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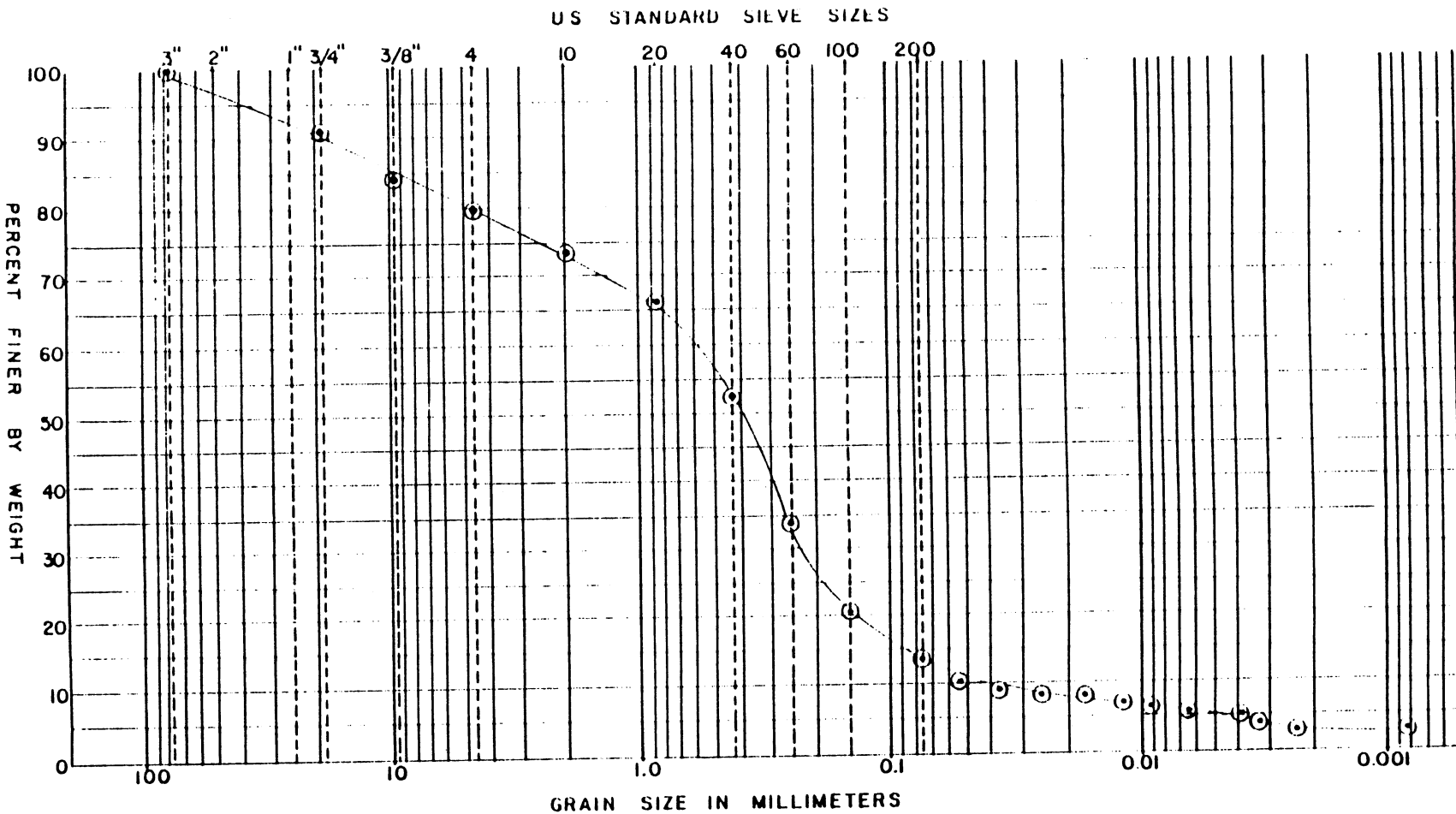
Appendix 3.5-17

**Grain Size Curves from 1979-82
Golder Associates "G40 and G41" Series Borings and Miscellaneous Test Pits**

GRAIN SIZE DISTRIBUTION

BEST COPY AVAILABLE

FIGURE 72-13



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

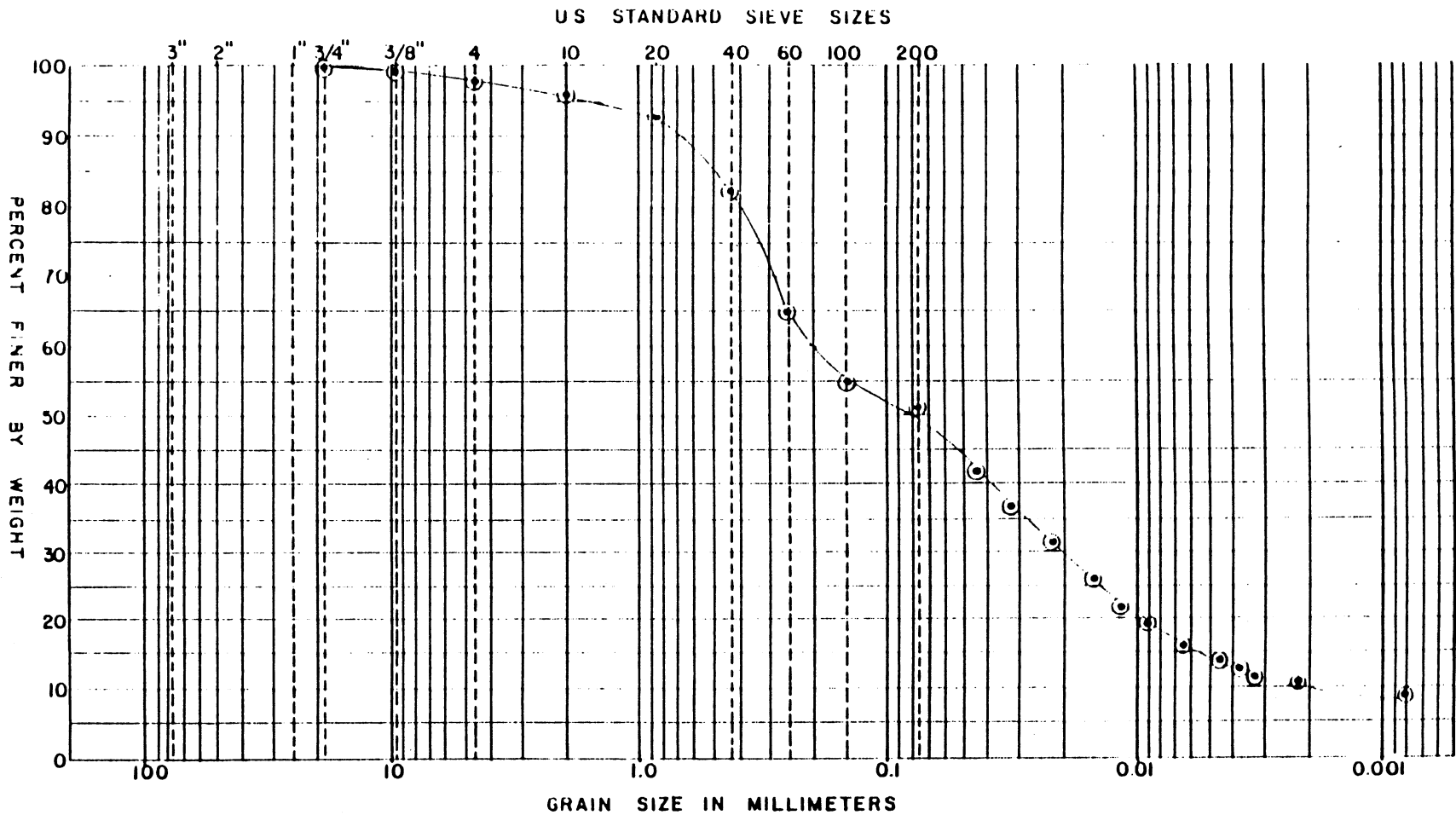
BORING NO.	ELEV OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
TP 1	1.52m- 2.13m (5.0'-7.0')	17.2	-	-	-	Red-brown, fine to coarse, gravelly, coarse SAND, some silt, trace clay (SH)

Date 1/2/80
Job No 736085

Golder Associates

3.5-17-1

Drawn MW
Checked [Signature]
Reviewed [Signature]



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
TP 4	1.68m-1.98m (5.5'-6.5')	14.1	25	16	9	Brown, fine to coarse SAND and silt, some clay, trace fine gravel (Cl)

Date 1/2/30
Job No. 786085

Golder Associates

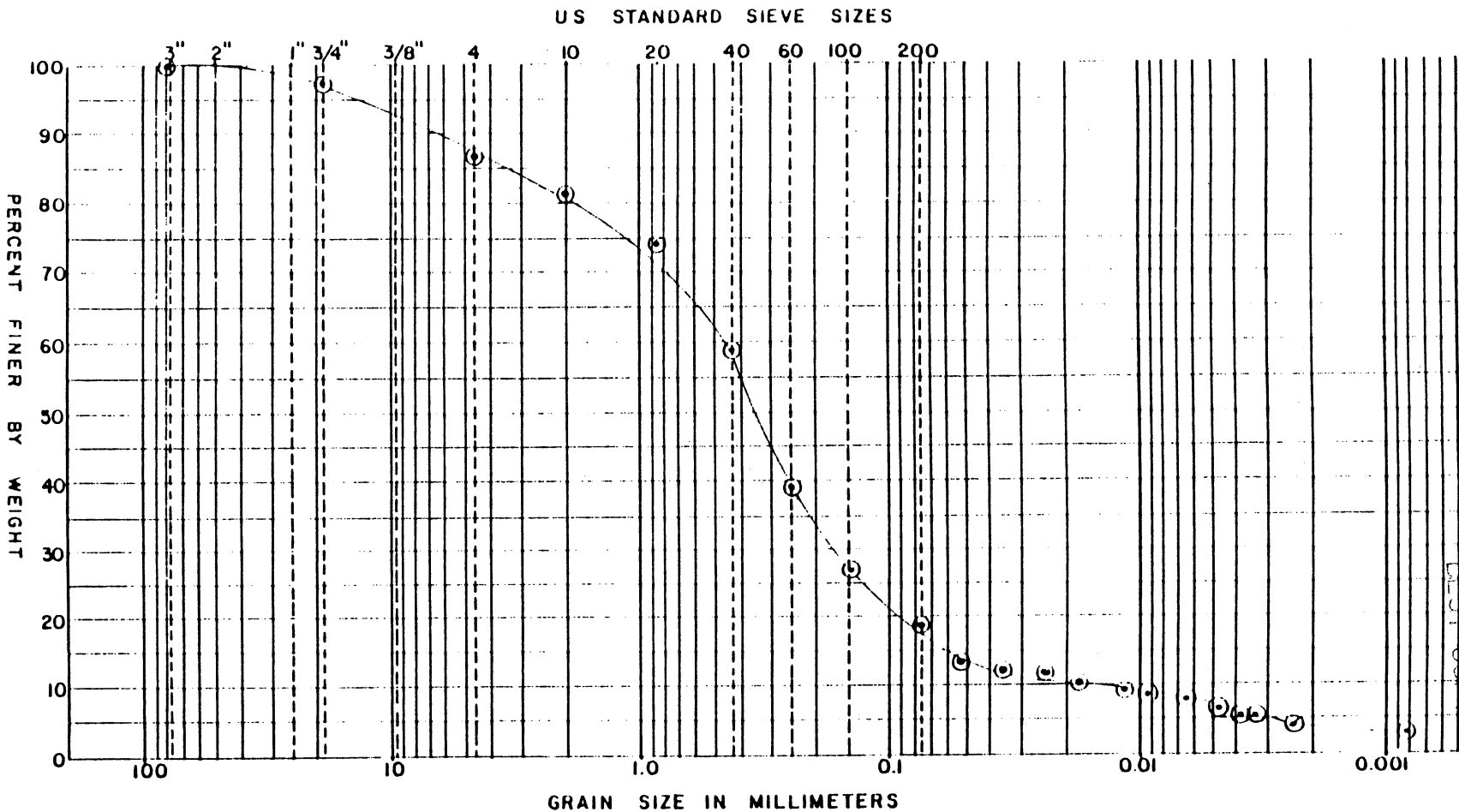
3.5-17-2

Drawn MM
Checked MM
Reviewed MM

GRAIN SIZE DISTRIBUTION

FIGURE 72-16

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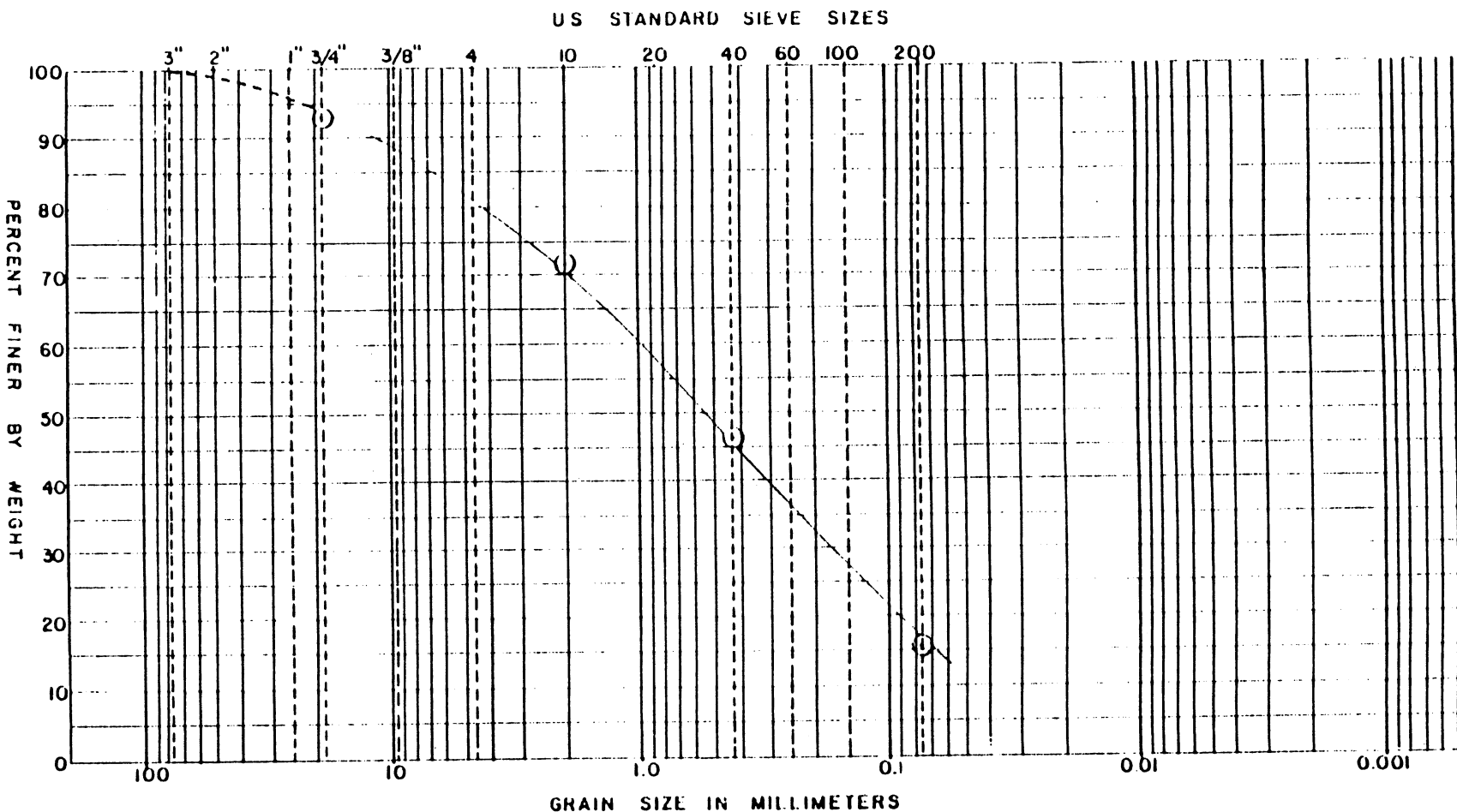
COBBLES	GRAVEL		SAND			FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
TP 5 — ○ —	1.83m-2.13m (6.0'-7.0')	4.8	-	-	-	Red-brown, fine to coarse SAND, some silt, some fine to coarse gravel, trace clay (SM)

Date 1/2/30
Job No 736035

Golder Associates 3.5-17-3

Drawn AM
Checked AM
Reviewed AM



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

BORING NO.	ELEV OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
TP-11	2.44m-2.74m (8.0'-9.0')					Brown, fine to coarse SAND, some fine to coarse gravel, some silt (SM)

Date 3/13/81
Job No. 785085

Golder Associates

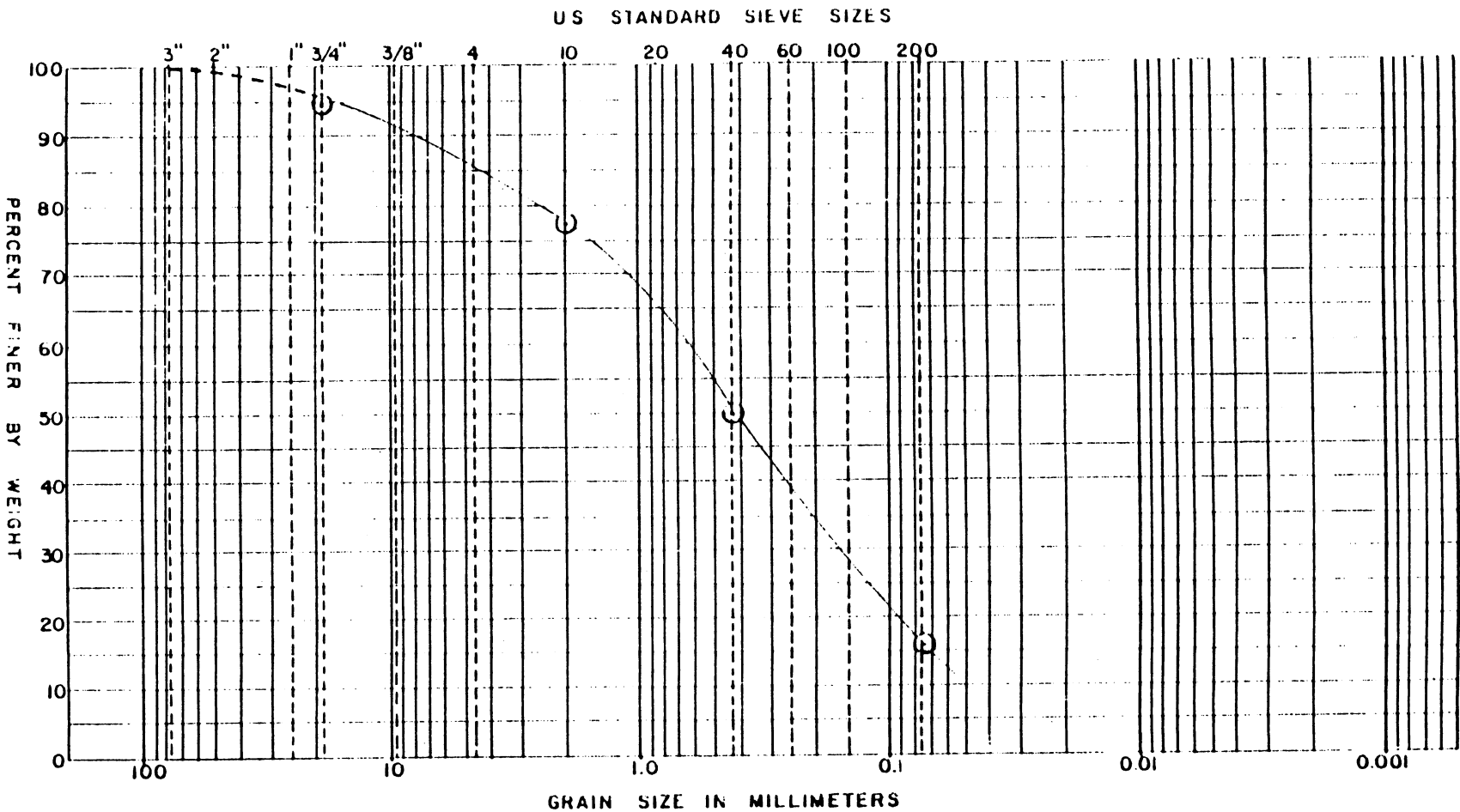
3.5-17-4

Drawn WJG
Checked AMC
Reviewed AMC

GRAIN SIZE DISTRIBUTION

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FIGURE V2-13



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

BORING NO.	ELEV OR DEPTH	w_n	w_L	w_p	i_p	DESCRIPTION OR CLASSIFICATION
TP-21	3.05m-3.35m (10.0'-11.0')					Brown, fine to coarse SAND, some fine to coarse gravel, some silt (SM)

Date 3/14/81
Job No. 736085

Golder Associates

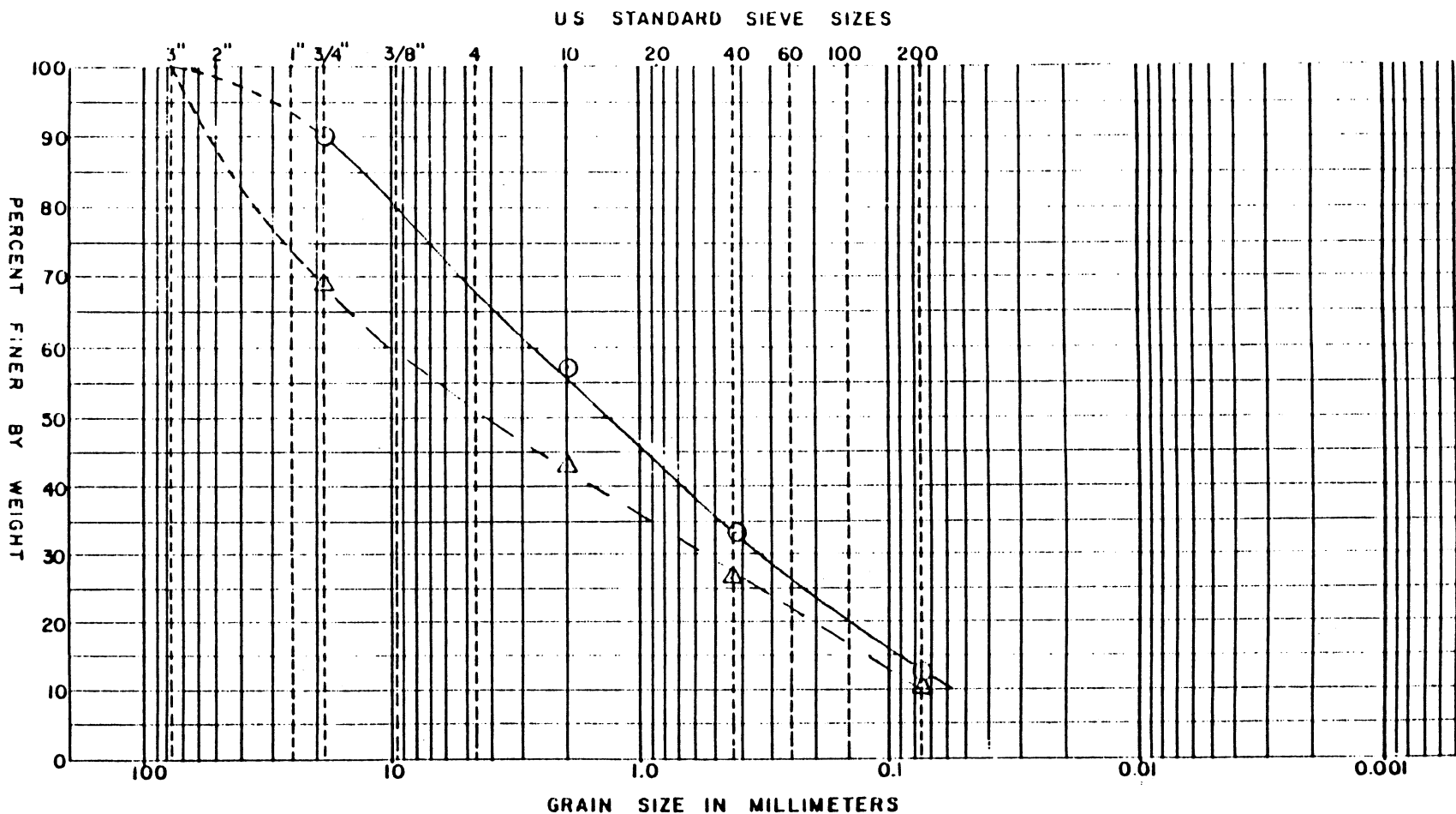
3.5-1/-5

Drawn WJB
Checked Blue
Reviewed

GRAIN SIZE DISTRIBUTION

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FIGURE V2-19



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

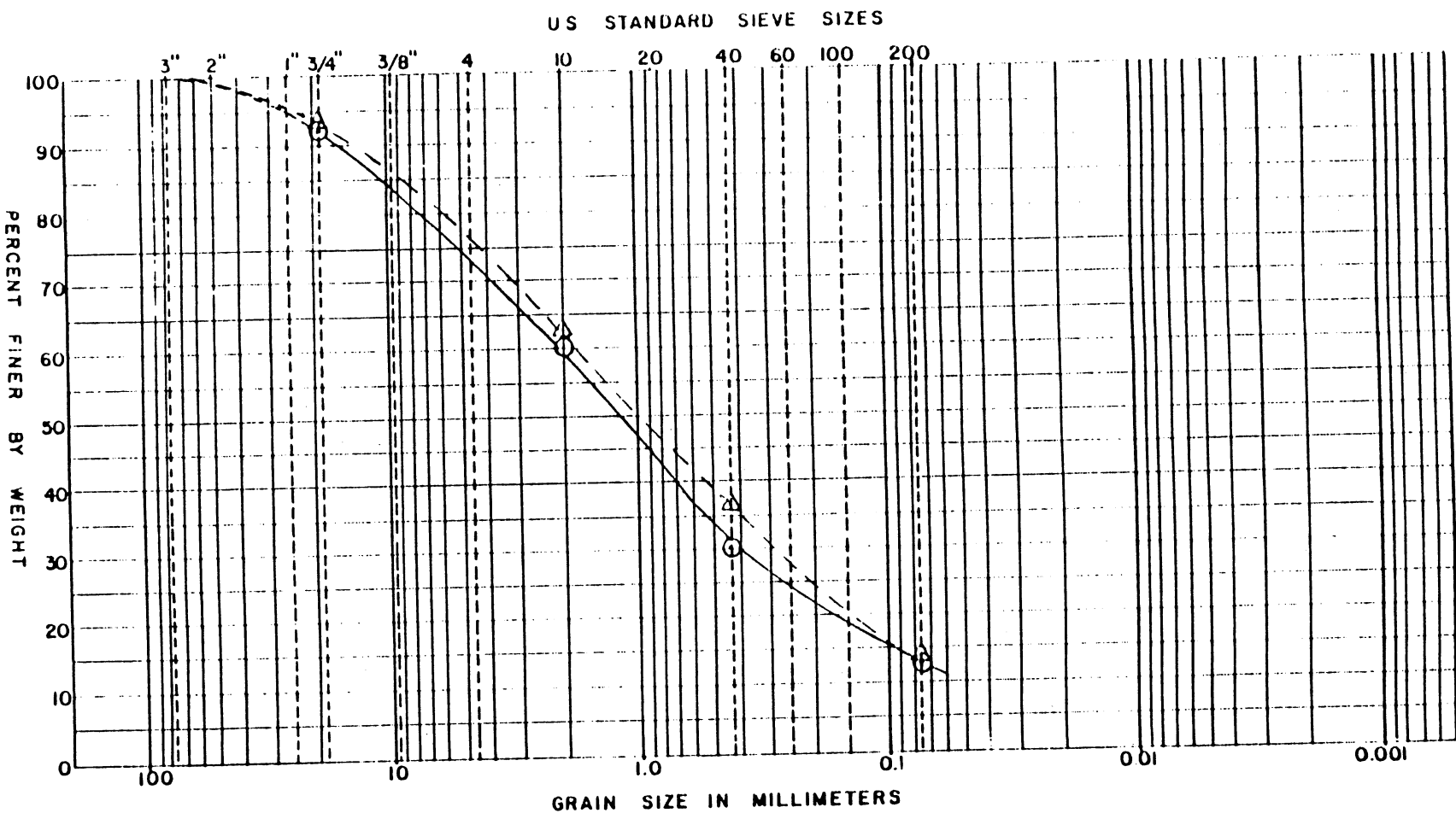
BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
TP-22, SA-1	3.05m-3.35m (10.0'-11.0')					Brown, fine to coarse GRAVEL, and fine to coarse SAND, some silt (GP-GM)
SA-2	3.35m-3.66m (11.0'-12.0')					Brown, fine to coarse gravelly, fine to coarse SAND, some silt (SM)

Date 3/11/81
Job No. 796085

Golder Associates

3.5-17-6

Drawn MRB
Checked *She*
Reviewed



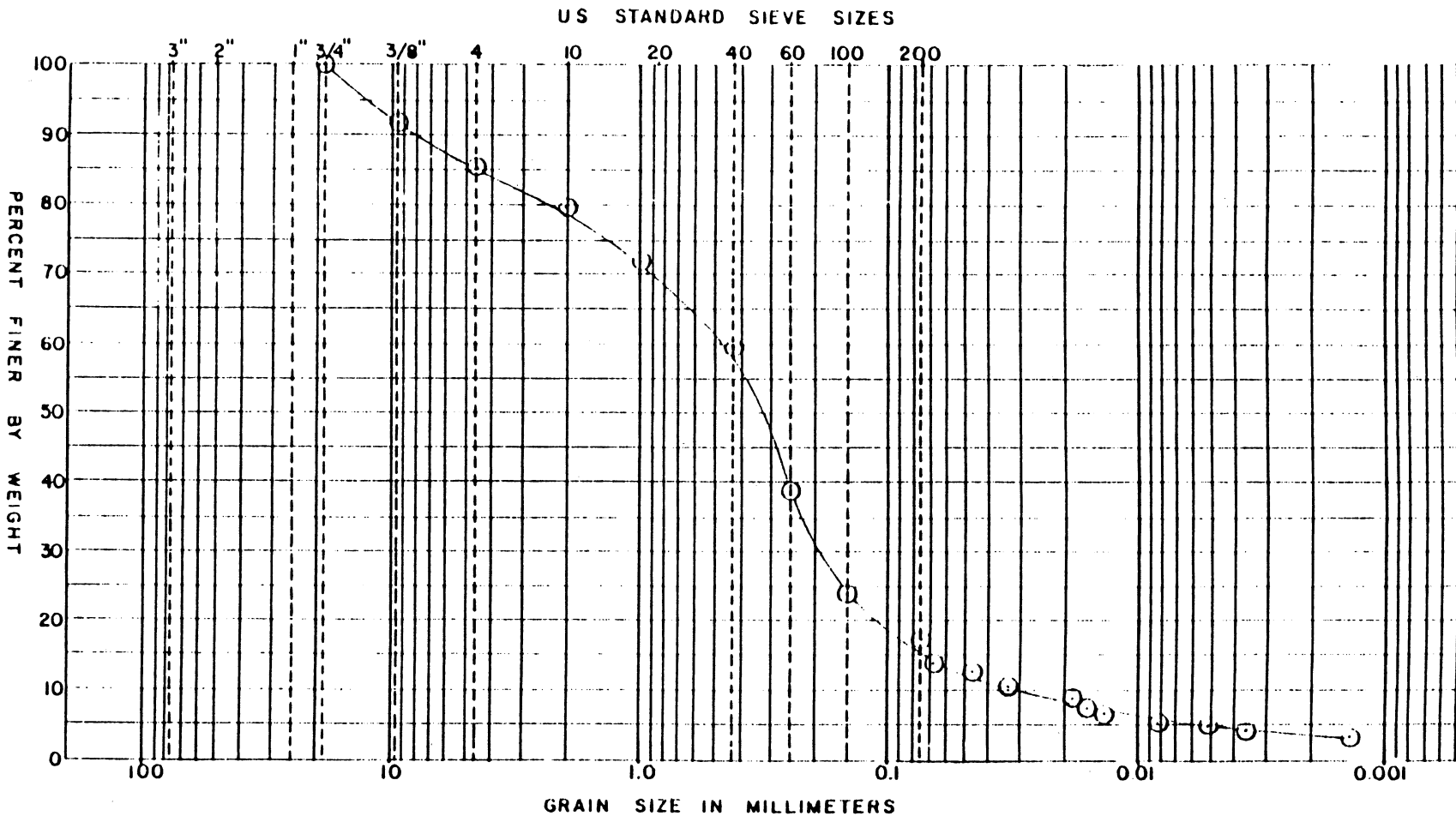
COBBLES	GRAVEL		SAND			FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
IP-22						
SA-3a 	} 3.35m-3.66m { (11.0'-12.0')					{ Brown, fine to coarse, gravelly, fine to coarse { SAND, some silt (SM)
SA-3b 						
(Both samples taken from one ton bulk sample)						

Date 3/15/81
 Job No. 36085

Golder Associates

Drawn 113
 Checked [Signature]
 Reviewed



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

BORING NO.	ELEV OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
TP-TW-41	0.61m-1.83m (2.0'-6.0')	-	-	-	-	Brown, fine to coarse SAND, some fine gravel, some silt, trace clay (SM)

Date 6/25/80
Job No. 736085

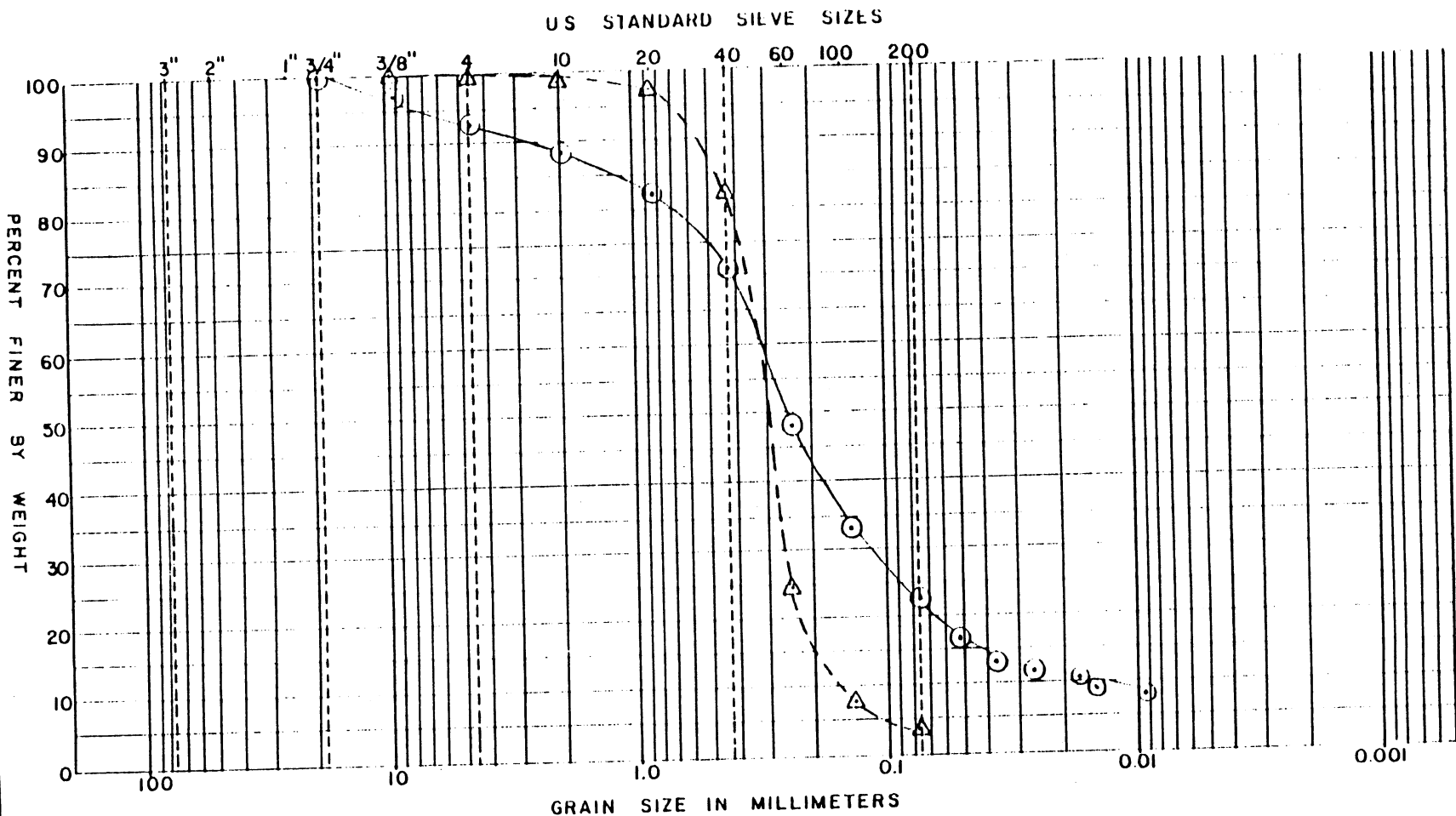
Golder Associates

3.5-17-8

Drawn MRS
Checked *[Signature]*
Reviewed

GRAIN SIZE DISTRIBUTION BEST COPY AVAILABLE

FIGURE V2-22



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

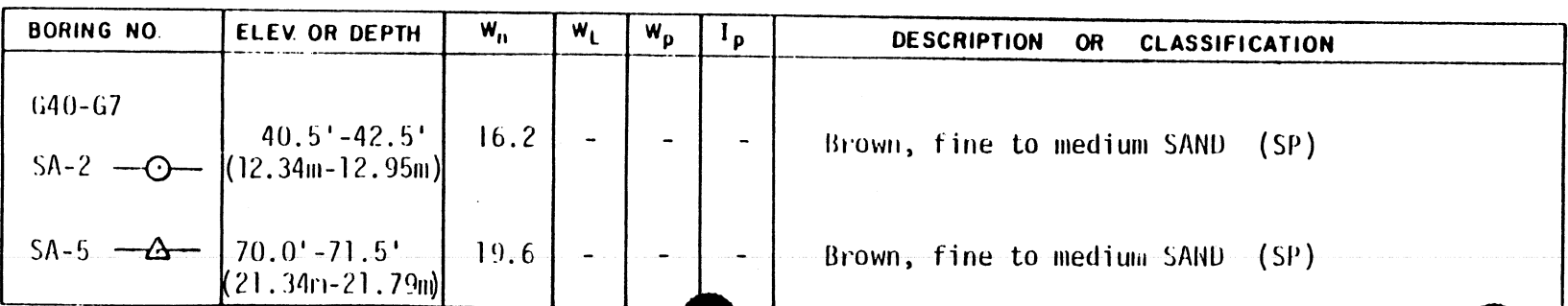
BORING NO.	ELEV OR DEPTH	w_n	w_l	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G40-D24 SA-6 —○—	7.62m-7.92m (25.0'-26.0')	-	-	-	-	Brown, silty, fine to coarse SAND, trace fine gravel (SM)
SA-22 —△—	33.53m-33.83m (110.0'-111.0')	-	-	-	-	Brown, fine to medium SAND, trace silt (SP)

Date 1-7-30
Job No. 786035

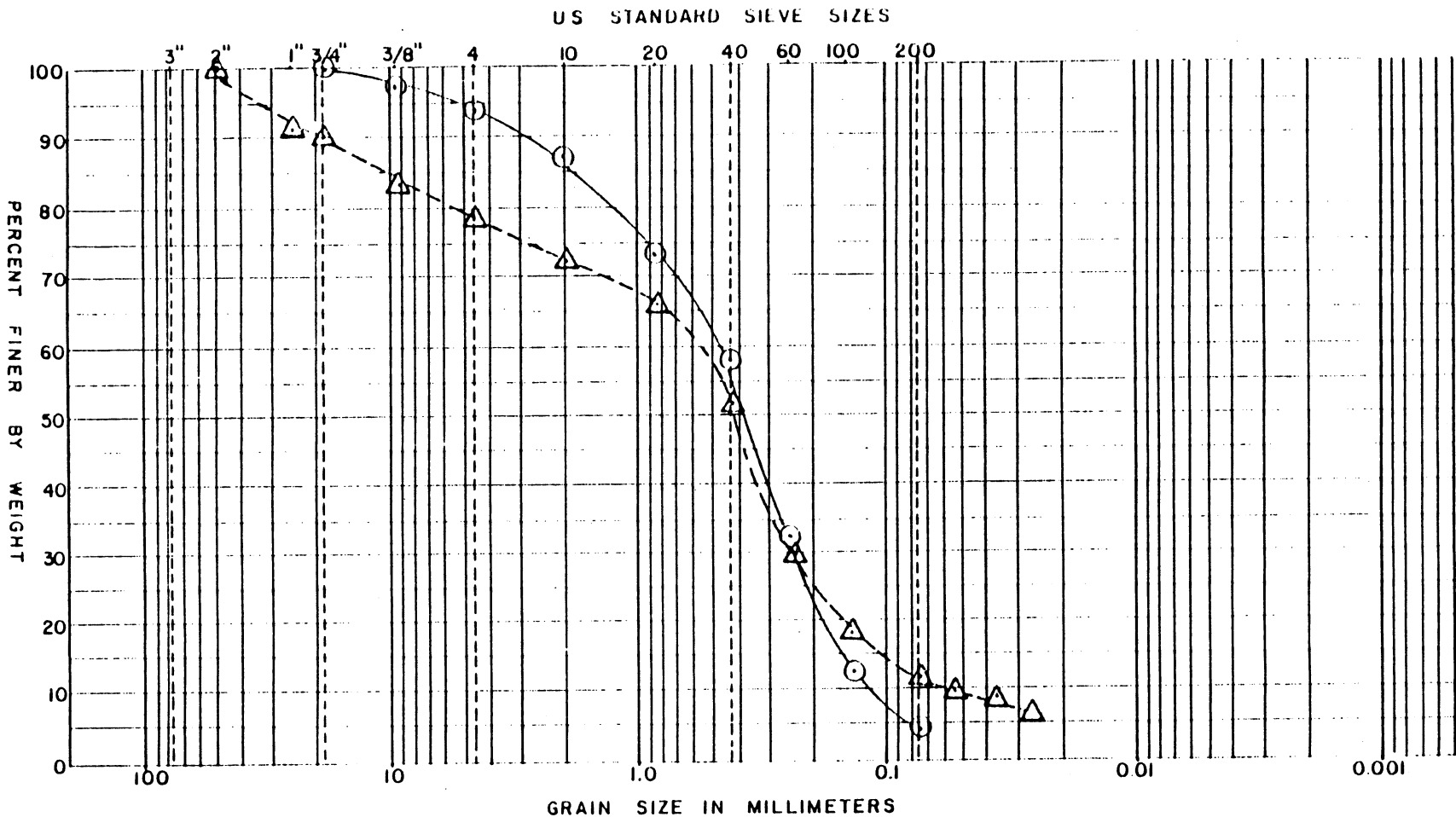
Golder Associates

Drawn jls
Checked MCA
Approved [Signature]

3.5-17-9

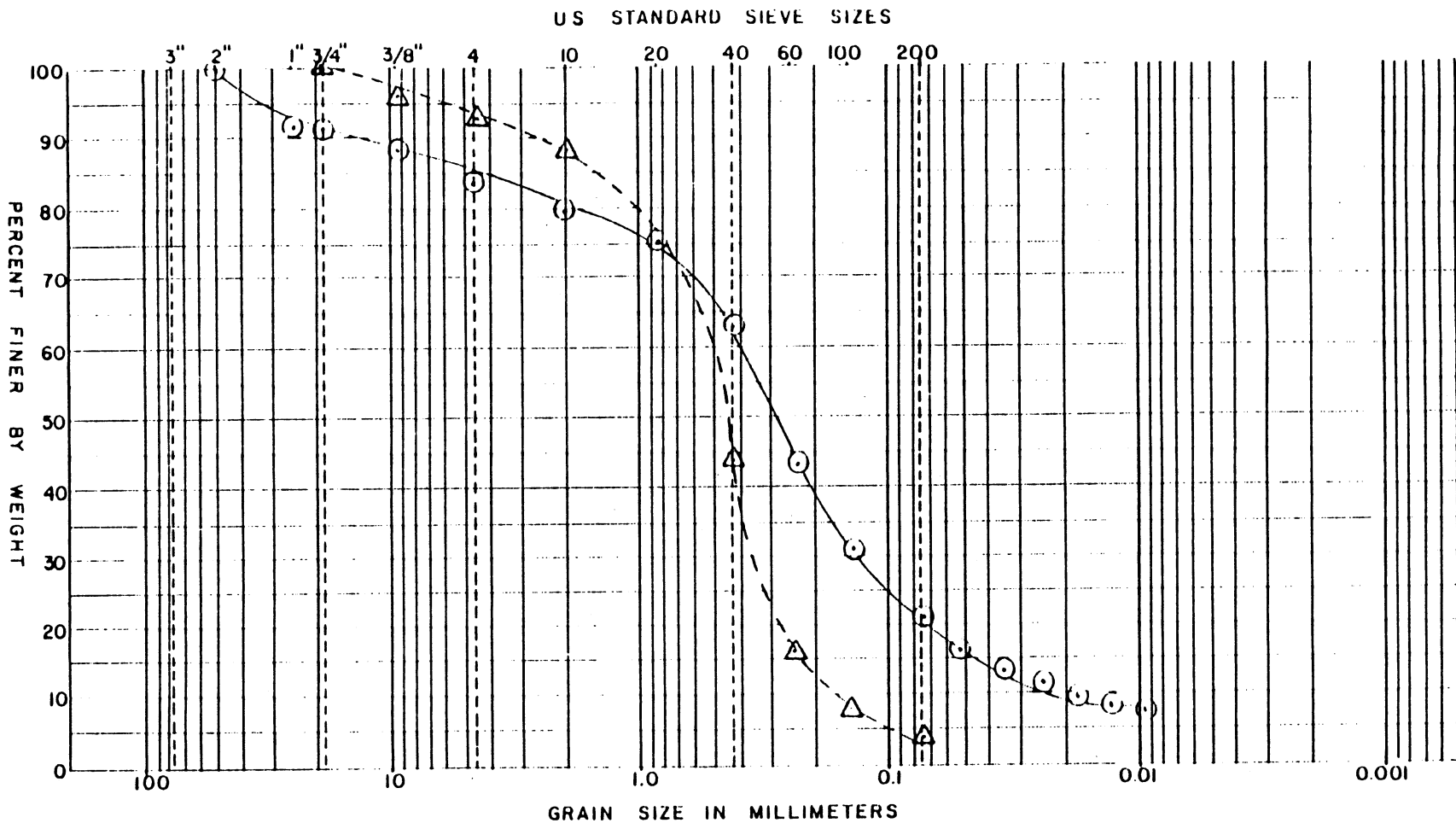


Drawn 6/5
Checked MTF
Reviewed 4/10



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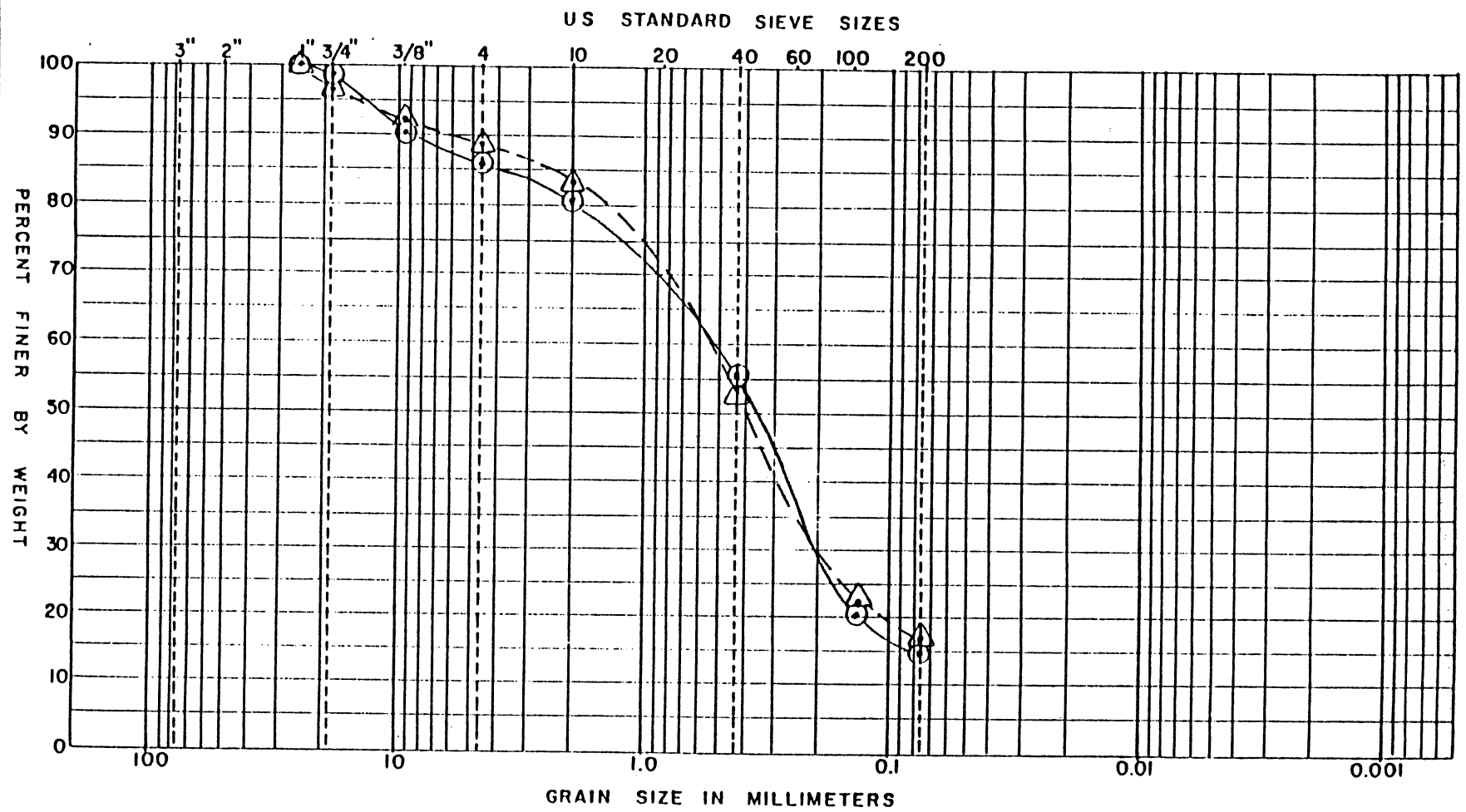
FIGURE 12-24



FIGURE

GRAIN SIZE DISTRIBUTION

FIGURE 29



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

BORING NO.	ELEV. OR DEPTH	W _n	W _L	W _p	I _p	DESCRIPTION OR CLASSIFICATION
G40-H13 SA-22 --○--	35.05m-35.51m (115'-116.5')	-	-	-	-	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt (SM)
SA-25 --△--	44.20m-44.65m (145'-146.5')	-	-	-	-	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt (SM)

STS

Date 5/30/79
Job No. 786035

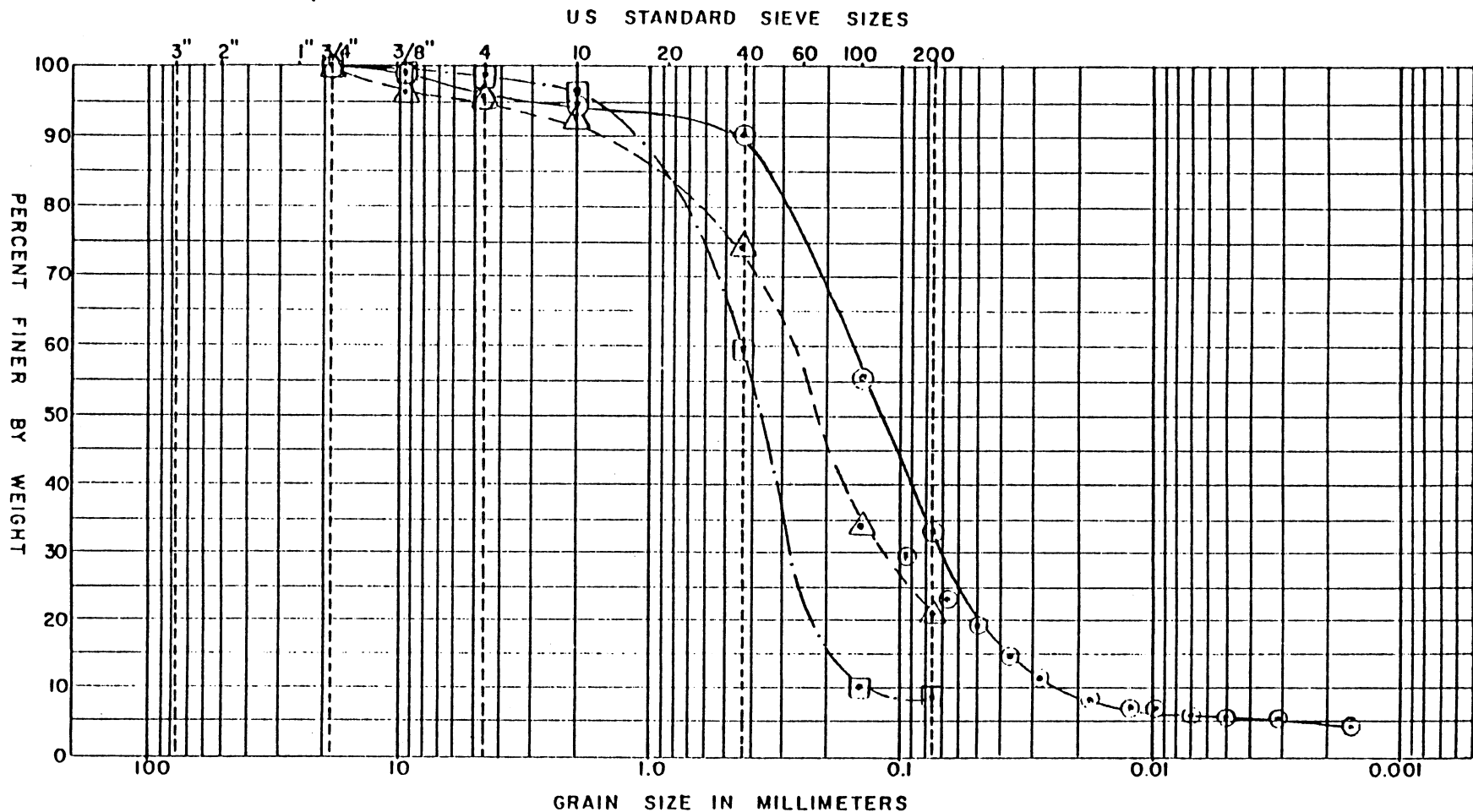
Golder Associates 3.5-17-14

Drawn AST
Checked JFC
Approved JFC

GRAIN SIZE DISTRIBUTION

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FIGURE



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

BORING NO.	ELEV. OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G40-1116 SA-2 --○--	1.52m-1.93m (5'-6.5')	-	-	-	-	Brown, silty, fine to coarse SAND, trace fine gravel, trace clay (SM)
SA-11 --△--	13.72m-14.17m (45'-46.5')	-	-	-	-	Light brown, fine to coarse SAND, some SILT, trace clay, trace fine gravel (SM)
SA-18 ---□---	24.38m-24.66m (80'-80.9')	-	-	-	-	Brown, fine to coarse SAND, trace fine gravel, trace silt (SP-SM)

Date 5/30/79
Job No. 786085

Golder Associates 3.5-17-15

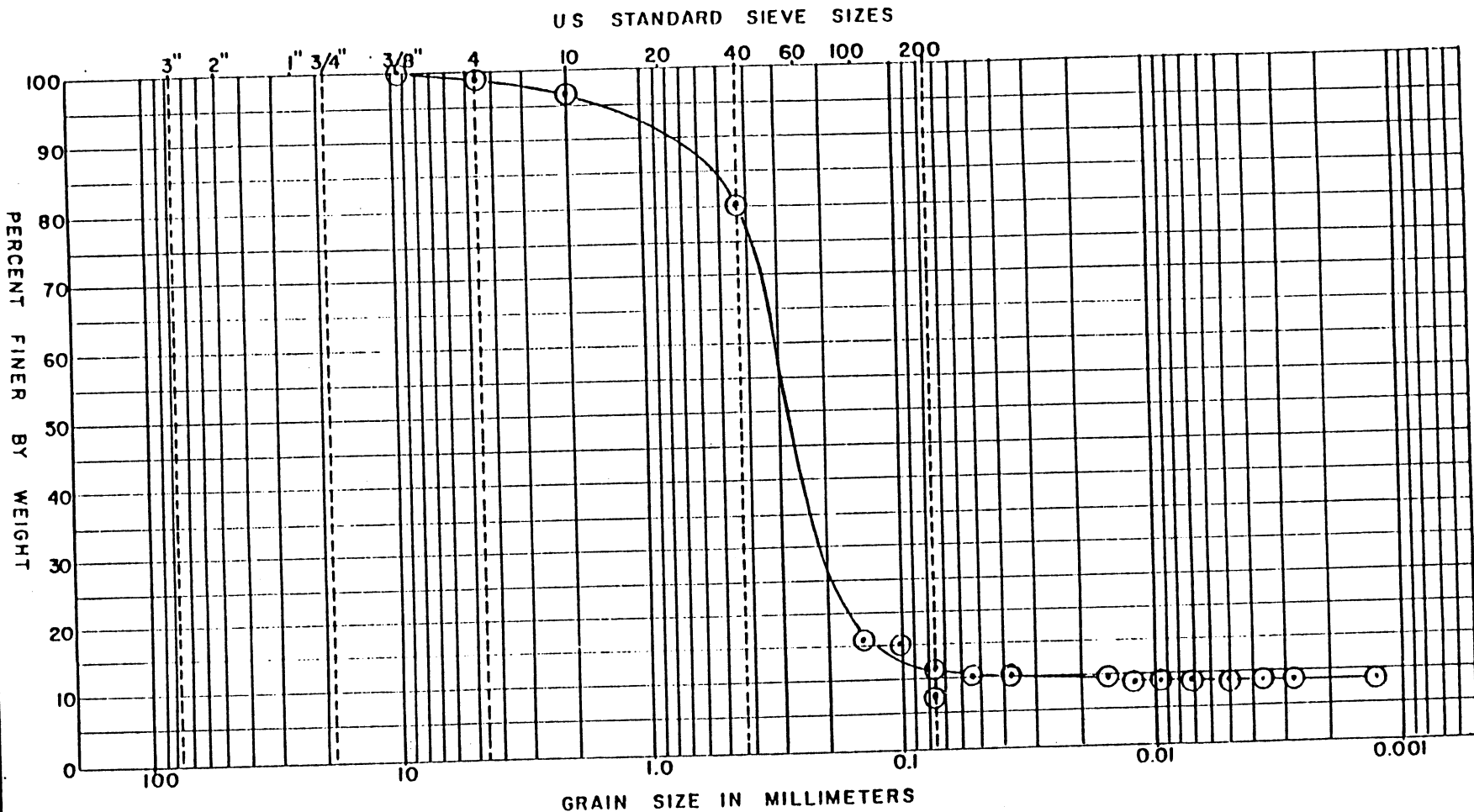
Drawn AST
Checked JFC
Approved JFC

575

Date 5/30/79
Job No. 786085

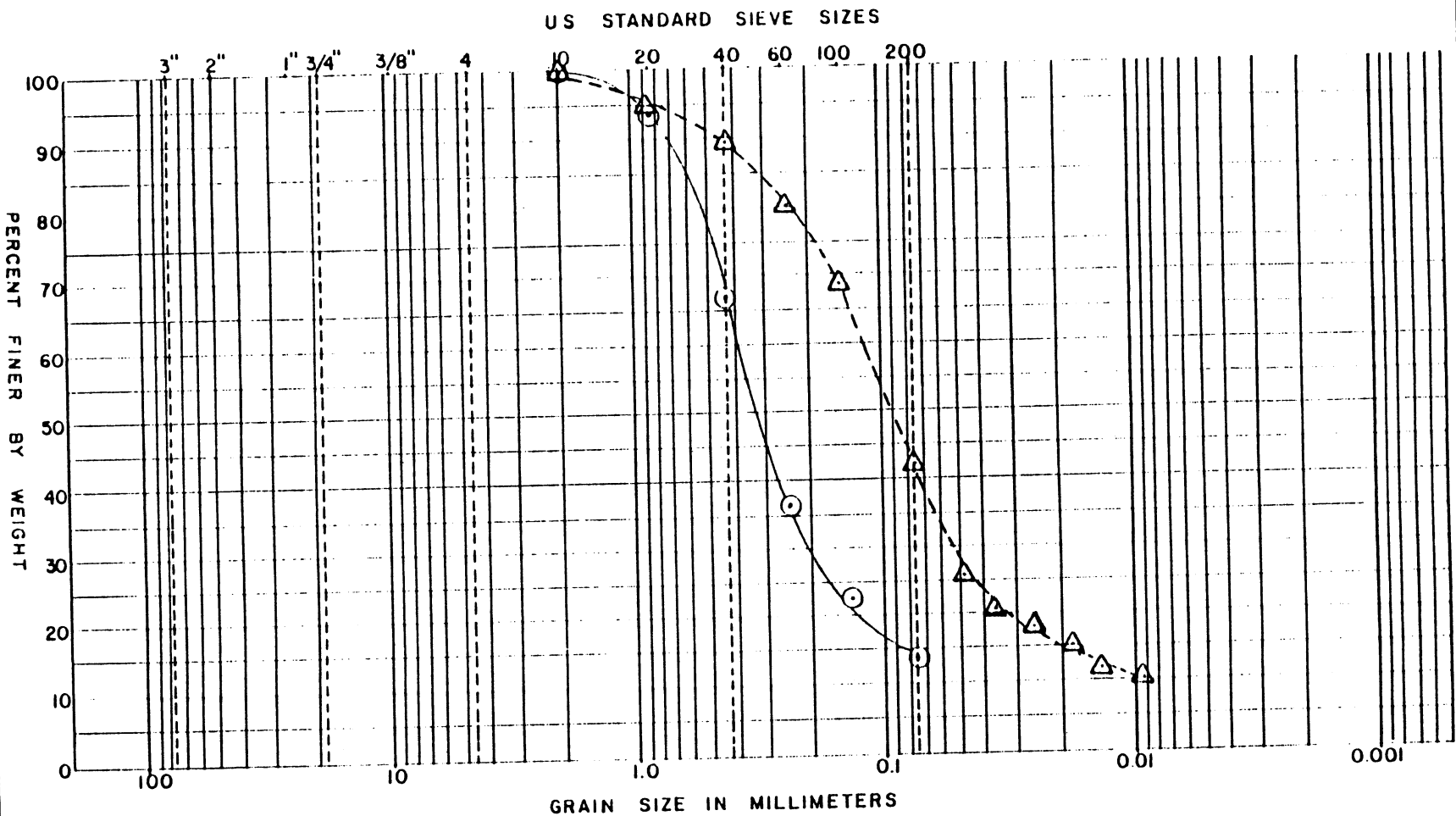
Golder Associates 3.5-17-16

Drawn AST
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Approved JFC



GRAIN SIZE DISTRIBUTION BEST COPY AVAILABLE

FIGURE 12-30



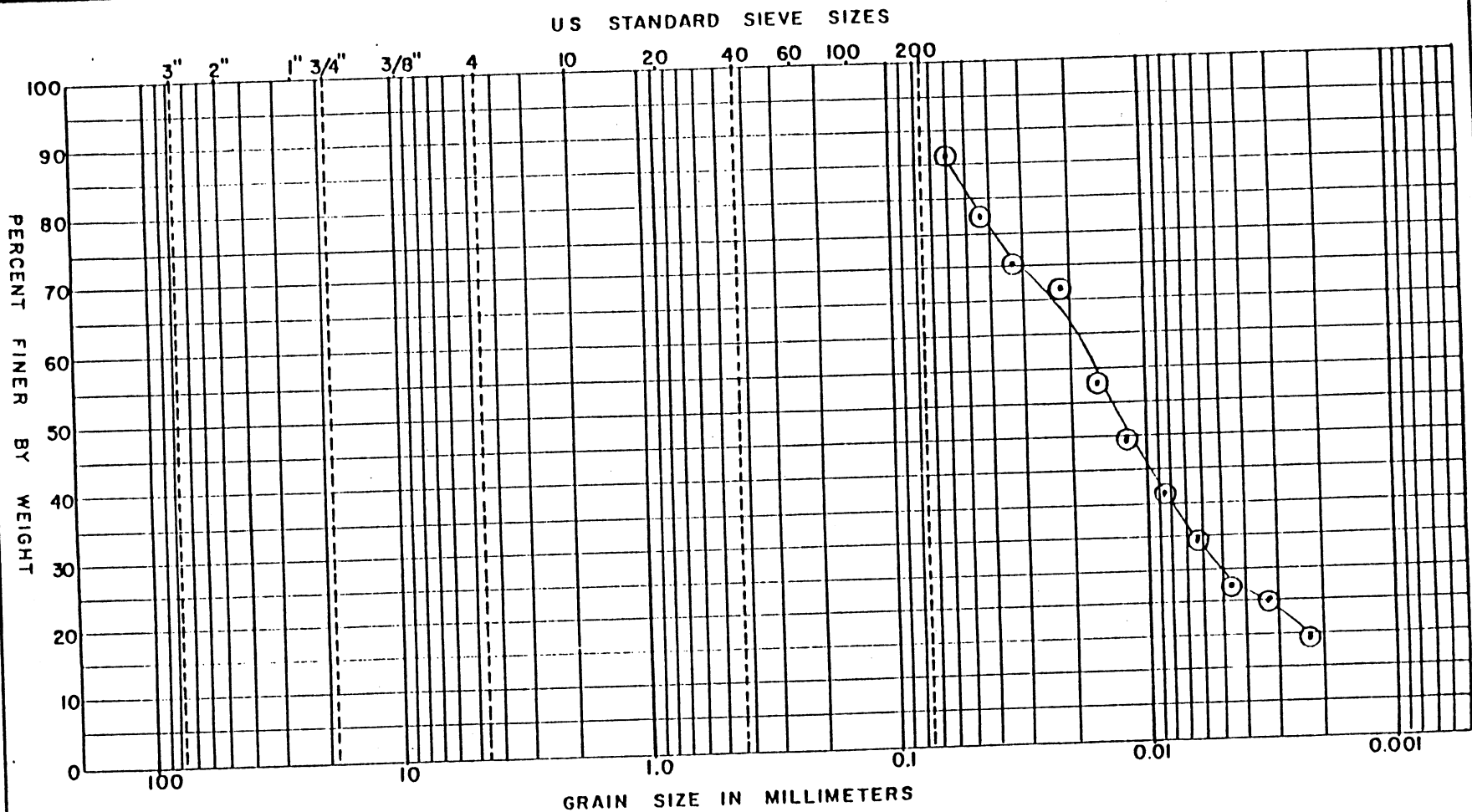
COBBLES	GRAVEL		SAND			FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G40-1127 SA-7 - Δ -	9.14m-9.42m (30.0'-30.9')	-	-	-	-	Brown, fine to medium SAND and SILL, trace clay (SM)
SA-13 - $\circ$ -	18.29m-18.75m (60.0'-61.5')	-	-	-	-	Red-brown, fine to medium SAND, some silt (SM)

Date 1-7-80
Job No. 736085

Golder Associates 3.5-17-18

Drawn 115
Checked
Approved



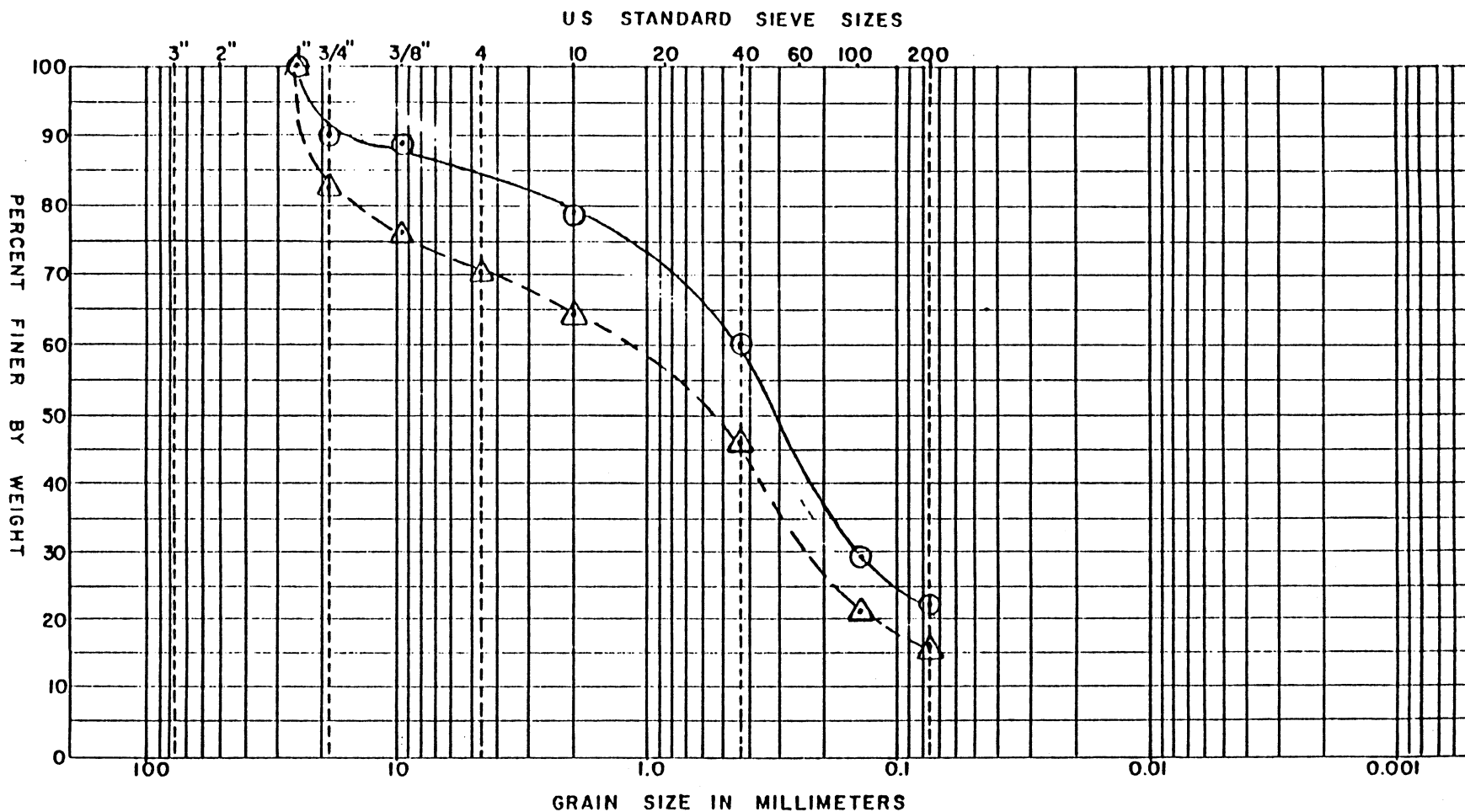
COBBLES	GRAVEL		SAND			FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G40-J15 SA-5 —○—	5.13m (17.0')	-	32	19	B	Gray-green, SILT, some clay (CL)

Date 6/7/79
Job No. 786035

Golder Associates 3.5-17-19

Drawn JIS
Checked JFC
Approved JFC



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G40-J15 SA-8 —○—	9.14m-9.60m (30'-31.5')	-	-	-	-	Brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay (SM)
SA-10 —△—	12.19m-12.65m (40'-41.5')	-	-	-	-	Brown, fine to coarse gravelly, fine to coarse SAND, some silt (SM)

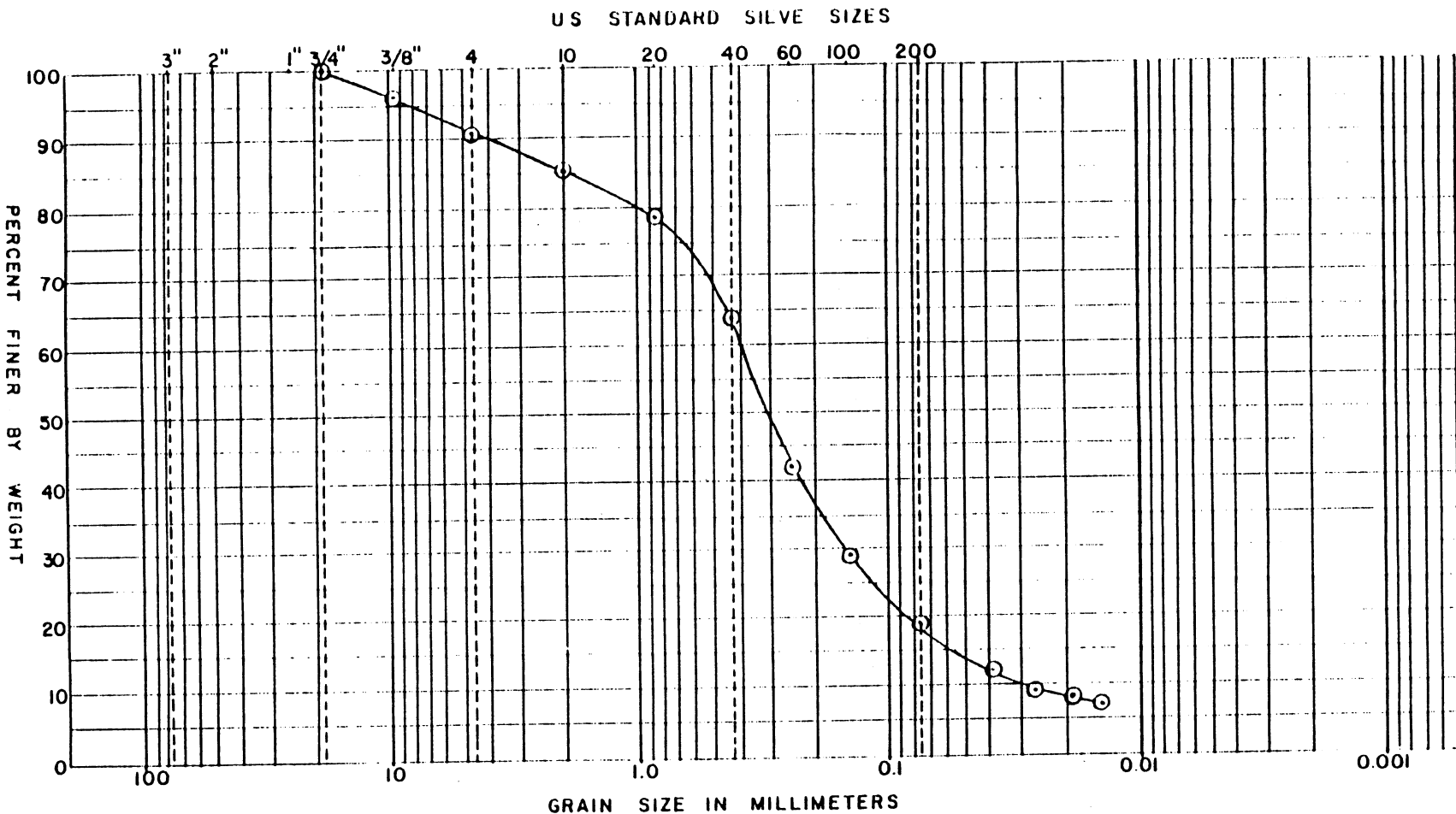
STS

Date 5/30/79
Job No. 786085

Golder Associates 3.5-17-20

Drawn AST
Checked JFC
Approved JFC

GRAIN SIZE DISTRIBUTION



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

BORING NO.	ELEV OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G40-J20 SA-7 —○—	9.14m-9.45m (30.0'-31.0')	-	-	-	-	Brown, fine to coarse SAND, some silt, trace fine gravel (SM)

FIGURE 12-32

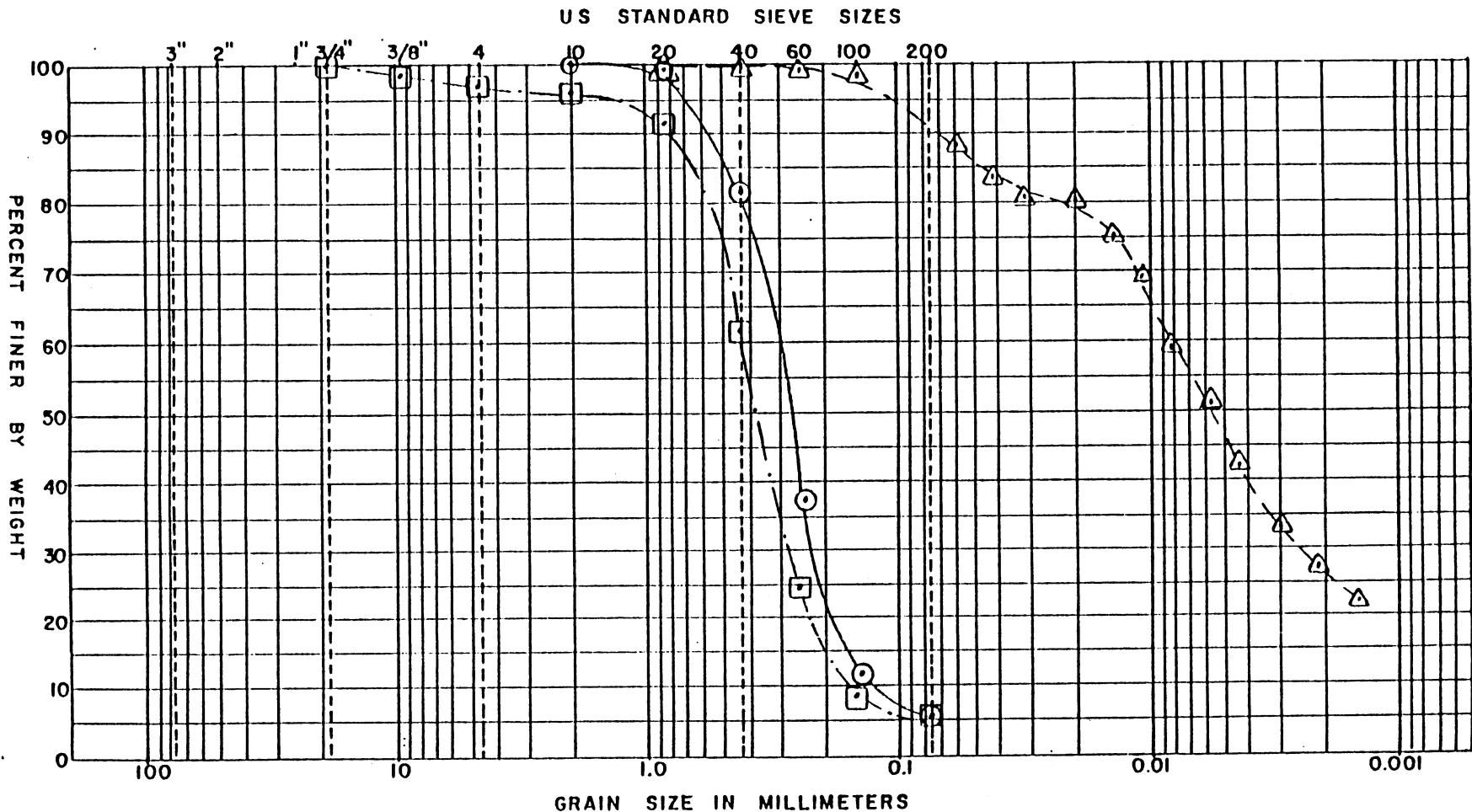
Date 1/22/80
Job No. 736035

Golder Associates 3.5-17-21

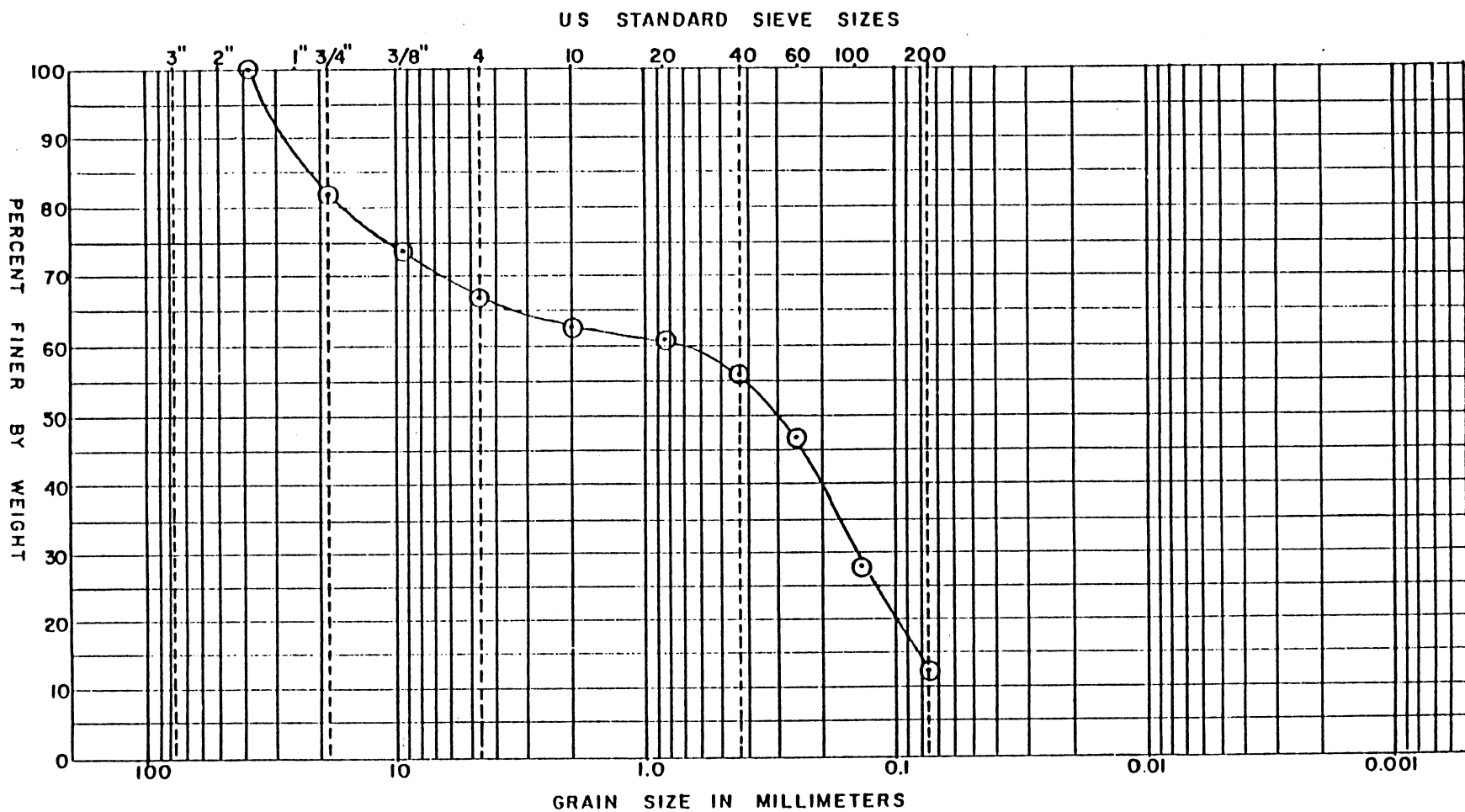
Drawn JLS
Checked 1/23/80
Approved [Signature]

GRAIN SIZE DISTRIBUTION

FIGURE



GRAIN SIZE DISTRIBUTION



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

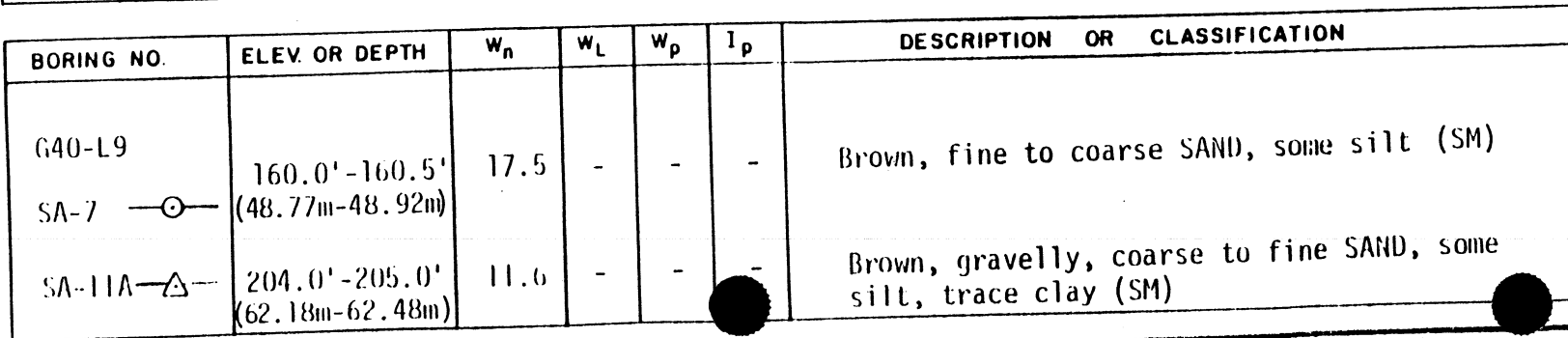
BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G40-K13 SA-11 —○—	13.72m-14.17m (45'-46.5')	-	-	-	-	Gray-brown, fine to coarse gravelly, fine to coarse SAND, some silt (SM)

FIGURE

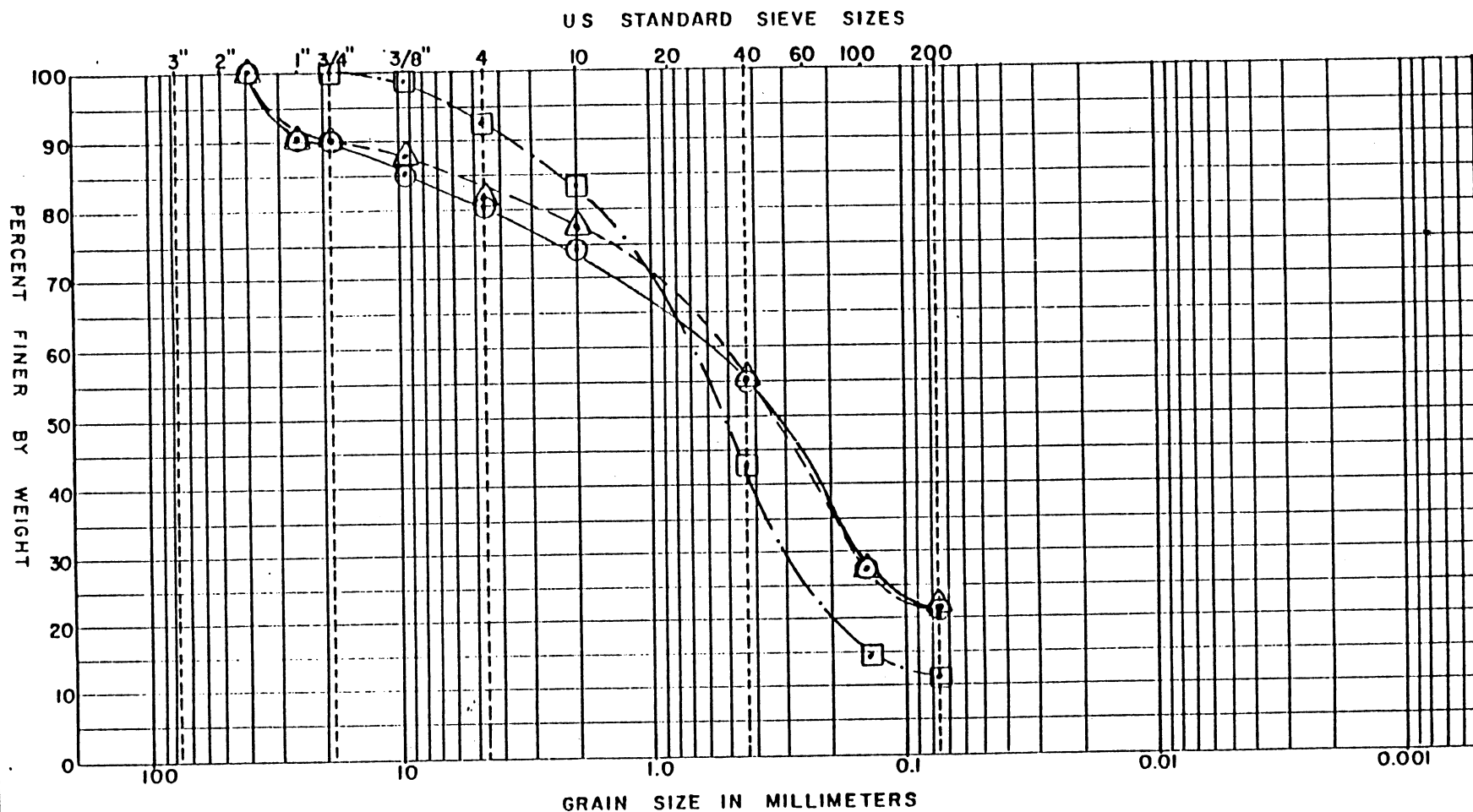
Date 6/7/79
Job No. 786035

Golder Associates 3.5-17-23

Drawn JJS
Checked JFC
Approved JFC

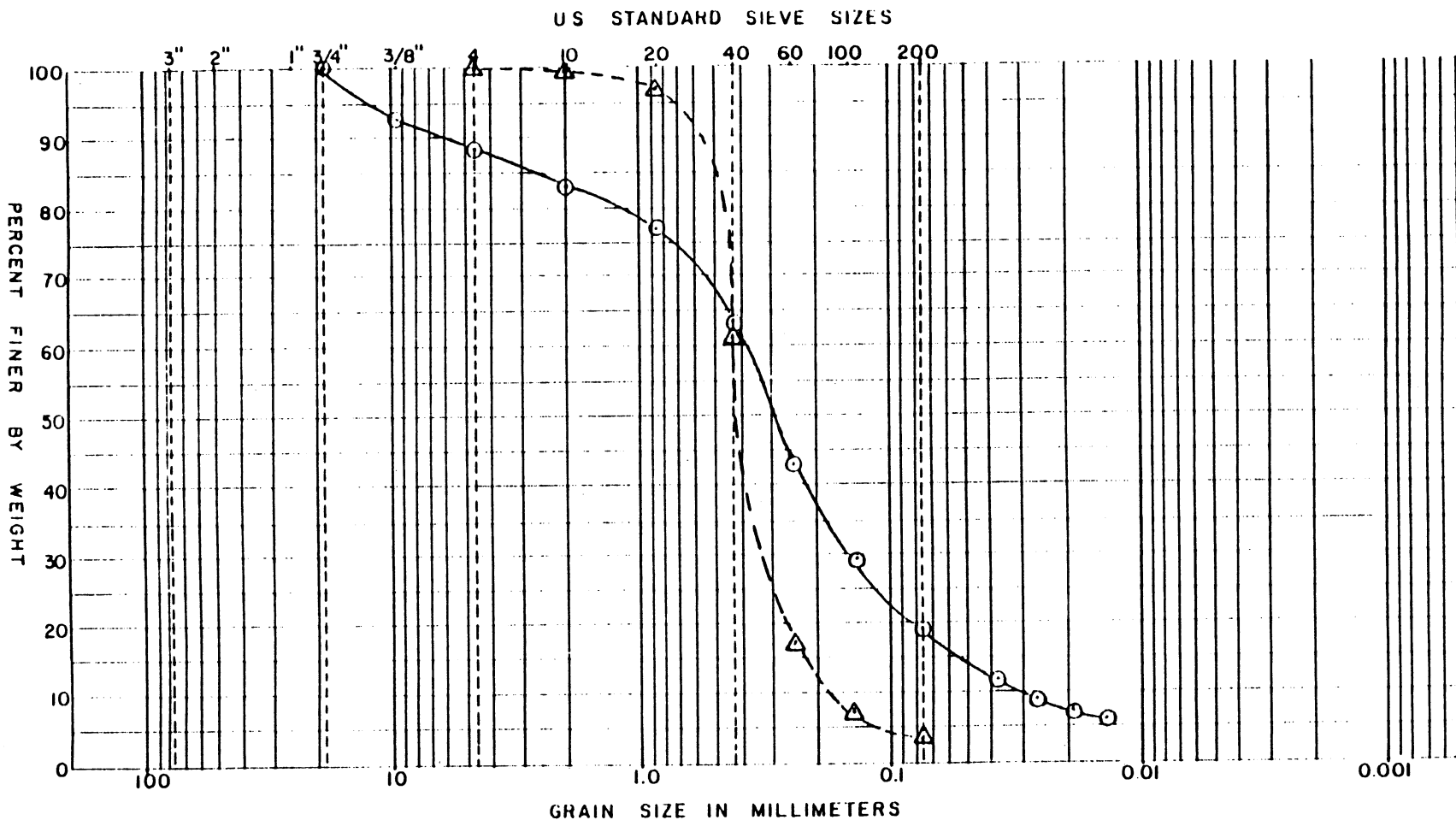


Drawn CHB
Checked MTF
Reviewed 2/2/02



GRAIN SIZE DISTRIBUTION

FIGURE V2-35



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

BORING NO	ELEV. OR DEPTH	W _n	W _L	W _p	I _p	DESCRIPTION OR CLASSIFICATION
G40-L23 SA-6 —○—	7.62m-8.08m (25.0'-26.5')	-	-	-	-	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt (SM)
SA-17 —△—	24.38m-24.66m (80.0'-80.9')	-	-	-	-	Brown, fine to medium SAND, trace silt (SP)

Date 1/22/80
Job No. 786085

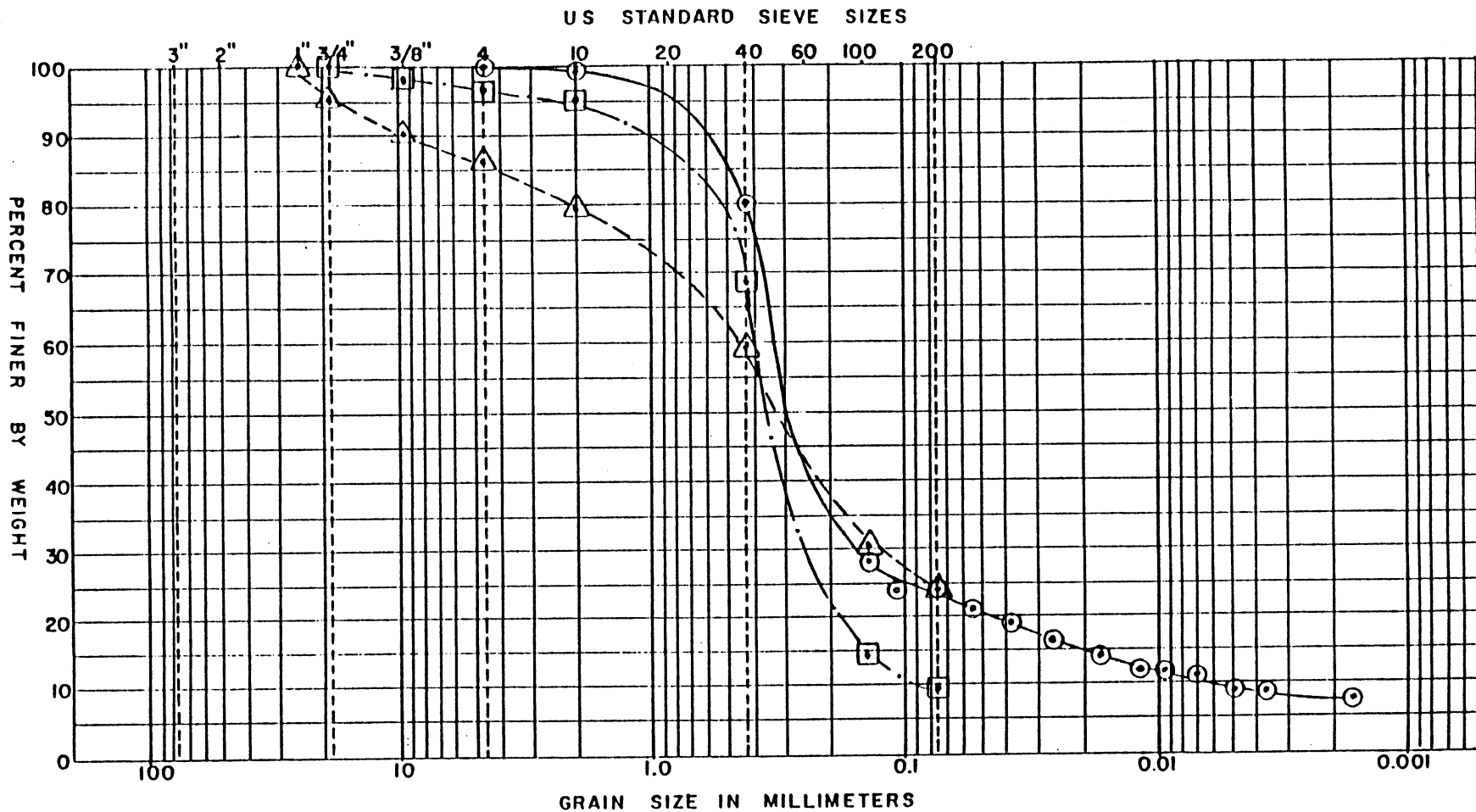
Golder Associates 3.5-17-26

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Date 5/30/79
Job No. 786085

Golder Associates 3.5-17-27

Drawn AST
Checked JFC
Approved JFC



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

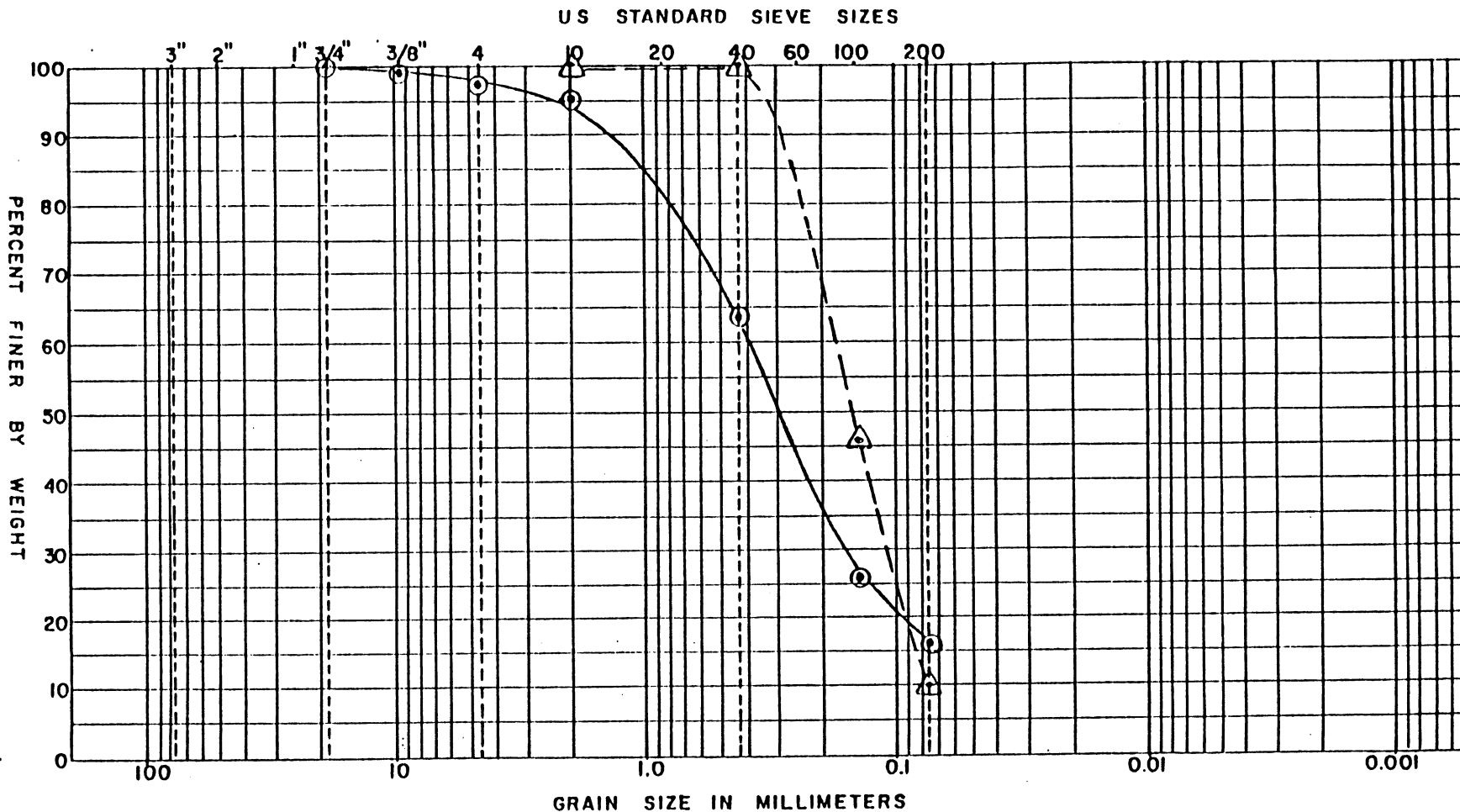
BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G40-M15 SA-2 —○—	1.52m-1.98m (5'-6.5')	-	-	-	-	Brown, fine to coarse SAND, some silt, trace clay (SM)
SA-7 --△--	7.62m-8.08m (25'-26.5')	-	-	-	-	Brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay (SM)
SA-22 ---□---	30.48m-30.94m (100'-101.5')	-	-	-	-	Brown, fine to coarse SAND, trace fine gravel, trace silt (SP-SM)

GRAIN SIZE DISTRIBUTION

FIGURE

GRAIN SIZE DISTRIBUTION

FIGURE



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G40-M15 SA-28 —○—	48.77m-49.07m (160'-161')	-	-	-	-	Brown, fine to coarse SAND, some silt, trace fine gravel (SM)
SA-32 --△--	60.96m-61.17m (200'-200.7')	-	-	-	-	Red-brown, fine SAND, trace silt (SP-SM)

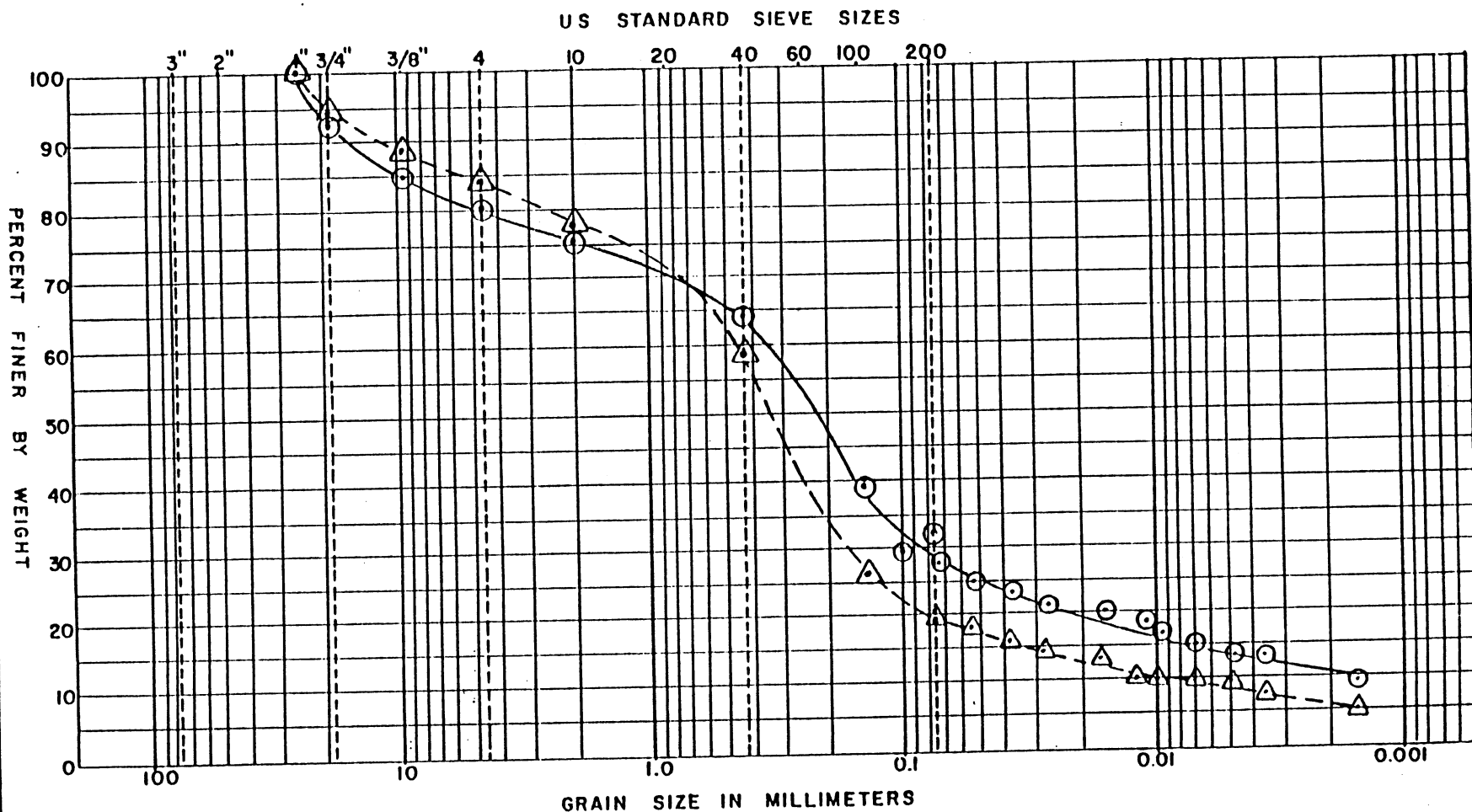
Date 5/30/79
Job No. 786085

Golder Associates 3.5-17-28

Drawn AST
Checked JFC
Approved JFC

GRAIN SIZE DISTRIBUTION

FIGURE 149



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G40-M15 SA-38 —○—	79.25m-79.52m (260'-260.9')	-	-	-	-	Red-brown, silty, fine to coarse SAND, some fine to coarse gravel, some clay (SM)
SA-39 -△-	83.52m-84.13m (274'-276')	-	-	-	-	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay (SM)

STS

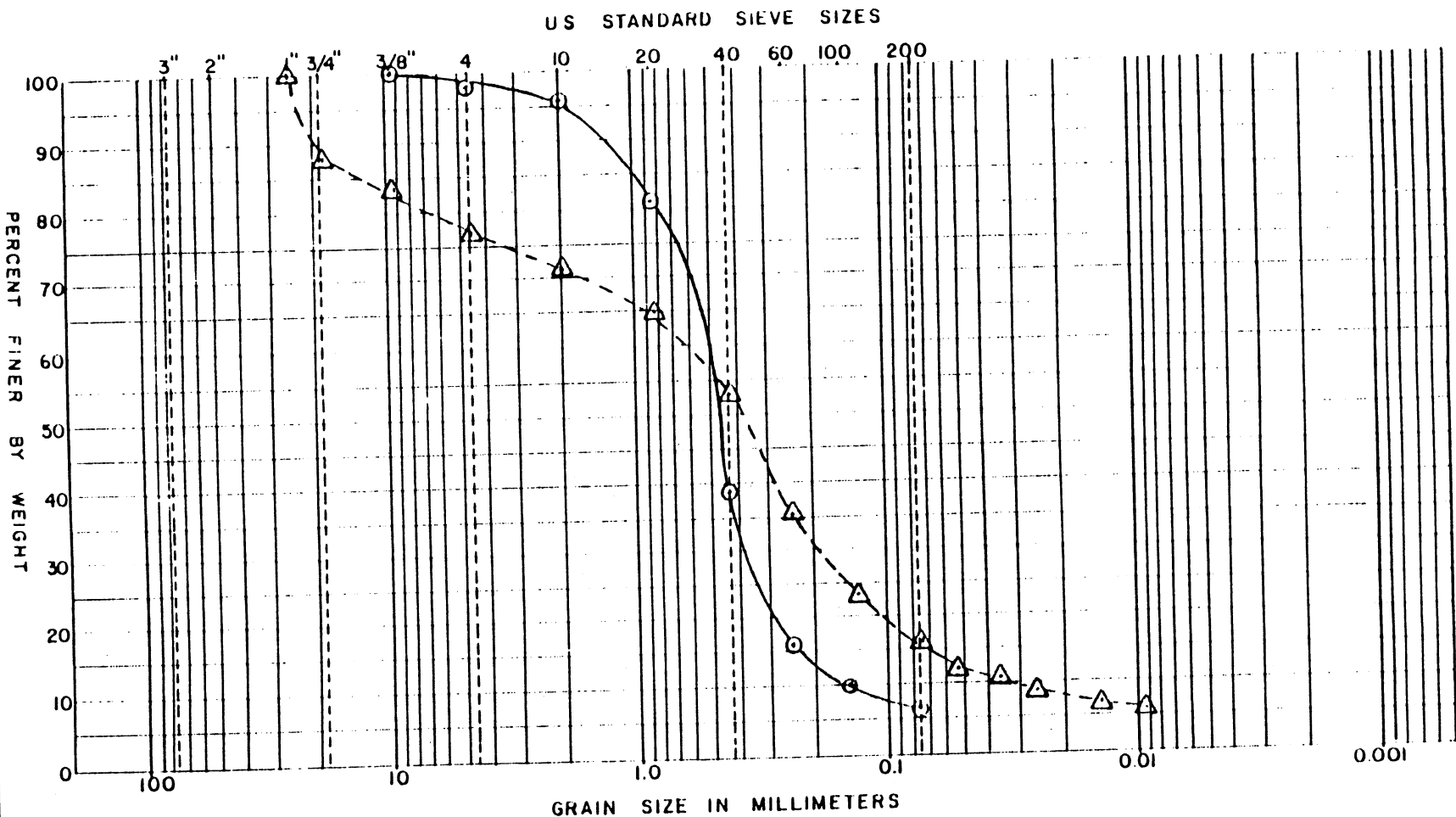
Date 5/30/79
Job No. 786085

Golder Associates 3.5-17-29

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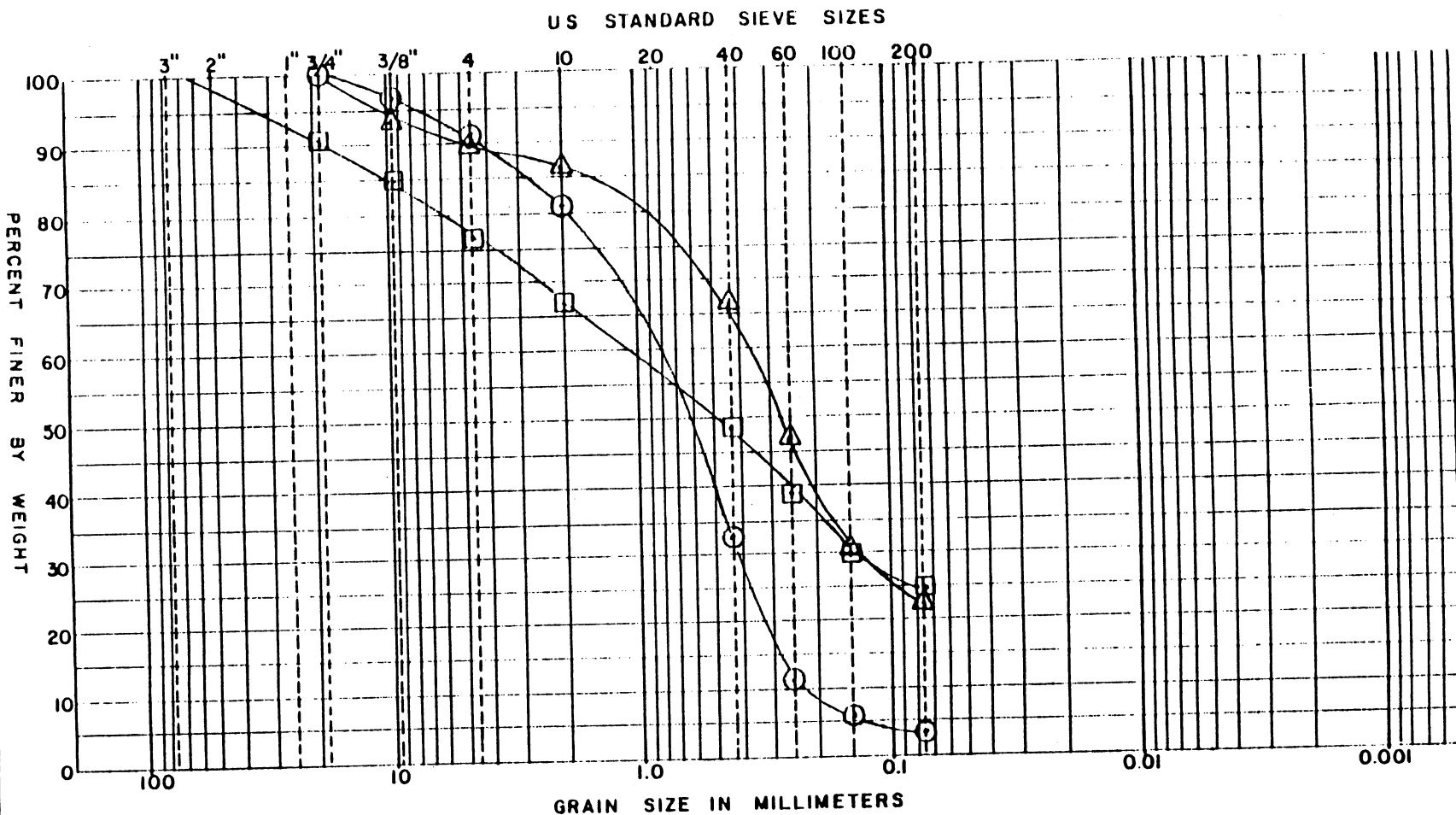
GRAIN SIZE DISTRIBUTION

FIGURE 72-40

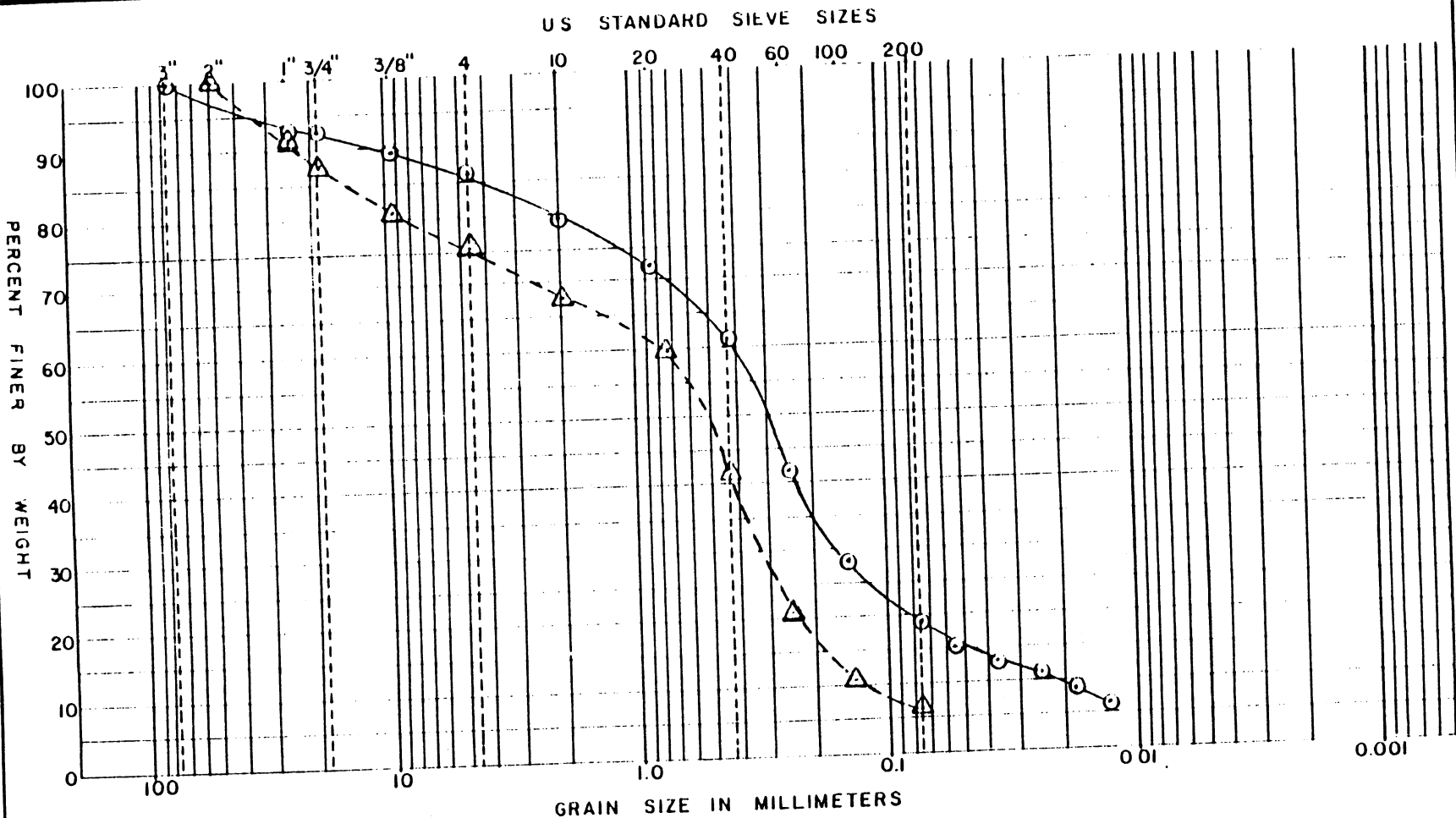


GRAIN SIZE DISTRIBUTION

FIGURE A-3



GRAIN SIZE DISTRIBUTION



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

BORING NO.	ELEV OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G40-P17 SA-6 Δ	7.62m-8.08m (25.0'-26.5')	-	-	-	-	Light brown, fine to coarse gravelly, fine to coarse SAND, trace silt (SP-SM)
SA-16 $\circ$	22.86m-23.01m (75.0'-75.5')	-	-	-	-	Brown, fine to coarse SAND, some fine to coarse gravel, some silt (SM)

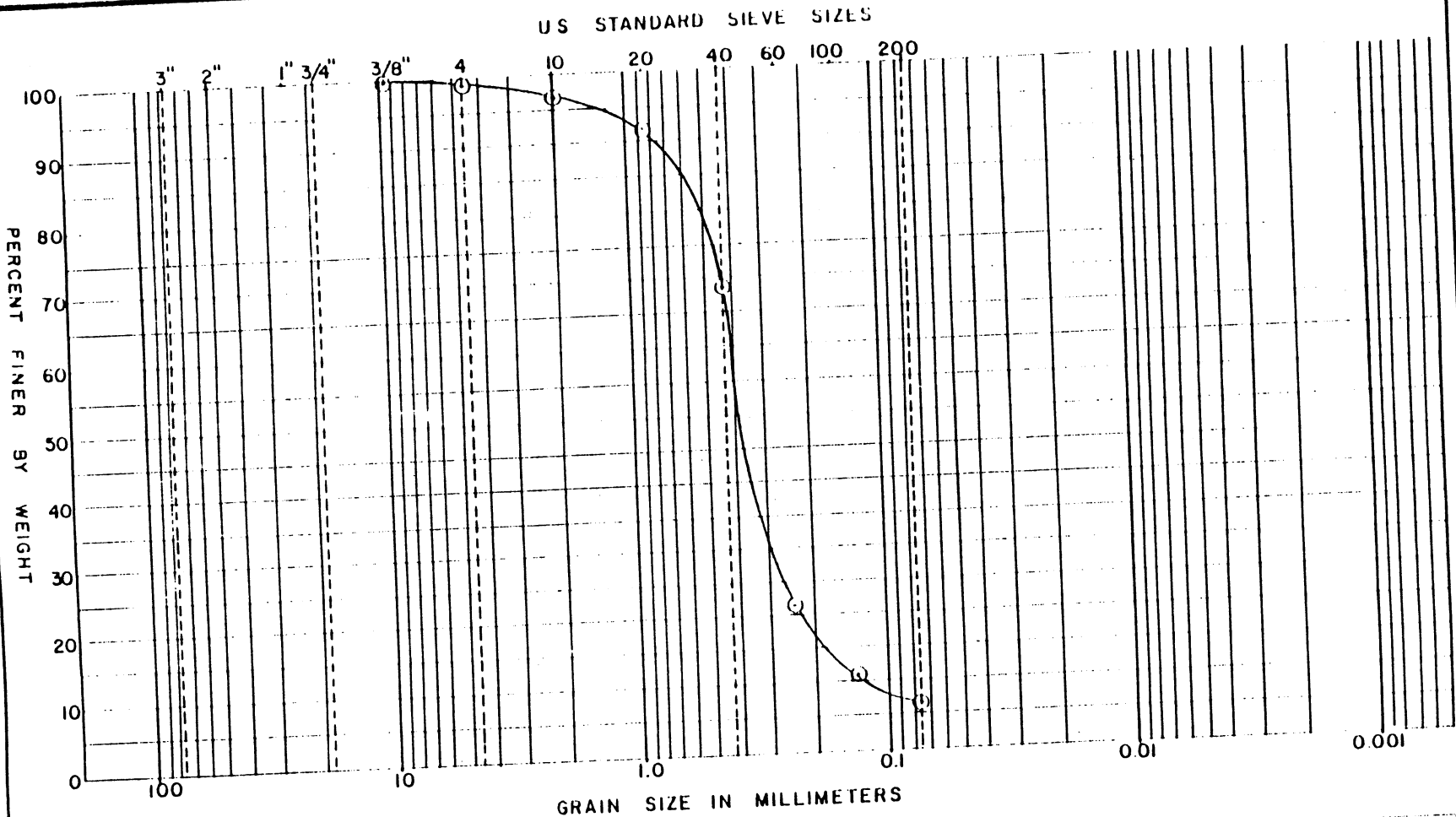
FIGURE 72-41

Date 1/7/80
Job No. 736085

Golder Associates 3.5-17-32

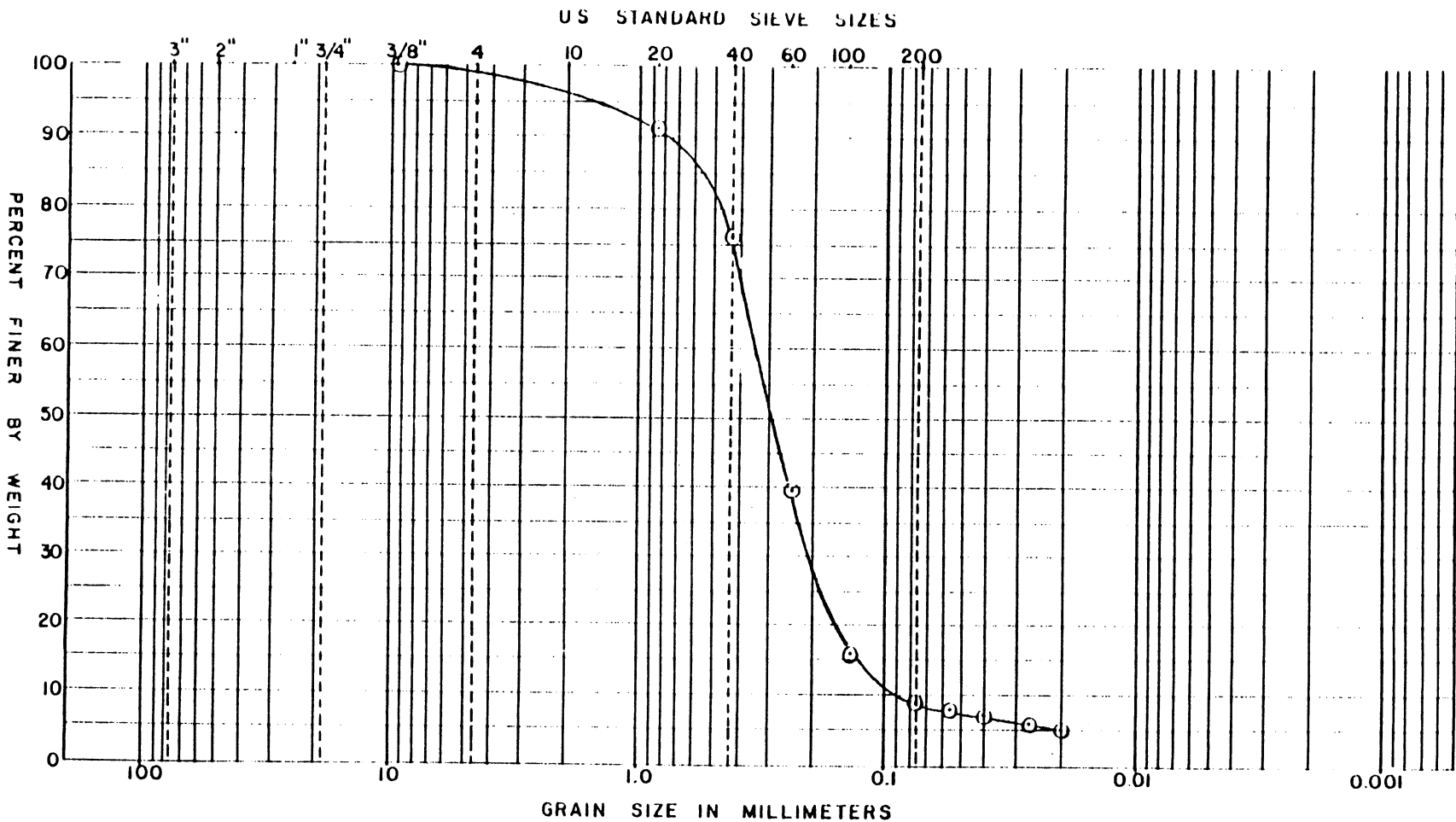
Drawn JLS
Checked JLS
Approved [Signature]

GRAIN SIZE DISTRIBUTION



GRAIN SIZE DISTRIBUTION

FIGURE W2-43



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

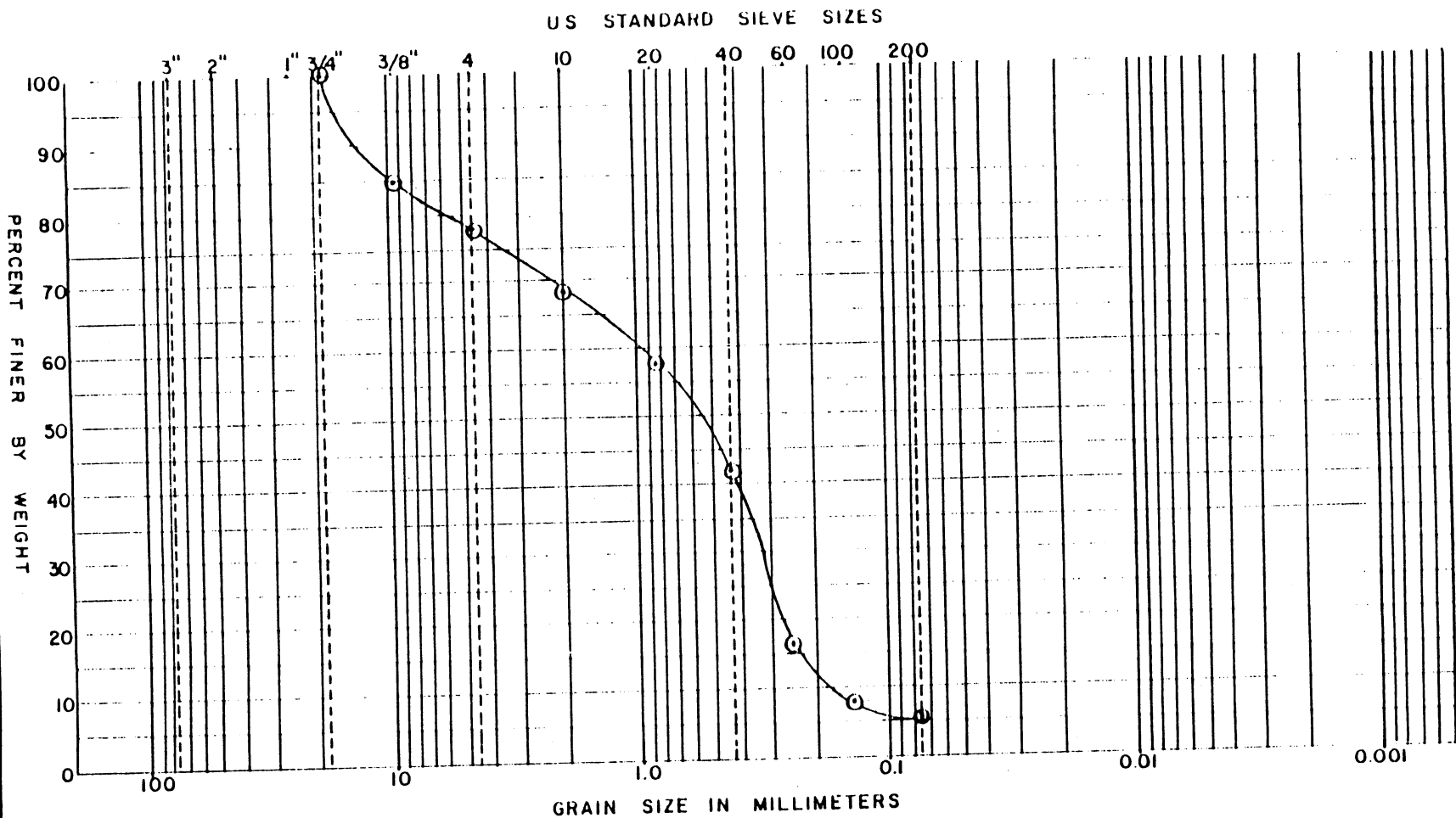
BORING NO	ELEV OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G40-R23 SA-15	21.34m-21.64m (70.0-71.0)	-	-	-	-	Brown, fine to medium SAND, trace silt (SP-SM)

Date 1/22/80
Job No. 736035

Golder Associates 3.5-17-34

Drawn jls
Checked MSB
Approved [Signature]

GRAIN SIZE DISTRIBUTION



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

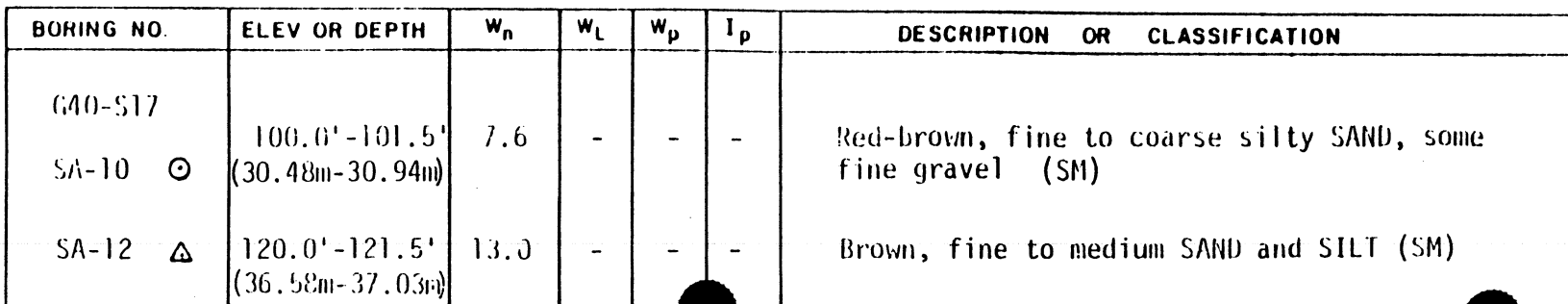
BORING NO.	ELEV OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G40-S11 SA-12	16.76m-17.07m (55.0'-56.0')	-	-	-	-	Brown, fine to coarse gravelly, fine to coarse SAND, trace silt (SP-SM)

FIGURE 42-11

Date 1/7/30
Job No. 736085

Golder Associates 3.5-17-35

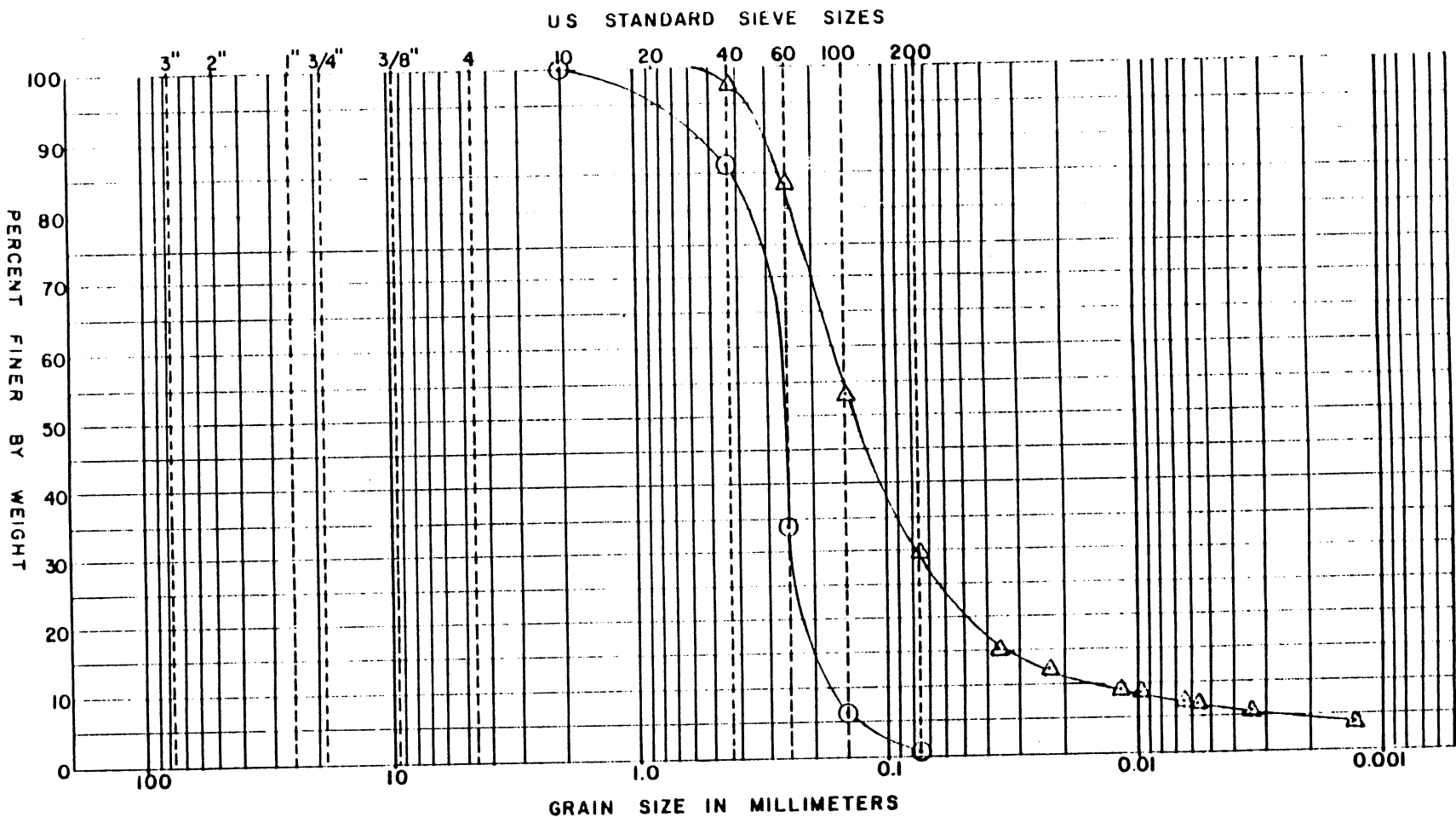
Drawn JLS
Checked WFS
Approved [Signature]



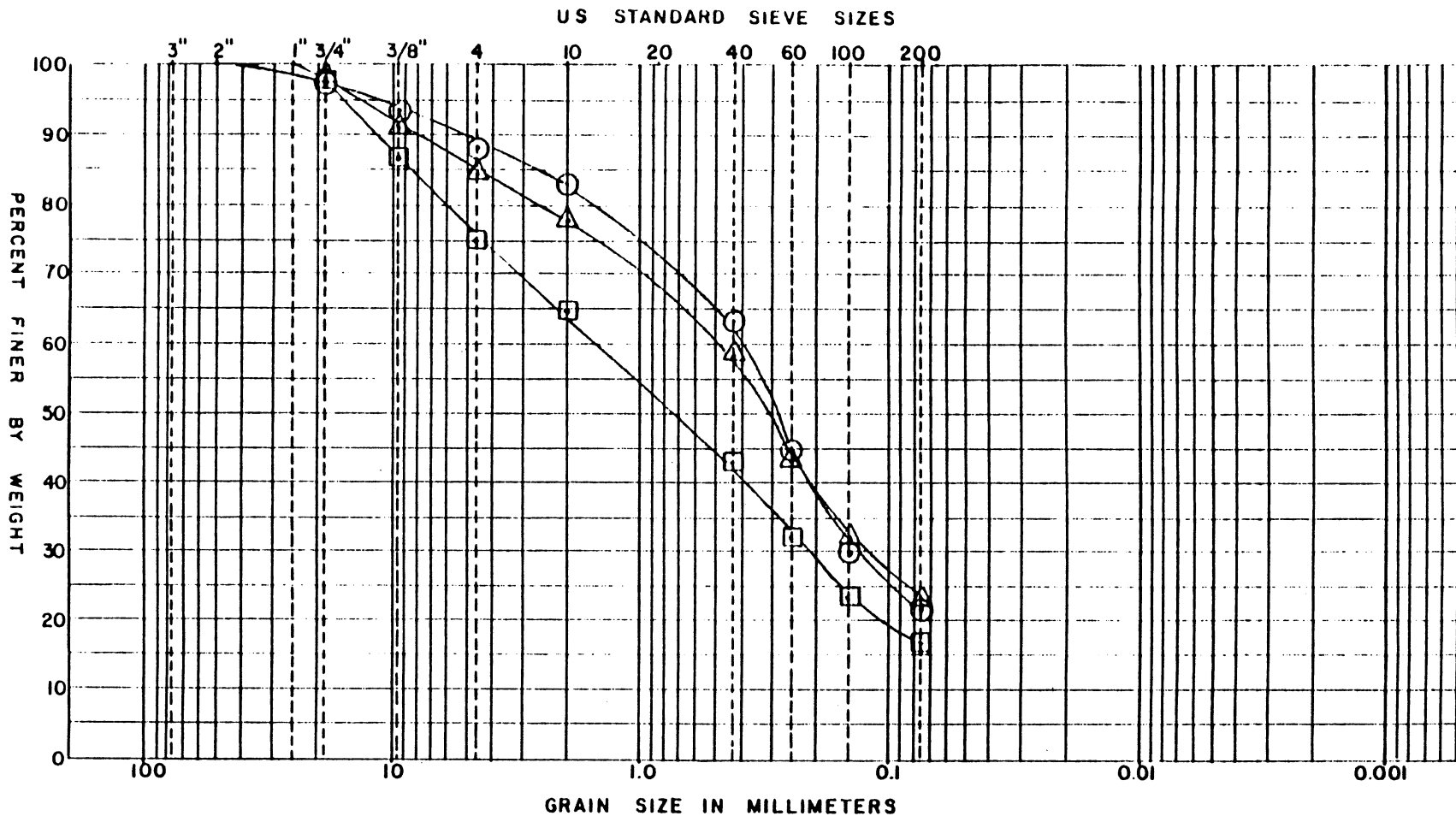
3.5-17-36

Drawn 0:3
Checked DTF
Reviewed WJL

GRAIN SIZE DISTRIBUTION



GRAIN SIZE DISTRIBUTION



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G40-X1						
SA-8	72.3'-73.5' (22.04m-22.40m)	9.7	-	-	-	Brown, fine to coarse SAND, some silt, some fine to coarse gravel, trace clay (SM)
SA-9	81.5'-83.0' (24.84m-25.30m)	8.8	-	-	-	Brown, fine to coarse SAND, some silt, some fine gravel, trace clay (SM)
SA-10	91.5'-93.3' (27.89m-28.44m)	8.9	-	-	-	Brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay (SM)

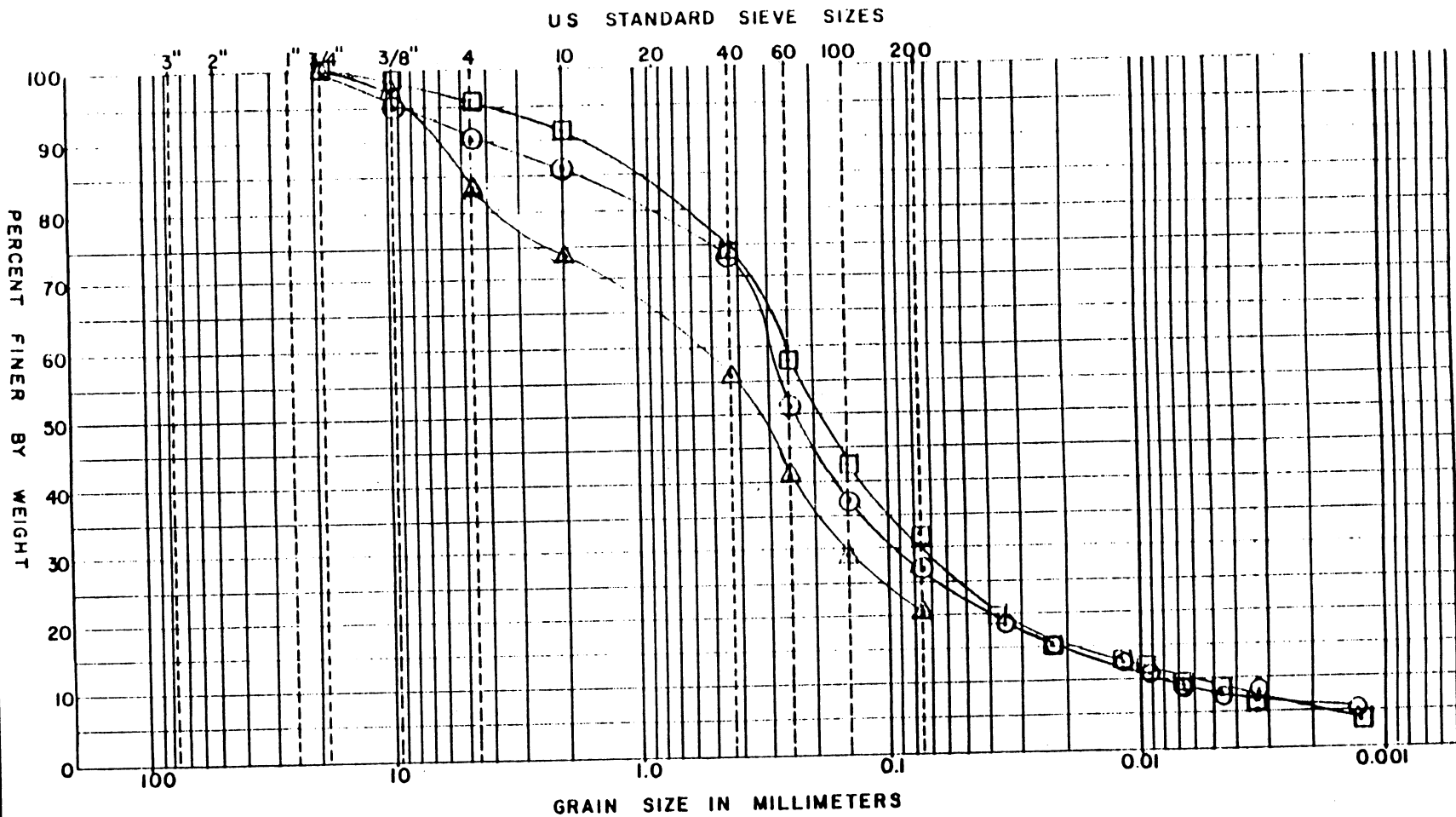
FIGURE A-6

Date 1/29/82
Job No 314-1296

Golden Associates

3.5-17-38

Drawn CAB
Checked MTF
Reviewed *[Signature]*



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

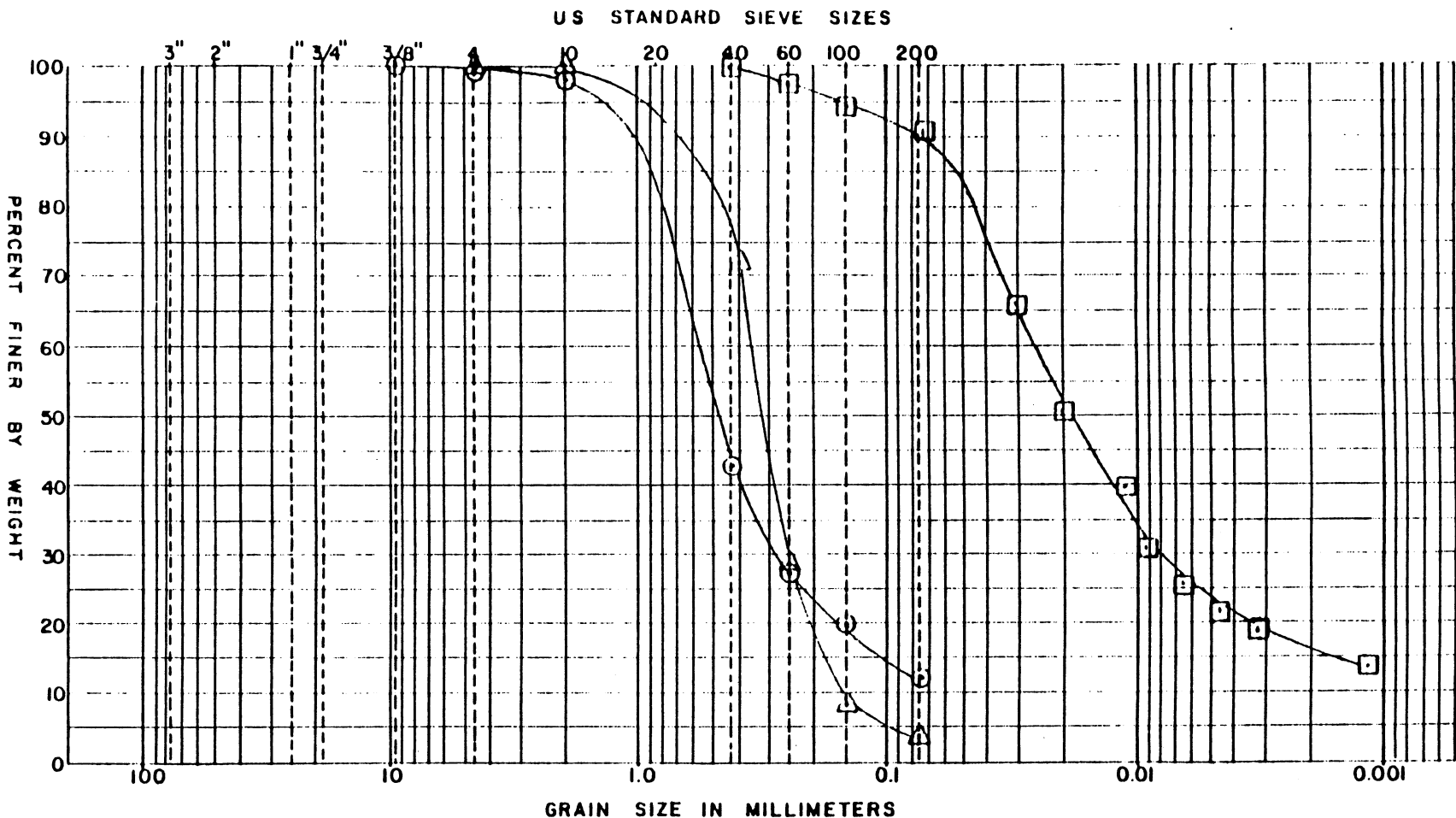
BORING NO.	ELEV. OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G40-X1A						
SA-5	40.0'-41.5' (12.19m-12.65m)	10.5	-	-	-	Brown, silty, fine to coarse SAND, trace fine gravel, trace clay (SM)
SA-6	51.0'-52.7' (15.54m-16.06m)	10.6	-	-	-	Reddish brown fine to coarse SAND, some silt, some fine gravel (SM)
SA-7	60.5'-62.2' (18.44m-18.96m)	11.4	-	-	-	Reddish brown, silty, fine to coarse SAND, trace fine gravel, trace clay (SM)

Date 1/29/82
Job No. 314-1296

Golder Associates

3.5-17-39

Drawn CAB
Checked MTF
Reviewed *[Signature]*



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G40-Y15						
SA-3	20.0'-24.0' (6.10m-7.32m)	37.4	32	22	10	Brown-gray, CLAYEY SILT, trace fine sand (CL)
SA-10	90.5'-91.8' (27.58m-27.98m)	17.3	-	-	-	Brown, fine to medium SAND, trace silt (SP)
SA-17	160.0'-162.0' (48.77m-49.38m)	12.7	-	-	-	Yellow-brown, fine to coarse SAND, some silt (SM)

FIGURE A-8

Date 1/23/82
Job No 811-1236

Golder Associates

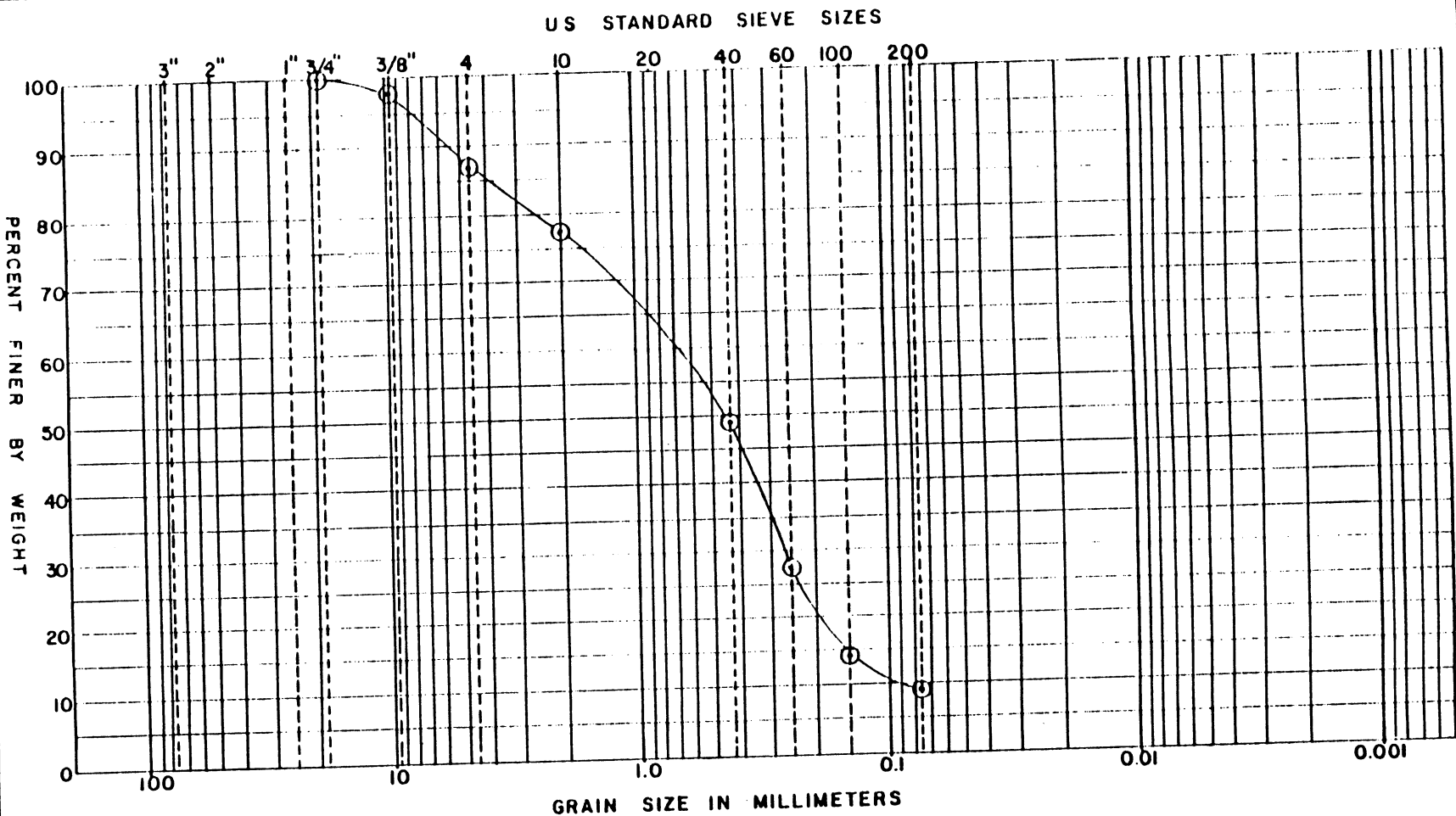
3.5-17-40

Drawn CAB
Checked MTF
Reviewed *[Signature]*

GRAIN SIZE DISTRIBUTION

FIGURE

A-9



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G40-Y21 SA-4	15.0'-18.0' (4.57m-5.49m)	16.5	-	-	-	Brown, fine to coarse SAND, some fine gravel, trace silt (SW-SM)

Date 1/2/82
Job No. 314-1236

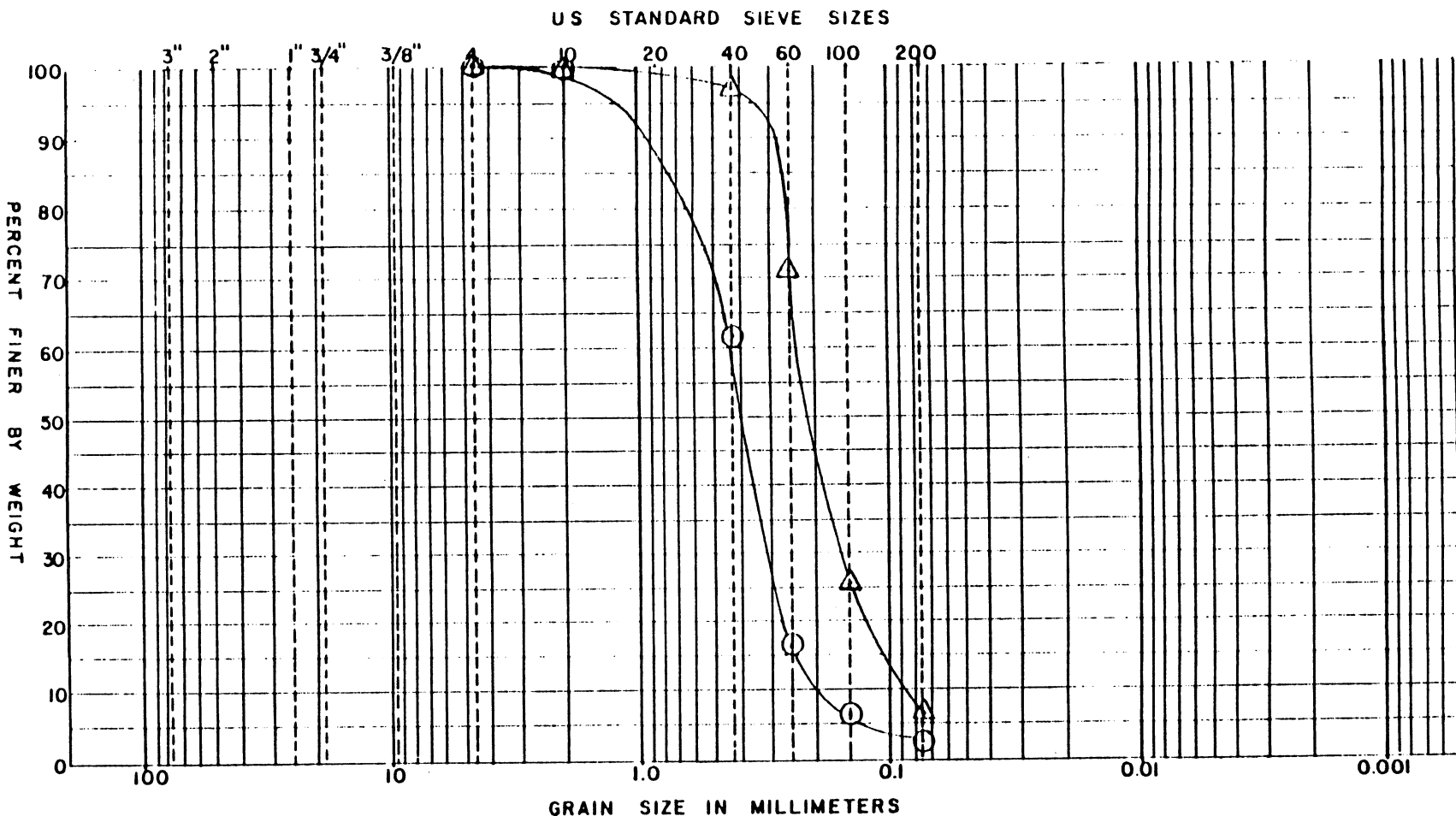
Golder Associates

Drawn CAS
Checked MTF
Reviewed [Signature]

3.5-17-41

GRAIN SIZE DISTRIBUTION

FIGURE 2-10



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

BORING NO.	ELEV OR DEPTH	W _n	W _L	W _p	I _p	DESCRIPTION OR CLASSIFICATION
G40-Y22						
SA-4	30.0'-32.0' (9.14m-9.75m)	20.8	-	-	-	Tan, fine to medium SAND (SP)
SA-8	71.0'-73.0' (21.64m-22.25m)	20.3	-	-	-	Brown, fine SAND, trace silt (SP-SM)

Date 1/29/82
Job No 313-1296

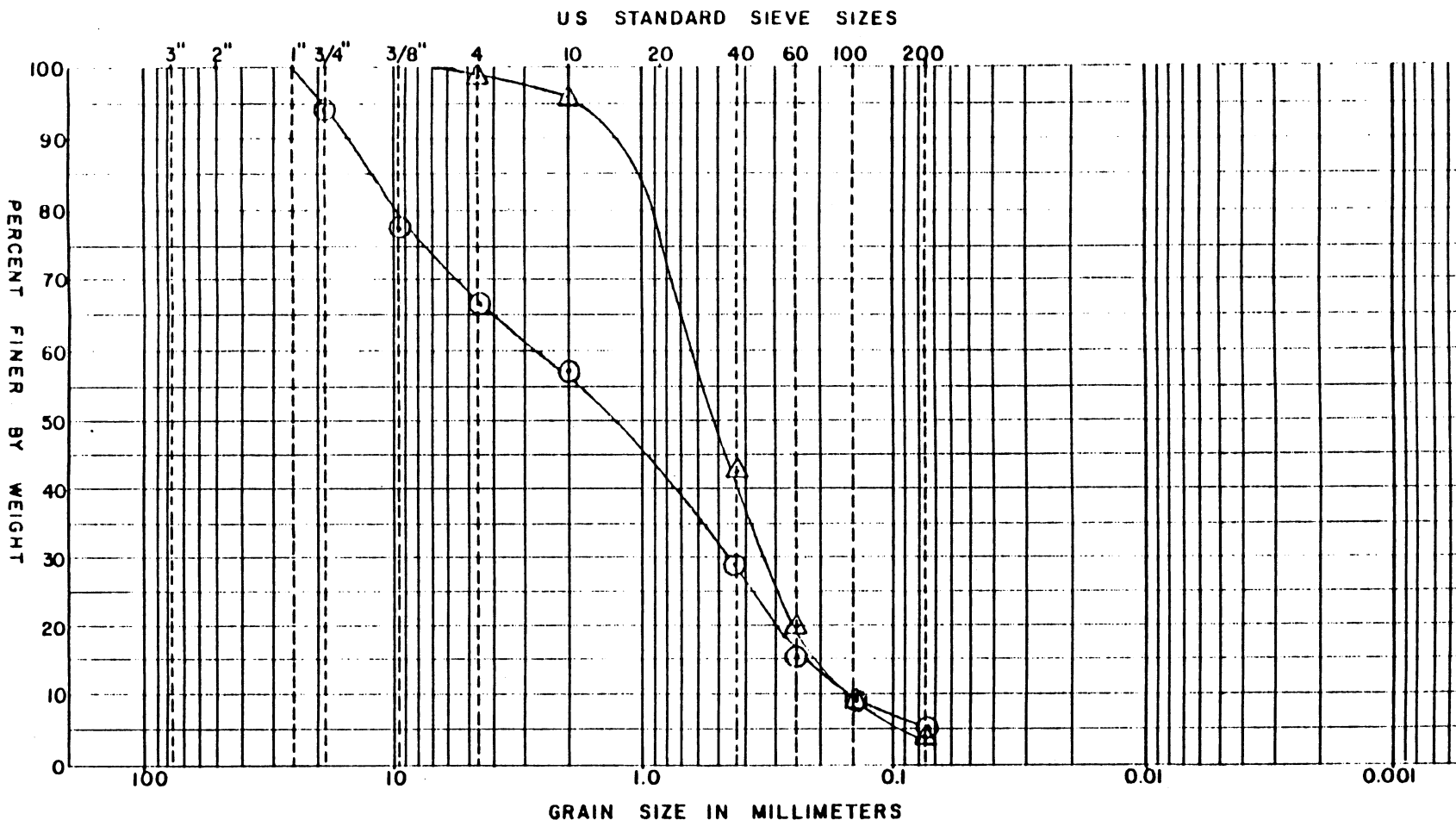
Golder Associates

3.5-17-42

Drawn CAB
Checked MTF
Reviewed CUE

GRAIN SIZE DISTRIBUTION

FIGURE A-11



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

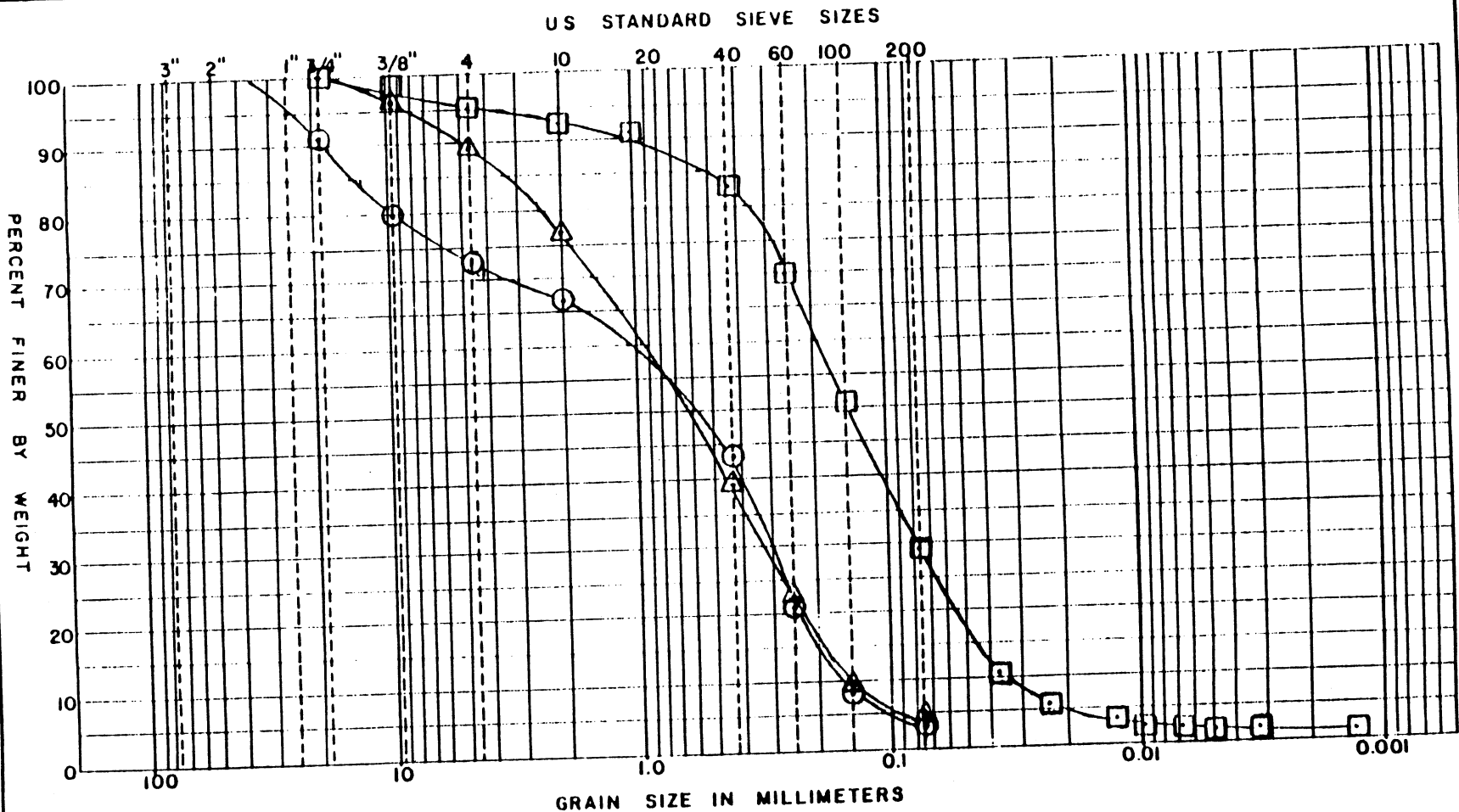
BORING NO.	ELEV OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G40-Y22 SA-17 —○—	163.5'-165.5' (49.83m-50.44m)	8.6	-	-	-	Brown, fine to coarse, gravelly, fine to coarse SAND, trace silt (SP)
SA-18 —Δ—	174.0'-175.8' (53.04m-53.58m)	15.2	-	-	-	Brown, fine to coarse SAND, trace silt (SP)

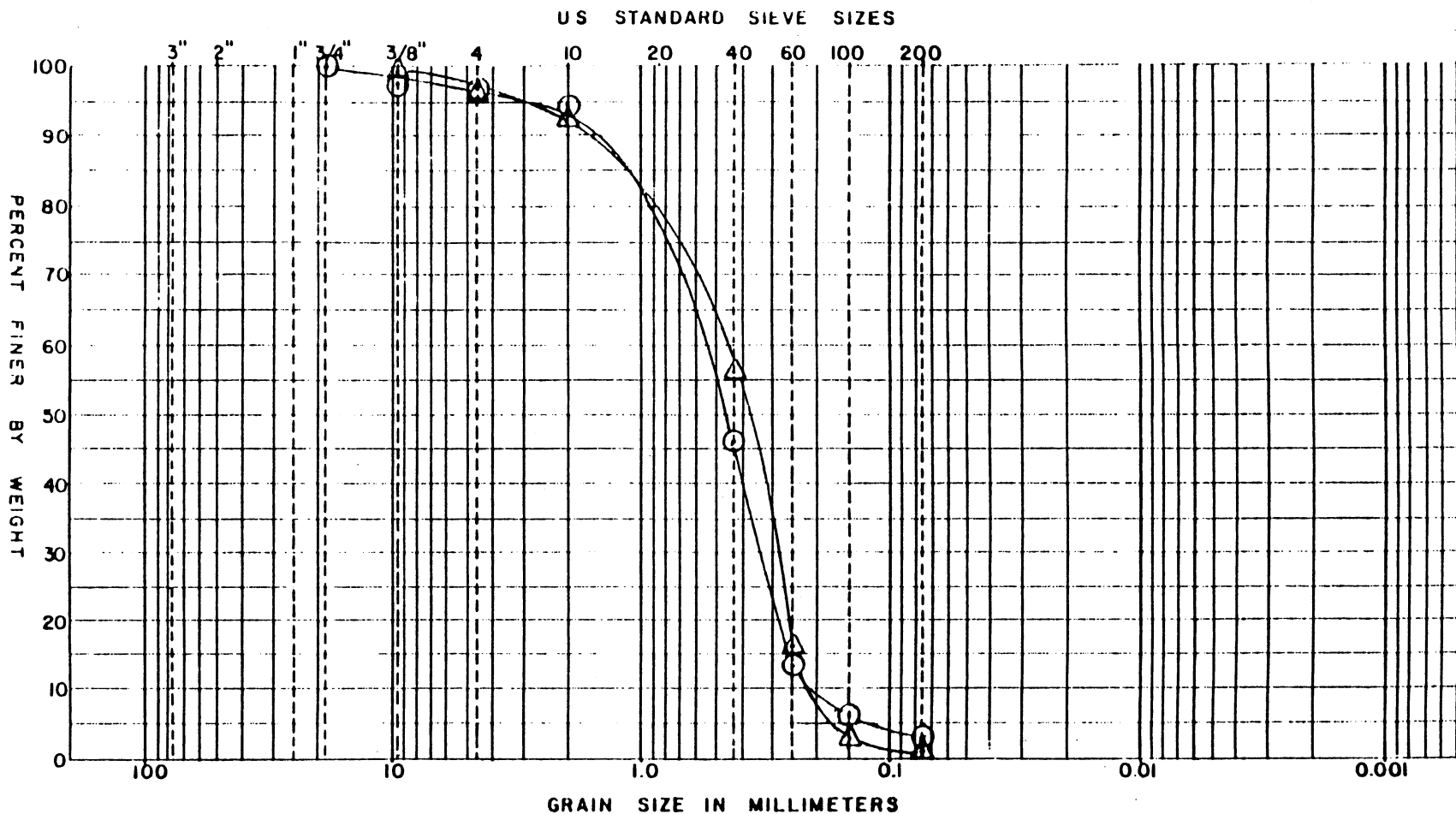
Date 1/29/52
Job No 311-1296

Golder Associates

3.5-17-43

Drawn CAB
Checked MTF
Revised 2/1/52





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

BORING NO.	ELEV OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-A23						
SA-7	—○— 30.0'-31.6' (9.14m-9.63m)	21.6	-	-	-	Brown, fine to coarse SAND, trace fine gravel, trace silt (SP)
SA-9	—△— 40.0'-42.0' (12.19m-12.80m)	22.0	-	-	-	Brown, fine to coarse SAND, trace fine gravel, trace silt (SP)

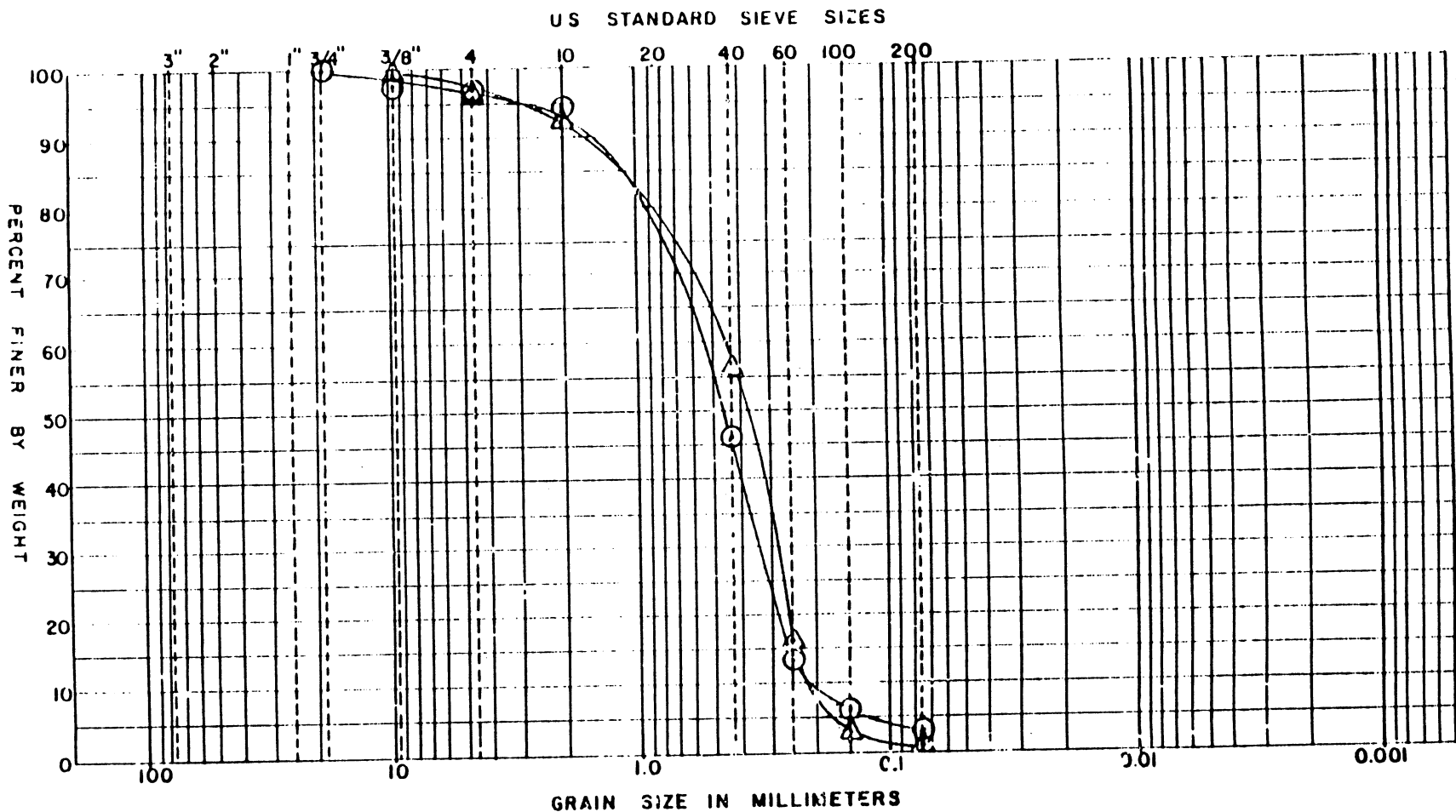
FIGURE A-13

Date 1/29/32
Job No 314-1296

Golder Associates

3.5-17-45

Drawn CAB
Checked MTF
Reviewed [Signature]



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

BOREING NO.	ELEV OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-A23 SA-7	30.0'-31.6' (9.14m-9.63m)	21.6	-	-	-	Brown, fine to coarse SAND, trace fine gravel, trace silt (SP)
SA-9	40.0'-42.0' (12.19m-12.80m)	22.0	-	-	-	Brown, fine to coarse SAND, trace fine gravel, trace silt (SP)

FIGURE A-13

Date 1/23/32
Job No 812-1296

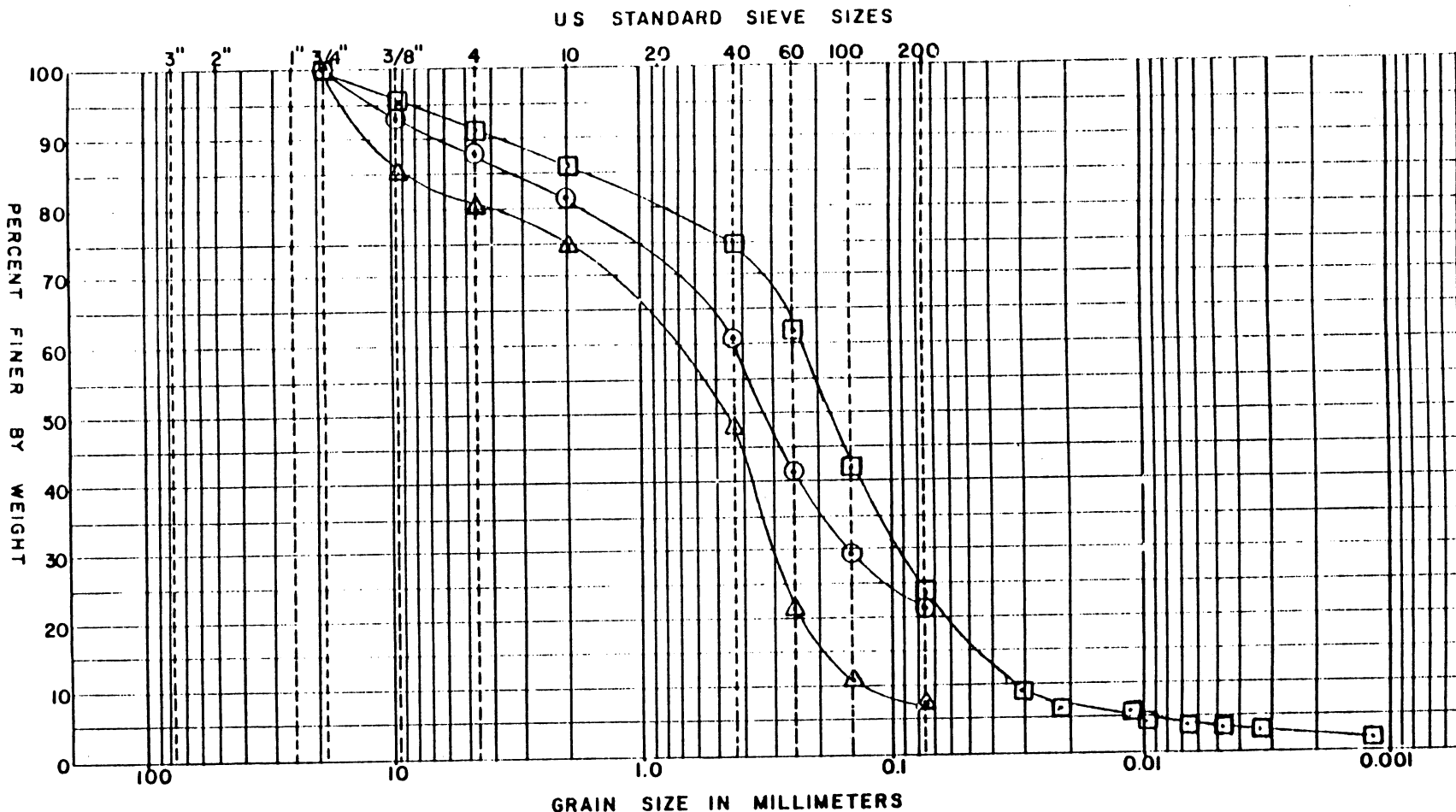
Golder Associates

3.5-17-46

Drawn CAB
Checked MTH
Reviewed *[Signature]*

GRAIN SIZE DISTRIBUTION

FIGURE
A-14



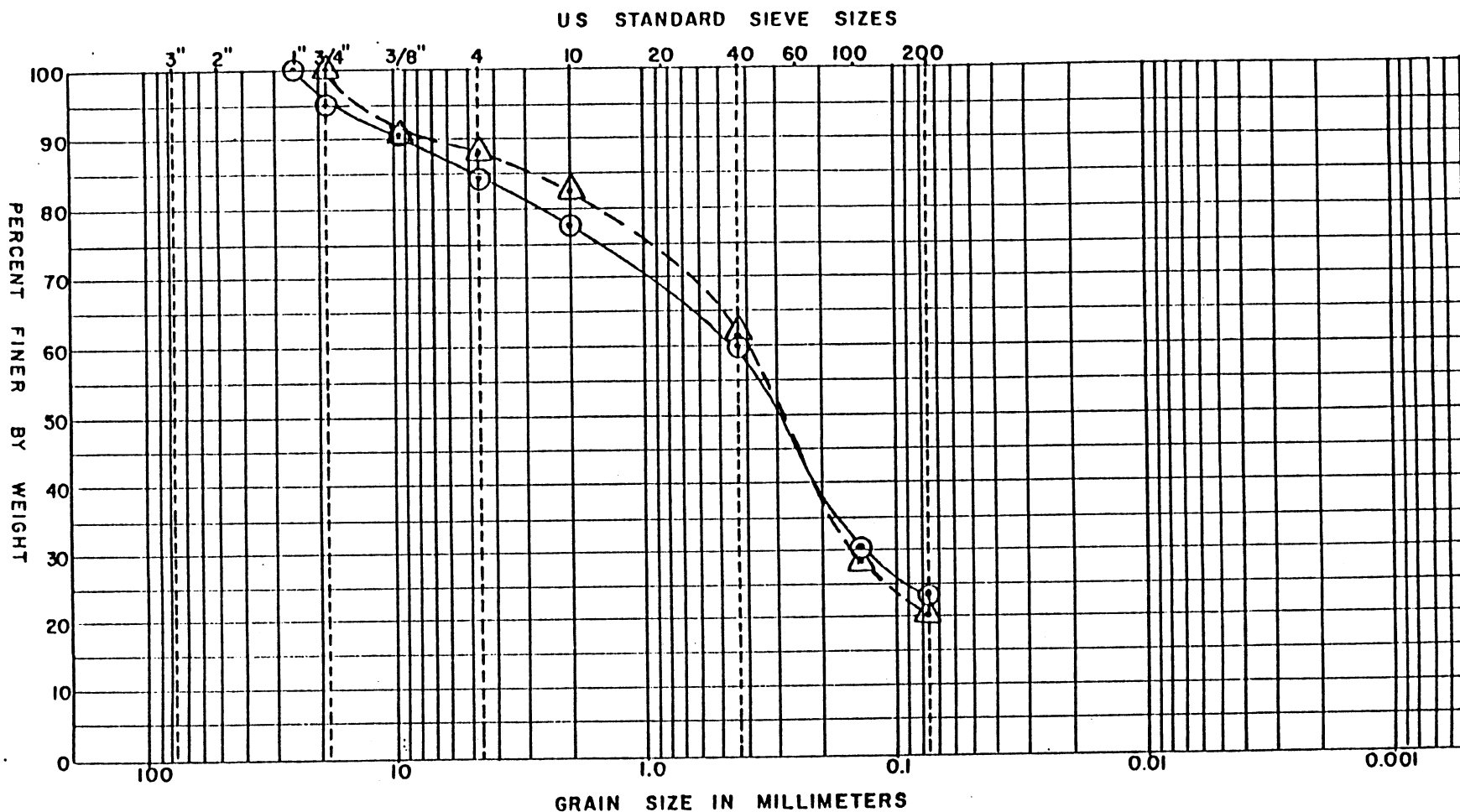
COBBLES	GRAVEL		SAND			FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-B12 SA-5	40.0'-41.5' (12.19m-12.65m)	8.4	-	-	-	Brown, fine to coarse SAND, some fine gravel, some silt, trace clay (SM)
SA-9	80.0'-81.9' (24.38m-24.96m)	12.5	-	-	-	Brown, fine to coarse SAND, some fine gravel, trace silt (SP-SM)
SA-12	110.0'-111.0' (33.53m-33.83m)	14.2	-	-	-	Red-brown, silty, fine to coarse SAND, trace fine gravel (SM)

Date 1/4/82
Job No 514-1295

Golder Associates 3.5-17-47

Drawn CAB
Checked MTF
Reviewed WLF



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

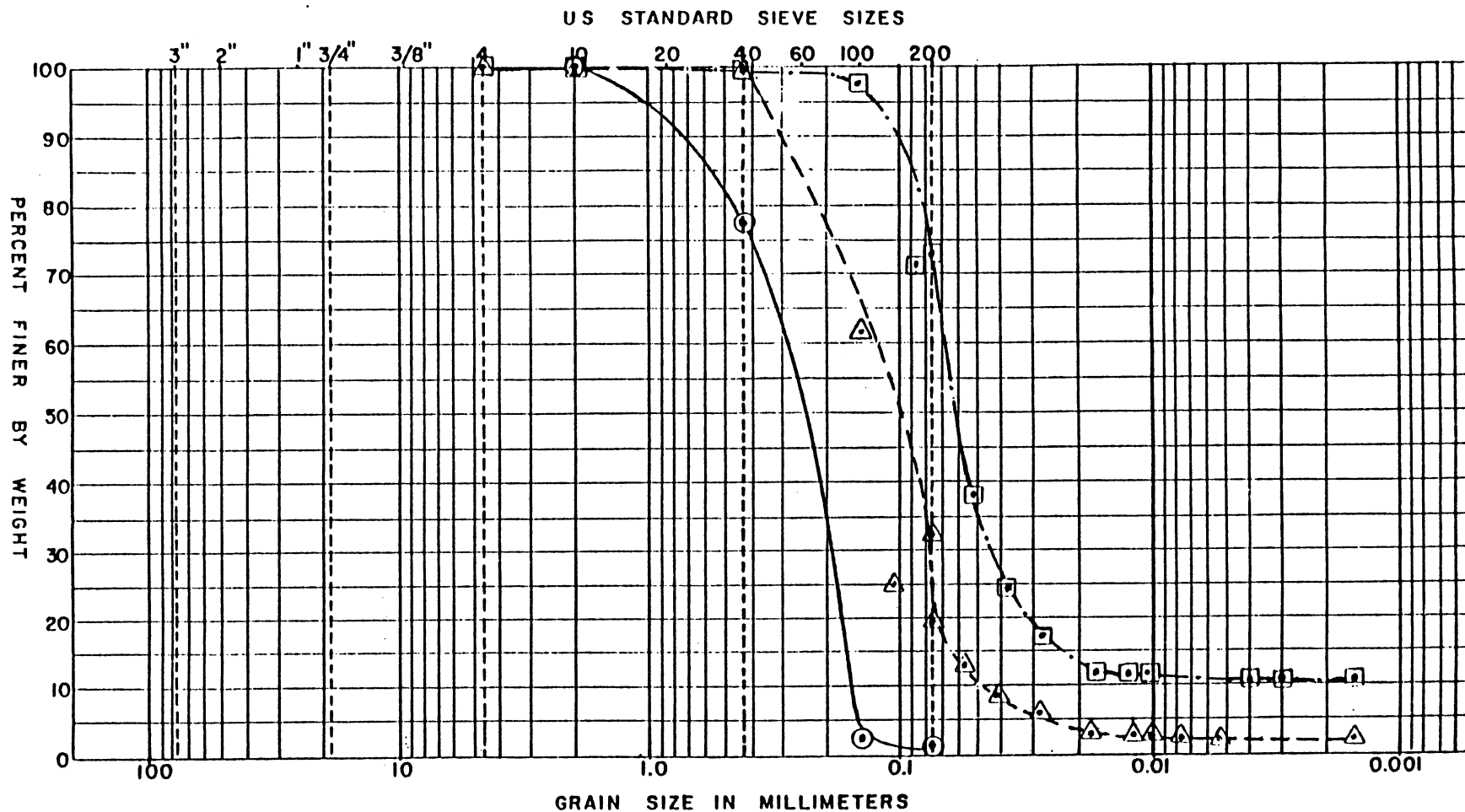
BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-C11 SA-4 —○—	3.05m-3.51m (10'-11.5')	-	-	-	-	Brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay (SM)
SA-9 —△—	10.67m-11.13m (35'-36.5')	-	-	-	-	Red-brown, fine to coarse SAND, some fine gravel, some silt, trace clay (SM)

