTY CLAY, TRACE SAND - GRAY AND BROWN - VERY TOUGH TO HARD (CL)	109					
50.0	12	ST			GRAY SHALE						

CONTINUED ON PAGE 2



LOG OF BORING NO. B-3 (CONTINUED)

OWNER

ST. JOSEPH WATER WORKS

ARCHITECT • ENGINEER

AMERICAN WATER WORKS

SITE

ST. JOSEPH, MISSOURI

PROJECT NAME

PROPOSED CHEMICAL PLANT

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2				
							1	2	3	4	5
X					SURFACE ELEVATION 4		PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % X ● ▲ STANDARD "N" PENETRATION (BLOWS/FT.) 10 20 30 40 50				
					CONTINUED FROM PAGE 1						
					GRAY SHALE						
60.0											
67.0											
					END OF BORING POWER AUGER REFUSAL AT 67.0'		*CALIBRATED PENETROMETER				

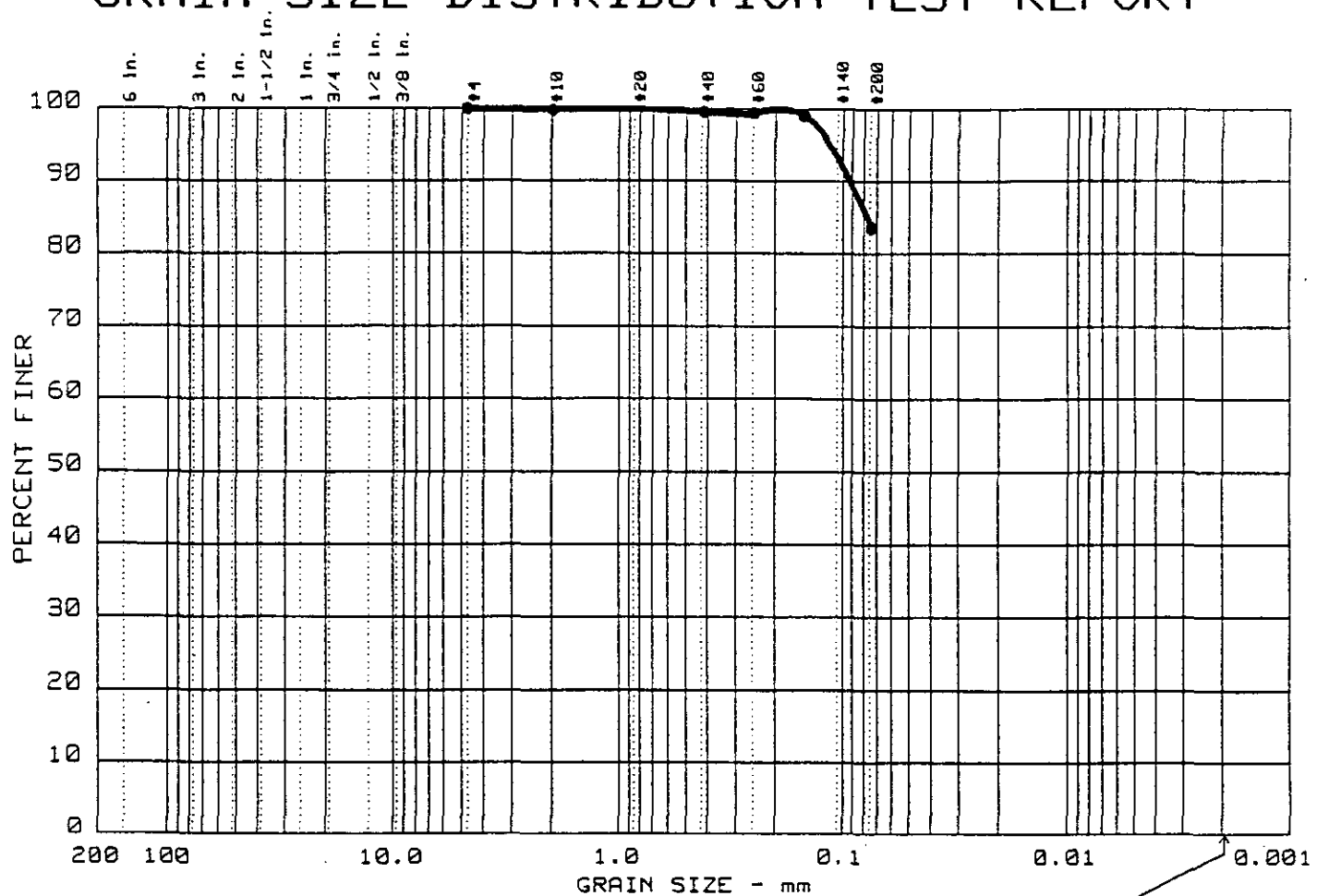
3/12

WATER LEVEL OBSERVATIONS			SOIL TESTING SERVICES INC. 111 PFINGSTEN ROAD NORTHBROOK, ILLINOIS	BORING STARTED 11/29/67	
W.L.	W.S. OR W.D.			BORING COMPLETED 11/29/67	
W.L.	B.C.R.	A.C.R.		RIG	FOREMAN
W.L.				DRAWN MP	APPROVED CNS
				JOB # 8002-D	SHEET 1 OF 1

APPENDIX B

• LABORATORY TESTING •

GRAIN SIZE DISTRIBUTION TEST REPORT



% +3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	16.3	83.7	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
N/P		0.08							

MATERIAL DESCRIPTION	USCS	AASHTO
● Grey silt with sand	ML	

Project No.: 28512.A90
 Project: St. Joseph, MO WTP
 ● Location: GF-1 /S-4, 5 & 6

