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Great Falls Billings Montana — Boise Pocatello Idaho — Gillette Wyoming

LOG OF EXPLORATION BORING

JOB NO. 81-1404

HOLE NO. DH-S1

SHEET 1 OF 2

DRILL TYPE: SOIL	Mobile B-53
ROCK	Mobile B-53
SIZE, TYPE OF BIT	8 inch hollowstem augers; NwD3 Diamond bit
CASING: SIZE N/A	LENGTH N/A
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	
Disturbed 4	Undisturbed 2
TOTAL NO. CORE BOXES 1	TOTAL CORE RECOVERY FOR BORING (%) 74
REMARKS	See sheet 2 for piezometer installation.

CLIENT	Beker Industries
PROJECT	Tailings Pond #4
LOCATION	N 94+77; E 0+09
ELEVATION: TOP OF HOLE	6157.6
GROUNDWATER	6151.6
THICKNESS OF OVERBURDEN, FT.	16.0
DEPTH DRILLED INTO ROCK, FT.	11.5
TOTAL DEPTH OF HOLE, FT.	27.5
STARTED	9-10-81
COMPLETED	9-10-81
DRILLED BY	C. Pelletier
LOGGED BY	S. Sharma

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	R.Q.D.	DEPTH, FEET	BLOWS/FOOT
0							
0.8		TOPSOIL; organic material					
		SAND, Clayey; loose to medium dense, moist to wet, moderately plastic, fine-grained sand, roots to 15 feet, grey (SC)	SST			2.5 - 4.5	q_u= 1.7 tsf
			SSS			4.5 - 6.0	4-4-5/9
5							
7.0		SILT, Clayey; stiff to hard, saturated, plastic, thinly interbedded sand lenses, mottled grey-brown (ML)	LST			7.5 - 9.5	q_u= 2.2 tsf
			SSS			9.5 - 11.0	3-5-6/11
10							
			LSS			12.5 - 14.0	6-9-12/21
			SSS			14.0 - 15.5	3-6-39/45
15							
16.0		BASALT; moderate to slightly weathered, moderately hard, 10-20% vesicles, very close jointed, grey-black	SSS			17.5 - 17.8	50 /R 0.3
20							

(Cont'd on Sheet 2)

LOG OF EXPLORATION BORING

JOB NO. 81-1404 HOLE NO. DH-S1 SHEET 2 OF 2

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	RQD	DEPTH, FEET	BLOWS/FOOT
20		BASALT; moderate to slightly weathered, moderately hard, 10-20% vesicles, very close jointed, grey-black	Nw core	84	48%	17.5 - 22.2	
			Nw core	64	20%	22.5 - 27.5	
25							
27.5		Bottom of Hole Piezometer Installation: Perforations between 10.5 - 15.5 Gravel backfill 10.5 - 15.5 Bentonite seals: 15.5 - 16.5 and 8.5 - 10.5					

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LOG OF EXPLORATION BORING

HOLE NO. DH-S3

JOB NO. 81-1404

SHEET 1 OF 1

DRILL TYPE: SOIL	Mobile B-53
ROCK	Mobile B-53
SIZE, TYPE OF BIT	Used 8" Hollowstem augers; NwD3 Diamond bit
CASING: SIZE N/A	LENGTH N/A
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	
Disturbed 1	Undisturbed 1
TOTAL NO. CORE BOXES 2	TOTAL CORE RECOVERY FOR BORING (%) 98

REMARKS
Hole was initially completed on 9-9-81, but was repeated on 9-10-81 in order to obtain rock cores

CLIENT	Beker Industries
PROJECT	Tailings Pond #4
LOCATION	N 76+73; E 0+10
ELEVATION: TOP OF HOLE	6153.0
GROUNDWATER	none
THICKNESS OF OVERBURDEN, FT.	7.0
DEPTH DRILLED INTO ROCK, FT.	11.0
TOTAL DEPTH OF HOLE, FT.	18.0
STARTED	9-9-81
COMPLETED	9-10-81
DRILLED BY	C. Pelletier
LOGGED BY	S. Sharma

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	R.Q.D.	DEPTH, FEET	BLOWS/FOOT
0		TOPSOIL, Organic Material					
0.8		SAND, Silty; loose, moist, non-plastic, calcareous, fine grained sand, grey-white (SM)	LST			2.5 - 4.5	q_u = 0.2 tsf
5			SSS			4.5 - 6.0	4-3-1/4
7.0		BASALT; slightly weathered, medium hard, 15-20% vesicles, clayey silt in vesicles to 13.0 feet, grey-black	LSS			7.5 - 7.7	100/R 0.2
			Nw core	96	78%	8.5 - 13.0	
10							
			Nw core	100	100%	13.0 - 16.5	
15		less than 5% vesicles below 16.0 feet	Nw core	100	100%	16.5 - 18.0	
18.0		Bottom of Hole					

Piezometer Installation:
Perforations between 3.2 - 8.2
Gravel backfill 3.0 - 8.2
Bentonite seal 1.0 - 3.0

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LOG OF EXPLORATION BORING

HOLE NO. DH-S4

JOB NO. 81-1404

SHEET 1 OF 3

DRILL TYPE: SOIL	Mobile B-53
ROCK	N/A
SIZE, TYPE OF BIT	8" Hollowstem augers 2-15/16" Tricone rockbit
CASING: SIZE N/A	LENGTH N/A
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	
Disturbed 21	Undisturbed 1
TOTAL NO. CORE BOXES 0	TOTAL CORE RECOVERY FOR BORING (%) N/A
REMARKS	
Rockbit used from 39.0 - 42.0	

CLIENT	Beker Industries
PROJECT	Tailings Pond #4
LOCATION	N 76+65; E 11+62
ELEVATION: TOP OF HOLE 6166.0	GROUNDWATER 6143.4
THICKNESS OF OVERBURDEN, FT. 60.5	DEPTH DRILLED INTO ROCK, FT. N/A / TOTAL DEPTH OF HOLE, FT. 60.5
STARTED 8-29-81	COMPLETED 9-9-81
DRILLED BY	C. Pelletier
LOGGED BY	S. Sharma

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	R.Q.D.	DEPTH, FEET	BLOWS/FOOT
0		SILT, Clayey; firm to hard, slightly moist, slightly plastic, brown (ML)					
			LST			2.5 - 4.5	q_u = 3.7 tsf
			SSS			4.5 - 6.0	3-3-6/9
5							
6.0		GRAVEL; Silty; medium dense to very dense, slightly moist, weakly to strongly cemented, minus 4 inch rock fragments, thinly interbedded sand lenses, tan (colluvium) (GM)					
			LSS			7.5 - 9.0	9-25-43/68
			SSS			9.0 - 10.5	23-29-25/54
10							
			LSS			12.5 - 14.0	5-7-12/19
			SSS			14.0 - 15.5	13-17-15/32
15							
			LST			17.5 - 17.7	
						no sample	
			LSS			17.7 - 19.2	16-14-22/36
20							

(Cont'd on Sheet 2)

LOG OF EXPLORATION BORING

JOB NO. 81-1404 HOLE NO. DH-S4 SHEET 2 OF 3

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp	% CORE RECOVERY	RQD	DEPTH, FEET	BLOWS/FOOT
20			SSS			19.2 - 20.7	12-9-6/15
22.0			LSS			22.5 - 24.0	11-14-25/39
		SAND, Silty; medium dense to very dense, saturated, slightly plastic fines, scattered minus 3 inch angular gravels, mottled tan to brown (colluvium) (SM)	SSS			24.0 - 25.5	11-14-11/25
25							
			LSS			27.5 - 29.0	16-24-25/49
			SSS			29.0 - 30.5	11-19-26/45
30							
			LSS			32.5 - 34.0	25-37-26/63
			SSS			34.0 - 35.5	21-22-24/46
35							
			SSS			37.5 - 39.0	11-24-34/58
		Boulder from 39.0 - 42.0	Nw core	---	---	39.0 - 42.0 cored thru boulder	
40							
			LSS			42.5 - 44.0	11-40-45/85
45							

(Cont'd on Sheet 3)

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LOG OF EXPLORATION BORING

JOB NO. 81-1404 HOLE NO. DH-S4 SHEET 3 OF 3

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp	% CORE RECOVERY	RQD	DEPTH, FEET	BLOWS/FOOT
45		SAND, Silty; medium dense to very dense, saturated, slightly plastic fines, scattered minus 3 inch angular gravels, mottled tan to brown (colluvium) (SM)					
47.8			LSS			47.5 - 49.0	16-13-17/30
		SAND, Silty; medium dense to very dense, non-plastic, fine grained sand, thinly interbedded gravelly lense, reworked sandstones of the Salt Lake Formation (SM)					
50			SSS			49.0 - 50.5	7-21-24/45
			LSS			52.5 - 54.0	6-11-20/31
			SSS			54.0 - 55.5	7-14-34/48
55							
			LSS			57.5 - 59.0	10-16-16/32
			SSS			59.0 - 60.5	7-9-11/20
60.5		Bottom of Hole					
		Piezometer Installation:					
		Perforations between 46.0 - 56.0					
		Gravel backfill 44.0 - 56.0					
		Bentonite seal 42.0 - 44.0					

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LOG OF EXPLORATION BORING

JOB NO. 81-1404

HOLE NO. DH-S5

SHEET 1 OF 2

DRILL TYPE: SOIL Mobile B-53	CLIENT Beker Industries
ROCK N/A	
SIZE, TYPE OF BIT 8" hollowstem augers	PROJECT Tailings Pond #4
CASING: SIZE N/A LENGTH N/A	LOCATION N 70+33; E 4+70
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: Disturbed 9, Undisturbed 1	ELEVATION: TOP OF HOLE 6152.7 GROUNDWATER 6146.7
TOTAL NO. CORE BOXES 0; TOTAL CORE RECOVERY FOR BORING (%) N/A	THICKNESS OF OVERBURDEN, FT. +25.0; DEPTH DRILLED INTO ROCK, FT. N/A; TOTAL DEPTH OF HOLE, FT. 25.0
REMARKS	STARTED 9-10-81 COMPLETED 9-11-81
Piezometer not installed.	DRILLED BY C. Pelletier
	LOGGED BY S. Sharma

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	R.Q.D.	DEPTH, FEET	BLOWS/FOOT
0		TOPSOIL; Organic material					
1.0		SAND, Silty; loose to medium dense, wet to saturated, non-plastic, fine to medium grained, reworked TUFA, tan (SM)	LST			2.5 - 4.5 Disturbed	q_u= 2 tsf
			SSS			4.5 - 6.0	3-2-3/5
5							
7.0		SILT, Clayey; very stiff, saturated, slightly plastic, brown (ML)	LSS			7.5 - 9.0	5-10-11/21
			SSS			9.0 - 10.5	3-2-3/5
9.8		SAND, Silty: loose to medium dense, saturated, non-plastic, calcareous, interbedded seams of TRAVERTINE, tan (SM)					
			LSS			12.5 - 14.0	7-10-19/29
			SSS			14.0 - 15.5	13-9-11/20
15							
			LSS			17.5 - 18.2	18-6/24
			SSS			18.2 - 19.7	5-6-3/9
19.6							

(Cont'd on Sheet 2)

LOG OF EXPLORATION BORING

JOB NO. 81-1404 HOLE NO. DH-S5 SHEET 2 OF 2

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	RQD	DEPTH, FEET	BLOWS/FOOT
20		SILT, Clayey; very stiff to hard, wet to saturated, moderately plastic, scattered angular basalt gravels, mottled brown (ML)					
			LS2			22.5 - 23.5	q_u= 2 tsf
			SSS			23.5 - 25.0	8-15-18/33
25.0		Bottom of Hole					

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LOG OF EXPLORATION BORING

JOB NO. 81-1404

HOLE NO. DH-S6

SHEET 1 OF 1

DRILL TYPE: SOIL Mobile B-53 ROCK Mobile B-53	CLIENT Beker Industries
SIZE, TYPE OF BIT 2-15/16" Tricone rockbit NwD3 Diamond bit	PROJECT Tailings Pond #4
CASING: SIZE Nw LENGTH 6.0 feet	LOCATION N 103+22; W 15+20
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN Disturbed 1 Undisturbed 1	ELEVATION: TOP OF HOLE 6158.0 GROUNDWATER 6149.1
TOTAL NO. CORE BOXES 1 TOTAL CORE RECOVERY FOR BORING (%) 100	THICKNESS OF OVERBURDEN, FT. 5.8 DEPTH DRILLED INTO ROCK, FT. 9.8 TOTAL DEPTH OF HOLE, FT. 15.6
REMARKS	STARTED 9-25-81 COMPLETED 9-25-81
	DRILLED BY C. Pelletier
	LOGGED BY S. Sharma

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	R.Q.D.	DEPTH, FEET	BLOWS/FOOT
0		TOPSOIL; Organic material					
1.5		SILT, Sandy; very stiff to hard, wet, non-plastic, weakly cemented, fine-grained, tan to light brown (ML)	SST			3.0 - 4.9	q_u= 3 tsf
			SSS			4.9 - 5.8	31-50 /R 0.4
5.8		BASALT; slight to very slightly weathered, moderately hard, 20-30% vesicles, close to very close jointed, grey-black	Nw core	100	90%	5.8 - 10.7	
10			Nw core	100	100%	10.7 - 15.6	
		100% water recirculation loss below 14.0 feet. Joint with oxidation stains at 14.5 - 14.9					
15.6		Bottom of Hole Piezometer Installation: Perforations between 5.6 - 15.6 Sand backfill 5.0 - 15.6 Bentonite seal 2.0 - 5.0					

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LOG OF EXPLORATION BORING

JOB NO. 81-1404

HOLE NO. DH-S8

SHEET 1 OF 2

DRILL TYPE: SOIL Mobile B-53 ROCK Mobile B-53	CLIENT Beker Industries
SIZE, TYPE OF BIT 2-15/16" Tricone rockbit NwD3 Diamond bit	PROJECT Tailings Pond #4
CASING: SIZE Nw LENGTH 17.3 ft	LOCATION N 95+08; W 20+93
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN Disturbed 4 Undisturbed 2	ELEVATION: TOP OF HOLE 6151.0 GROUNDWATER 6151.0
TOTAL NO. CORE BOXES 1 TOTAL CORE RECOVERY FOR BORING (%) 88	THICKNESS OF OVERBURDEN, FT. 17.3 DEPTH DRILLED INTO ROCK, FT. 5.2 TOTAL DEPTH OF HOLE, FT. 22.5
REMARKS See Sheet 2 for piezometer installation details	STARTED 9-27-81 COMPLETED 9-27-81 DRILLED BY C. Pelletier LOGGED BY S. Sharma

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	R.Q.D.	DEPTH, FEET	BLOWS/FOOT
0		TOPSOIL/PEAT; organic materials					
3.0		SAND, Silty; loose, saturated, non-plastic, calcareous, reworked TUFA, fine grained, white-tan (SM)	SST			3.0 - 5.0 Disturbed	
5			SSS			5.0 - 6.5	3-4-2/6
			SST			7.5 - 9.5	q_u= 0.7 tsf
8.0		SILT, Clayey; very soft to firm, saturated, plastic, rock flour, grey to brown (ML-CL)					
10			SSS			9.5 - 11.0	1-1-1/2
			SST			12.5 - 14.5	q_u= 0.2 tsf
15			SSS			14.5 - 16.0	2-2-6/8
17.3		BASALT; slightly weathered, medium hard, close jointed, 20-40% vesicles	Nw core	88	88%	17.3 - 22.5	
20		(Cont'd on Sheet 2)					

LOG OF EXPLORATION BORING

JOB NO. 81-1404 HOLE NO. DH-S8 SHEET 2 OF 2

DEPTH FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp	% CORE RECOVERY	RQD	DEPTH, FEET	BLOWS/FOOT
20		100% water recirculation loss below 20.5 feet.					
22.5		Bottom of Hole					
		Piezometer Installation:					
		Perforations between 15.5 - 22.5					
		Sand backfill 11.0 - 22.5					
		Bentonite seal 7.0 - 11.0					

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LOG OF EXPLORATION BORING

HOLE NO. DH-S9

JOB NO. 81-1404

SHEET 1 OF 2

DRILL TYPE: SOIL Mobile B-53 ROCK Mobile B-53	CLIENT Beker Industries
SIZE, TYPE OF BIT 2-15/16" Tricone rockbit NwD3 Diamond bit	PROJECT Tailings Pond #4
CASING: SIZE Nw LENGTH 24.0 feet	LOCATION N 77+00; W 19+88
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN Disturbed 6 Undisturbed 3	ELEVATION: TOP OF HOLE 6149.5 GROUNDWATER 6141.4
TOTAL NO. CORE BOXES 2 TOTAL CORE RECOVERY FOR BORING (%) 96	THICKNESS OF OVERBURDEN, FT. 24.2 DEPTH DRILLED INTO ROCK, FT. 13.8 TOTAL DEPTH OF HOLE, FT. 38.0
REMARKS See Sheet 2 for piezometer installation details __	STARTED 9-27-81 COMPLETED 9-27-81 DRILLED BY C. Pelletier LOGGED BY S. Sharma

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	R.Q.D.	DEPTH, FEET	BLOWS/FOOT
0		TOPSOIL; organic material					
1.5		SAND, Silty; loose to medium dense, wet, non-plastic, calcareous, scattered travertine gravels and cobbles, reworked TUFA, white-tan (SM)	SST			3.0 - 5.0 Disturbed	
5			SSS			5.0 - 6.5	3-5-5/10
			SST			7.5 - 9.5 Disturbed	
			SSS			9.0 - 10.5	1-2-1/3
10.3		SILT, Clayey; soft to stiff, saturated, plastic, some oxidation stains, grey-brown to brown (ML)					
			SST			12.5 - 14.5	q_u= 0.3 tsf
15			SSS			14.5 - 16.0	1-1-1/2
			SST			17.8 - 19.8	q_u= 1.6 tsf
20							

(Cont'd on Sheet 2)

LOG OF EXPLORATION BORING

JOB NO. 81-1404 HOLE NO. DH-S9 SHEET 2 OF 2

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	RQD	DEPTH, FEET	BLOWS/FOOT
20		SILT, Clayey; soft to stiff, saturated, plastic, some oxidation stains, grey-brown to brown (ML)	SSS			19.8 - 21.3	1-2-2/4
			SST			22.5 - 23.6	q_u = 1.7 tsf
23.6		BASALT; slight to very slightly weathered, moderately hard to hard, close jointed, 20-40% vesicles, severely weathered zone to 24.2, grey-black	Nw core	98	81%	24.0 - 29.0	
25							
			Nw core	90	75%	29.0 - 33.0	
30							
35			Nw core	100	84%	33.0 - 38.0	
38.0		Bottom of Hole					

Piezometer Installation:

Perforations between 31.0 - 38.0
Sand backfill 28.0 - 38.0
Bentonite seal 24.0 - 28.0

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LOG OF EXPLORATION BORING

JOB NO. 81-1404

HOLE NO. DH-S10

SHEET 1 OF 2

DRILL TYPE: SOIL CME 75 ROCK	CLIENT: Beker Industries
SIZE, TYPE OF BIT 7 inch hollowstem augers	PROJECT: Tailings Pond #4
CASING: SIZE N/A LENGTH ---	LOCATION: N 71+36; W 15+09
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: Disturbed 5; Undisturbed 4	ELEVATION: TOP OF HOLE 6149.9; GROUNDWATER 6140.2
TOTAL NO. CORE BOXES 0; TOTAL CORE RECOVERY FOR BORING (%) N/A	THICKNESS OF OVERBURDEN, FT. 25.1; DEPTH DRILLED INTO ROCK, FT. N/A; TOTAL DEPTH OF HOLE, FT. 25.1
REMARKS	STARTED 9-26-81; COMPLETED 9-26-81
	DRILLED BY S. Machado
	LOGGED BY D. Osterman

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	R.Q.D.	DEPTH, FEET	BLOWS/FOOT
0							
0.5		TOPSOIL; organic material	SSS			0.0 - 1.5	3-4-4/8
		SILT, Sandy; firm, slightly moist, non-plastic, grey (ML)					
2.5		SAND, Silty; medium dense, slightly moist, fine grained, scattered gravels, reworked TUFA, tan (SM)	SST			3.0 - 5.0	
5			SSS			5.0 - 6.5	2-2-22/24
			SST			8.0 - 10.0	
9.0		SILT, Clayey; soft, saturated, moderately plastic, brown (ML)					
10			SSS			10.0 - 11.5	1-1-0/1
			SST			13.0 - 15.0	
13.5		SAND, Silty; loose, saturated, non-plastic, fine grained, reworked TUFA, tan (SM)					
15			SSS			15.0 - 16.5	5-3-3/6
			SST			18.0 - 20.0	
20							

(Cont'd on Sheet 2)

LOG OF EXPLORATION BORING

JOB NO. 81-1404 HOLE NO. DH-S10 SHEET 2 OF 2

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	RQD	DEPTH, FEET	BLOWS/FOOT
20		SILT, Clayey; stiff, saturated, moderate plasticity, brown (ML-CL)	SSS			20.0 - 21.5	3-5-7/12
23.0		BASALT	SSS			23.0 - 23.1 No sample	50 /R 0.1
25.1			SSS			25.0 - 25.1 No sample	50 /R 0.1
		Bottom of Hole					
		Piezometer Installation:					
		Perforations between 15.0 - 25.0 Sand backfill 14.7 - 25.0 Bentonite seal 10.0 - 14.7					
		Remaining hole backfilled with natural soil.					

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LOG OF EXPLORATION BORING

JOB NO. 81-1404

HOLE NO. DH-S11

SHEET 1 OF 3

DRILL TYPE: SOIL CME 75 ROCK	CLIENT: Beker Industries
SIZE, TYPE OF BIT 7" hollowstem augers	PROJECT: Tailings Pond #4
CASING: SIZE N/A LENGTH ---	LOCATION: N 70+89; W 5+36
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: Disturbed 10, Undisturbed 8	ELEVATION: TOP OF HOLE 6151.8, GROUNDWATER 6142.8
TOTAL NO. CORE BOXES 2; TOTAL CORE RECOVERY FOR BORING (%) 99	THICKNESS OF OVERBURDEN, FT. 44.0; DEPTH DRILLED INTO ROCK, FT. 15.8; TOTAL DEPTH OF HOLE, FT. 59.8
REMARKS —	STARTED 9-26-81; COMPLETED 9-27-81
	DRILLED BY S. Machado
	LOGGED BY D. Osterman

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	RQD	DEPTH, FEET	BLOWS/FOOT
0		TOPSOIL; Organic Material	SSS			0.0 - 1.5	4-4-4/8
0.5		SILT, Sandy; firm, slightly moist, slightly plastic, brown (ML)					
2.5		SAND, Silty; loose, slightly moist, non-plastic, fine grained, reworked TUFA, tan (SM)	SST			3.0 - 5.0	
5			SSS			5.0 - 6.5	6-3-4/7
6.0		SILT, Clayey; soft to firm, moist, moderate plasticity, brown (ML)					
						8.0 - 10.0	
9.0		SAND, Silty; loose to medium dense, saturated, non-plastic, fine-medium grained, tan (SM)					
10			SSS			10.0 - 11.5	7-8-2/10
			LST			13.0 - 14.5	
15			SSS			15.0 - 16.5	10-3-7/10
			LST			18.0 - 20.0	
20		(Cont'd on Sheet 2)					

LOG OF EXPLORATION BORING

JOB NO. 81-1404 HOLE NO. DH-S11 SHEET 2 OF 3

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	RQD	DEPTH, FEET	BLOWS/FOOT
20		SAND, Silty; loose to medium dense, saturated, non-plastic, fine-medium grained, tan (SM)	SSS			20.0 - 21.5	2-2-6/8
			LST			23.0 - 25.0	
24.0		SILT, Clayey; firm to very stiff, saturated, moderate plasticity, dark olive green to brown (ML)					
25			SSS			25.0 - 26.5	2-2-3/5
			LST			28.0 - 30.0	
30			SSS			30.0 - 31.5	6-8-10/18
			LST			33.0 - 35.0	
35			SSS			35.0 - 36.5	2-2-3/5
			LST			38.0 - 39.8	
			SSS			39.8 - 40.9	16-33-50 /R (0.1)
40.0		SILT, Gravelly; soft, saturated, basalt fragments in silt matrix, brown (ML)					
44.0		BASALT; moderately weathered, soft, scoriaceous, very close jointed, clay filled joints, grey-black					
45		(Cont'd on Sheet 3)					

NTL 122A

LOG OF EXPLORATION BORING

JOB NO. 81-1404 HOLE NO. DH-S11 SHEET 3 OF 3

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp	% CORE RECOVERY	RQD	DEPTH, FEET	BLOWS/FOOT
45		BASALT; moderately weathered, soft, scoriaceous, very close jointed, clay filled joints, grey-black	SSS			45.0 - 45.7	80-50 /R 0.2
49.0							
50		BASALT; fresh to very slightly weathered, hard, plagioclase phenocrysts in aphanitic ground mass, 20% minus 1/4 inch vesicles, moderately close jointed, grey-black 100% water recirculation loss below 53.0 feet	Nw core	98	96%	49.8 - 54.8	
55			Nw core	100	96%	54.8 - 59.8	
59.8		Bottom of Hole Piezometer Installation: 1. Perforations between 51.0 - 59.8 Sand backfill 51.0 - 59.8 Bentonite seal 48.0 - 51.0 2. Perforations between 38.0 - 48.0 Sand backfill 5.0 - 48.0 Bentonite seal 3.0 - 5.0					

NTL 122 A

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LOG OF EXPLORATION BORING

JOB NO. 81-1404

HOLE NO. PR.-1

SHEET 1 OF 1

DRILL TYPE: SOIL / ROCK	Mobile B-53
SIZE, TYPE OF BIT	3-7/8" Tricone rockbit;
CASING: SIZE	N/A LENGTH ---
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	Disturbed 0 / Undisturbed 0
TOTAL NO. CORE BOXES	TOTAL CORE RECOVERY FOR BORING (%)
REMARKS	No samples, no piezometer
CLIENT	Beker Industries
PROJECT	Tailings Pond #4
LOCATION	N 98+67; E 0+03
ELEVATION: TOP OF HOLE	6157.3
GROUNDWATER	unknown
THICKNESS OF OVERBURDEN, FT.	30.0
DEPTH DRILLED INTO ROCK, FT.	5.1
TOTAL DEPTH OF HOLE, FT.	35.1
STARTED	9-16-81
COMPLETED	9-16-81
DRILLED BY	C. Pelletier
LOGGED BY	S. Sharma

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	R.Q.D.	DEPTH, FEET	BLOWS/FOOT
0		SAND; Silty; grey					
4.0							
5		SILT, Clayey; dark green-grey					
10							
15							
16.0							
		SAND, Silty; grey white, reworked TUFA					
20							
25.0							
		SILT, Clayey; light grey-green					
30.0							
		BASALT					
35.1							
		Bottom of Hole					

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LOG OF EXPLORATION BORING

JOB NO. 81-1404

HOLE NO. PR-2

SHEET 1 OF 1

DRILL TYPE: SOIL / ROCK	Mobile B-53
SIZE, TYPE OF BIT	3-7/8" Tricone rock bit
CASING: SIZE ---	LENGTH ---
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	
Disturbed ---	Undisturbed ---
TOTAL NO. CORE BOXES ---	TOTAL CORE RECOVERY FOR BORING (%) --
REMARKS	no samples

CLIENT	Beker Industries
PROJECT	Tailings Pond #4
LOCATION	N 94+71; W 9+35
ELEVATION: TOP OF HOLE	6159.9
GROUNDWATER	unknown
THICKNESS OF OVERBURDEN, FT.	9.5
DEPTH DRILLED INTO ROCK, FT.	1.5
TOTAL DEPTH OF HOLE, FT.	11.0
STARTED	9-22-81
COMPLETED	9-22-81
DRILLED BY	C. Pelletier
LOGGED BY	S. Sharma