Date 5/30/79
Job No. 786085

Golder Associates 3.5-17-48

Drawn AST
Checked JFC
Approved JFC

GRAIN SIZE DISTRIBUTION



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

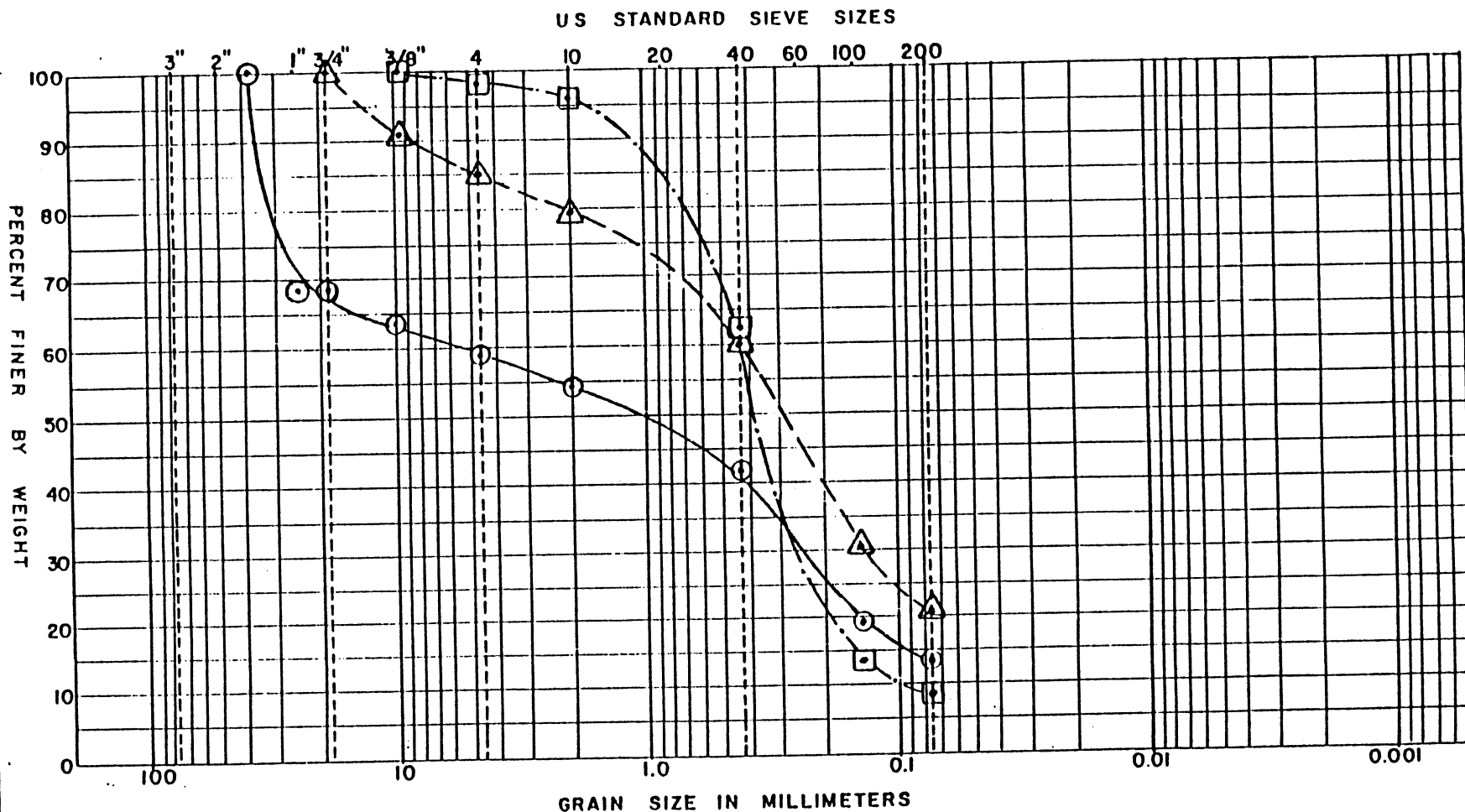
BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-C15 SA-3 —○—	2.29m-2.74m (7.5'-9')	-	-	-	-	Light brown, fine to medium SAND, trace silt (SP)
SA-8 --△--	8.53m-8.99m (28'-29.5')	-	-	-	-	Brown, silty fine SAND, trace clay (SM)
SA-11 ---□---	13.11m-13.56m (43'-44.5')	-	-	-	-	Brown, fine sandy SILT, some clay (ML)

FIGURE

Date 5/30/79
Job No. 786085

Golder Associates 3.5-17-49

Drawn AST
Checked JFC
Approved JFC



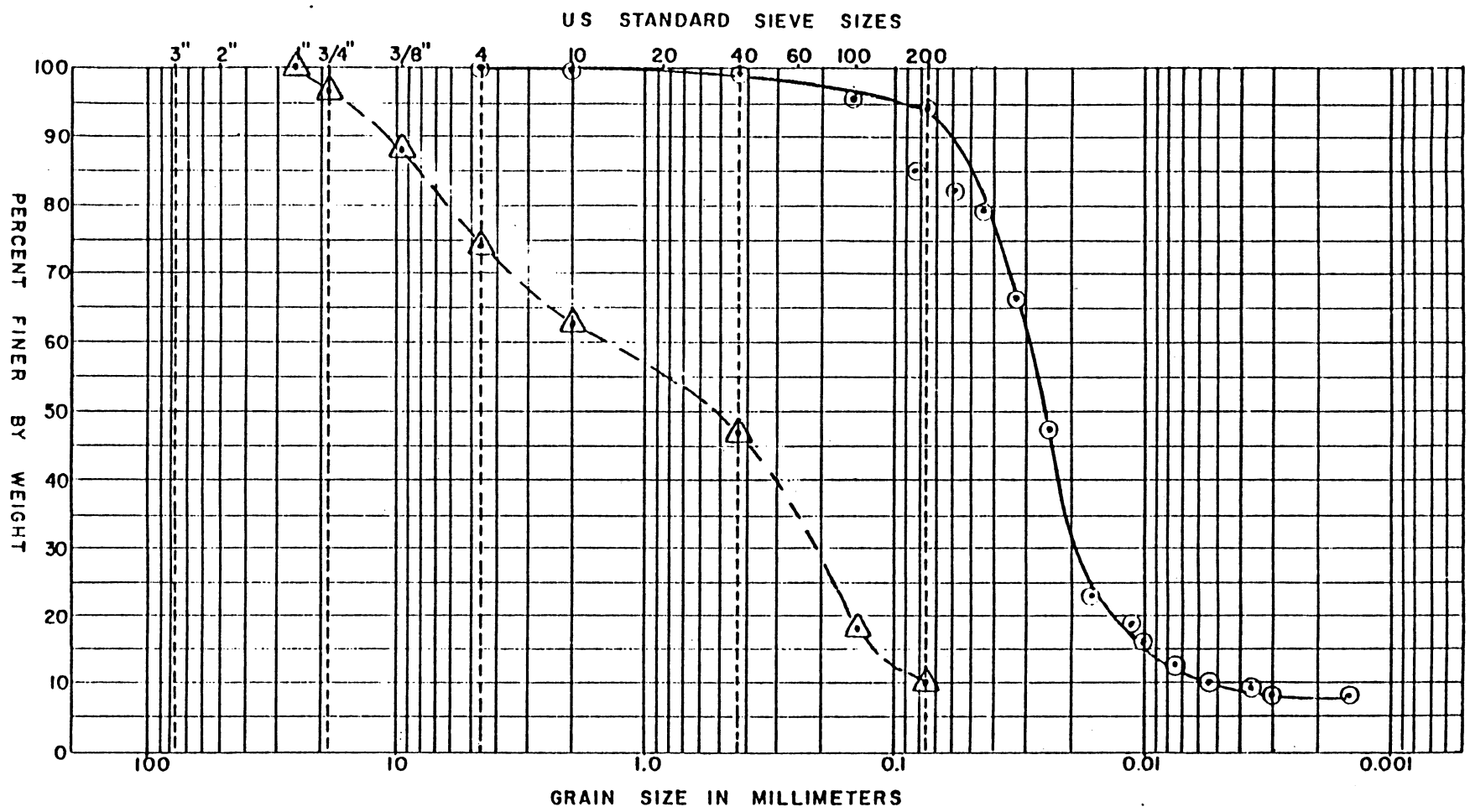
COBBLES	GRAVEL		SAND			FINES,	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-C15 SA-14 --○--	17.68m-18.14m (58'-59.5')	-	-	-	-	Red-brown, fine to coarse SAND and fine to coarse GRAVEL, some silt (GM-SM)
SA-20 --△--	27.43m-27.68m (90'-90.8')	-	-	-	-	Red-brown, fine to coarse SAND, some fine gravel, some silt, trace clay (SM)
SA-25 --□--	39.62m-39.93m (130'-131')	-	-	-	-	Brown, fine to coarse SAND, trace fine gravel, trace silt (SP-SM)

Date 5/30/79
Job No. 786085

Golder Associates 3.5-17-50

Drawn AST
Checked JFC
Approved JFC



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-C15 SA-31 —○—	57.91m-58.13m (190'-190.7')	-	NP	NP	NP	Brown, SILT, trace fine to medium sand, trace clay (ML)
SA-32 —△—	60.96m-61.17m (200'-200.7')	-	-	-	-	Brown, fine gravelly, fine to coarse SAND, trace silt (SP-SM)

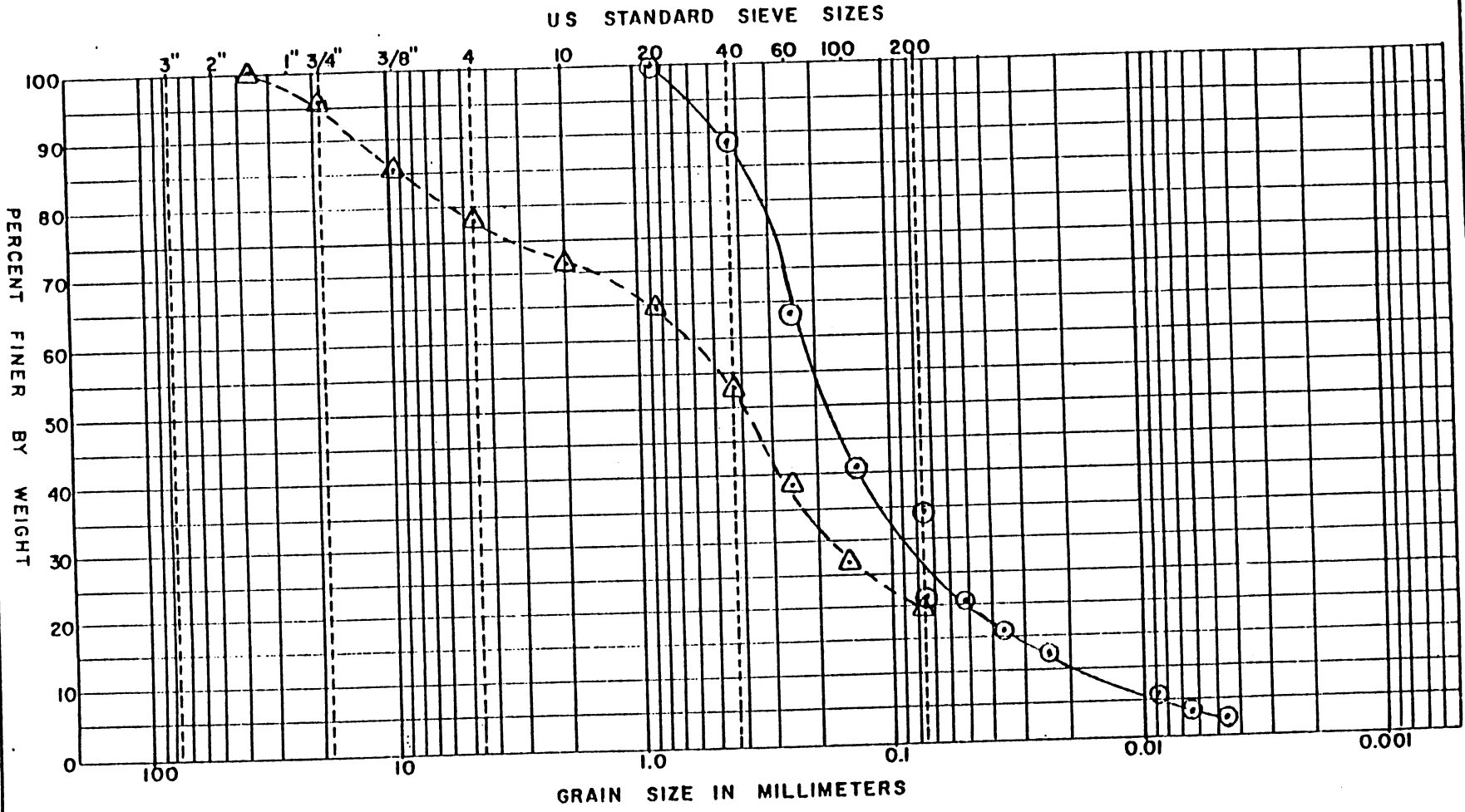
Date 5/30/79
Job No. 786035

Golder Associates 3.5-17-51

Drawn AST
Checked JFC
Approved JFC

GRAIN SIZE DISTRIBUTION

FIGURE



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

BORING NO.	ELEV. OR DEPTH	W _n	W _L	W _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-C15B						
SA-2A —○—	1.37m-1.74m (4.5'-5.7')	-	-	-	-	Black, peat and silty, fine to medium SAND, trace clay (PT)
SA-6 ---△---	7.47m-7.92m (24.5'-26.0')	-	-	-	-	Gray, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay (SM)

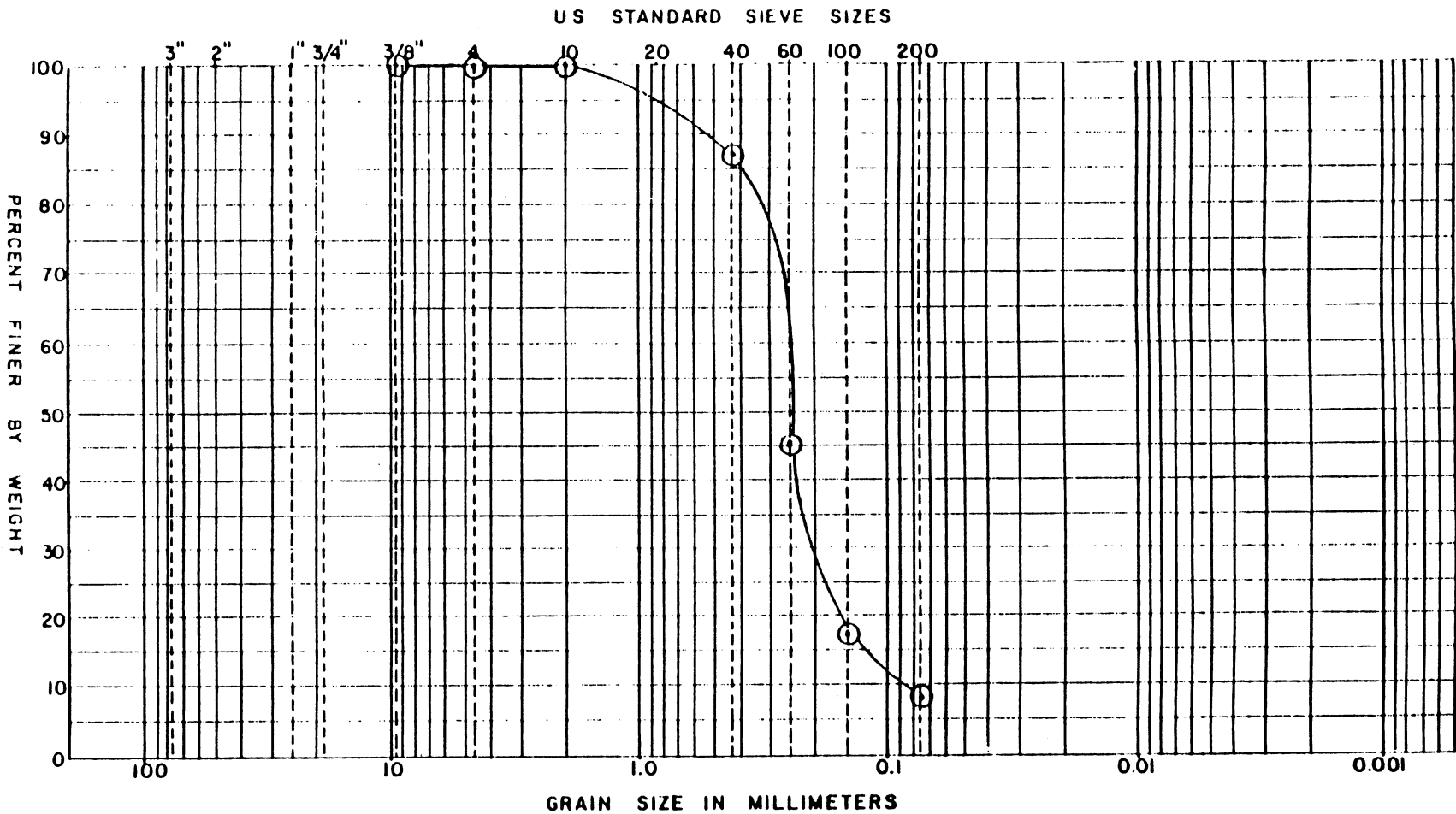
Date 6/7/79
Job No. 786085

Golder Associates 3.5-17-52

Drawn JJS
Checked JFC
Approved JFC

GRAIN SIZE DISTRIBUTION

FIGURE A-15



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

BORING NO.	ELEV OR DEPTH	W _n	W _L	W _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-C15C SA-2	15.0'-17.0' (4.57m-5.18m)	-	-	-	-	Gray-brown, fine to medium SAND, trace silt (SP-SM)

Date 1/29/82
Job No 311-1296

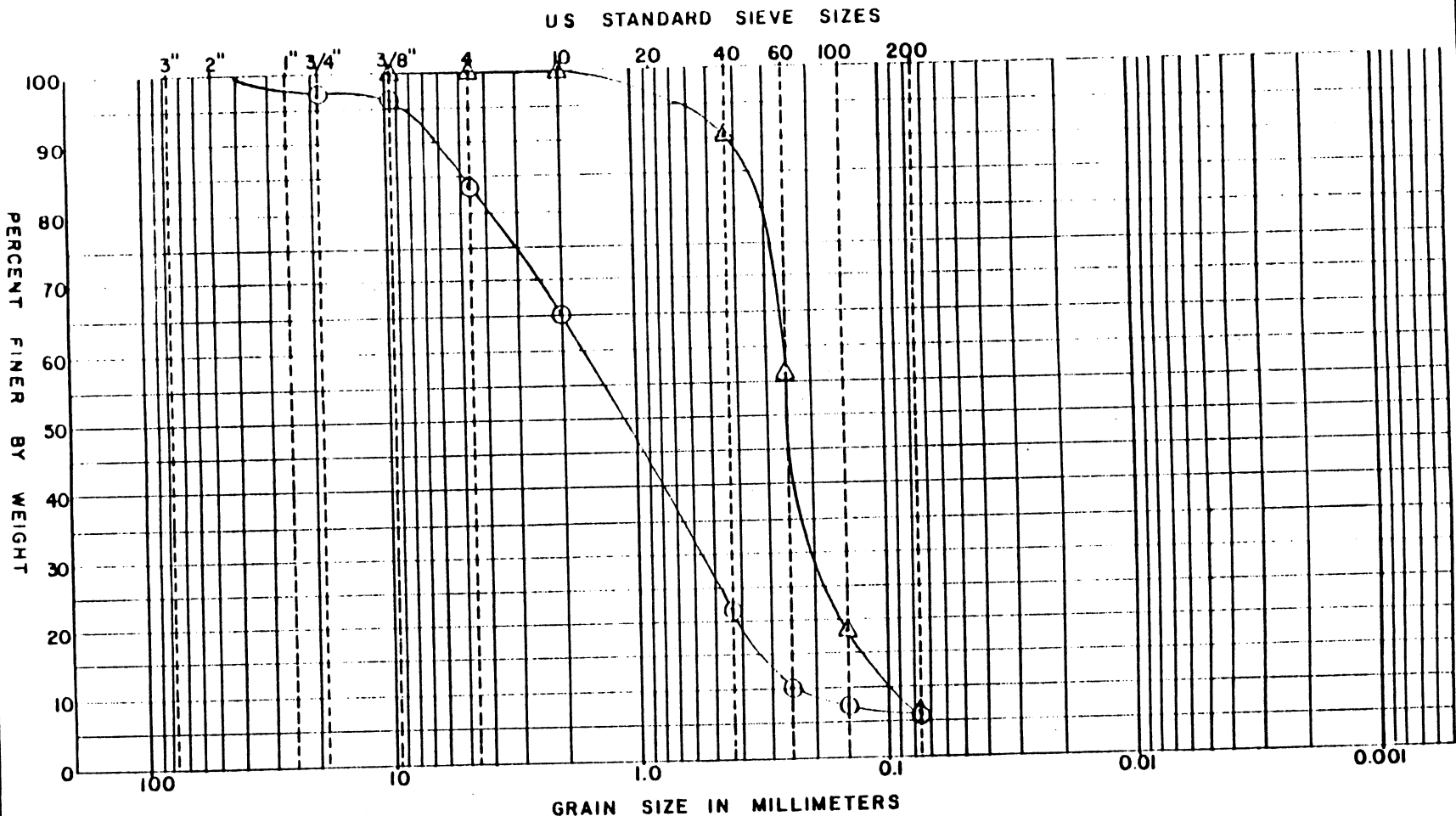
Golder Associates

3.5-17-53

Drawn CAB
Checked MTF
Reviewed [Signature]

GRAIN SIZE DISTRIBUTION

FIGURE 2-16



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

BORING NO.	ELEV OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-C32 —○— SA 13	120.0 - 121.5 (36.58m-37.03m)	10.0	-	-	-	Brown, fine to coarse SAND, some fine to coarse gravel, trace silt (SP-SM)
—△— SA 18	172.5 - 173.5 (52.58m-52.88m)	18.2	-	-	-	Tan, fine to medium SAND, trace silt (SP-SM)

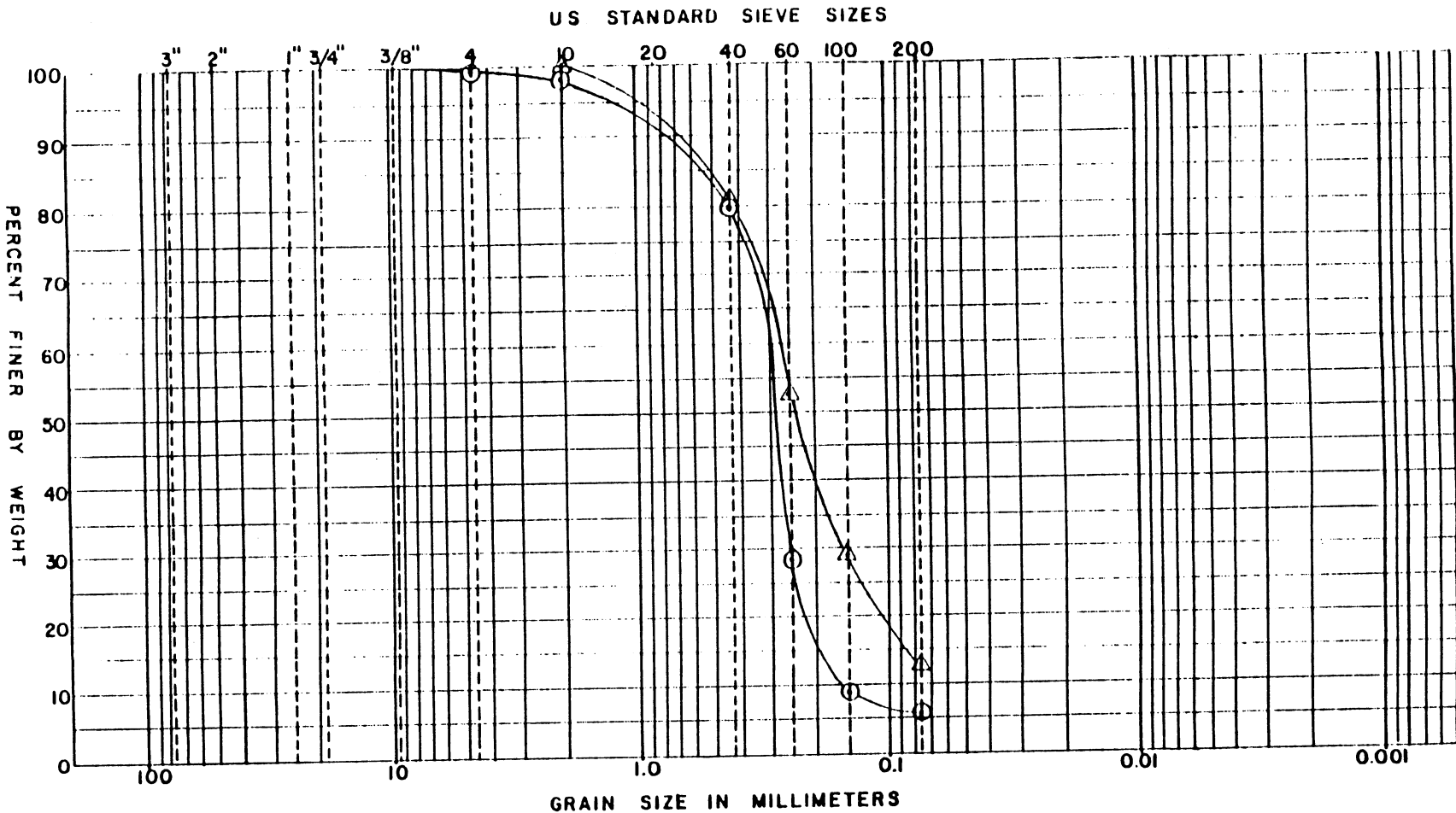
Date 2-10-82
Job No 811-1295

Golder Associates

3.5-17-54

Drawn J. Fish
Checked MTF
Reviewed [Signature]

GRAIN SIZE DISTRIBUTION



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-C32 —○— SA-21	205.0 - 206.0 (62.48m-62.79m)	18.9	-	-	-	Tan, medium to fine SAND, trace silt (SP-SM)
—△— SA-23	223.0 - 224.5 (67.97m-68.43m)	15.9	-	-	-	Tan, fine to medium SAND, some silt (SM)

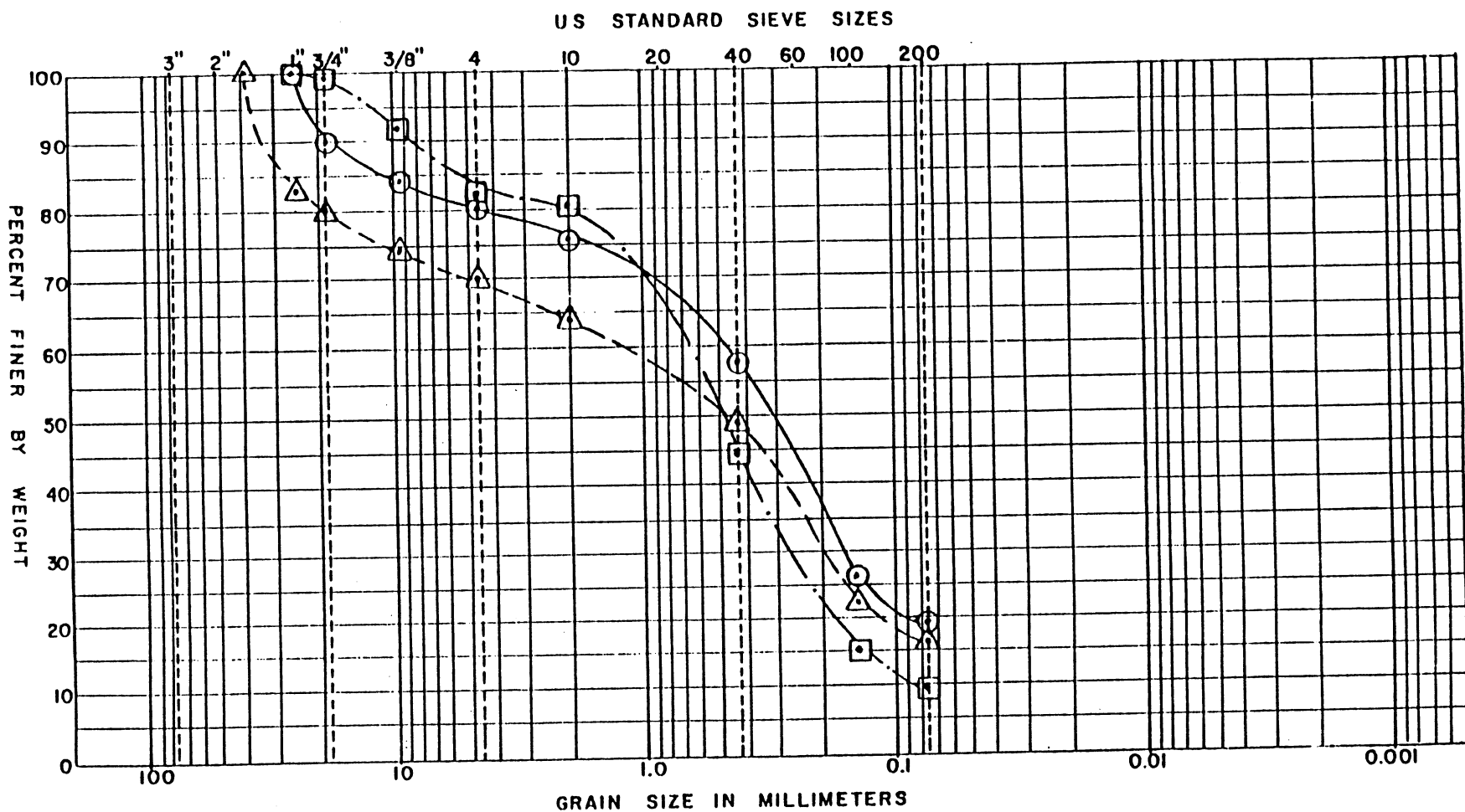
FIGURE A-17

Date 2-10-82
311-1296
Job No

Golder Associates

3.5-17-55

Drawn J. Fish
Checked JTF
Reviewed JTF

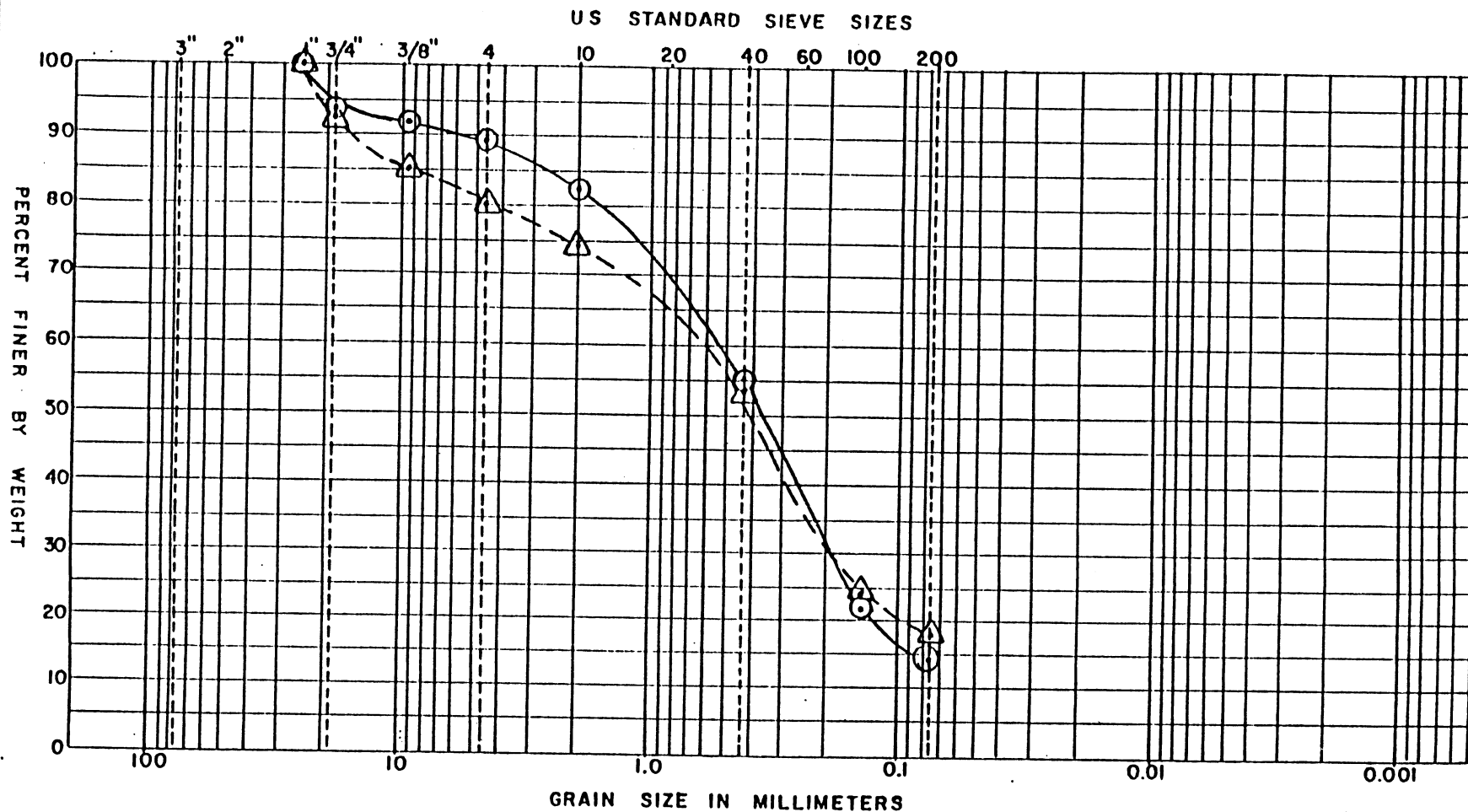


COBBLES	GRAVEL		SAND			FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV. OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-D18 SA-1 ---○---	.76m-1.22m (2.5'-4')	-	-	-	-	Red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay (SM)
SA-3 ---△---	3.05m-3.51m (10'-11.5')	-	-	-	-	Red-brown, fine to coarse gravelly, fine to coarse SAND, trace silt, trace clay (SM)
SA-5 ---□---	6.10m-6.34m (20'-20.8')	-	-	-	-	Red-brown, fine to coarse SAND, some fine to coarse gravel, trace silt (SP-SM)

GRAIN SIZE DISTRIBUTION

FIGURE



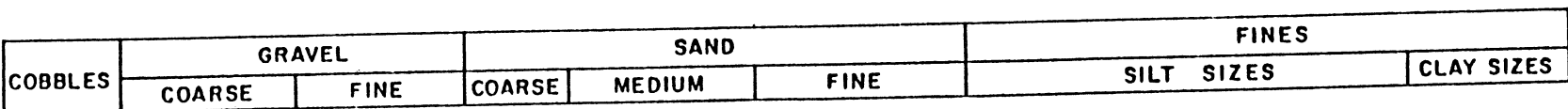
COBBLES	GRAVEL		SAND			FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-D18 SA-8 —○—	10.67m-11.03m (35'-36.2')	-	-	-	-	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay (SM)
SA-11 -△-	15.24m-15.45m (50'-50.7')	-	-	-	-	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay (SM)

Date 5/30/79
Job No. 786085

Golder Associates 3.5-17-57

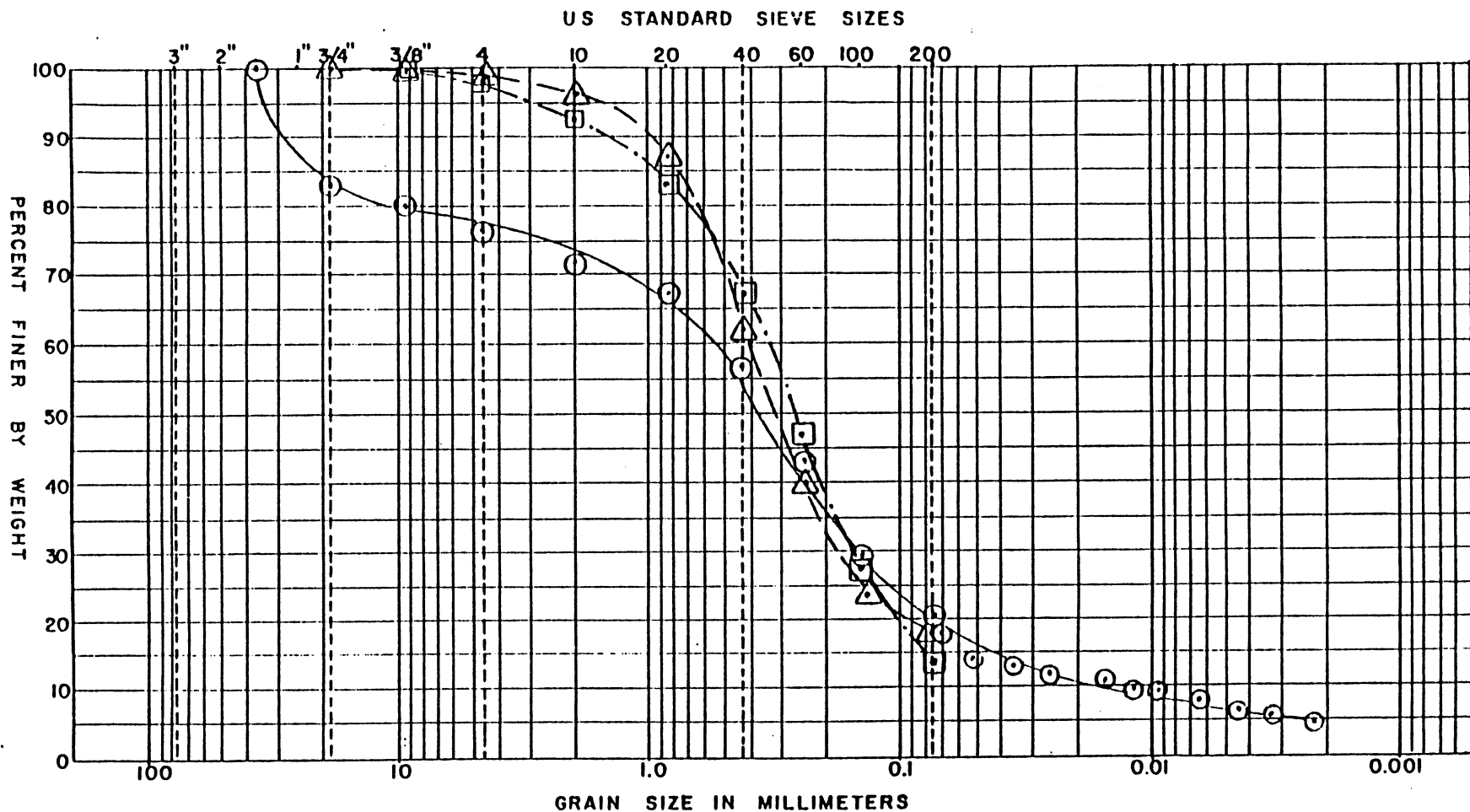
Drawn AST
Checked JFC
Approved JFC



BORING NO.	ELEV. OR DEPTH	W _n	W _L	W _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-E13 SA-3 —○—	3.05m-3.51m (10.0'-11.5')	-	-	-	-	Red-brown, fine to coarse SAND, some fine gravel, some silt, trace clay (SM)
SA-5 —△—	6.10m-6.55m (20.0'-21.5')	-	-	-	-	Light brown, fine to coarse SAND, some fine gravel, some silt, trace clay (SM)
SA-9 —□—	12.19m-12.65m (40.0'-41.5')	-	-	-	-	Red-brown, fine to coarse SAND and fine GRAVEL, trace silt, trace clay (SM)

Drawn JLs
Checked JFC
Approved JFC

GRAIN SIZE DISTRIBUTION



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-E13						
SA-13&14 —○—	19.31m-19.96m (65.0'-65.5')	-	-	-	-	Red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay (SM)
SA-21 —△—	30.48m-30.72m (100'-100.8')	-	-	-	-	Red-brown, fine to coarse SAND, trace fine gravel, some silt, trace clay (SM)
SA-22 —□—	33.53m-33.83m (110'-111')	-	-	-	-	Light brown, fine to coarse SAND, some silt, trace fine gravel (SM)

FIGURE

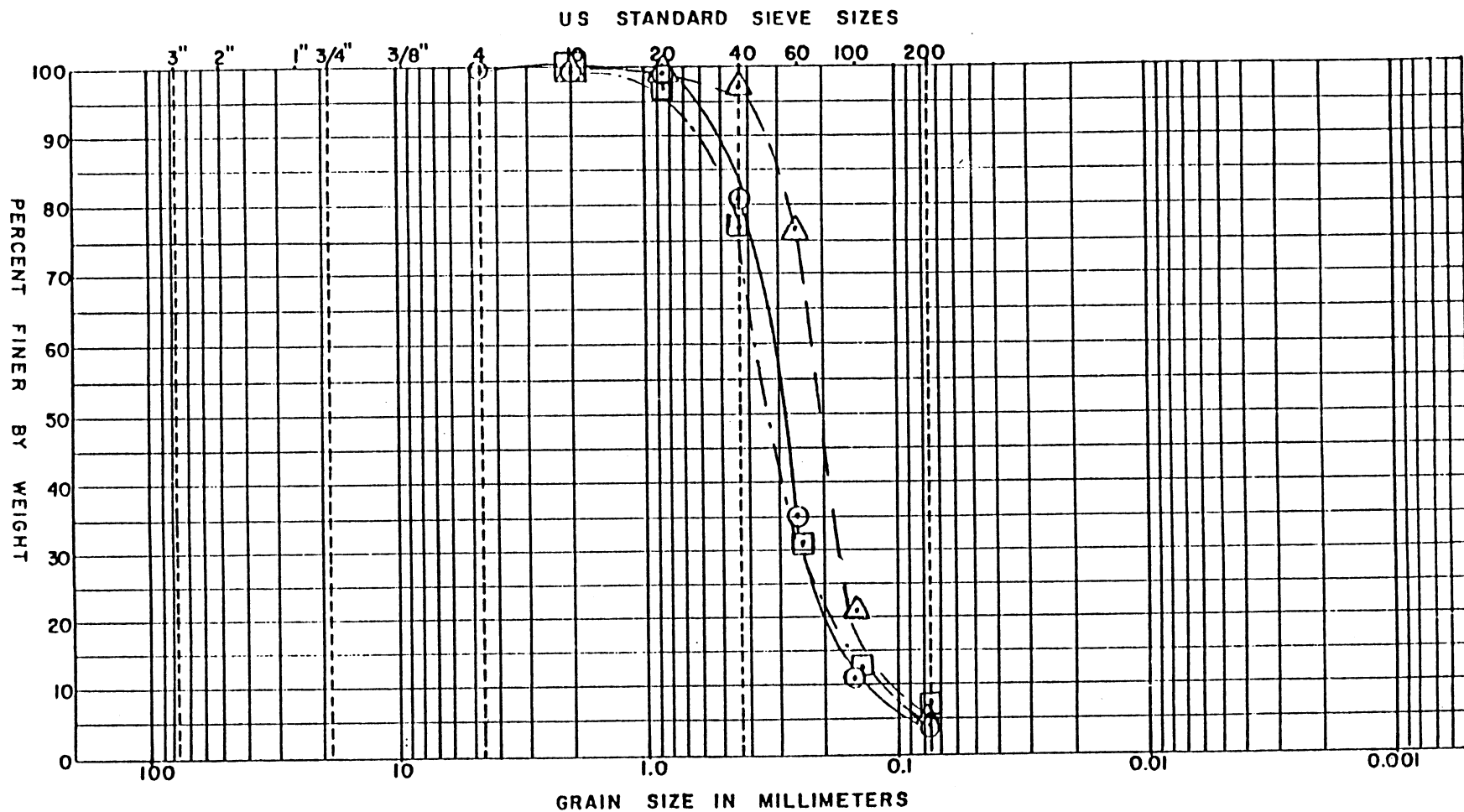
Date 6/3/79
Job No. 786085

Golder Associates 3.5-17-59

Drawn JIS
Checked JFC
Approved JFC

GRAIN SIZE DISTRIBUTION

FIGURE



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-E13 SA-25 —○—	42.67m-42.98m (140'-141')	-	-	-	-	Red-brown, fine to medium SAND, trace silt (SP)
SA-30 —△—	57.91m-58.22m (190'-191')	-	-	-	-	Red-brown, fine to medium SAND, trace silt (SP-SM)
SA-34 —□—	70.10m-70.41m (230'-231')	-	-	-	-	Red-brown, fine to medium SAND, trace silt (SP-SM)

Date 6/22/79

Job No. 736085

Golder Associates 3.5-17-60

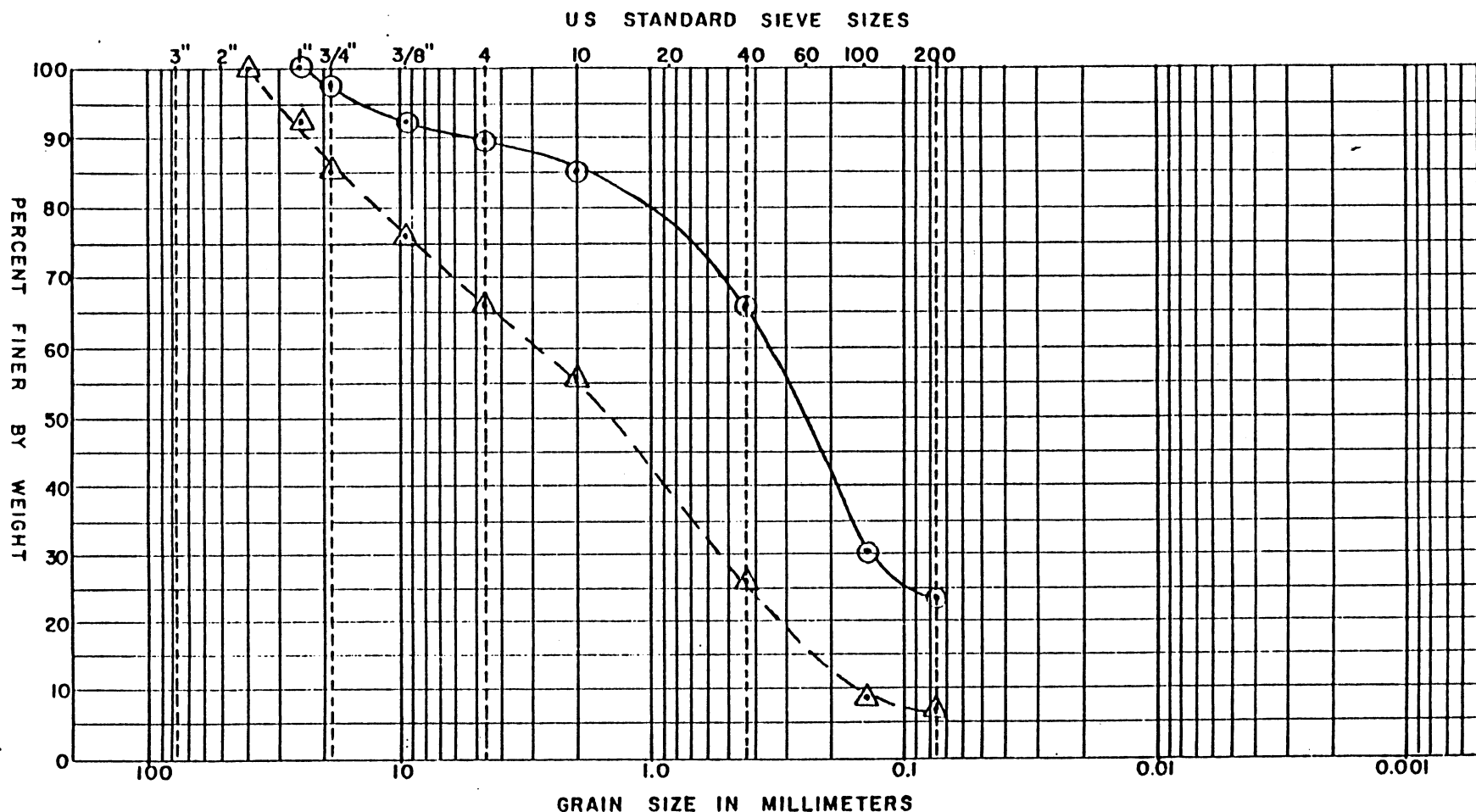
Drawn JIS

Checked JFC

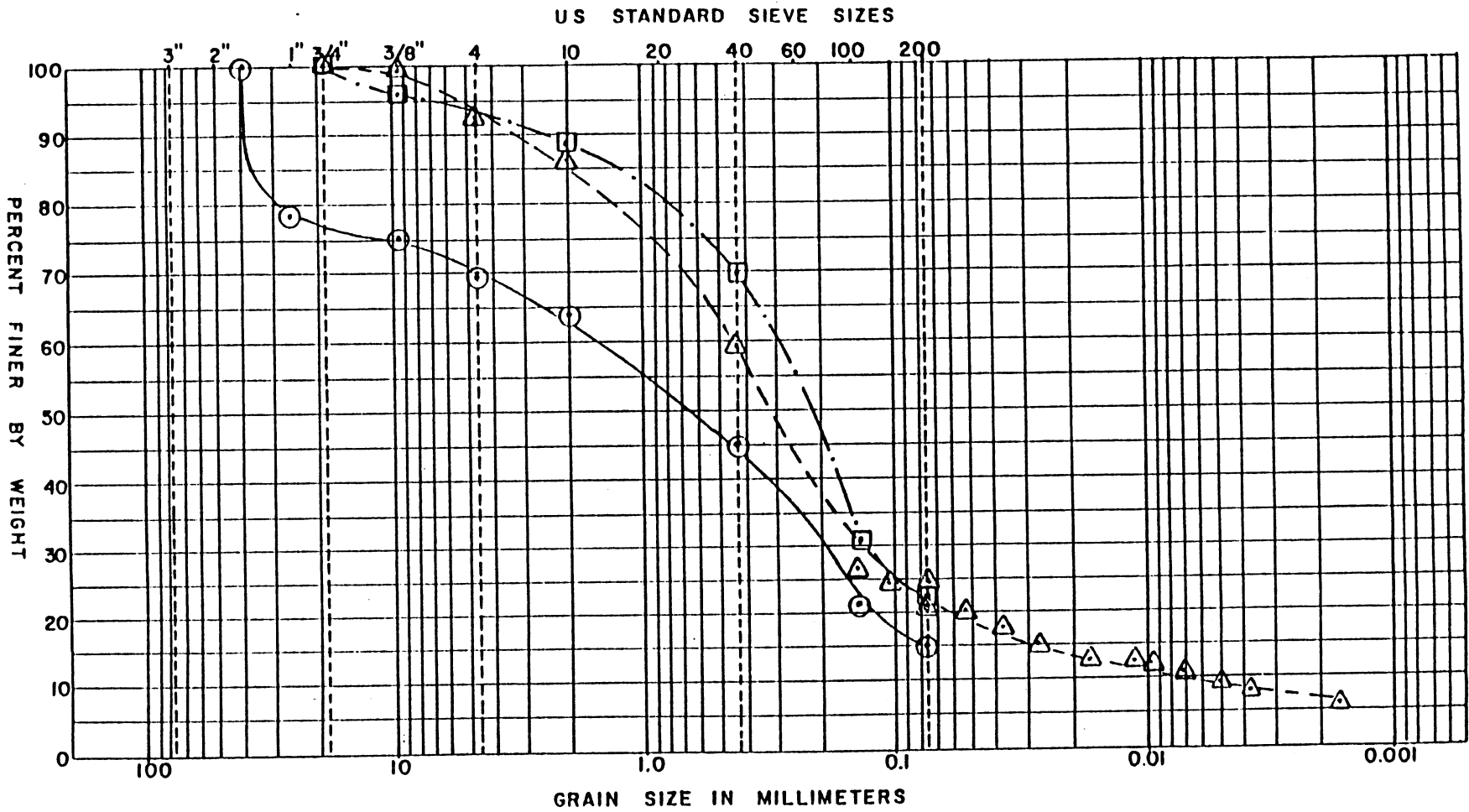
Approved JFC

GRAIN SIZE DISTRIBUTION

FIGURE



GRAIN SIZE DISTRIBUTION



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

BORING NO.	ELEV. OR DEPTH	W _n	W _L	W _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-E17 SA-2 —○—	3.66m-4.11m (12'-13.5')	-	-	-	-	Brown, fine to coarse gravelly, fine to coarse SAND, some silt (SM)
SA-7 --△--	12.19m-12.65m (40'-41.5')	-	-	-	-	Brown, fine to coarse SAND, some silt, trace fine gravel, trace clay (SM)
SA-16 ---□---	26.21m-26.67m (86'-87.5')	-	-	-	-	Red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay (SM)

FIGURE 250

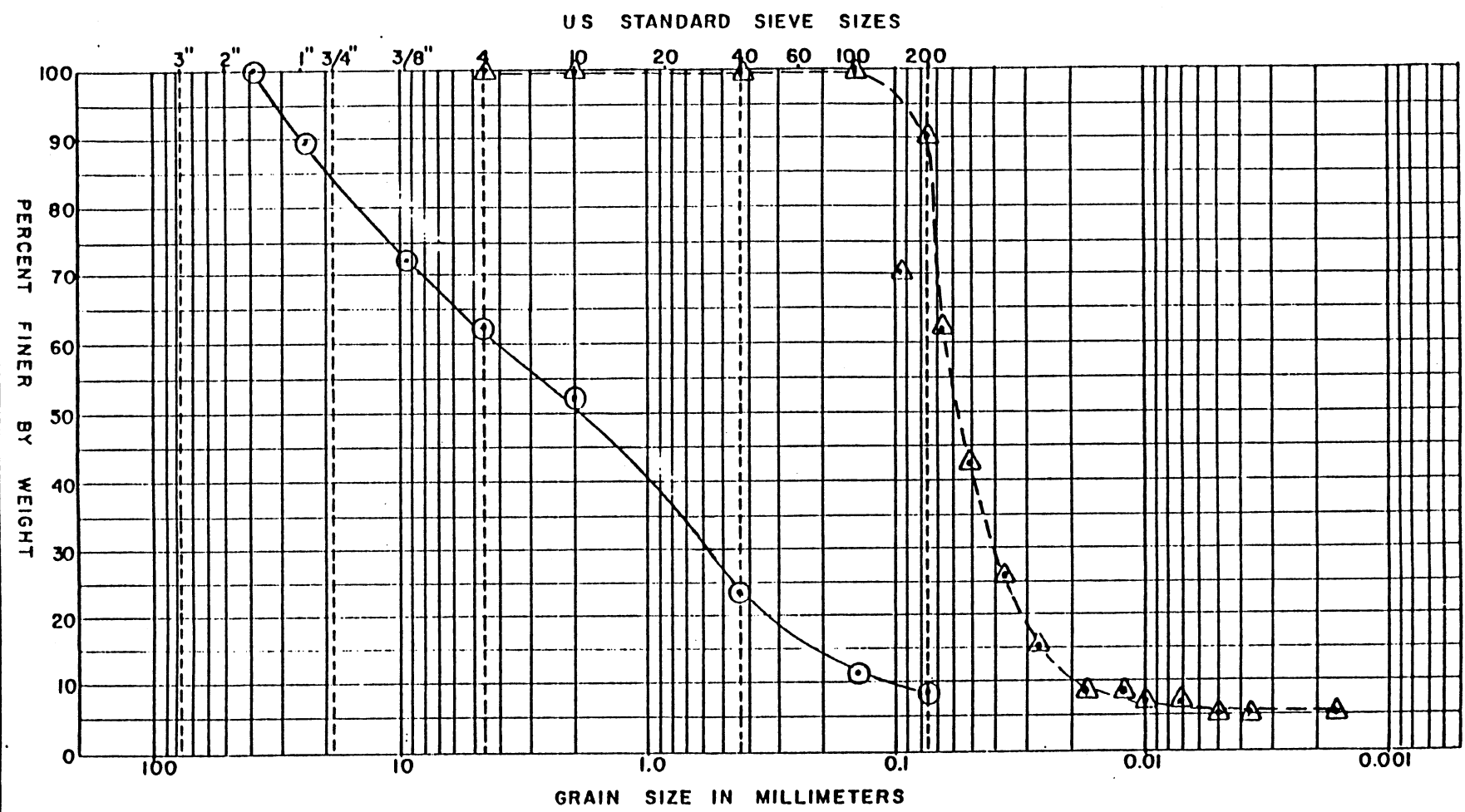
Date 5/30/79
Job No. 786085

Golder Associates

3.5-17-62

Drawn AST
Checked JFC
Approved JFC

GRAIN SIZE DISTRIBUTION



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

BORING NO.	ELEV OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-E17 SA-24 —○—	46.79m-47.24m (153.5'-155')	-	-	-	-	Brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt (SP-SM)
SA-30 --△--	65.23m-65.69m (214'-215.5')	-	-	-	-	Red-brown, SILT, trace fine sand, trace gravel (ML)

FIGURE

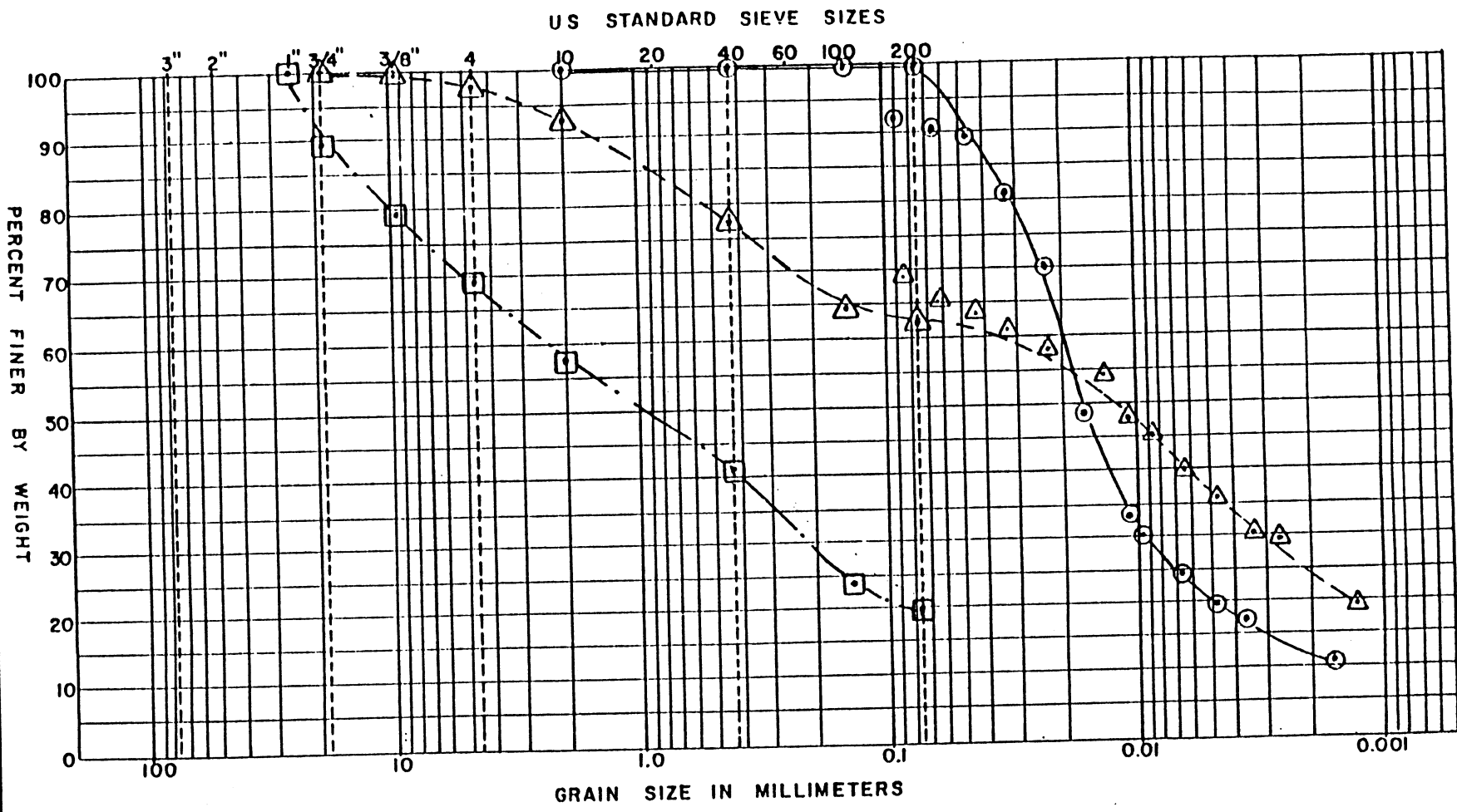
Date 5/30/79
Job No. 786085

Golder Associates 3.5-17-63

Drawn AST
Checked JFC
Approved JFC

GRAIN SIZE DISTRIBUTION

FIGURE



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

BORING NO.	ELEV. OR DEPTH	W _n	W _L	W _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-E17 SA-31 —○—	68.43m-68.89m (224.5'-226')	-	24	23	1	Red-brown, SILT, some clay, trace fine sand (ML)
SA-32 —△—	71.32m-71.63m (234'-235')	-	-	-	-	Red-brown, fine to coarse clayey SAND and SILT, trace fine gravel (ML)
SA-33 —□—	74.83m-75.13m (245.5'-246.5')	-	-	-	-	Brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay (SM)

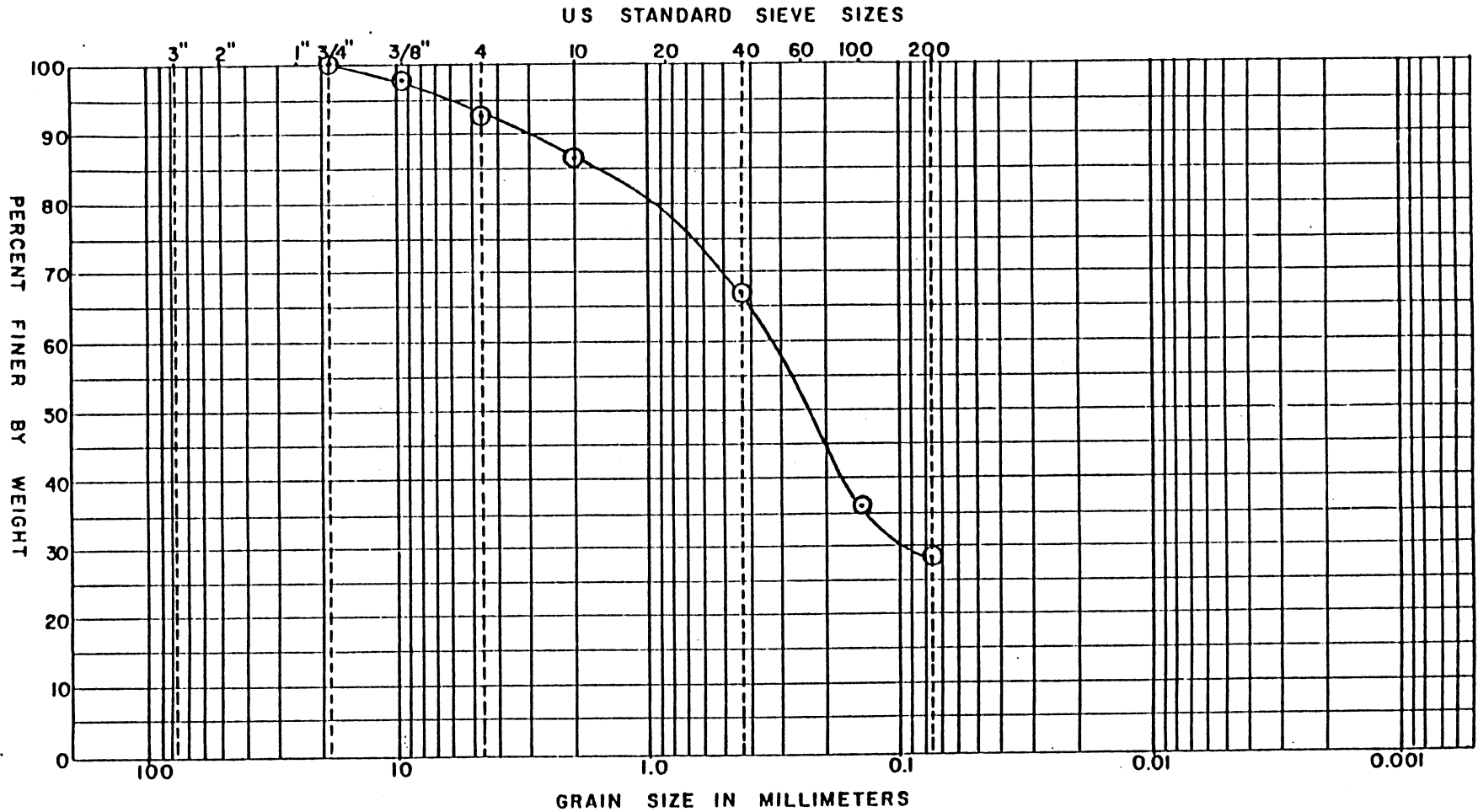
Date 5/30/79
Job No. 736085

Golder Associates 3.5-17-64

Drawn AST
Checked JFC
Approved JFC

GRAIN SIZE DISTRIBUTION

FIGURE



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

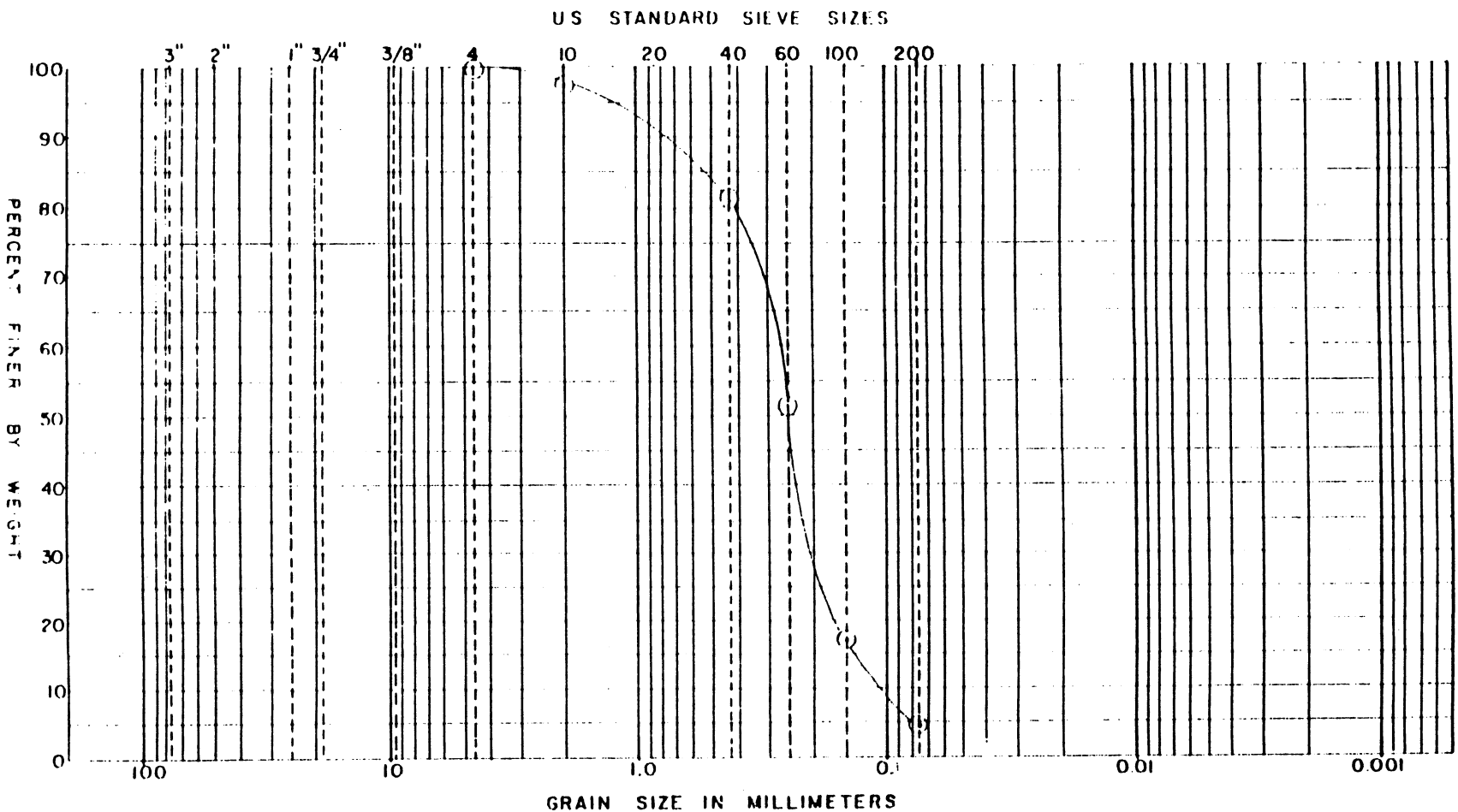
BORING NO.	ELEV. OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-E19 SA-3 —○—	2.29m-2.59m (7.5'-8.5')	-	-	-	-	Brown, fine to coarse SAND, some silt, some clay, trace fine gravel (SM)

Date 6/14/79
Job No. 736085

Golder Associates 3.5-17-65

Drawn ast
Checked JFC
Approved JFC

GRAIN SIZE DISTRIBUTION



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

BORING NO	ELEV OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
GA-12A	36.58m-37.03m (120.0'-121.5')	-	-	-	-	Light red-brown fine to medium SAND, trace silt (SP)

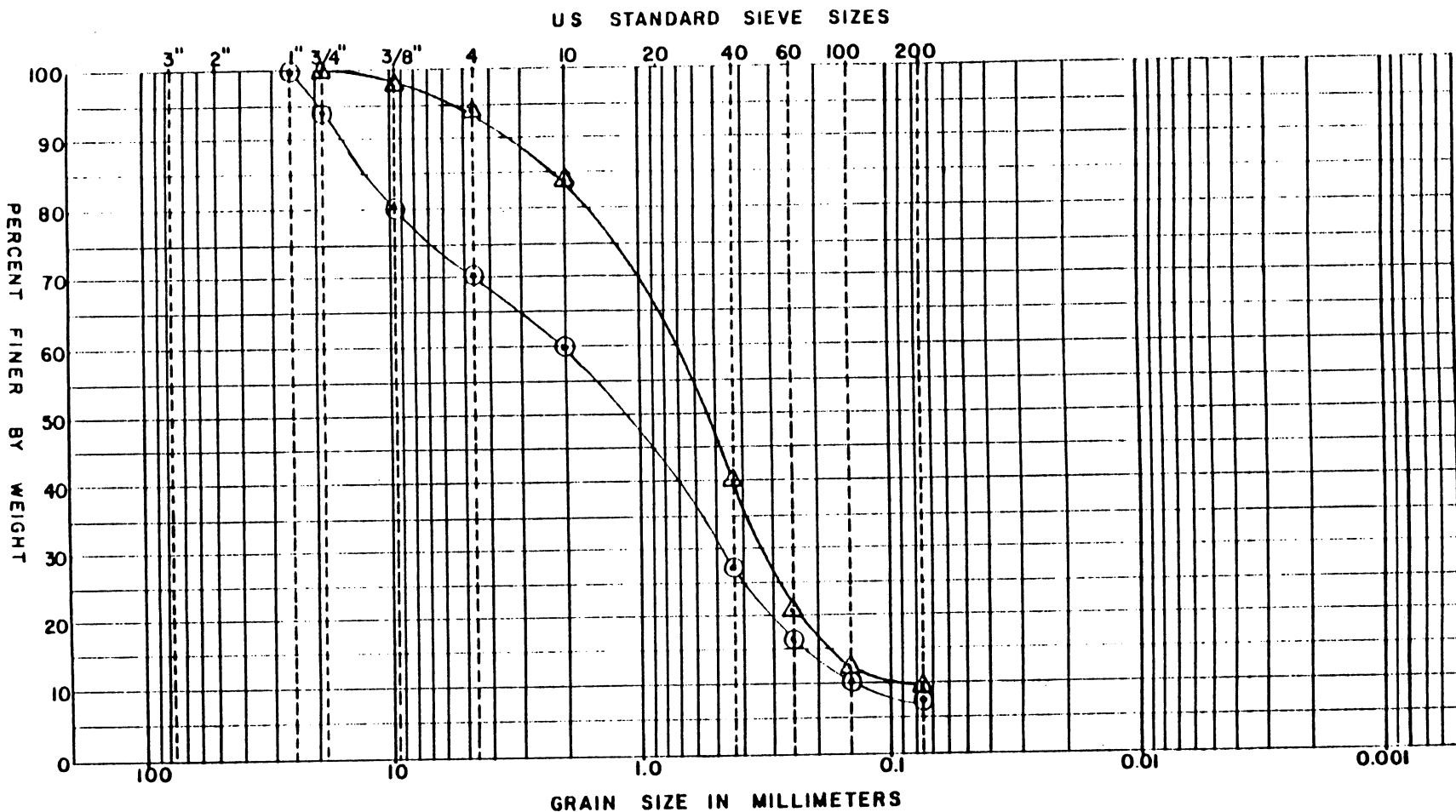
FIGURE T2-60

Date 6-16-81
Job No 766005

Golder Associates

3.5-17-66

Drawn BP
Checked TLH
Reviewed [Signature]



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-E22 SA-6 —○—	30.5'-31.7' (9.30m-9.66m)	10.6	-	-	-	Brown, fine to coarse SAND, some fine to coarse gravel, trace silt (SP-SM)
SA-10 —△—	70.0'-71.5' (21.34m-21.79m)	13.4	-	-	-	Brown, fine to coarse SAND, trace fine gravel, trace silt (SP-SM)

Date 1/17/82
Job No 812-1296

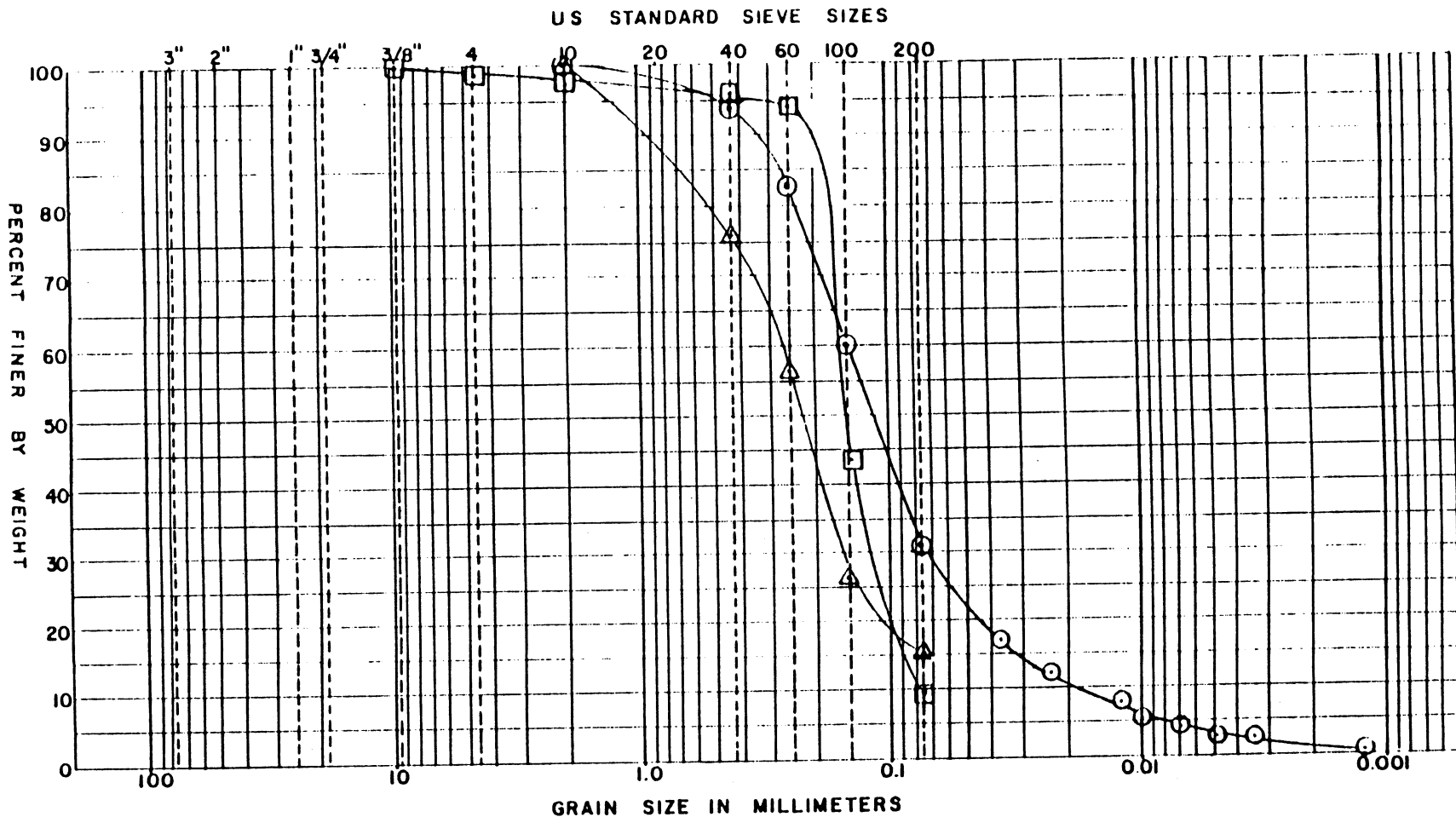
Golder Associates

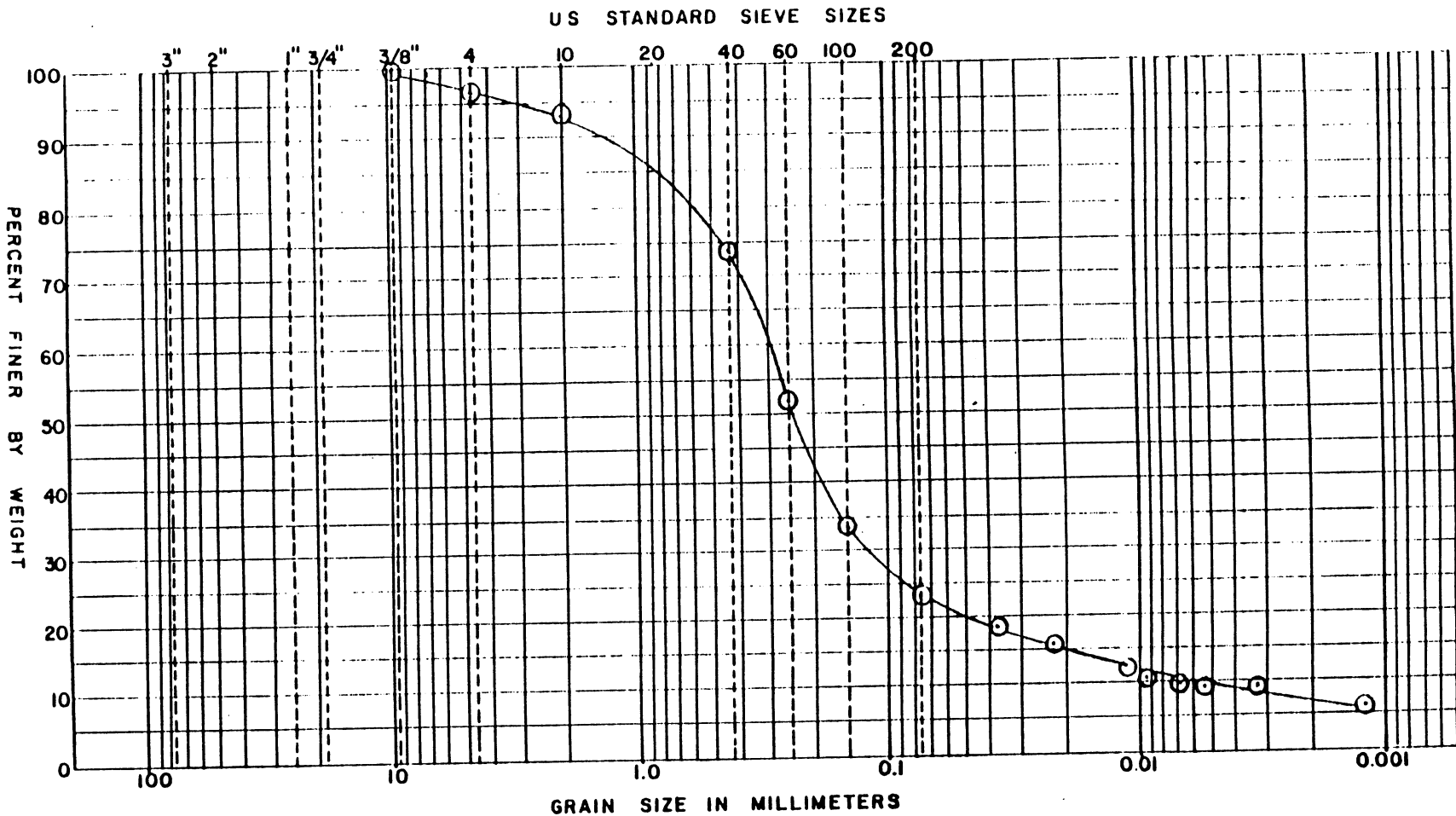
3.5-17-67

Drawn CAB
Checked MTF
Reviewed WKE

GRAIN SIZE DISTRIBUTION

FIGURE A-19





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

BORING NO.	ELEV. OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-E22A SA-4	35.0'-36.5' (10.67m-11.13m)	9.7	-	-	-	Brown, fine to coarse SAND, some silt, trace clay, trace fine gravel (SM)

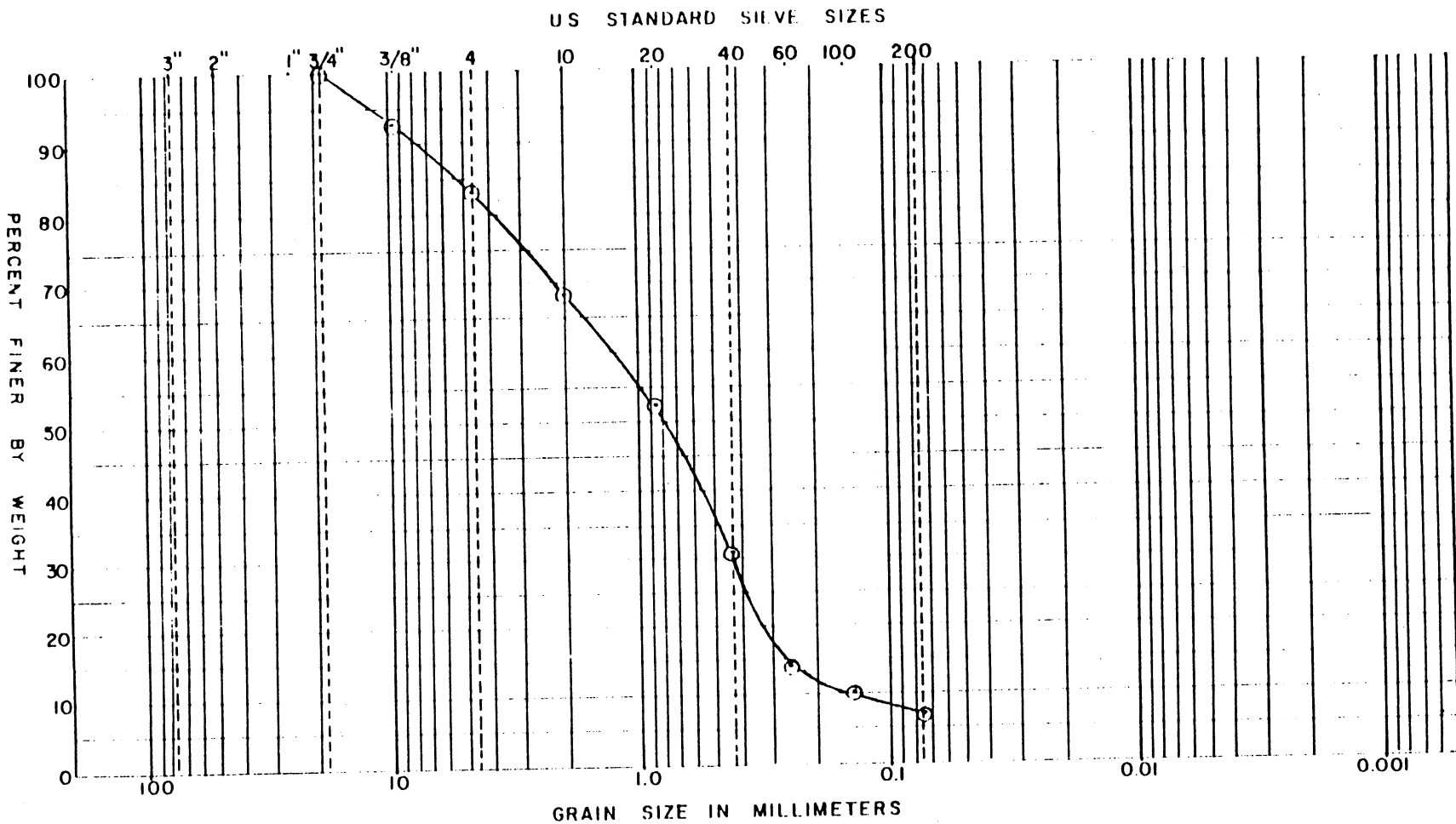
Date 1/12/82
Job No. 314-1296

Golder Associates

3.5-17-69

Drawn CAB
Checked MTF
Reviewed *[Signature]*

GRAIN SIZE DISTRIBUTION



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

BORING NO	ELEV OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-F24 SA 15	22.86m-23.32m (75.0-76.5')	-	-	-	-	Light brown, fine to coarse SAND, some fine gravel, trace silt (SW-SM)

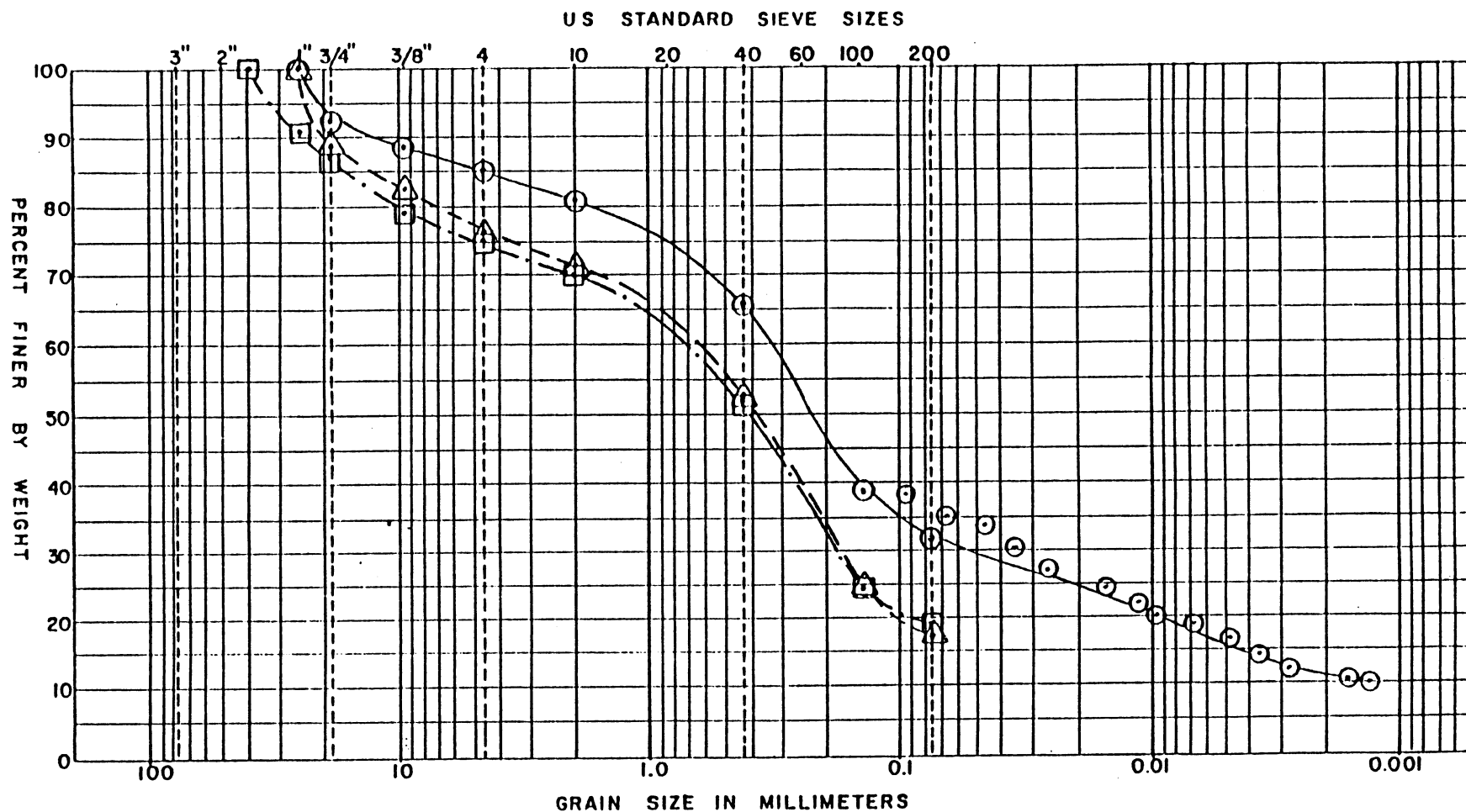
FIGURE V2-61

Date 1/22/50
Job No 766085

Golder Associates

3.5-17-70

Drawn JIS
Checked [Signature]
Approved [Signature]



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-G11 SA-1 —○—	0.0m-0.46m (0.0'-1.5')	-	-	-	-	Red-brown, silty, fine to coarse SAND, some fine to coarse gravel, some clay (SM)
SA-4 --△--	3.05m-3.51m (10'-11.5')	-	-	-	-	Red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay (SM)
SA-6 ---□---	6.10m-6.55m (20'-21.5')	-	-	-	-	Red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay (SM)

Date 5/30/79

Job No. 786085

Golder Associates 3.5-17-71

Drawn AST

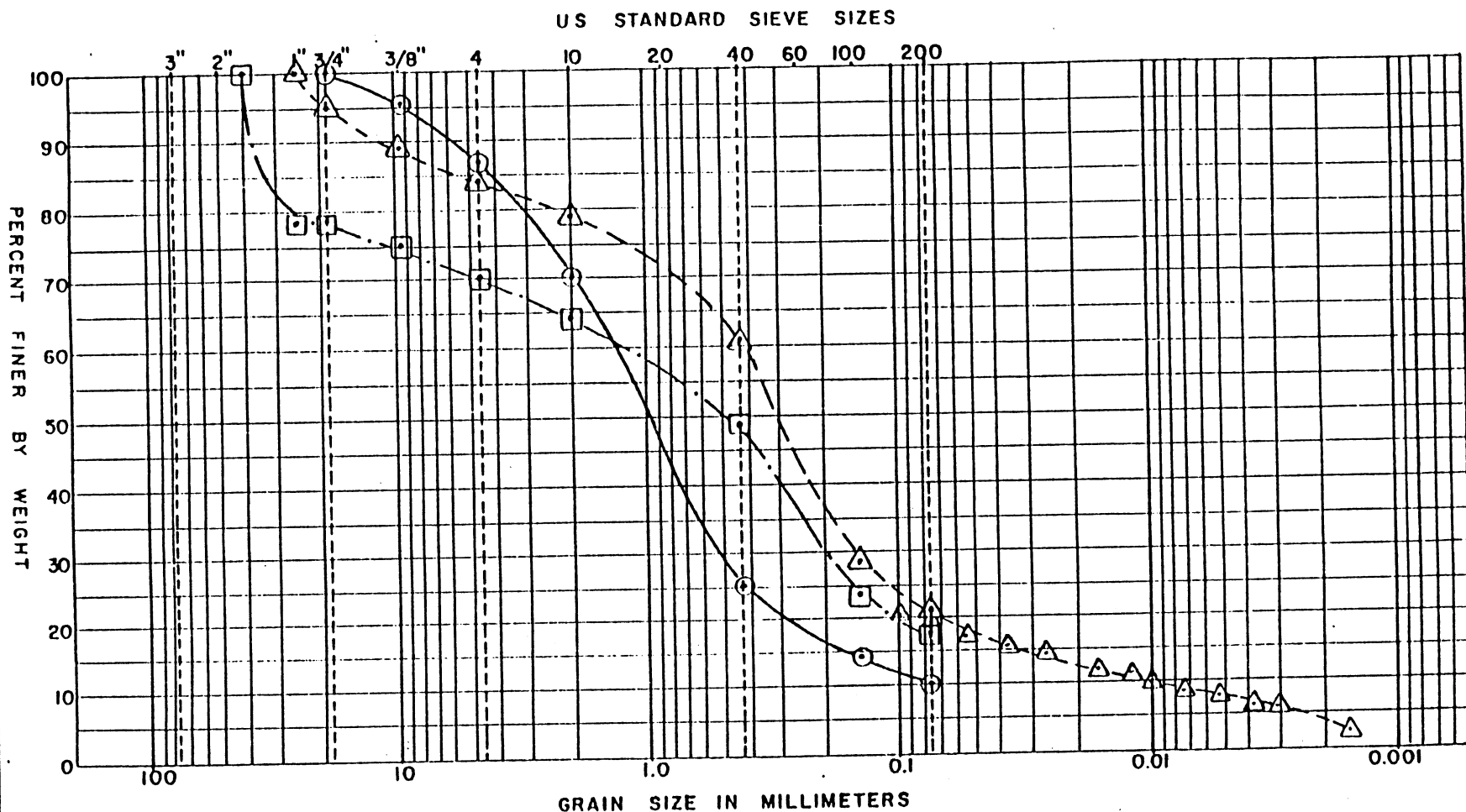
Checked JFC

Approved JFC

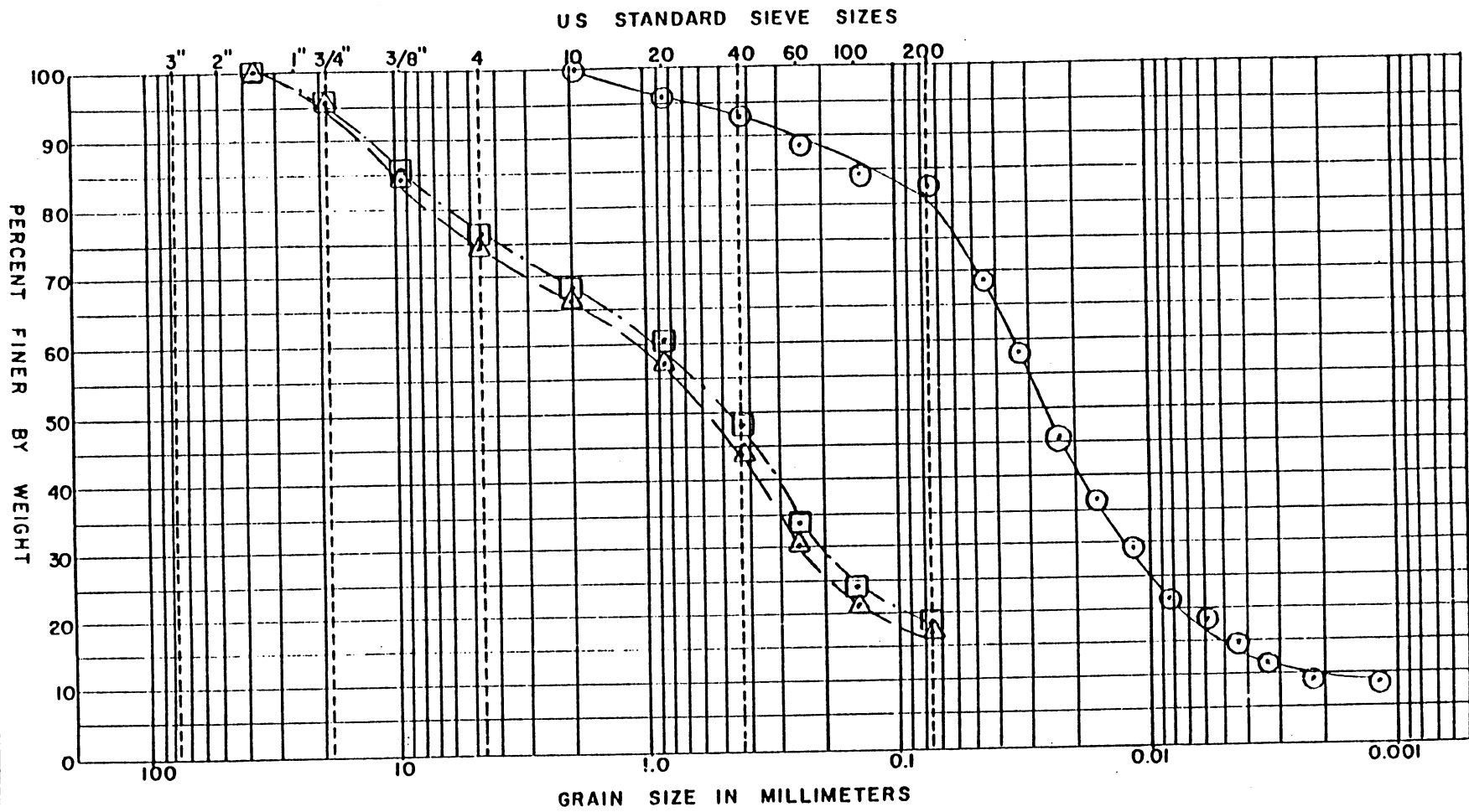
GRAIN SIZE DISTRIBUTION

FIGURE

10



GRAIN SIZE DISTRIBUTION



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

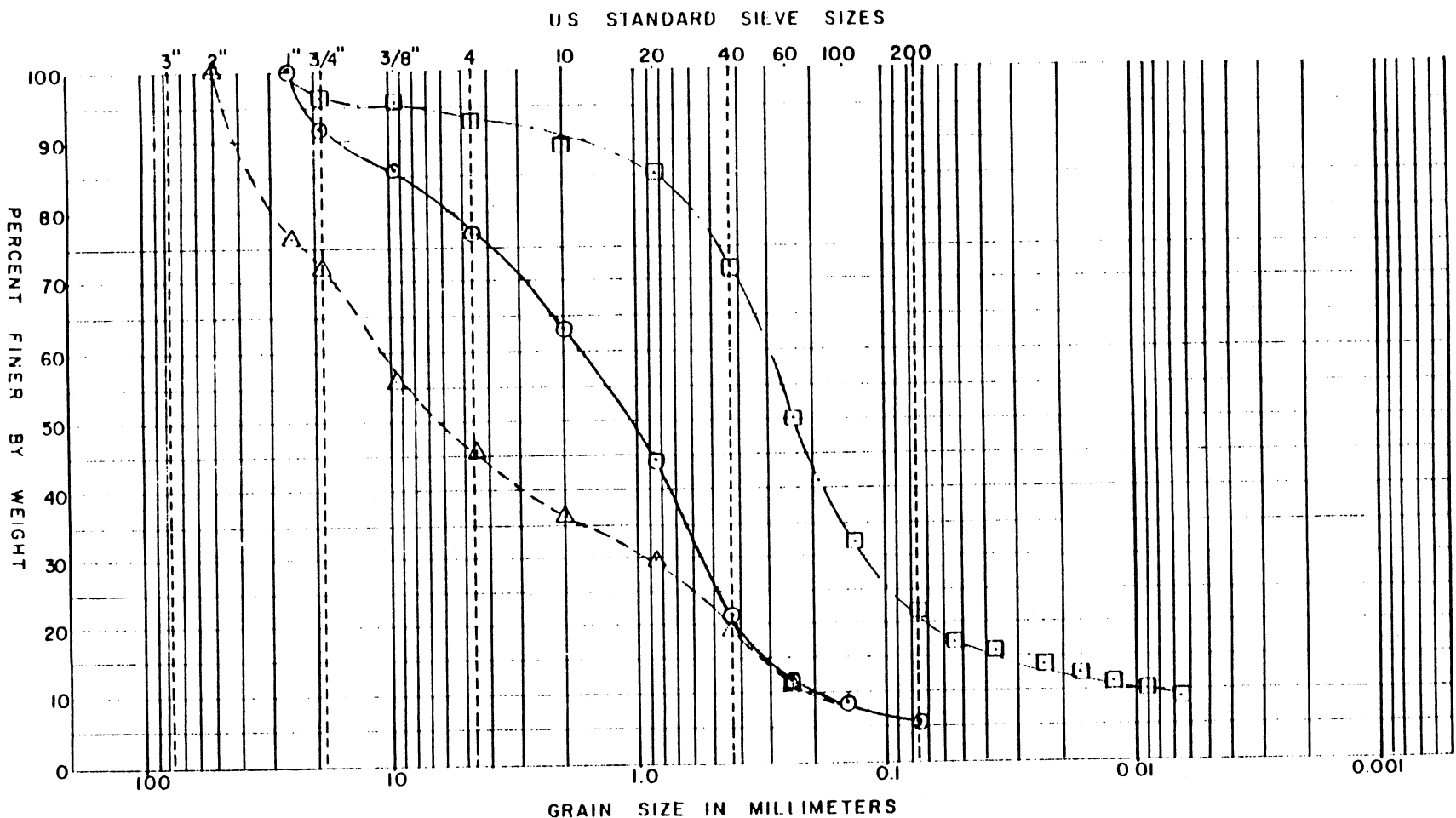
BORING NO.	ELEV. OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-G12 SA-1 —○—	0.0m-0.46m (0.0'-1.5')	-	NP	NP	NP	Red-brown, SILT, some fine to medium sand, trace clay (ML)
SA-4 --△--	4.42m-4.88m (14.5'-16.0')	-	-	-	-	Red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay (SM)
SA-5 ---□---	5.94m-6.40m (19.5'-21.0')	-	-	-	-	Red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay (SM)

FIGURE

Date 6/7/79
Job No. 730035

Golder Associates 3.5-17-73

Drawn JIS
Checked JEC
Approved JFC



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

BORING NO	ELEV OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-G14A SA 1 — ○ —	30.48m-30.63m (100.0'-100.5')	-	-	-	-	Brown, fine to coarse gravelly, fine to coarse SAND, trace silt (SP-SM)
SA 2 — △ —	33.53m-33.83m (110.0'-111.0')	-	-	-	-	Brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt (GP-GM)
SA 3 — □ —	36.53m-37.03m (120.0'-121.5')	-	-	-	-	Red-brown, fine to coarse SAND, some silt, trace fine to coarse gravel, trace clay (SM)

Date 12/22/79
Job No 786285

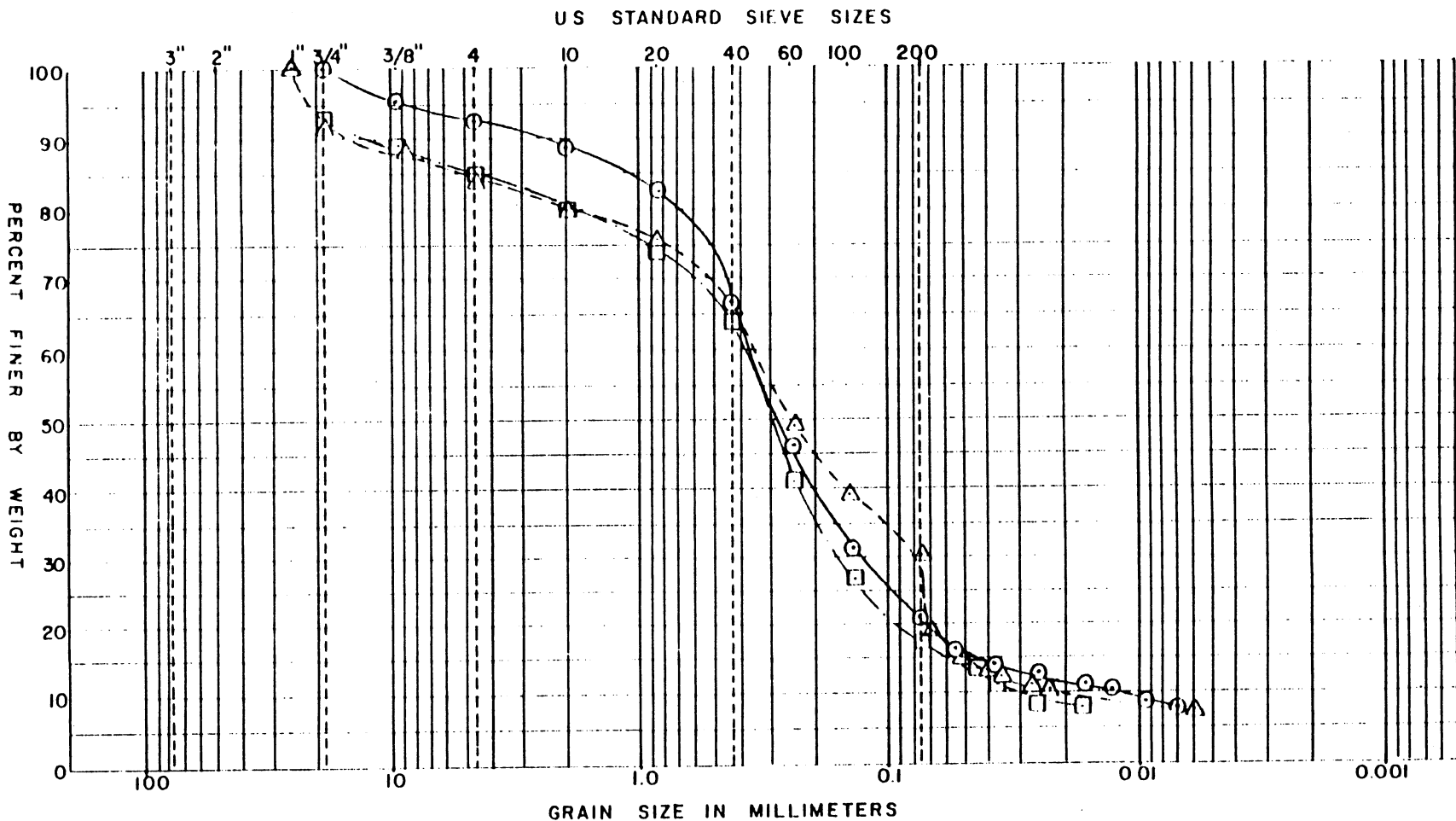
Golder Associates

3.5-17-74

Drawn JLS
Checked [Signature]
Approved [Signature]

GRAIN SIZE DISTRIBUTION

FIGURE V2-66



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

BORING NO	ELEV OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-G14A SA 4	39.62m-39.93m (130.0'-131.0')	-	-	-	-	Red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay (SM)
SA 5	42.67m-42.98m (140.0'-141.0')	-	-	-	-	Red-brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay (SM)
SA 7	42.77m-42.94m (160.0'-160.9')	-	-	-	-	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay (SM)

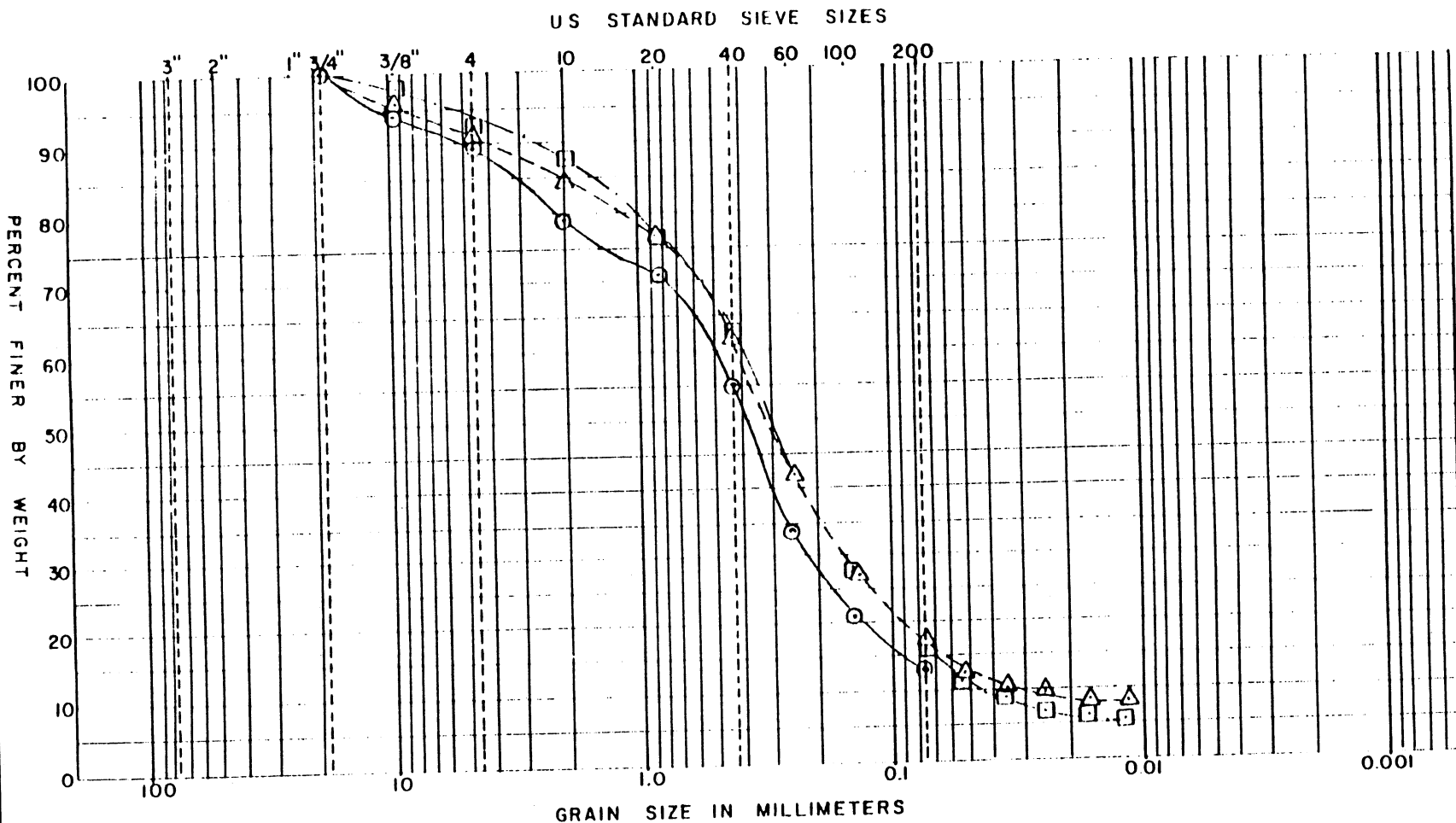
Date 12/26/79
Job No 786085

Golder Associates 3.5-17-75

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GRAIN SIZE DISTRIBUTION

FIGURE V2-67



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

BORING NO	ELEV OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-G14A SA 8 —○—	51.82m-52.12m (170.0'-171.0')	-	-	-	-	Red-brown, fine to coarse SAND, some fine gravel, some silt (SM)
SA 9 —△—	54.86m-55.17m (180.0'-181.0')	-	-	-	-	Red-brown, fine to coarse SAND, some silt, trace some gravel, trace clay (SM)
SA 10 —□—	57.91m-58.22m (190.0'-191.0')	-	-	-	-	Dark brown, fine to coarse SAND, some silt, trace fine gravel (SM)

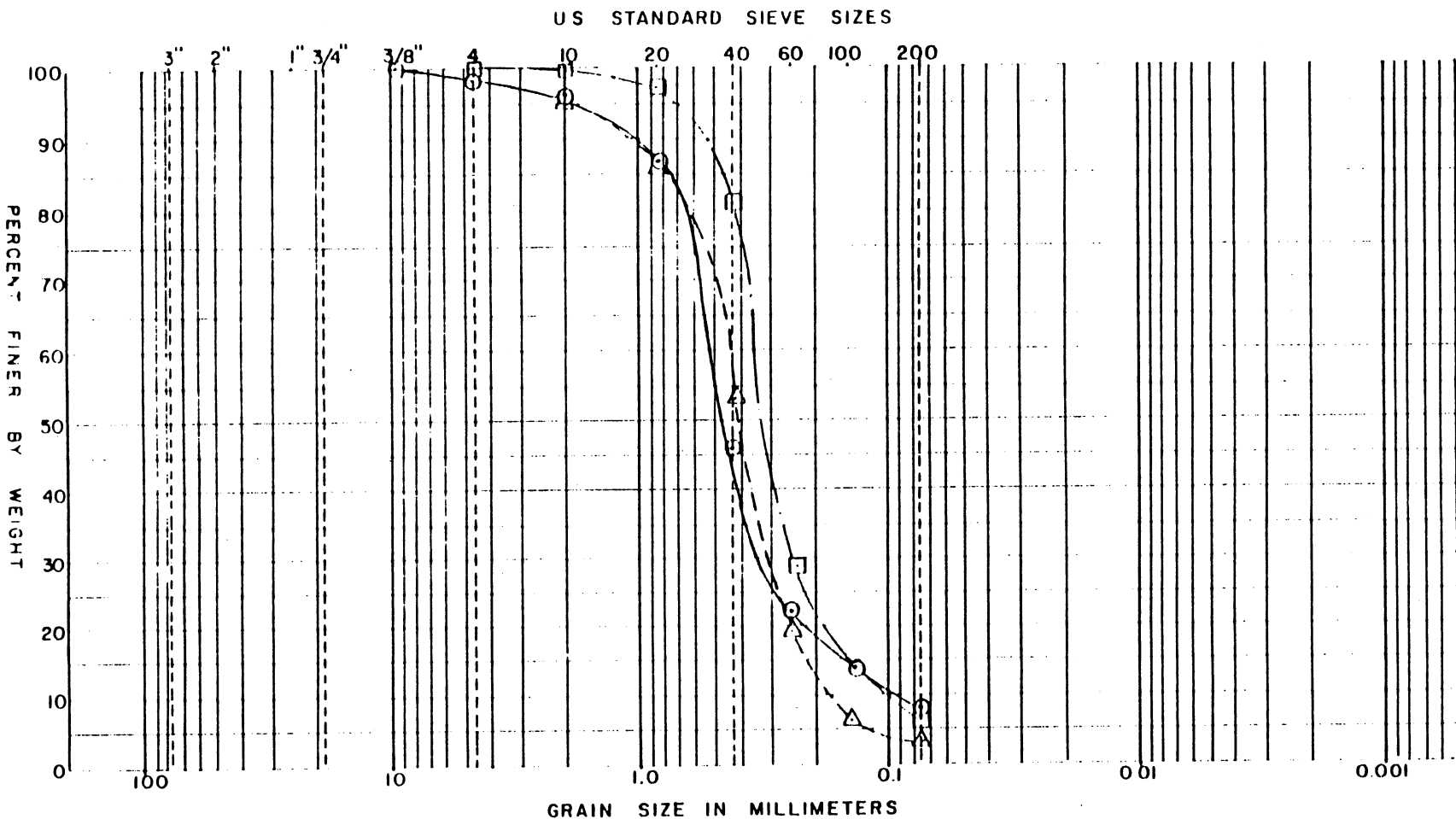
Date 12/26/79
Job No 786085

Golder Associates
3.5-17-76

Drawn jls
Checked HMC
Approved KMC

GRAIN SIZE DISTRIBUTION

FIGURE 12-68



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

BORING NO	ELEV OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-G14A SA 13 —○—	62.48m-62.94m (205.0'-206.5')	-	-	-	-	Brown, fine to medium SAND, trace silt (SP-SM)
SA 14 —△—	64.01m-64.47m (210.0'-211.5')	-	-	-	-	Brown, fine to coarse SAND, trace silt (SP)
SA 15 —□—	65.53m-65.99m (215.0'-216.5')	-	-	-	-	Brown, fine to medium SAND, trace silt (SP-SM)

Date 12/26/79
Job No 736085

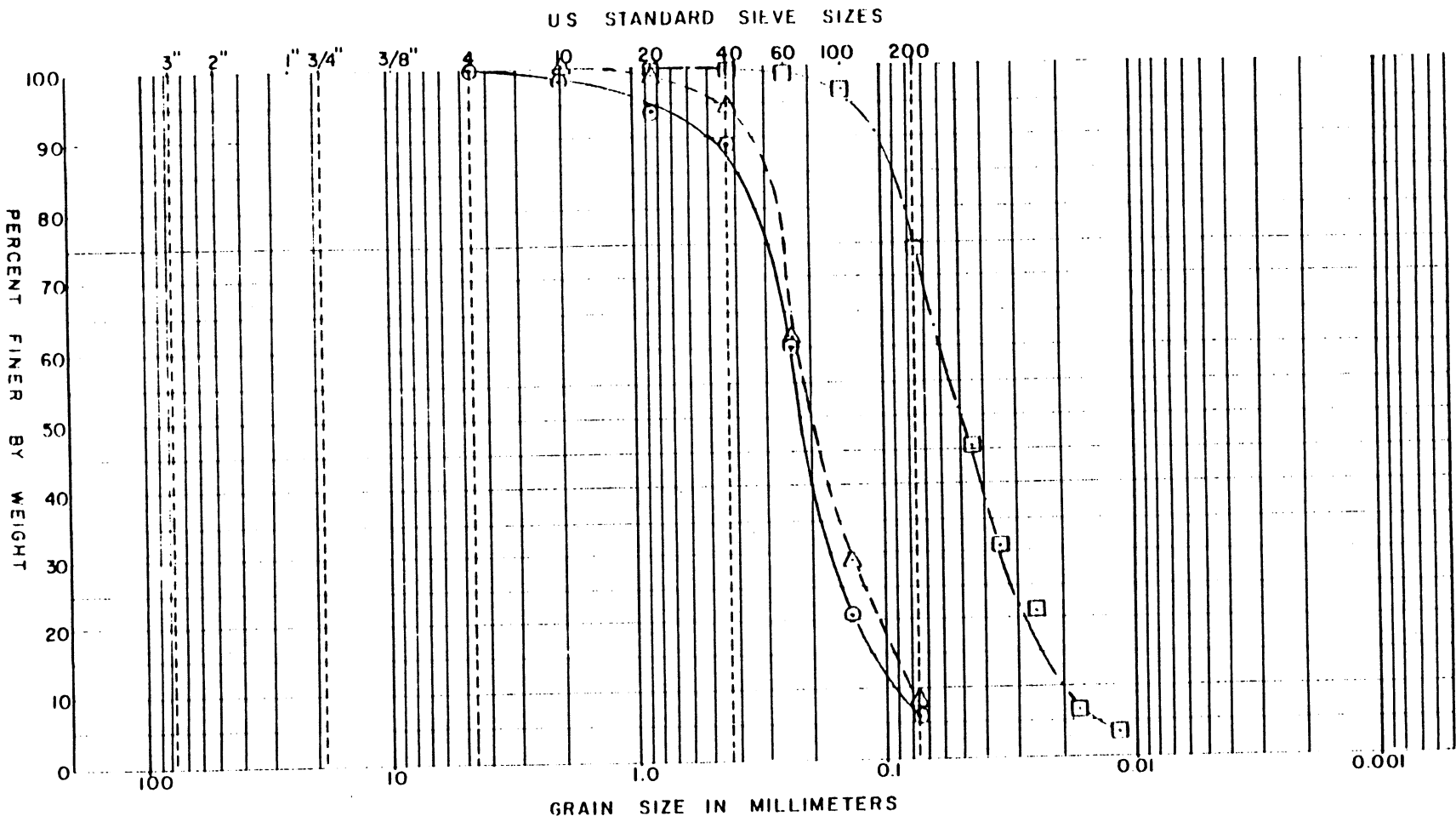
Golder Associates

3.5-17-77

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Approved *[Signature]*

GRAIN SIZE DISTRIBUTION

FIGURE V2-69



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

BORING NO	FLEV OR DEPTH	w _n	w _t	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-G14A SA 16 —○—	68.58m-68.98m (225.0'-226.3')	-	-	-	-	Brown, fine to medium SAND, trace silt (SP-SM)
SA 17 —△—	71.63m-71.93m (235.0'-236.0')	-	-	-	-	Brown, fine to medium SAND, trace silt (SP-SM)
SA 18 —□—	73.15m-73.46m (240.0'-241.0')	-	-	-	-	Brown, fine sandy SILT (MI)

Date 12/26/79
Job No 786085

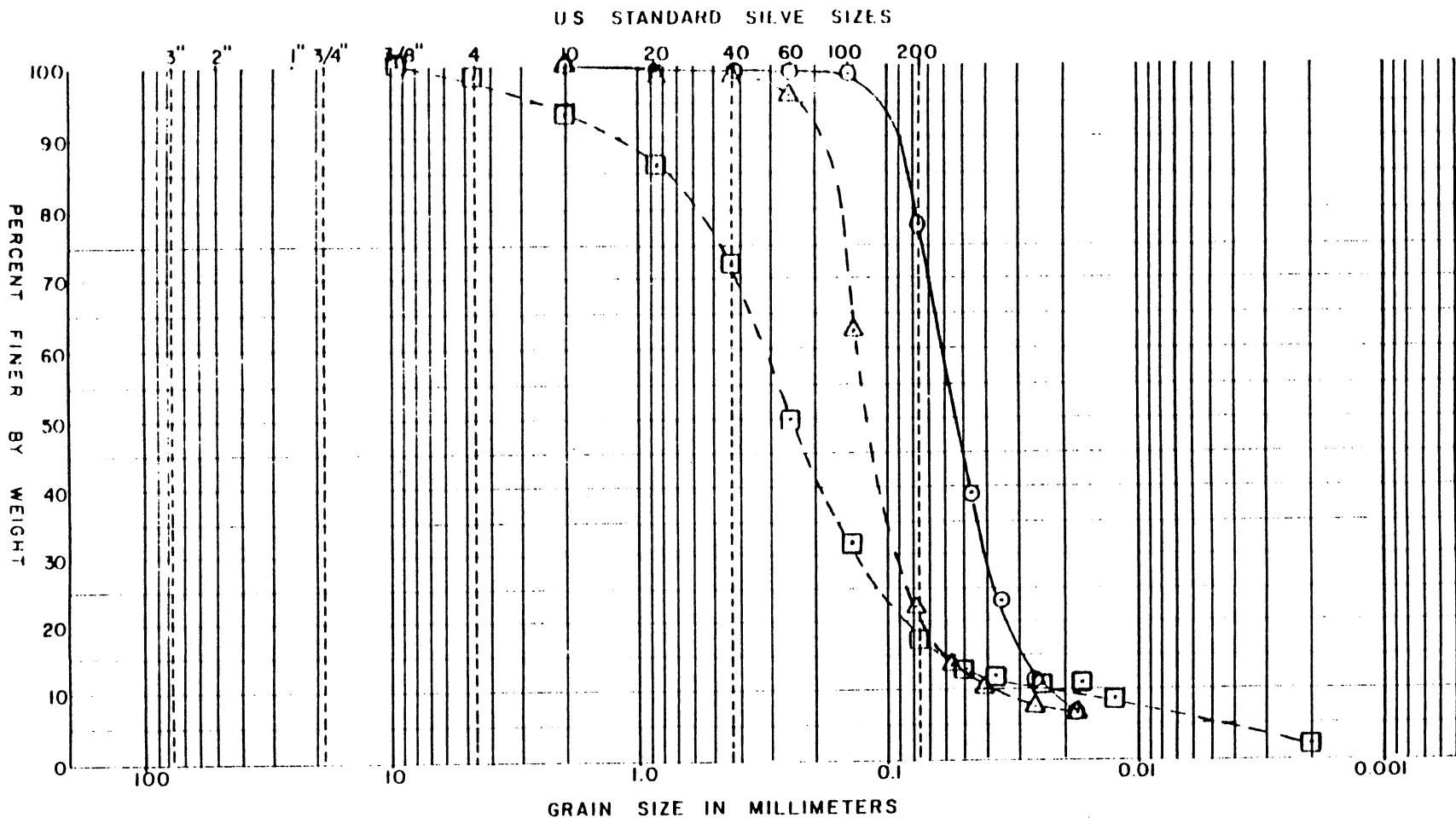
Golder Associates

3.5-17-78

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Approved *[Signature]*

GRAIN SIZE DISTRIBUTION

FIGURE V2-70



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

BORING NO	ELEV OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-G14B	74.68m-75.13m (245.0'-246.5')	-	-	-	-	Brown, silty, fine SAND, trace clay (SM)
SA 1 -A-	76.20m-76.66m (250.0'-251.5')	-	-	-	-	Brown, fine sandy SILT (ML)
SA 2 -O-	77.72m-78.18m (255.0'-256.5')	-	-	-	-	Red-brown, fine to coarse SAND, some silt (SM)

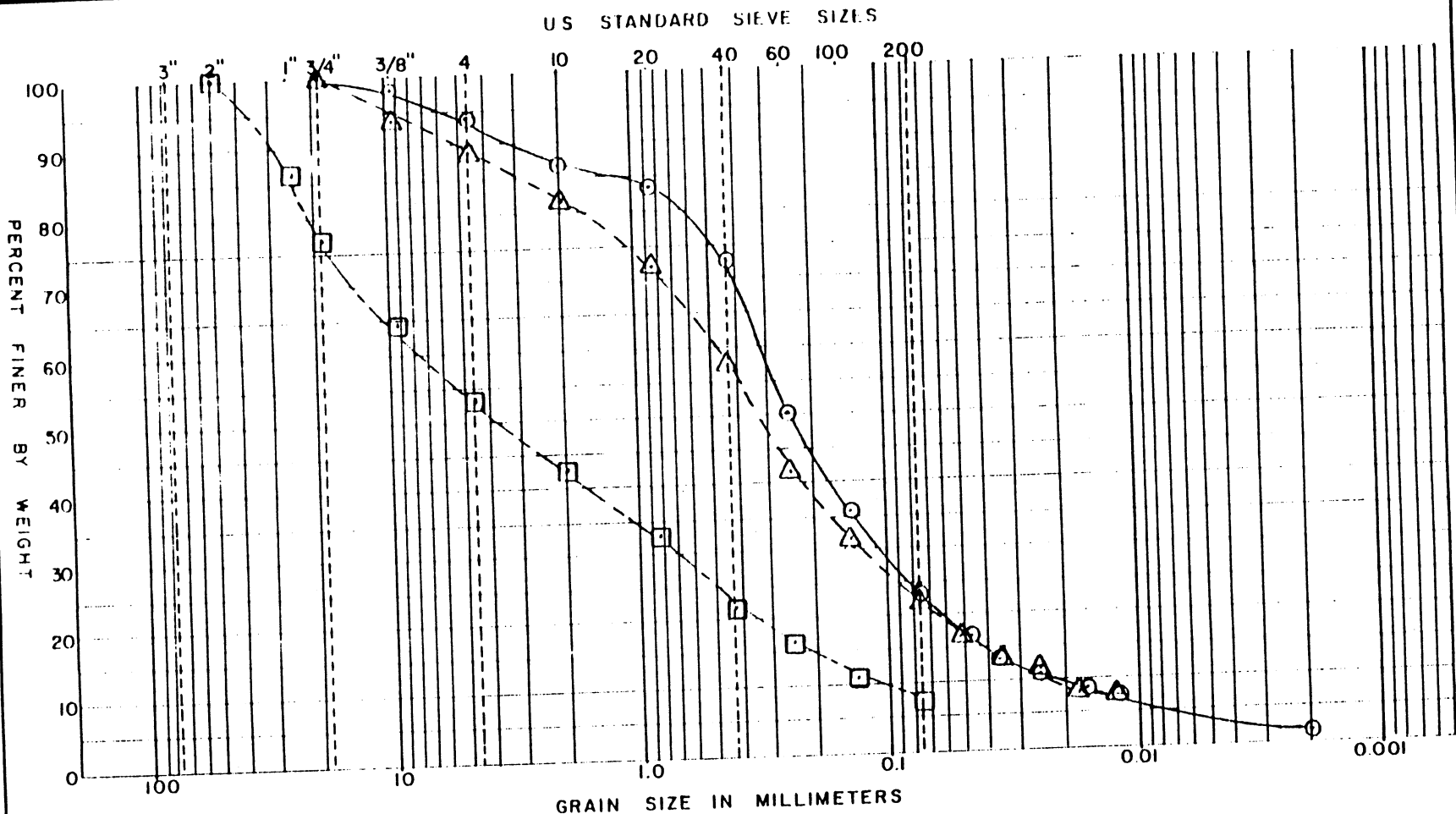
Date 12/26/79
Job No 75-385

Golder Associates 3.5-17-79

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Approved *[Signature]*

GRAIN SIZE DISTRIBUTION

FIGURE V2-71



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

BORING NO	ELEV OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-G14B SA 4 —○—	80.77m-81.08m (265.0'-266.0')	-	-	-	-	Brown, silty, fine to coarse SAND, trace fine gravel (SM)
SA 5 —△—	83.82m-83.97m (275.0'-275.5')	-	-	-	-	Brown, fine to coarse SAND, some silt, some fine gravel, trace clay (SM)
SA 6 —□—	86.87m-87.23m (285.0'-286.2')	-	-	-	-	Brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt (SP-SM)

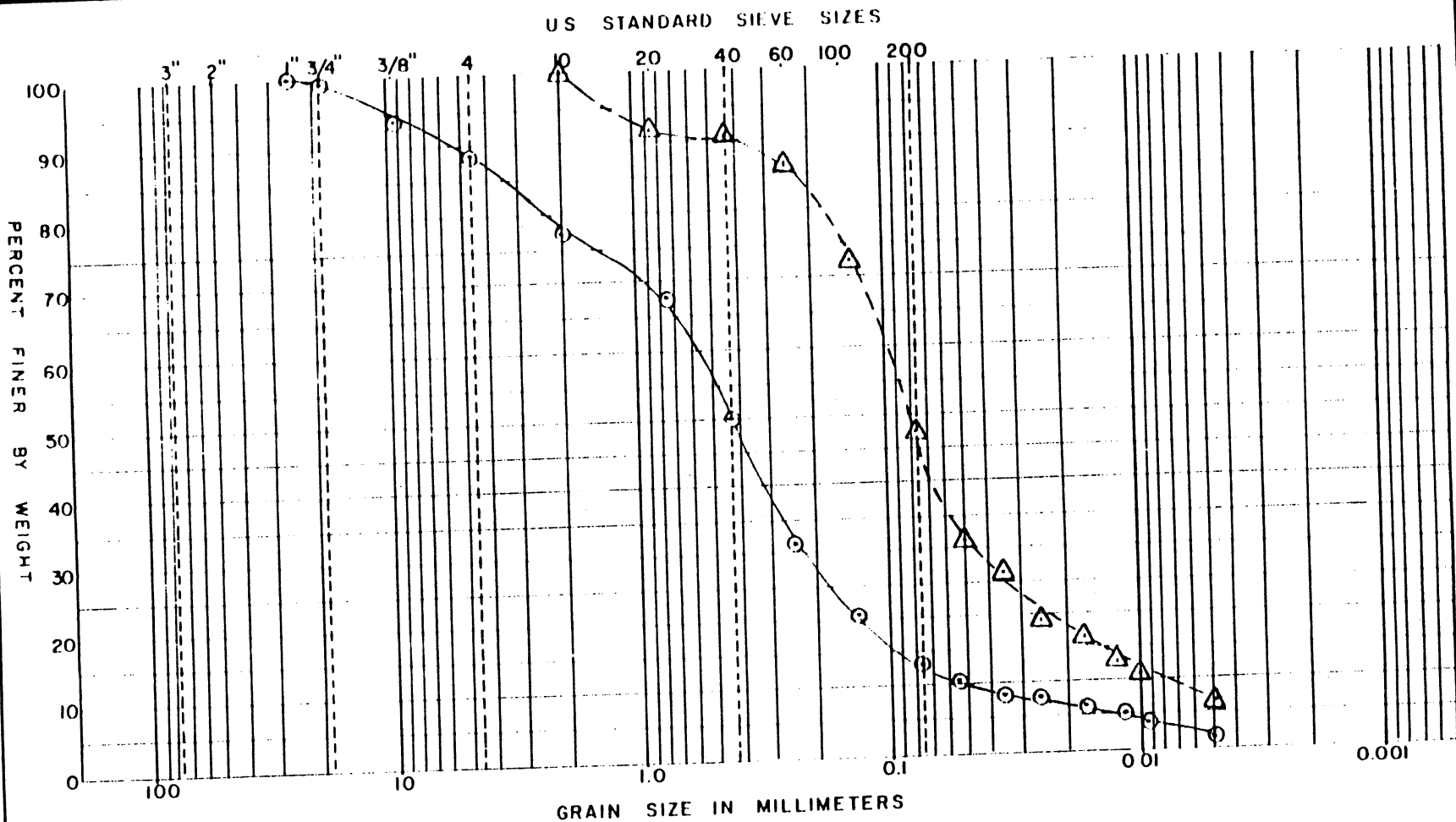
Date 12/26/79
Job No 736035

Golder Associates

3.5-17-80

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Approved [Signature]

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES
BORING NO	ELEV OR DEPTH		w_n	w_l	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-G14B SA 7 —○—	89.92m-90.04m (295.0'-295.4')		-	-	-	-	Brown, fine to coarse SAND, some fine gravel, some silt (SM)
SA 9 —△—	94.41m-94.58m (310.0'-310.3')		-	-	-	-	Brown, fine to coarse SAND and SILT, trace fine gravel (SM)

FIGURE 12-72

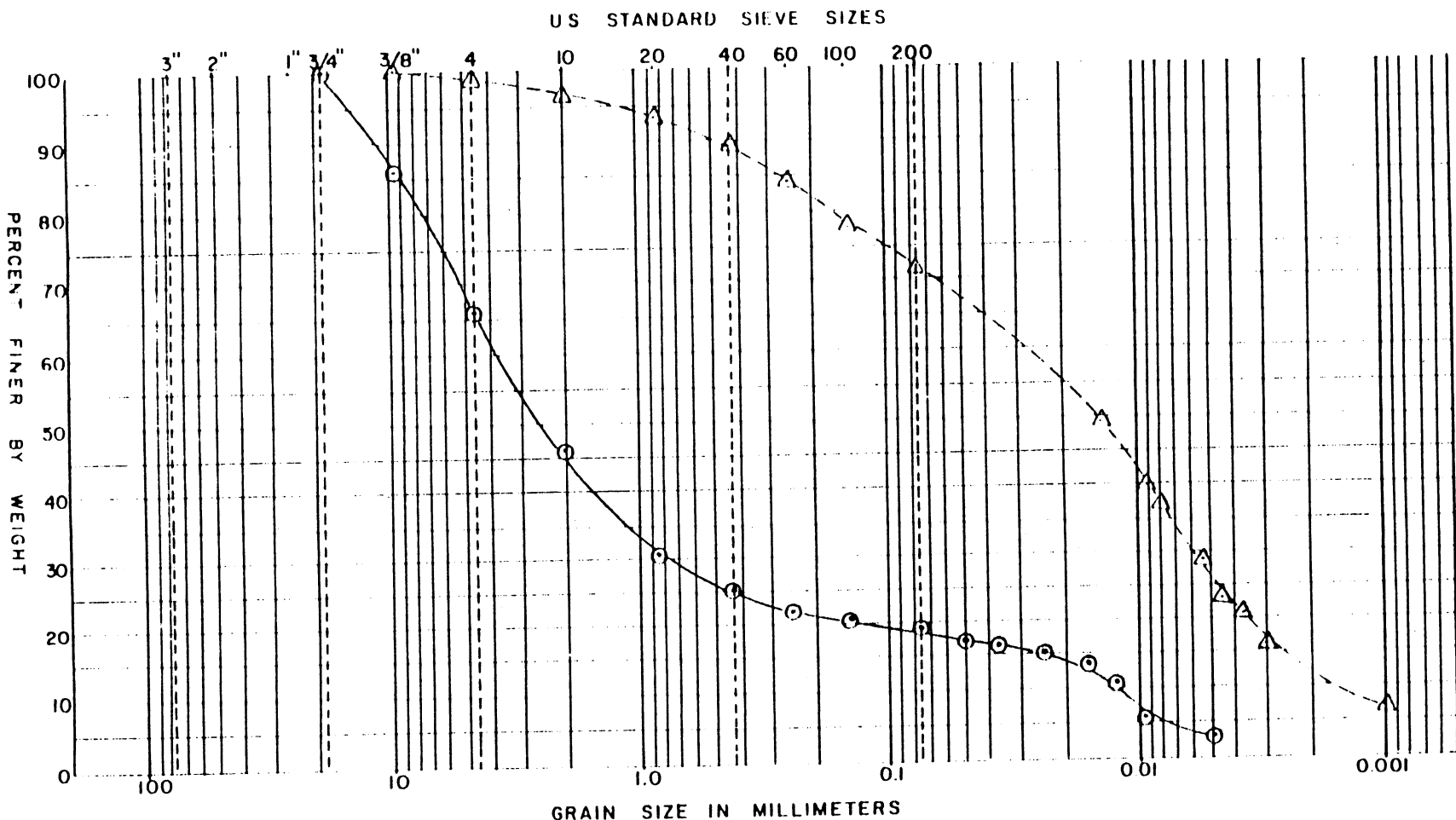
Date 12/26/79
Job No 736085

Golder Associates 3.5-17-81

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Approved [Signature]

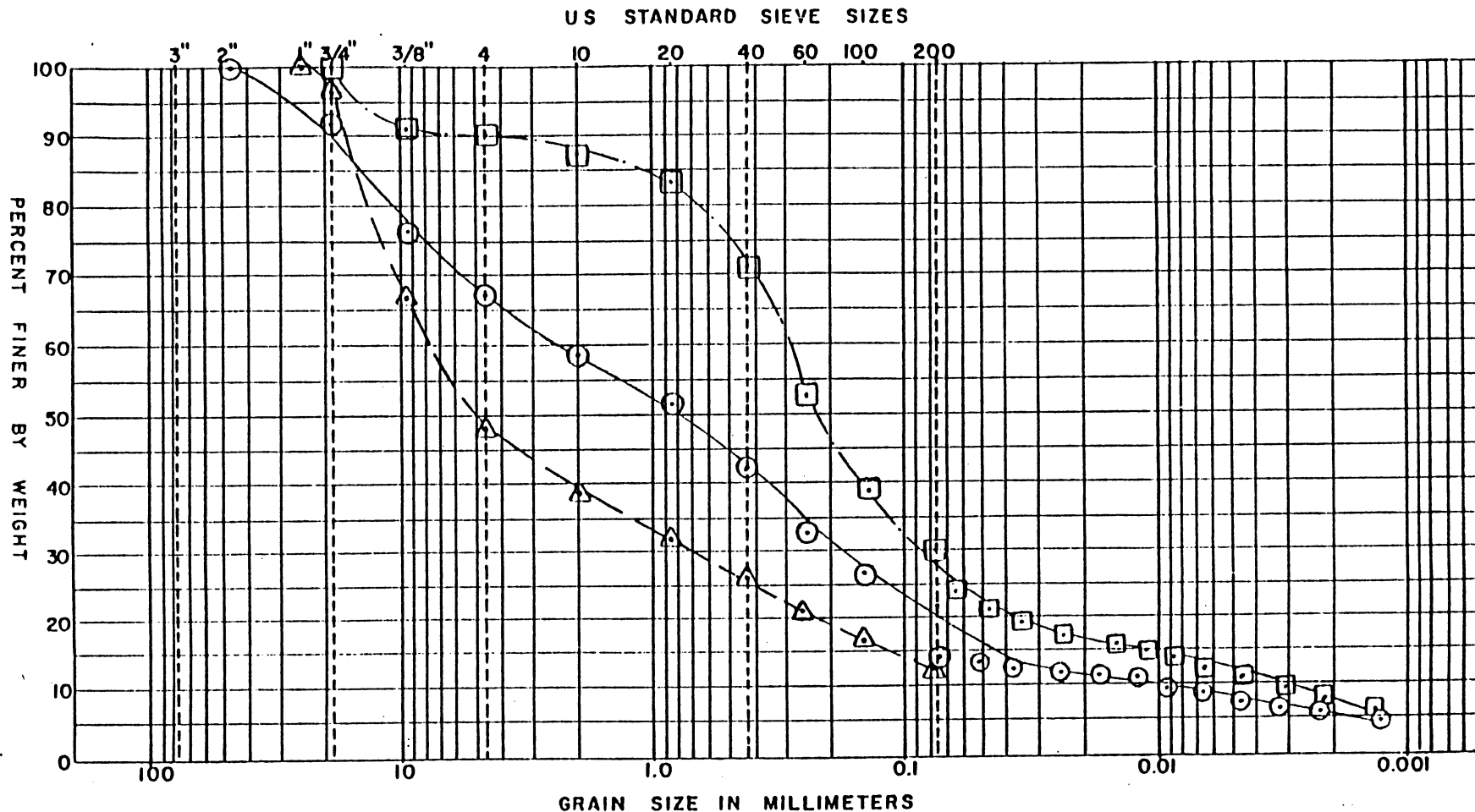
GRAIN SIZE DISTRIBUTION

FIGURE V2-73



GRAIN SIZE DISTRIBUTION

FIGURE



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

BORING NO.	ELEV. OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-G15 SA-1 —○—	13.11m-13.41m (43.0'-44.0')	-	-	-	-	Brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay (SM)
SA-3 —△—	16.46m-16.61m (54'-54.5')	-	-	-	-	Brown, fine to coarse GRAVEL and fine to coarse SAND, some silt (GM)
SA-5A&B —□—	19.96m-20.27m (65.5'-66.5')	-	-	-	-	Red-brown, silty, fine to coarse SAND, some fine gravel, trace clay (SM)

Date 6/7/79

Job No. 786035

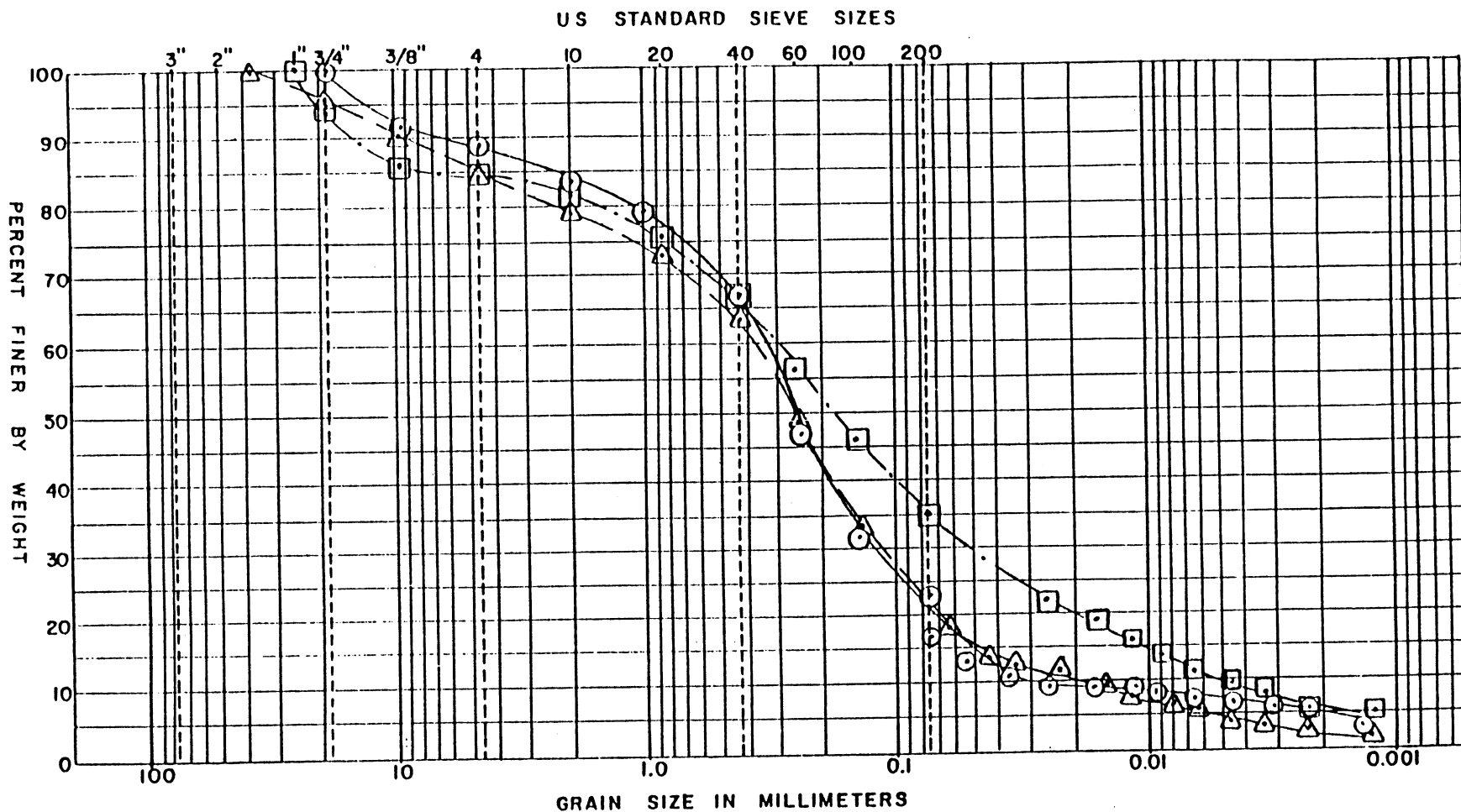
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GRAIN SIZE DISTRIBUTION



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

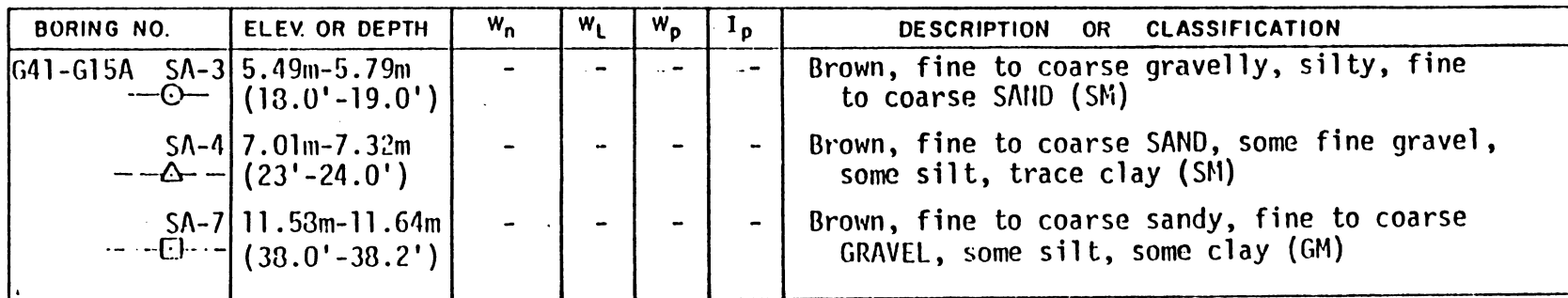
BORING NO.	ELEV. OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-G15 SA-3 —○—	24.69m-24.99m (81'-82')	-	-	-	-	Red-brown, fine to coarse SAND, some fine gravel, some silt, trace clay (SM)
SA-17 —△—	46.48m-46.79m (152.5'-153.5')	-	-	-	-	Red-brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay (SM)
SA-27 —□—	74.63m-74.77m (245'-245.3')	-	-	-	-	Red-brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay (SM)

FIGURE

Date 6/7/79
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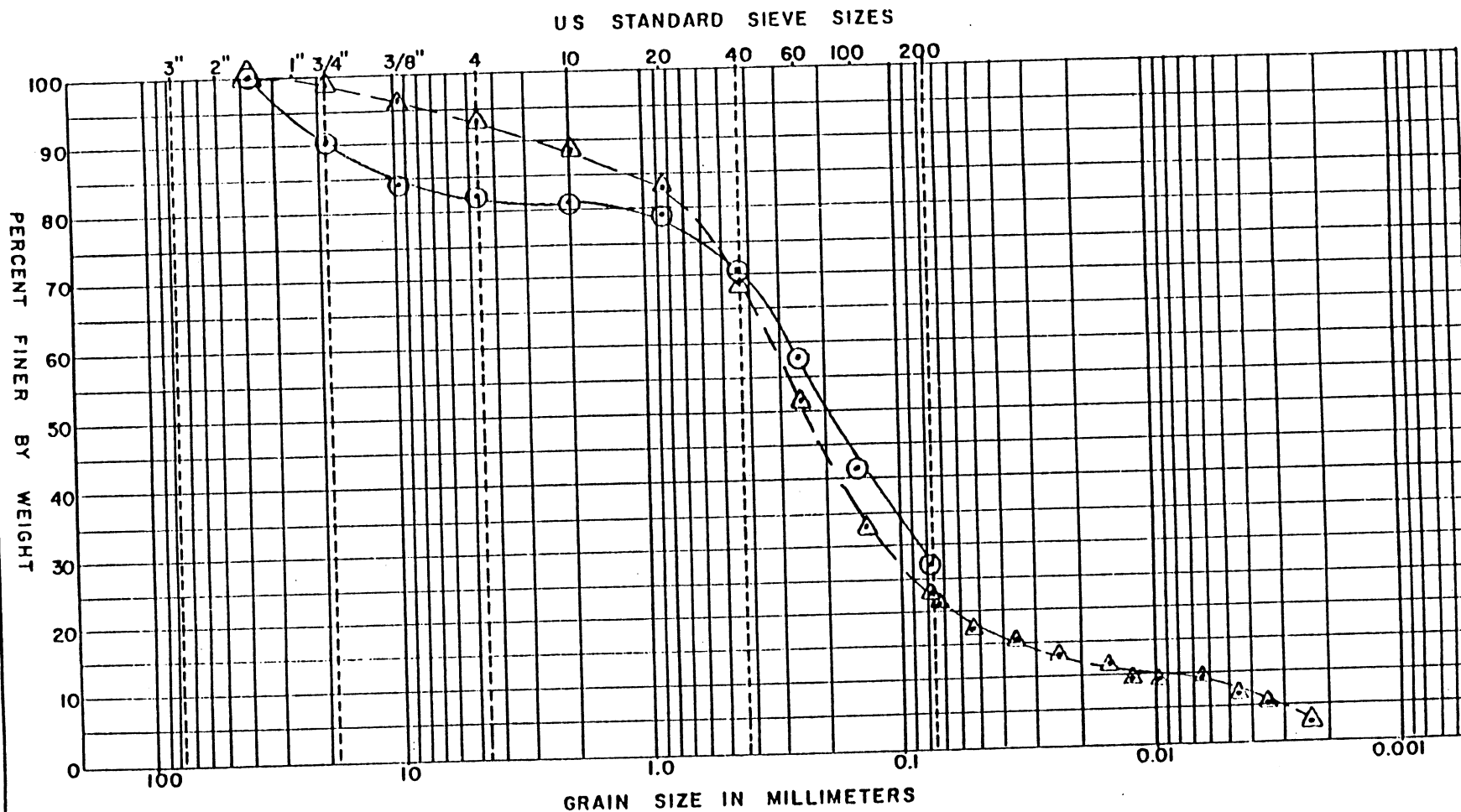


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JFC

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GRAIN SIZE DISTRIBUTION



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-G15A						
SA-9	31.55m-32.16m (103.5'-105.5')	-	-	-	-	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay (SM)
SA-10B	33.99m-34.44m (111.5'-113')	-	-	-	-	Red-brown, silty fine to coarse SAND, trace fine to coarse gravel, trace clay (SM)

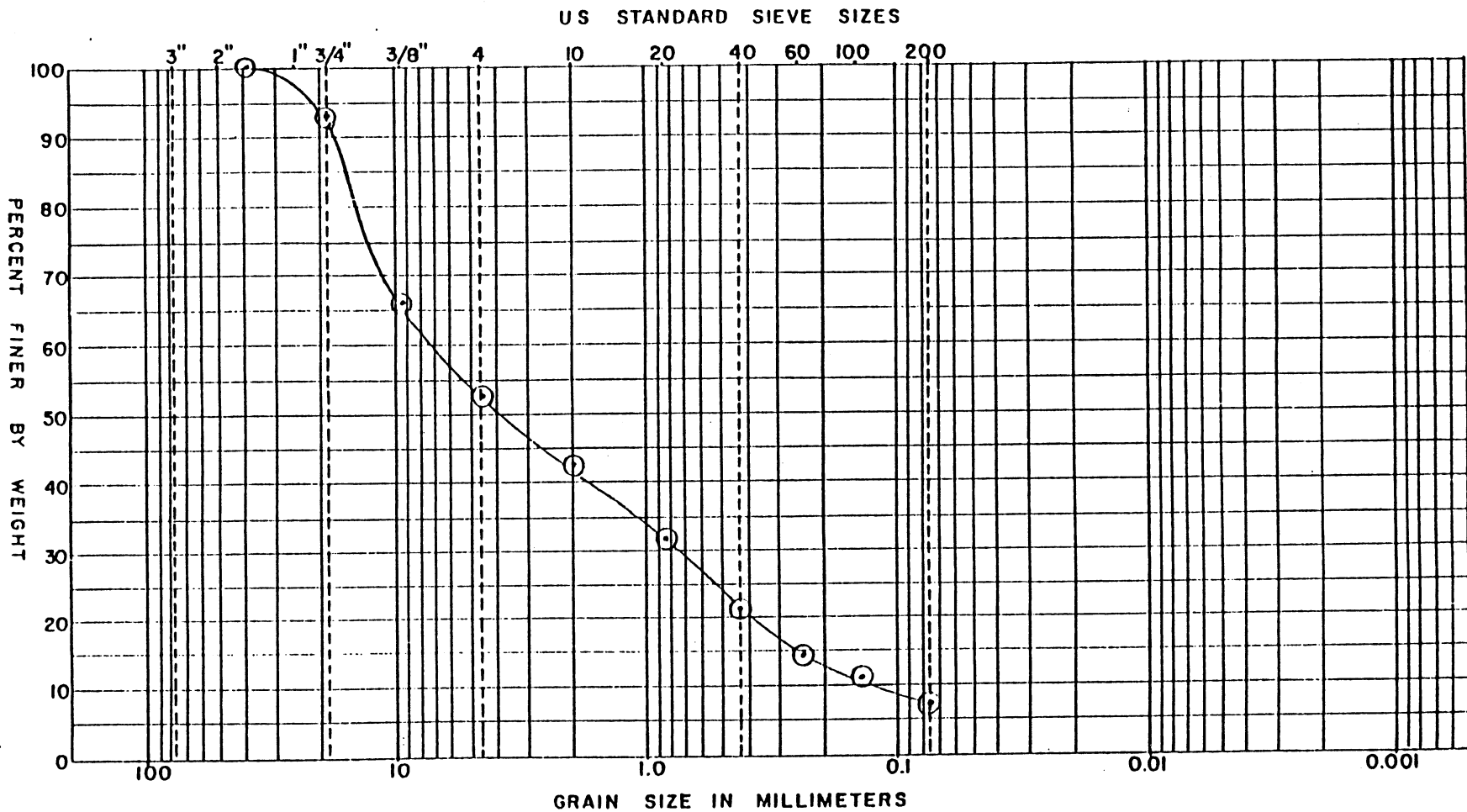
FIGURE

Date 6/7/79
Job No. 786085

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GRAIN SIZE DISTRIBUTION



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

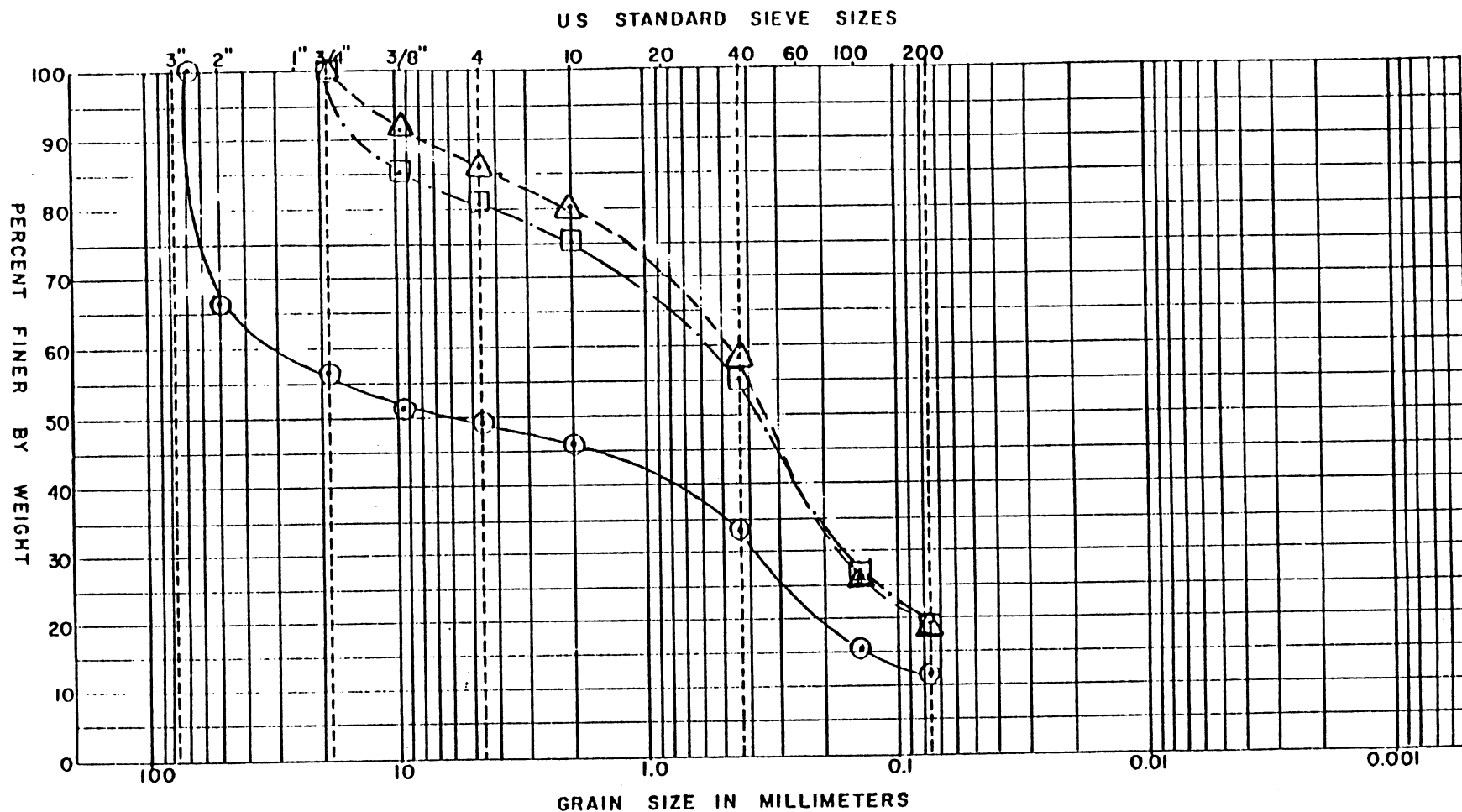
BORING NO.	ELEV. OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-G15B SA-2A —○—	50.90m-51.36m (167'-168.5')	-	-	-	-	Brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt (SP)

FIGURE

Date 6/7/79
Job No. 786035

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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-G19 SA-2 —○—	1.52m-1.98m (5'-6.5')	-	-	-	-	Brown, fine to coarse GRAVEL and fine to coarse SAND, some silt (GP-GM)
SA-4 —△—	3.05m-3.51m (10'-11.5')	-	-	-	-	Brown, fine to coarse SAND, some fine gravel, some silt, trace clay (SM)
SA-9 —□—	10.67m-11.13m (35'-36.5')	-	-	-	-	Brown, fine to coarse SAND, some fine gravel, some silt, trace clay (SM)

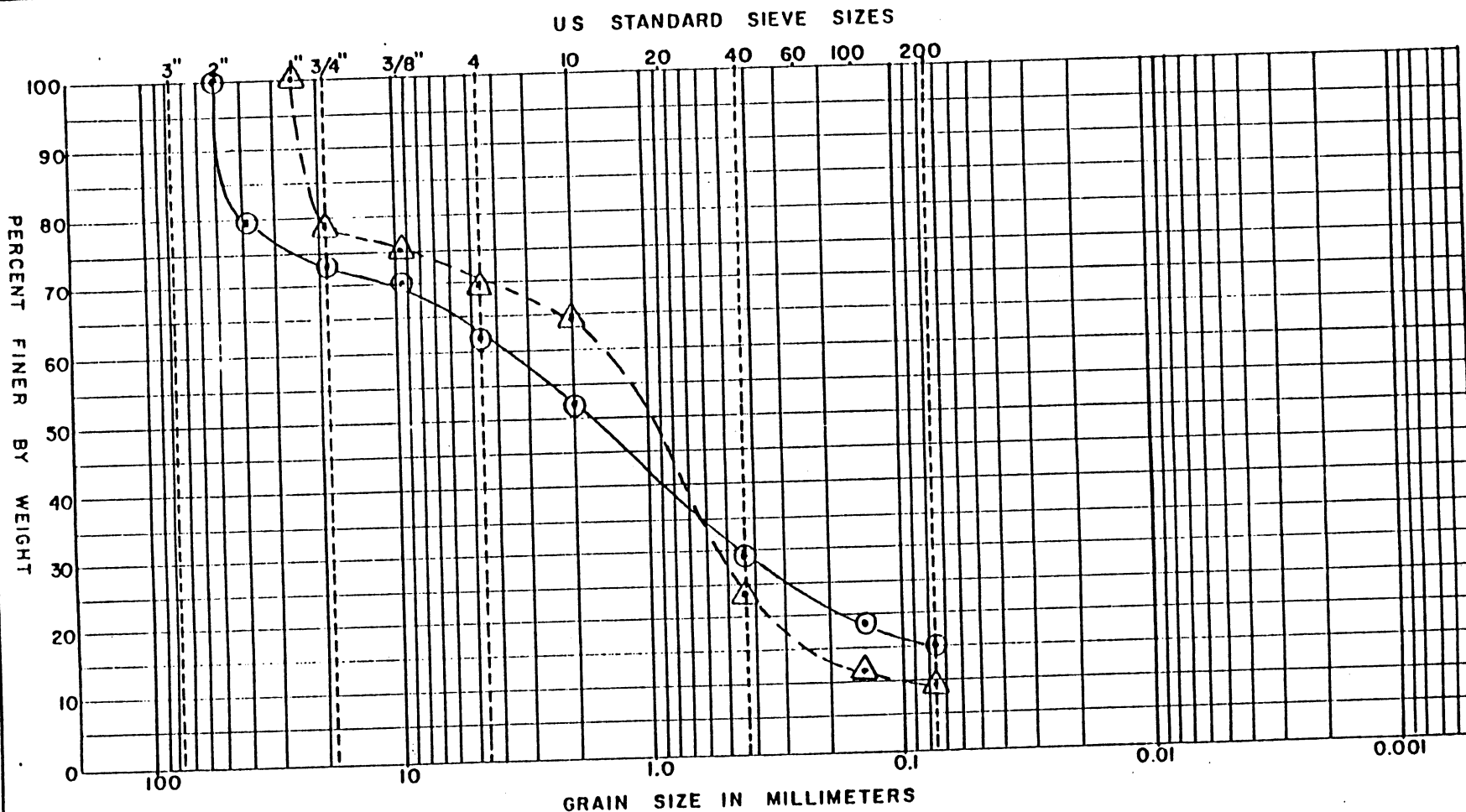
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GRAIN SIZE DISTRIBUTION

FIGURE 1



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

BORING NO.	ELEV. OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-G19 SA-12 —○—	15.24m-15.39m (50'-50.5')	-	-	-	-	Brown, fine to coarse GRAVEL and fine to coarse SAND, some silt (SM)
SA-16 --△--	21.34m-21.55m (70'-70.7')	-	-	-	-	Brown, fine to coarse gravelly, fine to coarse SAND, trace silt (SP-SM)

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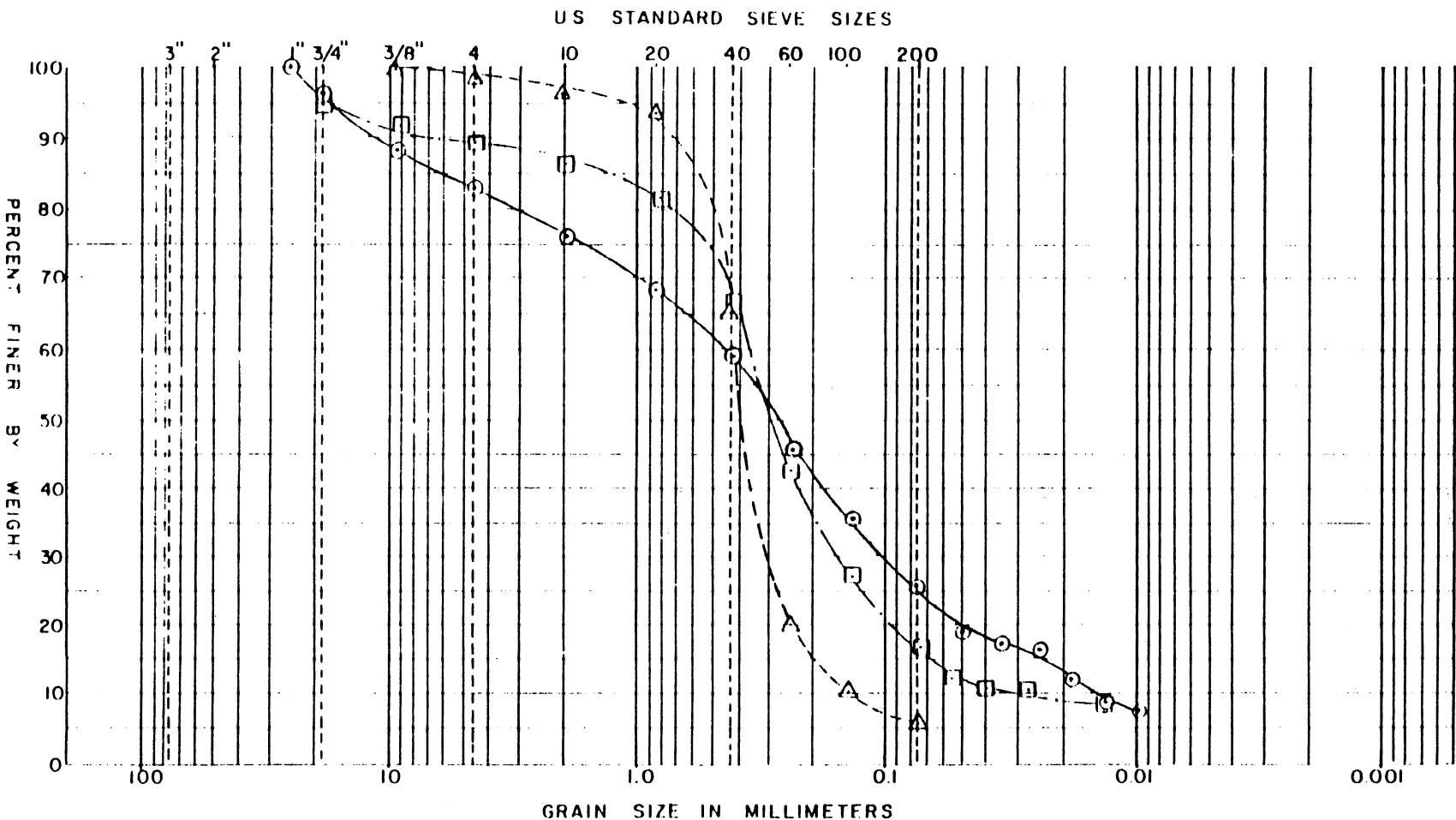
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GRAIN SIZE DISTRIBUTION

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FIGURE V2-51



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

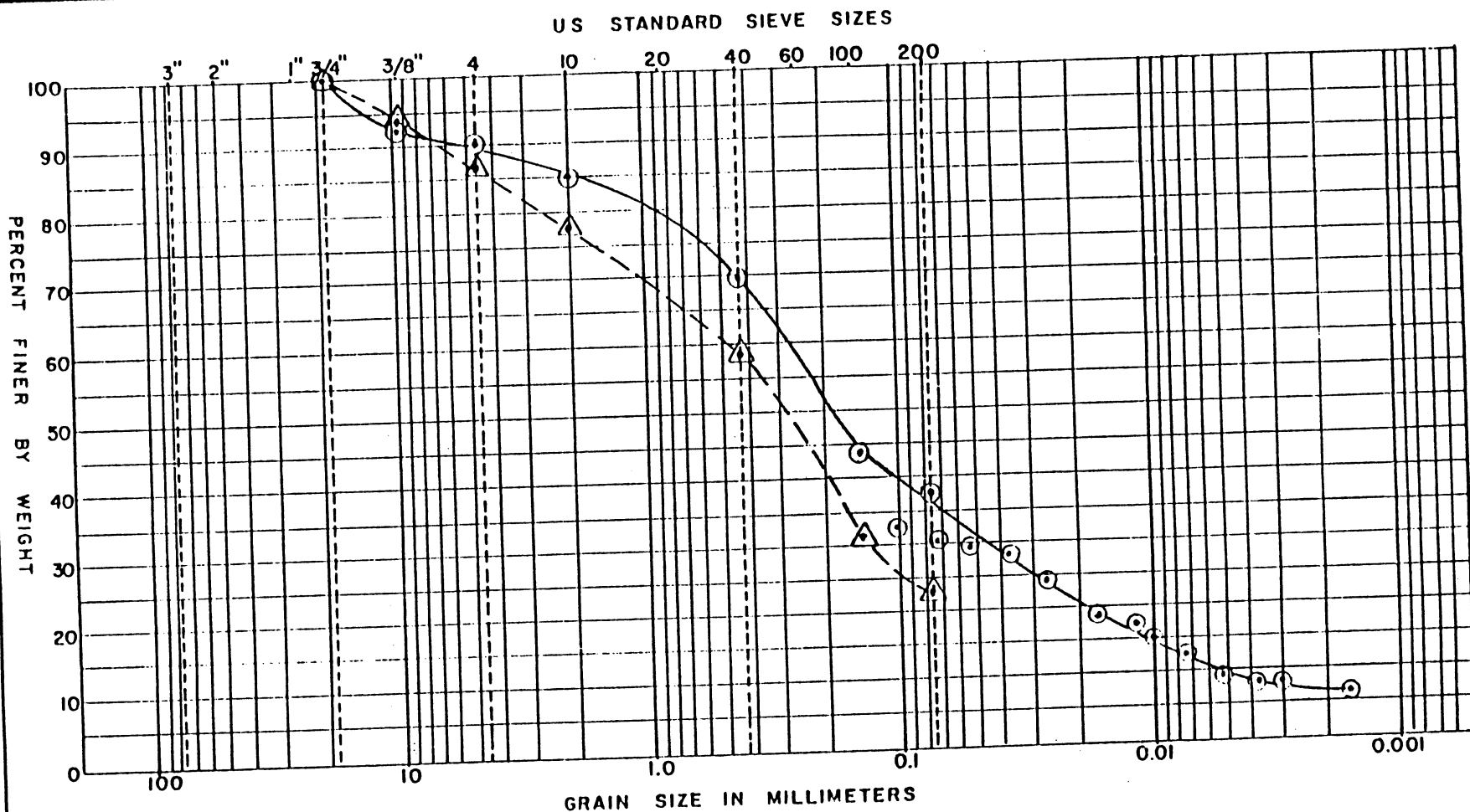
BORING NO	ELEV OR DEPTH	w_n	w_l	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-G21 SA 12 —○—	16.76m-16.98m (55.0'-55.7')	-	-	-	-	Brown, silty, fine to coarse SAND, some fine to coarse gravel (SM)
SA 13 —△—	25.91m-26.15m (85.0'-85.8')	-	-	-	-	Brown, fine to coarse SAND, trace silt (SP-SM)
SA 20 —□—	28.96m-29.17m (95.0'-95.7')	-	-	-	-	Brown, fine to coarse SAND, some fine to coarse gravel, some silt (SM)

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Job No 786085

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GRAIN SIZE DISTRIBUTION



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

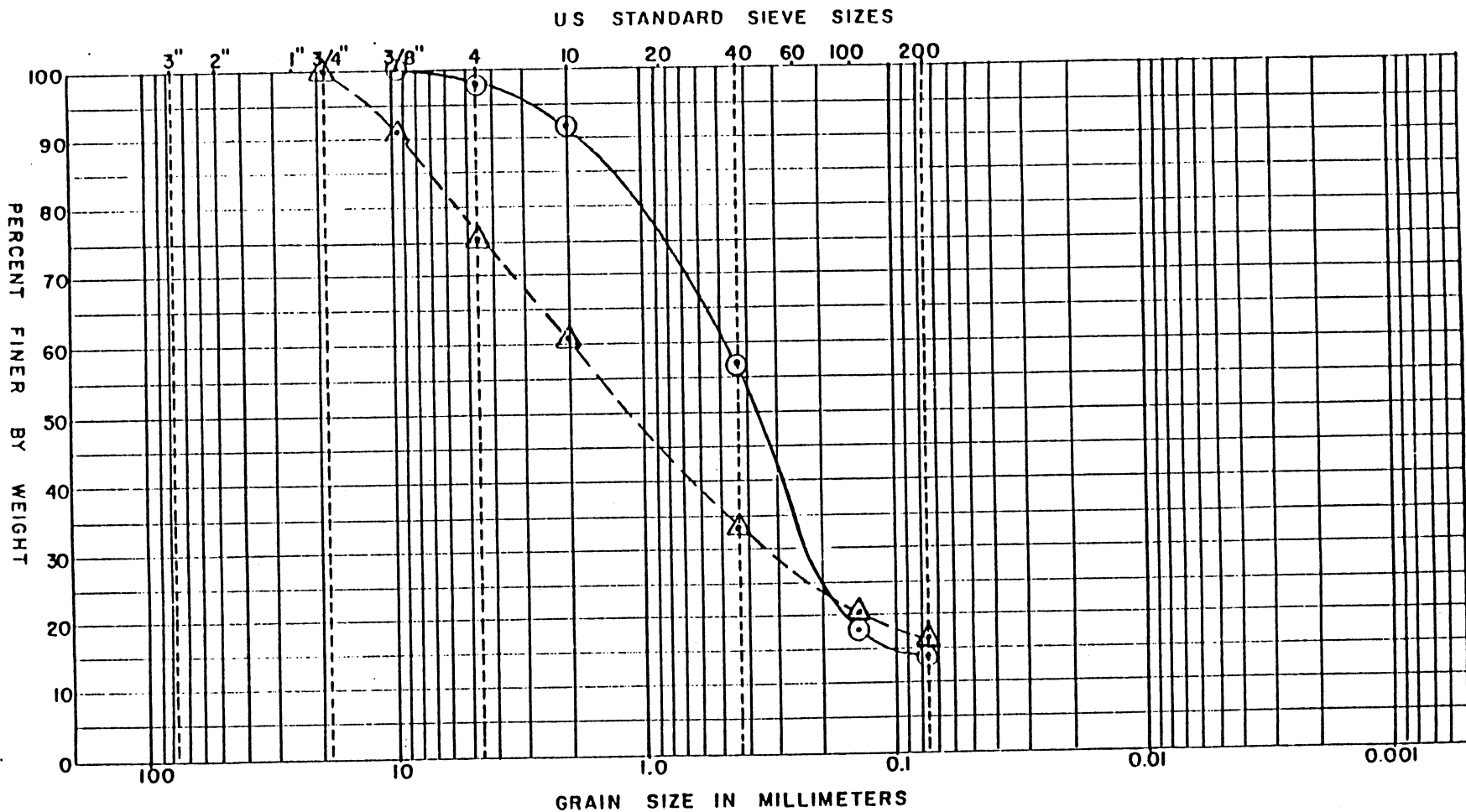
BORING NO.	ELEV. OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-II13 SA-1 —○—	0.0m-0.46m (0.0'-1.5')	-	-	-	-	Brown to dark brown, silty fine to coarse SAND, some fine gravel, trace clay (SM)
SA-7 --△--	8.84m-9.30m (29'-30.5')	-	-	-	-	Brown, silty fine to coarse SAND, some fine gravel, trace clay (SM)

FIGURE

Date 5/30/79
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COBBLES	GRAVEL		SAND			FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

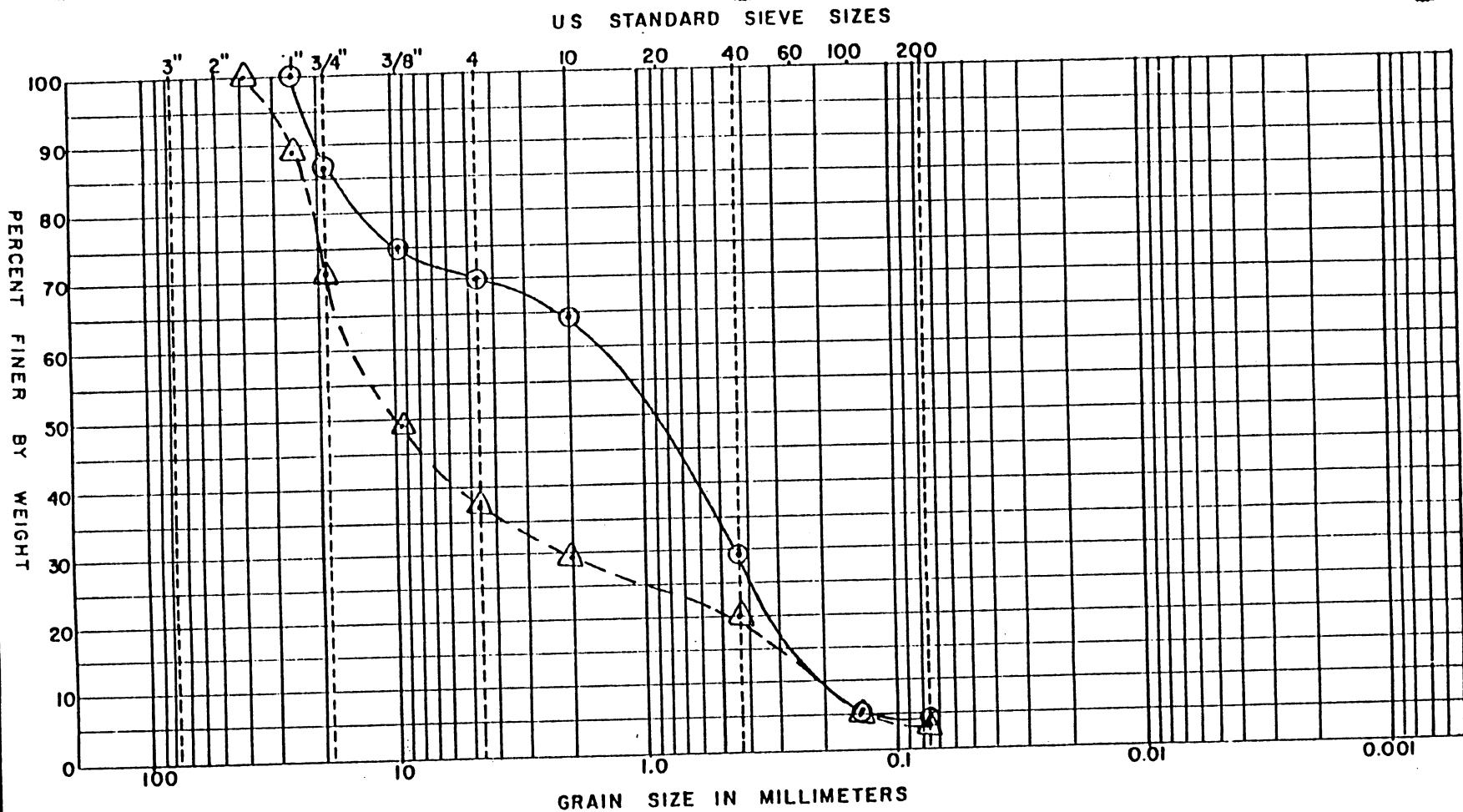
BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-1113 SA-15 —○—	21.64m-22.01m (71'-72.2')	-	-	-	-	Light brown, fine to coarse SAND, trace gravel, trace silt, trace clay (SM)
SA-22 —△—	31.70m-31.94m (104'-104.8')	-	-	-	-	Brown, fine gravelly, fine to coarse SAND, some silt, trace clay (SM)

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Job No. 786085

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GRAIN SIZE DISTRIBUTION



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-H17 SA-3 —○—	2.74m-3.20m (9'-10.5')	-	-	-	-	Brown, fine to coarse gravelly, fine to coarse SAND, trace silt (SP)
SA-6 --△--	7.32m-7.77m (24'-25.5')	-	-	-	-	Brown, fine to coarse sandy, fine to coarse GRAVEL, trace silt (GP)

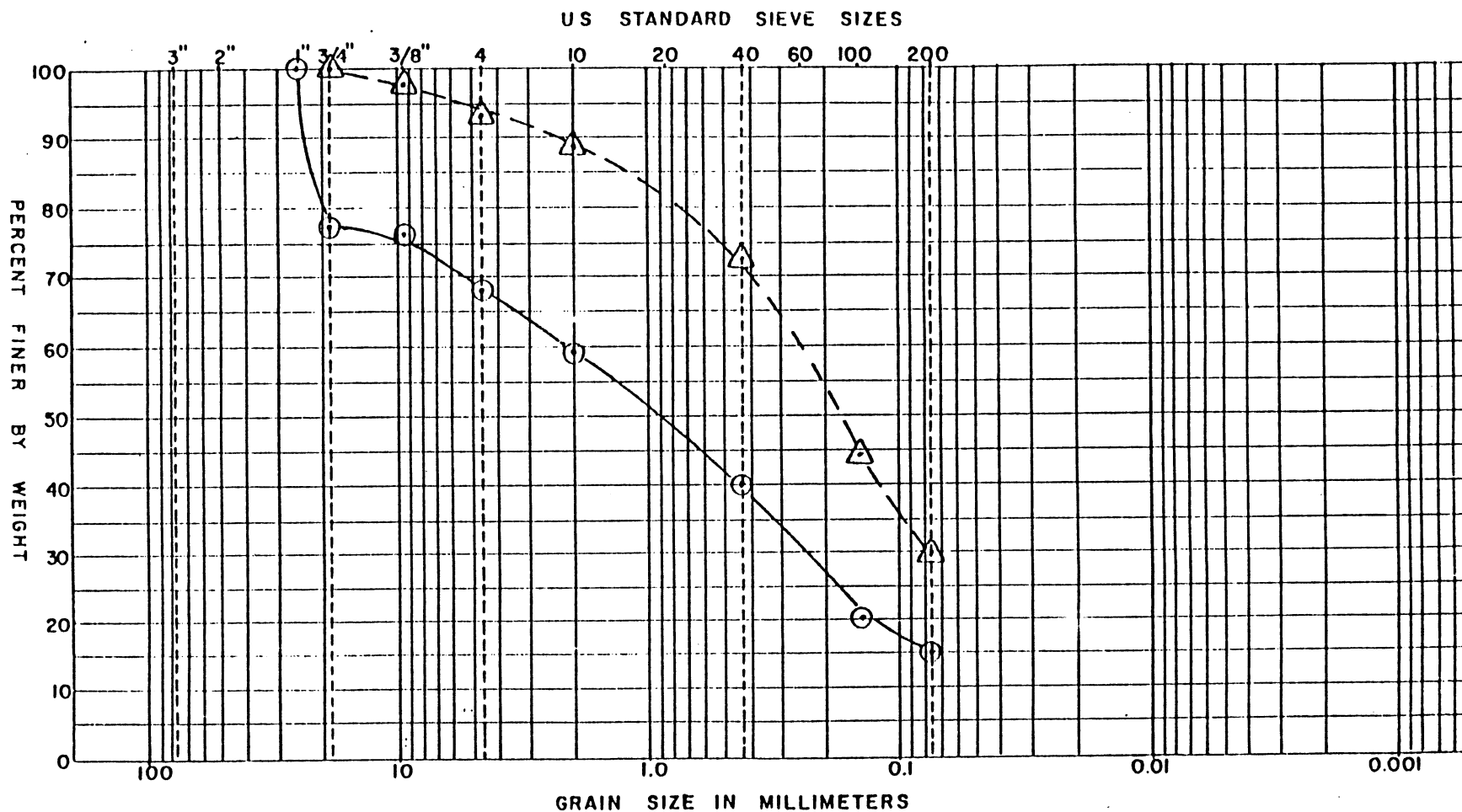
FIGURE 5

Date 5/30/79
Job No. 786085

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GRAIN SIZE DISTRIBUTION



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-III7 SA-13 —○—	16.46m-16.61m (54'-54.5')	-	-	-	-	Brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay (SM)
SA-16 —△—	21.03m-21.21m (69'-69.6')	-	-	-	-	Brown, silty, fine to coarse SAND, trace fine gravel, trace clay (SM)