Date: 2-11-93

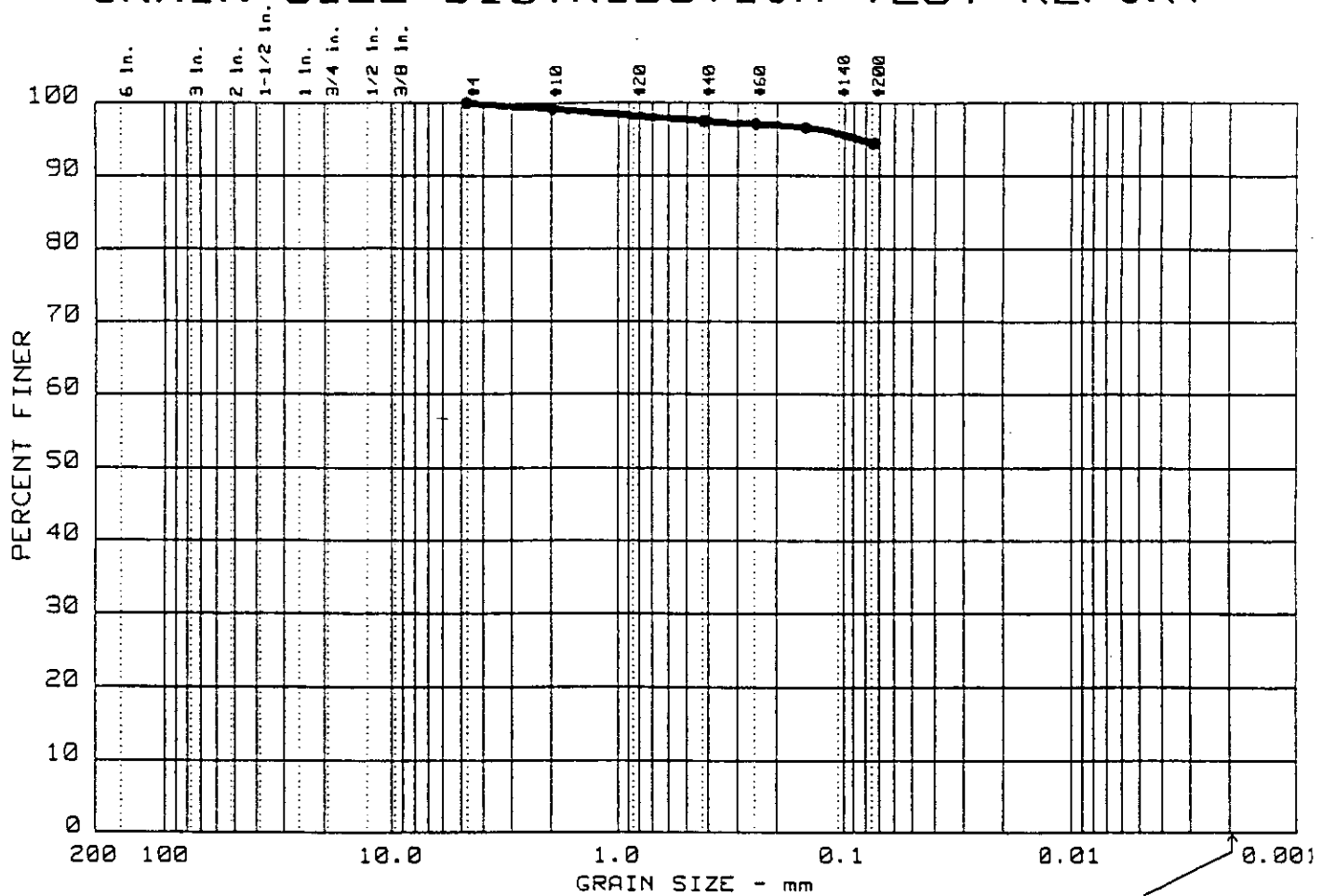
GRAIN SIZE DISTRIBUTION TEST REPORT
GANNETT FLEMING, INC.

Remarks:
 Sample Depth 6.0'-10.0'
 Nat. Water Content 22.1

Tested by: KAA

Figure No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



% +3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	5.5	94.5	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
29.4	4.5								

MATERIAL DESCRIPTION	USCS	AASHTO
• Grey silt	ML	

Project No.: 28512.A90
 Project: St. Joseph, MO WTP
 • Location: GF-2 /U-1

Date: 2-11-93

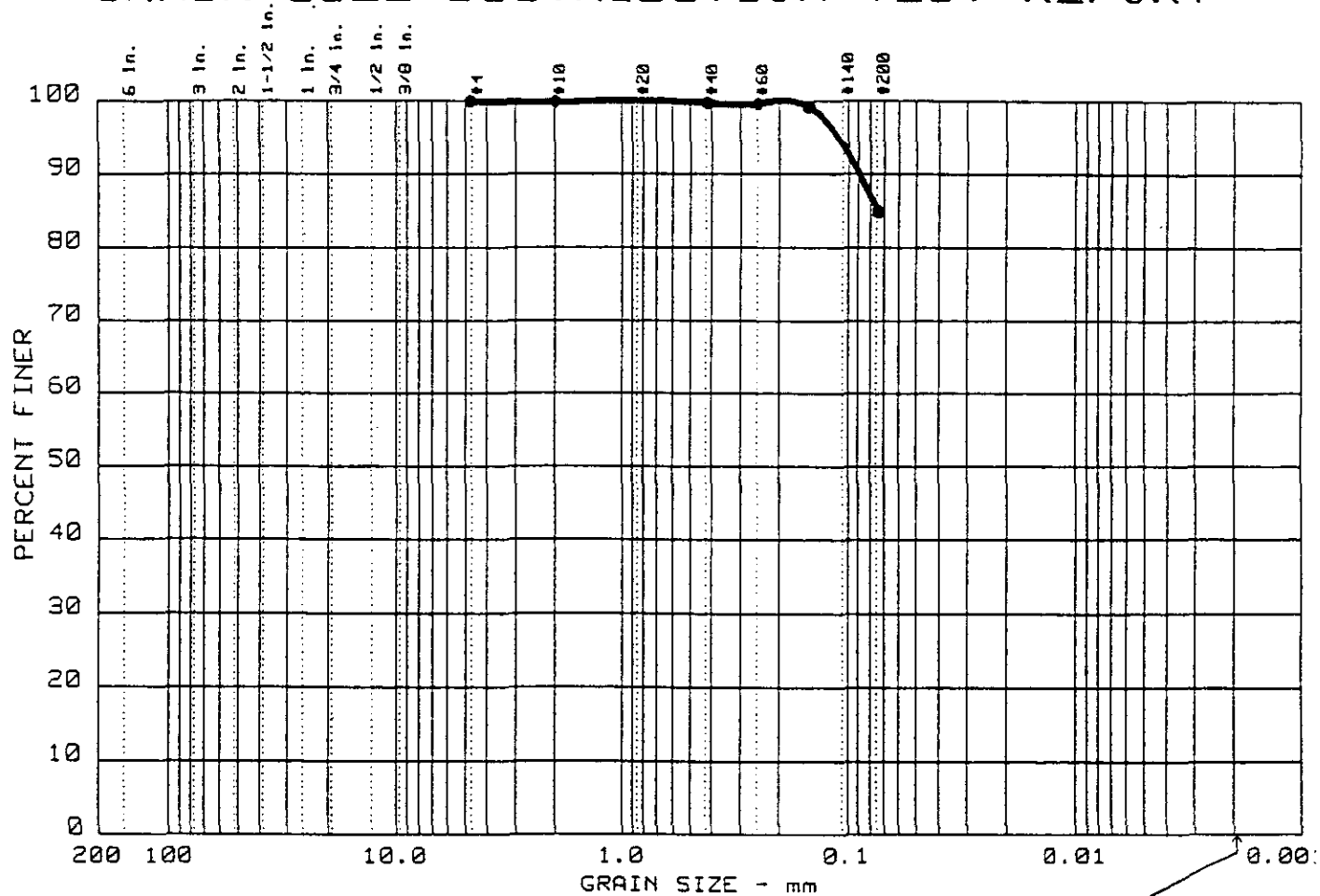
GRAIN SIZE DISTRIBUTION TEST REPORT
GANNETT FLEMING, INC.