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	R.Q.D.	DEPTH, FEET	BLOWS/FOOT
0							
1.0		TOPSOIL: Organic Material					
		SILT; Clayey; brown, some thinly interbedded sand lenses					
5							
9.5							
10		BASALT					
11.0		Bottom of Hole					
		Piezometer Installation:					
		Perforations between 3.0 - 11.0					
		Sand backfill 3.0 - 11.0					
		Bentonite seal 1.0 - 3.0					

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LOG OF EXPLORATION BORING

JOB NO. 81-1404

HOLE NO. PR-3

SHEET 1 OF 1

DRILL TYPE: SOIL / ROCK	Mobile B-53
SIZE, TYPE OF BIT	3-7/8" Tricone rockbit
CASING: SIZE ---	LENGTH ---
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	
Disturbed ---	Undisturbed ---
TOTAL NO. CORE BOXES 0	TOTAL CORE RECOVERY FOR BORING (%) ---
REMARKS	no samples

CLIENT	Beker Industries
PROJECT	Tailings Pond #4
LOCATION	N 94+80; E 6+40
ELEVATION: TOP OF HOLE	6157.0
GROUNDWATER	unknown
THICKNESS OF OVERBURDEN, FT.	20.5
DEPTH DRILLED INTO ROCK, FT.	1.5
TOTAL DEPTH OF HOLE, FT.	33.0
STARTED	9-16-81
COMPLETED	9-16-81
DRILLED BY	C. Pelletier
LOGGED BY	S. Sharma

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Sampl.	% CORE RECOVERY	R.Q.D.	DEPTH, FEET	BLOWS/FOOT
0							
1.0		TOPSOIL; Organic Material					
		SAND, Silty; reworked TUFA					
5							
8.0		SILT, Clayey					
10.5		GRAVEL, Sandy					
15							
20.1		BASALT					
22.0		Bottom of Hole					

Piezometer Installation:

Perforations between 9.0 - 19.0
Sand backfill 7.0 - 19.0
Bentonite seal 4.0 - 7.0

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LOG OF EXPLORATION BORING

JOB NO. 81-1404

HOLE NO. PR-4

SHEET 1 OF 1

DRILL TYPE: SOIL / ROCK	Mobile B-53
SIZE, TYPE OF BIT	3-7/8" Tricone rockbit
CASING: SIZE ---	LENGTH ---
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	
Disturbed ---	Undisturbed ---
TOTAL NO. CORE BOXES ---	TOTAL CORE RECOVERY FOR BORING (%) ---
REMARKS	no samples

CLIENT	Beker Industries
PROJECT	Tailings Pond #4
LOCATION	N 86+23; W 9+67
ELEVATION: TOP OF HOLE	6151.8
GROUNDWATER	unknown
THICKNESS OF OVERBURDEN, FT.	28.5
DEPTH DRILLED INTO ROCK, FT.	0.5
TOTAL DEPTH OF HOLE, FT.	29.0
STARTED	9-23-81
COMPLETED	9-23-81
DRILLED BY	C. Pelletier
LOGGED BY	S. Sharma

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	R.Q.D.	DEPTH, FEET	BLOWS/FOOT
0							
1.2		TOPSOIL; Organic Material					
		SILT, Clayey; tan-brown					
5							
10							
15							
20		Slightly harder and more plastic below 20 feet					
25							
28.5							
29.0		BASALT					
		Bottom of Hole					
		Piezometer Installation:					
		Perforations between 18.0 - 24.0					
		Sand backfill 4.0 - 24.0					
		Bentonite seal 2.0 - 4.0					

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LOG OF EXPLORATION BORING

HOLE NO. PR-5

JOB NO. 81-1404

SHEET 1 OF 1

DRILL TYPE: SOIL / ROCK Mobile B-53	CLIENT
SIZE, TYPE OF BIT 8" hollowstem augers	PROJECT
CASING: SIZE --- LENGTH ---	LOCATION
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: Disturbed --- Undisturbed ---	ELEVATION: TOP OF HOLE GROUNDWATER
TOTAL NO. CORE BOXES --- TOTAL CORE RECOVERY FOR BORING (%) ---	THICKNESS OF OVERBURDEN, FT. / DEPTH DRILLED INTO ROCK, FT. / TOTAL DEPTH OF HOLE, FT.
REMARKS Piezometer Installation: Perforations between 27.0 - 37.0; Gravel backfill 25.0 - 37.0; Bentonite seal 23.0 - 25.0	STARTED / COMPLETED
	DRILLED BY
	LOGGED BY

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	R.Q.D.	DEPTH, FEET	BLOWS/FOOT
0		TOPSOIL; Organic Material					
1.0		SAND, Silty; brown to 6.0 feet then tan					
5							
10							
15						no samples	
20							
25							
28.5		SILT, Clayey; dark brown to grey					
30							
34.5		BASALT					
37.0		Bottom of Hole					

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LOG OF EXPLORATION BORING

JOB NO. 81-1404

HOLE NO. PR-6

SHEET 1 OF 1

DRILL TYPE: SOIL / ROCK Mobile B-53	CLIENT Beker Industries
SIZE, TYPE OF BIT 3-7/8" Tricone rockbit	PROJECT Tailings Pond #4
CASING: SIZE --- LENGTH ---	LOCATION N 76+88; W 10+19
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: Disturbed --- Undisturbed ---	ELEVATION: TOP OF HOLE 6150.0 GROUNDWATER unknown
TOTAL NO. CORE BOXES 0 / TOTAL CORE RECOVERY FOR BORING (%) n/a	THICKNESS OF OVERBURDEN, FT. 26.8 / DEPTH DRILLED INTO ROCK, FT. 2.0 / TOTAL DEPTH OF HOLE, FT. 28.8
REMARKS: no samples	STARTED 9-22-81 / COMPLETED 9-22-81
	DRILLED BY C. Pelletier
	LOGGED BY S. Sharma

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	R.Q.D.	DEPTH, FEET	BLOWS/FOOT
0							
1.2		TOPSOIL; Organic Material					
		SAND, Silty; white-tan, reworked TUFA					
5							
7.0							
		SAND, Silty; tan-brown, reworked TUFA					
10							
15							
20							
23.0							
		SILT, Clayey; brown					
25							
26.8							
28.8		BASALT					
		Bottom of hole					
		Piezometer Installation:					
		Perforations between 20.0 - 28.8					
		Sand backfill 13.0 - 28.8					
		Bentonite seal 10.0 - 13.0					

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LOG OF EXPLORATION BORING

JOB NO. 81-1404

HOLE NO. PR-5

SHEET 1 OF 1

DRILL TYPE: SOIL / ROCK	Mobile B-53
SIZE, TYPE OF BIT	8" hollowstem augers
CASING: SIZE ---	LENGTH ---
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	
Disturbed ---	Undisturbed ---
TOTAL NO. CORE BOXES ---	TOTAL CORE RECOVERY FOR BORING (%) ---
REMARKS	Piezometer Installation: Perforations between 27.0 - 37.0 Gravel backfill 25.0 - 37.0 Bentonite seal 23.0 - 25.0

CLIENT	Beker Industries
PROJECT	Tailings Pond #4
LOCATION	N 86+25; E 6+48
ELEVATION: TOP OF HOLE	6157.8
GROUNDWATER	6146.3
THICKNESS OF OVERBURDEN, FT.	34.5
DEPTH DRILLED INTO ROCK, FT.	2.5
TOTAL DEPTH OF HOLE, FT.	37.0
STARTED	8-24-81
COMPLETED	8-24-81
DRILLED BY	C. Pelletier
LOGGED BY	S. Sharma

DEPTH, FT.	LEGEND	CLASSIFICATION OF MATERIALS	Type of Samp.	% CORE RECOVERY	RQD	DEPTH, FEET	BLOWS/FOOT
0		TOPSOIL; Organic Material					
1.0		SAND, Silty; brown to 6.0 feet then tan					
5							
10							
15						no samples	
20							
25							
28.5							
30		SILT, Clayey; dark brown to grey					
34.5							
		BASALT					
37.0		Bottom of Hole					

FH0028919

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Form SG-2
Proj No 1171

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

PROJECT Baker Tailings Pond #4

Sheet 1
Date 8/25/81

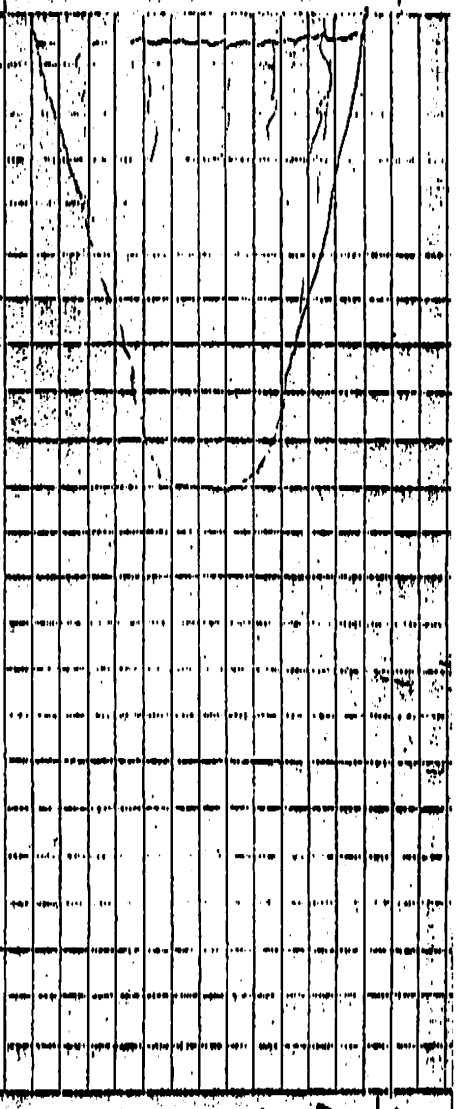
Trench or Hole No. T.P. #1
Location Top of knoll
Coordinates: N
E

Ground Elevation
Elevation of Bottom
Groundwater Elevation None
Approximate Dimensions 30 inches X 17 feet long

Method of Excavation Backhoe
Date Started 8/25/81
Date Completed 8/25/81
Logged by A.W.

Depth	Elevation	Blow Count or Sample Weight	Type of Sample Taken	Sample Number	Field Classification and Description of Material	Field Sketch of Test Pit or Test Trench Excavation
0.0'					0.0' to 0.6' Blk. silty sandy topsoil	
					0.6' to 3.0' yel. brn. gravelly silty sand. with roots and organic material	
					3.0' to 10.0' yel. brown gravelly silty sand	
5.0'						
10'			M.C.	#1	Bottom of hole	
					100' hard, consolidated w/boulders	

Remarks: no groundwater, low moisture content
Low rainfall reported during summer



Sample Hammer: Weight Drop

FH0028920

HARZA ENGINEERING COMPANY
Form SG-2
Proj No. 1171

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

PROJECT Baker Tailings Pond #4

Sheet 1
Date 8/25

Trench or Hole No. TP-1A
Location [illegible]
Coordinates: N
E

Ground Elevation
Elevation of Bottom
Groundwater Elevation none
Approximate Dimensions 30 inches X 12 feet long

Method of Excavation Backhoe
Date Started 8/25/81
Date Completed 8/25/81
Logged by A.P.W.

Depth	Elevation	Blow Count or Sample Weight	Type of Sample Taken	Sample Number	Field Classification and Description of Material	Field Sketch of Test Pit or Test Trench Excavation
					0.0' to 1.5' gr. blk. topsoil w/organics	
					1.5' to 3.0' yel. brn. sandy silt.	
			bag sample @ 4'	TP-1A	3.0' to 8.5' white to gr. silty sand and silty fine sandstone beds. Thin bedded 1/2" to 1", soft.-broken between fingers.	
5.0'						
			M.C.	HT2 @ 8.5'	Bottom of hole @ 8.5'	
					white to gr. silty fine sandstone.	
10.0'						

Remarks: soil slightly damp. No groundwater.

Sample Hammer: Weight ____ Drop ____

FH0028921

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Form SG-2
Proj. No. 1171

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

PROJECT Baker Tailings Pond #4

Sheet 1
Date 8/2

Trench or Hole No. T.P.-2
Location [illegible]
Coordinates: N
E

Ground Elevation
Elevation of Bottom
Groundwater Elevation None
Approximate Dimensions 30 inches x 10 feet long

Method of Excavation Backhoe
Date Started 8/25/81
Date Completed 8/25/81
Logged by A.F.W.

Depth	Elevation	Blow Count or Sample Weight	Type of Sample Taken	Sample Number	Field Classification and Description of Material
					0.0' to 0.6' lt. gr. topsoil w/organics
					0.6' to 5.75' lt. gr. to white fine silty sand and siltstone w/roots and organic material. Thin beds of siltstone alternate w/sand. Siltstone soft.-broken between fingers.
5.0'					
			M.C.	@7'	5.75' to 7.5' lt. gr. to white fine silty sand and siltstone. Thin beds of siltstone alternate w/sand. Siltstone soft.-broken between fingers. Beds 1/2" to 1" thick.
					Bottom of hole @ 7.5'
					Hard white siltstone.
10.0'					

Field Sketch of Test Pit or Test Trench Excavation

Remarks: no groundwater, M.C. low.

Sample Hammer: Weight ____ Drop ____

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Form SG-2

Proj. No. 1171

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

PROJECT Baker Tailings Pond #4

Sheet 1
Date 8/25

Trench or Hole No. T.P.-2A
Location Slightly below T.P.-2 on knoll
Coordinates: N
E

Ground Elevation
Elevation of Bottom
Groundwater Elevation none
Approximate Dimensions 30 min x 11 feet

Method of Excavation Backhoe
Date Started 8/25/81
Date Completed 8/25/81
Logged by APW

Depth	Elevation	Blow Count or Sample Weight	Type of Sample Taken	Sample Number	Field Classification and Description of Material	Field Sketch of Test Pit or Test Trench Excavation
0.0'					0.0' to 0.6' gr. topsoil w/organics	
					0.6' to 2.0' yel. brn. sandy silt.	
					2.0' to 7.0' white to gray silty sand and siltstone. Thin bedded (½" to 1') siltstone alternate with fine silty sand. Siltstone soft: broken between fingers.	
5.0'			M.C.	@5'		
					Bottom of hole @ 7.0'	
					Hard white siltstone	
10.0'						

Remarks: no groundwater. Low M.C.

Sample Hammer: Weight ____ Drop ____

FH00028923

HARZA ENGINEERING COMPANY
Form SG-2
Proj. No. 117'

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

PROJECT Baker Tailings Pond #4
Harza Project No. 117'

Sheet 1 of 1
Date 8/25/81

Trench or Hole No. TP-3
Location [illegible]
Coordinates: N
E

Ground Elevation
Elevation of Bottom
Groundwater Elevation 6.25ft @ 5hrs 8/25/81
Approximate Dimensions 30 inches x 12 ft long

Method of Excavation Backhoe
Date Started 8/25/81
Date Completed 8/25/81
Logged by A.P.W.

Depth	Elevation	Blow Count or Sample Weight	Type of Sample Taken	Sample Number	Field Classification and Description of Material
0.0'					0.0' to 1.4' Blk topsoil w/organics.
					1.4' to 4.0' yel. brn. silty sand to sandy silt
			M.C.	@3'	
			bag sample and M.C	@4'	4.0 to 6.0' yel. brn to gr. sandy silty clay.
5.0'					
		▽W.T. 6.75 ft 1" 5hrs			6.0' to 9.0' red brn to yel. brn sandy silty clay
			M.C.	@7'	
		▽W.T. 8.75 ft. 1" 15min			
					Bottom of Hole @ 9.0'
					Basalt bedrock
10.0'					

Field Sketch of Test Pit or Test Trench Excavation

Remarks:

Sample Hammer: Weight ____ Drop ____

FH0028924

HARZA ENGINEERING COMPANY
Form SG-2
Proj. No. 1171

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

PROJECT Baker Ind. Tailings Pond #4

Sheet 1
Date 8/2

Trench or Hole No. TP-#4
Location (see drawing)
Coordinates: N
E

Ground Elevation
Elevation of Bottom
Groundwater Elevation 6.3' below ground elev.
Approximate Dimensions 30" X 12'

Method of Excavation Backhoe
Date Started 8/25/81
Date Completed 8/25/81
Logged by A.P.W.

Depth	Elevation	Blow Count or Sample Weight	Type of Sample Taken	Sample Number	Field Classification and Description of Material
0.0'					0.0' to 2.25' Blk. silty topsoil
					2.25' to 11.0' lt. gr. silty fine sand.
			bag sample and M.C.	@4'	
5.0'					
					▽ W.T. @ 6.3'
					[Hole caving during excavation]
10.0'					Bottom of hole @ 11.0' soft, lt. gr. silty fine sand

Field Sketch of Test Pit or Test Trench Excavation

Remarks:

Sample Hammer: Weight ____ Drop ____

FH0028925

HARZA ENGINEERING COMPANY
Form SG-2
Proj. No. 117'

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

PROJECT Bakerland Tailings Pond #4

Sheet 1
Date 9/

Trench or Hole No. T.P. #5
Location (see drawing)
Coordinates: N
E

Ground Elevation
Elevation of Bottom
Groundwater Elevation none
Approximate Dimensions 30' X 12'

Method of Excavation Backhoe
Date Started 8/24/81
Date Completed 8/25/81
Logged by A. P. W.

Depth	Elevation	Blow Count or Sample Weight	Type of Sample Taken	Sample Number	Field Classification and Description of Material	Field Sketch of Test Pit or Test Trench Excavation
0.0'					0' to 1.5' blk. organic topsoil	
					1.5' to 11.5' lt. yel. brn. sandy silt w/30% gravel and cobbles (1½" to 6").	
5.0'			bag sample	@5'		
			M.C.	@8'		
10.0'					Bottom of hole @ 11.5'	

Remarks: no groundwater after 24 hrs same material below 11.5'

Sample Hammer: Weight ____ Drop ____

FH0028926

HARZA ENGINEERING COMPANY
Form SG-2

Proj. No 1171

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

PROJECT Baker Ind. Tailings Pond #4

Sheet 1
Date 8/2

Trench or Hole No. TP #6
Location (Sec. Tramway)
Coordinates: N
E

Ground Elevation
Elevation of Bottom
Groundwater Elevation 6.25 ft. below ground
Approximate Dimensions 3.5' X 11'

Method of Excavation Backhoe
Date Started 8/24/81
Date Completed 8/24/81
Logged by A.P.W.

Depth	Elevation	Blow Count or Sample Weight	Type of Sample Taken	Sample Number	Field Classification and Description of Material	Field Sketch of Test Pit or Test Trench Excavation
0.0'					0.0' to 2.0' blk. organic topsoil	
					2.0' to 4.8'	
			M.C.	@3.0'		
			Bag Sample	@4'		
5.0'					4.8' to 10.0' light gr. silty sand	
			M.C.	@6'	▽ W.T. @6.3'	
10.0'			M.C.	@10'	BOH @ 10.0' Hard Travertine (Tufa) - may be broken with large equipment and/or rippers.	

Remarks: Sides sloughed immediately.

Sample Hammer: Weight ____ Drop ____

FH0028927

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Form SG-2
Proj No 1171

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

PROJECT Baker Ind. Tailings Pond #4

Sheet
Date 8/

Trench or Hole No. T.P. #1
Location
Coordinates: N
E

Ground Elevation
Elevation of Bottom
Groundwater Elevation none
Approximate Dimensions 30" X 11'

Method of Excavation Backhoe
Date Started 8/24/81
Date Completed 8/25/81
Logged by

Depth	Elevation	Blow Count or Sample Weight	Type of Sample Taken	Sample Number	Field Classification and Description of Material	Field Sketch of Test Pit or Test Trench Excavation
0.0'					0.0. to 2.6' blk. organic topsoil	
			M.C.	@4'	2.6' to 6.0' yel. brn. silty sand w/ 30% cobbles to 1.0'.	
5.0'						
			M.C.	@8'	6.0' to 12.0'± yel. brn. sandy silty gravel w/ gravel and boulders to ~18". (~30% combined)	
10.0'						

Remarks: Soil drained and became hard and compact after 15 hours when left in a small stockpile. 12.0'± Bott. boulders

Sample Hammer: Weight ____ Drop ____

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Form SG-2
Proj. No. 1171

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

PROJECT Baker Ind Tailings Pond #4

Sheet 1
Date 8/25

Trench or Hole No. T.P. - #8
Location Cross Trenching (a) P-7
Coordinates: N
E

Ground Elevation
Elevation of Bottom
Groundwater Elevation 6.0' @ 15 hrs.
Approximate Dimensions 30 inches X 14ft

Method of Excavation Backhoe
Date Started 8/25/81
Date Completed 8/25/81
Logged by A.P.W.

Depth	Elevation	Blow Count or Sample Weight	Type of Sample Taken	Sample Number	Field Classification and Description of Material
					0.0' to 3.0' blk. organic Topsoil
					3.0' to 10.0' lt. gr. silty fine sand
			M.C.	@ 4'	
5.0'			Bag Sample	@ 5'	
					▽ W.T. @ 6.0' @ 15 hrs.
					▽ W.T. @ 6.9' @ 15 min.
10.0'					B.O.H. @ 10.0' Hard travertine (Tufa)

Field Sketch of Test Pit or Test Trench Excavation

Remarks: Caving slightly during excavation

Sample Hammer: Weight ____ Drop ____

FH00289 29

HARZA ENGINEERING COMPANY
Form SG-2

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

PROJECT Baker Tailings Pond #4

Sheet ___ of ___
Date ___

Trench or Hole No. Test Pit #9
Location [illegible] Northwest Site
Coordinates: N ___
E ___

Ground Elevation ___
Elevation of Bottom ___
Groundwater Elevation 10.0'
Approximate Dimensions 30 inches X 12 feet long

Method of Excavation backhoe
Date Started 9/14/81
Date Completed 9/14/81
Logged by A.P.W.

DEPTH	ELEVATION	BLOW COUNT OR SAMPLE WEIGHT	TYPE OF SAMPLE TAKEN	SAMPLE NUMBER	FIELD CLASSIFICATION AND DESCRIPTION OF MATERIAL	FIELD SKETCH OF TEST PIT OR TEST TRENCH EXCAVATION
0.0'					0.0' to 1.8' Black organic topsoil 1.8'	
					1.8' to 10.0' light gray silty fine sandstone, very calcareous.	
5.0'			bag sample E.M.C.	@4'		
					W.T. @ 10.0' ▽ 10.0'	
10.0'					basalt cobbles w/silty sand B.O.H. 10.5'	
					basalt bedrock	

Remarks:

Sample Hammer: Weight ___ Drop ___

FH0028930

HARZA ENGINEERING COMPANY
Form SG-2

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

Sheet 1 of 1
Date 9/14/81

PROJECT Baker Tailings Pond #4

Trench or Hole No. Test Pit #10
Location Northwest side (see map)
Coordinates: N
E

Ground Elevation
Elevation of Bottom
Groundwater Elevation 5.5'
Approximate Dimensions 30 inches X 10 feet long

Method of Excavation backhoe
Date Started 9/14/81
Date Completed 9/14/81
Logged by A.P.W.

DEPTH	ELEVATION	BLOW COUNT OR SAMPLE WEIGHT	TYPE OF SAMPLE TAKEN	SAMPLE NUMBER	FIELD CLASSIFICATION AND DESCRIPTION OF MATERIAL	FIELD SKETCH OF TEST PIT OR TEST TRENCH EXCAVATION
0.0'					0.0' to 2.8'	
					Black organic topsoil.	
					2.8'	
					2.8' to 6.0'	
			bag sample and M.C.	@4'	Tan to gray clayey fine sandy silt. Very calcareous.	
5.0'					W.T. @ 5.5'	
					B.O.H. 6.0'	
					basalt bedrock	
10.0'						

Remarks:

Sample Hammer: Weight ____ Drop ____

FH002893

HARZA ENGINEERING COMPANY
Form SG-2

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

Sheet 1 of 1
Date 9/16/81

PROJECT Baker Tailings Pond #4

Trench or Hole No. Test Pit #11
Location Northwest Site (see map)
Coordinates: N
E

Ground Elevation
Elevation of Bottom
Groundwater Elevation 6.2'
Approximate Dimensions 30 inches X 15 feet long

Method of Excavation back hoe
Date Started 9/14/81
Date Completed 9/14/81
Logged by A.P.W

DEPTH	ELEVATION	BLOW COUNT OR SAMPLE WEIGHT	TYPE OF SAMPLE TAKEN	SAMPLE NUMBER	FIELD CLASSIFICATION AND DESCRIPTION OF MATERIAL	FIELD SKETCH OF TEST PIT OR TEST TRENCH EXCAVATION
0.0'					0.0' to 2.3'	
					2.3'	
					2.3' to 13.5'	
					tan and light gray sandy silt and silty fine sand. very calcareous	
5.0'			bag sample and ME.	@5'	W.T.@	
					▽ 6.2'	
10.0'						
					BOH. 13.5'	

Remarks:

Sample Hammer: Weight ____ Drop ____

FH0028932

HARZA ENGINEERING COMPANY
Form SG-2

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

Sheet 1 of 1
Date 9/16/81

PROJECT Baker Tailings Pond #4

Trench or Hole No. Test Pit #12
Location Northwest Site (see map)
Coordinates: N
E

Ground Elevation
Elevation of Bottom
Groundwater Elevation 11' (rising)
Approximate Dimensions 30 inches X 15 feet long

Method of Excavation backhoe
Date Started 9/14/81
Date Completed 9/14/81
Logged by A.P.W.

DEPTH	ELEVATION	BLOW COUNT OR SAMPLE WEIGHT	TYPE OF SAMPLE TAKEN	SAMPLE NUMBER	FIELD CLASSIFICATION AND DESCRIPTION OF MATERIAL	FIELD SKETCH OF TEST PIT OR TEST TRENCH EXCAVATION
0.0'					0.0' to 1.0' Black organic topsoil 1.0'	
					1.0' to 5.6' tan silty fine sand, very calcareous, 5.6'	
5.0'		bag sample and M.C.	@ 5			
					5.6 to 14.0' light gray fine sandy silt, very calcareous. Note: Hole began caving before completion of excavation. Caving rapidly.	
10.0'					W.T.@ 11.0' ▽ 11.0'	
					B.O.H. 14.0'	

Remarks:

Sample Hammer: Weight ____ Drop ____

FH0028933

HARZA ENGINEERING COMPANY
Form SG-2

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

PROJECT Baker Tailings Pond #4

Sheet 1 of 1
Date 9/16/81

Trench or Hole No. Test Pit #13
Location Northwest side
Coordinates: N
E

Ground Elevation
Elevation of Bottom
Groundwater Elevation 7.7' (6.0' after 2 hrs.)
Approximate Dimensions 30 inches x 12 feet long

Method of Excavation backhoe
Date Started 9/15/81
Date Completed 9/15/81
Logged by A.P.W.

DEPTH	ELEVATION	BLOW COUNT OR SAMPLE WEIGHT	TYPE OF SAMPLE TAKEN	SAMPLE NUMBER	FIELD CLASSIFICATION AND DESCRIPTION OF MATERIAL	FIELD SKETCH OF TEST PIT OR TEST TRENCH EXCAVATION
0.0'					0.0' to 1.0' Black organic topsoil 1.0'	
					1.0' to 12.0' tan to lt. gray silty fine sand very calcareous. Note: caving below W.T. faster than excavator can dredge hole.	
5.0'			bag sample and M.C.	@5'	W.T. @ 6.0' ▽	
10.0'						

Remarks: B.O.H. 12.0'

Sample Hammer: Weight ____ Drop ____

FH0028934

HARZA ENGINEERING COMPANY
Form SG-2

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

PROJECT Baker Tailings Pond #4

Sheet 1 of 1
Date 9/16/81

Trench or Hole No. Test Pit #14
Location Northwest Site (see map)
Coordinates: N
E

Ground Elevation
Elevation of Bottom
Groundwater Elevation 6ft. (estimated)
Approximate Dimensions 30 inches x 11 feet long

Method of Excavation backhoe
Date Started 9/15/81
Date Completed 9/15/81
Logged by APW.