FIGURE 1

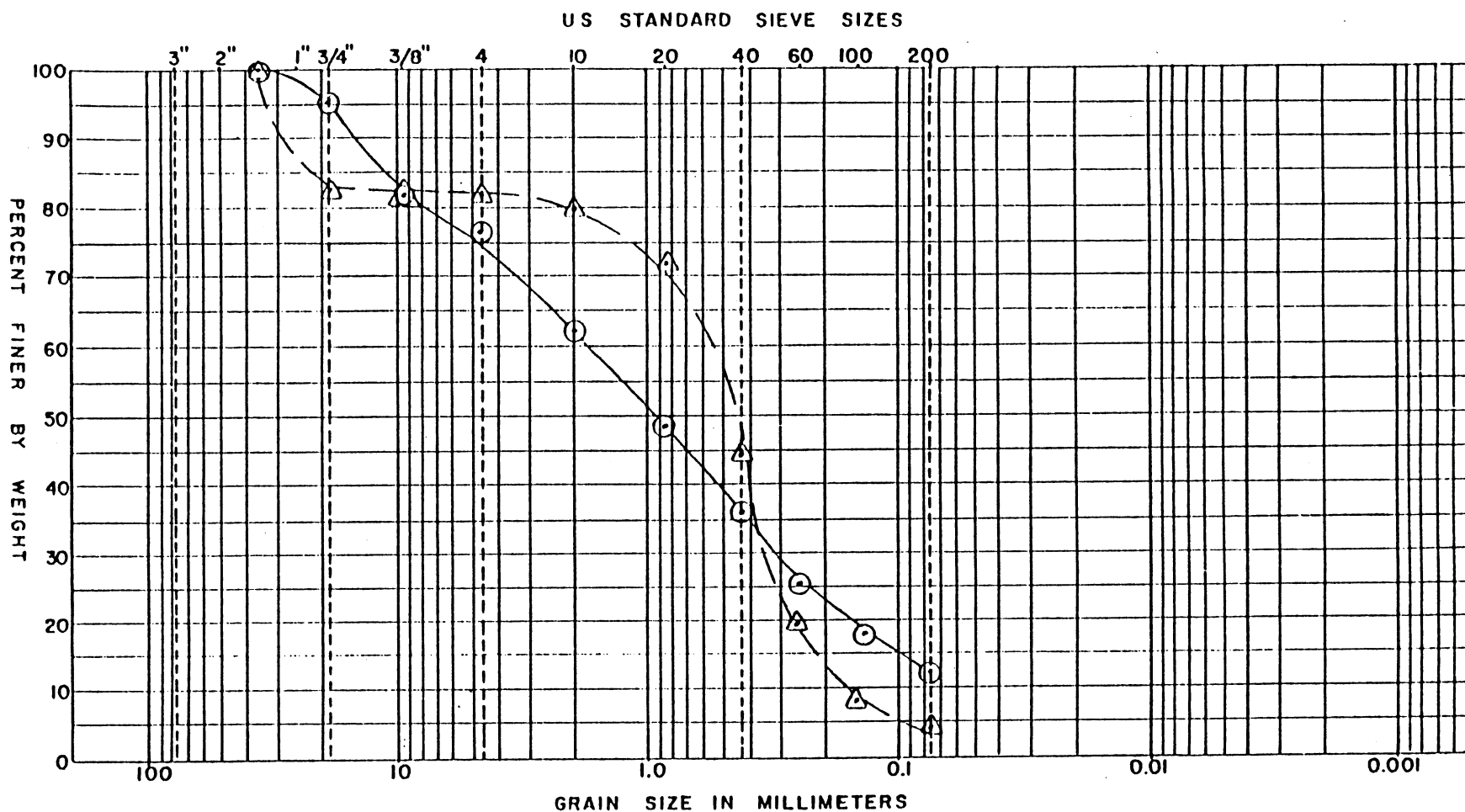
Date 5/30/79
Job No. 786085

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GRAIN SIZE DISTRIBUTION

FIGURE



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

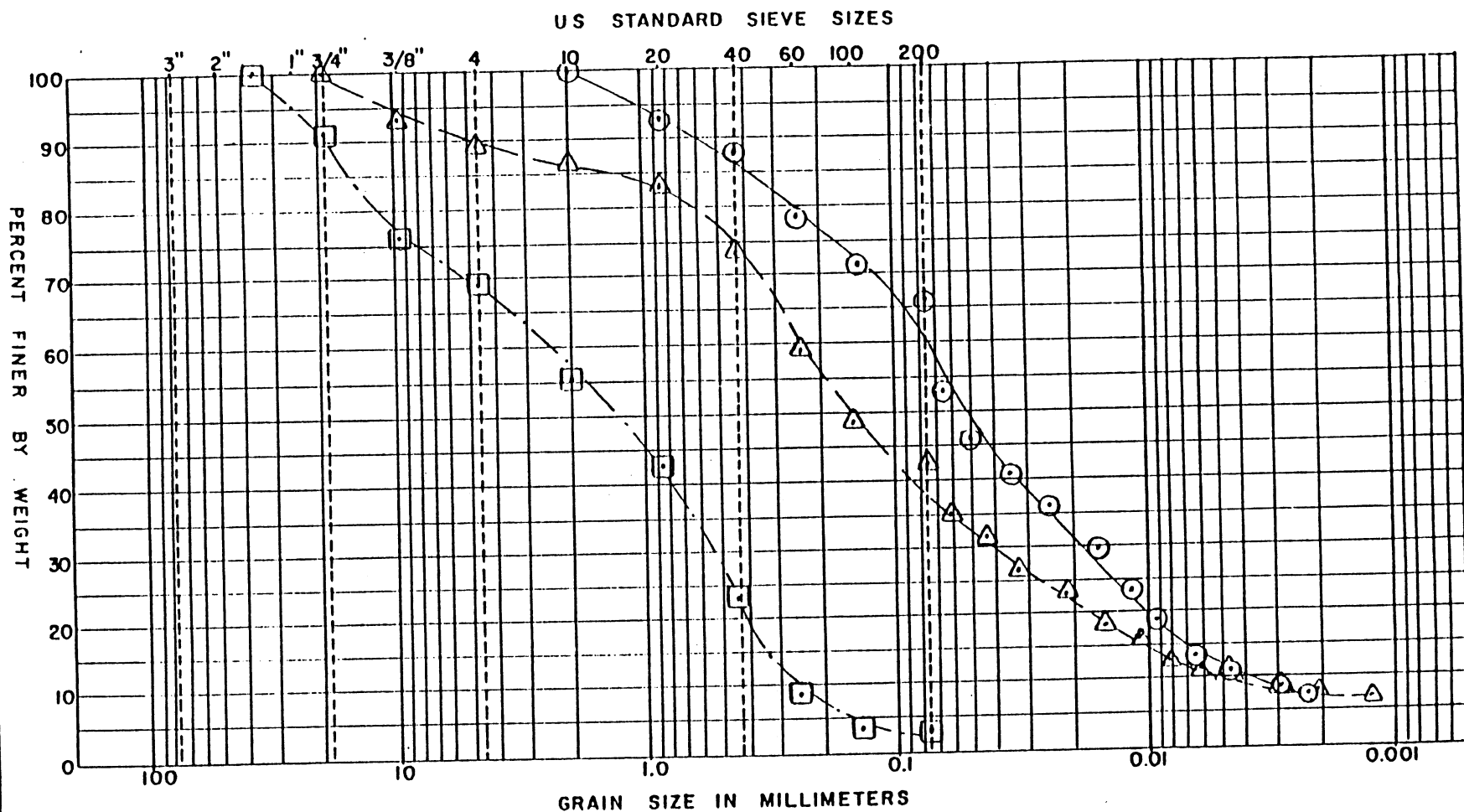
BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-H13 SA-5 —○—	6.10m-6.55m (20'-21.5')	-	-	-	-	Brown, fine to coarse gravelly, fine to coarse SAND, some silt (SM)
SA-9 --△--	12.19m-12.50m (40'-41')	-	-	-	-	Brown, fine to coarse SAND, some fine to coarse gravel, trace silt (SP)

Date 6/7/79
Job No. 786085

Golder Associates 3.5-17-95

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GRAIN SIZE DISTRIBUTION



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-1113A SA-2 —○—	3.96m-4.42m (13'-14.5')	-	-	-	-	Gray, fine to medium SAND and SILT, trace clay (SM)
SA-3 --△--	5.03m-5.49m (16.5'-18.0')	-	-	-	-	Gray, fine to coarse SAND and SILT, some fine gravel, trace clay (SM)
SA-4 ---□---	6.10m-6.55m (20.0'-21.5')	-	-	-	-	Light brown, fine to coarse gravelly, fine to coarse SAND, trace silt (SP)

FIGURE

Date 6/7/79
Job No. 786035

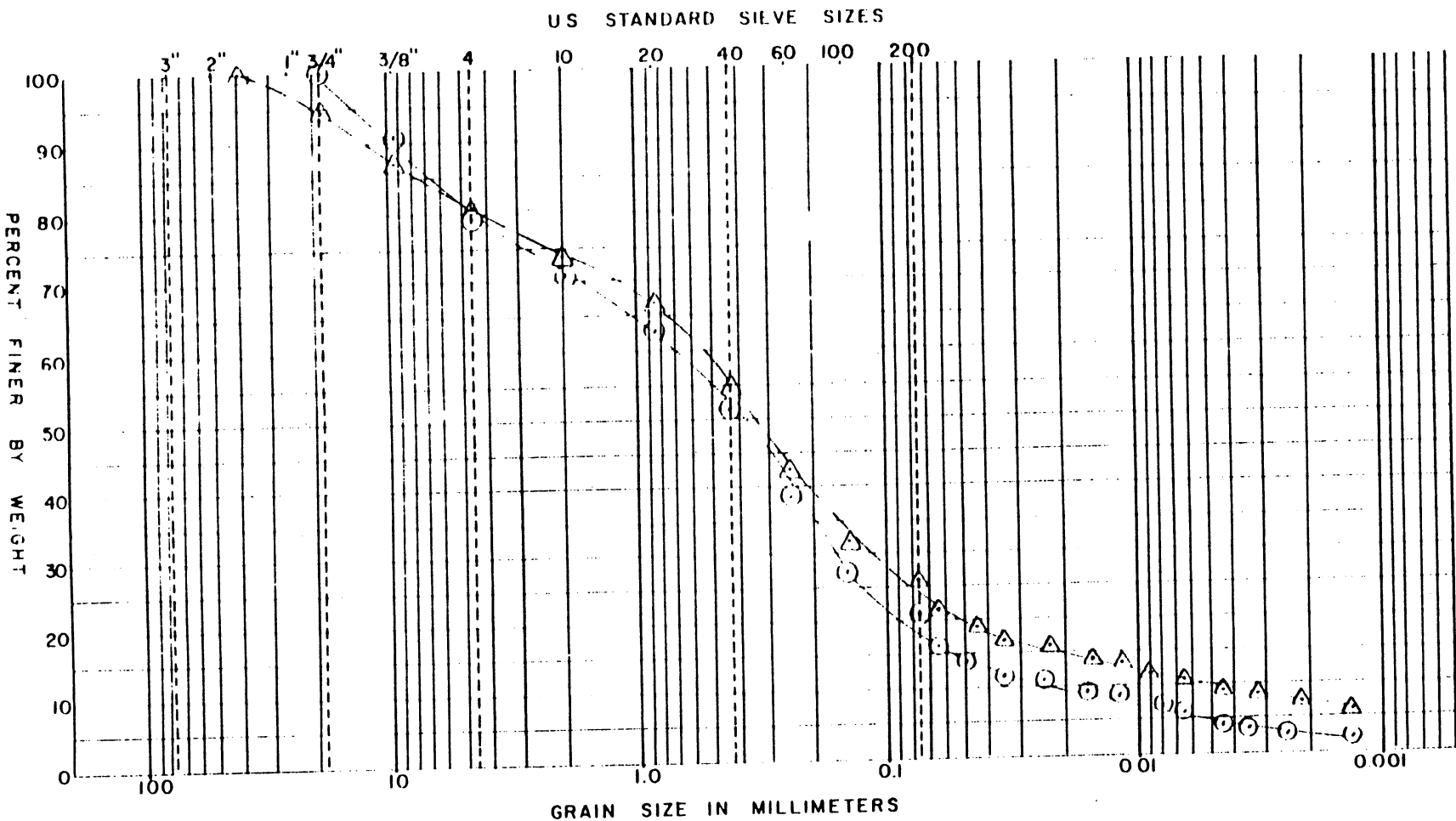
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GRAIN SIZE DISTRIBUTION

LABORATORY REPORT

FIGURE 1-2-83



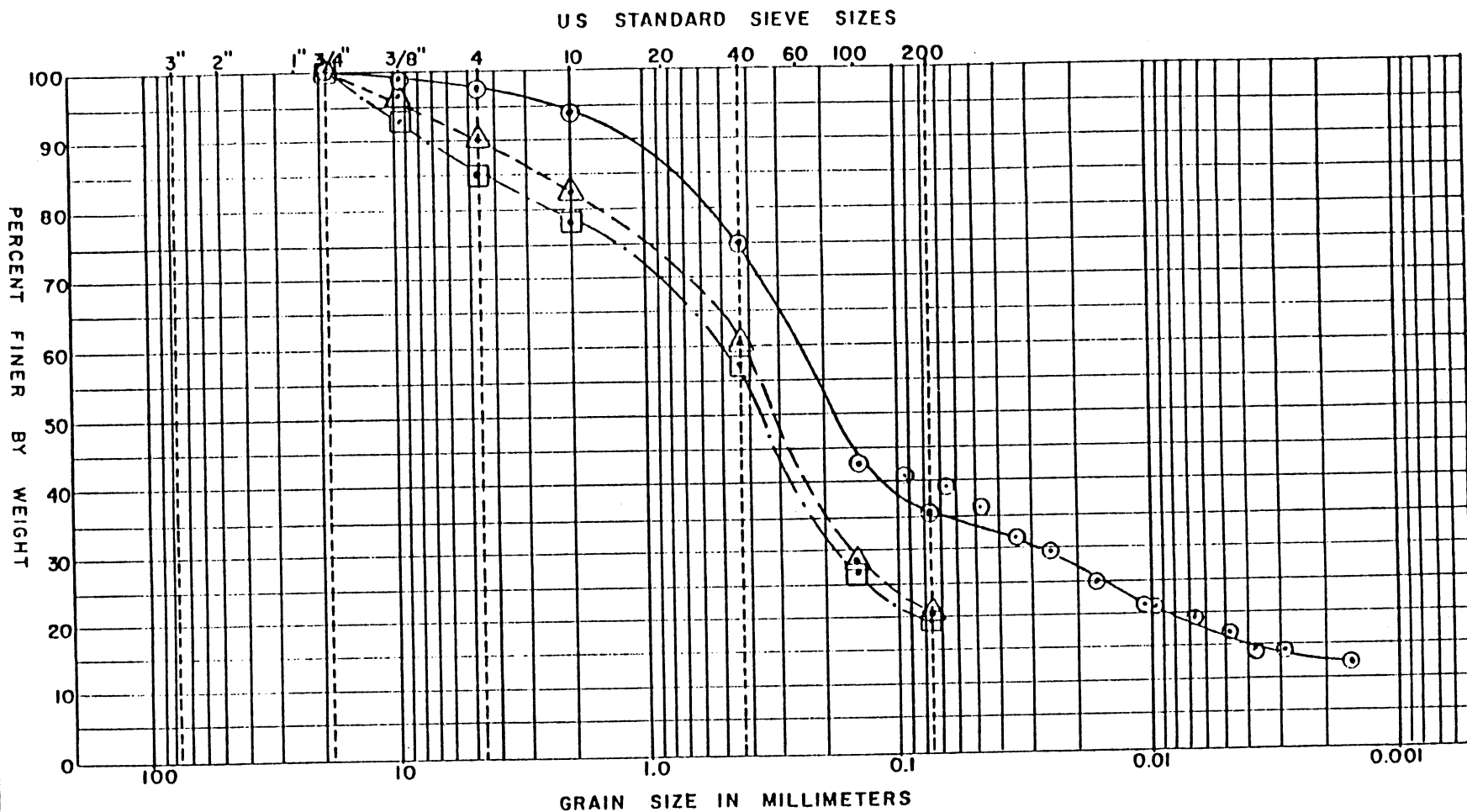
COBBLES	GRAVEL		SAND			FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO	ELEV OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-117 SA-3 --C--	5.79m-5.94m (19.0'-19.5')	-	-	-	-	Brown, fine gravelly, fine to coarse SAND, some silt, trace clay (SM)
SA-6 -A-	10.67m-10.97m (35.0'-36.0')	-	-	-	-	Brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay (SM)

Date 6/7/79
Job No 726035

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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-J18 SA-1B —○—	0.91m-1.22m (3'-4')	-	NP	NP	NP	Red-brown, silty, fine to coarse SAND, some clay, trace fine gravel, trace organics (SM)
SA-3 --△--	3.05m-3.51m (10'-11.5')	-	-	-	-	Red-brown, fine to coarse SAND, some silt, some fine gravel, trace clay (SM)
SA-4 --□--	4.57m-5.03m (15'-16.5')	-	-	-	-	Red-brown, fine to coarse SAND, some silt, some fine gravel, trace clay (SM)

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Job No. 786085

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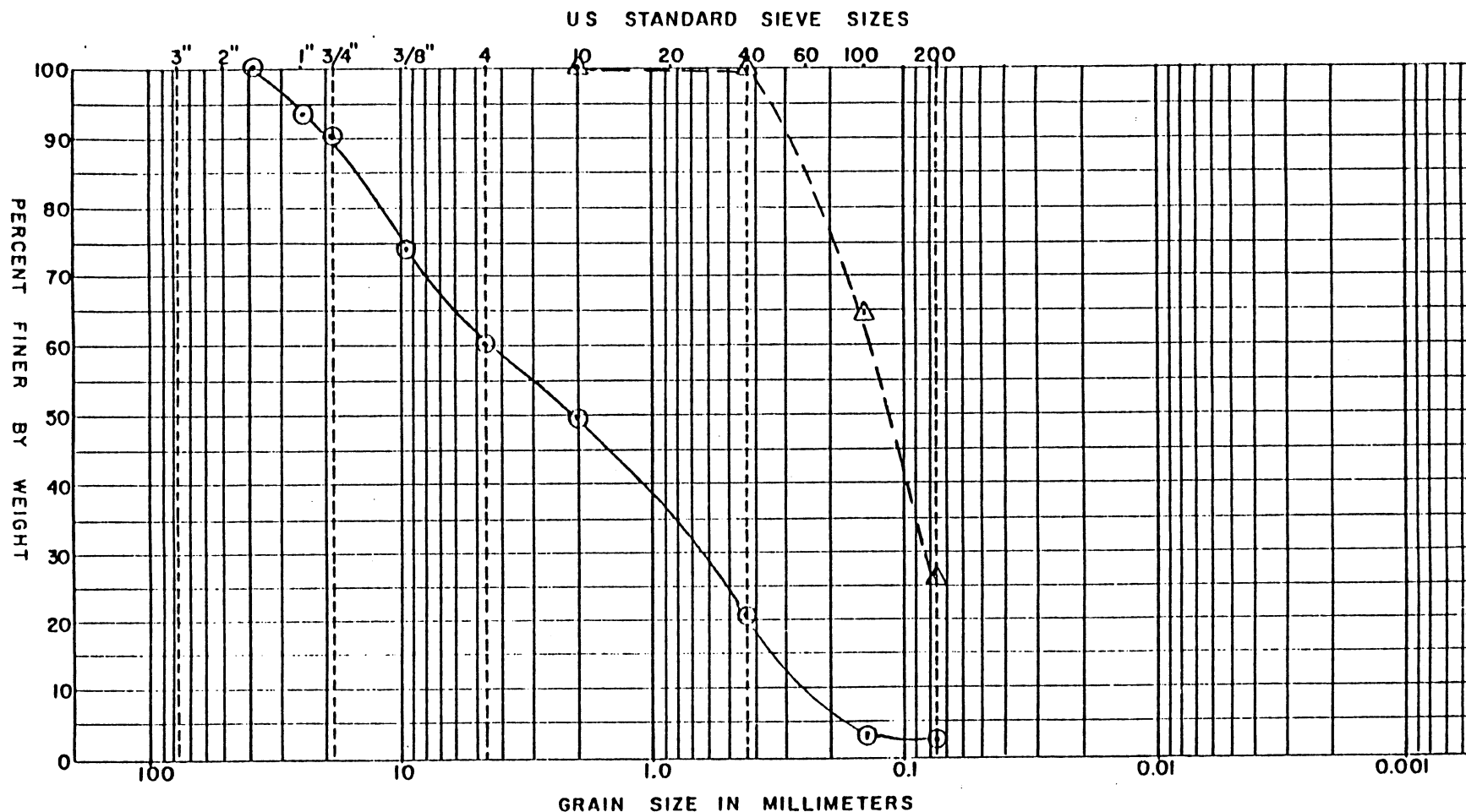
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Date 5/30/79
Job No. 786085

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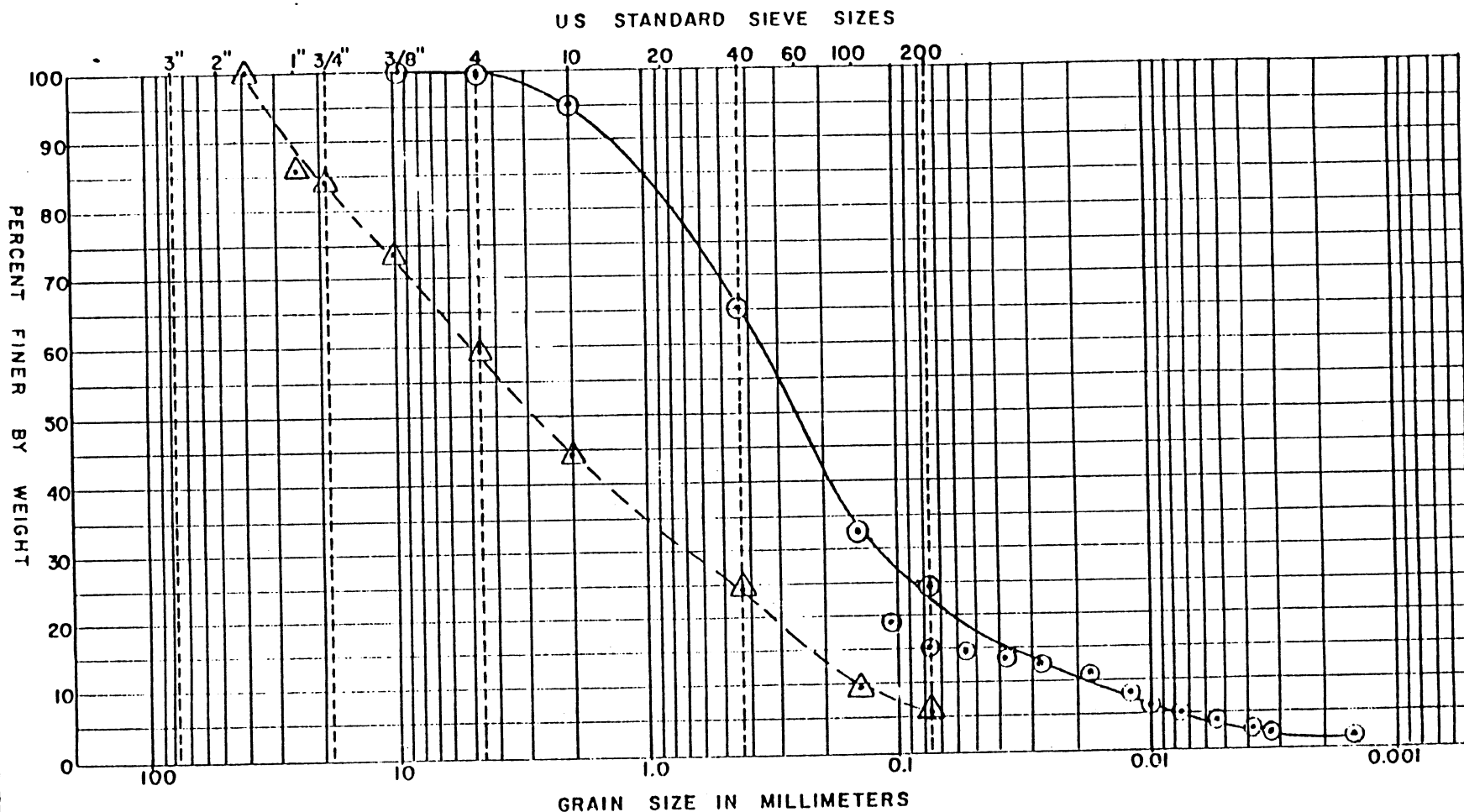


COBBLES	GRAVEL		SAND			FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-J18 SA-7 —○—	9.14m-9.60m (30'-31.5')	-	-	-	-	Brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt (SP)
SA-10 —△—	13.72m-14.17m (45'-46.5')	-	-	-	-	Light brown, silty, fine SAND (SM)

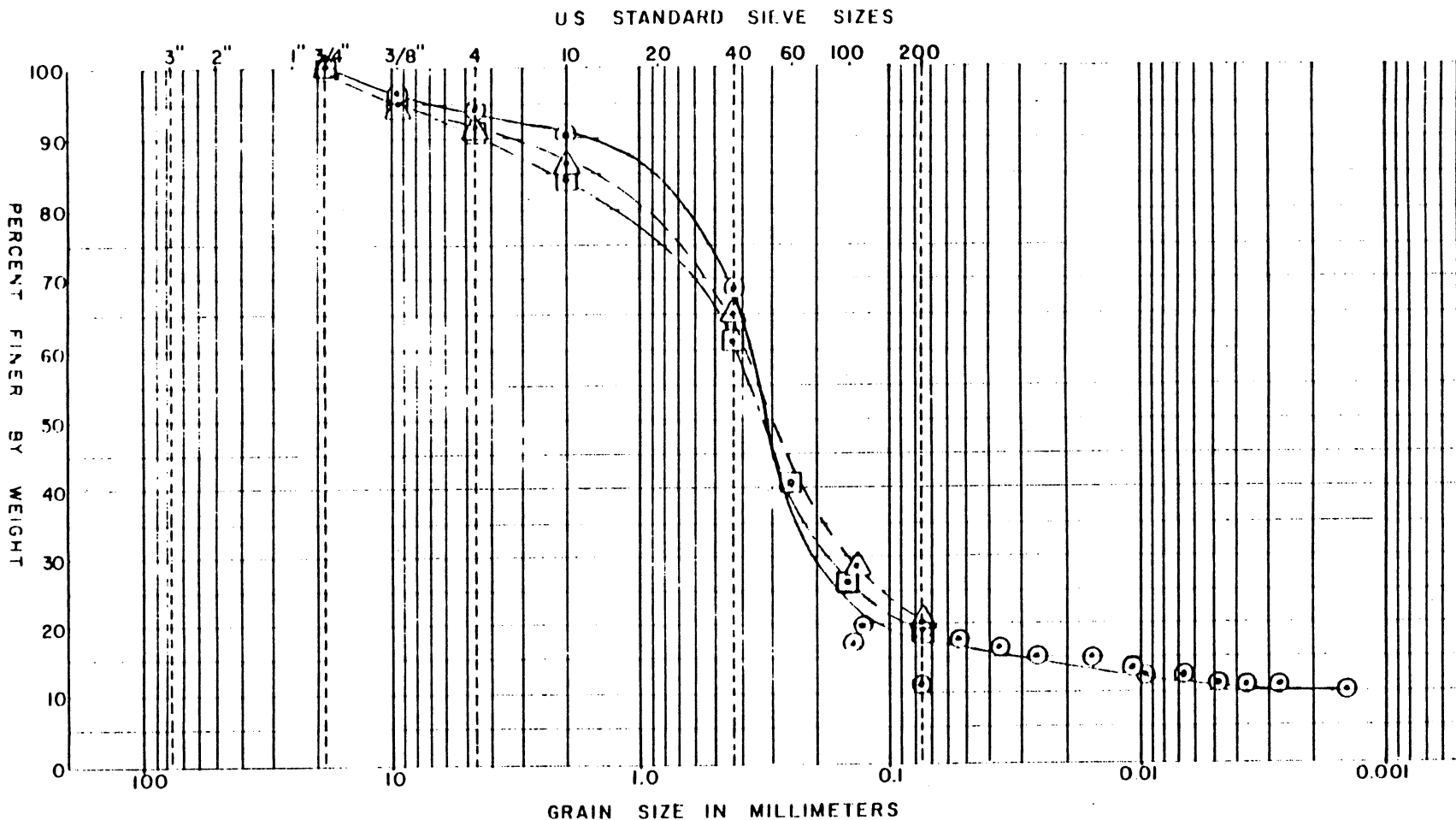
GRAIN SIZE DISTRIBUTION

FIGURE 10



GRAIN SIZE DISTRIBUTION BEST COPY AVAILABLE

FIGURE V2-92



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

BORING NO	FLEV OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-K13 SA-1 C	36.53m-36.82m (120.0'-120.3')	-	-	-	-	Yellow-brown, fine to coarse SAND, trace fine gravel, trace silt, trace clay (SM)
SA-3 A	43.23m-43.59m (142.0'-143.0')	-	-	-	-	Red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay (SM)
SA-5 B	49.38m-49.68m (162.0'-163.0')	-	-	-	-	Brown, fine to coarse SAND, some silt, trace fine gravel (SM)

Date 5/30/79
Job No 7S6035

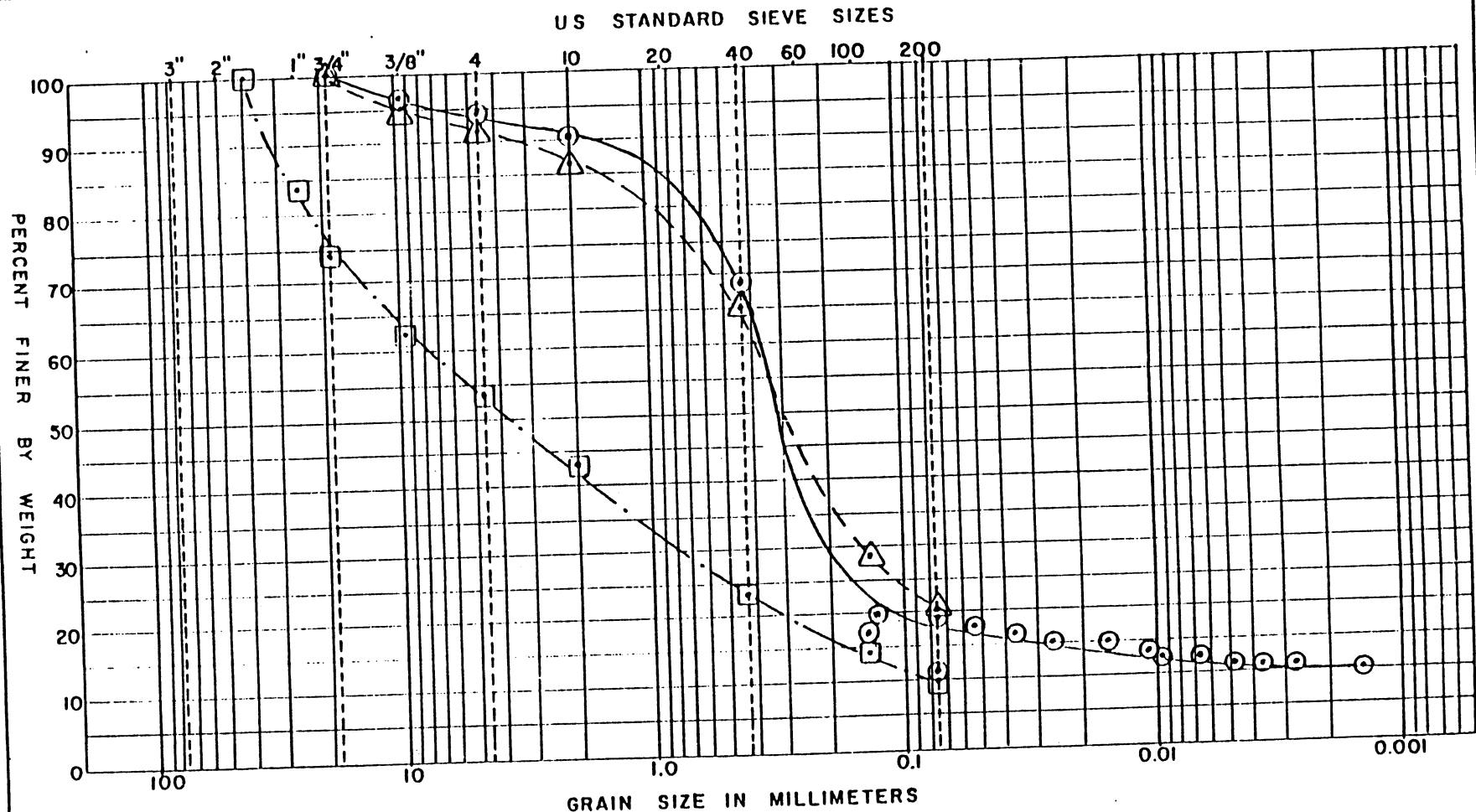
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Date 5/30/79
Job No. 786035

Golder Associates 3.5-17-102

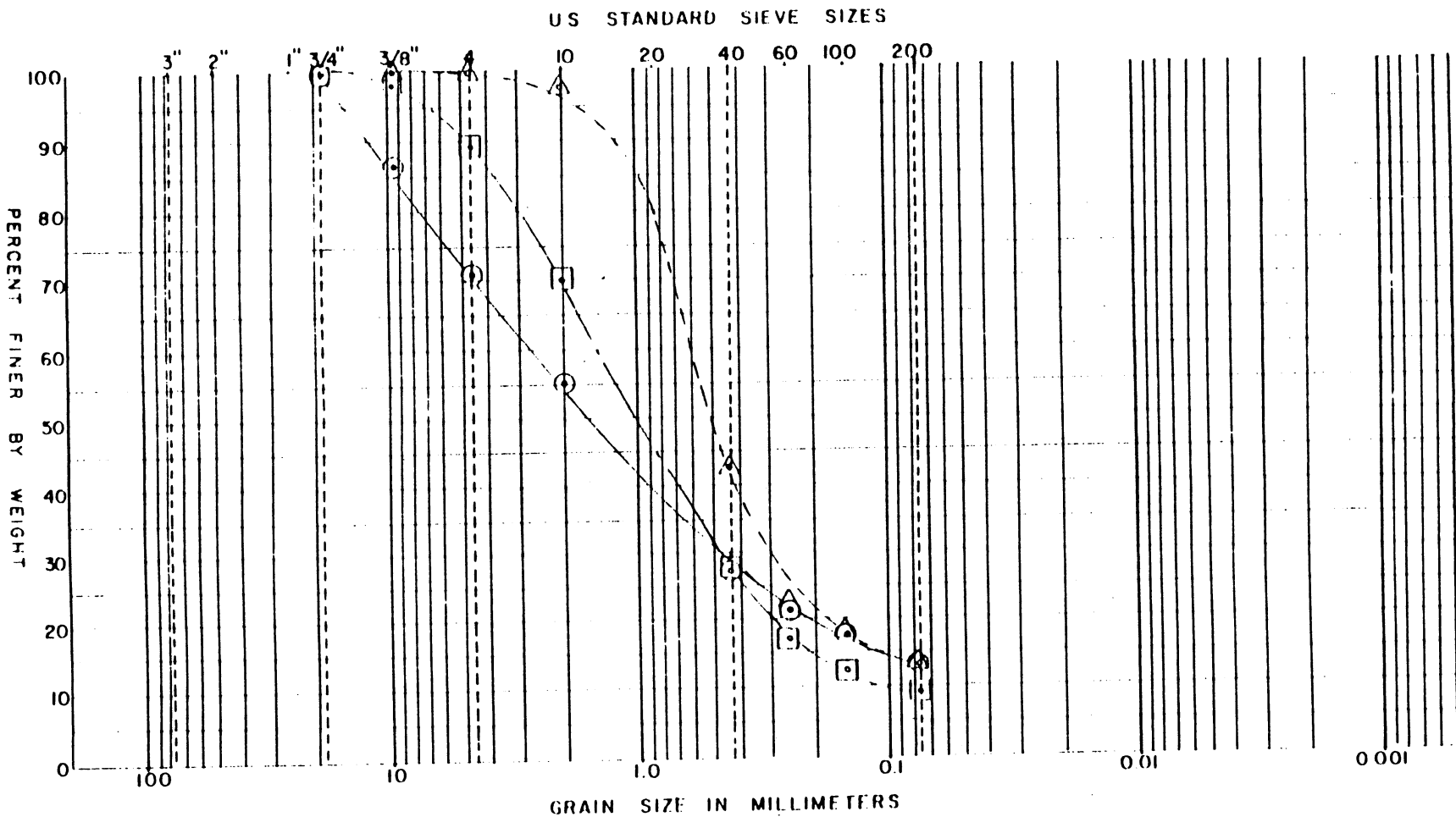
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GRAIN SIZE DISTRIBUTION

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FIGURE V2-93



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

BORING NO	ELEV OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-K13 SA-6 —○—	52.43m-52.73m (172.0'-173.0')	-	-	-	-	Brown, fine, gravelly, fine to coarse SAND, some silt (SM)
SA-8 --△--	58.52m-58.82m (192.0'-193.0')	-	-	-	-	Yellow-brown, fine to coarse SAND, some silt (SM)
SA-9A, 9B 	61.87m-62.33m (203.0'-204.5')	-	-	-	-	Brown, fine to coarse SAND, some fine gravel, trace silt (SW-SM)

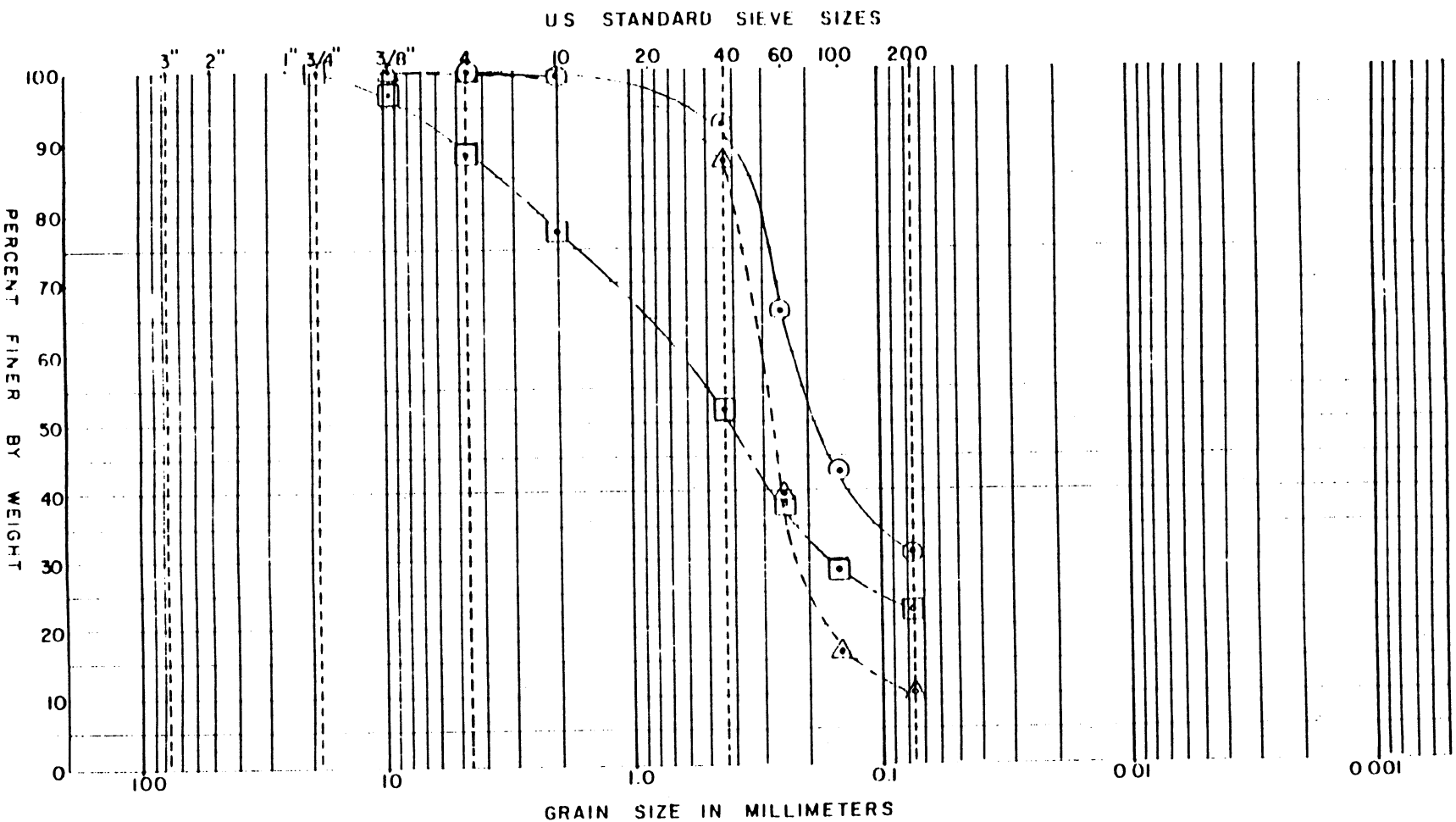
Date 2/12/31
Job No 786085

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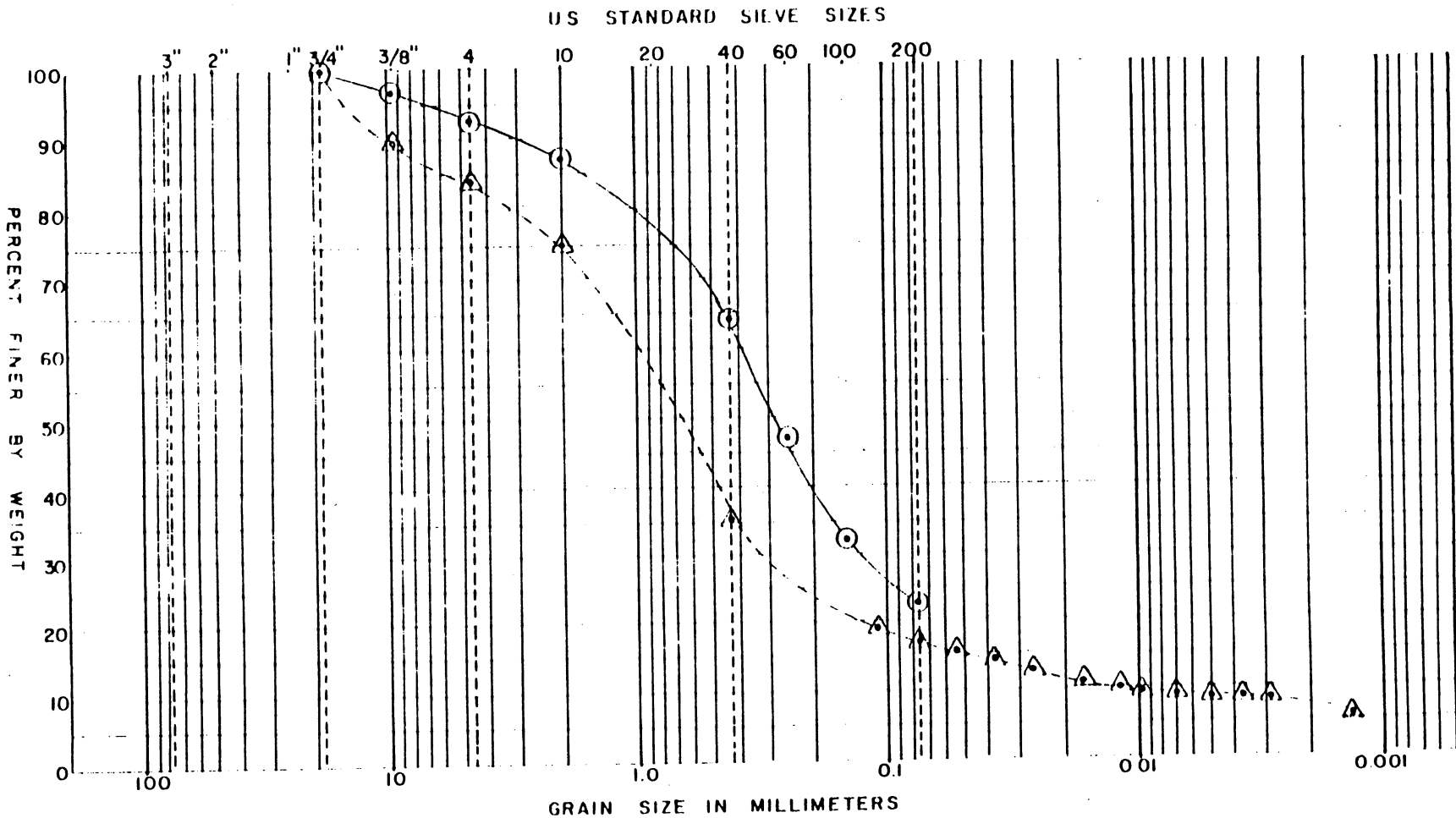
FIGURE V2-94



GRAIN SIZE DISTRIBUTION

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FIGURE W2-95



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

BORING NO	ELEV OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-K13 SA-13	74.37m-74.67m (244.0'-245.0')	-	-	-	-	Red-brown, silty, fine to coarse SAND, trace fine gravel (SM)
SA-14	77.42m-77.9m (254.0'-255.5')	-	-	-	-	Brown, fine to coarse SAND, some fine gravel, trace silt, trace clay (SM)

Date 2/12/81
Job No 786085

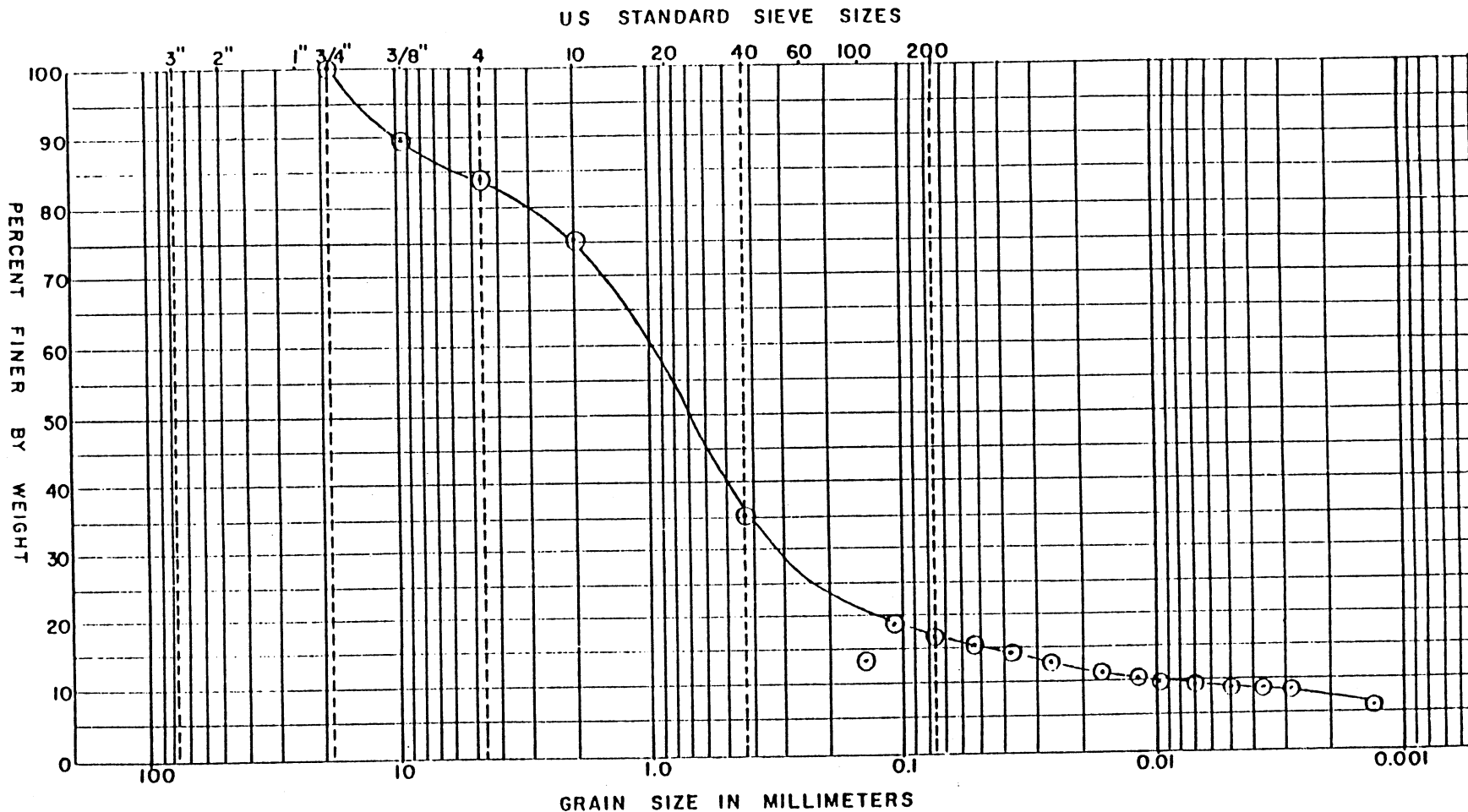
Golder Associates 3.5-17-105

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Date 5/30/79
Job No 786085

Golder Associates 3.5-17-106

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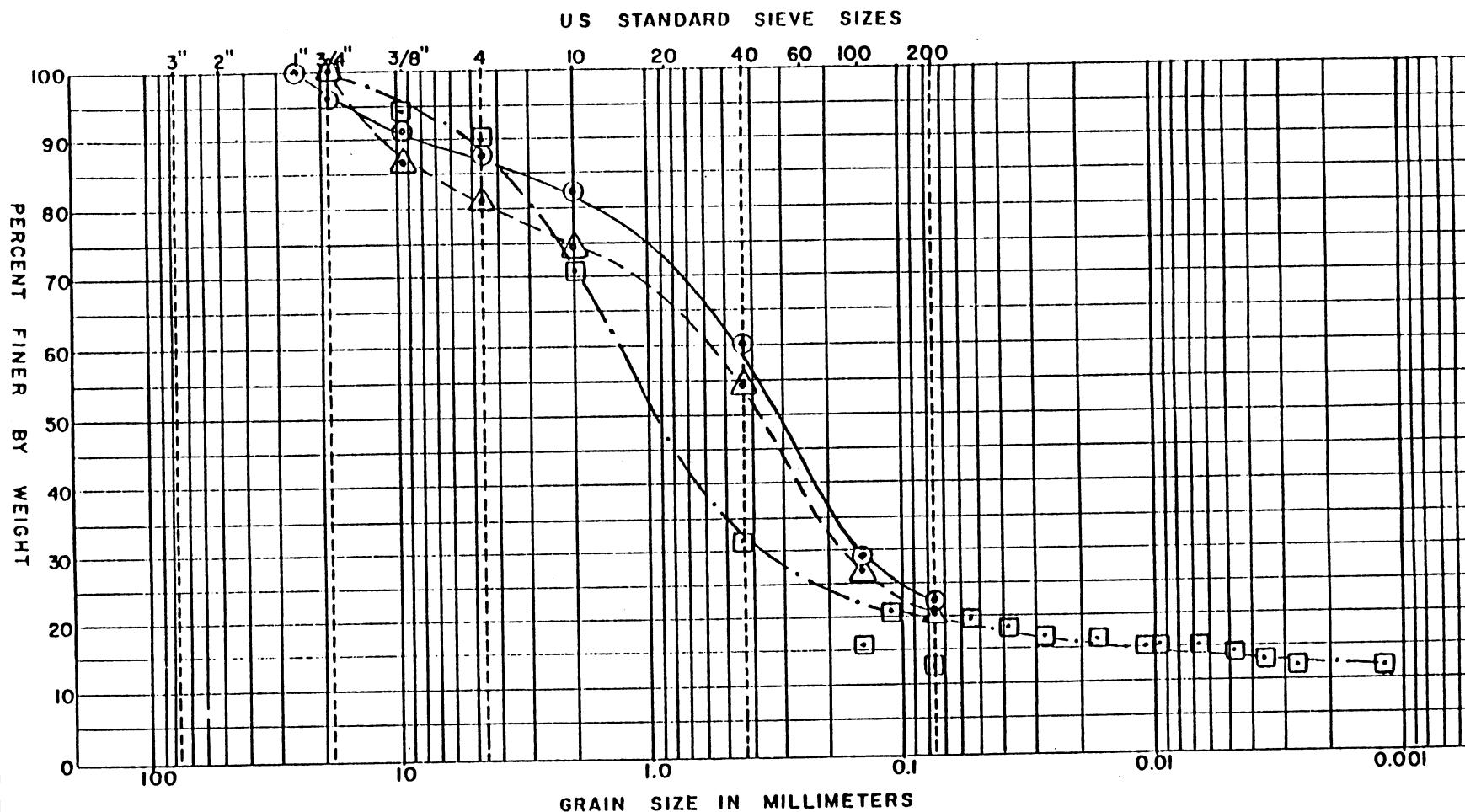
COBBLES	GRAVEL		SAND			FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-K13 SA-14 —○—	77.42m-77.63m (254'-254.7')	-	-	-	-	Brown, fine to coarse SAND, some fine gravel, trace silt, trace clay (SM)

GRAIN SIZE DISTRIBUTION

FIGURE

GRAIN SIZE DISTRIBUTION



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

BORING NO.	ELEV. OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-K13A SA-2 —○—	1.52m-1.98m (5'-6.5')	-	-	-	-	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay (SM)
SA-8 —△—	10.67m-10.76m (35'-35.3')	-	-	-	-	Brown, fine to coarse SAND, some fine gravel, some silt, trace clay (SM)
SA-13 —□—	18.29m-18.47m (60'-60.6')	-	-	-	-	Red-brown, fine to coarse SAND, some fine gravel, some clay, trace silt (SM)

FIGURE

Date 5/30/79
Job No. 786085

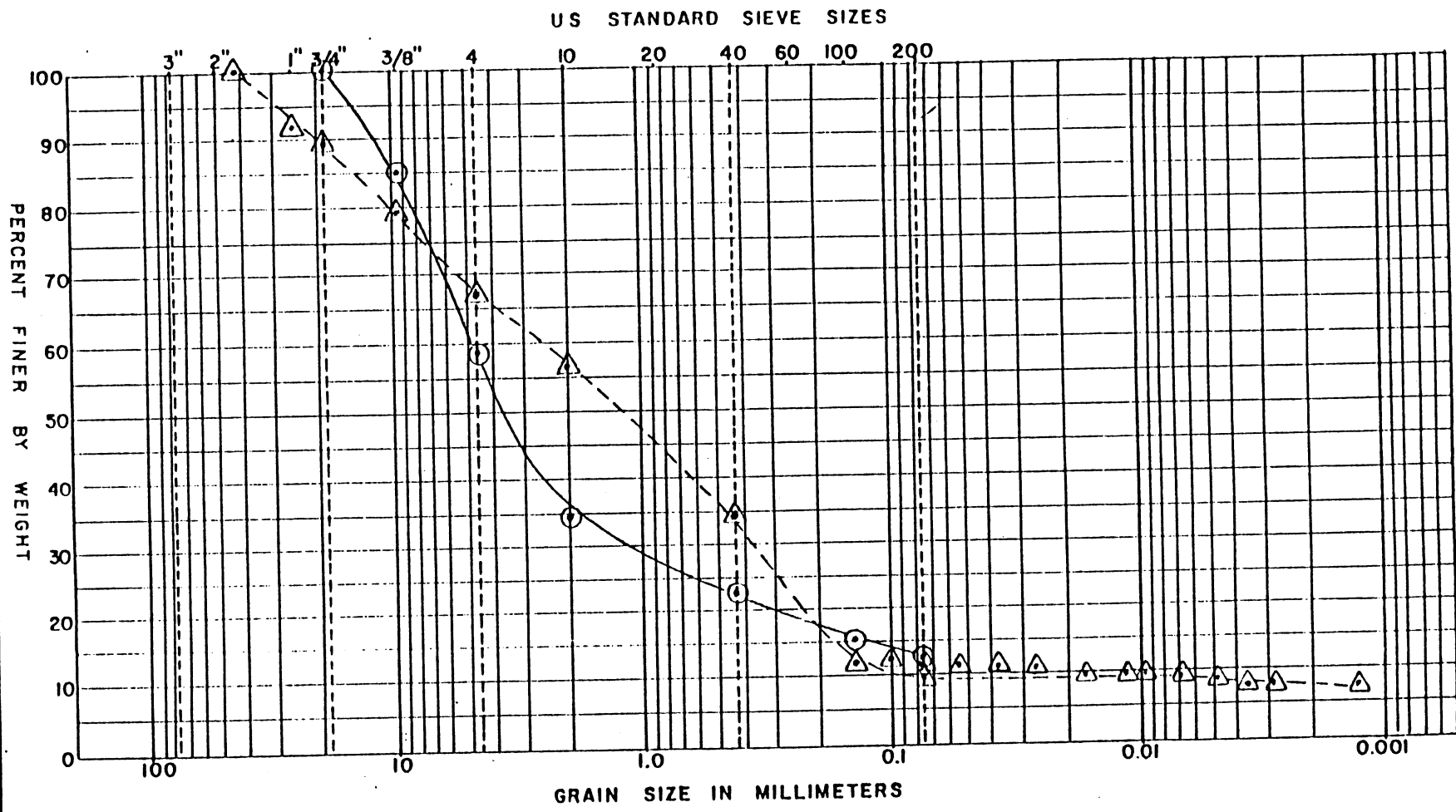
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Job No. 786085

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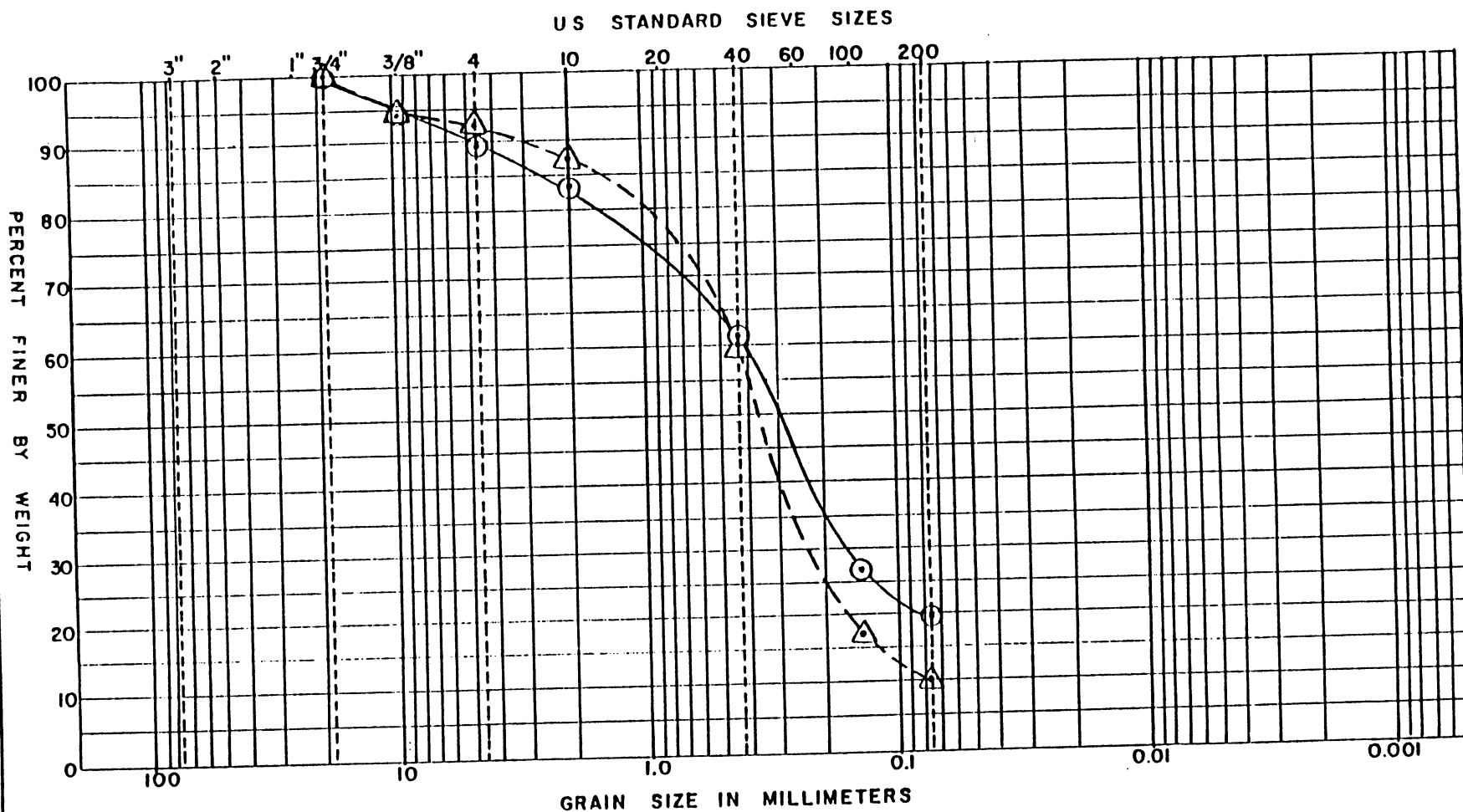
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Date 5/30/79
Job No. 786085

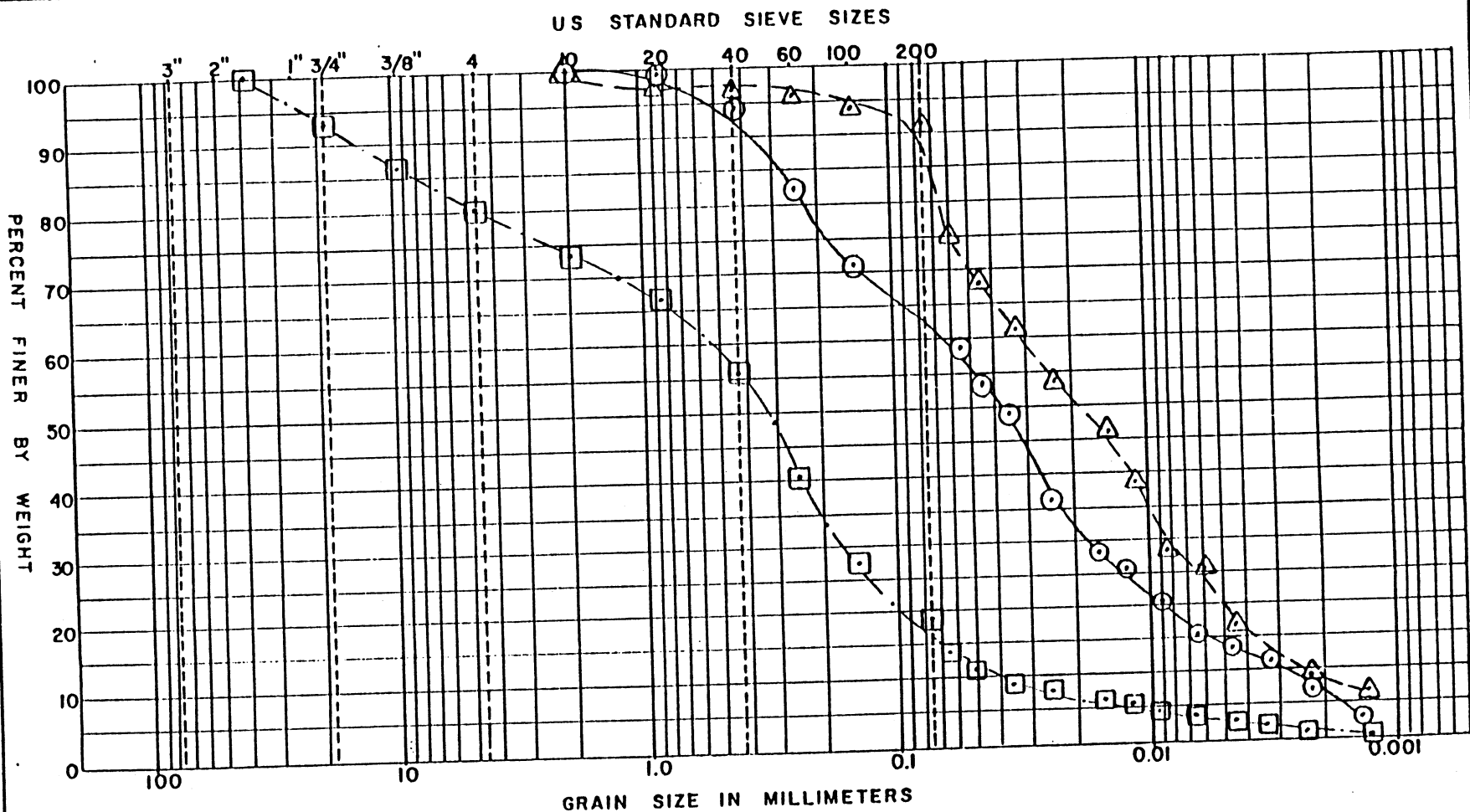
Golder Associates 3.5-17-109

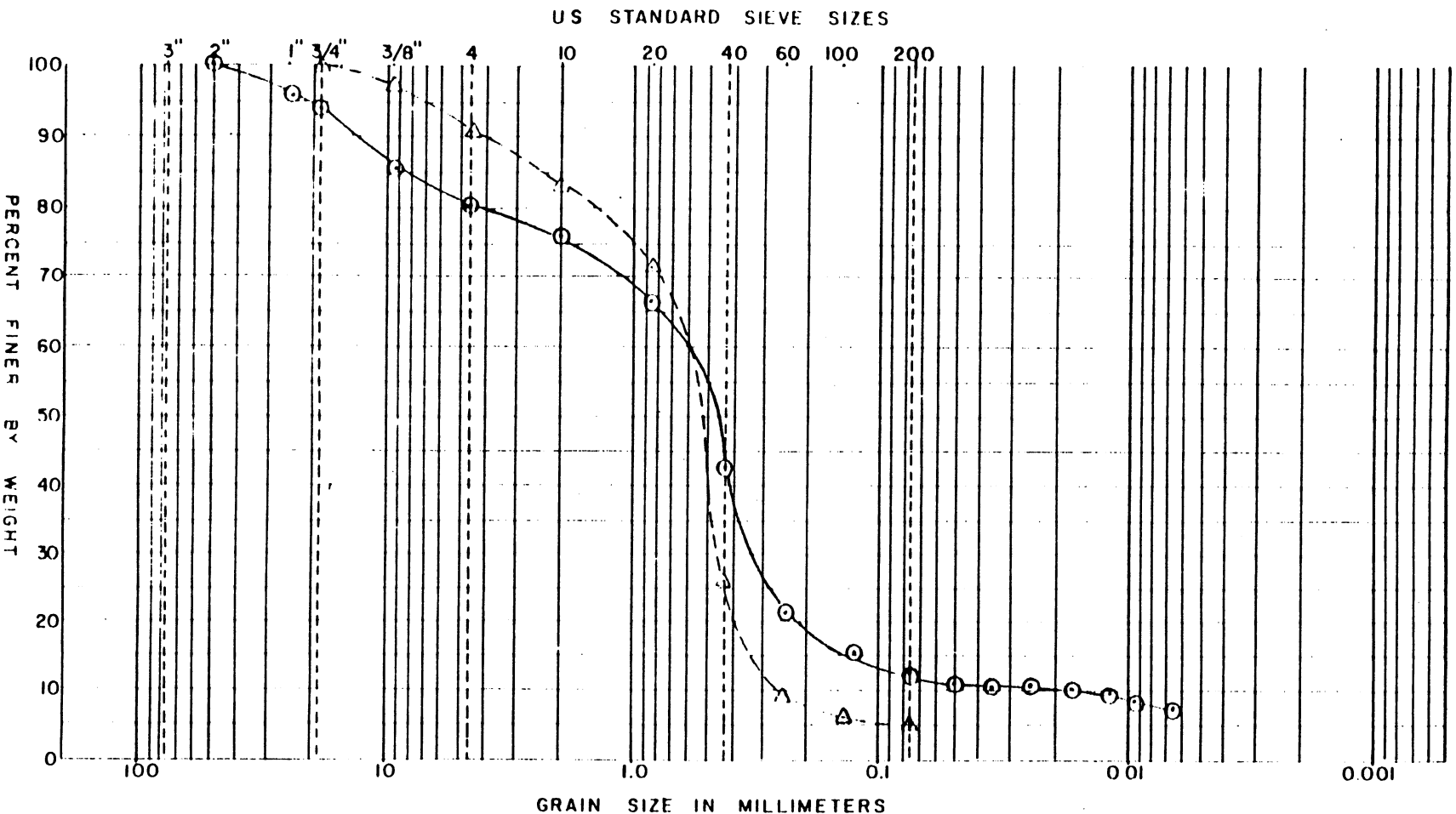
Drawn ASI
Checked JFC
Approved JFC



GRAIN SIZE DISTRIBUTION

FIGURE





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

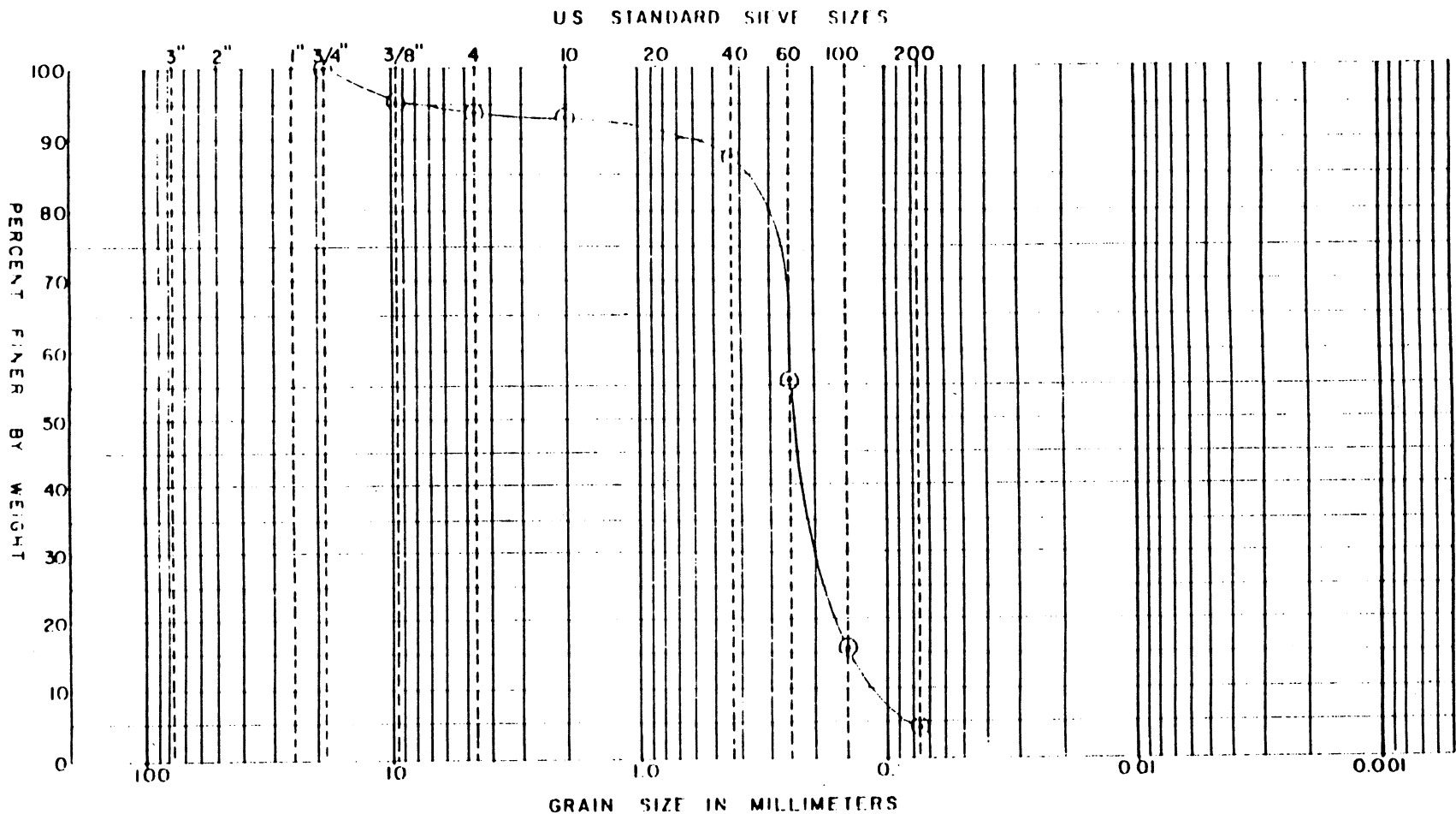
BORING NO	FLEV OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
641-F21 SA 8	10.67m-11.03m (35.0'-36.2')	-	-	-	-	Brown, fine to coarse SAND, some fine to coarse gravel, some silt (SM)
SA 14	19.31m-20.27m (63.0'-66.5')	-	-	-	-	Light brown, fine to coarse SAND, trace fine gravel, trace silt (SP)

Date 1/7/83
Job No 786035

Golder Associates

3.5-17-111

Drawn JTS
Checked
Approved



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

BORING NO	ELEV OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-K26						
SA-18	51.82m-52.27m (170.0'-171.5')	-	-	-	-	Brown fine to medium SAND, trace fine gravel, trace silt (SP)

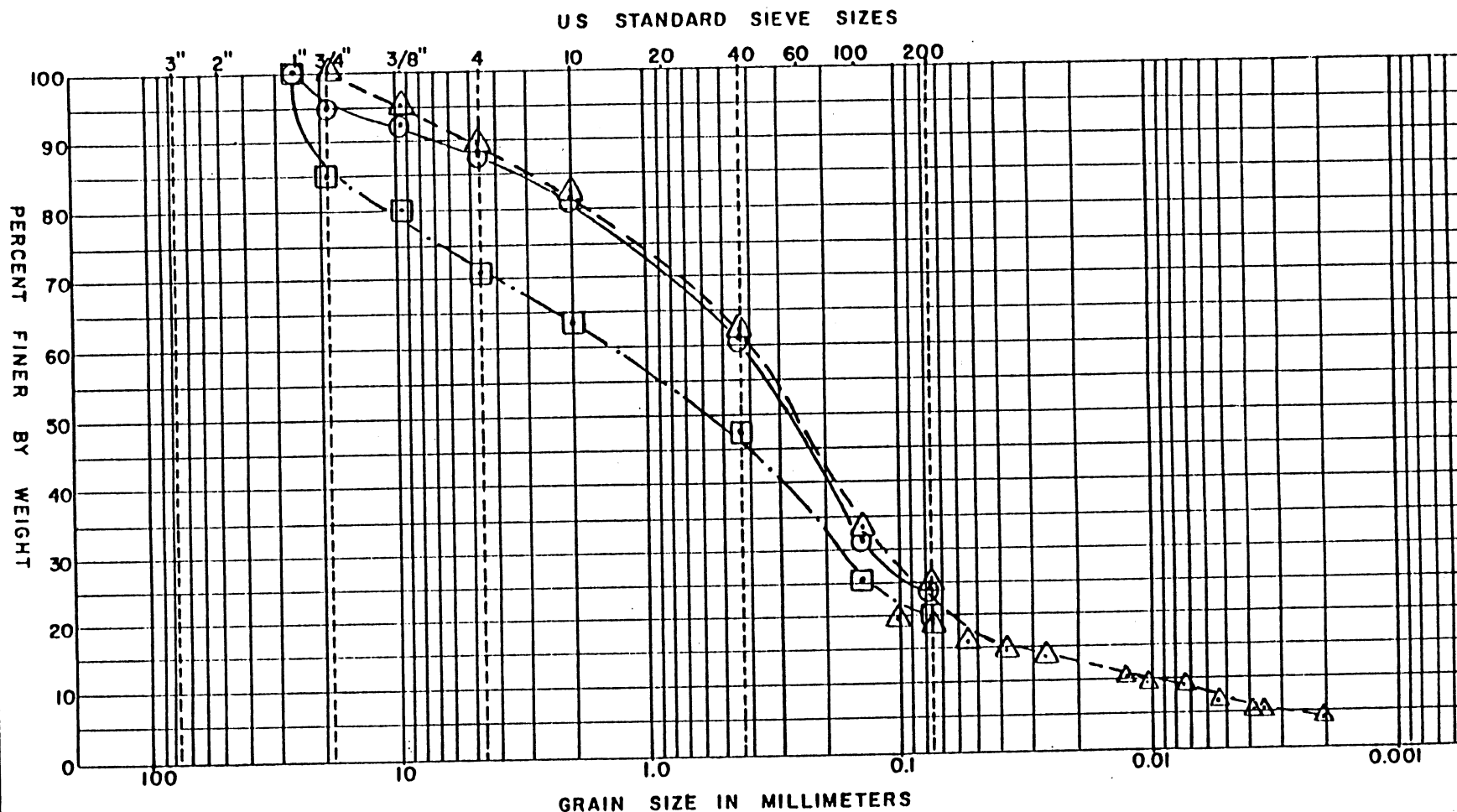
Date 3/16/91
Job No. 2509E

Golder Associates

3.5-17-112

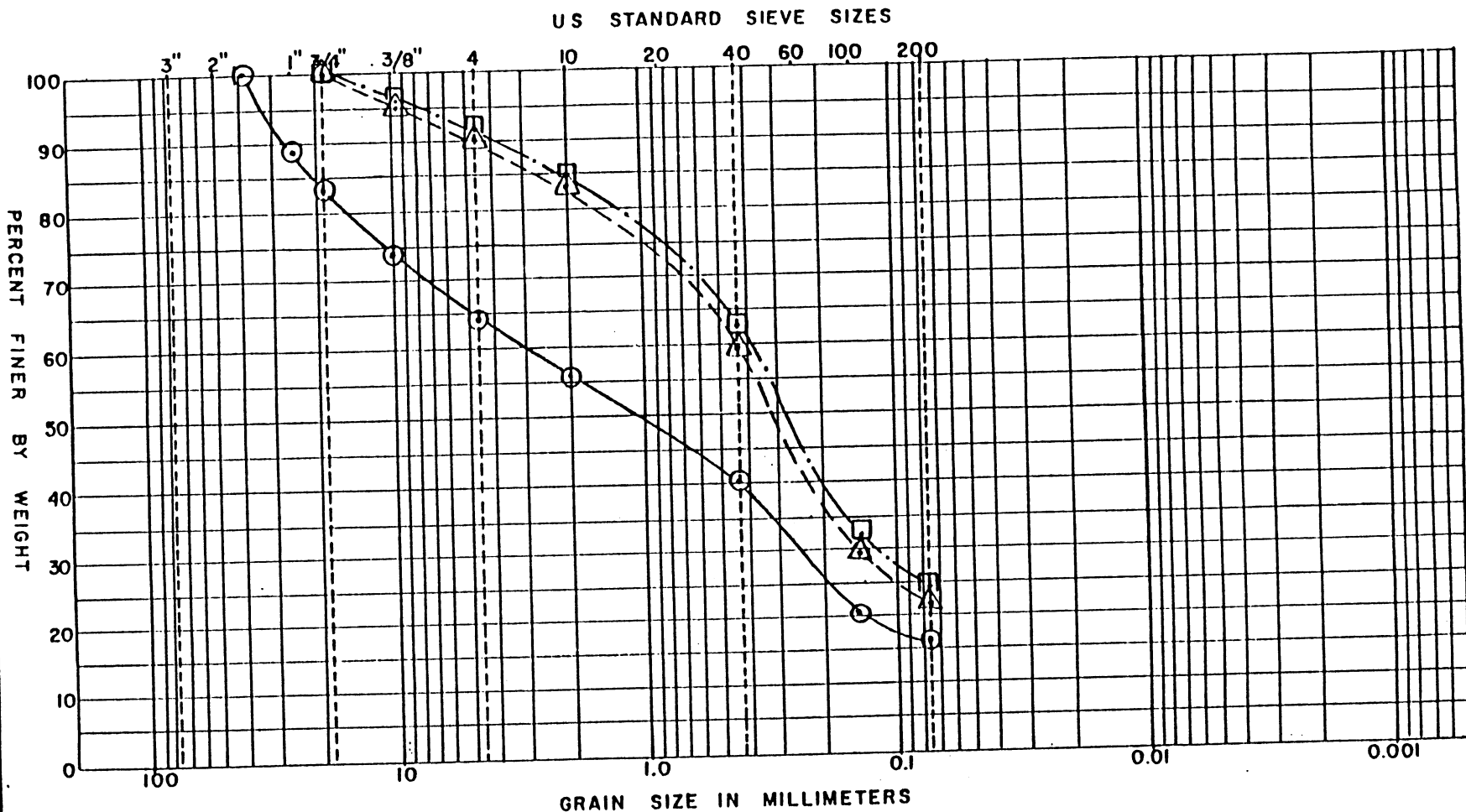
Drawn ES
Checked TLM
Reviewed [Signature]

GRAIN SIZE DISTRIBUTION



GRAIN SIZE DISTRIBUTION

FIGURE



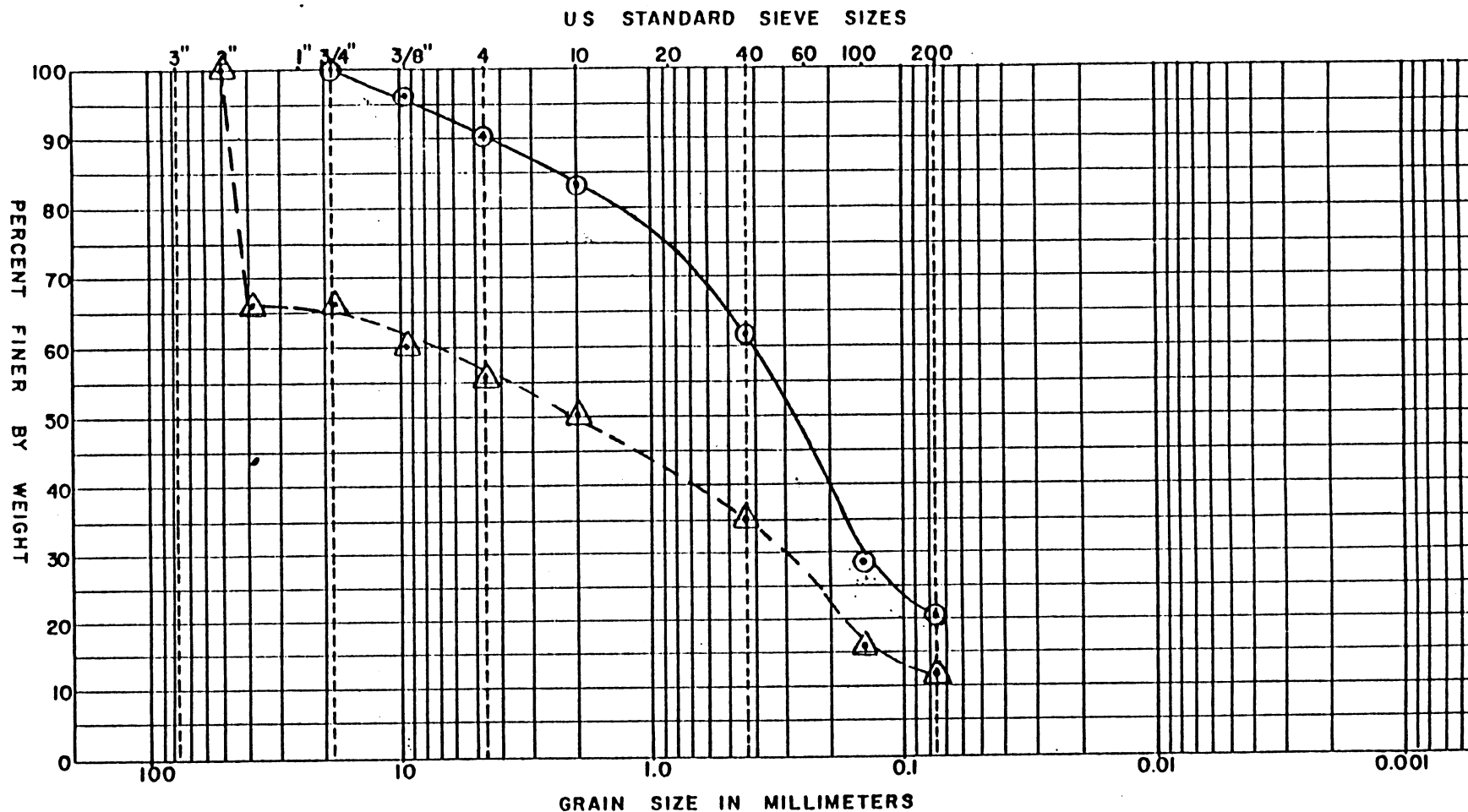
COBBLES	GRAVEL		SAND			FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-L11 SA-10 —○—	12.19m-12.34m (40'-40.5')	-	-	-	-	Brown, fine to coarse GRAVEL and fine to coarse SAND, some silt (SM)
SA-12 --△--	15.24m-15.39m (50'-50.5')	-	-	-	-	Brown, fine to coarse SAND, some fine gravel, some silt, trace clay (SM)
SA-14 ---□---	18.29m-18.59m (60'-61')	-	-	-	-	Brown, fine to coarse SAND, some silt, trace fine gravel, trace clay (SII)

Date 5/30/79
Job No. 786085

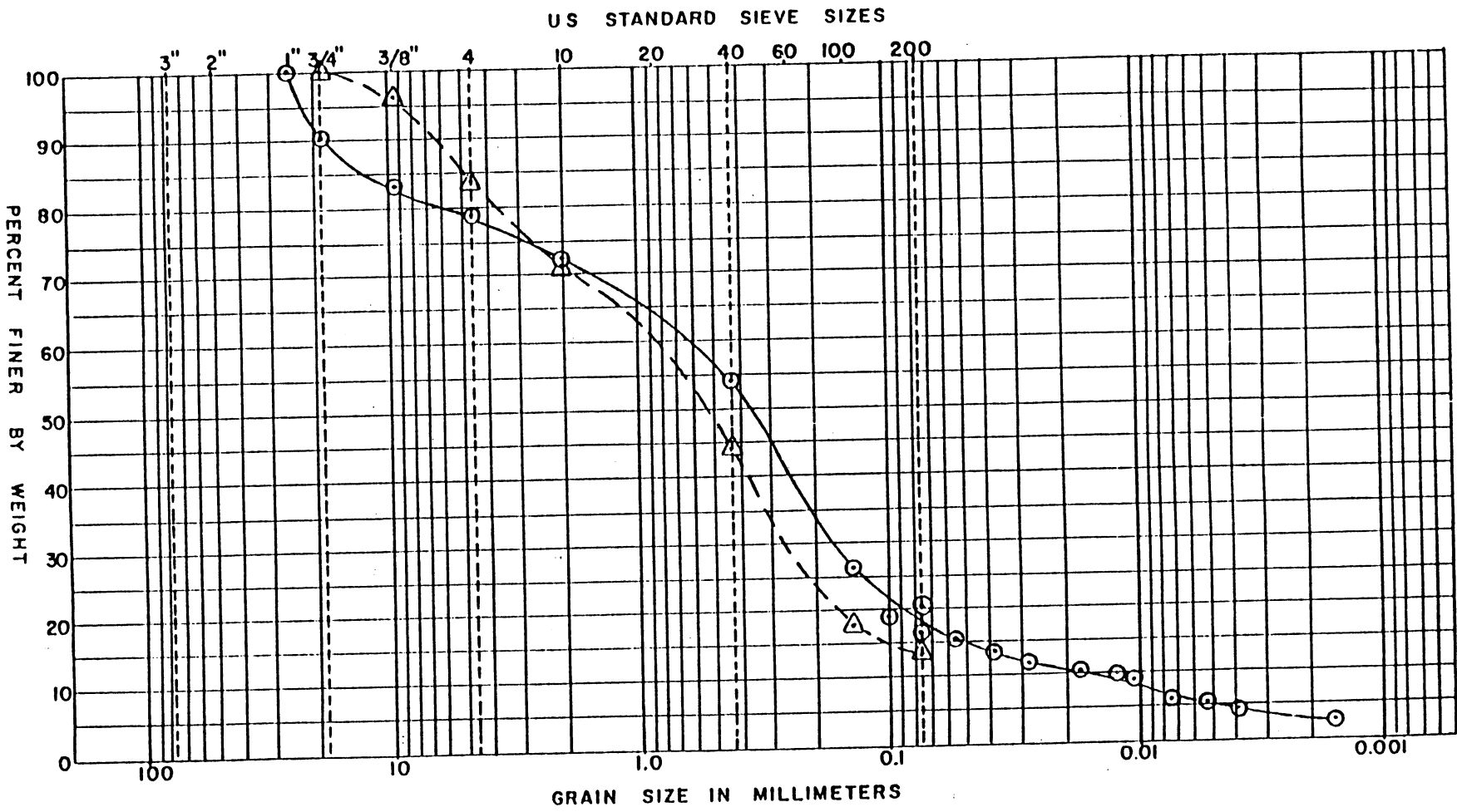
Golder Associates 3.5-17-114

Drawn AST
Checked JFC
Approved JFC



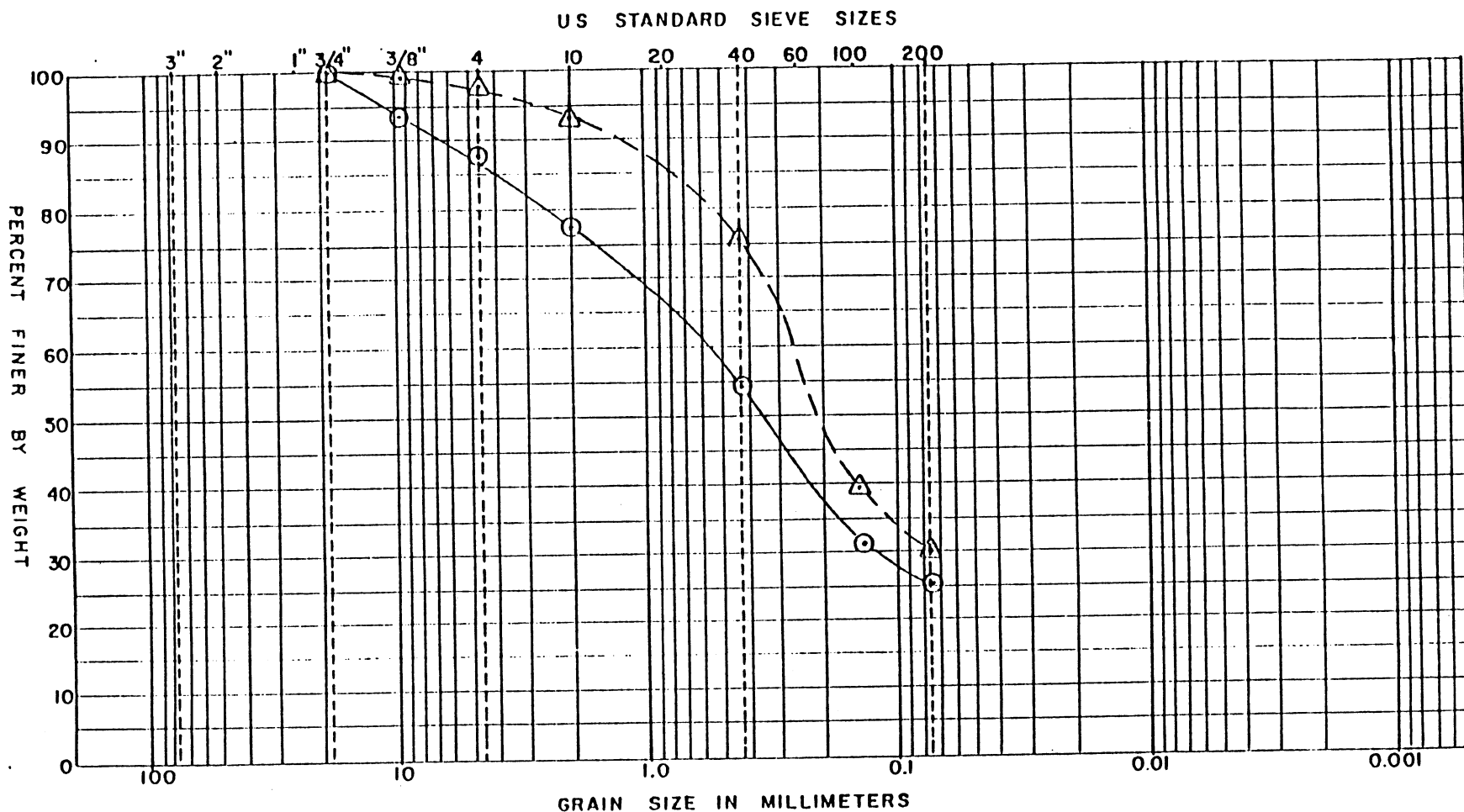
GRAIN SIZE DISTRIBUTION

FIGURE



GRAIN SIZE DISTRIBUTION

FIGURE



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

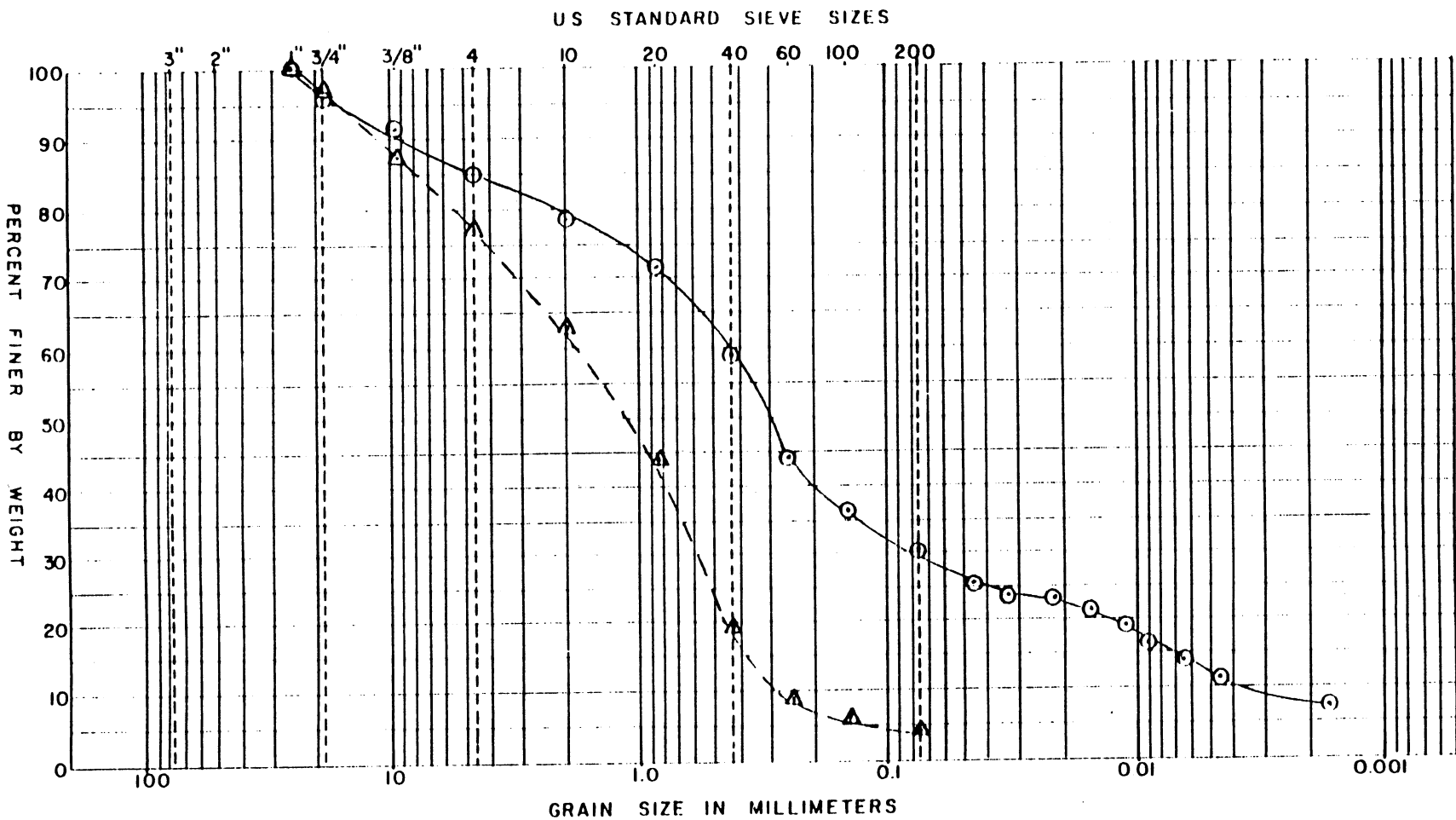
BORING NO.	ELEV. OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-L19 SA-11 ---○---	16.46m-16.61m (54'-54.5')	-	-	-	-	Brown, fine to coarse SAND, some fine gravel, some silt, trace clay (SM)
SA-12 ---△---	17.98m-18.14m (59'-59.5')	-	-	-	-	Brown, fine to coarse SAND, some silt, some clay, trace fine gravel (SM)

Date 6/14/79
 Job No. 786085
 Golden Associates 3.5-17-118
 Drawn ast
 Checked JFC
 Approved JFC

GRAIN SIZE DISTRIBUTION

BEST COPY AVAILABLE

FIGURE V2-108



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

BORING NO	ELEV OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-123 SA 8 —○—	10.67m-10.85m (35.0'-35.6')	-	-	-	-	Brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay (SM)
SA 15 —Δ—	21.34m-21.64m (70.0'-71.0')	-	-	-	-	Brown, fine to coarse gravelly, fine to coarse SAND, trace silt (SP)

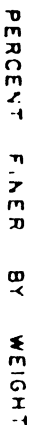
Date 1/7/83
Job No 786095

Golder Associates 3.5-17-119

Drawn JLS
Checked JLS
Approved JLS

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4
1
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1



CORBLES	GRAVEL		SAND			FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO	ELEV OR DEPTH	W _n	W _L	W _p	I _p	DESCRIPTION OR CLASSIFICATION
641-125 SA-6- SA-6	6.07m-6.55m (20.0'-21.5')	-	-	-	-	Brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay (SM)
SA-14- 	19.81-20.12 (65.0'-66.0')	-	-	-	-	Brown, fine to coarse SAND, and fine to coarse GRAVEL, trace silt (SW)

Date 1/1/80
Job No 10000

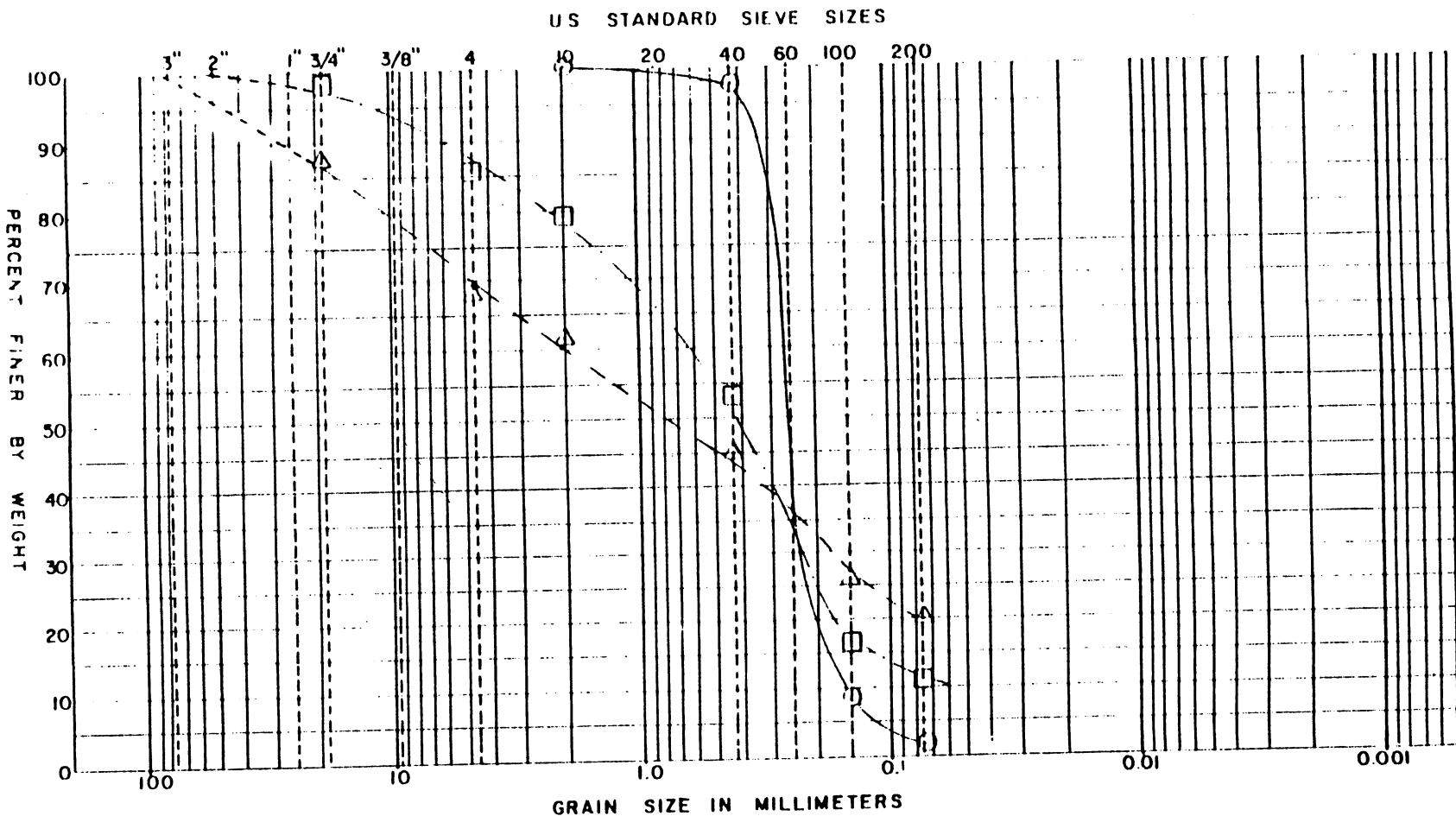
Golder Associates 3.5-17-120

Drawn 3/15
Checked MSB
Reviewed APL

GRAIN SIZE DISTRIBUTION

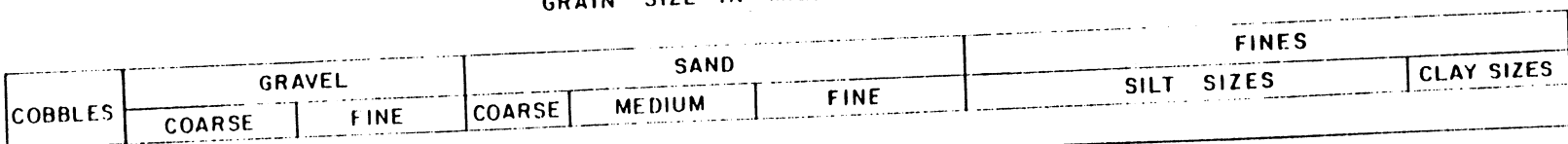
BEST COPY AVAILABLE

FIGURE V2-110



1100

FIGURE V2-111

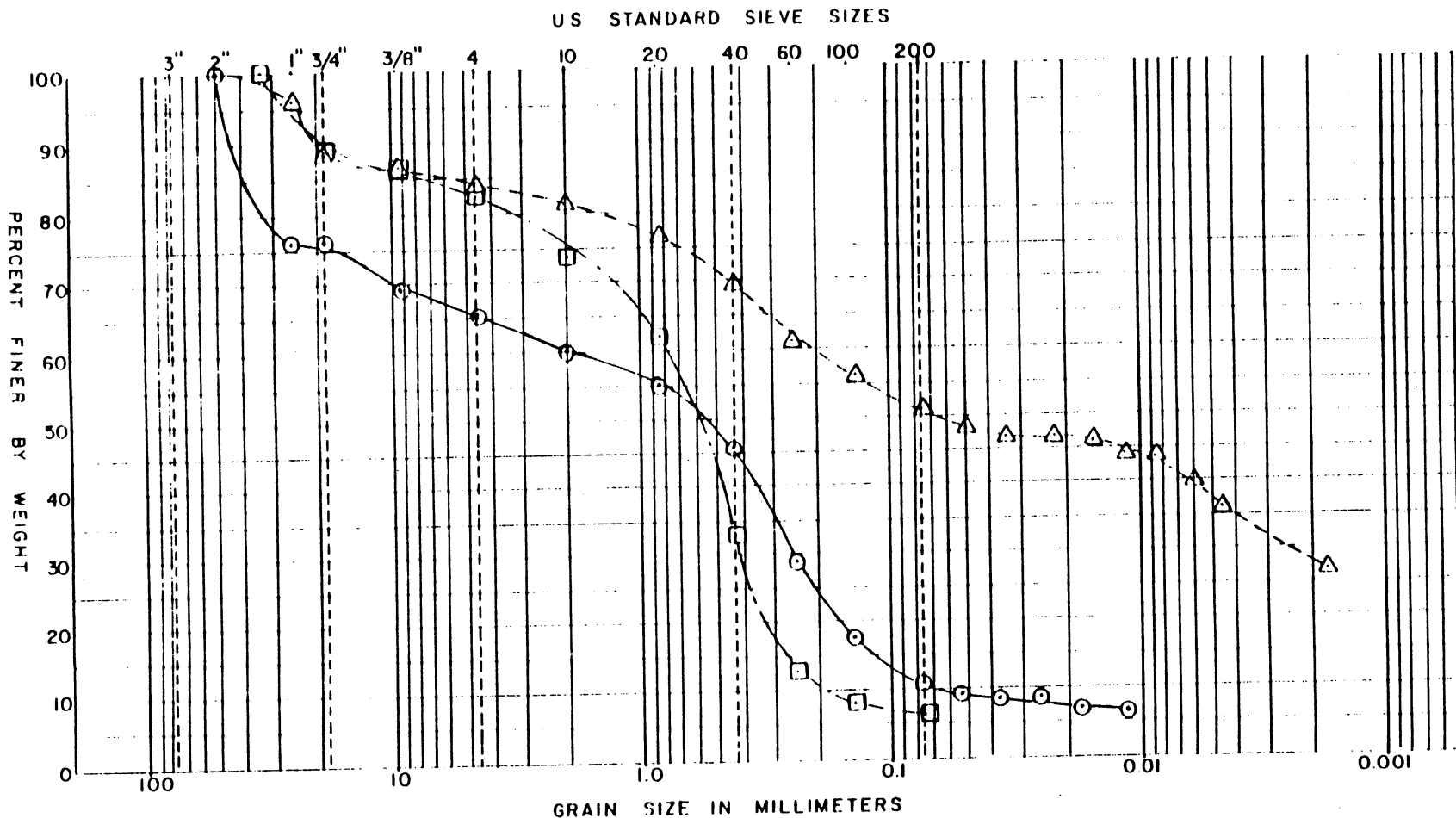


Date 7-7-60
Job No 736055

Golder Associates 3.5-17-122

Drawn Jis

Checked _____
Approved [Signature]



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

BORING NO	ELEV OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-N21	3.05m-3.51m	-	-	-	-	Brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt (SP-SM)
SA 3 —○—	(10.0'-11.5')	-	-	-	-	
SA 17 —△—	24.08m-24.54m	-	-	-	-	Brown, clayey, silty fine to coarse SAND, some fine to coarse gravel (ML-CL)
	(79.0'-80.5')	-	-	-	-	
SA 26 —□—	45.72m-45.87m	-	-	-	-	Brown, fine to coarse SAND, some fine to coarse gravel, trace silt (SP)
	(150.0'-150.5')	-	-	-	-	

Date 1/7/80
Job No 736085

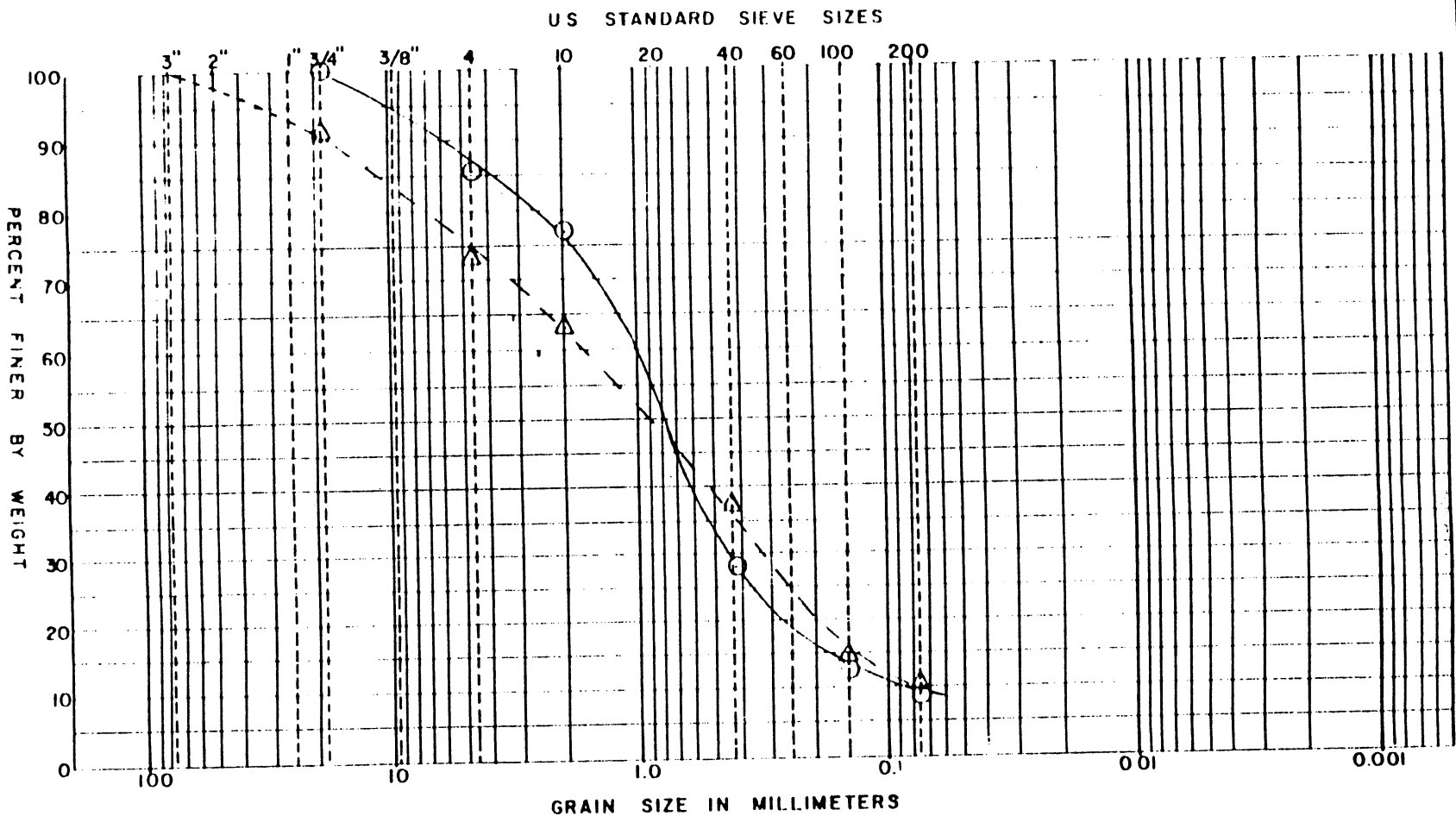
Golder Associates 3.5-17-123

Drawn JIS
Checked JP
Approved JP

GRAIN SIZE DISTRIBUTION

BEST COPY AVAILABLE

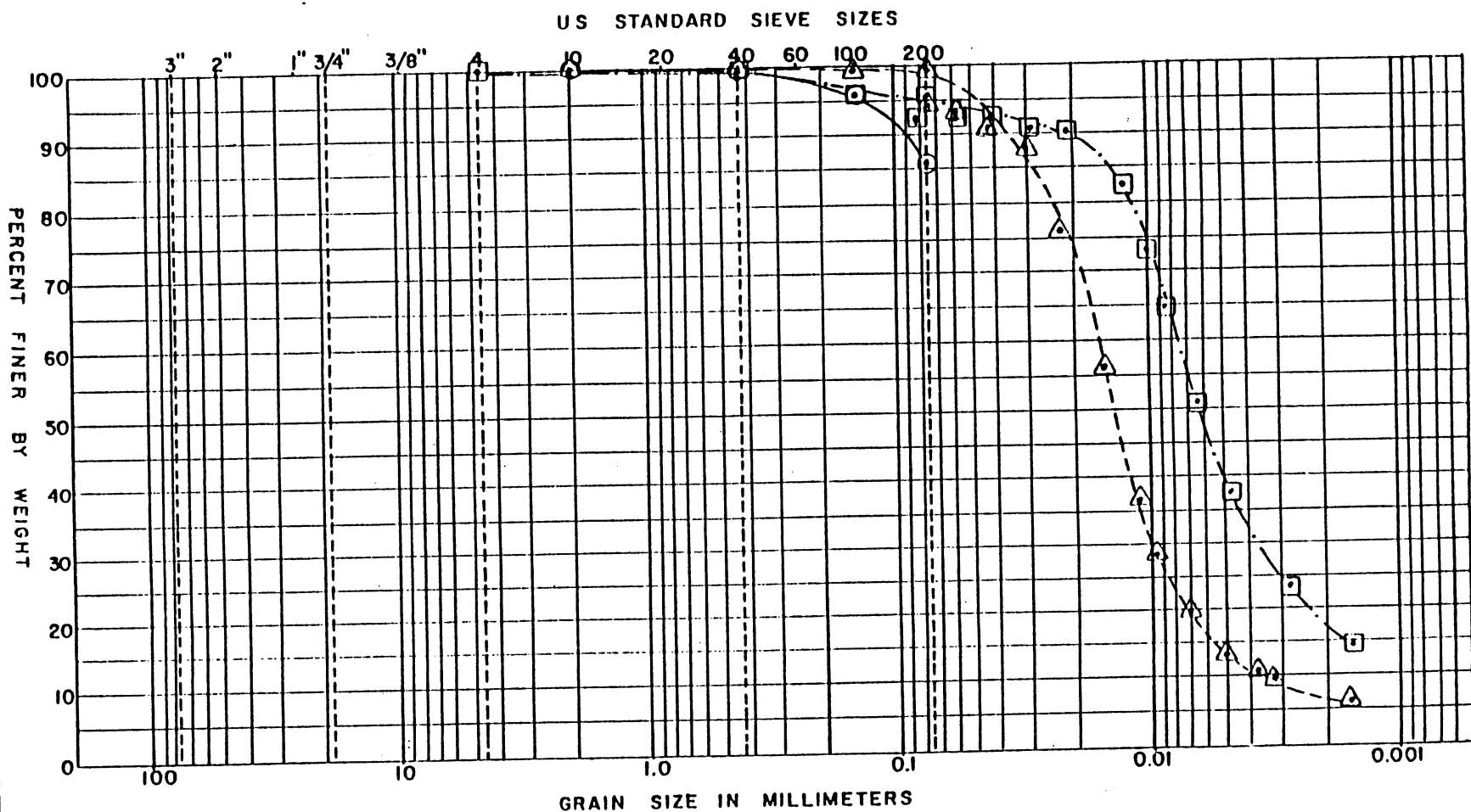
FIGURE V2-113



Date 5/30/79
Job No. 786085

Golder Associates 3.5-17-125

Drawn AST
Checked JFC
Approved JFC

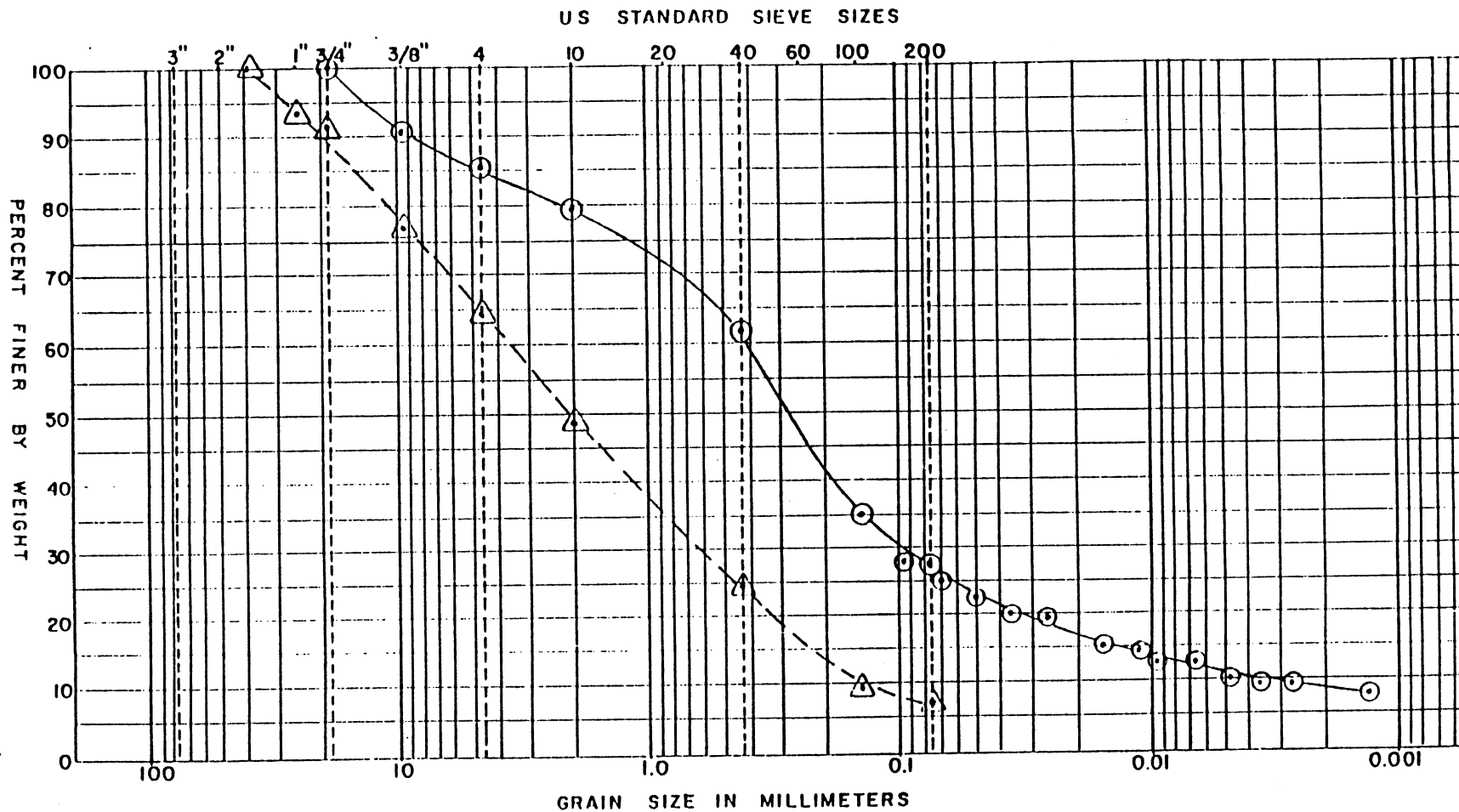


COBBLES	GRAVEL		SAND			FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-P18 SA-2 —○—	1.52m-1.98m (5'-6.5')	-	-	-	-	Brown, SILT, trace fine sand, trace clay (ML)
SA-5 --△--	6.10m-6.55m (20'-21.5')	-	-	-	-	Light brown, SILT, trace fine sand, trace clay (ML)
SA-6 ---□---	7.62m-8.08m (25'-26.5')	-	36	24	12	Red-brown, SILT, some clay, trace fine sand (ML)

GRAIN SIZE DISTRIBUTION

FIGURE



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

BORING NO.	ELEV. OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-P18 SA-10	13.72m-14.17m (45'-46.5')	-	-	-	-	Red-brown, fine to coarse SAND, some fine gravel, some silt, trace clay (SM)
SA-12	16.76m-17.22m (55'-56.5')	-	-	-	-	Red-brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt (SP-SM)

Date 5/30/79
Job No. 786085

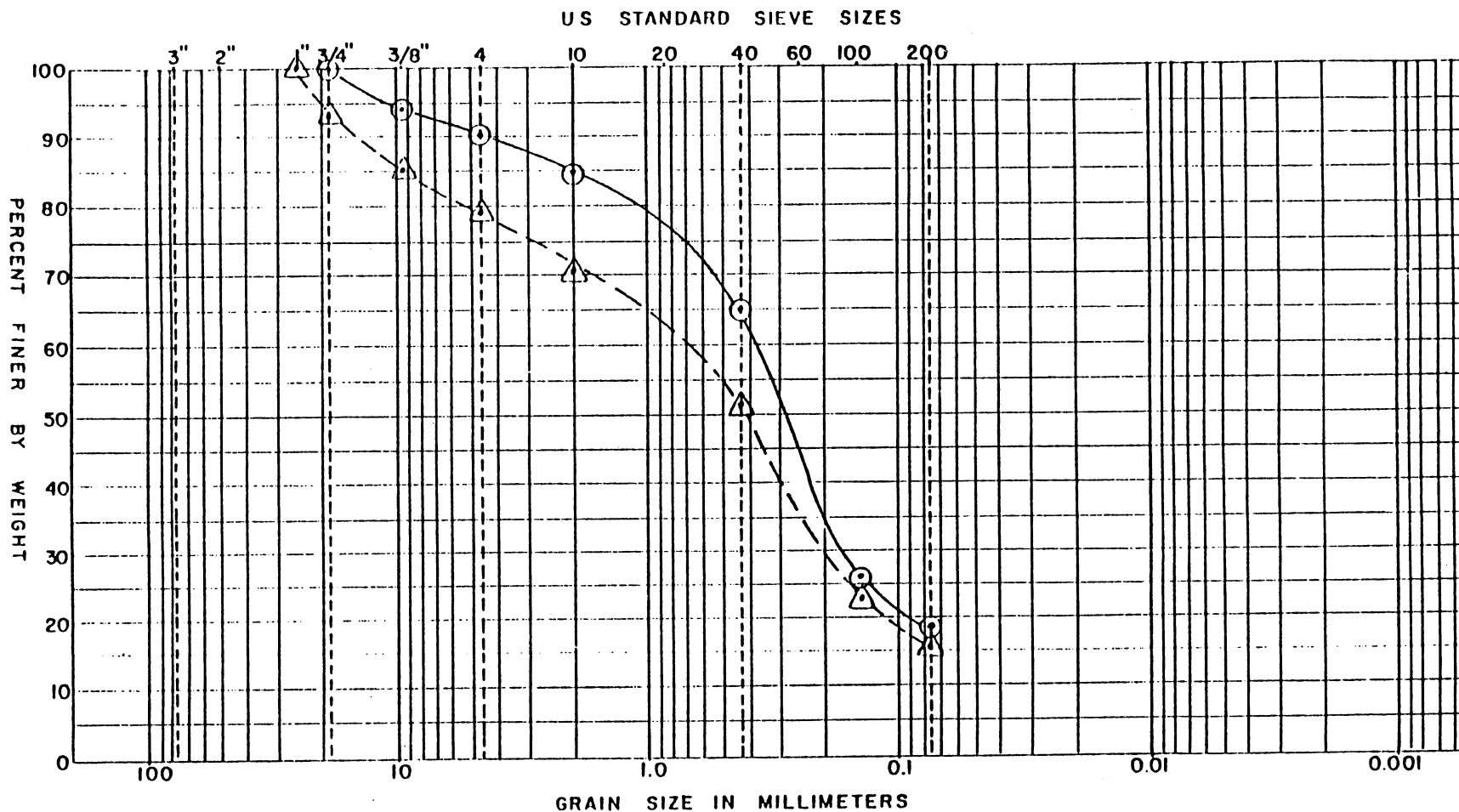
Golder Associates 3.5-17-126

Drawn AST
Checked JFC
Approved JFC

Date 5/30/79
Job No 786035

Golder Associates 3.5-17-127

Drawn AST
Checked JFC
Approved JFC



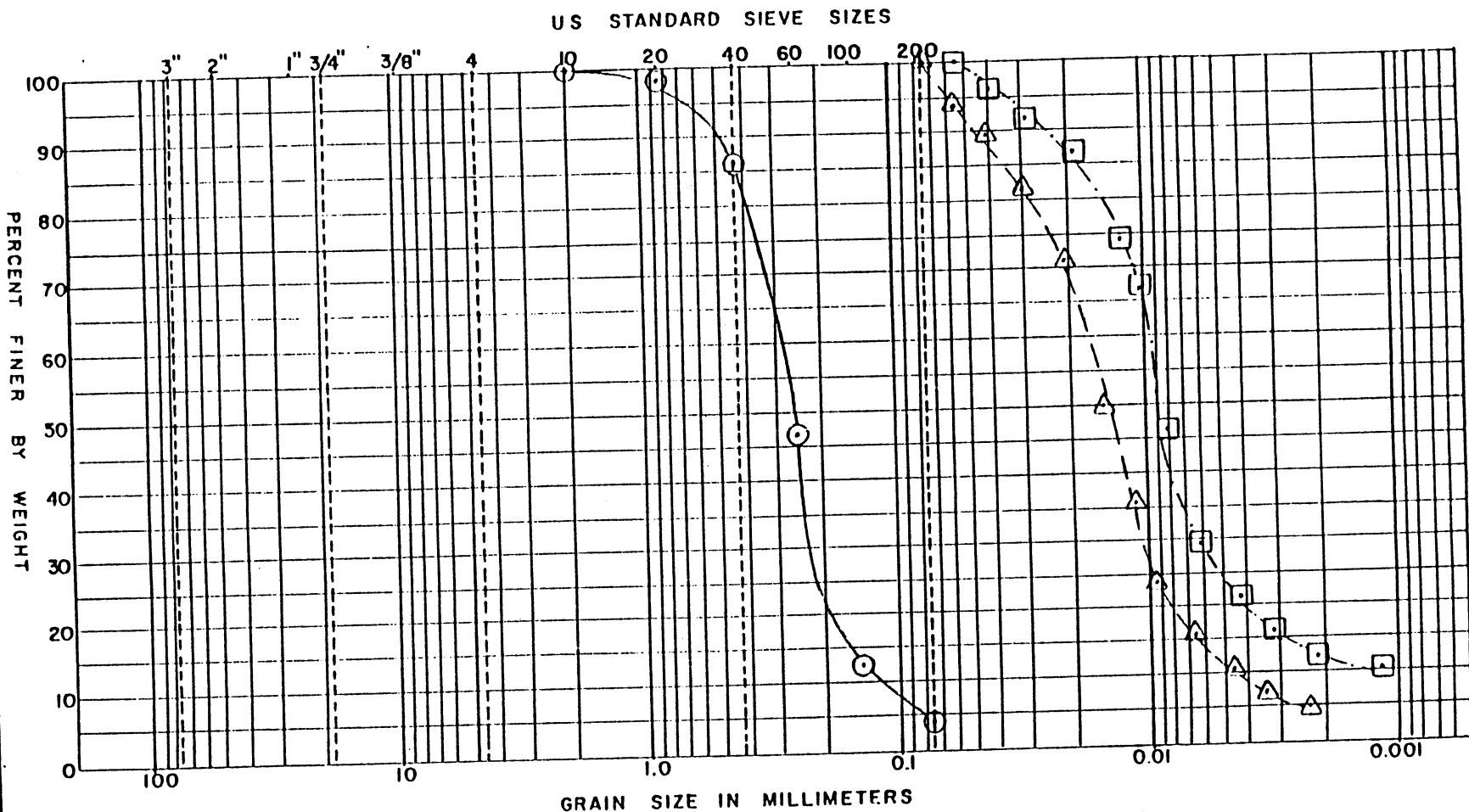
COBBLES	GRAVEL		SAND			FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV. OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-P18 SA-20	28.96m-29.41m (95'-96.5')	-	-	-	-	Red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay (SM)
SA-21	30.48m-30.79m (100'-101')	-	-	-	-	Red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay (SM)

GRAIN SIZE DISTRIBUTION

FIGURE

GRAIN SIZE DISTRIBUTION



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

BORING NO.	ELEV. OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-P18B SA-2	1.37m-1.83m (4.5'-6.0')	-	-	-	-	Red-brown, fine to medium SAND, trace silt (SP)
SA-3	8.99m-9.45m (29.5'-31.0')	-	-	-	-	Light brown, SILT, trace clay (ML)
Tube	5.94m-6.55m (19.5'-21.5')	-	NP	NP	NP	SILT, some clay (ML)

FIGURE

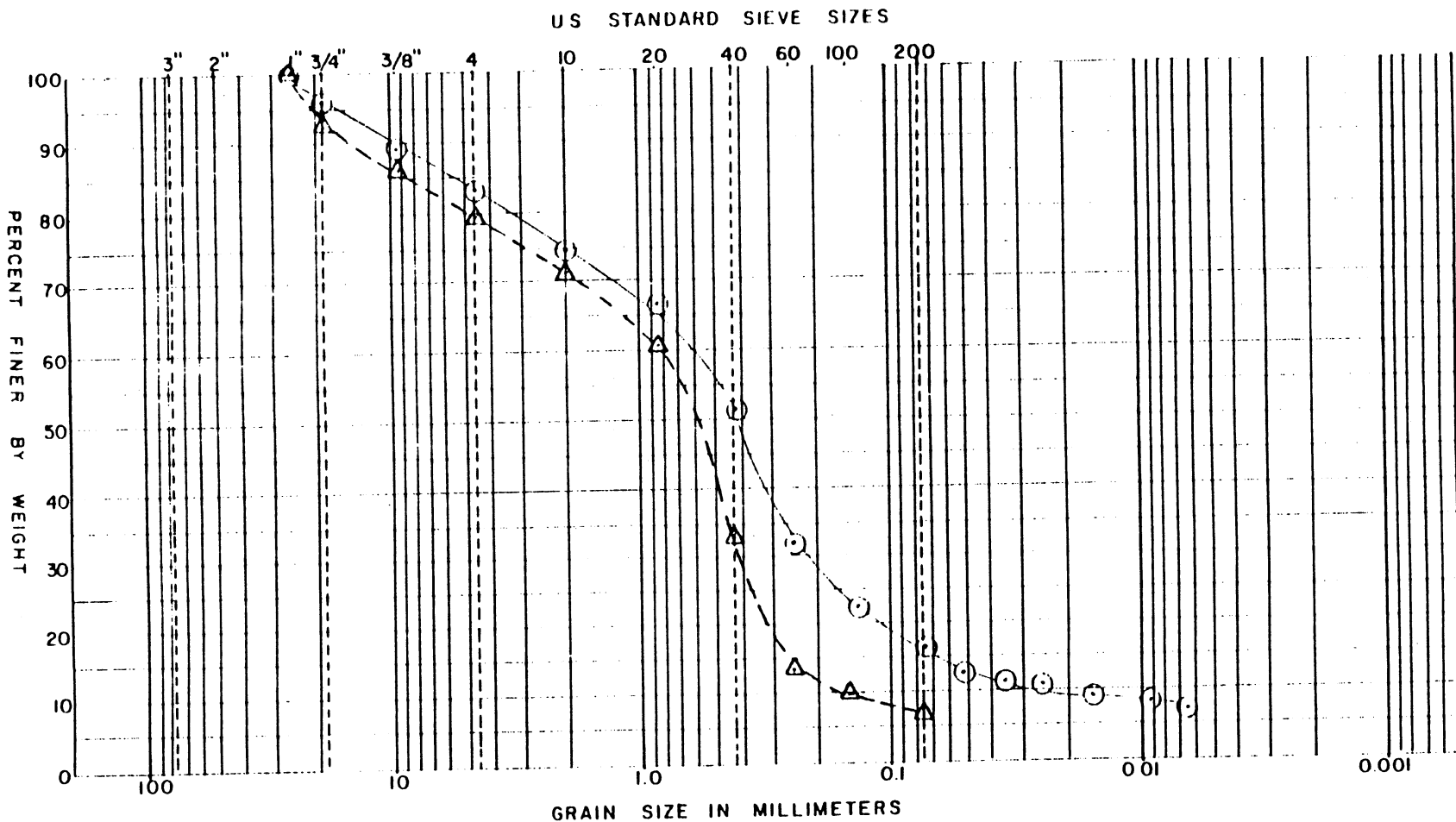
Date 6/7/79
Job No. 786035

Golder Associates 3.5-17-128

Drawn JLS
Checked JFC
Approved JFC

GRAIN SIZE DISTRIBUTION

FIGURE V2-115



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

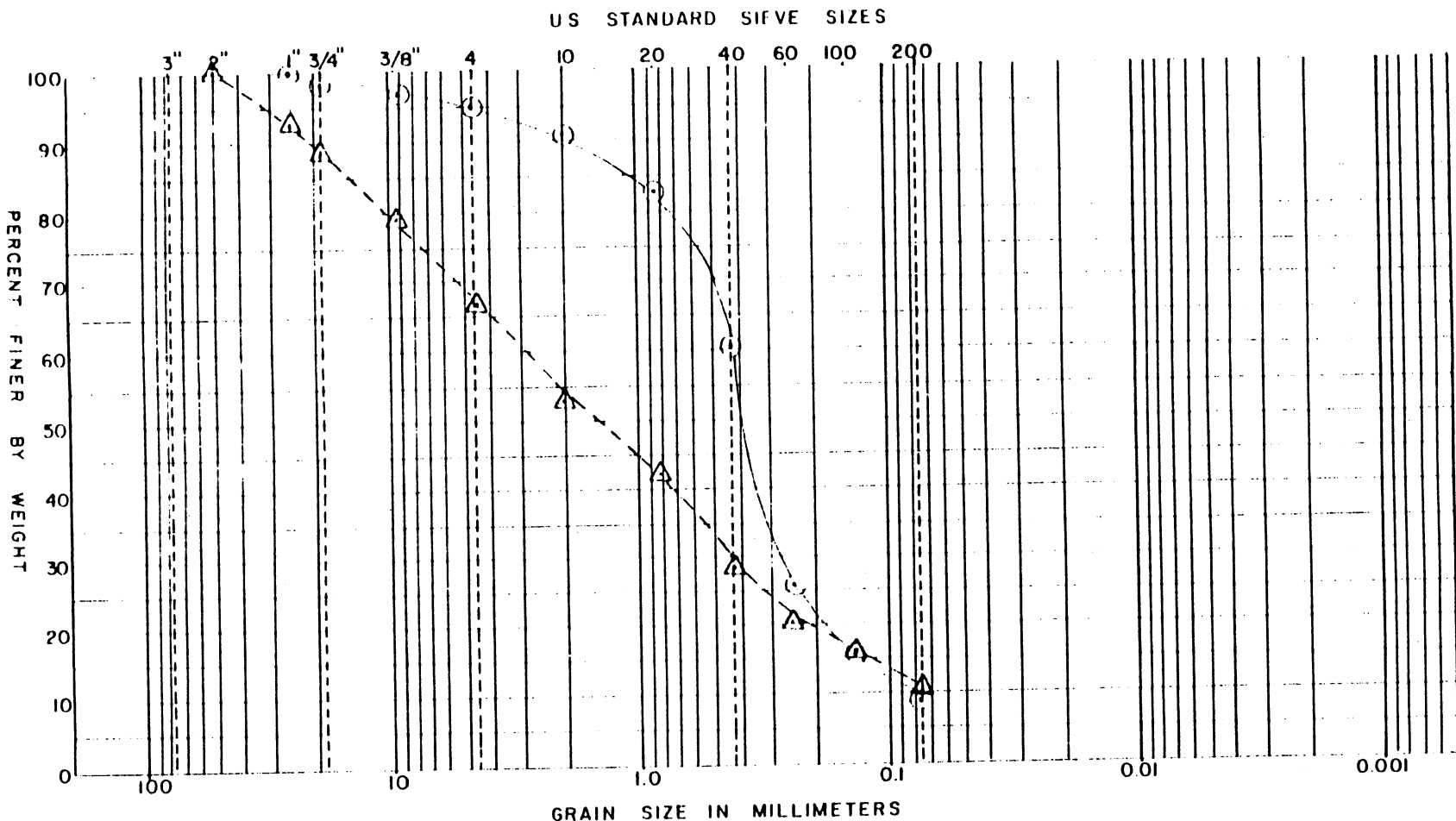
BORING NO	ELEV OR DEPTH	w_n	w_L	w_p	I_p	DESCRIPTION OR CLASSIFICATION
G41-P24 SA 4 	4.5m-5.93m (15.0'-16.5')	-	-	-	-	Brown, fine to coarse gravelly, fine to coarse SAND, trace silt (SP-SM)
SA 7 	9.14m-9.51m (30.0'-31.2')	-	-	-	-	Brown, fine to coarse SAND, some fine to coarse gravel, some silt (SM)

Date 1-7-80
Job No 786035

Golder Associates 3.5-17-129

Drawn JLS
Checked M. E. L.
Approved [Signature]

GRAIN SIZE DISTRIBUTION



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

BORING NO	ELEV OR DEPTH	w _n	w _L	w _p	I _p	DESCRIPTION OR CLASSIFICATION
G41-P24 SA 23 —○—	35.05m-35.36m (115.0'-116.0')	-	-	-	-	Light brown, fine to coarse SAND, trace fine gravel, trace silt (SP-SM)
SA 26B —△—	45.72m-46.02m (150.0'-151.0')	-	-	-	-	light brown, fine to coarse gravelly, fine to coarse SAND, some silt (SW-SM)

FIGURE V2-119

Date 1-7-80
Job No 756085

Golder Associates 3.5-17-130

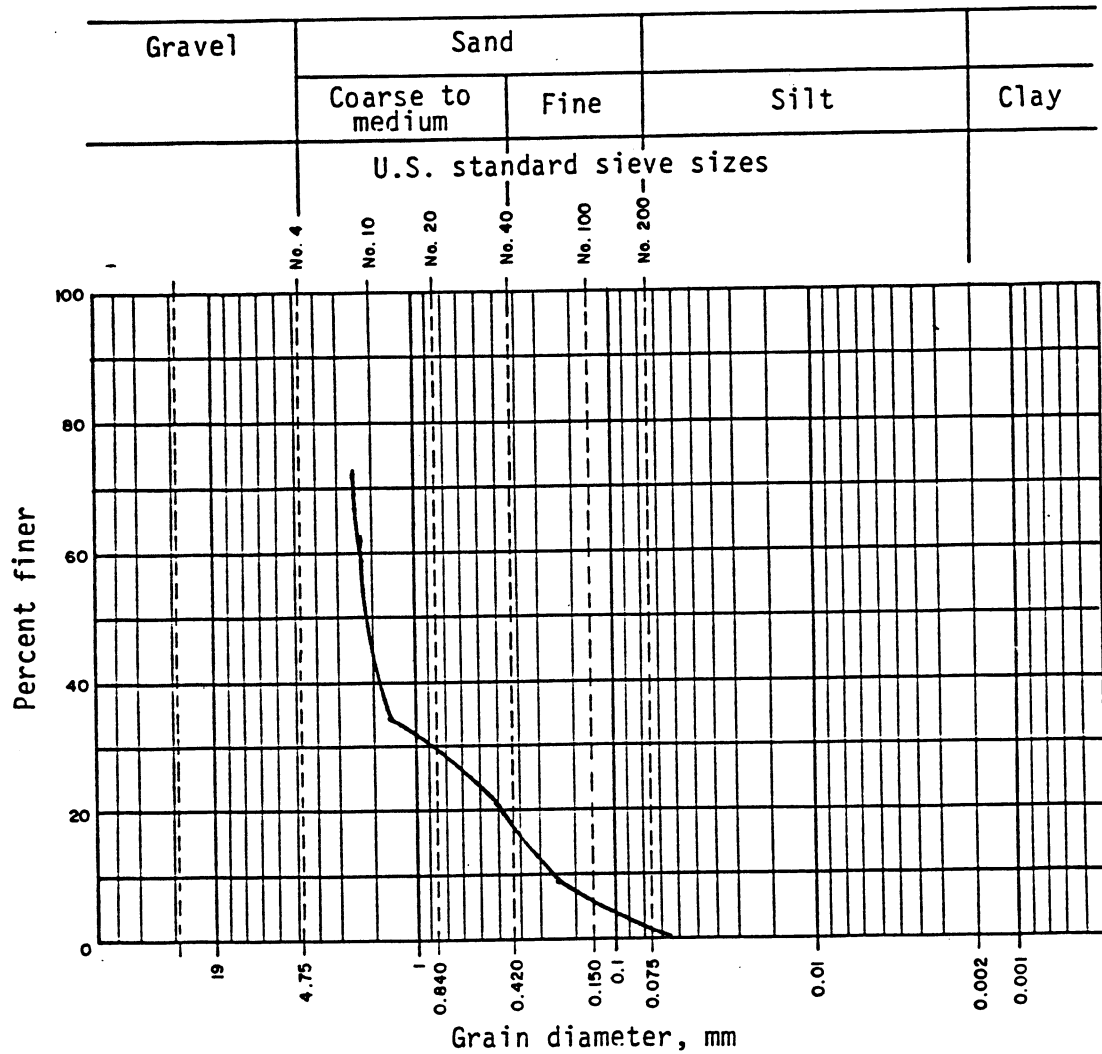
Drawn JLS
Checked P. J. S.
Approved [Signature]

Appendix 3.5-18

**Grain Size Curves From 1981 Camp, Dresser & McKee CDM Series Borings
(211, 213, 216 & WW Boring)**

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-1 Sample No. 8
 Tested By R.O & D.W Depth of Sample 44-45'
 Date of Testing AUGUST 1981



Soil classification:

SP System USCS

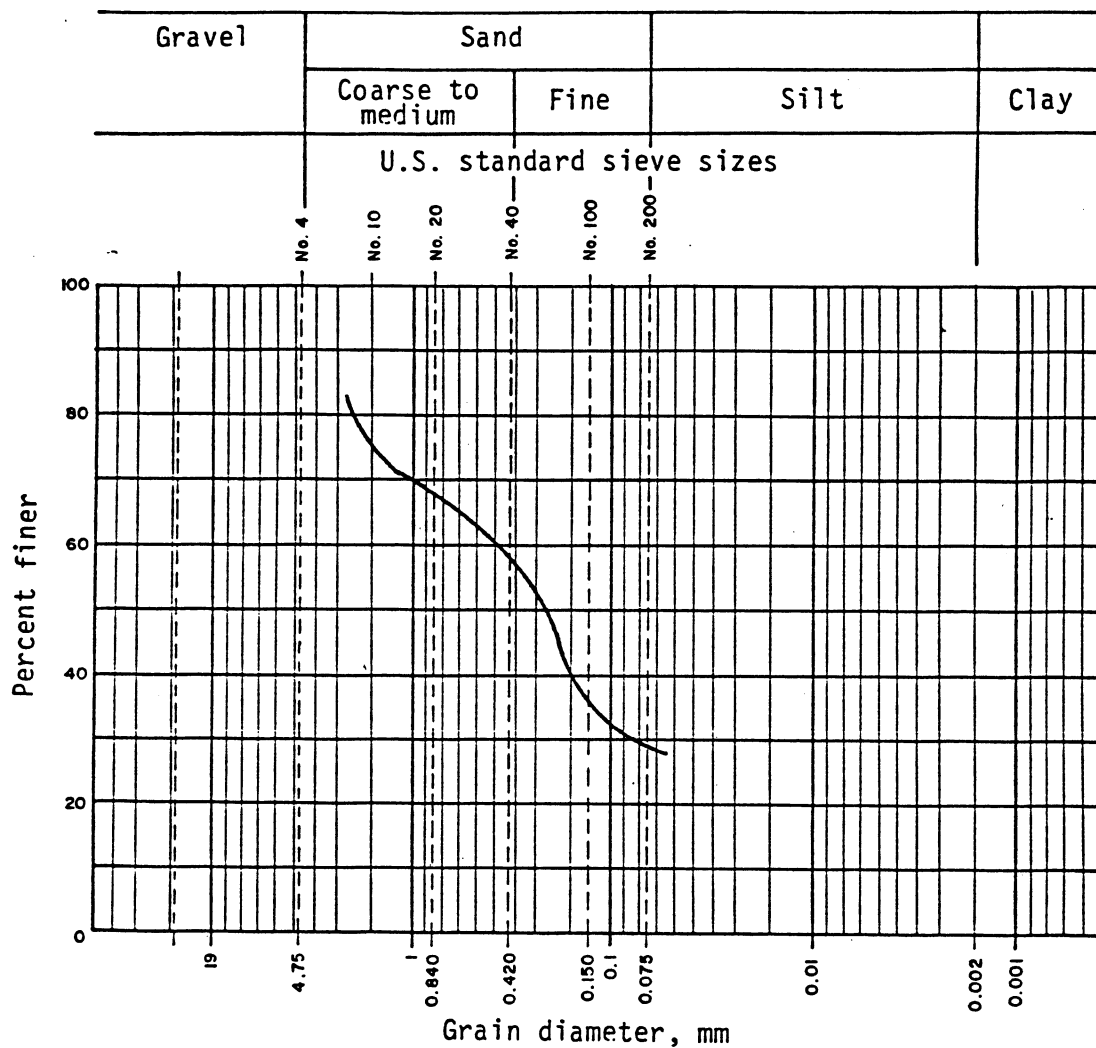
GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208

Location of Project CRANDON Boring No. 211-1 Sample No. 11

Tested By R.O & D.W Depth of Sample 64-65'

Date of Testing AUGUST 1981

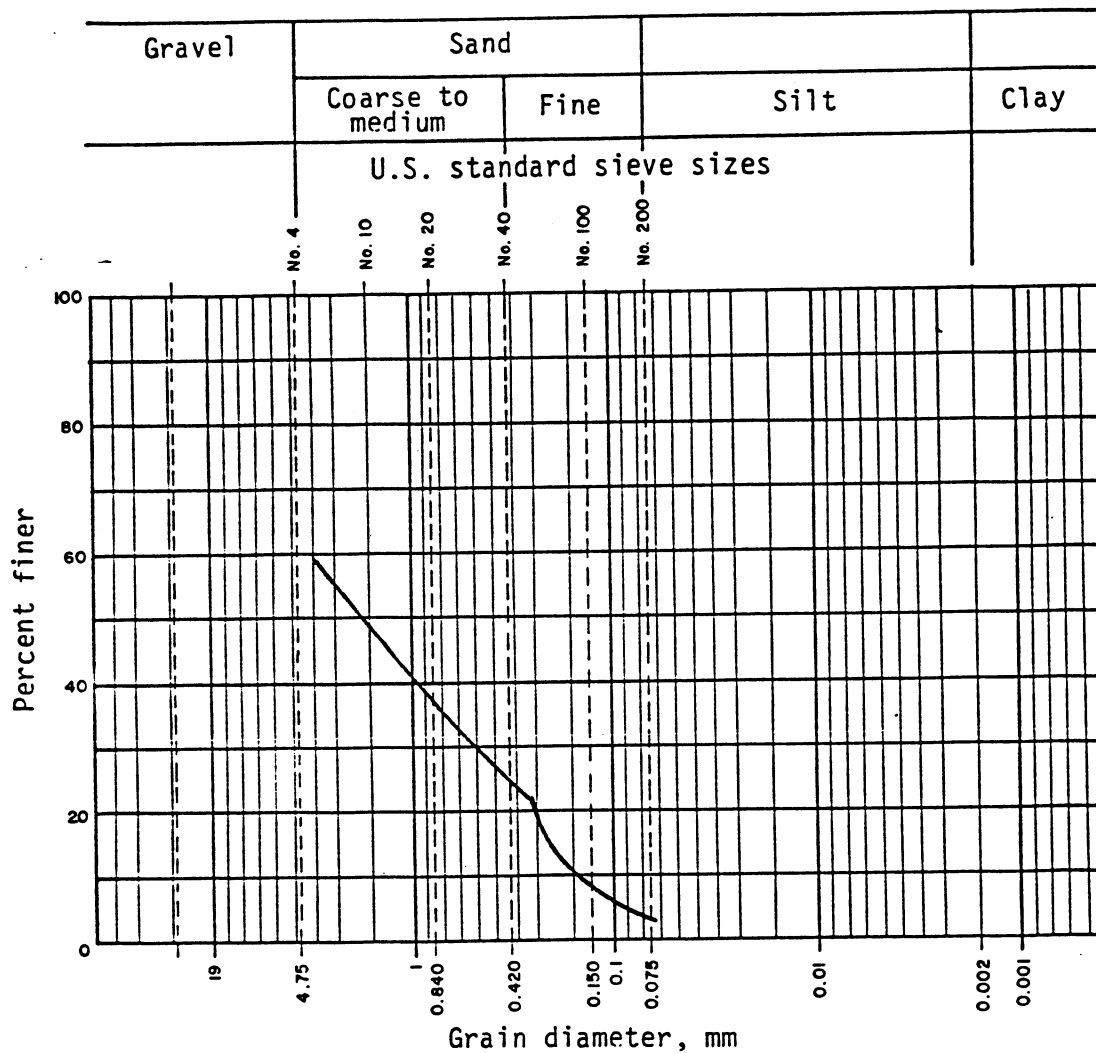


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-1 Sample No. 15
 Tested By D.W & R.O Depth of Sample 84-85
 Date of Testing AUGUST 1981



Soil classification:

SP System USCS

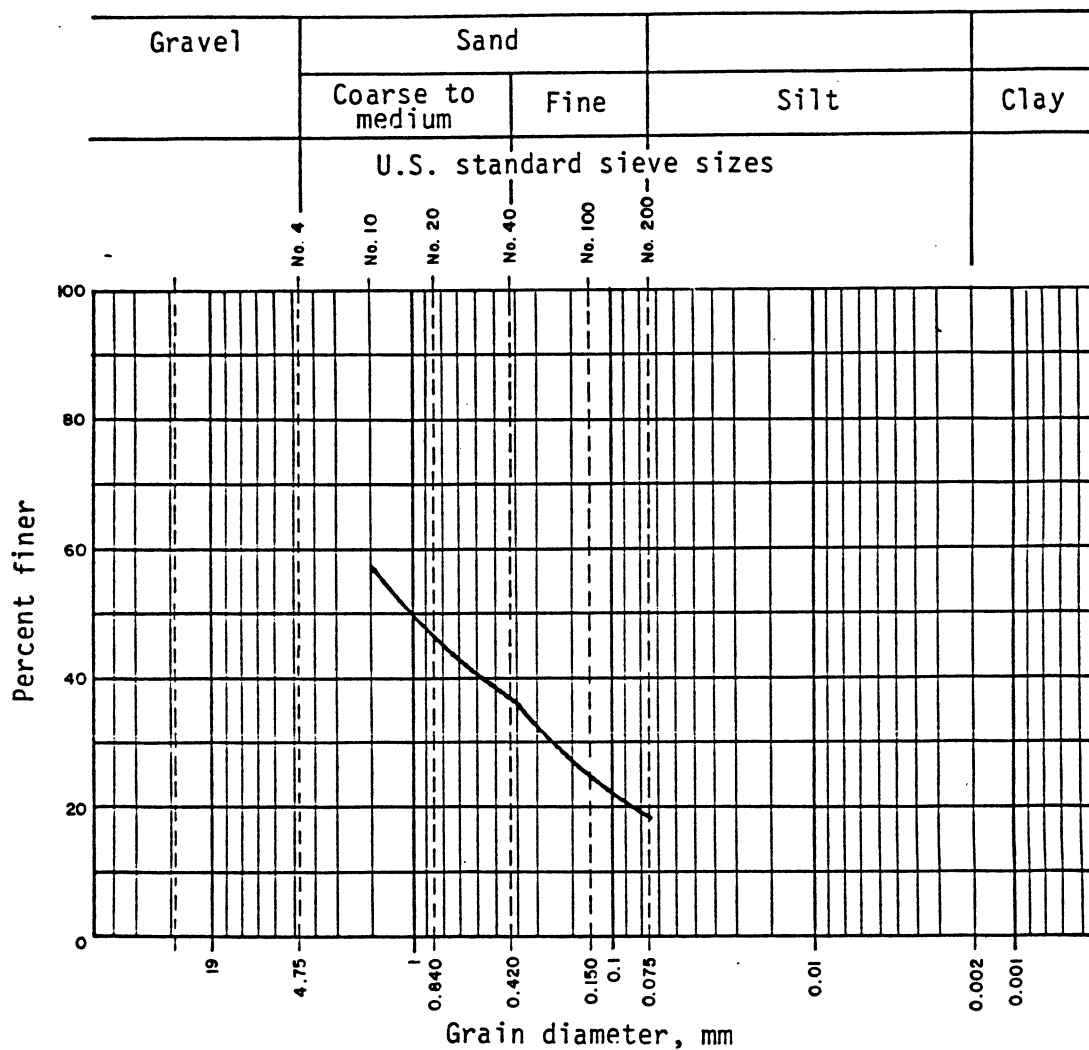
GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208

Location of Project CRANDON Boring No. 211-1 Sample No. 18

Tested By R.O & D.W Depth of Sample 109-110'

Date of Testing AUGUST 1981

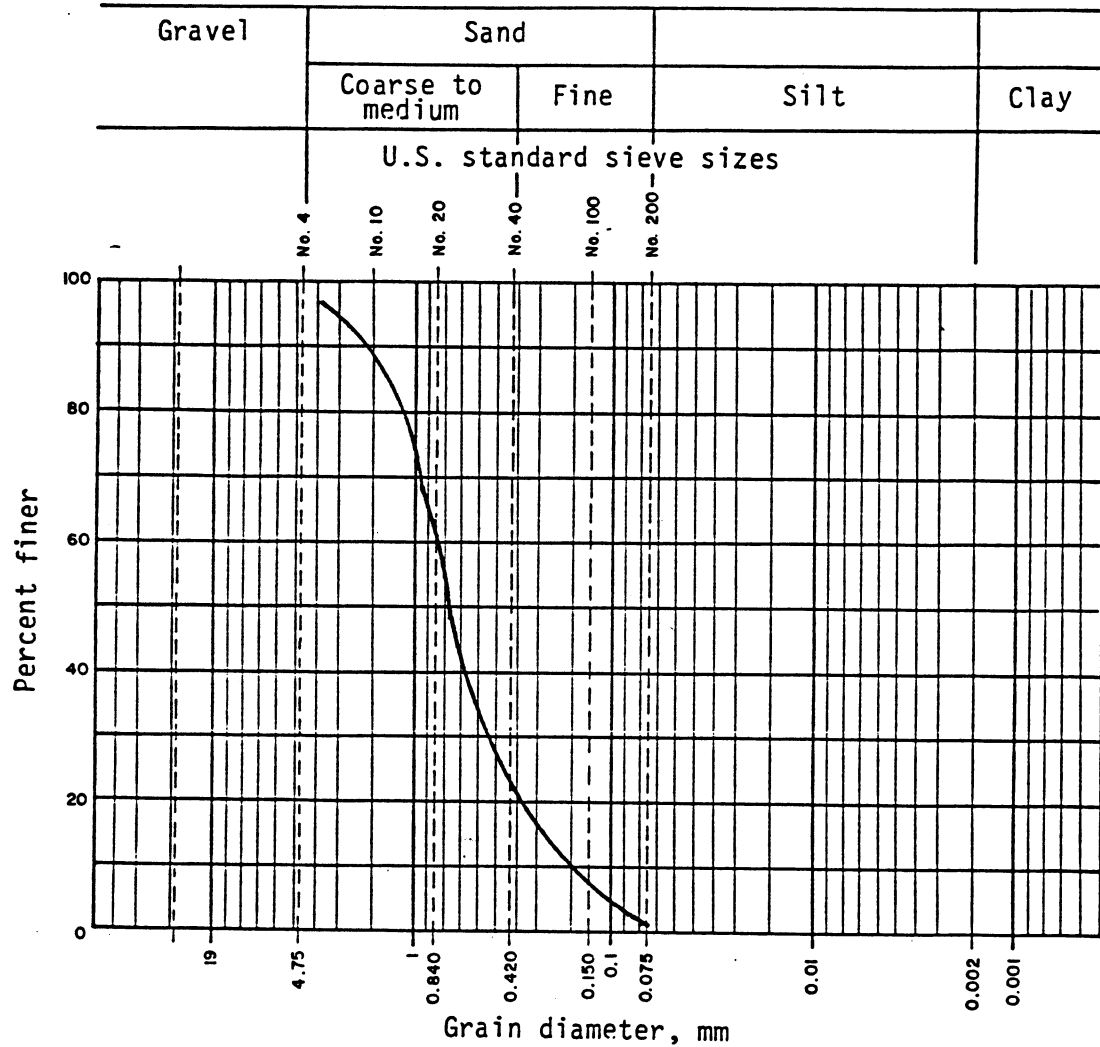


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job No. 1208
 Location of Project CRANDON Boring No. 211-1 Sample No. 20
 Tested By D.W & R.O Depth of Sample 129-130'
 Date of Testing AUGUST 1981

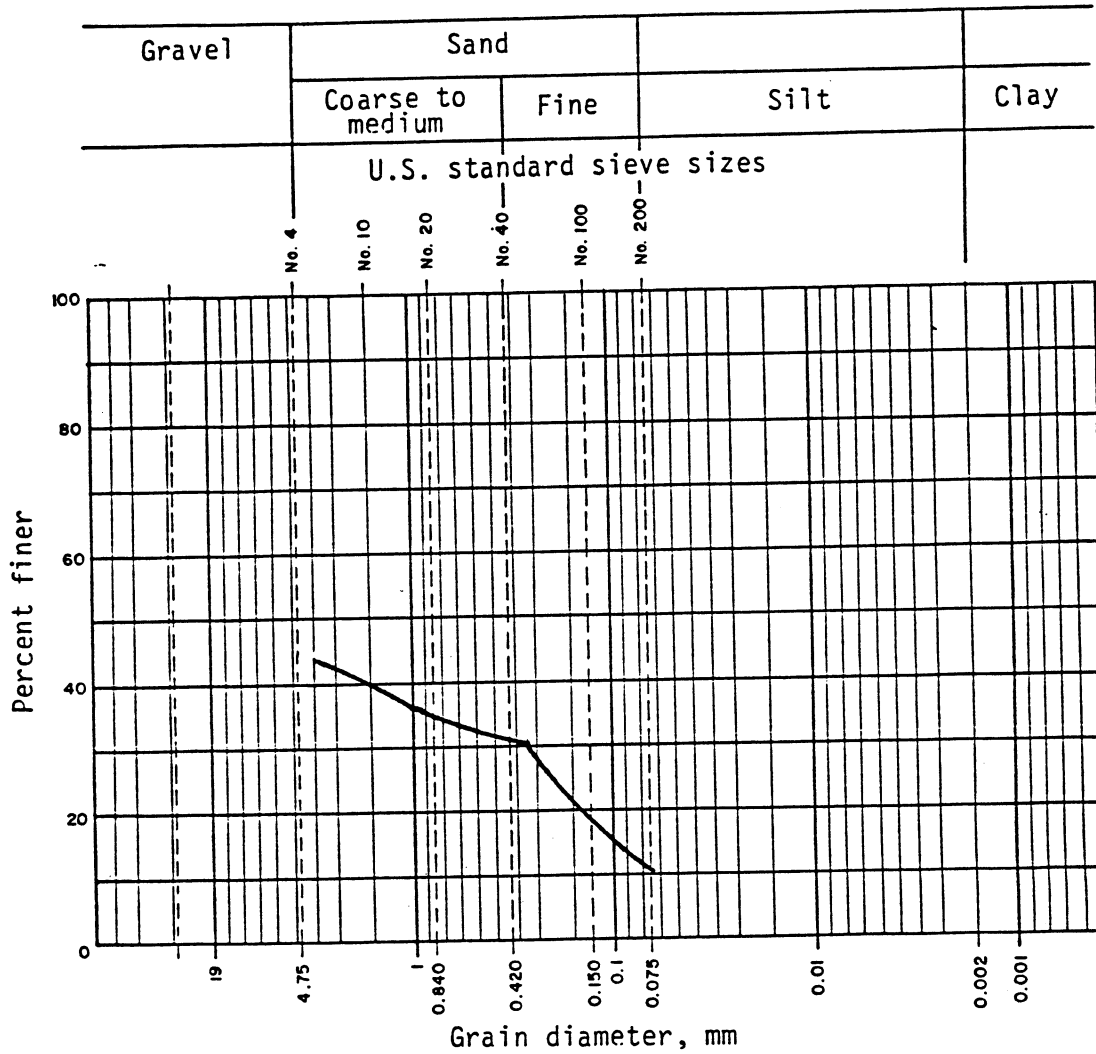


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-1 Sample No. 22
 Tested By R.O & D.W Depth of Sample 149-150'
 Date of Testing AUGUST 1981



Soil classification:

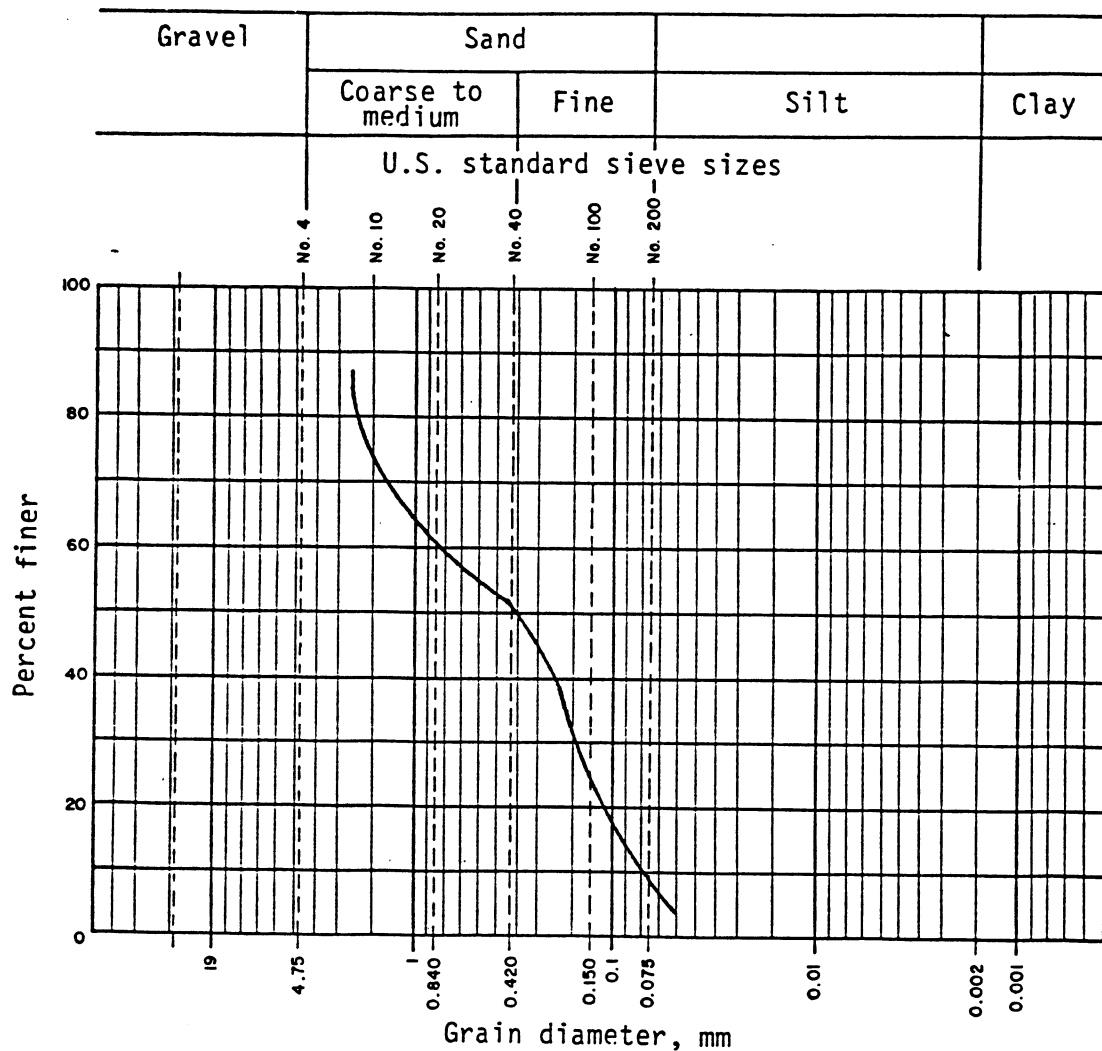
SM System USCS

GRAIN SIZE DISTRIBUTION

 Project EXXON Job. No. 1208

 Location of Project CRANDON Boring No. 211-1 Sample No. 24

 Tested By D.W & R.O Depth of Sample 169-170'

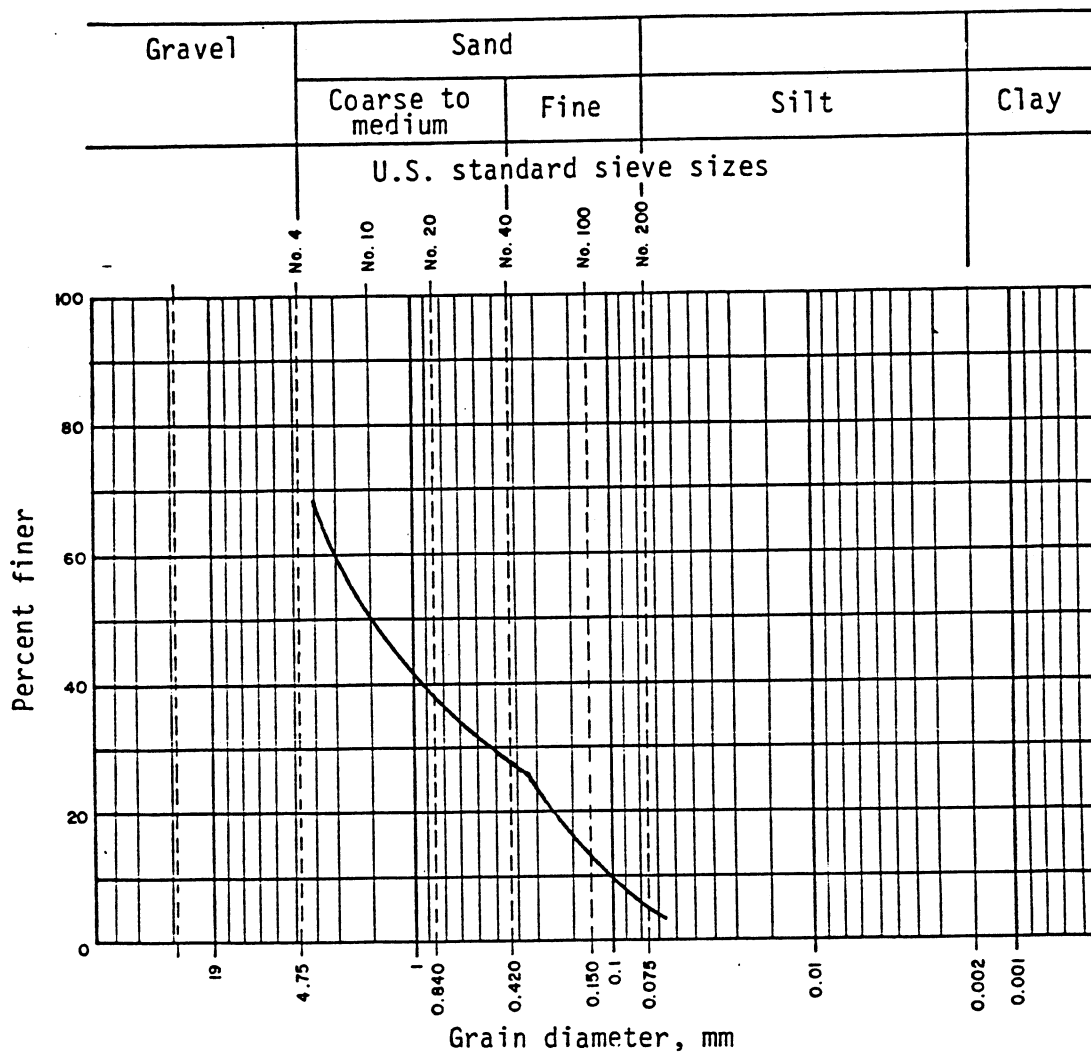
 Date of Testing AUGUST 1981


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-1 Sample No. 25
 Tested By D.W & R.O Depth of Sample 179-180'
 Date of Testing AUGUST 1981

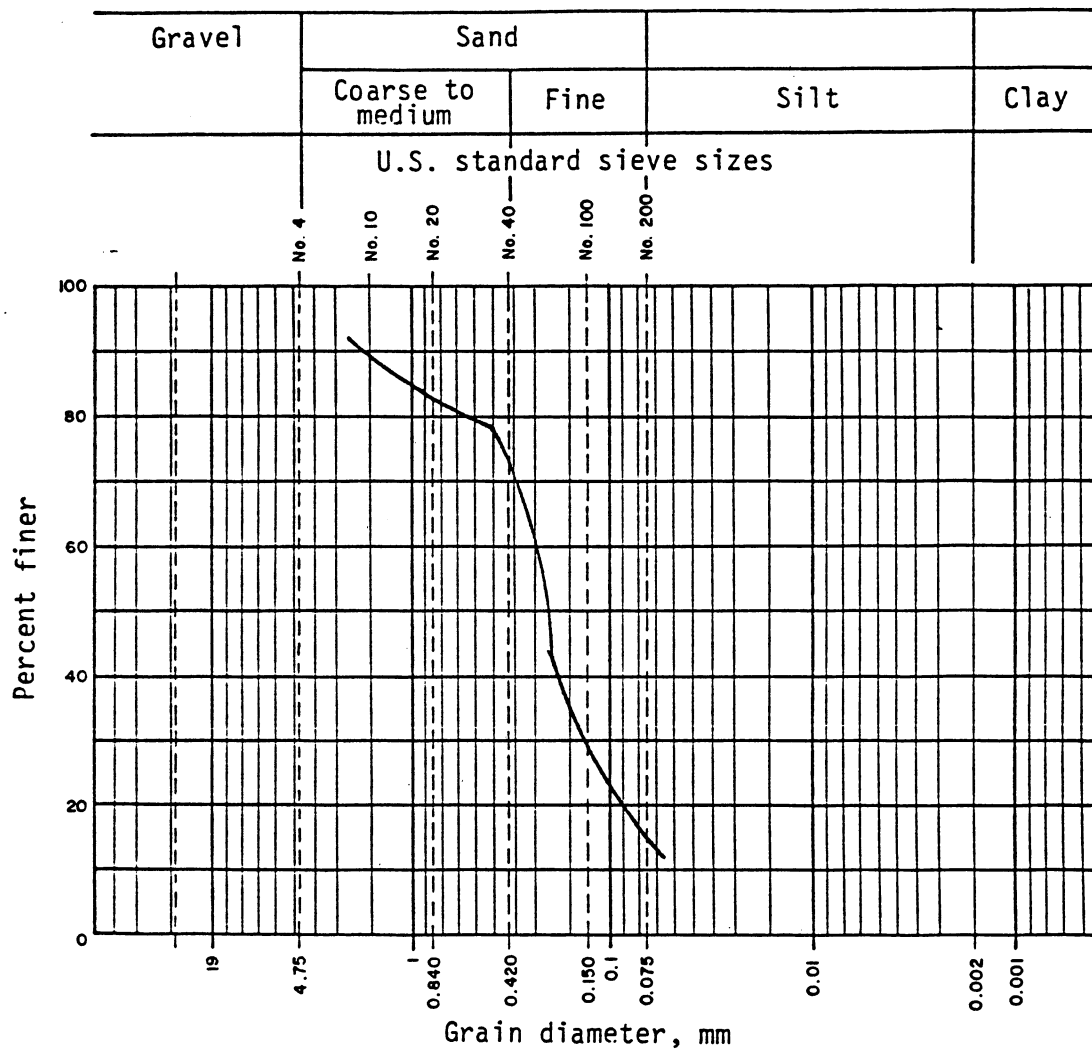


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-2 Sample No. 45
 Tested By R.O & D.W Depth of Sample 150'
 Date of Testing AUGUST 1981

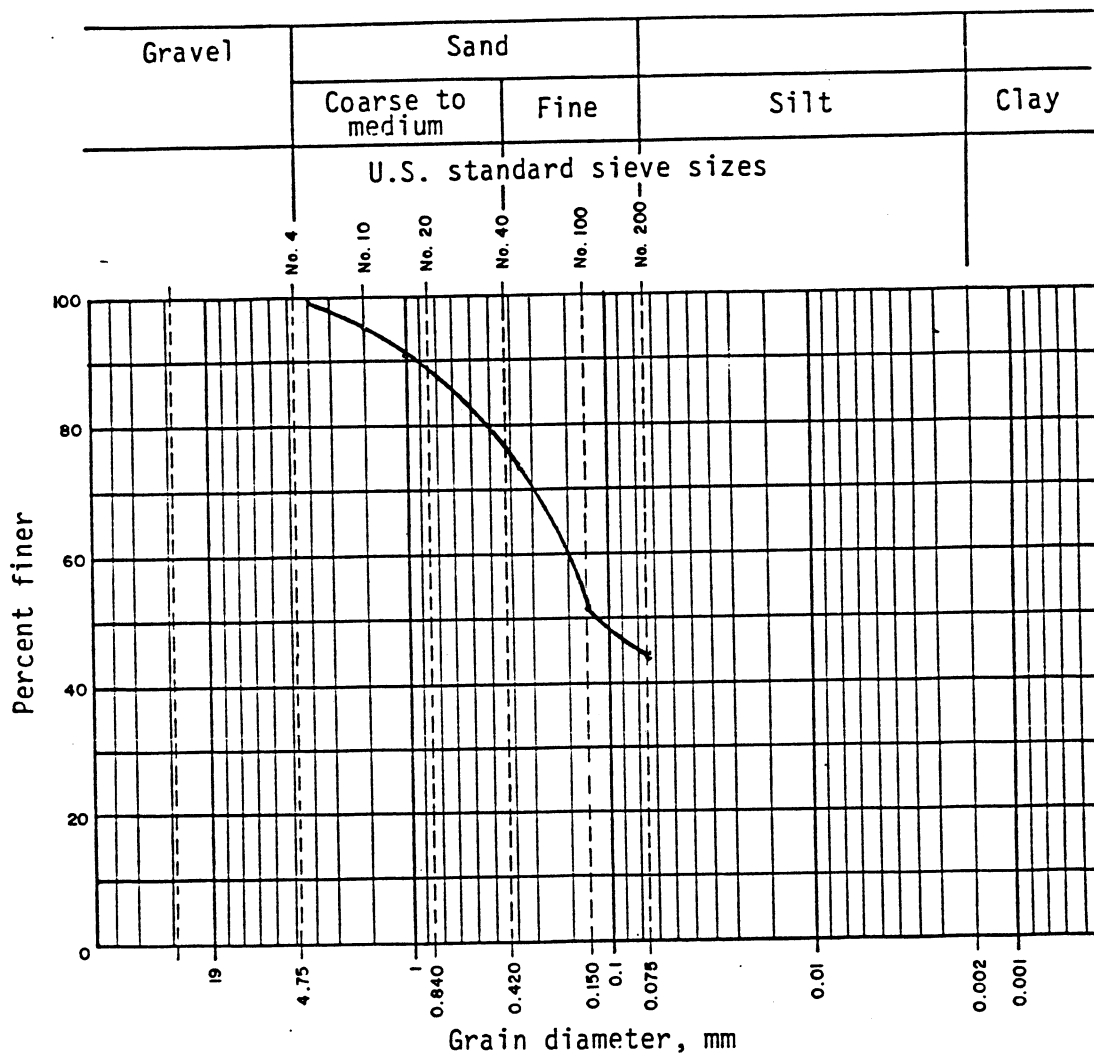


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-2 Sample No. 46
 Tested By R.O & D.W Depth of Sample 160'
 Date of Testing AUGUST 1981



Soil classification:

SM System USCS

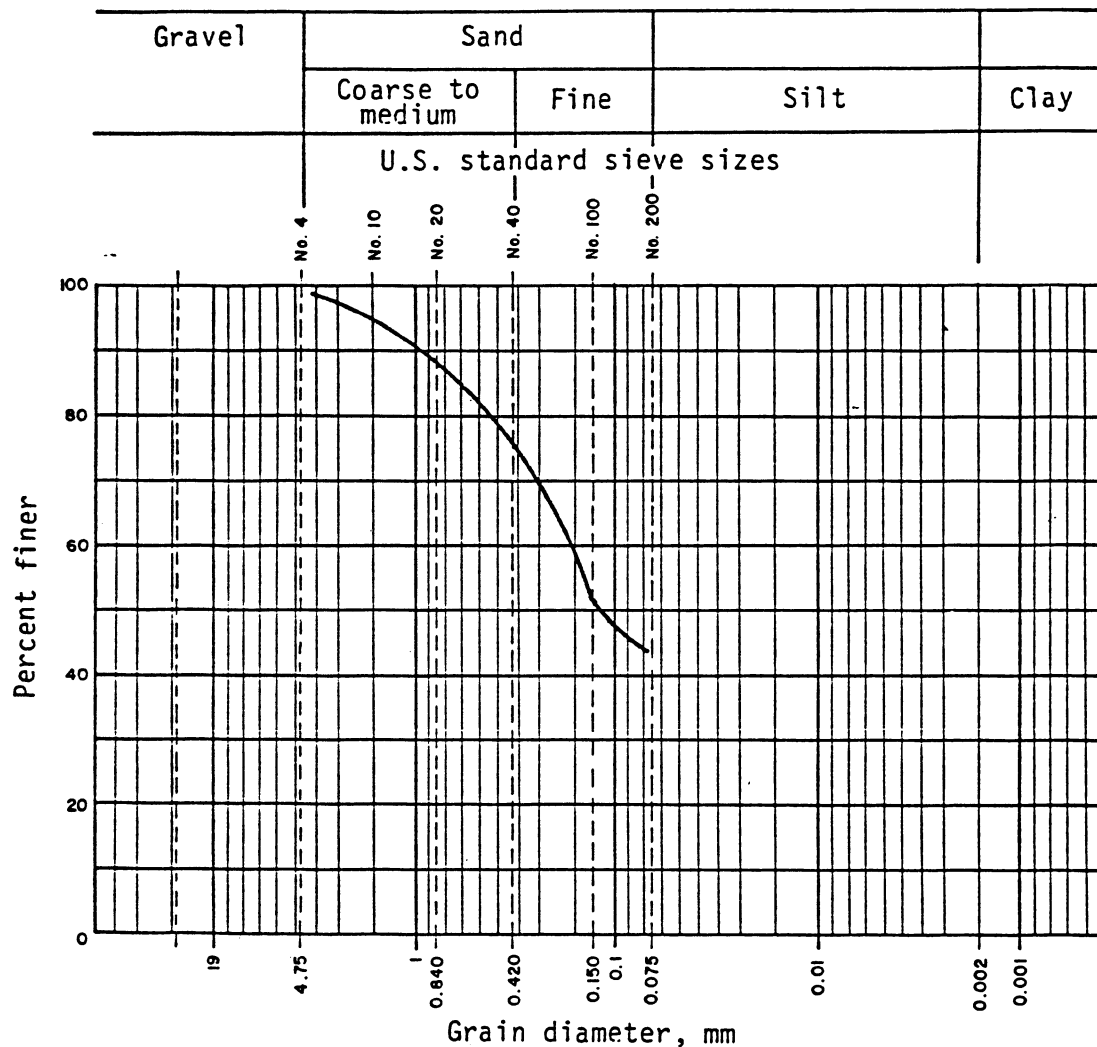
GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208

Location of Project CRANDON Boring No. 211-2 Sample No. 47

Tested By R.O & D.W Depth of Sample 170'

Date of Testing AUGUST 1981

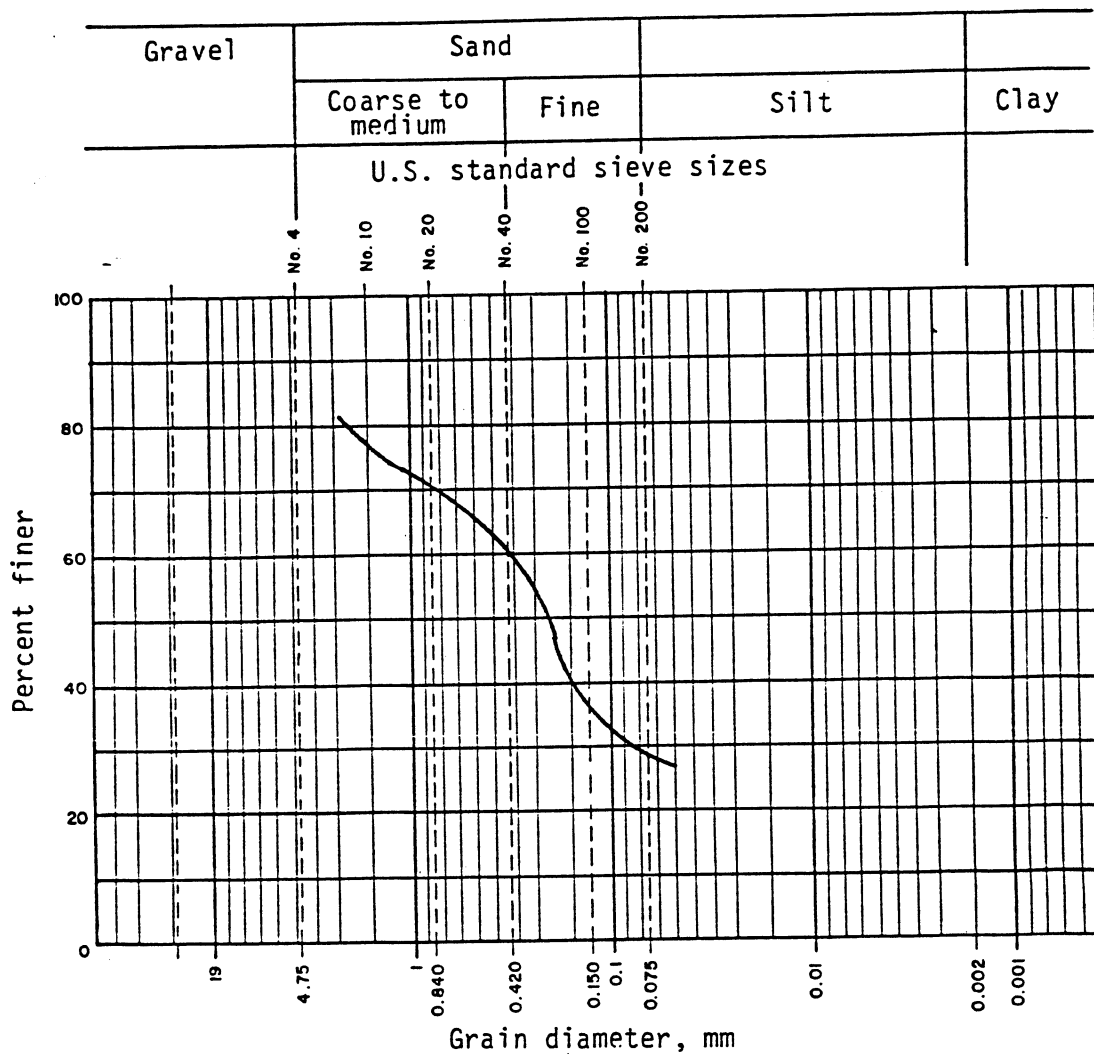


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-2 Sample No.
 Tested By D.W. & R.O Depth of Sample 185'
 Date of Testing AUGUST 1981



Soil classification:

SM System USCS

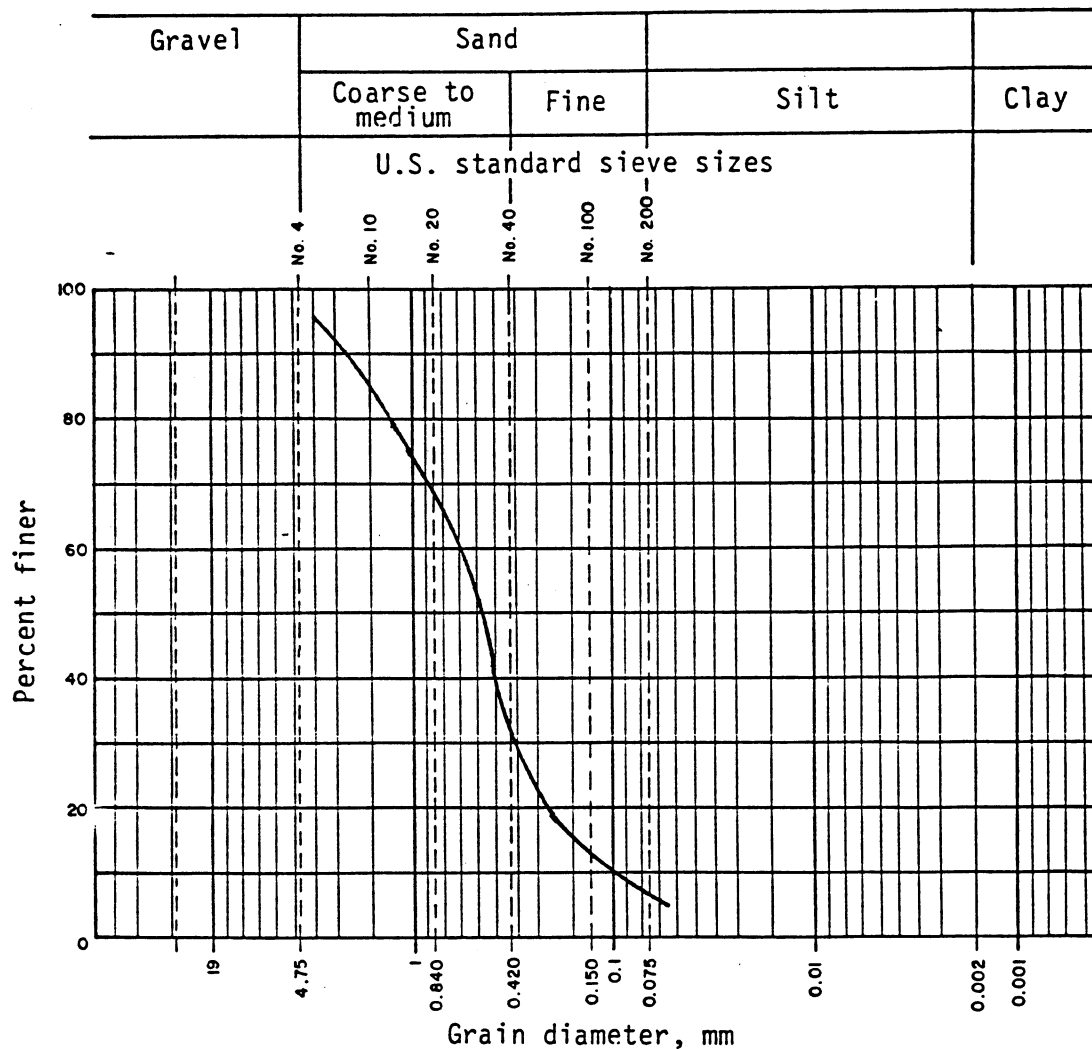
GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208