Remarks:
 Sample Depth 10.0'-12.0'
 Nat. Water Content 28.9

Tested by: KAA

Figure No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



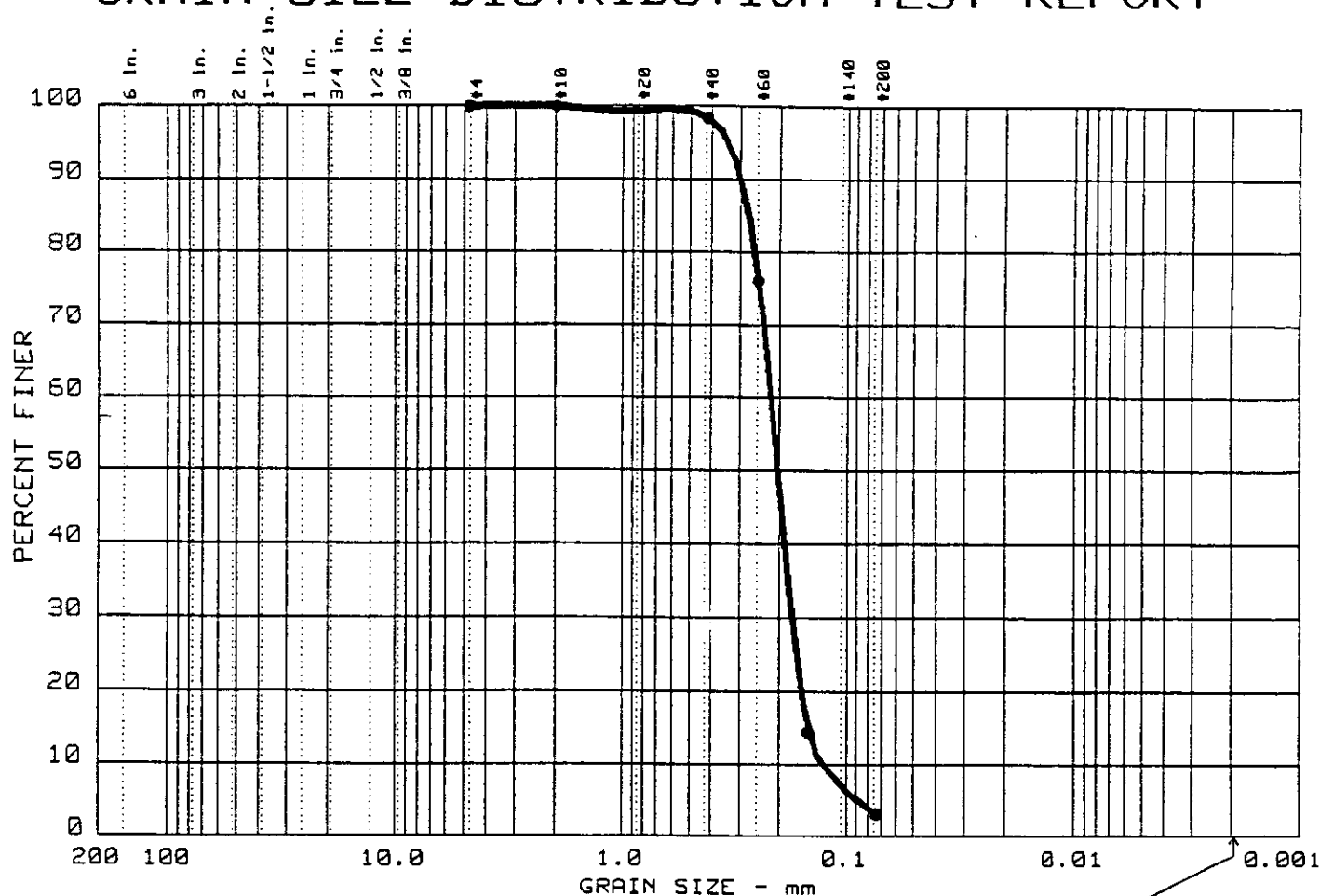
% +3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	15.0	85.0	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
	N/P								

MATERIAL DESCRIPTION	USCS	AASHTO
● Grey silt with sand	ML	

Project No.: 28512.A90 Project: St. Joseph, MO WTP ● Location: GF-3 /S-4,5&6 Date: 2-12-1993	Remarks: Sample Depth 6.0'-16.0' Nat. Water Content 13.0 Tested by: KAA Figure No. _____
GRAIN SIZE DISTRIBUTION TEST REPORT GANNETT FLEMING, INC.	

