U-006-302.3

246

CERTIFICATE OF ANALYSIS - PROJECT NUMBER 482331 JOB NUMBER 303317.24.05.20 - SILO MATERIAL

3-22-90

IT WMCO
33
CERTIFICATE

[redacted]

246

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

Thomas Tank
IT Corporation
312 Directors Drive
Knoxville, TN 37923

March 22, 1990

PROJECT NUMBER: 482331 **JOB NUMBER:** 303317.24.05.20

This is the Certificate of Analysis for the following samples:

Client Project ID:	303317.24.05.20 (Fernald)
Date Received by Lab:	10/20/89
Number of Samples:	13
Sample Type:	Silo Material

I. Introduction

ITAS Geotechnical Services located within the Technology Development Laboratory (TDL) was contracted to provide geotechnical/physical analytical services to support the K-65 Silo Residues and Sub-soils Feasibility Study Testing Plan. Physical testing and sample handling was conducted in a on-site laboratory at the Feed Materials Production Center (FMPC) located in Hamilton County, Ohio.

II. Analytical Results/Methodology

REFERENCE: Annual Book of ASTM Standards. 1989. Soil and Rock; Building Stones; Geotextiles. Vol. 4.08.

Specific Gravity (not used in water content analysis)	ASTM D854-83
Water Content	ASTM D2216-80
Atterberg Limits (liquid limit, plasticity index, classification)	ASTM D4318-84
Grain Size (hydrometer <0.075 mm and sieve analysis ≥0.075 mm)	ASTM D422-63

Reviewed and Approved:

Michael A. Krstich
Geotechnical Services

mak\MAK040

American Council of Independent Laboratories
International Association of Environmental Testing Laboratories
American Association for Laboratory Accreditation

IT Analytical Services • 304 Directors Drive • Knoxville, TN 37923 • (615) 690-3211

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II. Analytical Results/Methodology (Continued)

Sample Cross Reference List and Silo Sampling Results are contained in Appendix A.
Results are contained in Appendix B.
Analyses Summation List and Summary is contained in Appendix C.

III. Quality Control

QC measures to insure accuracy and precision of test results included the following:

100% verification on all numerical results - all raw data entries, transcriptions and calculations entered by lab technicians are checked, recalculated and verified by the geotechnical laboratory manager.

Data validation through test reasonableness - summaries of all test results for individual reports are reviewed by the geotechnical laboratory manager to determine the overall reasonableness of data and to determine the presence of any data that may be considered outliers.

Routine instrument calibration - all instruments, gauges and equipment used in testing is calibrated on a timely routine basis. All instrument calibration follows ASTM or manufactures guidelines.

Maintenance of all past calibration records - records and certification documents of all instruments, gauges and equipment are updated routinely and maintained in the geotechnical laboratory managers office.

Use of trained personnel for conducting tests - all technicians are trained in the application of standard laboratory procedures for geotechnical analyses as well as the quality assurance measures implemented for internal quality control checks.

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Fernald
Date: 3/22/90
Client Project ID: 303317.24.05.20 Job Number: 303317.24.05.20

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CROSS-REFERENCE LIST

SILO NO.	SAMPLE NO.	MANWAY ID/ VERTICAL SECTION	MATRIX
1	1	NE-1 A	K-65
1	2	NE-1 C	K-65
1	3	SE-2 BT	K-65
1	4	SW-1/SE-1/NW-1 COMPOSITE	K-65
2	1	NW-1 A	K-65
2	2	NE-2 BT	K-65
2	3	SW-1 A	K-65
2	4	SW-2/NW-2/NE-1 COMPOSITE	K-65
3	1	NW-1 A	METAL OXIDE
3	2	NW-1 C	METAL OXIDE
3	3	SE-1 A	METAL OXIDE
3	4	SE-1 C	METAL OXIDE
3	5	NE-1 ABC COMPOSITE	METAL OXIDE

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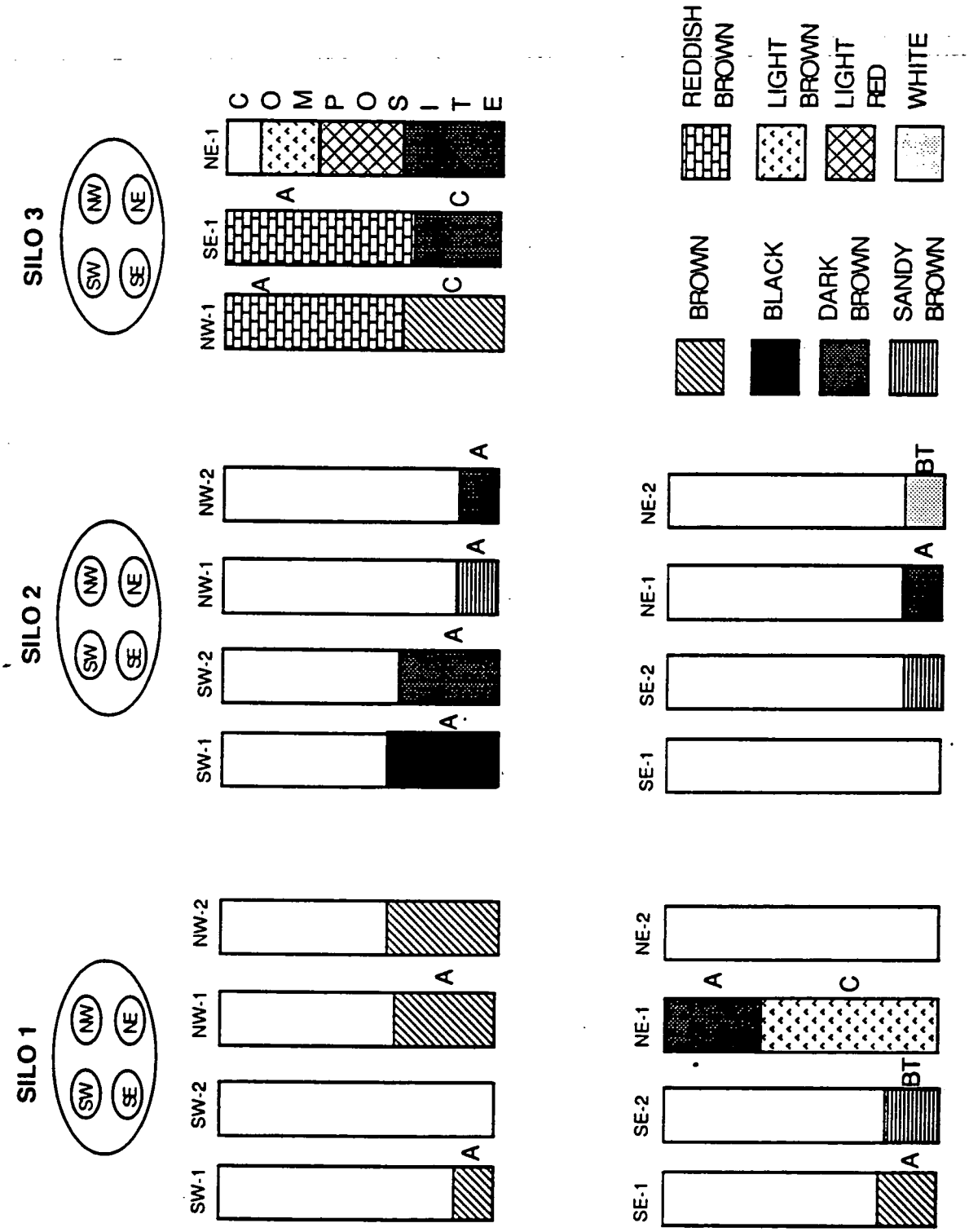
Job Number: 303317.24.05.20

K-65 AND METAL OXIDES SILOS SAMPLPLINT RESULTS



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Fernald
Date: 3/22/90
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Job Number: 303317.24.05.20 246

SILO NO: 1 MANWAY NO: NE-1 VERTICAL SECTION: A

WATER CONTENT

50.7%

SPECIFIC GRAVITY

3.19 g/cc

ATTERBERG LIMITS

LIQUID LIMIT: 55.2 PLASTICITY INDEX: 5.2

PLASTIC LIMIT: 50.0 USCS: MH

GRAIN SIZE

SIEVE SIZE/TIME	DIAMETER (mm)	PERCENT FINER
SIEVE ANALYSIS:		
3.000 in	75.000	100.0
1.500 in	37.500	100.0
0.750 in	19.000	100.0
0.375 in	9.500	100.0
NO. 4	4.750	100.0
NO. 10	2.000	95.1
NO. 20	0.850	93.2
NO. 40	0.425	92.6
NO. 60	0.250	91.6
NO. 140	0.106	80.1
NO. 200	0.075	72.7
HYDROMETER ANALYSIS		
1 min	0.047	49.3
2 min	0.034	46.3
5 min	0.022	40.1
15 min	0.013	33.9
30 min	0.008	27.8
60 min	0.007	24.7
240 min	0.003	21.6
1440 min	0.001	15.4

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Thomas Tank
Fernald
Date: 3/22/90
Client Project ID: 303317.24.05.20 Job Number: 303317.24.05.20