Location of Project CRANDON Boring No. 211-3 Sample No. 94

Tested By R.O. & D.W. Depth of Sample 10'

Date of Testing AUGUST 1981

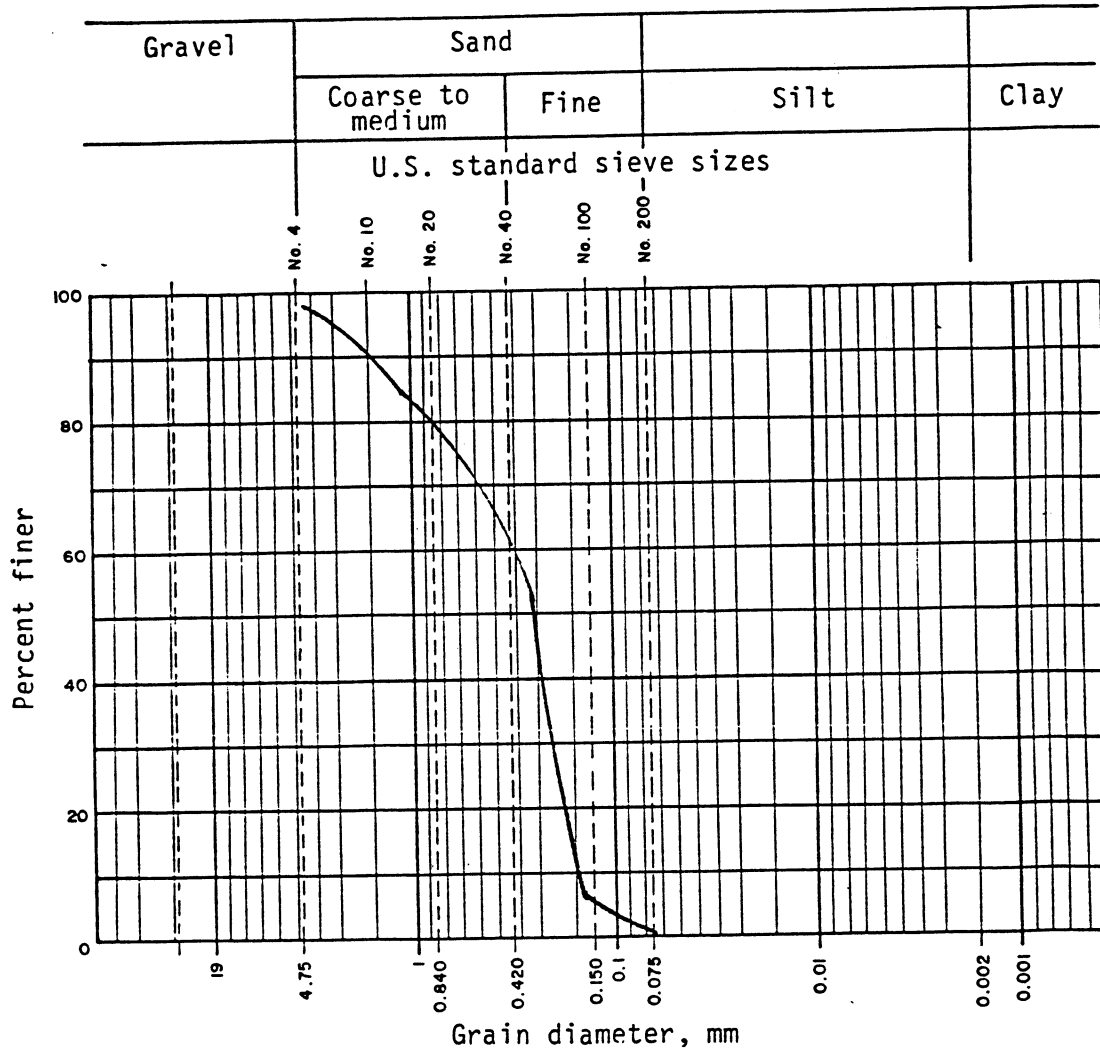


Soil classification:

SW System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job No. 1208
 Location of Project CRANDON Boring No. 211-3 Sample No.
 Tested By D.W. & R.O Depth of Sample 25'
 Date of Testing AUGUST 1981

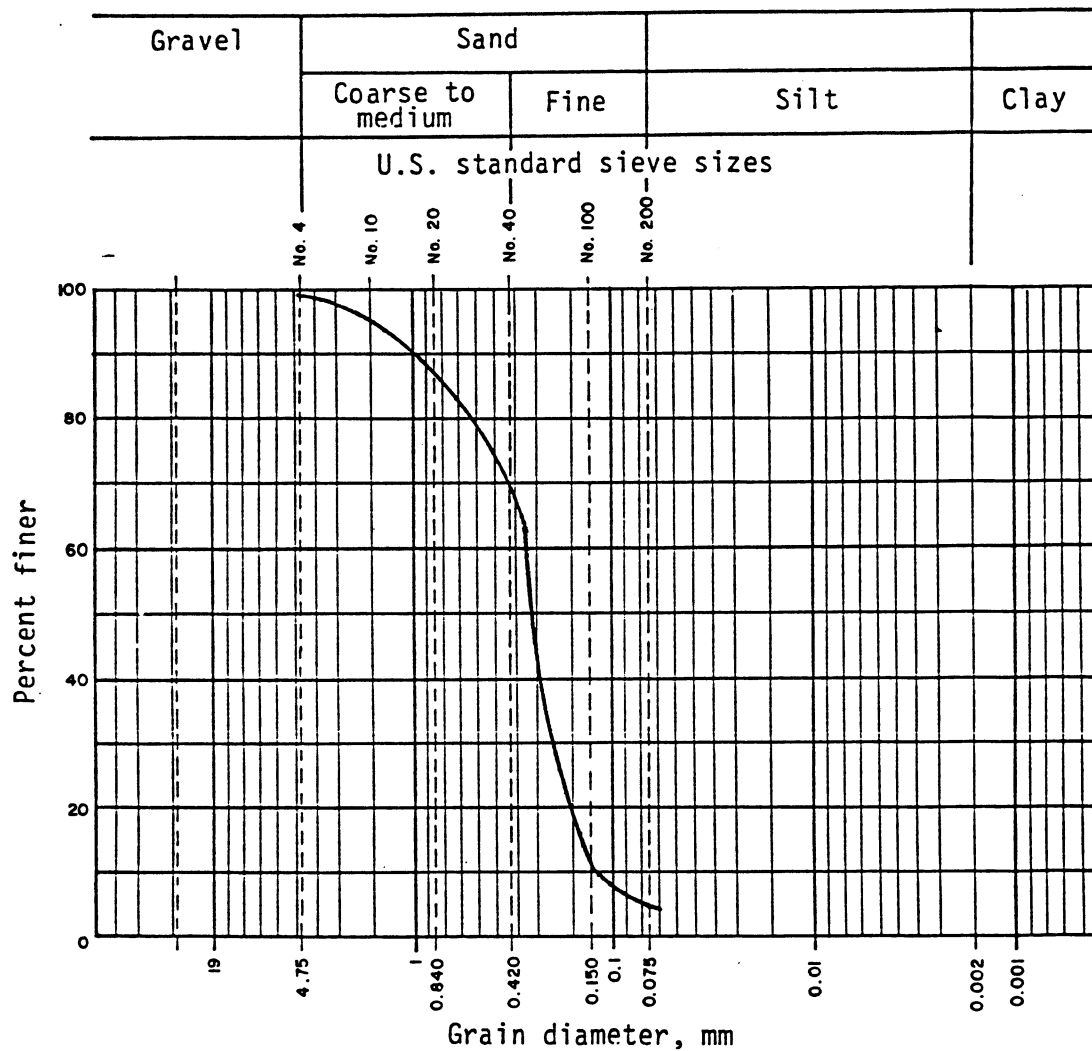


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-3 Sample No. 99
 Tested By RO. & D.W Depth of Sample 35'
 Date of Testing AUGUST 1981

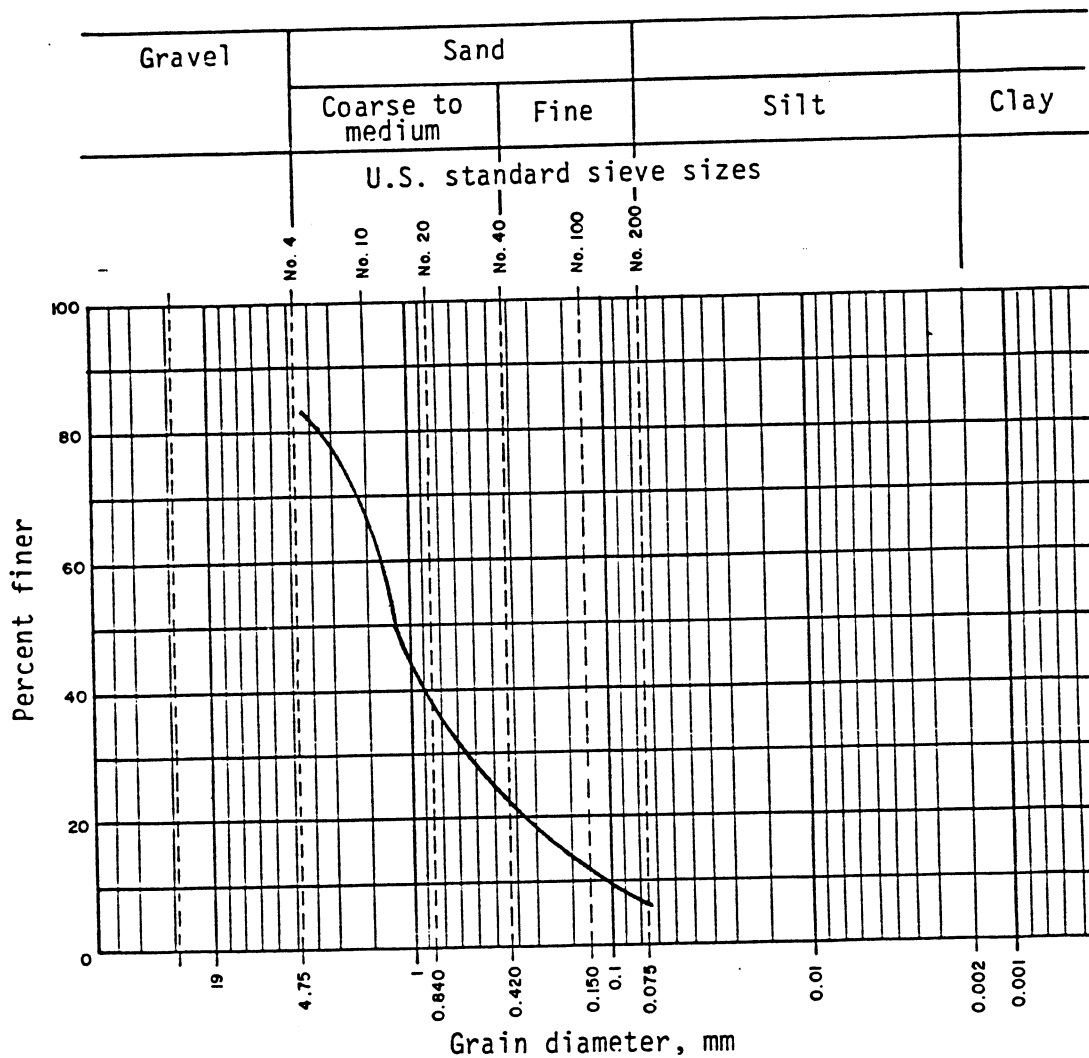


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-3 Sample No. 101
 Tested By R.O & D.W Depth of Sample 44'
 Date of Testing AUGUST 1981

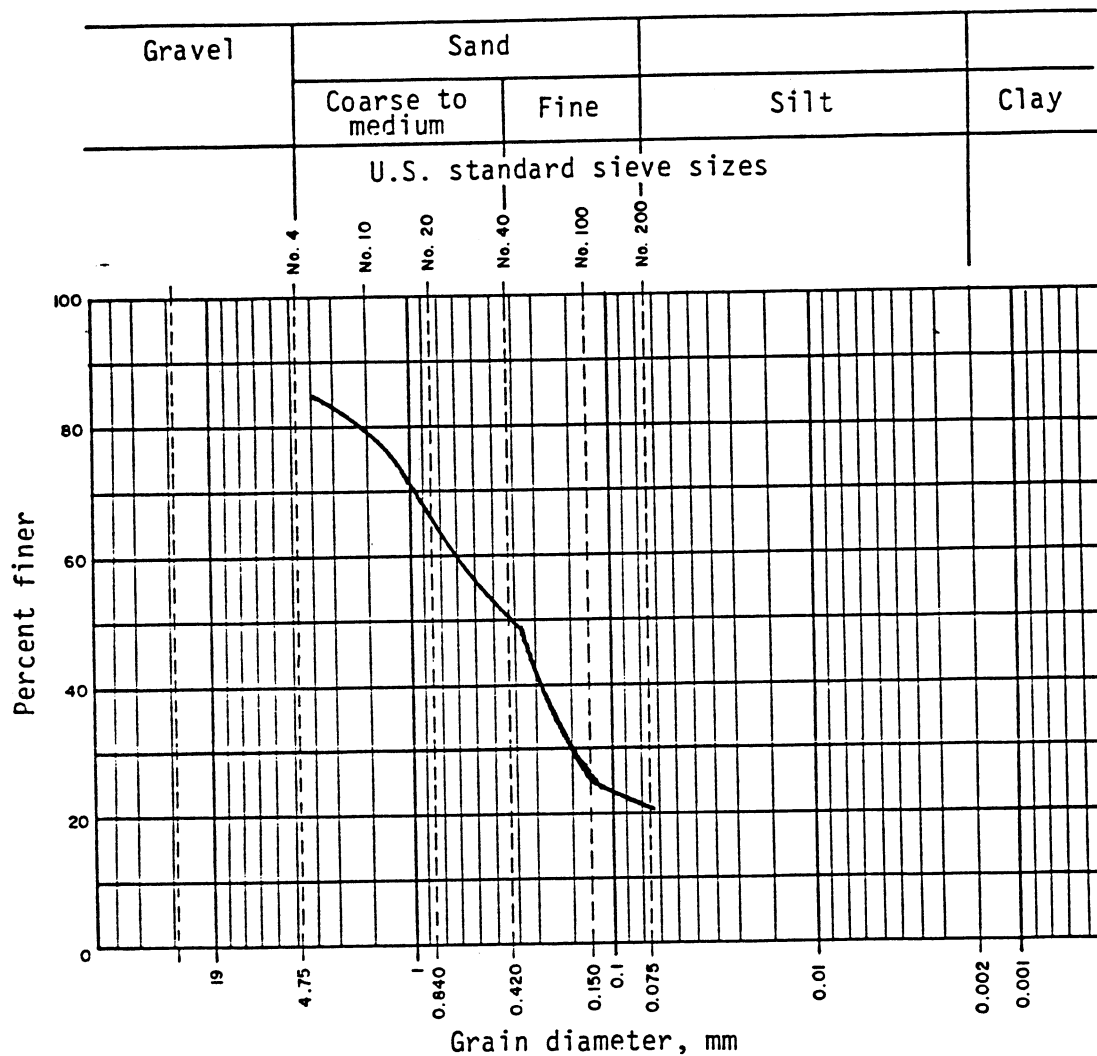


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-3 Sample No. 103
 Tested By D.W & R.O Depth of Sample 55'
 Date of Testing AUGUST 1981

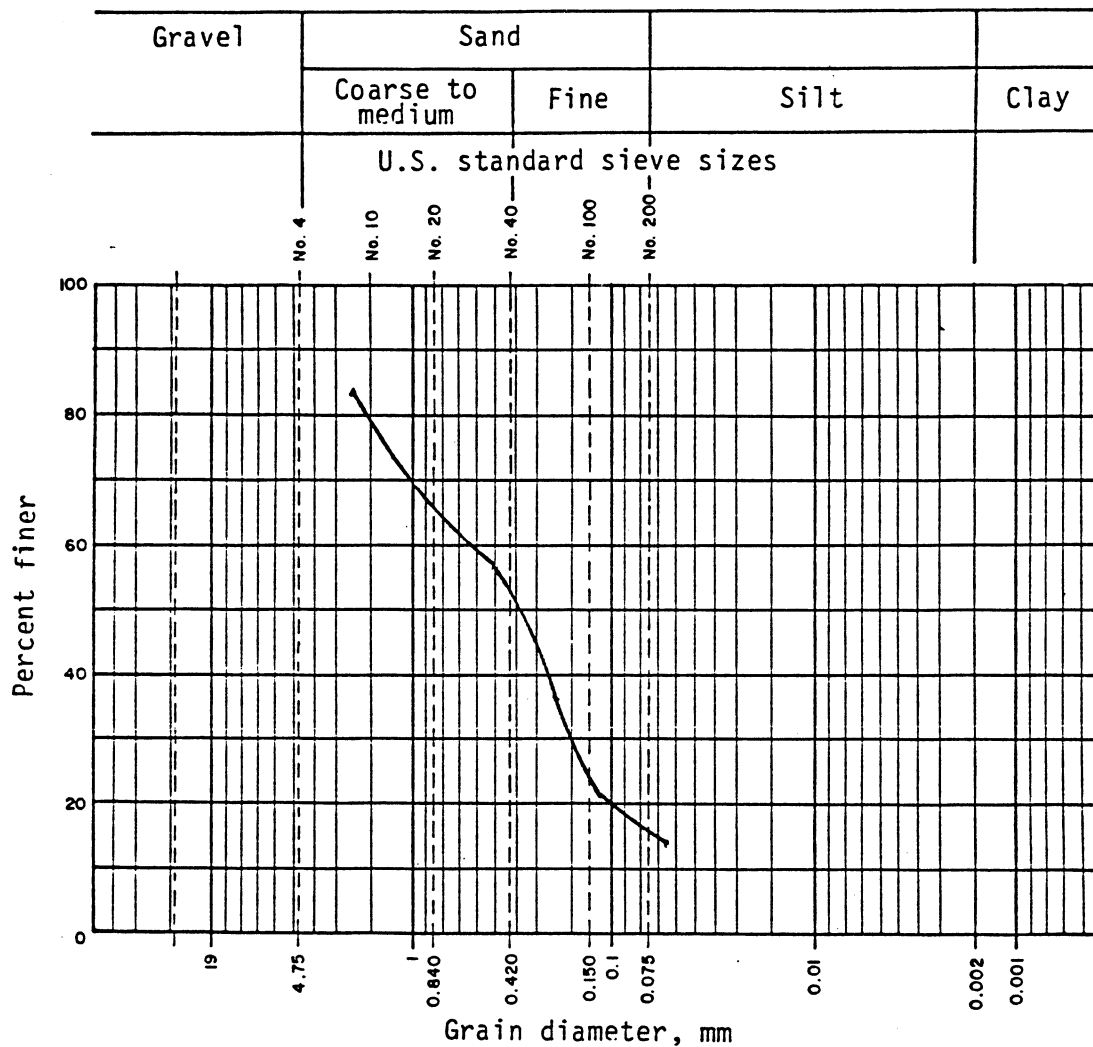


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-3 Sample No. 105
 Tested By R.O & D.W Depth of Sample 65'
 Date of Testing AUGUST 1981

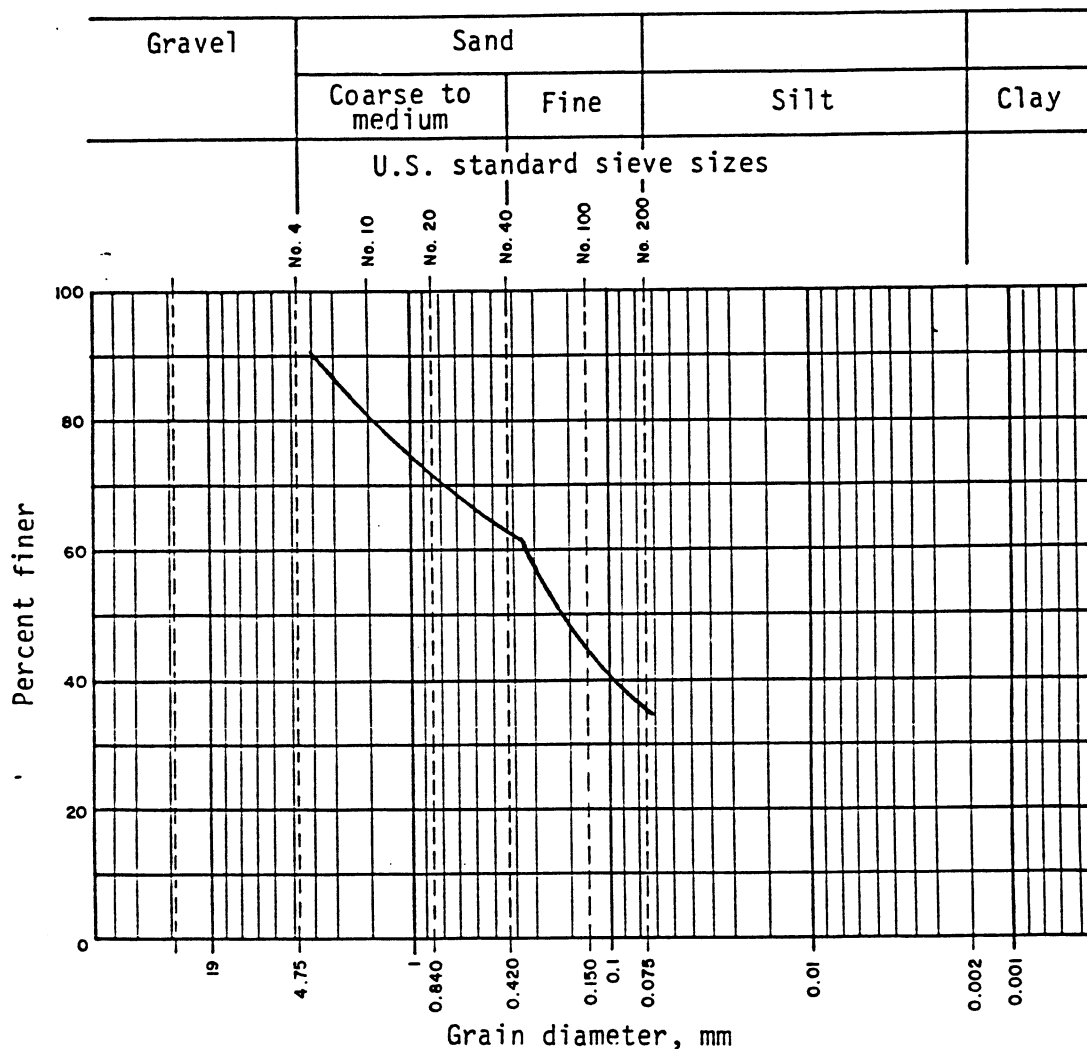


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-3 Sample No. 106
 Tested By D.W. & R.O Depth of Sample 70'
 Date of Testing AUGUST 1981

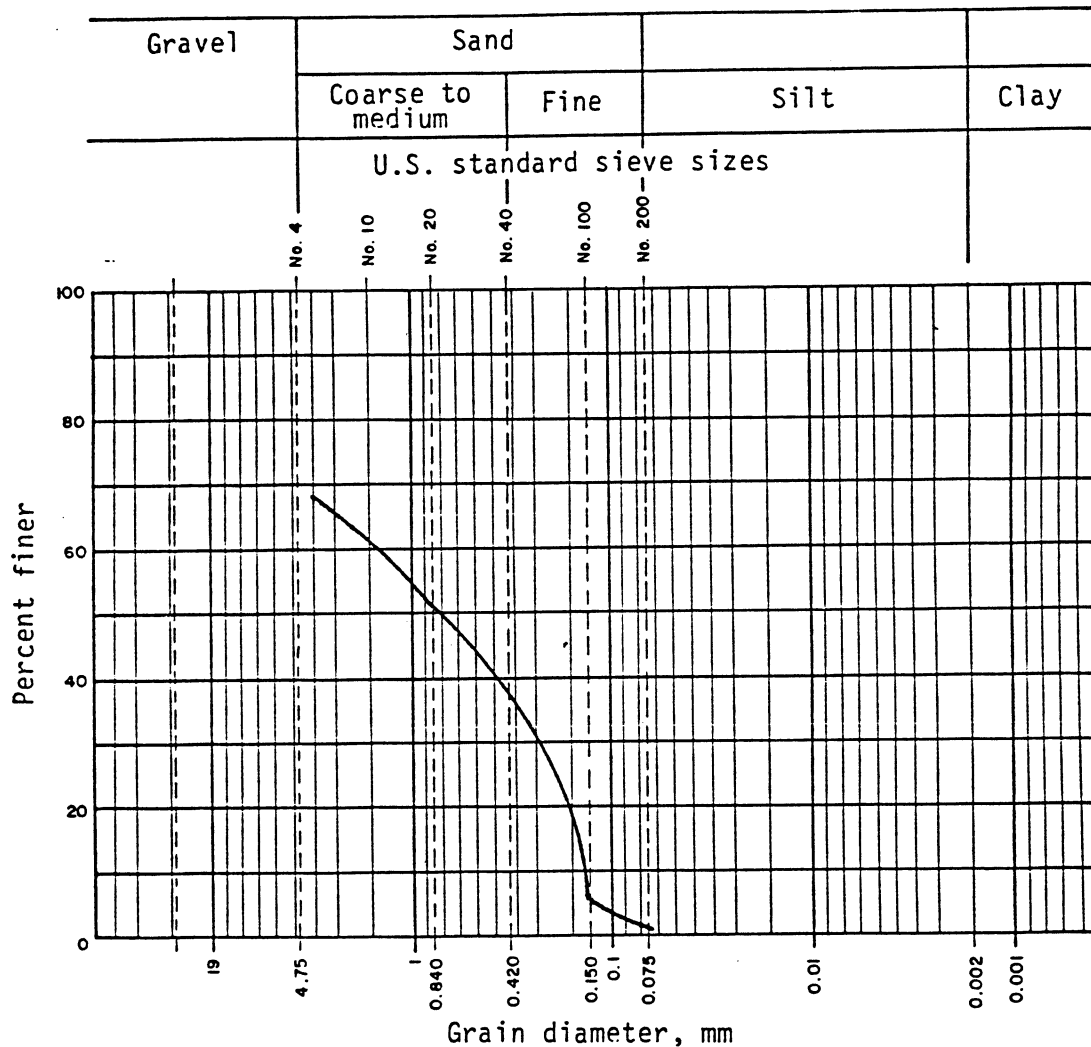


Soil classification:
SM

System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-3 Sample No. 108
 Tested By D.W & R.O Depth of Sample 85'
 Date of Testing AUGUST 1981

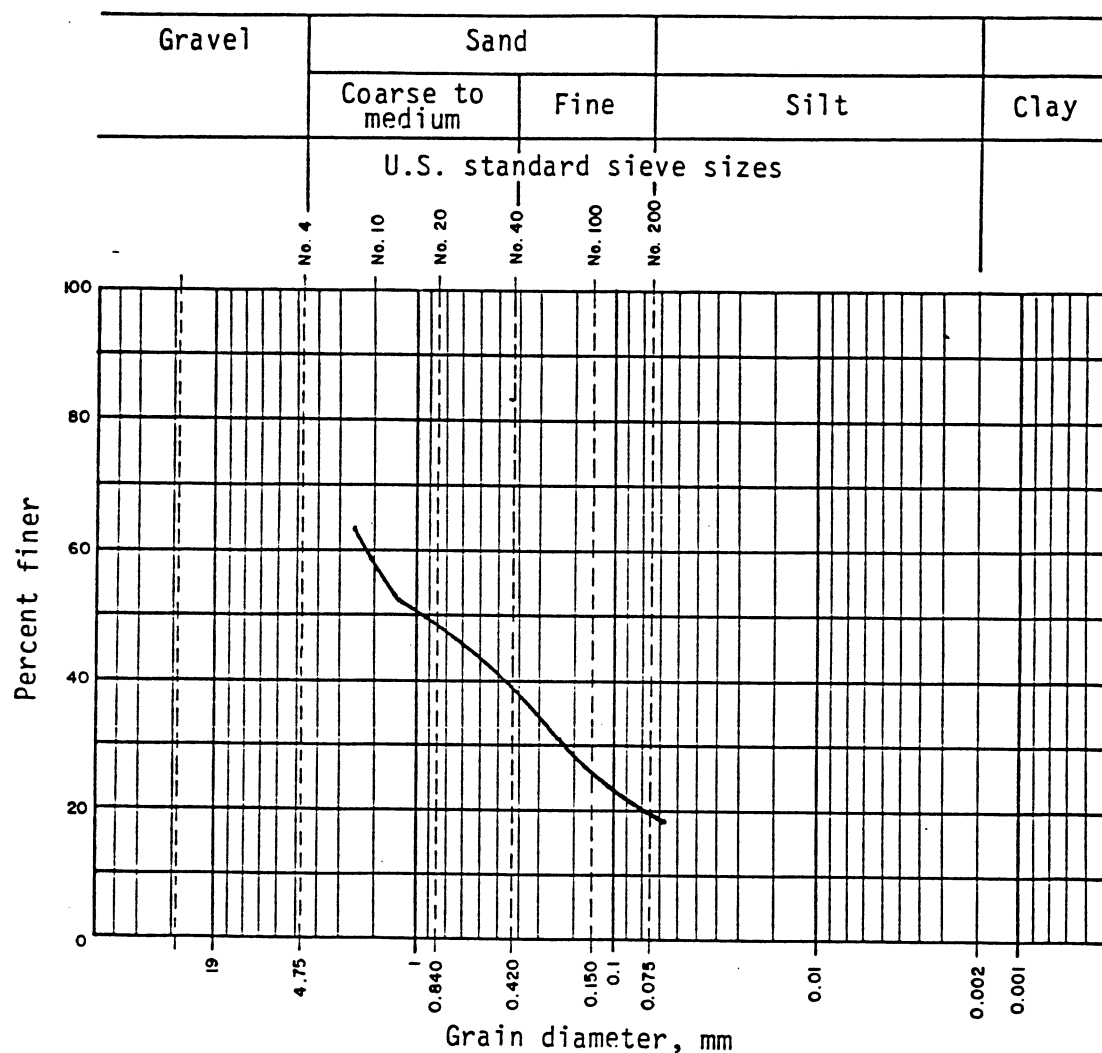


Soil classification:

SW System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-3 Sample No. 110
 Tested By R.O & D.W Depth of Sample 95 ft.
 Date of Testing AUGUST 1981

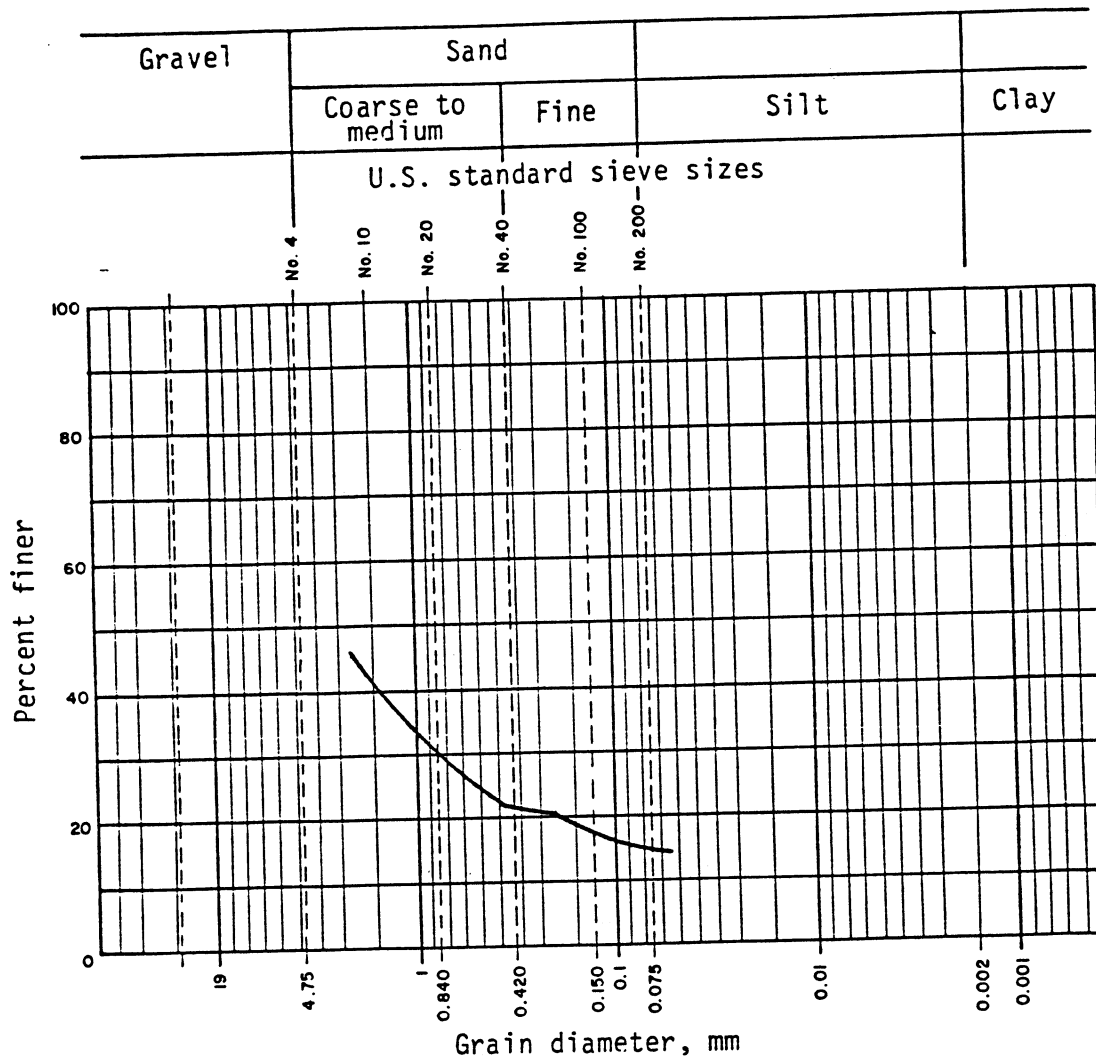


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-3 Sample No. 112
 Tested By D.W. & R.O Depth of Sample 120'
 Date of Testing AUGUST 1981

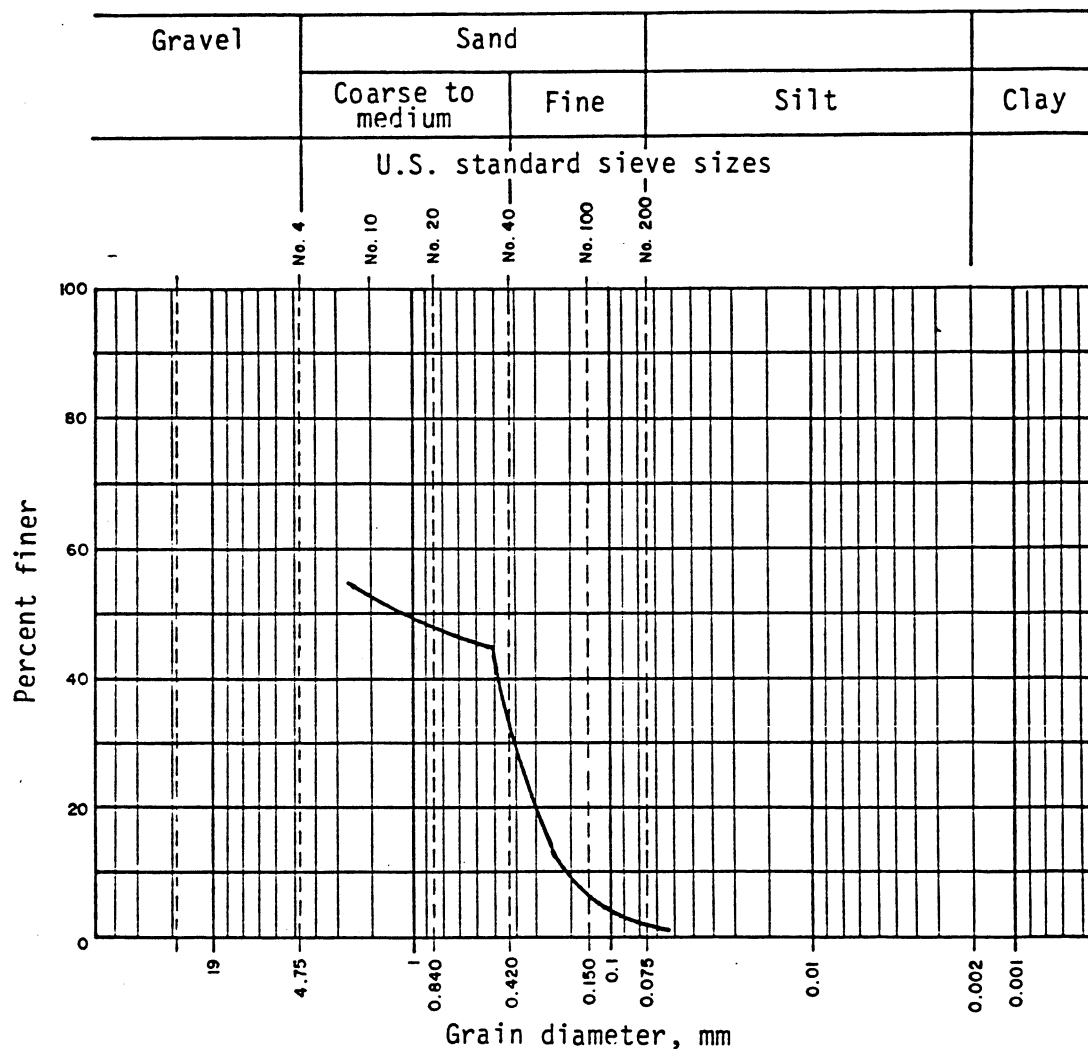


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-3 Sample No. 113
 Tested By D.W 7 R.O Depth of Sample 130'
 Date of Testing AUGUST 1981

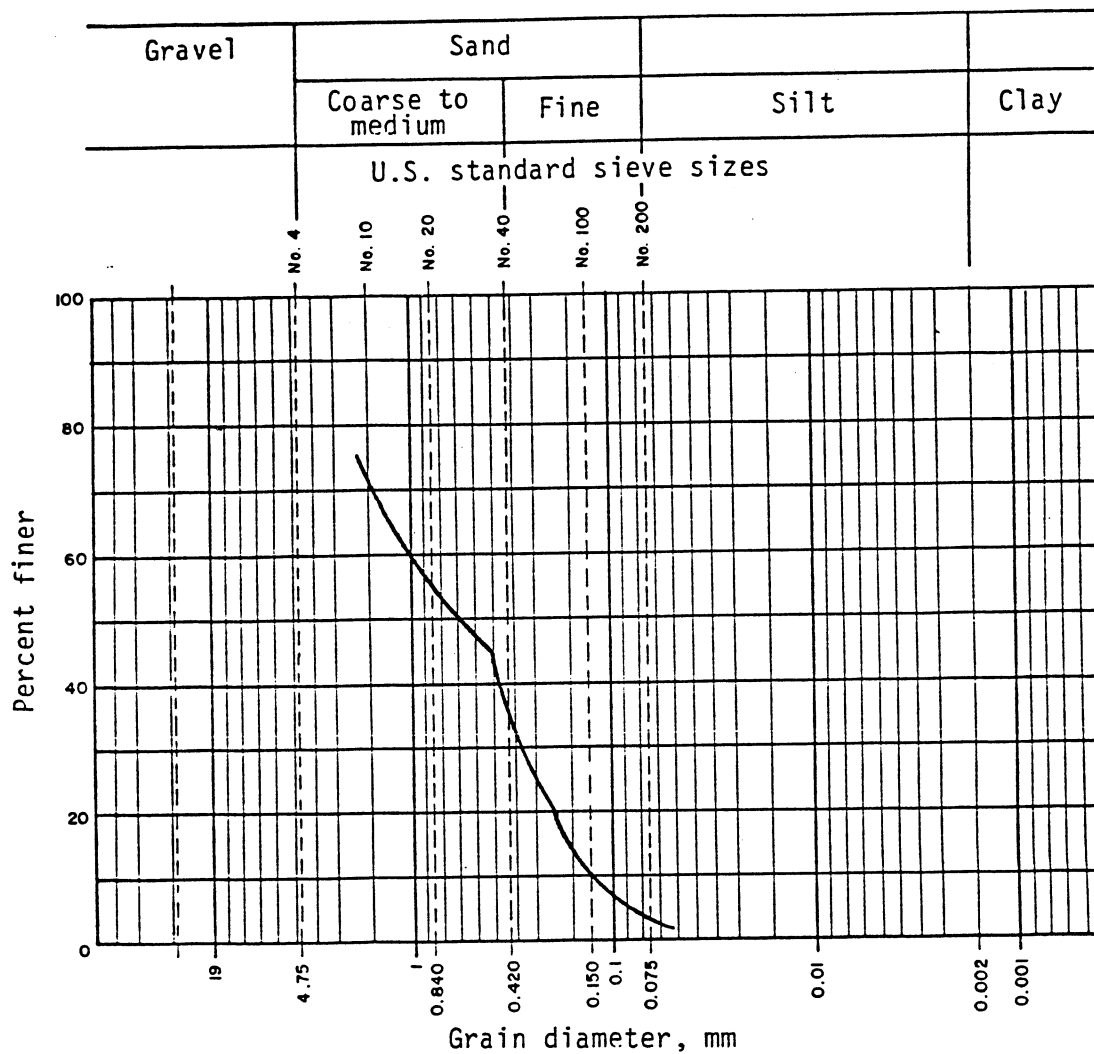


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-3 Sample No. 114
 Tested By D.W. & R.O Depth of Sample 140'
 Date of Testing AUGUST 1981

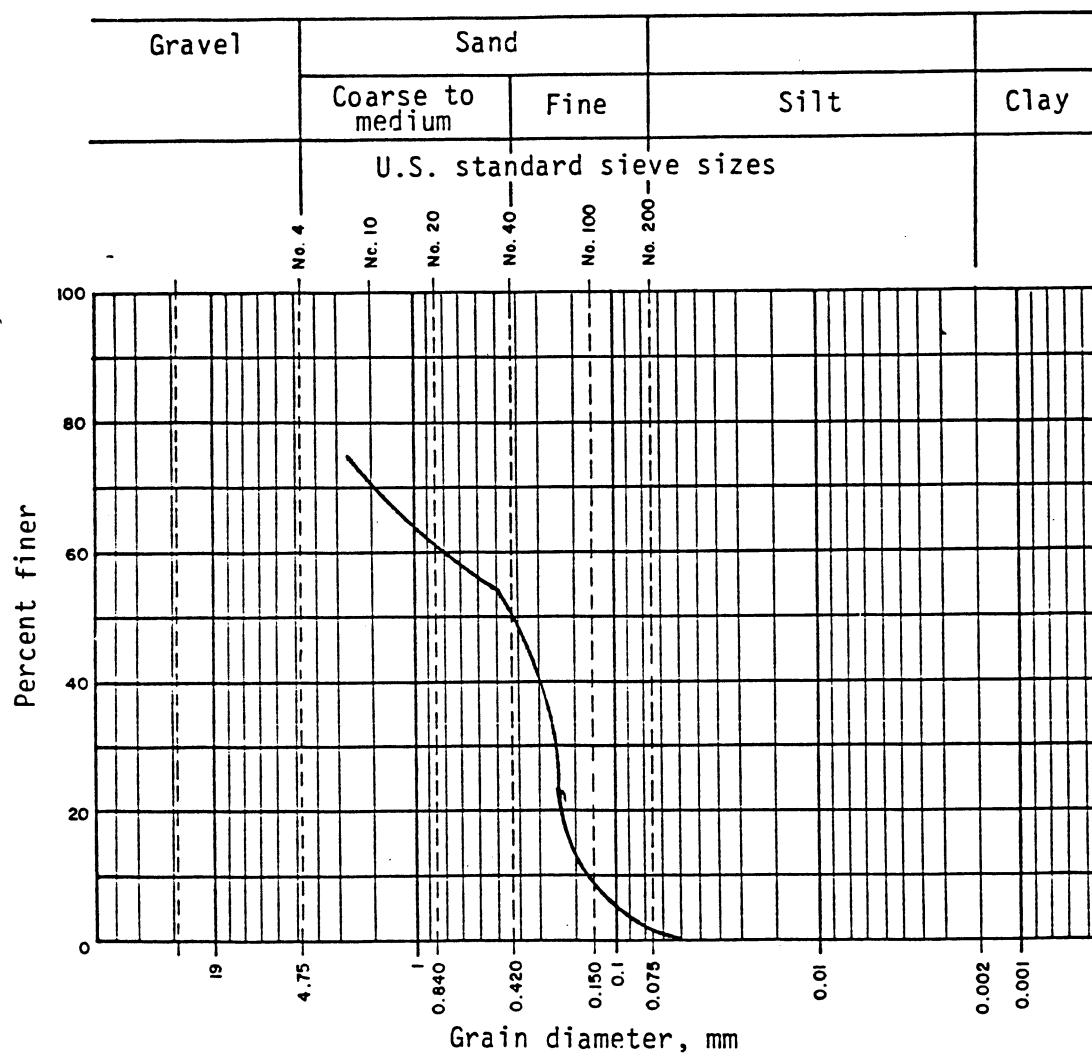


Soil classification:

SW System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-3 Sample No. 115
 Tested By R.O. & D.W. Depth of Sample 150 ft.
 Date of Testing AUGUST 1981

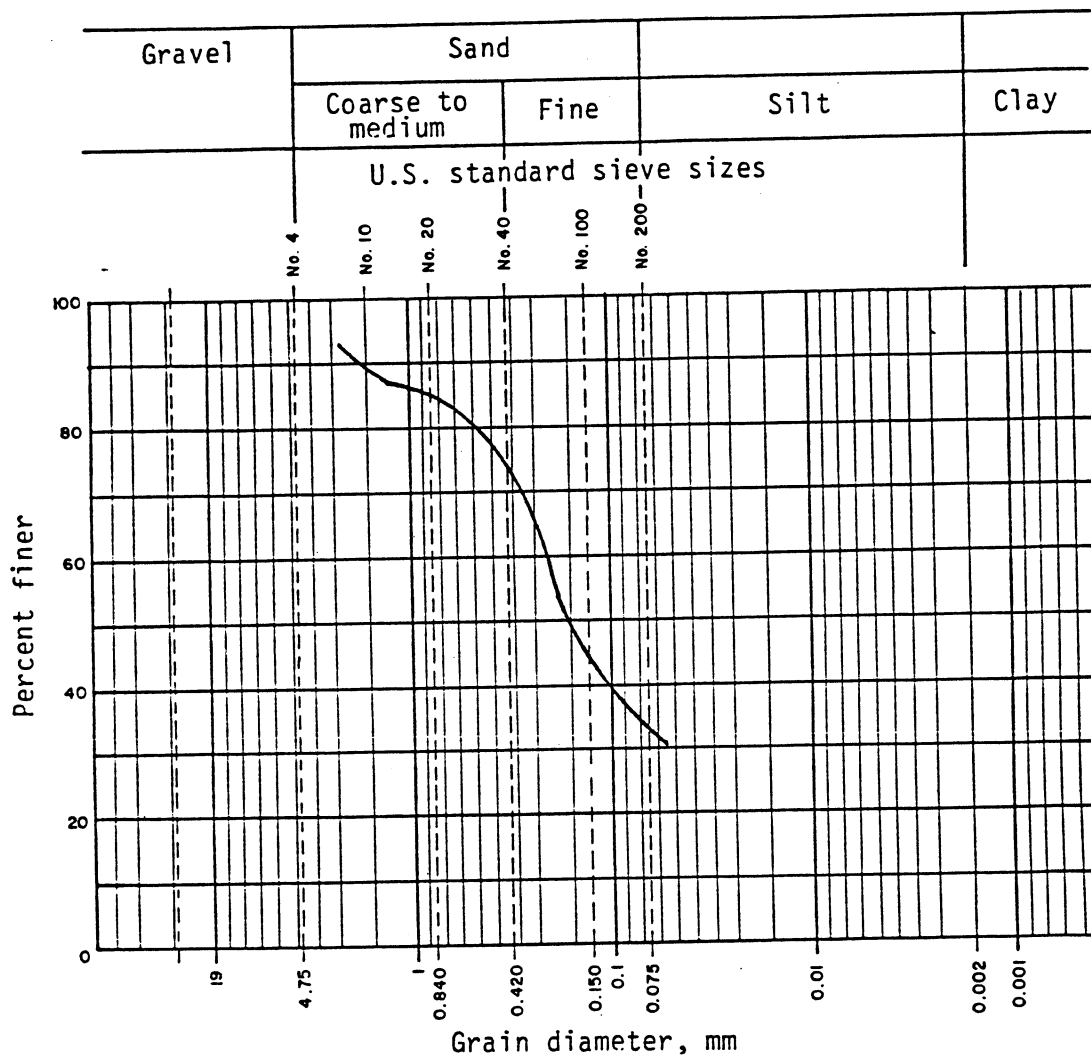


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-3 Sample No. 116
 Tested By D.W. & R.O. Depth of Sample 170'
 Date of Testing AUGUST 1981



Soil classification:

SM System USCS

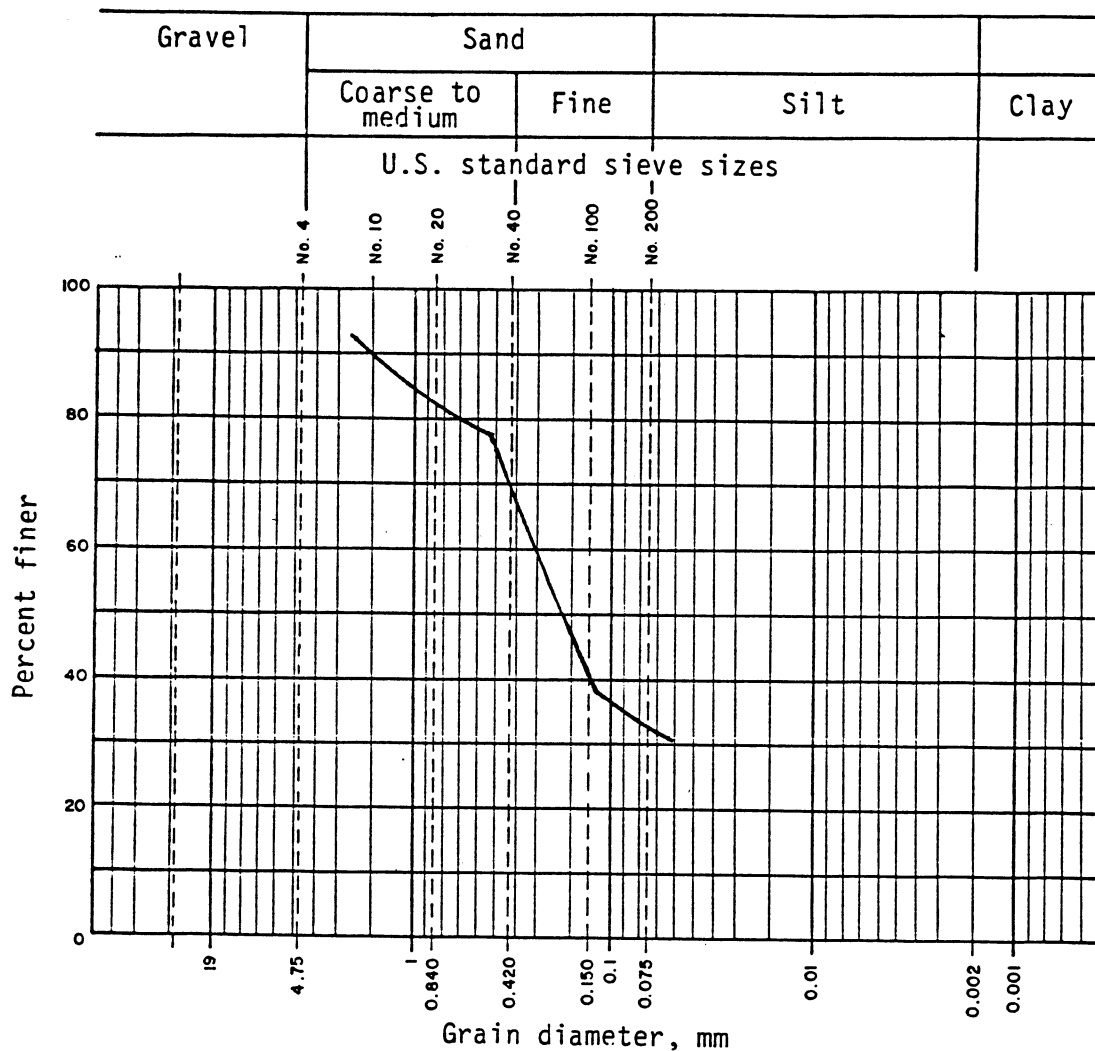
GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208

Location of Project CRANDON Boring No. 211-3 Sample No. 117

Tested By R.O & D.W Depth of Sample 180'

Date of Testing AUGUST 1981

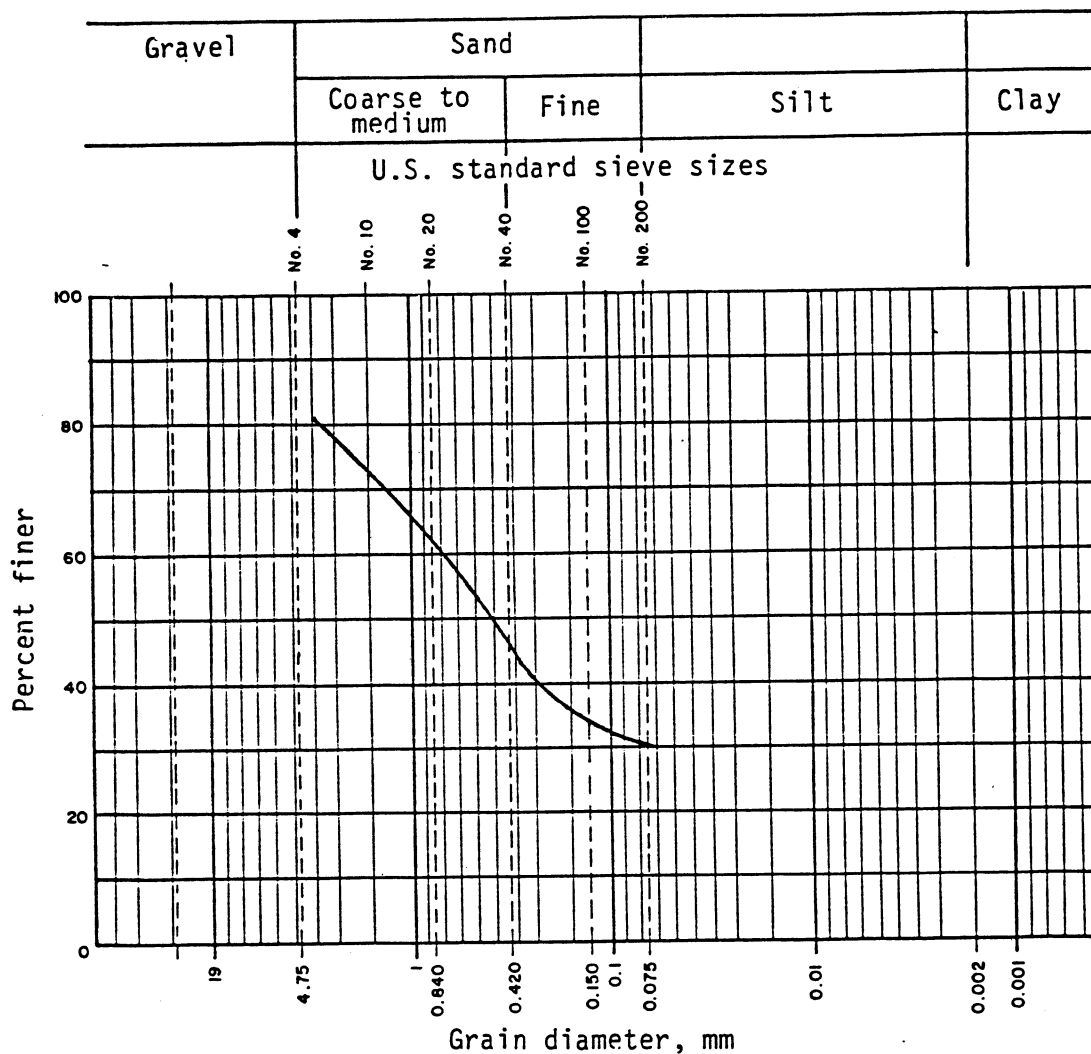


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 211-3 Sample No. 119
 Tested By D.W & R.O Depth of Sample 190'
 Date of Testing AUGUST 1981

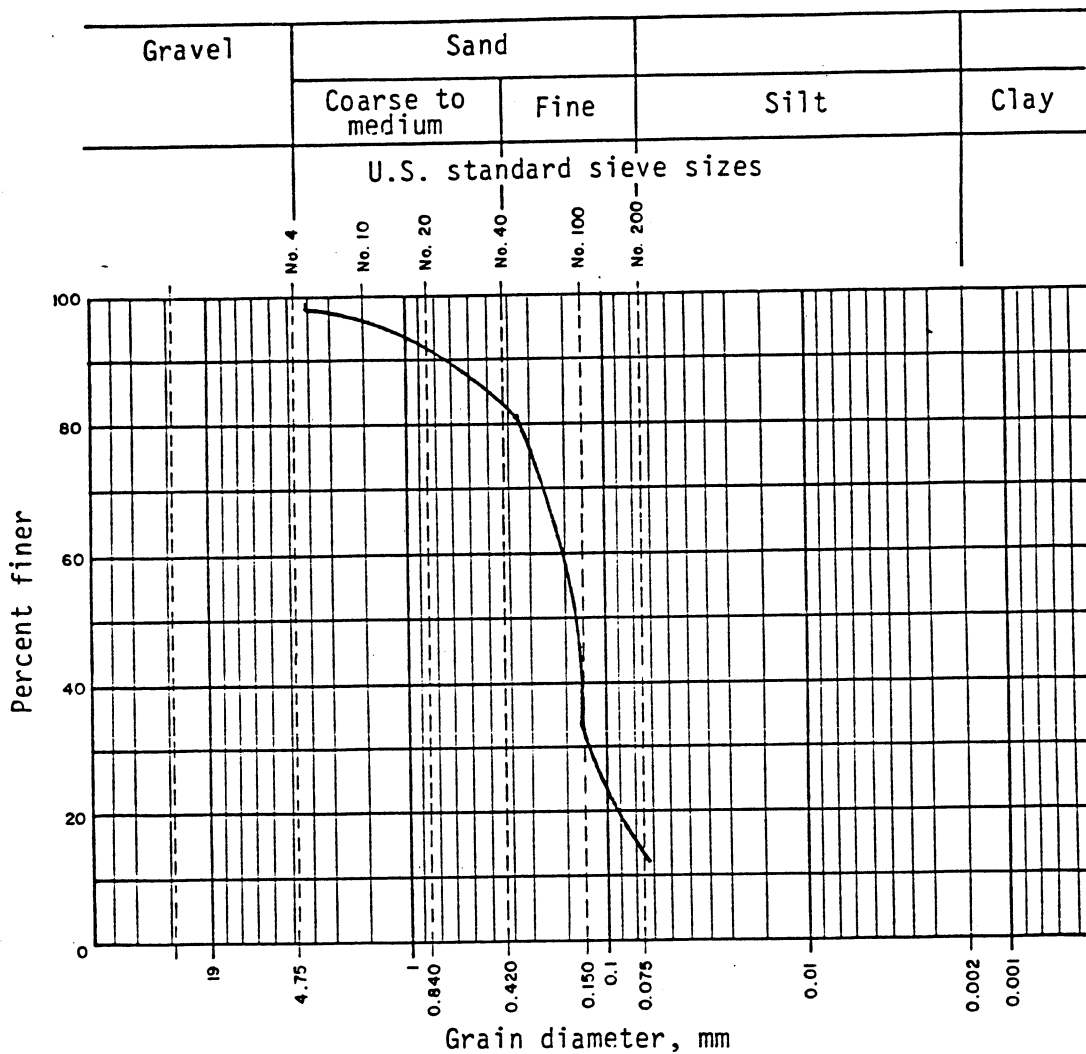


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 213-1 Sample No. 5
 Tested By RO & DW Depth of Sample 30'
 Date of Testing AUGUST 1981



Soil classification:

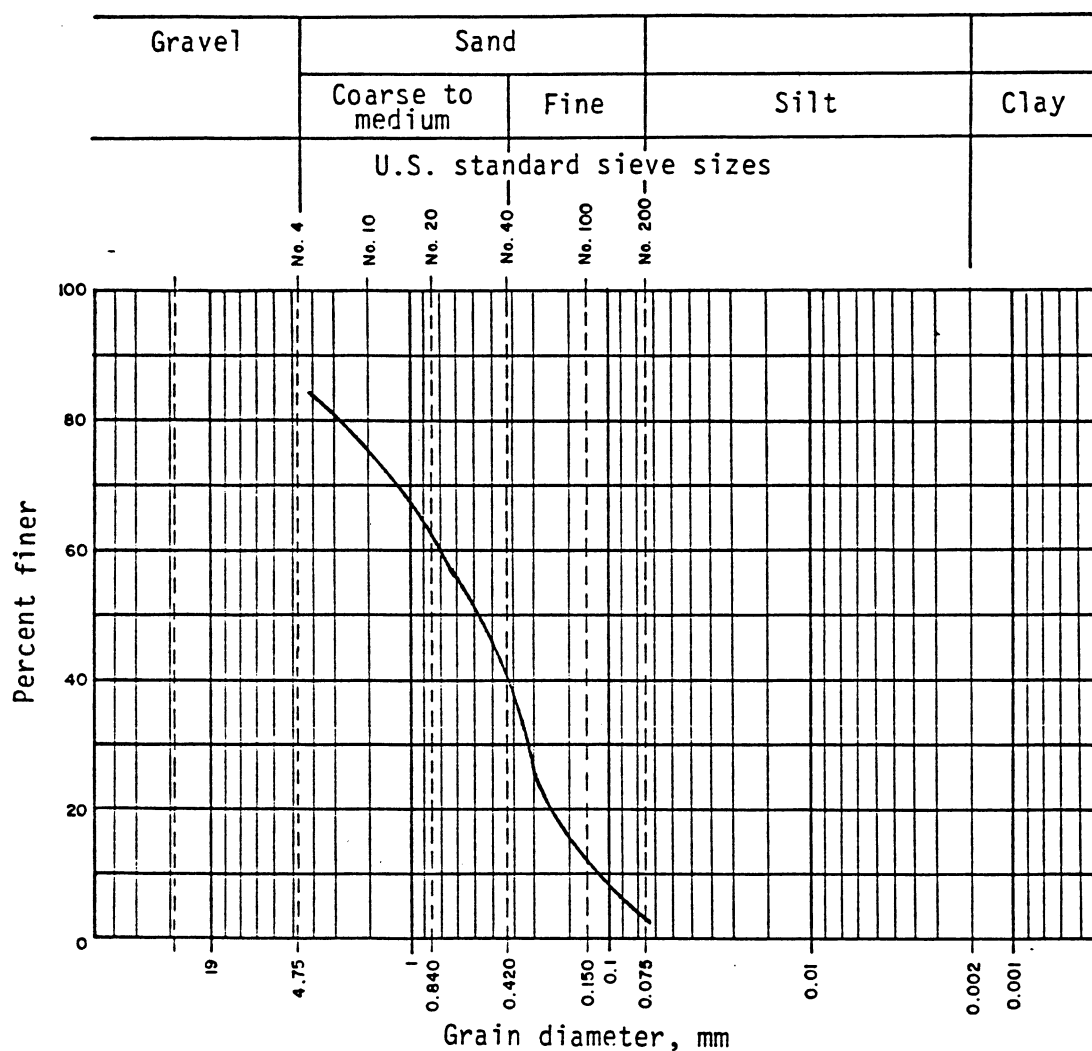
SP System USCS

GRAIN SIZE DISTRIBUTION

 Project EXXON Job. No. 1208

 Location of Project CRANDON Boring No. 213-1 Sample No. 7

 Tested By D.W. & R.O Depth of Sample 40'

 Date of Testing AUGUST 1981


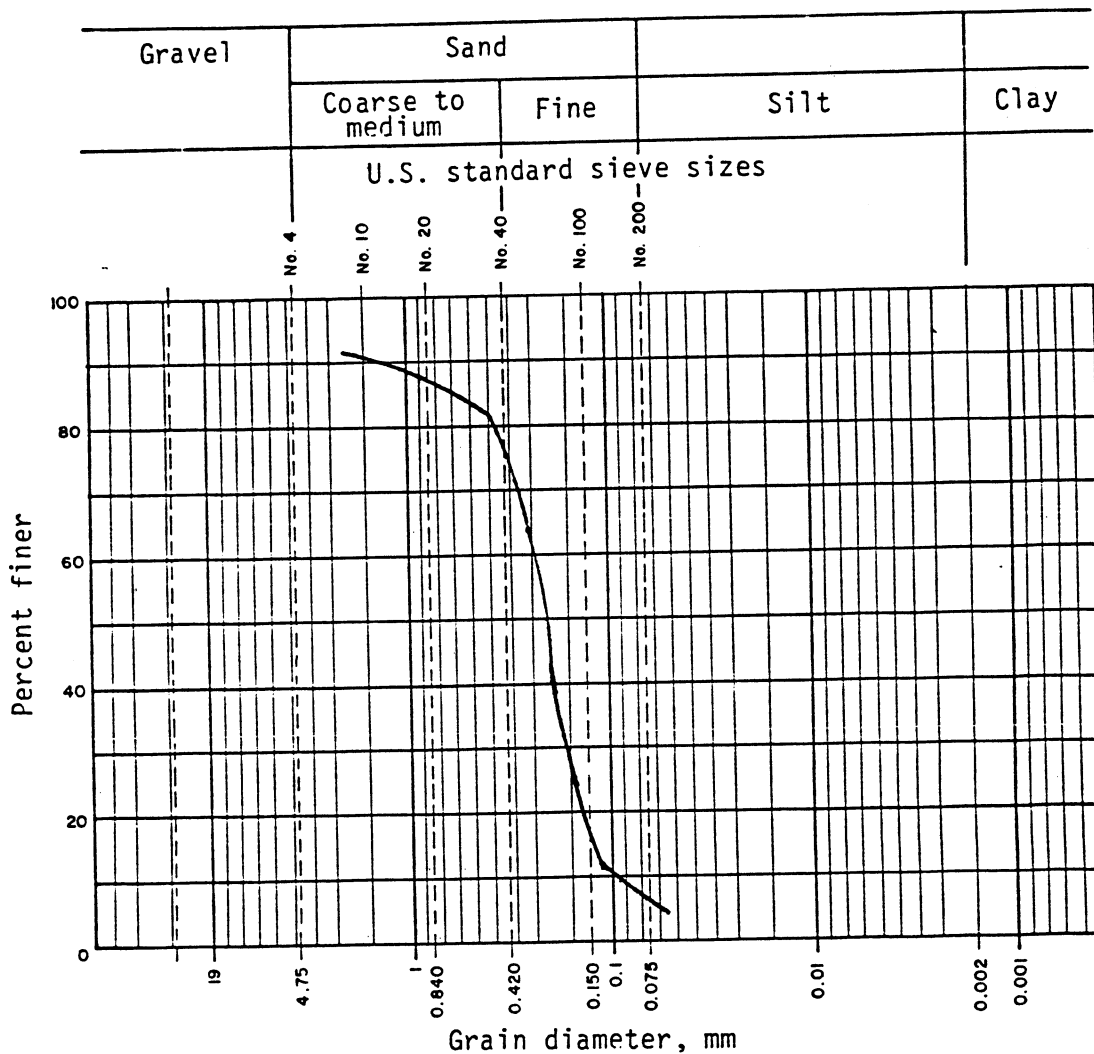
Soil classification:

SP

 System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 213-1 Sample No. 8
 Tested By D.W & R.O Depth of Sample 75'
 Date of Testing AUGUST 1981



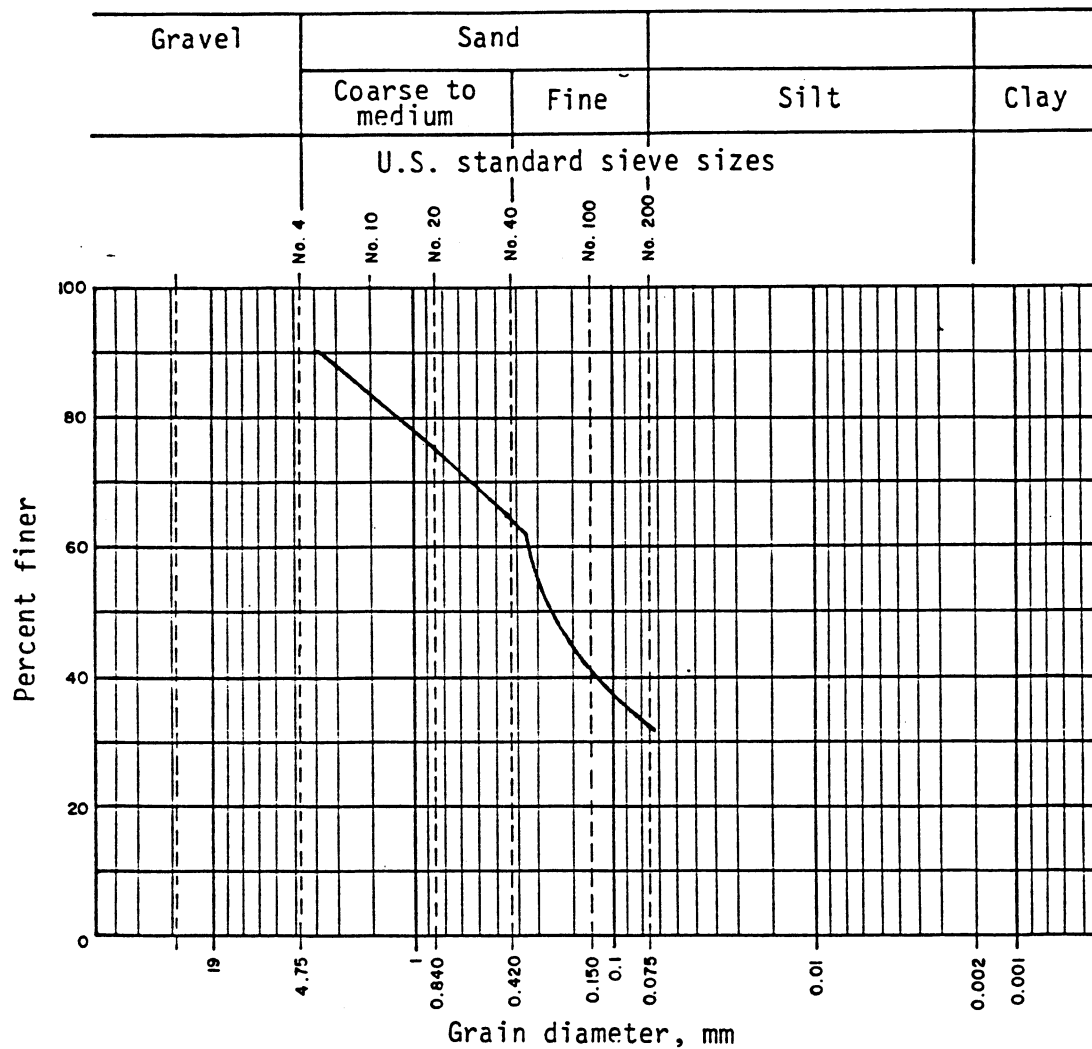
Soil classification:

SP

System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 213-1 Sample No. 10
 Tested By D.W & R.O Depth of Sample 85'
 Date of Testing AUGUST 1981

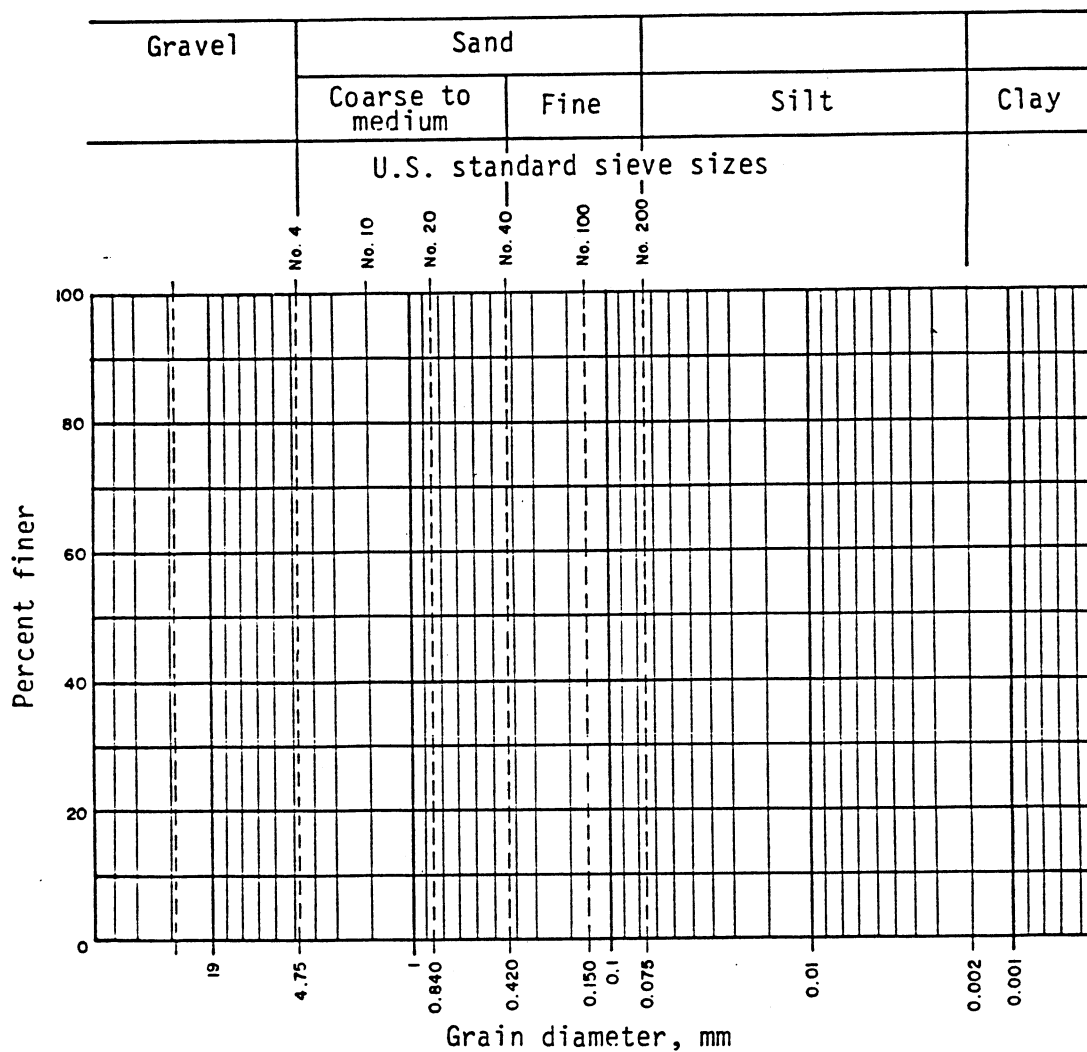


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 213-2 Sample No. 19
 Tested By R.O & D.W Depth of Sample 50'
 Date of Testing AUGUST 1981

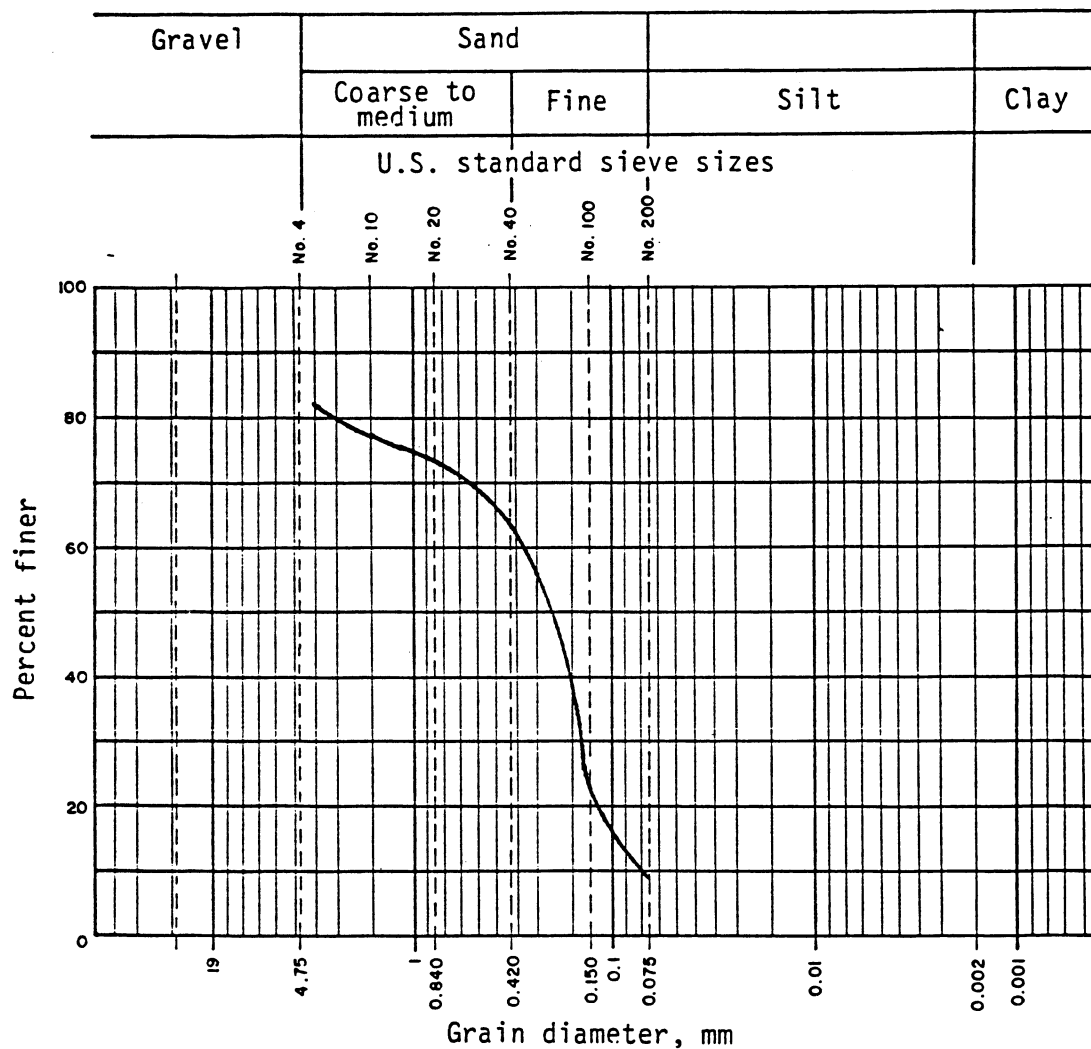


Soil classification:

GP System USCS Sample consisted of eight large pebbles.

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 213-2 Sample No. 20
 Tested By R.O. & D.W. Depth of Sample 75'
 Date of Testing AUGUST 1981

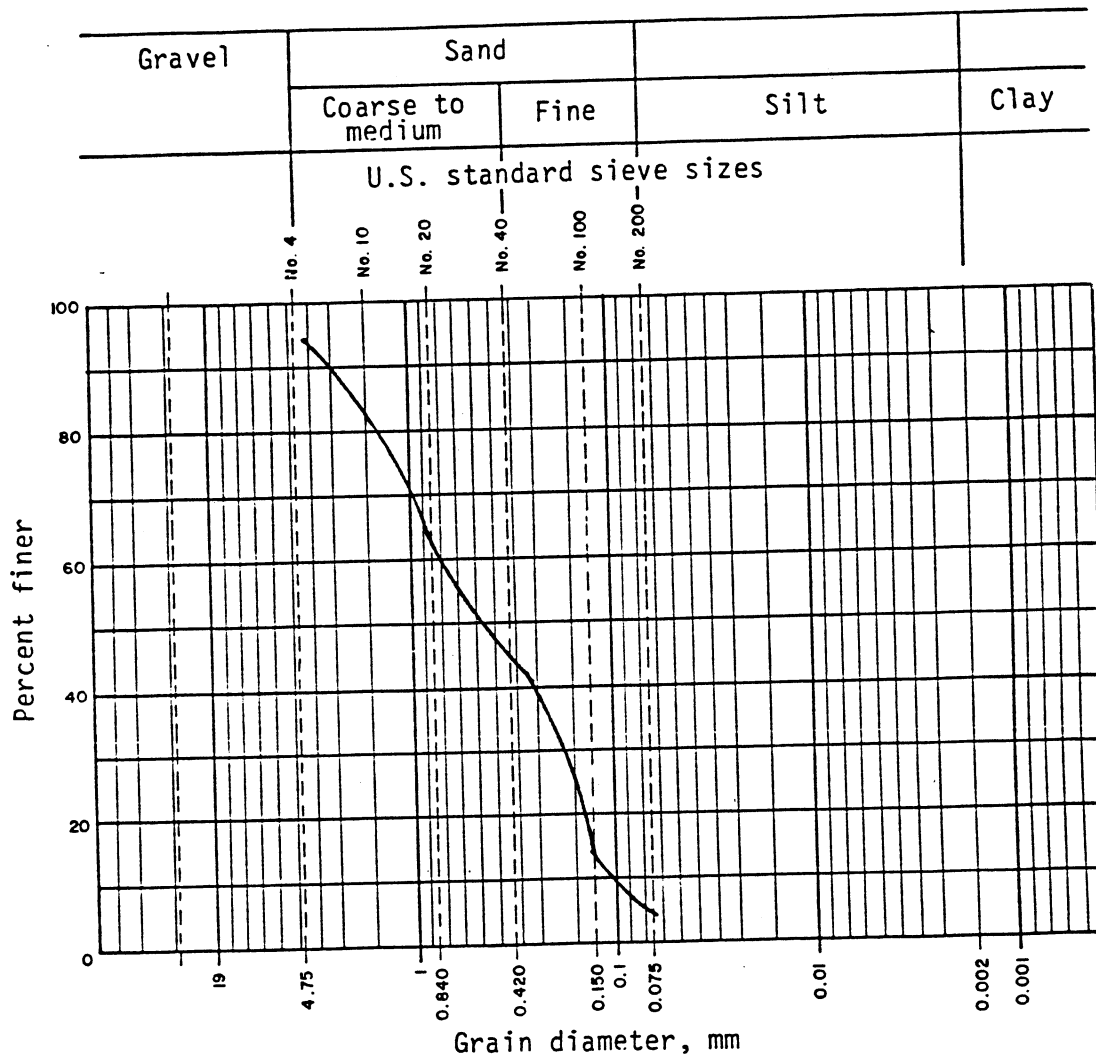


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 213-2 Sample No. 22
 Tested By D.W. & R.O Depth of Sample 85'
 Date of Testing AUGUST 1981

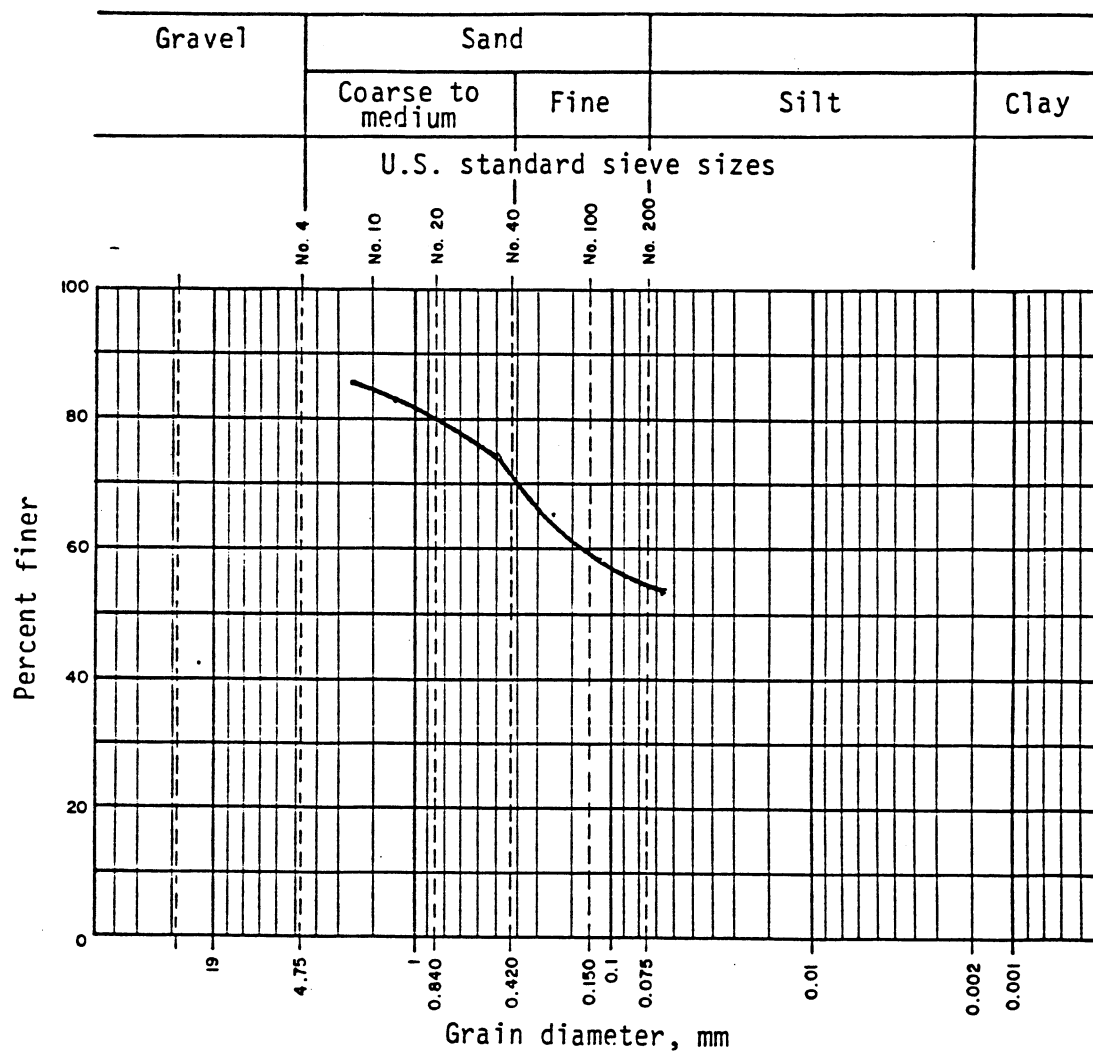


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 213-2 Sample No. 23
 Tested By D.W & R.O Depth of Sample 90'
 Date of Testing AUGUST 1981

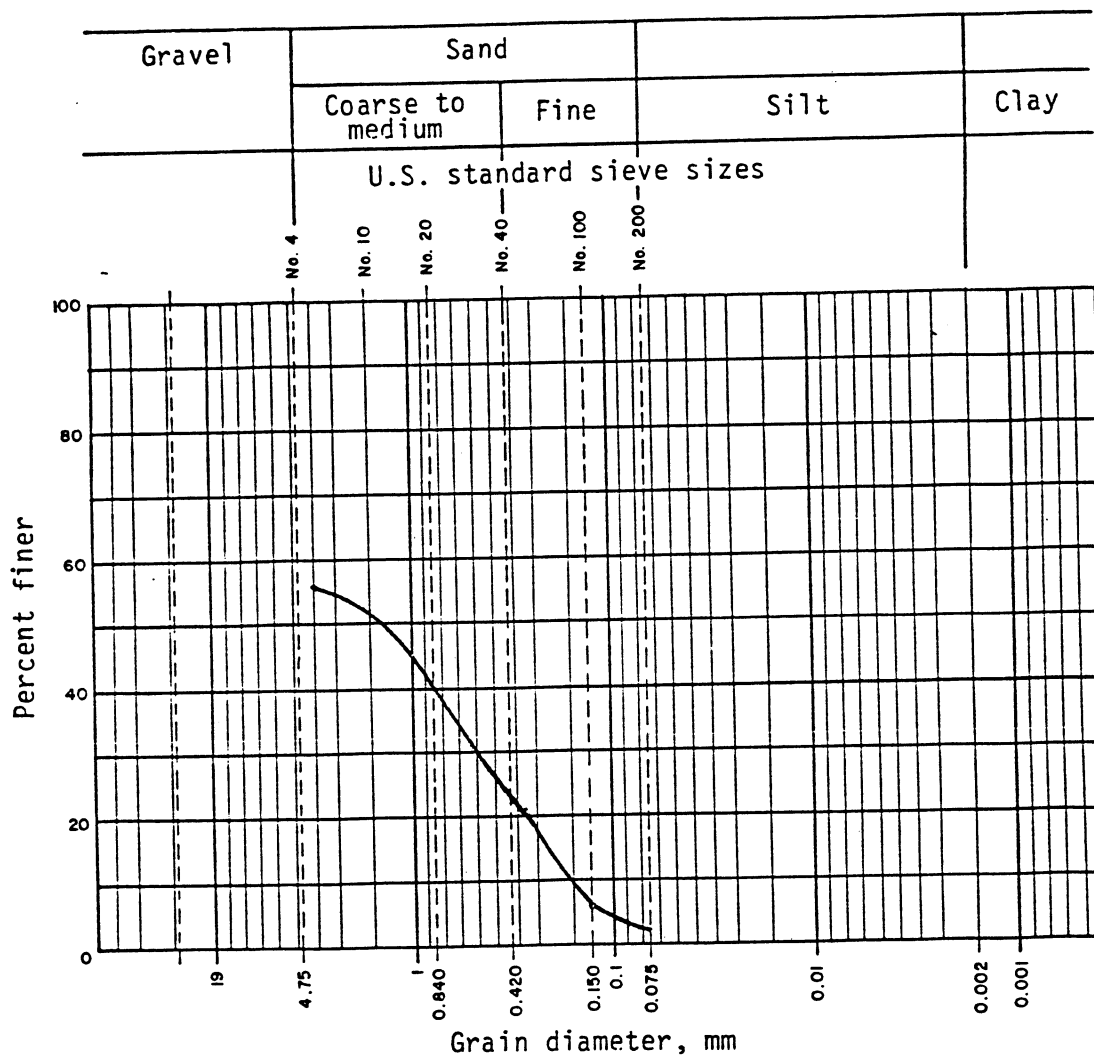


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 213-3 Sample No. 30
 Tested By R.O. & D.W. Depth of Sample 14-15'
 Date of Testing AUGUST 1981

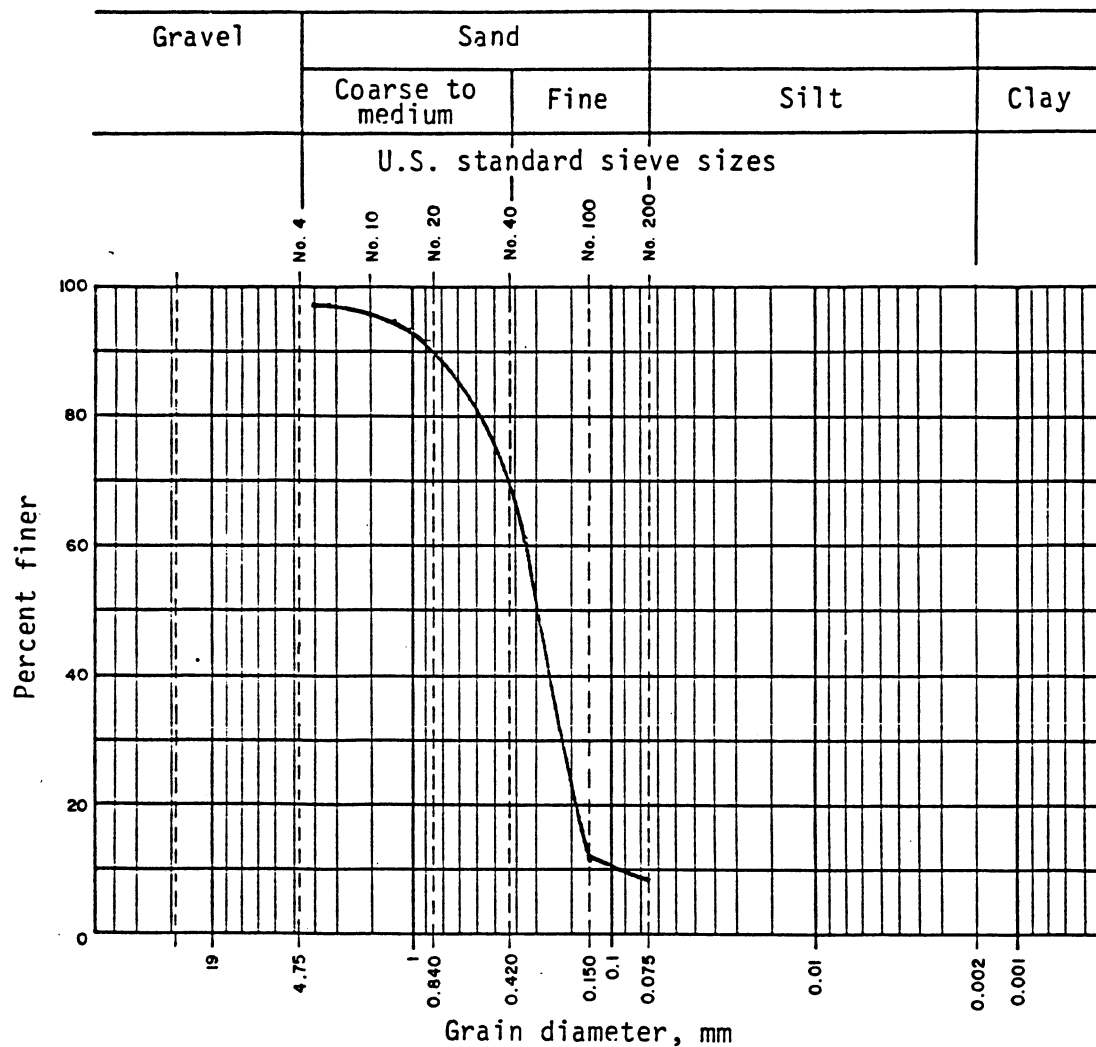


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 213-3 Sample No. 31
 Tested By R.O & D.W Depth of Sample 19-20'
 Date of Testing AUGUST 1981

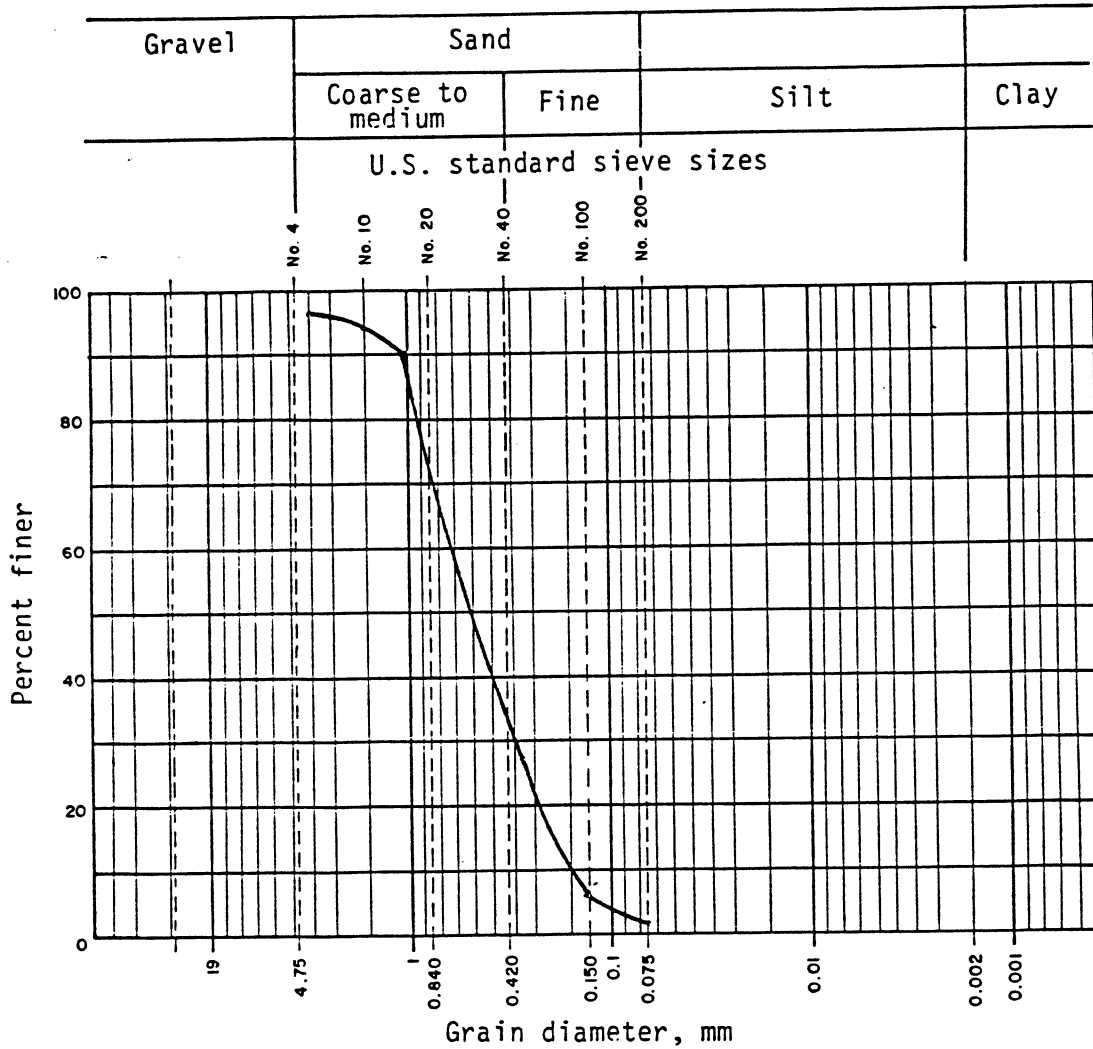


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 213-3 Sample No. 32
 Tested By D.W & R.O Depth of Sample 25'
 Date of Testing AUGUST 1981

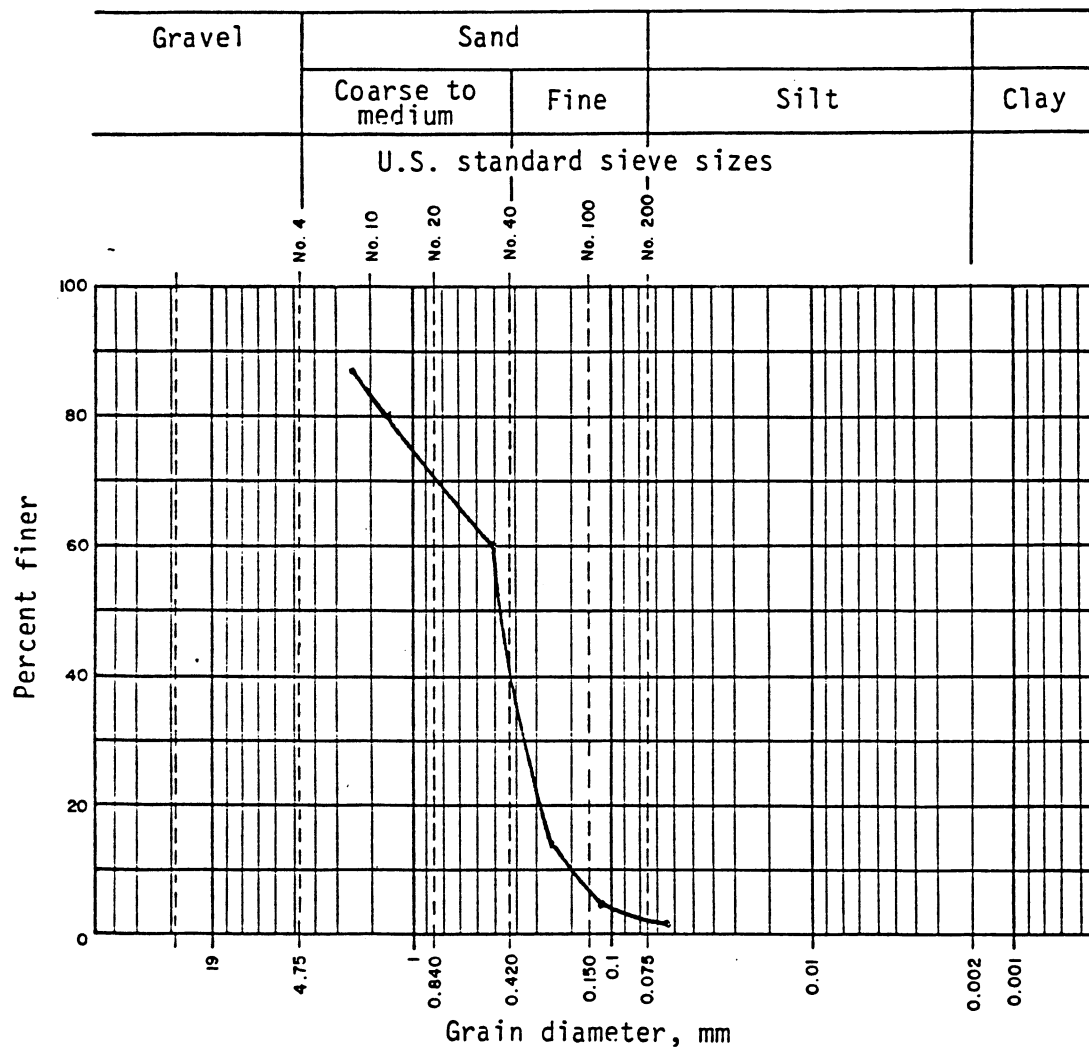


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 213-3 Sample No. 34
 Tested By R.O & D.W Depth of Sample 34-35'
 Date of Testing AUGUST 1981

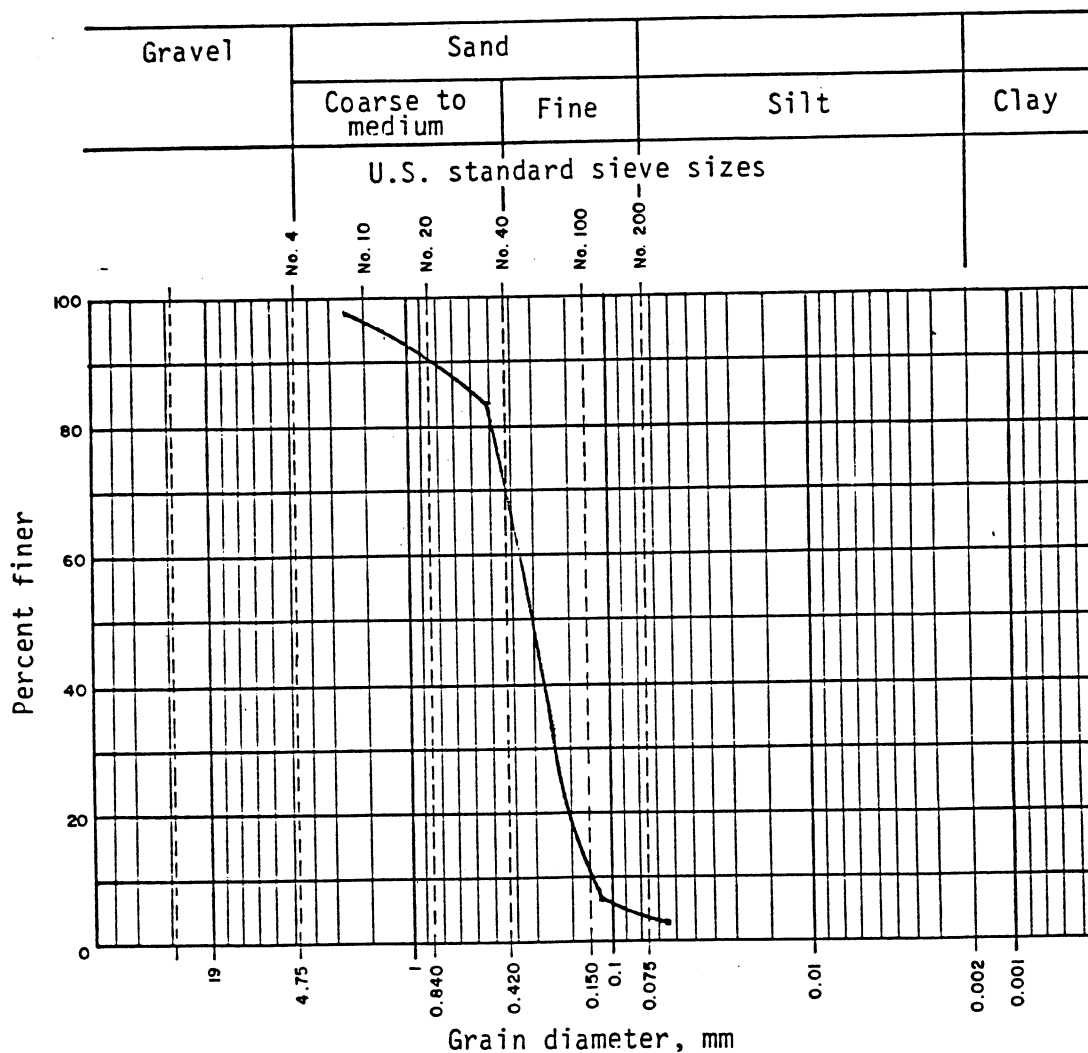


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 213-3 Sample No. 37
 Tested By D.W & R.O Depth of Sample 49-50
 Date of Testing AUGUST 1981

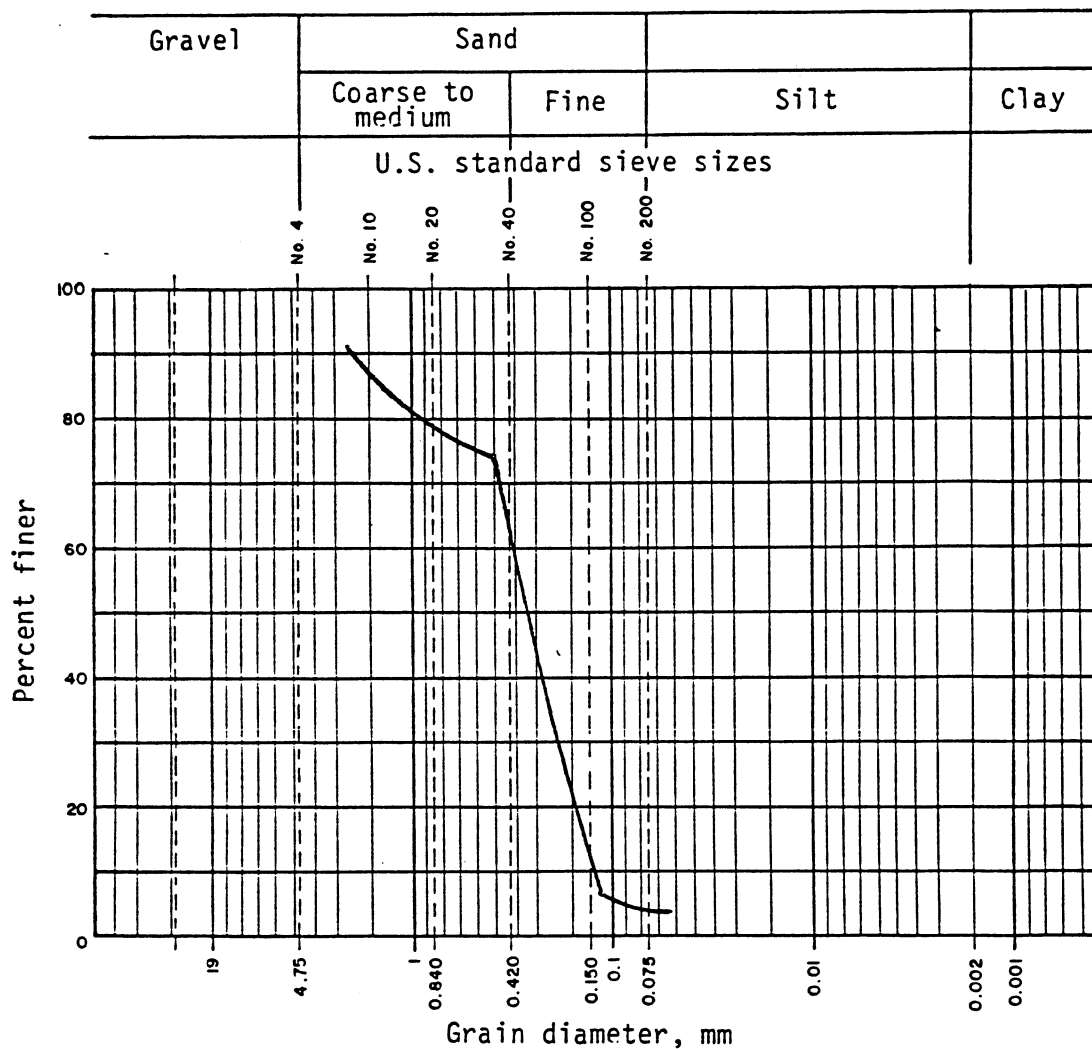


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 213-3 Sample No. 38
 Tested By R.O & D.W Depth of Sample 54-55'
 Date of Testing AUGUST 1981

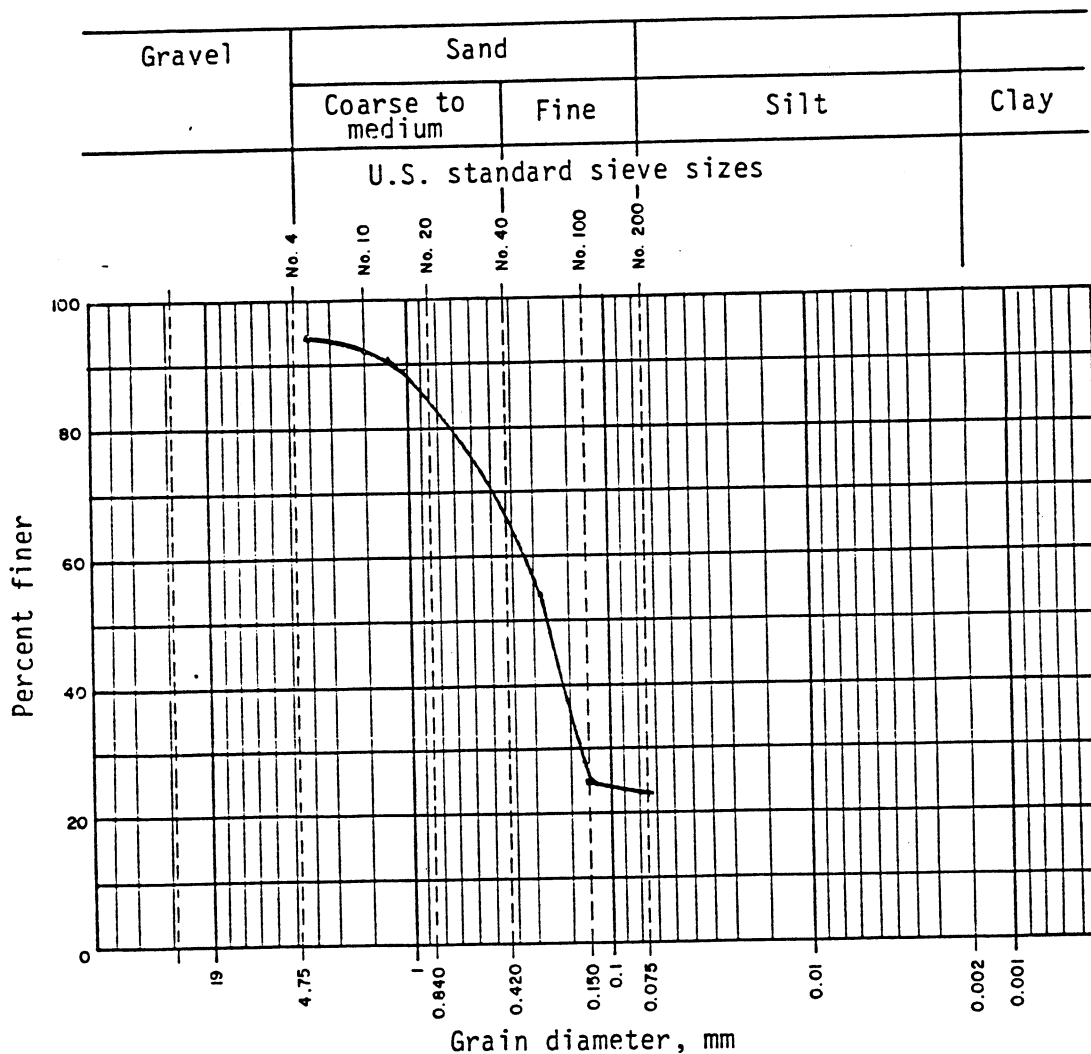


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 213-3 Sample No. 40
 Tested By D.W. & R.O Depth of Sample 74-75'
 Date of Testing AUGUST 1981

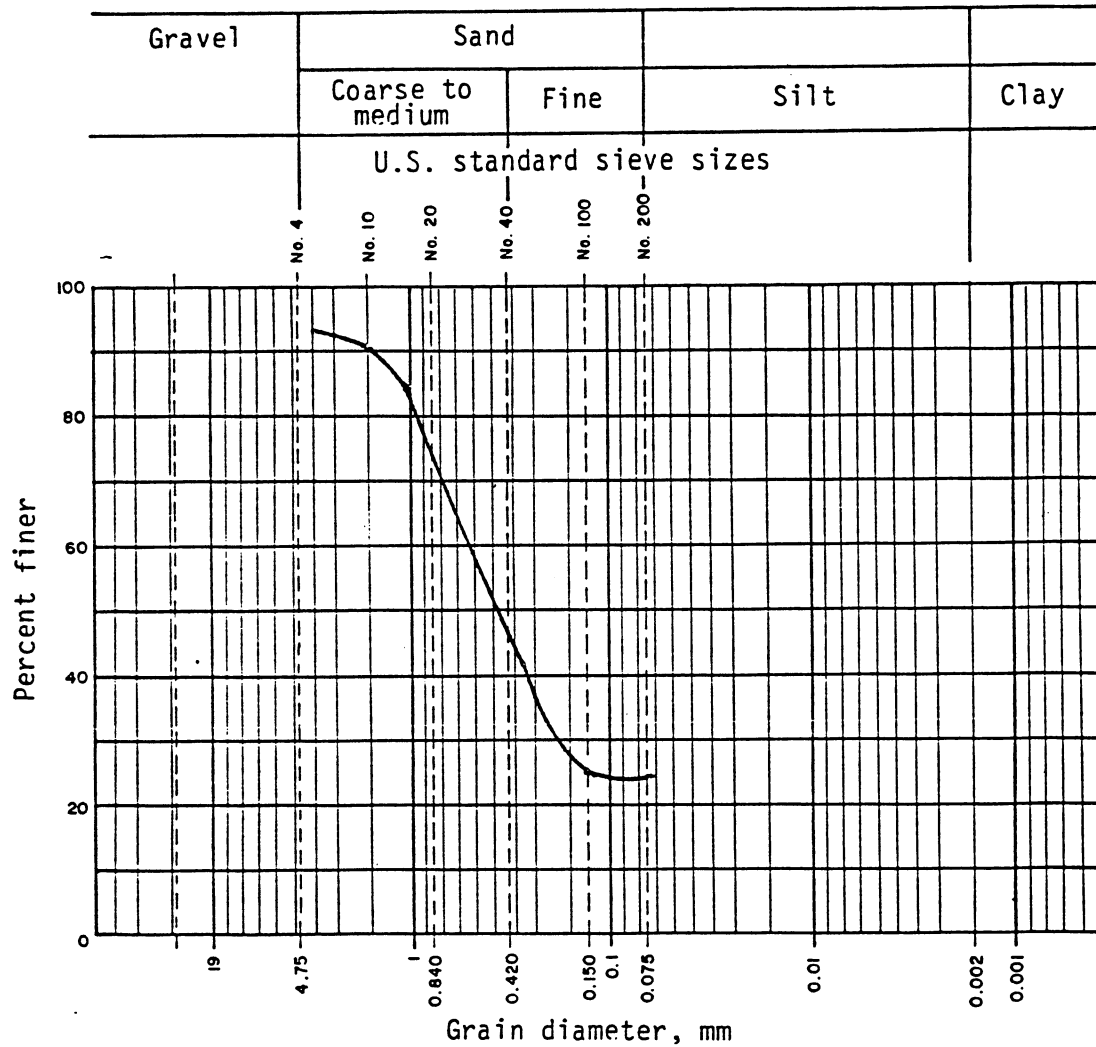


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 213-3 Sample No. 41
 Tested By R.O & D.W Depth of Sample 79-80
 Date of Testing AUGUST 1981

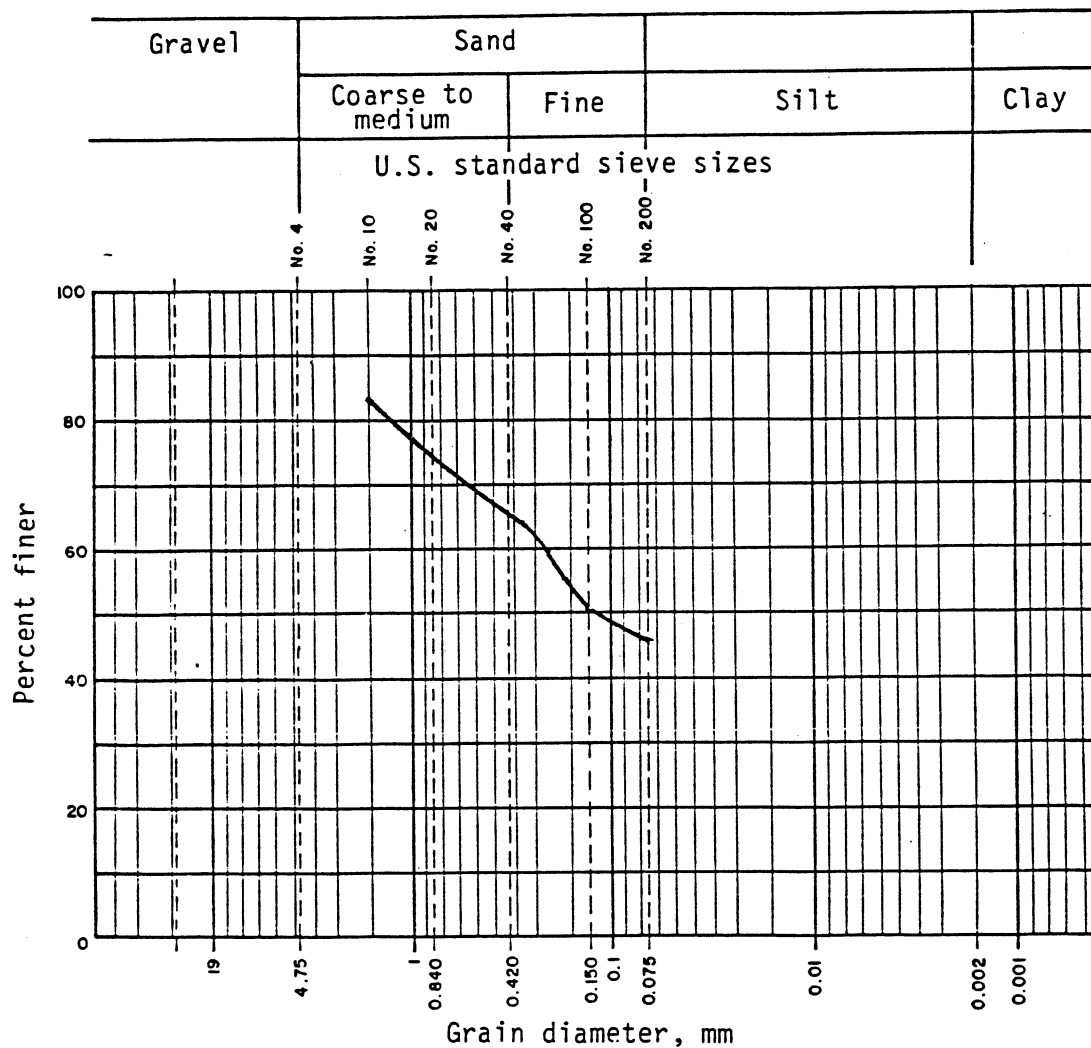


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 213-3 Sample No. 42
 Tested By RO&DW Depth of Sample 84-85
 Date of Testing AUGUST 1981

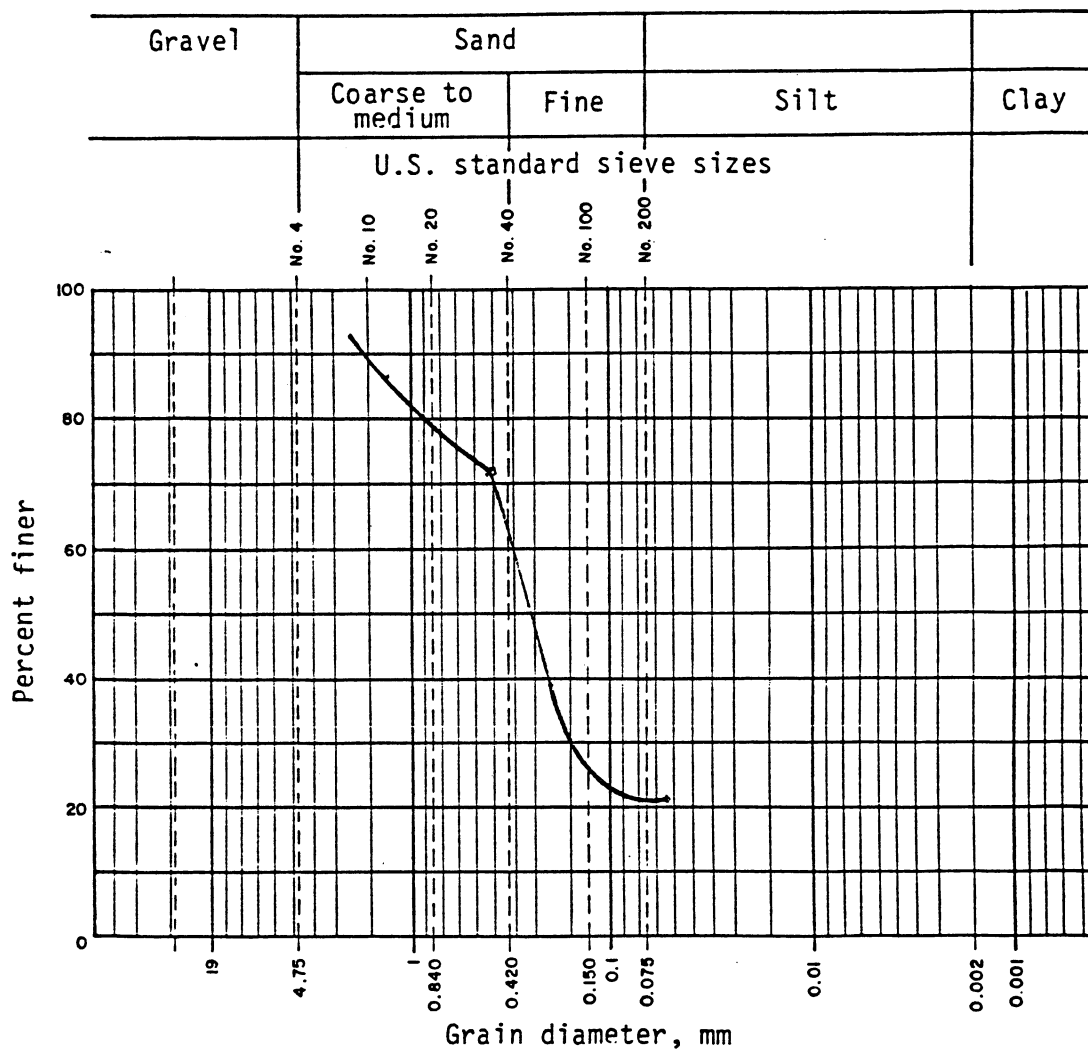


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-1 Sample No. 58
 Tested By D.W. & R.O Depth of Sample 45'
 Date of Testing AUGUST 1981

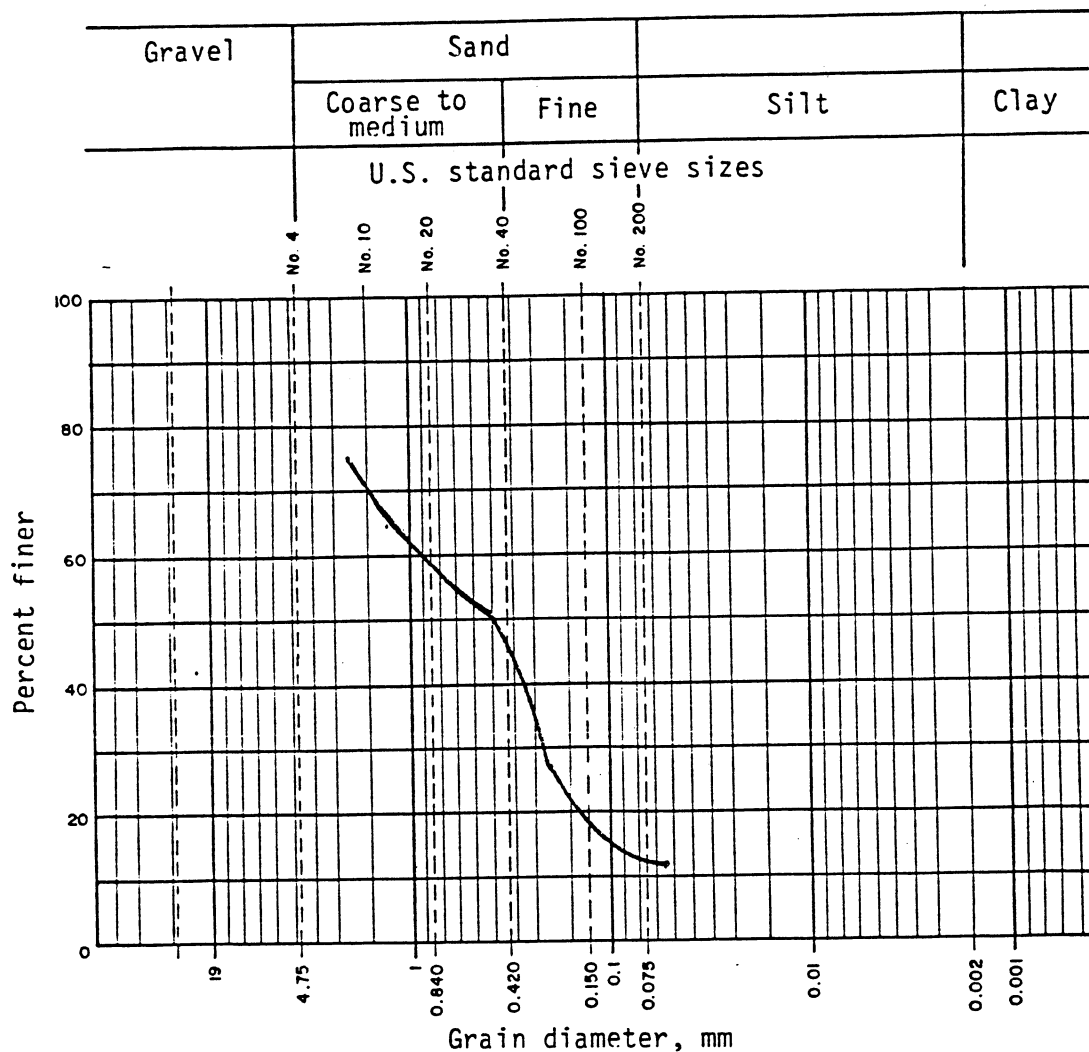


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-1 Sample No. 61
 Tested By R.O & D.W Depth of Sample 70'
 Date of Testing AUGUST 1981

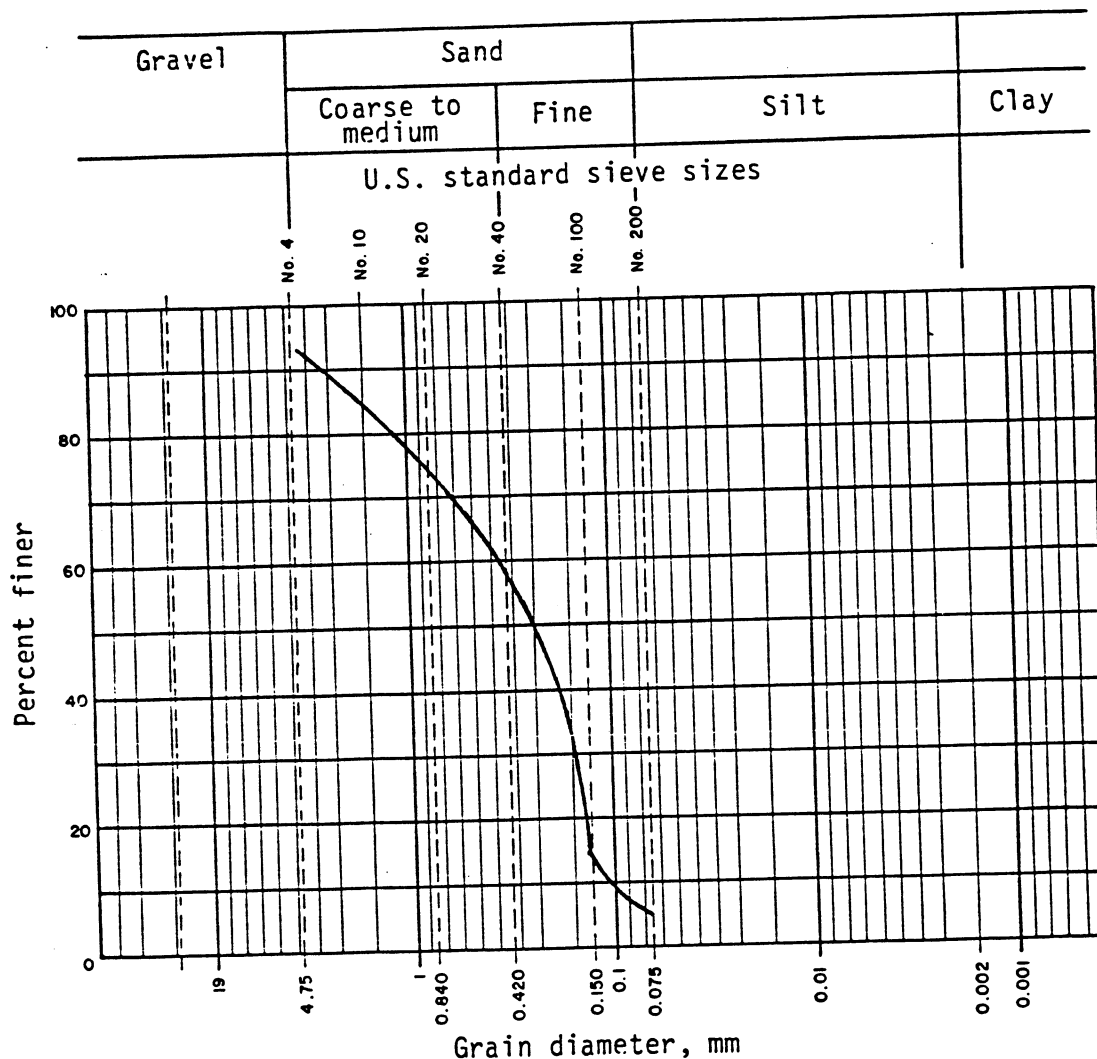


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job No. 1208
 Location of Project CRANDON Boring No. 216-1 Sample No. 65
 Tested By D.W. & R.O. Depth of Sample 90'
 Date of Testing AUGUST 1981

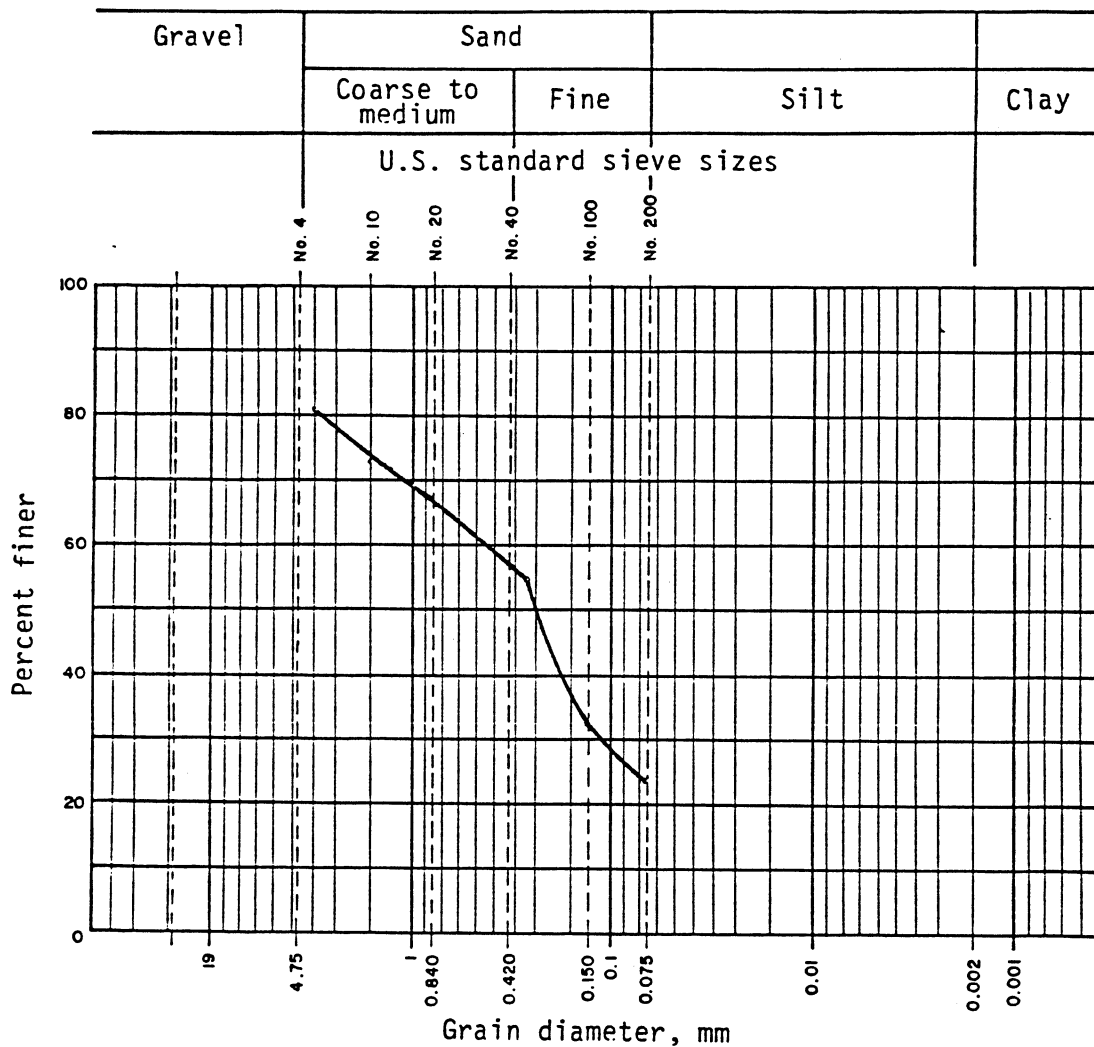


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-1 Sample No. 67
 Tested By R.O & D.W Depth of Sample 110'
 Date of Testing AUGUST 1981

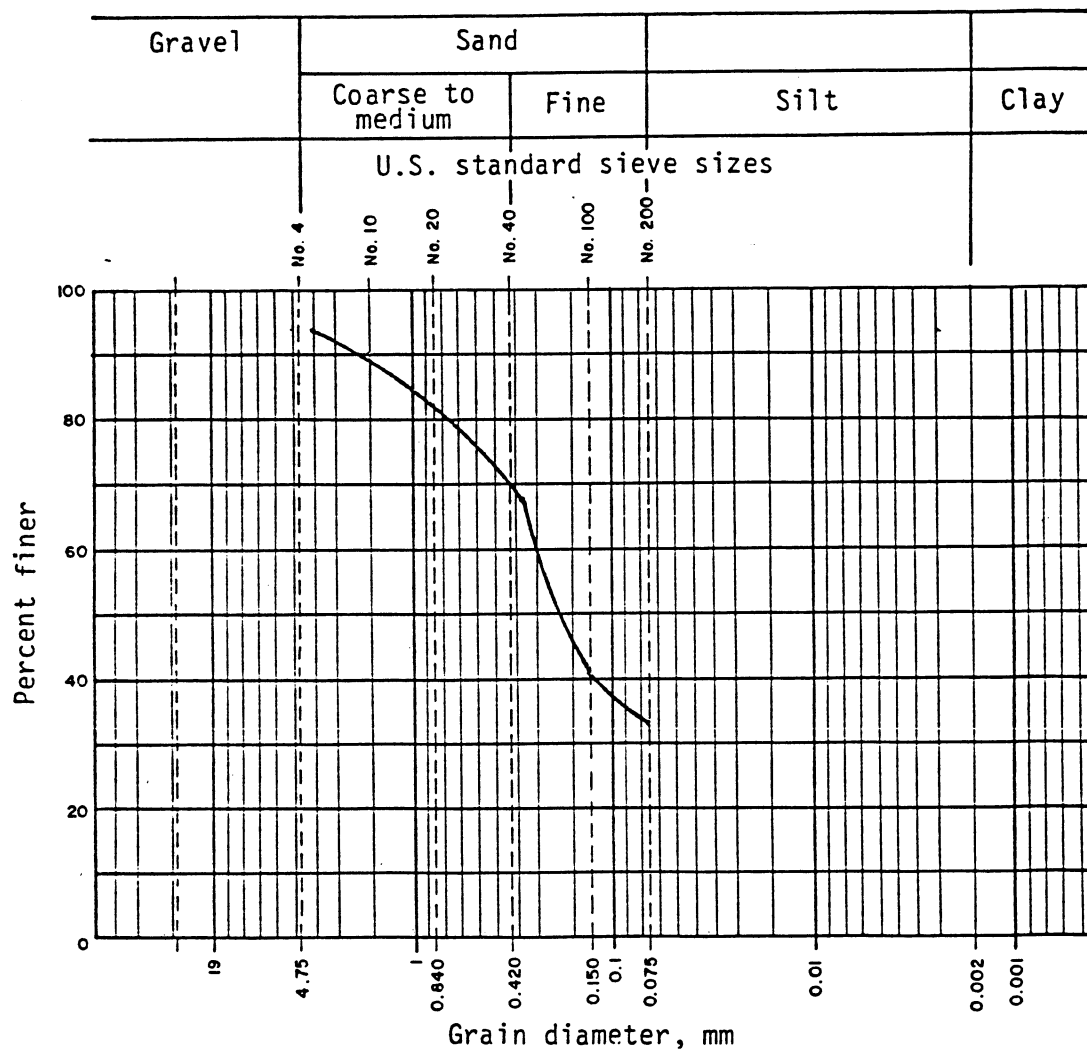


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-1 Sample No. 69
 Tested By D.W & R.O Depth of Sample 130'
 Date of Testing AUGUST 1981

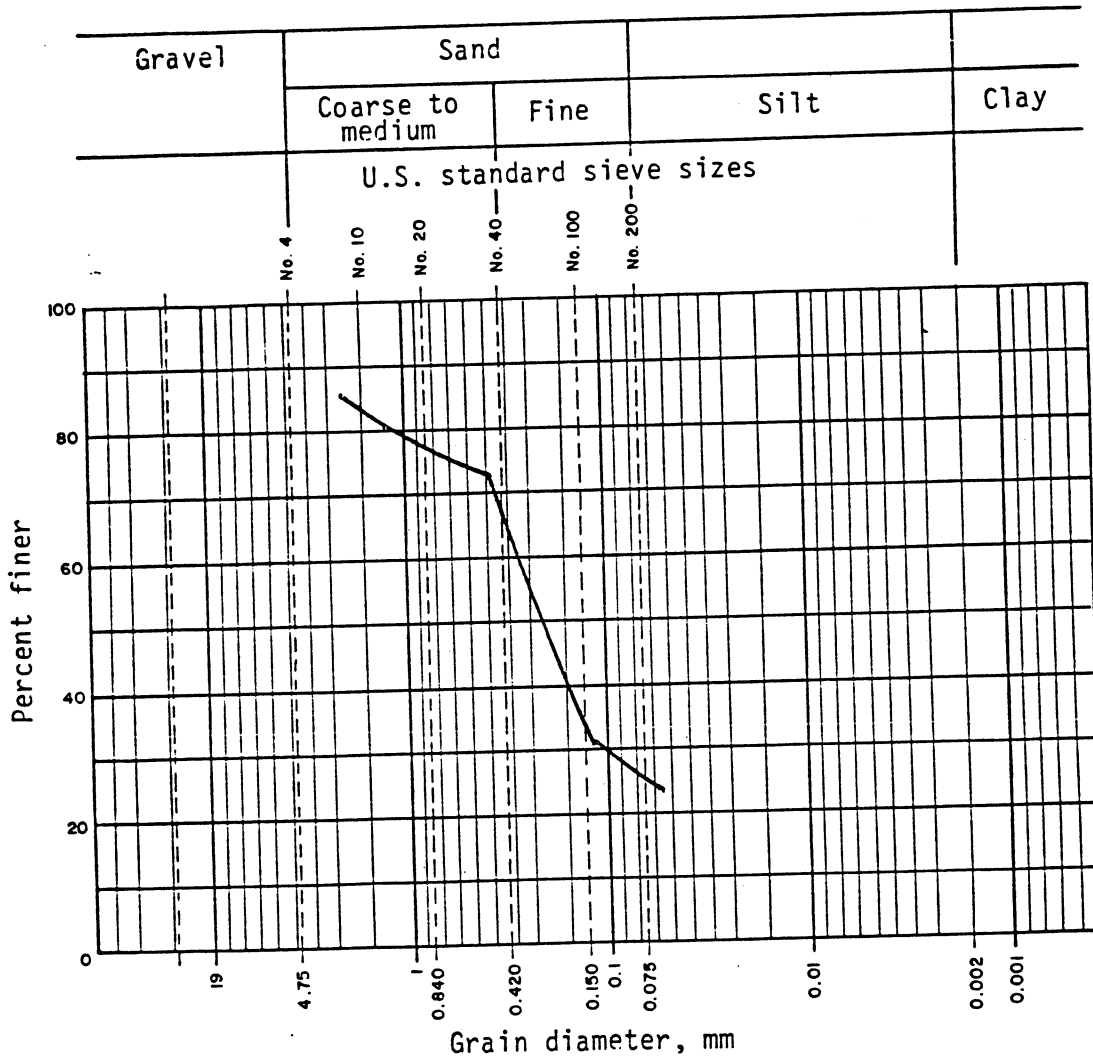


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-2 Sample No. 82
 Tested By D.W. & R.O. Depth of Sample 71'
 Date of Testing AUGUST 1981

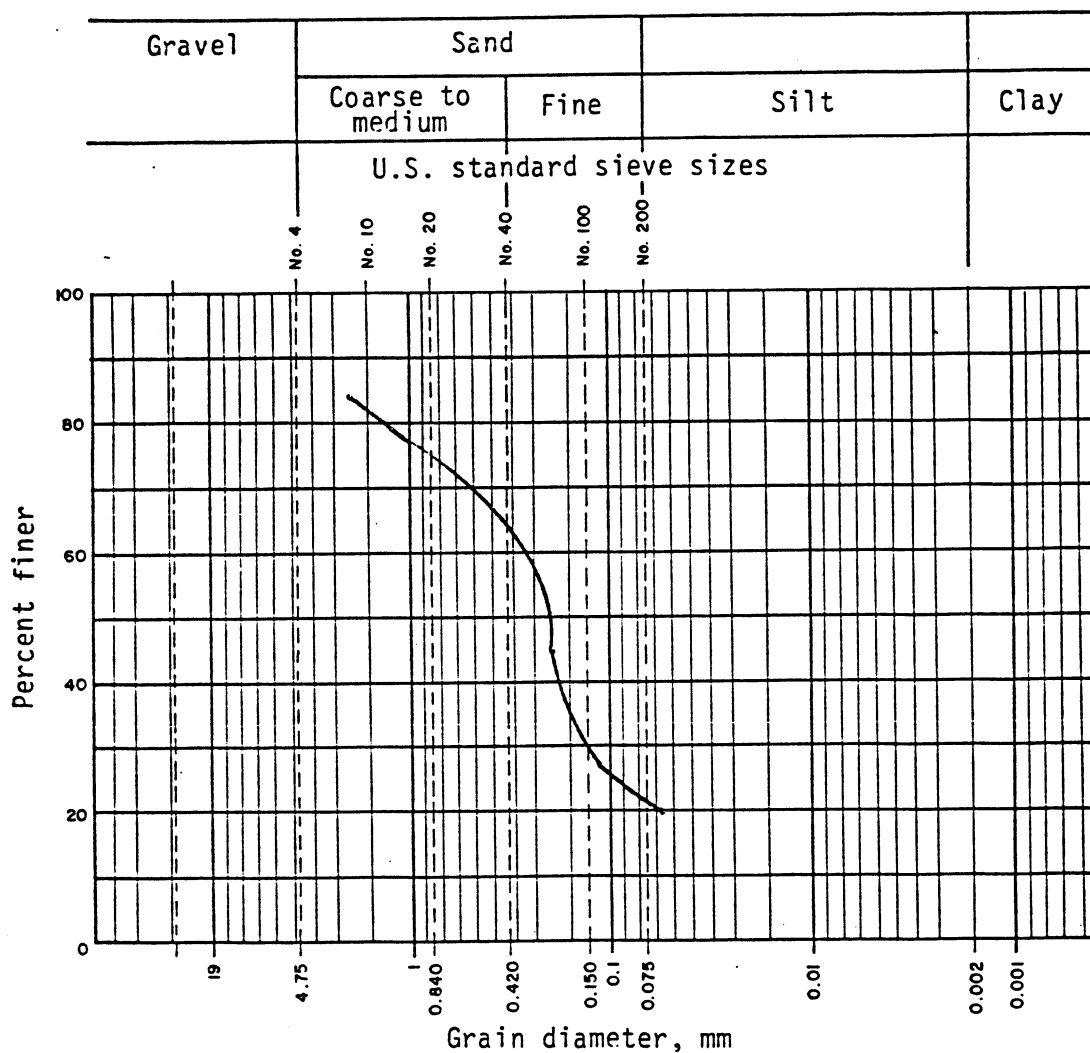


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-2 Sample No. 86
 Tested By D.W. & R.O. Depth of Sample 90'
 Date of Testing AUGUST 1981

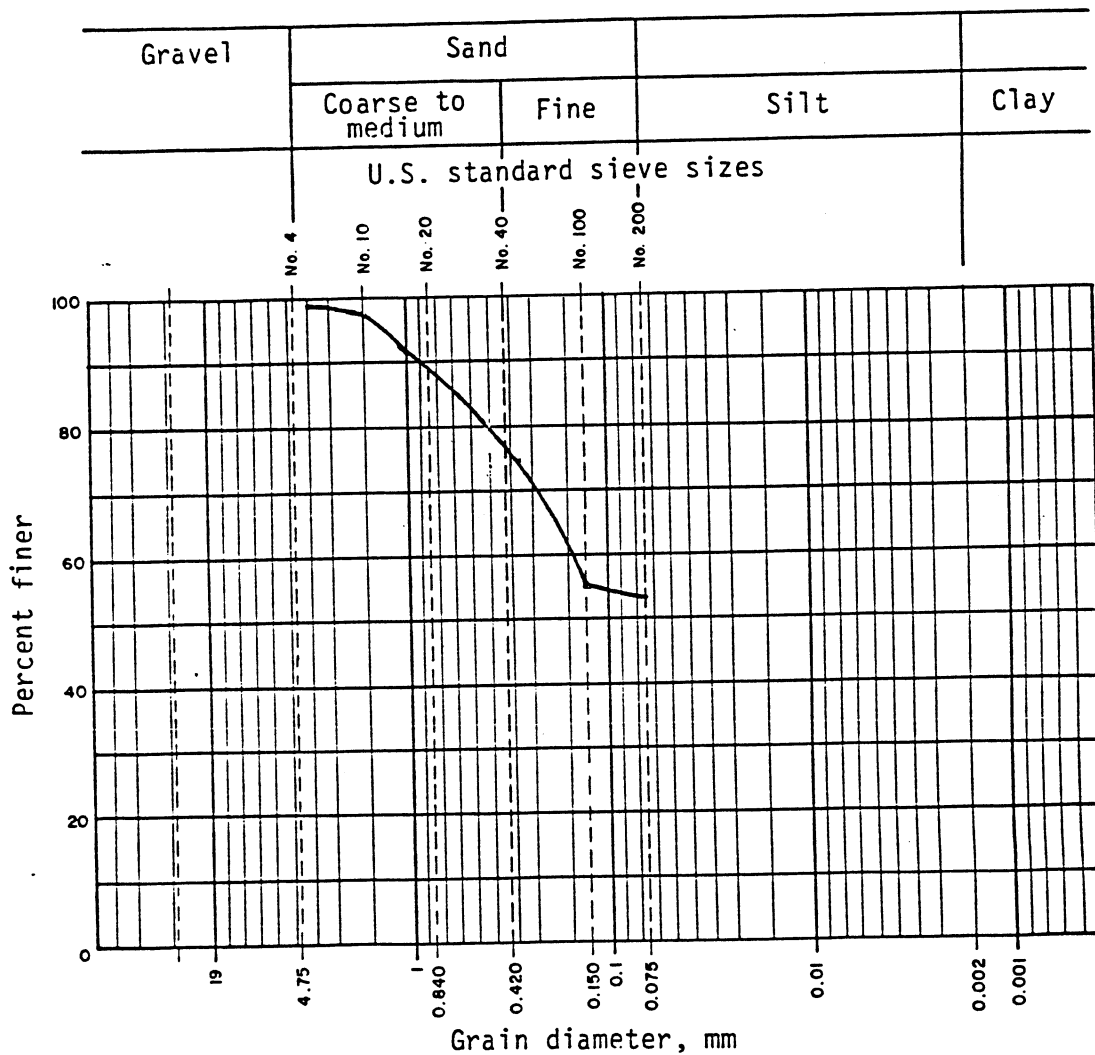


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-2 Sample No. 91
 Tested By R.O & D.W Depth of Sample 131'
 Date of Testing AUGUST 1981

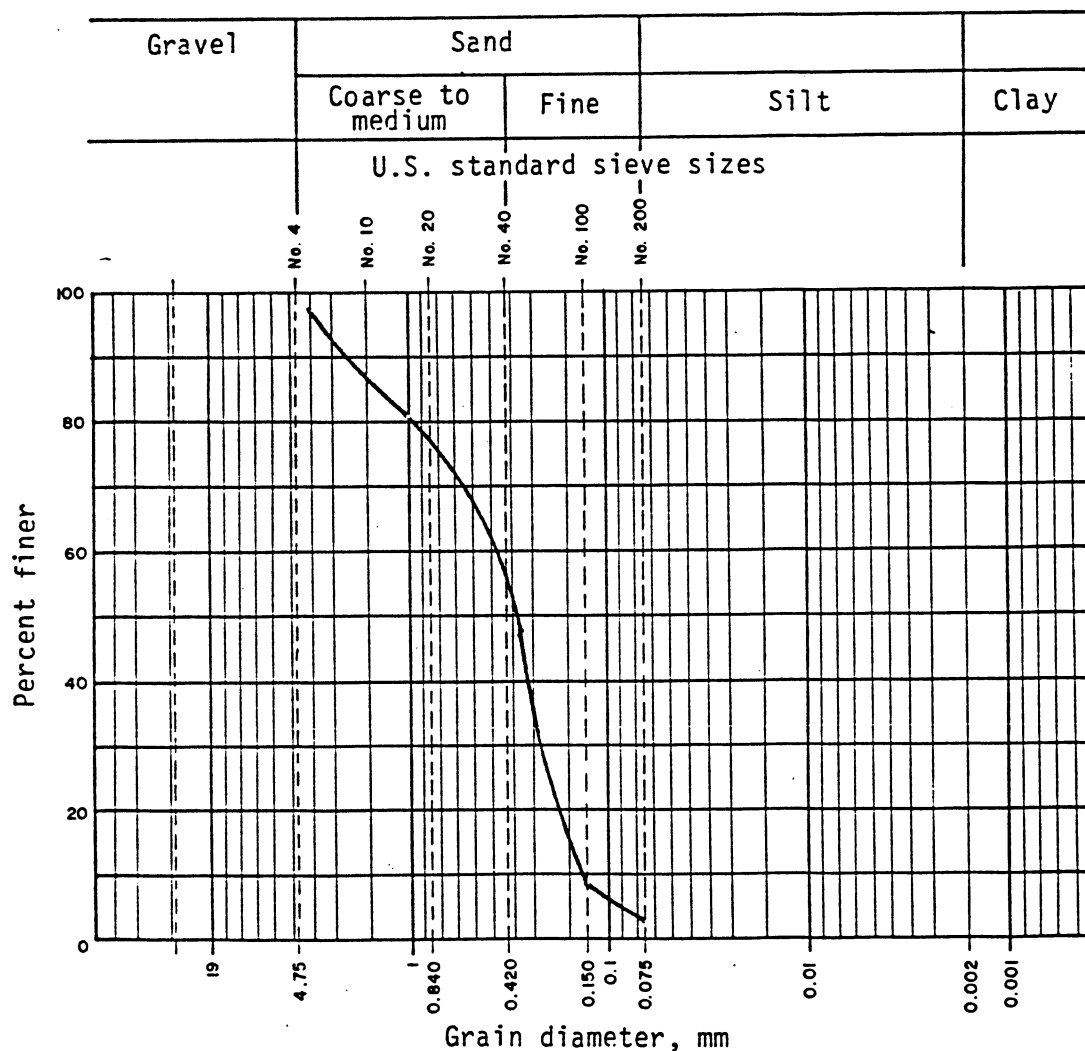


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-2 Sample No. 89
 Tested By D.W & R.O Depth of Sample 111'
 Date of Testing AUGUST 1981

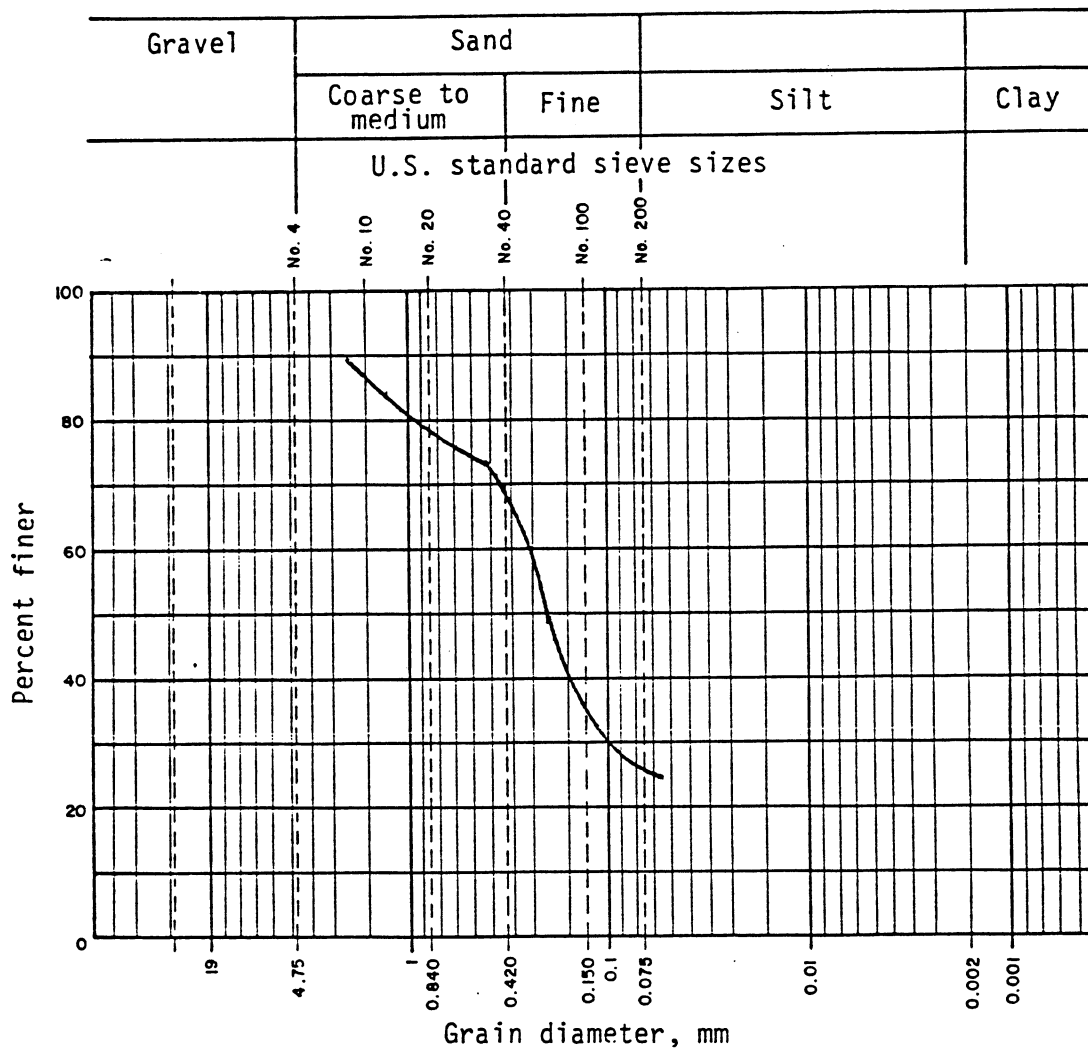


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-3 Sample No. 34
 Tested By R.O & D.W Depth of Sample 77'
 Date of Testing AUGUST 1981



Soil classification:

SM System USCS

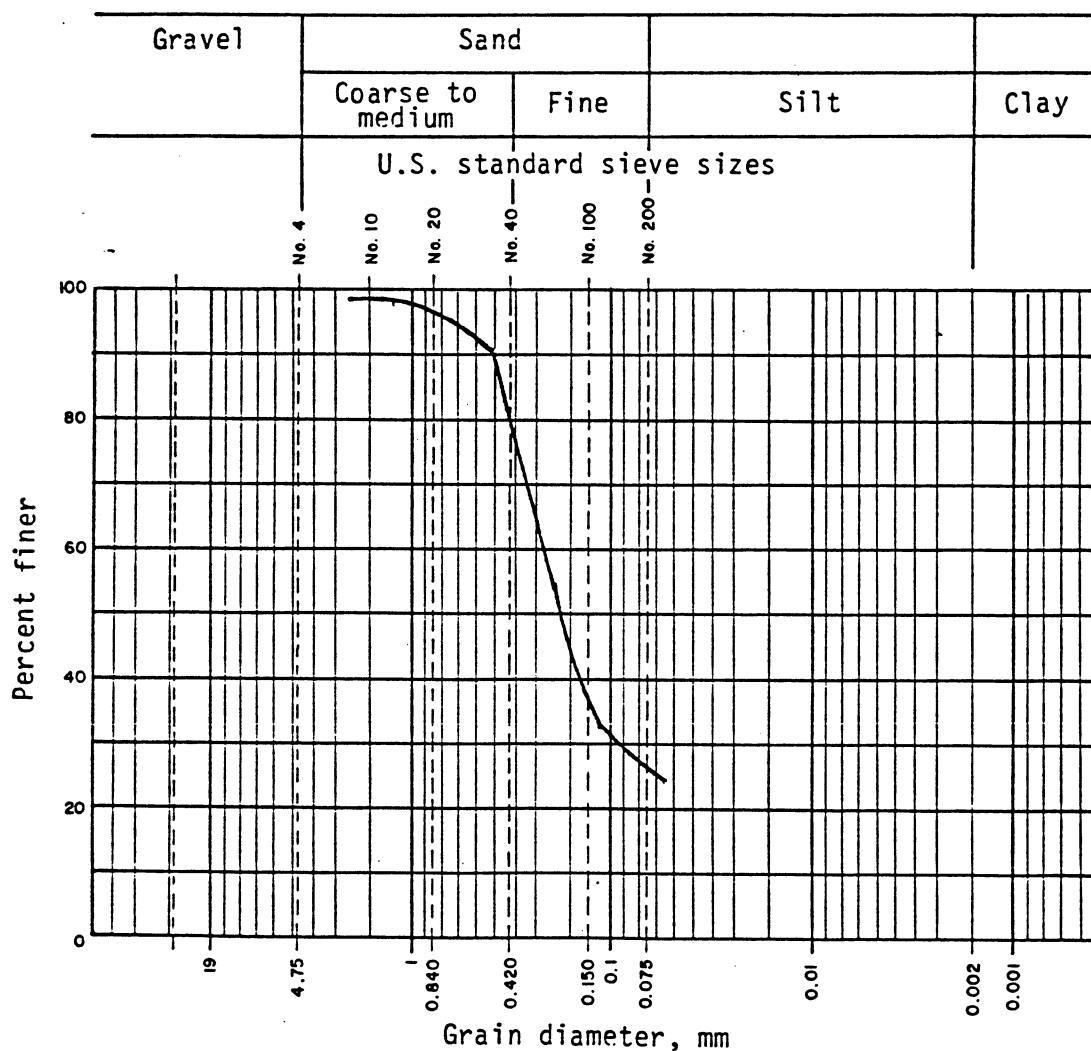
GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208

Location of Project CRANDON Boring No. 216-3 Sample No. 122

Tested By R.O & D.W Depth of Sample 15'

Date of Testing AUGUST 1981

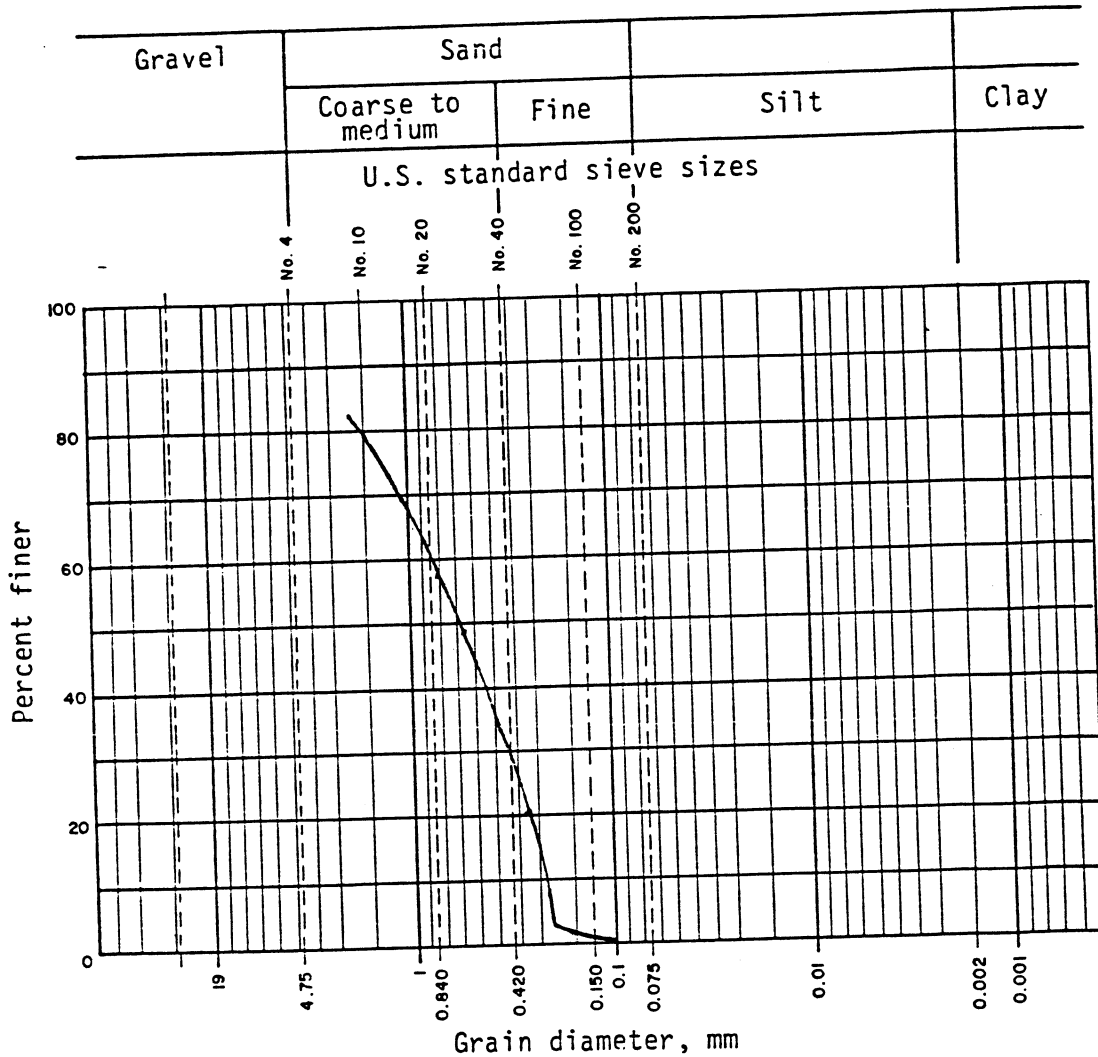


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-3 Sample No. 124
 Tested By D.W & R.O Depth of Sample 27'
 Date of Testing AUGUST 1981

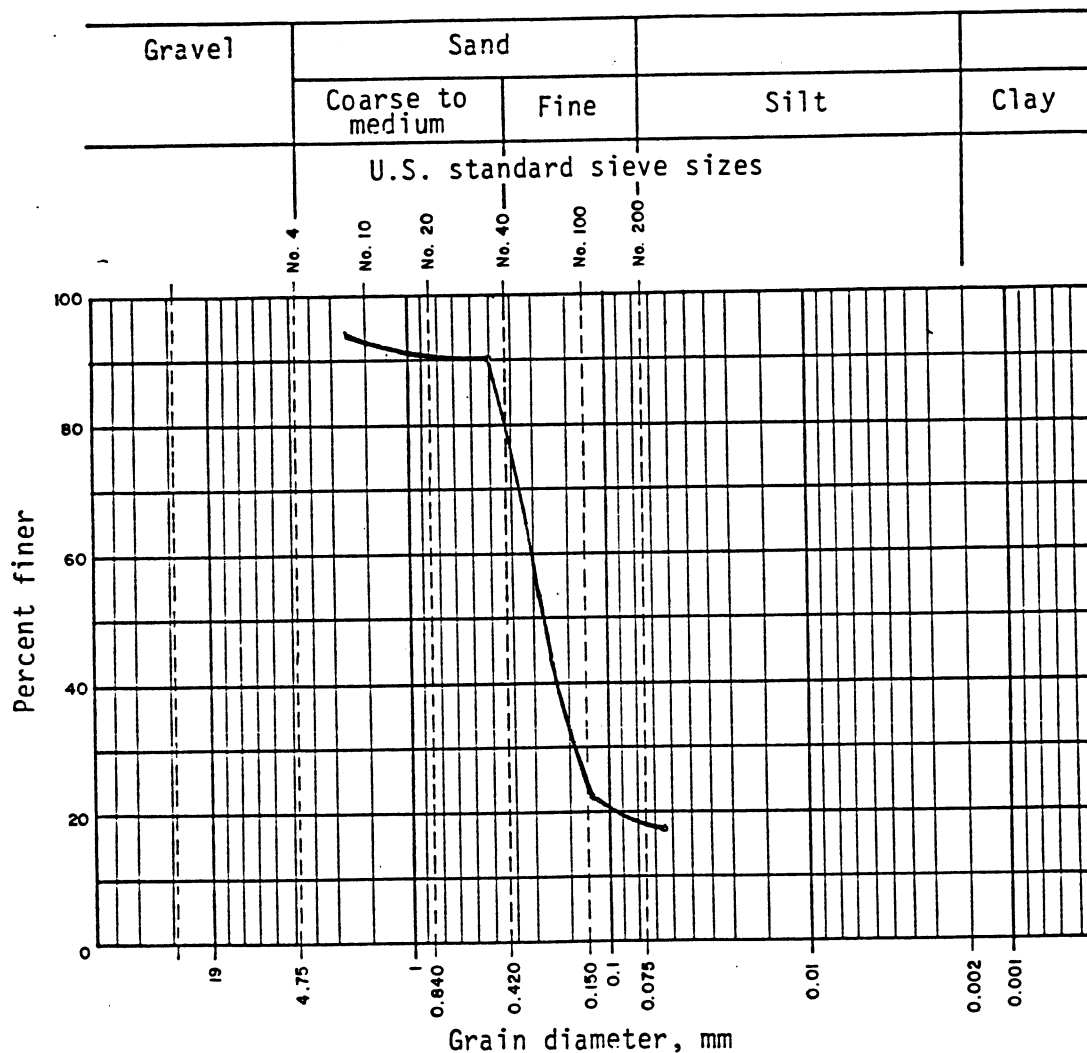


Soil classification:
SP

System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-3 Sample No. 126
 Tested By D.W & R.O Depth of Sample 37'
 Date of Testing AUGUST 1981

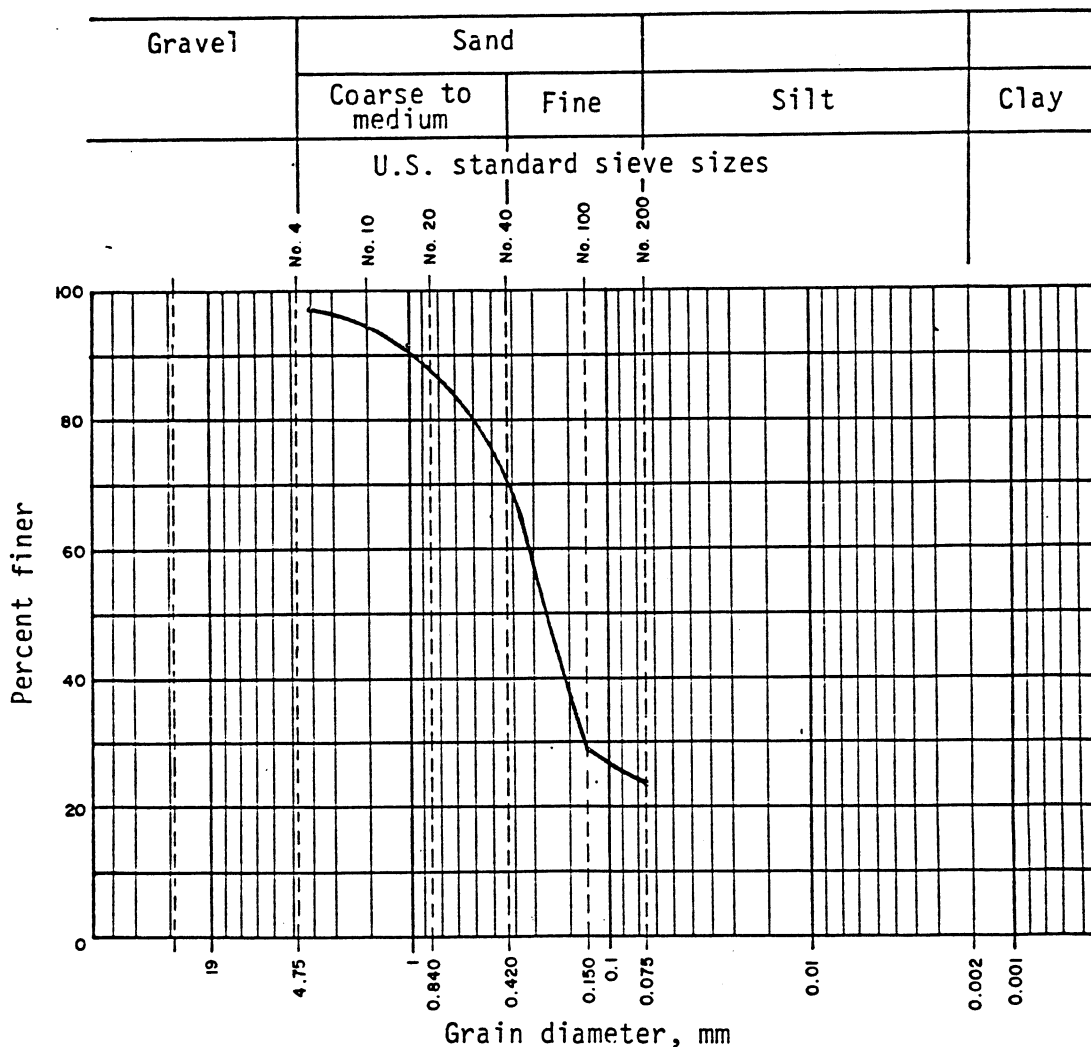


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-3 Sample No. 128
 Tested By D.W & R.O Depth of Sample 47'
 Date of Testing AUGUST 1981

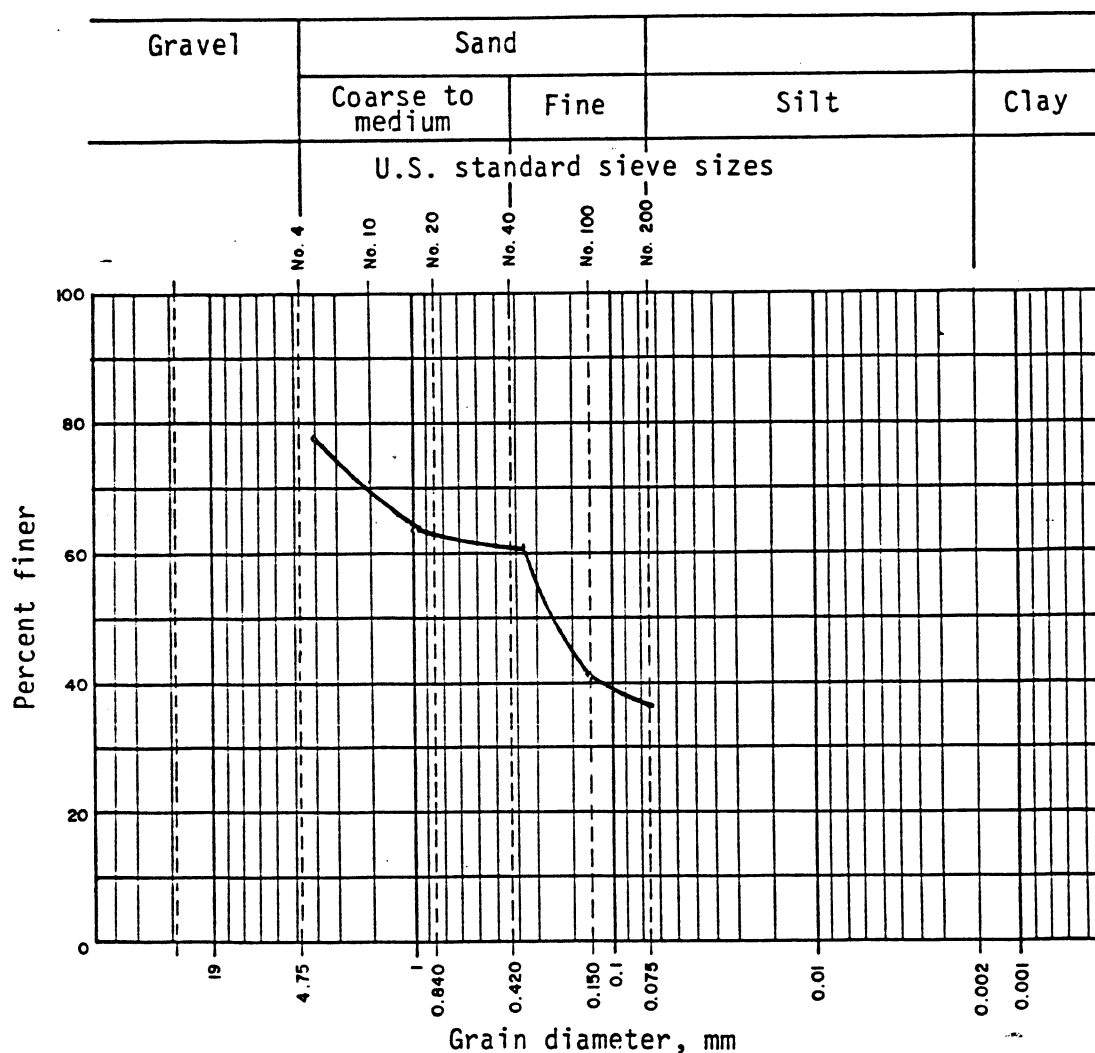


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-3 Sample No. 132
 Tested By D.W. & R.O Depth of Sample 67'
 Date of Testing AUGUST 1981

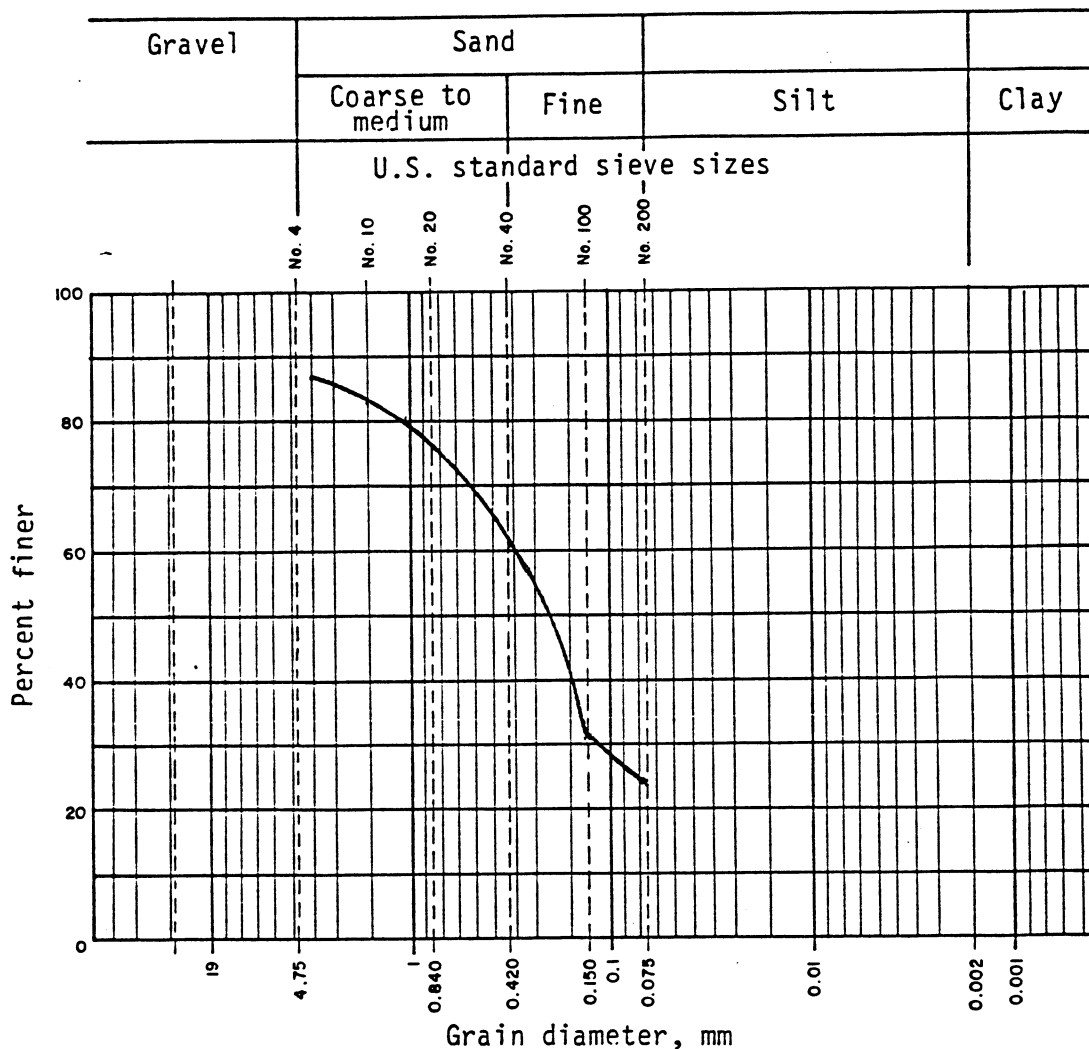


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-3 Sample No. 136
 Tested By R.O & D.W Depth of Sample 87'
 Date of Testing AUGUST 1981



Soil classification:

SM System USCS

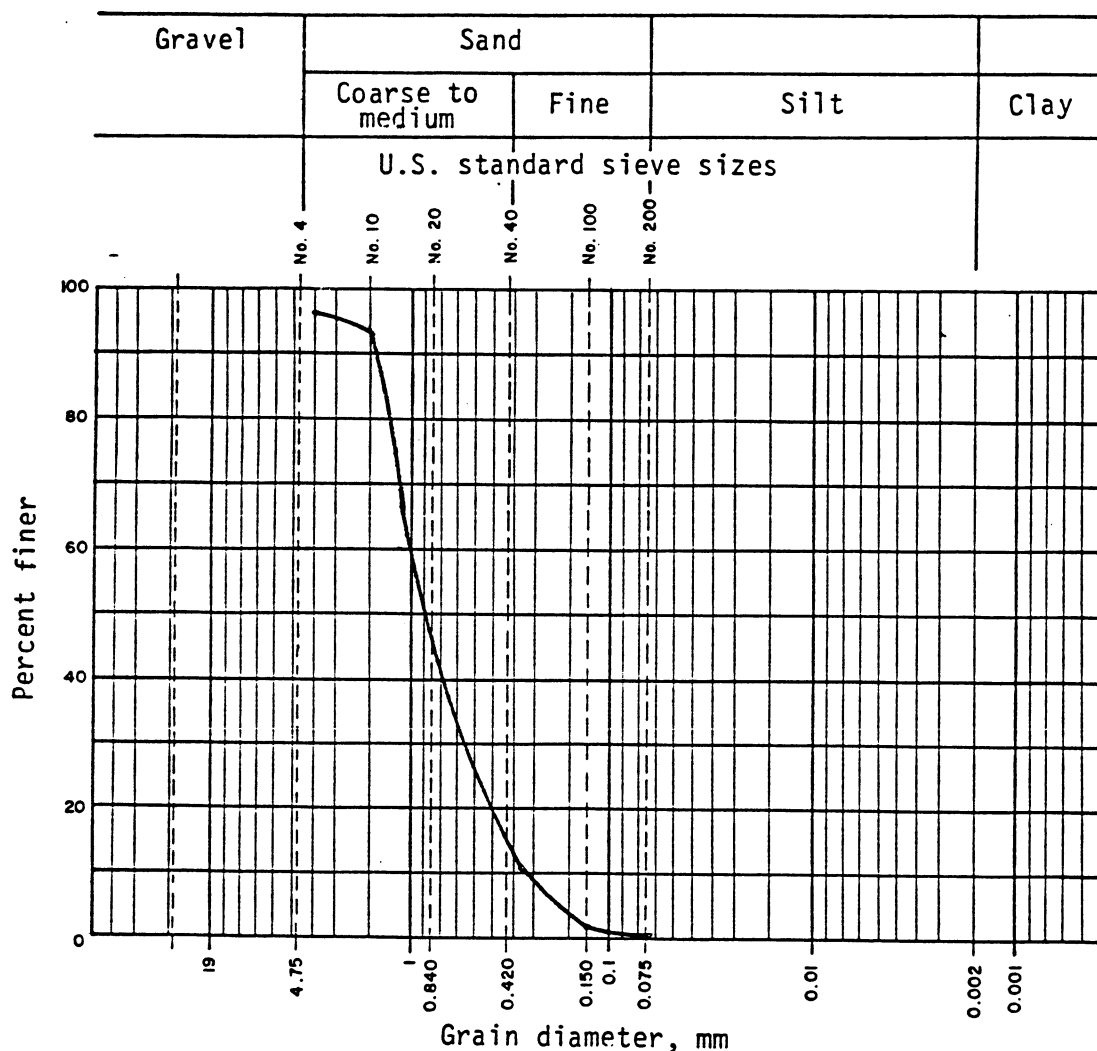
GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208

Location of Project CRANDON Boring No. 216-3 Sample No. 137

Tested By R.O & D.W Depth of Sample 92'