GRAIN SIZE DISTRIBUTION TEST REPORT



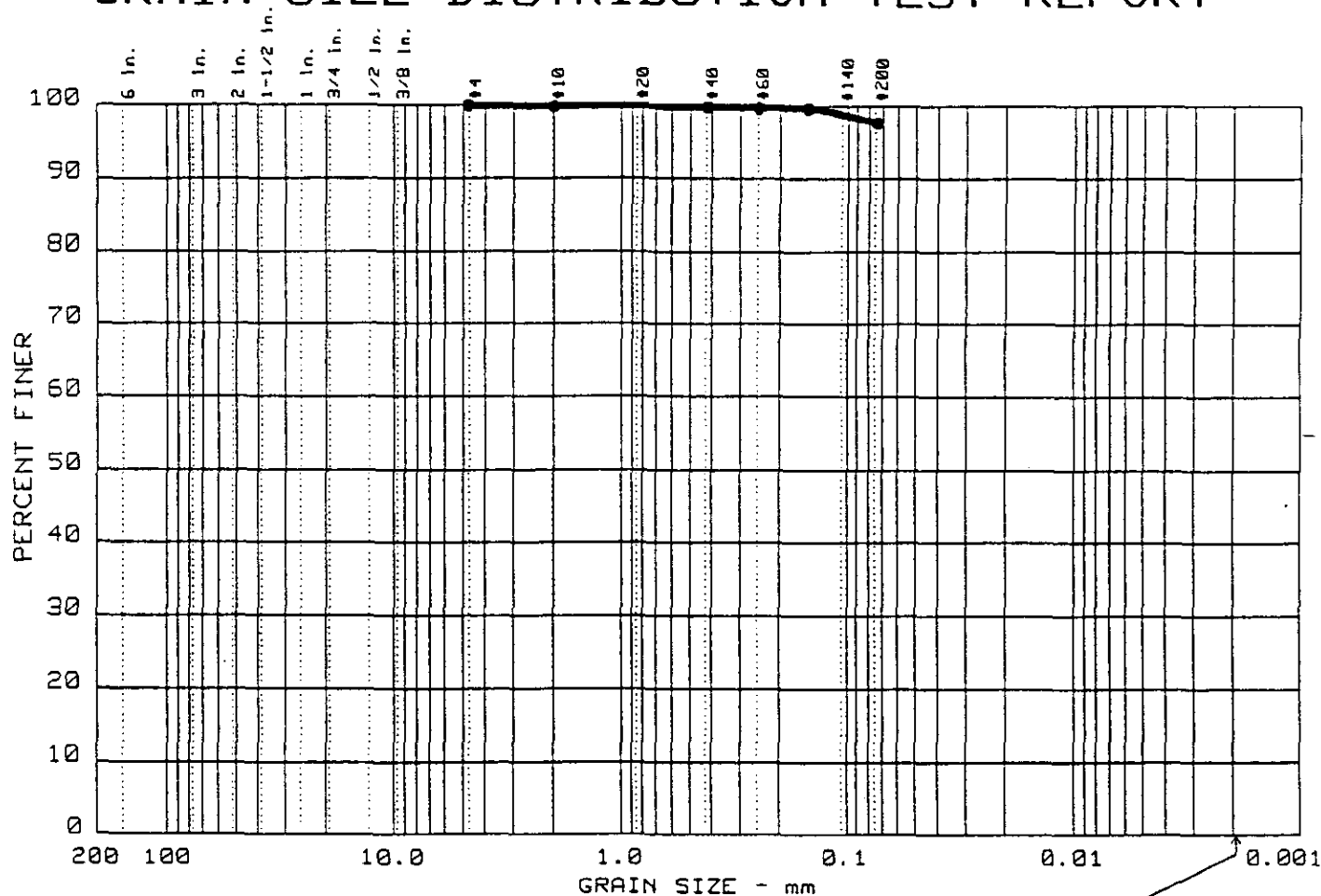
% +3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	96.8	3.2	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
	N/P	0.28	0.22	0.20	0.176	0.1501	0.1278	1.10	1.7

MATERIAL DESCRIPTION	USCS	AASHTO
● Grey poorly graded sand	SP	

Project No.: 28512.A90 Project: St. Joseph, MO WTP ● Location: GF-3 /S-13,14 Date: 2-12-1993	Remarks: Sample Depth 49.0'-56.0' Nat. Water Content 18.3 Tested by: KAA Figure No. _____
GRAIN SIZE DISTRIBUTION TEST REPORT GANNETT FLEMING, INC.	

GRAIN SIZE DISTRIBUTION TEST REPORT



% +3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	2.3	97.7	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
	N/P								