DEPTH	ELEVATION	BLOW COUNT OR SAMPLE WEIGHT	TYPE OF SAMPLE TAKEN	SAMPLE NUMBER	FIELD CLASSIFICATION AND DESCRIPTION OF MATERIAL	FIELD SKETCH OF TEST PIT OR TEST TRENCH EXCAVATION
0.0'					0.0' to 2.5'	
					Black organic topsoil	
					2.5'	
					2.5' to 11'	
					gray to tan sandy clayey silt, very calcareous.	
5.0'					W.T. @ 6' ▽	
			bag sample + M.C.	@7'	*Note: Hole caved rapidly after excavation. Water table moved with displacement by caved material.	
10.0'						
					B.O.H. 11.0'	

Remarks:

Sample Hammer: Weight ____ Drop ____

FH0028935

HARZA ENGINEERING COMPANY
Form SG-2

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

PROJECT Baker Tailings Pond #3

Sheet 1 of 1
Date 9/16/81

Trench or Hole No. Test Pit #5
Location Northwest Site (see map)
Coordinates: N
E

Ground Elevation
Elevation of Bottom
Groundwater Elevation 5.6' (rising slowly)
Approximate Dimensions 30 inches x 8 feet long

Method of Excavation Backhoe
Date Started 9/15/81
Date Completed 9/15/81
Logged by A.P.W.

DEPTH	ELEVATION	BLOW COUNT OR SAMPLE WEIGHT	TYPE OF SAMPLE TAKEN	SAMPLE NUMBER	FIELD CLASSIFICATION AND DESCRIPTION OF MATERIAL	FIELD SKETCH OF TEST PIT OR TEST TRENCH EXCAVATION
0.0'					0.0' to 1.5'	
					Black organic topsoil	
					1.5'	
					1.5' to 6.0'	
					light gray fine sandy clayey silt, very calcareous.	
					W.T. @ 5.6' ▽	
5.0'					B.O.H. 6.0'	
					basalt bedrock	
10.0'						

Remarks:

Sample Hammer: Weight ____ Drop ____

FH00289936

HARZA ENGINEERING COMPANY
Form SG-2

LOG OF TEST PIT, TEST TRENCH OR AUGER HOLE

Sheet 1 of 1
Date 9/16/81

PROJECT Baker Tailings Pond #4

Trench or Hole No. Test Pit #11
Location Northwest site (see map)
Coordinates: N
E

Ground Elevation
Elevation of Bottom
Groundwater Elevation 13.0'
Approximate Dimensions 30 inches X 14 feet long

Method of Excavation backhoe
Date Started 9/14/81
Date Completed 9/14/81
Logged by H.P.W.

DEPTH	ELEVATION	BLOW COUNT OR SAMPLE WEIGHT	TYPE OF SAMPLE TAKEN	SAMPLE NUMBER	FIELD CLASSIFICATION AND DESCRIPTION OF MATERIAL	FIELD SKETCH OF TEST PIT OR TEST TRENCH EXCAVATION
0.0'					0.0 to 1.5' Black organic topsoil 1.5'	
					1.5' to 5.8' tan silty fine sand, very calcareous. 5.8'	
5.0'			bag sample M.T.	@4'		
					5.8' to 13.5' light gray silty sandy clay, very calcareous.	
10.0'						

Remarks:

W.T. @ 13.0' ▽

BOH. 13.5'

Sample Hammer: Weight ____ Drop ____

FH0028937

RECEIVED AUG 2 4 1984

Northern
Engineering
and Testing, Inc.

600 South 25th St.
Box 30615
Billings, Montana 59107
(406) 248-9161

August 23, 1984

Beker Industries
P O Box 37
Conda, ID 83230

SUBJECT: Laboratory Testing Services
Beker Pond No. 4
Northern Job No. 81-1404

Gentlemen:

In accordance with our agreement, we have completed a series of geotechnical laboratory tests with samples from your Pond No. 4.

A table showing the requested tests is enclosed and all the test results are presented on the enclosed plates.

The laboratory tests were performed in general accordance with the methods listed below:

Standard Tests:

Test Name	Method
Moisture-Density Relationship	ASTM D698
Atterberg Limits	ASTM D423 and D424
Sieve Analysis through No. 200 Sieve	ASTM D422
Direct Shear	ASTM D3080
Unconsolidated-Undrained Triaxial Shear	ASTM D2850
One-dimensional Consolidation	ASTM D2435

Consolidated-Undrained Triaxial Tests:

The consolidated-undrained triaxial tests were run on samples in accordance with procedures set forth in Bishop and Henkel /1/. The samples were saturated by use of high back pressure until a 95 percent or better pore pressure response was obtained. Then a confining pressure was applied and flow out of the sample was monitored.

/1/ Bishop and Henkel, "The Measurement of Soil Properties in the Triaxial Tests," Edward Arnold, Ltd., London, England, 1964.

When flow out of the sample was complete, the test was run. Filter strips were normally placed around the outside of the sample during the consolidation phase and when the test was run to facilitate pore pressure equalization.

Permeability Tests:

The permeability tests were performed on samples in accordance with procedures set forth in the U.S. Army Engineering Manual EM 1110-2-1906 /2/. Samples are prepared and backpressure saturated similar to the triaxial specimens, except filter strips are not applied. Using an air over water interface in a pressure reservoir, a gradient is applied across the specimen and flow into and out of the specimen is monitored until a constant rate of flow is observed. Then the volume of water flowing through the specimen is measured over a period of time and a permeability value calculated. The results of these tests are presented on the moisture-density relationship plates.

Sample Preparation:

Many of the direct shear, triaxial and permeability tests were performed using remolded specimens. These specimens were prepared by moisture conditioning each soil to its optimum moisture content determined from the moisture-density relationship test. Then a cylindrical sample was compacted in thin lifts to 95% of the maximum dry density also determined from the moisture-density relationship test. These were carefully wrapped and sealed to retain the moisture content until needed for testing.

Should you have any questions or if we can be of further service, please contact us.

Respectfully submitted,

Larry G. O'Dell, P.E.

LGO(JP)rmr

cc: Pinnacle Engineering
Hamilton, MT

/2/ Engineer Manual EM 1110-2-1906, "Laboratory Soils Testing," Department of the Army, Office of The Chief Engineers, Washington, D.C., 1970.

NORTHERN ENGINEERING AND TESTING, INC.

TABLE OF REQUESTED TESTS
Beker Pond No. 4

Sample Identification	Lab No.	Moisture-Density Relationship	Sieve Analysis	Atter-berg Limits	Uncon-solidated Undrained Triaxial	Consol-idated Undrained Triaxial	Direct Shear	Perm-eability	Consoli-dation with time rate Readings
TPP3A; 4.3' - 5.3'	140659	X	X	X		X			
TPS4A; 9.0' - 10.0'	140660	X	X	X		X			
TPPR3A; 3.0' - 3.3'	140661	X	X	X			X		
TPP2A; 2.0' - 3.3'	140662	X	X	X		X		X	
TPP10A; 3.3' - 3.8'	140663	X	X	X		X			
TPS9A; 5.5' - 6.0'	140664	X	X	X			X	X	
TPS11A	140665		X	X	X	X			
TPP4A; 1.9' - 2.9'	140666		X	X	X	X			X
TPPR2A; 7.0' - 8.0'	140667		X	X	X	X			
TPP6A; 3.6' - 3.8' and 5.3' - 6.3'	140668		X	X	X	X			

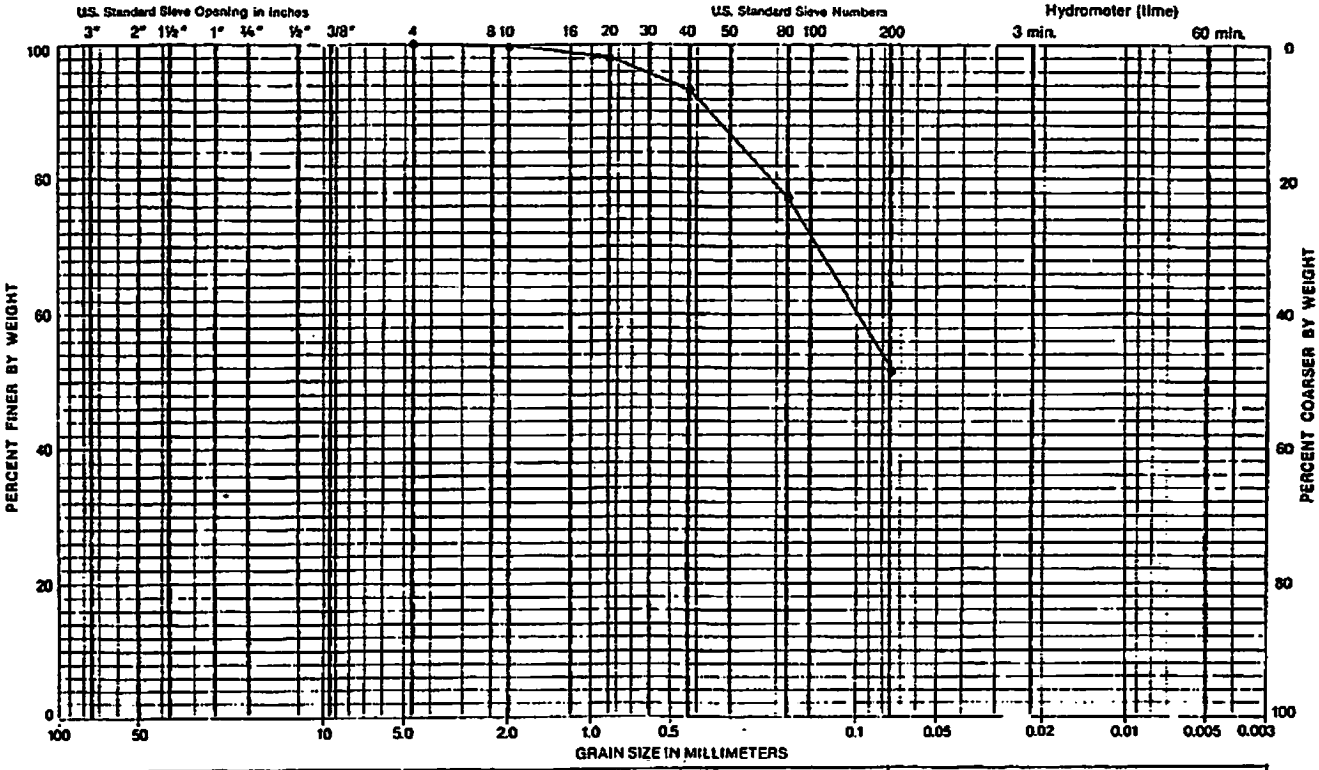
FH00289940

Northern Engineering and Testing, Inc.

MOISTURE - DENSITY RELATIONSHIP DATA

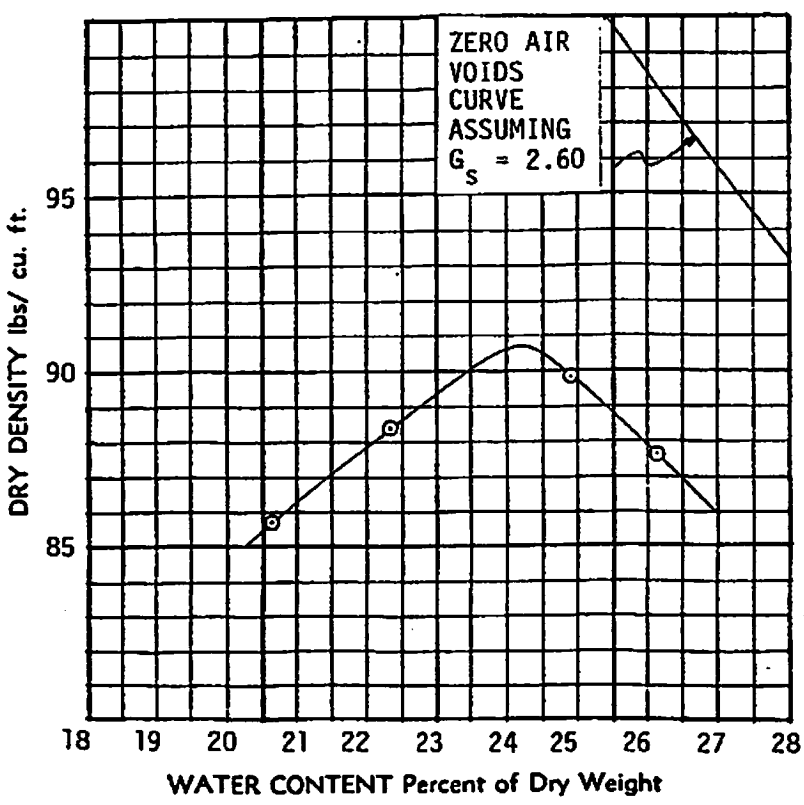
Client: Beker Industries
Location Sampled: TPP3A 4.3 - 5.3
Sampled By: _____ Date: _____

Sample No. 140659
Job No. 81-1404
Date: August 1984



Gravels		Sand			Fines	
Coarse	Fine	Coarse	Medium	Fine	Silts	Clay

MOISTURE-DENSITY RELATIONSHIP



TEST METHODS

ASTM D698
Method A
0.0333 cu. ft. mold
5.5 lb. hammer
12 in. drop
3 layers
25 blows/layer

SOIL CONSTANTS

Classification: SILT, Sandy (ML)
Liquid Limit: Granular
Plasticity Index: Non-plastic
Max. Density: 90.7 pcf
Optimum Moisture: 24.2 %

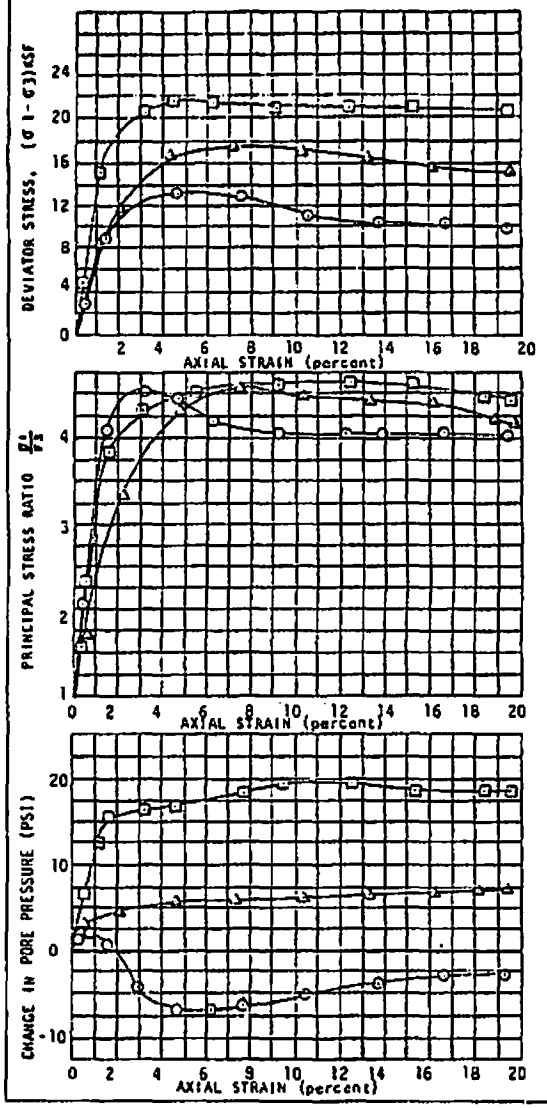
SOIL USE

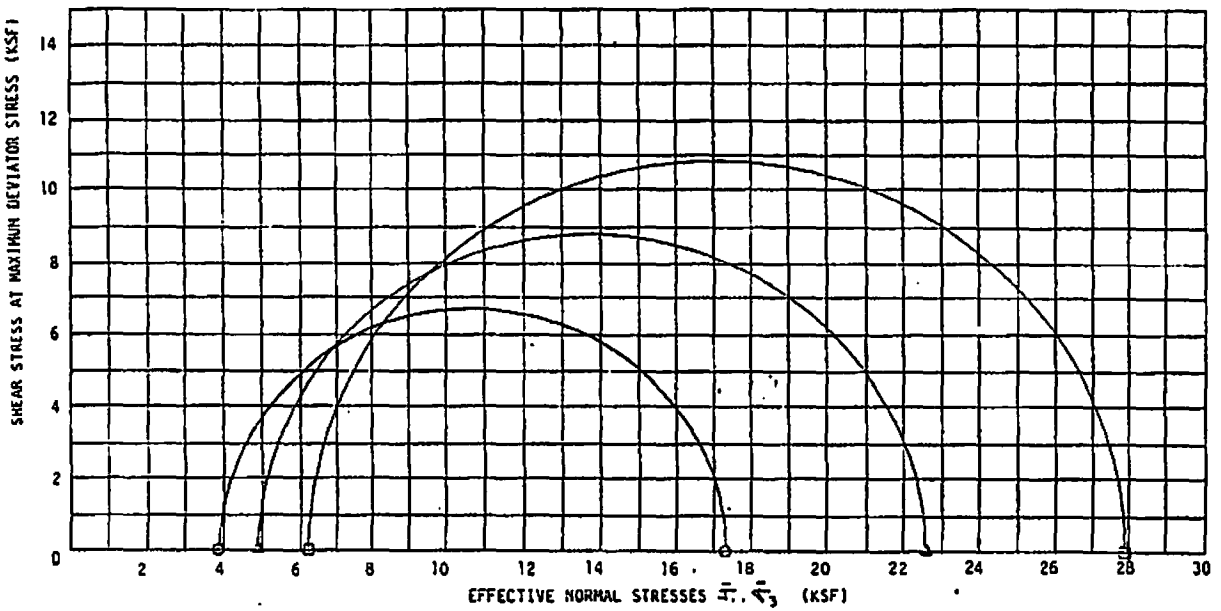
BEKER POND NO. 4

Project

FH0028941

CONSOLIDATED UNDRAINED TRIAXIAL SHEAR TEST - REMOLDED
SAMPLE NO. 140659





TEST NO. OR SYMBOL	BORING NO AND DEPTH	SAMPLE DATA: DRY DENSITY (pcf)	MOISTURE CONTENT (percent): Initial	MOISTURE CONTENT (percent): Final	PORE PRESSURE RESPONSE (percent)	CONFINING PRESSURE σ3, KSF	MAXIMUM DEVIATOR STRESS σ1 - σ3 KSF	MAXIMUM PRINCIPAL STRESS RATIO σ1/σ3	VALUES AT MOHR COULOMB FAILURE: MINOR PRINCIPAL STRESS σ3 KSF	VALUES AT MOHR COULOMB FAILURE: MAJOR PRINCIPAL STRESS σ KSF	HEIGHT TO DIAMETER RATIO	RATE OF STRAIN INCHES/MINUTE	
○	TPP3A 4.3-5.3	86	24	35	97	2.9	13.35	4.52	3.89	17.24	2.24	0.009	
△	TPP3A 4.3-5.3	86	24	34	98	5.8	17.65	4.55	4.97	22.62	2.24	0.009	
□	TPP3A 4.3-5.3	86	24	34	99	8.6	21.70	4.67	6.22	27.93	2.24	0.009	

Northern Engineering and Testing, Inc.

TRIAXIAL SHEAR TEST RESULTS

BEKER POND NO. 4

JOB NO.	DATE	PLATE NO.
81-1404	August 1984	

NET 157

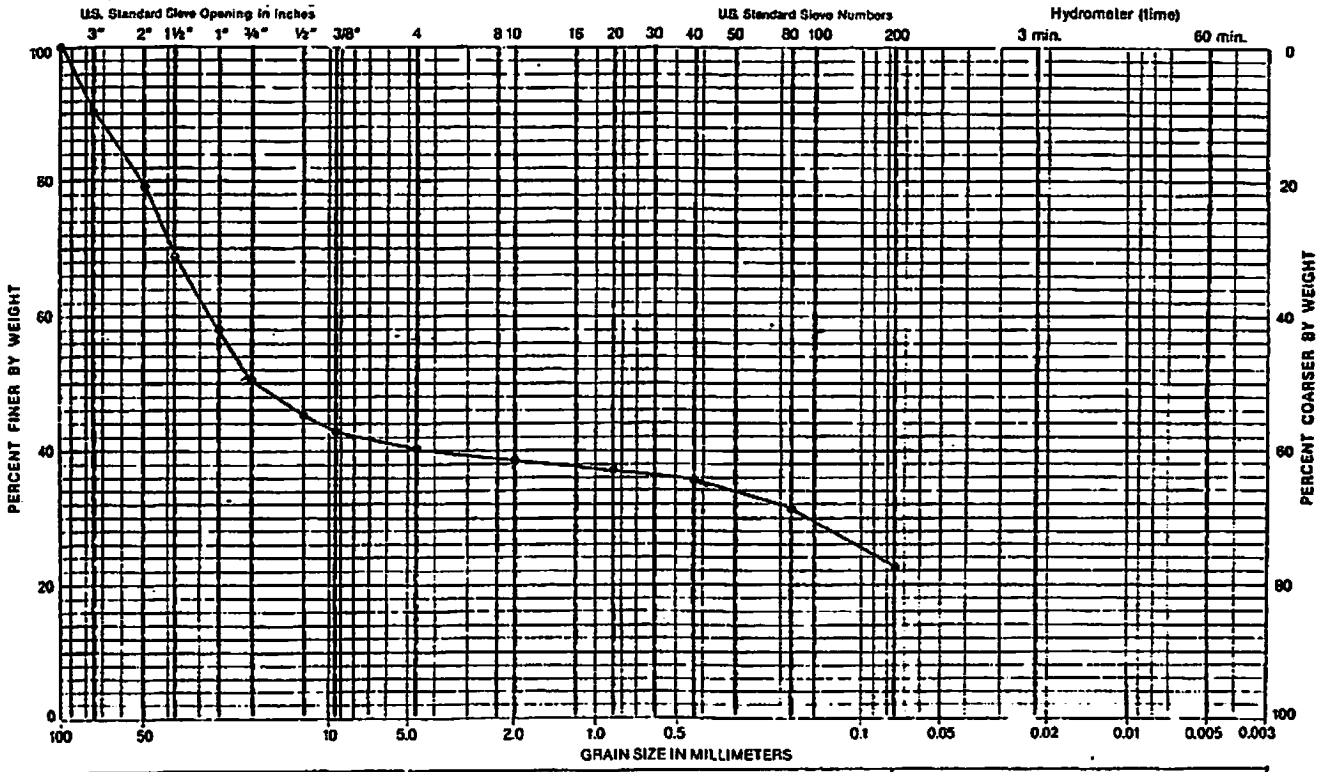
FH0028942

Northern Engineering and Testing, Inc.

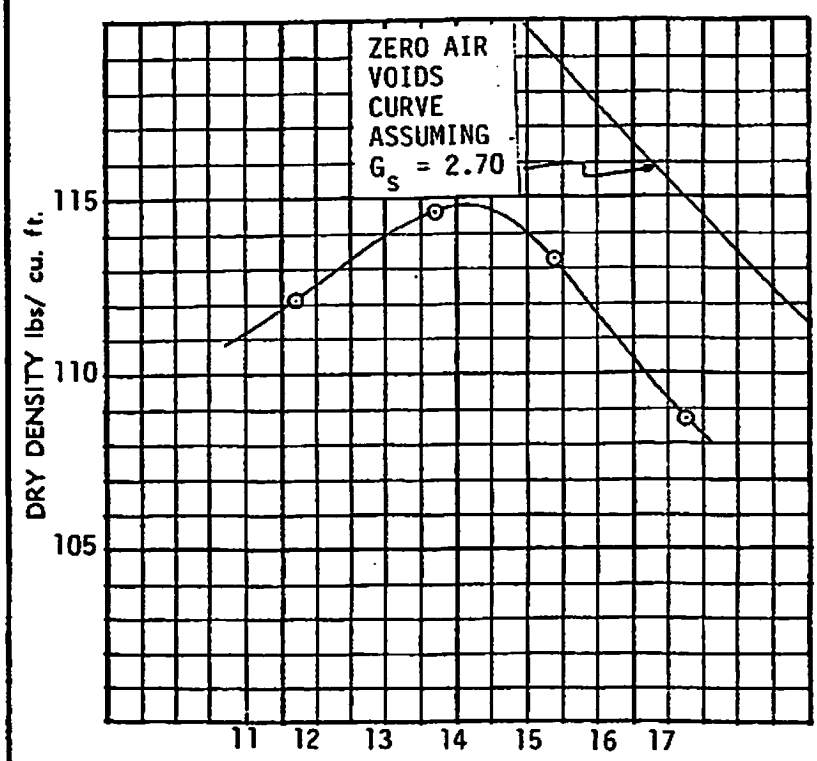
MOISTURE - DENSITY RELATIONSHIP DATA

Client: Beker Industries
Location Sampled: TPS4A 9.0 - 10.0
Sampled By: _____ Date: _____

Sample No. 140660
Job No. 81-1404
Date: August 1984



MOISTURE-DENSITY RELATIONSHIP



TEST METHODS

ASTM D698
Method A
0.0333 cu. ft. mold
5.5 lb. hammer
12 in. drop
3 layers
25 blows/layer

SOIL CONSTANTS

Classification: GRAVEL, Silty (GM)
Liquid Limit: 22
Plasticity Index: 1
Max. Density: 114.8 pcf
Optimum Moisture: 14.2 %

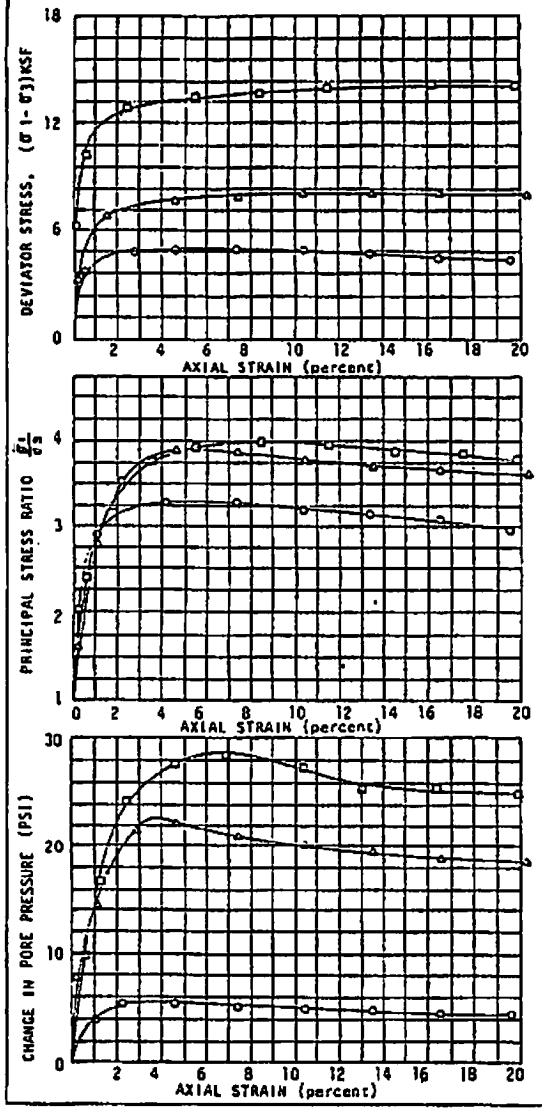
SOIL USE

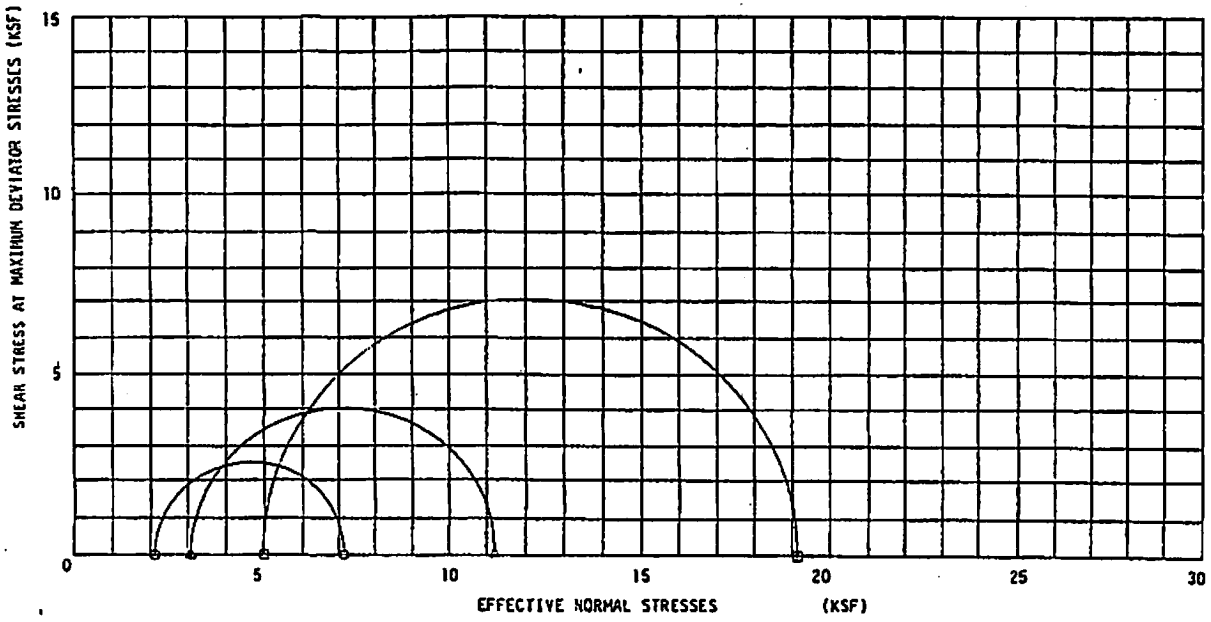
BEKER POND NO. 4

Project

FH0028943

UNCONSOLIDATED-UNDRAINED TRIAXIAL SHEAR TEST - REMOLDED
SAMPLE NO. 140660





TEST NO. OR SYMBOL	BORING NO. AND DEPTH	SAMPLE DATA: DRY DENSITY (pcf)	MOISTURE CONTENT (percent): Initial	MOISTURE CONTENT (percent): Final	PORE PRESSURE RESPONSE (percent)	CONFINING PRESSURE σ3 KSF	MAXIMUM DEVIATOR STRESS σ1 - σ3 KSF	MAXIMUM PRINCIPAL STRESS RATIO σ1/σ3	VALUES AT MOHR COULOMB FAILURE: MINOR PRINCIPAL STRESS σ3 KSF	VALUES AT MOHR COULOMB FAILURE: MAJOR PRINCIPAL STRESS σ1 KSF	HEIGHT TO DIAMETER RATIO	RATE OF STRAIN INCHES/MINUTE	
○	TPS4A 8.0-10.0	109.1	14.2	19.0	97	2.9	4.95	3.33	2.16	7.11	2.24	0.009	
△	TPS4A 9.0-10.0	109.1	14.2	18.3	98	5.8	8.10	3.91	3.07	11.17	2.24	0.009	
□	TPP4A 9.0-10.0	109.1	14.2	17.7	99	8.6	14.19	3.99	4.95	19.14	2.24	0.009	

Northern Engineering and Testing, inc.