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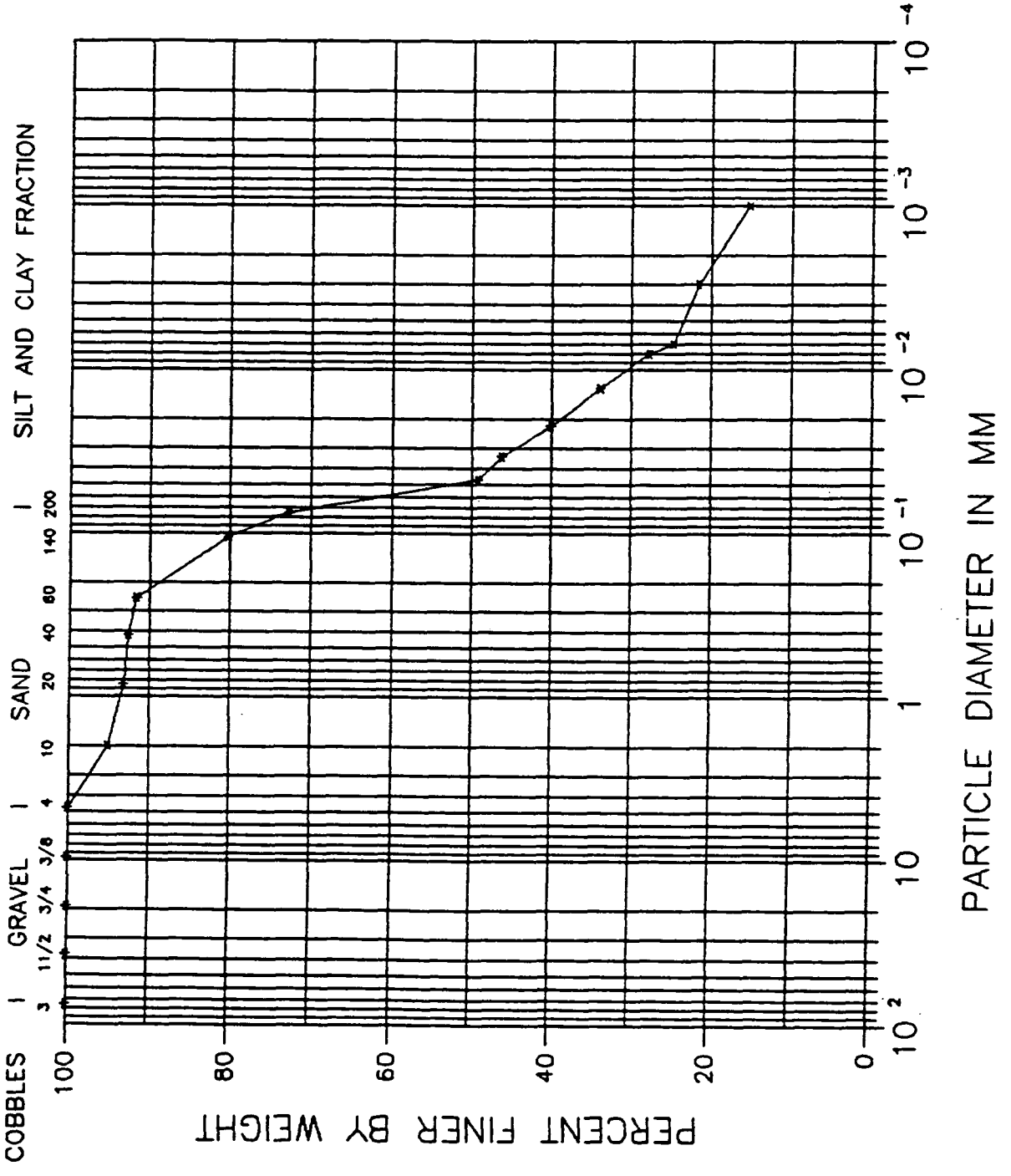
CLIENT: IT CORPORATION
PROJECT NO: 90106
MANWAY NO: NE-1
DESCRIPTION: K-65 MATERIAL
USCS CLASSIFICATION: NA

CLIENT PROJECT: FERNALD
BORING NO: SILO NO. 1
VERTICAL SECTION: A



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Thomas Tank
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Date: 3/22/90
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SILO NO: 1 MANWAY NO: NE-1 VERTICAL SECTION: C

WATER CONTENT

71.5%

SPECIFIC GRAVITY

2.74 g/cc

ATTERBERG LIMITS

LIQUID LIMIT: 70.3 PLASTICITY INDEX: 3.7

PLASTIC LIMIT: 66.6 USCS: MH

GRAIN SIZE

SIEVE SIZE/TIME	DIAMETER (mm)	PERCENT FINER
SIEVE ANALYSIS:		
3.000 in	75.000	100.0
1.500 in	37.500	100.0
0.750 in	19.000	100.0
0.375 in	9.500	100.0
NO. 4	4.750	100.0
NO. 10	2.000	97.3
NO. 20	0.850	91.6
NO. 40	0.425	86.7
NO. 60	0.250	81.2
NO. 140	0.106	72.2
NO. 200	0.075	71.5
HYDROMETER ANALYSIS		
1 min	0.042	62.1
2 min	0.031	58.5
5 min	0.019	56.0
15 min	0.011	53.6
30 min	0.008	48.7
60 min	0.006	46.3
240 min	0.003	41.4
1440 min	0.001	26.8

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Date: 3/22/90
Client Project ID: 303317.24.05.20 Job Number: 303317.24.05.20

IT ANALYTICAL SERVICES
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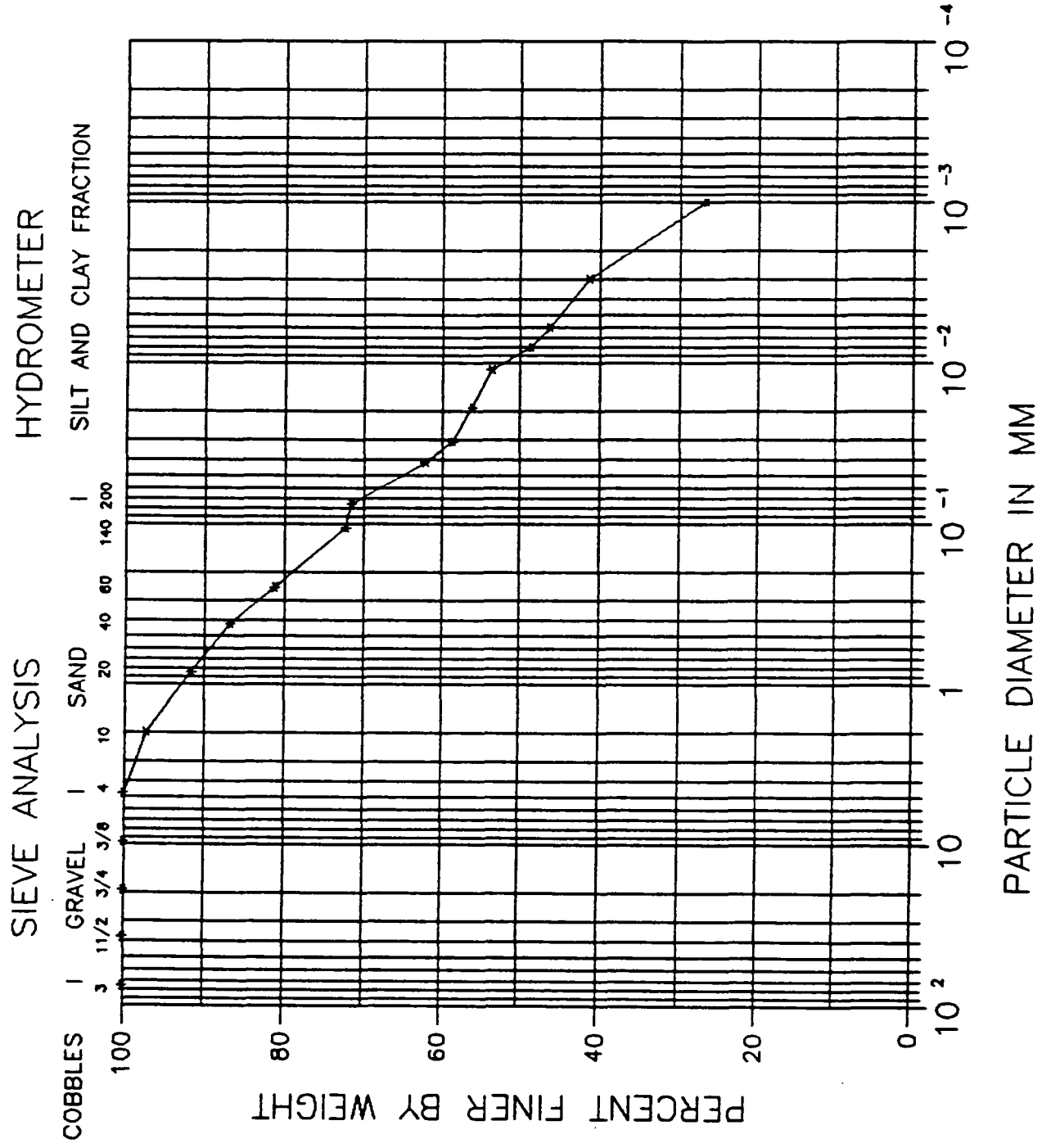
CLIENT: IT CORPORATION
PROJECT NO: 90106
MANWAY NO: NE-1
DESCRIPTION: K-65 MATERIAL
USCS CLASSIFICATION: NA

CLIENT PROJECT: FERNALD
BORING NO: SILO NO. 1
VERTICAL SECTION: C



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Fernald
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SILO NO: 1 MANWAY NO: SE-2 VERTICAL SECTION: BT

WATER CONTENT

31.9%

SPECIFIC GRAVITY

3.37 g/cc

ATTERBERG LIMITS

LIQUID LIMIT: NP PLASTICITY INDEX: NP

PLASTIC LIMIT: NP USCS: NA

CONSISTENCY BREAK POINT (WATER CONTENT): 38.0%

GRAIN SIZE

SIEVE SIZE/TIME	DIAMETER (mm)	PERCENT FINER
SIEVE ANALYSIS:		
3.000 in	75.000	100.0
1.500 in	37.500	100.0
0.750 in	19.000	100.0
0.375 in	9.500	100.0
NO. 4	4.750	100.0
NO. 10	2.000	96.7
NO. 20	0.850	95.1
NO. 40	0.425	92.4
NO. 60	0.250	83.6
NO. 140	0.106	49.3
NO. 200	0.075	43.9
HYDROMETER ANALYSIS		
1 min	0.051	28.5
2 min	0.036	23.7
5 min	0.023	19.0
15 min	0.014	17.4
30 min	0.010	15.8
60 min	0.007	15.8
240 min	0.003	14.2
1440 min	0.001	12.7