MATERIAL DESCRIPTION	USCS	AASHTO
• Grey Silt	ML	

Project No.: 28512.A90
 Project: St. Joseph, MO WTP
 • Location: GF-5 /S-3, 4&5

Date: 2-12-1993

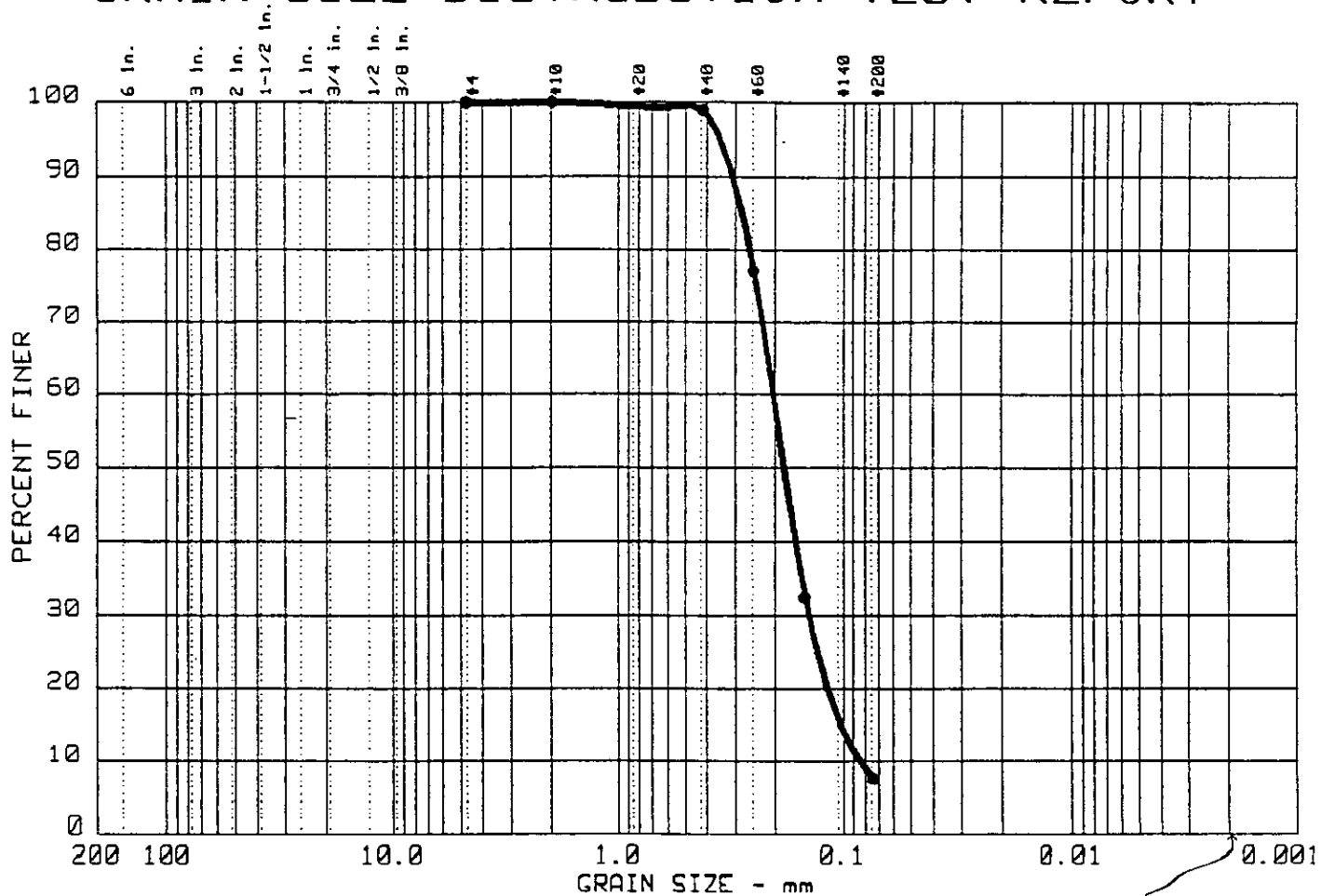
GRAIN SIZE DISTRIBUTION TEST REPORT
GANNETT FLEMING, INC.

Remarks:
 Sample Depth 4.0'-10.0'
 Nat. Water Content 22.2

Tested by: KAA

Figure No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



% +3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	92.3	7.7	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
	N/P	0.28	0.20	0.18	0.143	0.1034	0.0831	1.21	2.5

MATERIAL DESCRIPTION	USCS	AASHTO
● Grey poorly graded sand with silt	SP-SM	

Project No.: 28512.A90
 Project: St. Joseph, MO WTP
 ● Location: GF-5 /S-11&12

Date: 2-12-1993

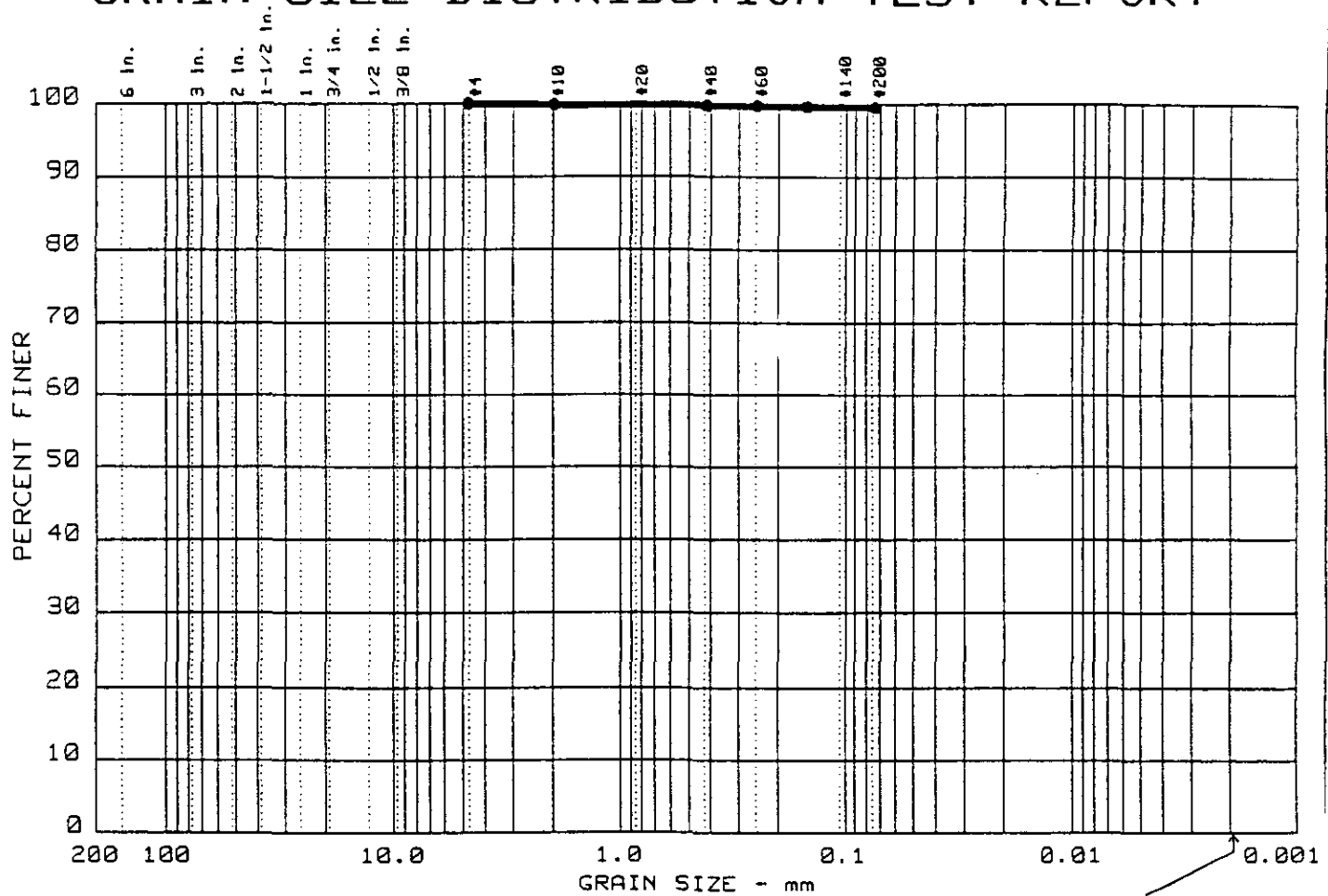
GRAIN SIZE DISTRIBUTION TEST REPORT
GANNETT FLEMING, INC.