TRIAXIAL SHEAR TEST RESULTS

BEKER POND NO. 4

JOB NO.	DATE	PLATE NO.
81-1404	August 1984	

NET 157

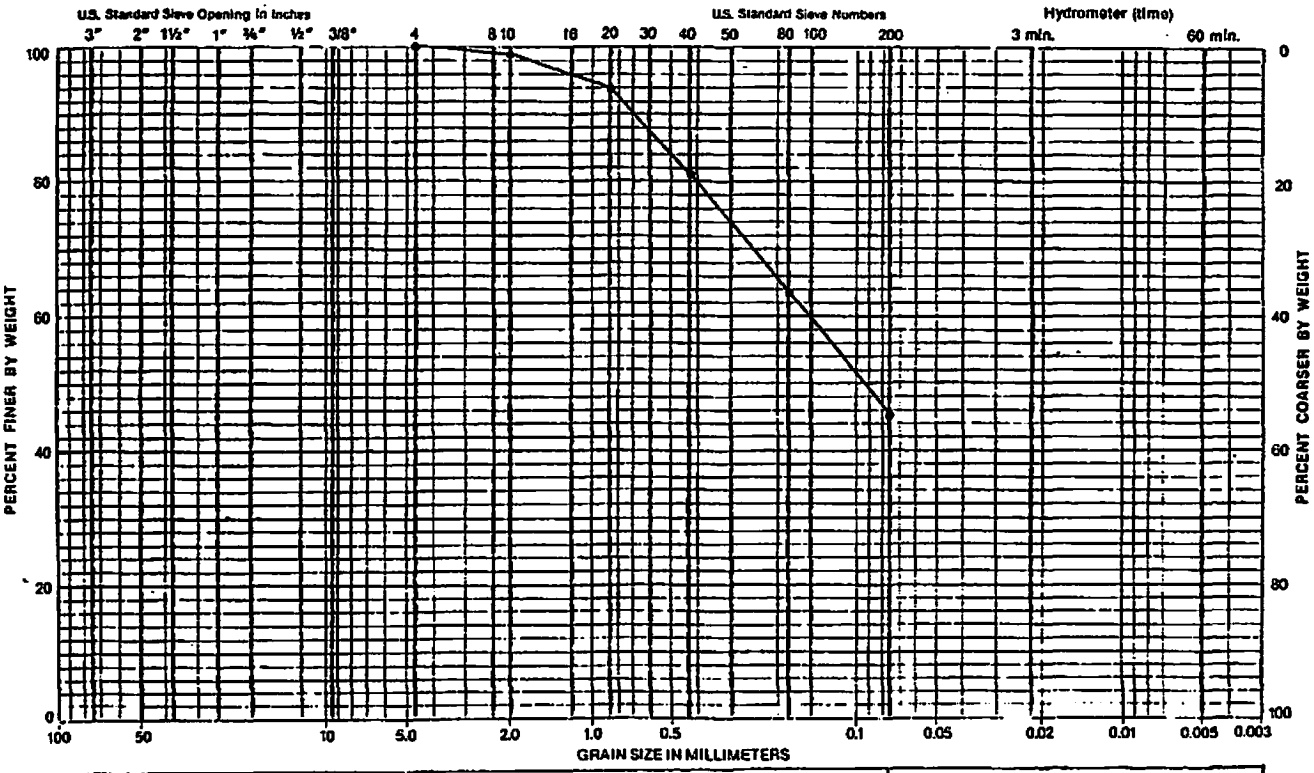
FH0028944

Northern Engineering and Testing, Inc.

MOISTURE - DENSITY RELATIONSHIP DATA

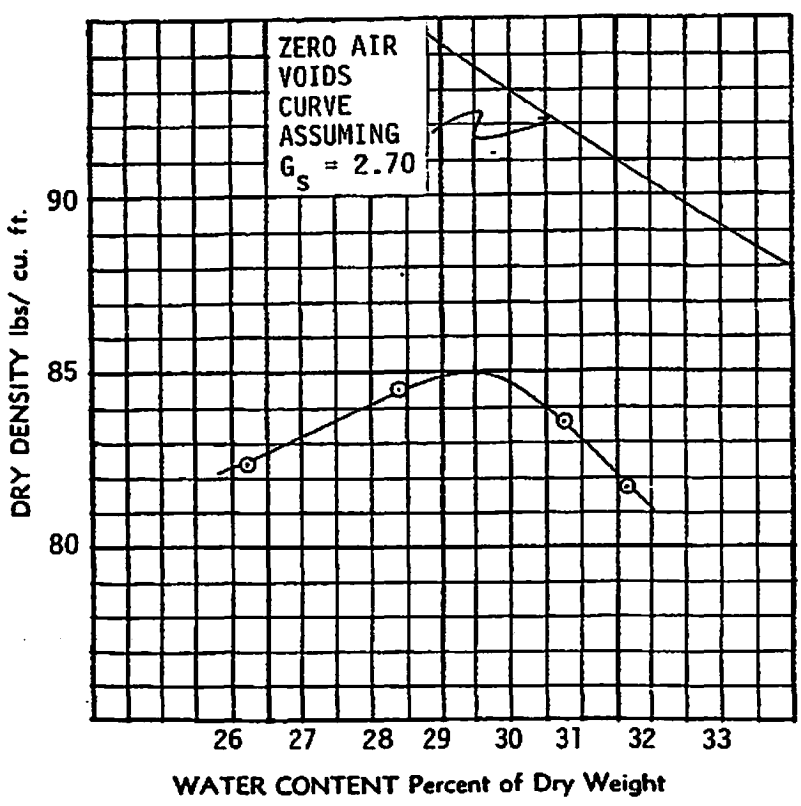
Client: Beker Industries
Location Sampled: TPPR3A 3.0 - 3.3
Sampled By: _____ Date: _____

Sample No. 140661
Job No. 81-1404
Date: August 1984



Gravels		Sand			Fines	
Coarse	Fine	Coarse	Medium	Fine	Silts	Clay

MOISTURE-DENSITY RELATIONSHIP



TEST METHODS

ASTM D698
Method A
0.0333 cu. ft. mold
5.5 lb. hammer
12 in. drop
3 layers
25 blows/layer

SOIL CONSTANTS

Classification: SAND, Silty (SM)
Liquid Limit: Granular
Plasticity Index: Non-plastic
Max. Density: 85.0 pcf
Optimum Moisture: 29.5 %

SOIL USE

BEKER POND NO. 4

Project

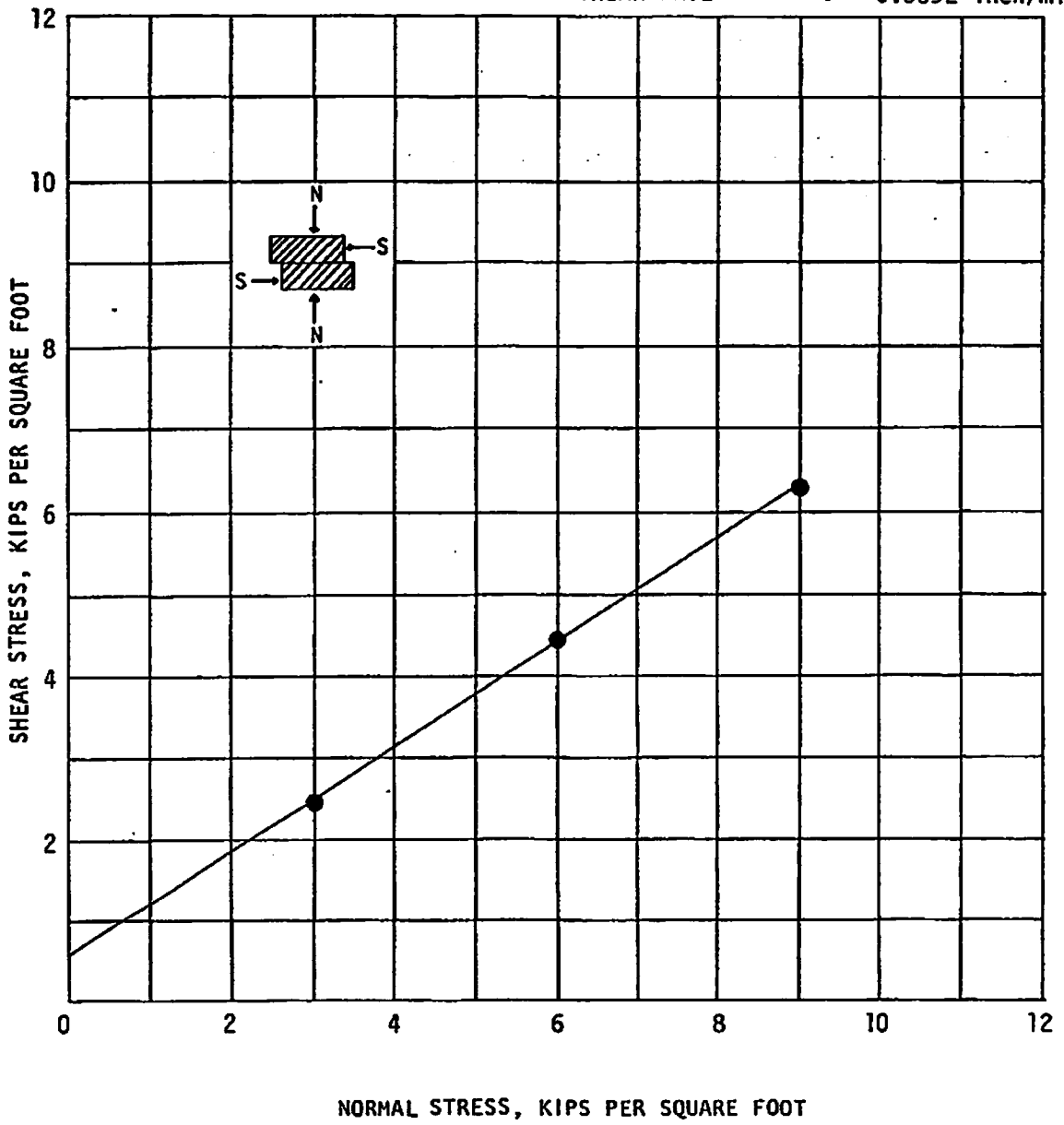
NET 116

FH0028945

REMOLDED
DIRECT SHEAR TEST

DRILL HOLE: TPPR3A
DEPTH: 3.0 - 3.3
SAMPLE NO.: 140661

MOIST UNIT WEIGHT: 104.6 pcf
DRY UNIT WEIGHT : 80.7 pcf
MOISTURE CONTENT : 29.5 %
CLASSIFICATION : SAND, Silty (SM)
FRICTION ANGLE : 32°
COHESION INTERCEPT: 0.6 ksf
SHEAR RATE : 0.0092 inch/minute



● SATURATED
○ FIELD MOISTURE CONTENT

BEKER POND NO. 4

BEKER INDUSTRIES

Northern Engineering and Testing, Inc.

JOB NO. 81-1404 PLATE NO.

NET 159

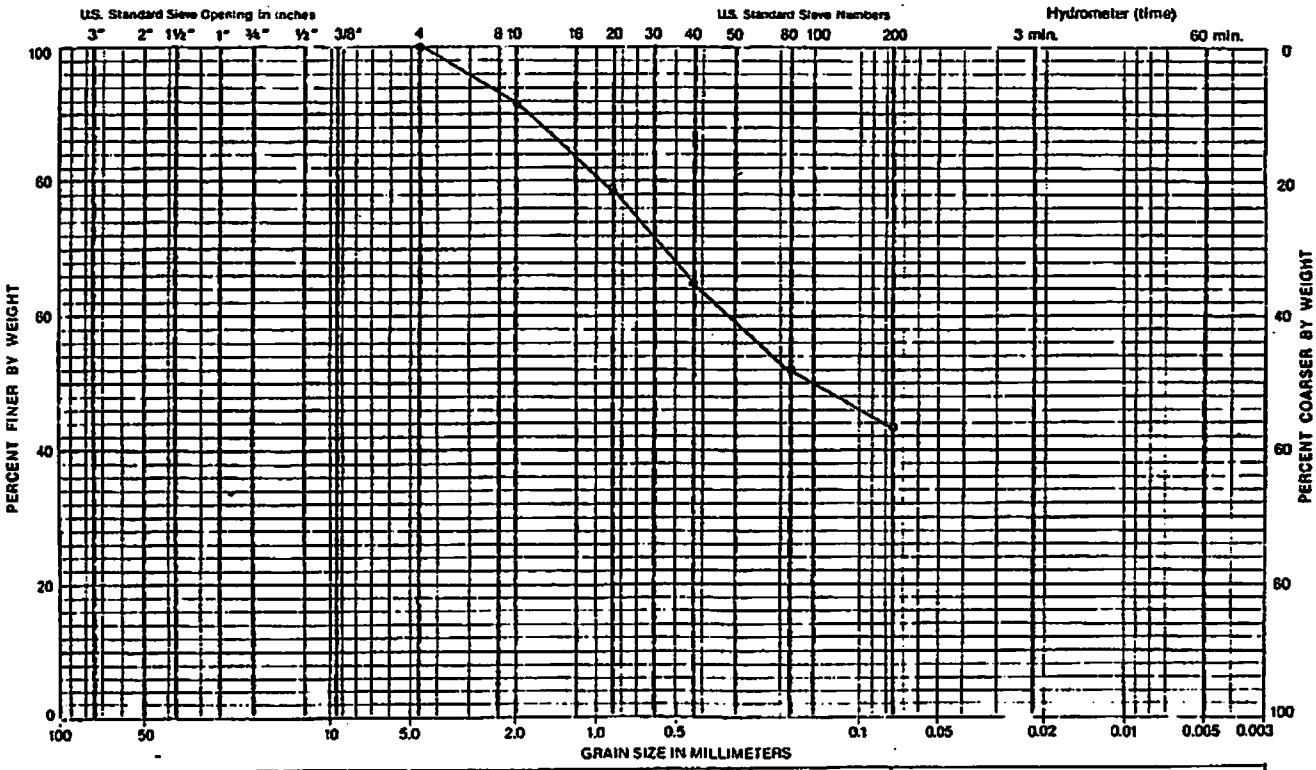
FH0028946

Northern Engineering and Testing, Inc.

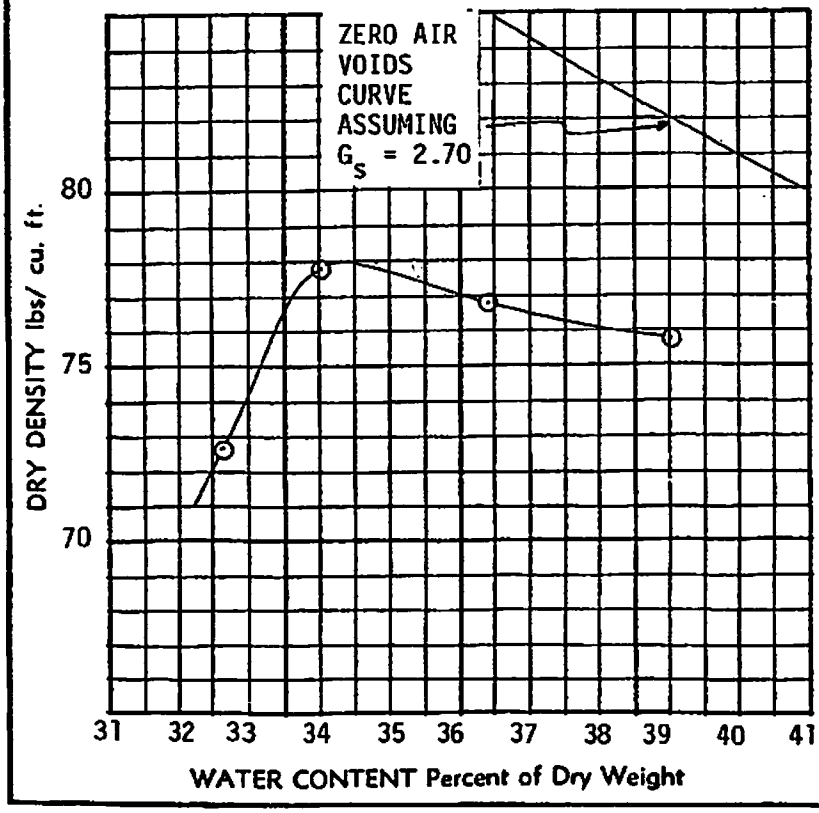
MOISTURE - DENSITY RELATIONSHIP DATA

Client: Beker Industries
Location Sampled: TPP2A 2.0 - 3.3
Sampled By: _____ Date: _____

Sample No. 140662
Job No. 81-1404
Date: August 1984



MOISTURE-DENSITY RELATIONSHIP



TEST METHODS

ASTM D698
Method A
0.0333 cu. ft. mold
5.5 lb. hammer
12 in. drop
3 layers
25 blows/layer

SOIL CONSTANTS

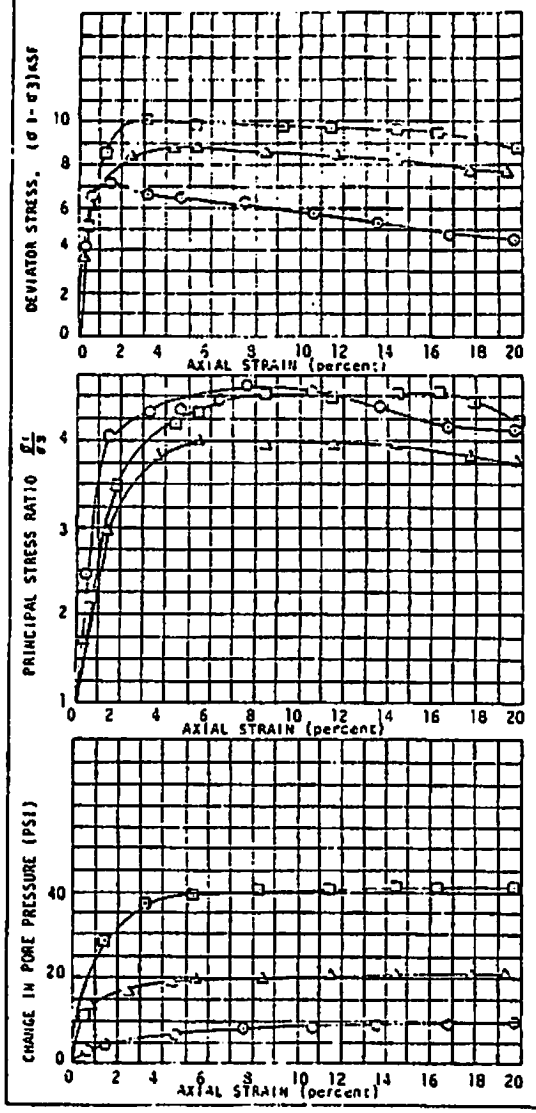
Classification: SAND, Silty (SM)
Liquid Limit: Granular
Plasticity Index: Non-plastic
Max. Density: 78 pcf
Optimum Moisture: 34.4 %
Coefficient of Permeability: 4×10^{-5} cm/sec.

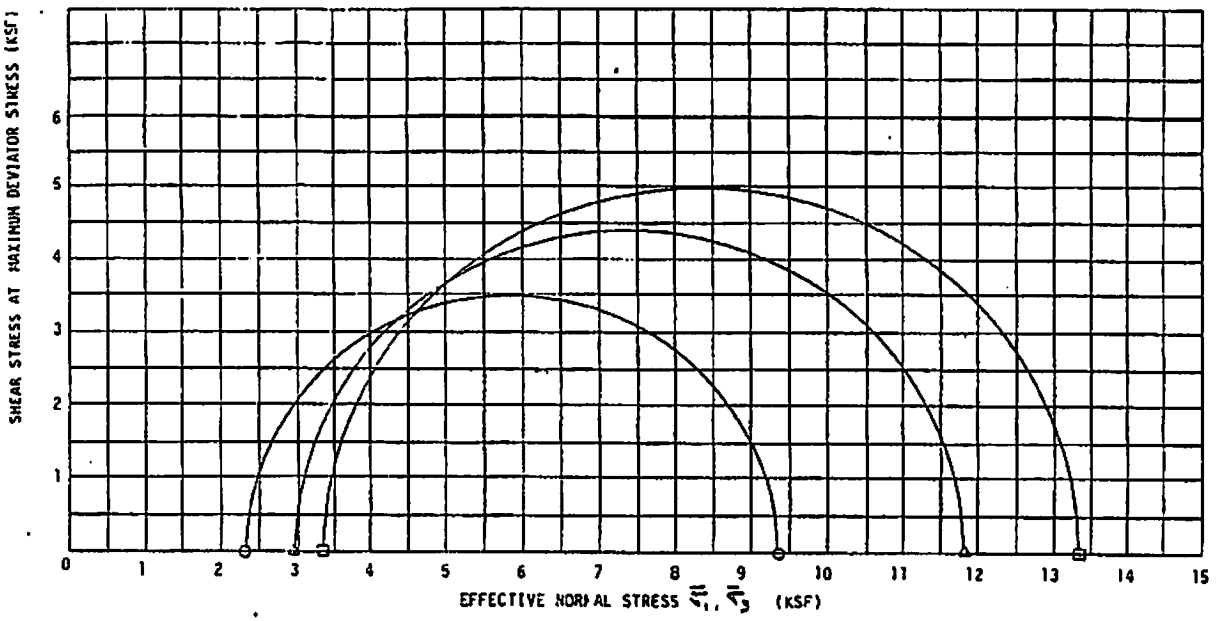
SOIL USE

BEKER POND NO. 4
Project

FH0028947

CONSOLIDATED UNDRAINED TRIAXIAL SHEAR TEST - REMOLDED
SAMPLE NO. 140662





TEST NO OR SYMBOL	BORING NO AND DEPTH	SAMPLE DATA: DRY DENSITY (pcf)	MOISTURE CONTENT (percent) Initial	MOISTURE CONTENT (percent) Final	PORE PRESSURE RESPONSE (percent)	CONFINING PRESSURE σ3 KSF	MAXIMUM DEVIATOR STRESS σ1-σ3 KSF	MAXIMUM PRINCIPAL STRESS RATIO σ1/σ3	VALUES AT MOHR COULOMB FAILURE: MINOR PRINCIPAL STRESS σ3 KSF	MAJOR PRINCIPAL STRESS σ1 KSF	HEIGHT TO DIAMETER RATIO	RATE OF STRAIN INCHES/MINUTE	
○	TPP2A 2.0-3.3	74	34	44	99	2.9	7.04	4.63	2.30	9.34	2.24	0.009	
△	TPP2A 2.0-3.3	74	34	43	98	5.8	8.86	4.00	2.95	11.81	2.24	0.009	
□	TPP2A 2.0-3.3	74	34	42	99	8.6	10.04	4.52	3.31	13.35	2.24	0.009	

Northern Engineering and Testing, Inc.