Date of Testing AUGUST 1981

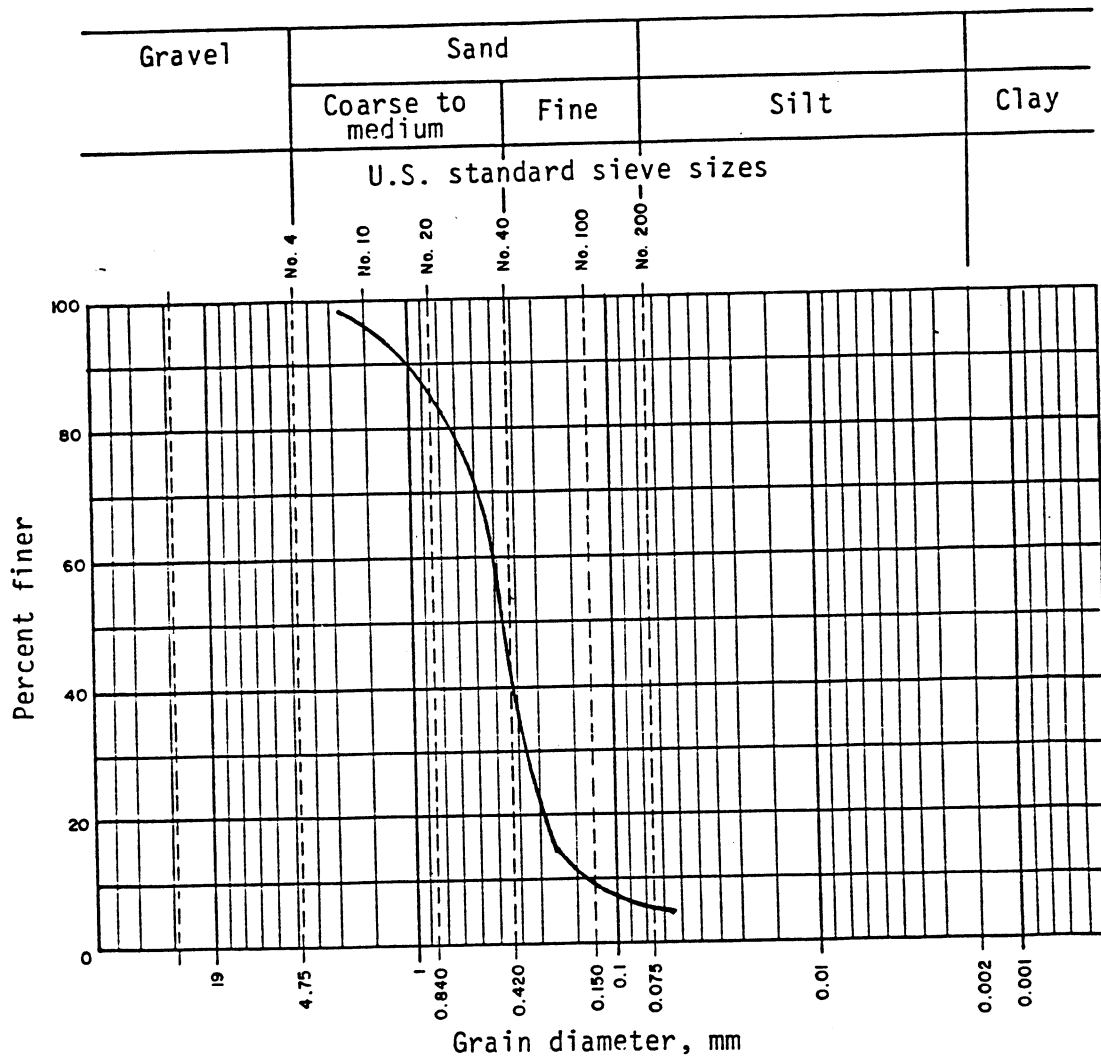


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-3 Sample No. 139
 Tested By D.W. & R.O. Depth of Sample 112'
 Date of Testing AUGUST 1981

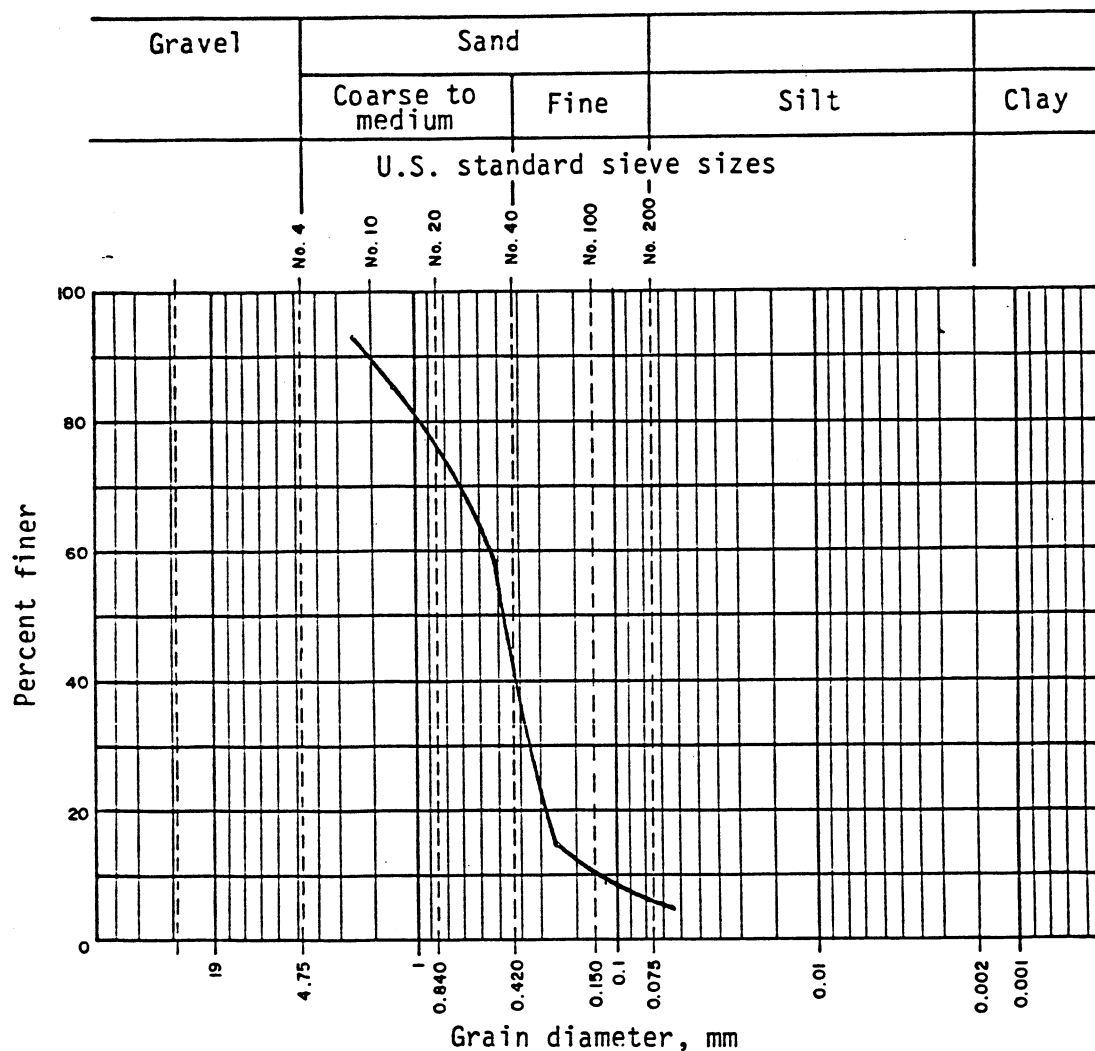


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-3 Sample No. 140
 Tested By R.O & D.W Depth of Sample 122'
 Date of Testing AUGUST 1981

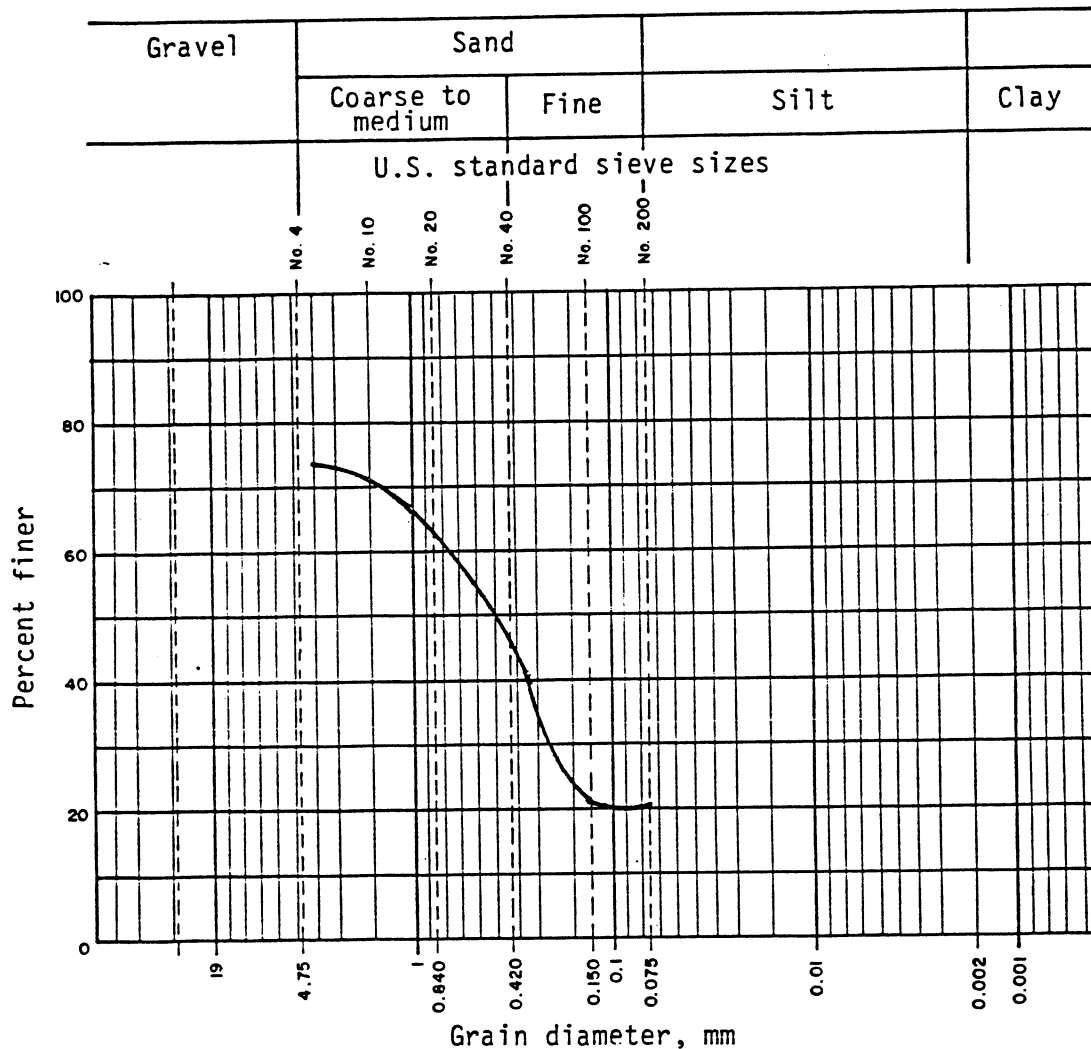


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-3 Sample No. 141
 Tested By D.W. & R.O. Depth of Sample 132'
 Date of Testing AUGUST 1981

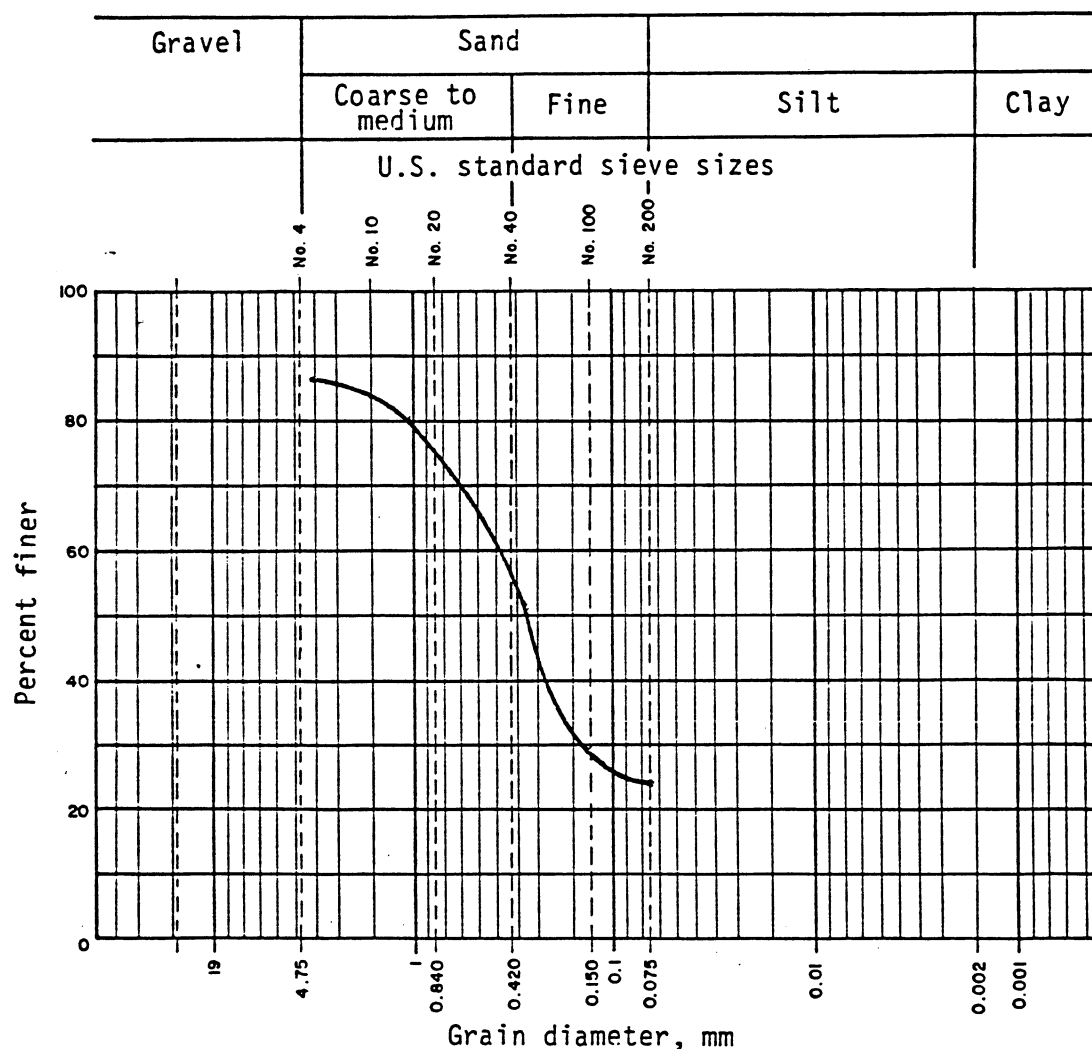


Soil classification:

SM System USCS

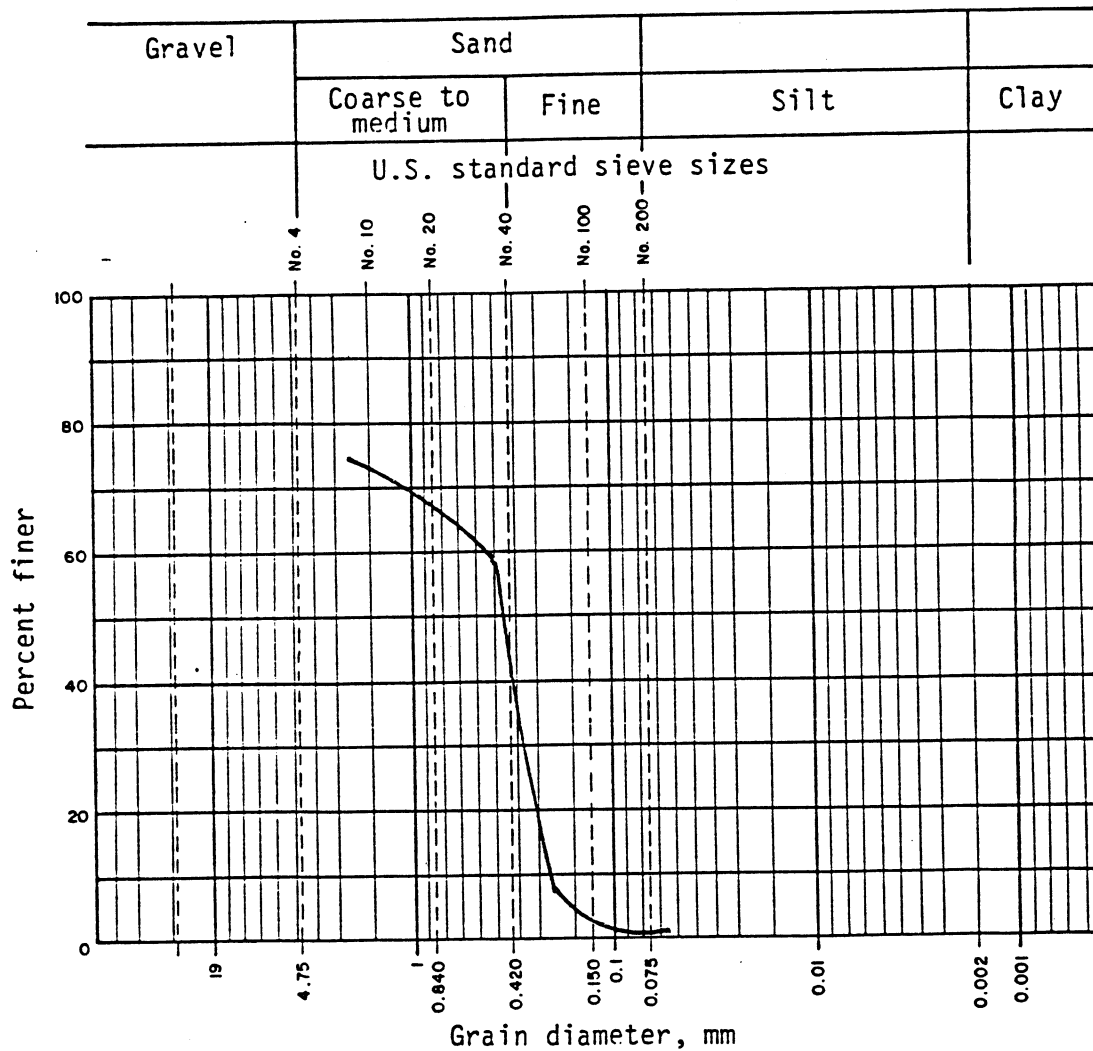
GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. 216-3 Sample No. 142
 Tested By D.W. & R.O. Depth of Sample 142
 Date of Testing August 1981



GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. WW4 Sample No. --
 Tested By D.W & R.O Depth of Sample 20 ft.
 Date of Testing AUGUST 1981

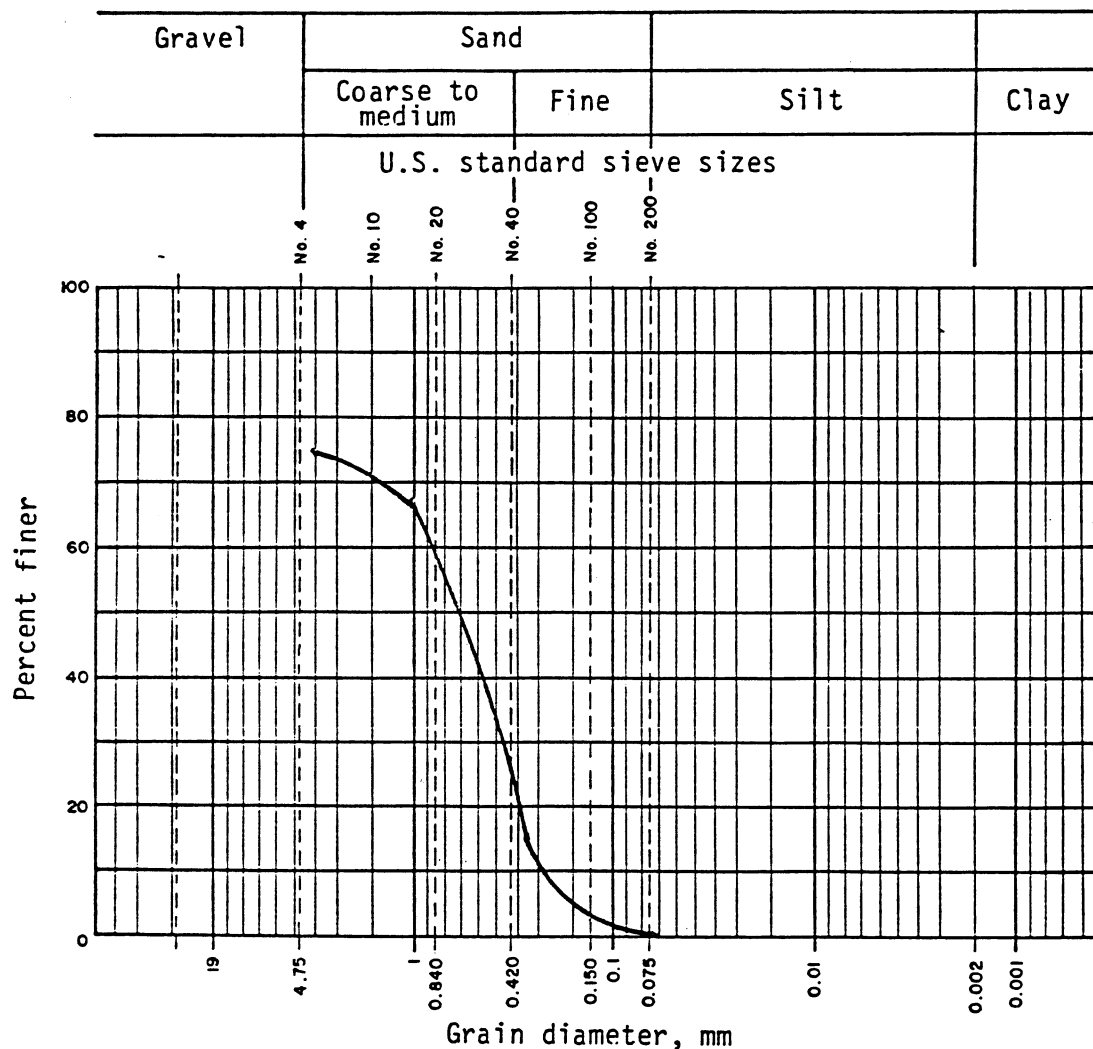


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. WW-4 Sample No. --
 Tested By R.O & D.W Depth of Sample 30'
 Date of Testing AUGUST 1981

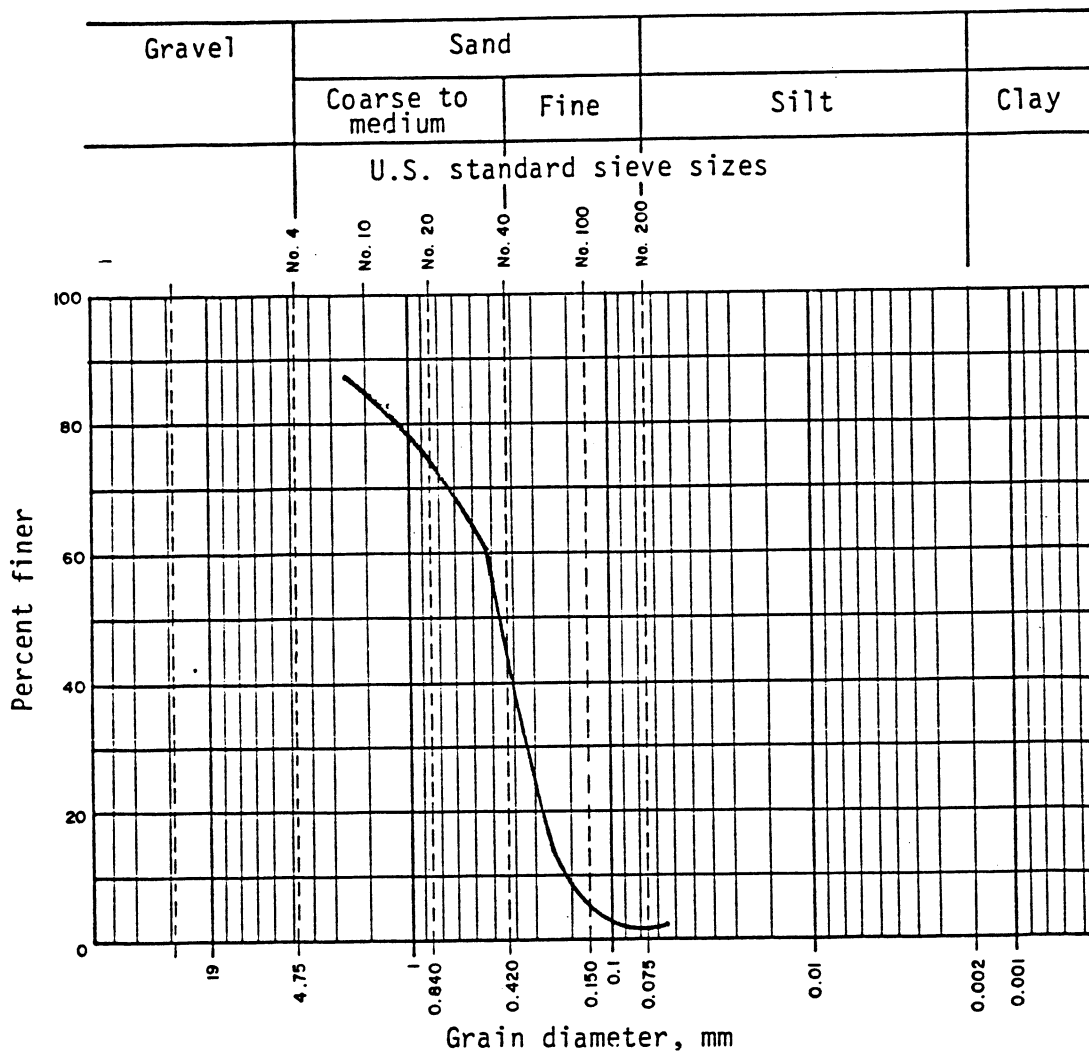


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
Location of Project CRANDON Boring No. WW-4 Sample No. --
Tested By R.O & D.W Depth of Sample 40'
Date of Testing AUGUST 1981

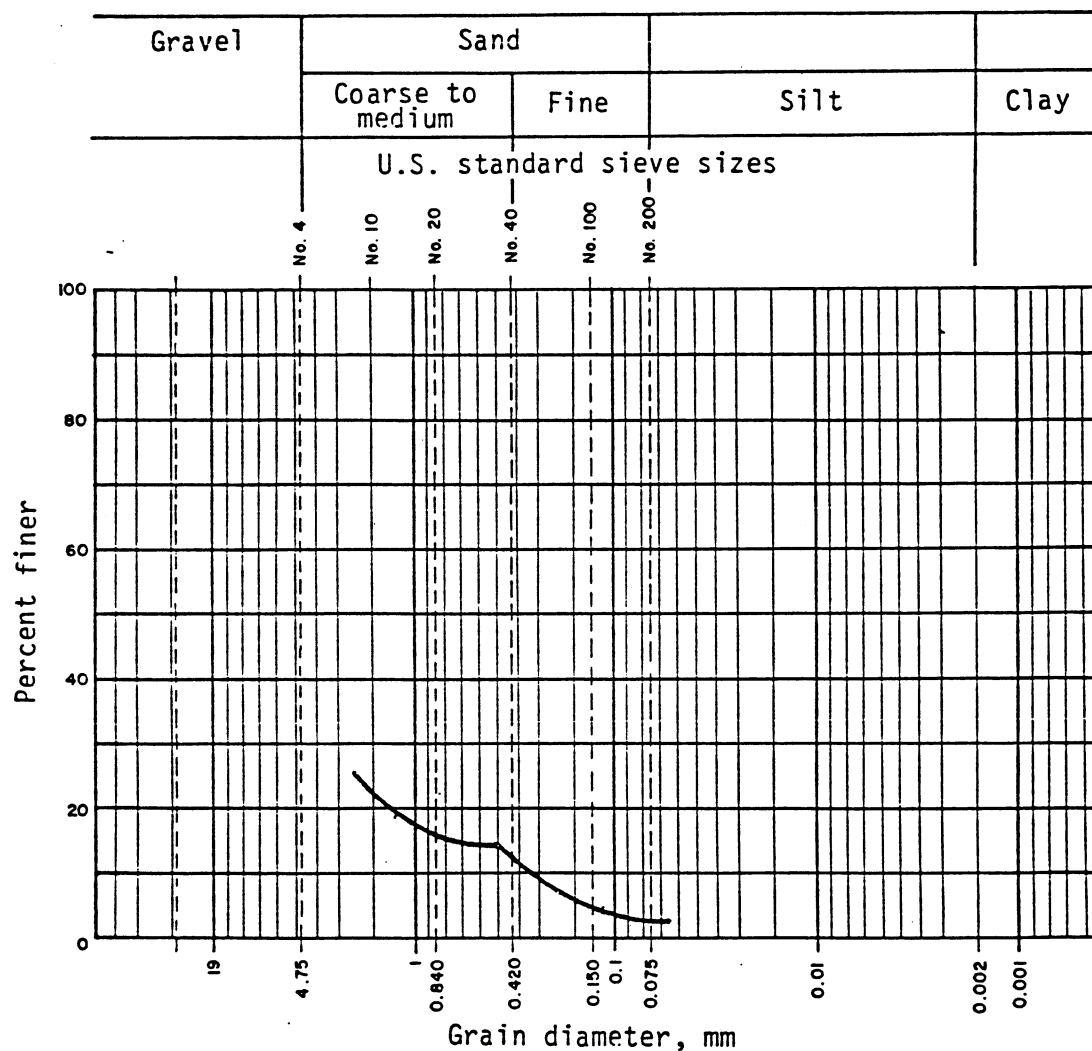


Soil classification:

SP System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
Location of Project CRANDON Boring No. WW-4 Sample No. --
Tested By R.O & D.W Depth of Sample 50'
Date of Testing AUGUST 1981

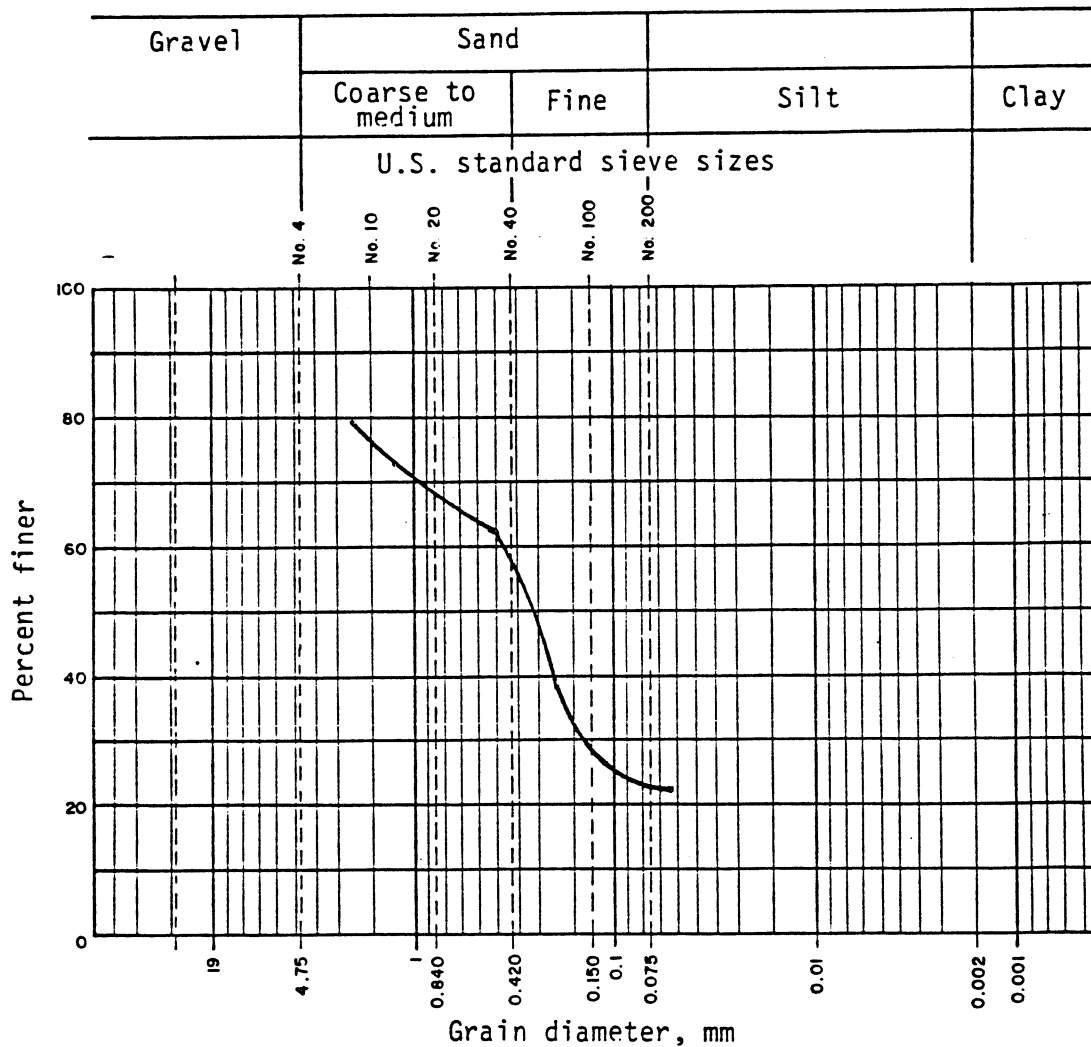


Soil classification:

_____ SP _____ System _____ USCS _____

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. WW-4 Sample No. --
 Tested By D.W & R.O Depth of Sample 60'
 Date of Testing AUGUST 1981



Soil classification:

SM System USCS

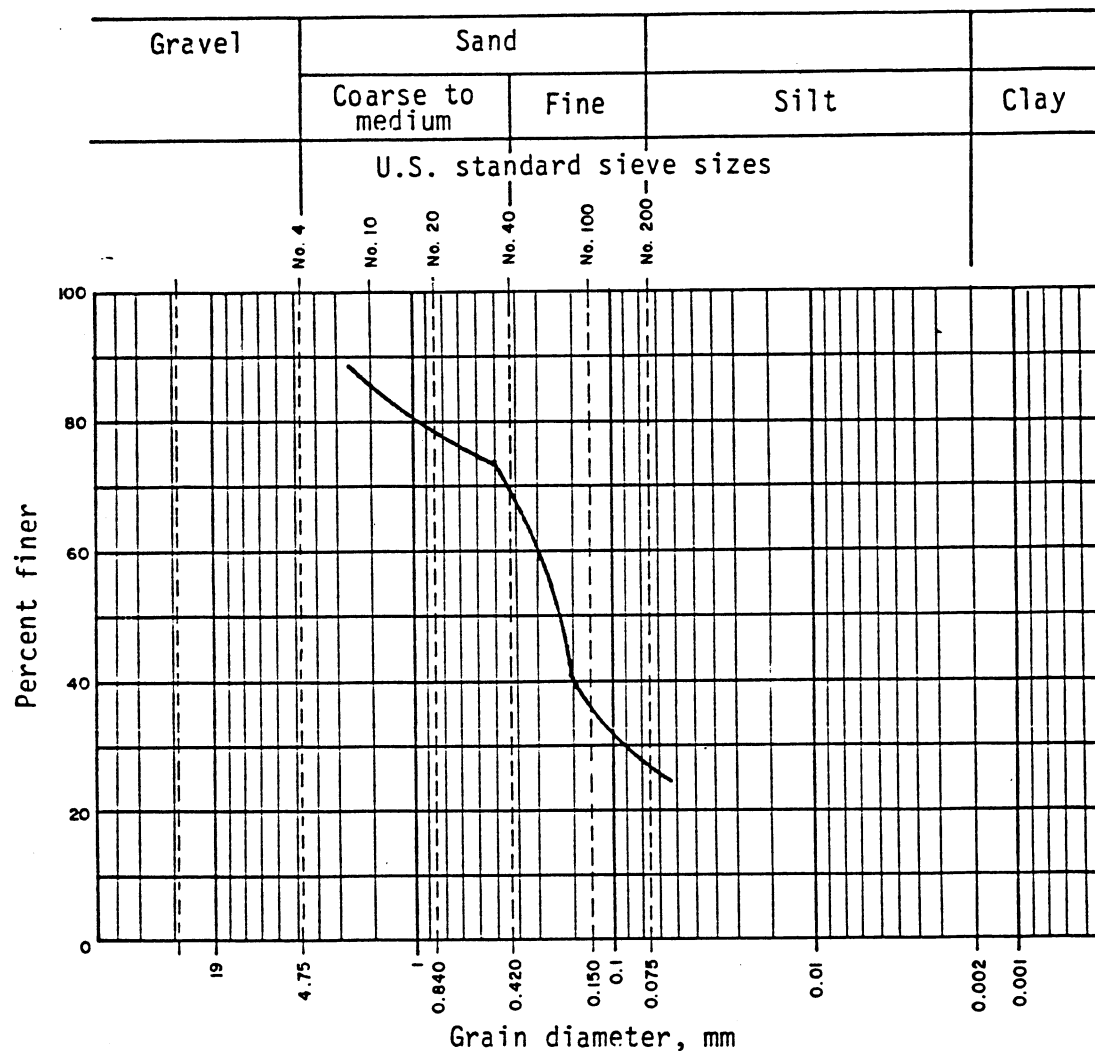
GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208

Location of Project CRANDON Boring No. WW-4 Sample No. --

Tested By D.W & R.O Depth of Sample 65'

Date of Testing AUGUST 1981

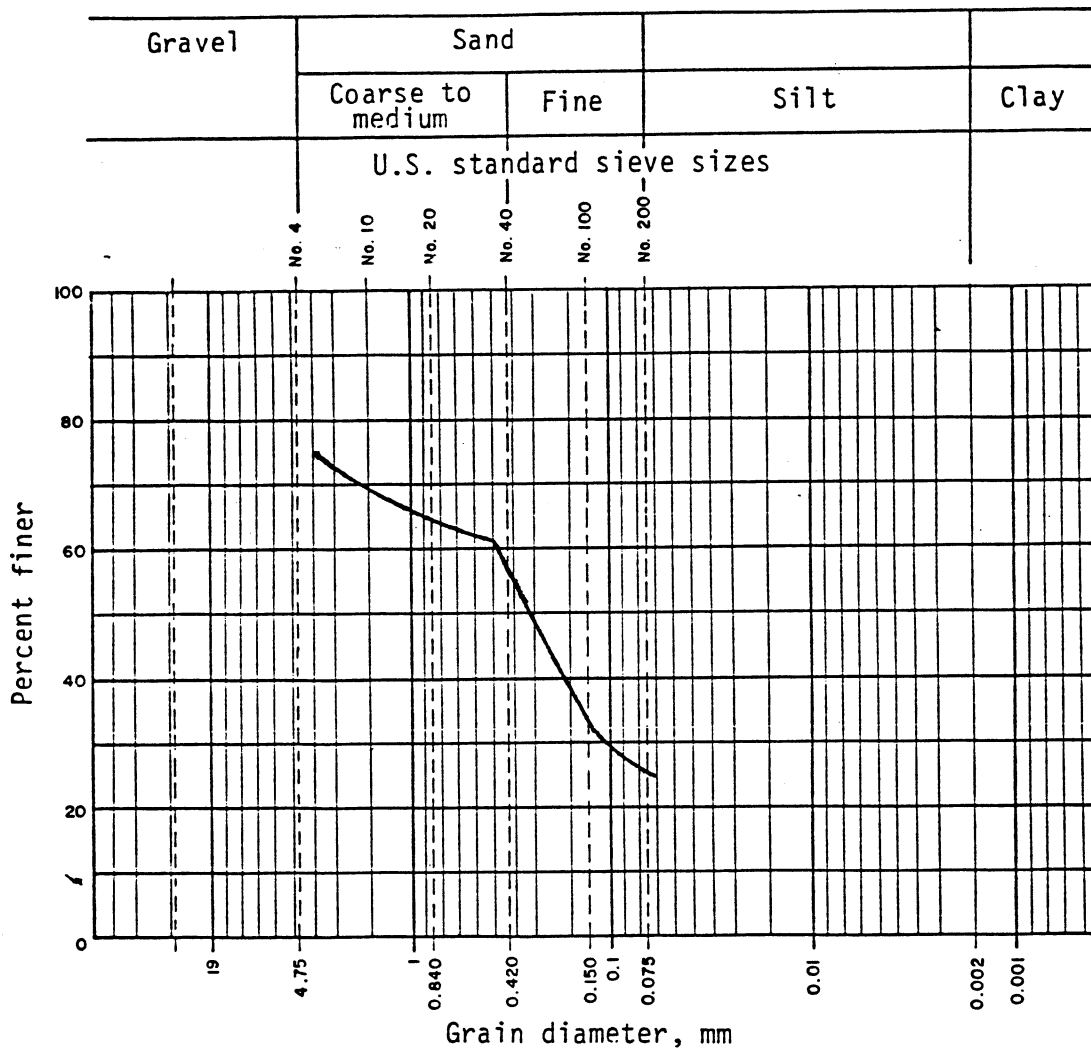


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. WW-4 Sample No. --
 Tested By R.O & D.W Depth of Sample 70'
 Date of Testing AUGUST 1981



Soil classification:

SM System USCS

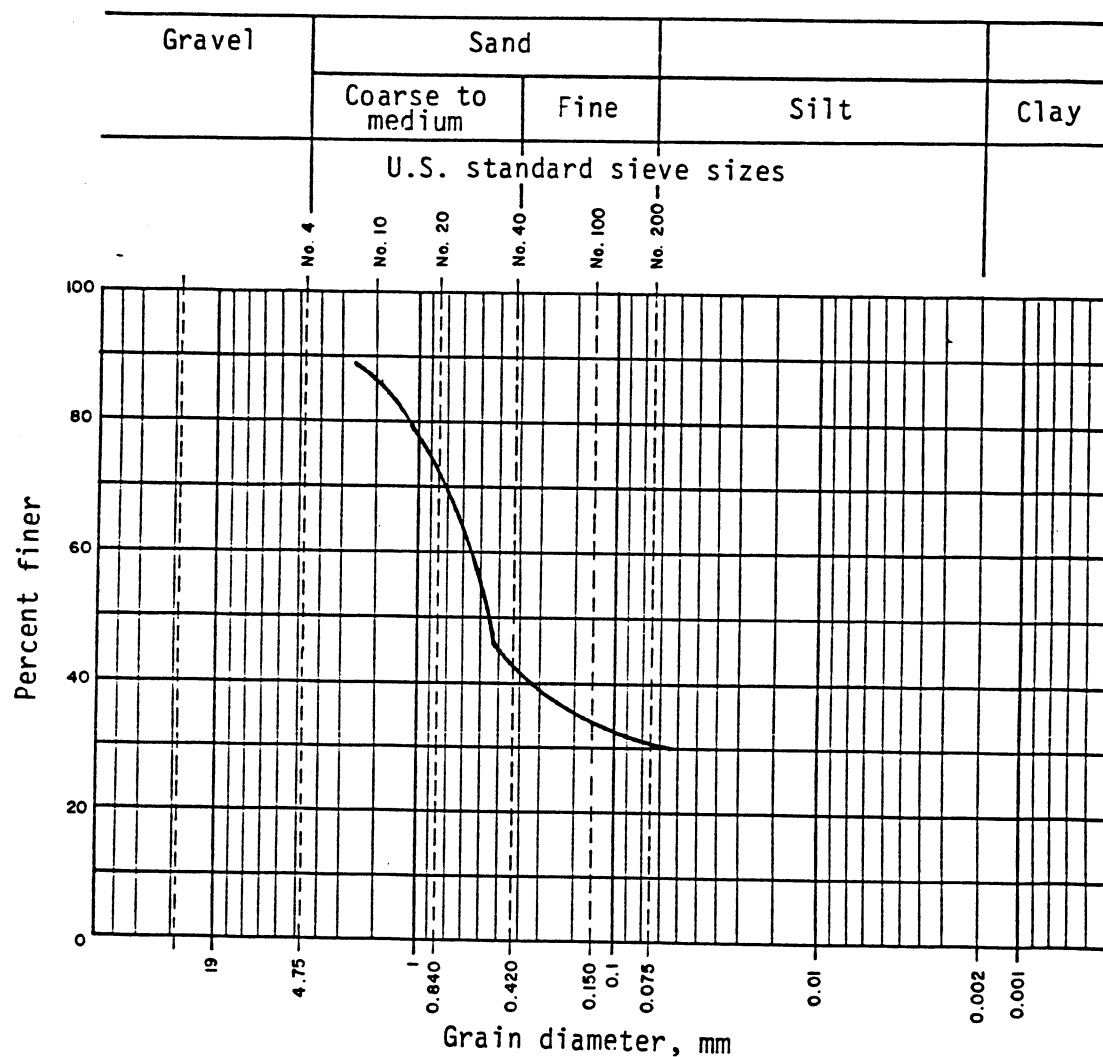
GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208

Location of Project CRANDON Boring No. WW-4 Sample No. --

Tested By R.O & D.W Depth of Sample 75 ft.

Date of Testing AUGUST 1981

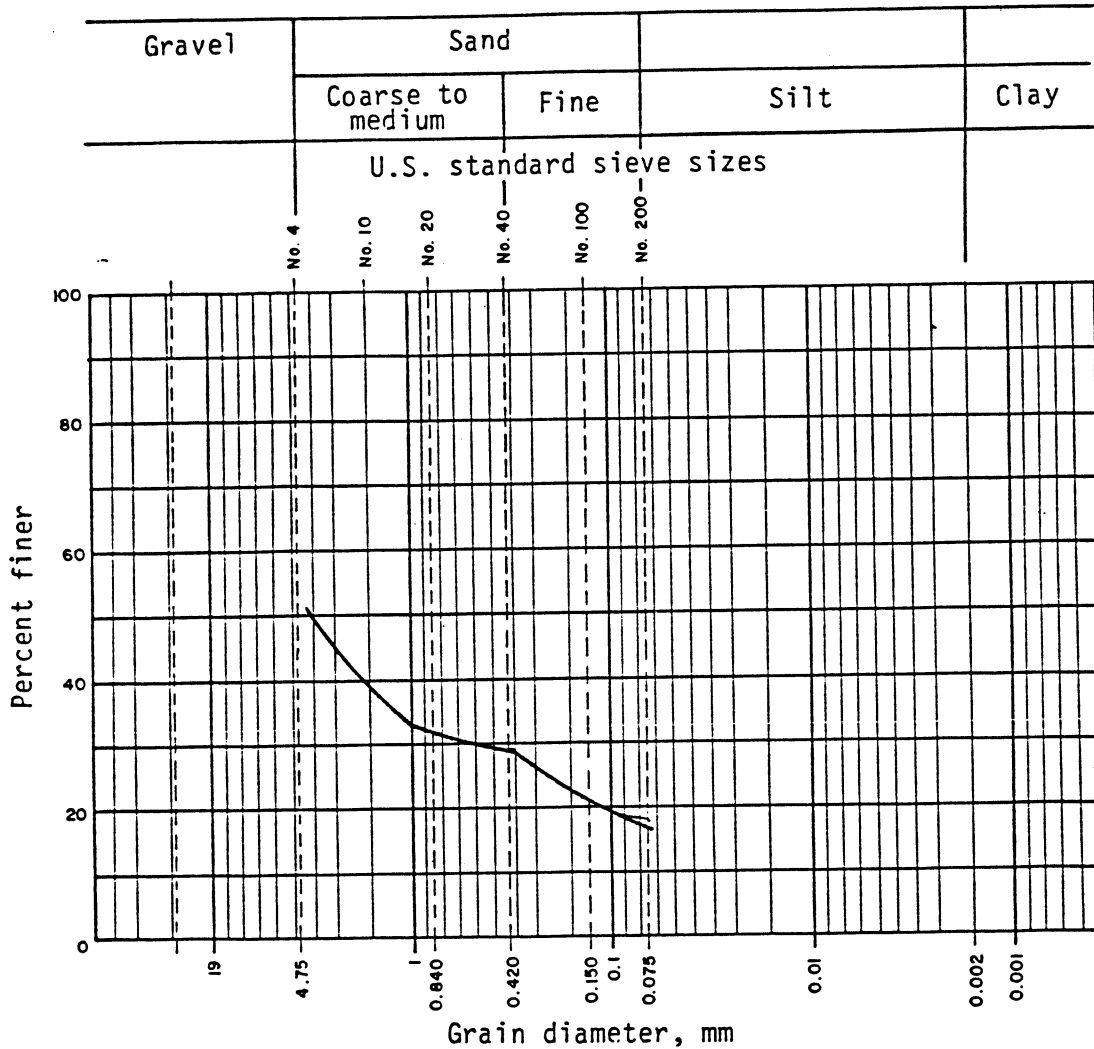


Soil classification:

SM System USCS

GRAIN SIZE DISTRIBUTION

Project EXXON Job. No. 1208
 Location of Project CRANDON Boring No. WW-4 Sample No. --
 Tested By D.W & R.O Depth of Sample 81'
 Date of Testing AUGUST 1981



Soil classification:

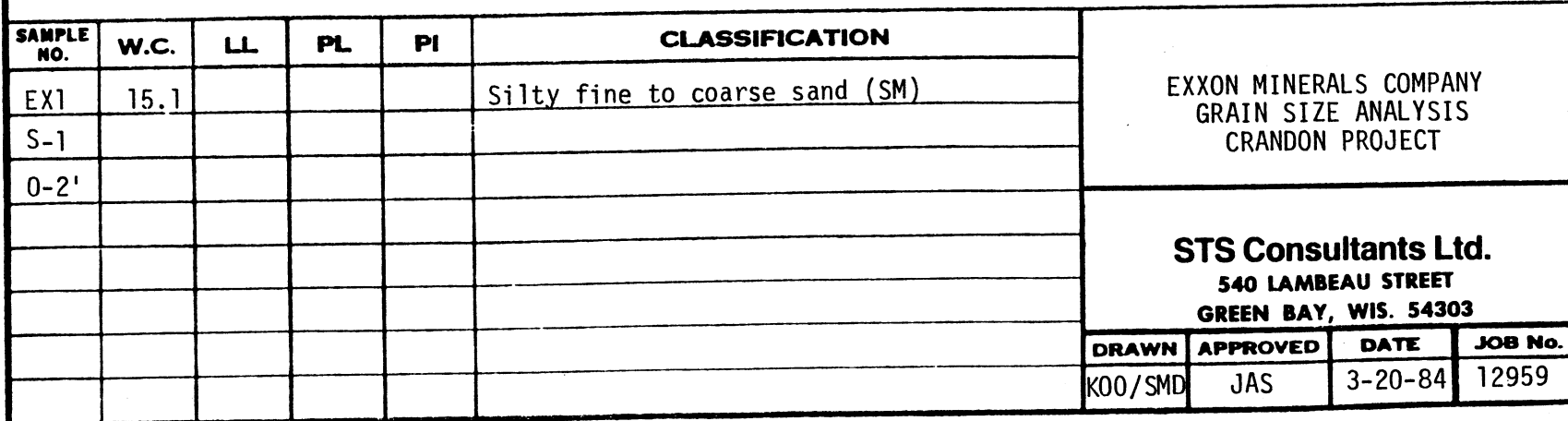
SM System USCS

Appendix 3.5-19

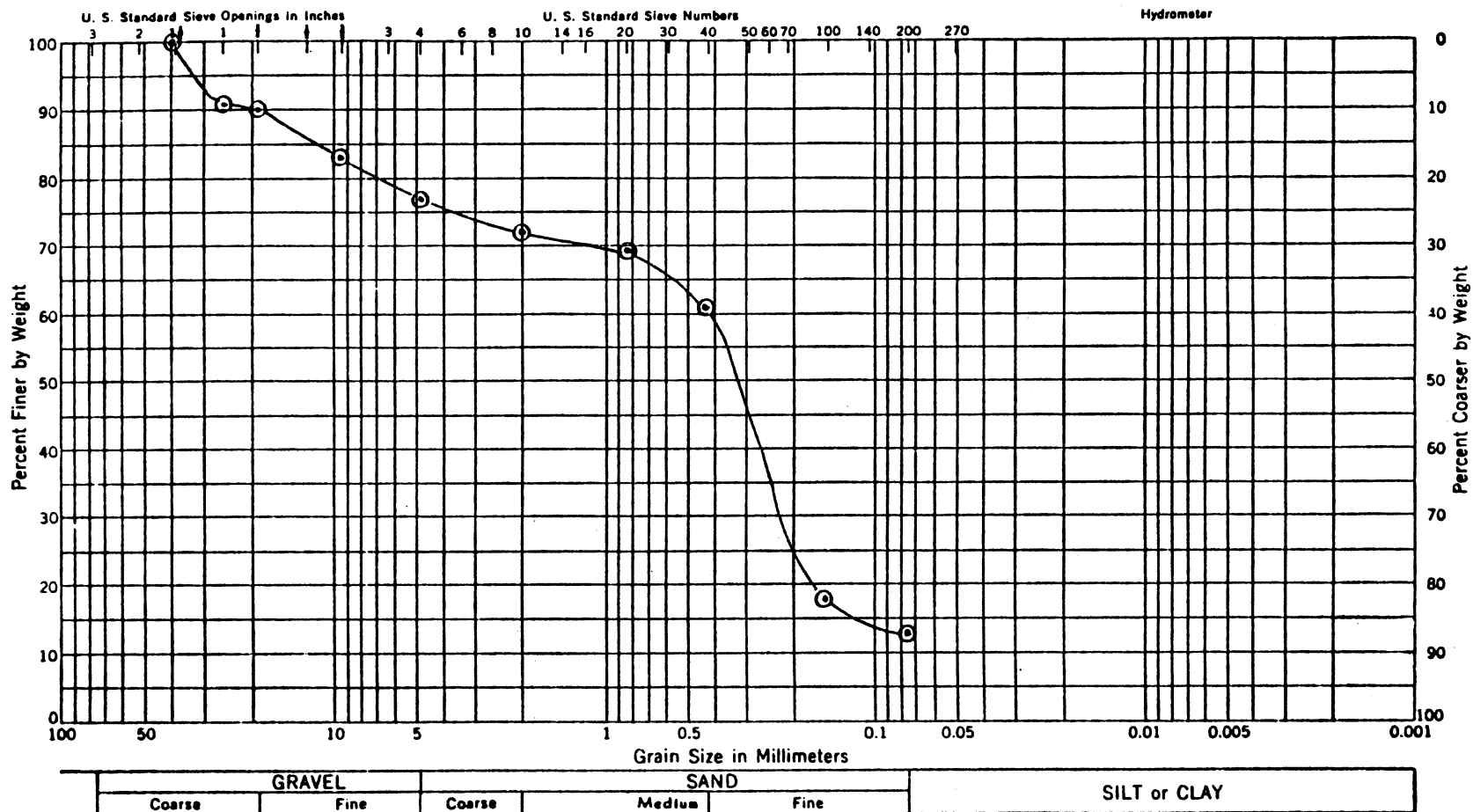
**Grain Size Curves From
1984 STS Consultants Ltd 1984 "Ex" Series Borings**

Gradation Curves for EX Borings

3.5-19-2

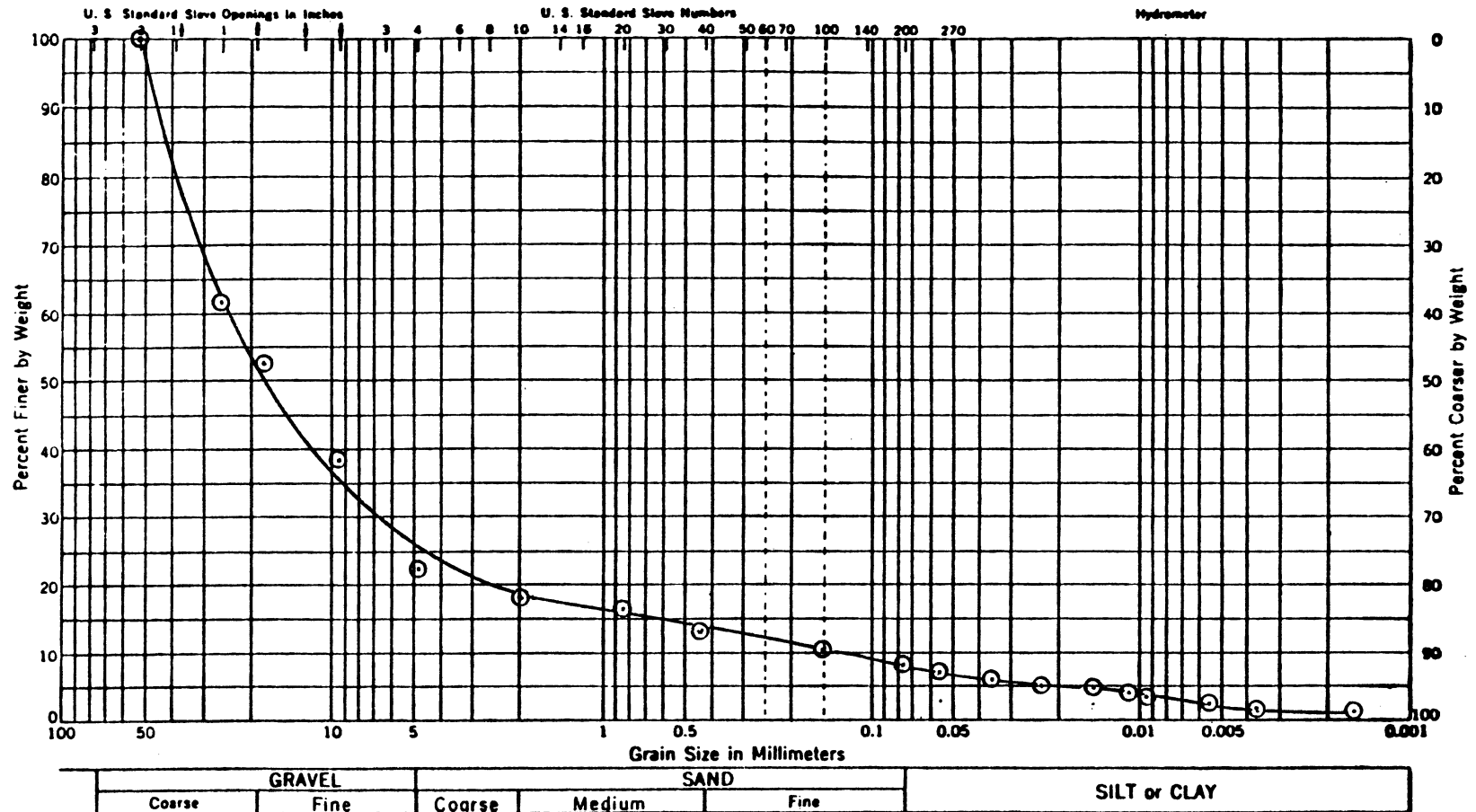


3.5-19-3



BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX1	S-2	11.5-14							Silty fine to coarse sand (SM)				
									W.C. 16.9				
										STS CONSULTANTS LTD.			
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SM	JAS	3-24-84	12959

UNIFIED CLASSIFICATION SYSTEM



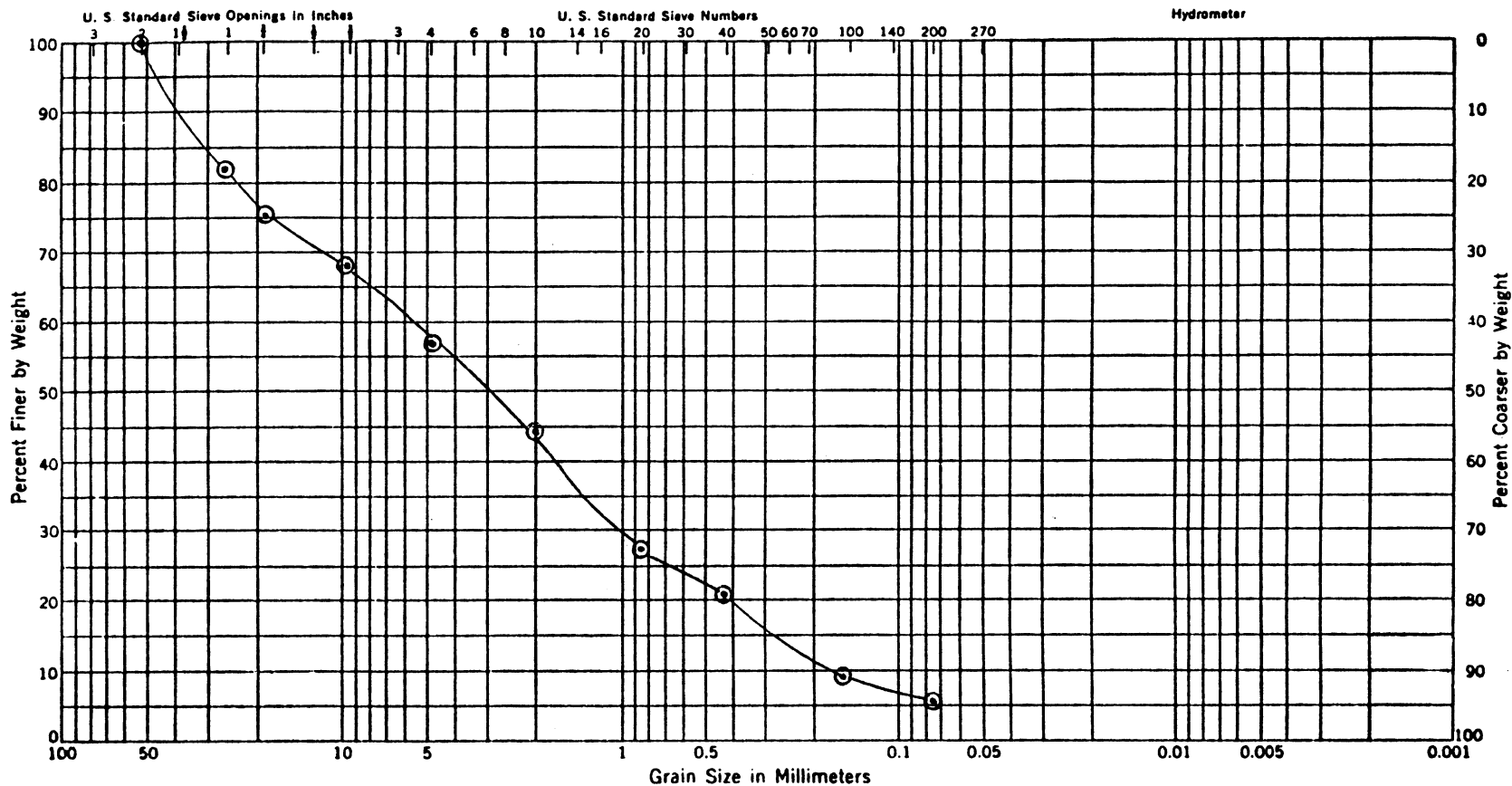
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX1	12.2				Slightly silty fine to coarse gravel
S-4					(GP-GM)
30.5-32.5'					

EXXON MINERALS COMPANY
 GRAIN SIZE ANALYSIS
 CRANDON PROJECT

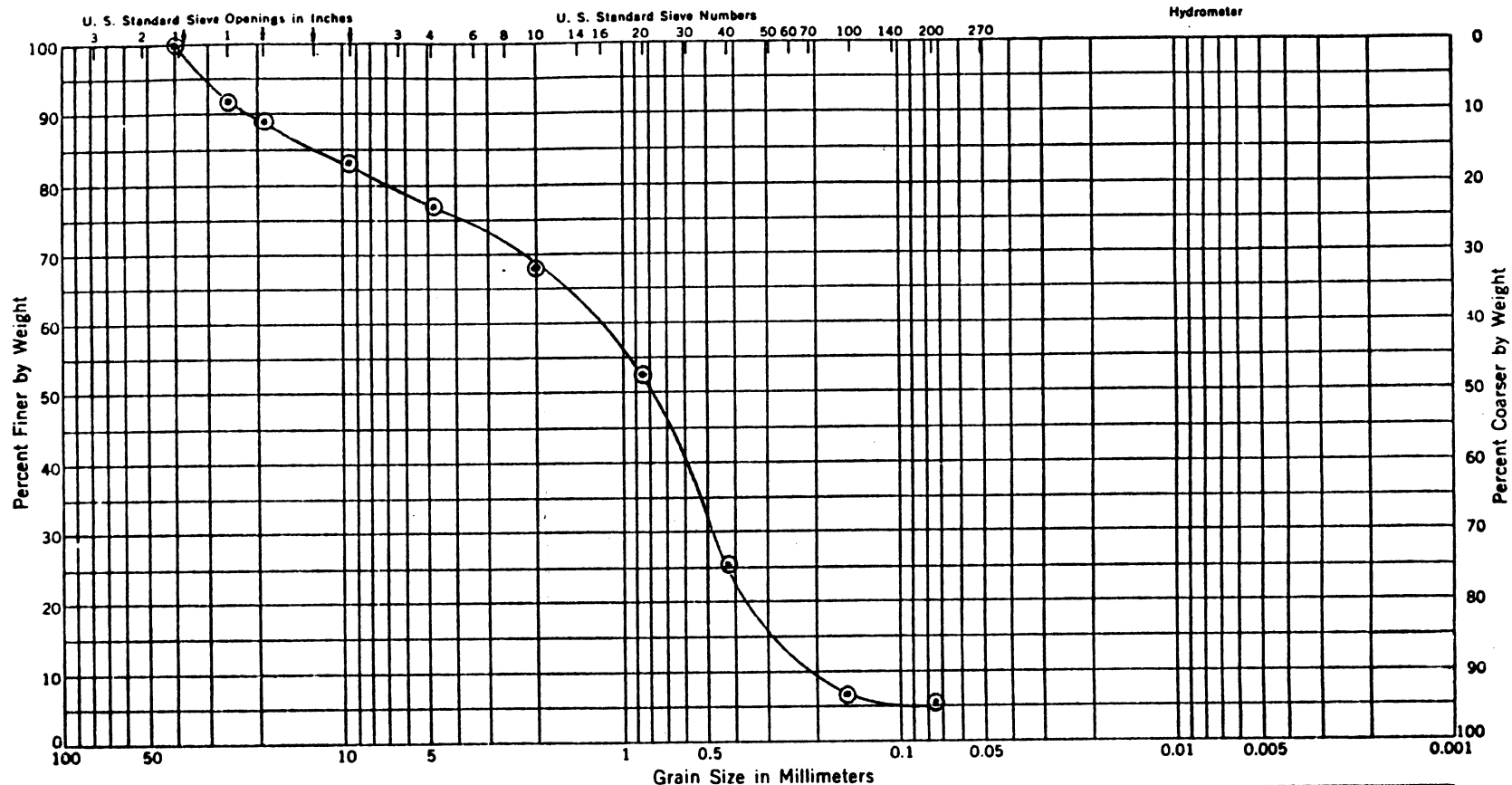
STS Consultants Ltd.
 540 LAMBEAU STREET
 GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
KOO/SMD	JAS	3-20-84	12959

3.5-19-5



3.5-19-6



U. S. Standard Sieve Openings in Inches

U. S. Standard Sieve Numbers

Hydrometer

Percent Finer by Weight

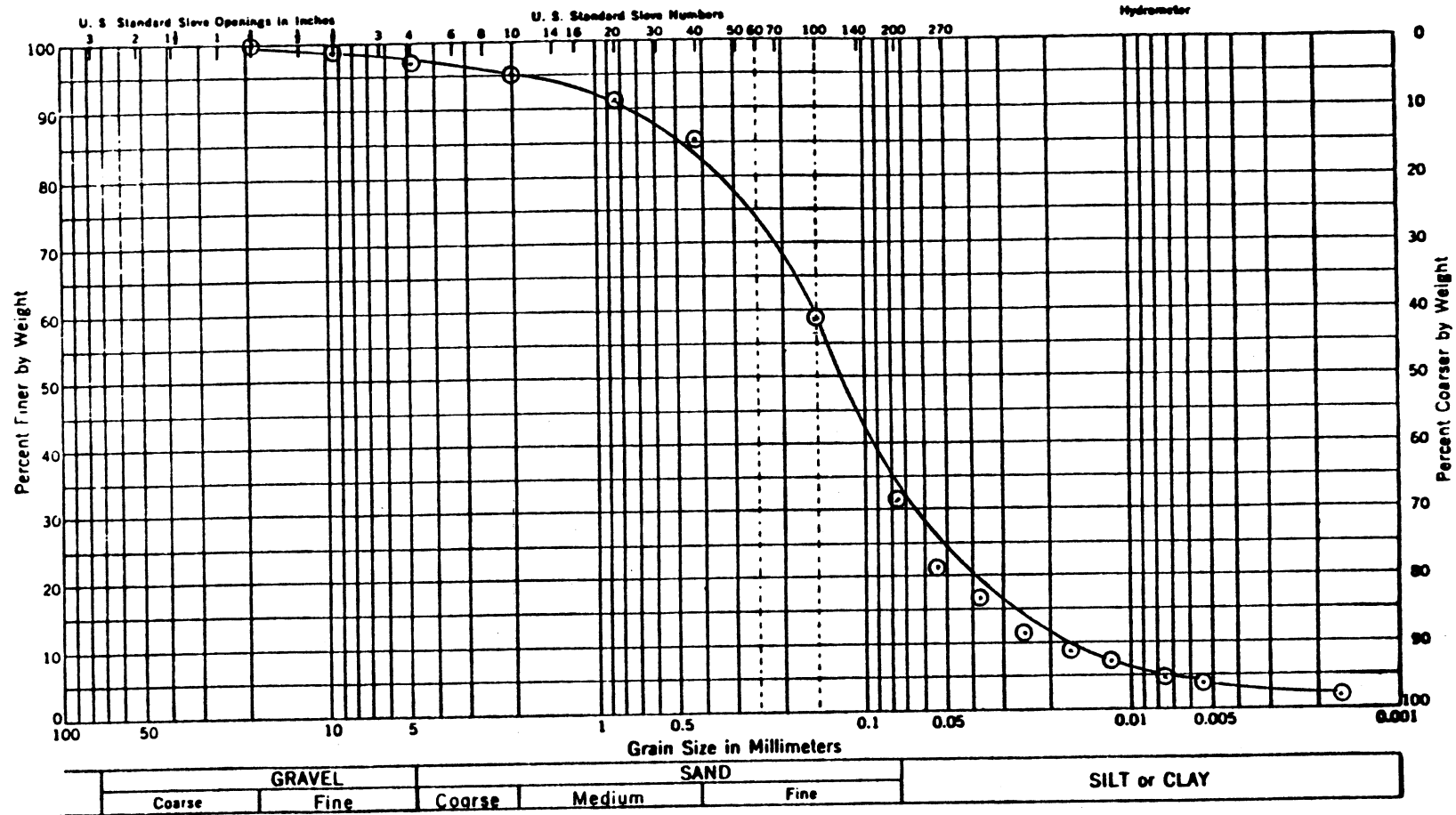
Percent Coarser by Weight

Grain Size in Millimeters

GRAVEL			SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine		
100	75	4.75	2.0	0.425	0.075	

BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX1	S-10	92-94'							Slightly silty				
									fine to medium				
									sand (SM-SP)				
										STS CONSULTANTS LTD.			
									W.C. 13.0				
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SMO	JAS	3-24-84	12959

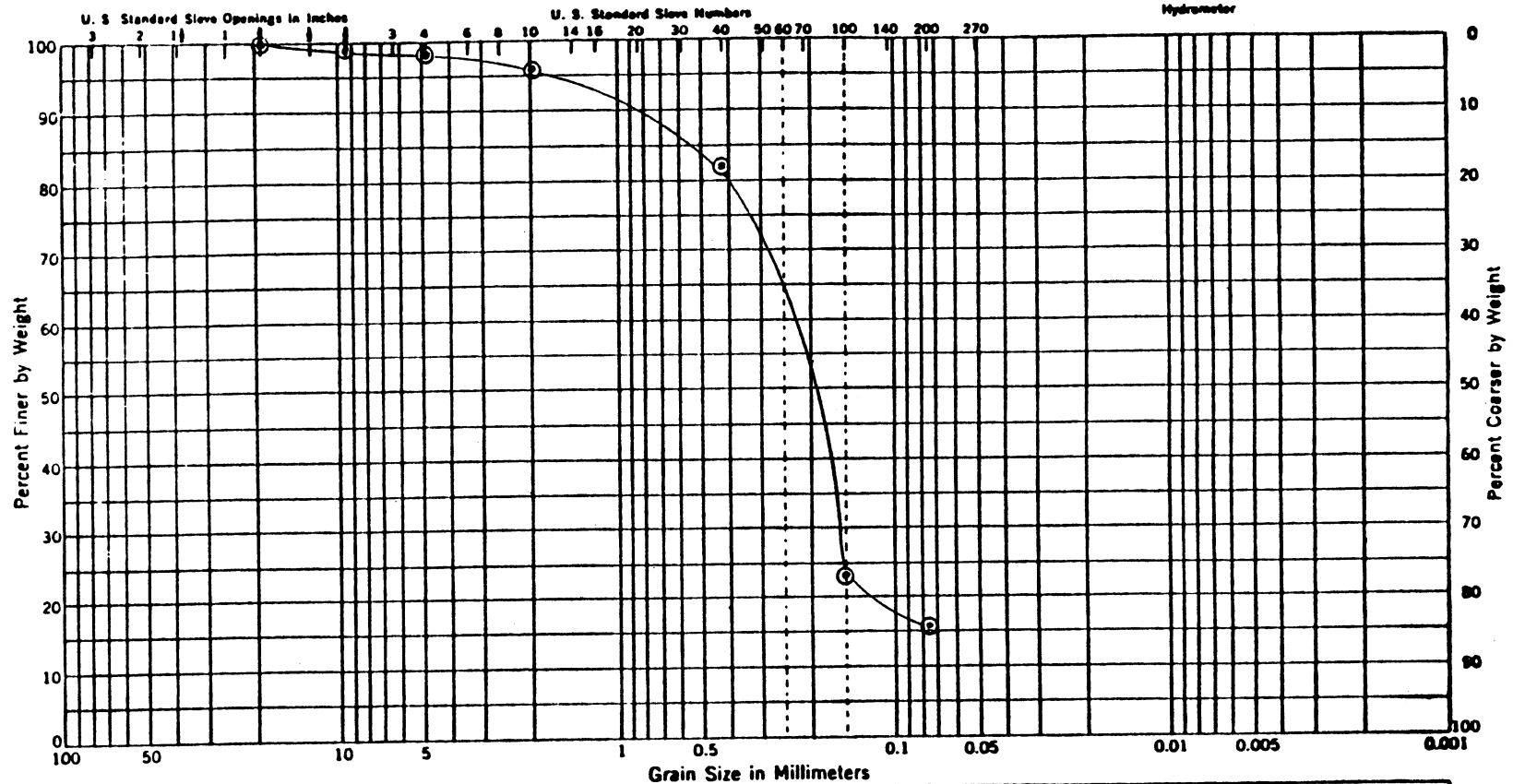
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX1	15.8				Silty fine to coarse sand (SM)				
S-12									
112.5-114.5'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						KOO/SMD	JAS	3-20-84	12959

3.5-19-8

UNIFIED CLASSIFICATION SYSTEM

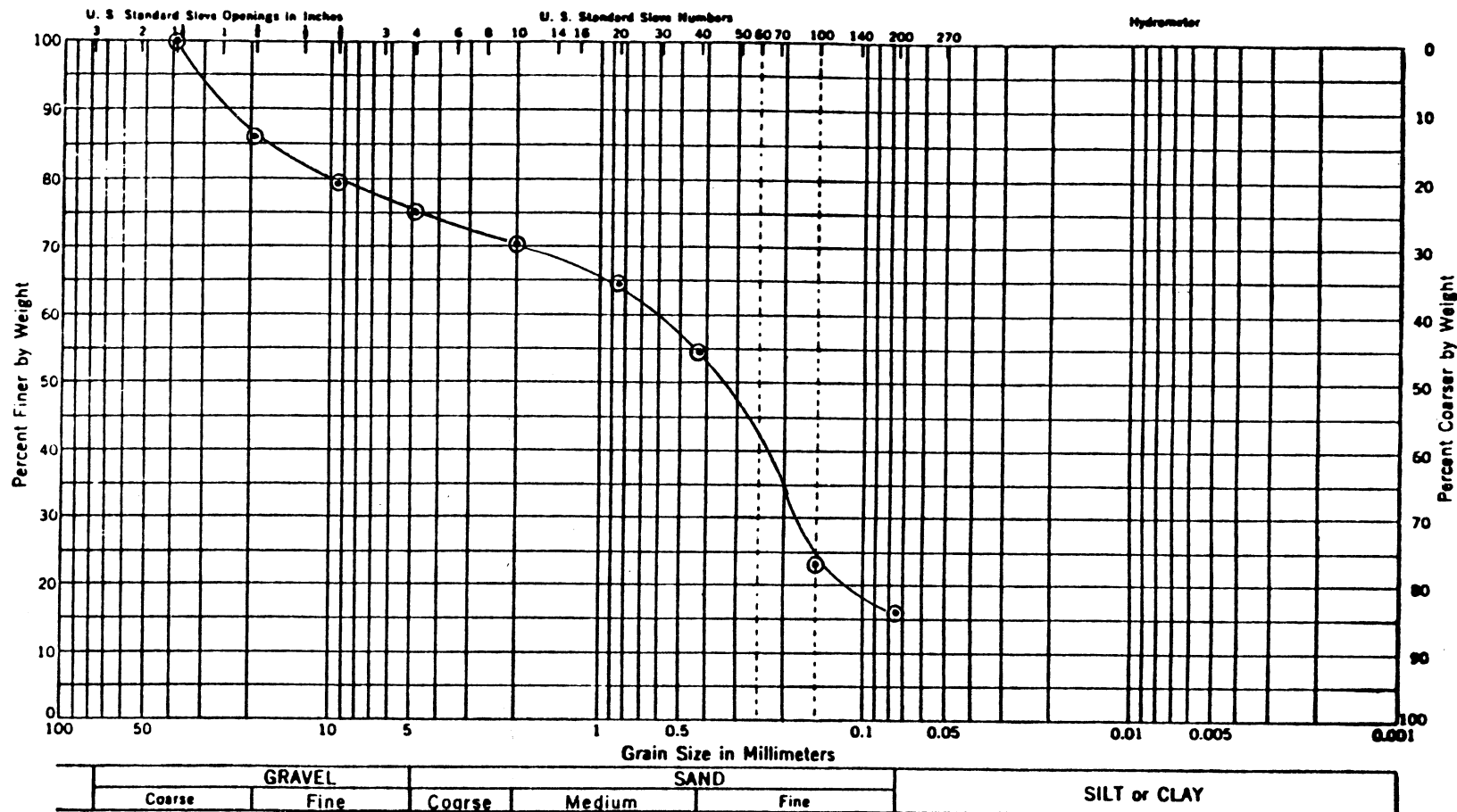


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-2	10.9				Silty fine to medium sand (SM)
S-1					
1.0-3.0'					

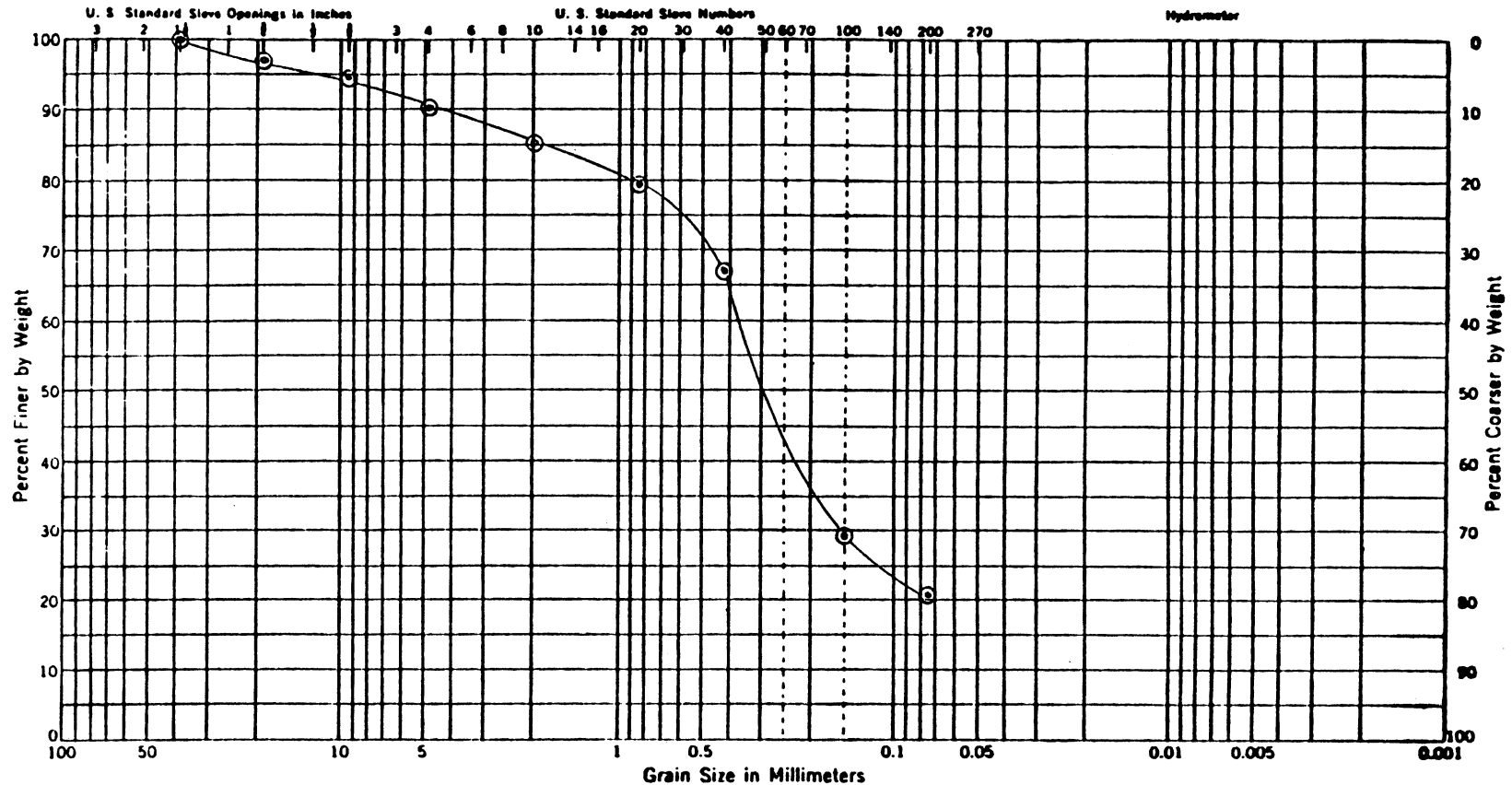
EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

UNIFIED CLASSIFICATION SYSTEM



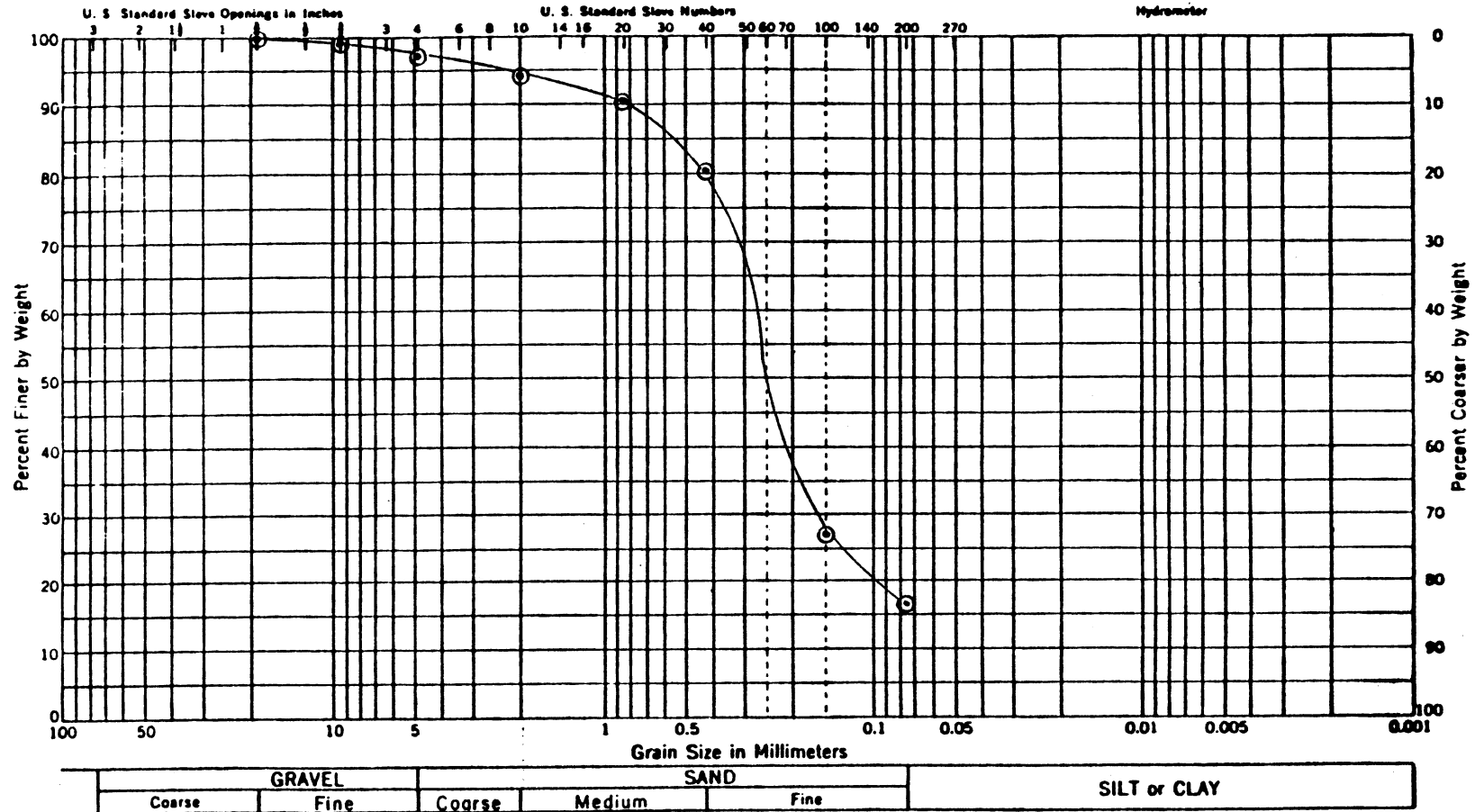
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-2	6.2				Silty fine to coarse sand (SM)				
S-2									
10.0-12.0'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

UNIFIED CLASSIFICATION SYSTEM



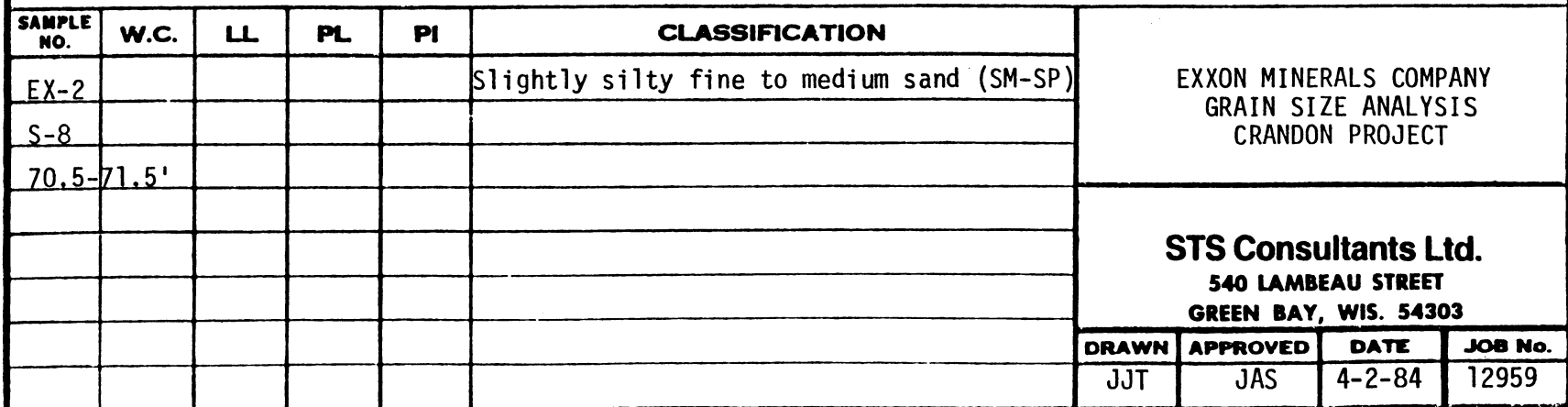
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-2	10.2				Silty fine to coarse sand (SM)				
S-5									
40.0-42.0'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

UNIFIED CLASSIFICATION SYSTEM

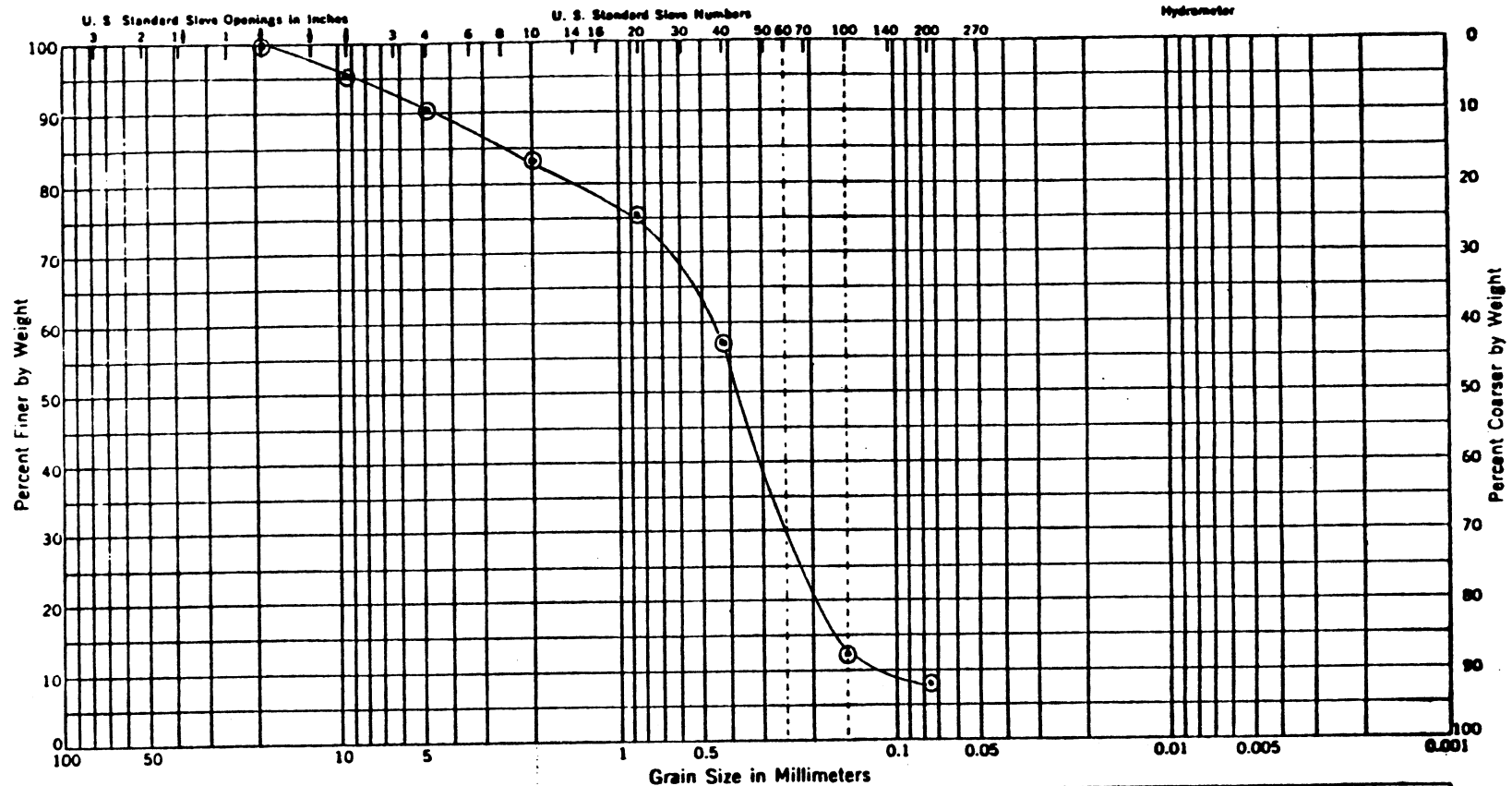


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
EX-2	11.1				Silty fine to medium sand (SM)				
S-6									
50.0-52.0'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

3.5-19-13



UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-2	17.7				Slightly silty fine to coarse sand (SM-SP)
S-9					
81.0-82.5'					

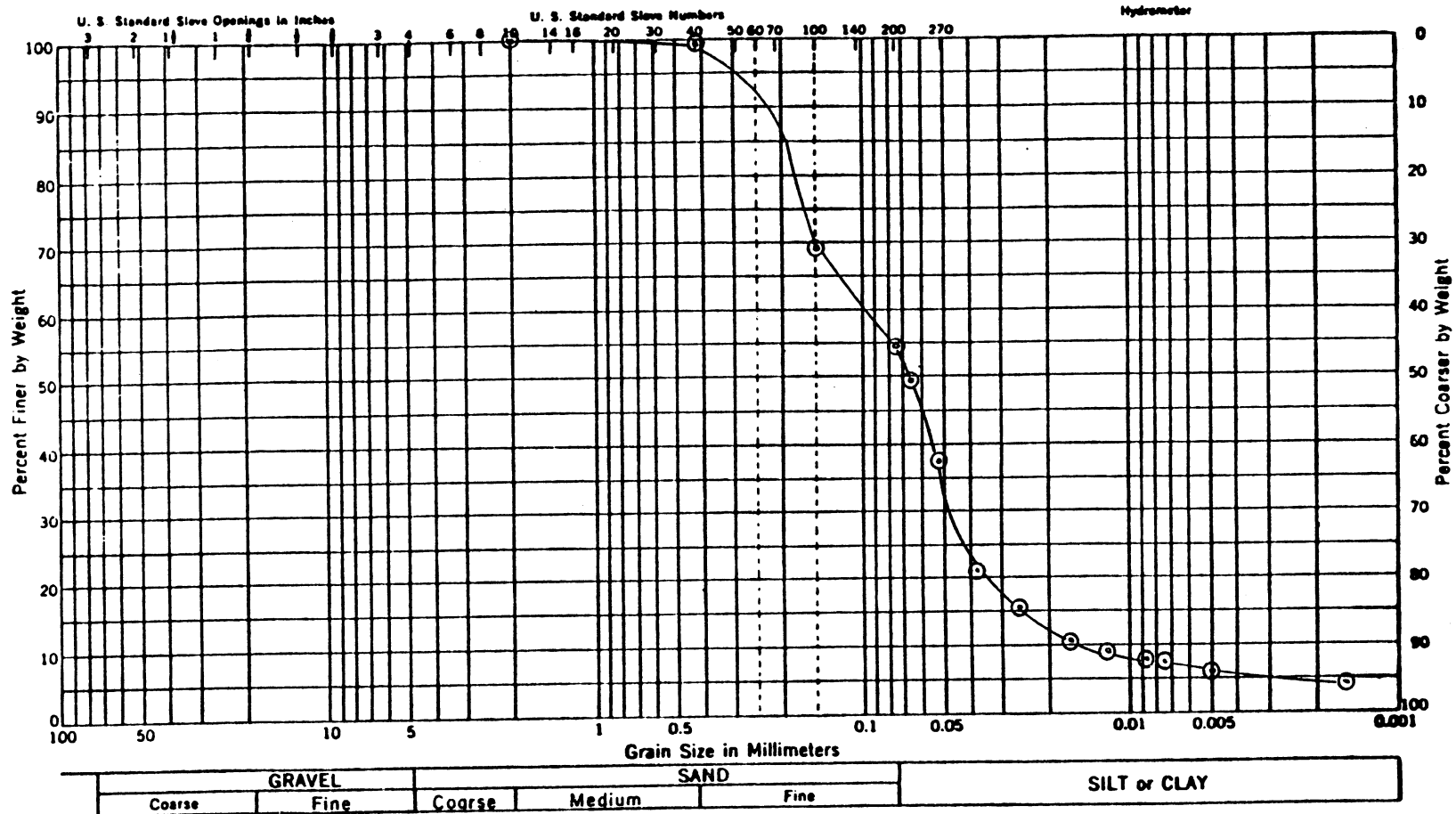
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

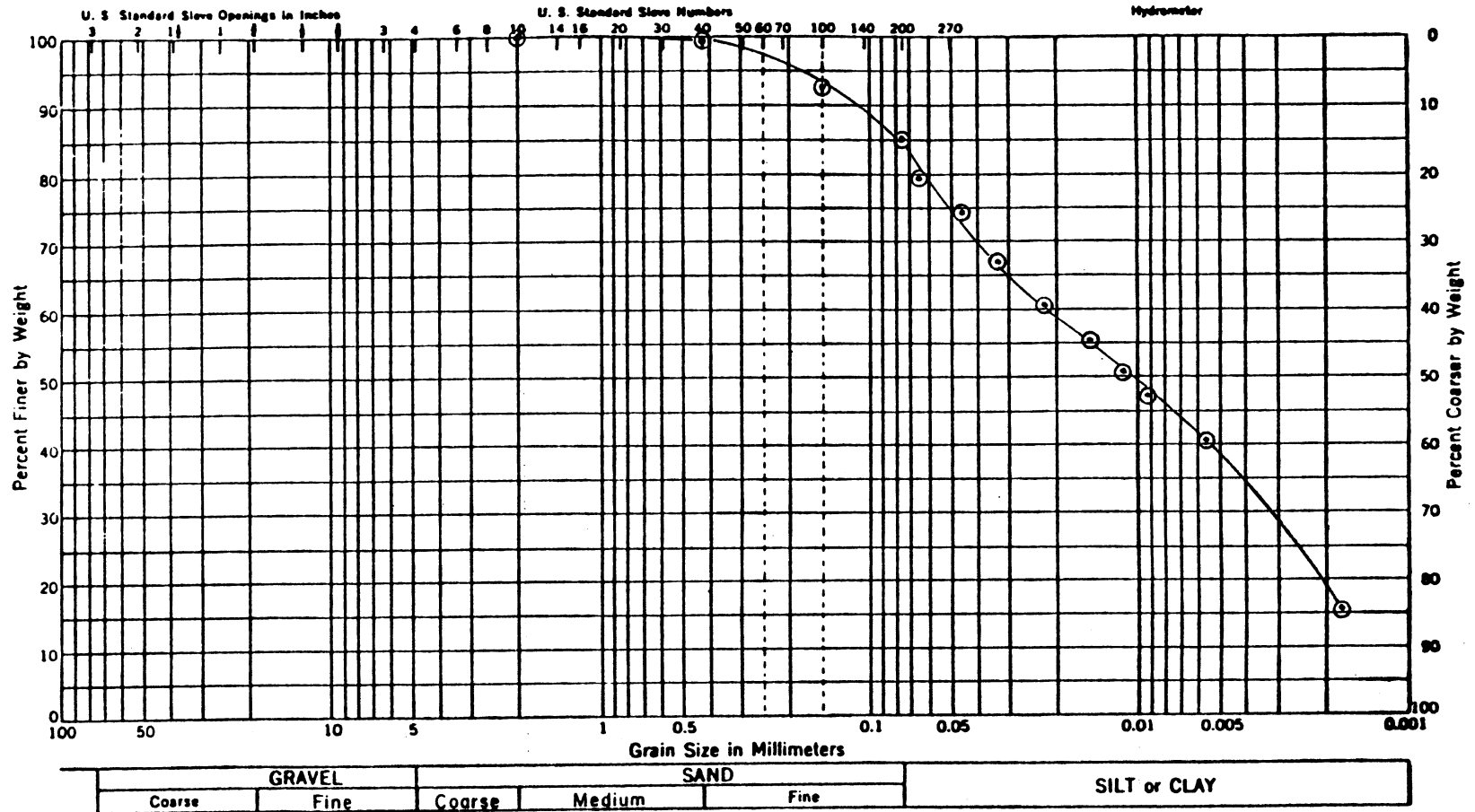
DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

3.5-19-14

UNIFIED CLASSIFICATION SYSTEM



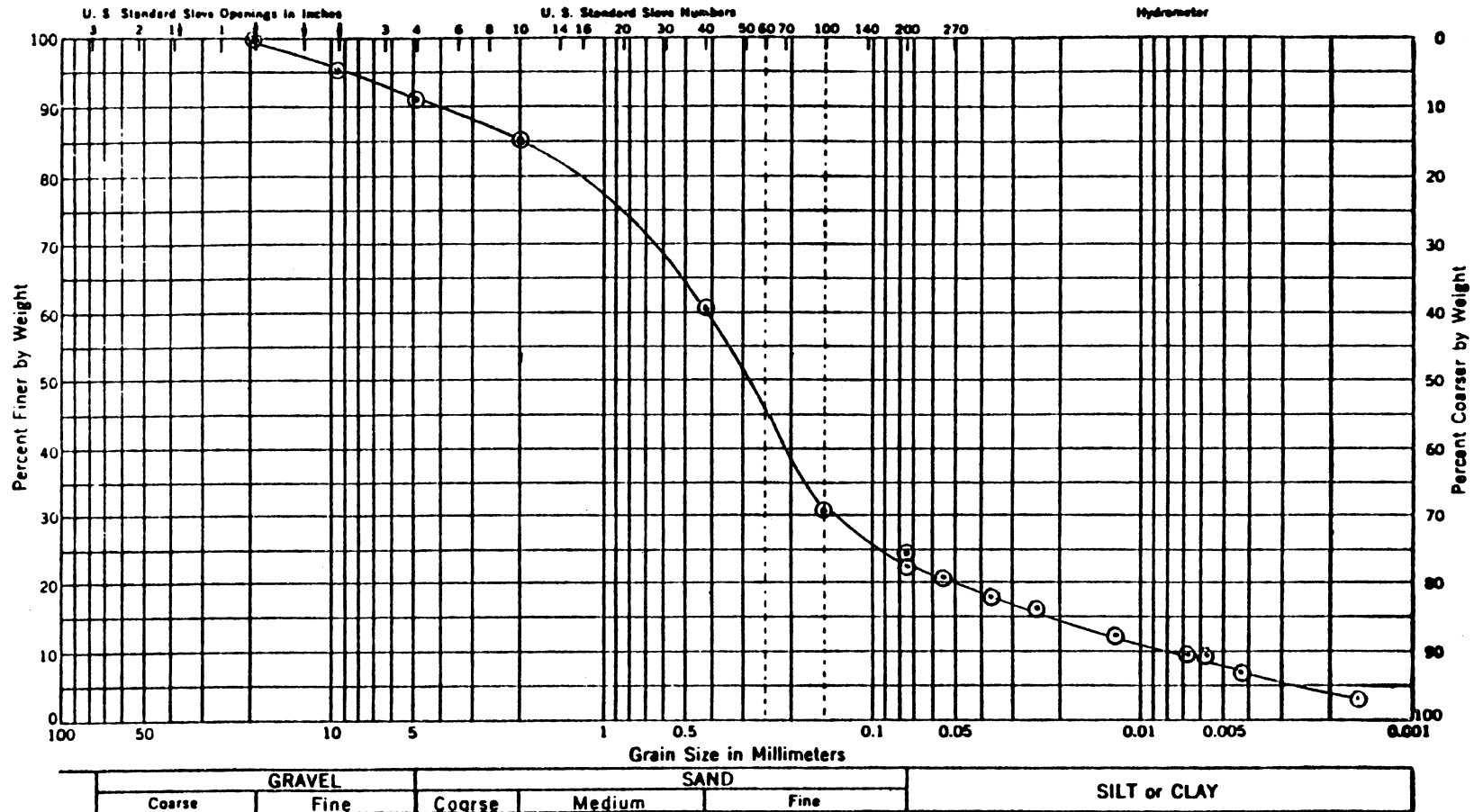
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-2	14.1				Silty clay (CL)				
S-11									
101.5-	103.5'					STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

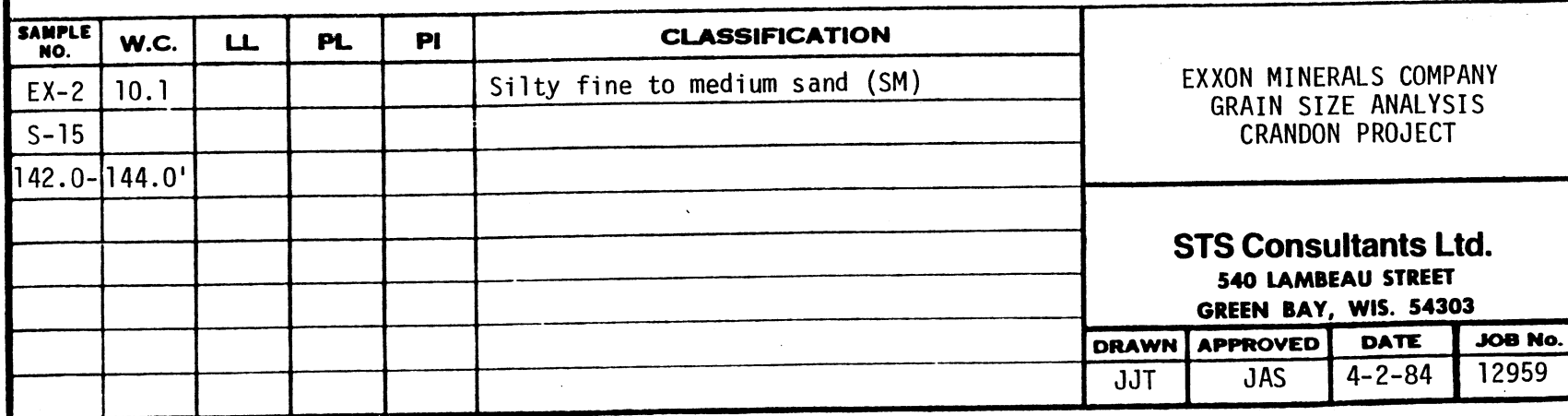
3.5-19-16

UNIFIED CLASSIFICATION SYSTEM

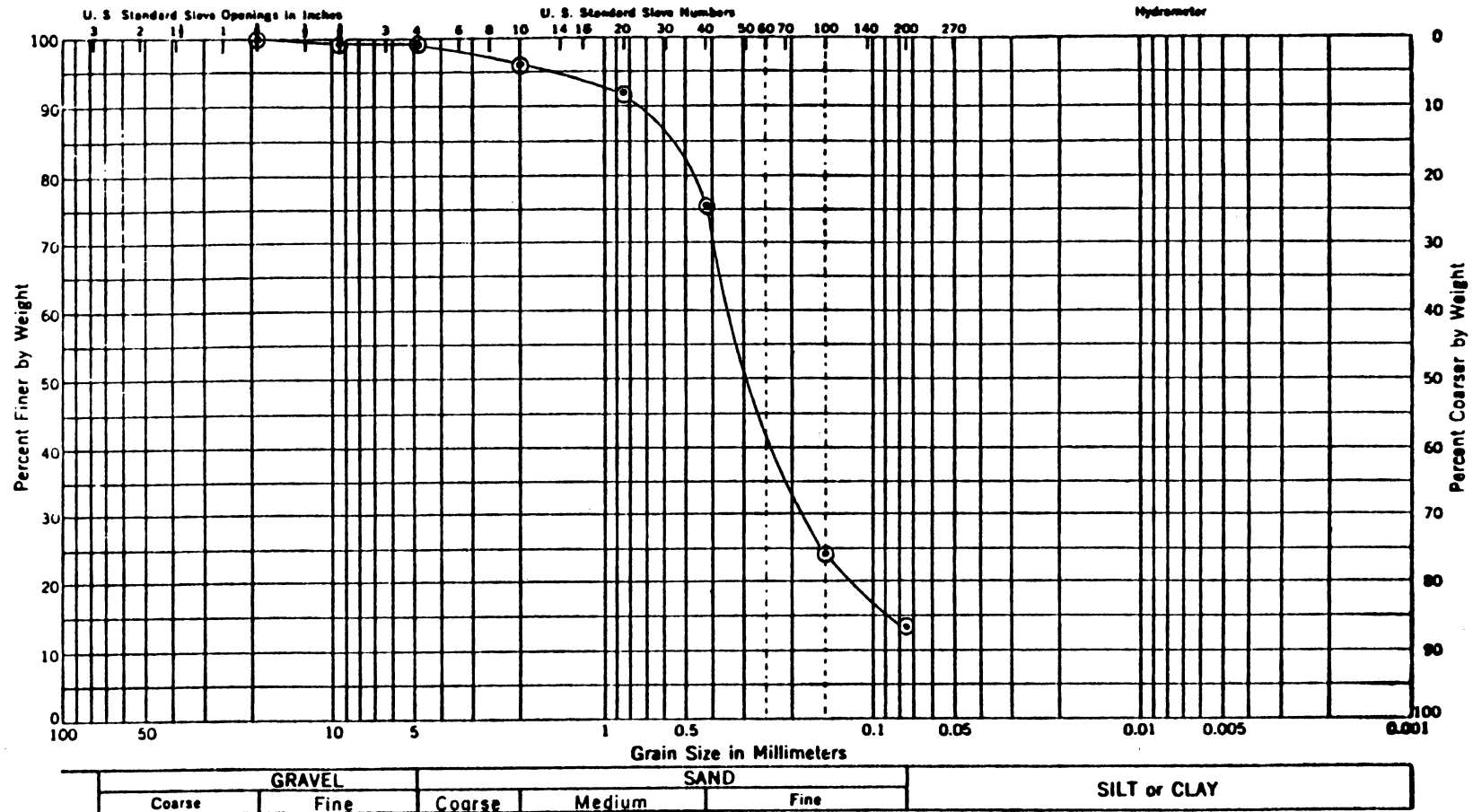


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-2	10.6				Silty fine to coarse sand (SM)				
S-12									
112.0-113.5'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

3.5-19-18

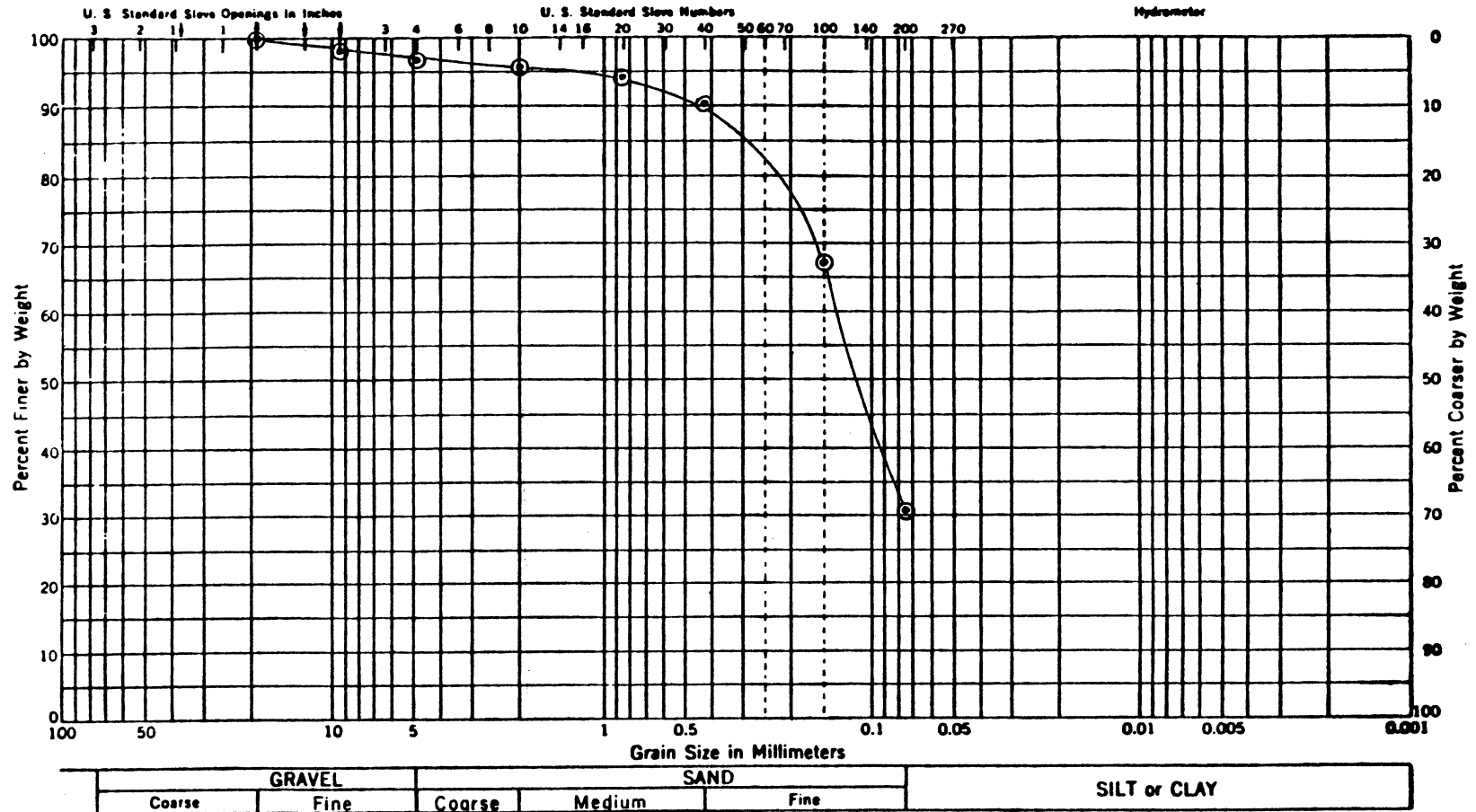


UNIFIED CLASSIFICATION SYSTEM



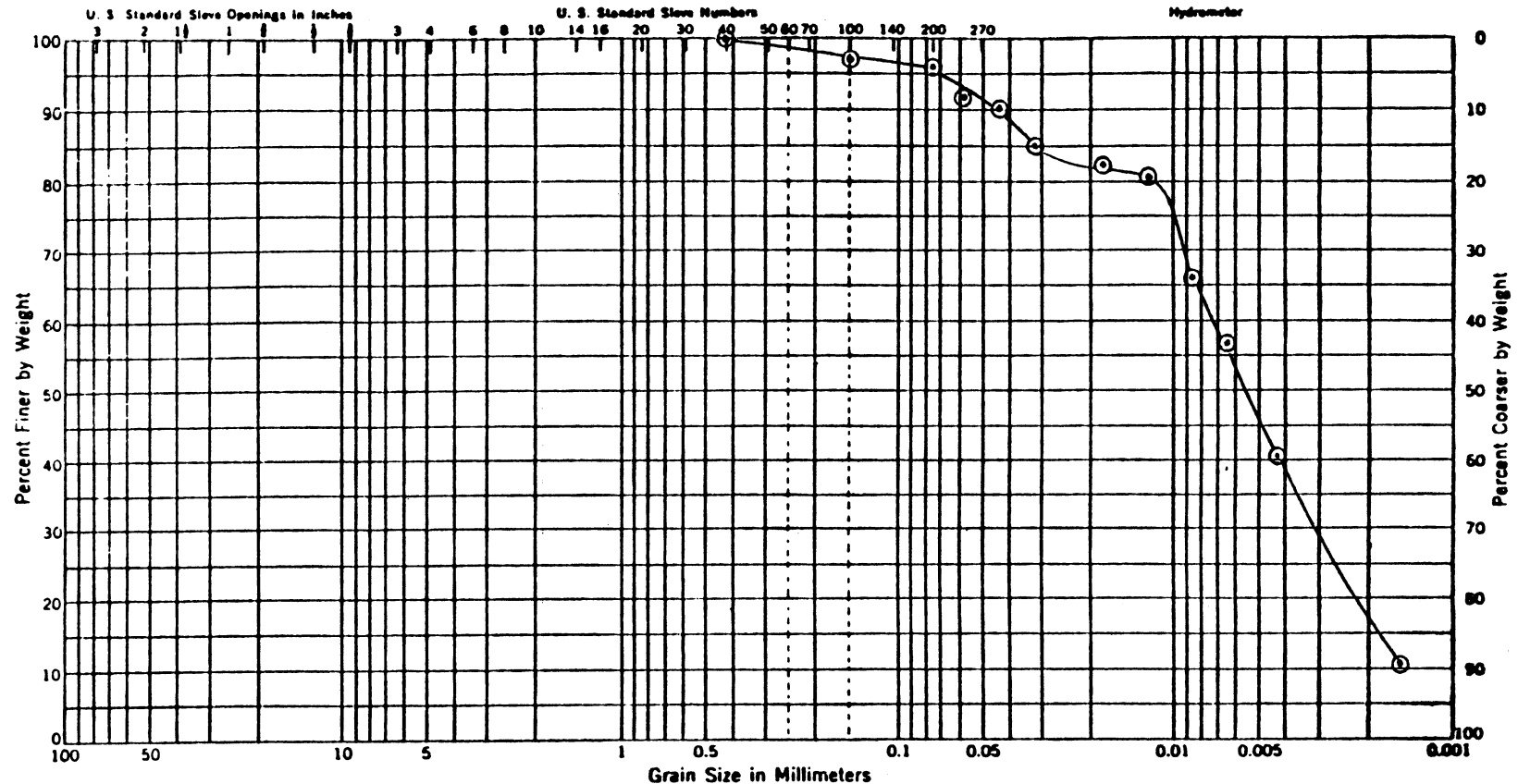
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-2	13.7				Silty fine to medium sand (SM)				
S-16									
153.0-155.0'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-2	20.7				Silty fine to medium sand (SM)				
S-17						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
163.0-164.6'									
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

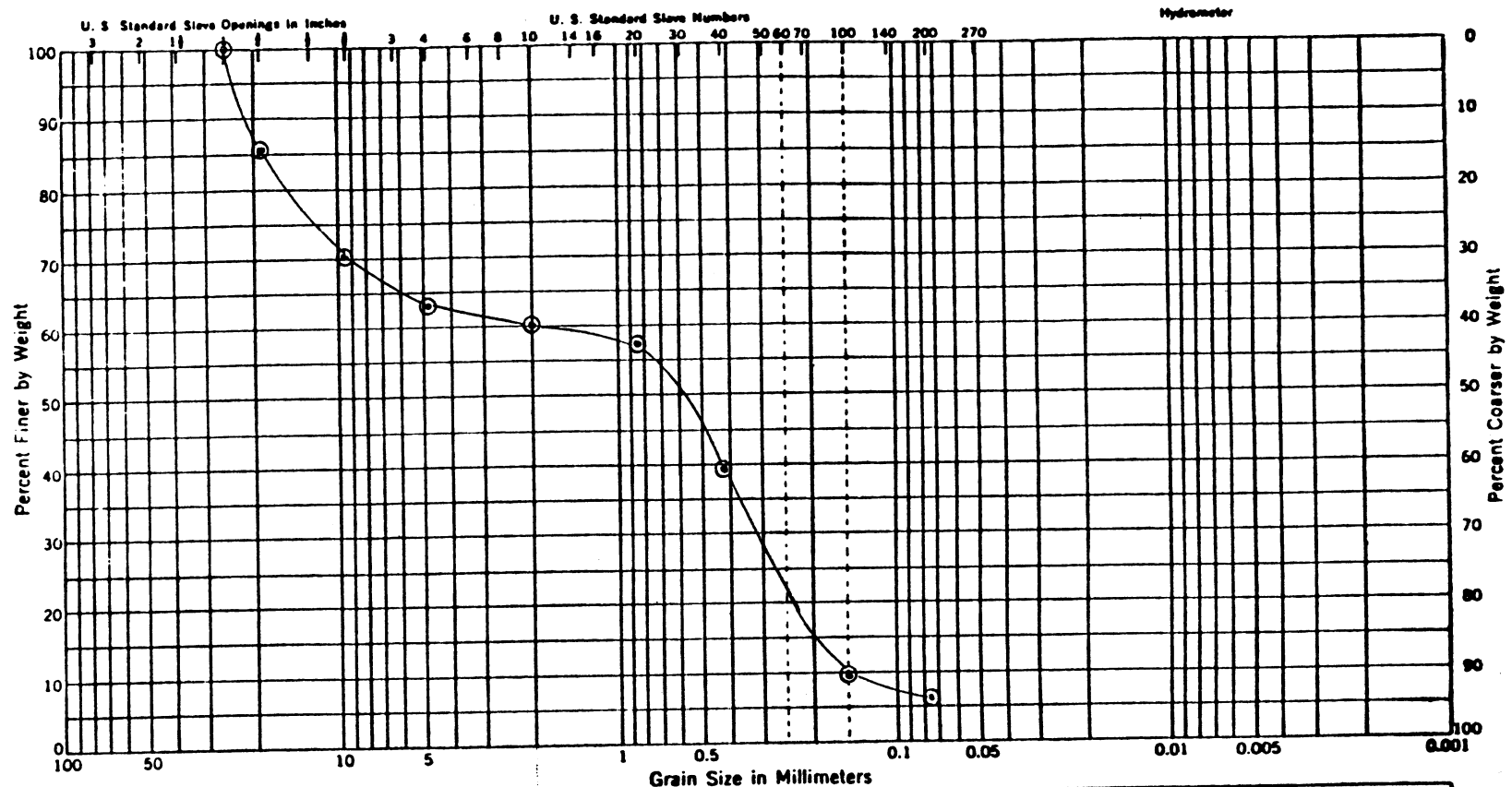
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-2	25.3				Silty clay (CL)
S-18					
173.0-175.0'					

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-3	7.2				Slightly silty fine to coarse sand (SM-SP)
S-1					
1.0-3.0'					

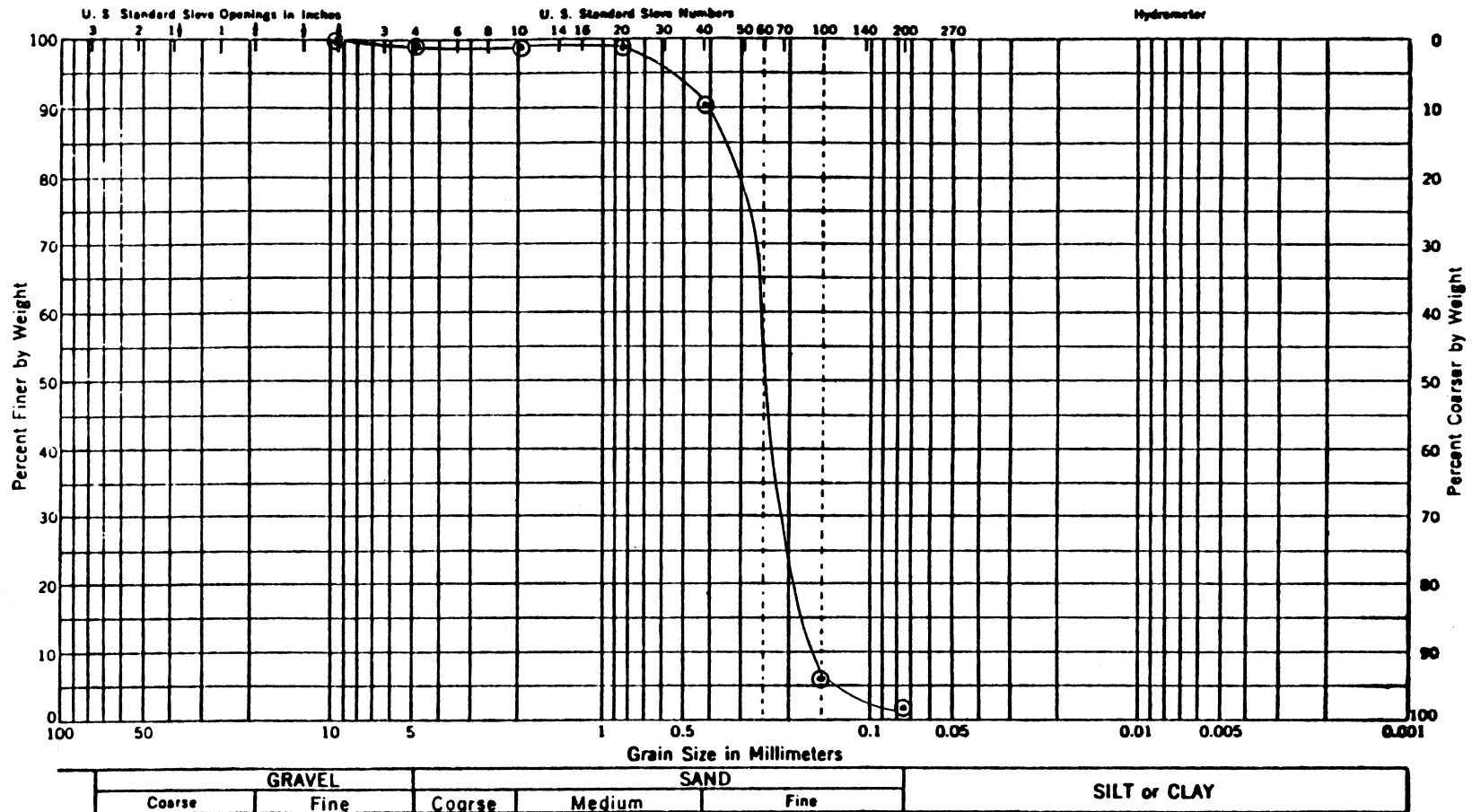
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

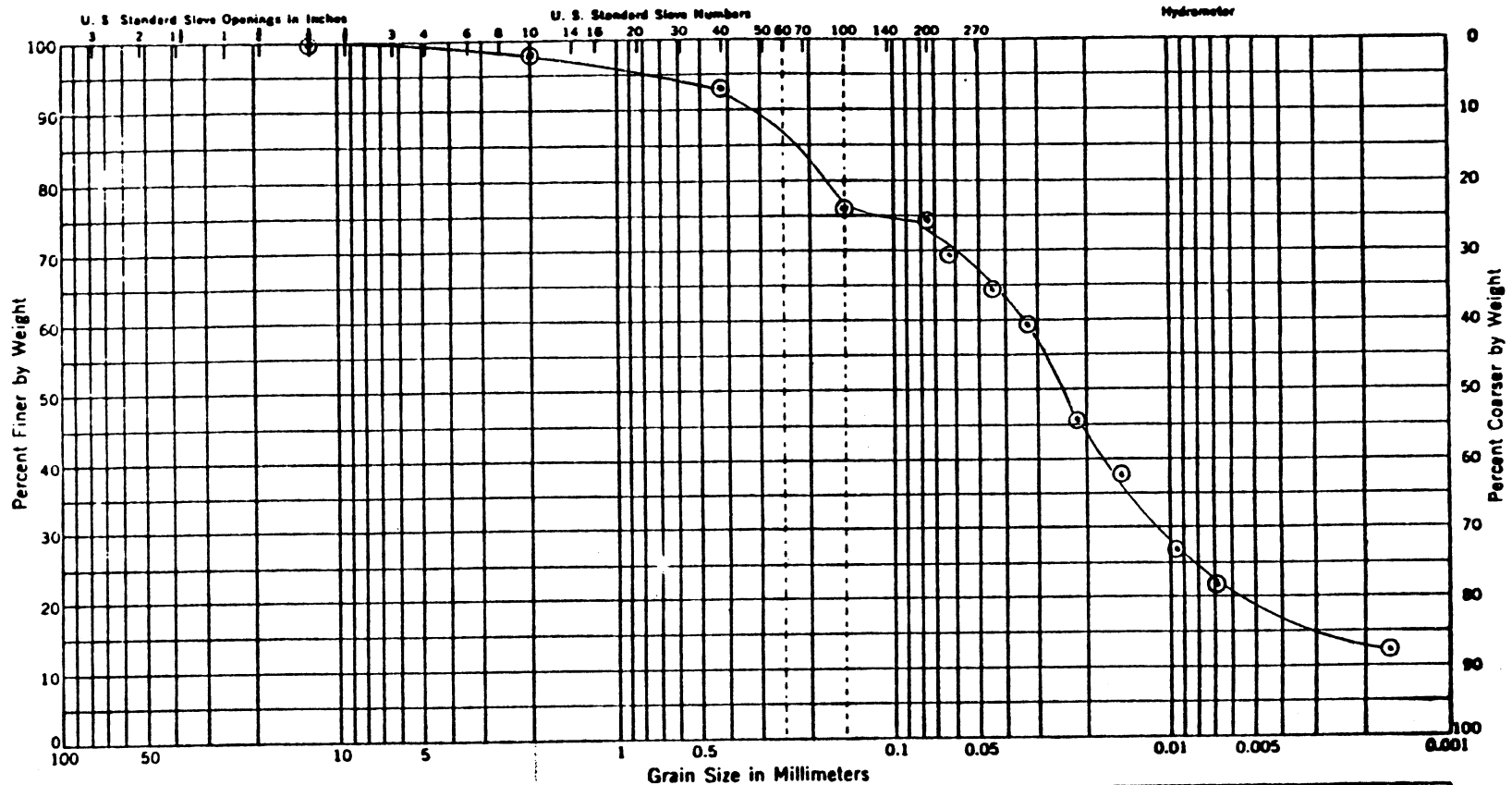
3.5-19-22

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-3	21.7				Fine sand (SP)				
S-2									
10.0-12.0'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-3	29.4				Silty clay (CL)
S-3					
19.5-	21.5'				

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

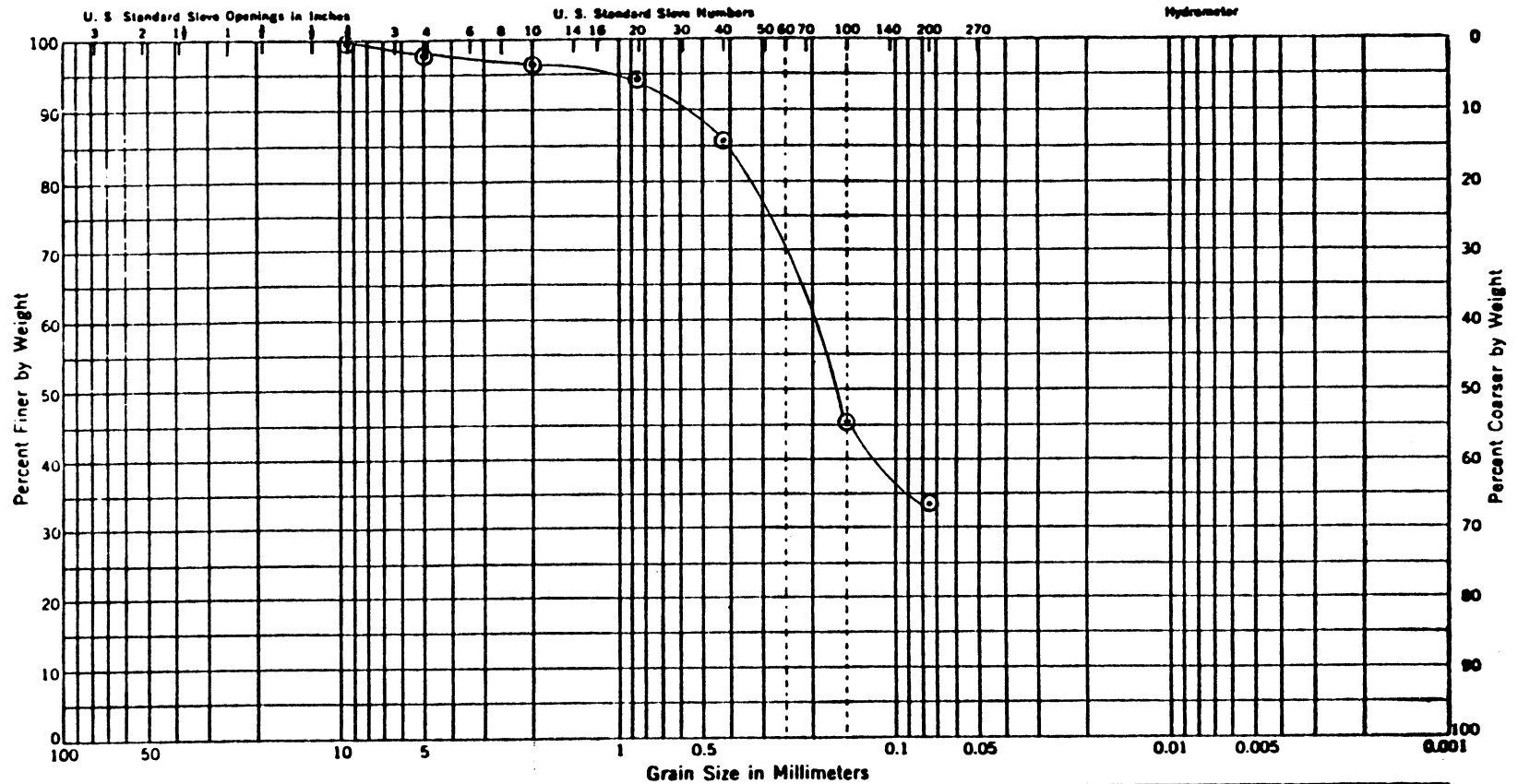
STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

3.5-19-24

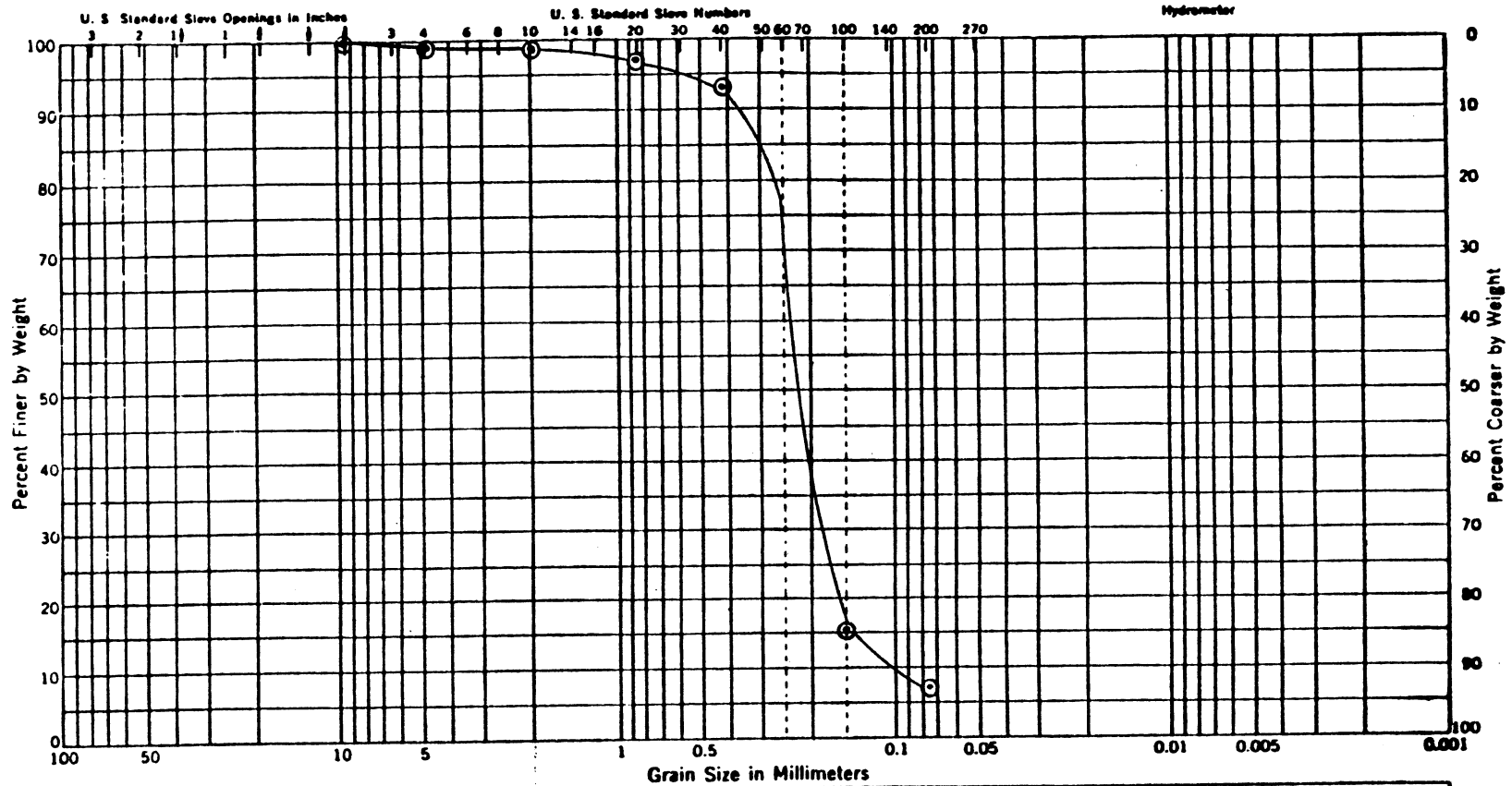
UNIFIED CLASSIFICATION SYSTEM

3.5-19-25



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-3	19.7				Silty fine sand (SM)				
S-4						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
29.5-31.5'									
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

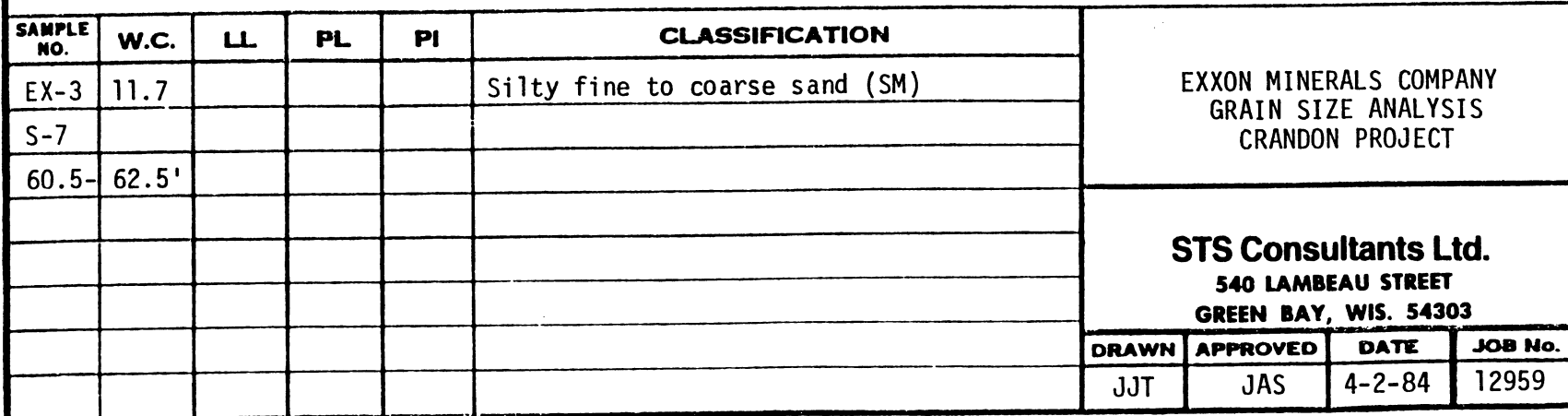
UNIFIED CLASSIFICATION SYSTEM



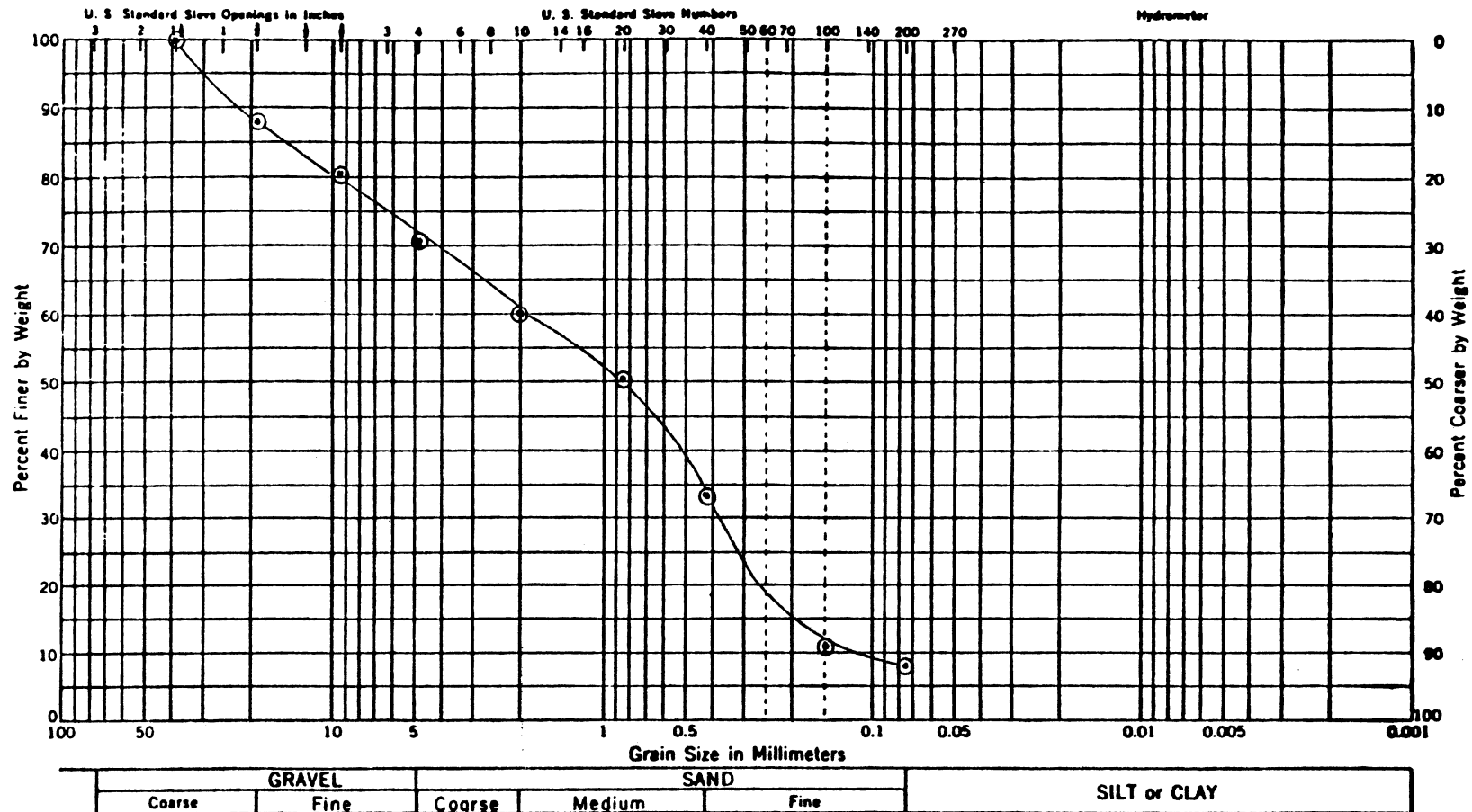
GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-3	18.5				Slightly silty fine sand (SM-SP)				
S-6									
50.0-	52.1'					STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

3.5-19-27

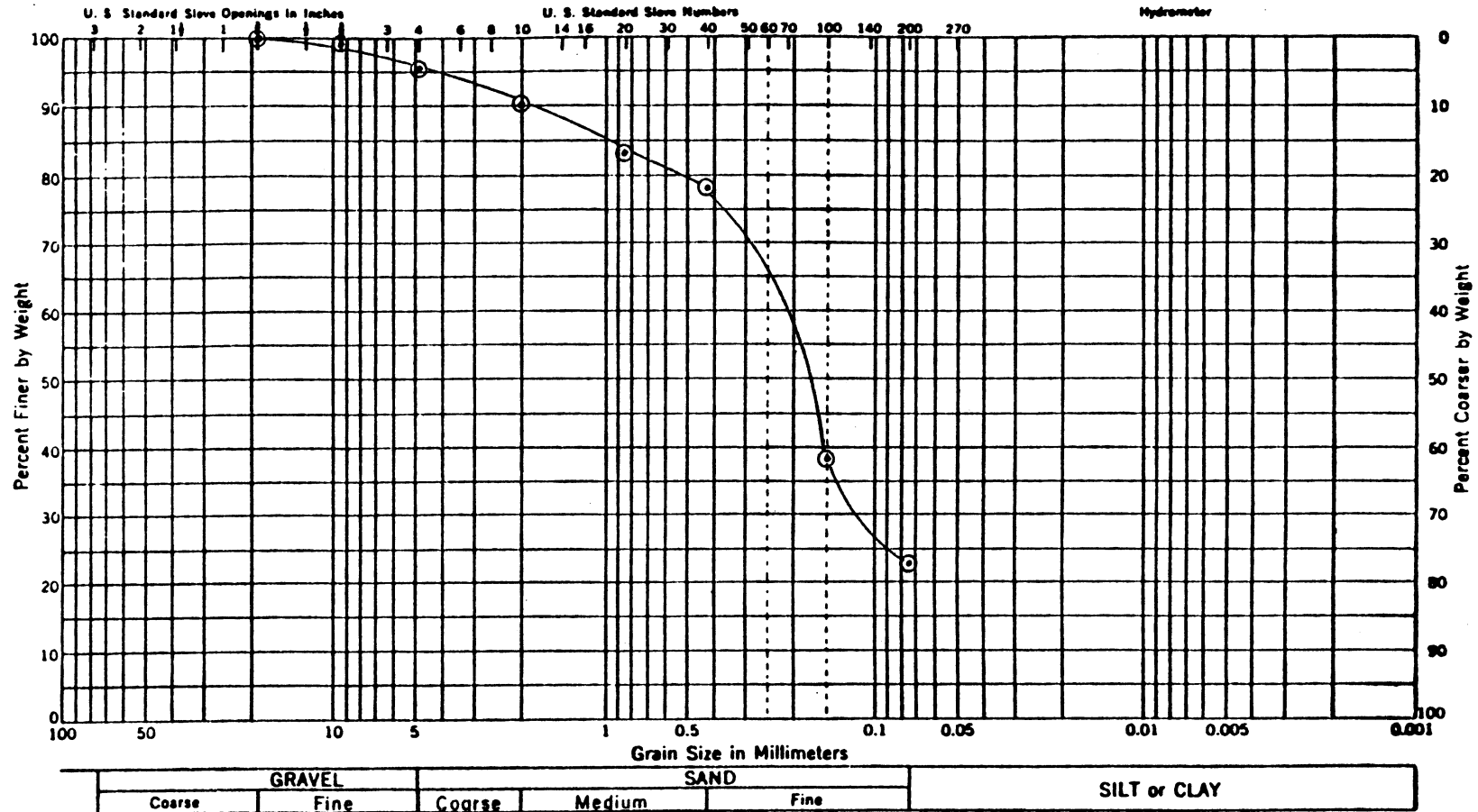


UNIFIED CLASSIFICATION SYSTEM

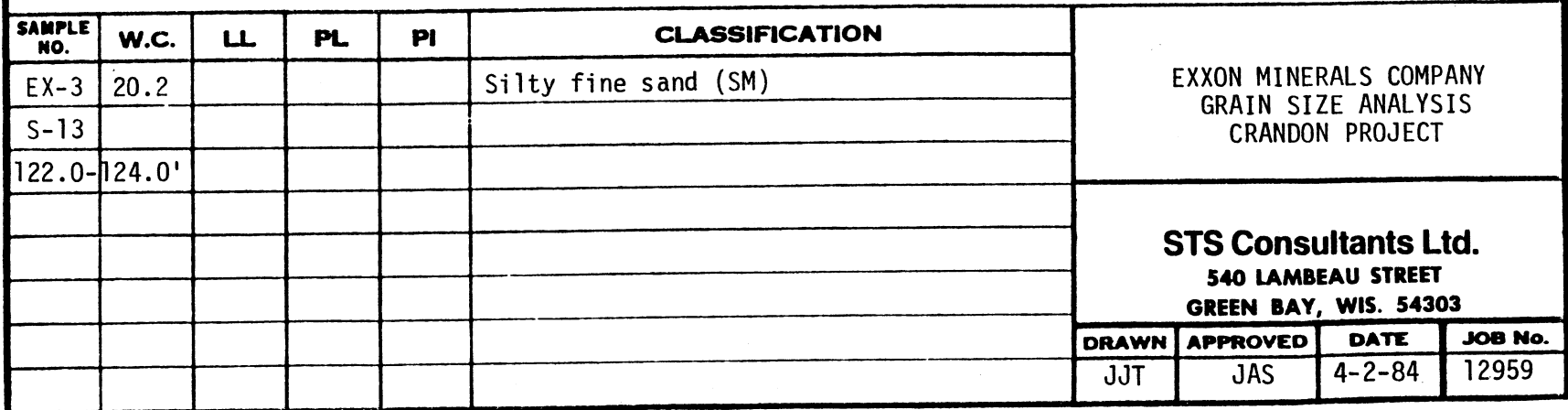


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-3	10.7				Slightly silty fine to coarse sand (SM-SP)				
S-8						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
70.5-72.5'									
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

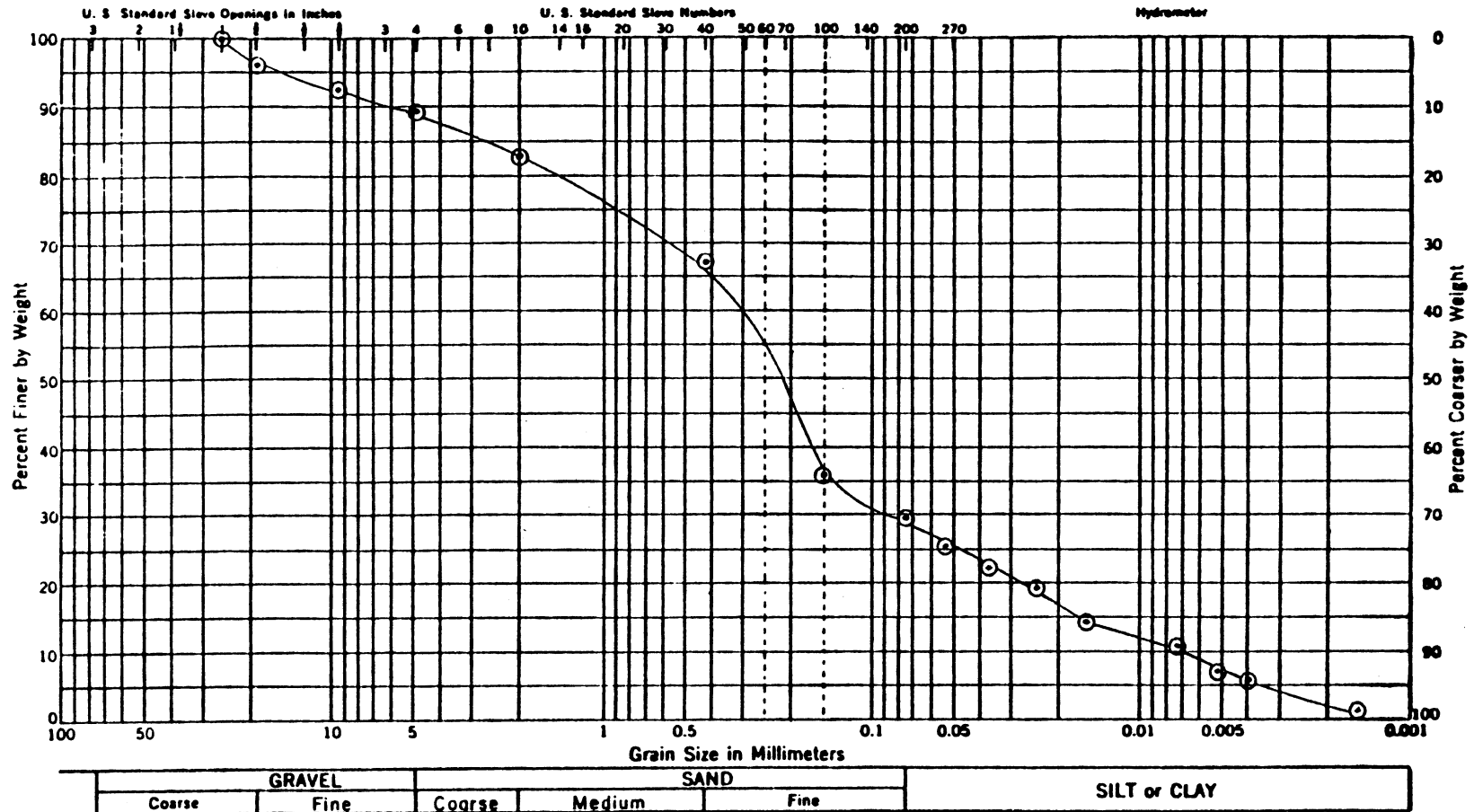
UNIFIED CLASSIFICATION SYSTEM



3.5-19-30

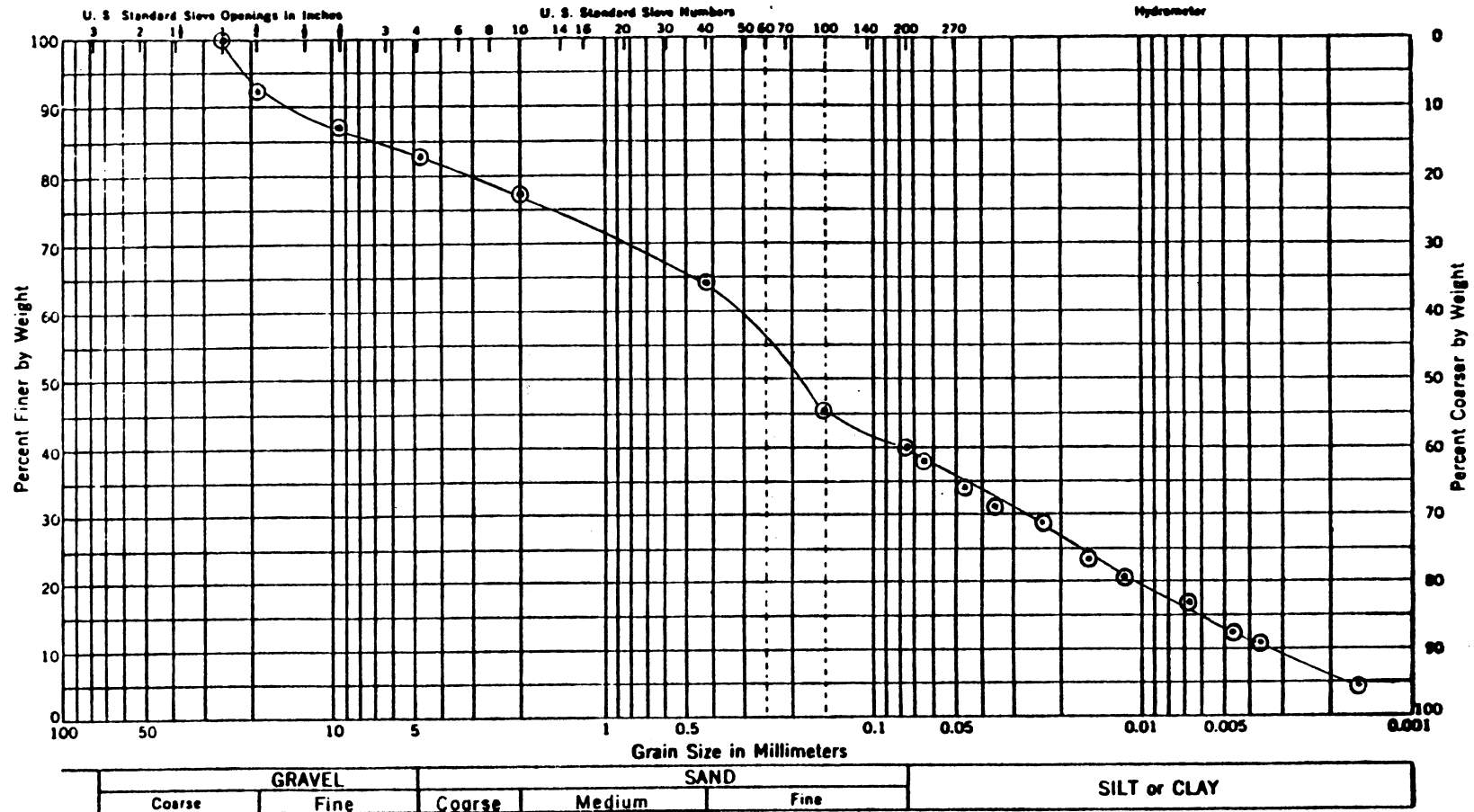


UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-3	9.6				Silty fine to coarse sand (SM)				
S-15									
144.5-148.75						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

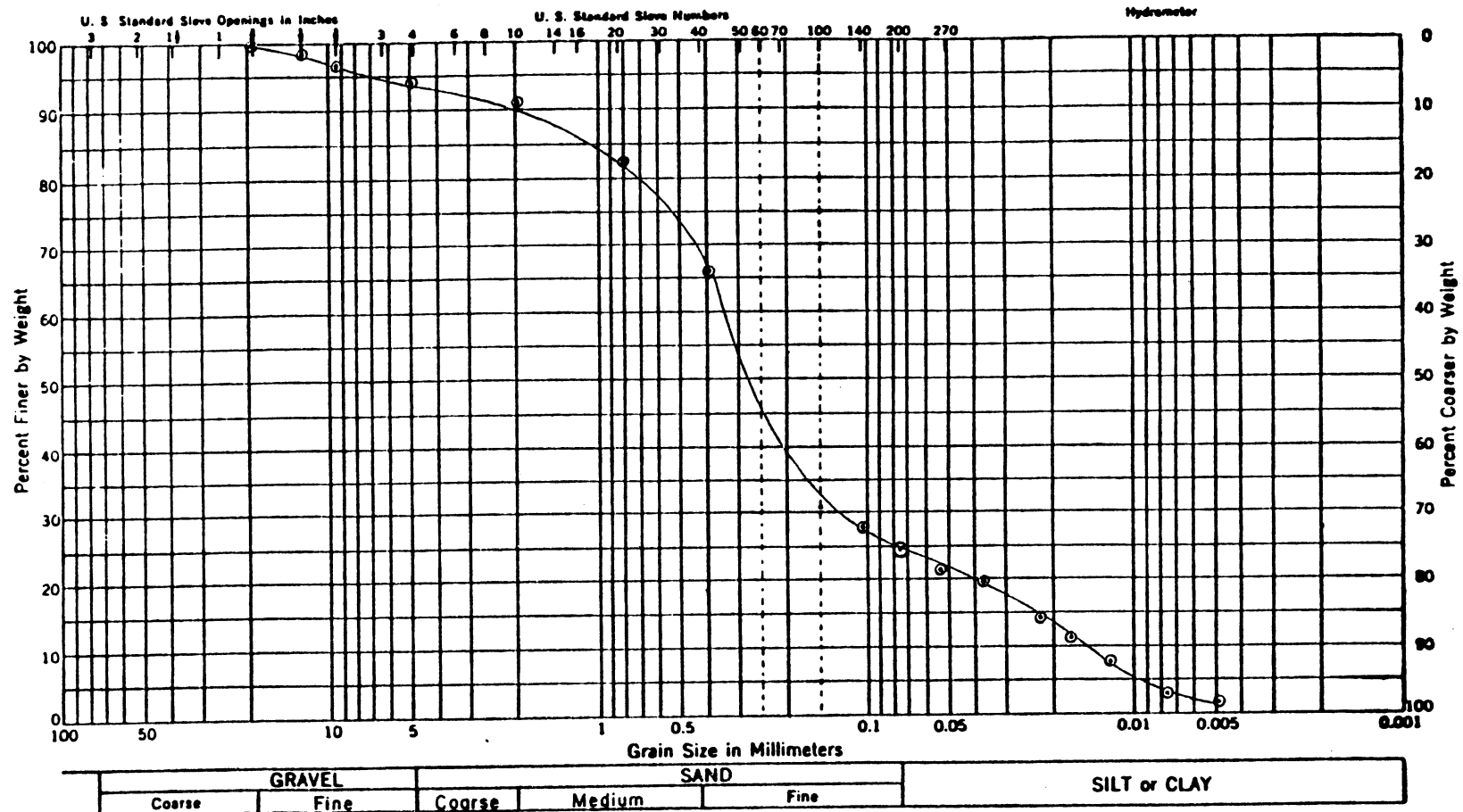
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-3	11.0				Silty fine to coarse sand (SM)				
S-16						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
153.0-154.1'									
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

3.5-19-32

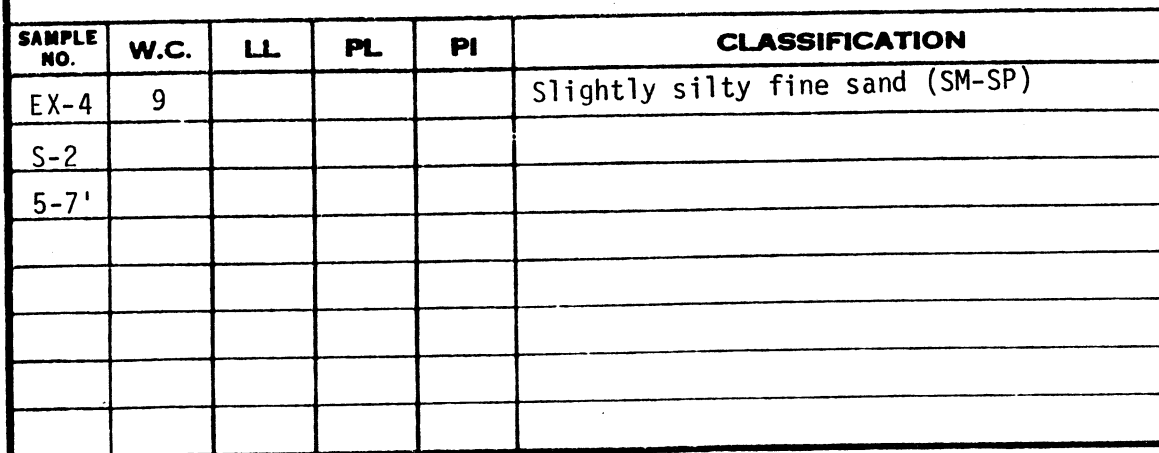
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-4	8				Silty fine to medium sand (SM)				
S-1									
1-3'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JV	JAS	2-2-84	12959

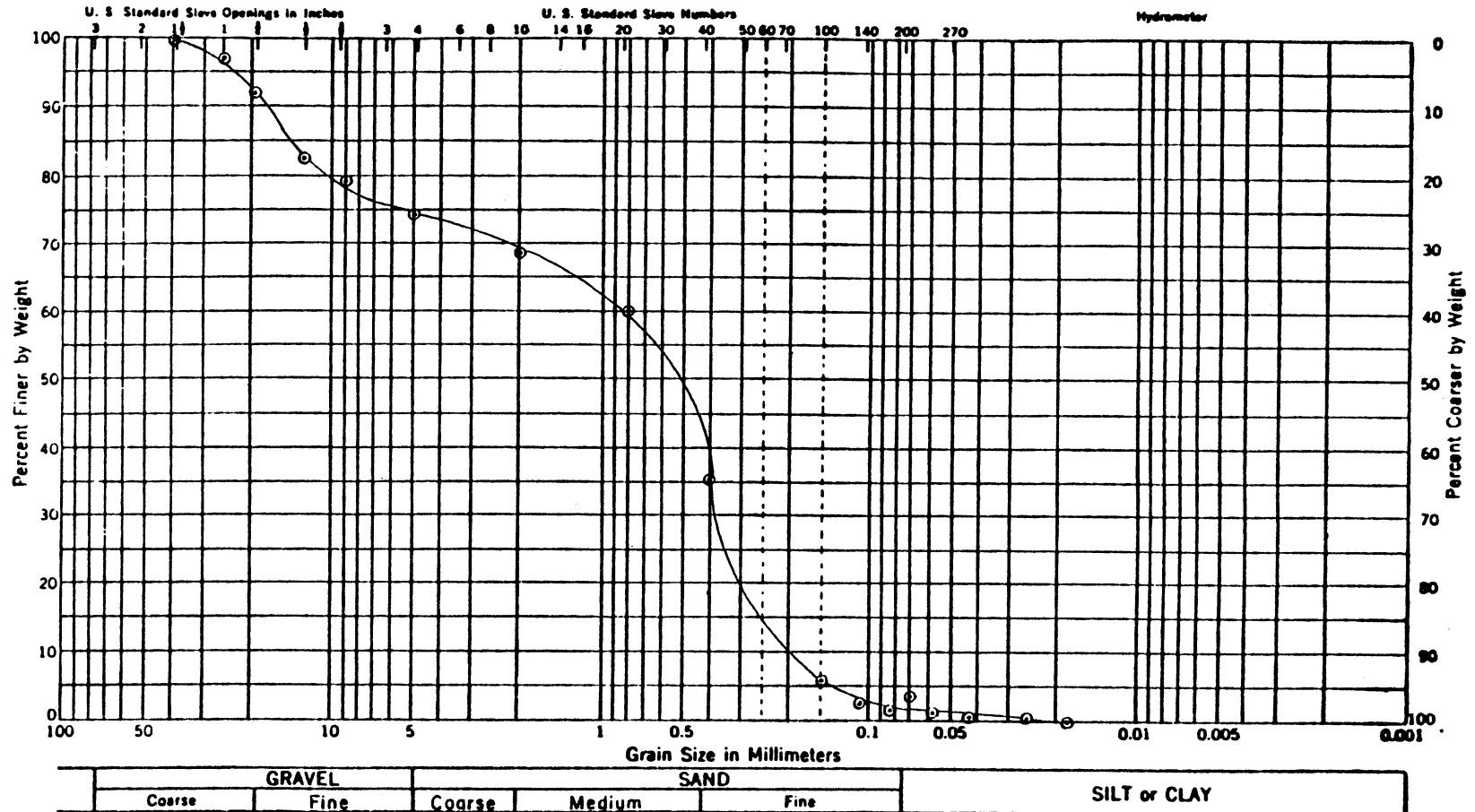
3.5-19-33

3.5-19-34



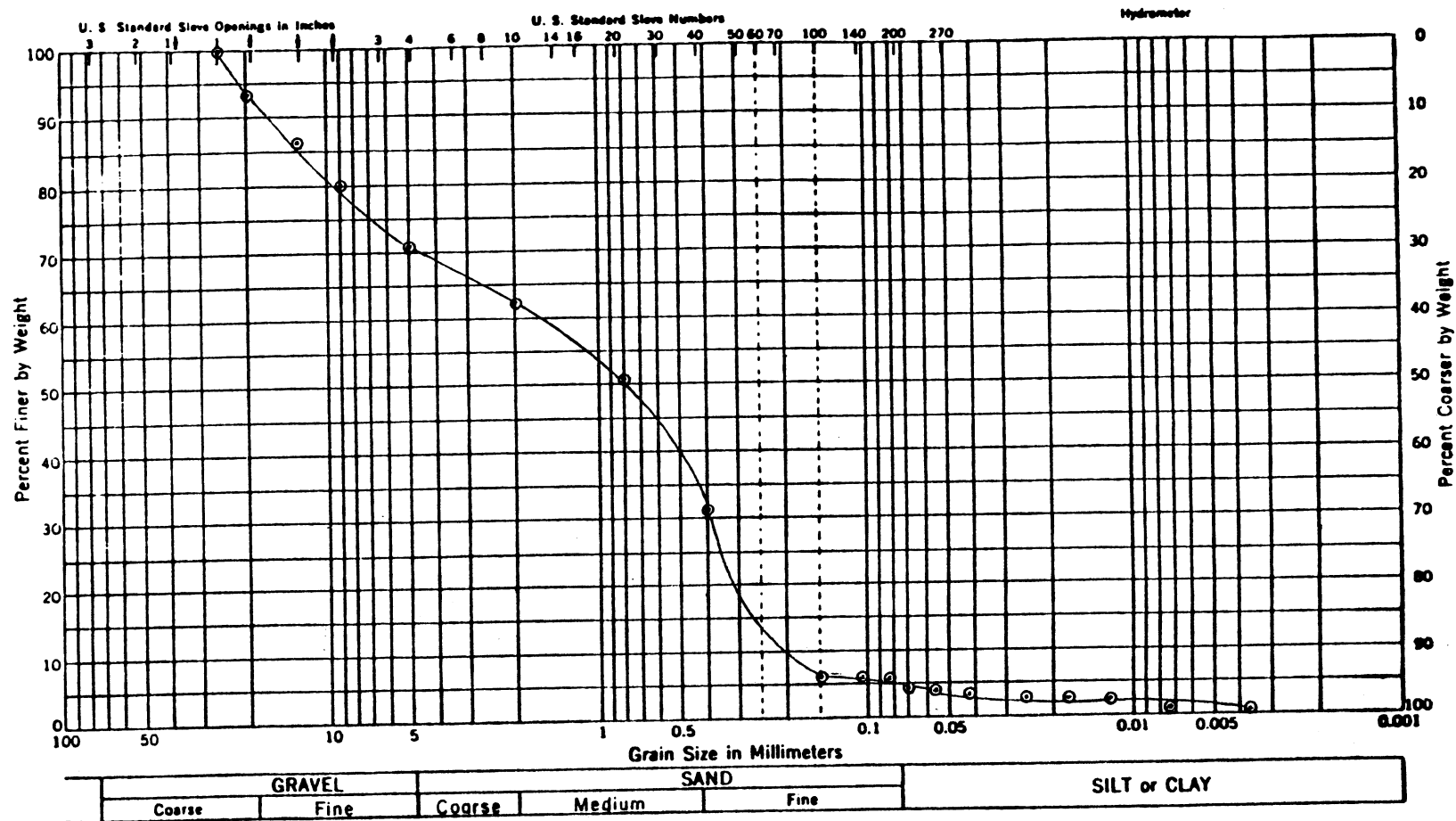
DRAWN	APPROVED	DATE	JOB No.
JV	JAS	2-2-84	12959

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-4	6				Fine to coarse sand (SP)				
S-3						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
10-12'									
						DRAWN	APPROVED	DATE	JOB No.
						JV	JAS	2-2-84	12959

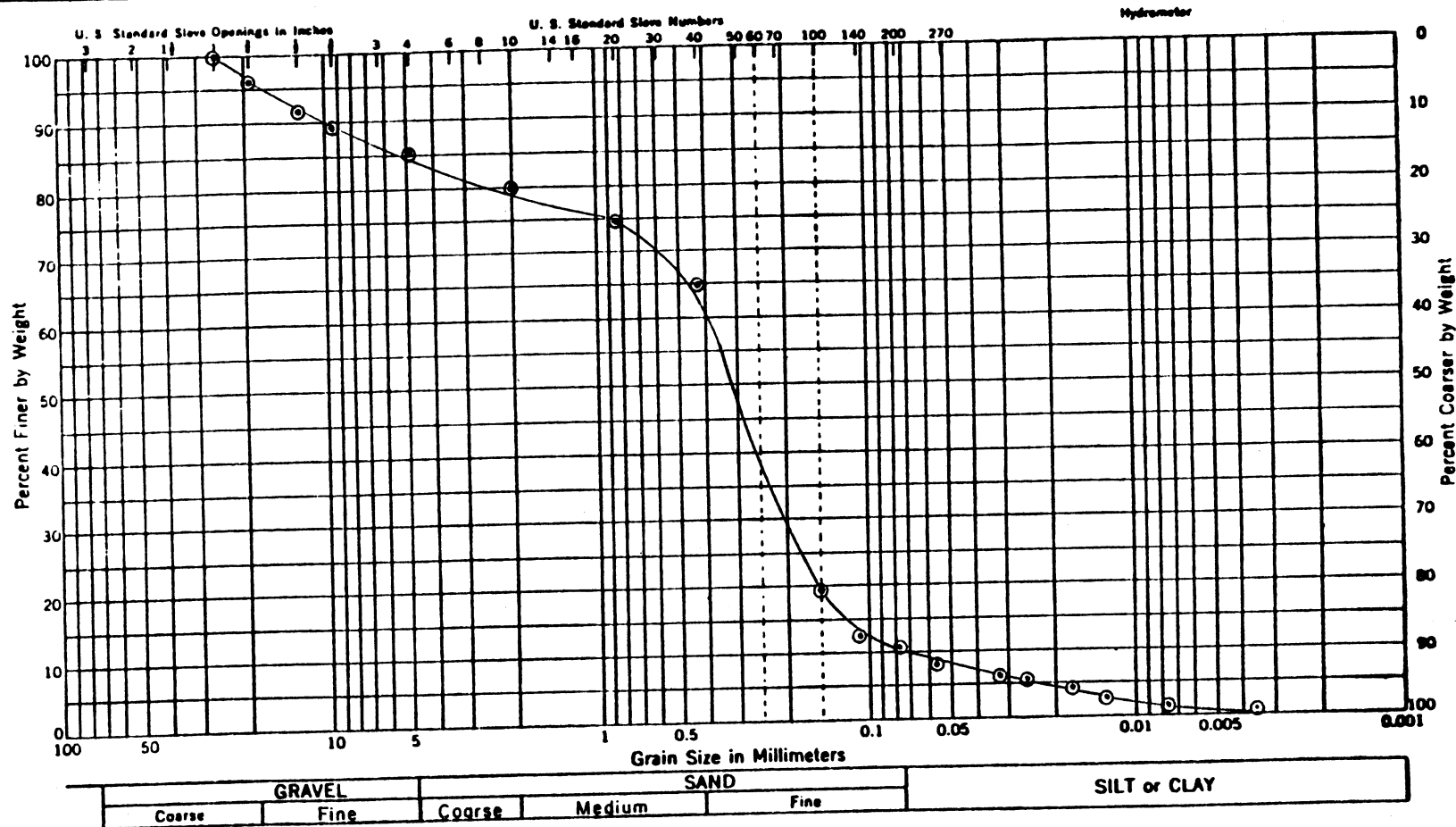
UNIFIED CLASSIFICATION SYSTEM



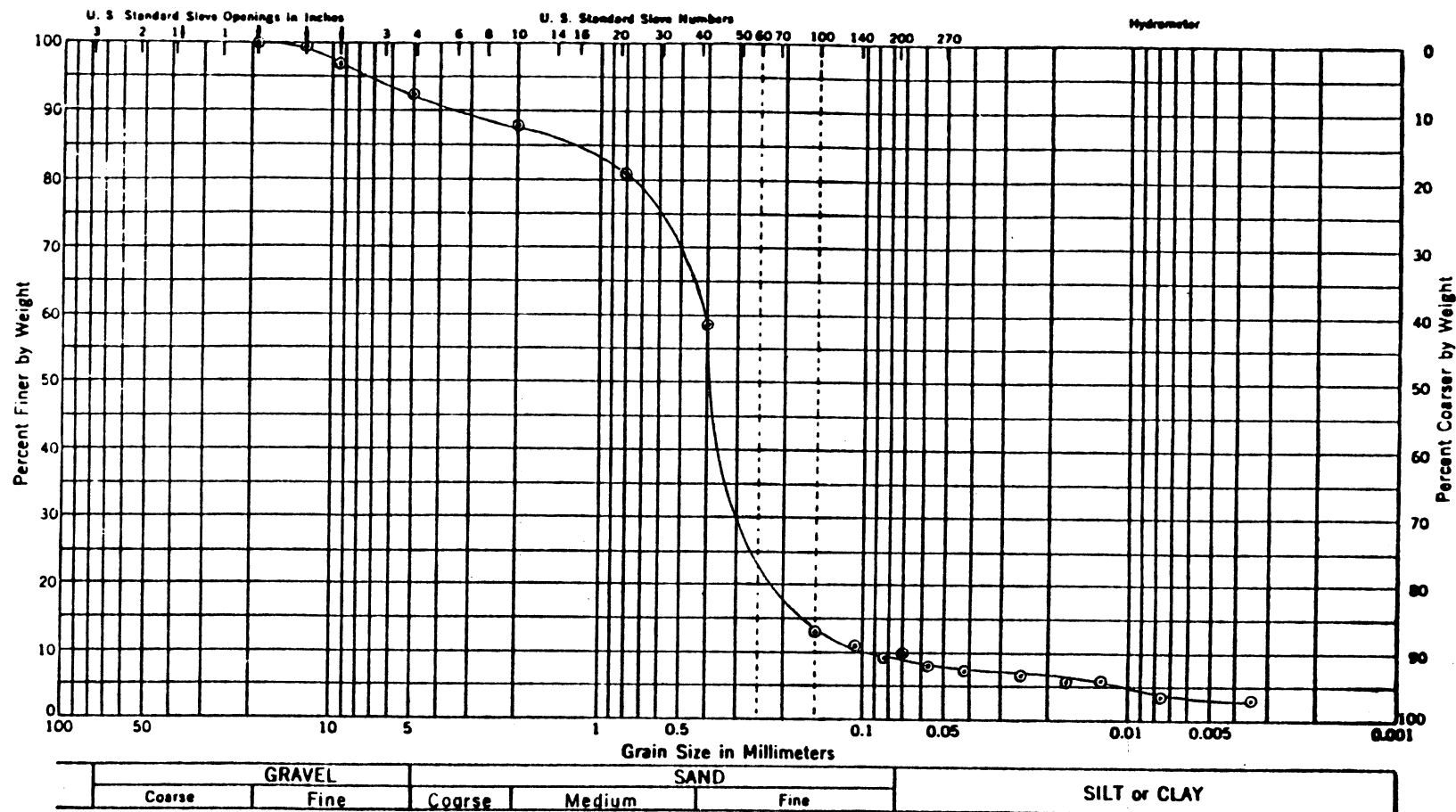
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION									
EX-4	7				Fine to coarse sand (SP)	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT								
S-4														
15-17'														
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303								
						<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 15%;">DRAWN</th> <th style="width: 15%;">APPROVED</th> <th style="width: 15%;">DATE</th> <th style="width: 15%;">JOB No.</th> </tr> <tr> <td>JV</td> <td>JAS</td> <td>2-2-84</td> <td>12959</td> </tr> </table>	DRAWN	APPROVED	DATE	JOB No.	JV	JAS	2-2-84	12959
DRAWN	APPROVED	DATE	JOB No.											
JV	JAS	2-2-84	12959											

3.5-19-36

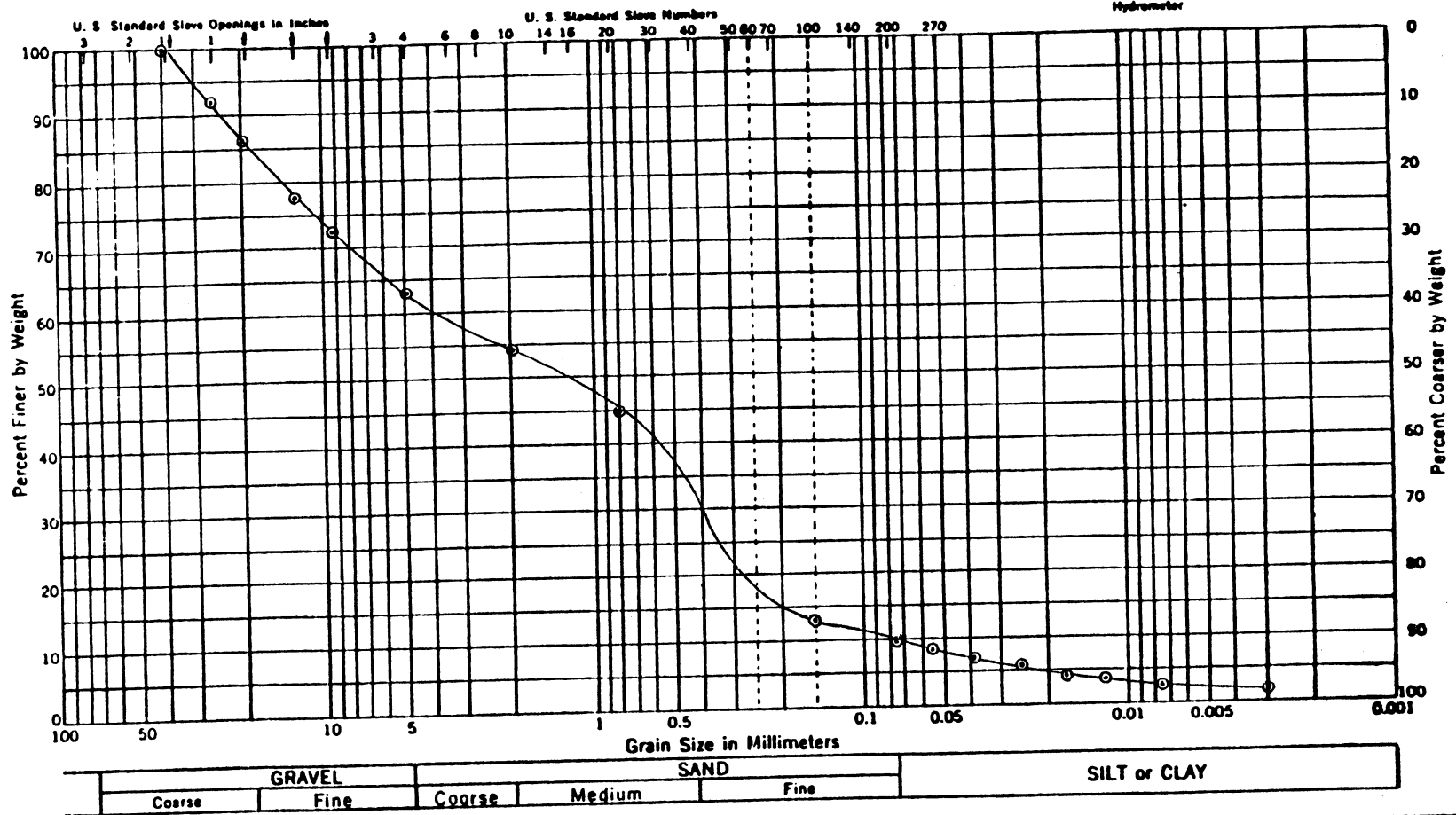
UNIFIED CLASSIFICATION SYSTEM



UNIFIED CLASSIFICATION SYSTEM



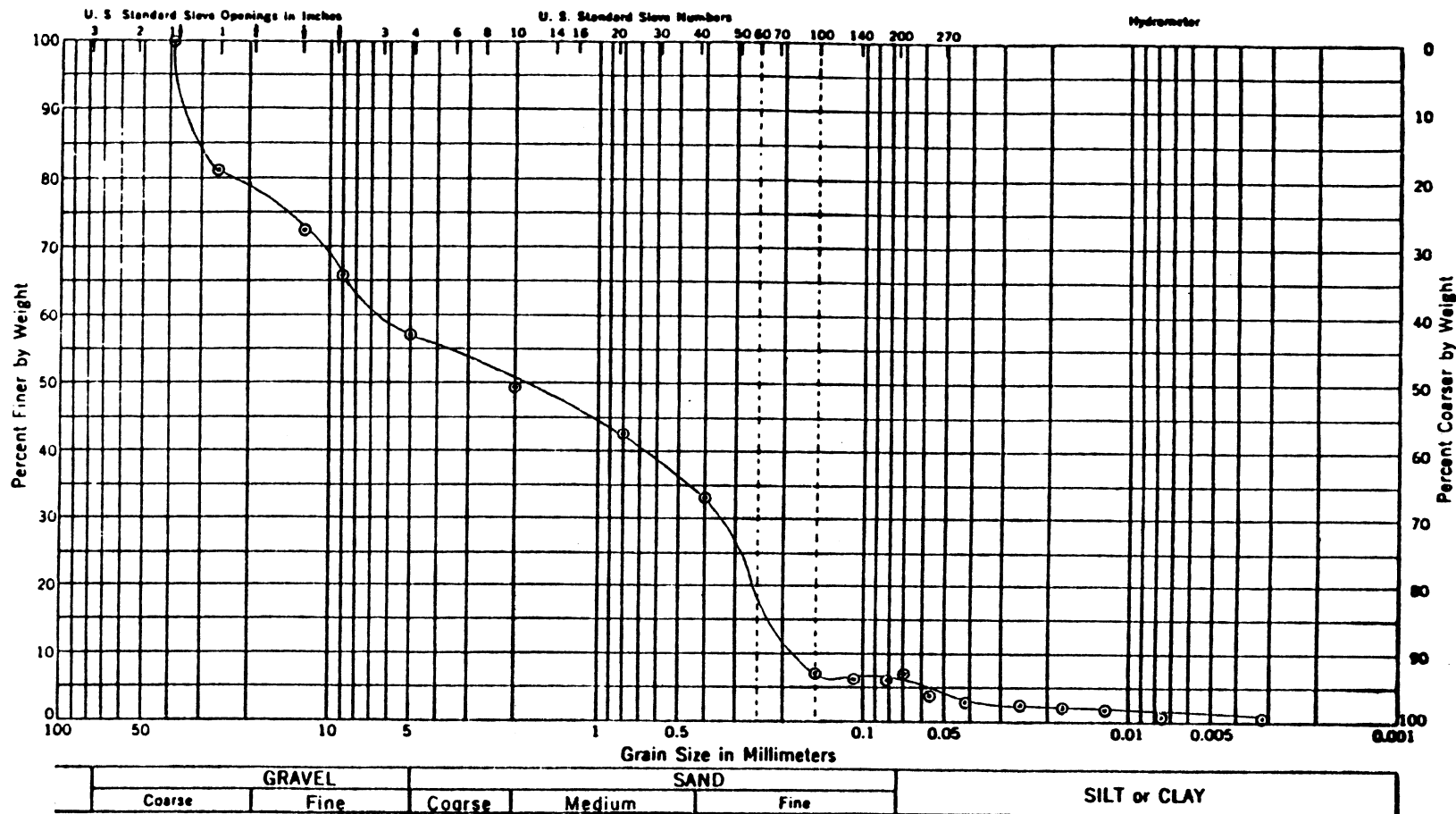
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-4	5				Slightly silty fine to coarse sand and				
S-7					fine gravel (SM-SP)				
40-41.5'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JV	JAS	2-2-84	12959