Remarks:
 Sample Depth 39.0'-46.0'
 Nat. Water Content 20.5

Tested by: KAA

Figure No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



% +3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	0.4	99.6	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
63.9	37.2								

MATERIAL DESCRIPTION	USCS	AASHTO
● Grey fat clay	CH	

Project No.: 28512.A90
 Project: St. Joseph, MO WTP
 ● Location: GF-8 /U-2

Date: 2-12-1993

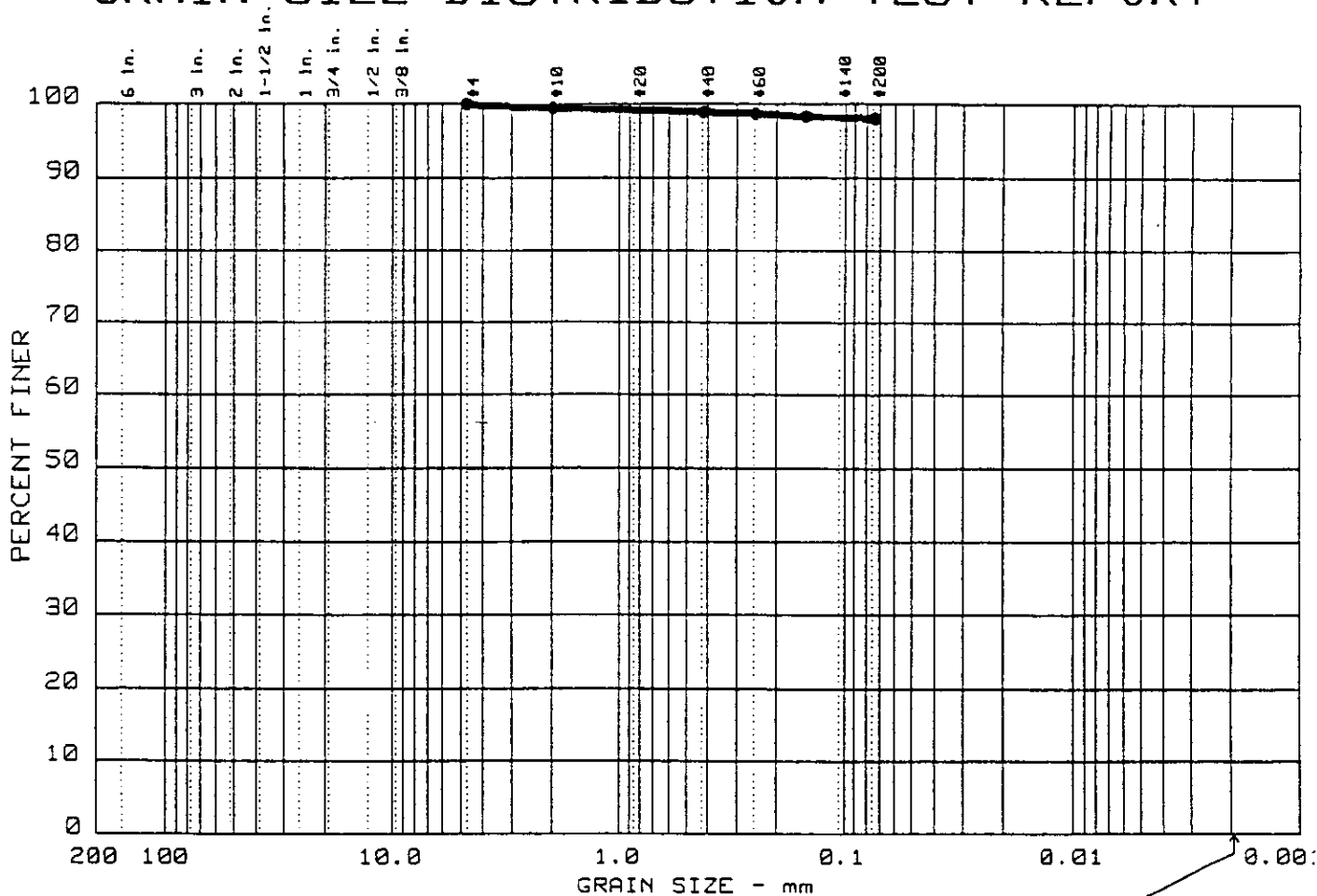
GRAIN SIZE DISTRIBUTION TEST REPORT
GANNETT FLEMING, INC.