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IT ANALYTICAL SERVICES
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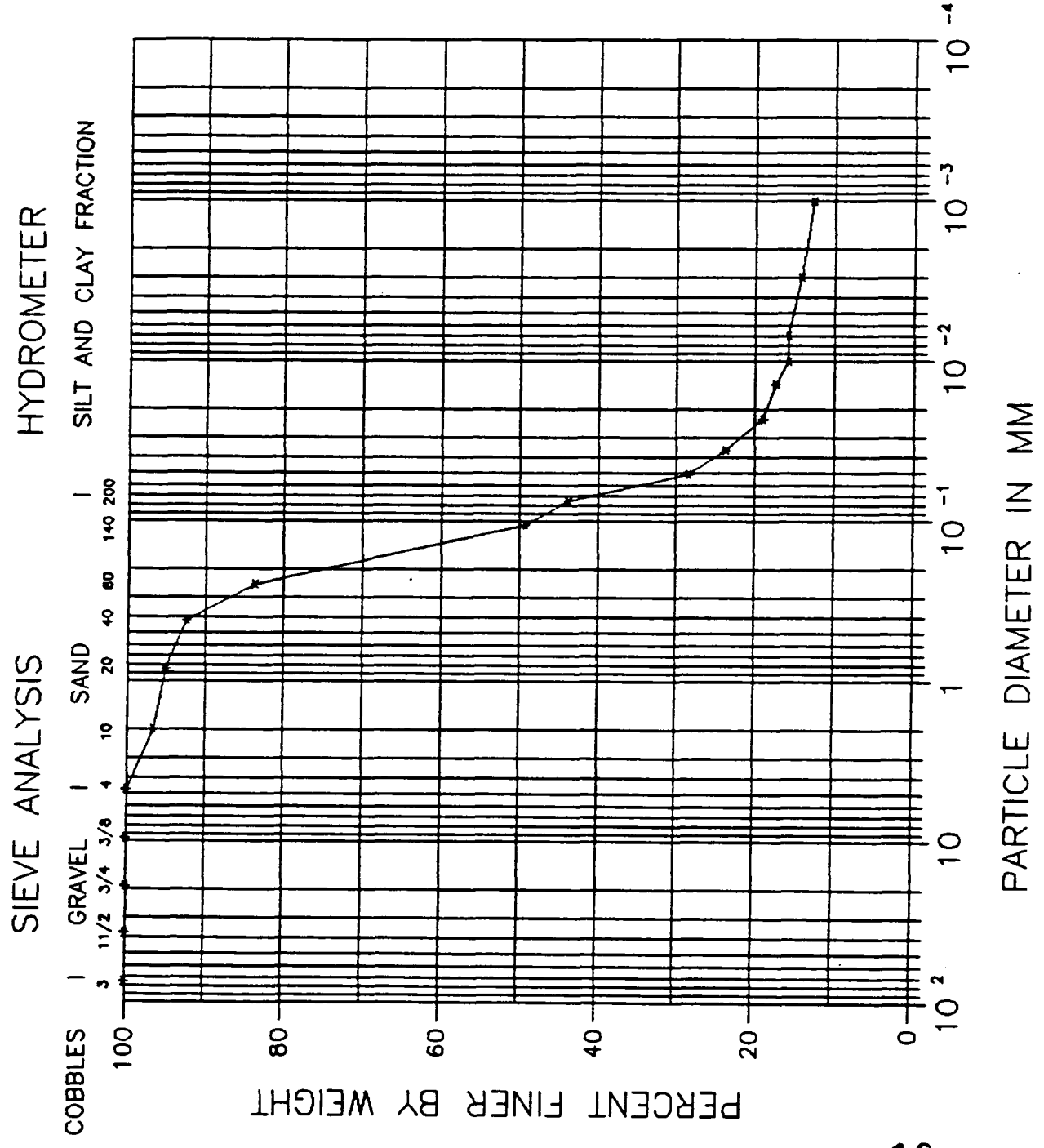
CLIENT: IT CORPORATION
PROJECT NO: 90106
MANWAY NO: SE-2
DESCRIPTION: K-65 MATERIAL
USCS CLASSIFICATION: NA

CLIENT PROJECT: FERNALD
BORING NO: SILO NO. 1
VERTICAL SECTION: BT



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SILO NO: 1 MANWAY NO: SW-1/SE-1/NW-1 VERTICAL SECTION: COMPOSITE

WATER CONTENT

22.8%

SPECIFIC GRAVITY

2.58 g/cc

ATTERBERG LIMITS

LIQUID LIMIT: NP PLASTICITY INDEX: NP

PLASTIC LIMIT: NP USCS: NA

CONSISTENCY BREAK POINT (WATER CONTENT): 35.7%

GRAIN SIZE

SIEVE SIZE/TIME	DIAMETER (mm)	PERCENT FINER
SIEVE ANALYSIS:		
3.000 in	75.000	100.0
1.500 in	37.500	100.0
0.750 in	19.000	100.0
0.375 in	9.500	100.0
NO. 4	4.750	100.0
NO. 10	2.000	97.2
NO. 20	0.850	95.5
NO. 40	0.425	92.0
NO. 60	0.250	81.1
NO. 140	0.106	58.7
NO. 200	0.075	54.5
HYDROMETER ANALYSIS		
1 min	0.049	40.7
2 min	0.035	37.6
5 min	0.022	34.5
15 min	0.013	31.3
30 min	0.009	28.2
60 min	0.007	26.6
240 min	0.003	25.1
1440 min	0.001	21.9

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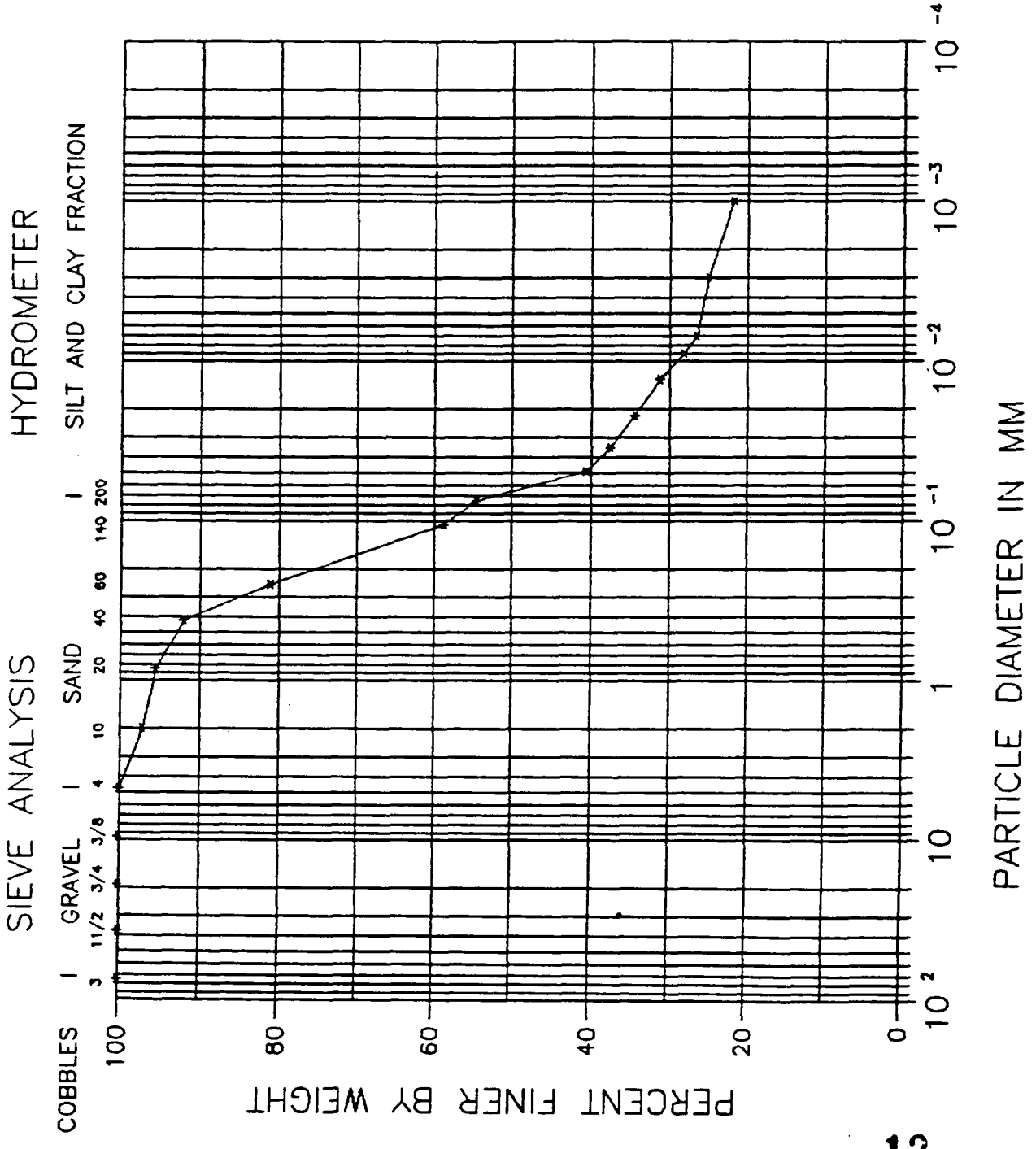
CLIENT: IT CORPORATION
PROJECT NO: 90106
MANWAY NO: SW-1/SE-1/NW-1 COMPOSITE
DESCRIPTION: K-65 MATERIAL
USCS CLASSIFICATION: NA

CLIENT PROJECT: FERNALD
BORING NO: SILO NO. 1
VERTICAL SECTION: A



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SILO NO: 2 MANWAY NO: NW-1 VERTICAL SECTION: A

WATER CONTENT

25.9%

SPECIFIC GRAVITY

2.87 g/cc

ATTERBERG LIMITS

LIQUID LIMIT: NP PLASTICITY INDEX: NP

PLASTIC LIMIT: NP USCS: NA

CONSISTENCY BREAK POINT (WATER CONTENT): 47.6%

GRAIN SIZE

SIEVE SIZE/TIME	DIAMETER (mm)	PERCENT FINER
SIEVE ANALYSIS:		
3.000 in	75.000	100.0
1.500 in	37.500	100.0
0.750 in	19.000	100.0
0.375 in	9.500	100.0
NO. 4	4.750	100.0
NO. 10	2.000	93.2
NO. 20	0.850	88.1
NO. 40	0.425	83.0
NO. 60	0.250	74.9
NO. 140	0.106	45.7
NO. 200	0.075	39.8
HYDROMETER ANALYSIS		
1 min	0.050	31.0
2 min	0.036	28.0
5 min	0.023	25.1
15 min	0.013	19.2
30 min	0.010	16.2
60 min	0.007	14.8
240 min	0.003	11.8
1440 min	0.001	8.9