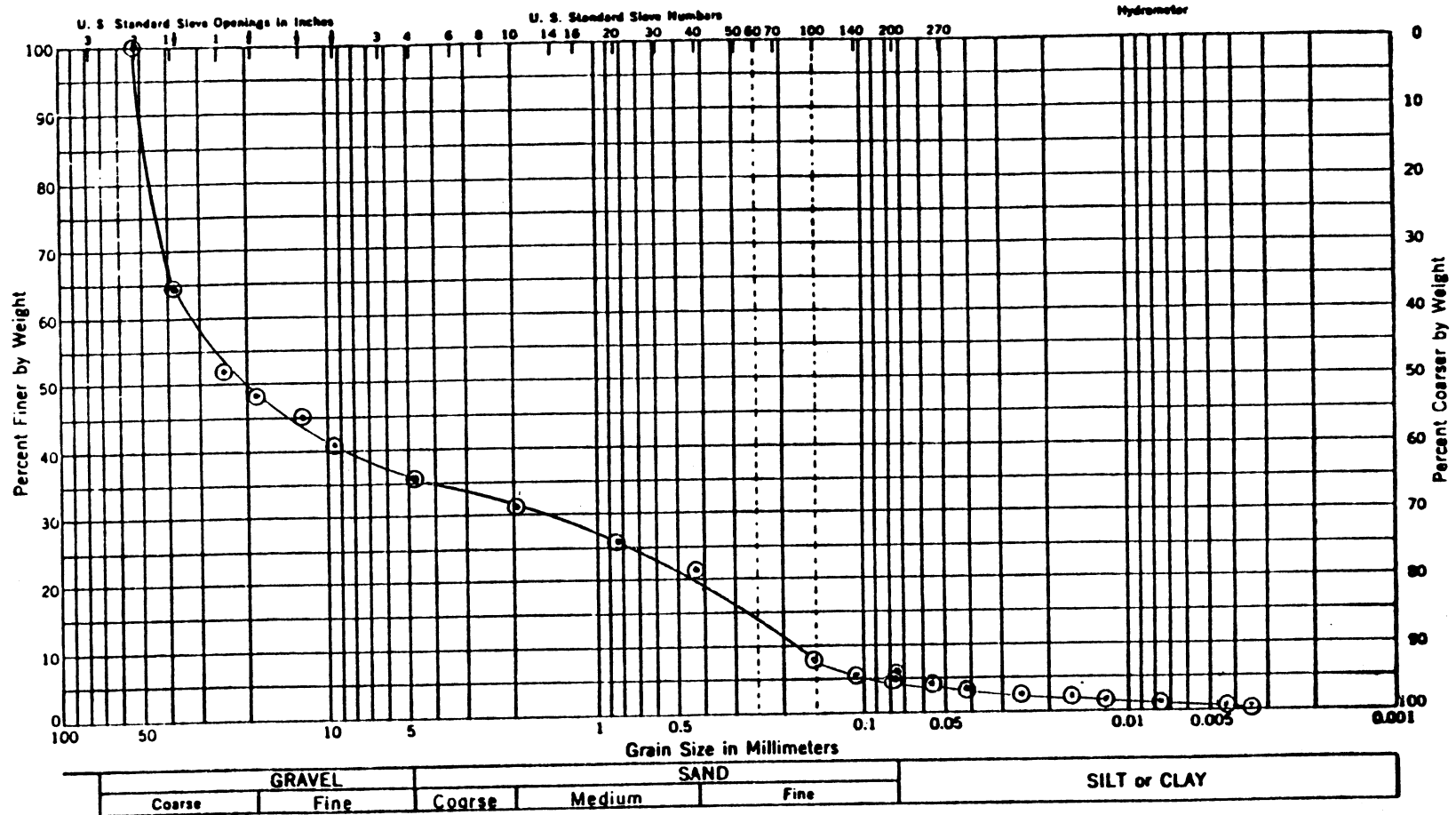
3.5-19-39

UNIFIED CLASSIFICATION SYSTEM



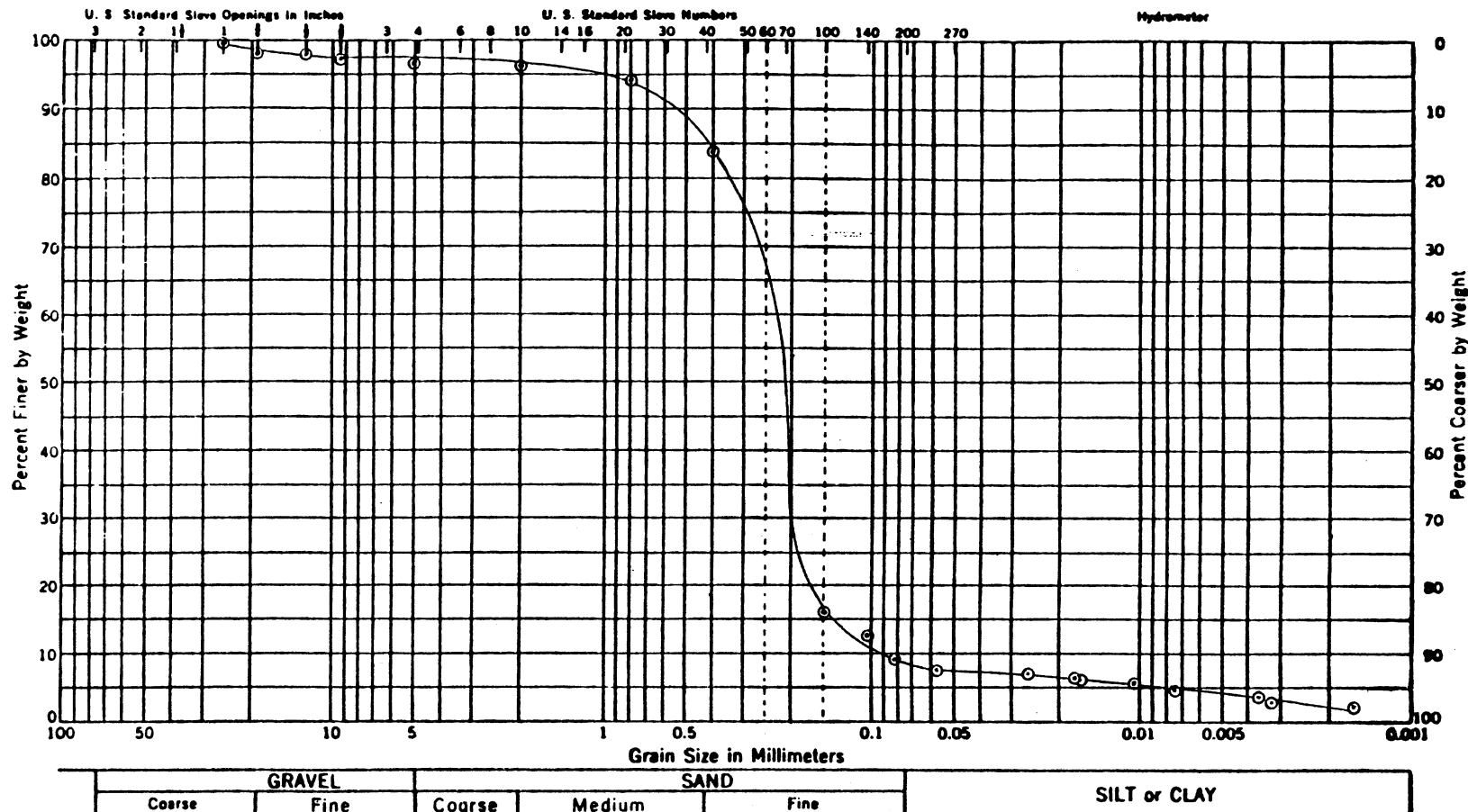
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-4	9				Slightly silty fine to coarse sand and				
S-8					fine gravel (SM-SP)	STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
45-47'									
						DRAWN	APPROVED	DATE	JOB No.
						JV	JAS	2-2-84	12959

UNIFIED CLASSIFICATION SYSTEM



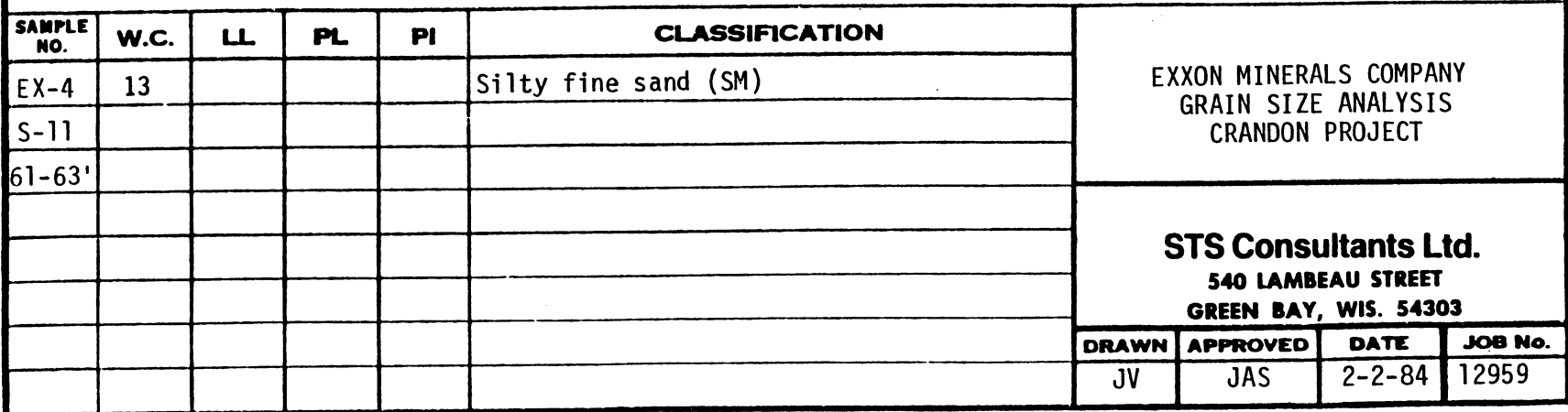
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-4	8				Slightly silty fine gravel and fine to				
S-9					coarse sand (GM-GP)	STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
51.5-									
53.0									
						DRAWN	APPROVED	DATE	JOB No.
						JV	JAS	2-2-84	12959

UNIFIED CLASSIFICATION SYSTEM

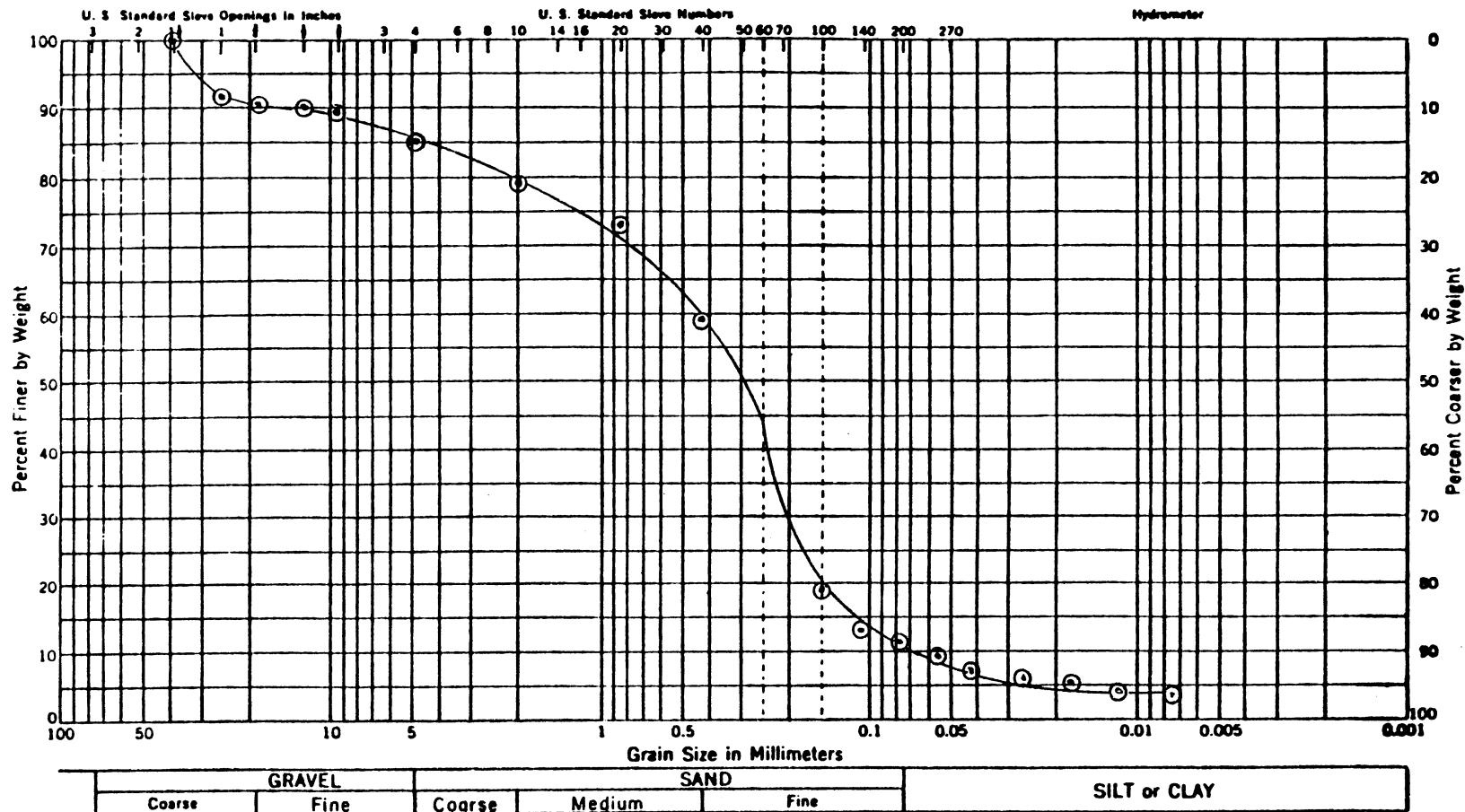


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-4	13				Slightly silty fine sand (SM-SP)				
S-10									
56-58'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JV	JAS	2-2-84	12959

3.5-19-43



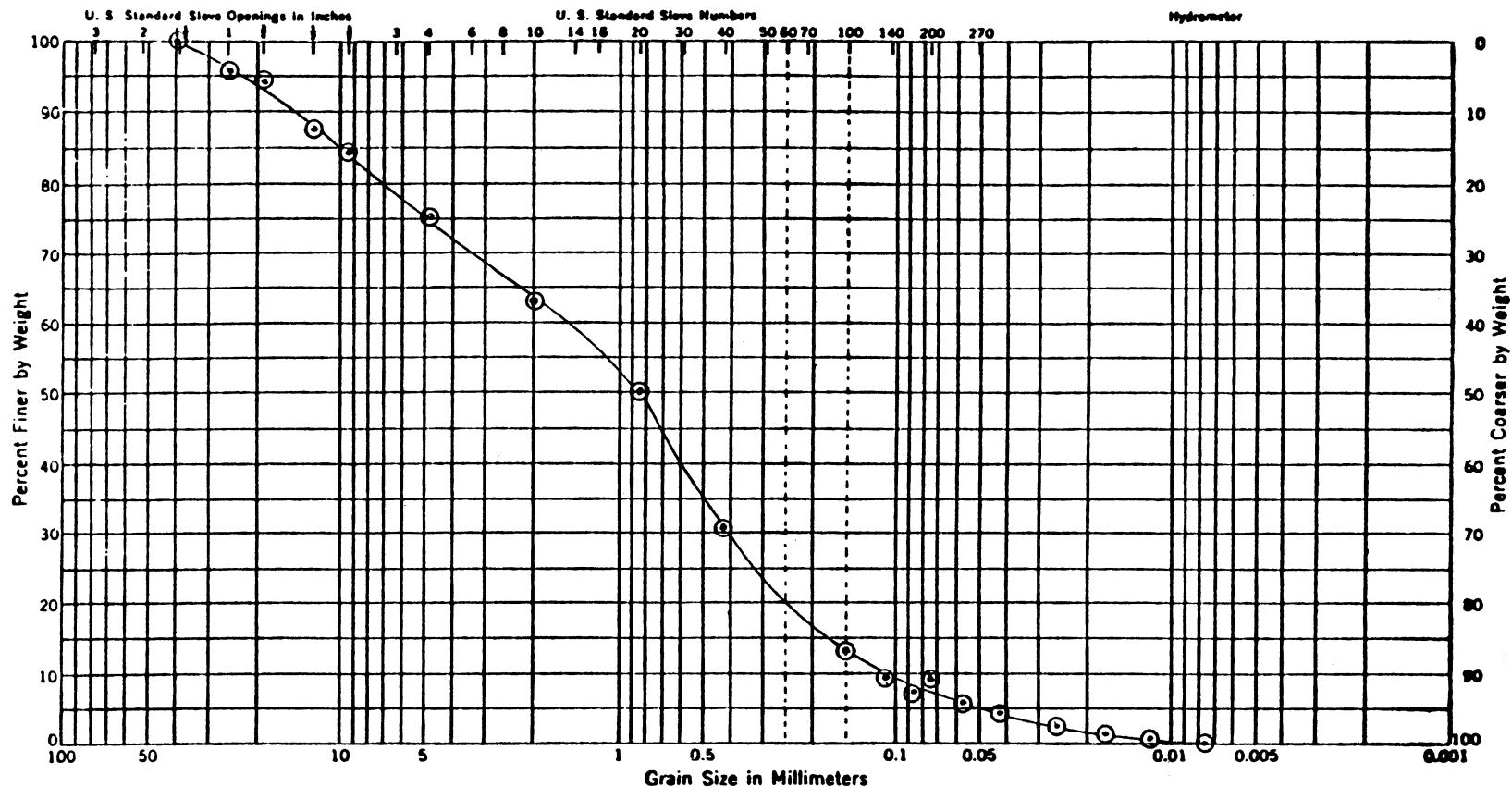
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
EX-4	13				Slightly silty fine to medium sand (SM-SP)				
S-12									
66-68'									
						DRAWN APPROVED DATE JOB No.			
						JV	JAS	2-2-84	12959

3.5-19-44

UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

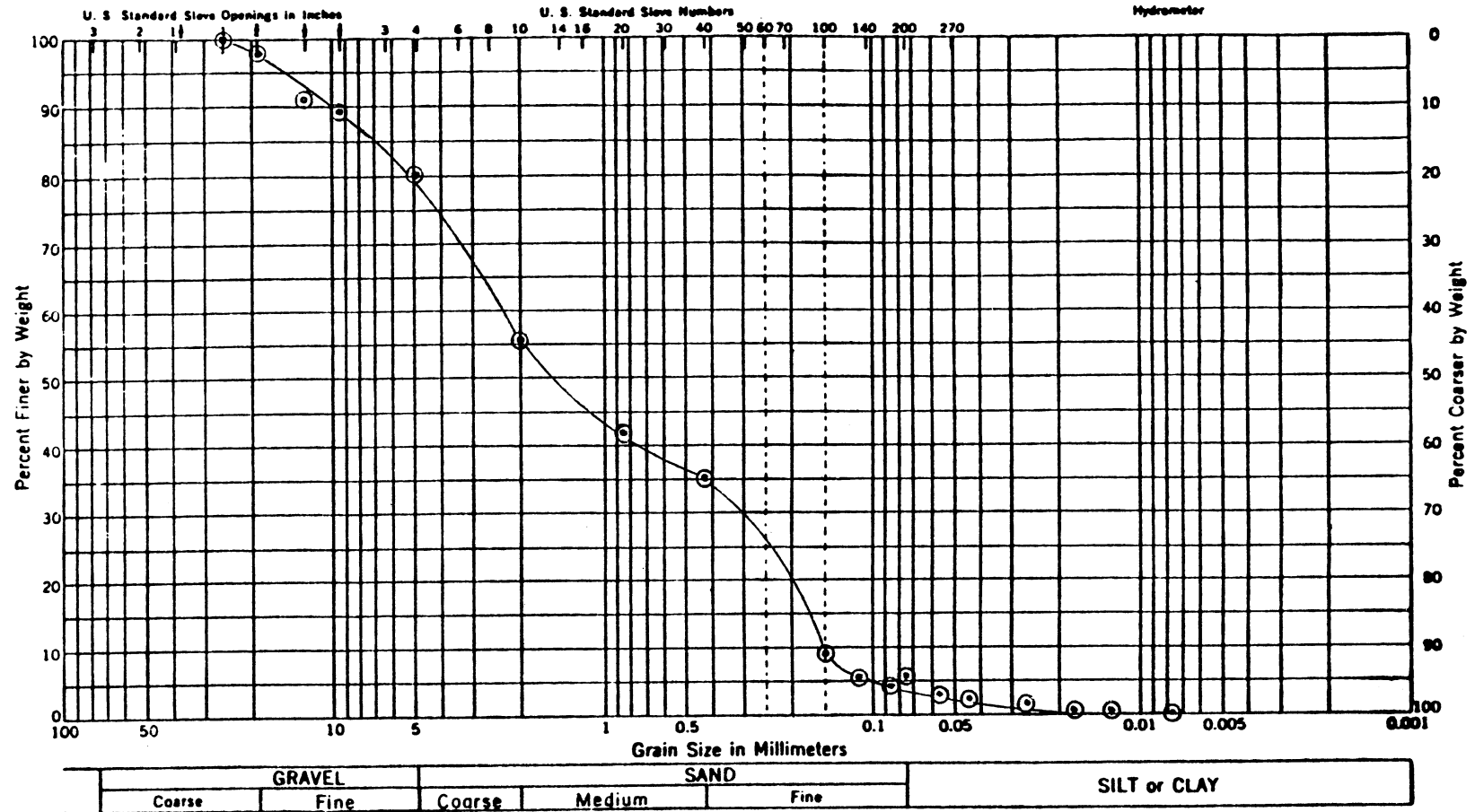
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-4	12				Slightly silty fine to coarse sand (SM-SP)
S-13					
72-74'					

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JV	JAS	2-2-84	12959

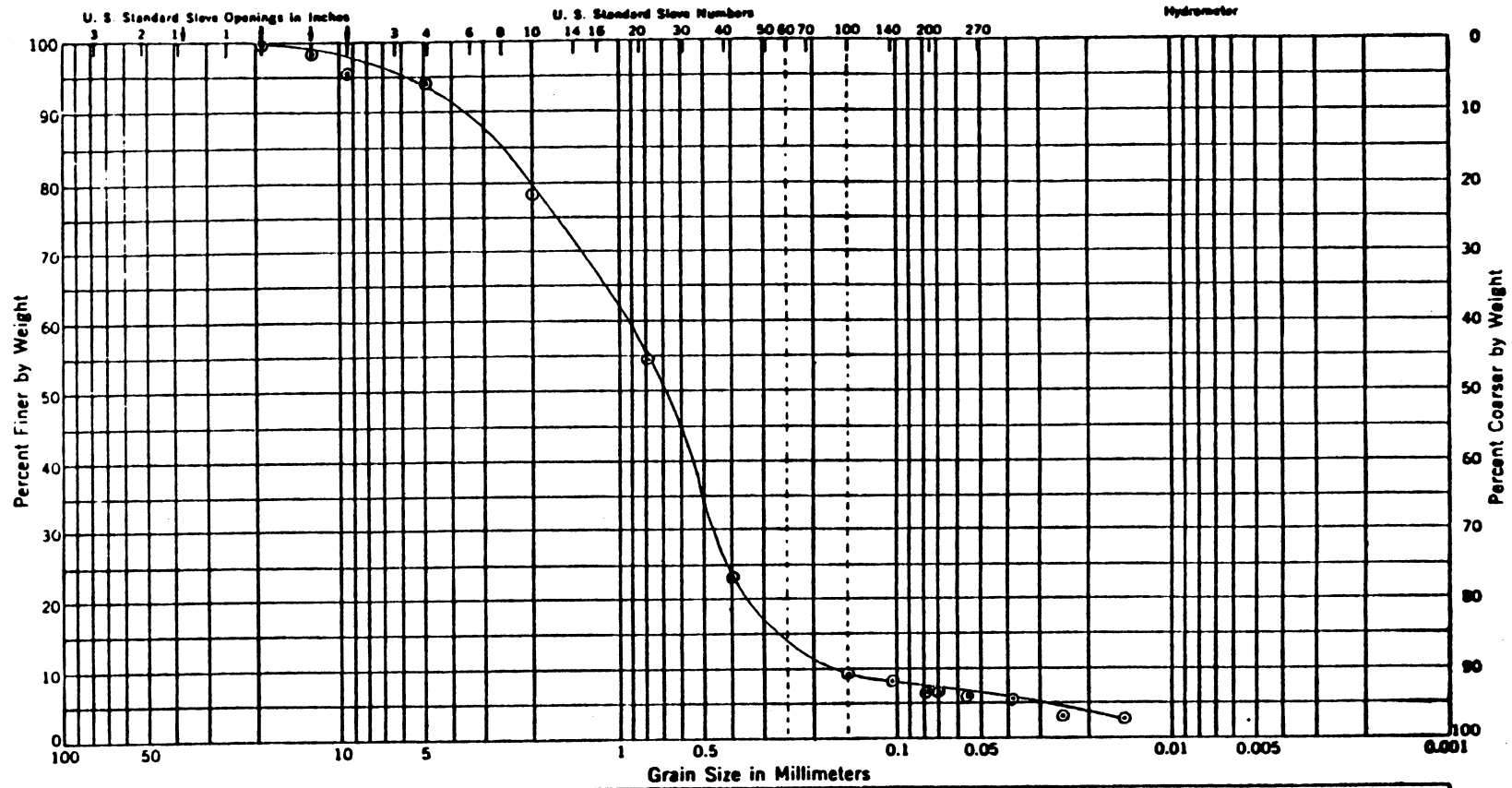
UNIFIED CLASSIFICATION SYSTEM



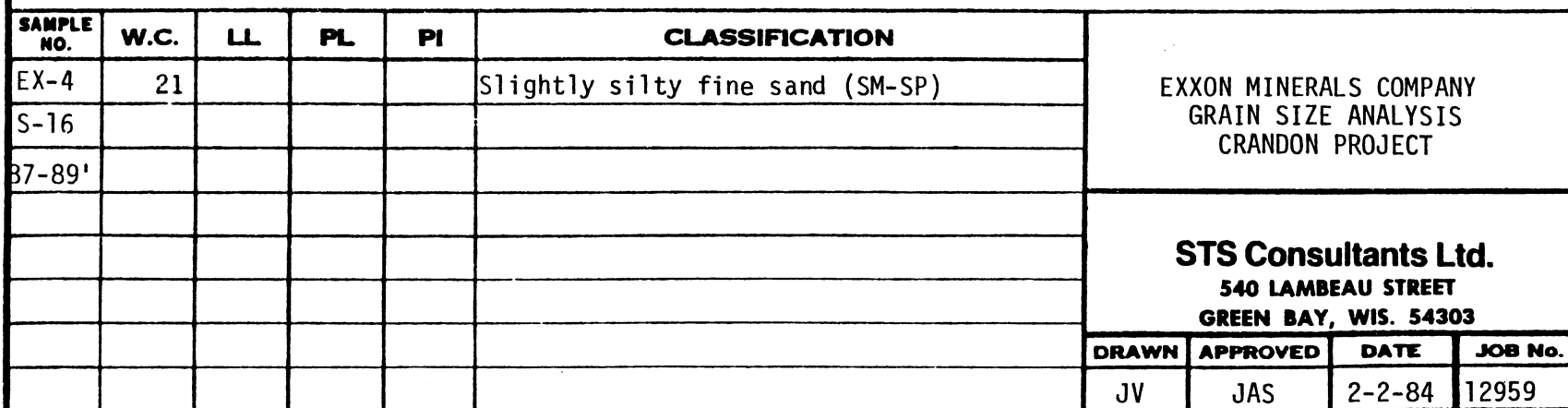
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-4	13				Slightly silty fine to coarse sand (SM-SP)				
S-14									
77-79'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JV	JAS	2-2-84	12959

3.5-19-46

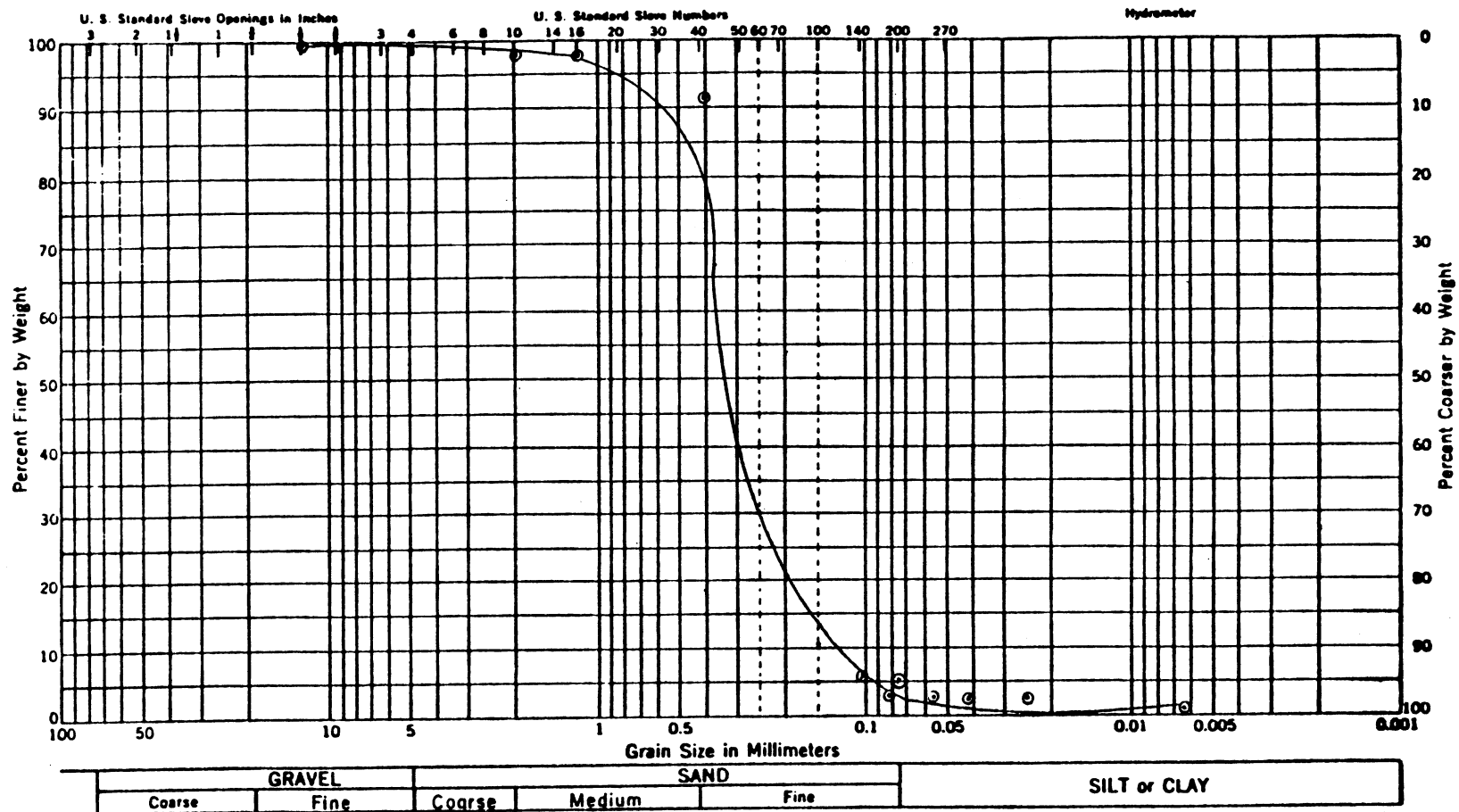
UNIFIED CLASSIFICATION SYSTEM



3.5-19-48

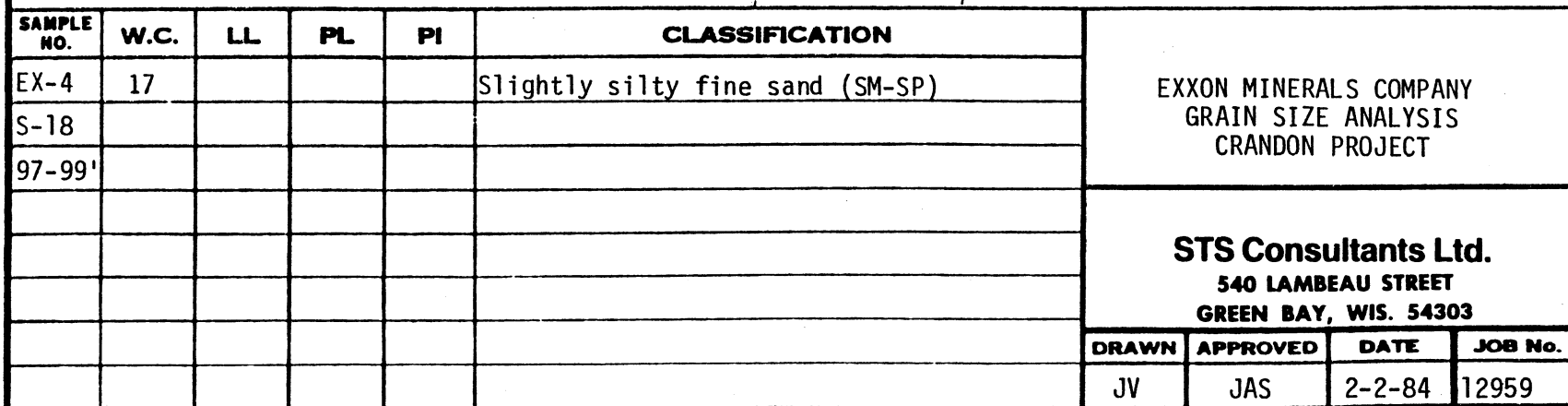


UNIFIED CLASSIFICATION SYSTEM

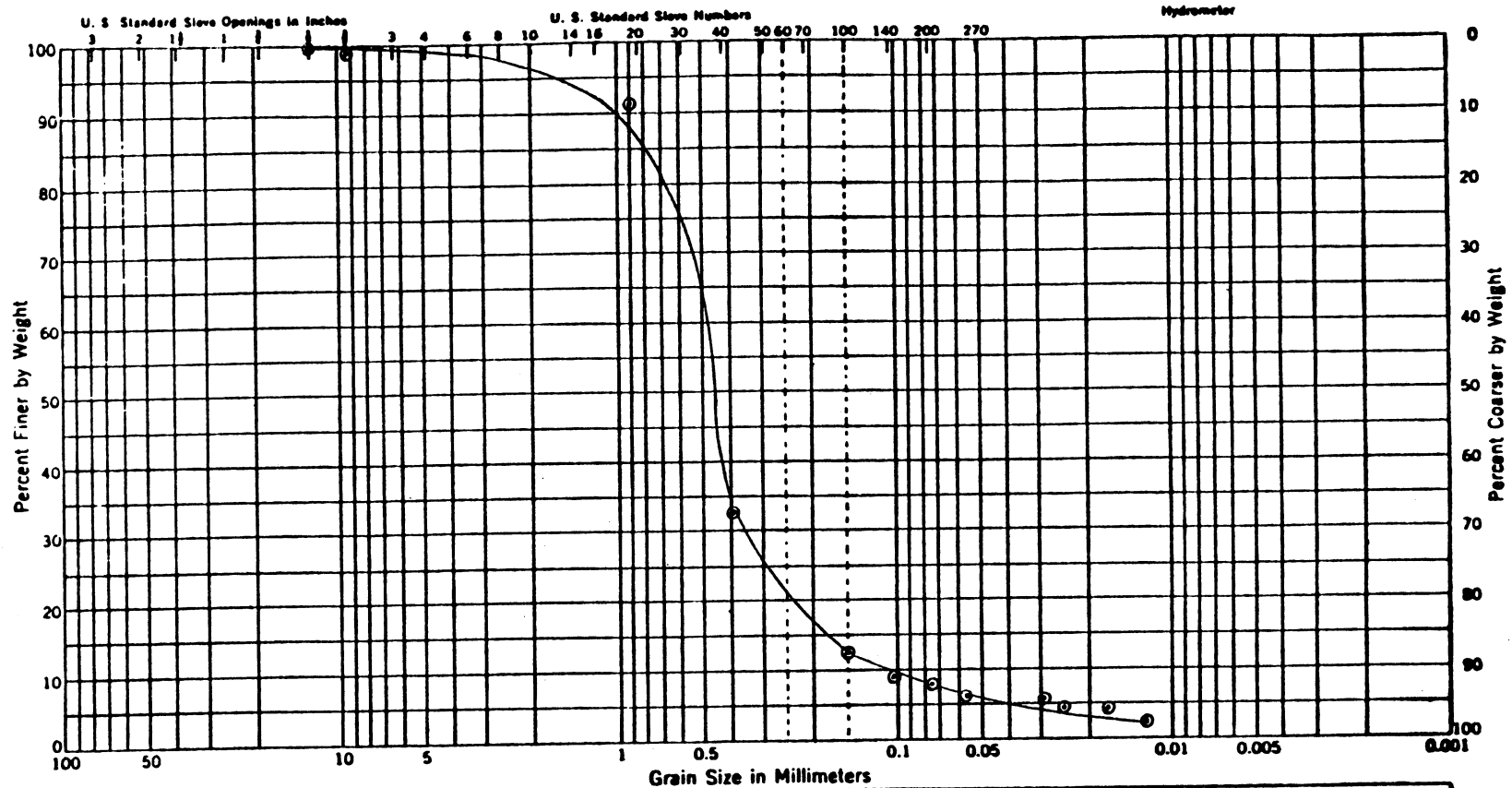


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
EX-4	21				Slightly silty fine sand (SM-SP)				
S-17									
92-94'									
						DRAWN APPROVED DATE JOB No.			
						JV	JAS	2-2-84	12959

3.5-19-50



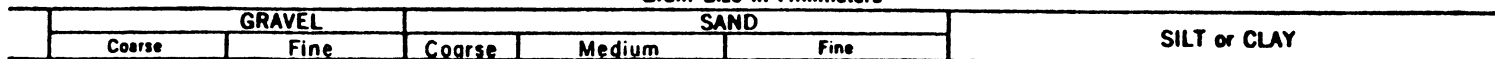
UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

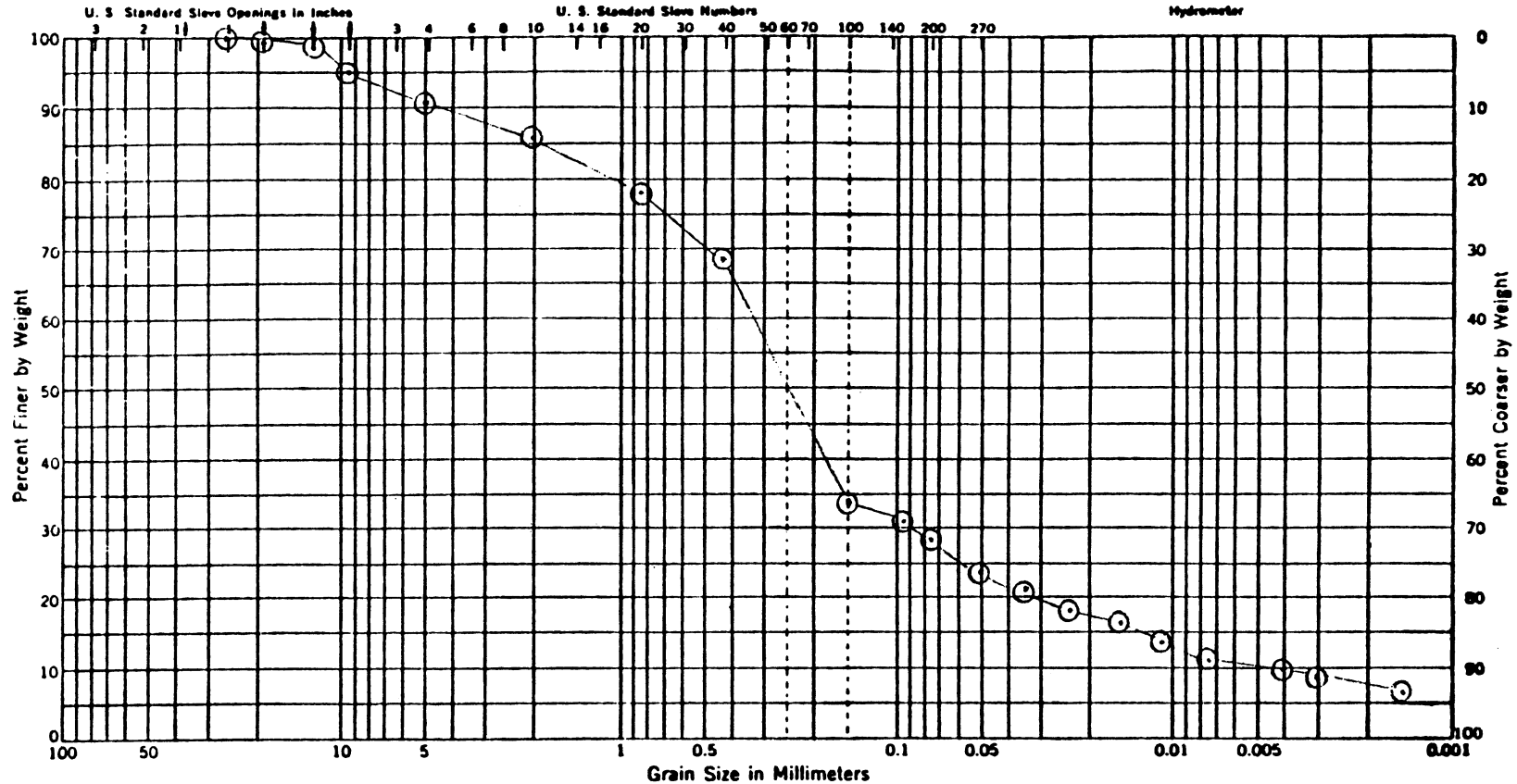
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-4	15				Slightly silty fine sand (SM-SP)				
S-19									
102-104'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JV	JAS	2-2-84	12959

3.5-19-52



BBS09302

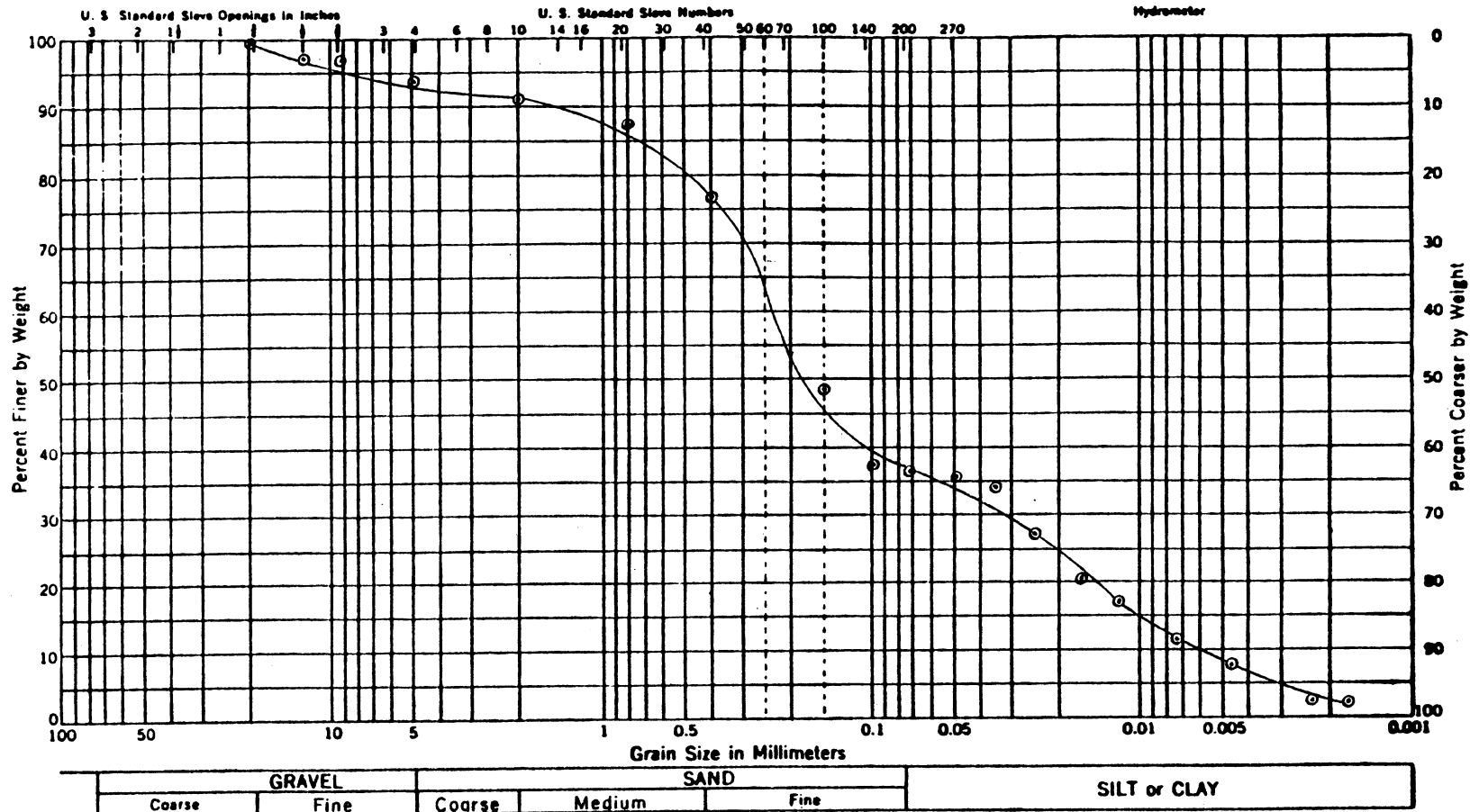
UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-4	10				Silty fine to coarse sand (SM)				
S-21									
112-4									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JV	JAS	2-2-84	12959

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-5	15				Silty fine to medium sand (SM)
S-1					
0-2'					

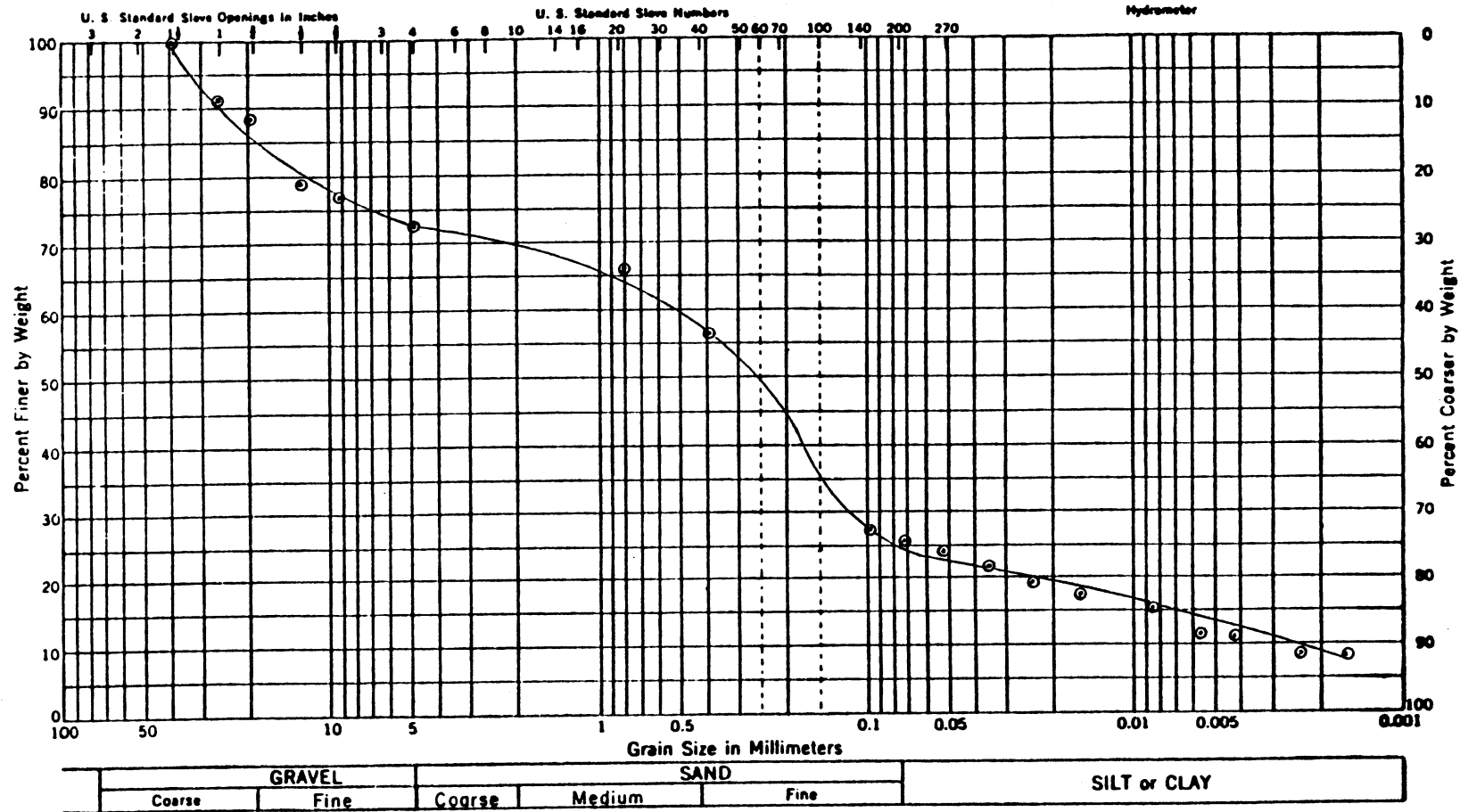
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JV	JAS	2-2-84	12959

3.5-19-54

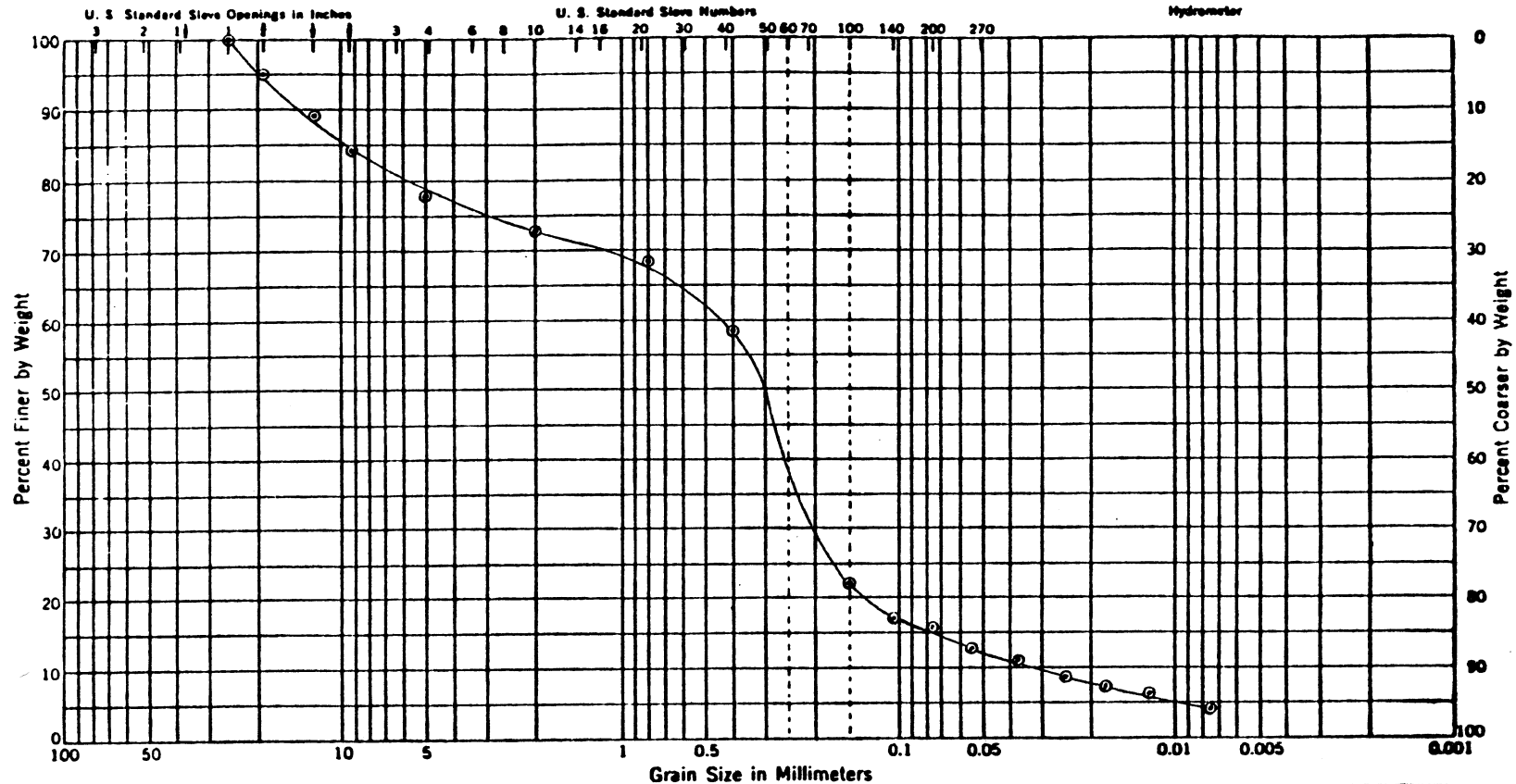
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-5	6				Silty fine to medium sand (SM)
S-2					
10-12'					

EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
DRAWN	APPROVED	DATE	JOB No.
JV	JAS	2-2-84	12959

UNIFIED CLASSIFICATION SYSTEM

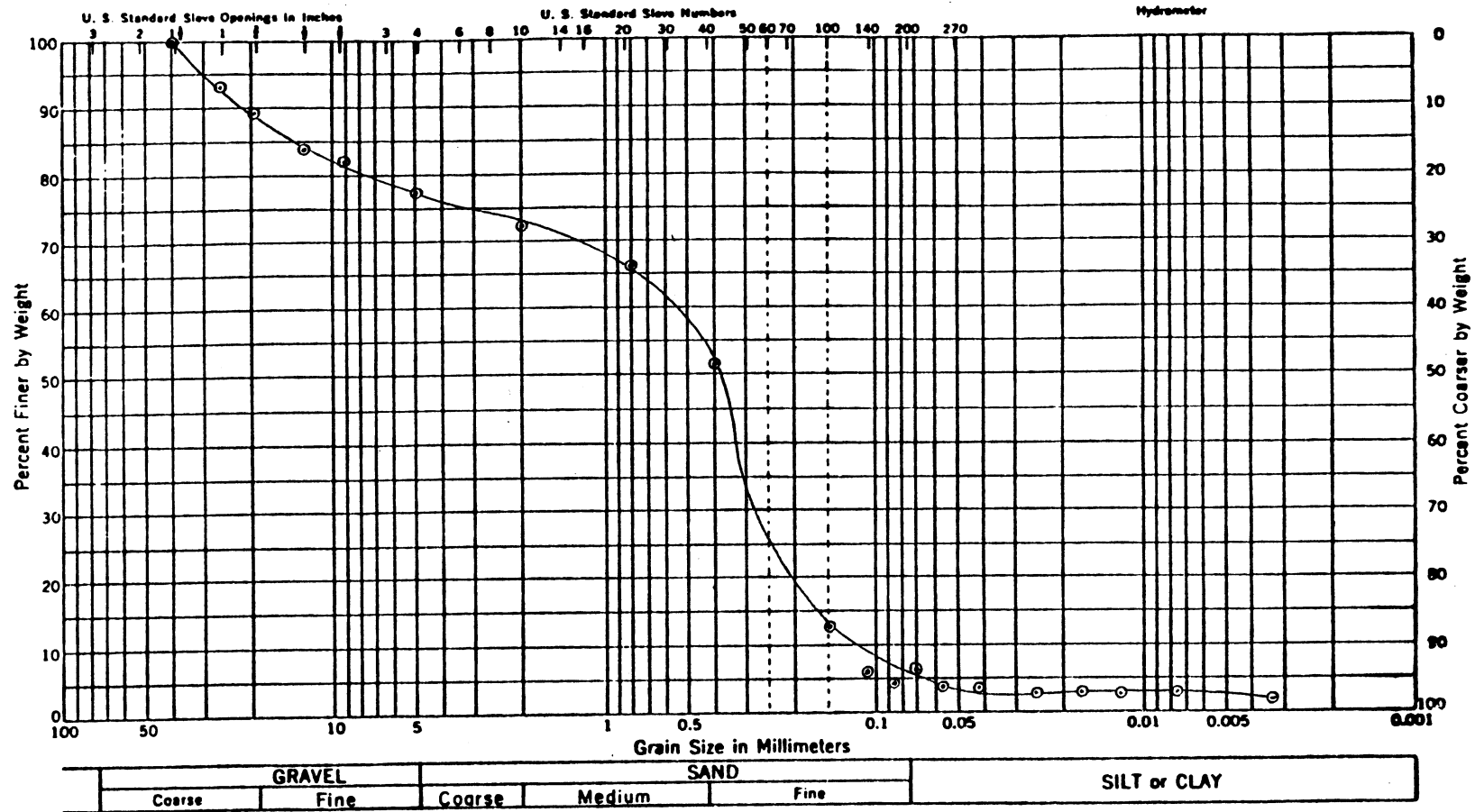


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

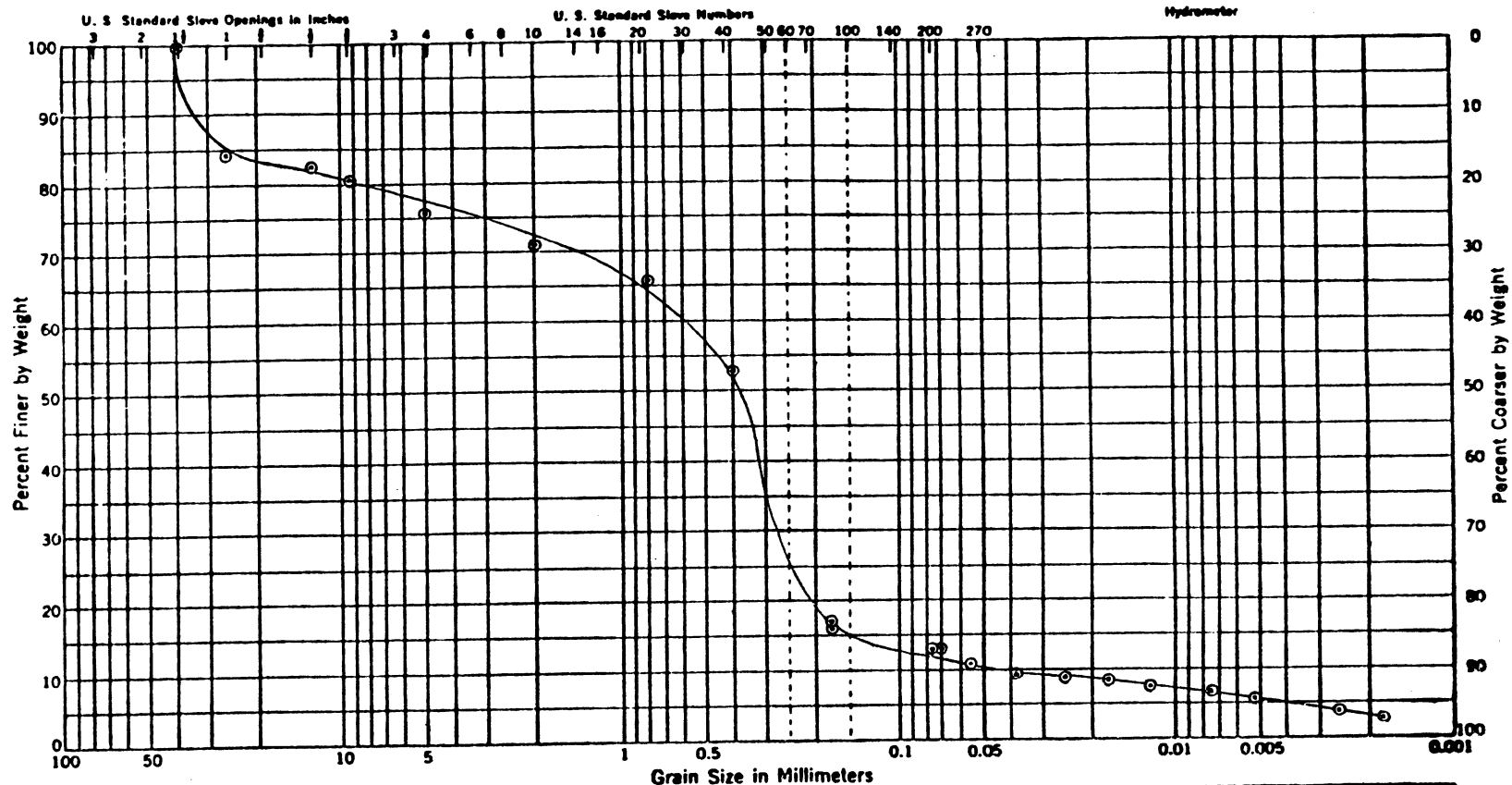
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-5	5				Silty fine to medium sand (SM)				
S-3									
20-22'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JV	JAS	2-2-84	12959

3.5-19-56

UNIFIED CLASSIFICATION SYSTEM



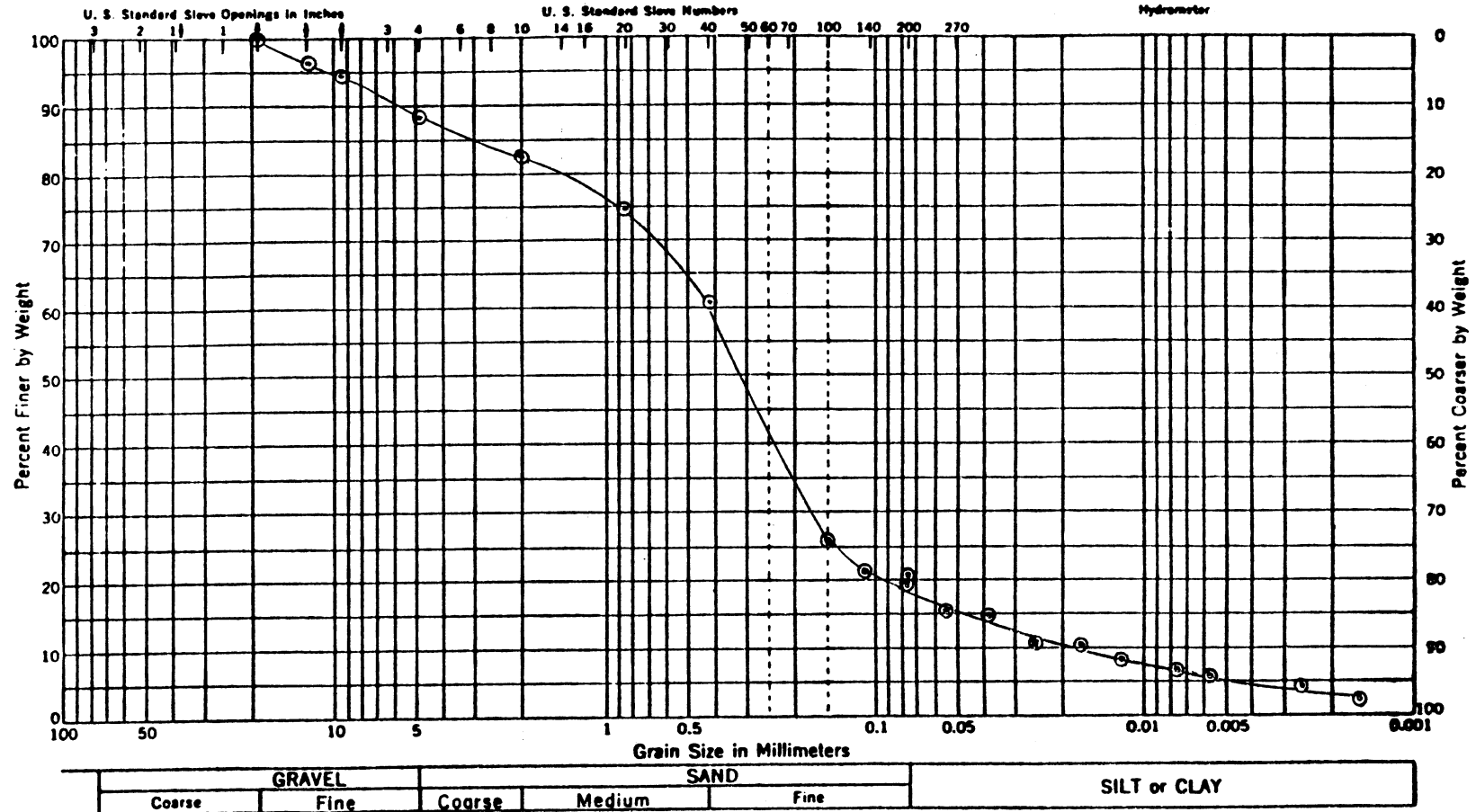
UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

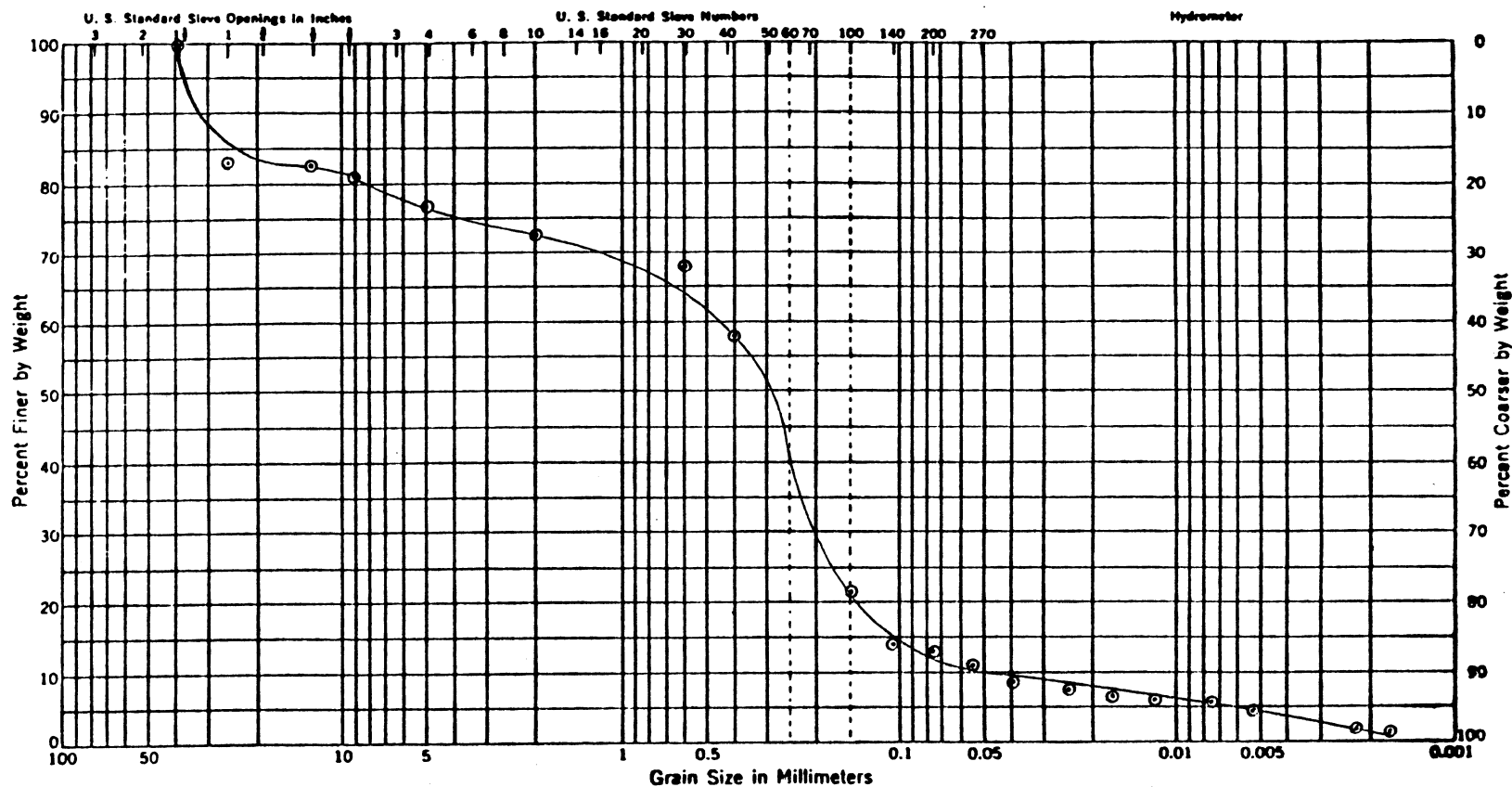
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-5	8				Silty fine to medium sand (SM)				
S-5									
40-42'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JV	JAS	2-2-84	12959

UNIFIED CLASSIFICATION SYSTEM

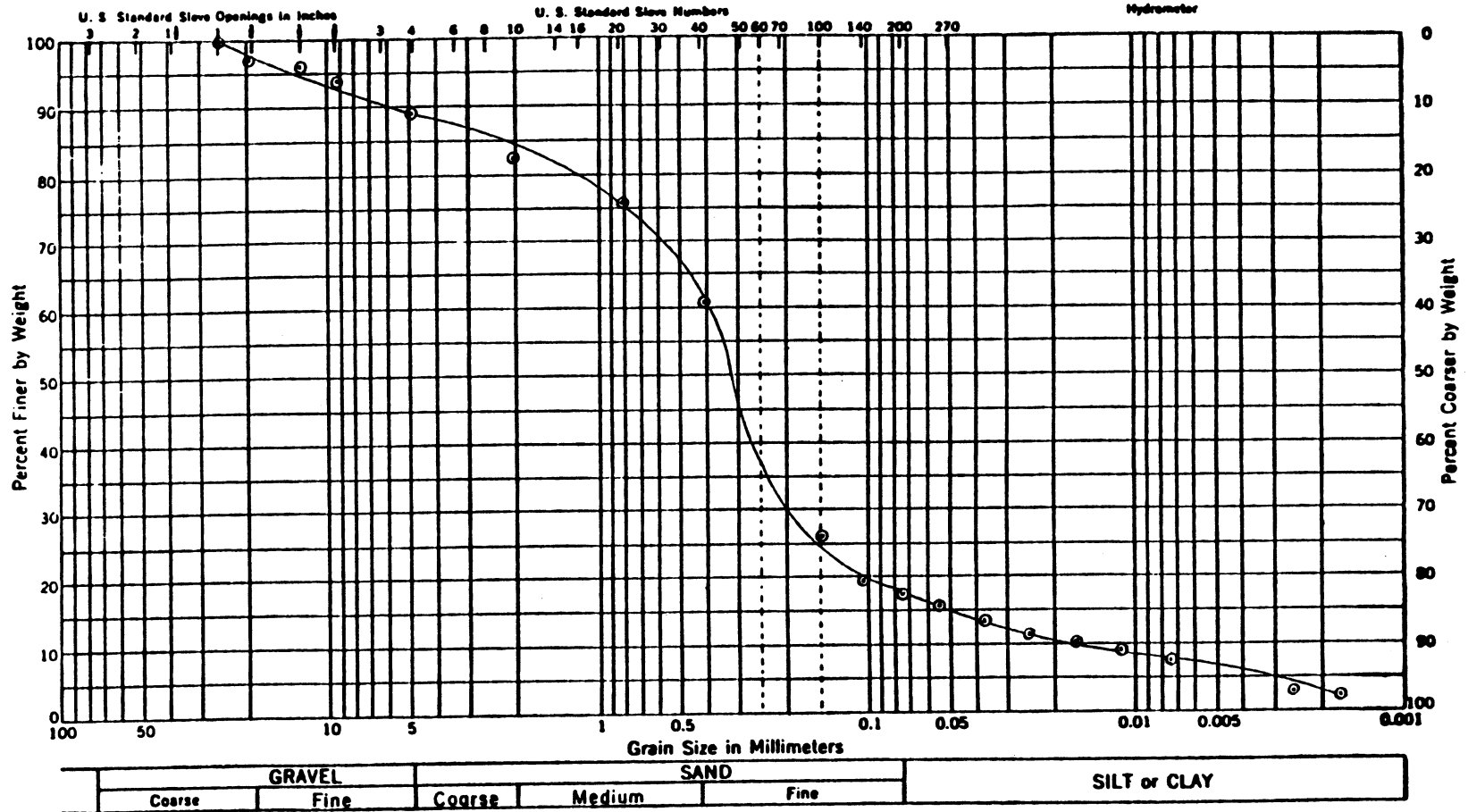


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
EX-5	10				Silty fine to coarse sand (SM)				
S-7									
60-62'									
						DRAWN APPROVED DATE JOB No.			
						JV	JAS	2-2-84	12959

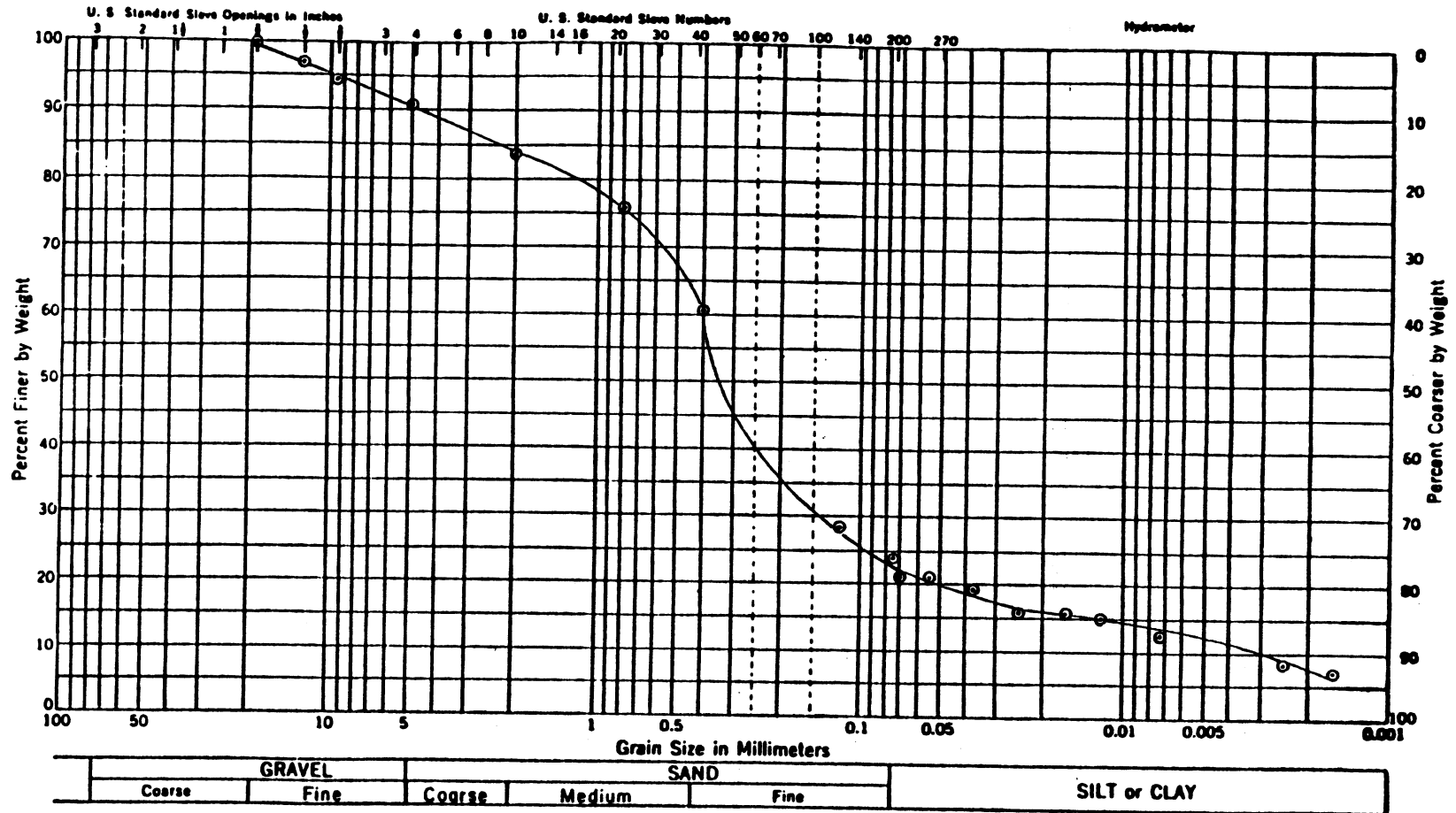
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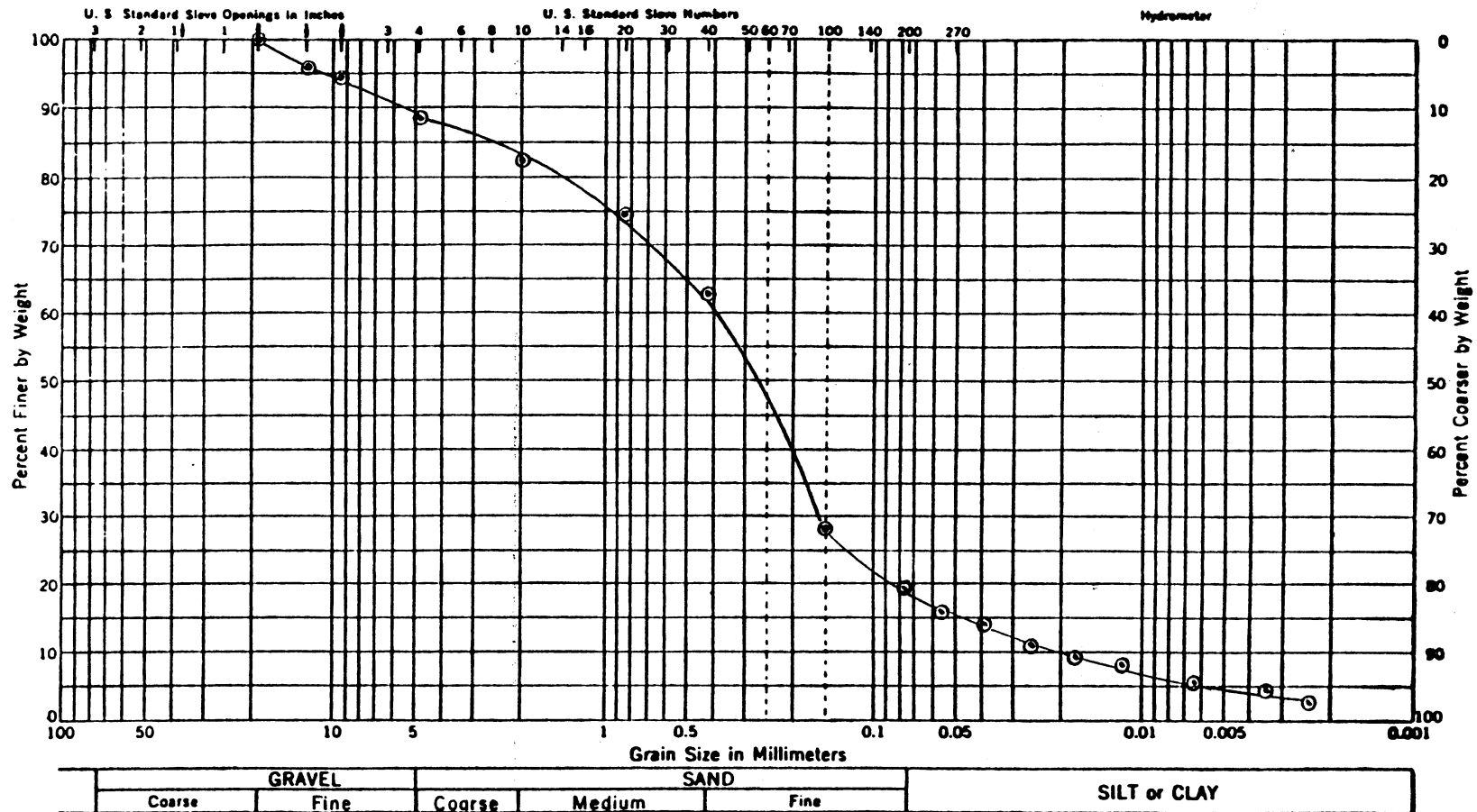
UNIFIED CLASSIFICATION SYSTEM



UNIFIED CLASSIFICATION SYSTEM

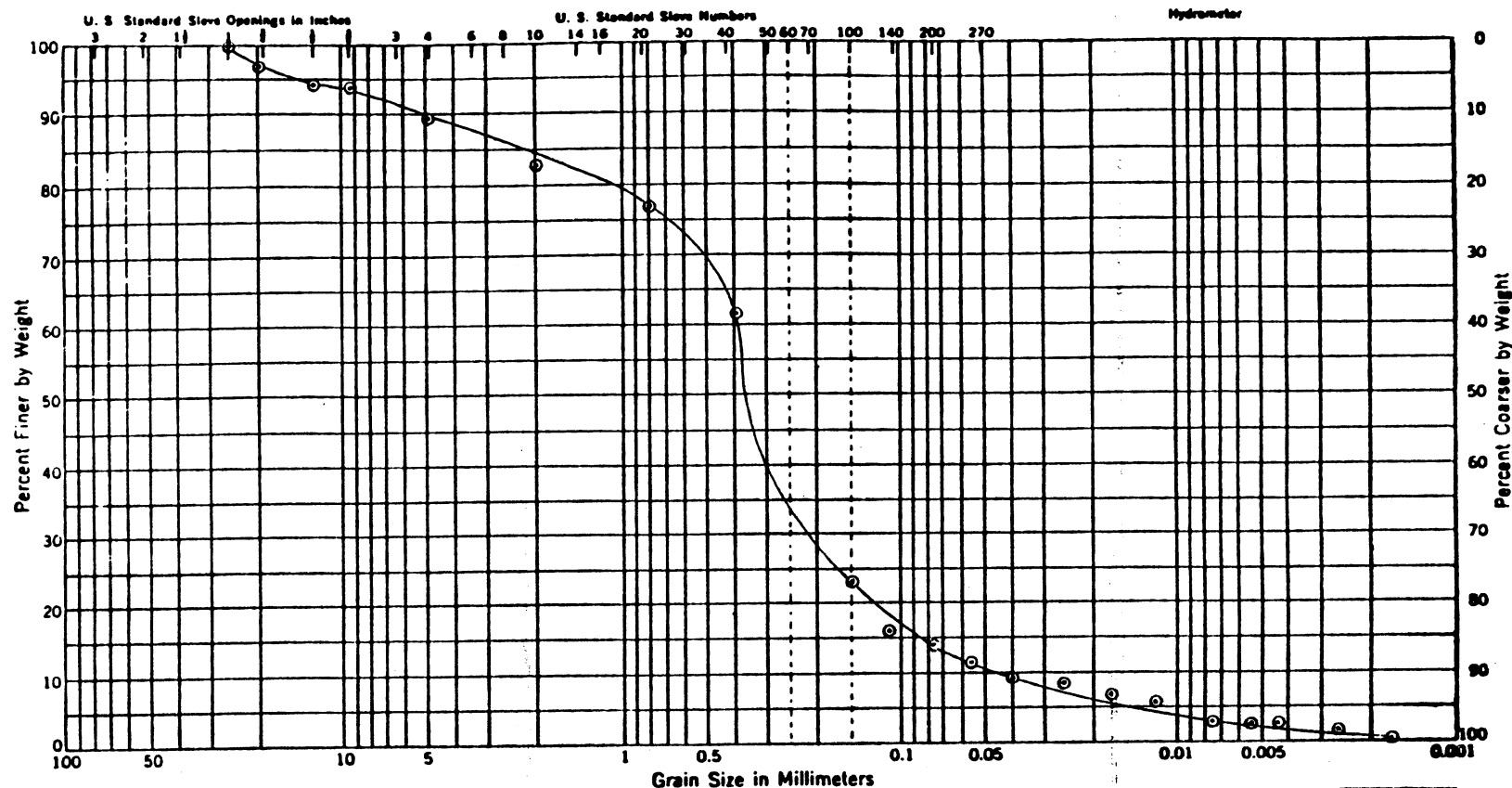


UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
EX-5	11				Silty fine to coarse sand (SM)				
S-10									
90-92'									
						DRAWN APPROVED DATE JOB No.			
						JV	JAS	2-2-84	12959

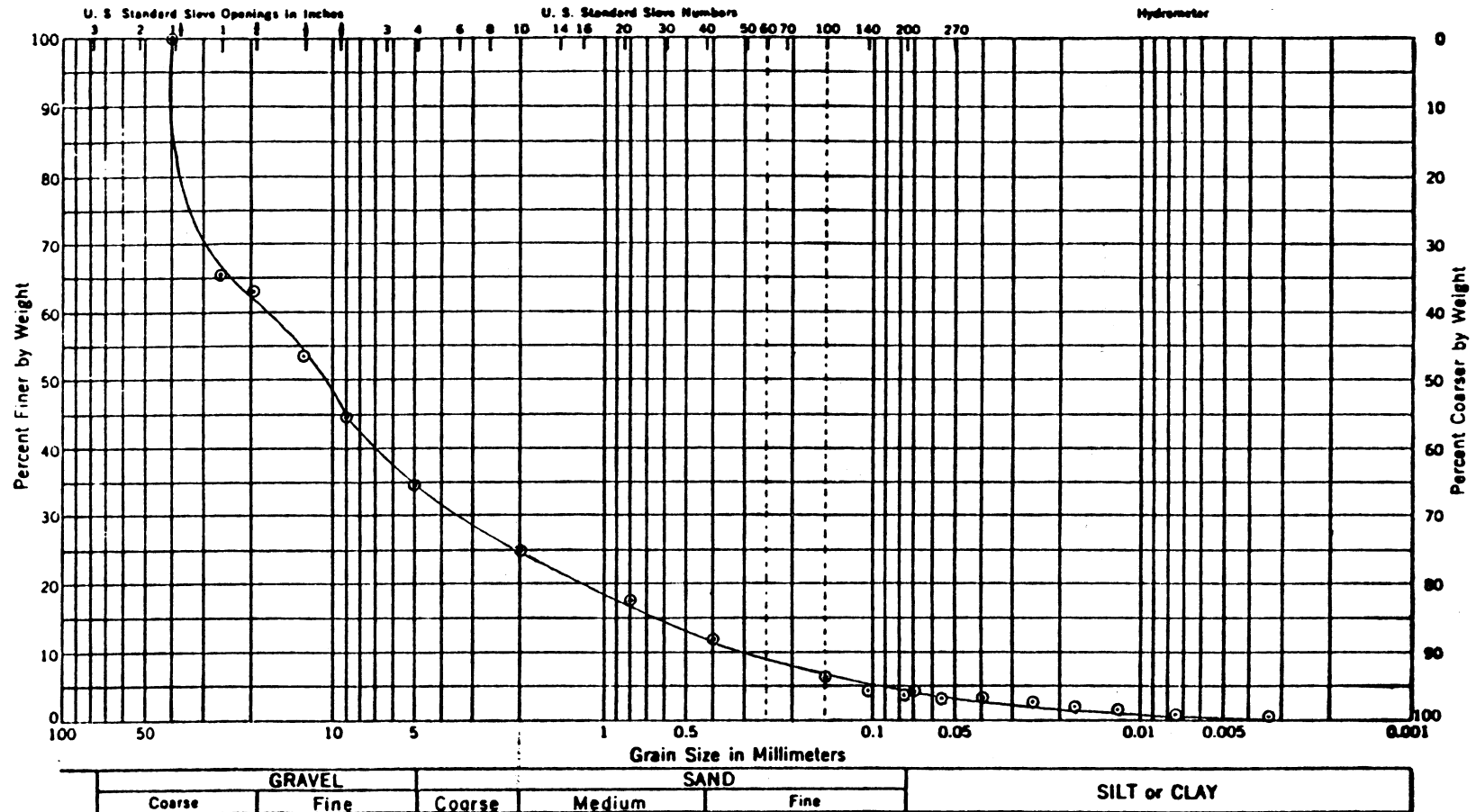
UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-5	8				Silty fine to coarse sand (SM)				
S-11									
100- 102									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JV	JAS	2-2-84	12959

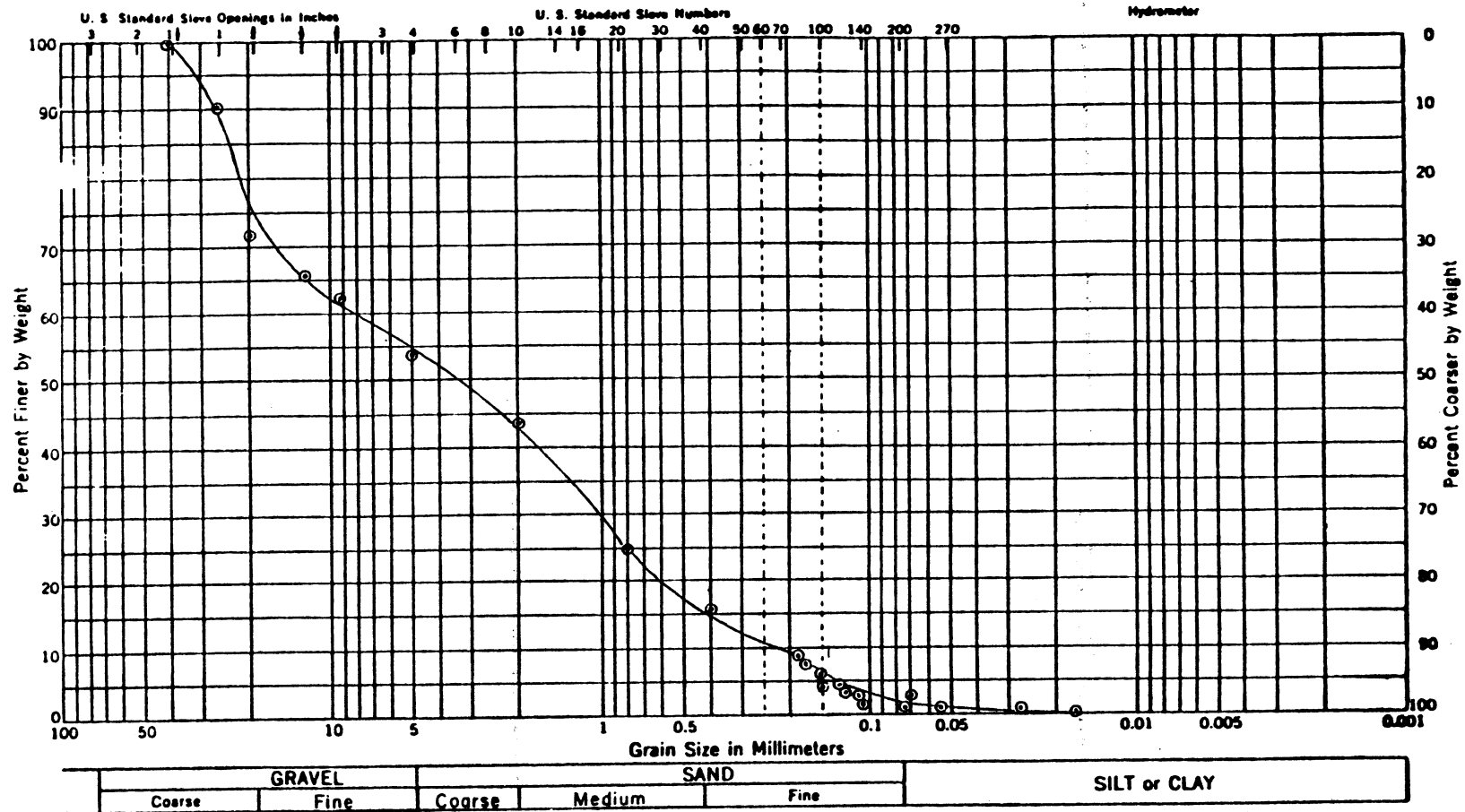
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-5	10				Fine to coarse sand and gravel (GW)				
S-12						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
110-112'									

DRAWN	APPROVED	DATE	JOB No.
JV	JAS	2-2-84	12959

UNIFIED CLASSIFICATION SYSTEM



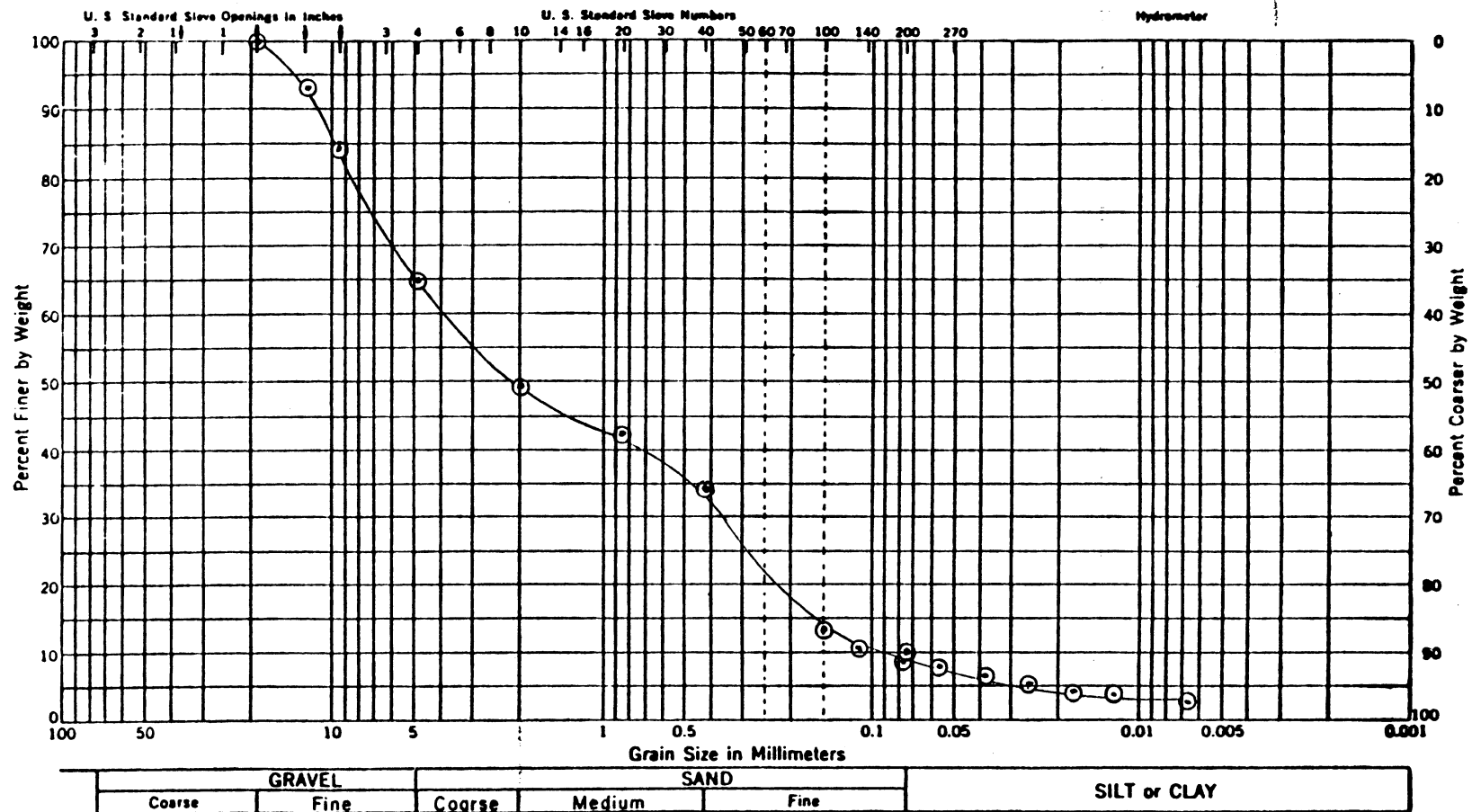
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-5	9				Fine to coarse sand and gravel (SP)
S-13					
121					
123					

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JV	JAS	2-2-84	12959

UNIFIED CLASSIFICATION SYSTEM



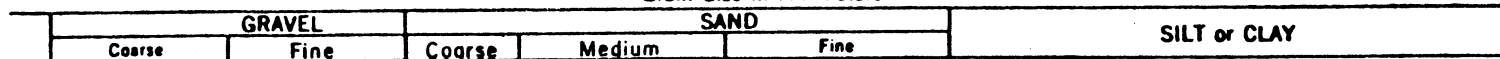
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-5	11				Slightly silty fine to coarse sand (SM-SP)
S-14					
131					
132					

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

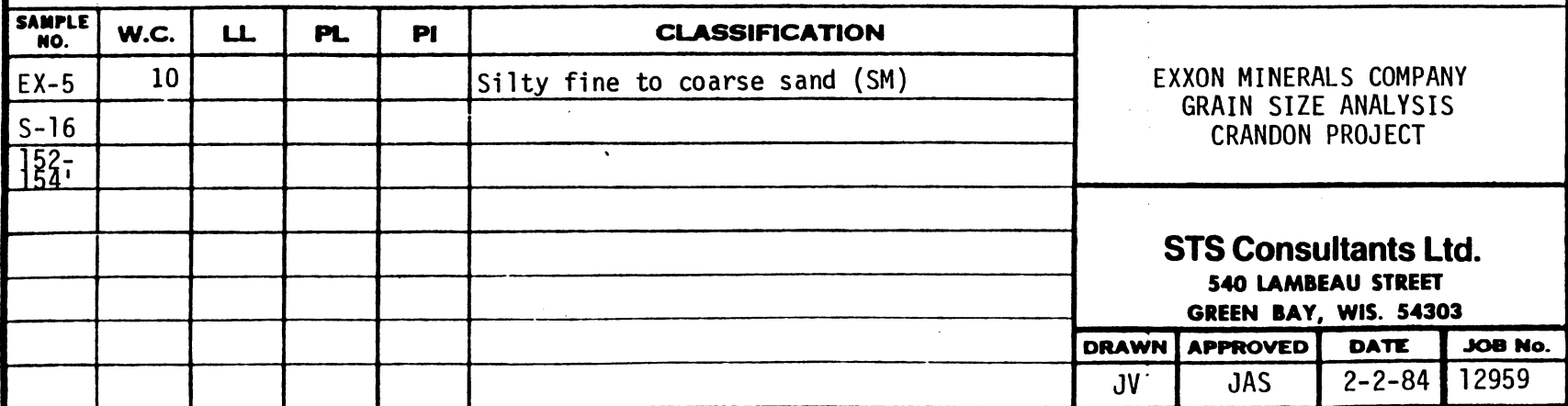
DRAWN	APPROVED	DATE	JOB No.
JV	JAS	2-2-84	12959

3.5-19-68

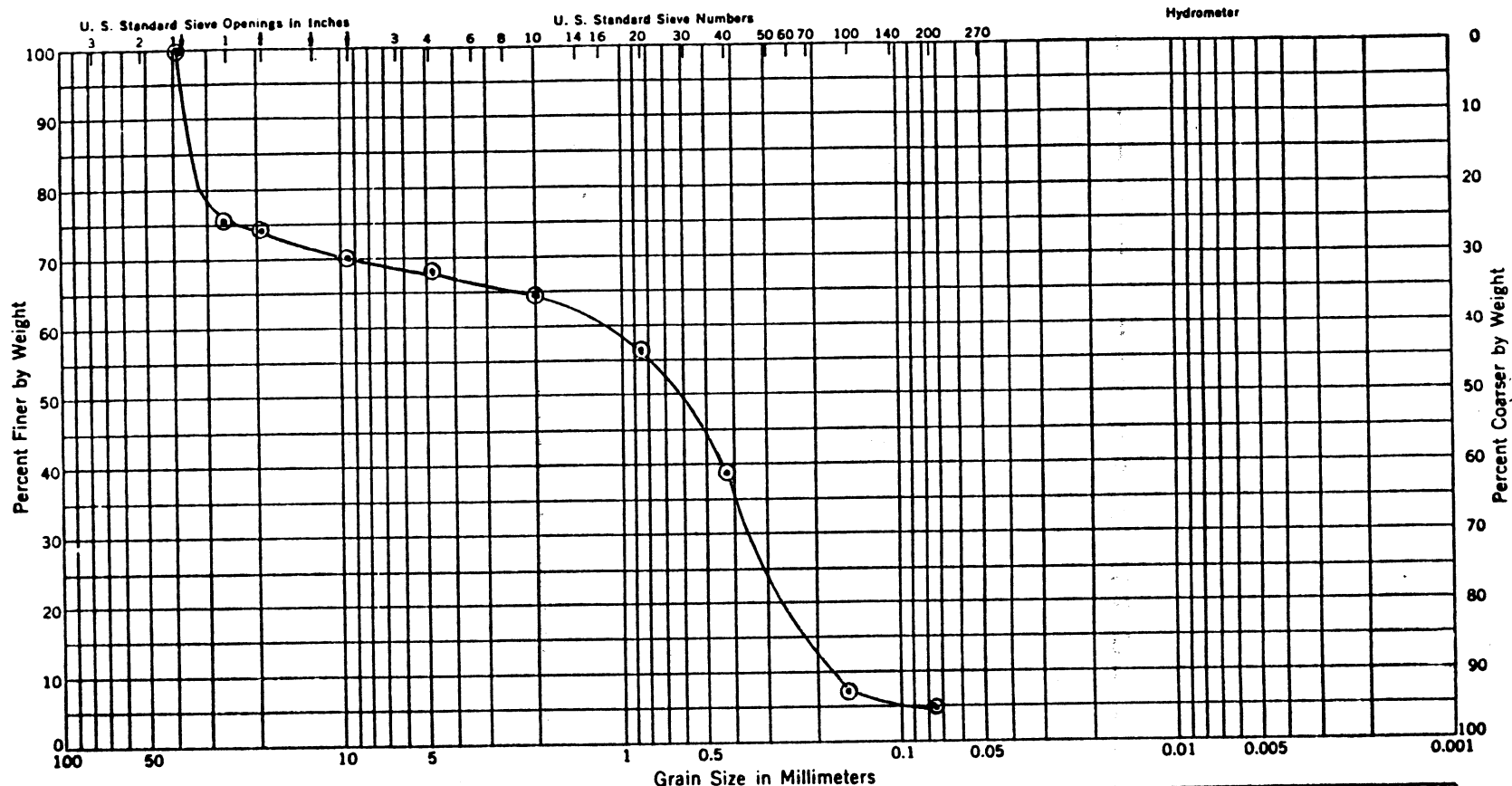


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-5	11				Silty fine to medium sand (SM)				
S-15									
142- 144									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JV	JAS	2-2-84	12959

3.5-19-69



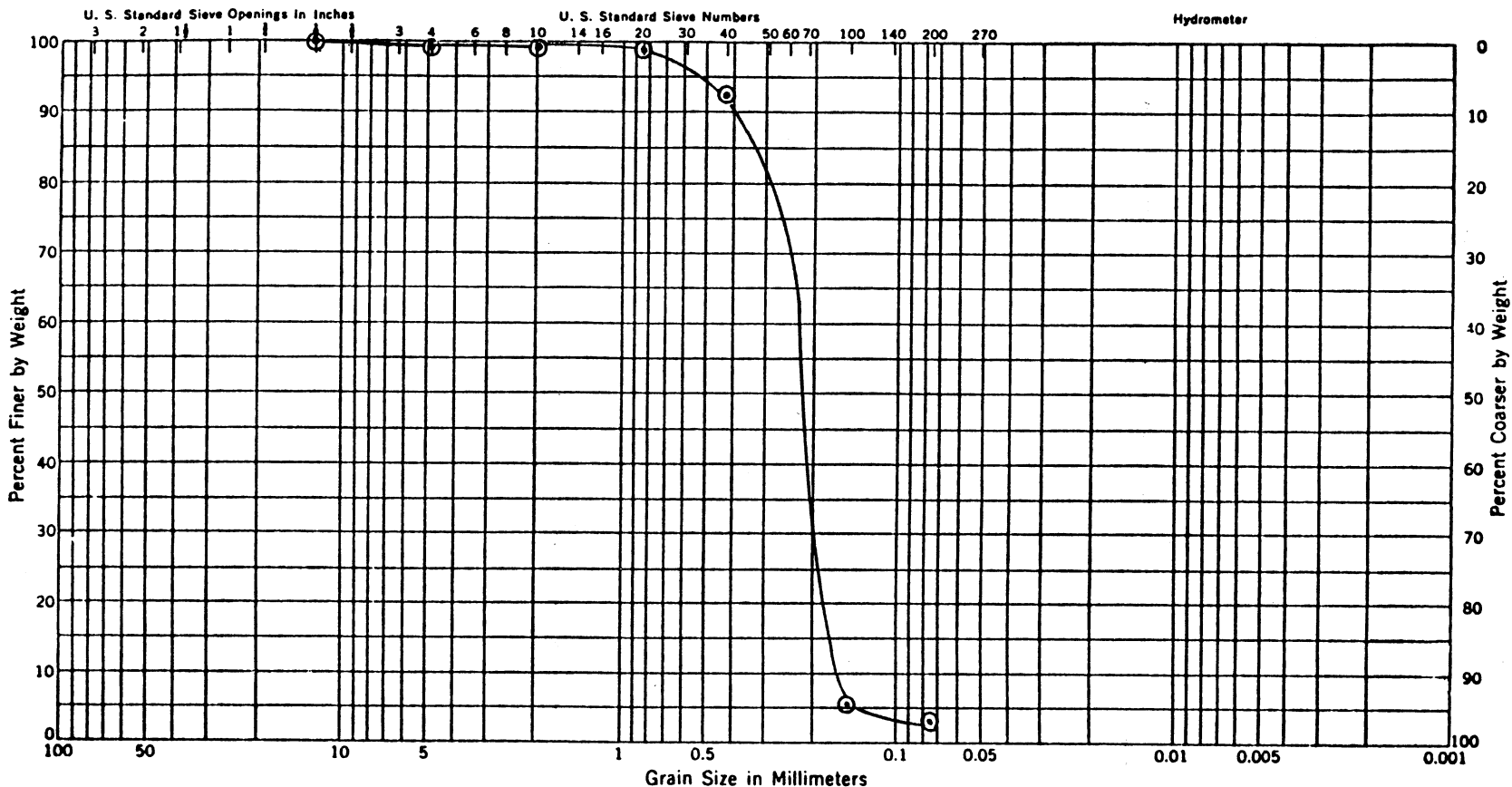
3.5-19-70



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX6	S-2	10-12'							Fine to coarse sand (SP)				
									W.C. 4.5				
										STS CONSULTANTS LTD.			
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SMD	JAS	3-24-84	12959

3.5-19-71



GRAVEL						SAND			SILT or CLAY
Coarse	Fine		Coarse	Medium	Fine				

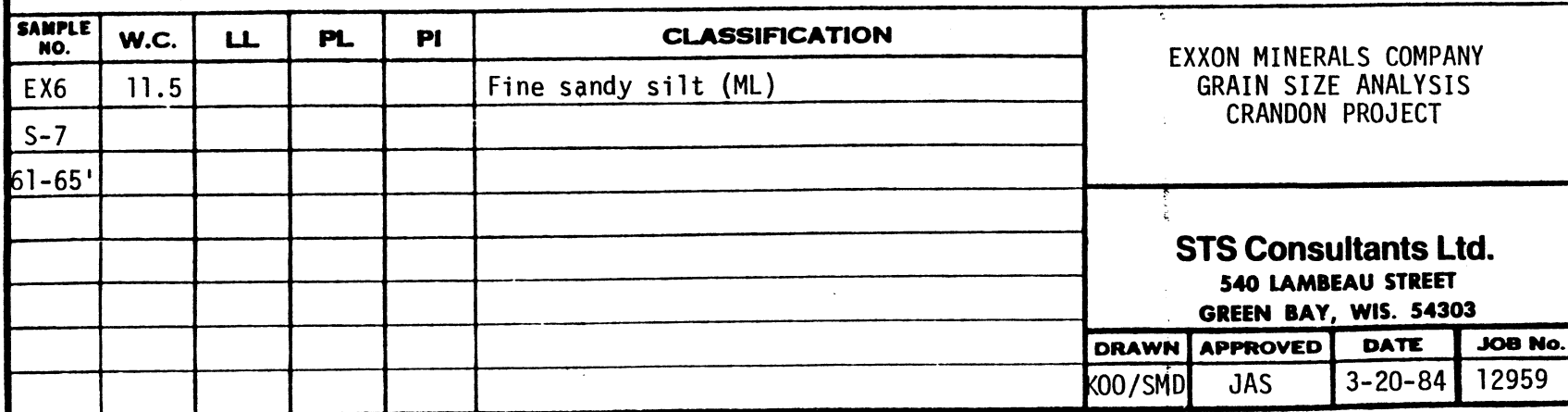
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION
EX6	S-5	40.5-44.5'							Fine sand (SP)
									W.C. 23.9

EXXON MINERALS COMPANY
SIEVE ANALYSIS
CRANDON PROJECT

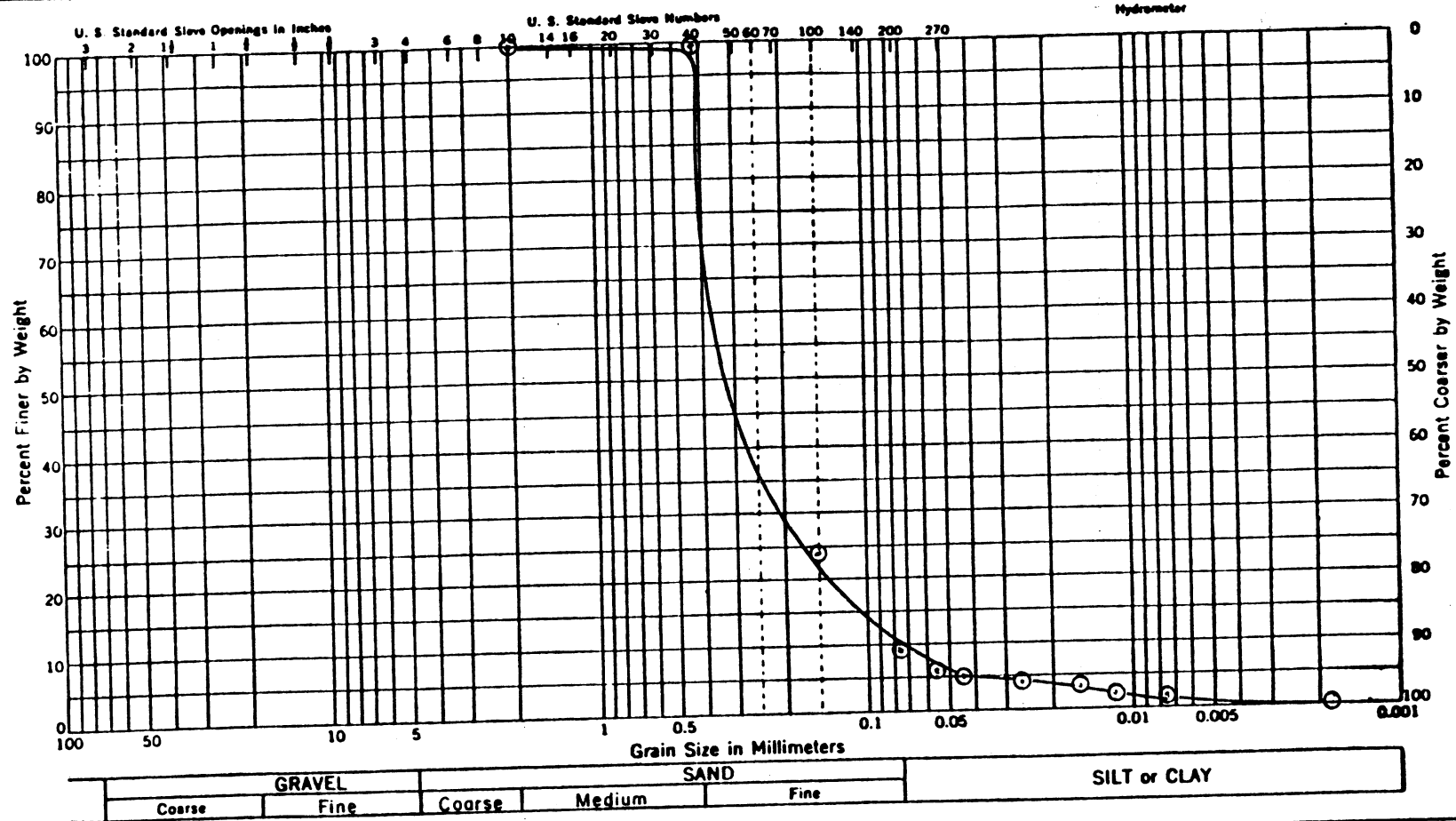
STS CONSULTANTS LTD.

DRAWN	APPROVED	DATE	JOB No.
JJT/SMD	JAS	3-24-84	12959

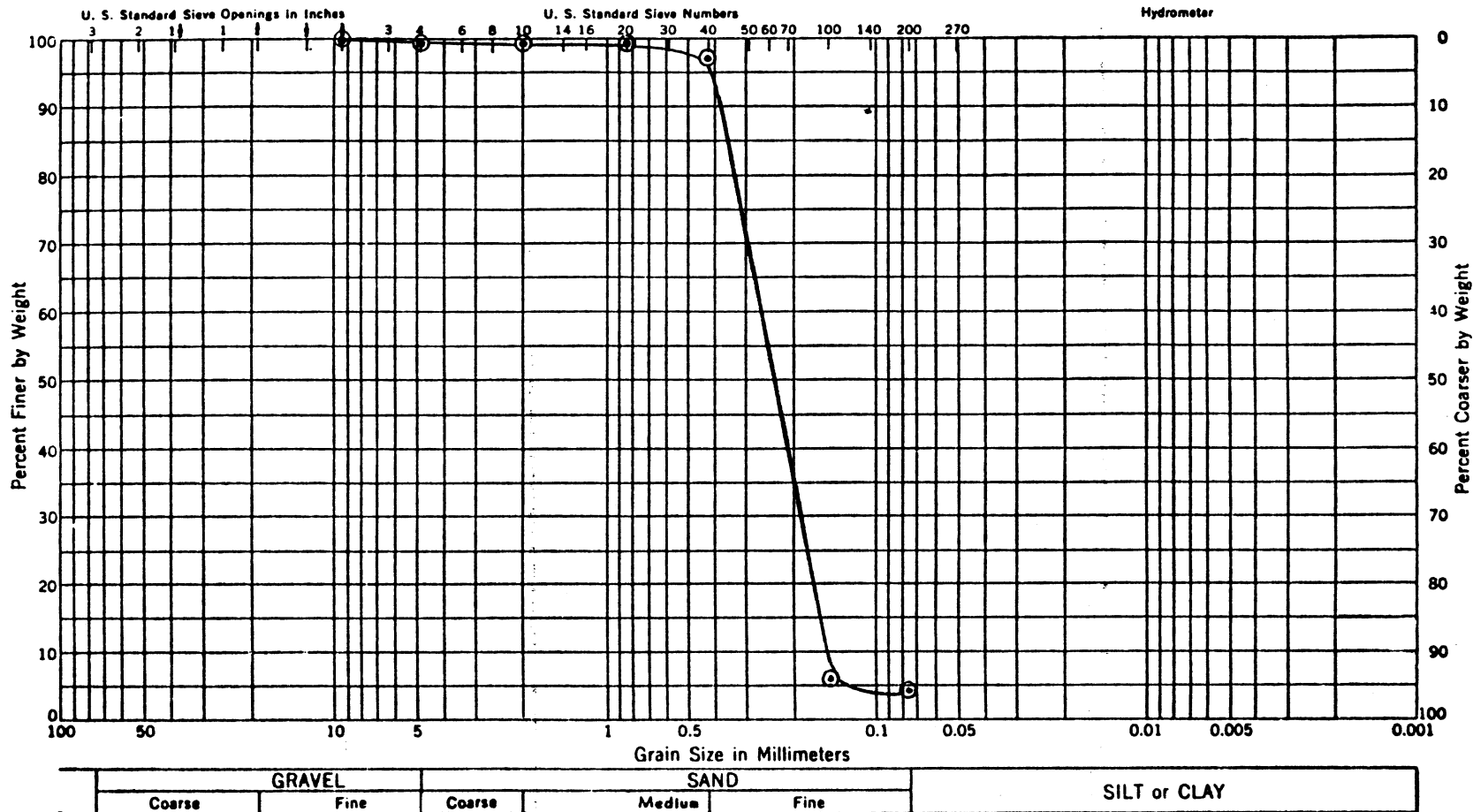
3.5-19-72



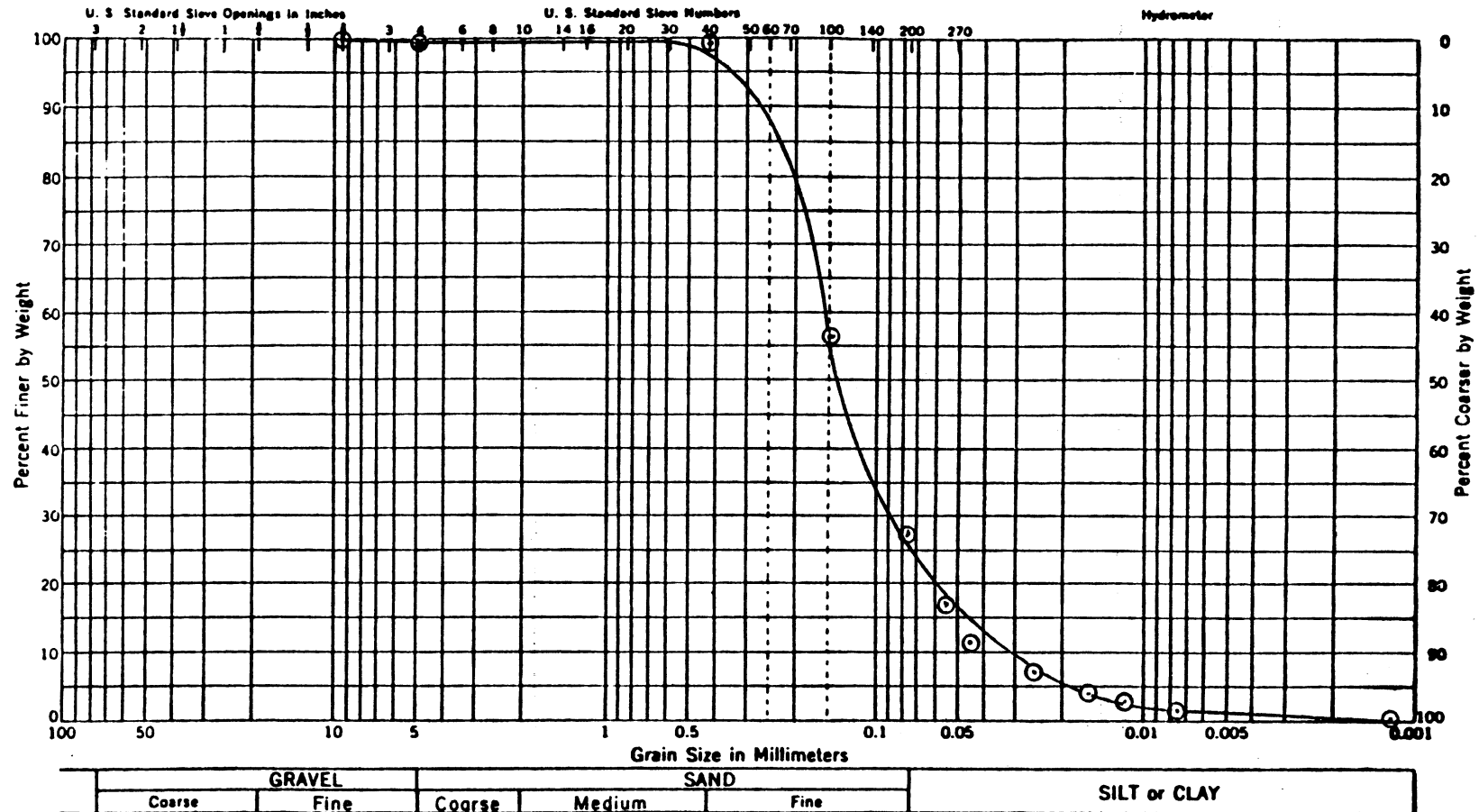
UNIFIED CLASSIFICATION SYSTEM



3.5-19-74

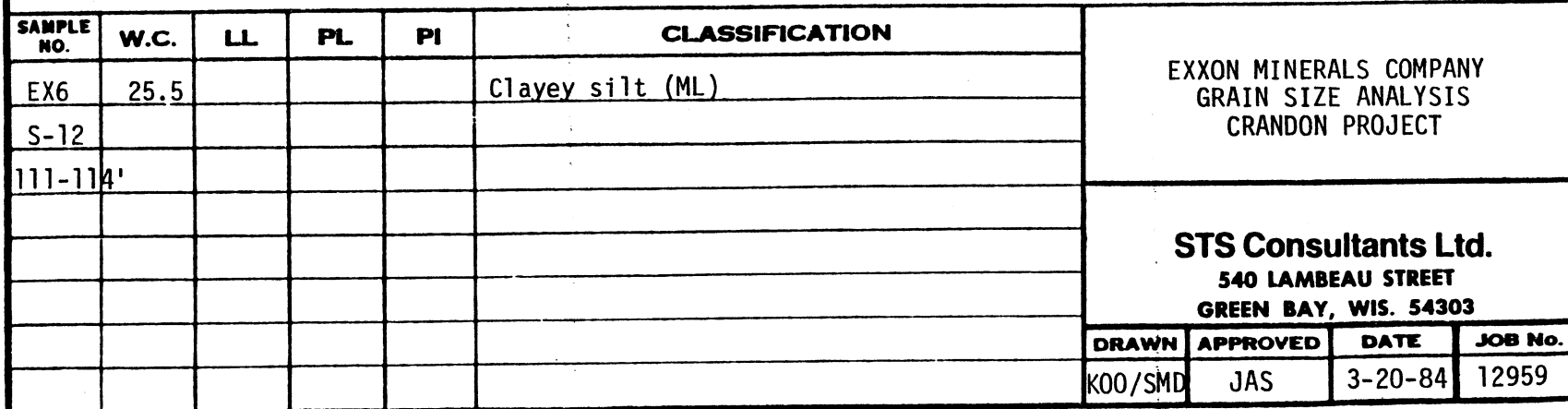


UNIFIED CLASSIFICATION SYSTEM

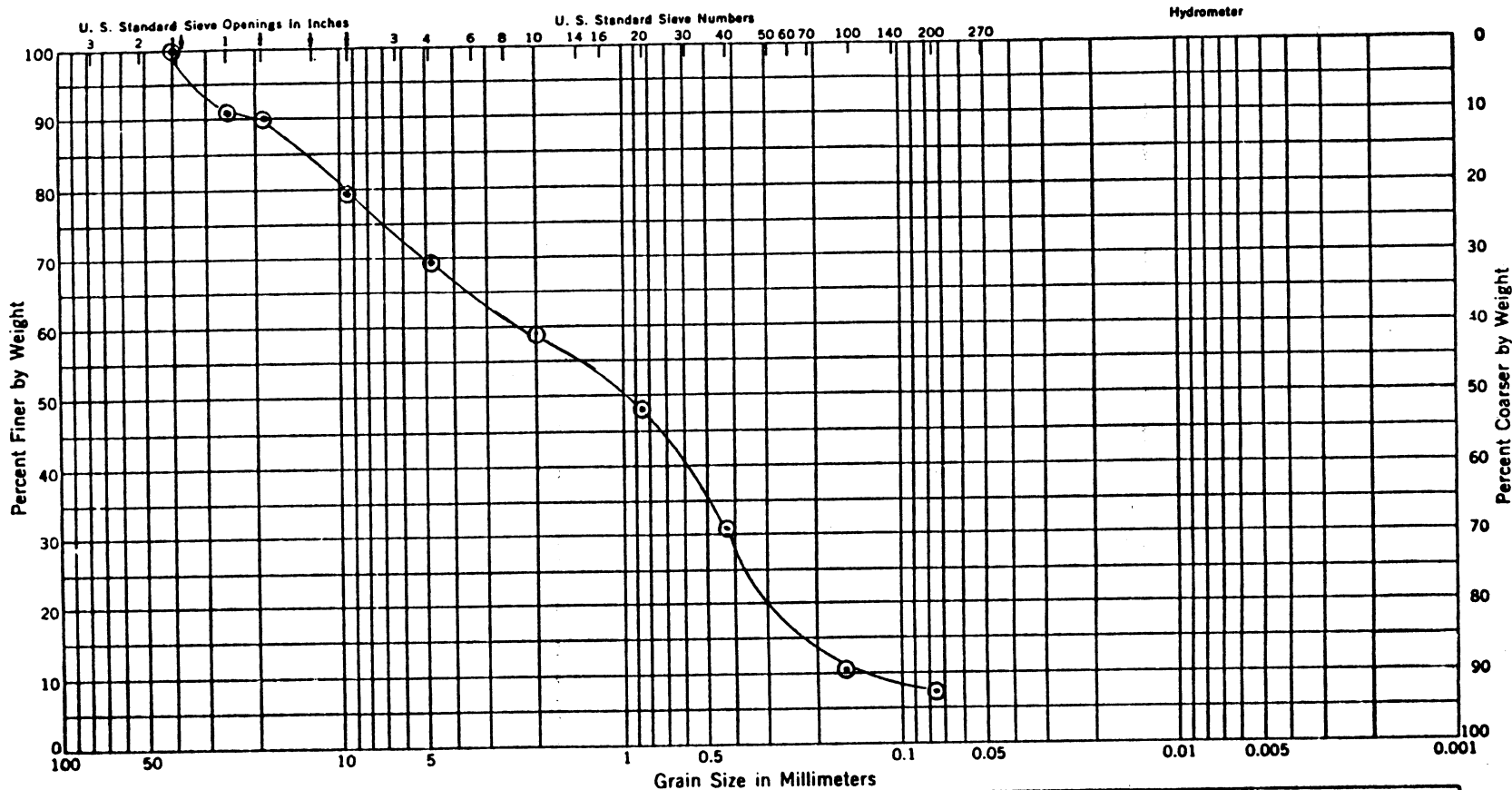


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX6	21.9				Silty fine sand (SM)				
S-10									
90.5-92.5'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						K00/SMD	JAS	3-20-84	12959

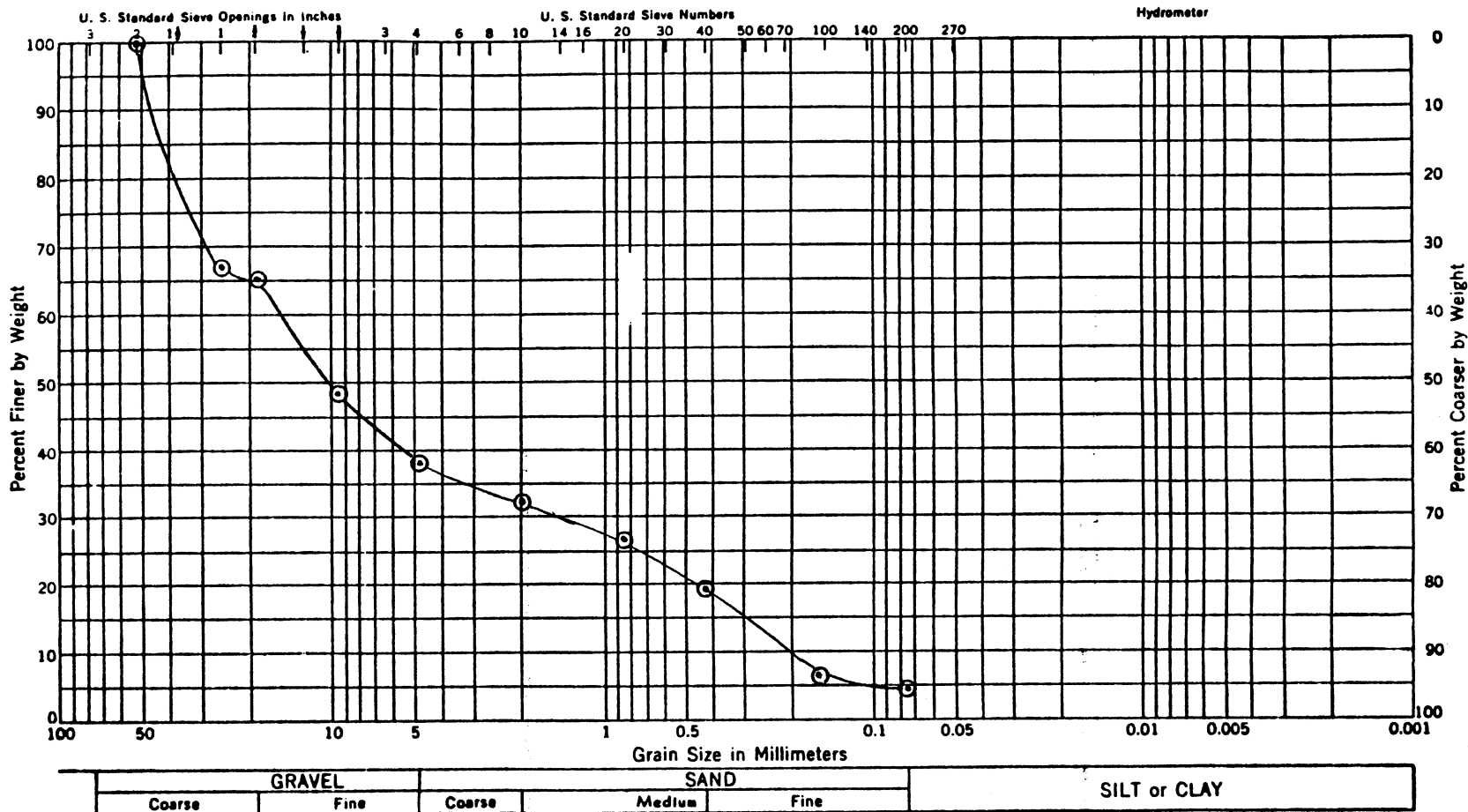
3.5-19-76



3.5-19-77

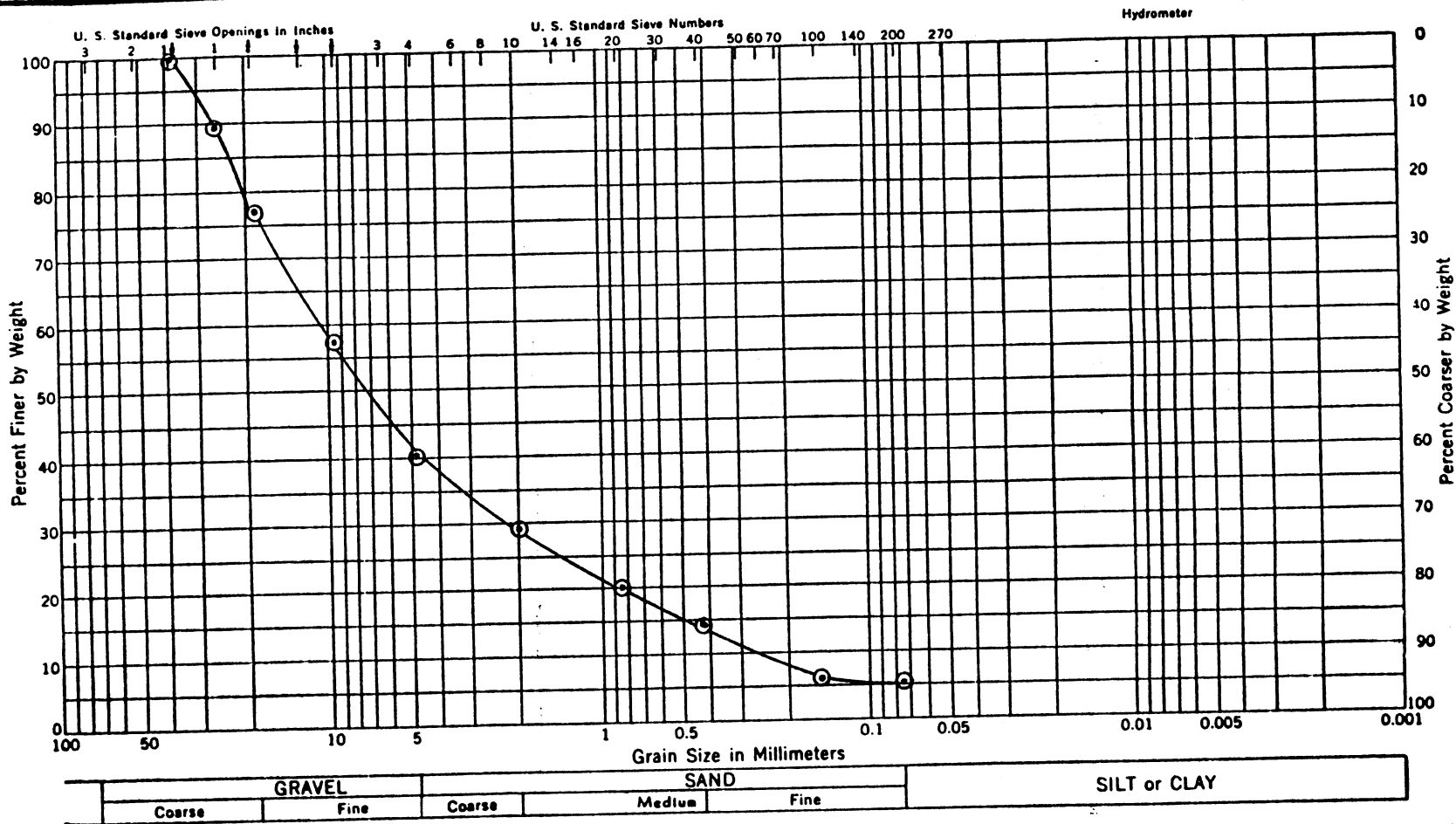


3.5-19-78



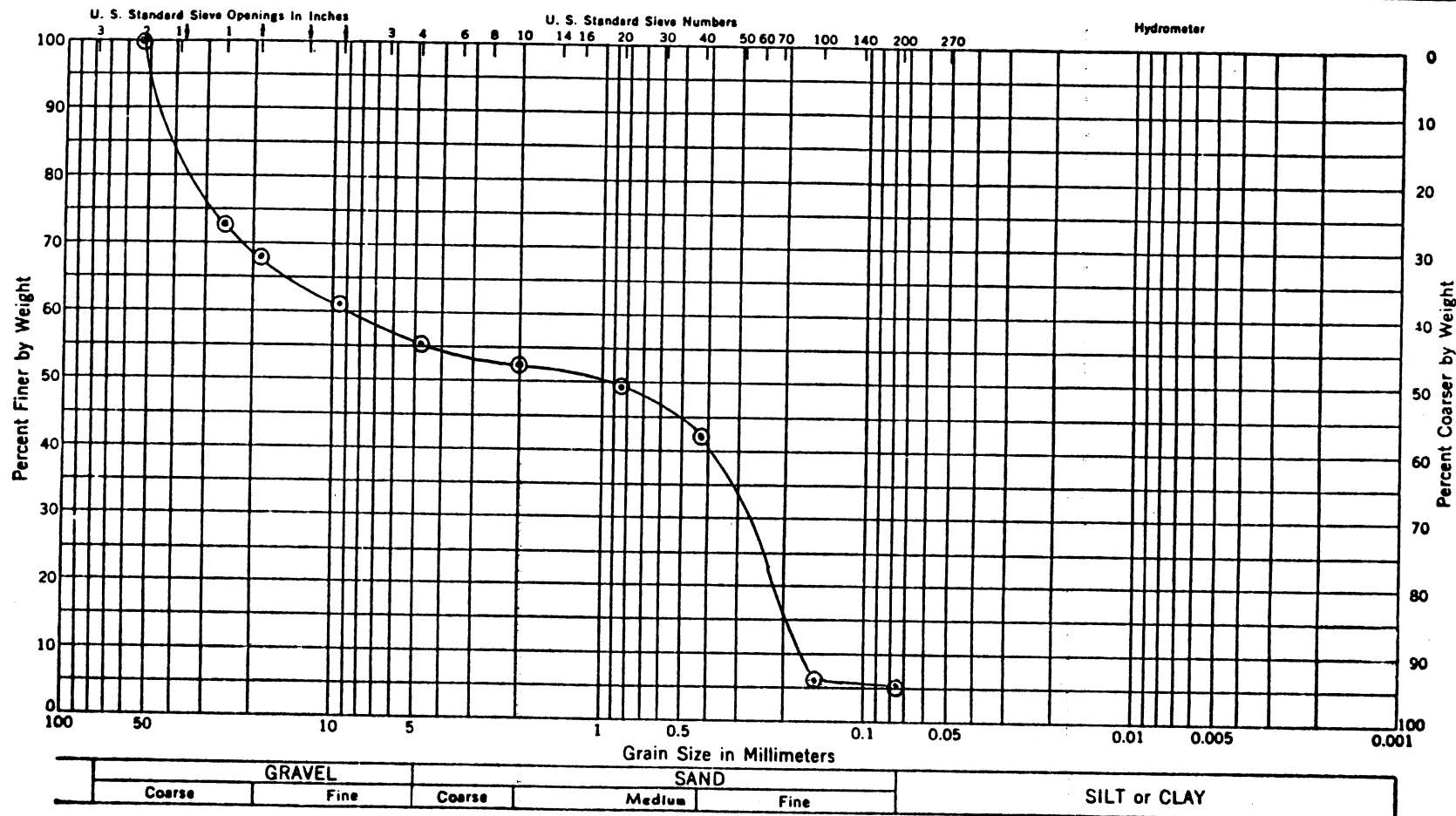
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX6	S-15	142-143'							Fine to coarse gravel (GP)				
									W.C. 17.2				
										STS CONSULTANTS LTD.			
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SMD	JAS	3-24-84	12959

3.5-19-79



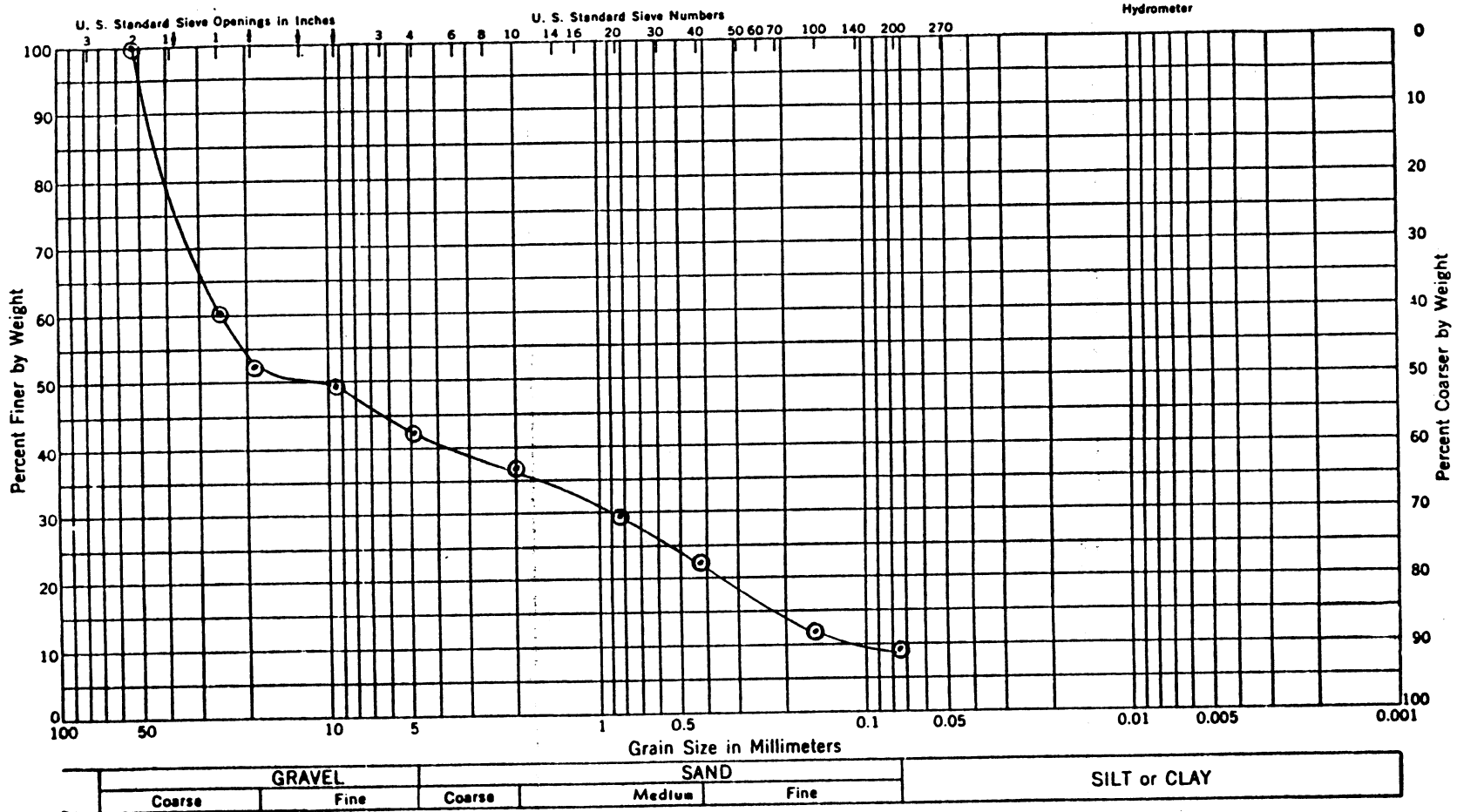
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT
EX 6	S-16	153.5-155'							Slightly silty	
									fine to coarse	
									gravel (GM-GP)	
									W.C. 11.2	STS CONSULTANTS LTD.

3.5-19-80



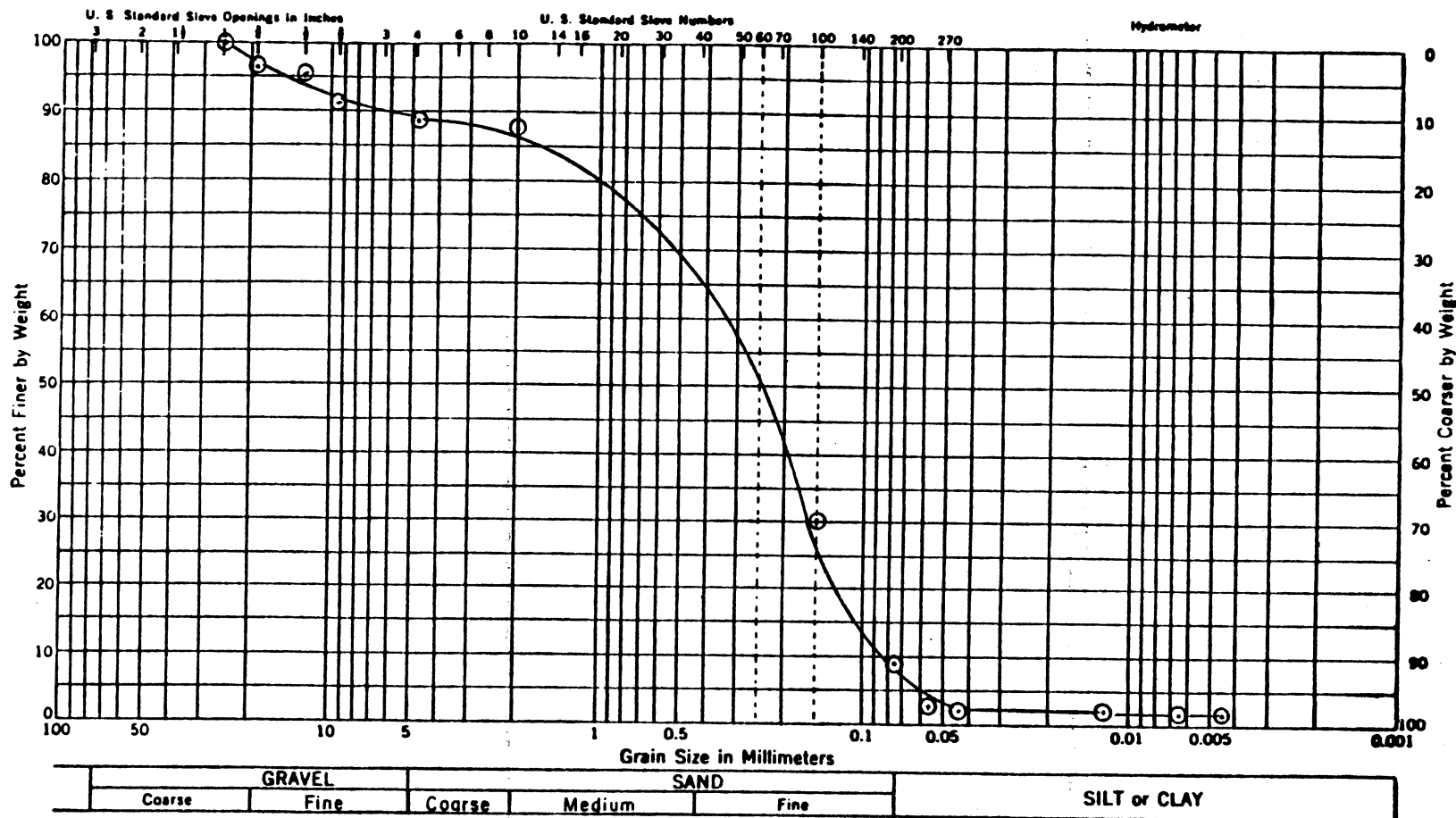
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX6	S-17	164.5- 166.5'							Slightly silty fine to coarse sand (SM-SP)				
									W.C. 12.6	STS CONSULTANTS LTD.			
										DRAWN APPROVED DATE JOB No.			
										JJT/SMD JAS 3-24-84 12959			

3.5-19-81



BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX6	S-19	184-186'							Slightly silty fine to coarse gravel (GM-GP)				
									W.C. 9.6	STS CONSULTANTS LTD.			
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SMD	JAS	3-24-84	12959

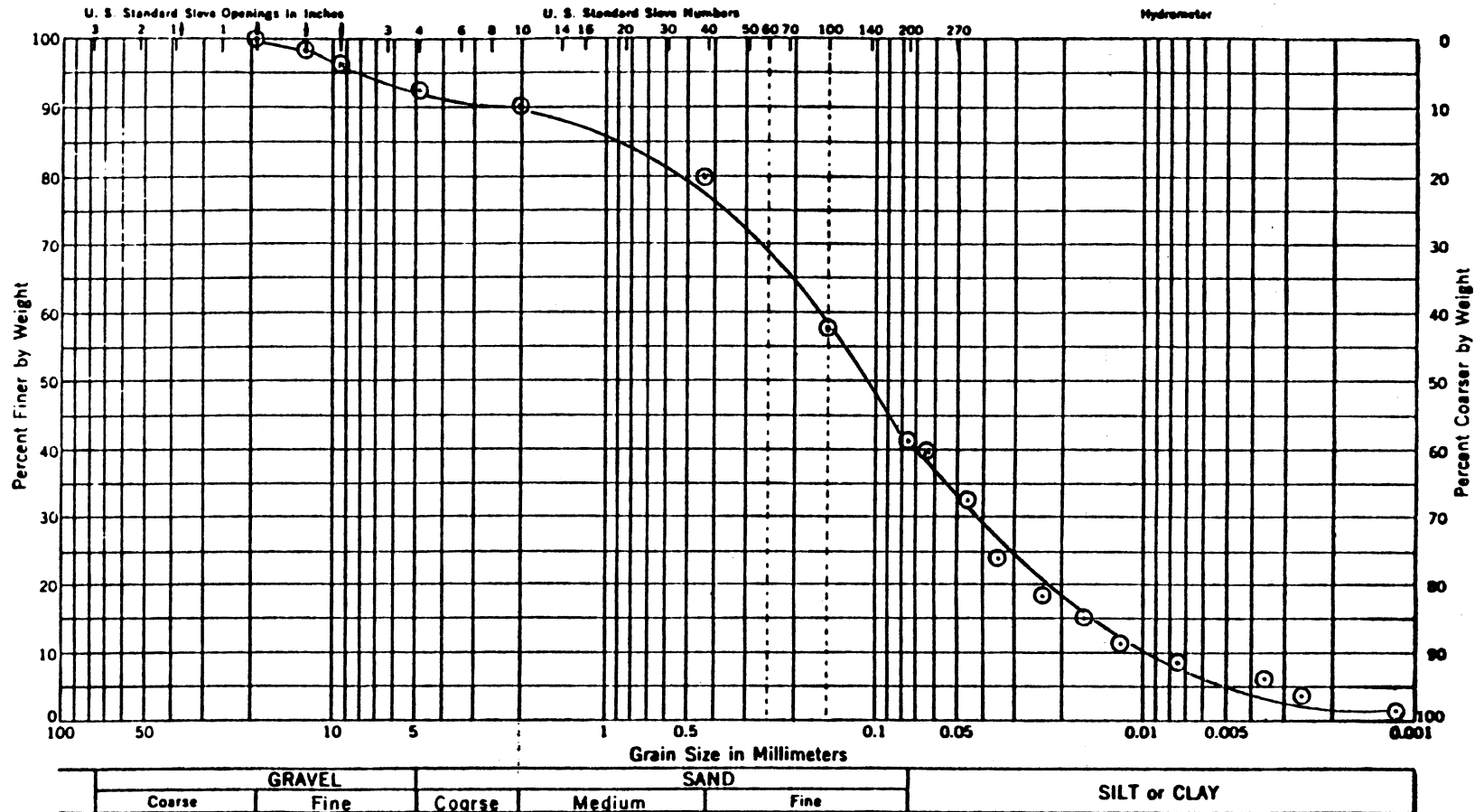
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX7	21.6				Slightly silty fine to coarse sand (SM-SP)				
S-1									
61.5-63.5'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						KOO/SMD	JAS	3-20-84	12959

3.5-19-82

UNIFIED CLASSIFICATION SYSTEM



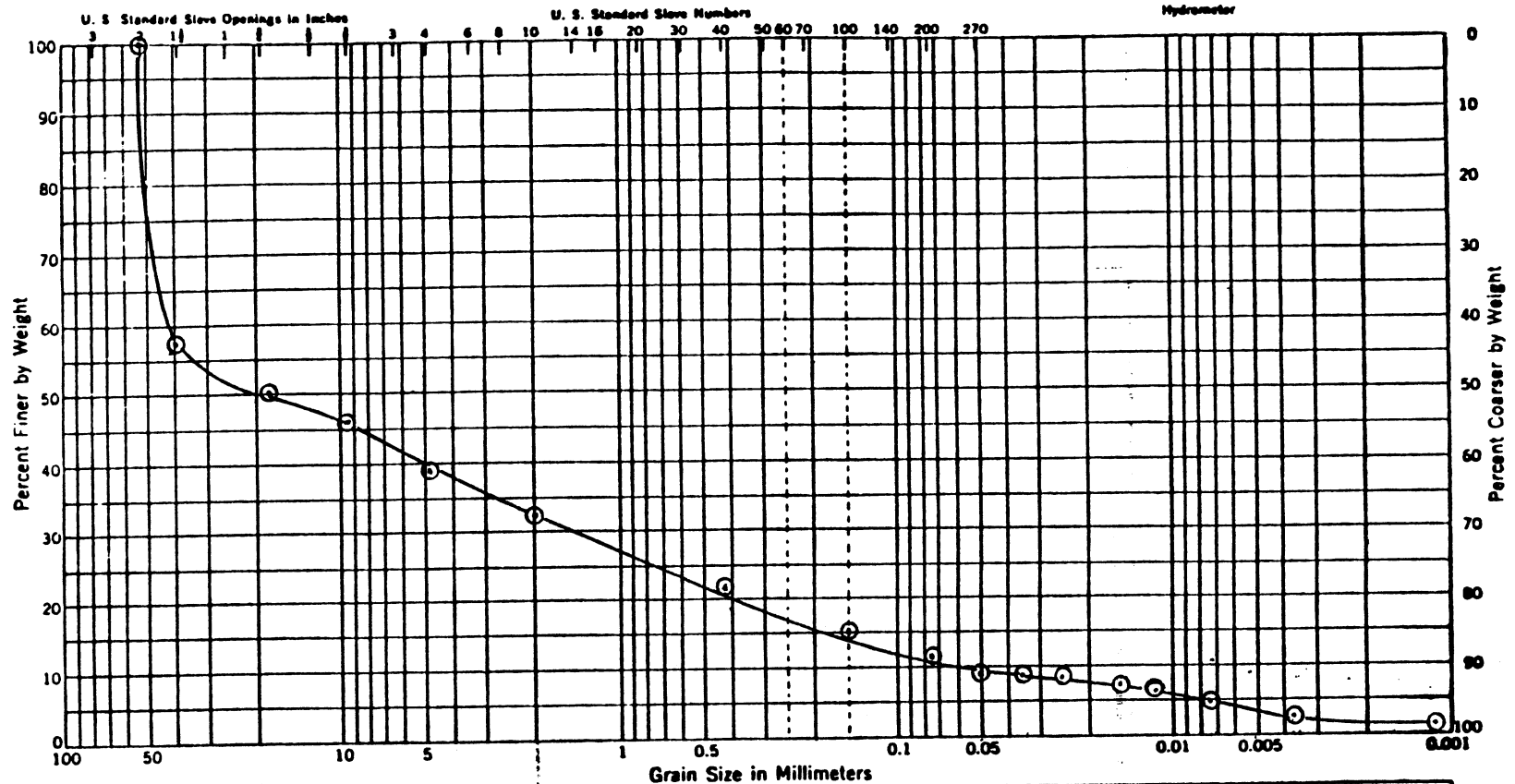
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX7	13.3				Silty fine to coarse sand (SM)
S-2					
120-122'					

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

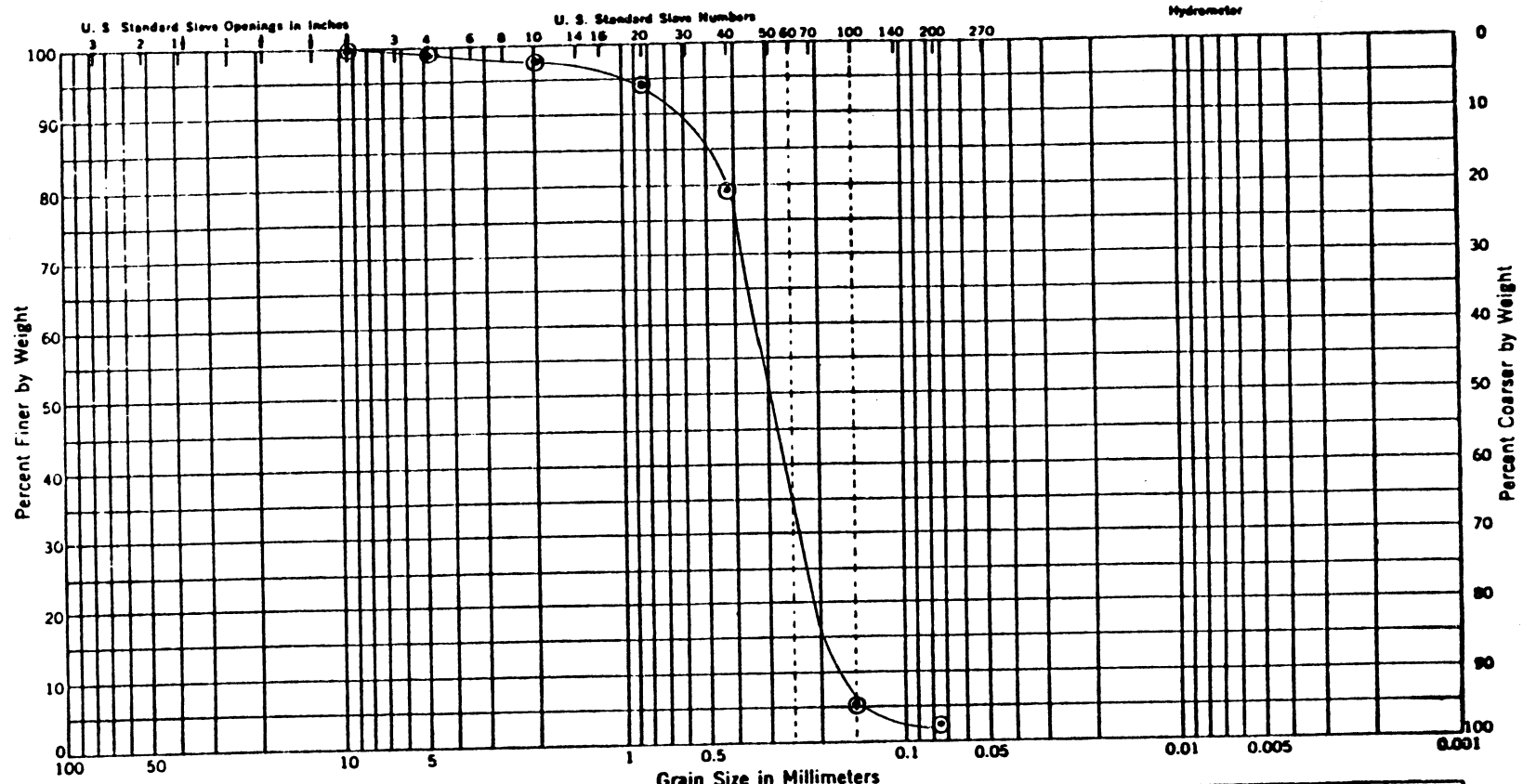
STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
KOO/SMD	JAS	3-20-84	12959

UNIFIED CLASSIFICATION SYSTEM



UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-8	3.5				Fine to medium sand (SP)
S-1					
1.0-1.3'					

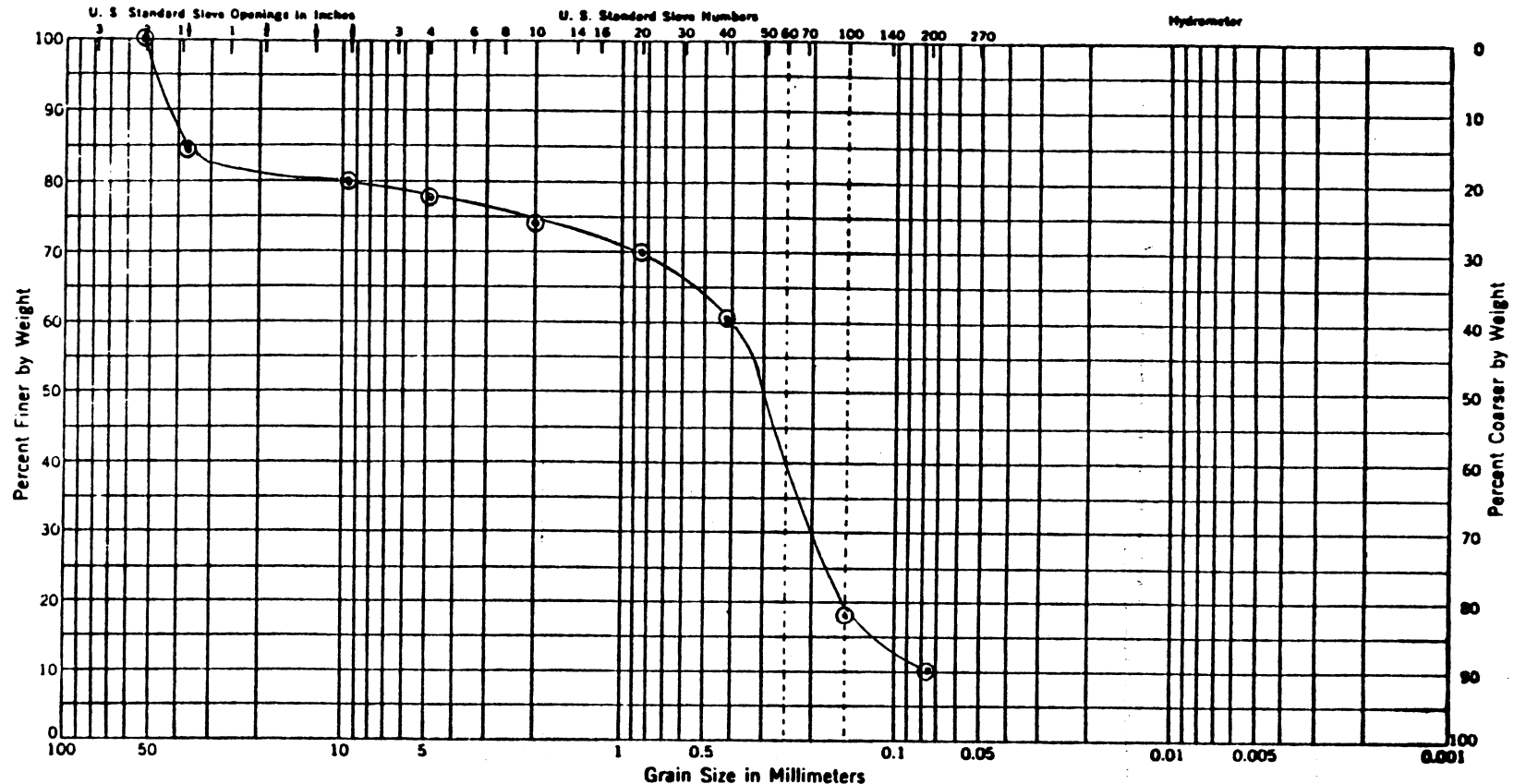
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

3.5-19-85

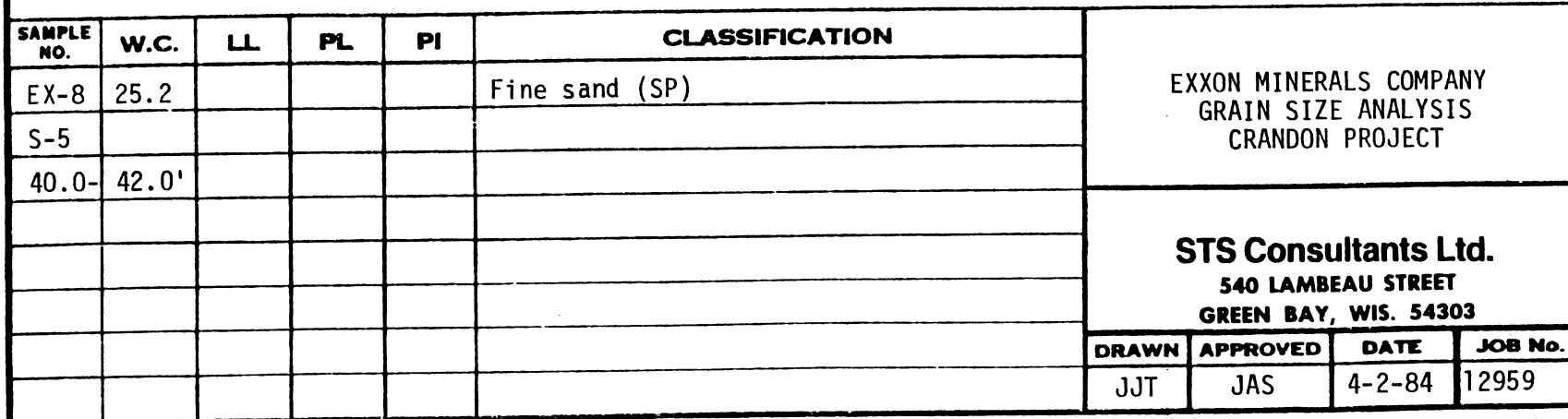
UNIFIED CLASSIFICATION SYSTEM



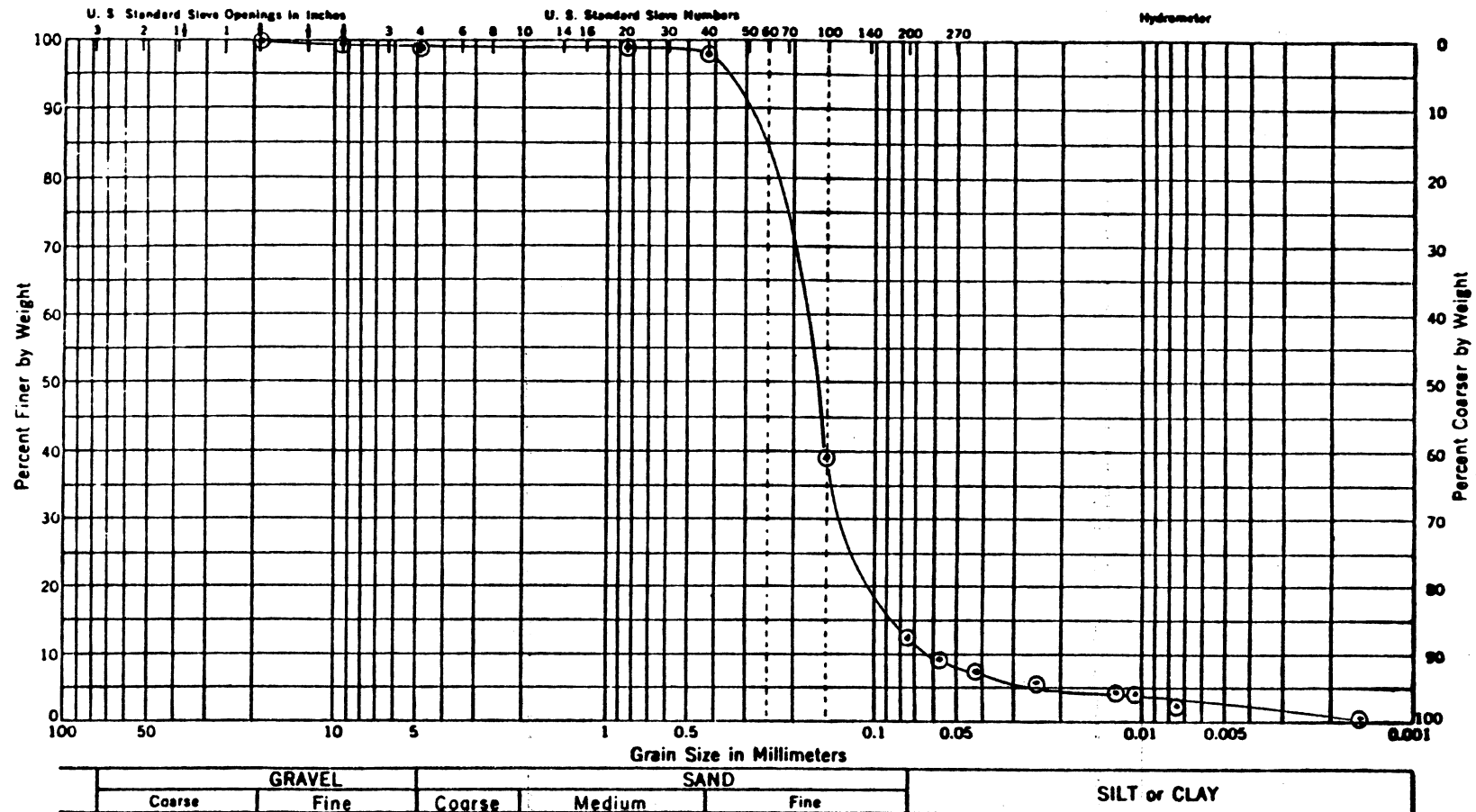
GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
EX-8	21.2				Slightly silty fine to coarse sand (SM-SP)				
S-3									
20.0-	22.0'					STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

3.5-19-87



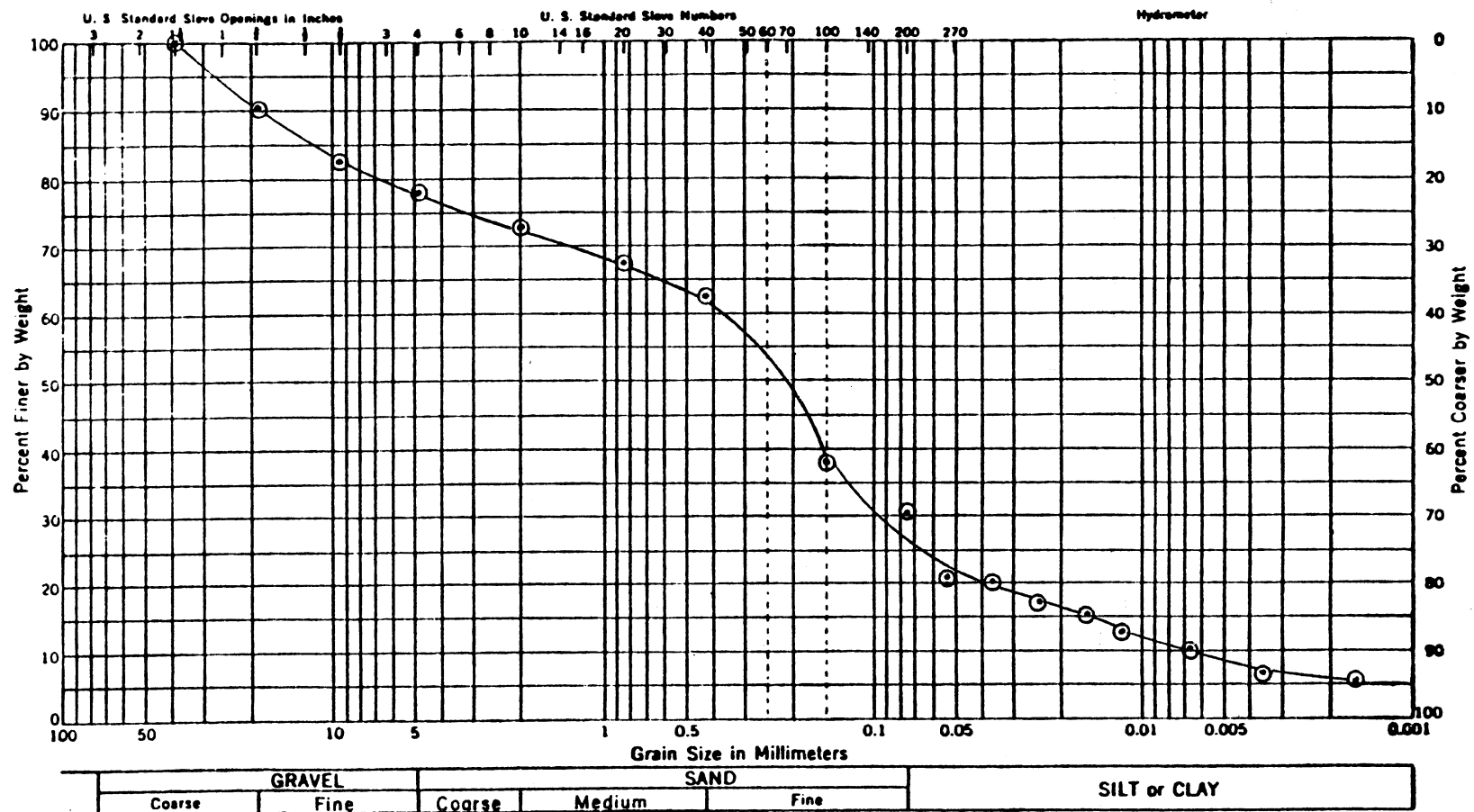
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-8	21.3				Silty fine sand (SM)				
S-8						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
71.0-	73.0'								
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

3.5-19-88

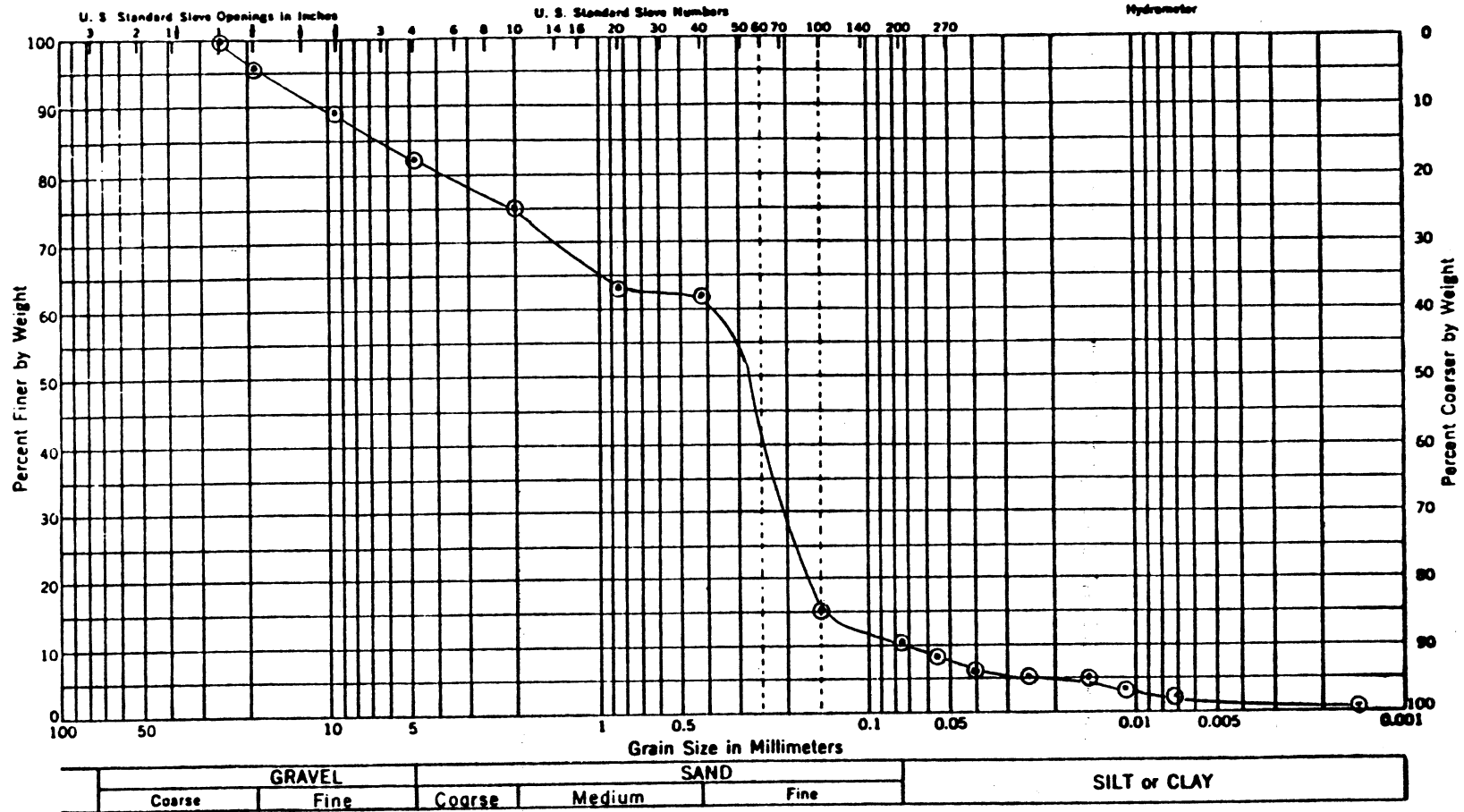
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-8	8.0				Silty fine to coarse sand (SM)				
S-10						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
92.0-94.0'									
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

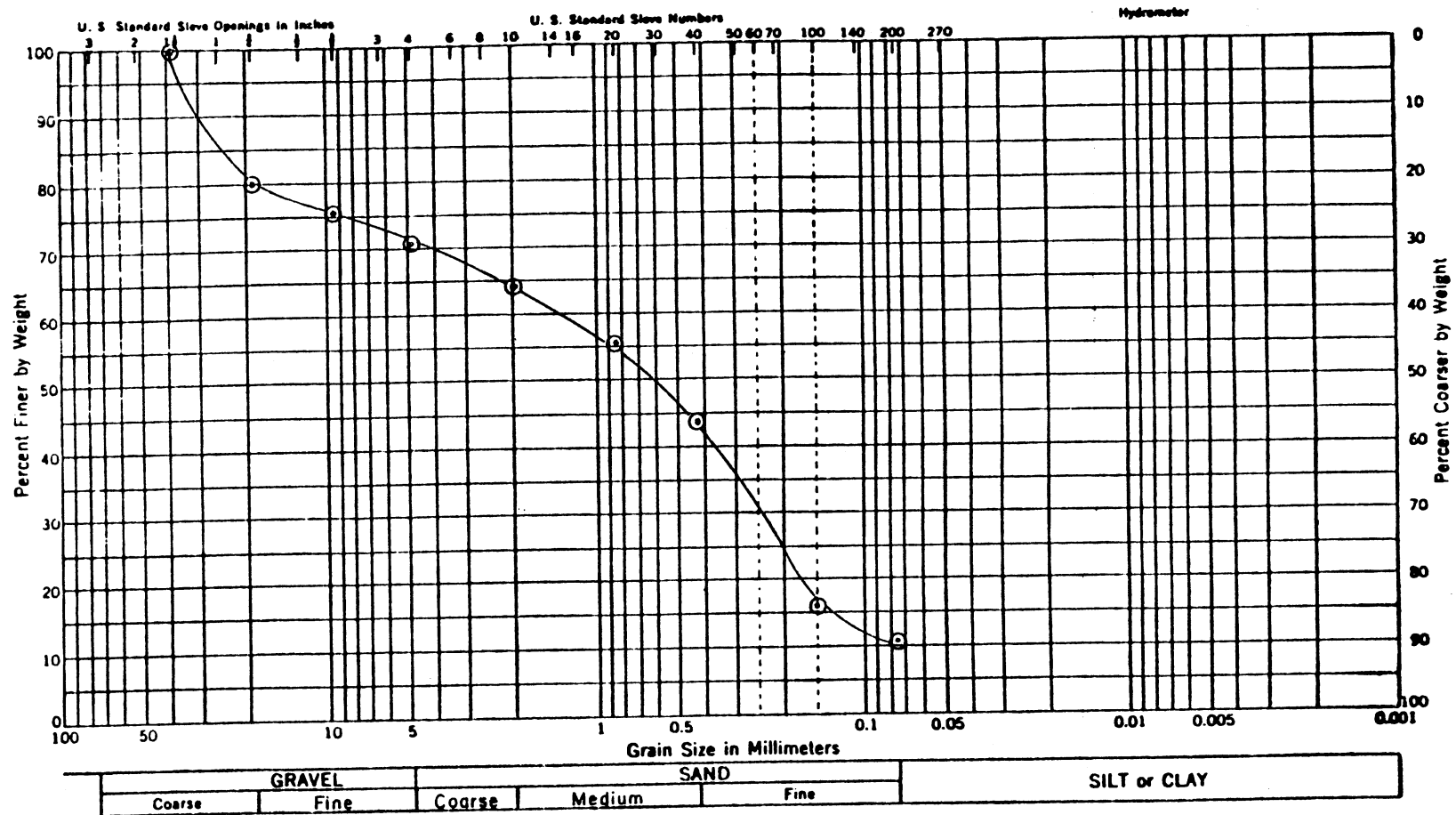
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UNIFIED CLASSIFICATION SYSTEM

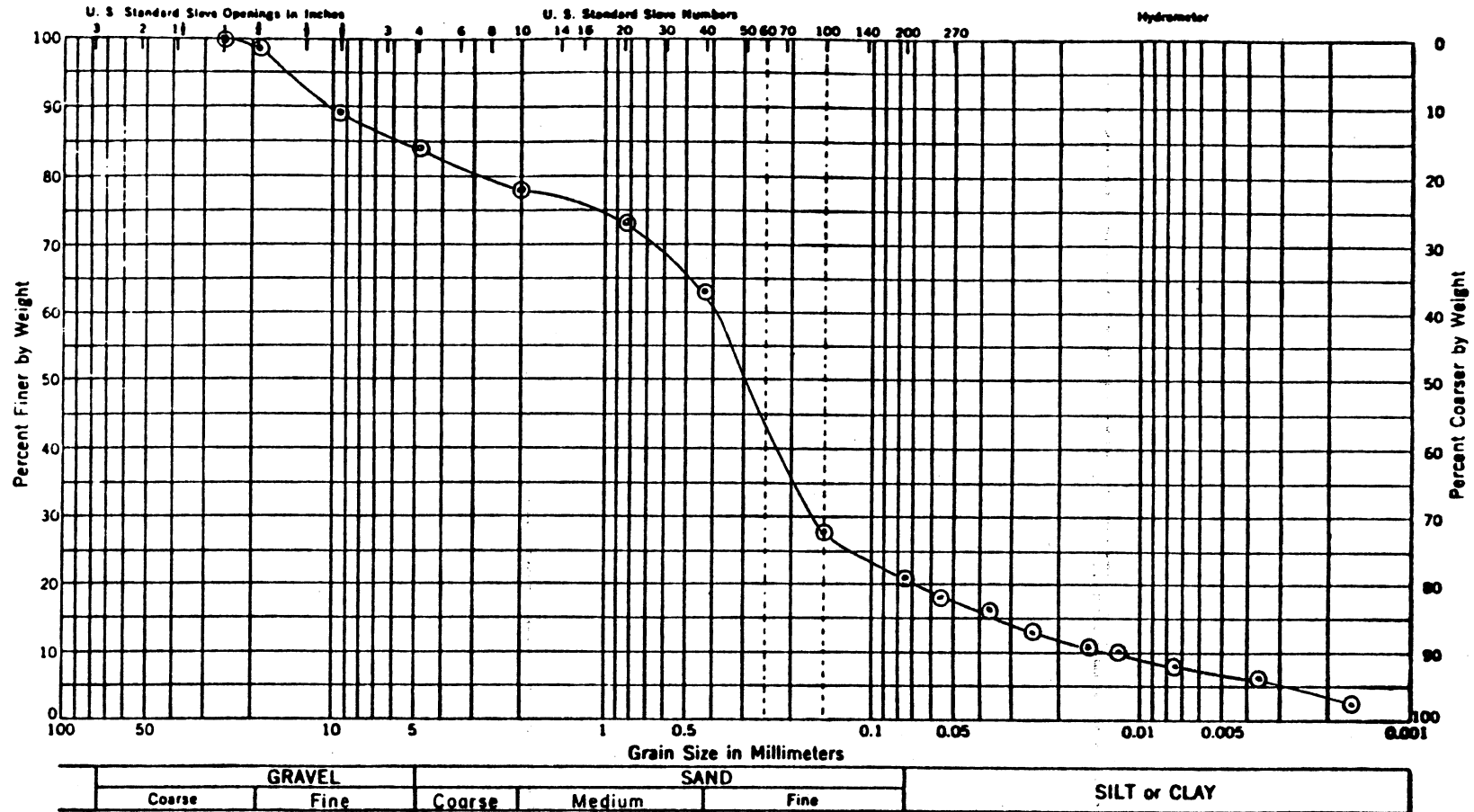


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-8	9.9				Slightly silty fine to coarse sand (SM-SP)				
S-12						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
112.0-114.0'									
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