Remarks:
 Sample Depth 10.0'-12.0'
 Nat. Water Content 41.4

Tested by: KAA

Figure No. _____

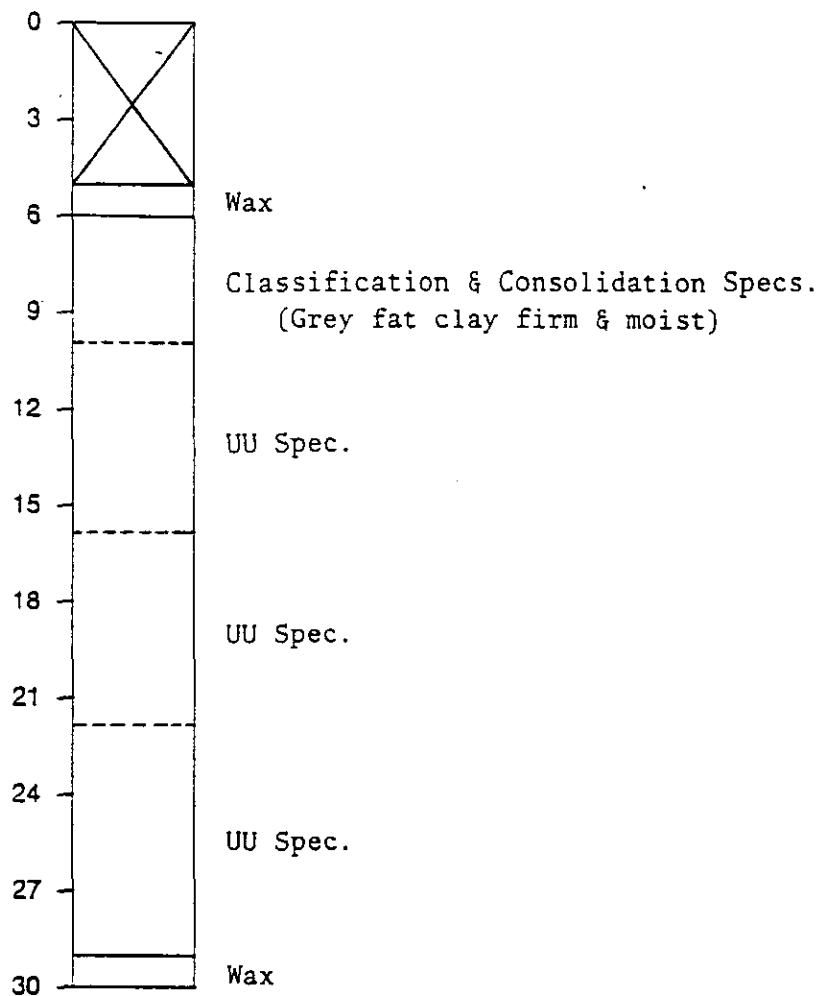
GRAIN SIZE DISTRIBUTION TEST REPORT



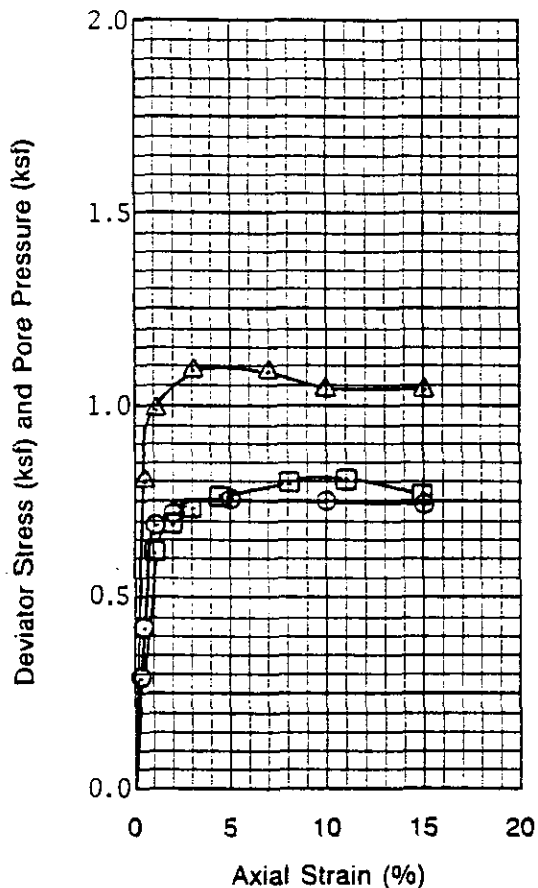
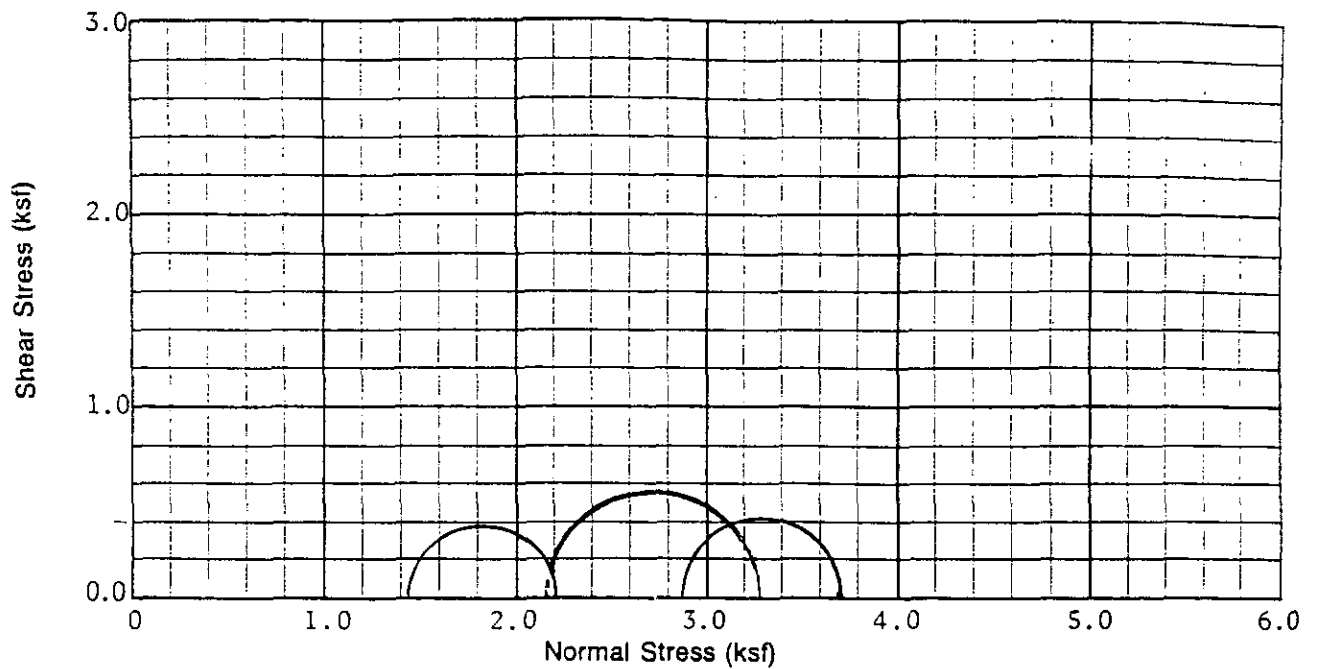
GANNETT FLEMING GEOTECHNICAL LABORATORY

UNDISTURBED SAMPLE LOG

Project ST. JOSEPH, MO. WTP Job No 28512.A90
Boring No GF-8 Sample No U-2 Depth 10.0' - 12.0'
Sample Type SHELBY Sampler Dia 3" Sampler Length 30"