TRIAXIAL SHEAR TEST RESULTS

BEKER POND NO. 4

JOB NO.	DATE	PLATE NO.
81-1404	August 1984	

NET 157

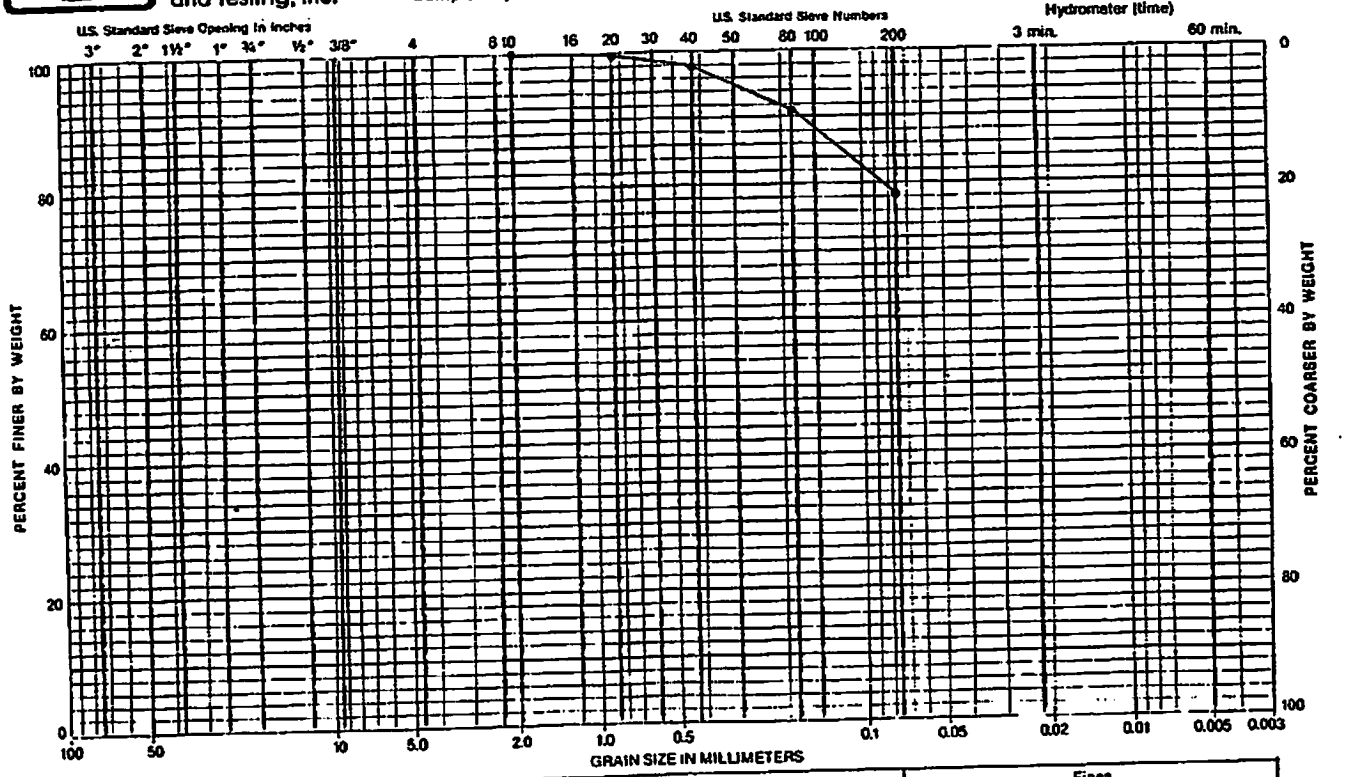
FH0028948

Northern Engineering and Testing, Inc.

MOISTURE - DENSITY RELATIONSHIP DATA

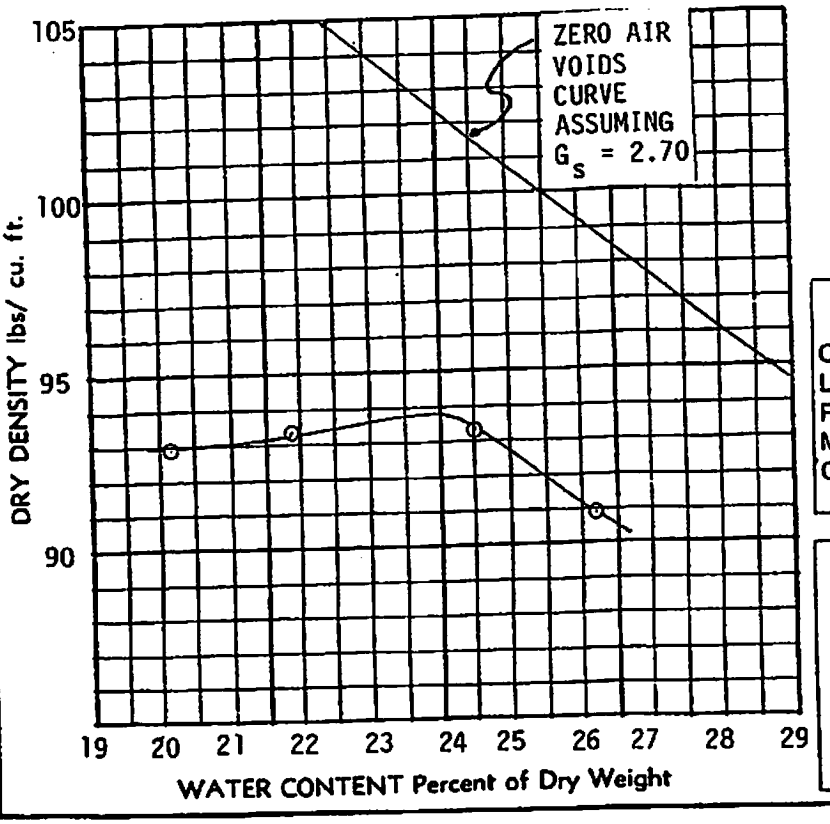
Client: Beker Industries
Location Sampled: TPP10A 3.3 - 3.8
Sampled By: _____ Date: _____

Sample No. 140663
Job No. 81-1404
Date: August 1984



Gravels		Sand			Fines	
Coarse	Fine	Coarse	Medium	Fine	Silts	Clay

MOISTURE-DENSITY RELATIONSHIP



TEST METHODS

ASTM D698
Method A
0.0333 cu. ft. mold
5.5 lb. hammer
12 in. drop
3 layers
25 blows/layer

SOIL CONSTANTS

Classification: SILT, Sandy (SM)
Liquid Limit: Granular
Plasticity Index: Non-plastic
Max. Density: 93.7 pcf
Optimum Moisture: 24.2 %

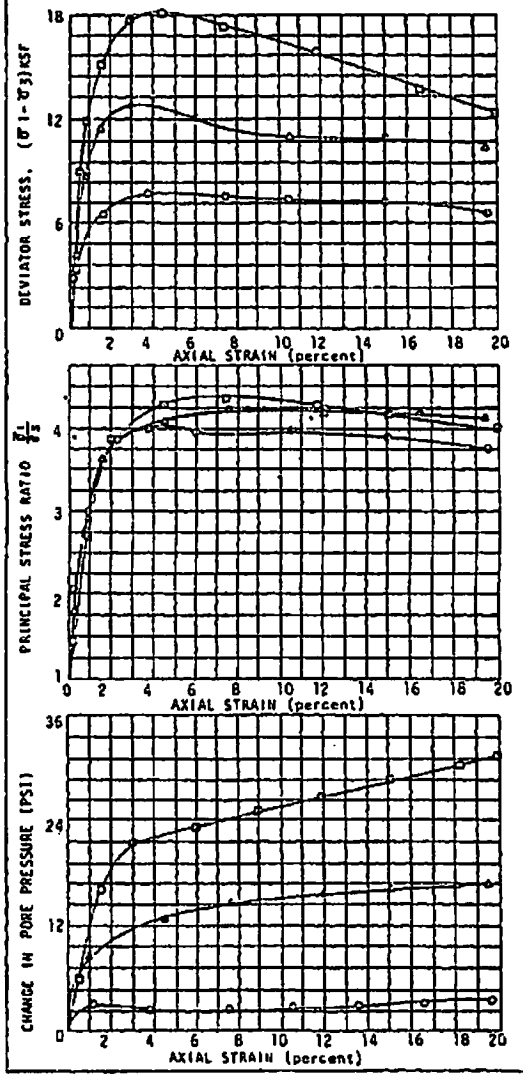
SOIL USE

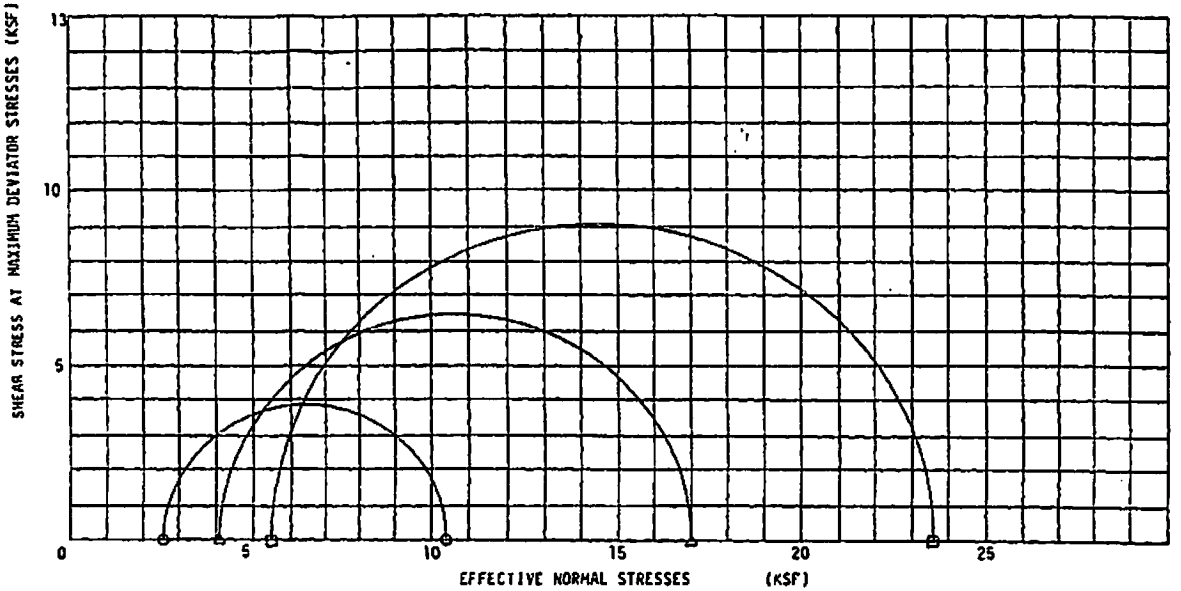
BEKER POND NO. 4

Project

FH0028949

CONSOLIDATED-UNDRAINED TRIAXIAL SHEAR TEST - REMOLDED
SAMPLE NO. 140663





TEST NO OR SYMBOL	BORING NO. AND DEPTH	SAMPLE DATA: DRY DENSITY (pcf)	MOISTURE CONTENT (percent): Initial	MOISTURE CONTENT (percent): Final	PORE PRESSURE RESPONSE (percent)	CONFINING PRESSURE σ3 KSF	MAXIMUM DEVIATOR STRESS σ1-σ3 KSF	MAXIMUM PRINCIPAL STRESS RATIO σ1/σ3	VALUES AT MOHR COULOMB FAILURE: MINOR PRINCIPAL STRESS σ3 KSF	VALUES AT MOHR COULOMB FAILURE: MAJOR PRINCIPAL STRESS σ KSF	HEIGHT TO DIAMETER RATIO	RATE OF STRAIN INCHES/MINUTE	
○	TPP10A 3.3-3.8	80.2	24.2	31.5	97	2.90	7.74	4.00	2.58	10.32	2.24	0.009	
△	TPP10A 3.3-3.8	80.2	24.2	30.7	97	5.80	12.85	4.23	4.16	17.01	2.24	0.009	
□	TPP10A 3.3-3.8	80.2	24.2	30.7	99	8.60	18.12	4.35	5.53	23.65	2.24	0.009	

Northern Engineering and Testing Inc

TRIAXIAL SHEAR TEST RESULTS		
BEKER POND NO. 4		
JOB NO.	DATE	PLATE NO.
81-1404	August 1984	

NET 157

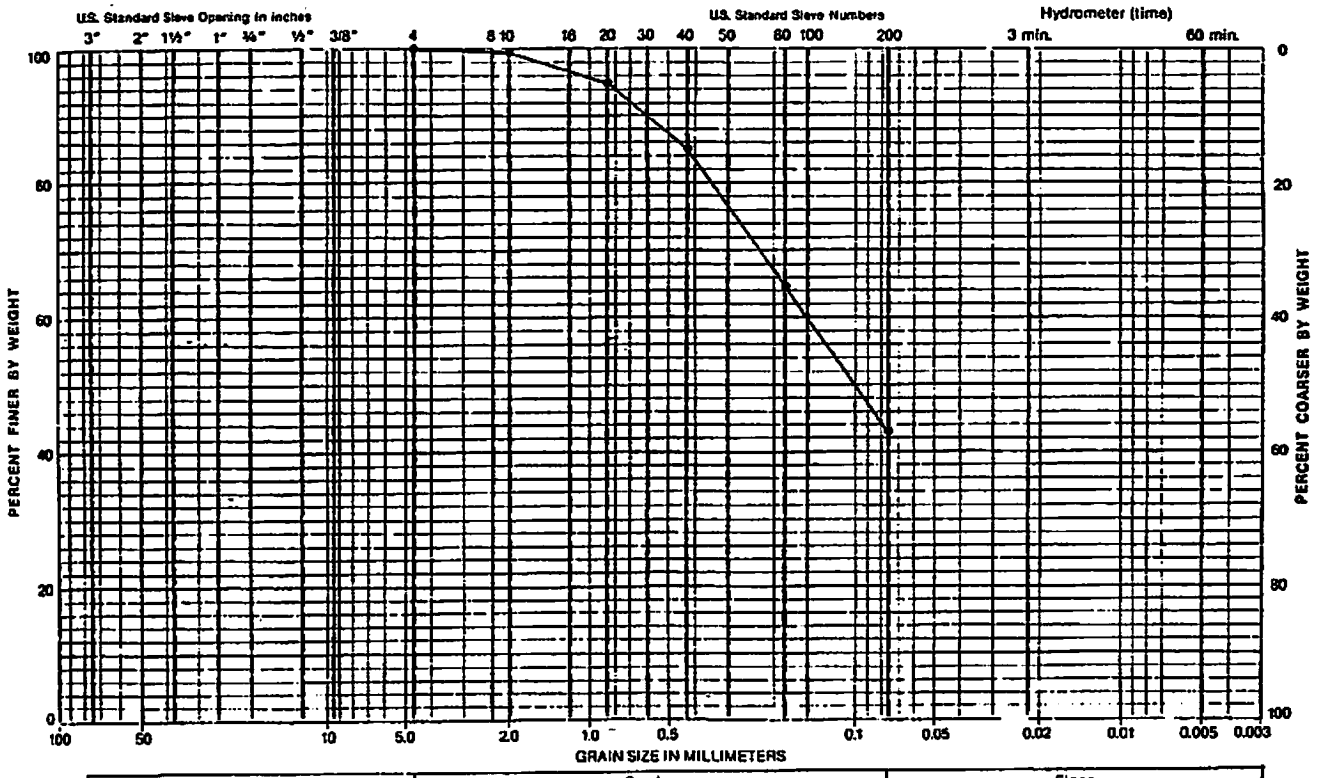
FH0028950

Northern Engineering and Testing, Inc.

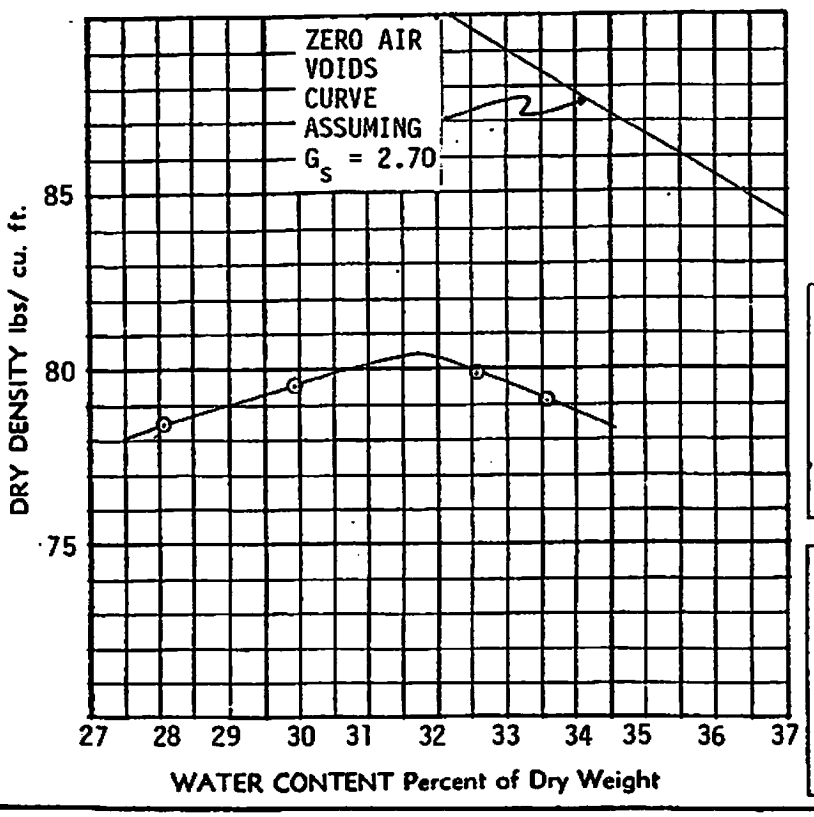
MOISTURE - DENSITY RELATIONSHIP DATA

Client: Beker Industries
Location Sampled: TPS9A 5.5 - 6.0
Sampled By: _____ Date: _____

Sample No. 140664
Job No. 81-1404
Date: August 1984



MOISTURE-DENSITY RELATIONSHIP



TEST METHODS

ASTM D698
Method A
0.0333 cu. ft. mold
5.5 lb. hammer
12 in. drop
3 layers
25 blows/layer

SOIL CONSTANTS

Classification: SAND, Silty (SM)
Liquid Limit: Granular
Plasticity Index: Non-plastic
Max. Density: 80.4 pcf
Optimum Moisture: 31.7 %
Coefficient of Permeability: 5×10^{-4} cm/sec

SOIL USE

BEKER POND NO. 4

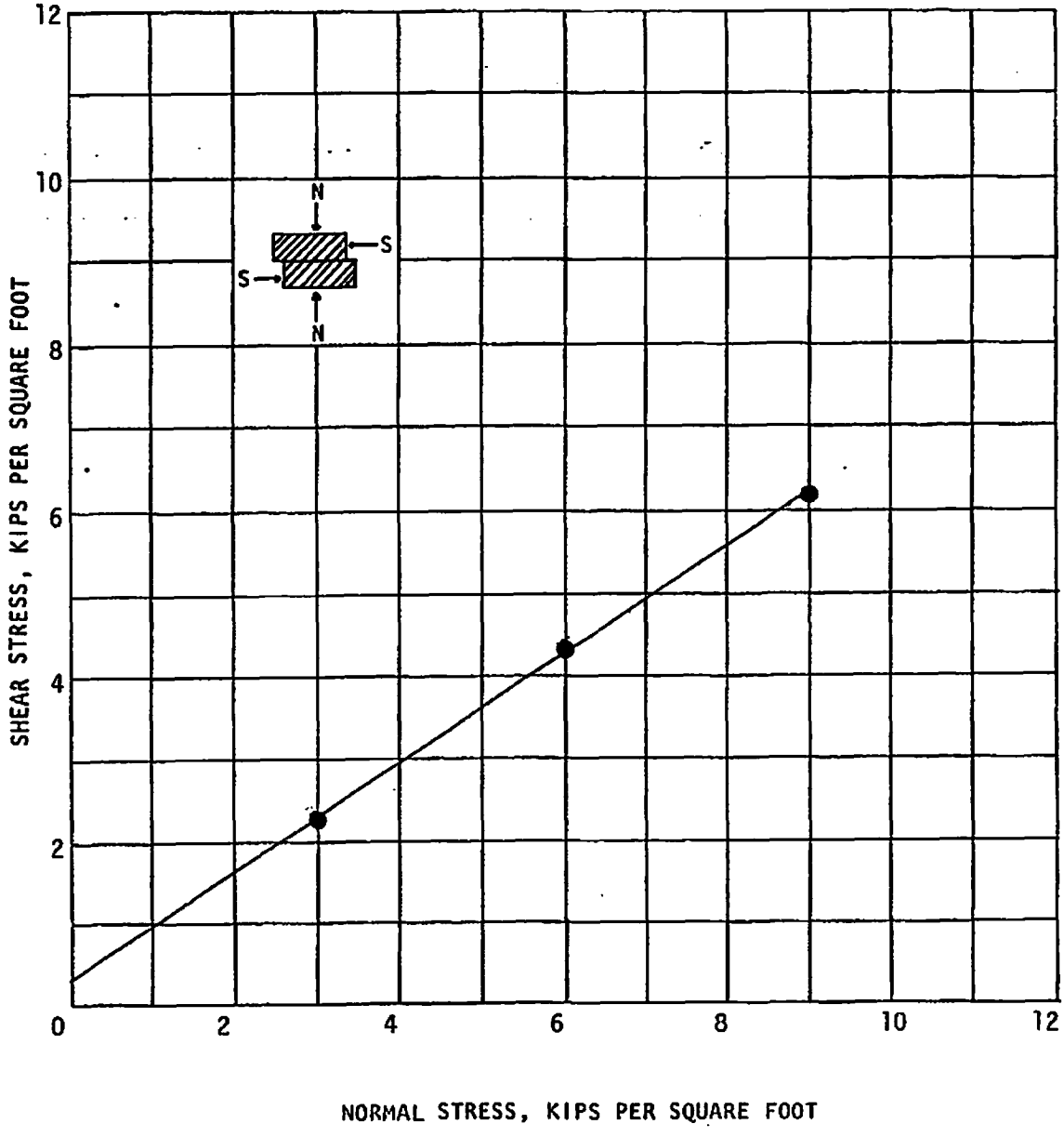
Project

FH0028951

REMOLDED
DIRECT SHEAR TEST

DRILL HOLE: TPS9A
DEPTH: 5.5 - 6.0
SAMPLE NO.: 140664

MOIST UNIT WEIGHT: 100.6 pcf
DRY UNIT WEIGHT : 76.8 pcf
MOISTURE CONTENT : 31.7 %
CLASSIFICATION : SAND, Silty (SM)
FRICTION ANGLE : 33°
COHESION INTERCEPT: 0.4 ksf
SHEAR RATE : 0.0092 inch/minute



● SATURATED
○ FIELD MOISTURE CONTENT

BEKER POND NO. 4	Northern Engineering and Testing, Inc.
BEKER INDUSTRIES	JOB NO. 81-1404 PLATE NO.

NET 159

FH0028952

Northern

Engineering and Testing, Inc.

GRAIN SIZE DISTRIBUTION CURVE

Project: Beker Pond No. 4

Sample No. 140665

Location: TPS11A 6.5 - 7.5

Job No. 81-1404

Classification CLAY, Silty - CL-ML

Date August 1984

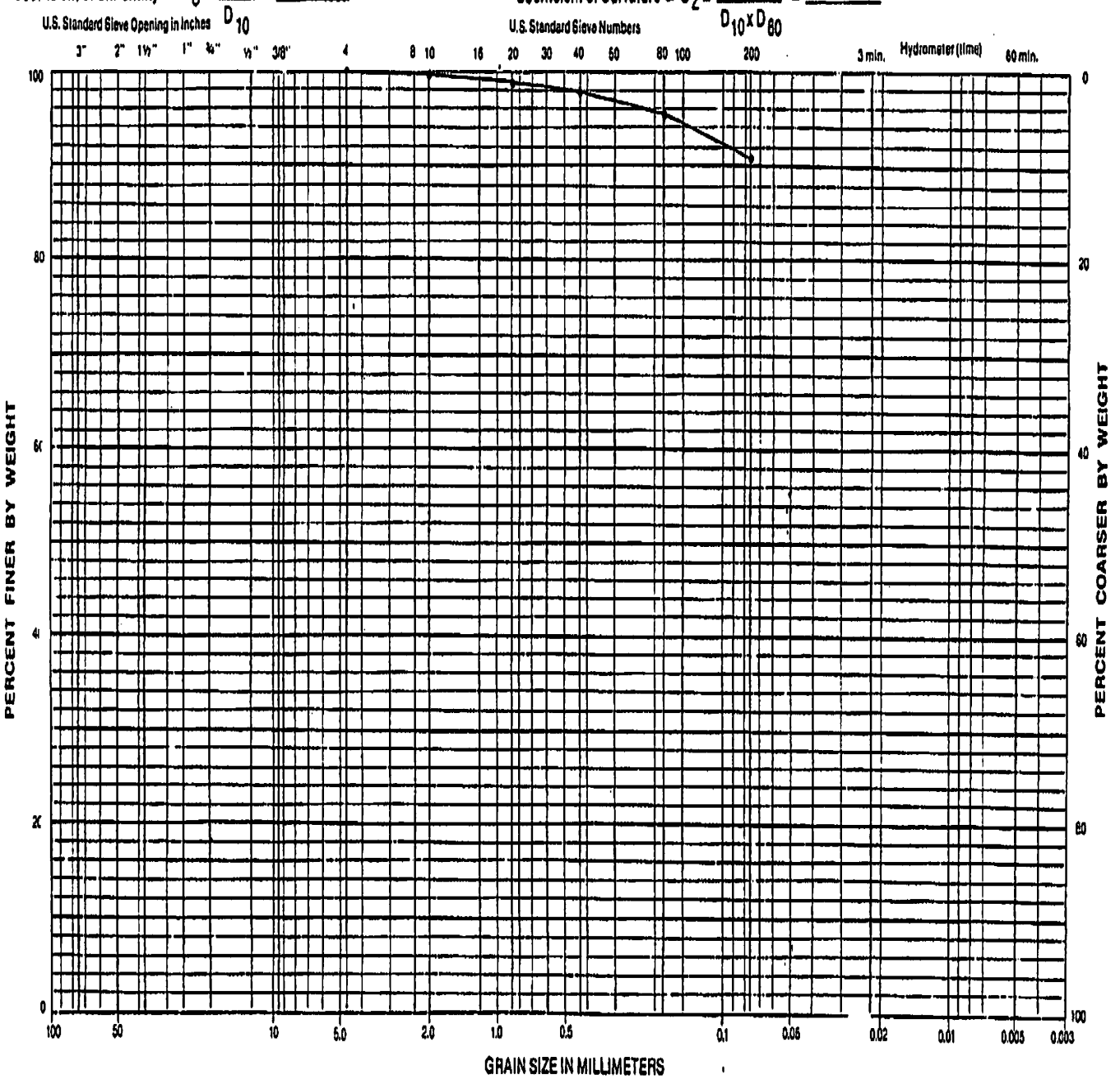
Moisture Content _____ %

Liquid Limit 25 %

Plasticity Index 4 %

Coefficient of Uniformity $= C_U = \frac{D_{60}}{D_{10}} =$ _____

Coefficient of Curvature $= C_Z = \frac{(D_{30})^2}{D_{10} \times D_{60}} =$ _____