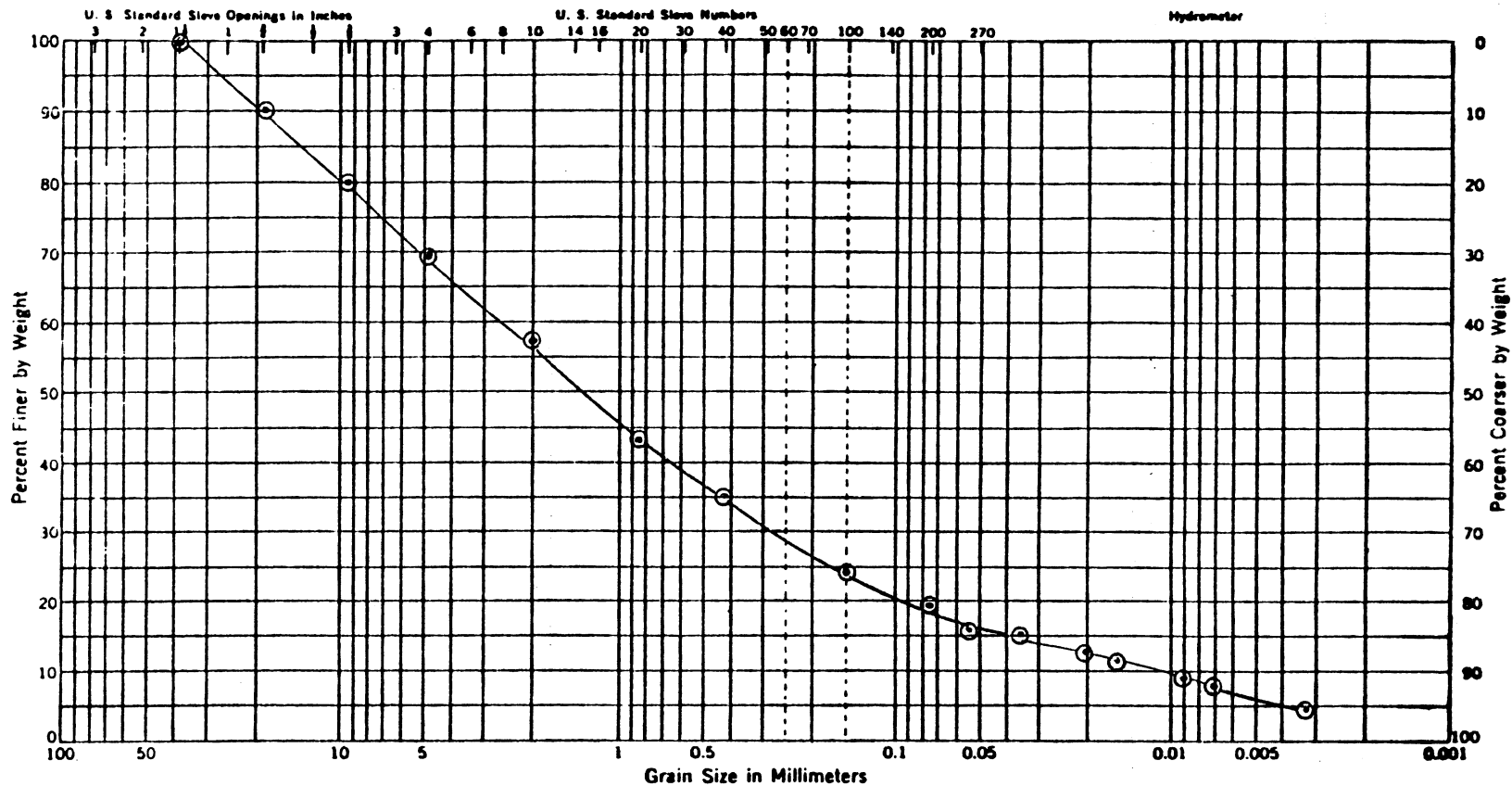
UNIFIED CLASSIFICATION SYSTEM



UNIFIED CLASSIFICATION SYSTEM



UNIFIED CLASSIFICATION SYSTEM

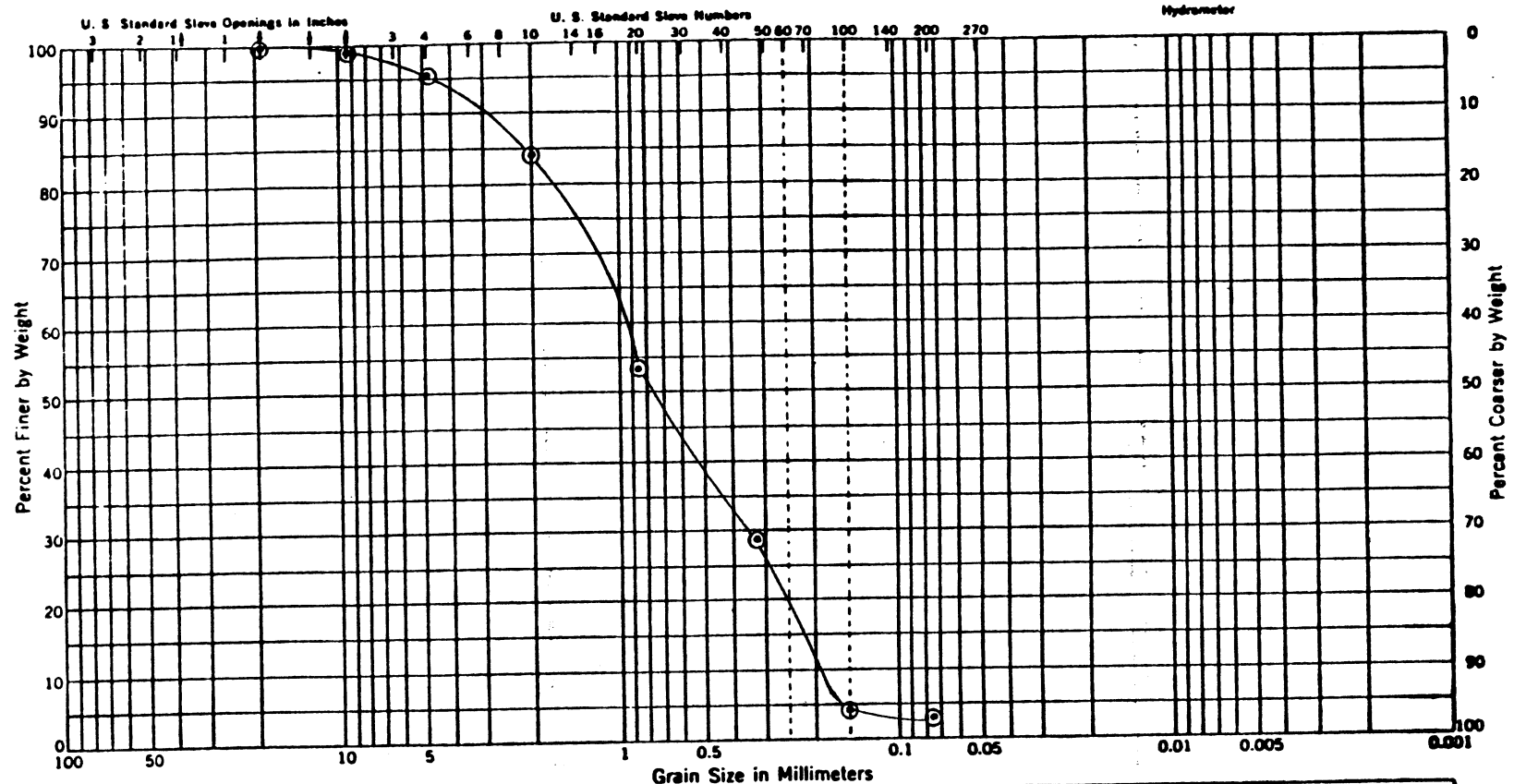


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-8	10.5				Silty fine to coarse sand (SM)
S-17					
164.0-166.0'					

EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

UNIFIED CLASSIFICATION SYSTEM

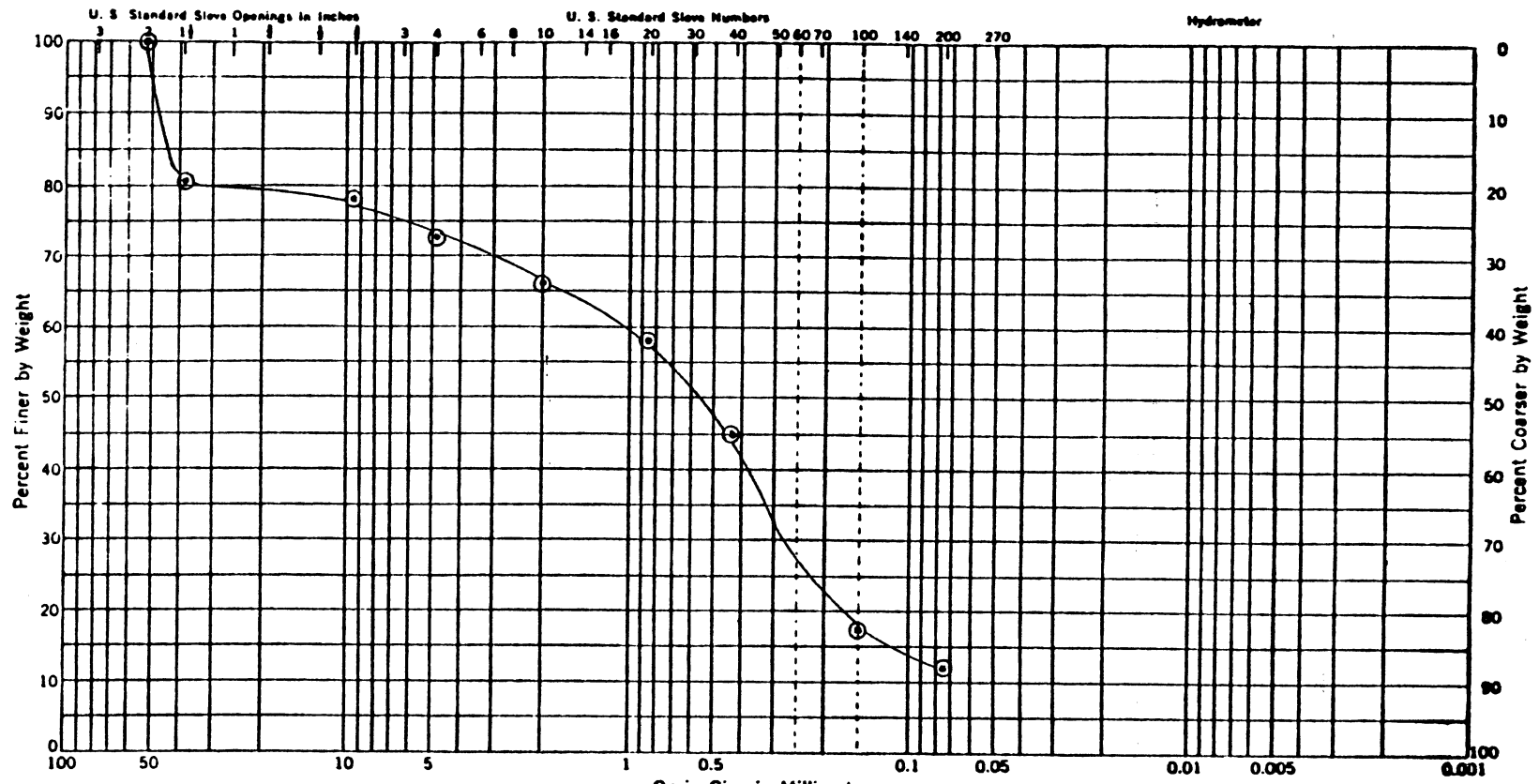


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

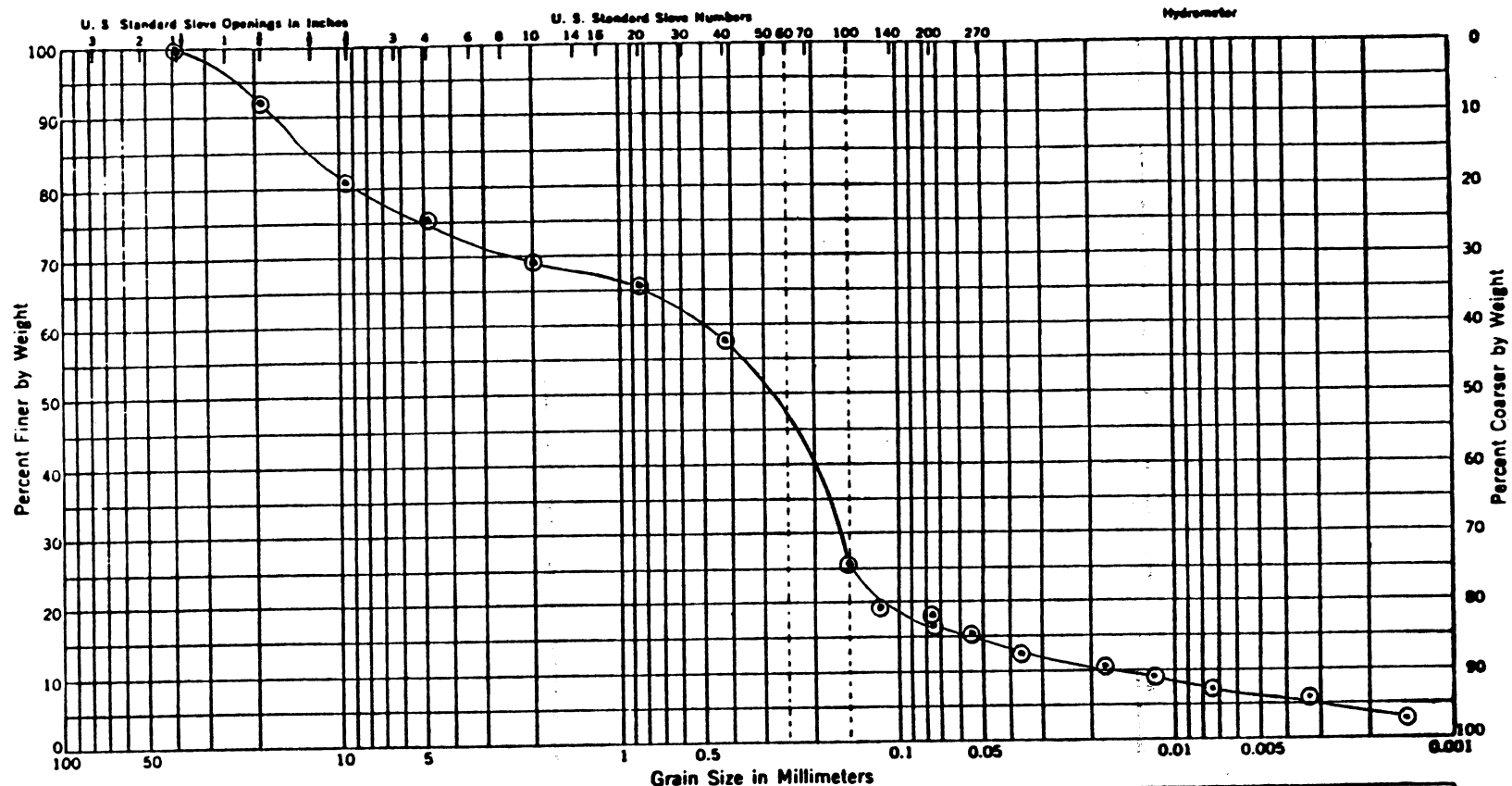
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION									
EX-9	4.9				Fine to coarse sand (SP)	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT								
S-A														
4.0-6.0'														
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303								
						<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 15%;">DRAWN</th> <th style="width: 15%;">APPROVED</th> <th style="width: 15%;">DATE</th> <th style="width: 15%;">JOB No.</th> </tr> <tr> <td>JJT</td> <td>JAS</td> <td>4-2-84</td> <td>12959</td> </tr> </table>	DRAWN	APPROVED	DATE	JOB No.	JJT	JAS	4-2-84	12959
DRAWN	APPROVED	DATE	JOB No.											
JJT	JAS	4-2-84	12959											

3.5-19-94

UNIFIED CLASSIFICATION SYSTEM



UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

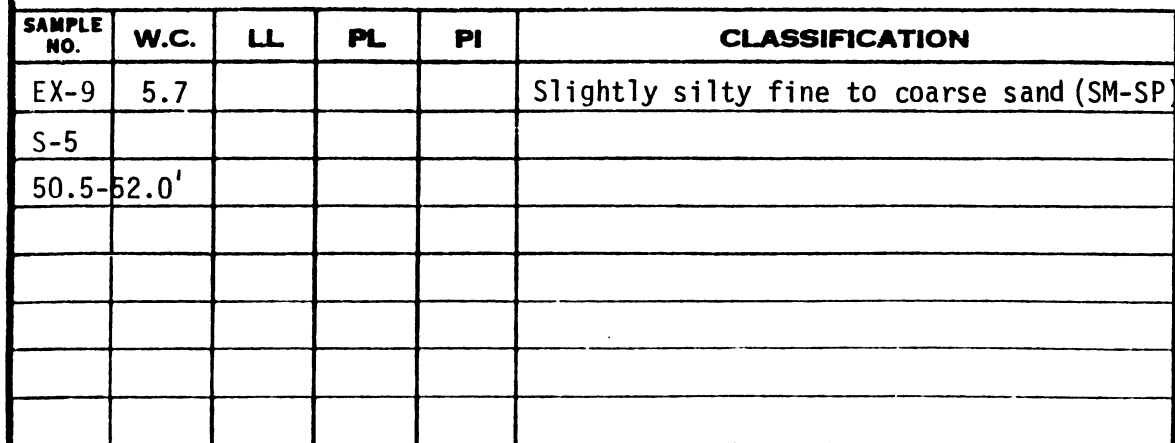
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-9	4.1				Silty fine to coarse sand (SM)
S-3					
30.1-	31.5'				

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

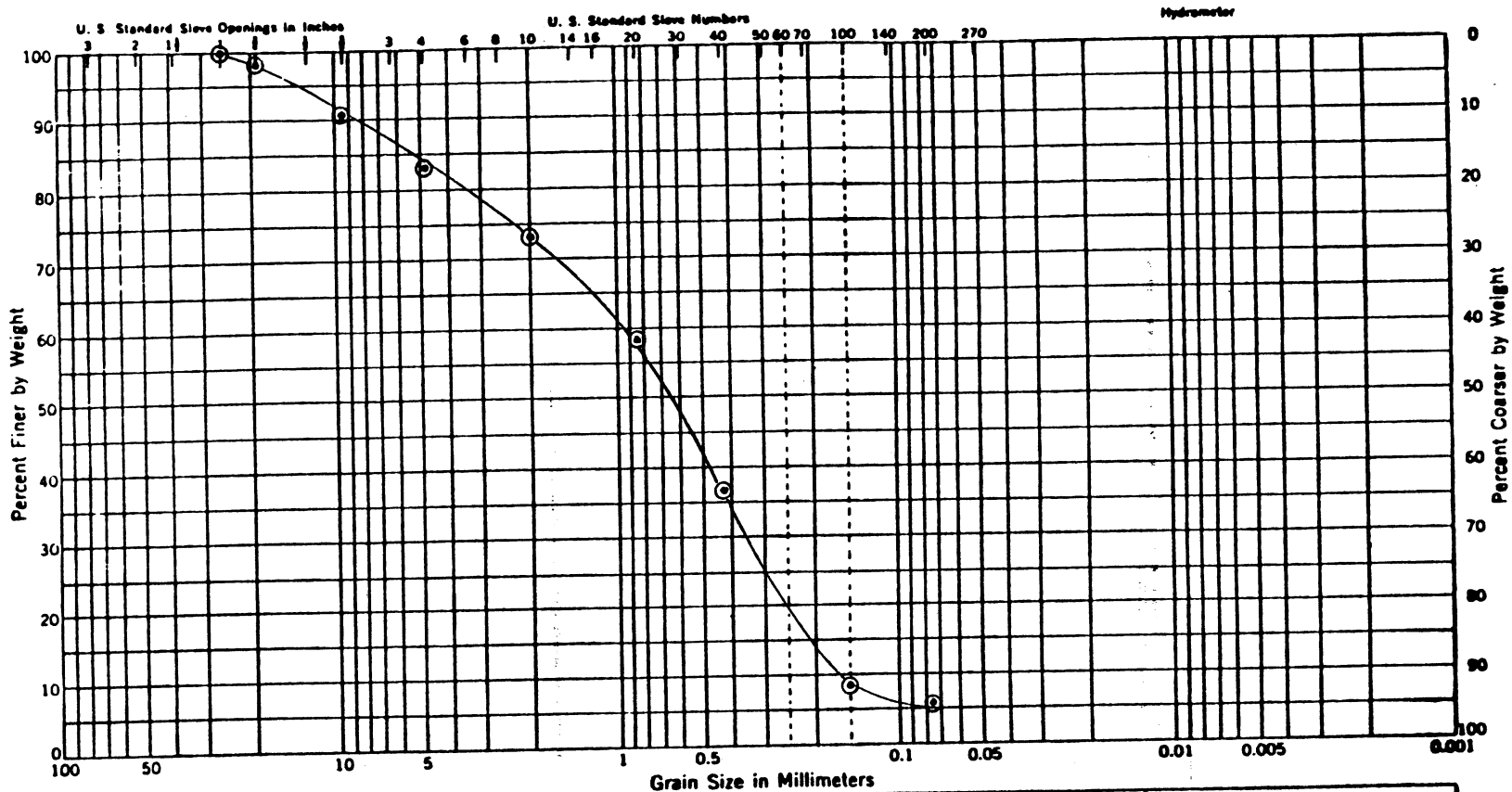
3.5-19-97



STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-9	11.3				Slightly silty fine to coarse sand (SM-SP)
S-7					
70.5-	72.0'				

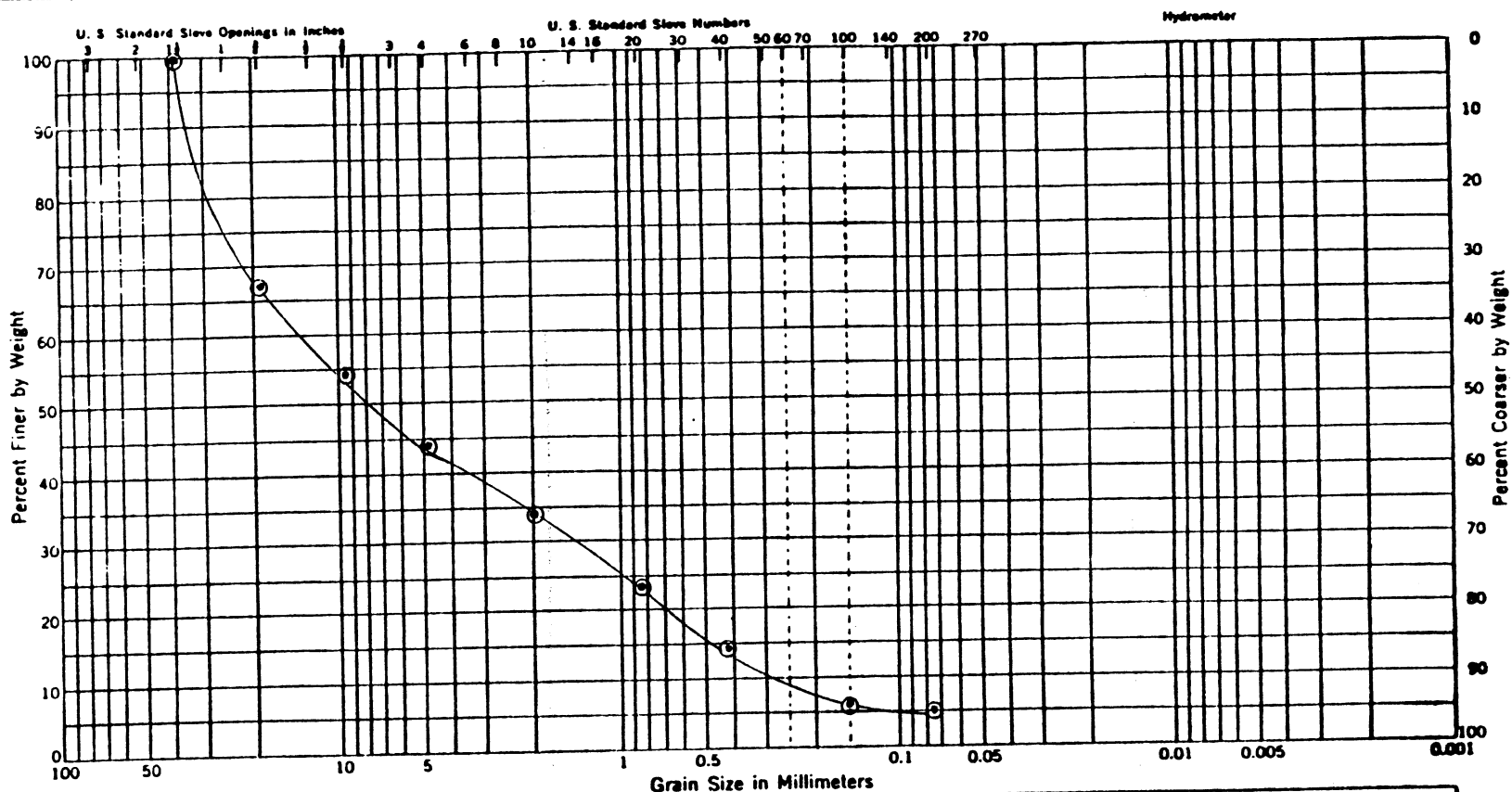
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

3.5-19-98

UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-9	7.7				Fine to coarse gravel (GP)
S-9					
91.0-	93.0'				

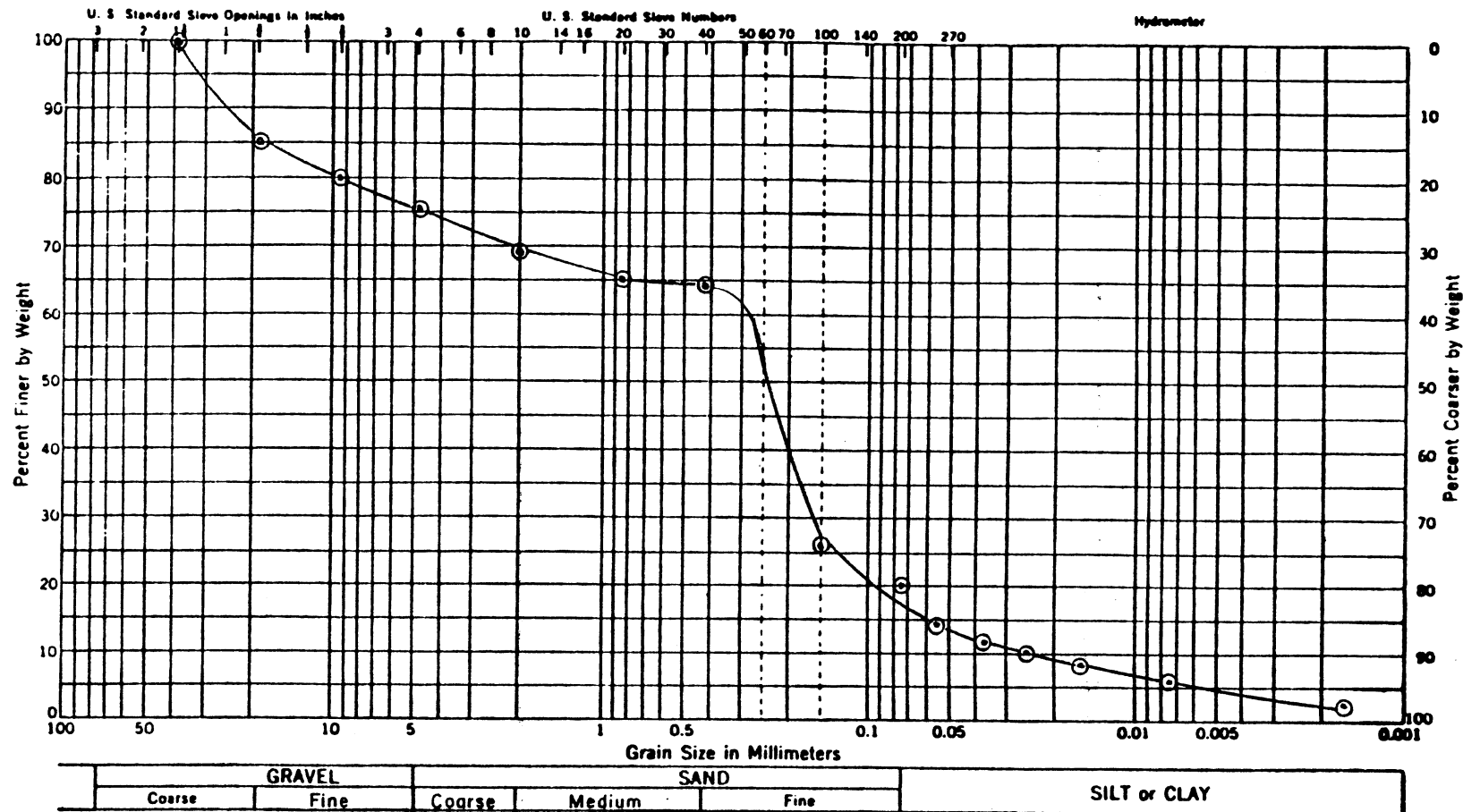
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

3.5-19-99

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-9	8.5				Silty fine to coarse sand (SM)
S-10					
101.5-103.5'					

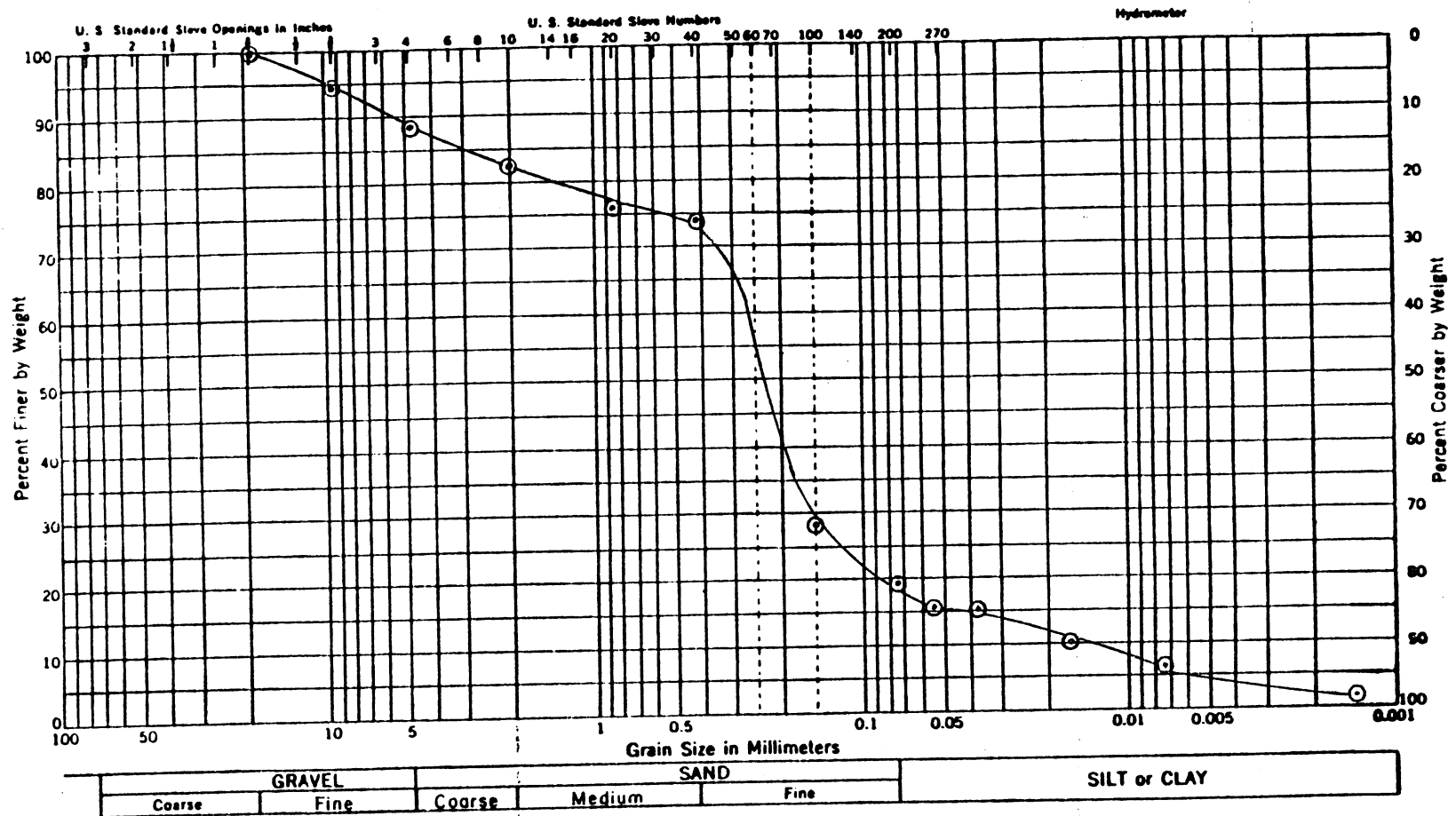
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

3.5-19-100

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-9	8.7				Silty fine to coarse sand (SM)
S-12					
123.0-124.5'					

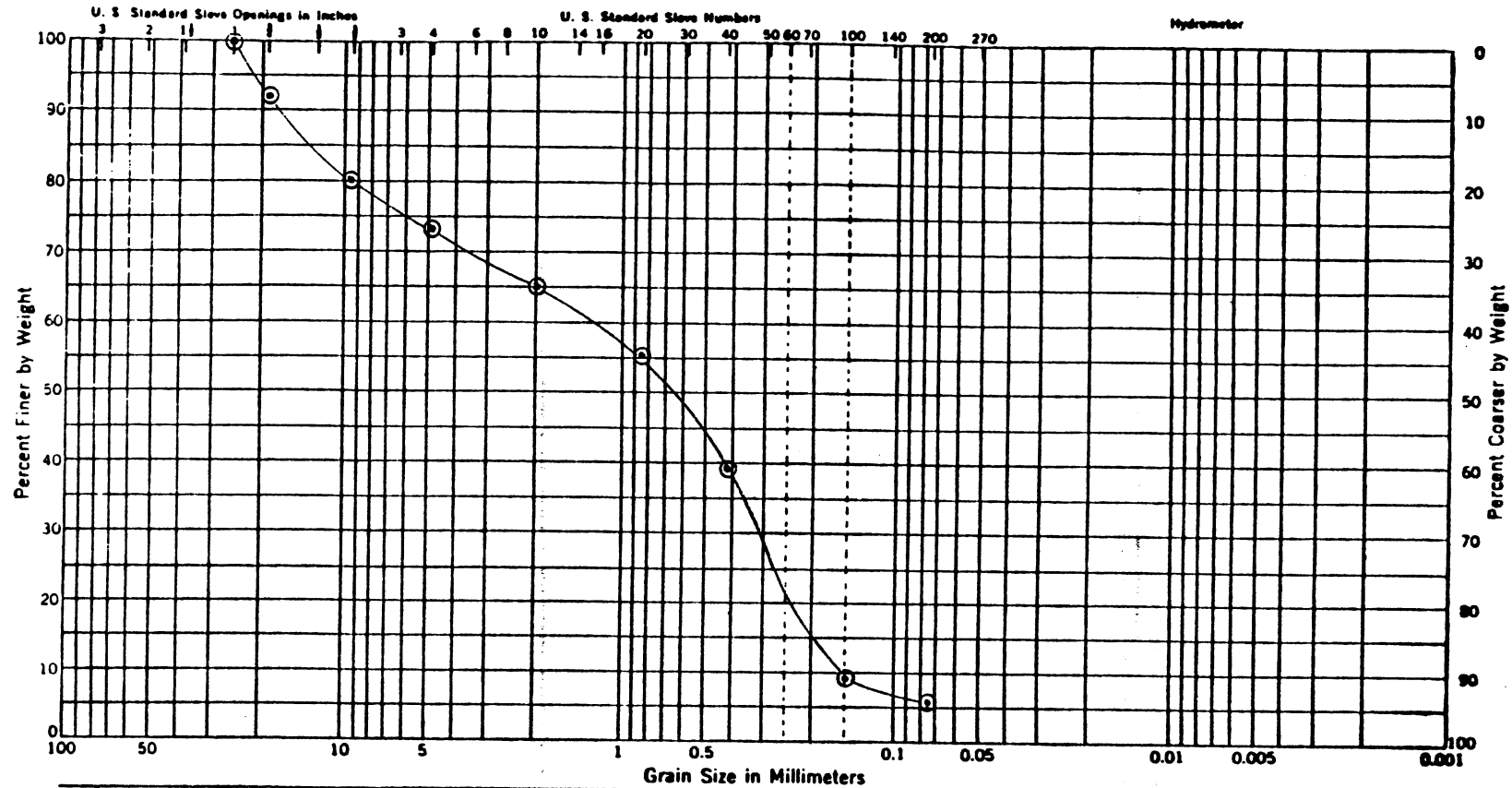
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

3.5-19-101

UNIFIED CLASSIFICATION SYSTEM

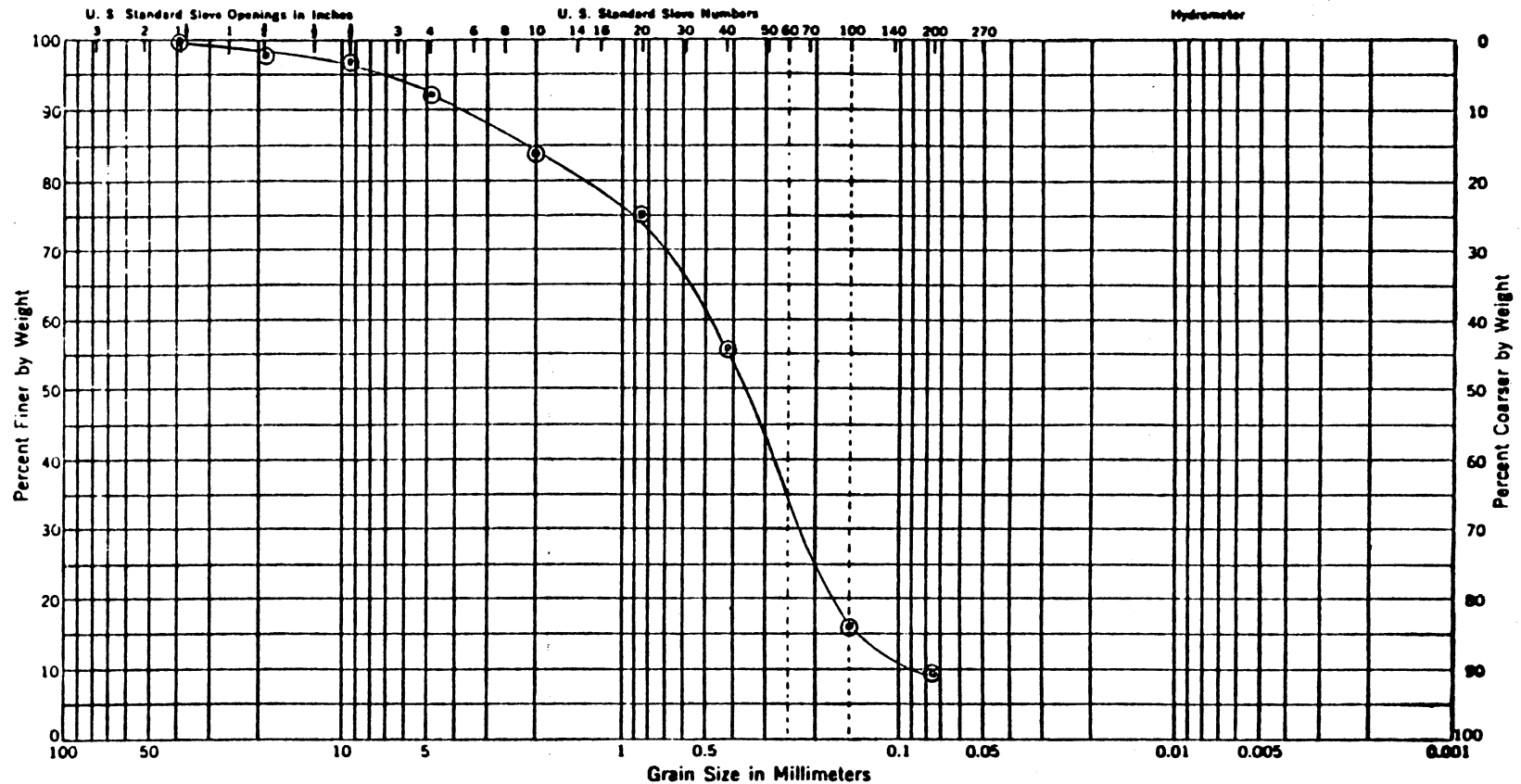


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

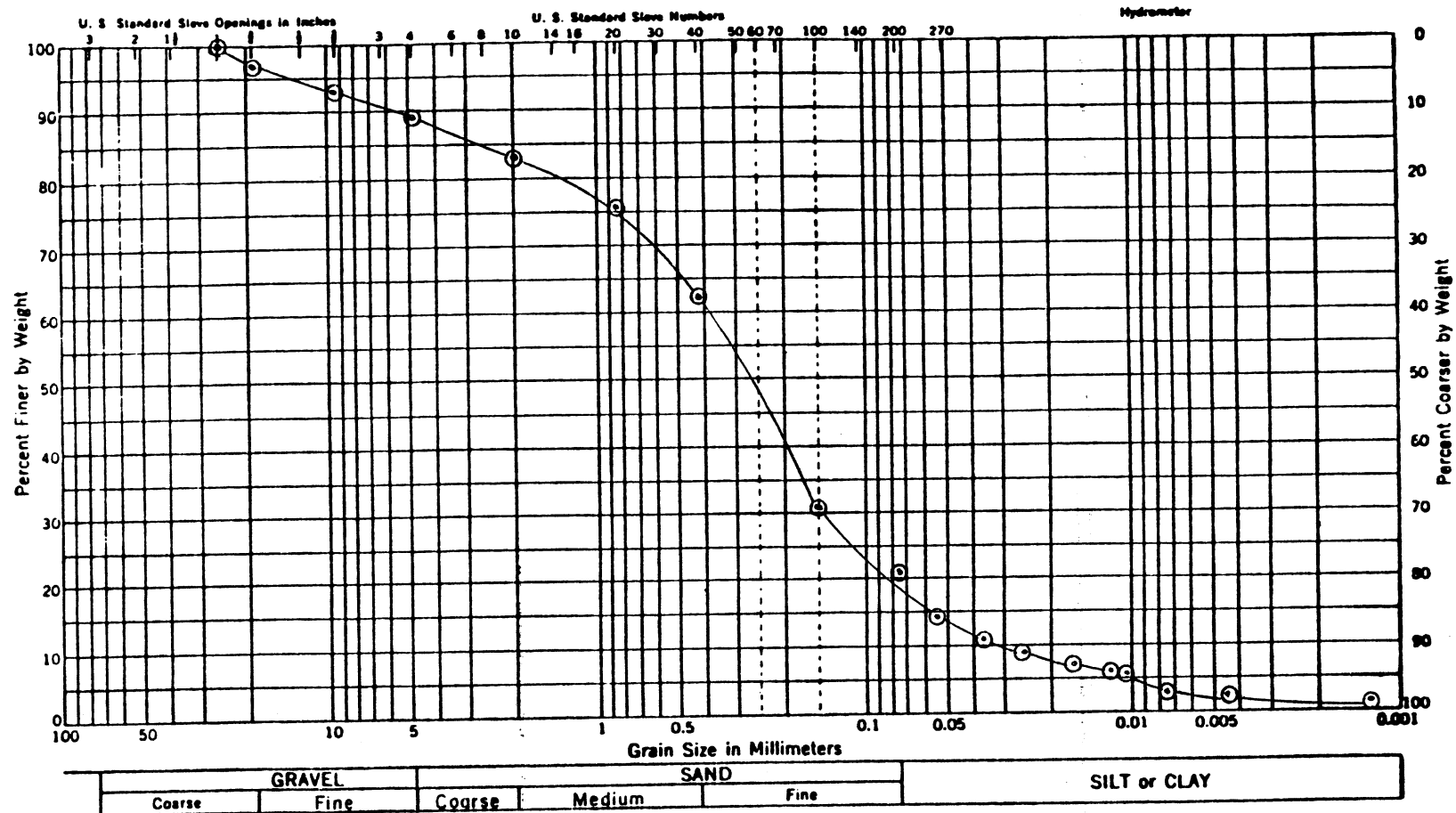
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
EX-9	10.9				Slightly silty fine to coarse sand (SM-SP)				
S-13									
133.5-135.0'									
						DRAWN APPROVED DATE JOB No. JJT JAS 4-2-84 12959			

3.5-19-102

UNIFIED CLASSIFICATION SYSTEM



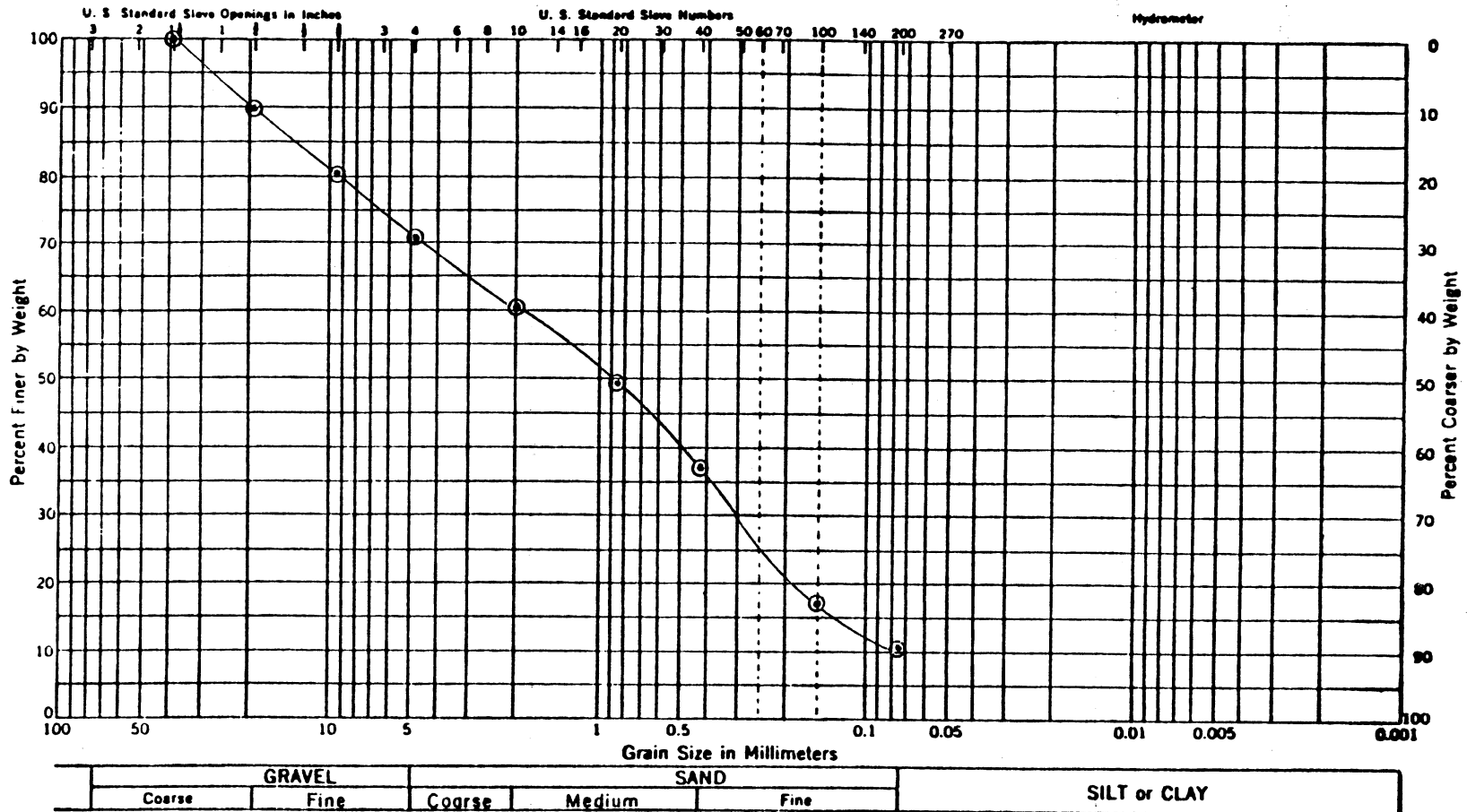
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-9	9.3				Silty fine to coarse sand (SM)				
S-16									
163.0-165.0'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

3.5-19-104

UNIFIED CLASSIFICATION SYSTEM



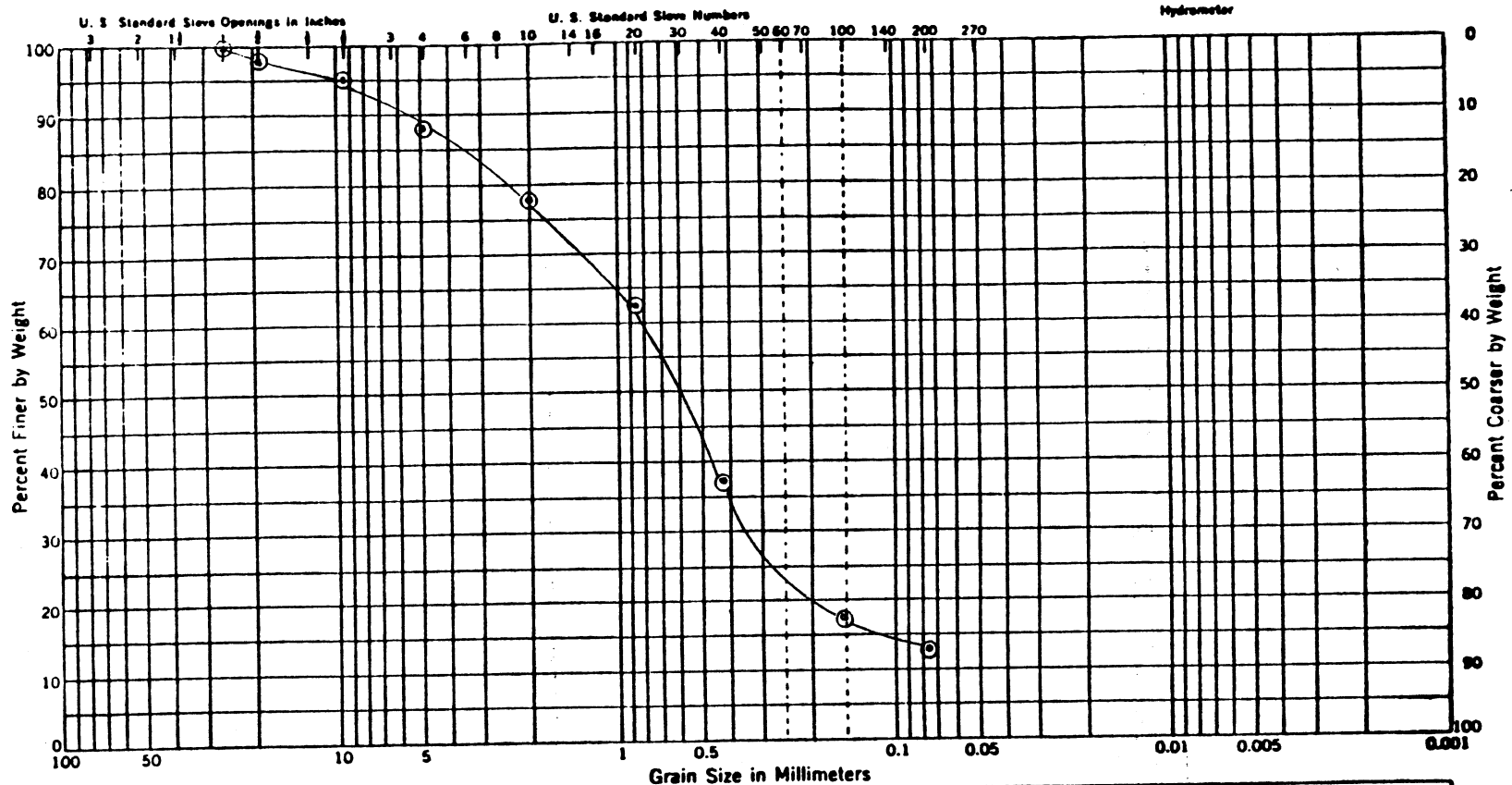
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-9	9.8				Slightly silty fine to coarse sand (SM-SP)
S-18					
185.0-186.5'					

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

UNIFIED CLASSIFICATION SYSTEM

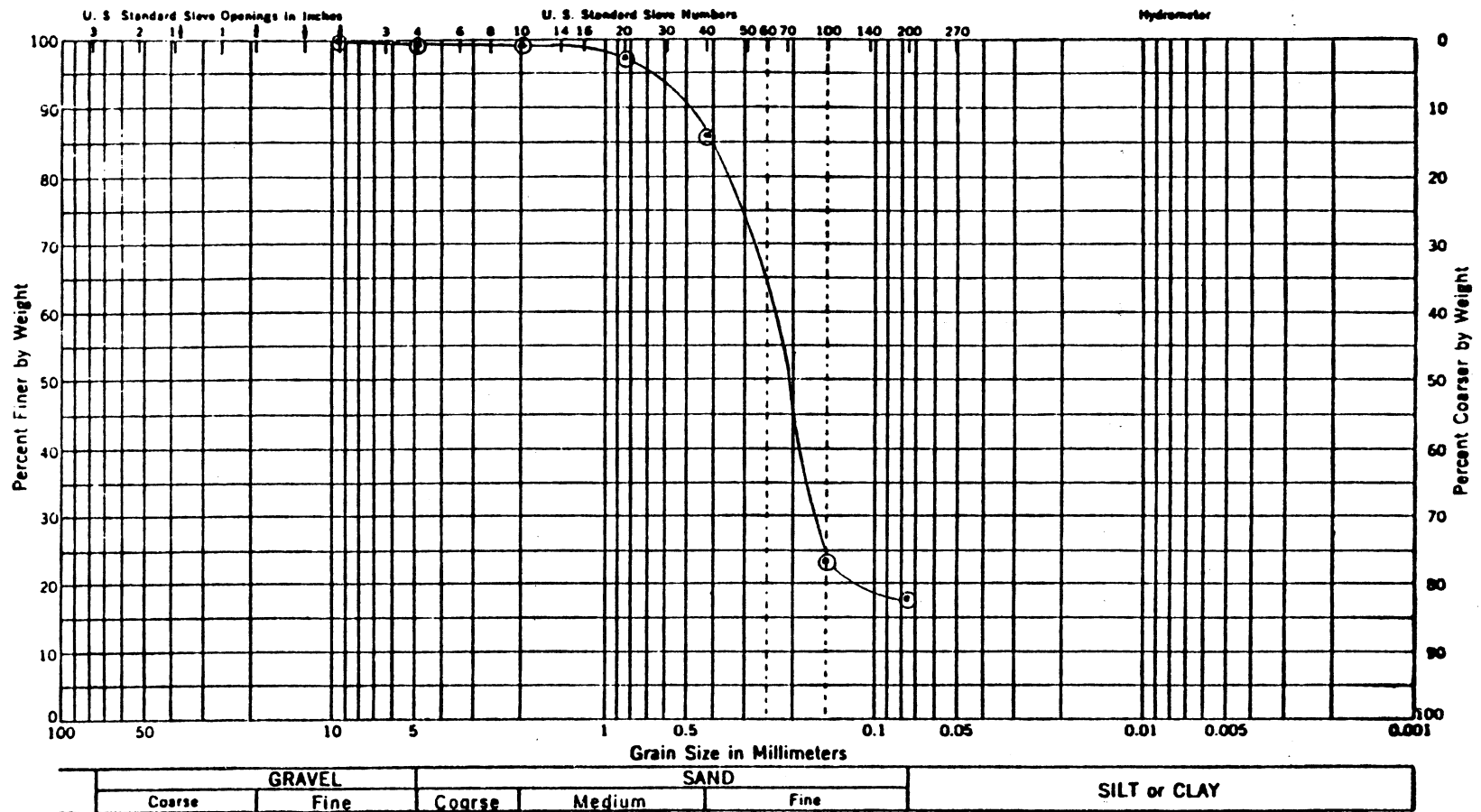


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
EX-9	13.7				Silty fine to coarse sand (SM)				
S-20									
203.0-205.0'									
						DRAWN APPROVED DATE JOB No. JJT JAS 4-2-84 12959			

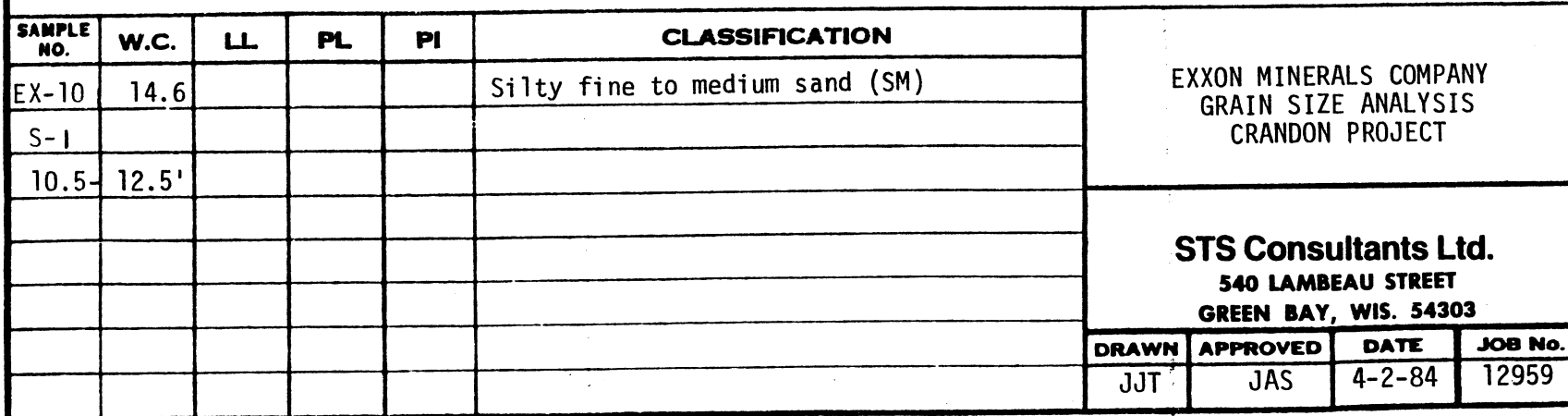
3.5-19-106

UNIFIED CLASSIFICATION SYSTEM

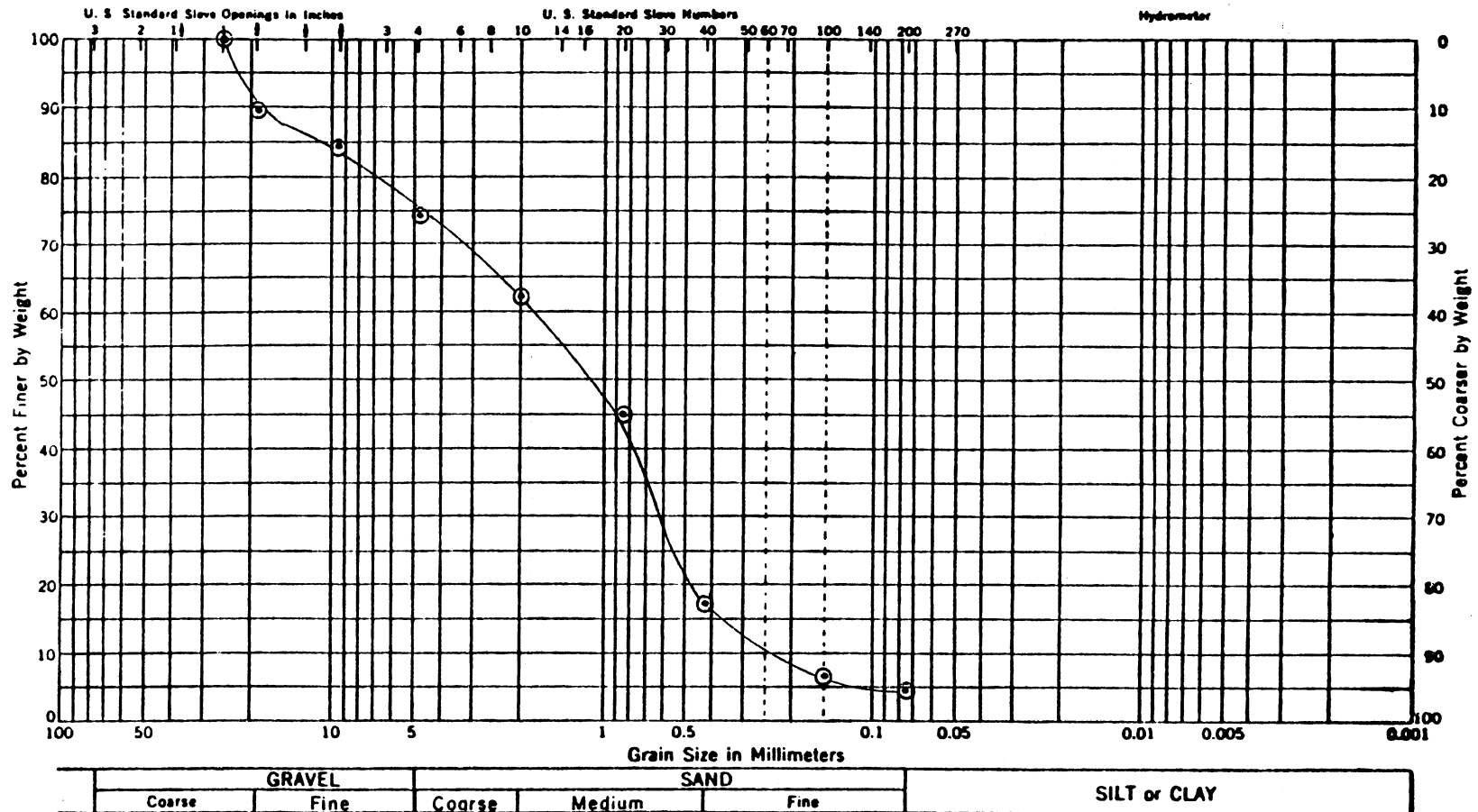


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-9	17.5				Silty fine to medium sand (SM)				
S-25									
255.0-256.0									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

3.5-19-108

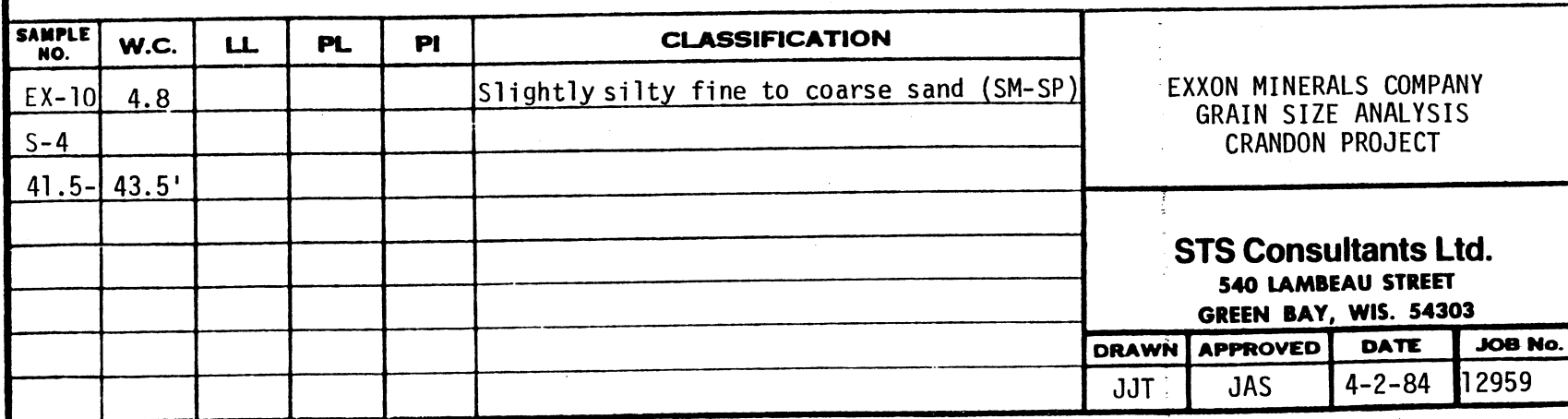


UNIFIED CLASSIFICATION SYSTEM

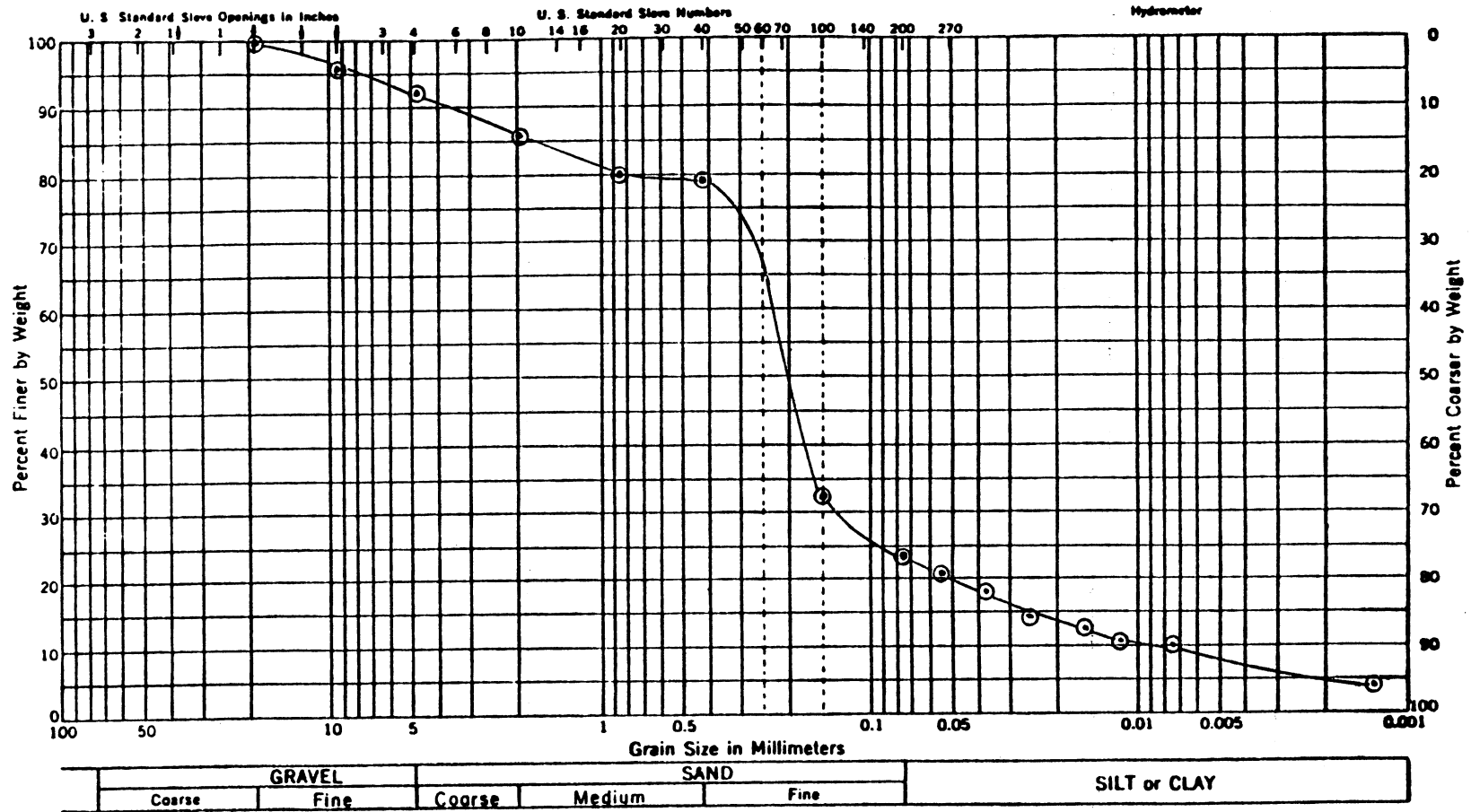


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-10	3.7				Fine to coarse sand (SP)				
S-2						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
20.5-22.5'									
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

3.5-19-110



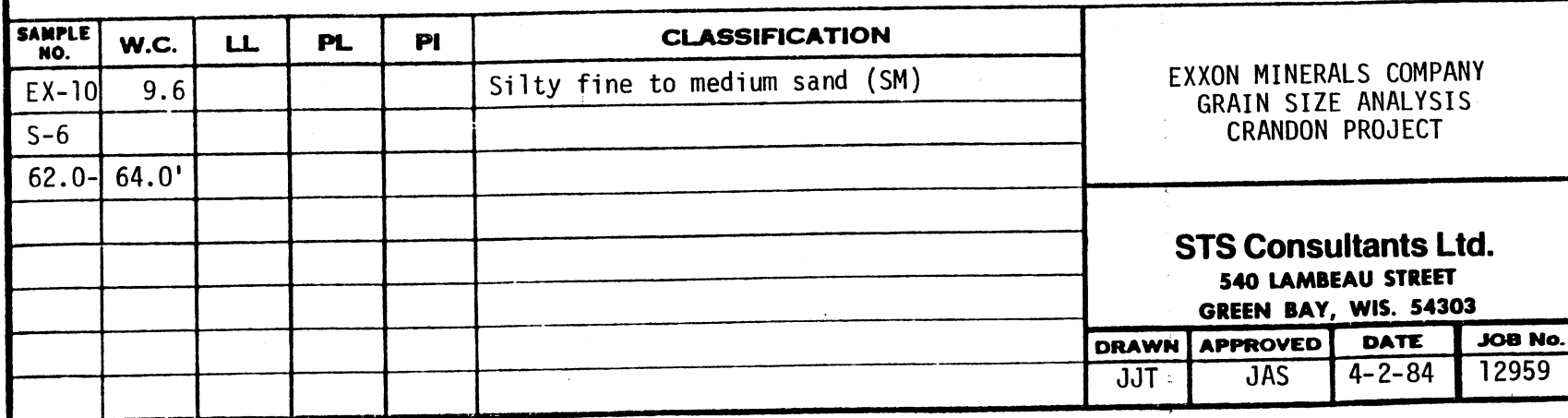
UNIFIED CLASSIFICATION SYSTEM



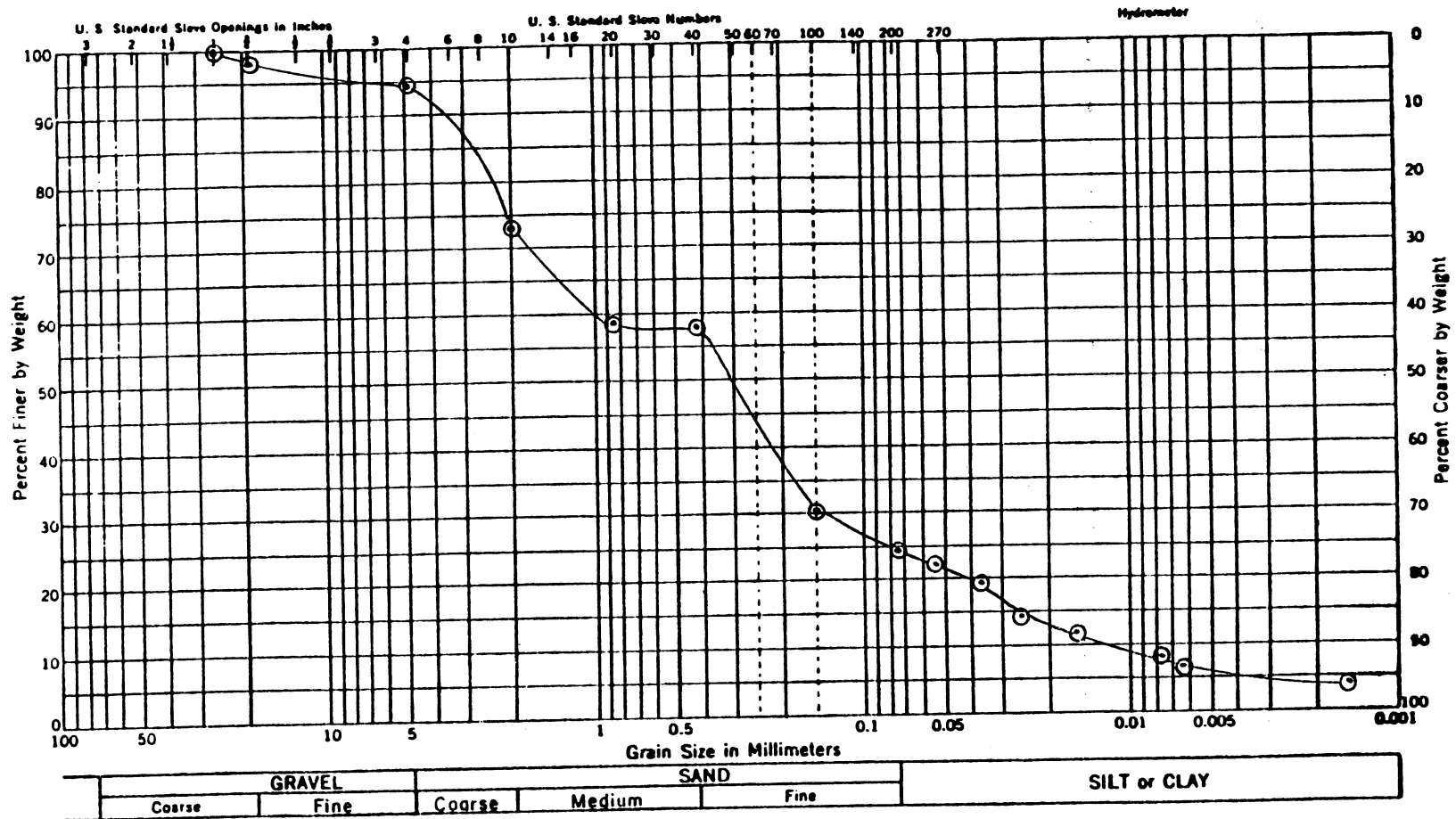
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-10	9.2				Silty fine to medium sand (SM)				
S-5									
51.5-	53.5'					STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

3.5-19-111

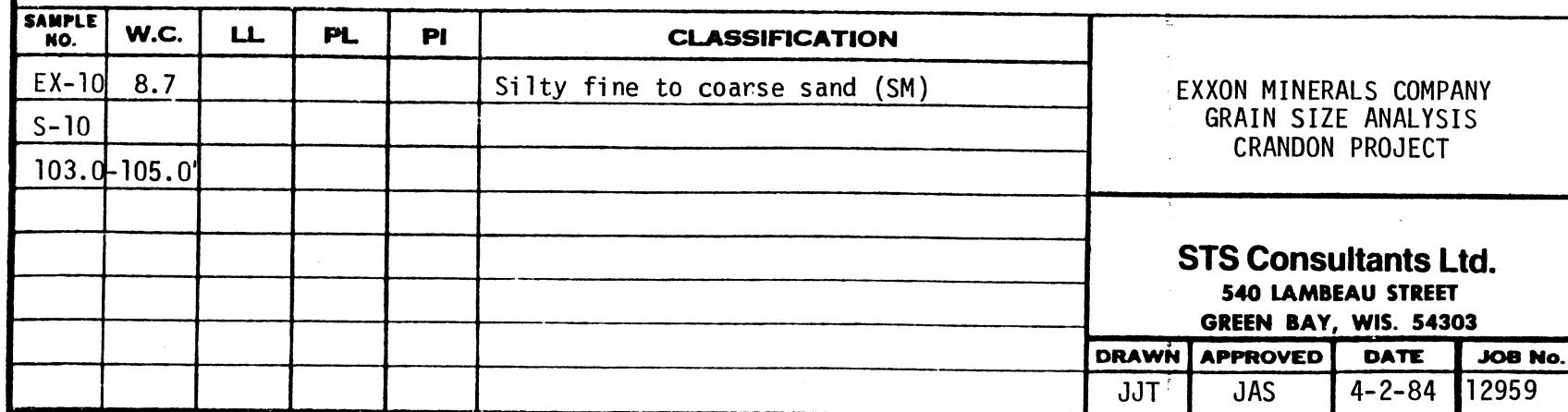
3.5-19-112



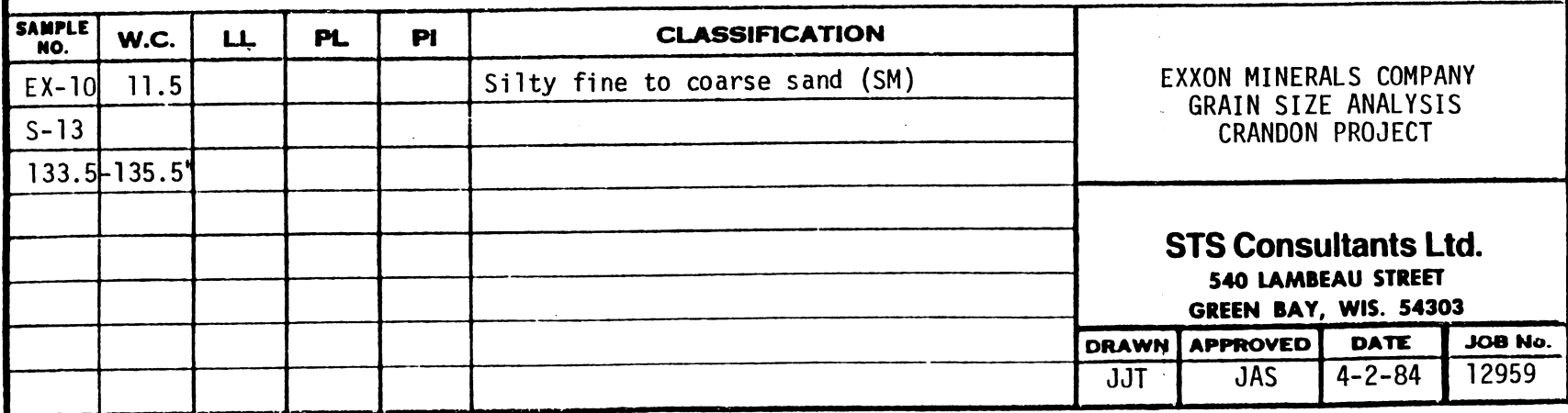
UNIFIED CLASSIFICATION SYSTEM



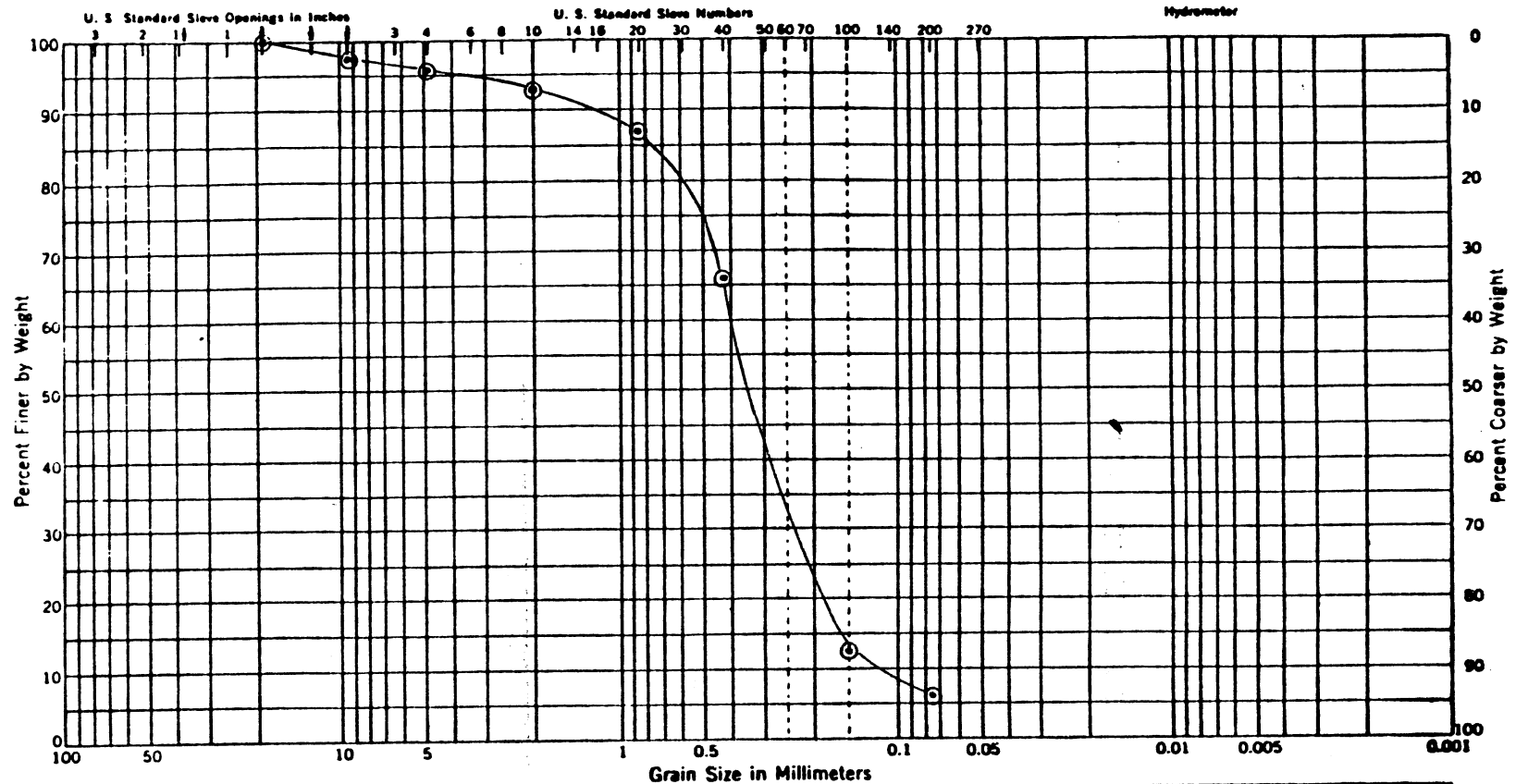
3.5-19-114



3.5-19-115



UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-10	13.2				Slightly silty fine to medium sand (SM-SP)
S-17					
174.5-176.5					

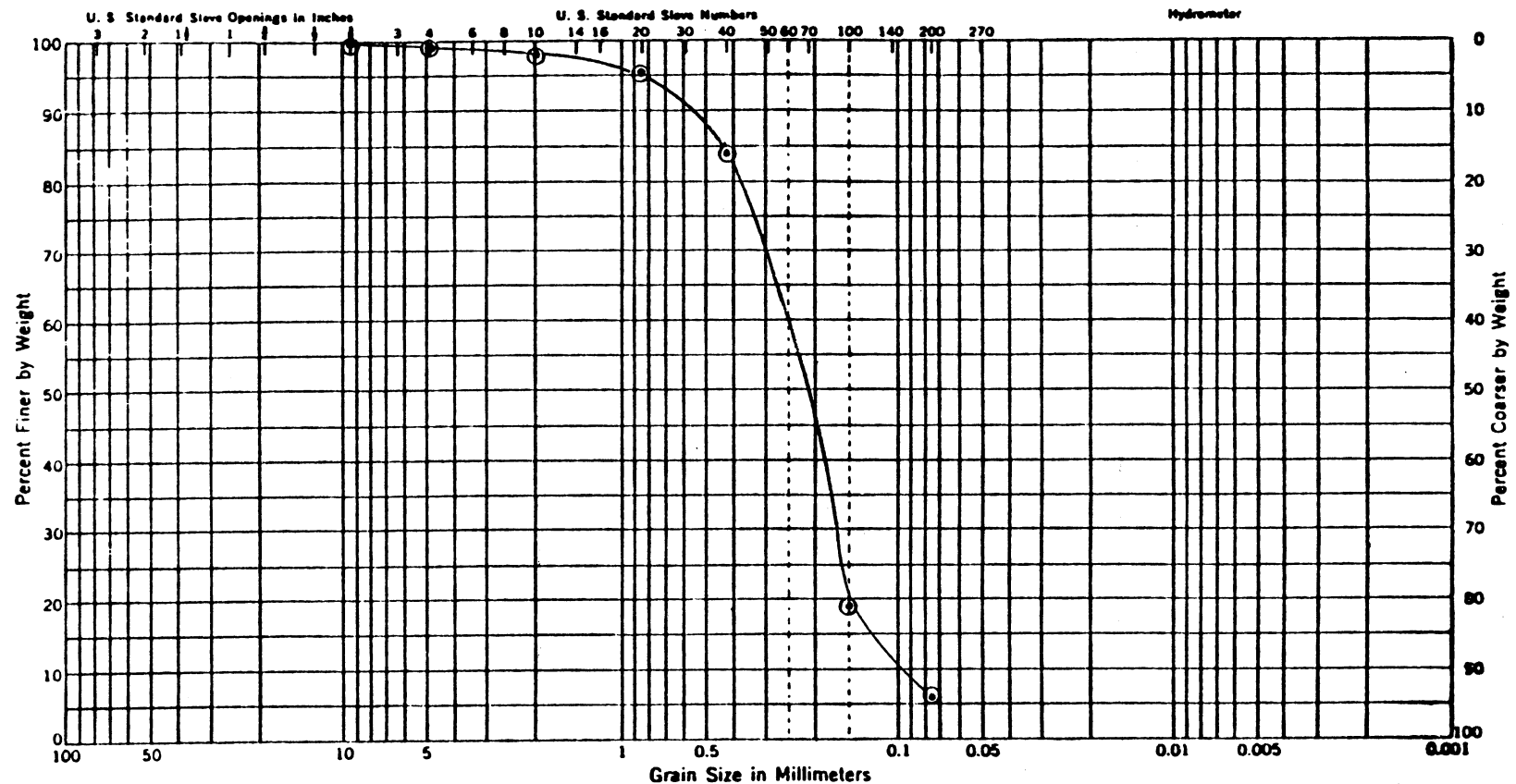
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

3.5-19-116

UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-10	18.7				Slightly silty fine sand (SM-SP)
S-18					
185.0-186.5					

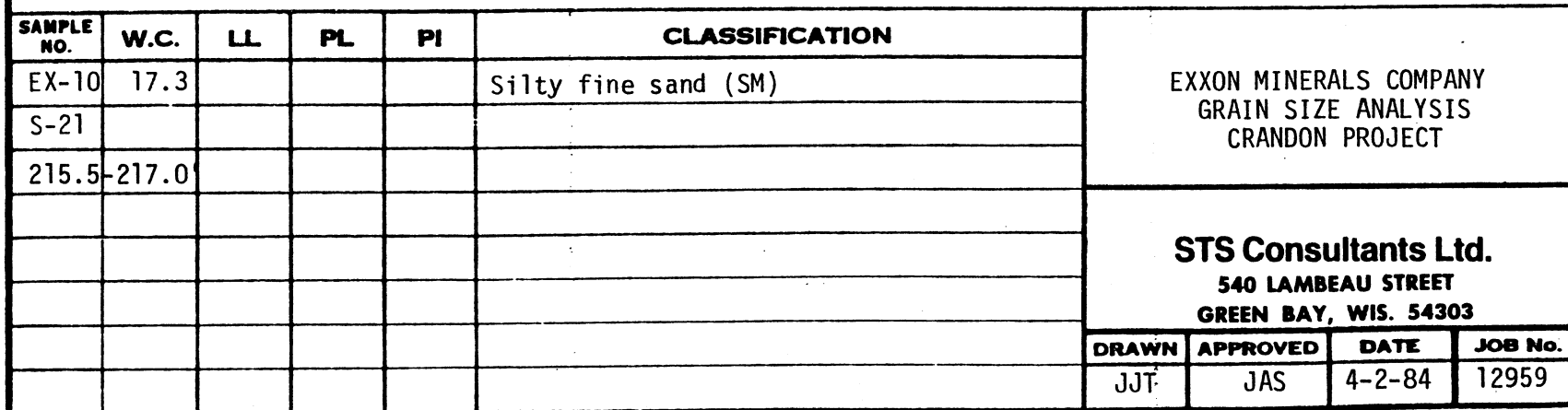
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

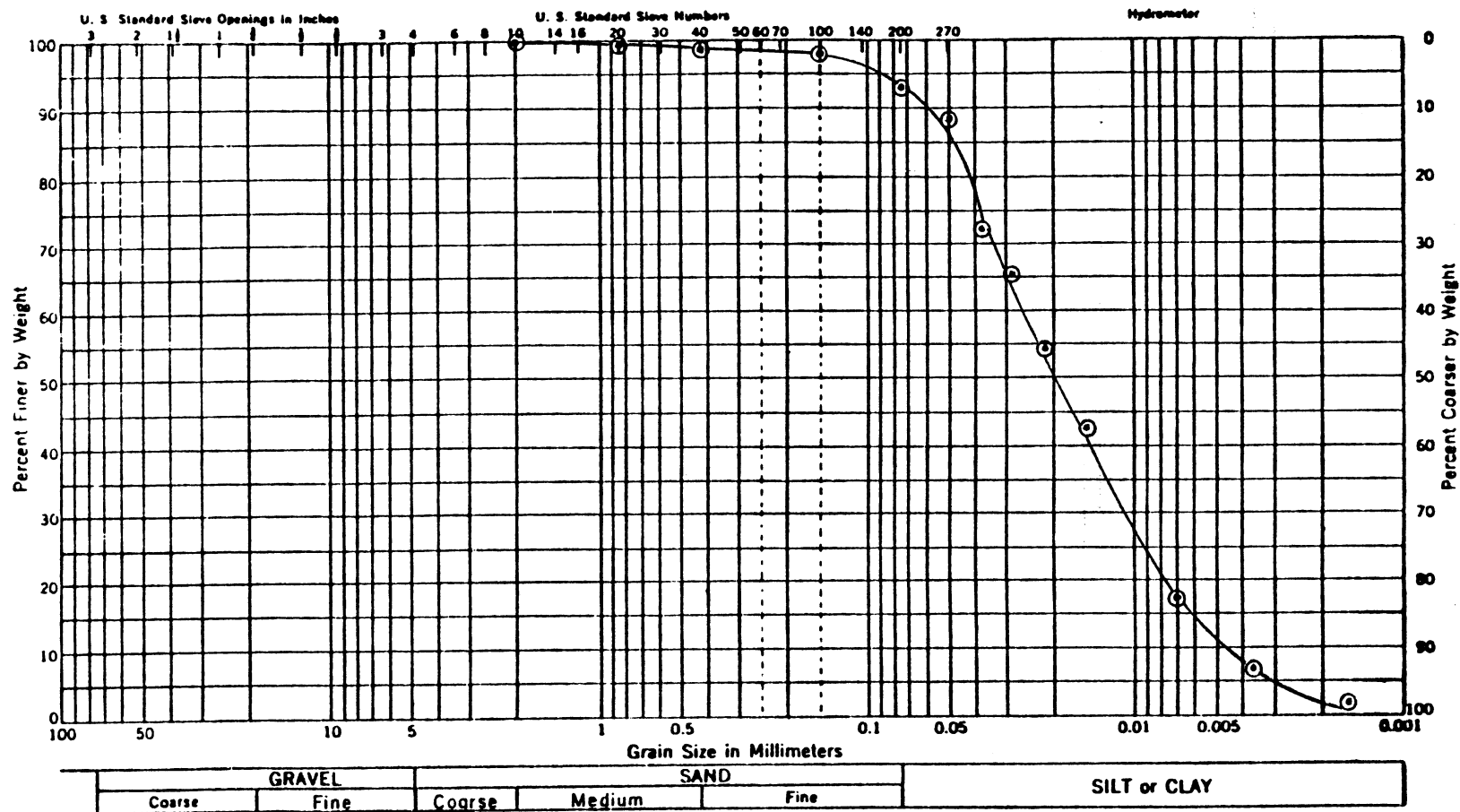
DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

3.5-19-117

3.5-19- 118

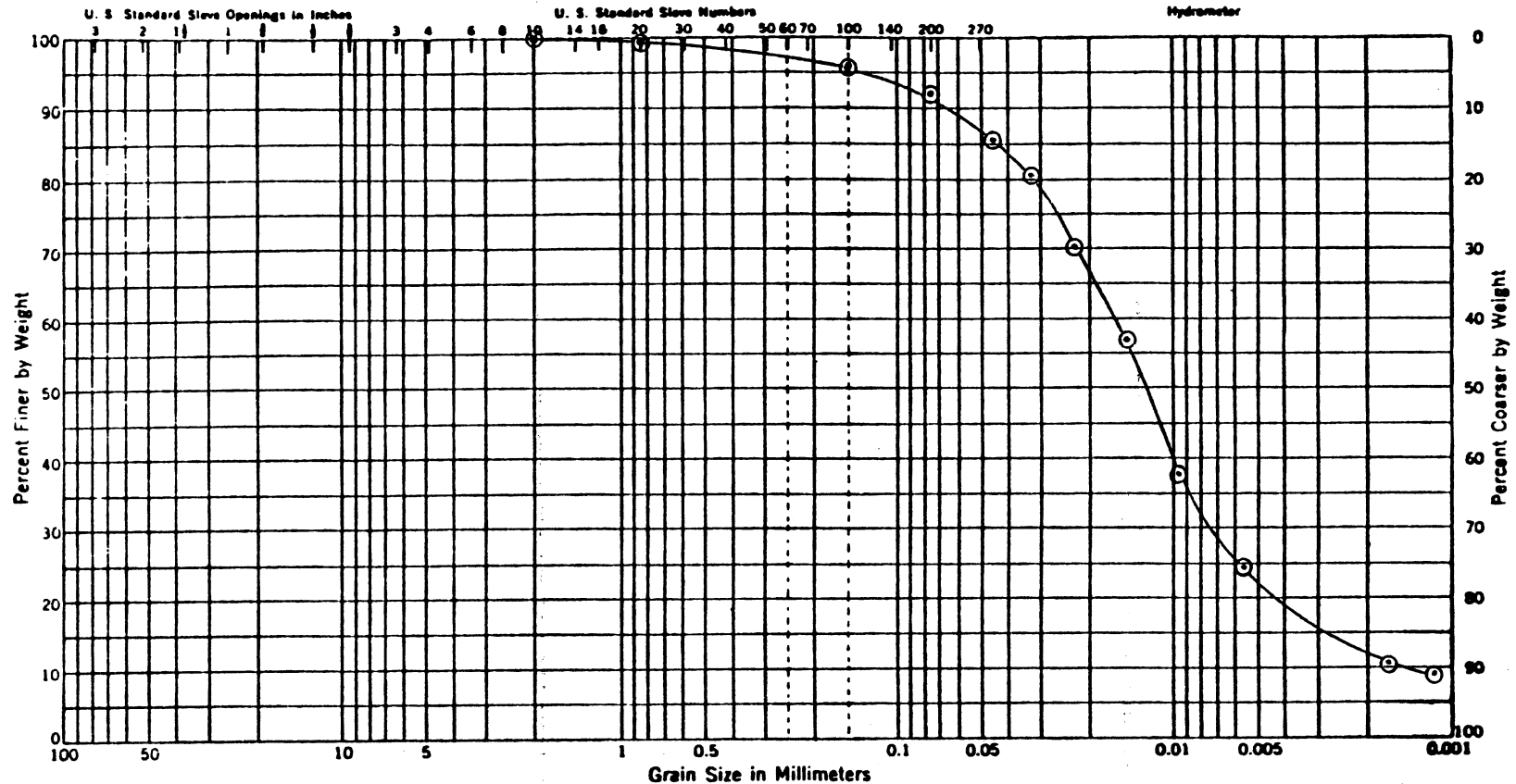


UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-10	19.7				Silt (ML)				
S-22						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
228.0-229.0									
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

UNIFIED CLASSIFICATION SYSTEM



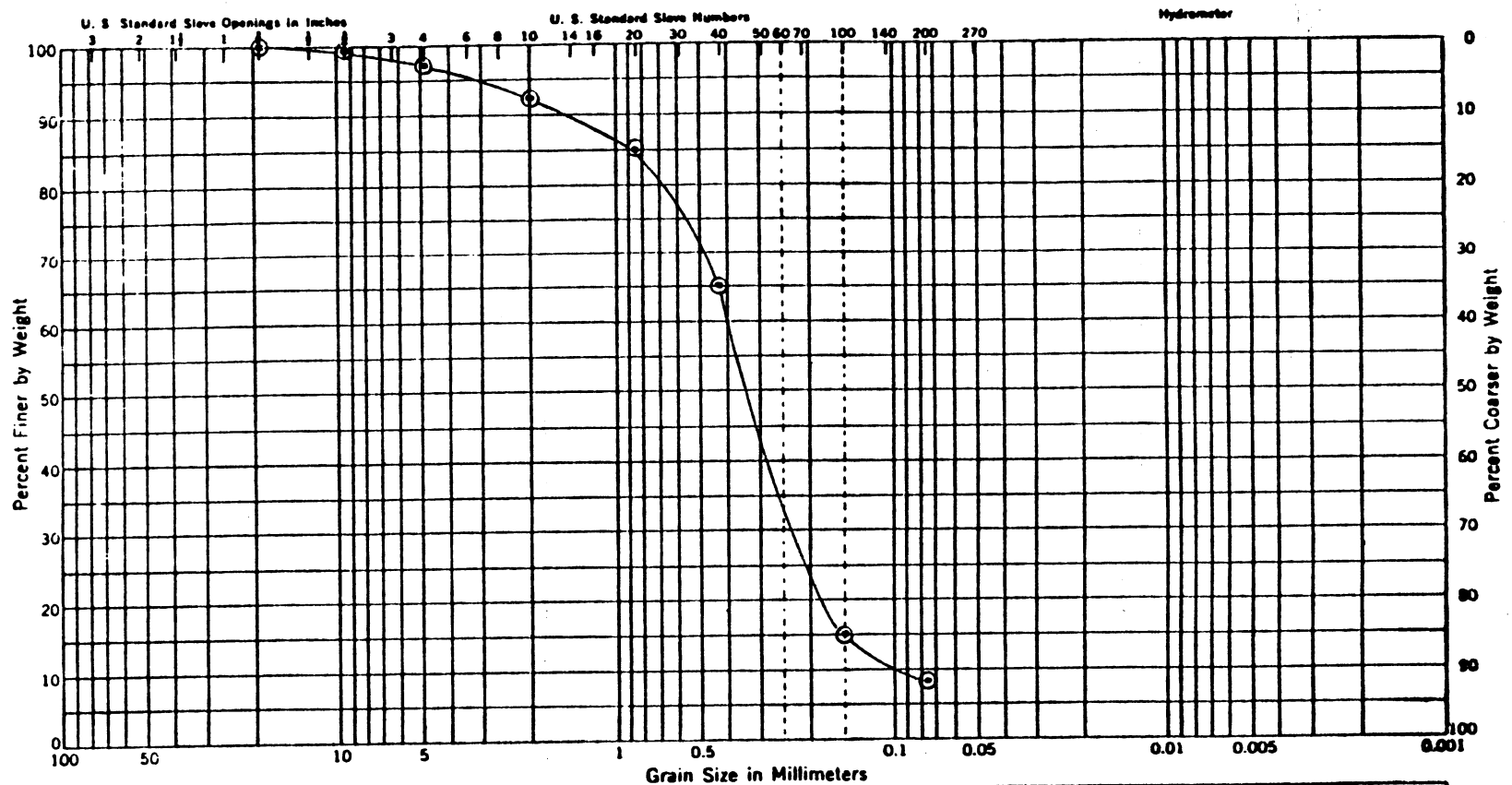
GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-10	20.8				Silty clay (CL)
S-23					
236.0-237.0					

EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

3.5-19-120

UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-10	14.5				Slightly silty fine to medium sand (SM-SP)
S-24					
246.5-250.5'					

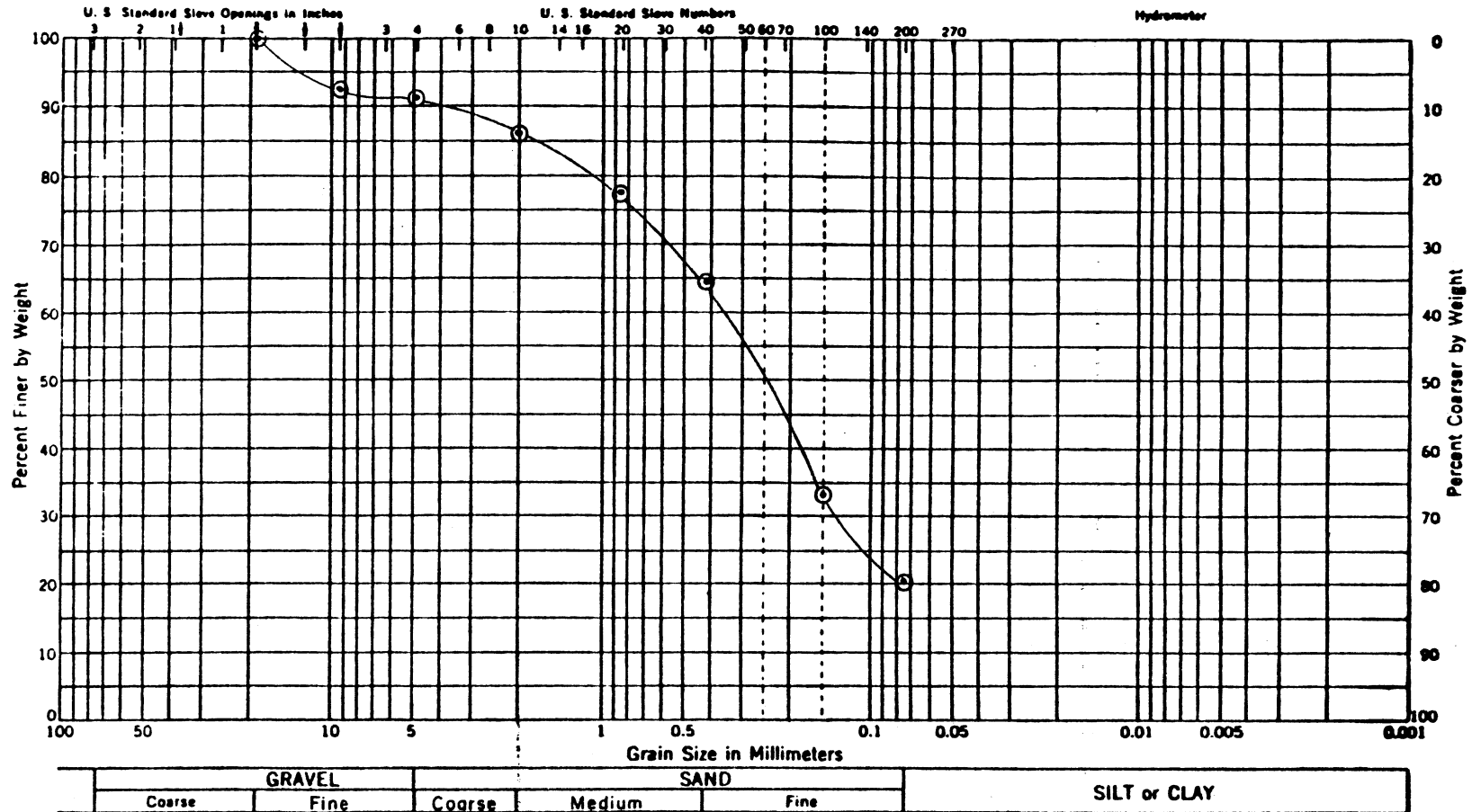
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

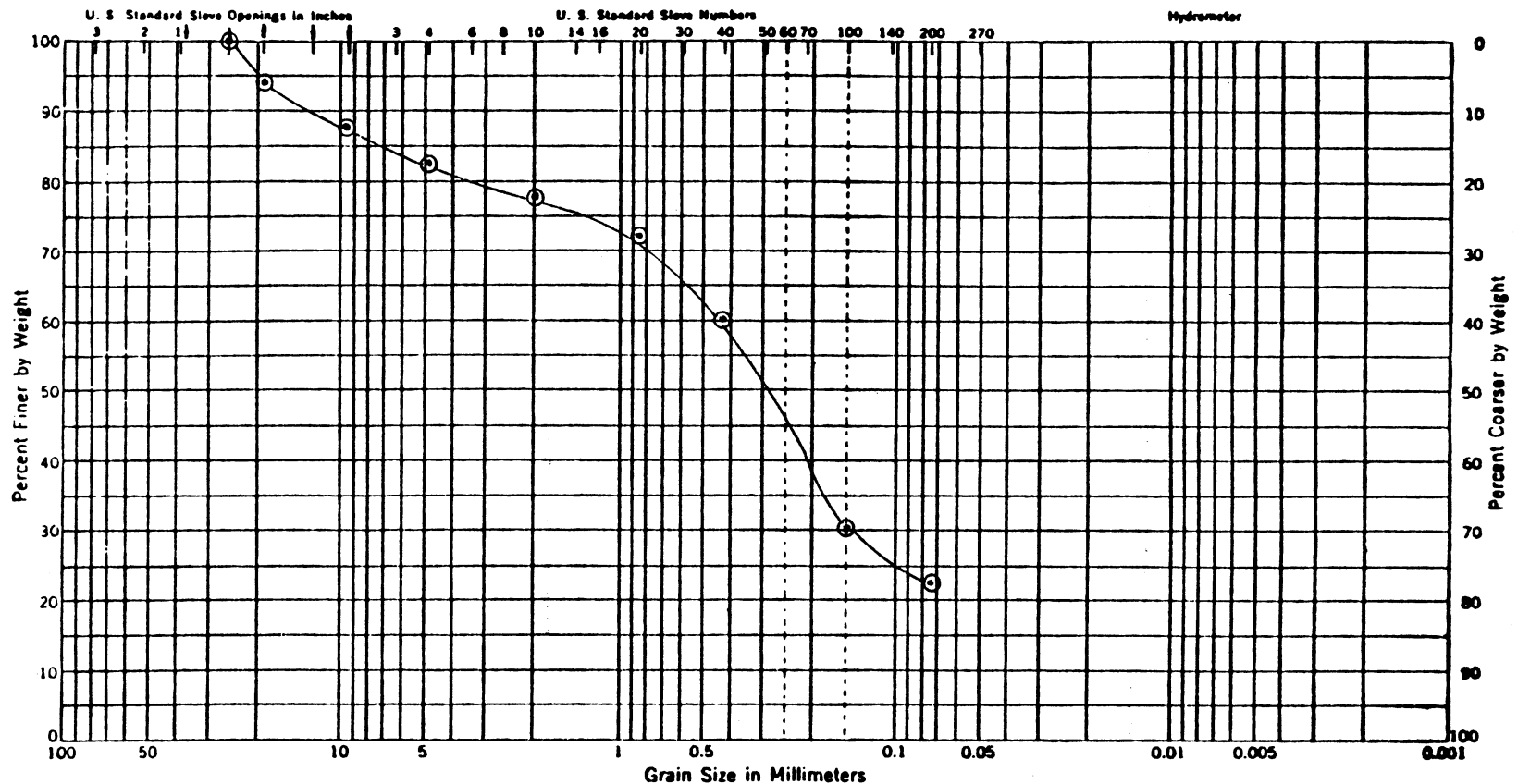
DRAWN	APPROVED	DATE	JOS No.
JJT	JAS	4-2-84	12959

3.5-19-121

UNIFIED CLASSIFICATION SYSTEM



UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-11	5.2				Silty fine to coarse sand (SM)
S-2					
10.0-12.0'					

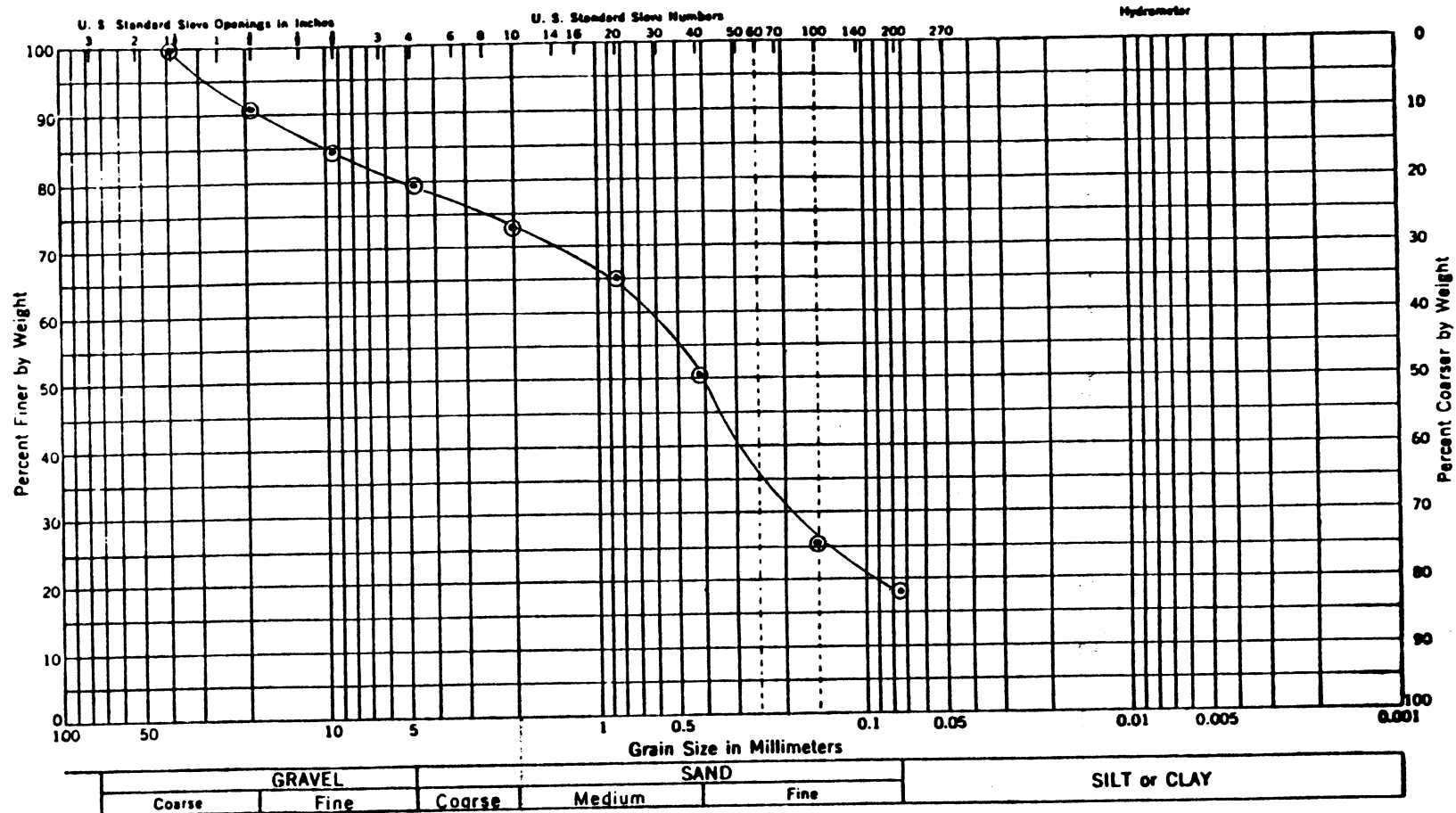
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

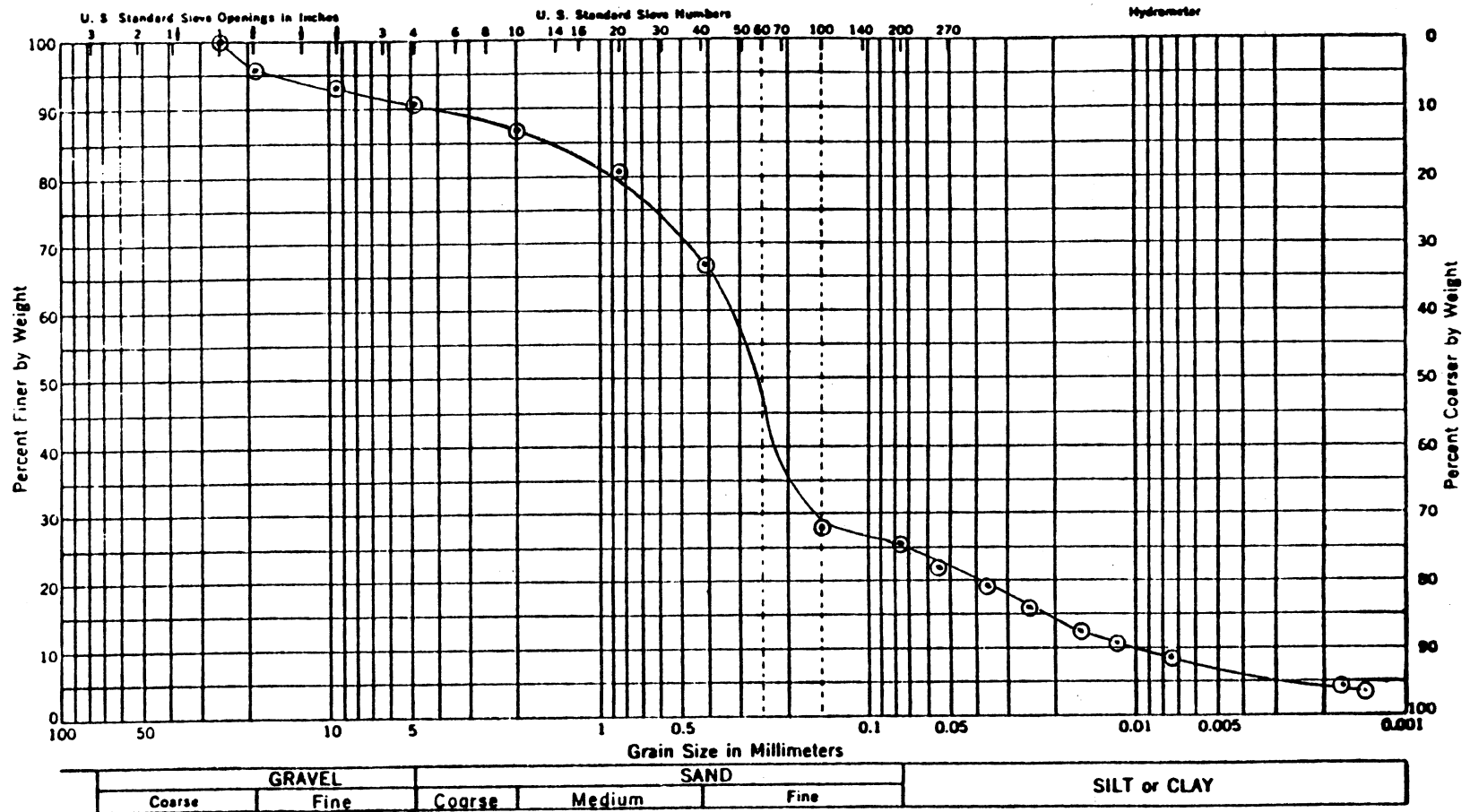
3.5-19-123

UNIFIED CLASSIFICATION SYSTEM



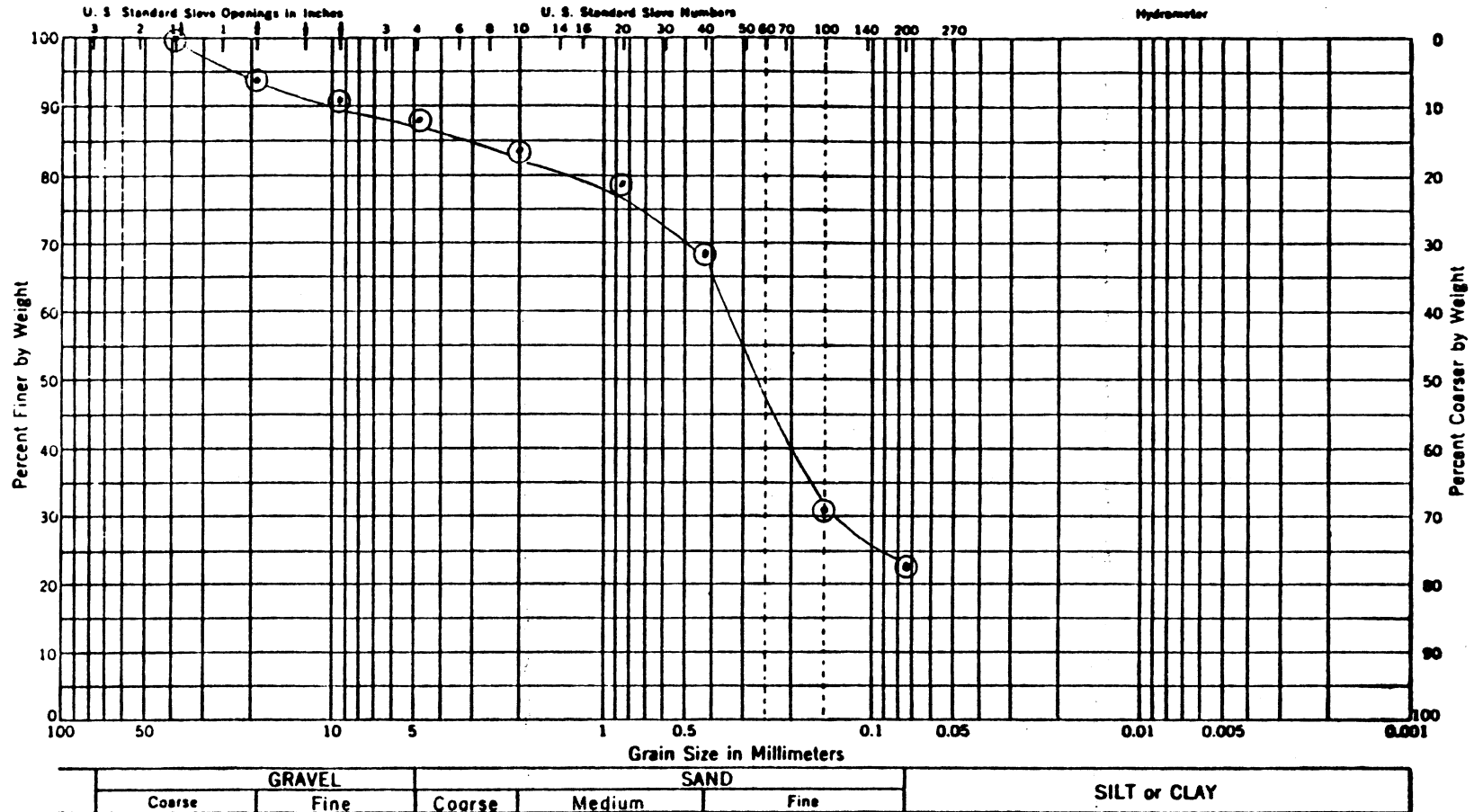
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-11	8.7				Silty fine to coarse sand (SM)				
S-3						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
20.6-22.6'									
						DRAWN	APPROVED	DATE	JOB No.
						JJT.	JAS	4-2-84	12959

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-11	8.6				Silty fine to coarse sand (SM)				
S-4						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
30.5-32.5'									
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

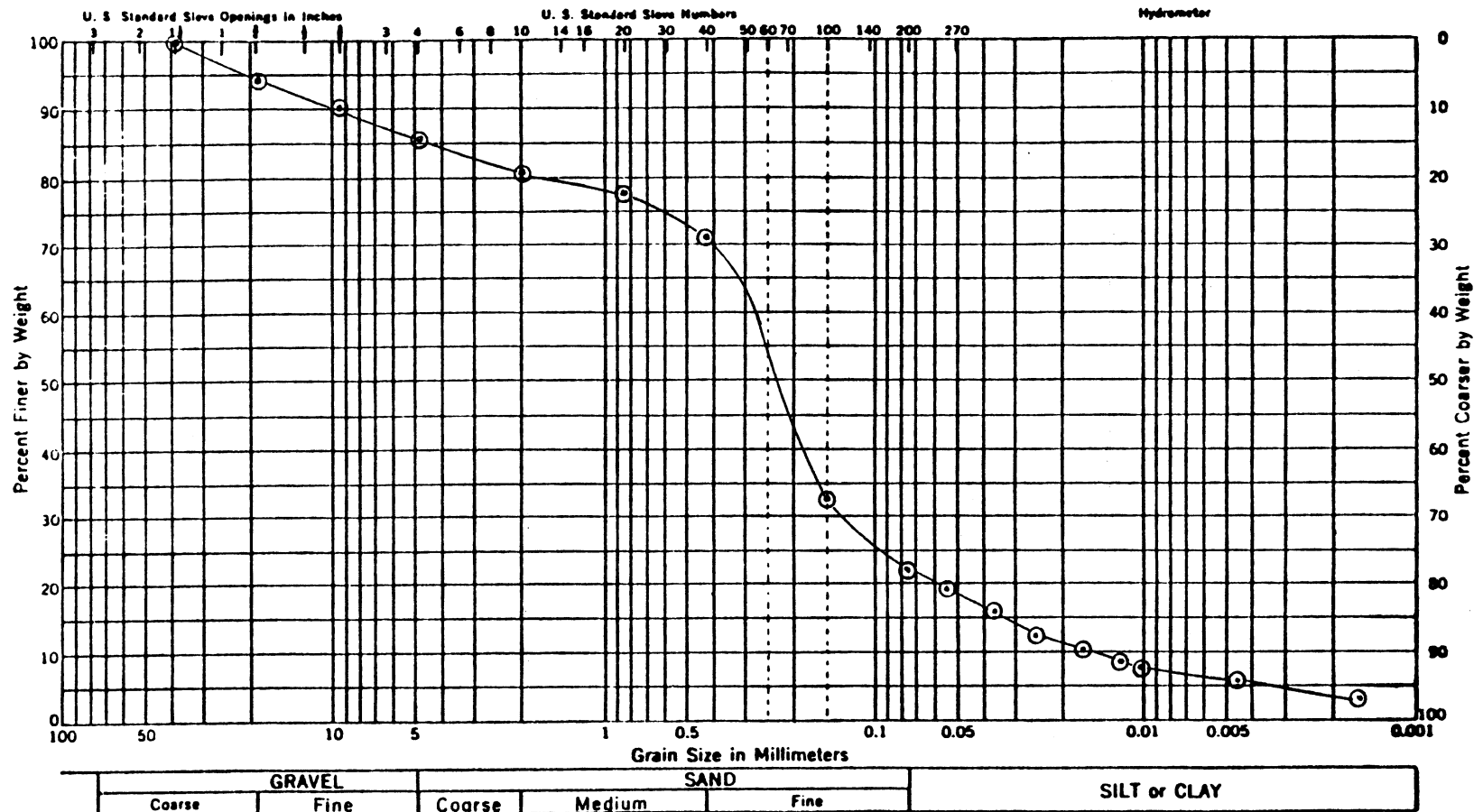
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY Grain Size Analysis Crandon Project			
EX 11	9.0				Silty fine to coarse sand (SM)				
S-5									
41.0 - 45.0'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-16-84	12959

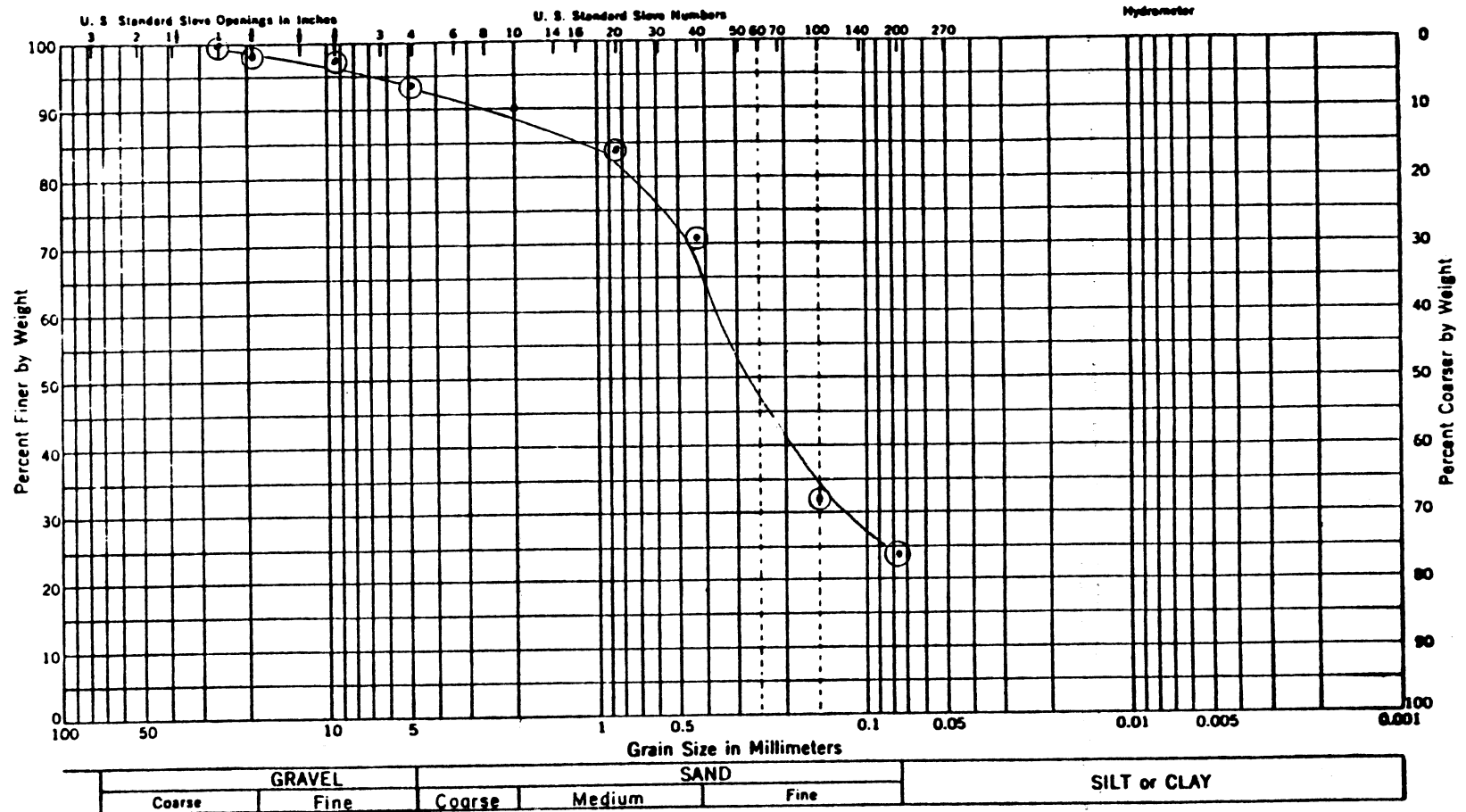
3.5-19-126

UNIFIED CLASSIFICATION SYSTEM

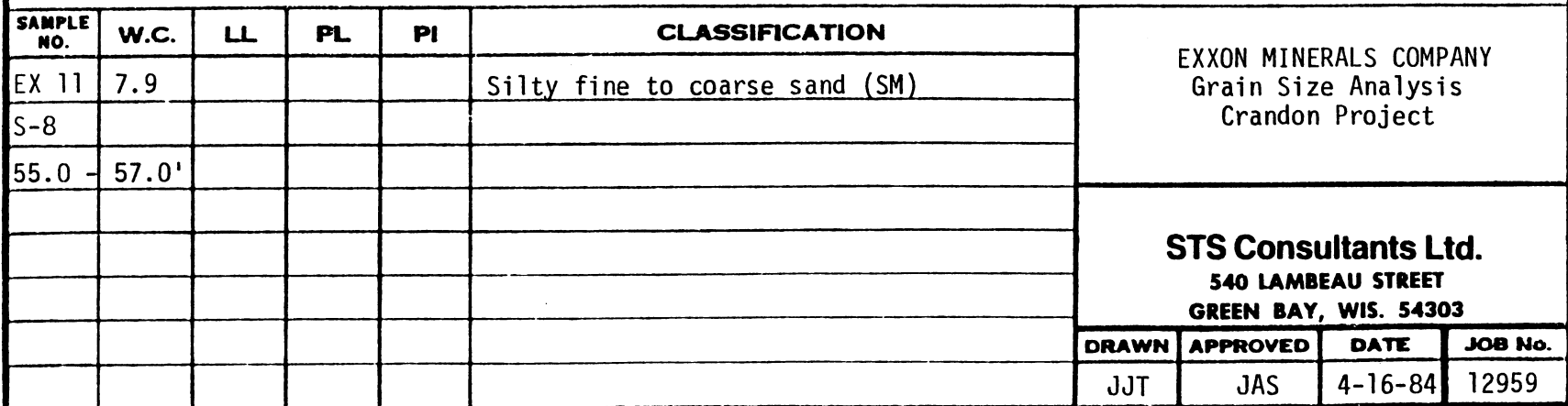


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
EX-11	9.0				Silty fine to coarse sand (SM)				
S-6									
45.0-49.0'									
						DRAWN APPROVED DATE JOB No. JJT JAS 4-2-84 12959			

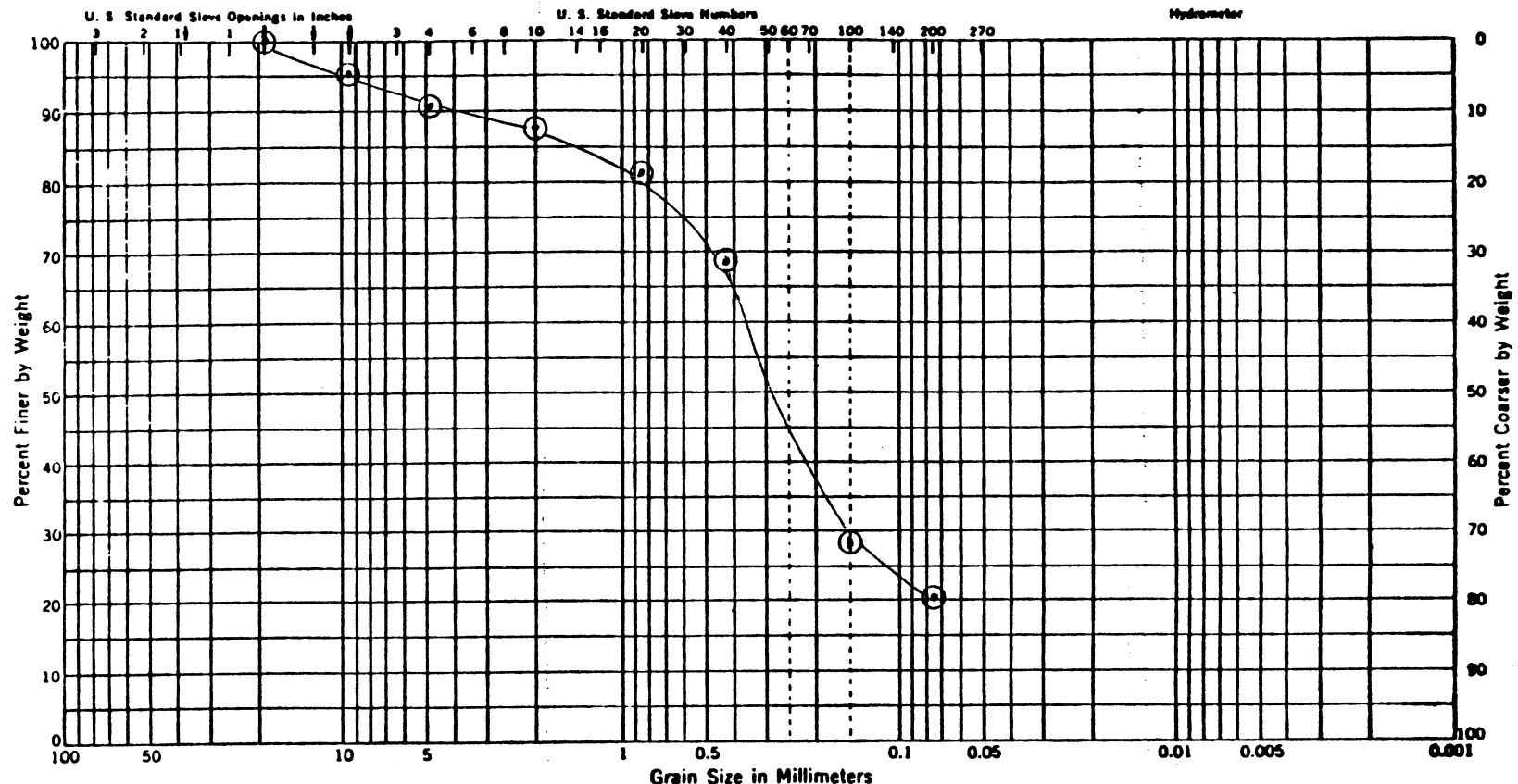
UNIFIED CLASSIFICATION SYSTEM



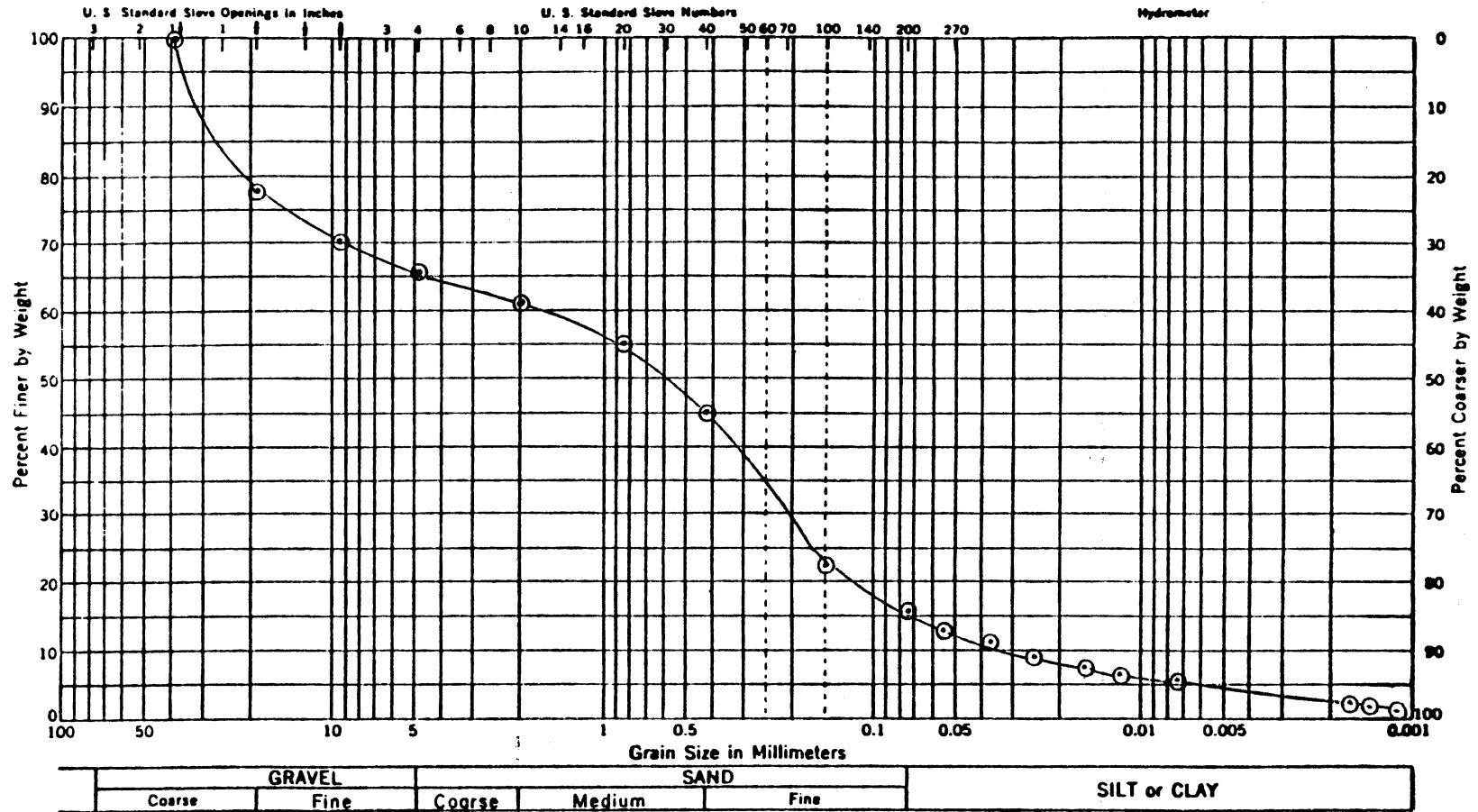
3.5-19-129



UNIFIED CLASSIFICATION SYSTEM



UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-11	8.2				Silty fine to coarse sand (SM)
S-10					
65.0-69.0'					

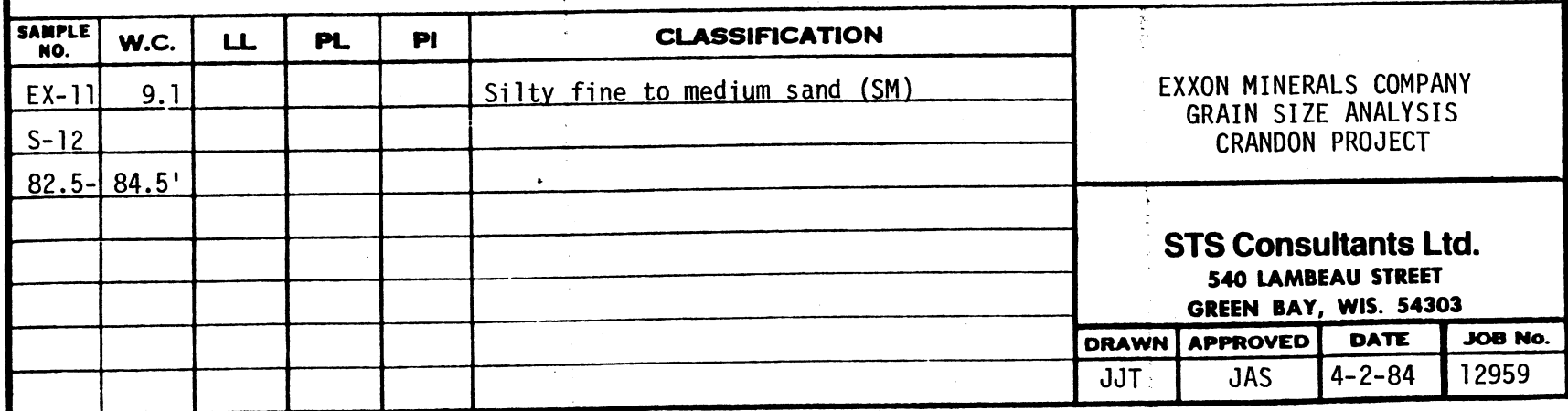
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

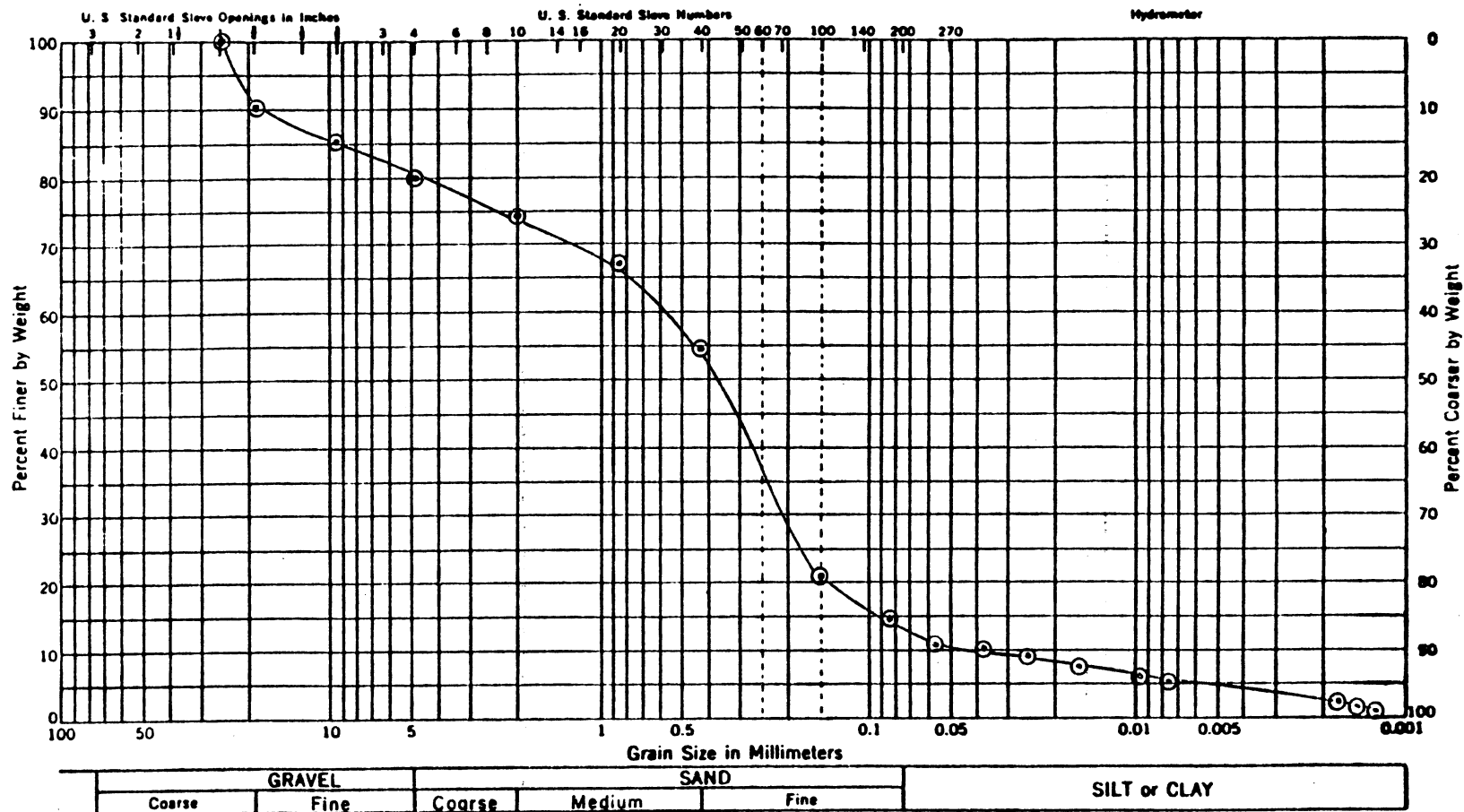
DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

3.5-19-131

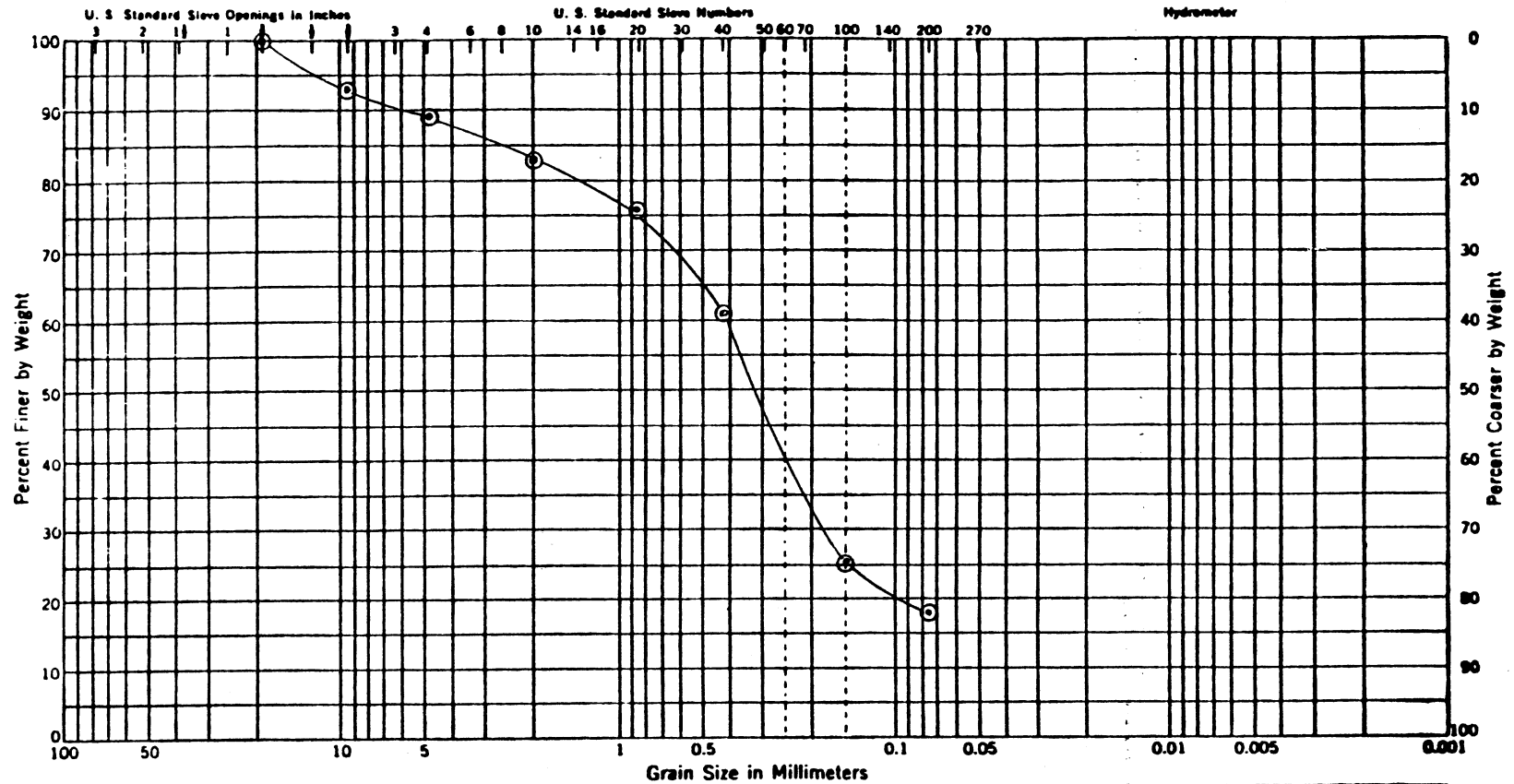
3.5-19-132



UNIFIED CLASSIFICATION SYSTEM



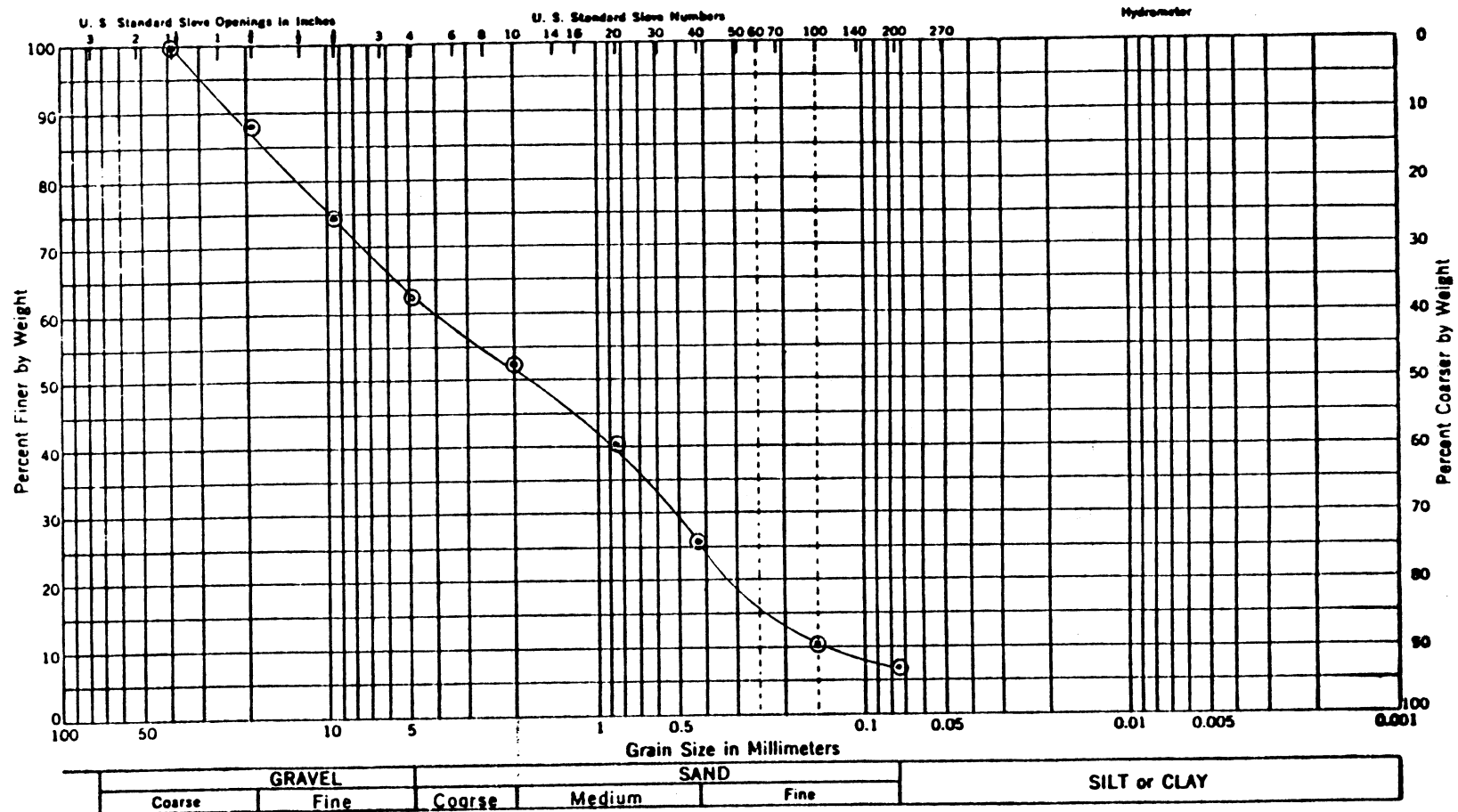
UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-11	7.8				Silty fine to coarse sand (SM)				
S-19									
154.0-156.0'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

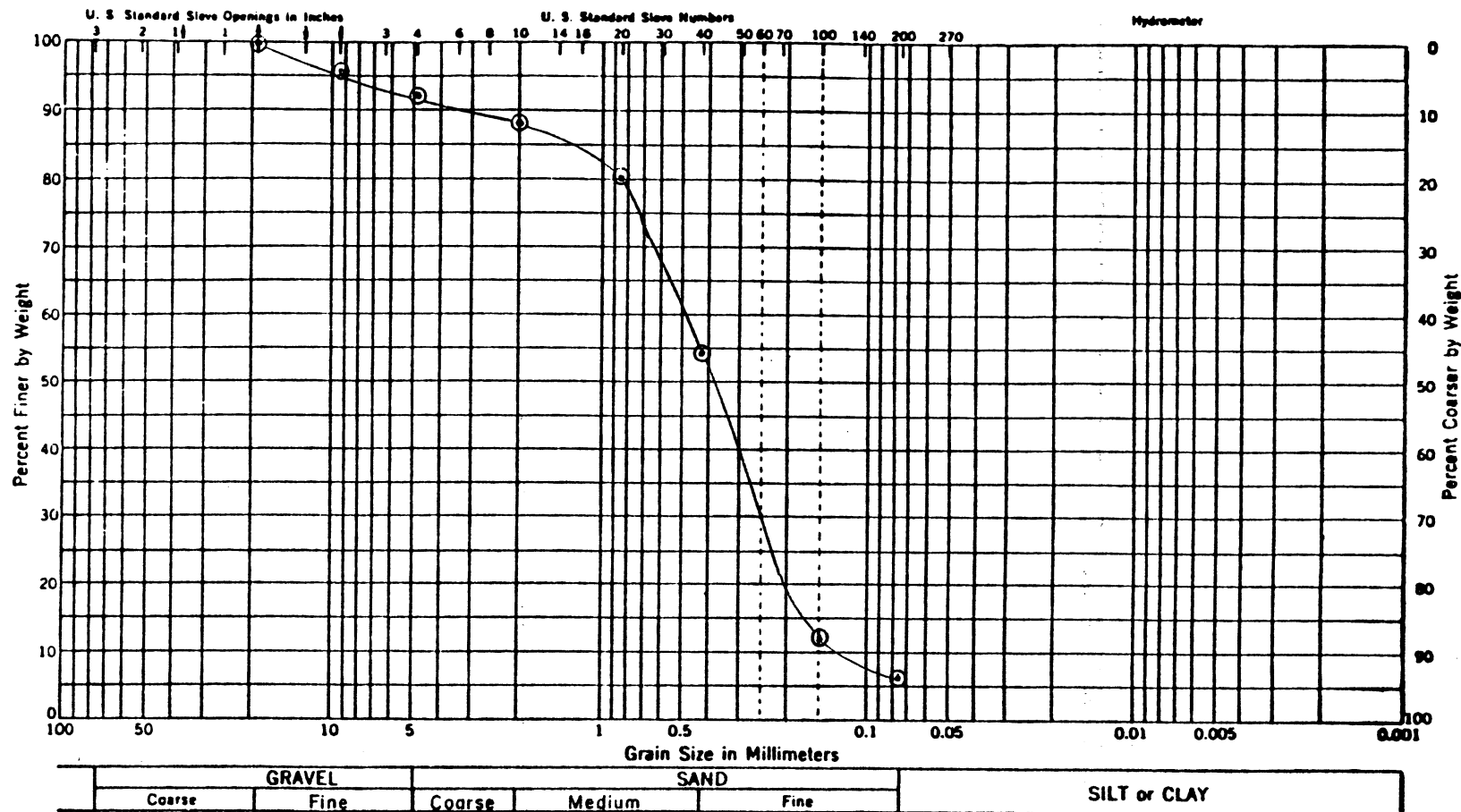
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-11	6.2				Slightly silty fine to coarse sand (SM-SP)				
S-20						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
164.5-166.5'									
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

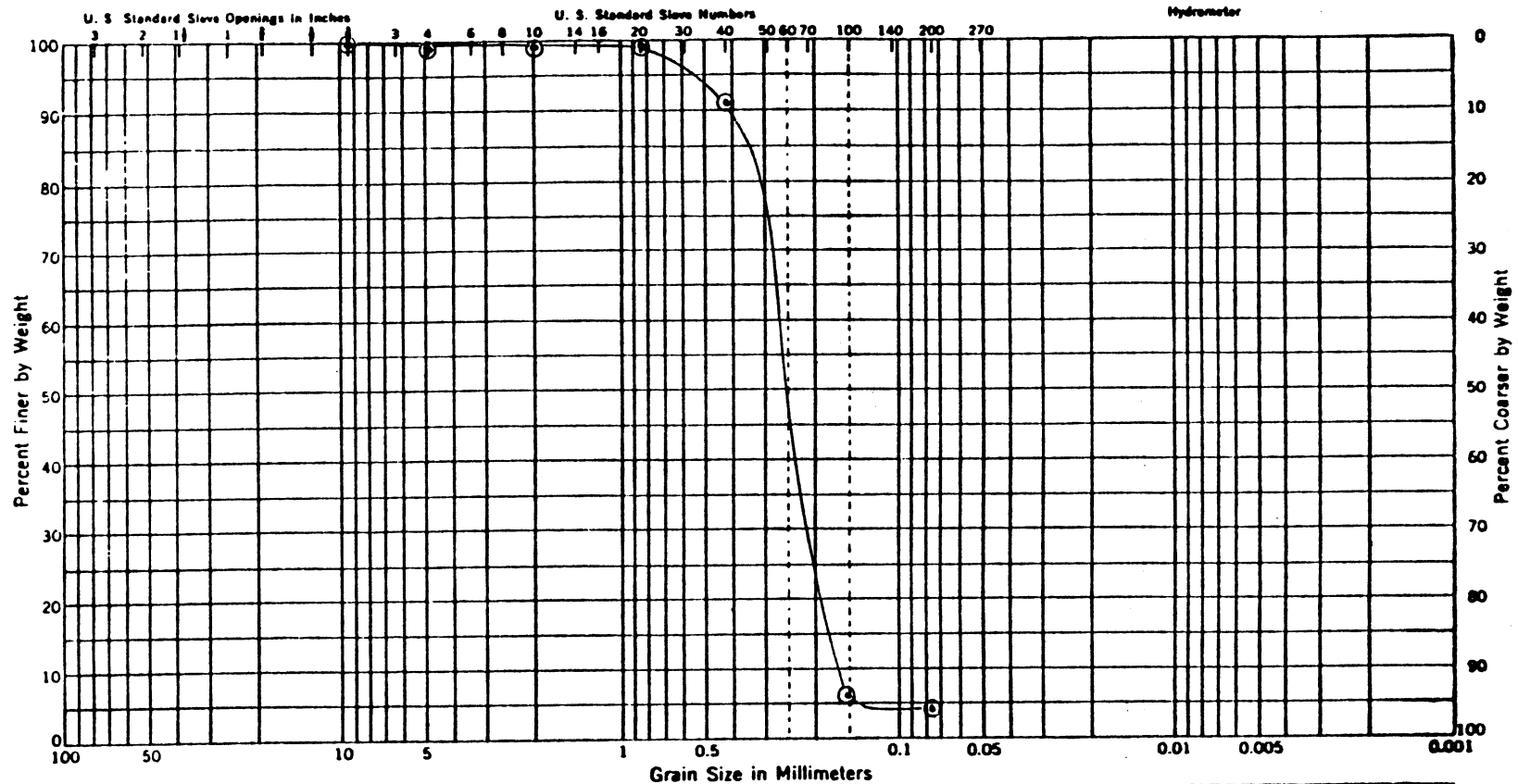
3.5-19-135

UNIFIED CLASSIFICATION SYSTEM

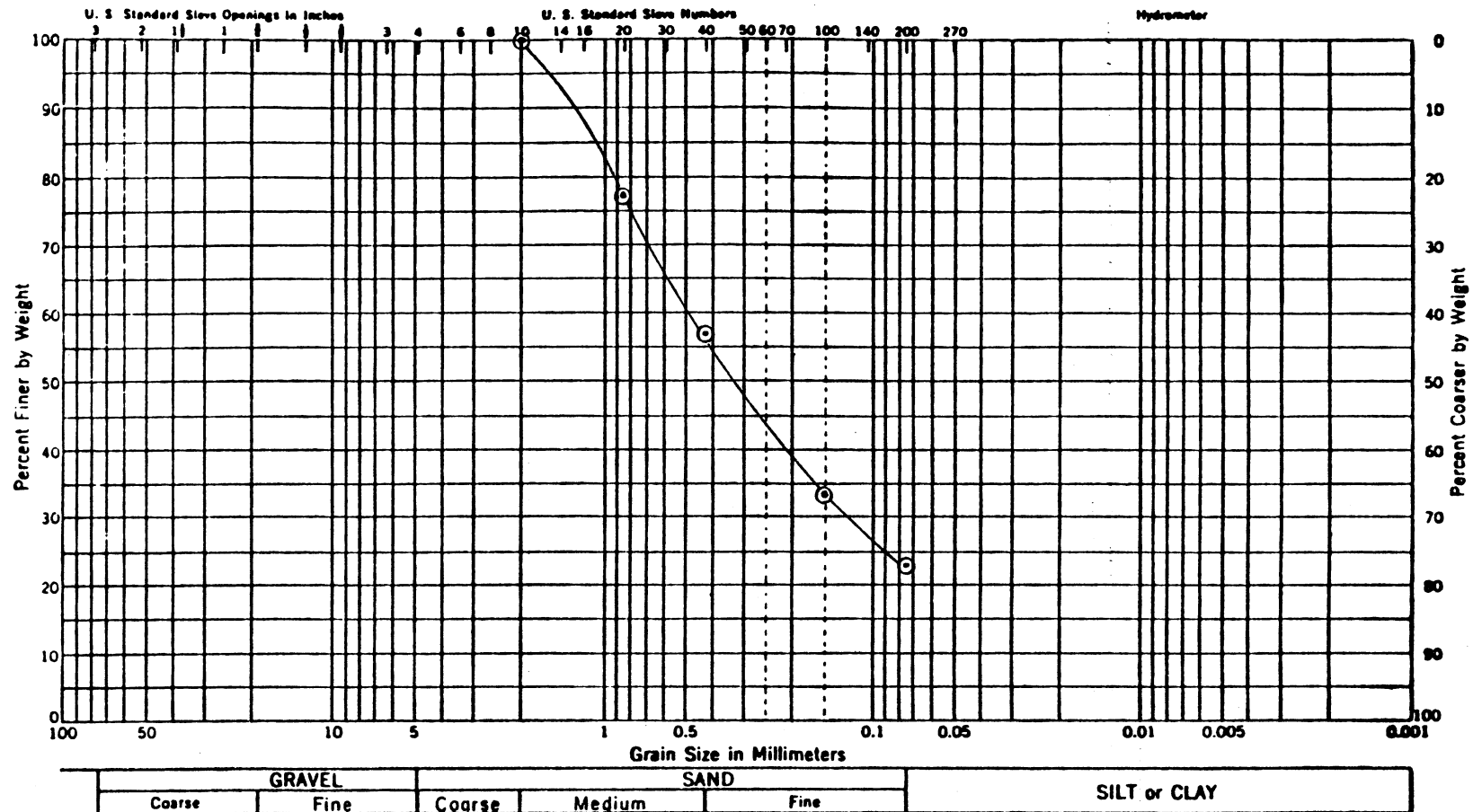


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-11	11.6				Slightly silty fine to coarse sand (SM-SP)				
S-22									
185.0-187.0'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

UNIFIED CLASSIFICATION SYSTEM

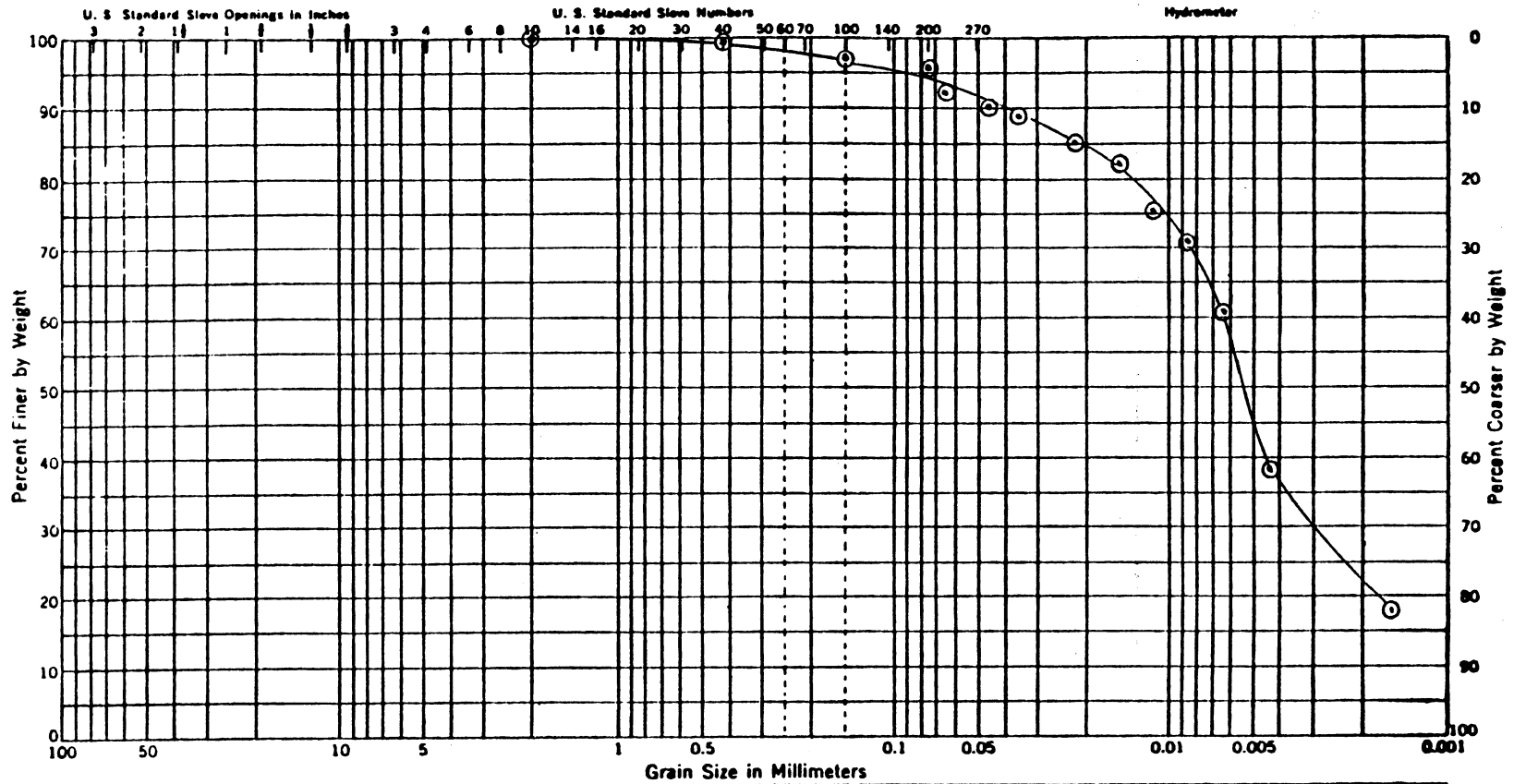


UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-11	22.2				Silty fine to medium sand (SM)				
S-27									
236.0-237.0						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-11	23.6				Silty clay (CL)
S-29					
256.5-258.5'					

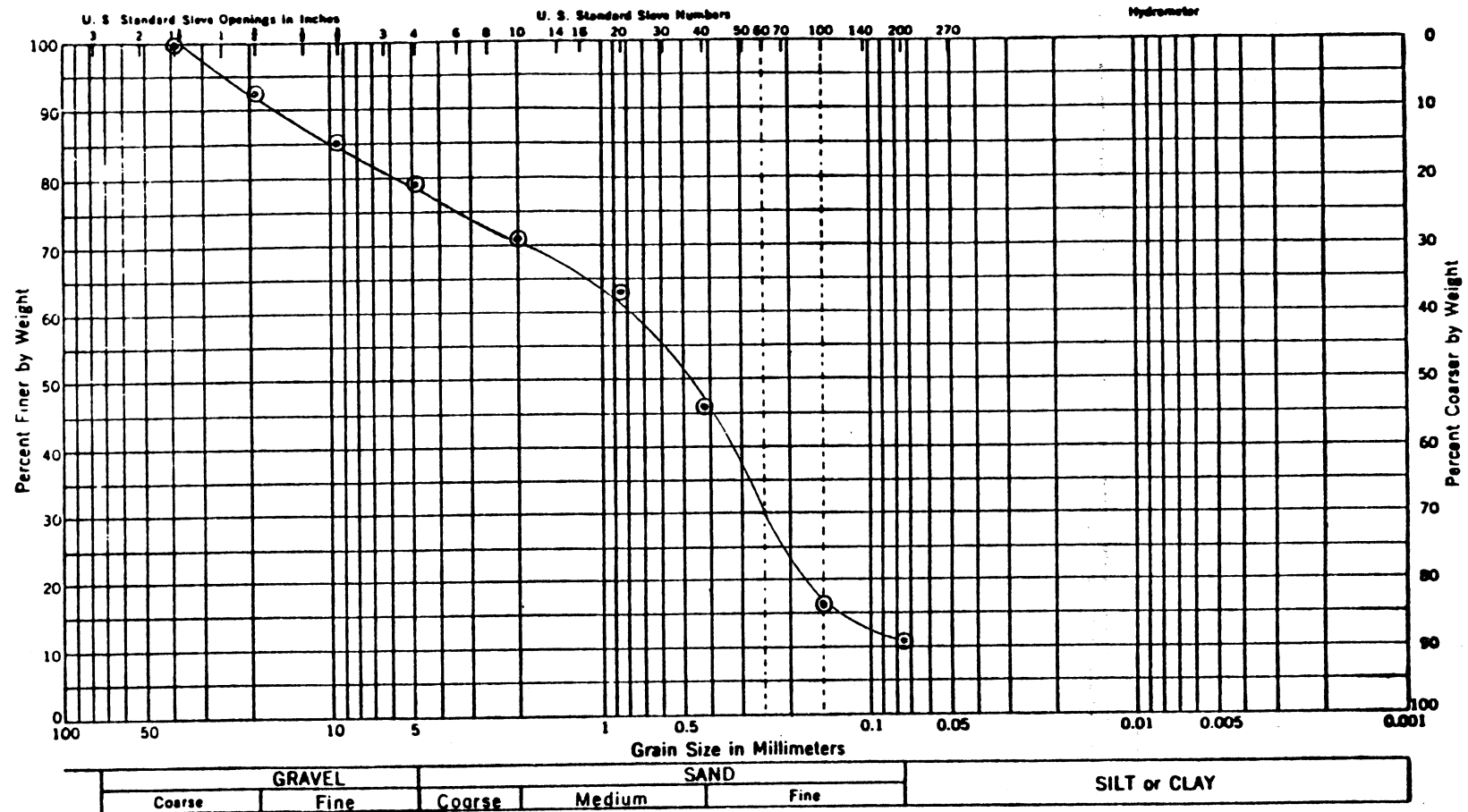
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

3.5-19-139

UNIFIED CLASSIFICATION SYSTEM

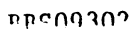


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-11	9.6				Slightly silty fine to coarse sand (SM-SP)				
S-30									
267.0-269.0									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

3.5-19-140

3.5-19-141

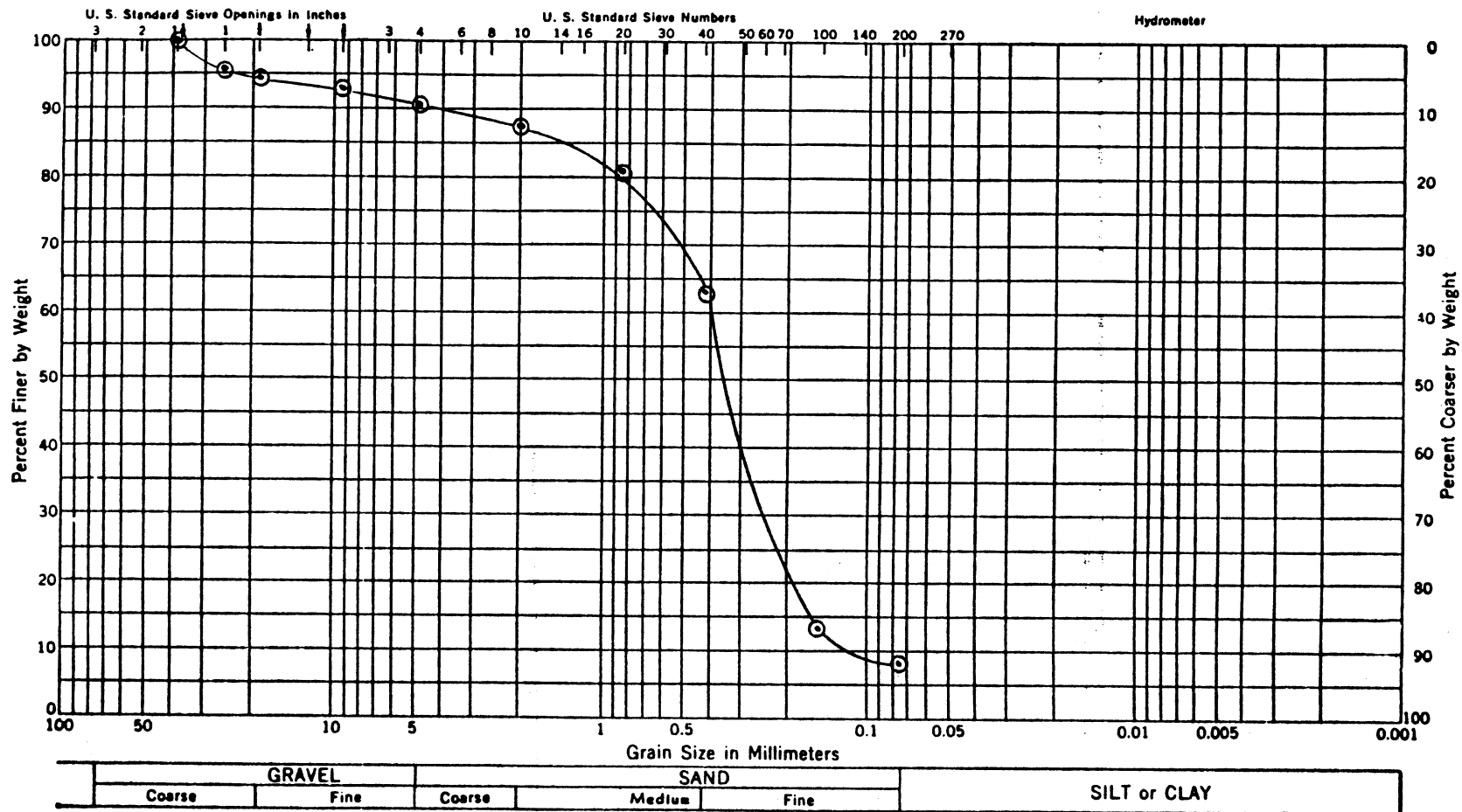


EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

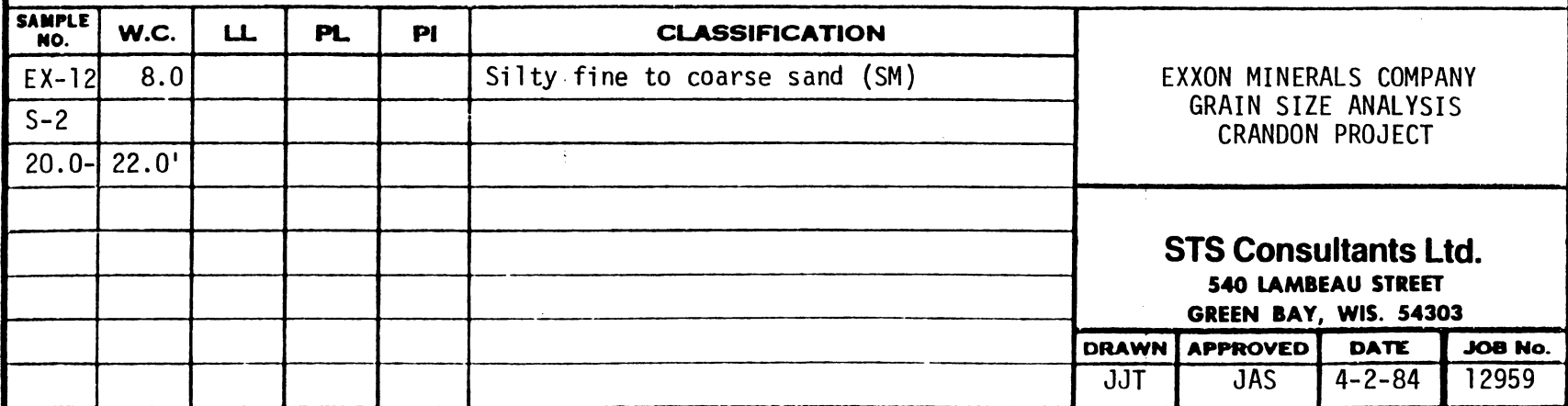
DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

3.5-19-142

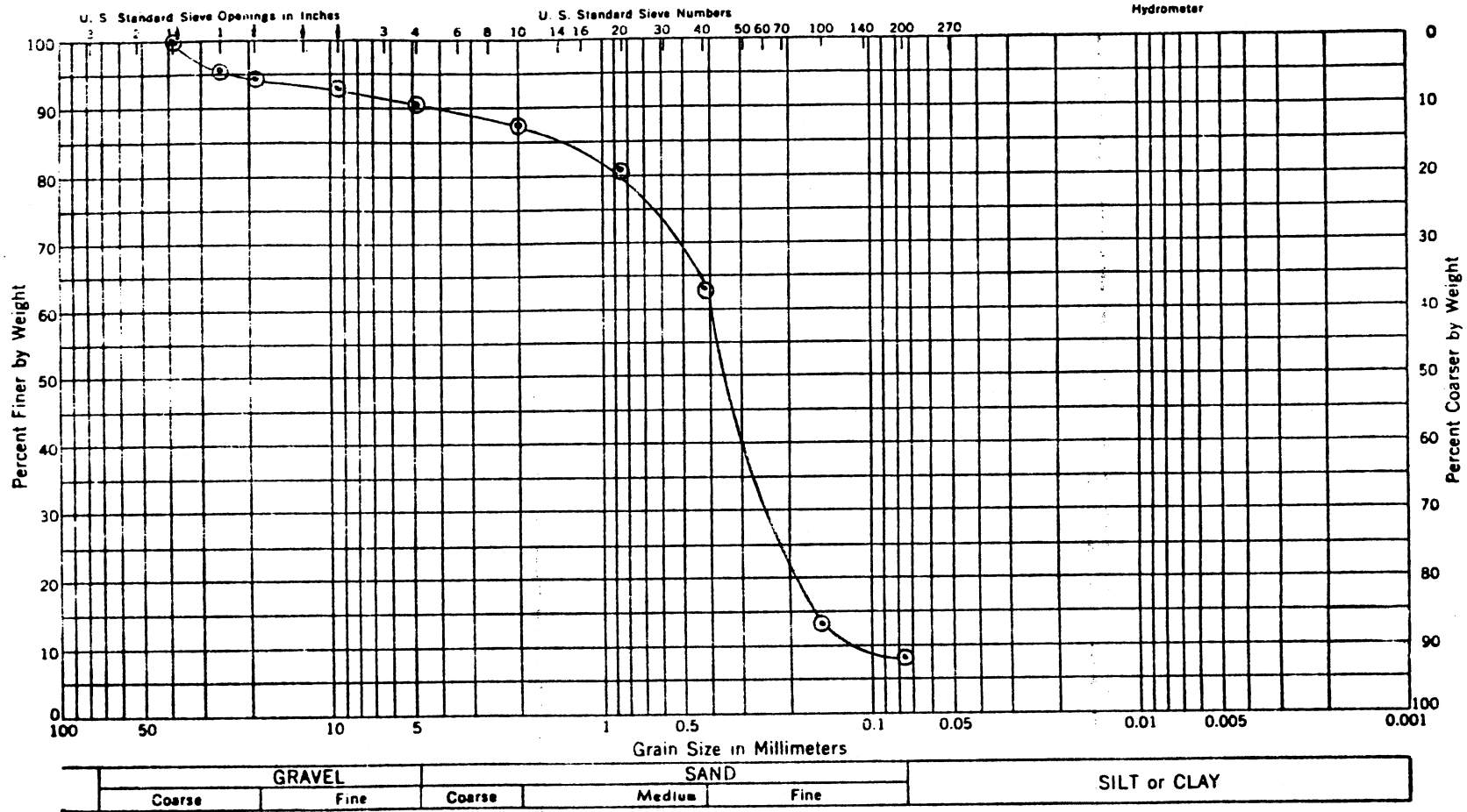


BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX12	S-1	10-12'							Slightly silty				
									fine to coarse				
									sand (SM-SP)				
									W.C. 12.1	STS CONSULTANTS LTD.			
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SMI	JAS	3-24-84	12959

3.5-19-143



3.5-19-144



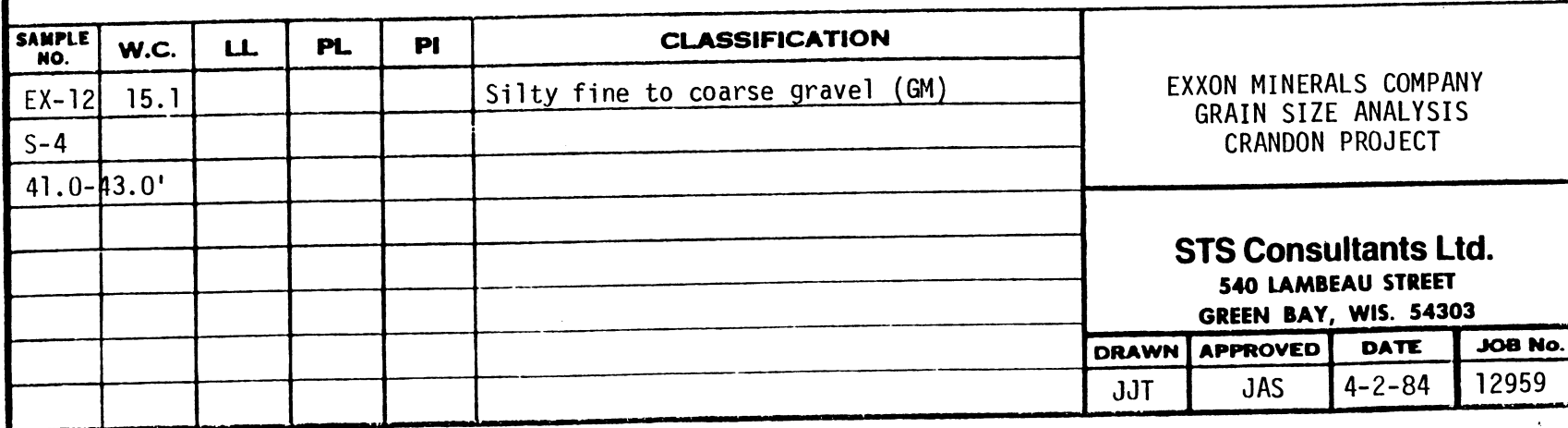
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION
EX12	S-1	10-12'							Slightly silty
									fine to coarse
									sand (SM-SP)
									W.C. 12.1

EXXON MINERALS COMPANY
SIEVE ANALYSIS
CRANDON PROJECT

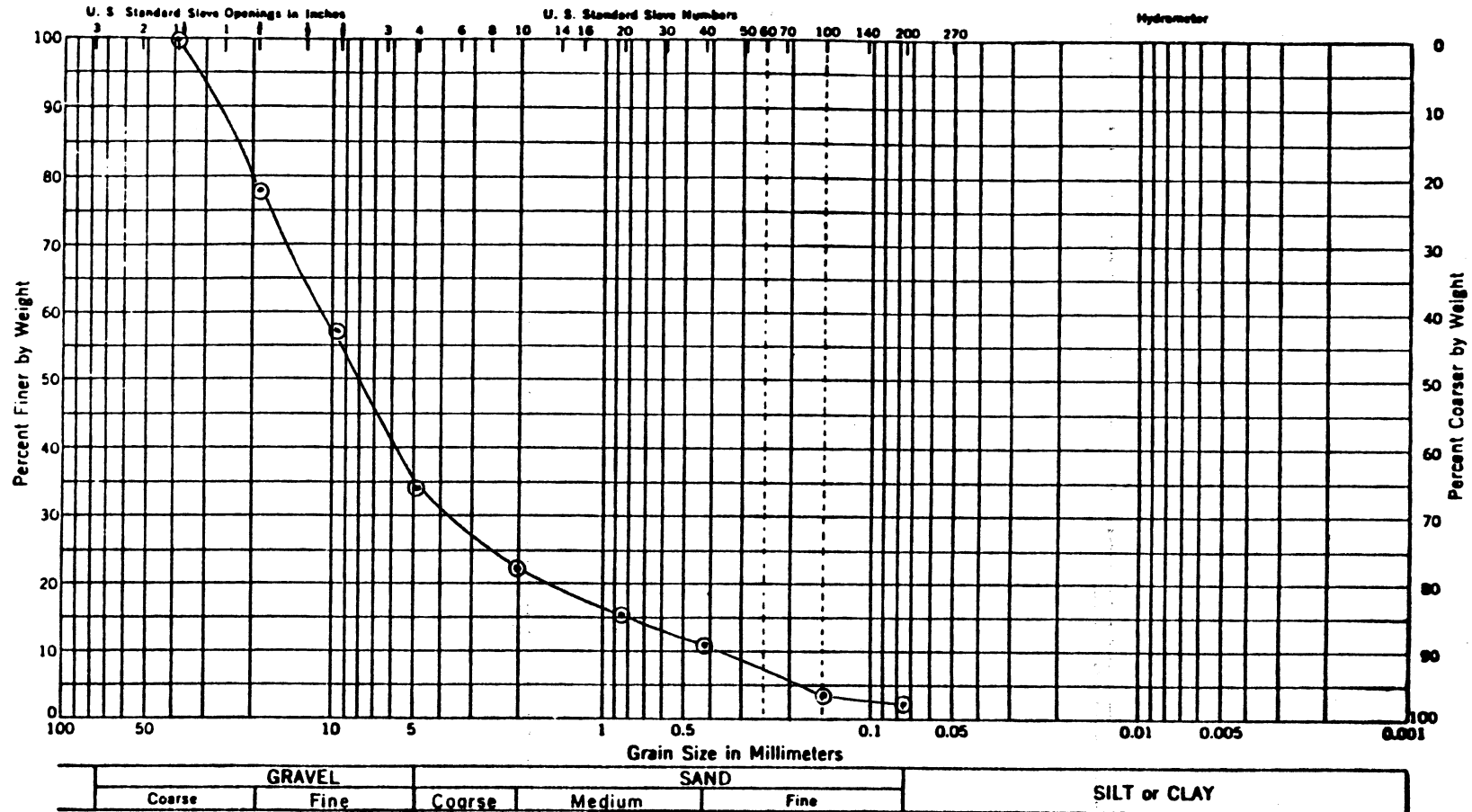
STS CONSULTANTS LTD.