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Thomas Tank
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Date: 3/22/90
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IT ANALYTICAL SERVICES
304 DIRECTORS DRIVE
KNOXVILLE, TN
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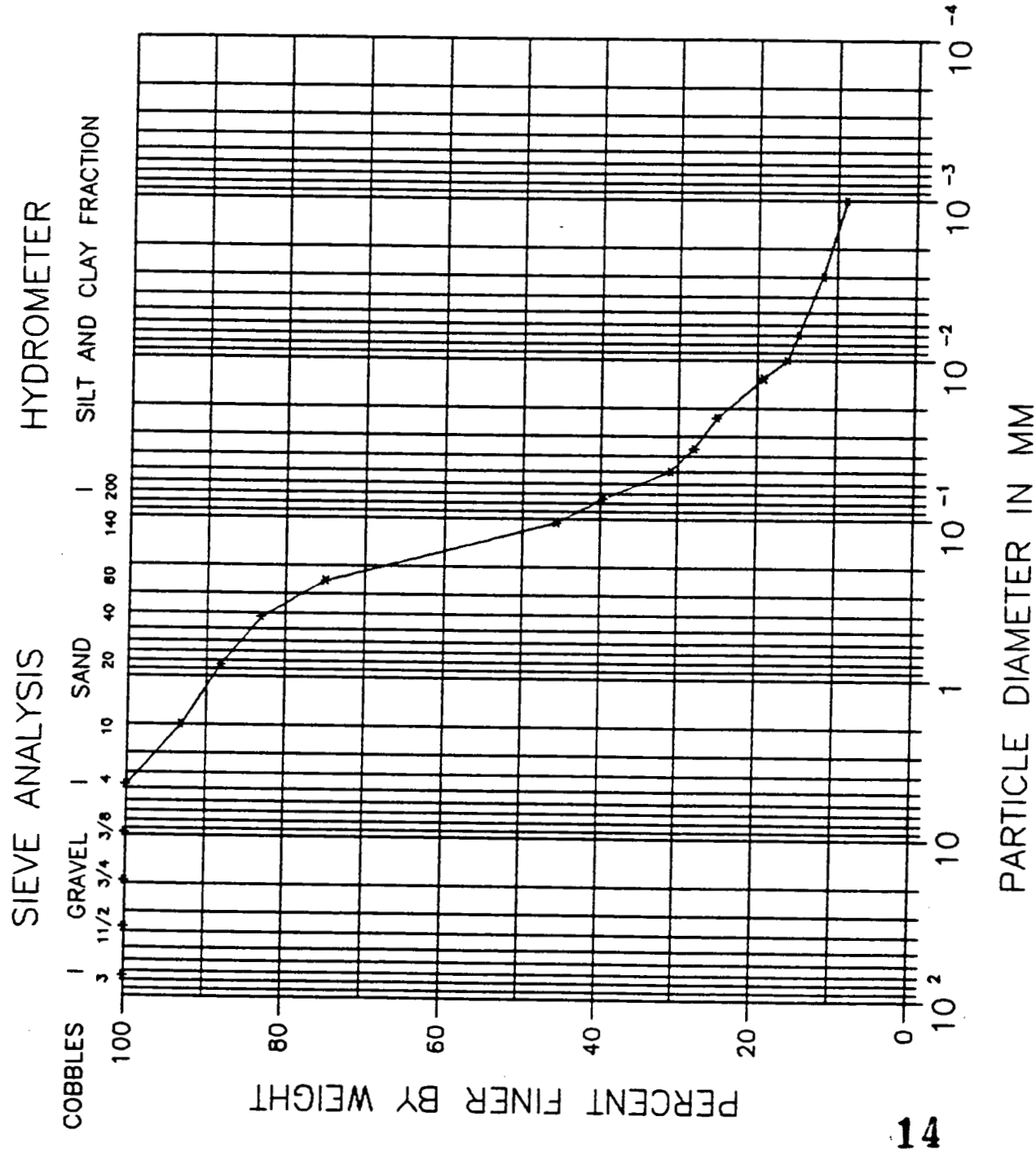
CLIENT: IT CORPORATION
PROJECT NO: 90106
MANWAY NO: NW-1
DESCRIPTION: K-65 MATERIAL
USCS CLASSIFICATION: NA

CLIENT PROJECT: FERNALD
BORING NO: SILO NO. 2
VERTICAL SECTION: A



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Thomas Tank
Fernald
Date: 3/22/90
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304 DIRECTORS DRIVE
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SILO NO: 2 MANWAY NO: NE-2 VERTICAL SECTION: BT

WATER CONTENT

21.8%

SPECIFIC GRAVITY

2.59 g/cc

ATTERBERG LIMITS

LIQUID LIMIT: NP PLASTICITY INDEX: NP

PLASTIC LIMIT: NP USCS: NA

CONSISTENCY BREAK POINT (WATER CONTENT): 40.9%

GRAIN SIZE

SIEVE SIZE/TIME	DIAMETER (mm)	PERCENT FINER
SIEVE ANALYSIS:		
3.000 in	75.000	100.0
1.500 in	37.500	100.0
0.750 in	19.000	100.0
0.375 in	9.500	100.0
NO. 4	4.750	100.0
NO. 10	2.000	86.3
NO. 20	0.850	80.5
NO. 40	0.425	69.6
NO. 60	0.250	62.2
NO. 140	0.106	53.1
NO. 200	0.075	51.9
HYDROMETER ANALYSIS		
1 min	0.050	36.1
2 min	0.036	32.8
5 min	0.023	26.3
15 min	0.014	18.1
30 min	0.010	11.5
60 min	0.007	9.8
240 min	0.003	8.2
1440 min	0.001	4.9

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IT ANALYTICAL SERVICES
304 DIRECTORS DRIVE
KNOXVILLE, TN
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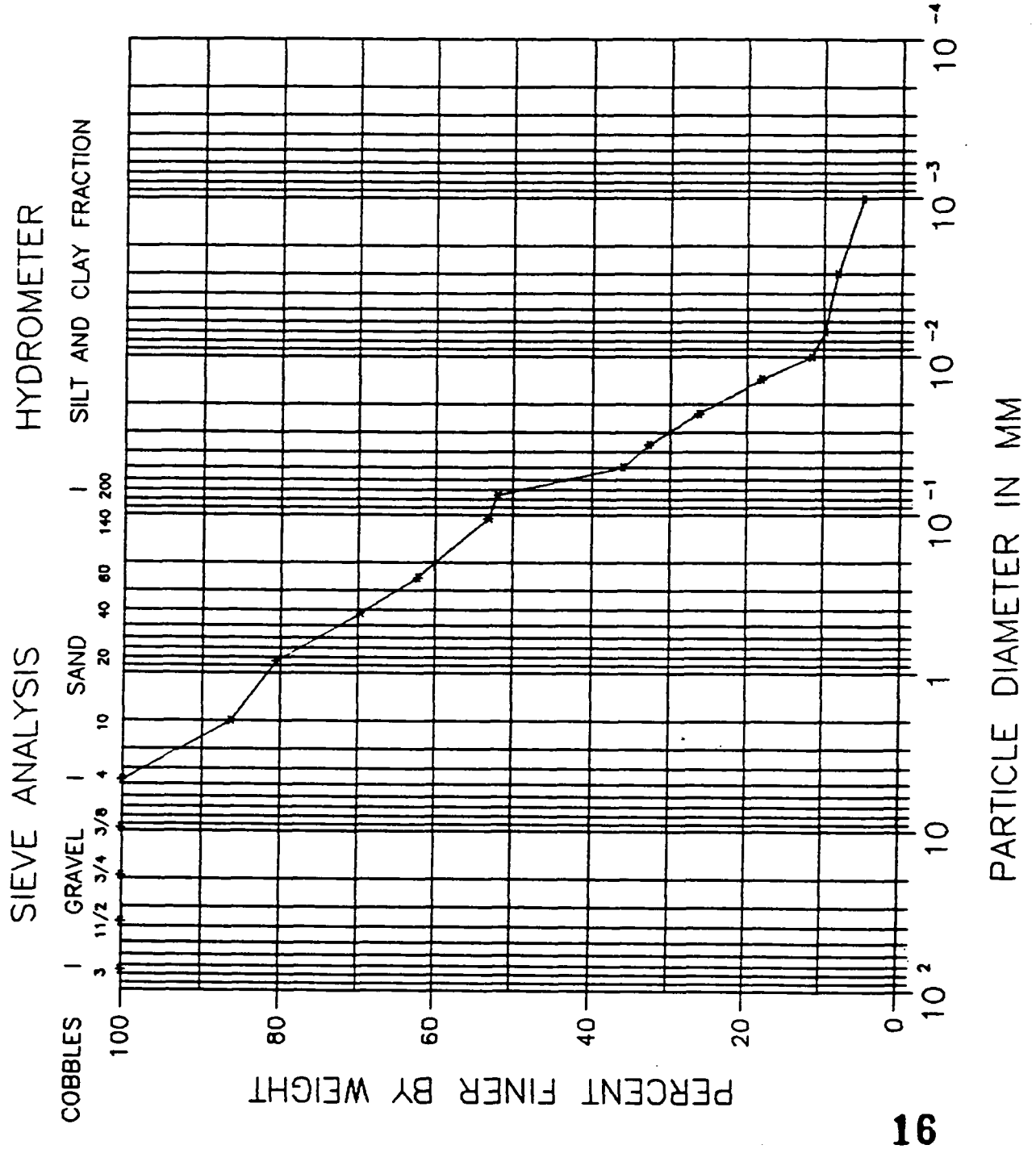
CLIENT: IT CORPORATION
PROJECT NO: 90106
MANWAY NO: NE-2
DESCRIPTION: K-65 MATERIAL
USCS CLASSIFICATION: NA

CLIENT PROJECT: FERNALD
BORING NO: SILO NO. 2
VERTICAL SECTION: BT



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Date: 3/22/90
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SILO NO: 2 MANWAY NO: SW-1 VERTICAL SECTION: A