Gravel		Sand			Fines	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

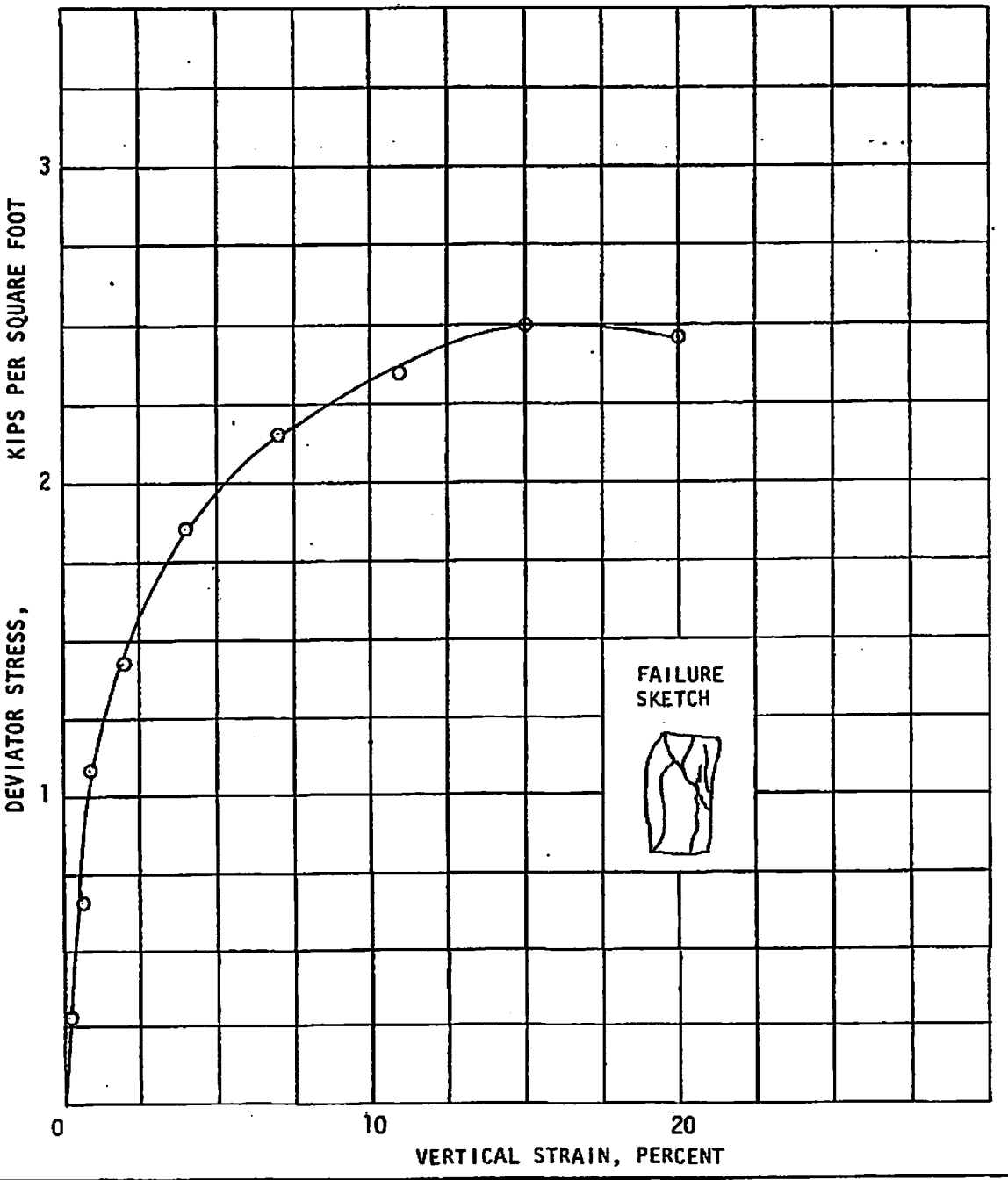
NET-105

FH0028953

UNCONSOLIDATED - UNDRAINED
TRIAXIAL SHEAR TEST

DRILL HOLE TPS11A
DEPTH 6.5 - 7.5
SAMPLE NO. 140665
CONFINING STRESS: 3.0 ksf
PORE PRESSURE RESPONSE: --

MOIST UNIT WEIGHT: 122 pcf
DRY UNIT WEIGHT: 97 pcf
MOISTURE CONTENT: 26 %
CLASSIFICATION: CLAY, Silty - CL-ML
HEIGHT TO DIAMETER RATIO: 2.08
RATE OF STRAIN: 0.03 inch/minute



BEKER POND NO. 4

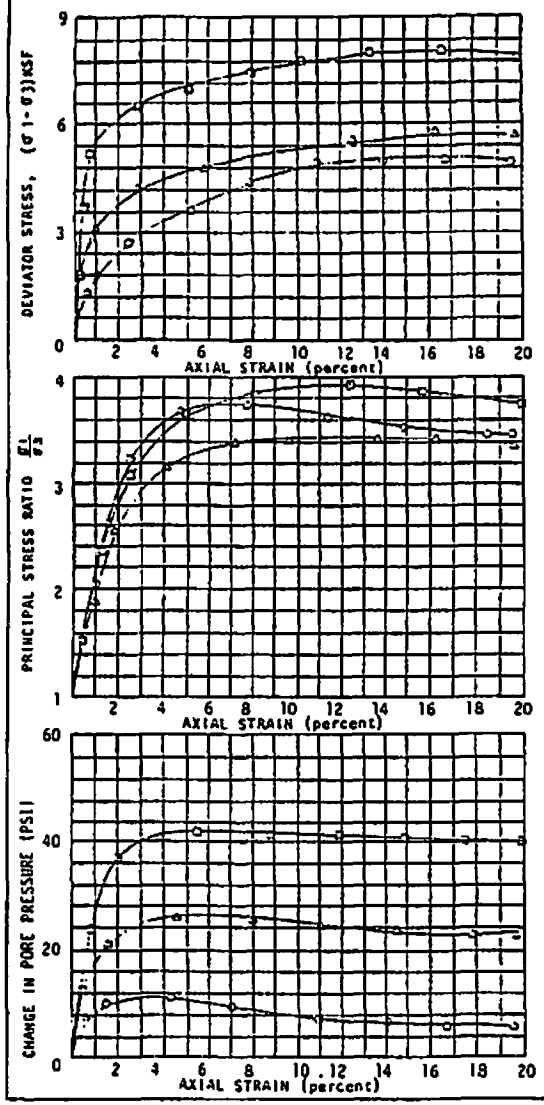
Northern Engineering and Testing, Inc.

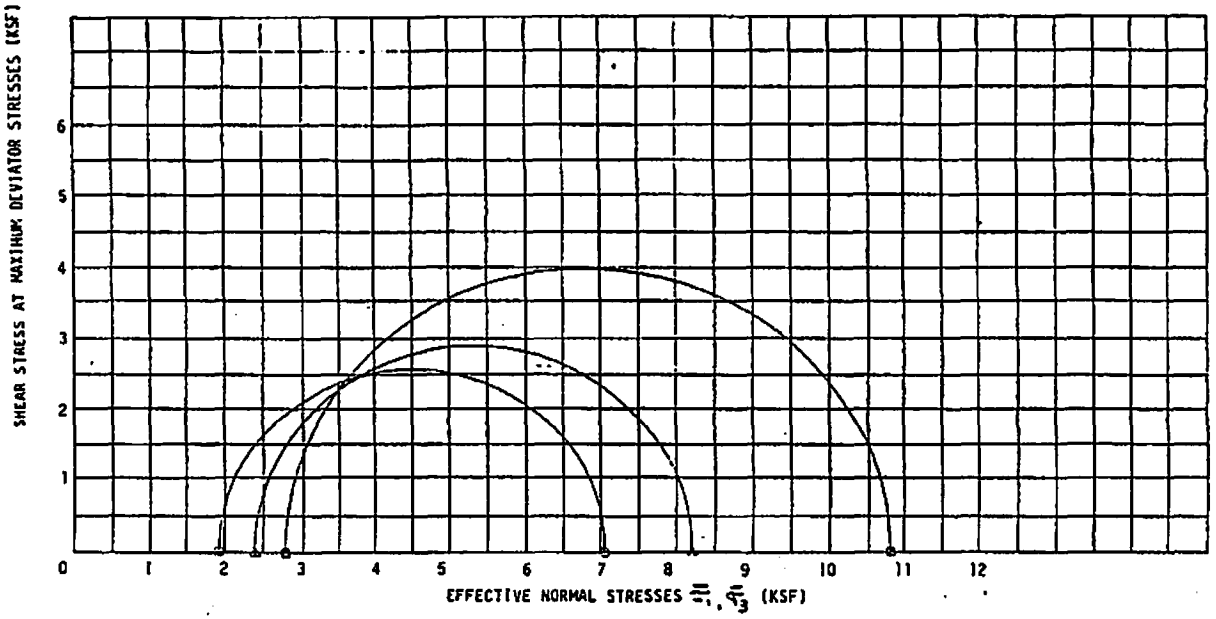
JOB NO. 81-1404 PLATE NO.

NET 155

FH0028954

CONSOLIDATED-UNDRAINED TRIAXIAL SHEAR TEST - UNDISTURBED
SAMPLE NO. 140665





TEST NO OR SYMBOL	BORING NO. AND DEPTH	SAMPLE DATA: DRY DENSITY (pcf)	MOISTURE CONTENT (percent): Initial	MOISTURE CONTENT (percent): Final	PORE PRESSURE RESPONSE (percent)	CONFINING PRESSURE σ3 KSF	MAXIMUM DEVIATOR STRESS σ1 - σ3 KSF	MAXIMUM PRINCIPAL STRESS RATIO σ1/σ3	VALUES AT MOHR COULOMB FAILURE: MINOR PRINCIPAL STRESS σ3 KSF	VALUES AT MOHR COULOMB FAILURE: MAJOR PRINCIPAL STRESS σ KSF	HEIGHT TO DIAMETER RATIO	RATE OF STRAIN INCHES/MINUTE	
○	TPS11A 6.5-7.5	92	27	24	99	2.9	5.05	3.77	1.97	7.03	2.00	0.0024	
△	TPS11A 6.5-7.5	94	28	24	99	5.8	5.79	3.43	2.39	8.18	2.09	0.0024	
□	TPS11A 6.5-7.5	94	28	23	99	8.6	8.04	3.93	2.78	10.82	2.09	0.0024	

Northern Engineering and Testing, Inc

TRIAXIAL SHEAR TEST RESULTS

BEKER POND NO. 4

JOB NO.	DATE	PLATE NO.
81-1404	August 1984	

NET 157

FH0028955

Northern

Engineering and Testing, Inc.

GRAIN SIZE DISTRIBUTION CURVE

Project: Beker Pond No. 4

Sample No. 140666

Location: TPP4A 1.9 - 2.9

Job No. 81-1404

Classification CLAY, Silty, CL

Date August 1984

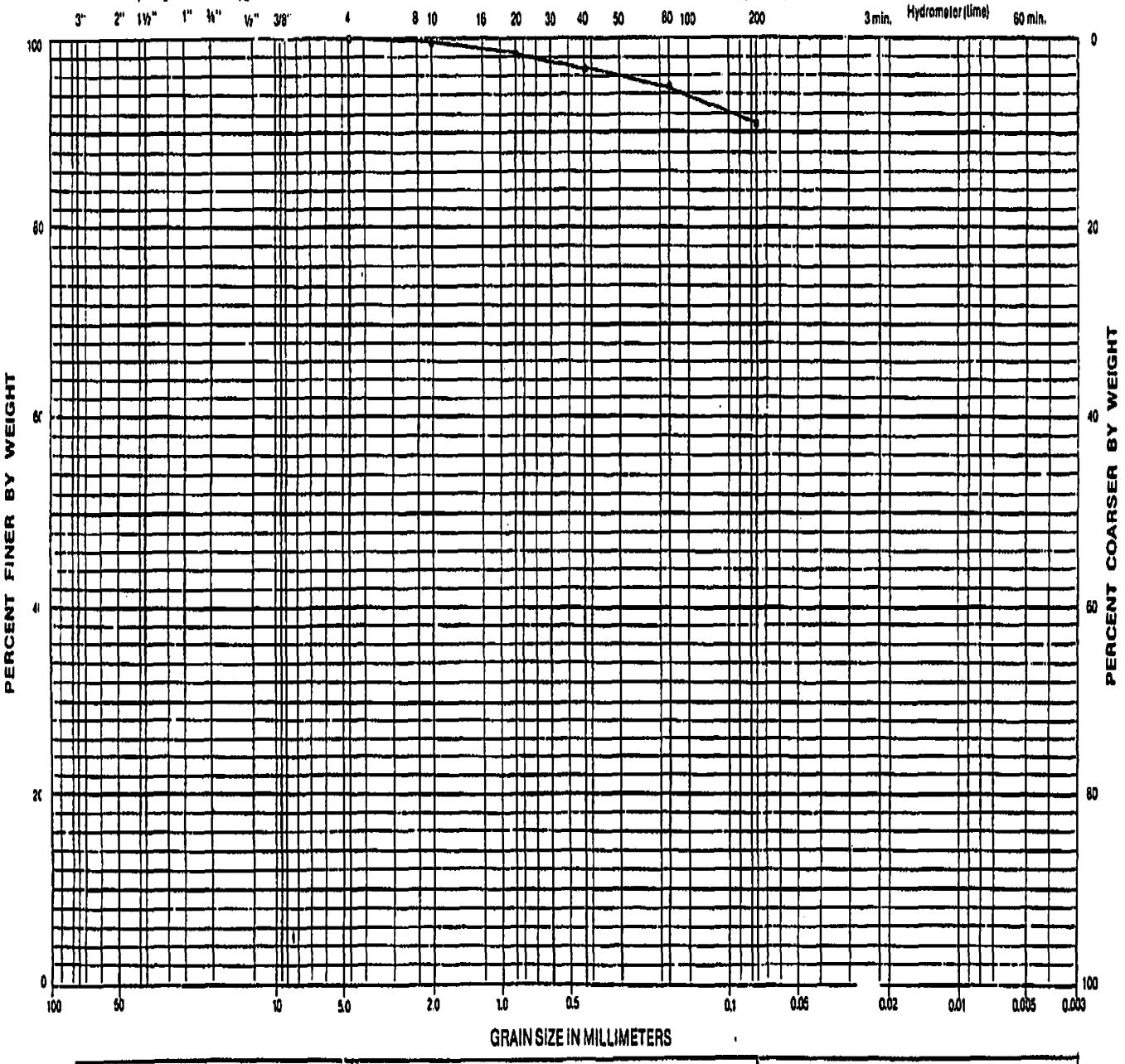
Moisture Content _____ %

Liquid Limit 29 %

Plasticity Index 9 %

Coefficient of Uniformity = $C_U = \frac{D_{60}}{D_{10}}$ = _____

Coefficient of Curvature = $C_Z = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ = _____



Gravel		Sand			Fines	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

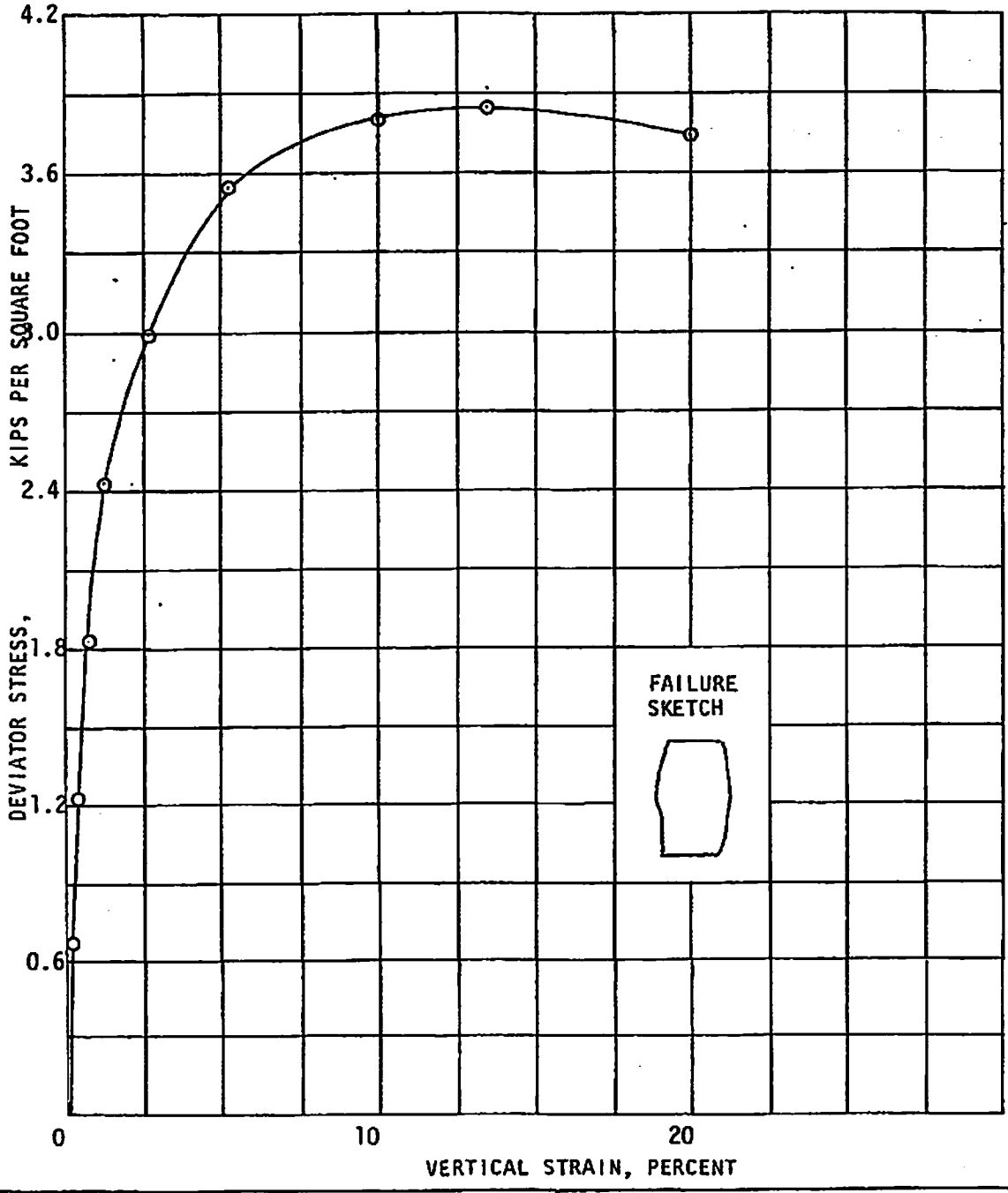
NET-105

FH00028956

UNCONSOLIDATED - UNDRAINED
TRIAXIAL SHEAR TEST

DRILL HOLE TPP4A
DEPTH 1.9 - 2.9
SAMPLE NO. 140666
CONFINING STRESS: 3 KSF
PORE PRESSURE RESPONSE:

MOIST UNIT WEIGHT: 100 pcf
DRY UNIT WEIGHT: 82 pcf
MOISTURE CONTENT: 21 %
CLASSIFICATION: CLAY, Silty, CL
HEIGHT TO DIAMETER RATIO: 2.06
RATE OF STRAIN: 0.030 inch/minute



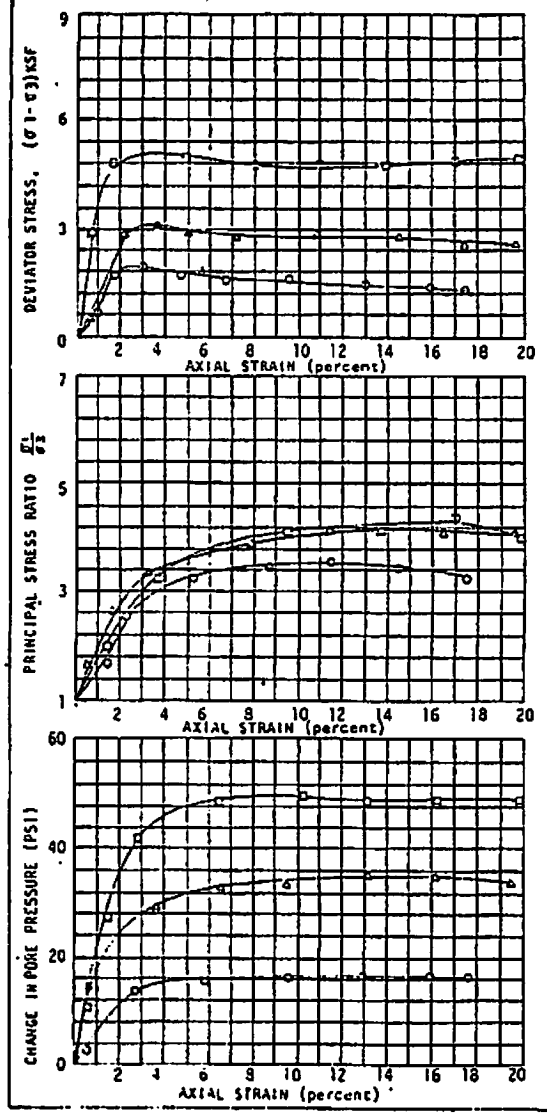
BEKER POND NO. 4

Northern Engineering and Testing, Inc.

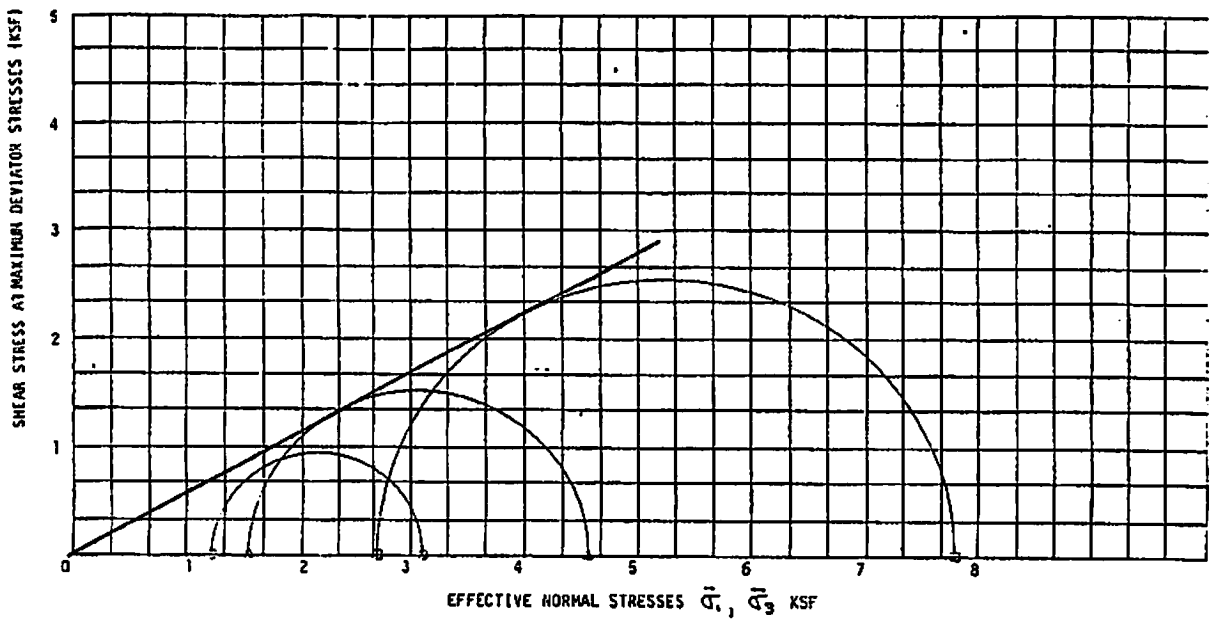
JOB NO. 81-1404 PLATE NO.

NET 155

FH0028957



CONSOLIDATED-UNDRAINED TRIAXIAL SHEAR TEST - UNDISTURBED
SAMPLE NO. 140666



TEST NO. OR SYMBOL	BORING NO AND DEPTH	SAMPLE DATA: DRY DENSITY (pcf)	MOISTURE CONTENT (percent): Initial	MOISTURE CONTENT (percent): Final	PORE PRESSURE RESPONSE (percent)	CONFINING PRESSURE σ3 KSF	MAXIMUM DEVIATOR STRESS σ1-σ3 KSF	MAXIMUM PRINCIPAL STRESS RATIO σ1/σ3	VALUES AT MOHR COULOMB FAILURE: MINOR PRINCIPAL STRESS σ3 KSF	VALUES AT MOHR COULOMB FAILURE: MAJOR PRINCIPAL STRESS σ KSF	HEIGHT TO DIAMETER RATIO	RATE OF STRAIN INCHES/MINUTE	
○	TPP4A 1.9-2.9	86	19	30	99	2.9	1.89	2.53	1.21	3.10	2.09	0.004	
△	TPP4A 1.9-2.9	83	20	26	99	5.8	3.04	4.24	1.53	4.56	2.09	0.004	
□	TPP4A 1.9-2.9	86	21	24	98	8.6	5.08	4.37	2.68	7.76	2.09	0.004	

Northern Engineering and Testing, Inc.

TRIAXIAL SHEAR TEST RESULTS

BEKER POND NO. 4

JOB NO.	DATE	PLATE NO.
81-1404	August 1984	

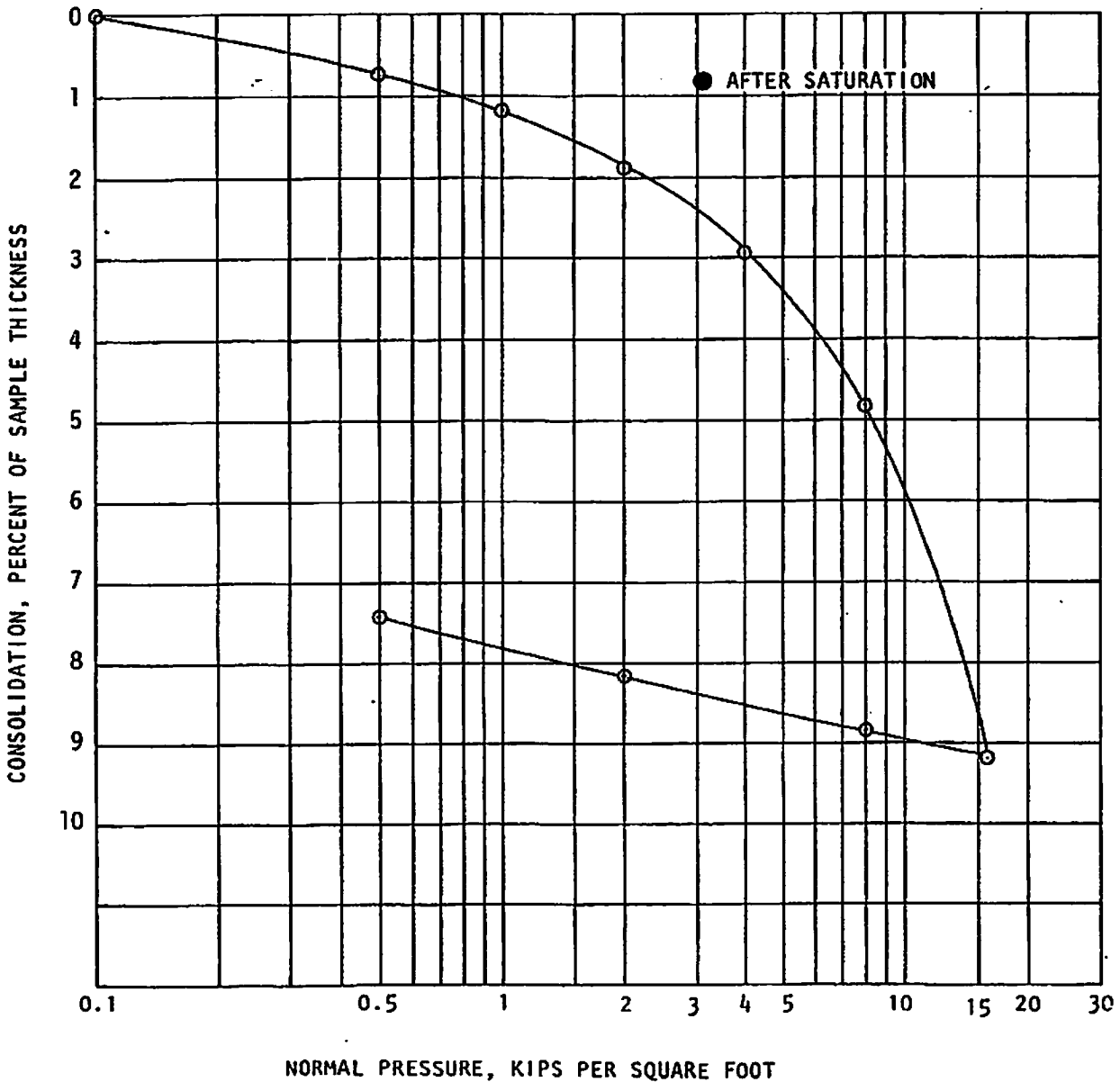
NET 157

FH00028958

CONSOLIDATION TEST

DRILL HOLE TPP4A
DEPTH 1.9 - 2.9
SAMPLE NO. 140666

MOIST UNIT WEIGHT : 111 pcf
DRY UNIT WEIGHT : 91 pcf
INITIAL MOISTURE CONTENT: 22 %
FINAL MOISTURE CONTENT : 19 %
CLASSIFICATION : CLAY, Silty, CL



BEKER POND NO. 4

Northern Engineering and Testing, Inc.