Comments: Total recovery = 23 "

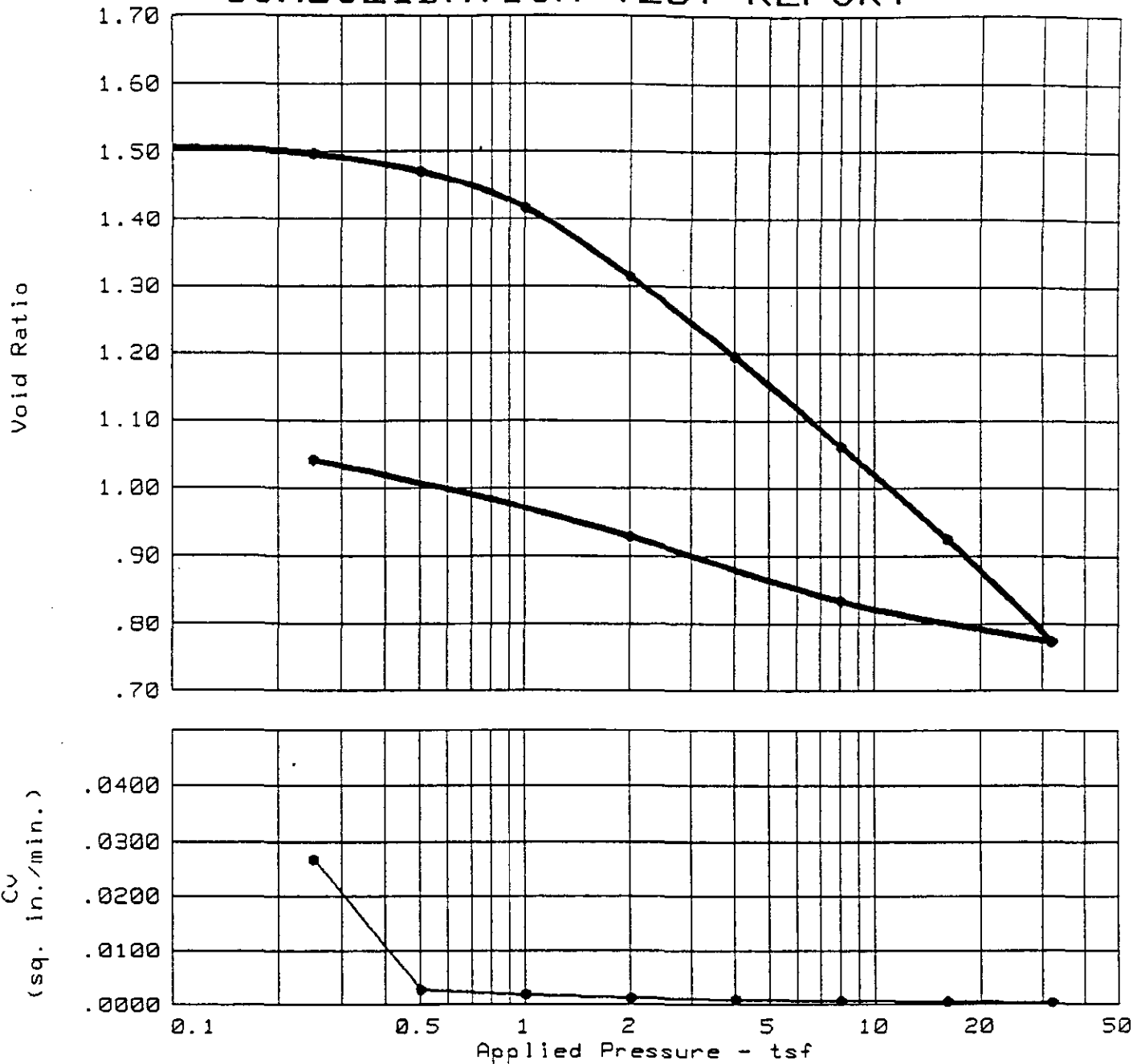


Remarks: Grey fat clay(CH)

Specimen No		1	2	3
Diameter (in)	D_o	2.86	2.87	2.85
Height (in)	H_o	5.57	5.58	5.61
Initial	Water Content (%)	w_o	52.7	52.7
	Dry Density (pcf)	γ_{do}	69.8	70.0
	Void Ratio	e_o	1.458	1.451
	Saturation (%)	S_o	99.4	99.9
Before Test	Water Content (%)	w_c	-	-
	Dry Density (pcf)	γ_{dc}	-	-
	Void Ratio	e_c	-	-
	Saturation (%)	S_c	-	-
	Back Pressure (ksf)	μ_B	-	-
Total Minor Princ Stress (ksf)		σ_3	1.44	2.16
Maximum Deviator Stress (ksf)		P/A	0.77	1.08
Time Max Deviator Stress		t_f	7	3
Total Major Princ Stress (ksf)		σ_1	2.21	3.24
Pore Pressure at Max Deviator Stress (ksf)		μ	-	-
Eff Minor Princ Stress (ksf)		σ_3'	-	-
Eff Major Princ Stress (ksf)		σ_1'	-	-

Project	ST. JOSEPH, MO. WTP	Boring No	GF-8	Sample No	U-2
Type of Test:	Unconsolidated-Undrained (UU)			Sample Type:	Shelby
$c =$	0.40 ksf	$\phi =$	-- °	$c' =$	-- ksf
				$\phi' =$	-- °
GANNETT FLEMING GEOTECHNICAL LABORATORY TRIAXIAL COMPRESSION TEST REPORT					

CONSOLIDATION TEST REPORT



Swell press.	Nat. Sat.	Nat. Moist.	Dry Density	LL	PI	Sp.Gr.	C _c	e ₀
	96.2 %	52.7	68.4	63.9	37.2	2.75	0.47	1.5063

TEST RESULTS

Compression Index = 0.47

Project No.: 28512.A90
 Project: ST. JOSEPH, MO WTP
 Location: BORING NO. GF-8 / U-2
 SAMPLE DEPTH 10.0'-12.0'
 Date: FEB. 15, 1993

CONSOLIDATION TEST REPORT

GANNETT FLEMING, INC.

MATERIAL DESCRIPTION

GREY FAT CLAY

Class: CH

Remarks:

TESTED BY KAA

Fig. No. 0