WATER CONTENT

73.5%

SPECIFIC GRAVITY

3.11 g/cc

ATTERBERG LIMITS

LIQUID LIMIT: NP PLASTICITY INDEX: NP

PLASTIC LIMIT: NP USCS: NA

CONSISTENCY BREAK POINT (WATER CONTENT): 79.4%

GRAIN SIZE

SIEVE SIZE/TIME	DIAMETER (mm)	PERCENT FINER
SIEVE ANALYSIS:		
3.000 in	75.000	100.0
1.500 in	37.500	100.0
0.750 in	19.000	100.0
0.375 in	9.500	100.0
NO. 4	4.750	100.0
NO. 10	2.000	96.5
NO. 20	0.850	89.4
NO. 40	0.425	80.4
NO. 60	0.250	73.1
NO. 140	0.106	63.7
NO. 200	0.075	63.3
HYDROMETER ANALYSIS		
1 min	0.042	48.2
2 min	0.030	47.2
5 min	0.019	45.3
15 min	0.011	42.5
30 min	0.008	39.7
60 min	0.006	36.8
240 min	0.003	34.0
1440 min	0.001	20.8

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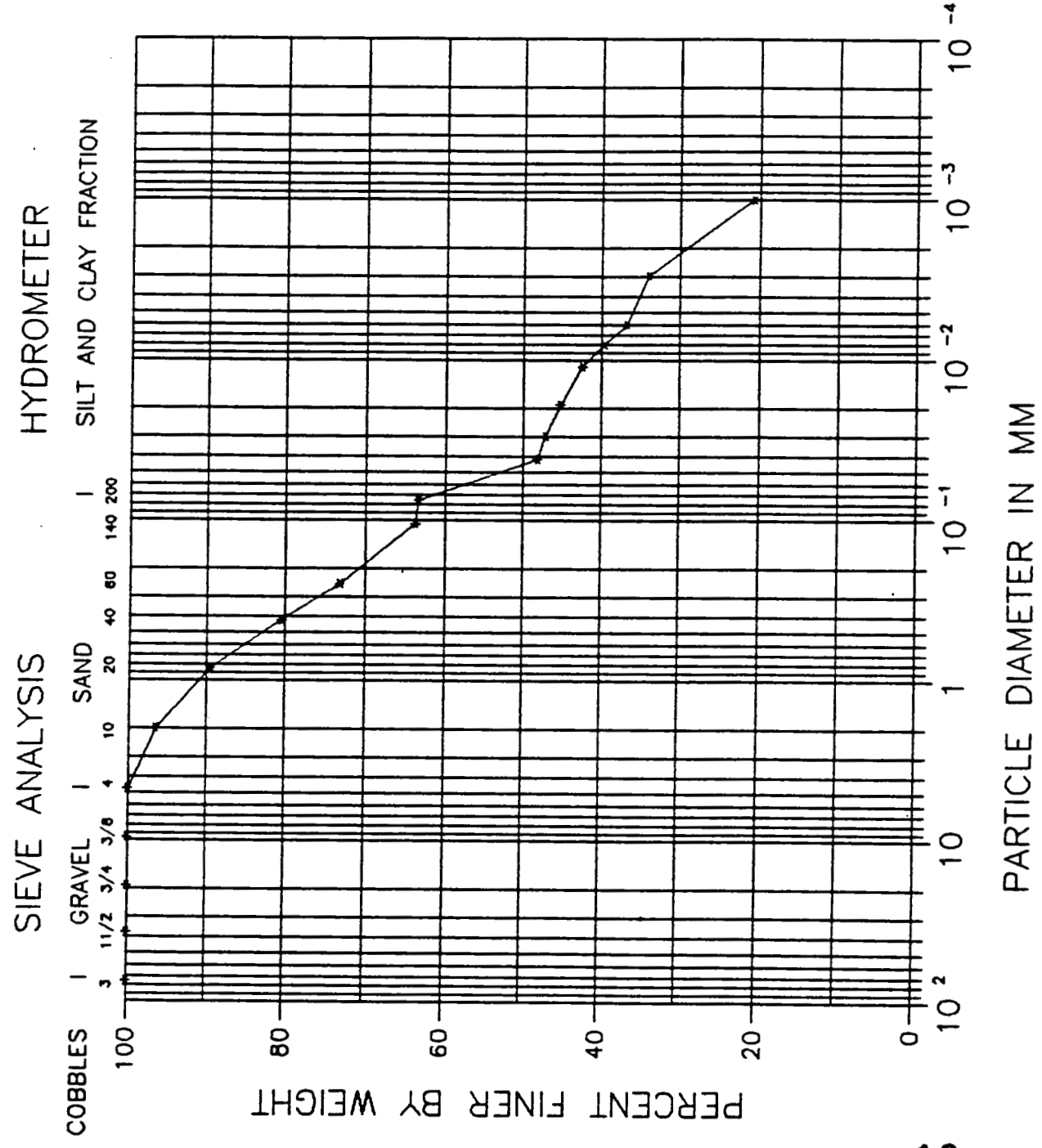
CLIENT: IT CORPORATION
PROJECT NO: 90106
MANWAY NO: SW-1
DESCRIPTION: K-65 MATERIAL
USCS CLASSIFICATION: NA

CLIENT PROJECT: FERNALD
BORING NO: SILO NO. 2
VERTICAL SECTION: A



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Thomas Tank
Fernald
Date: 3/22/90
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IT ANALYTICAL SERVICES
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SILO NO: 2 MANWAY NO: SW-2/NW-2/NE-1 VERTICAL SECTION: COMPOSITE

WATER CONTENT

34.2%

SPECIFIC GRAVITY

2.78 g/cc

ATTERBERG LIMITS

LIQUID LIMIT: NP PLASTICITY INDEX: NP

PLASTIC LIMIT: NP USCS: NA

CONSISTENCY BREAK POINT (WATER CONTENT): 46.4%

GRAIN SIZE

SIEVE SIZE/TIME	DIAMETER (mm)	PERCENT FINER
SIEVE ANALYSIS:		
3.000 in	75.000	100.0
1.500 in	37.500	100.0
0.750 in	19.000	100.0
0.375 in	9.500	100.0
NO. 4	4.750	100.0
NO. 10	2.000	96.4
NO. 20	0.850	88.9
NO. 40	0.425	67.2
NO. 60	0.250	57.1
NO. 140	0.106	39.7
NO. 200	0.075	38.1
HYDROMETER ANALYSIS		
1 min	0.050	32.0
2 min	0.036	30.5
5 min	0.023	28.9
15 min	0.013	25.9
30 min	0.009	22.9
60 min	0.007	19.8
240 min	0.003	18.3
1440 min	0.001	10.7

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Date: 3/22/90
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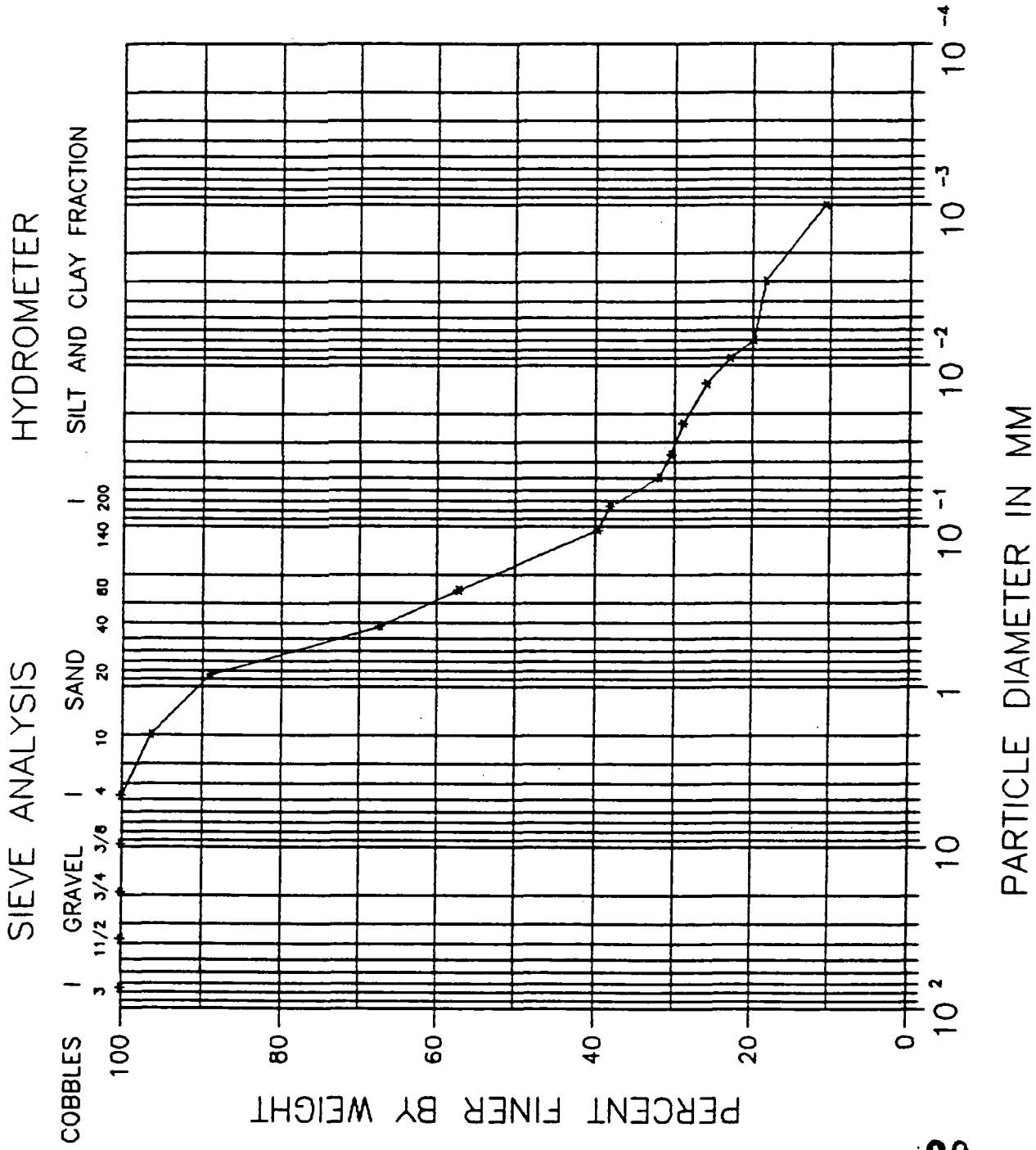
IT ANALYTICAL SERVICES
304 DIRECTORS DRIVE
KNOXVILLE, TN
(615) 690-3211