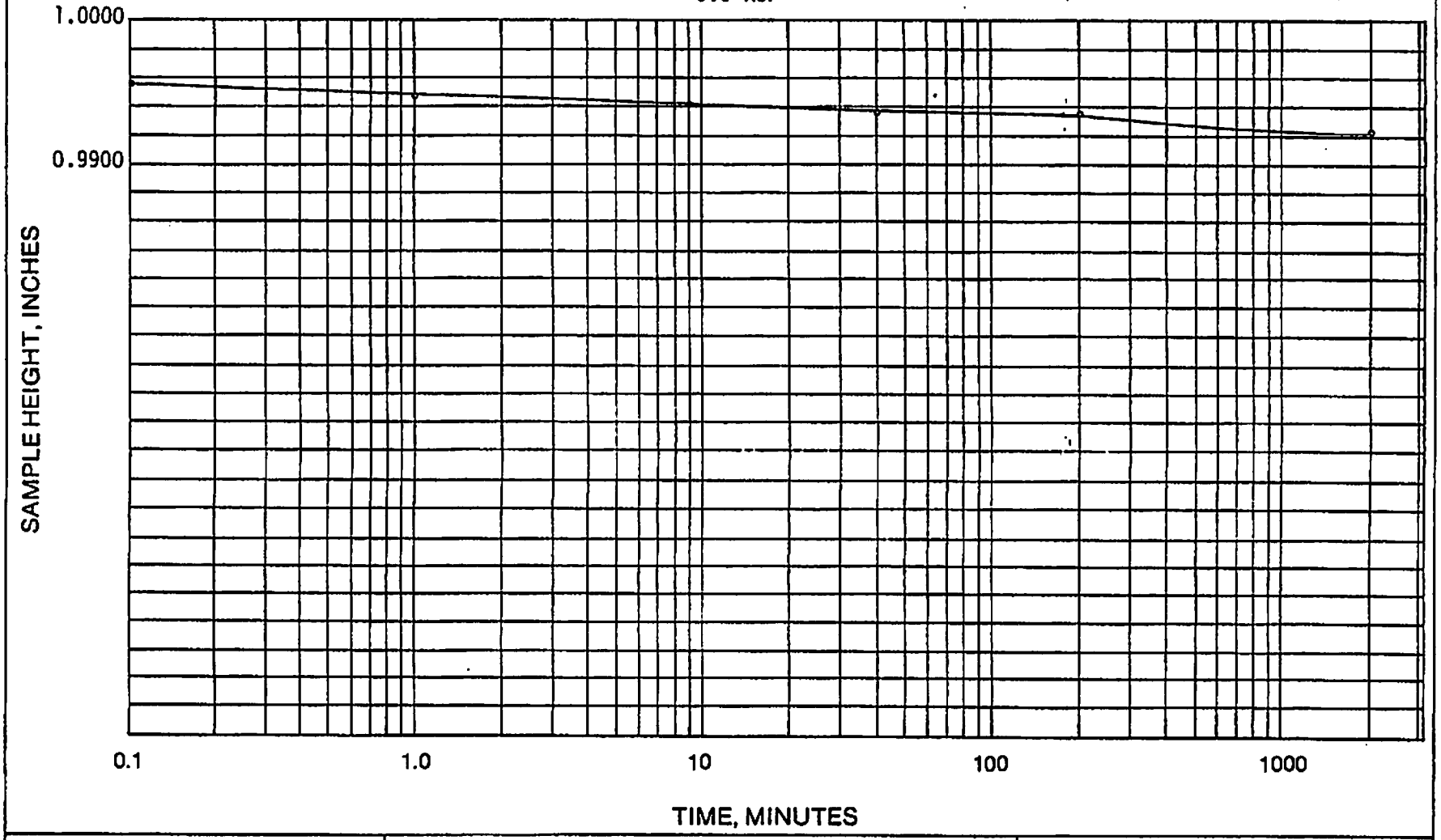
JOB NO. 81-1404 PLATE NO.

NET 156

FH0028959

TIME RATE CONSOLIDATION TEST

0.5 KSF



BEKER POND NO. 4	DRILL HOLE TPP4A DEPTH 1.9 - 2.9 CLASSIFICATION: CLAY, Silty (CL)	MOIST UNIT WEIGHT 111 pcf DRY UNIT WEIGHT 91 pcf INITIAL MOISTURE CONTENT 22% FINAL MOISTURE CONTENT 19%

Northern Engineering and Testing, Inc.

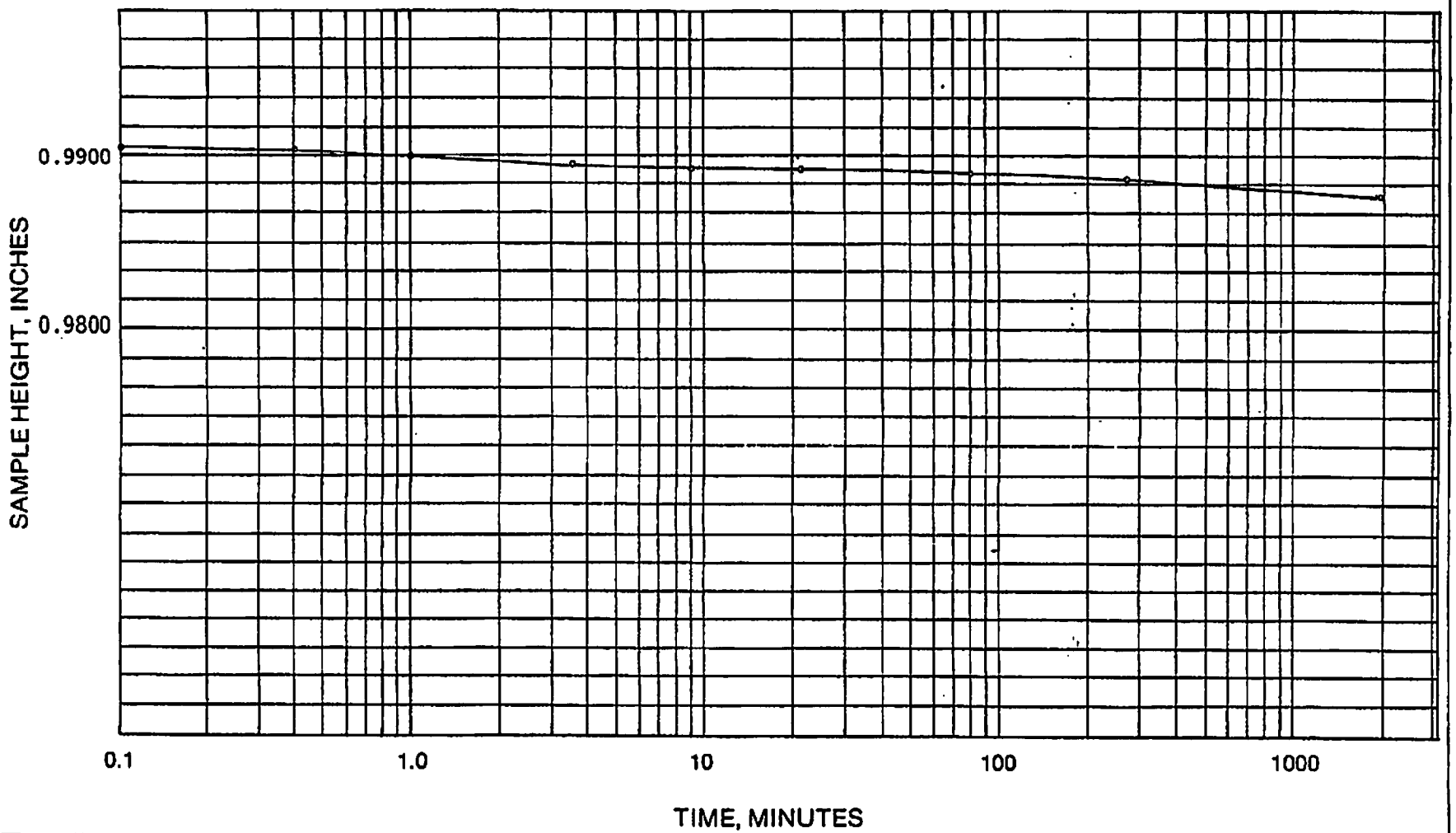
Job No. 81-1404 Plate No.

NET 161

FH0028960

TIME RATE CONSOLIDATION TEST

1 KSF



BEKER POND NO. 4	DRILL HOLE TPP4A DEPTH 1.9 - 2.9 CLASSIFICATION: CLAY, Silty (CL)	MOIST UNIT WEIGHT 111 pcf DRY UNIT WEIGHT 91 pcf INITIAL MOISTURE CONTENT 22% FINAL MOISTURE CONTENT 19%

Northern Engineering and Testing, Inc.

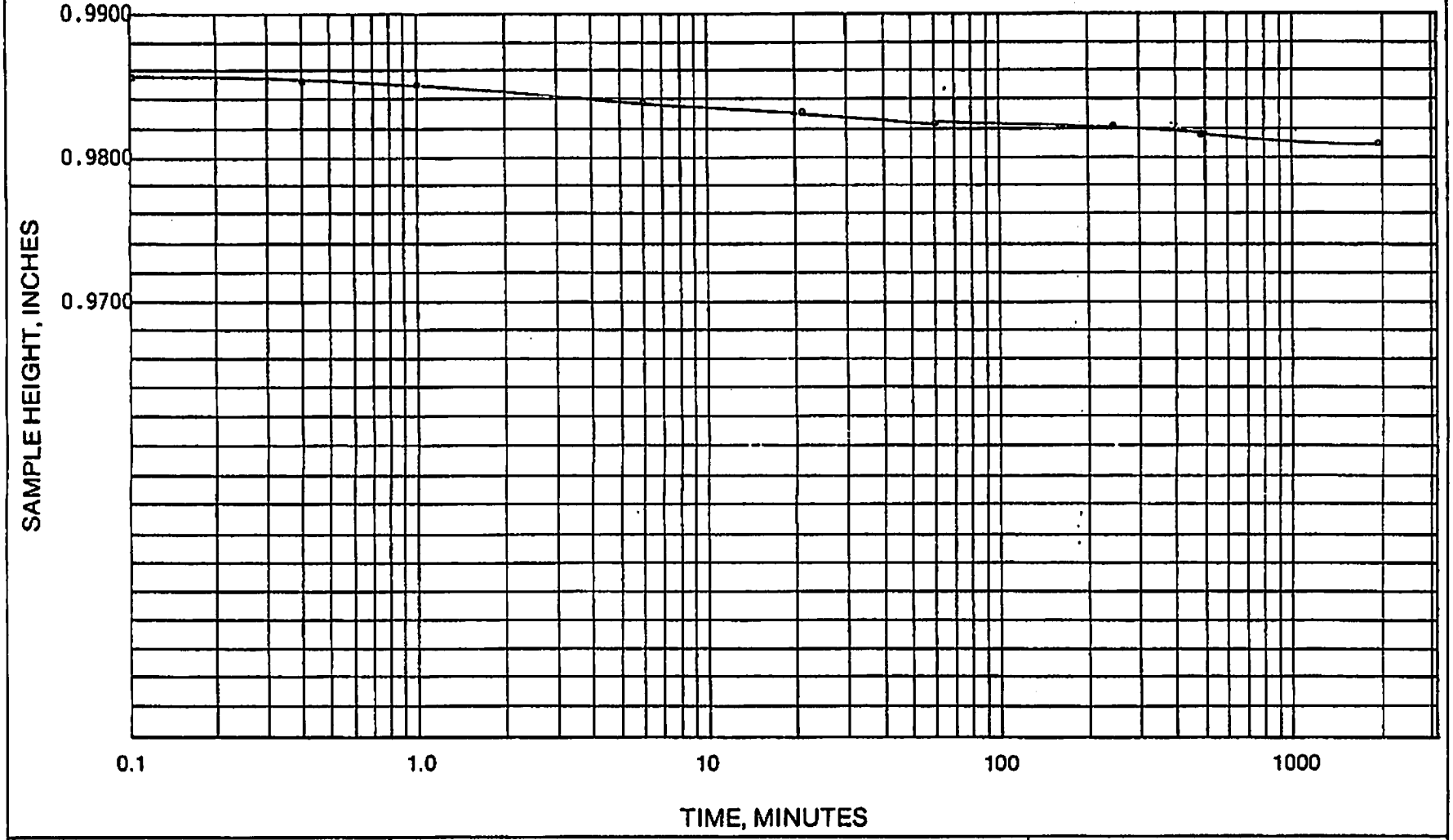
Job No. 81-1404 Plate No.

NET 161

FH0028961

TIME RATE CONSOLIDATION TEST

2 KSF



BEKER POND NO. 4	DRILL HOLE TPP4A DEPTH 1.9 - 2.9 CLASSIFICATION: CLAY, Silty (CL)	MOIST UNIT WEIGHT 111 pcf DRY UNIT WEIGHT 91 pcf INITIAL MOISTURE CONTENT 22% FINAL MOISTURE CONTENT 19%

Northern Engineering and Testing, Inc.

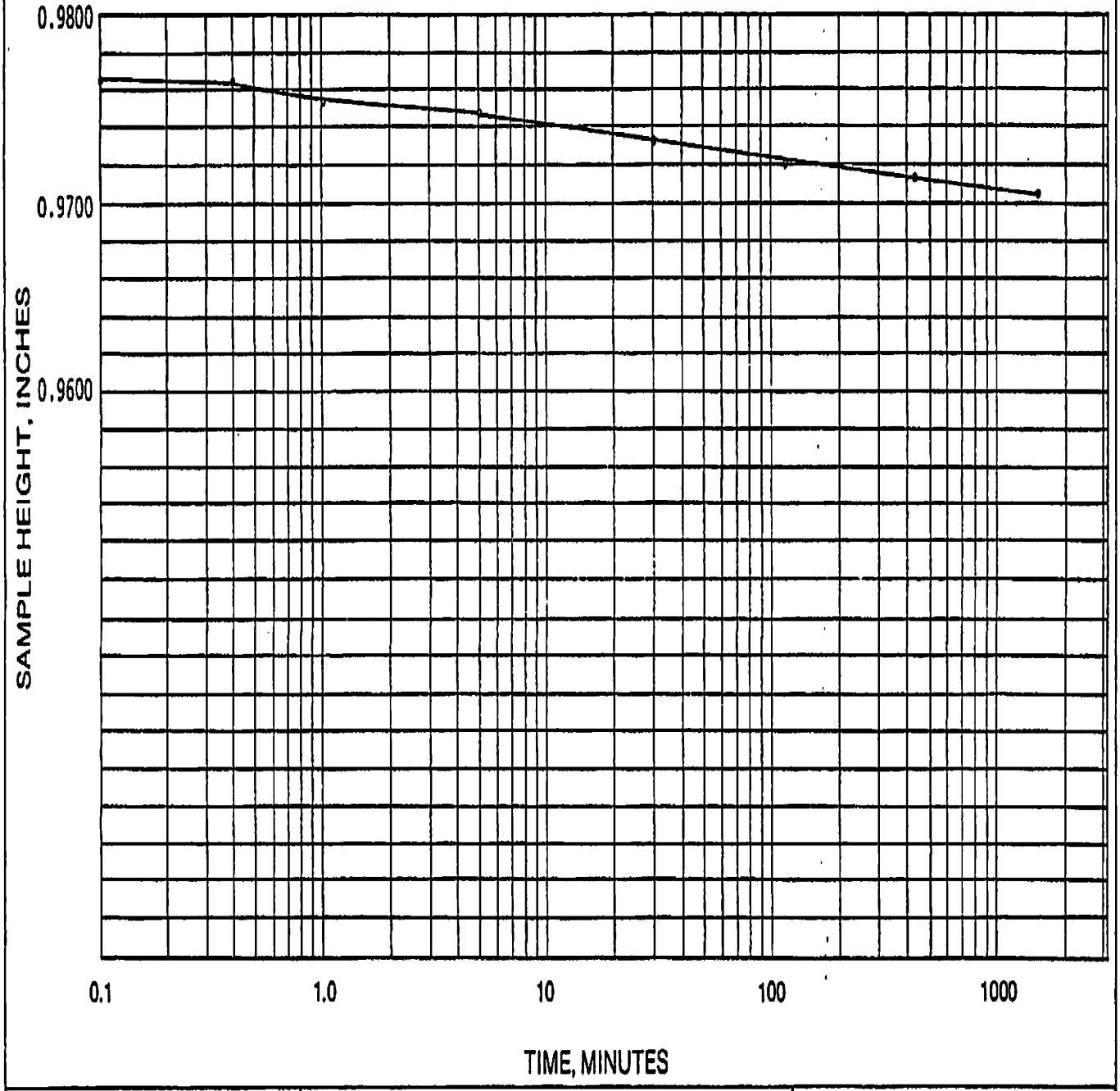
Job No. 81-1404 Plate No.

NET 161

FH00289862

TIME RATE CONSOLIDATION TEST

4 KSF



BEKER POND NO. 4	DRILL HOLE TPP4A DEPTH 1.9 - 2.9 CLASSIFICATION: CLAY, Silty (CL)	MOIST UNIT WEIGHT 111 pcf DRY UNIT WEIGHT 91 pcf INITIAL MOISTURE CONTENT 22% FINAL MOISTURE CONTENT 19%

Northern Engineering and Testing, Inc.

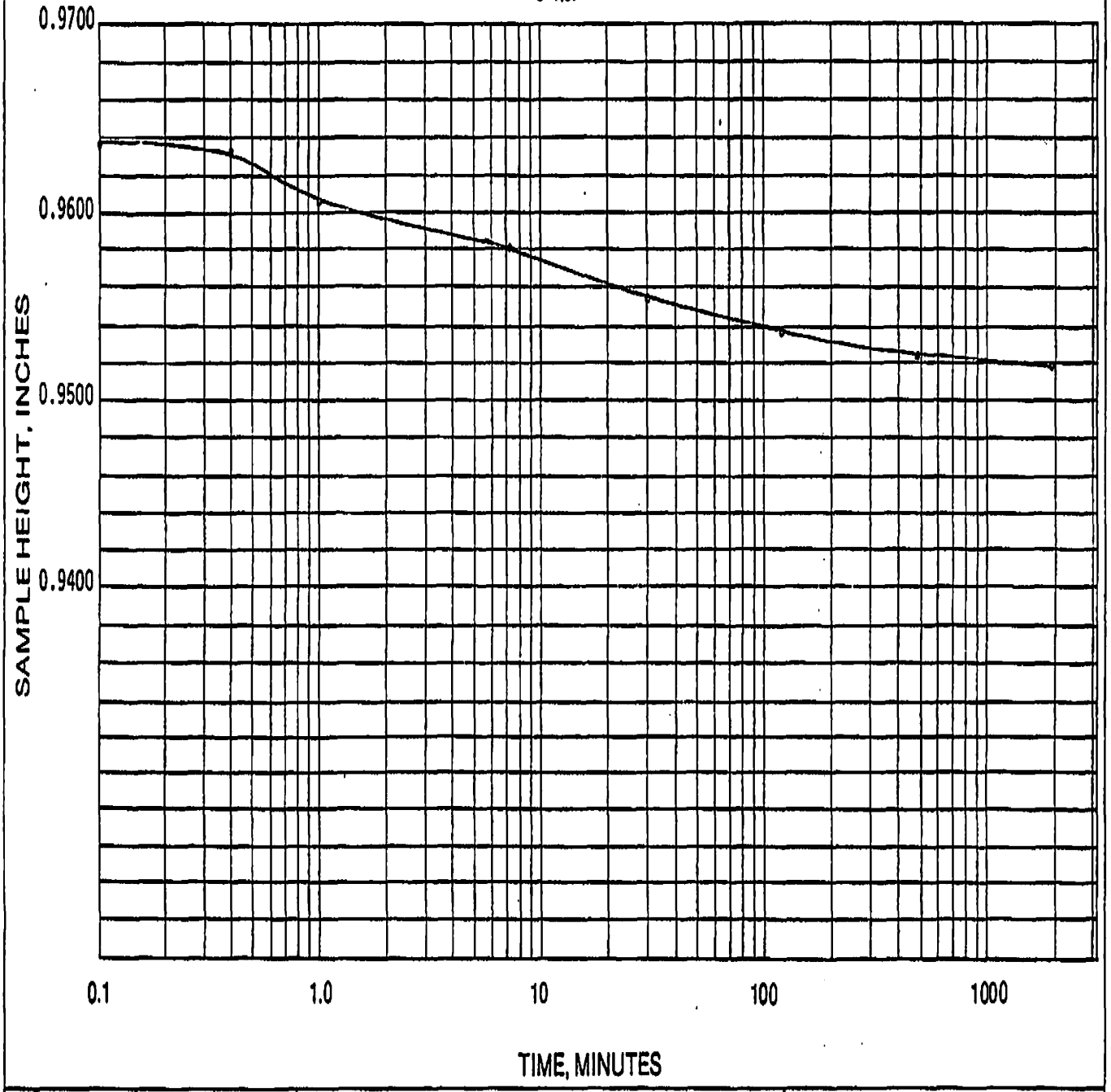
Job No. 81-1404 Plate No.

FH0028963

NET 161

TIME RATE CONSOLIDATION TEST

8 KSF



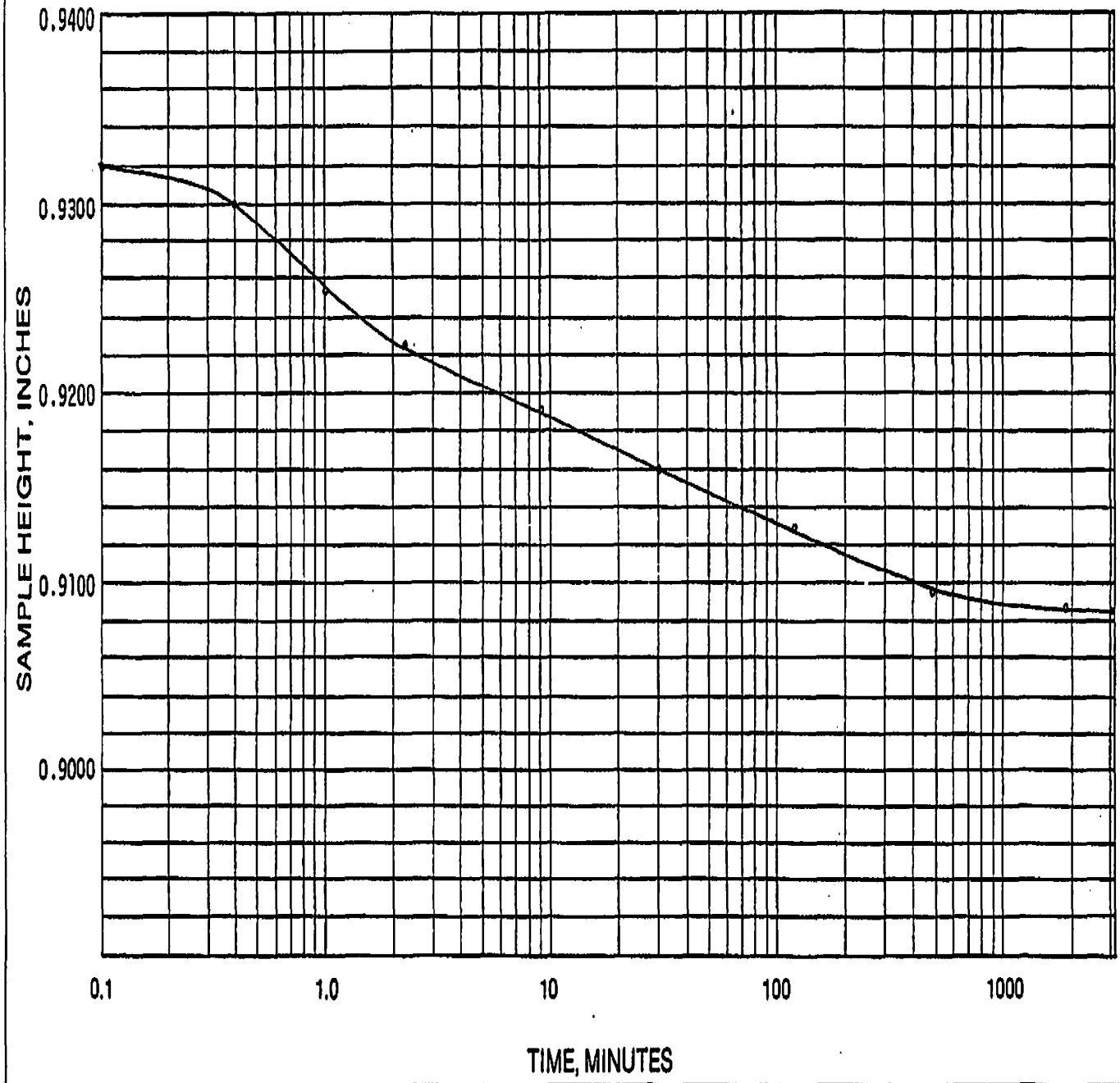
BEKER POND NO. 4	DRILL HOLE TPP4A MOIST UNIT WEIGHT 111 pcf DEPTH 1.9 - 2.9 DRY UNIT WEIGHT 91 pcf CLASSIFICATION: CLAY, Silty (CL) INITIAL MOISTURE CONTENT 22% FINAL MOISTURE CONTENT 19%	Northern Engineering and Testing, Inc. Job No. 81-1404 Plate No.

FH0028964

NET 161

TIME RATE CONSOLIDATION TEST

16 KSF



BEKER POND NO. 4	DRILL HOLE TPP4A DEPTH 1.9 - 2.9 CLASSIFICATION: CLAY, Silty (CL)	MOIST UNIT WEIGHT 111 pcf DRY UNIT WEIGHT 91 pcf INITIAL MOISTURE CONTENT 22% FINAL MOISTURE CONTENT 19%

Northern Engineering and Testing, Inc.

Job No. 81-1404 Plate No.

FH0028965

NET 161

Northern

Engineering and Testing, Inc.

GRAIN SIZE DISTRIBUTION CURVE

Project: Beker Pond No. 4

Sample No. 140667

Location: TPPR2 7.0 - 8.0

Job No. 81-1404

Classification CLAY, Silty (CL)

Date August 1984

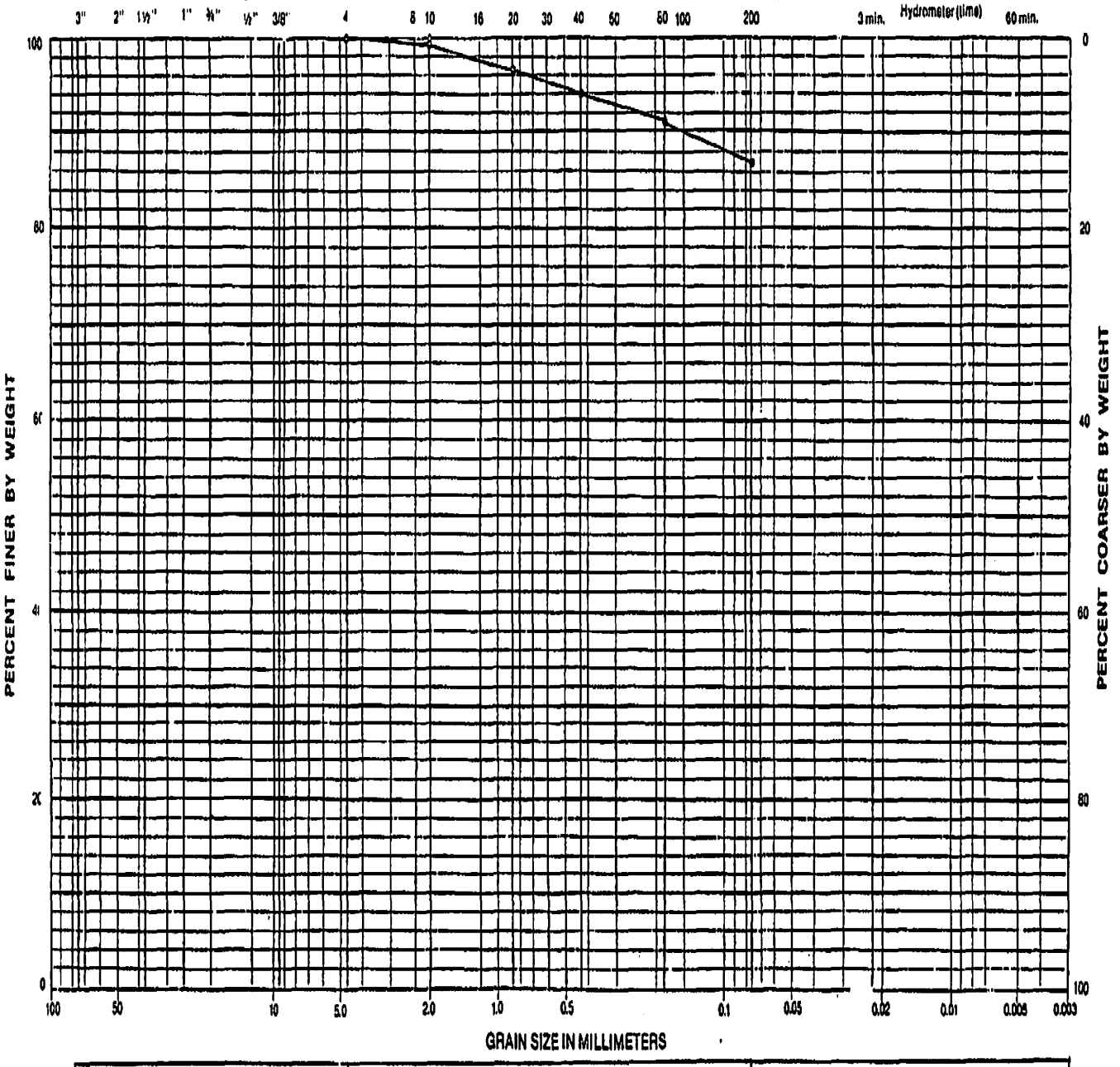
Moisture Content _____ %

Liquid Limit 33 %

Plasticity Index 12 %

Coefficient of Uniformity $= C_U = \frac{D_{60}}{D_{10}} =$ _____

Coefficient of Curvature $= C_Z = \frac{(D_{30})^2}{D_{10} \times D_{60}} =$ _____



Gravel		Sand			Fines	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

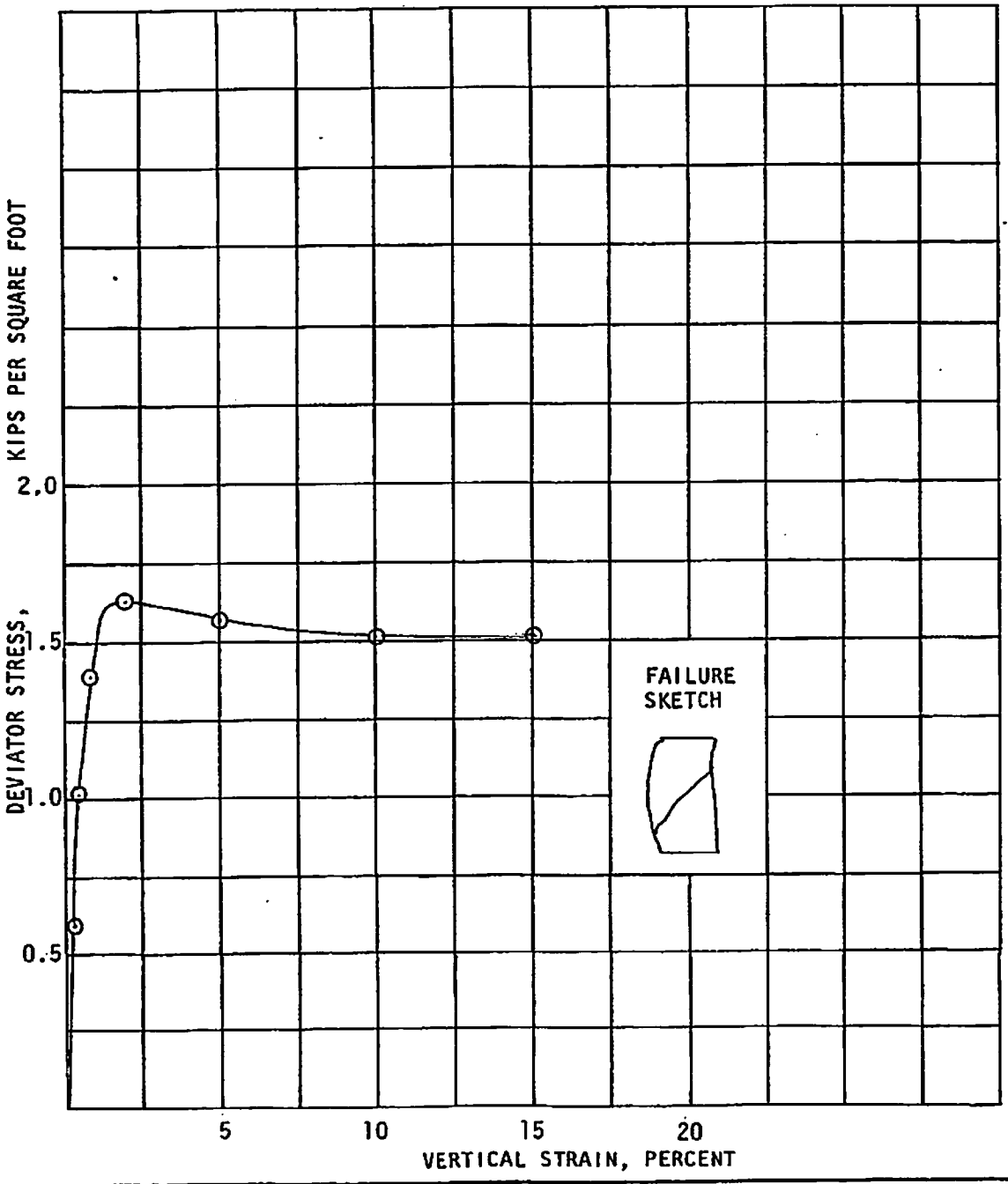
NET-105

FH0028966

UNCONSOLIDATED - UNDRAINED
TRIAXIAL SHEAR TEST

DRILL HOLE TPPR2
DEPTH 7.0 - 8.0
SAMPLE NO. 140667
CONFINING STRESS: 3 KSF
PORE PRESSURE RESPONSE: --

MOIST UNIT WEIGHT: 110 pcf
DRY UNIT WEIGHT: 84 pcf
MOISTURE CONTENT: 30 %
CLASSIFICATION: CLAY, Silty (CL)
HEIGHT TO DIAMETER RATIO: 2.06
RATE OF STRAIN: 0.030 inch/minute



BEKER POND NO. 4

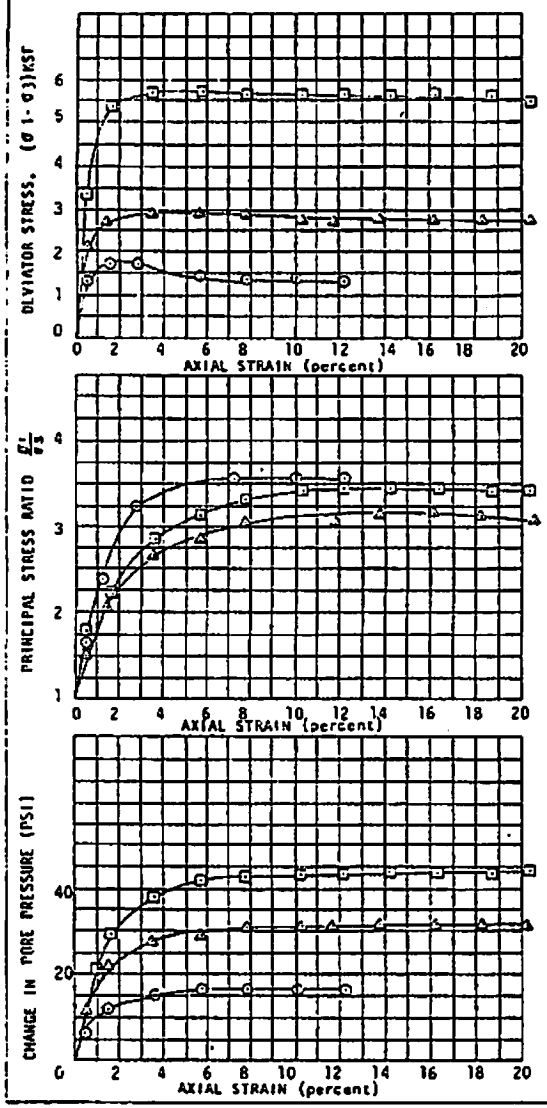
Northern Engineering and Testing, Inc.

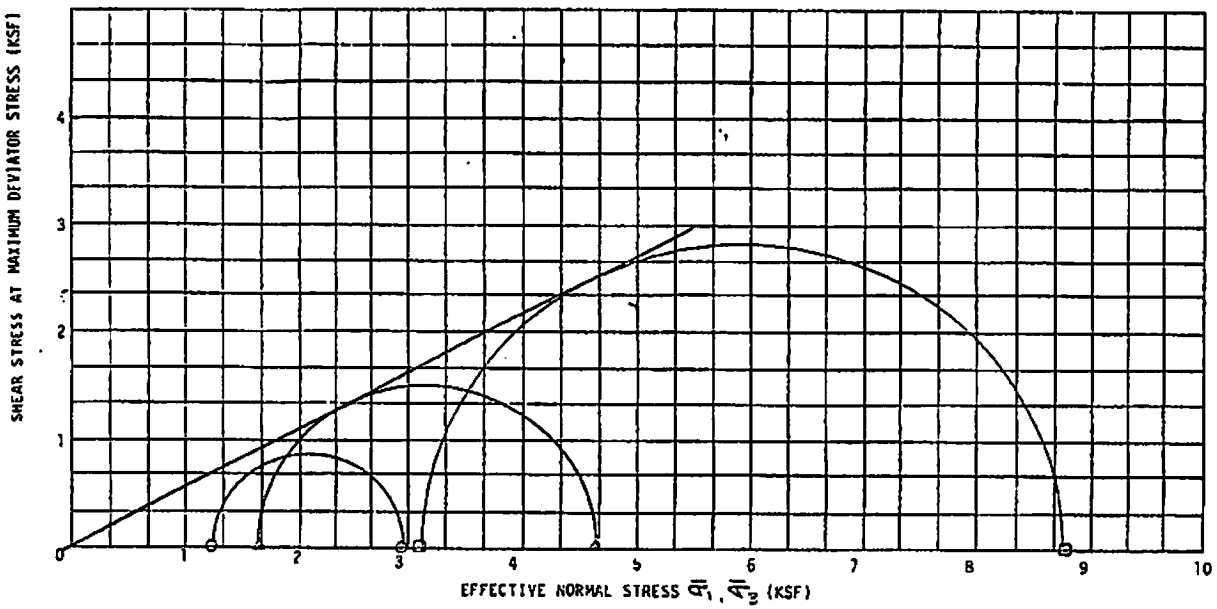
JOB NO. 81-1404 PLATE NO.

NET 155

FH0028967

CONSOLIDATED UNDRAINED TRIAXIAL SHEAR TEST - UNDISTURBED
SAMPLE NO. 140667





TEST NO OR SYMBOL	BORING NO. AND DEPTH	SAMPLE DATA: DRY DENSITY (pcf)	MOISTURE CONTENT (percent): Initial	MOISTURE CONTENT (percent): Final	PORE PRESSURE RESPONSE (percent)	CONFINING PRESSURE σ3 KSF	MAXIMUM DEVIATOR STRESS σ1 - σ3 KSF	MAXIMUM PRINCIPAL STRESS RATIO σ1/σ3	VALUES AT MOHR COULOMB FAILURE: MINOR PRINCIPAL STRESS σ3 KSF	VALUES AT MOHR COULOMB FAILURE: MAJOR PRINCIPAL STRESS σ KSF	HEIGHT TO DIAMETER RATIO	RATE OF STRAIN INCHES/MINUTE	
○	TPPR2 7.0-8.0	84	33	31	99	2.9	1.68	3.58	1.24	2.91	2.09	0.004	
△	TPPR2 7.0-8.0	87	31	30	98	5.8	2.98	3.23	1.64	4.62	2.09	0.004	
□	TPPR2 7.0-8.0	91	28	26	99	8.6	5.67	3.43	3.10	8.77	2.09	0.004	

Northern Engineering and Testing Inc

TRIAXIAL SHEAR TEST RESULTS

BEVER POND NO. 4

JOB NO.	DATE	PLATE NO.
81-1404	August 1984	

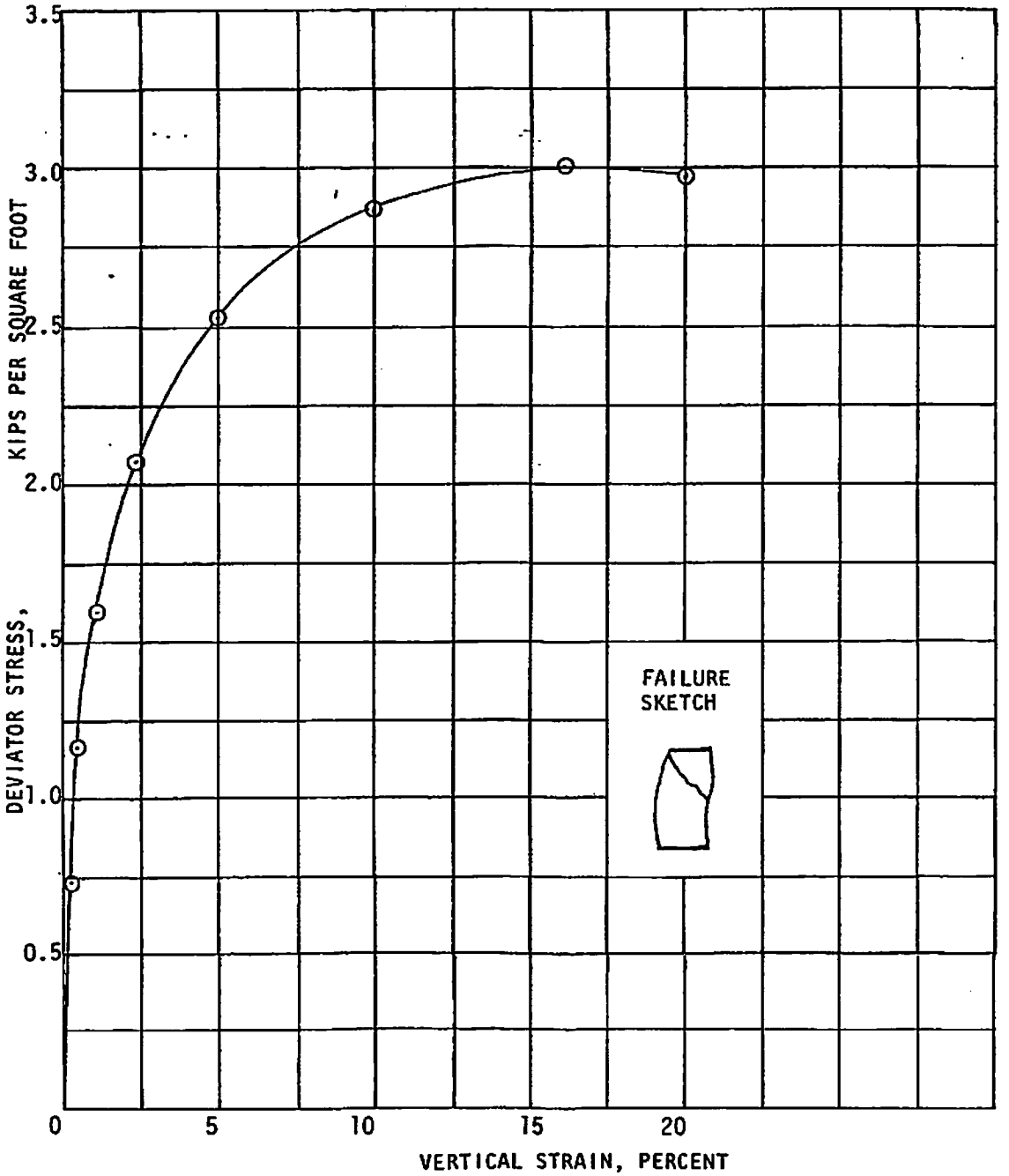
NET 157

FH00028968

UNCONSOLIDATED - UNDRAINED
TRIAXIAL SHEAR TEST

DRILL HOLE TPP6A
DEPTH 3.6 - 3.8
SAMPLE NO. 140668
CONFINING STRESS: 3 ksf
PORE PRESSURE RESPONSE: --

MOIST UNIT WEIGHT: 106 pcf
DRY UNIT WEIGHT: 85 pcf
MOISTURE CONTENT: 25 %
CLASSIFICATION: CLAY, Silty (CL)
HEIGHT TO DIAMETER RATIO: 2.06
RATE OF STRAIN: 0.03 inch/minute



BEKER POND NO. 4

Northern Engineering and Testing, Inc.

JOB NO. 81-1404 PLATE NO.

NET 155

FH0028969

Northern

Engineering and Testing, Inc.

GRAIN SIZE DISTRIBUTION CURVE

Project: Beker Pond No. 4

Sample No. 140668

Location: TPP6A 5.3 - 6.3

Job No. 81-1404

Classification CLAY, Silty (CL)

Date August 1984

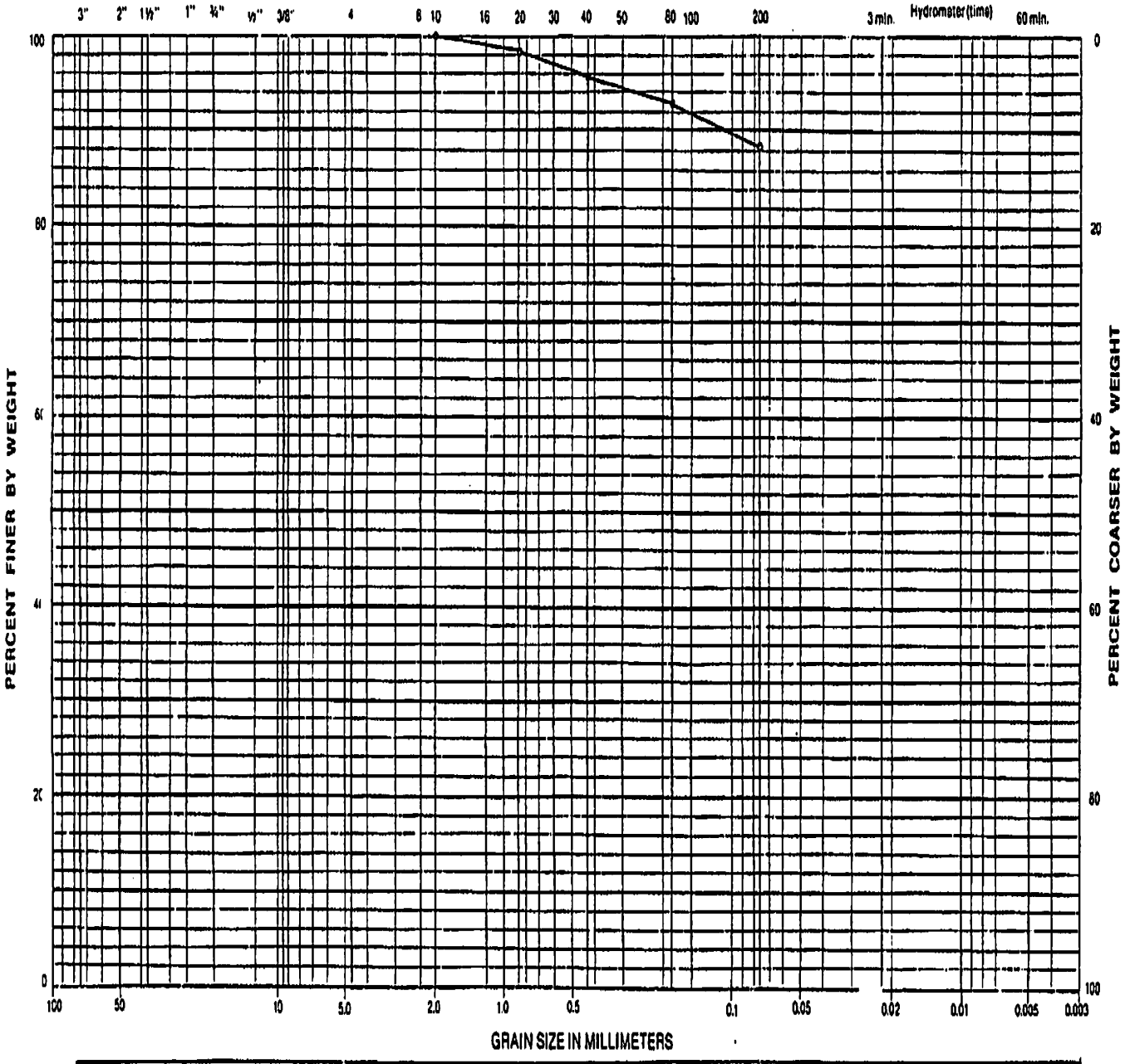
Moisture Content _____ %

Liquid Limit 30 %

Plasticity Index 9 %

Coefficient of Uniformity = $C_U = \frac{D_{60}}{D_{10}}$ = _____

Coefficient of Curvature = $C_Z = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ = _____

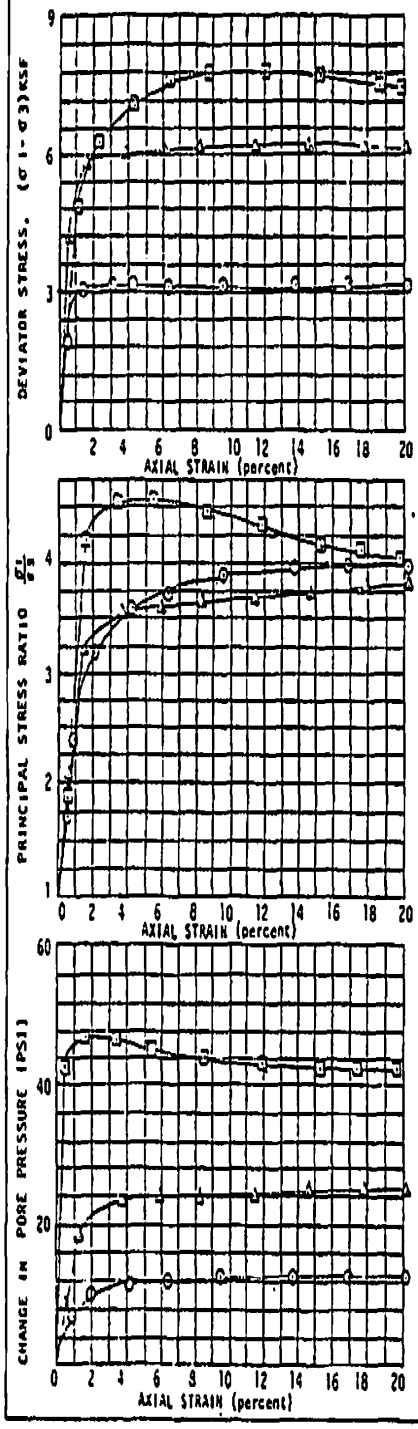


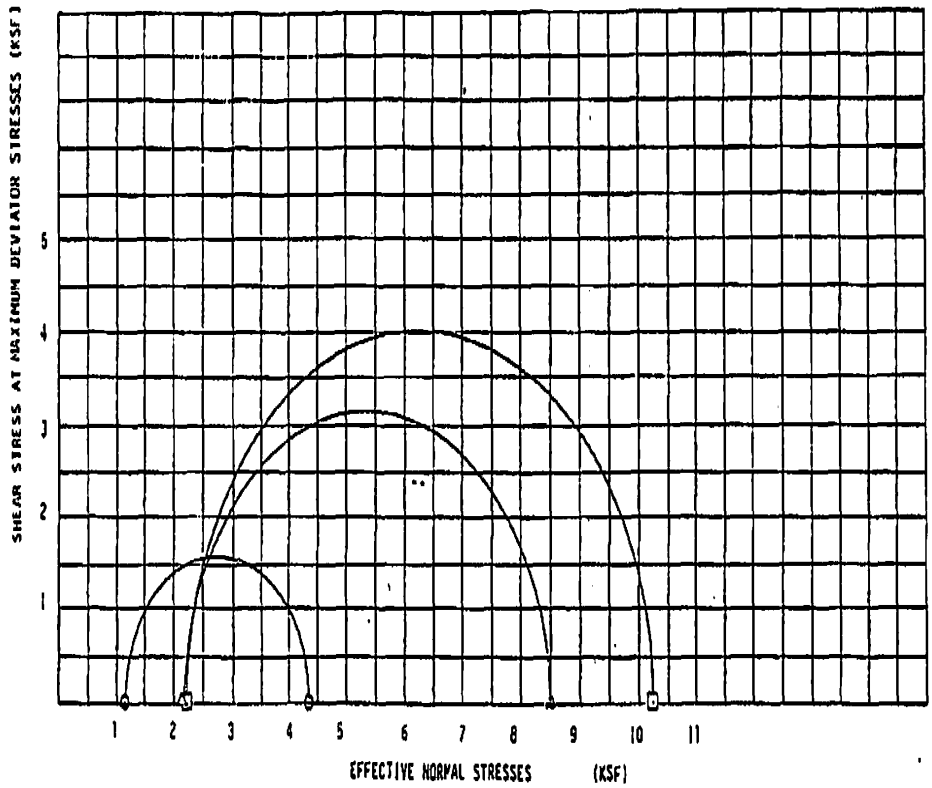
Gravel		Sand			Fines	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

NET-105

FH00289970

CONSOLIDATED-UNDRAINED TRIAXIAL SHEAR TEST - UNDISTURBED
SAMPLE NO. 140668





TEST NO. OR SYMBOL	BORING NO AND DEPTH	SAMPLE DATA: DRY DENSITY (pcf)	MOISTURE CONTENT (percent) Initial	MOISTURE CONTENT (percent) Final	PORE PRESSURE RESPONSE (percent)	CONFINING PRESSURE σ3 KSF	MAXIMUM DEVIATOR STRESS σ1-σ3 KSF	MAXIMUM PRINCIPAL STRESS RATIO σ1/σ3	VALUES AT MOHR COULOMB FAILURE: MINOR PRINCIPAL STRESS σ3 KSF	MAJOR PRINCIPAL STRESS σ1 KSF	HEIGHT TO DIAMETER RATIO	RATE OF STRAIN INCHES/MINUTE	
○	TPP6A 3.6-3.8	93	24	31	99	2.9	3.23	3.97	1.08	4.31	2.06	0.004	
△	TPP6A 5.3-6.3	90	32	24	98	5.8	6.25	3.78	2.25	8.50	2.06	0.004	
□	TPP6A 5.3-6.3	95	24	24	98	8.6	7.89	4.56	2.33	10.23	2.06	0.004	

Northern Engineering and Testing, Inc

TRIAXIAL SHEAR TEST RESULTS

BEKER POND NO. 4

JOB NO.	DATE	PLATE NO.
81-1404	August 1984	

NET 157

FH0028971

RECEIVED NOV 6 1984

Northern
Engineering
and Testing, Inc.

REPORT
OF
LABORATORY TEST RESULTS

SUBSURFACE INVESTIGATION
PROPOSED EXPANSION
BEKER TAILINGS POND NO. 3
CONDA, IDAHO