CLIENT: IT CORPORATION
PROJECT NO: 90106
MANWAY NO: SW-2/NW-2/NE-1 COMPOSITE
DESCRIPTION: K-65 MATERIAL
USCS CLASSIFICATION: NA

CLIENT PROJECT: FERNALD
BORING NO: SILO NO. 2
VERTICAL SECTION: A



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Fernald
Date: 3/22/90
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SILO NO: S3 MANWAY NO: NW-1 VERTICAL SECTION: A

WATER CONTENT

7.4%

SPECIFIC GRAVITY

2.35 g/cc

ATTERBERG LIMITS

LIQUID LIMIT: NP PLASTICITY INDEX: NP

PLASTIC LIMIT: NP USCS: NA

CONSISTENCY BREAK POINT (WATER CONTENT): 66.0%

GRAIN SIZE

SIEVE SIZE/TIME	DIAMETER (mm)	PERCENT FINER
SIEVE ANALYSIS:		
3.000 in	75.000	100.0
1.500 in	37.500	100.0
0.750 in	19.000	100.0
0.375 in	9.500	100.0
NO. 4	4.750	100.0
NO. 10	2.000	100.0
NO. 20	0.850	99.7
NO. 40	0.425	97.7
NO. 60	0.250	96.0
NO. 140	0.106	93.5
NO. 200	0.075	93.2
HYDROMETER ANALYSIS		
1 min	0.045	92.4
2 min	0.033	85.3
5 min	0.022	67.5
15 min	0.014	35.5
30 min	0.010	35.5
60 min	0.007	35.5
240 min	0.004	35.5
1440 min	0.001	35.5

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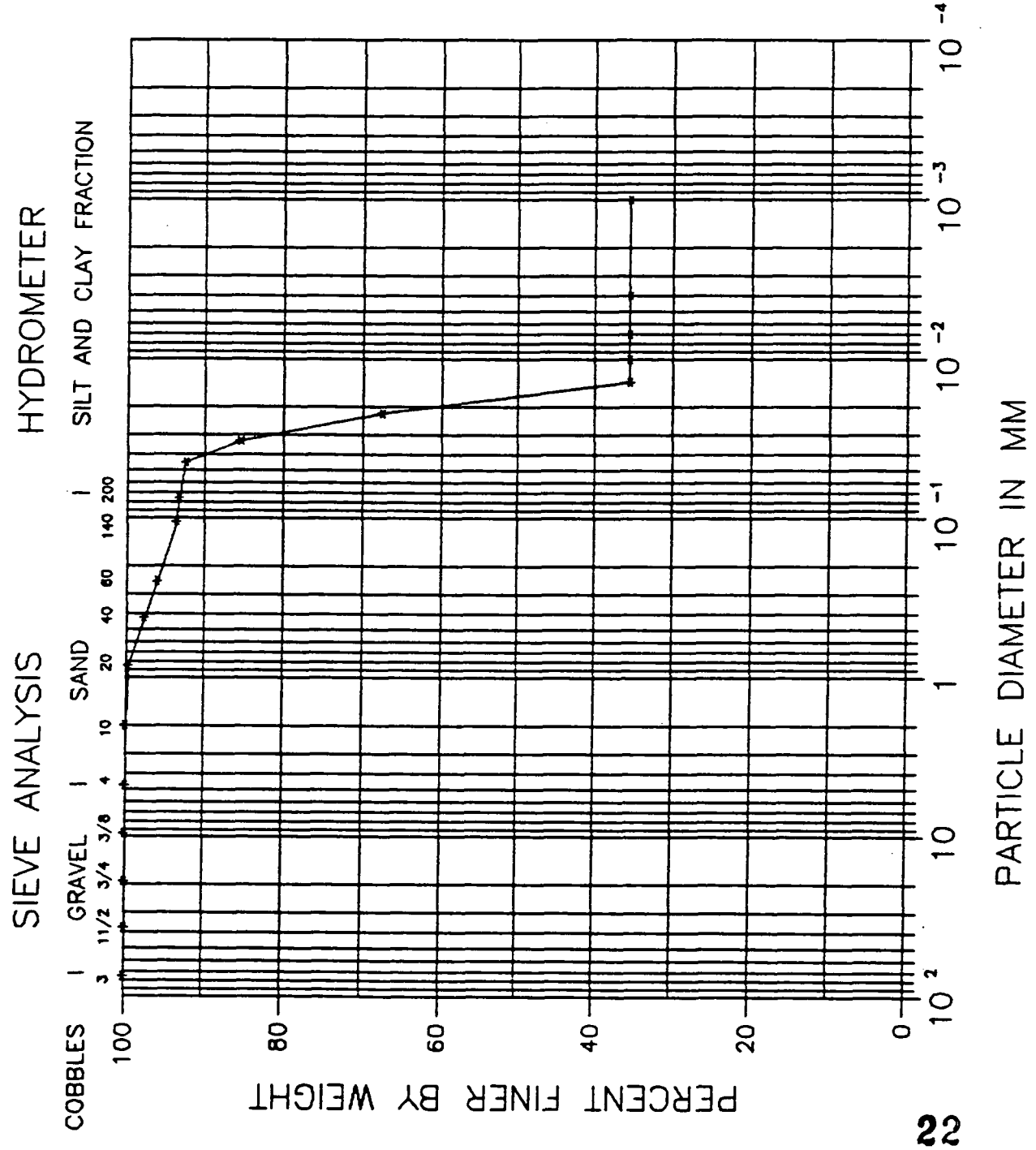
Thomas Tank
Fernald
Date: 3/22/90
Client Project ID: 303317.24.05.20 Job Number: 303317.24.05.20

IT ANALYTICAL SERVICES
304 DIRECTORS DRIVE
KNOXVILLE, TN
(615) 690-3211

CLIENT: IT CORPORATION
PROJECT NO: 90106
MANWAY NO: NW-1
DESCRIPTION: METAL OXIDE
USCS CLASSIFICATION: NA

CLIENT PROJECT: FERNALD
BORING NO: SILO NO. S3
VERTICAL SECTION: A



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Thomas Tank
Fernald
Date: 3/22/90
Client Project ID: 303317.24.05.20 Job Number: 303317.24.05.20

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SILO NO: S3 MANWAY NO: NW-1 VERTICAL SECTION: C

WATER CONTENT

3.7%

SPECIFIC GRAVITY

2.08 g/cc

ATTERBERG LIMITS

LIQUID LIMIT: NP PLASTICITY INDEX: NP

PLASTIC LIMIT: NP USCS: NA

CONSISTENCY BREAK POINT (WATER CONTENT): 68.3%

GRAIN SIZE

SIEVE SIZE/TIME	DIAMETER (mm)	PERCENT FINER
SIEVE ANALYSIS:		
3.000 in	75.000	100.0
1.500 in	37.500	100.0
0.750 in	19.000	100.0
0.375 in	9.500	100.0
NO. 4	4.750	100.0
NO. 10	2.000	100.0
NO. 20	0.850	98.7
NO. 40	0.425	98.2
NO. 60	0.250	97.5
NO. 140	0.106	94.6
NO. 200	0.075	93.9
HYDROMETER ANALYSIS		
1 min	0.049	93.3
2 min	0.036	86.4
5 min	0.025	64.5
15 min	0.015	50.2
30 min	0.011	50.2
60 min	0.008	50.2
240 min	0.004	50.2
1440 min	0.001	50.2

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Date: 3/22/90
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304 DIRECTORS DRIVE
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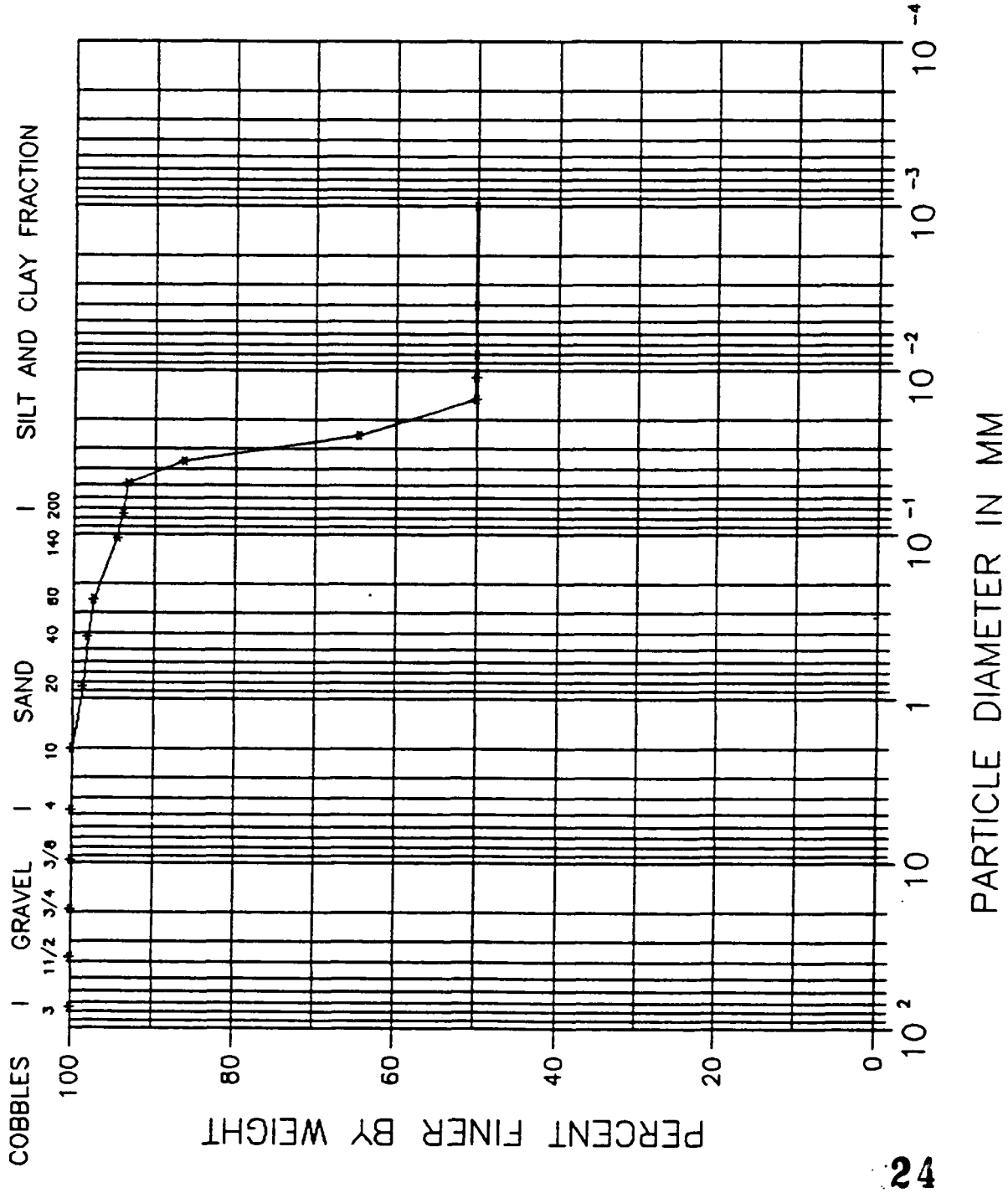
CLIENT: IT CORPORATION
PROJECT NO: 90106
MANWAY NO: NW-1
DESCRIPTION: METAL OXIDE
USCS CLASSIFICATION: NA

CLIENT PROJECT: FERNALD
BORING NO: SILO NO. S3
VERTICAL SECTION: C



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Thomas Tank
Fernald
Date: 3/22/90
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SILO NO: S3 MANWAY NO: SE-1 VERTICAL SECTION: A

WATER CONTENT

10.2%

SPECIFIC GRAVITY

2.58 g/cc

ATTERBERG LIMITS

LIQUID LIMIT: NP PLASTICITY INDEX: NP

PLASTIC LIMIT: NP USCS: NA

CONSISTENCY BREAK POINT (WATER CONTENT): 77.7%

GRAIN SIZE

SIEVE SIZE/TIME	DIAMETER (mm)	PERCENT FINER
SIEVE ANALYSIS:		
3.000 in	75.000	100.0
1.500 in	37.500	100.0
0.750 in	19.000	100.0
0.375 in	9.500	100.0
NO. 4	4.750	100.0
NO. 10	2.000	100.0
NO. 20	0.850	97.4
NO. 40	0.425	92.6
NO. 60	0.250	90.8
NO. 140	0.106	90.0
NO. 200	0.075	90.0
HYDROMETER ANALYSIS		
1 min	0.043	87.2
2 min	0.031	80.0
5 min	0.020	72.7
15 min	0.013	29.1
30 min	0.010	25.4
60 min	0.007	21.8
240 min	0.003	21.8
1440 min	0.001	21.8

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Thomas Tank
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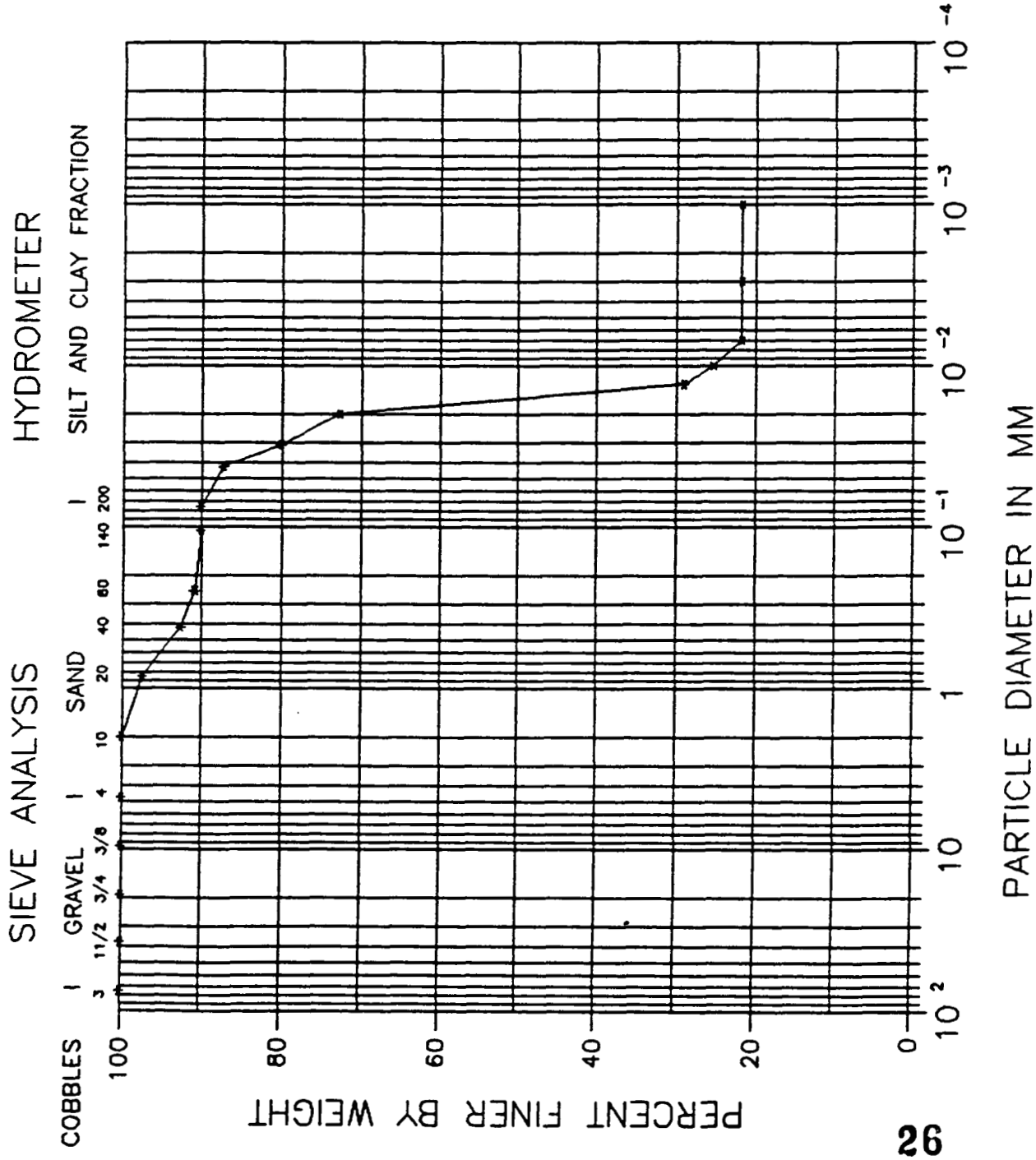
Date: 3/22/90
Client Project ID: 303317.24.05.20 Job Number: 303317.24.05.20

IT ANALYTICAL SERVICES
304 DIRECTORS DRIVE
KNOXVILLE, TN
(615) 690-3211

CLIENT: IT CORPORATION
PROJECT NO: 90106
MANWAY NO: SE
DESCRIPTION: METAL OXIDE
USCS CLASSIFICATION: NA

CLIENT PROJECT: FERNALD
BORING NO: SILO NO. S3
VERTICAL SECTION: A



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Thomas Tank
Fernald
Date: 3/22/90
Client Project ID: 303317.24.05.20 Job Number: 303317.24.05.20

IT ANALYTICAL SERVICES
304 DIRECTORS DRIVE
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SILO NO: S3 MANWAY NO: SE-1 VERTICAL SECTION: C

WATER CONTENT

6.3%

SPECIFIC GRAVITY

2.29 g/cc

ATTERBERG LIMITS

LIQUID LIMIT: NP PLASTICITY INDEX: NP

PLASTIC LIMIT: NP USCS: NA

CONSISTENCY BREAK POINT (WATER CONTENT): 62.6

GRAIN SIZE

SIEVE SIZE/TIME	DIAMETER (mm)	PERCENT FINER
SIEVE ANALYSIS:		
3.000 in	75.000	100.0
1.500 in	37.500	100.0
0.750 in	19.000	100.0
0.375 in	9.500	100.0
NO. 4	4.750	100.0
NO. 10	2.000	100.0
NO. 20	0.850	97.3
NO. 40	0.425	94.7
NO. 60	0.250	93.6
NO. 140	0.106	93.0
NO. 200	0.075	92.9
HYDROMETER ANALYSIS		
1 min	0.046	91.1
2 min	0.033	86.0
5 min	0.023	61.9
15 min	0.014	37.8
30 min	0.010	34.4
60 min	0.007	34.4
240 min	0.004	34.4
1440 min	0.001	34.4

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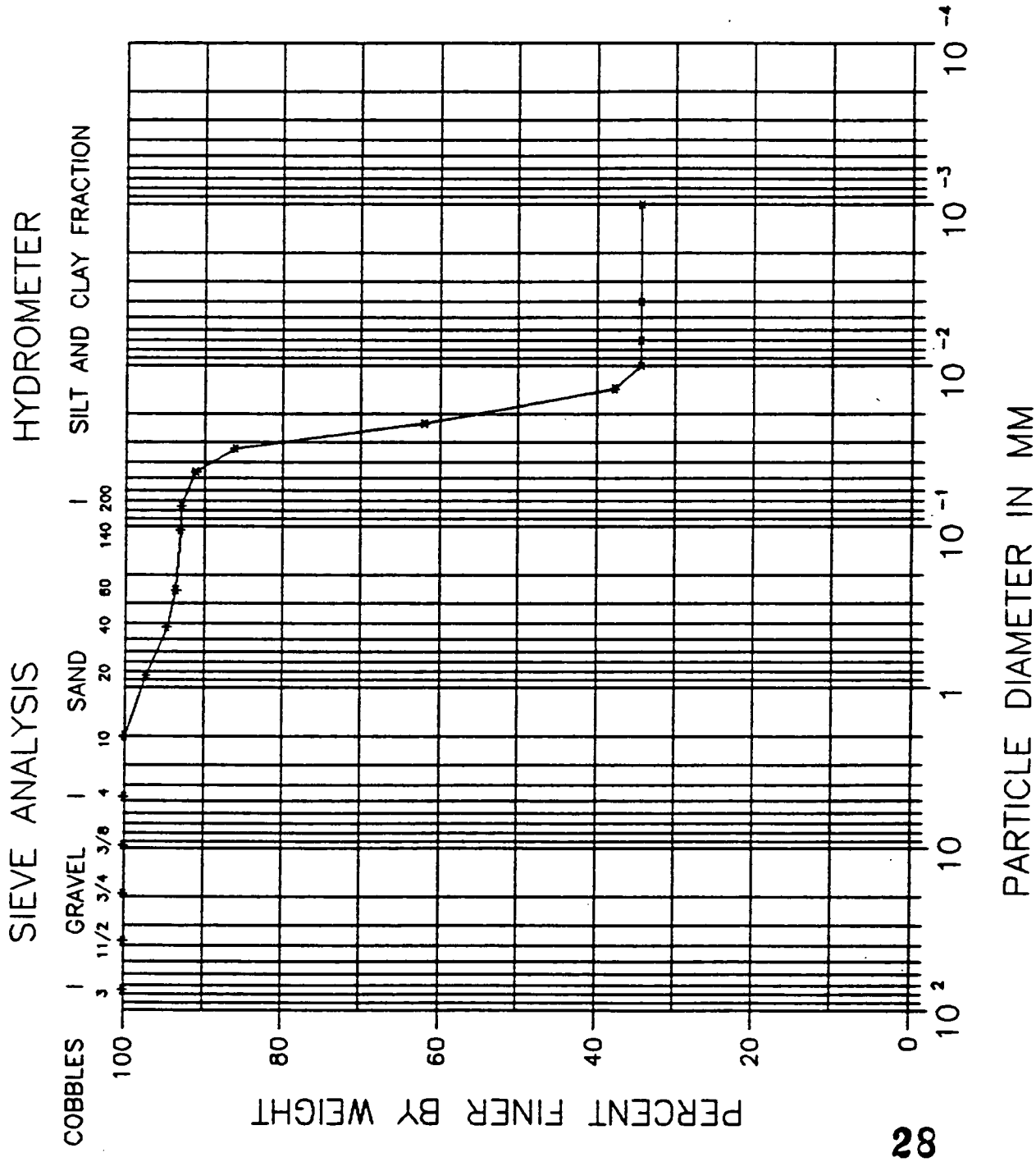
KNOXVILLE, TN
(615) 690-3211

Job Number: 303317.24.05.20

CLIENT: IT CORPORATION
PROJECT NO: 90106
MANWAY NO: SE
DESCRIPTION: METAL OXIDE
USCS CLASSIFICATION: NA

CLIENT PROJECT: FERNALD
BORING NO: SILO NO. S3
VERTICAL SECTION: C



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SILO NO: S3 MANWAY NO: NE-1 VERTICAL SECTION: COMPOSITE

WATER CONTENT

3.8%

SPECIFIC GRAVITY

2.75 g/cc

ATTERBERG LIMITS

LIQUID LIMIT: NP PLASTICITY INDEX: NP

PLASTIC LIMIT: NP USCS: NA

CONSISTENCY BREAK POINT (WATER CONTENT): 57.5%

GRAIN SIZE

SIEVE SIZE/TIME	DIAMETER (mm)	PERCENT FINER
SIEVE ANALYSIS:		
3.000 in	75.000	100.0
1.500 in	37.500	100.0
0.750 in	19.000	100.0
0.375 in	9.500	100.0
NO. 4	4.750	100.0
NO. 10	2.000	100.0
NO. 20	0.850	95.1
NO. 40	0.425	91.1
NO. 60	0.250	89.0
NO. 140	0.106	88.0
NO. 200	0.075	87.8
HYDROMETER ANALYSIS		
1 min	0.038	85.2
2 min	0.028	79.1
5 min	0.019	63.9
15 min	0.012	39.5
30 min	0.009	36.5
60 min	0.006	36.5
240 min	0.003	36.5
1440 min	0.001	36.5

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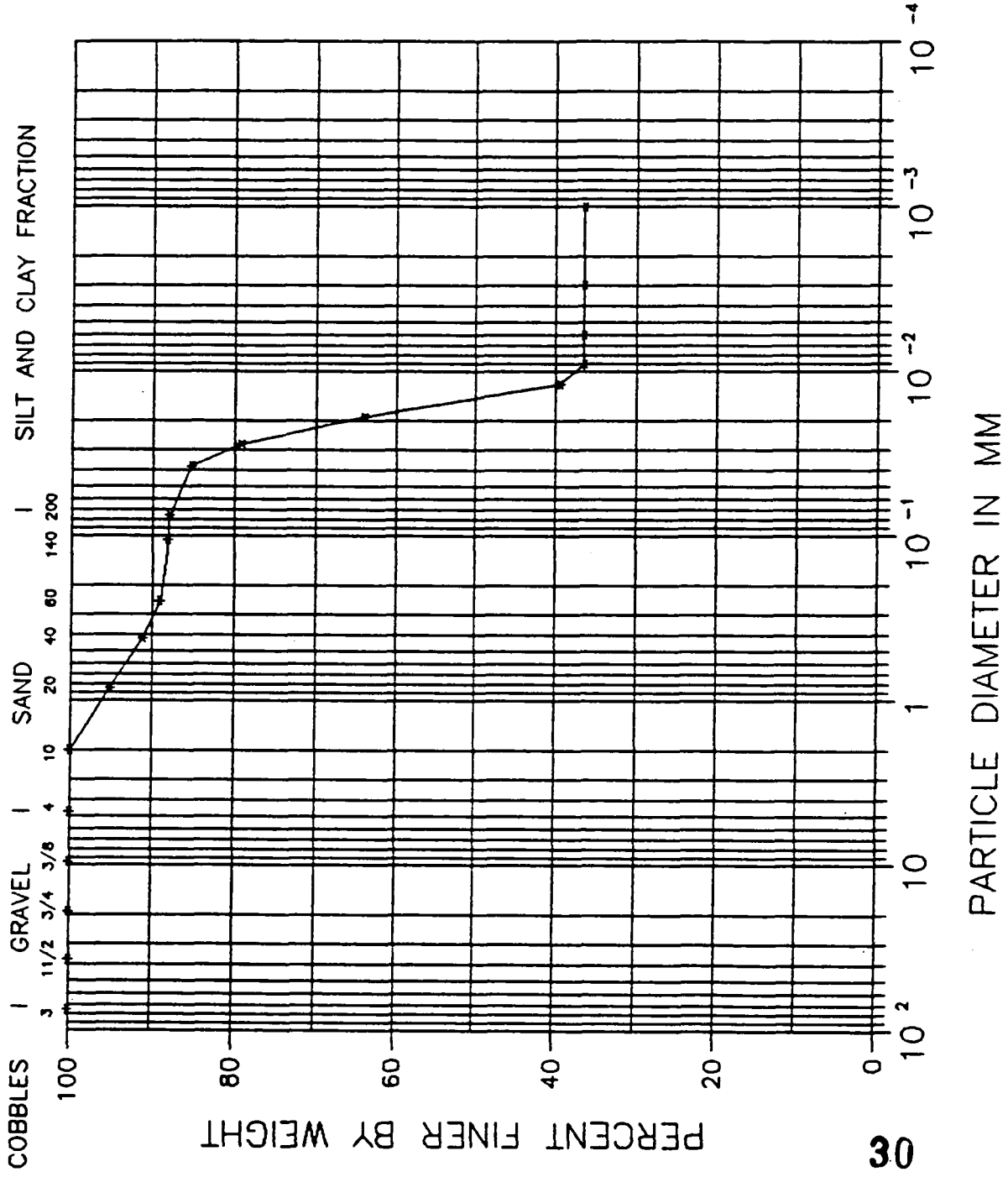
CLIENT: IT CORPORATION
PROJECT NO: 90106
MANWAY NO: NE-1
DESCRIPTION: METAL OXIDE
USCS CLASSIFICATION: NA

CLIENT PROJECT: FERNALD
BORING NO: SILO NO. S3
VERTICAL SECTION: ABC COMPOSITE



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CROSS-REFERENCE LIST

SILO NO./ MANWAY ID/ VERT. SEC.	WATER CONTENT %	SPECIFIC GRAVITY g/cc	PLASTICITY INDEX/ BREAK POINT (%)*	PERCENT FINER NO.200
1/NE-1 A	50.7	3.19	5.2	72.7
1/NE-1 C	71.5	2.74	3.7	71.5
1/SE-2 BT	31.9	3.37	NP/38.0	43.9
1/COMPOSITE	22.8	2.58	NP/35.7	54.5
2/NW-1 A	25.9	2.87	NP/47.6	39.8
2/NE-2 BT	21.8	2.59	NP/40.9	51.9
2/SW-1 A	73.5	3.11	NP/79.4	63.3
2/COMPOSITE A	34.2	2.78	NP/46.4	39.1
3/NW-1 A	7.4	2.35	NP/66.0	93.2
3/NW-1 C	3.7	2.08	NP/68.3	93.9
3/SE-1 A	10.2	2.58	NP/77.7	90.0
3/SE-1 C	6.3	2.29	NP/62.6	92.9
3/COMPOSITE	3.8	2.75	NP/57.5	87.8

*When the plasticity index was NP (non plastic) a break point in consistency was observed and the moisture content determined.

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SUMMARY

The results in this report for the geotechnical analyses of K-65 and metal oxides silos samples contain data that must be interpreted with certain understandings. First and foremost, the material that was analyzed from each of the three silos was not soil or even soil-like material. The geotechnical protocols used (standard ASTM methods) are primarily for either soil or soil-like material.

The silo material was primarily nonplastic (NP). However, it was observed during the analysis that a definable break in consistency was evident. This break in consistency was observed to be a difference between a solid-like consistency and a fluid-like consistency with the addition of a small amount of water. This was considered by us to represent a physical characteristic of the material that was not definable by current ASTM standards. We therefore decided to measure the water content of the material at this noted break in consistency and present it in the data for those samples with nonplastic consistencies.

Another physical phenomena occurred in the particle size distribution analyses for silo 3 material, the metal oxides. All metal oxide samples exhibited a quasi-equilibrium in particle suspension. The data illustrate that the particles stopped settling out of suspension after 60 minutes. The explanation of this phenomena is strictly hypothetical. First, there may have been a phase separation in the cylinder as a result of the type of material that was being analyzed. Second, there may have been an incomplete dispersion of particles reaction that normally takes place with the addition of sodium hexametaphosphate. This may be a result of the metal oxide material differing in its charge characteristics as compared to soil or soil like material. Once again these explanations are only hypothetical.

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