DRAWN	APPROVED	DATE	JOB No.
JJT/SM	JAS	3-24-84	12959

3.5-19-145



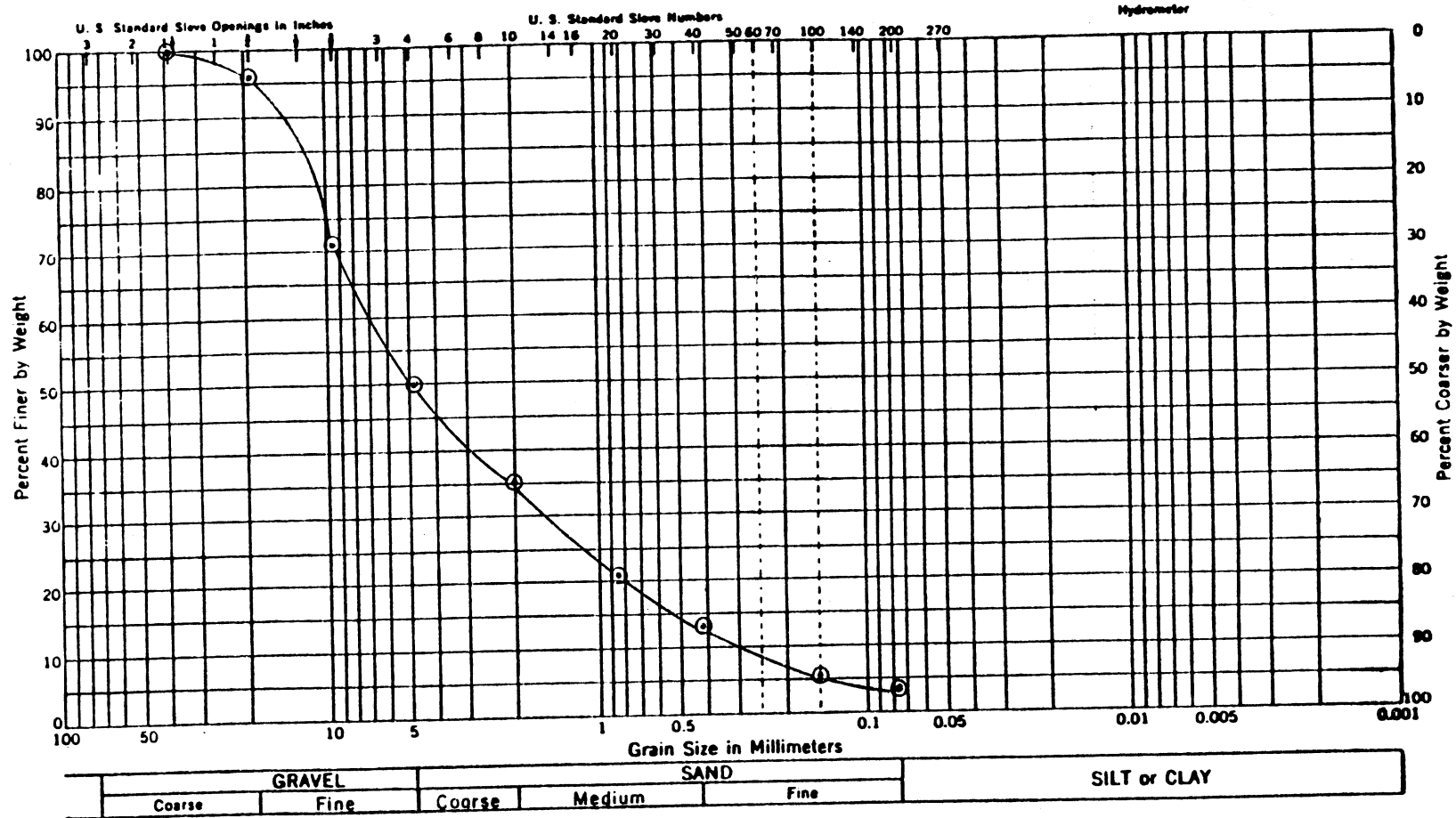
UNIFIED CLASSIFICATION SYSTEM



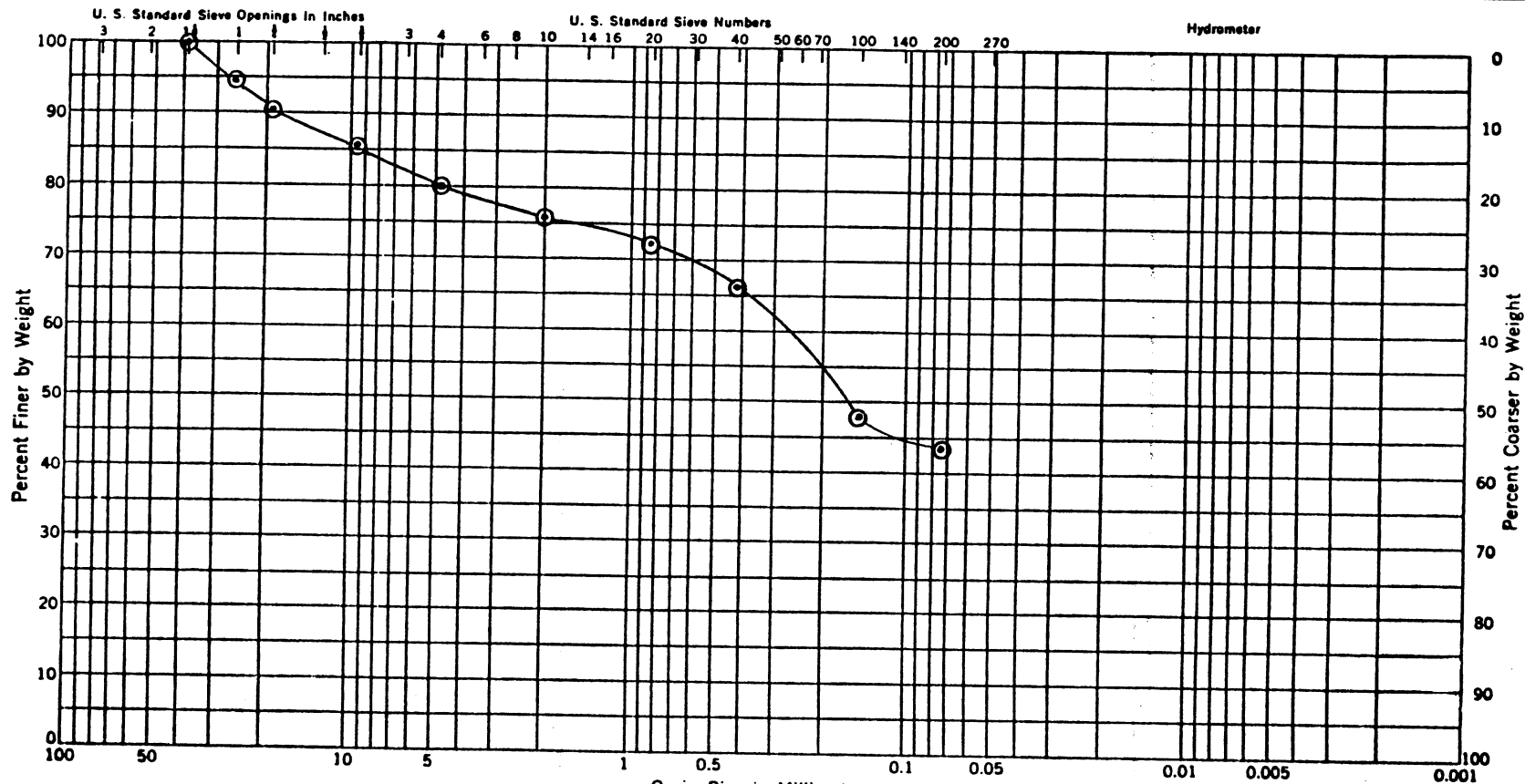
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
EX-12	8.1				Fine to coarse gravel (GW)				
S-5									
48.0-49.0'									
						DRAWN APPROVED DATE JOB No.			
						JJT	JAS	4-2-84	12959

3.5-19-146

UNIFIED CLASSIFICATION SYSTEM



3.5-19-148



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

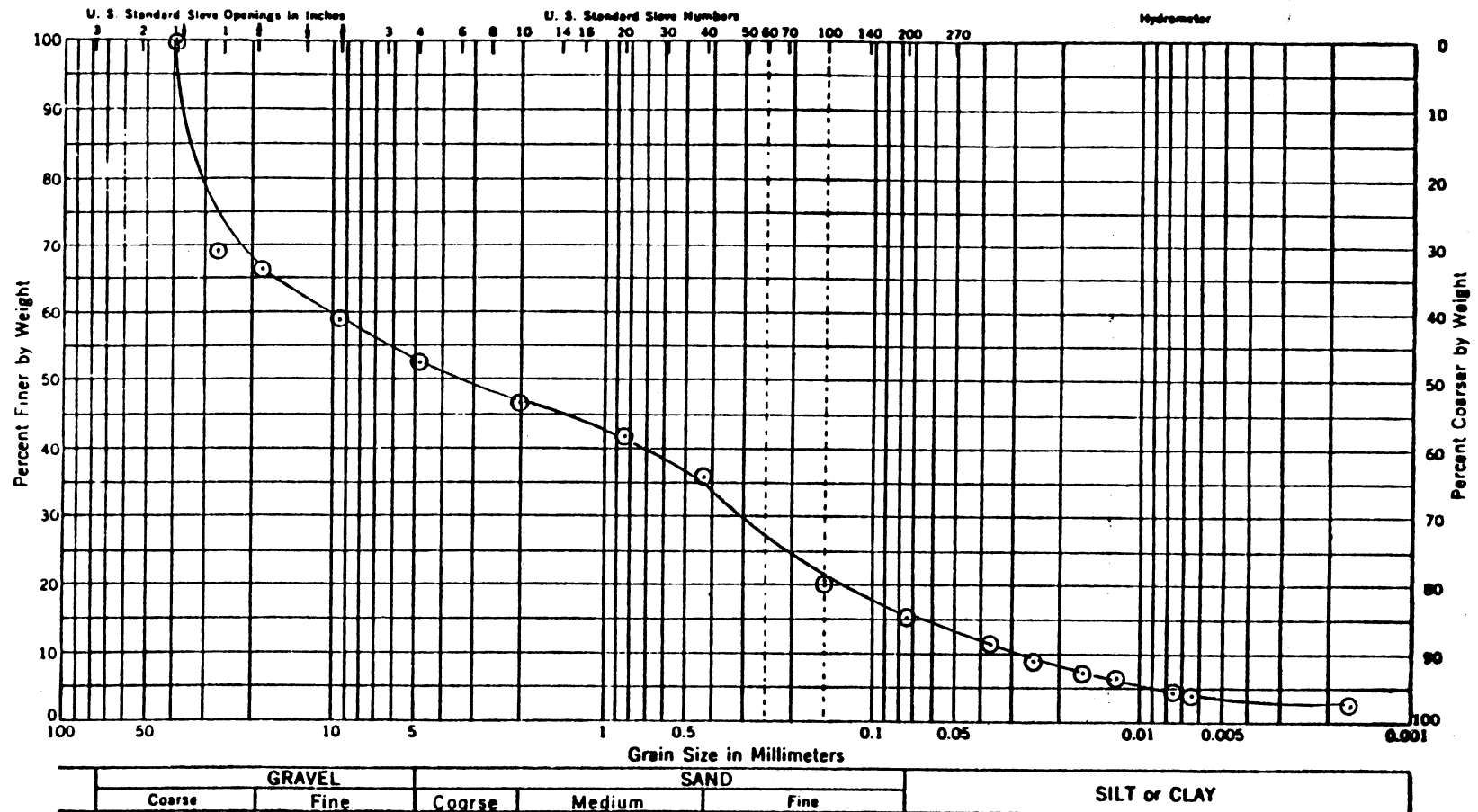
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION
EX12	S-7	69-70.5'							Silty fine to coarse sand (SM)
									W.C. 12.3

EXXON MINERALS COMPANY
SIEVE ANALYSIS
CRANDON PROJECT

STS CONSULTANTS LTD.

DRAWN	APPROVED	DATE	JOB No.
JJT/SM	JAS	3-24-84	12959

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX12	13.0				Silty fine to coarse sand (SM)
S-8					
80-81.5'					

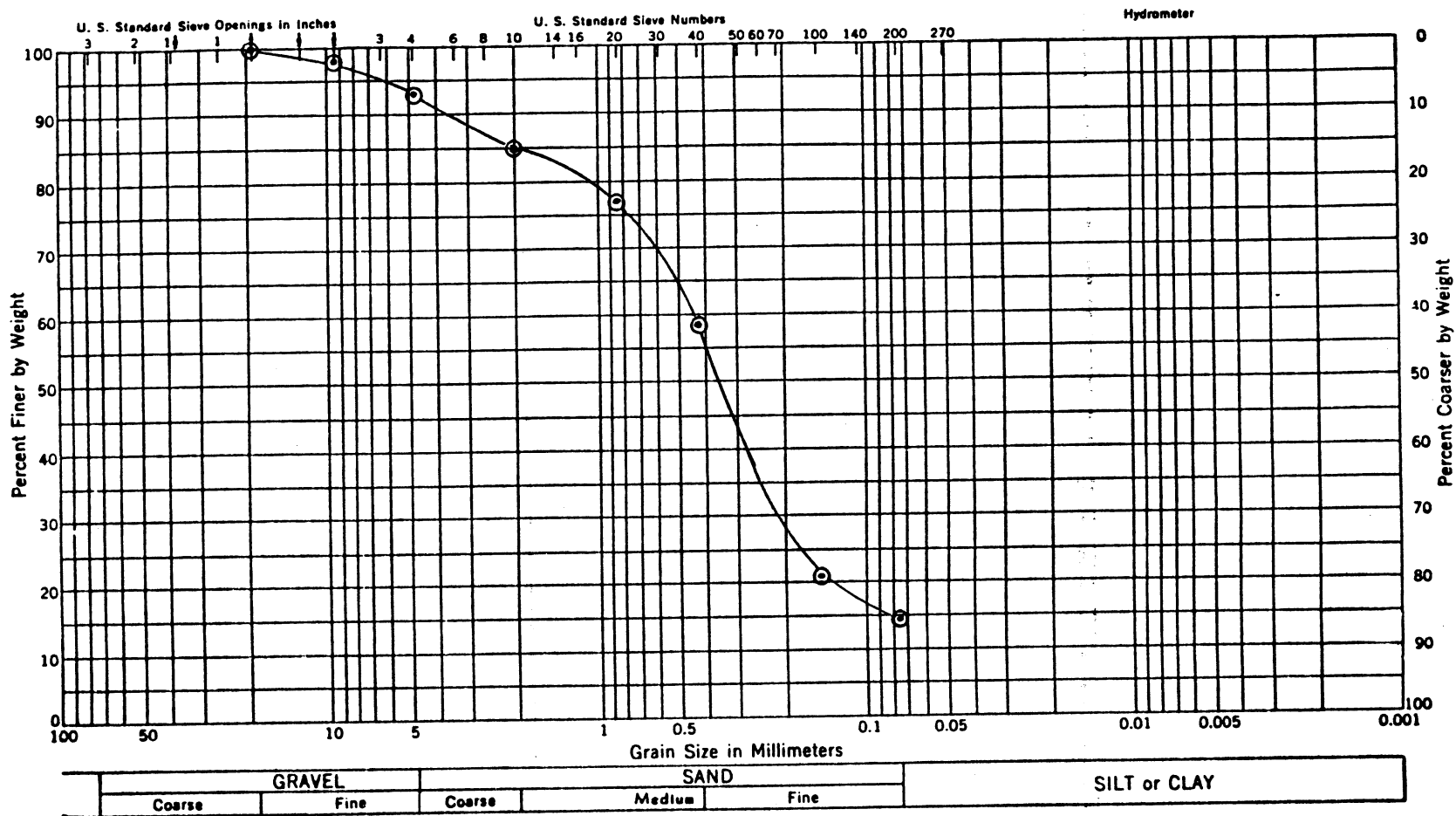
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
K00/SMD	JAS	3-20-84	12959

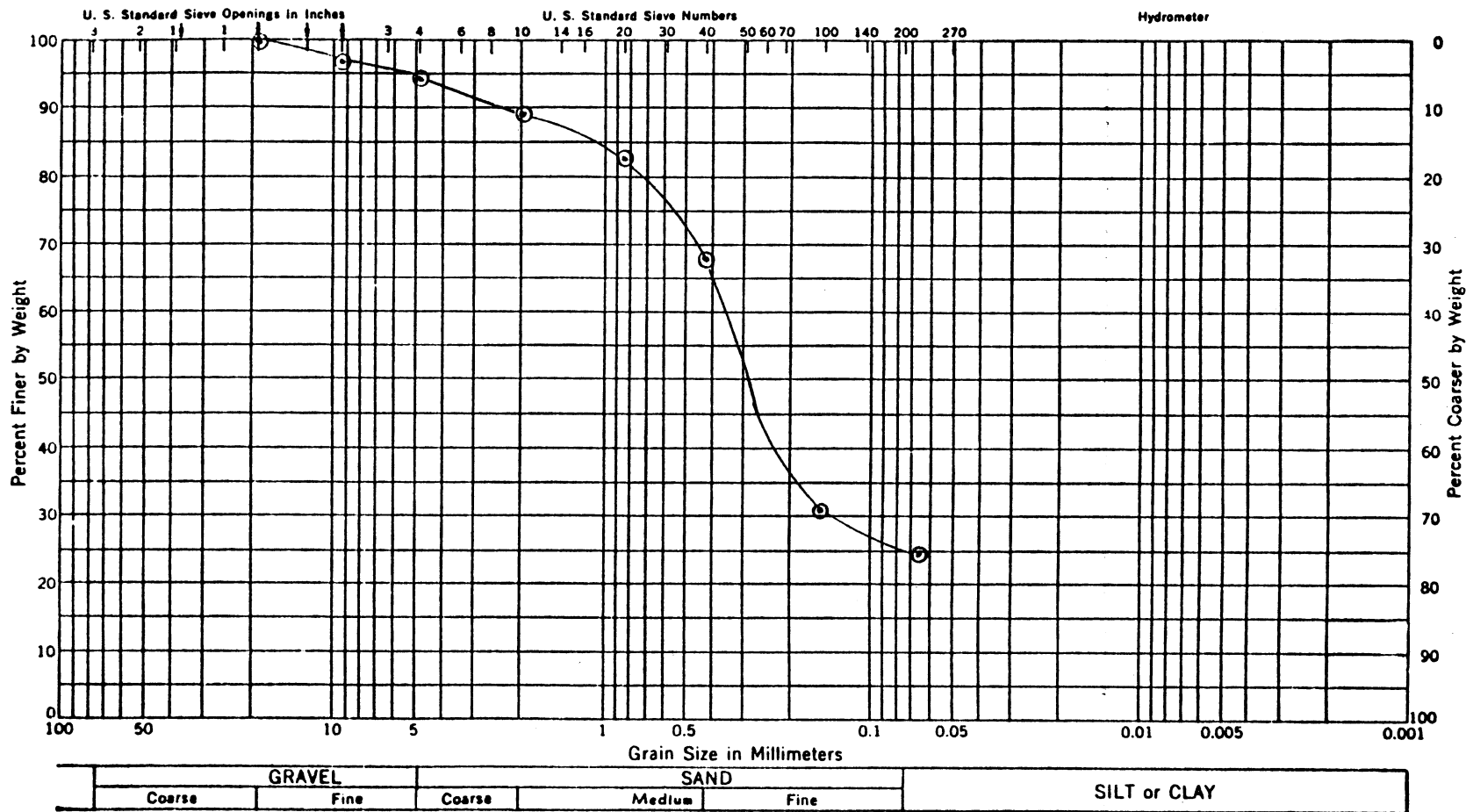
3.5-19-149

3.5-19-150



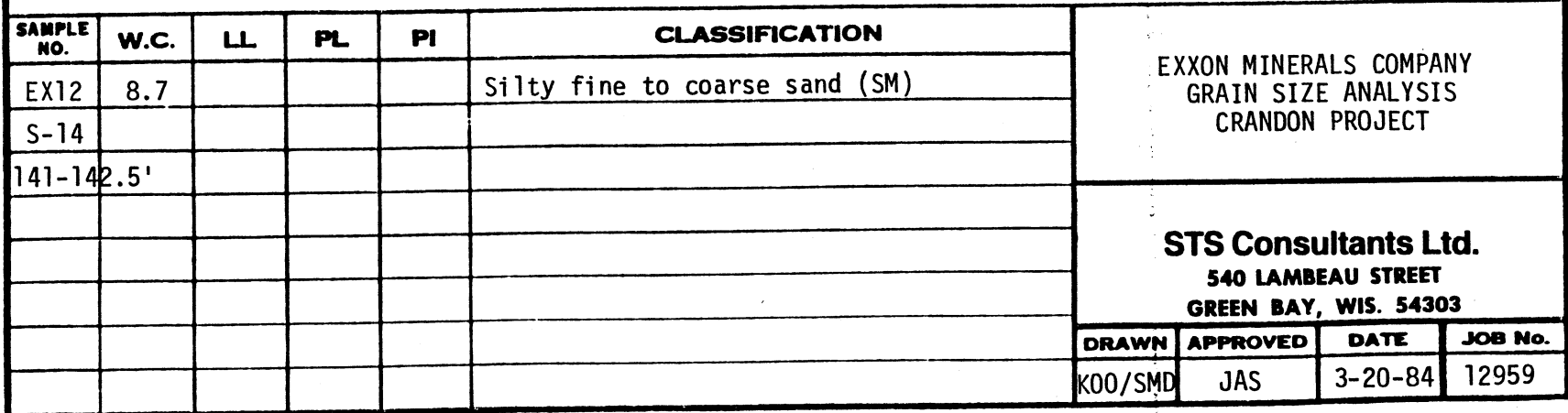
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX12	S-9	90- 91.5'							Silty fine to coarse sand (SM)				
									W.C. 19.7				
										STS CONSULTANTS LTD.			
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SMD	JAS	3-24-84	12959

3.5-19-151

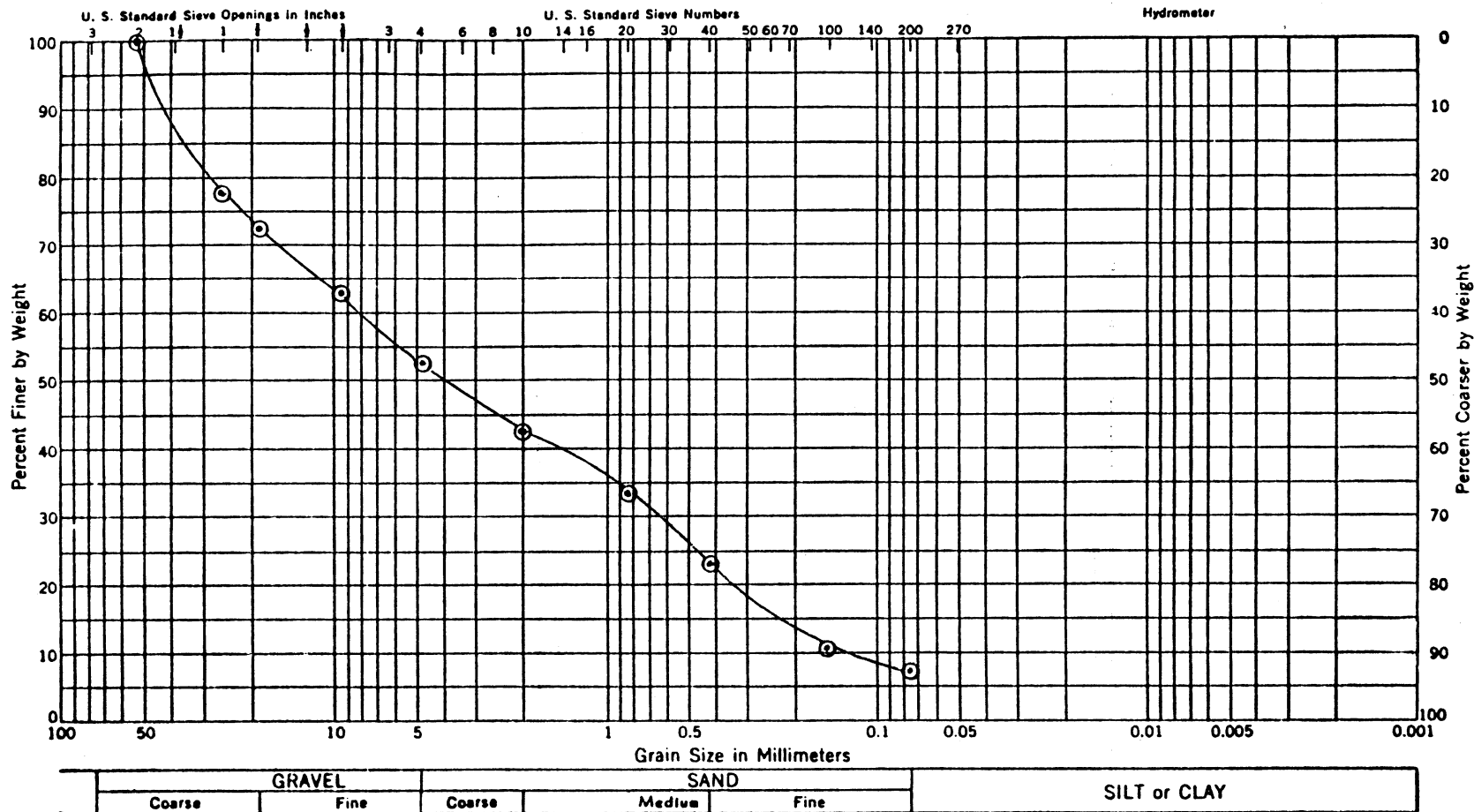


BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX12	S-11	110.5- 112'							Silty fine to				
									coarse sand (SM)				
									W.C. 10.8				
										STS CONSULTANTS LTD.			
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SMD	JAS	3-24-84	12959

3.5-19-152

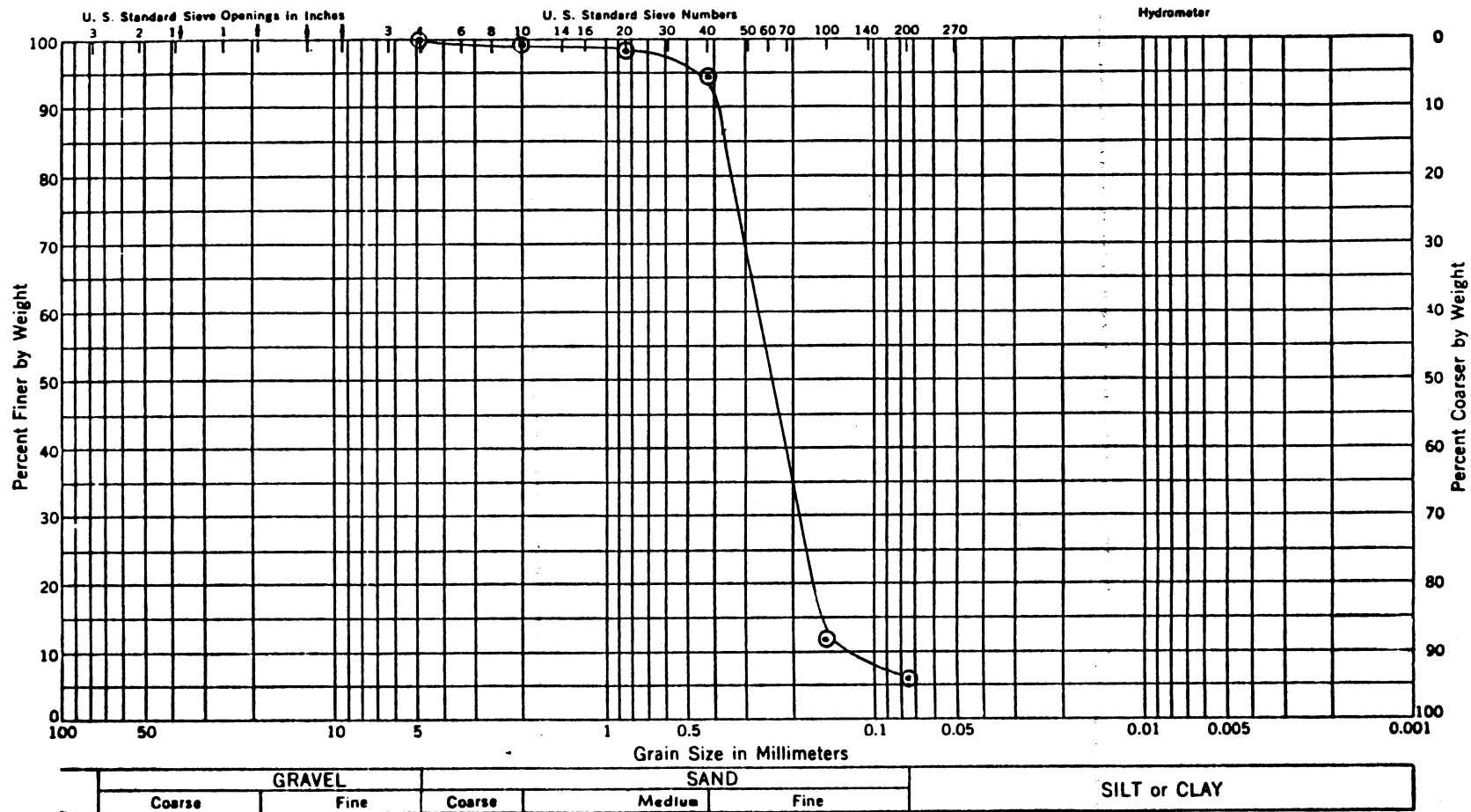


3.5-19-153



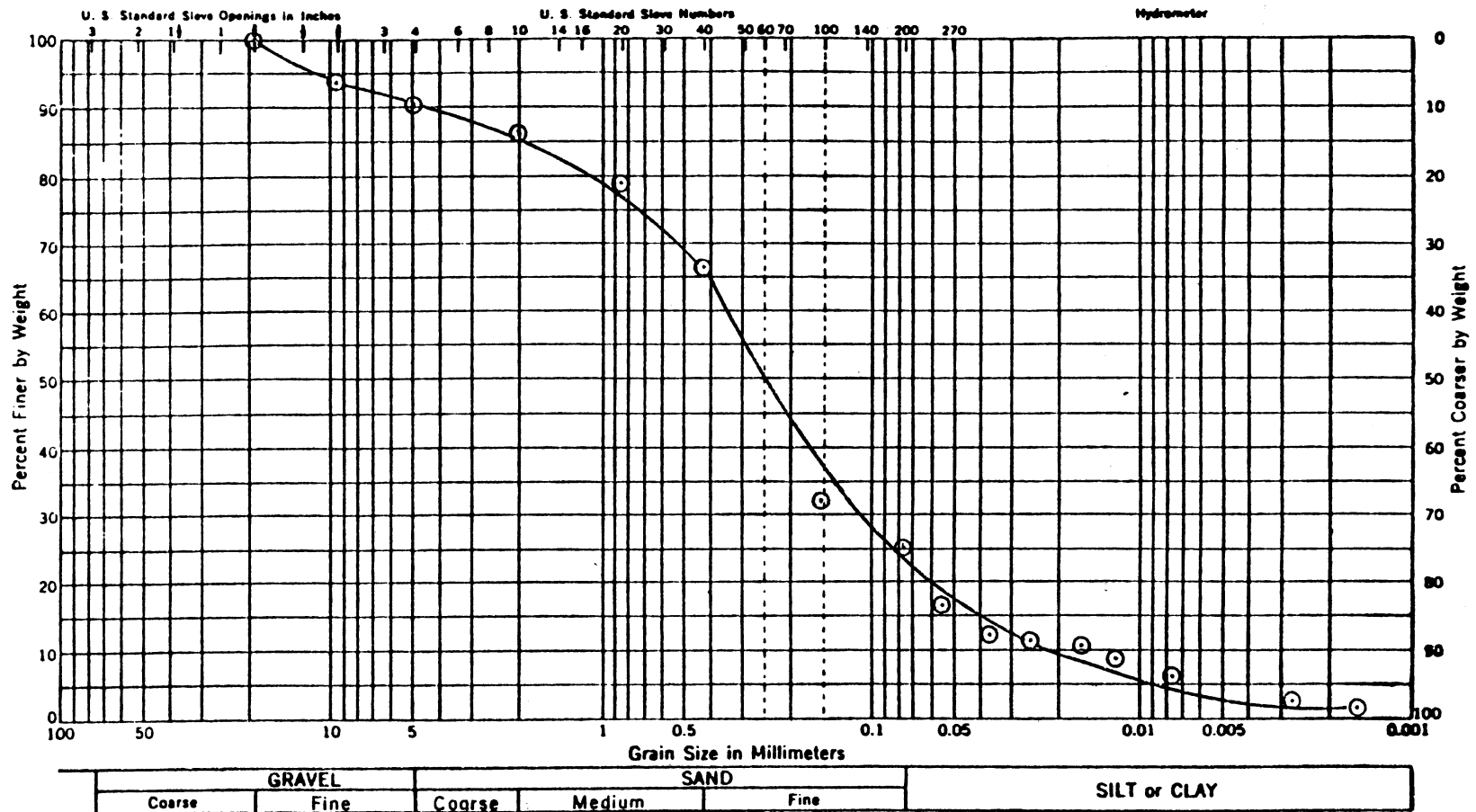
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX12	S-19	192.5-194'							Slightly silty fine to coarse sand (SM-SP)				
									W.C. 10.6	STS CONSULTANTS LTD.			
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SM	JAS	3-24-84	12959

3.5-19-154



BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX12	S-20	203- 204.5'							Slightly silty				
									fine				
									sand (SM-SP)				
										STS CONSULTANTS LTD.			
									W.C. 21.1				
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SM	JAS	3-24-84	12959

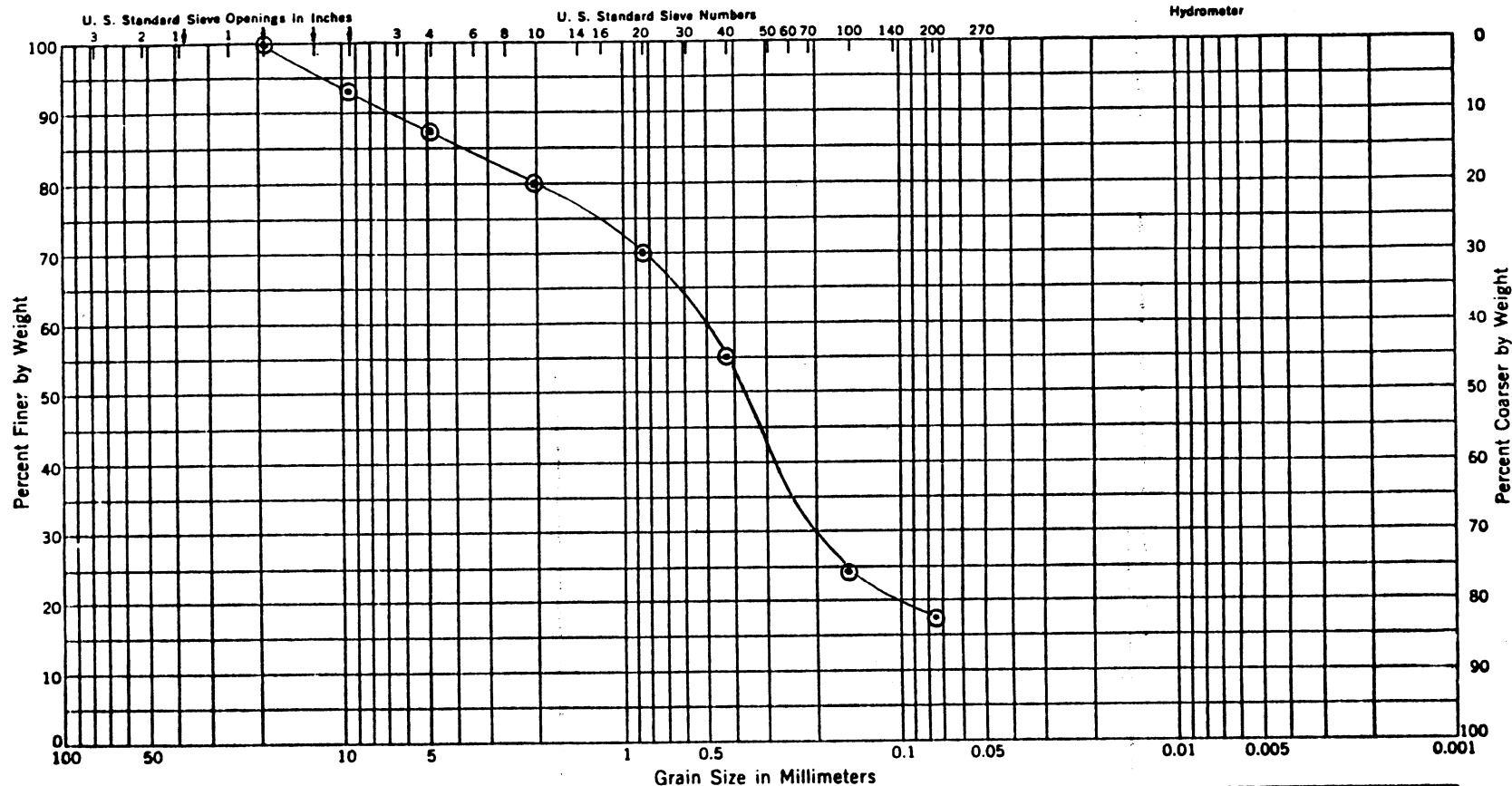
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX12	9.6				Silty fine to coarse sand (SM)				
S-21									
213-214.5'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						KOO/SMD	JAS	3-20-84	12959

3.5-19-155

3.5-19-156



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

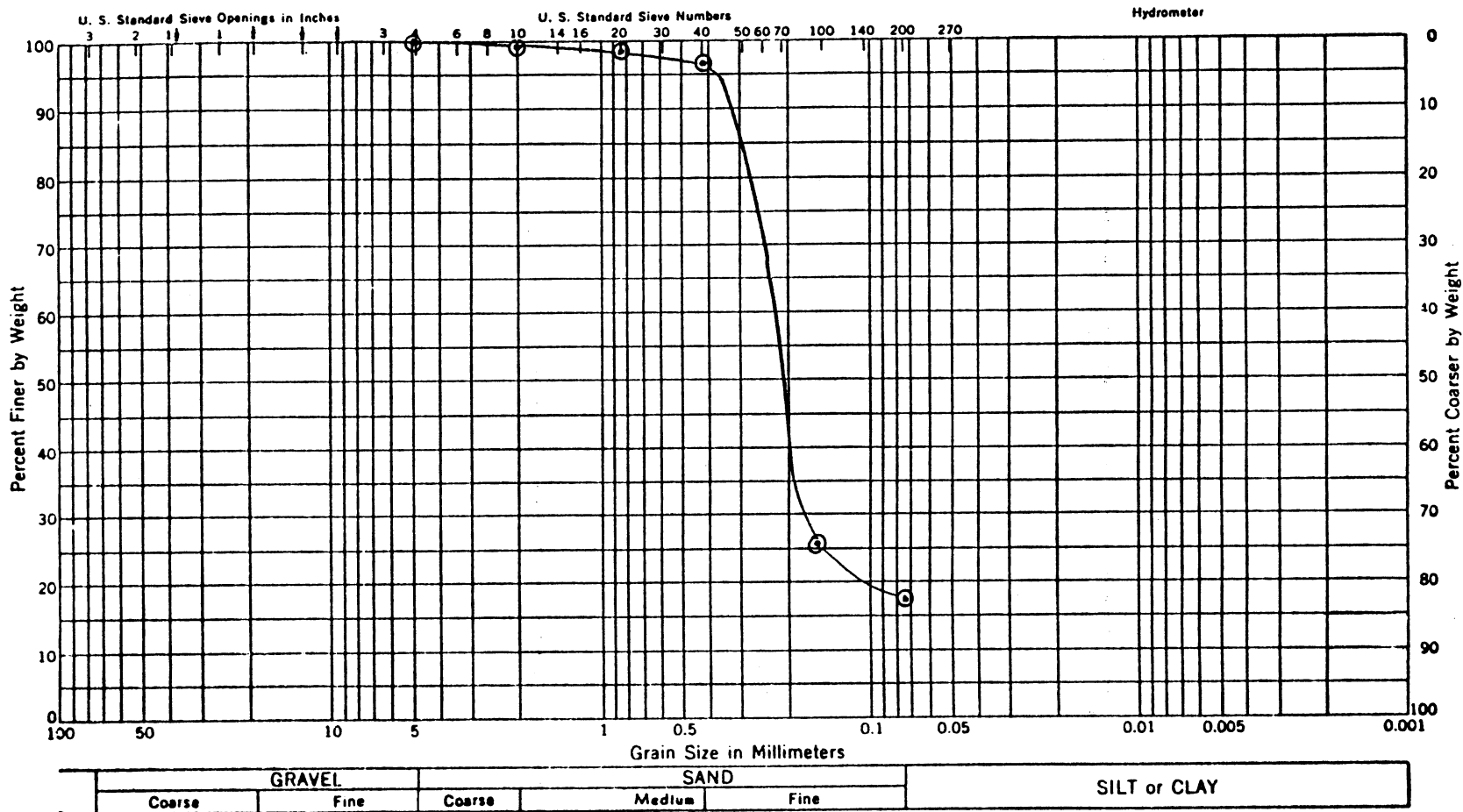
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION
EX12	S-22	223.5-225 ⁱ							Silty fine to coarse sand (SM)
									W.C. 9.1

EXXON MINERALS COMPANY
SIEVE ANALYSIS
CRANDON PROJECT

STS CONSULTANTS LTD.

DRAWN	APPROVED	DATE	JOB No.
JJT/SMD	JAS	3-24-84	12959

3.5-19-157



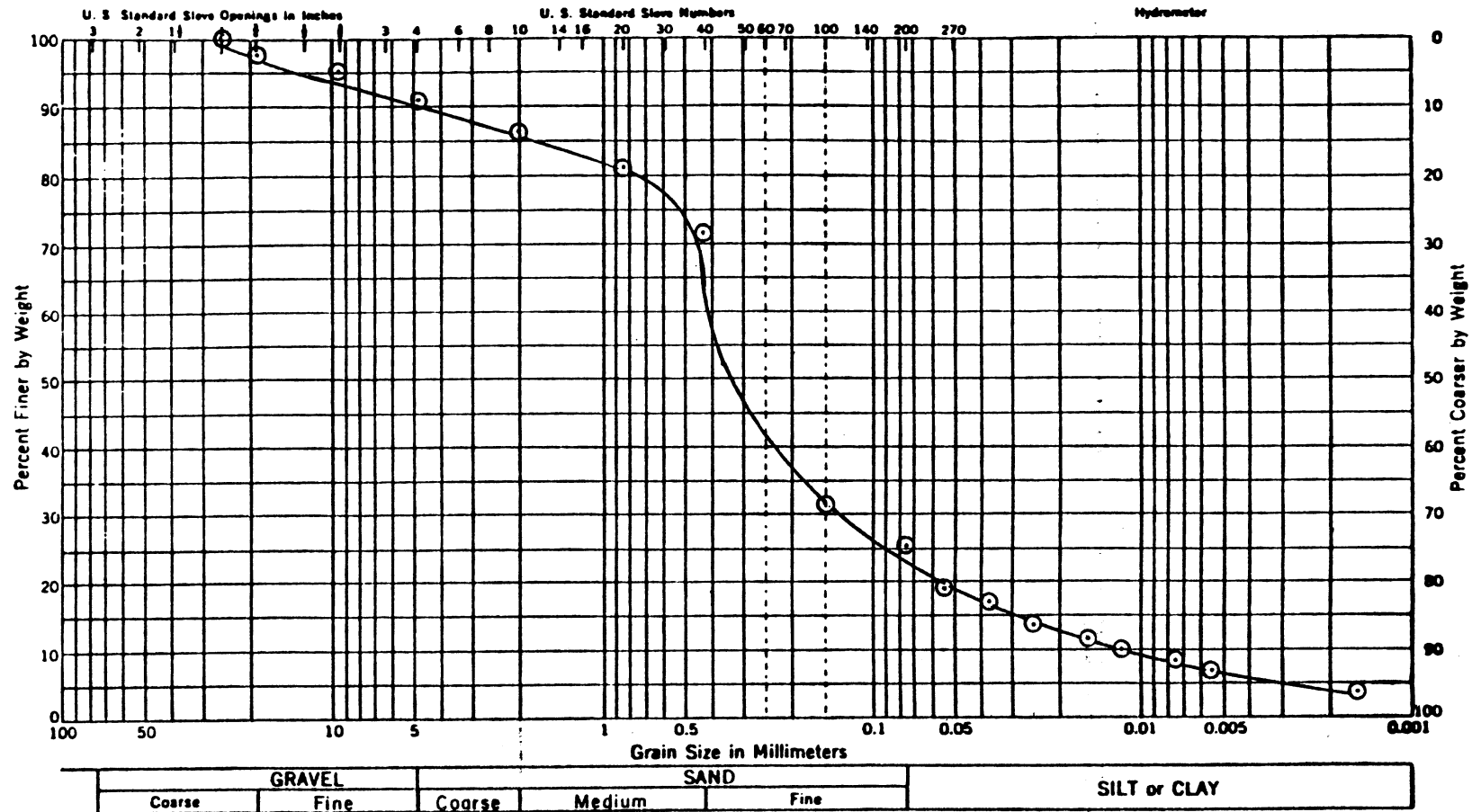
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION
EX12	S-24	244.2-245.5'							Silty fine sand (SM)
									W.C. 20.0

EXXON MINERALS COMPANY
SIEVE ANALYSIS
CRANDON PROJECT

STS CONSULTANTS LTD.

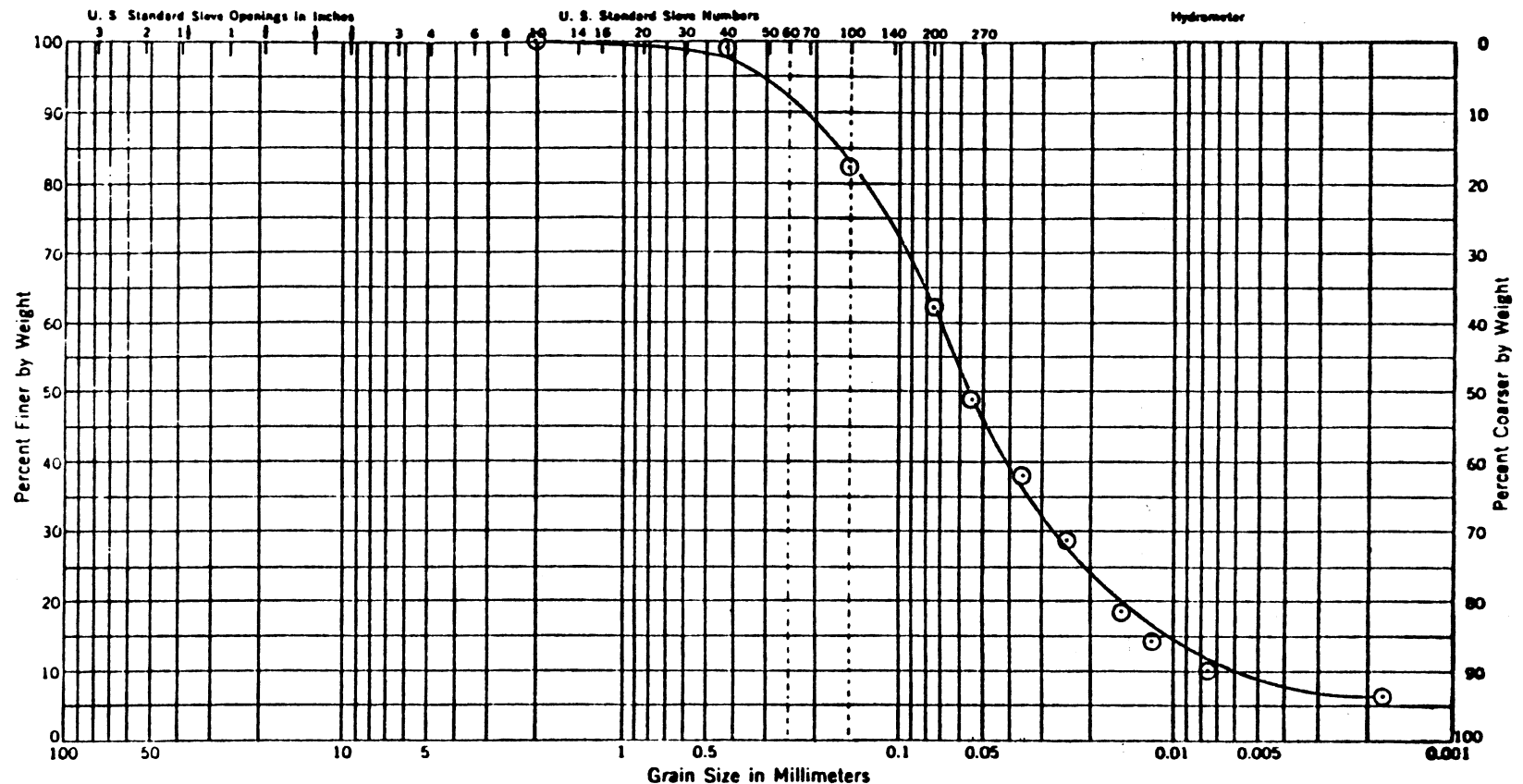
DRAWN	APPROVED	DATE	JOB No.
JJT/SM	JAS	3-24-84	12959

UNIFIED CLASSIFICATION SYSTEM

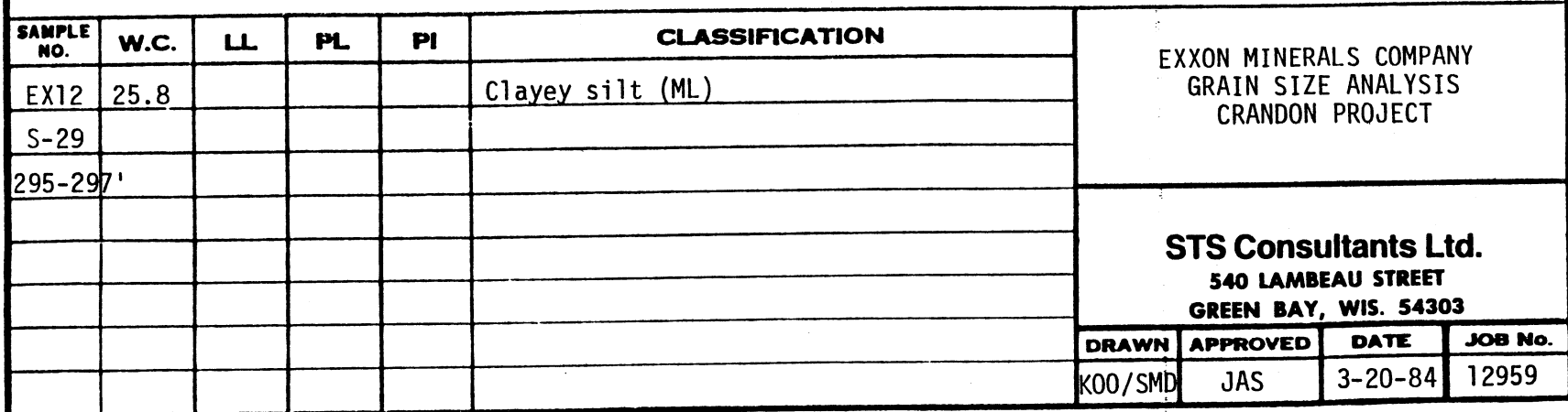


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX12	10.9				Silty fine to coarse sand (SM)				
S-27						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
274.5-276.5'									
						DRAWN	APPROVED	DATE	JOB No.
						KOO/SMD	JAS	3-20-84	12959

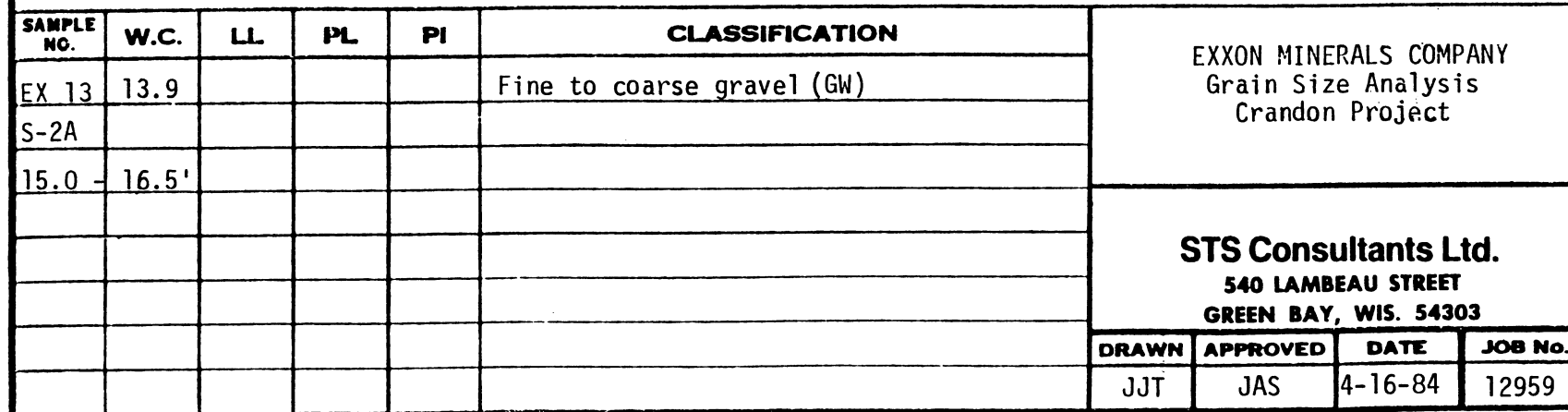
UNIFIED CLASSIFICATION SYSTEM



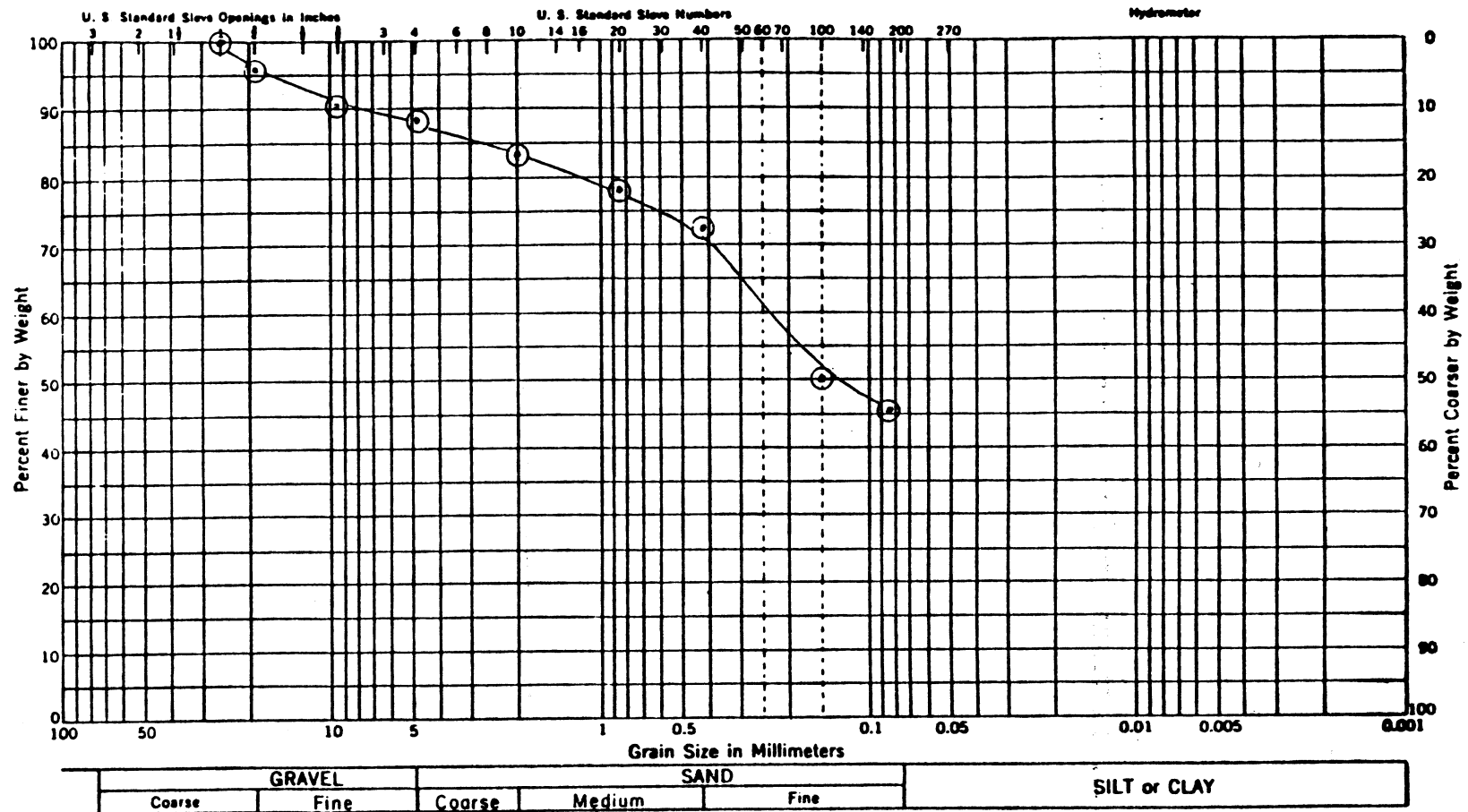
3.5-19-160



3.5-19-16.1

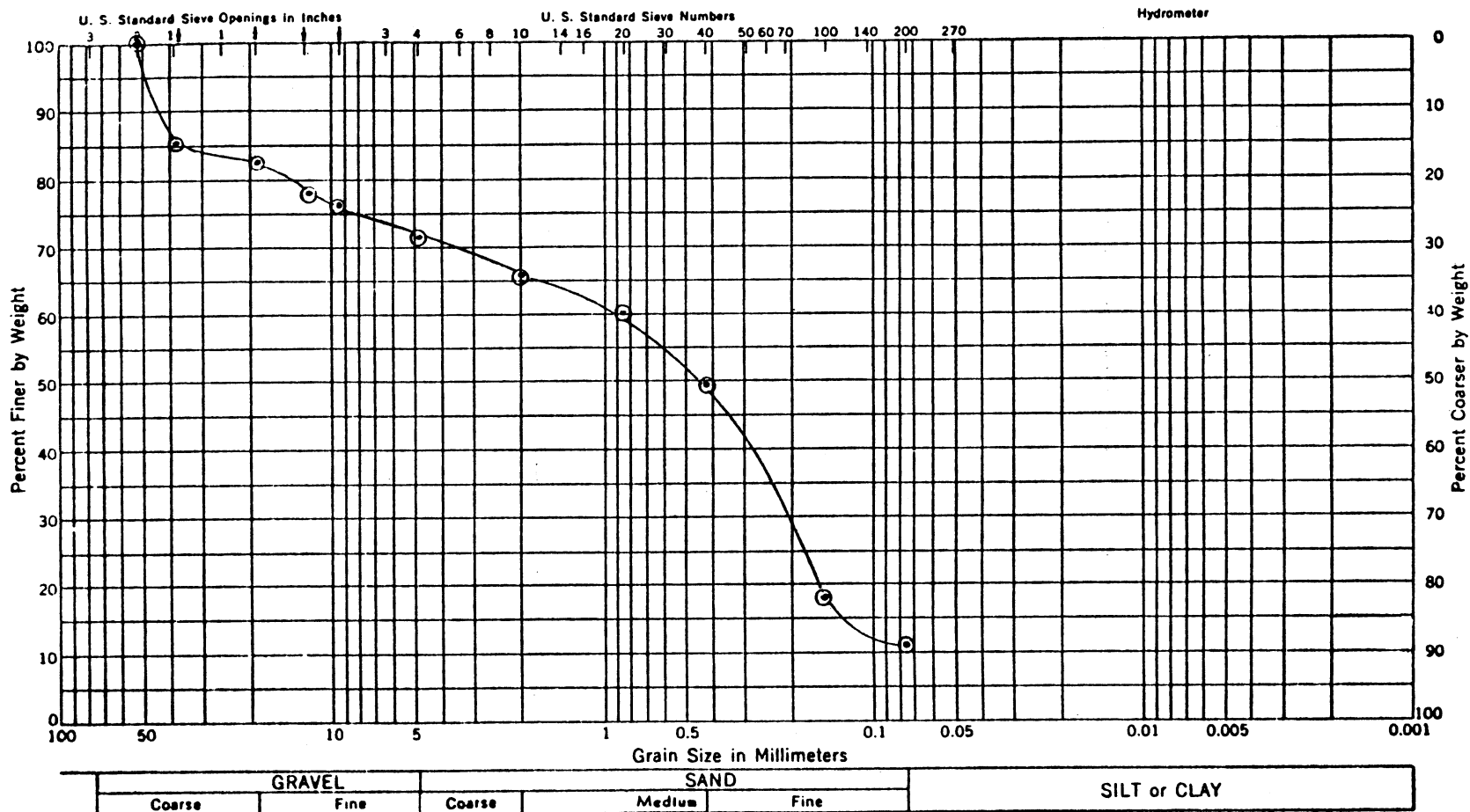


UNIFIED CLASSIFICATION SYSTEM



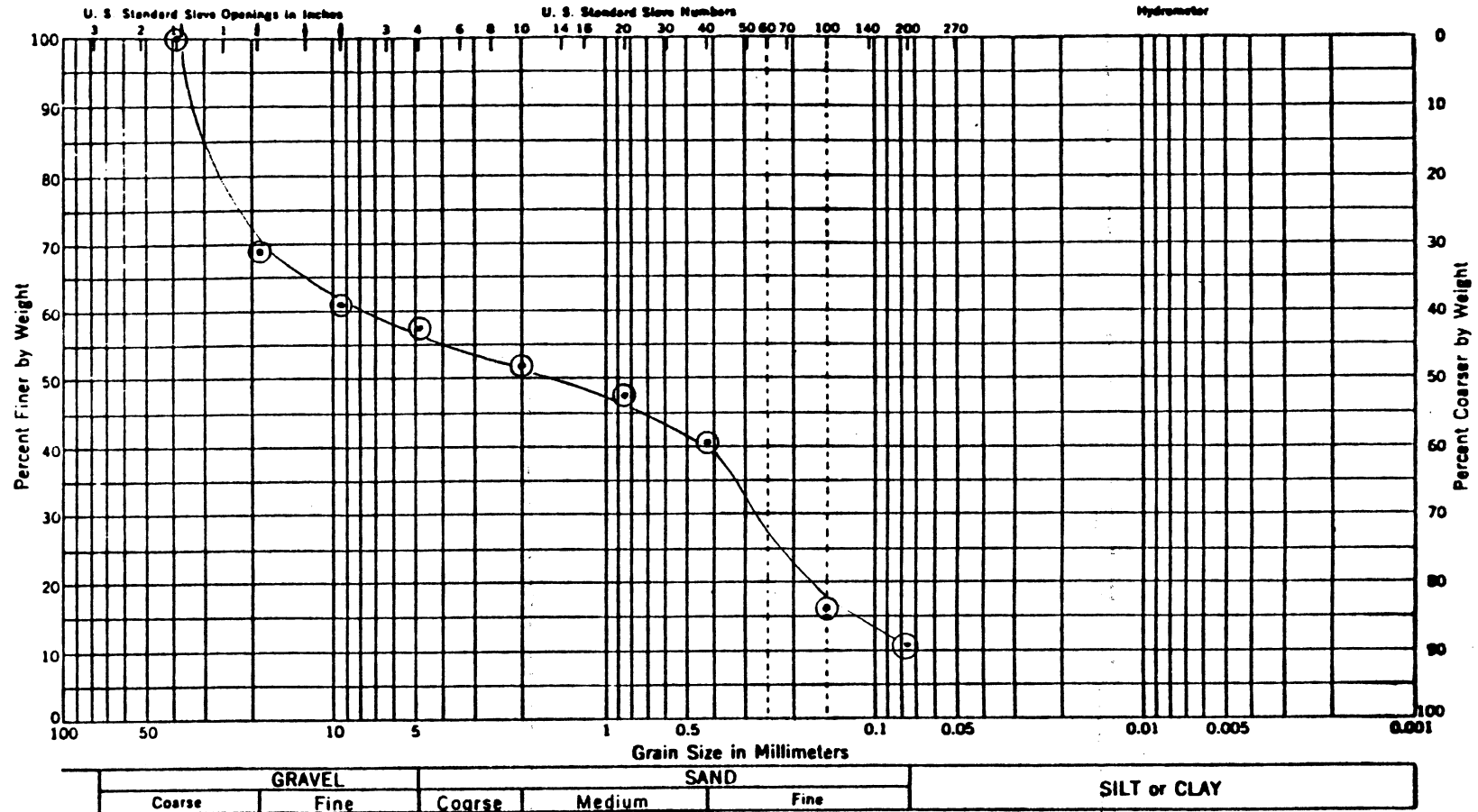
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY Grain Size Analysis Crandon Project			
EX 13	5.3				Silty fine to coarse sand (SM)				
S-3A						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
20.0 - 22.0'									
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-16-84	12959

3.5-19-163



BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX13B	S-4A	25-27'							Slightly silty				
									Fine to coarse				
									sand (SM-SP)				
										STS CONSULTANTS LTD.			
									W.C. 10.7				
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SMD	JAS	3-24-84	12959

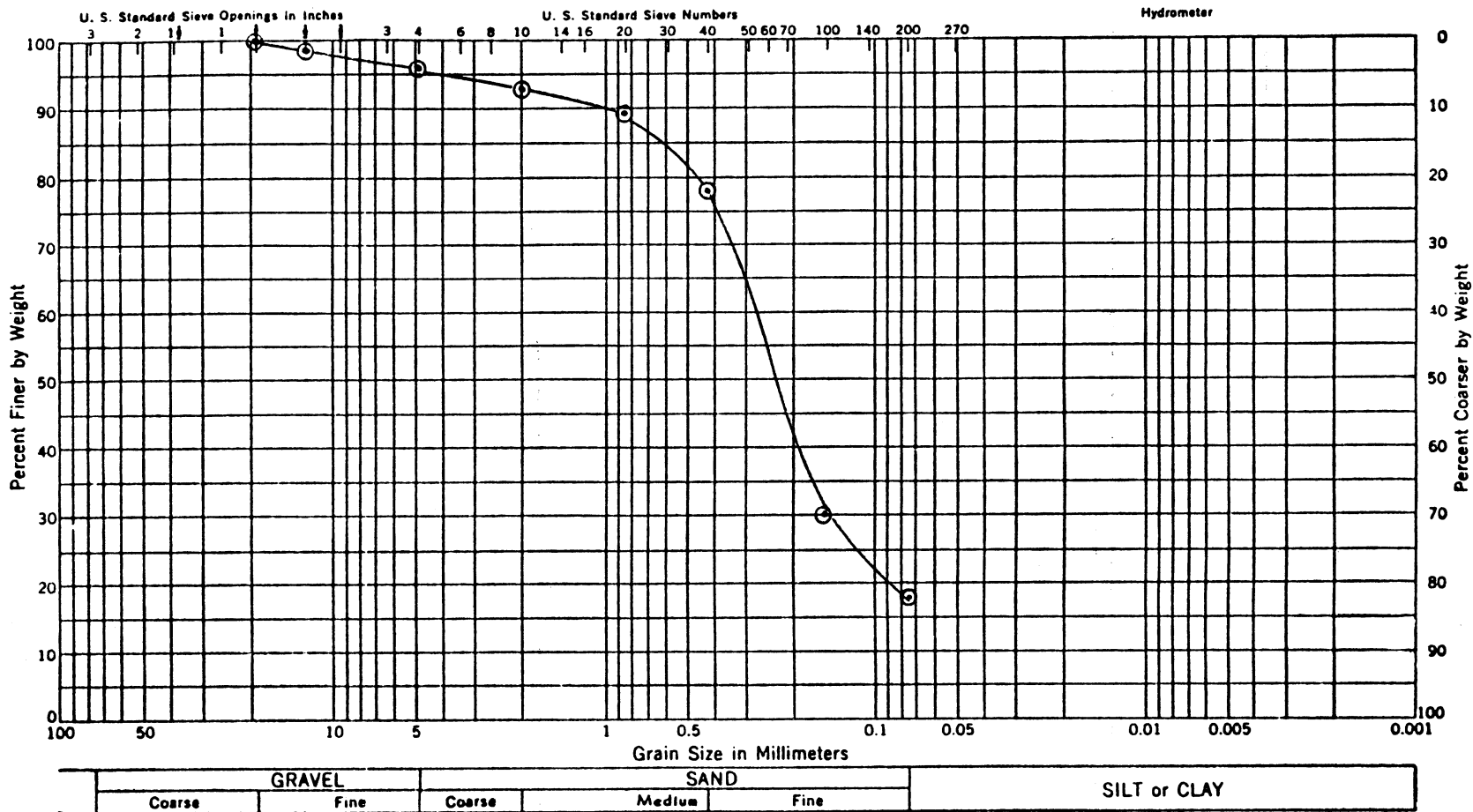
UNIFIED CLASSIFICATION SYSTEM



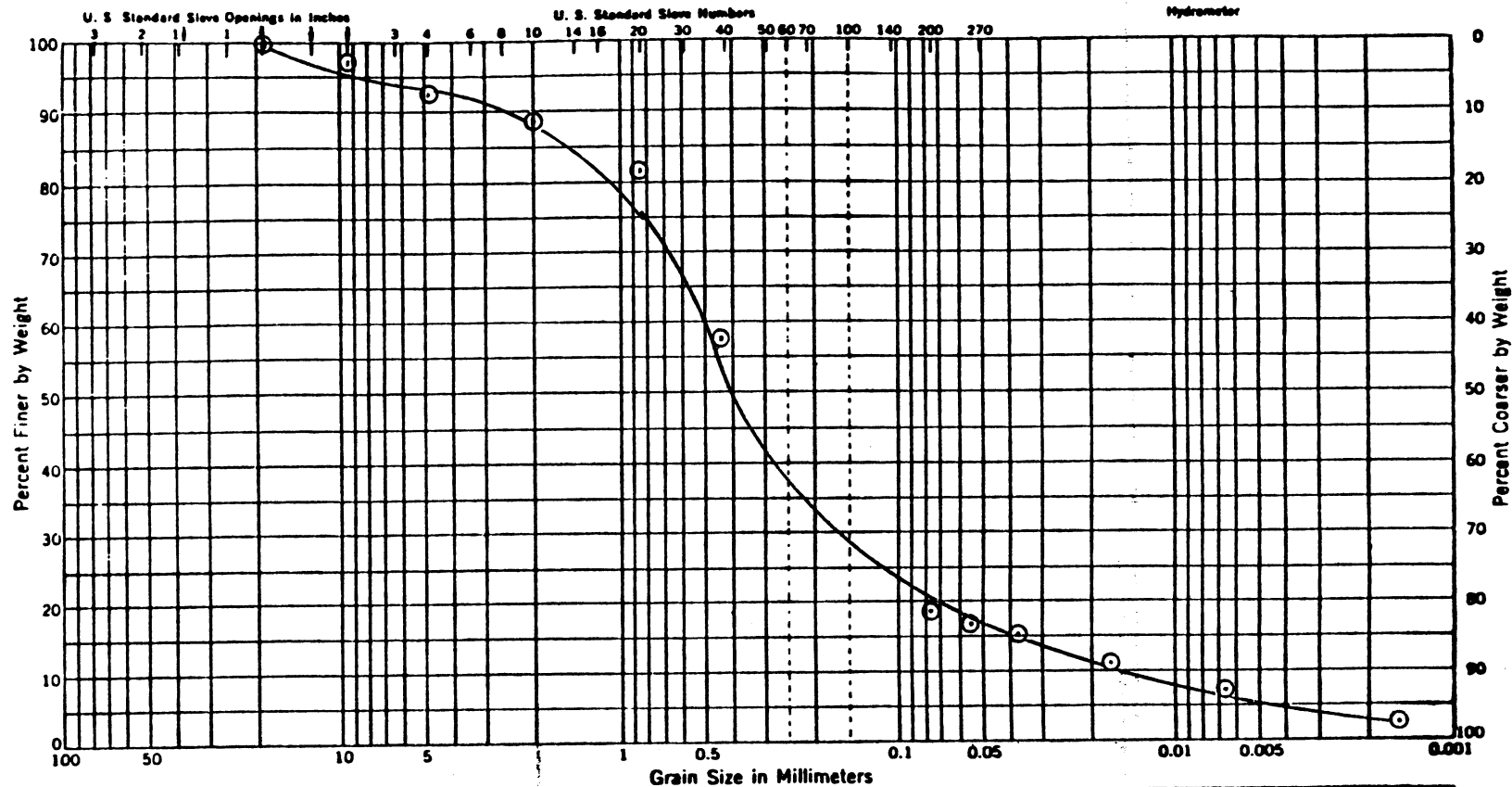
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY Grain Size Analysis Crandon Project			
EX 13	9.0				Slightly silty fine to coarse sand				
S-5A					(SM-SP)				
30.0 - 32.0'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-16-84	12959

3.5-19-164

3.5-19-165



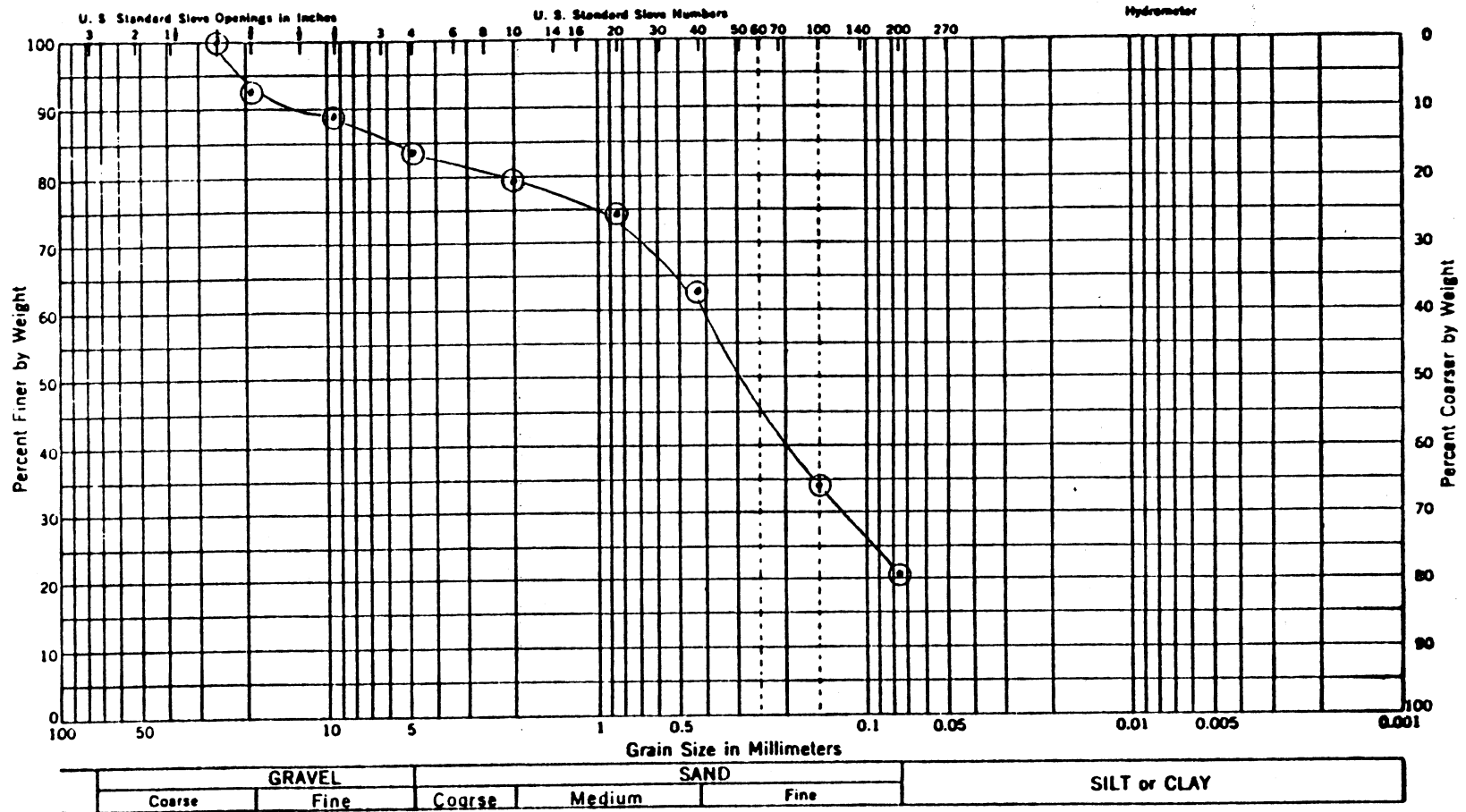
UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX13B	11.0				Silty fine to coarse sand (SM)				
S-7A									
41-42.5'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						KOO/SMD	JAS	3-20-84	12959

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX 13	10.0				Silty fine to coarse sand (SM)
S-8A					
51.0 - 52.5'					

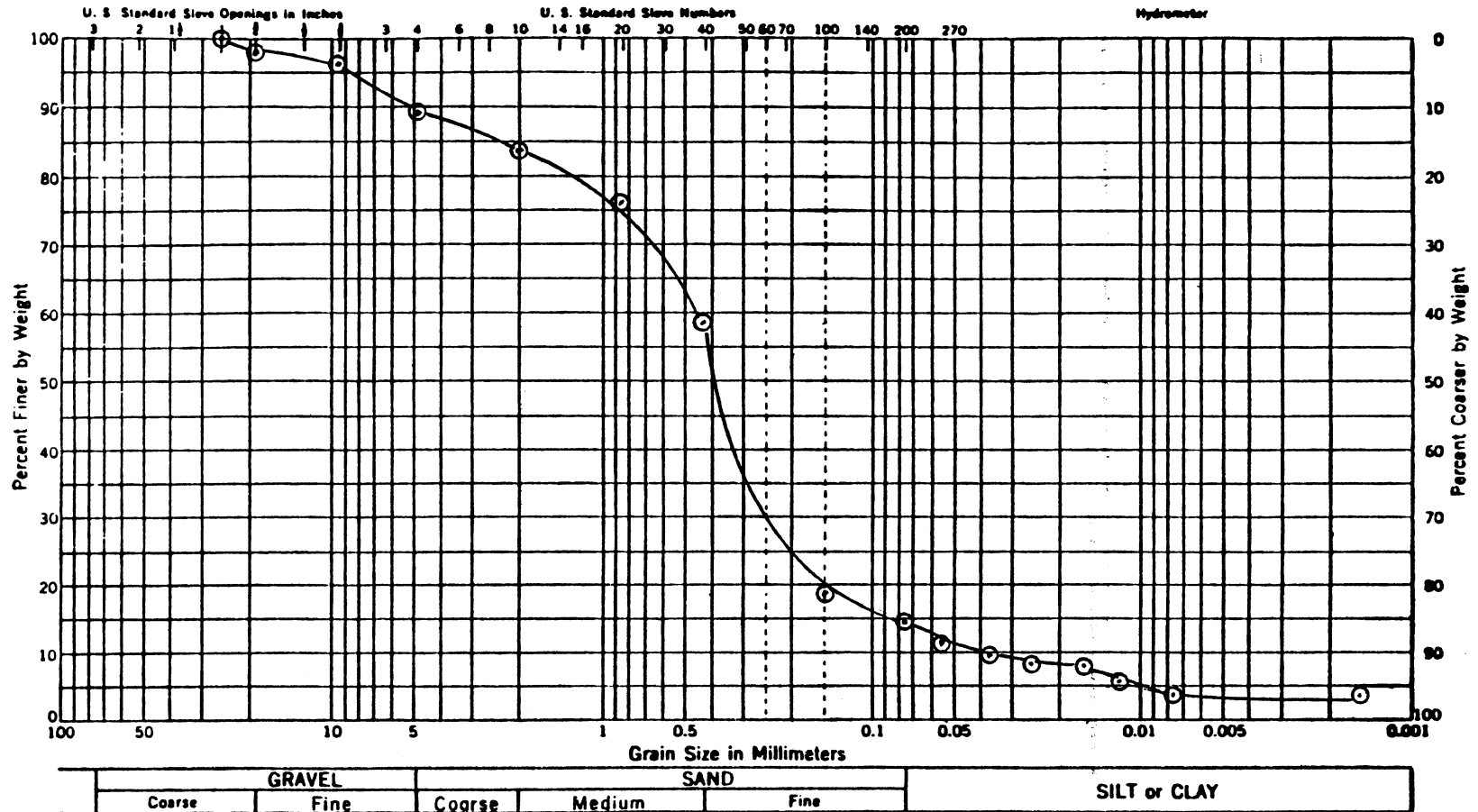
EXXON MINERALS COMPANY
Grain Size Analysis
Crandon Project

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-16-84	12959

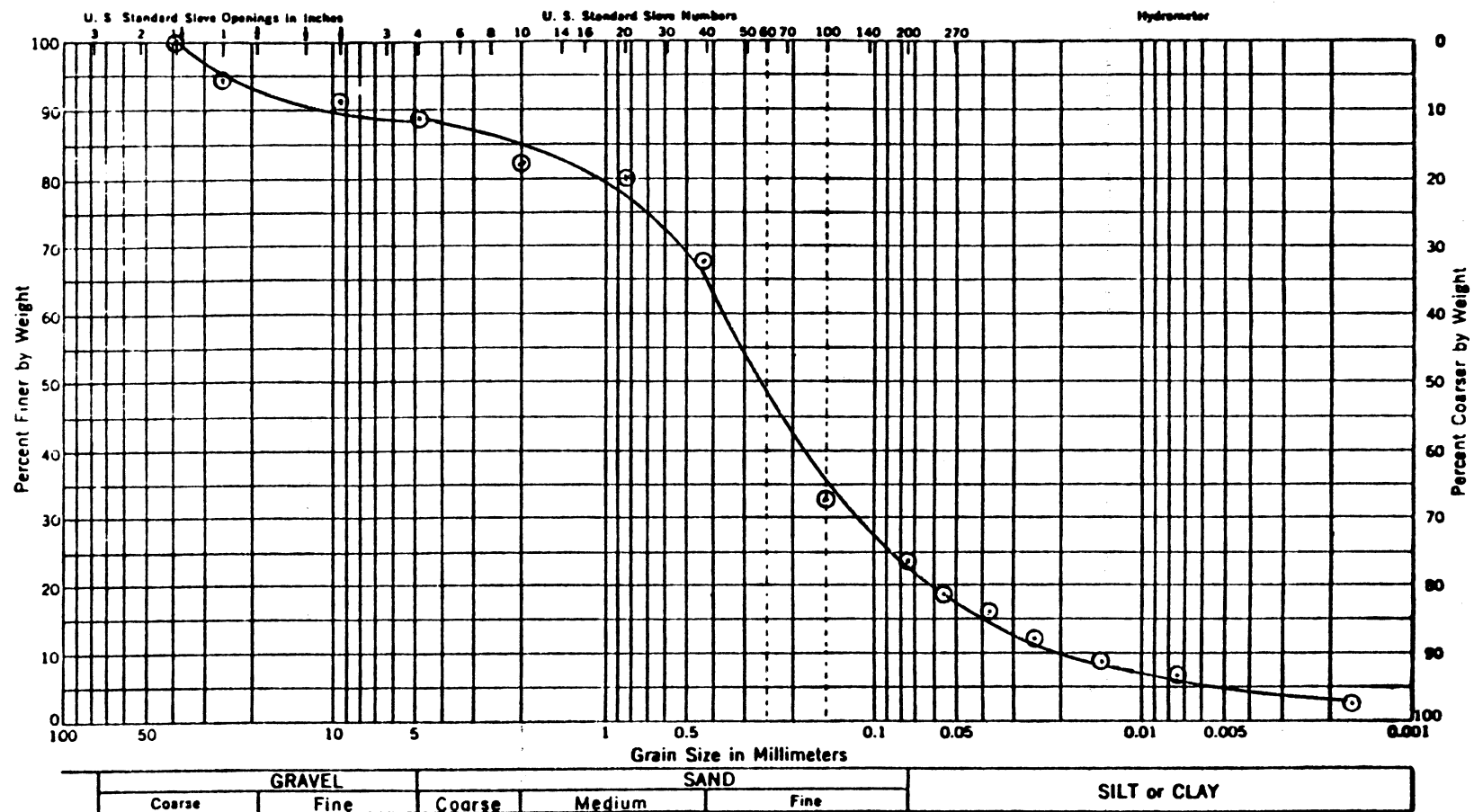
3.5-19-167

UNIFIED CLASSIFICATION SYSTEM

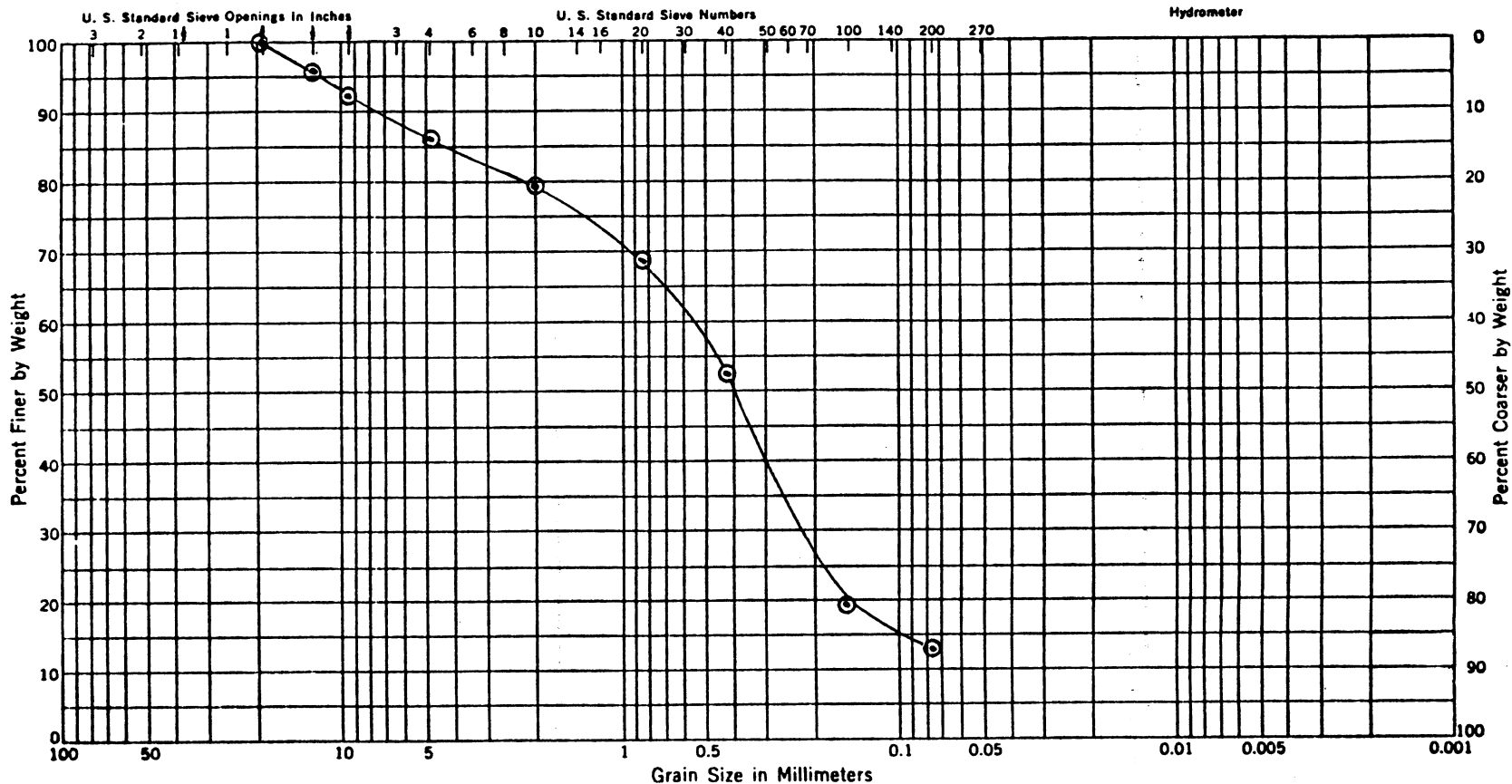


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX13B	11.5				Silty fine to coarse sand (SM)				
S-10A						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
71-72.5'									
						DRAWN	APPROVED	DATE	JOB No.
						K00/SMD	JAS	3-20-84	12959

UNIFIED CLASSIFICATION SYSTEM

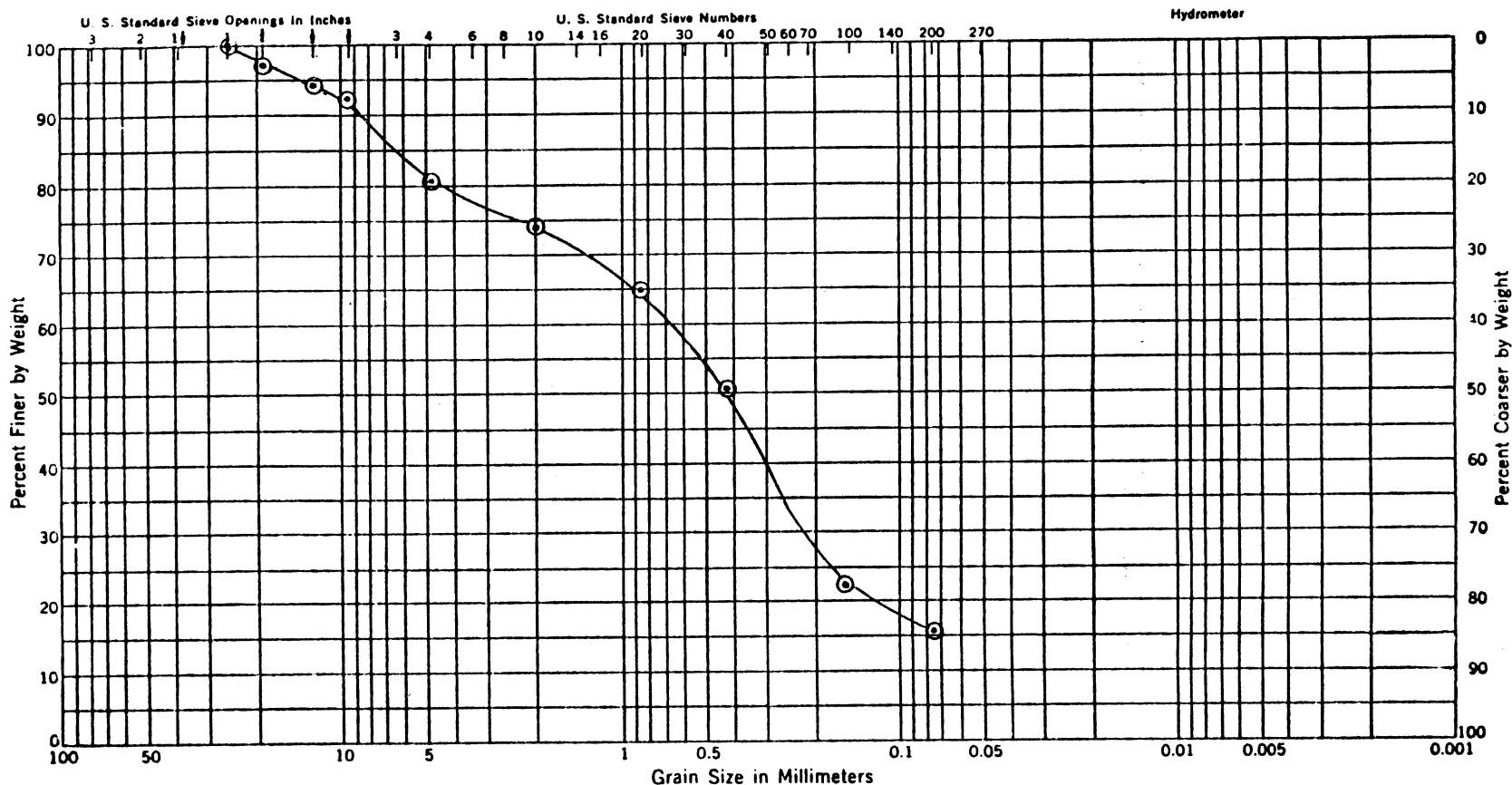


3.5-19-170



BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX13B	S-13A	102-103.5'							Silty fine to coarse sand (SM)				
									W.C. 10.8				
										STS CONSULTANTS LTD.			
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SMD	JAS	3-24-84	12959

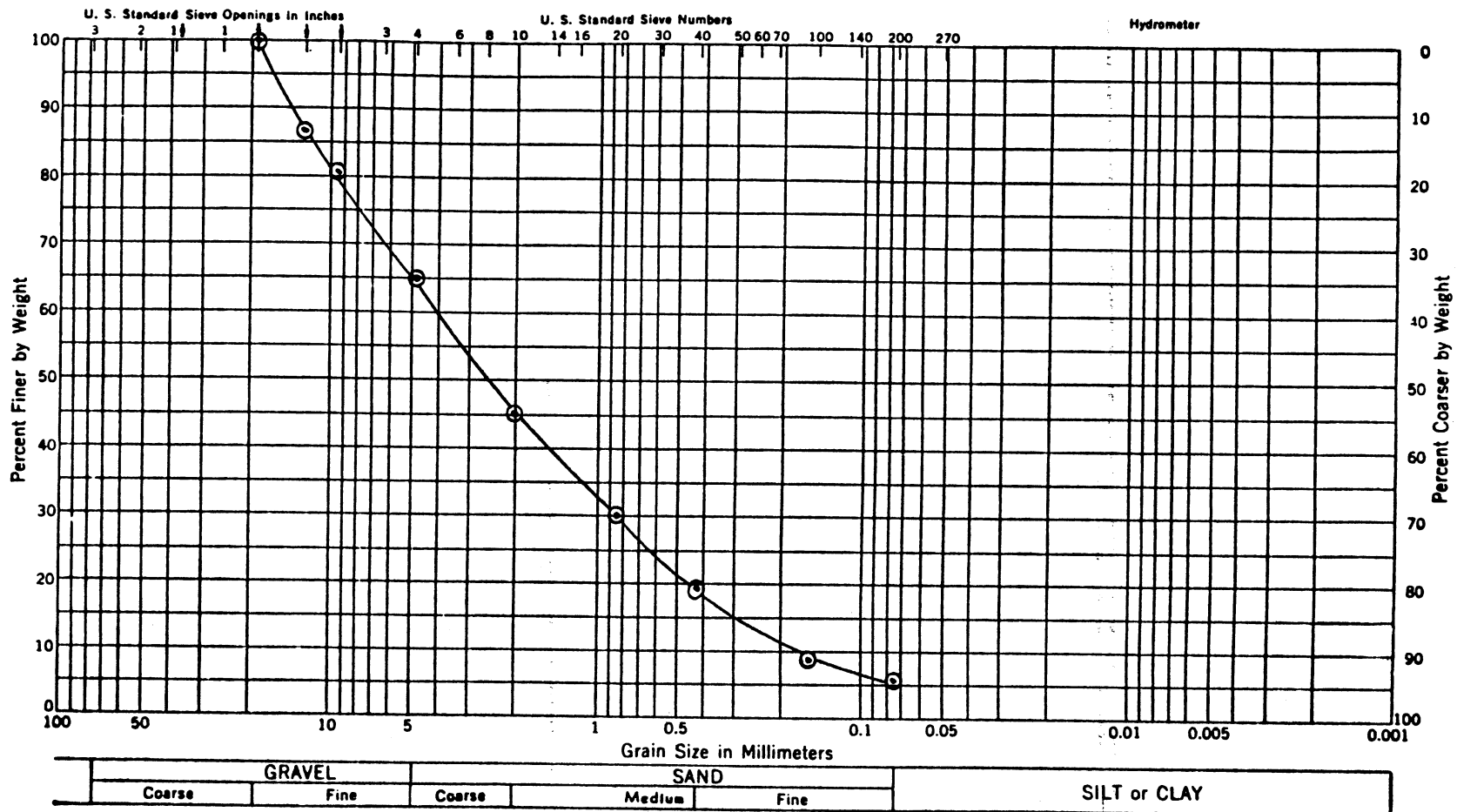
3.5-19-171



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

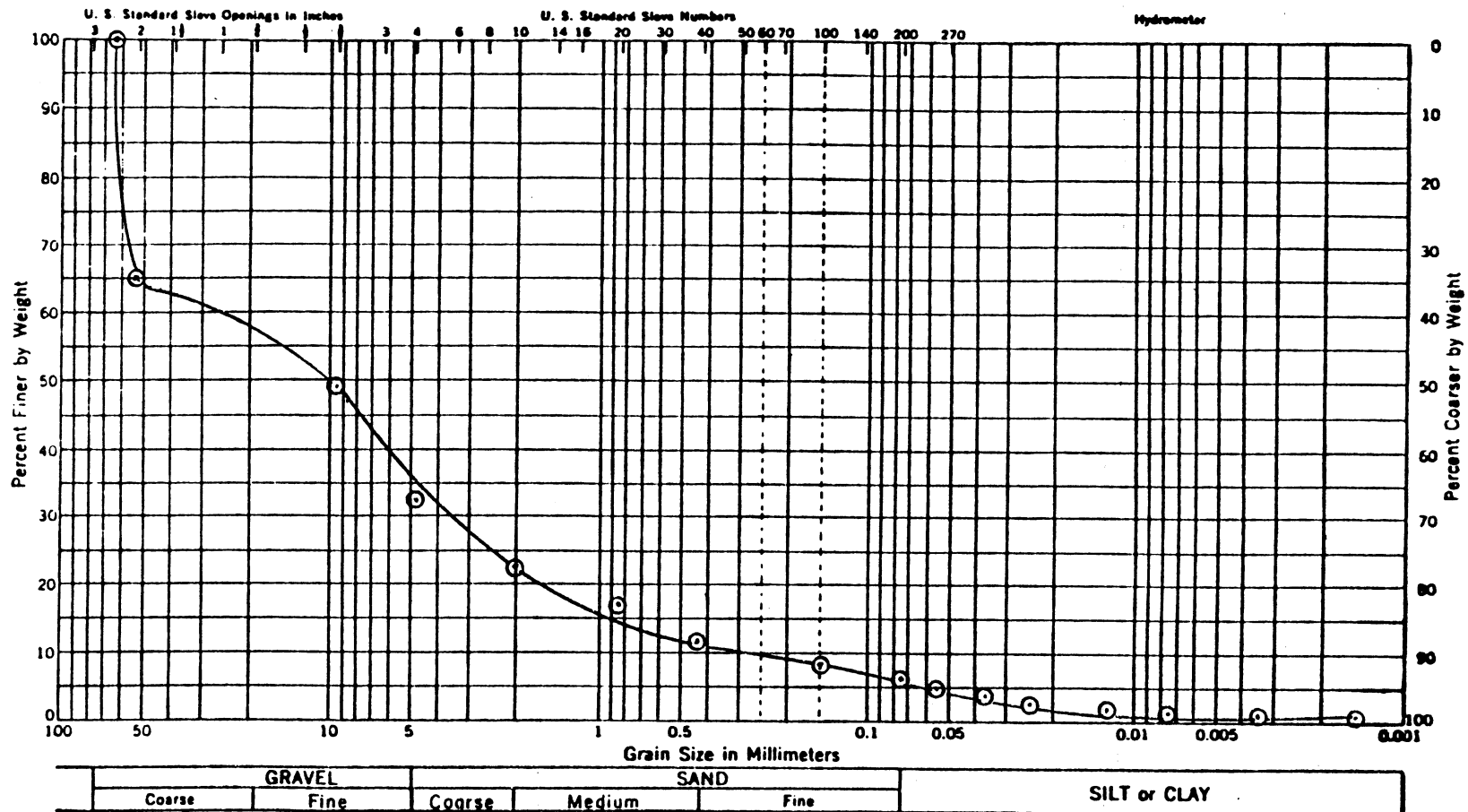
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX13B	S-14A	110-111.5'							Silty fine to				
									coarse sand (SM)				
									W.C. 11.4	STS CONSULTANTS LTD.			
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SM	JAS	3-24-84	12959

3.5-19-172



BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX13B	S-16A	131- 132.5'							Slightly silty fine to coarse sand (SM-SP)				
									W.C. 9.0				
										STS CONSULTANTS LTD.			
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SMD	JAS	3-24-84	12959

UNIFIED CLASSIFICATION SYSTEM



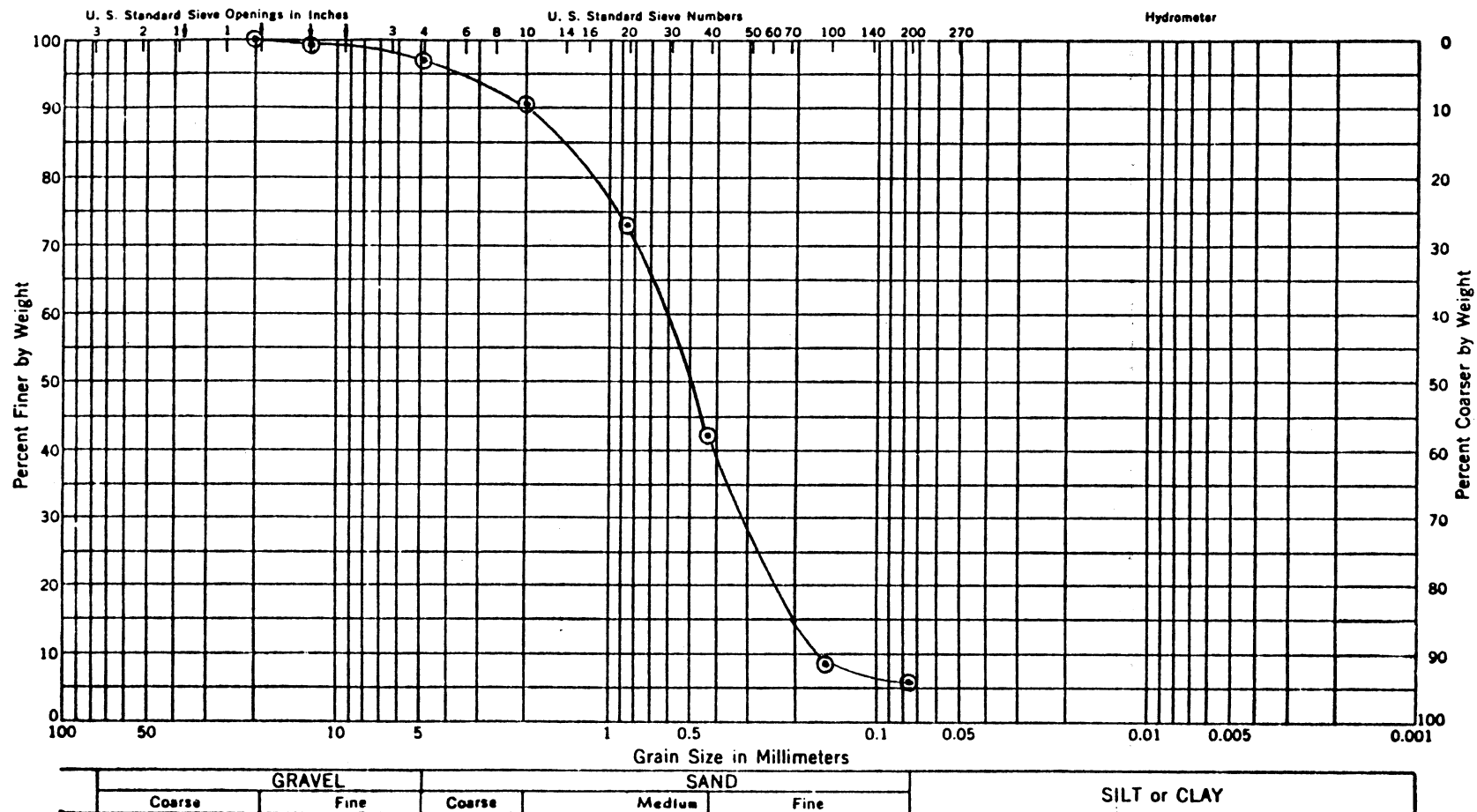
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION
EX13	S-2	162-163.5'							Slightly silty fine to coarse sand (SM-SP)
									W.C. 12.0

EXXON MINERALS COMPANY
SIEVE ANALYSIS
CRANDON PROJECT

STS CONSULTANTS LTD.

DRAWN	APPROVED	DATE	JOB No.
JJT/SMD	JAS	3-23-84	12959

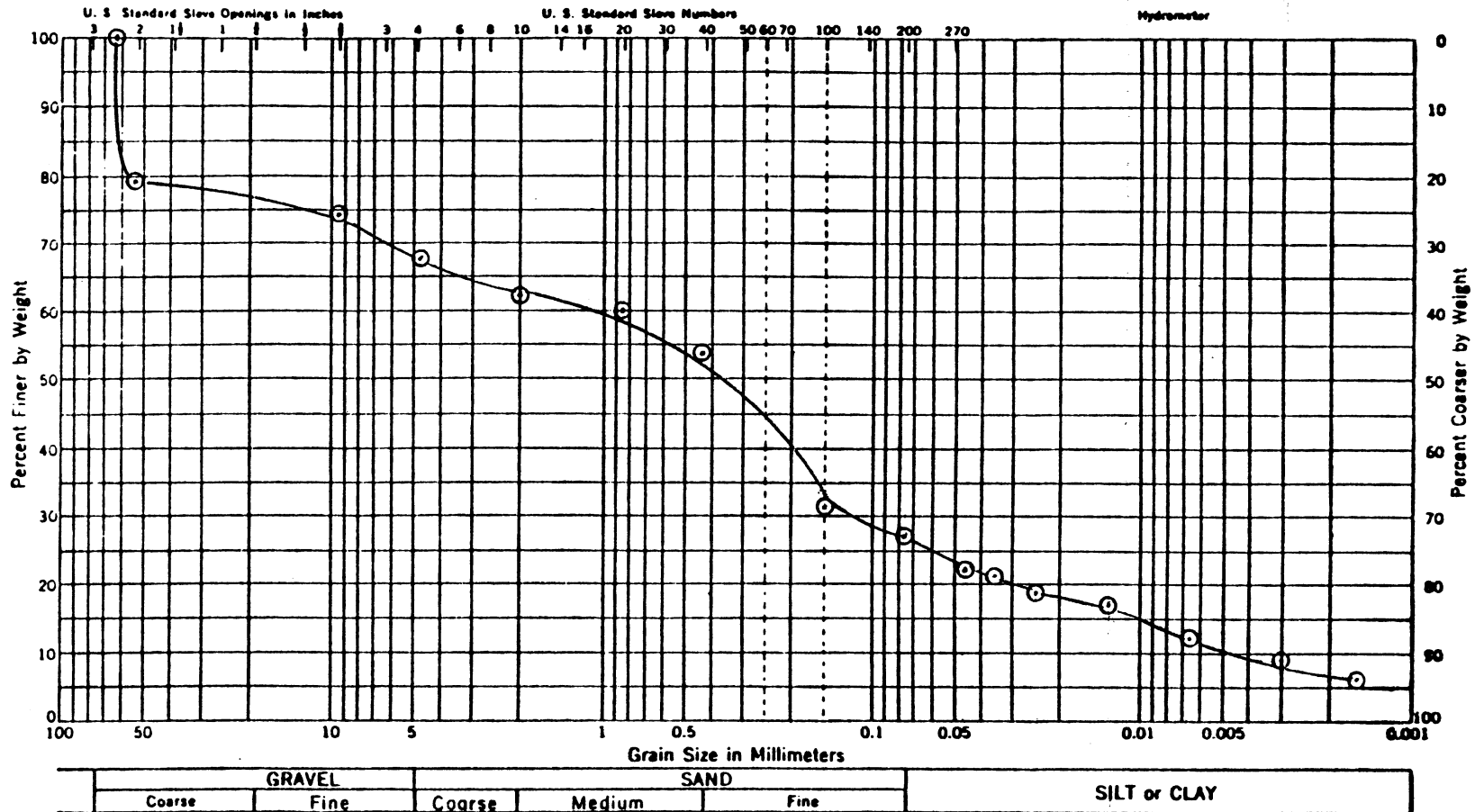
3.5-19-175



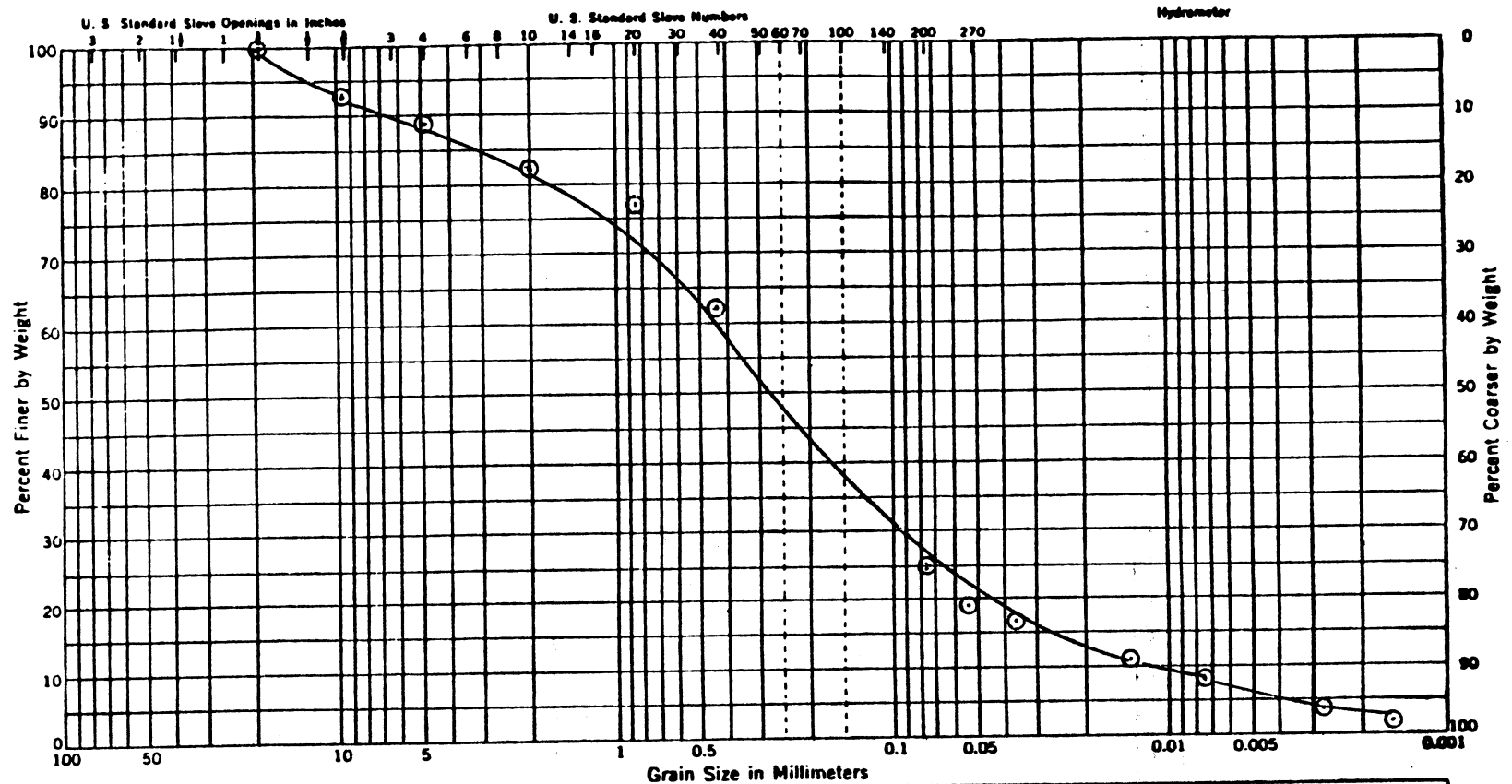
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX13	S-3	172- 173.5'							Slightly silty fine to coarse sand (SM-SP)				
									W.C. 17.9				
										STS CONSULTANTS LTD.			
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SMI	JAS	3-23-84	12959

[illegible]

UNIFIED CLASSIFICATION SYSTEM



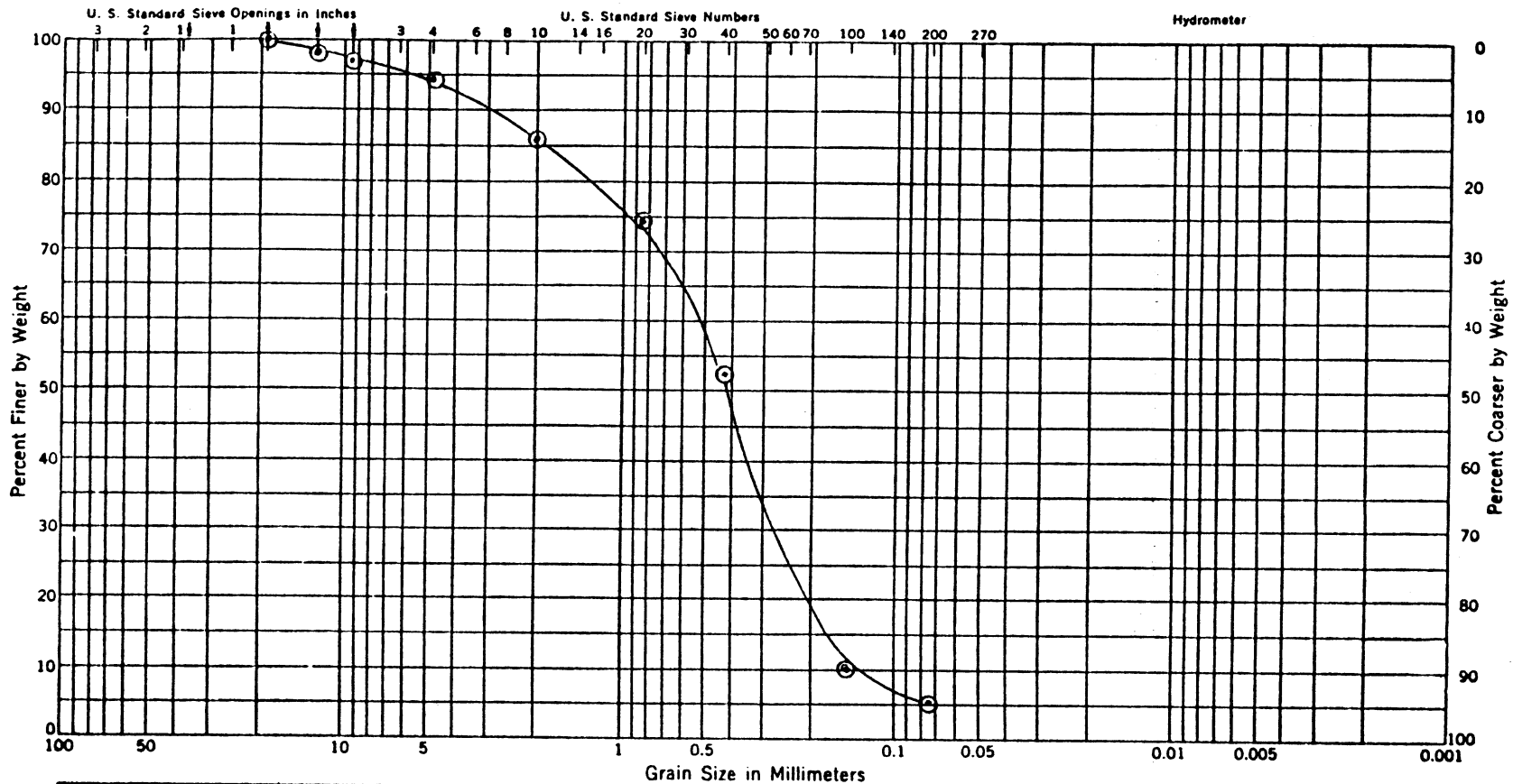
UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX13	10.3				Silty fine to coarse sand (SM)				
S-6									
205-206'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						K00/SMD	JAS	3-20-84	12959

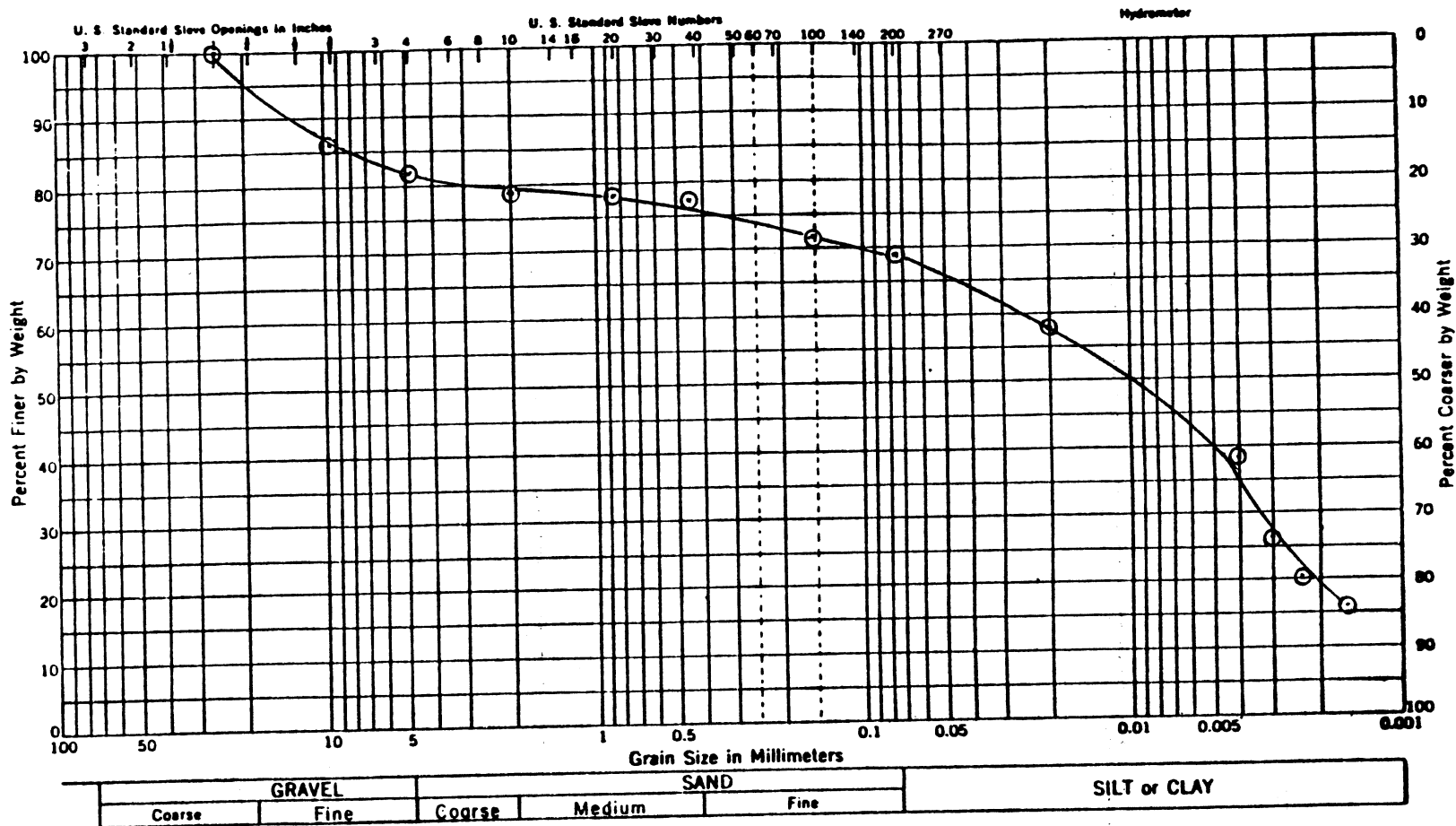
3.5-19-179



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

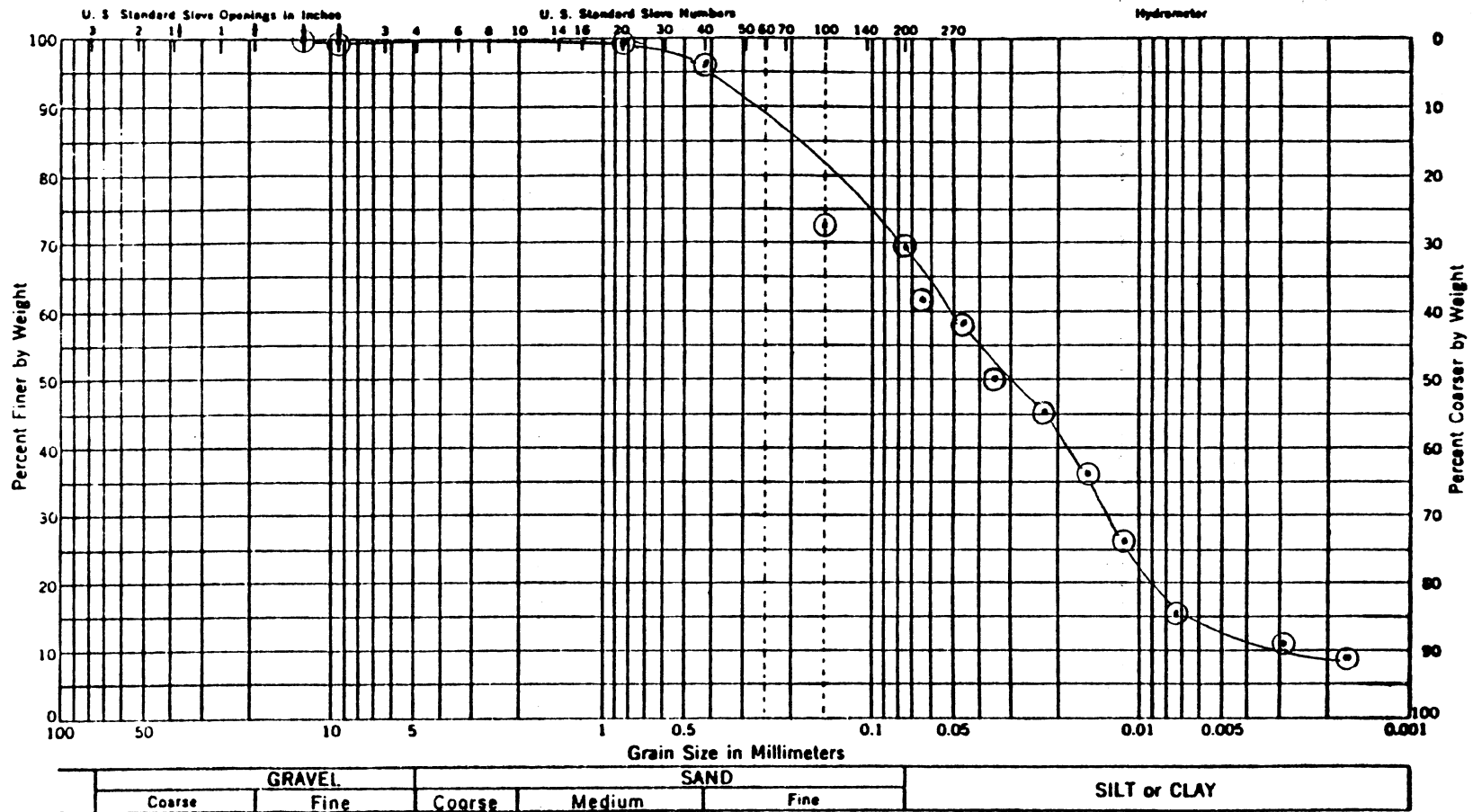
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX13	S-7B	215.6 216.5'							Slightly silty fine to coarse sand (SM-SP)				
									W.C. 16.0				
										STS CONSULTANTS LTD.			
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SMI	JAS	3-24-84	12959

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX13	26.1				Silty clay (CL)				
S-8						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
226-226.5'									
						DRAWN	APPROVED	DATE	JOB No.
						KOO/SMD	JAS	3-20-84	12959

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX14	21.3%				Clayey silt (ML)
S-1					
2-4'					

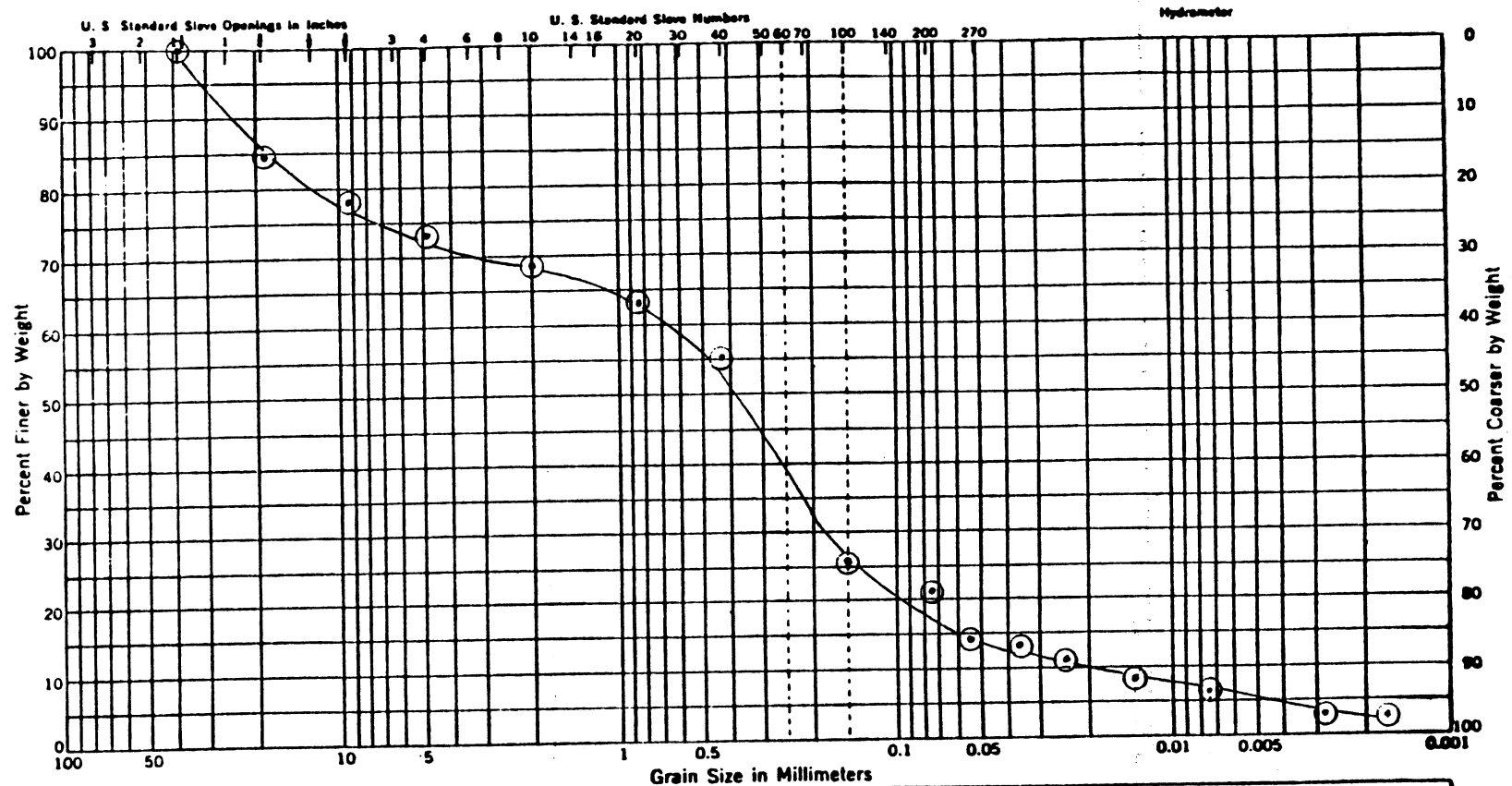
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	5-18-84	12959

3.5-19-181

UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX14	6.4%				Silty fine to coarse sand (SM)
S-2					
10-12'					

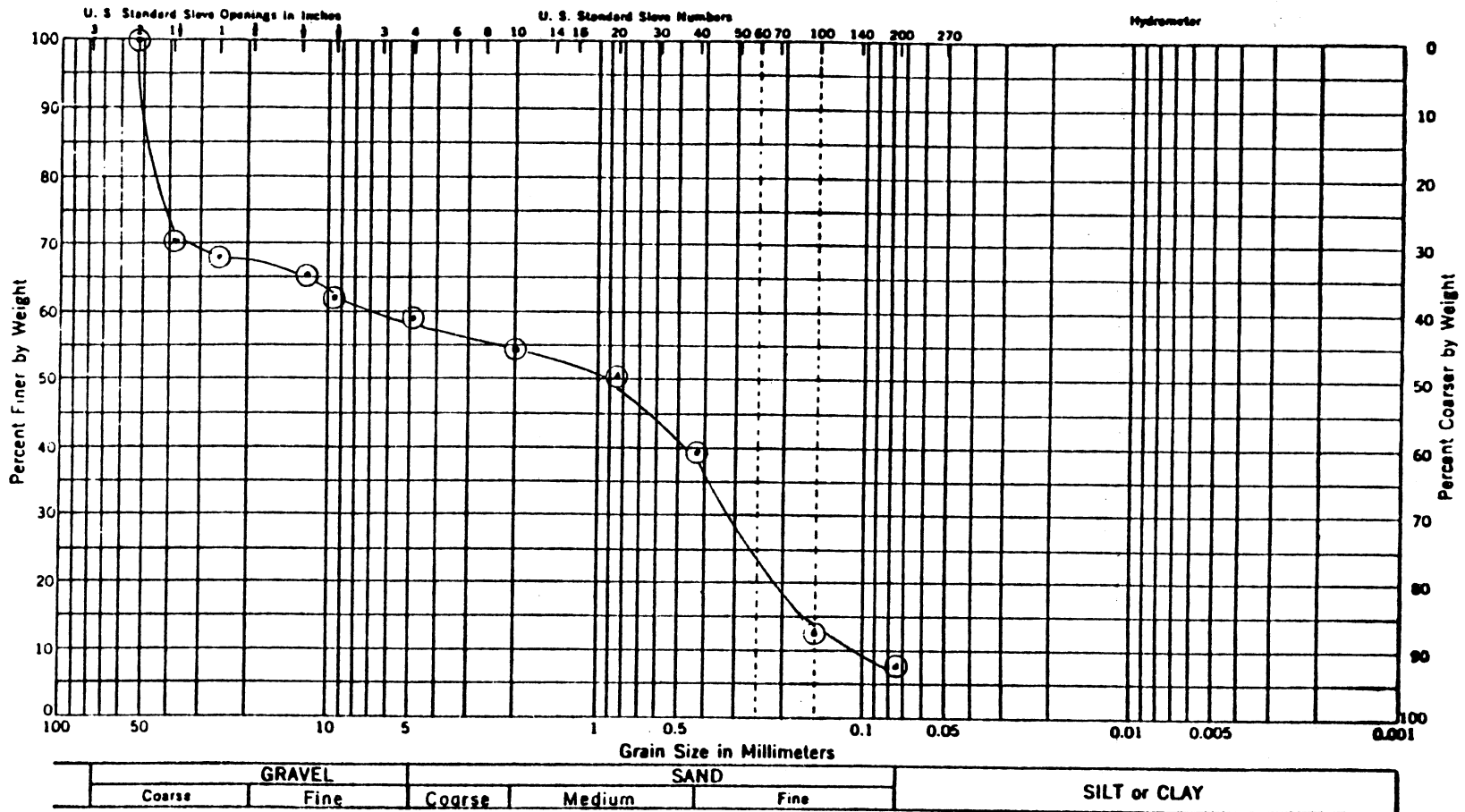
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	5-18-84	12959

3.5-19-182

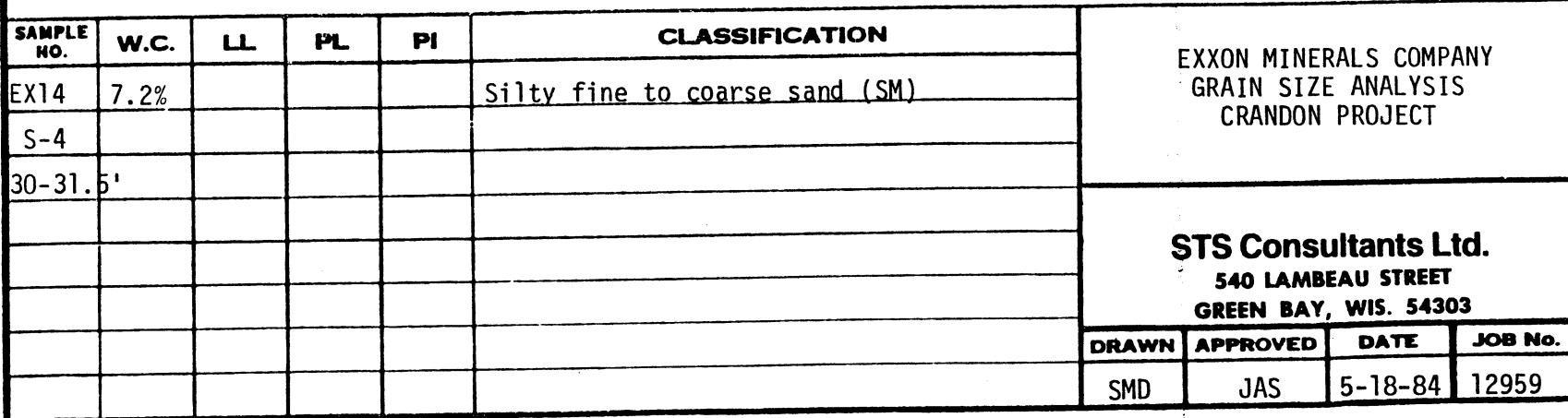
UNIFIED CLASSIFICATION SYSTEM



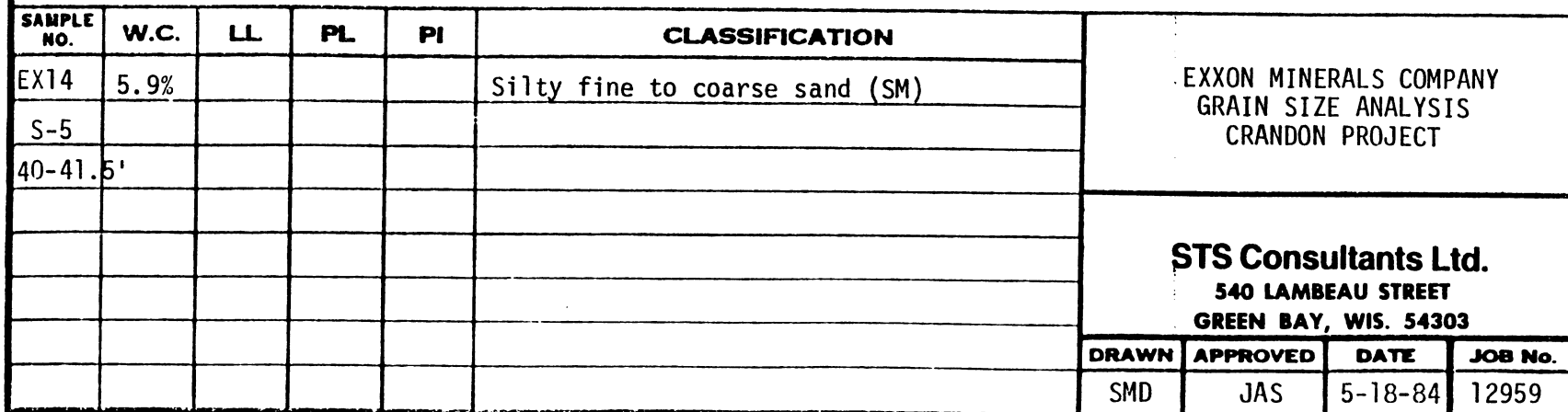
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX14	9.0%				Slightly silty fine to coarse sand (SM-SP)				
S-3									
21-22'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

3.5-19-183

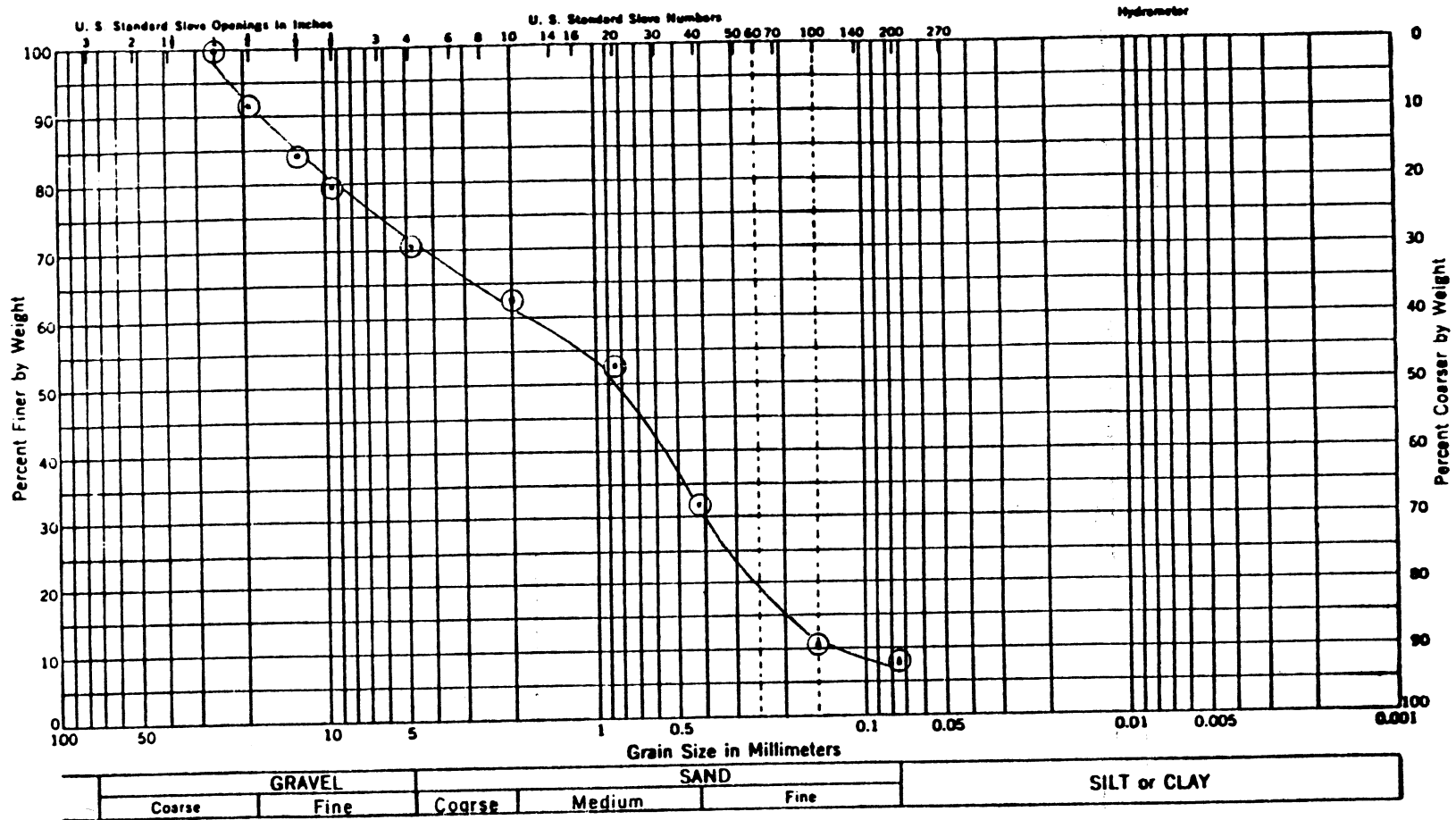
3.5-19-184



3.5-19-185

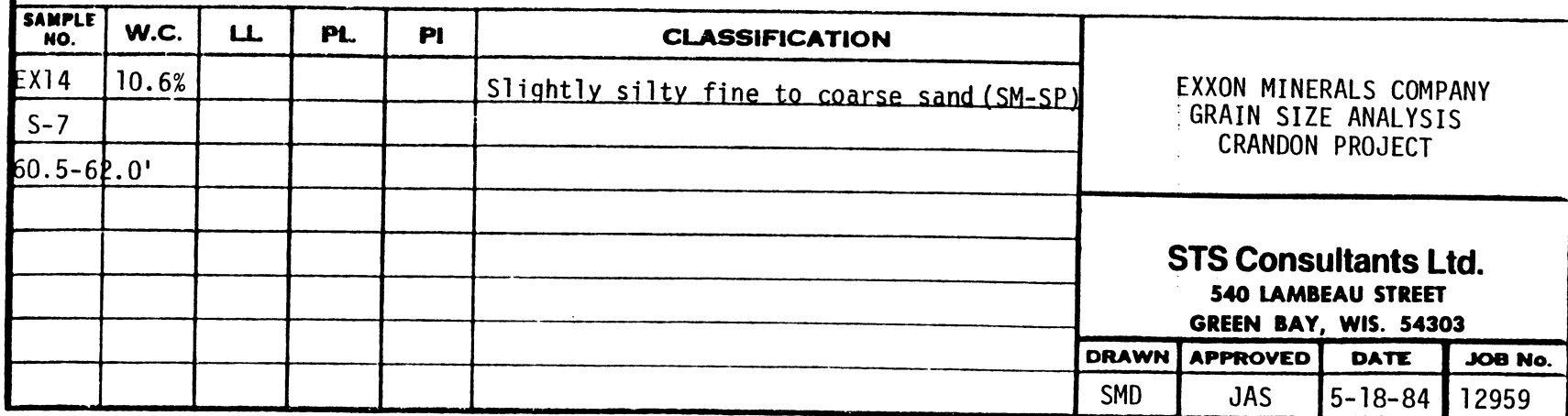


UNIFIED CLASSIFICATION SYSTEM

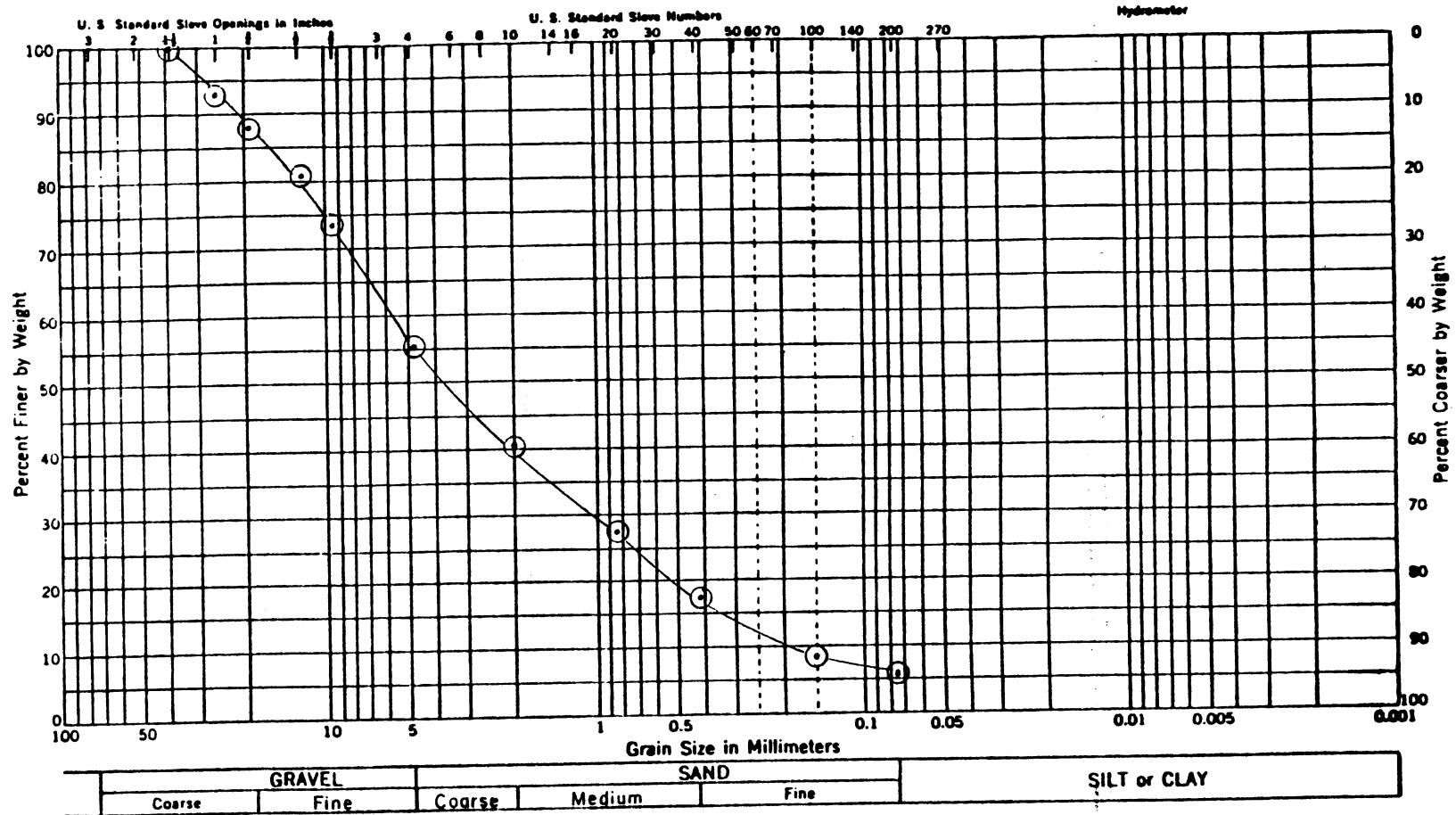


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX14	10.2%				Slightly silty fine to coarse sand (SM-SP)				
S-6						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
50.9-51.9'									
						DRAWN:	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

3.5-19-187



UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX14	5.6%				Slightly silty fine to coarse sand (SM-SP)
S-8					
71-73'					

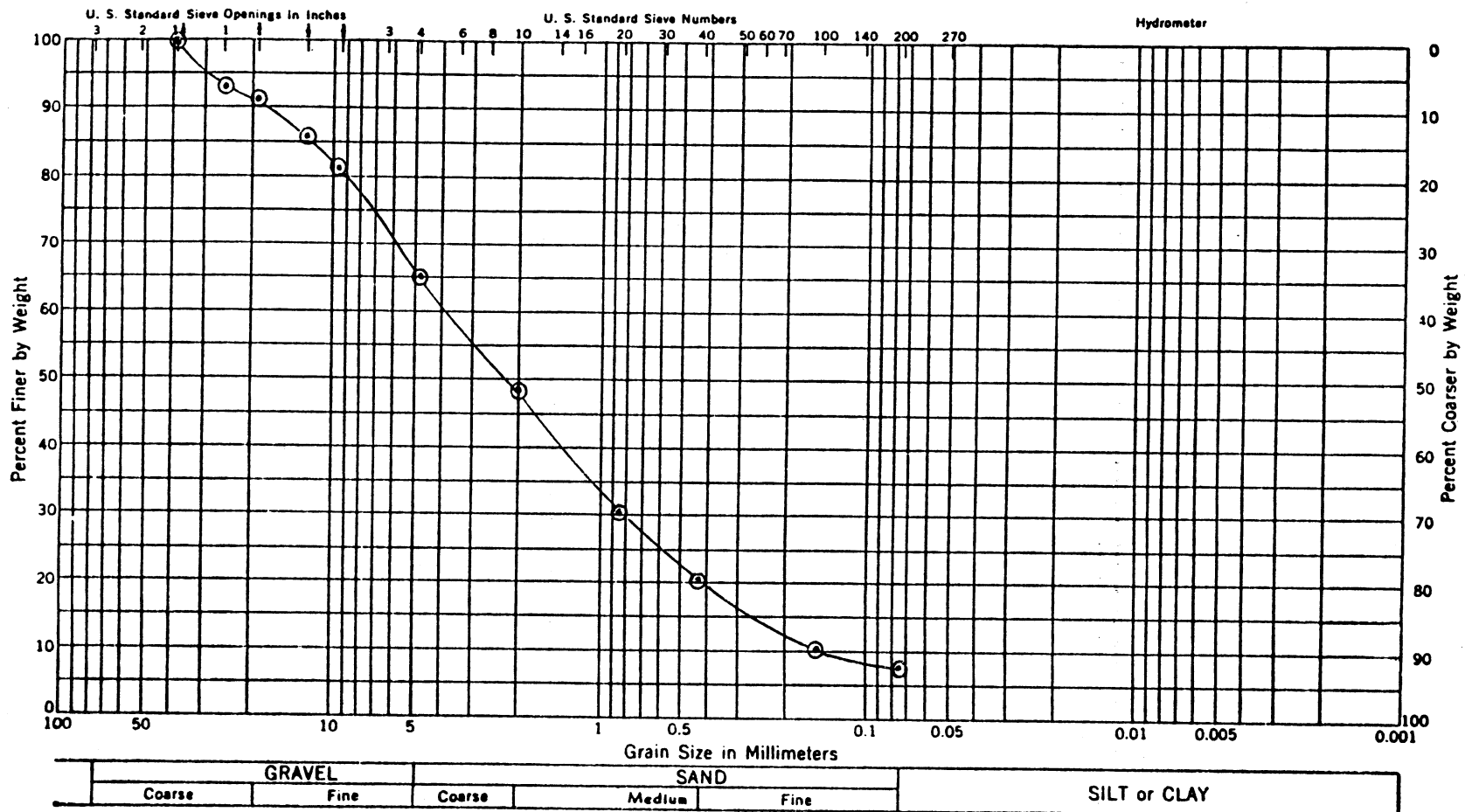
EXXON MINERALS COMPANY
 GRAIN SIZE ANALYSIS
 CRANDON PROJECT

STS Consultants Ltd.
 540 LAMBEAU STREET
 GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	5-18-84	12959

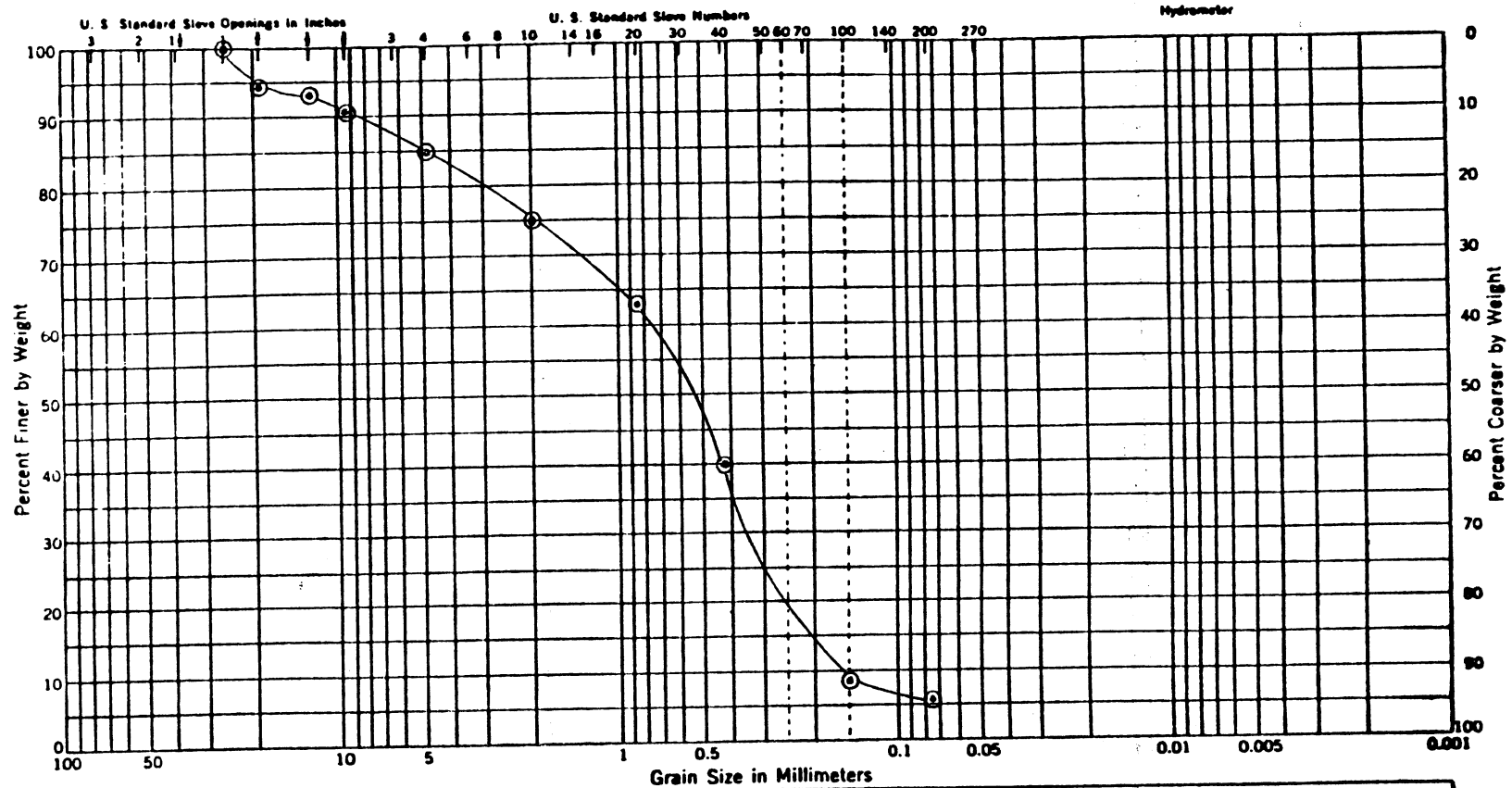
3.5-19-188

3.5-19-189



BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
EX14	S-9	81-82'							Slightly silty fine to coarse sand (SM-SP)				
										STS CONSULTANTS LTD.			
										DRAWN	APPROVED	DATE	JOB No.
										JLT/SMI	JAS	3-24-84	12959

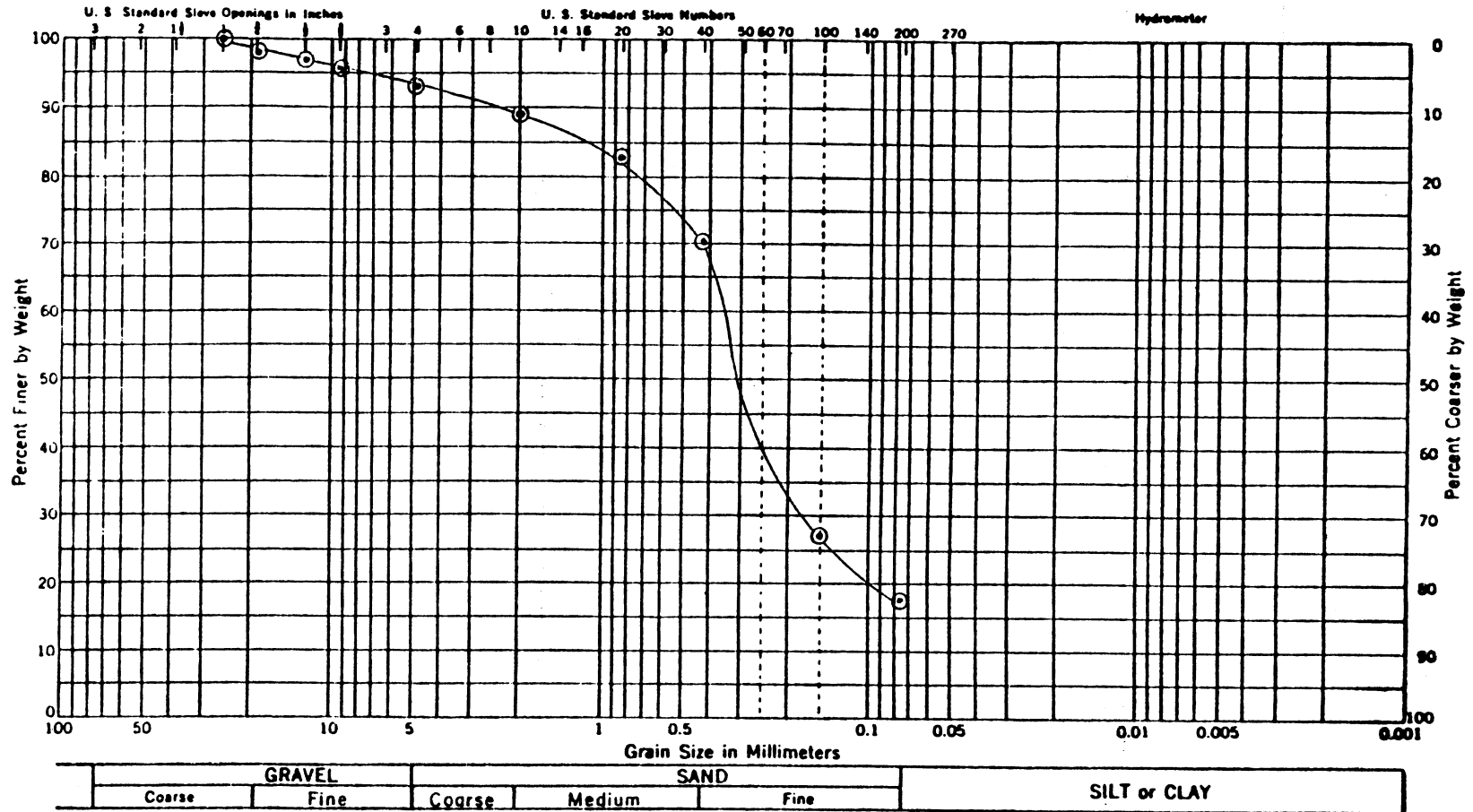
UNIFIED CLASSIFICATION SYSTEM



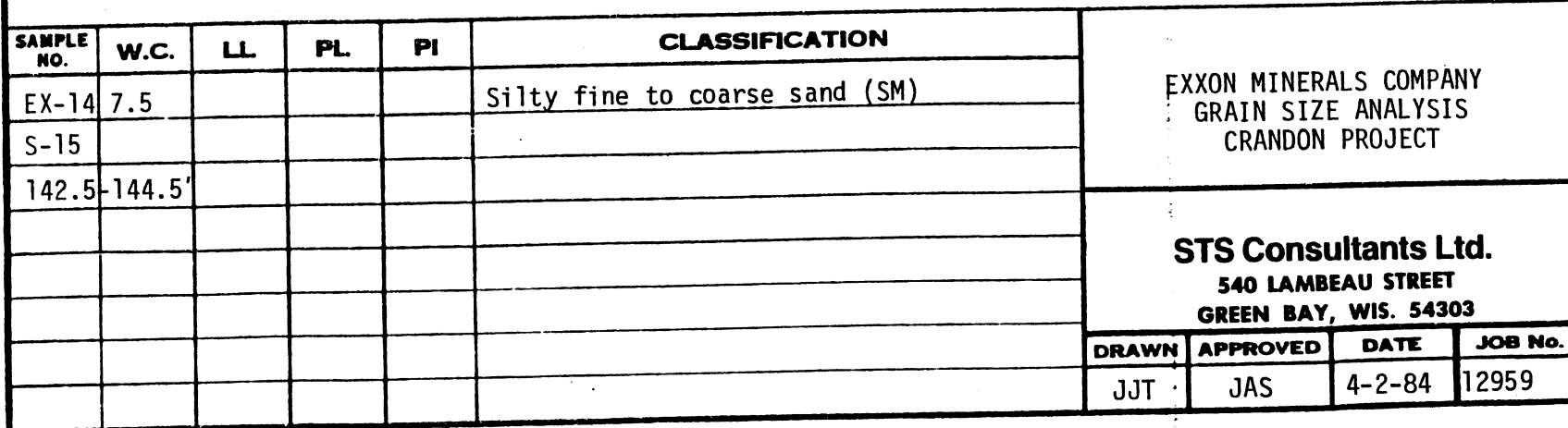
GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-14	11.2				Slightly silty fine to coarse sand (SM-SP)				
S-11									
101.5-103.5'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

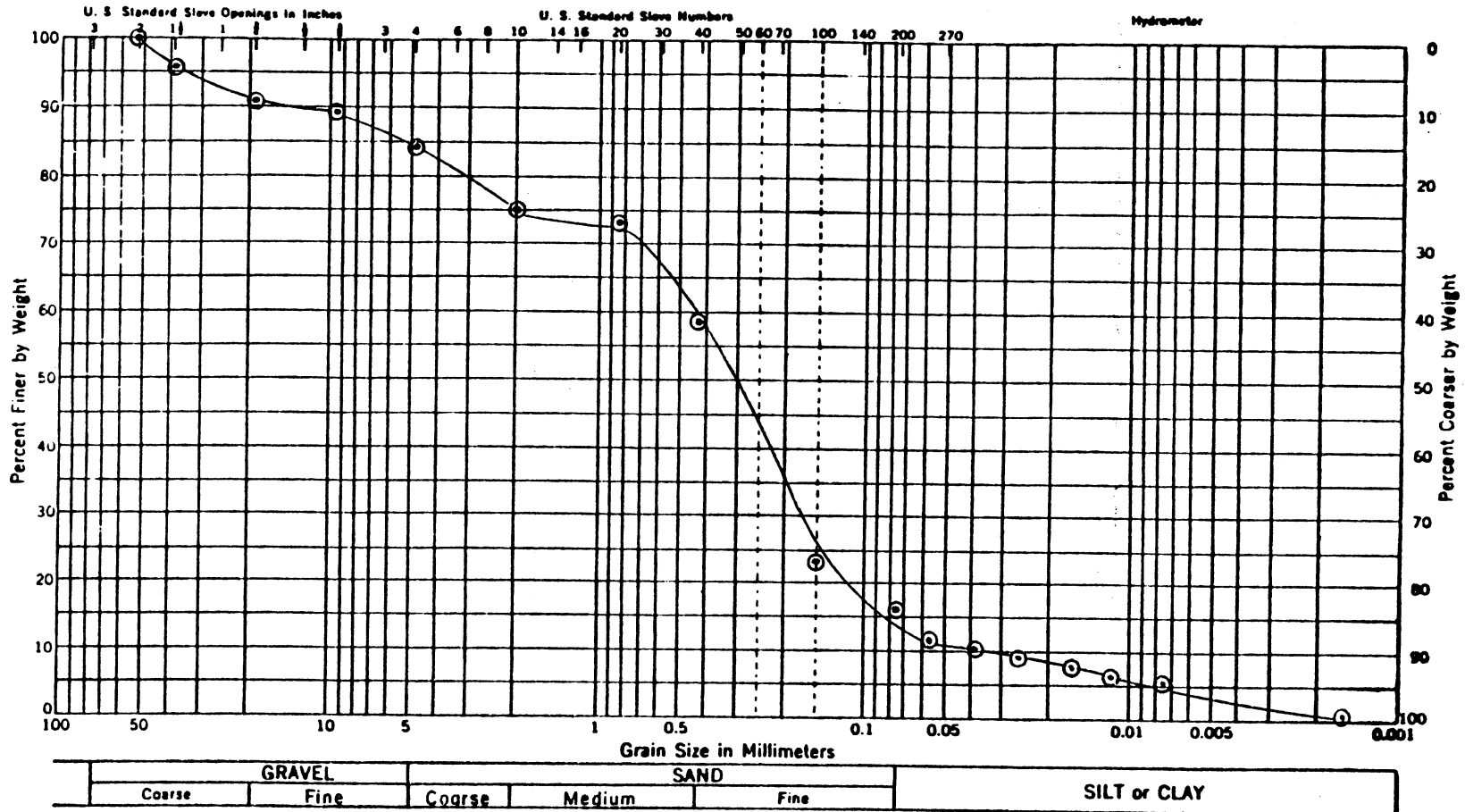
UNIFIED CLASSIFICATION SYSTEM



3.5-19-192



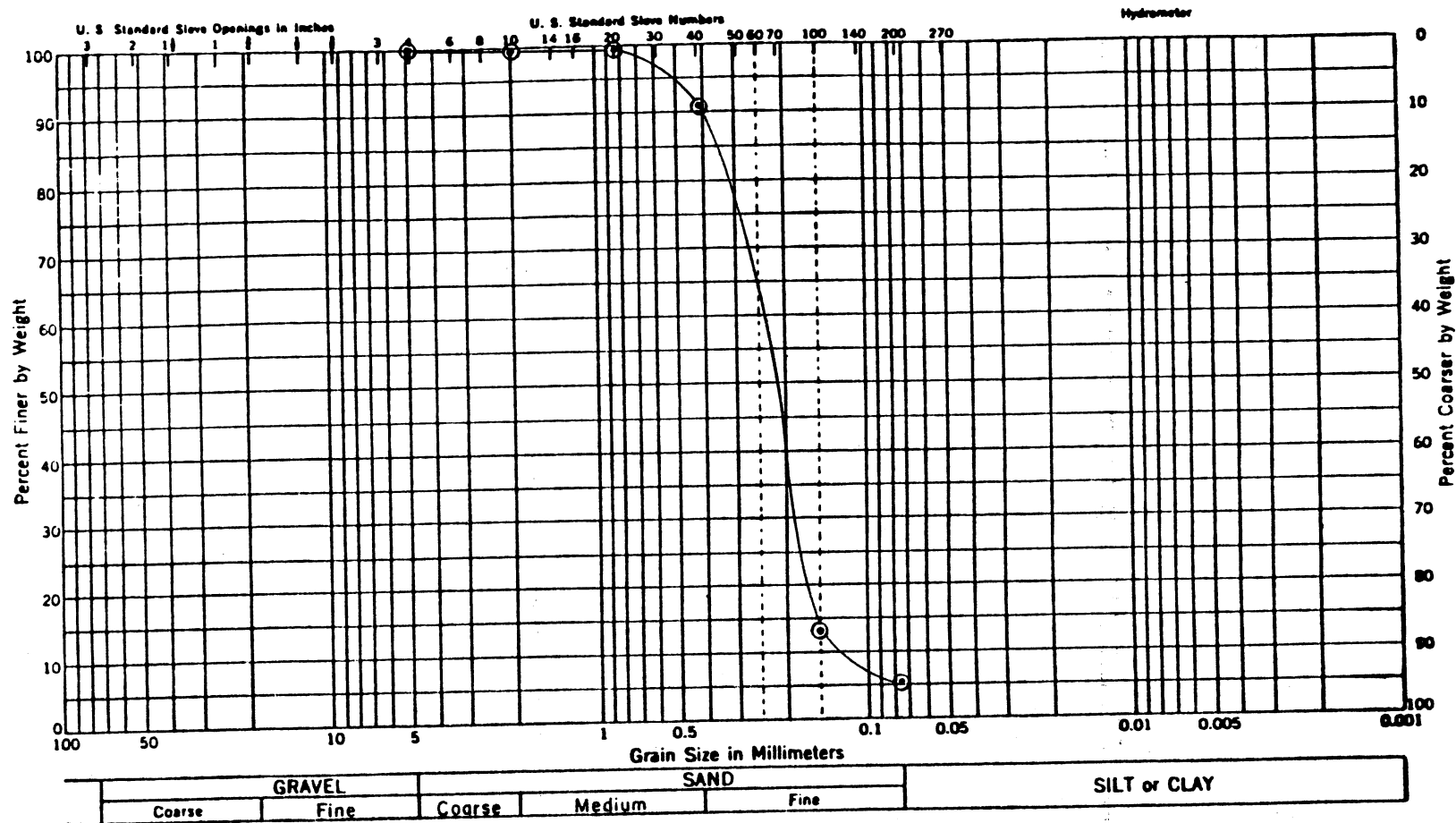
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
EX-14	9.5				Silty fine to coarse sand (SM)				
S-18									
173.0-175.0									
						DRAWN APPROVED DATE JOB No.			
						JJT	JAS	4-2-84	12959

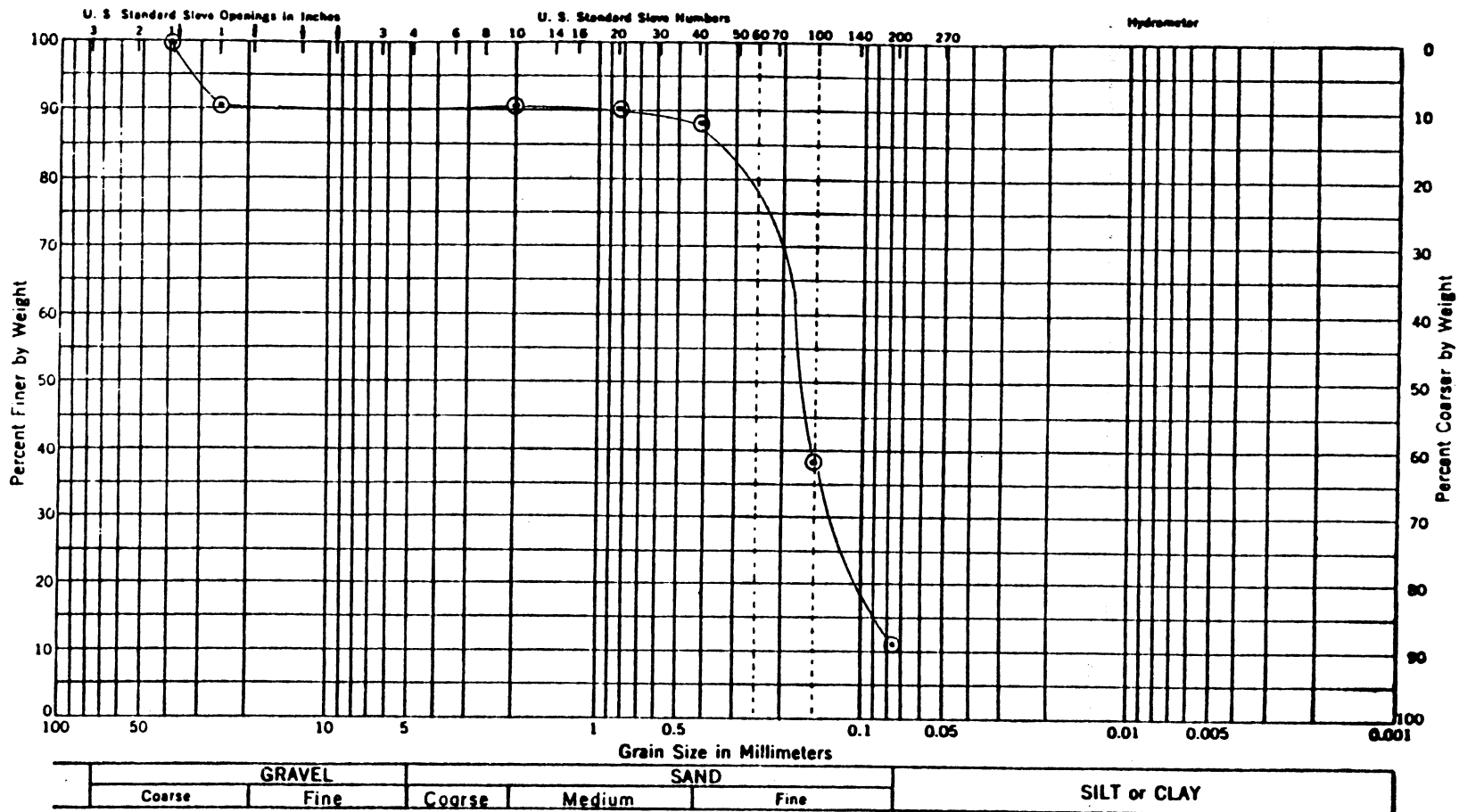
3.5-19-193

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX-14	16.8				Slightly silty fine sand (SM-SP)				
S-19						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
183.5-185.5'									
						DRAWN JJT	APPROVED JAS	DATE 4-2-84	JOB No. 12959

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-14	17.8				Slightly silty fine to medium sand (SM-SP)
S-22					
214.0	215.5'				

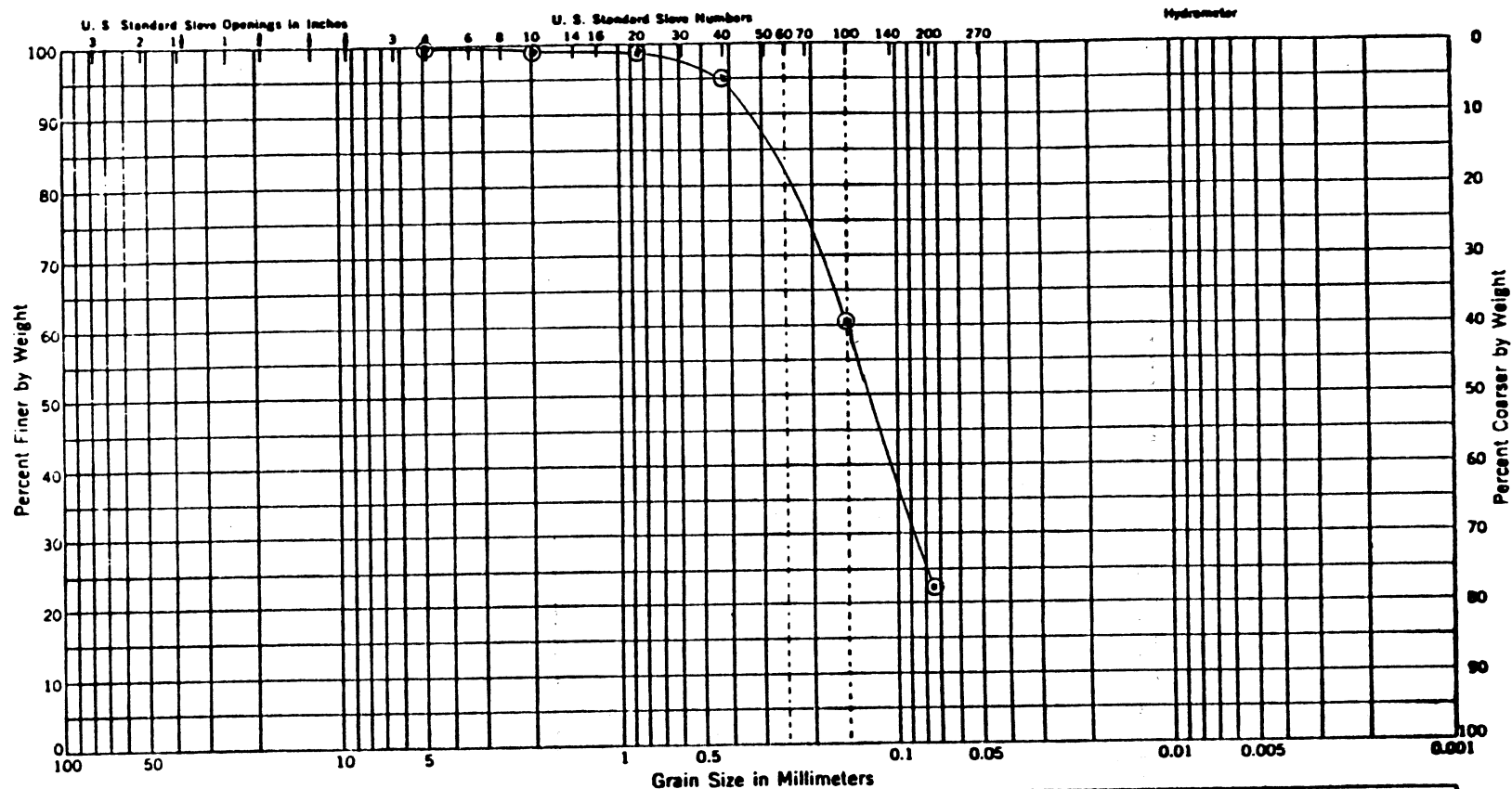
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

UNIFIED CLASSIFICATION SYSTEM

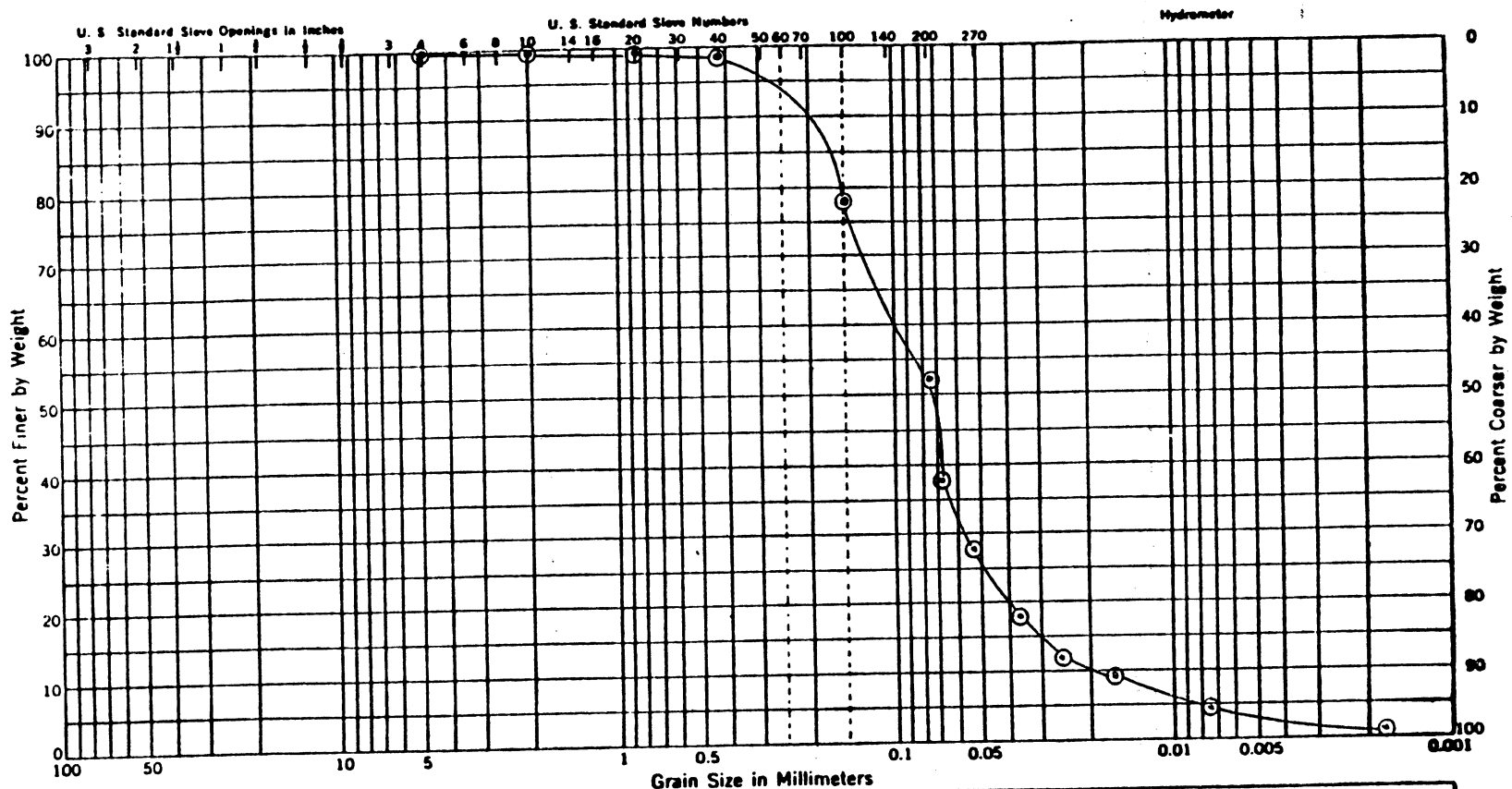
3.5-19-196



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
EX-14	18.6				Silty fine sand (SM)				
S-23									
224.5-226.0'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX-14	20.0				Fine sandy silt (ML)
S-25					
245.0-246.0'					

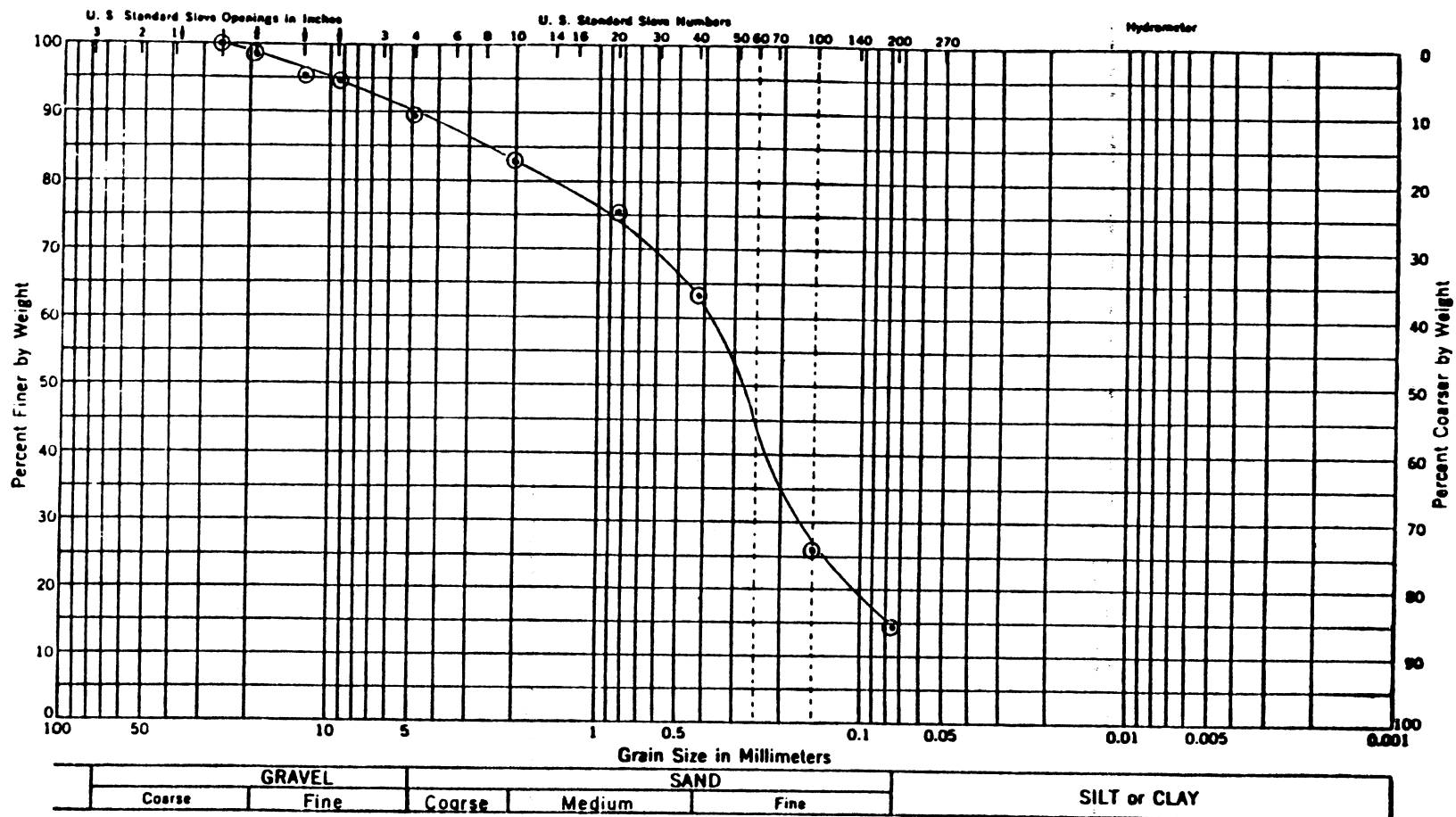
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

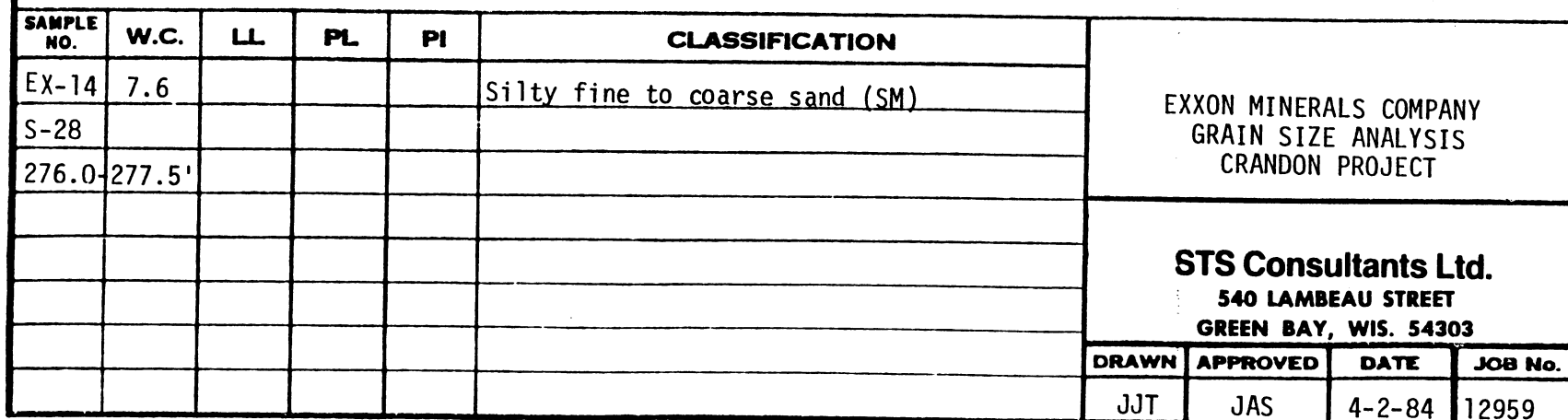
3.5-19-197

UNIFIED CLASSIFICATION SYSTEM

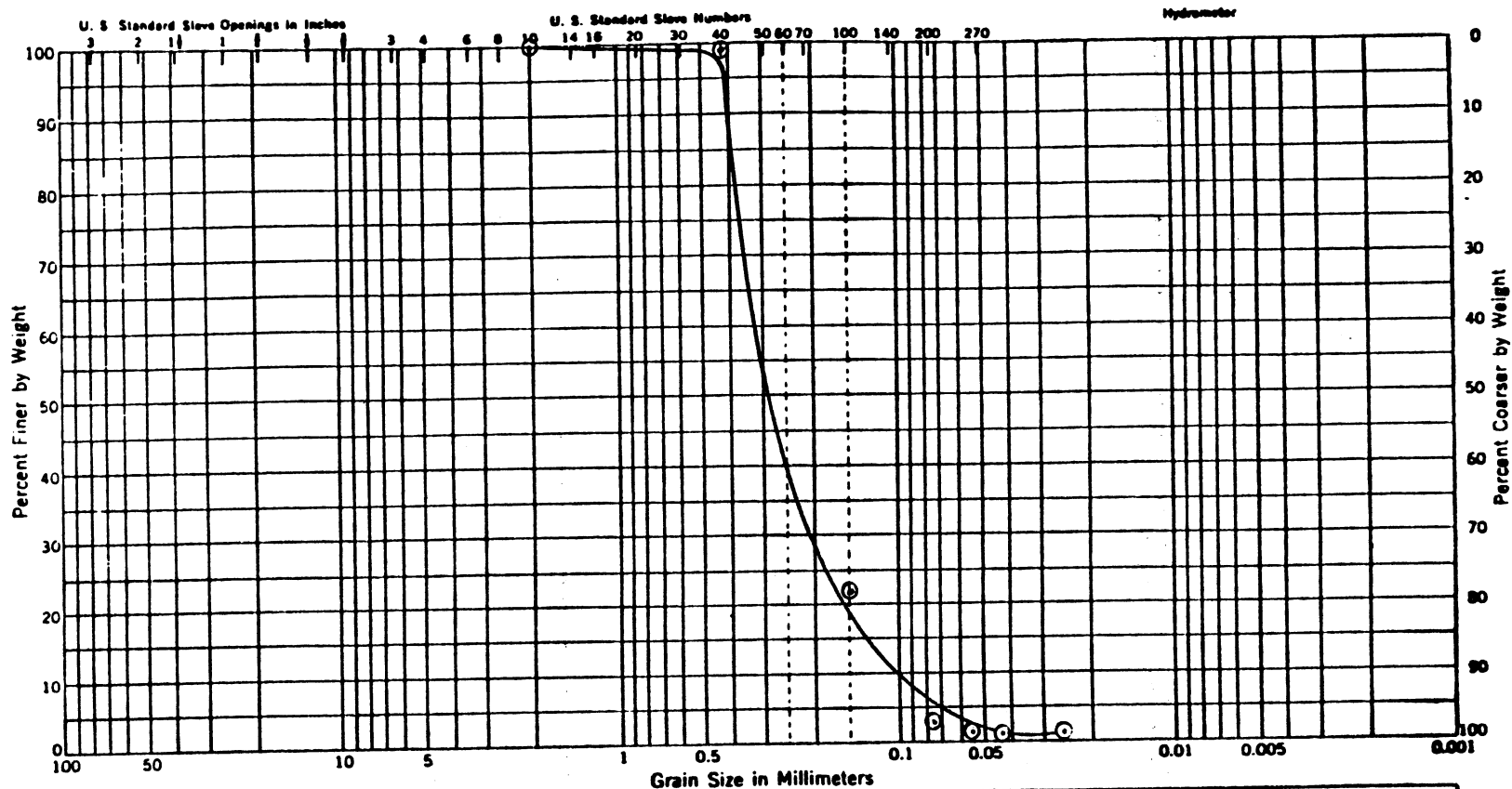


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
EX-14	13.7				Silty fine to coarse sand (SM)				
S-27									
264.5-266.5'									
						DRAWN APPROVED DATE JOB No. JJT JAS 4-2-84 12959			

3.5-19-199



UNIFIED CLASSIFICATION SYSTEM

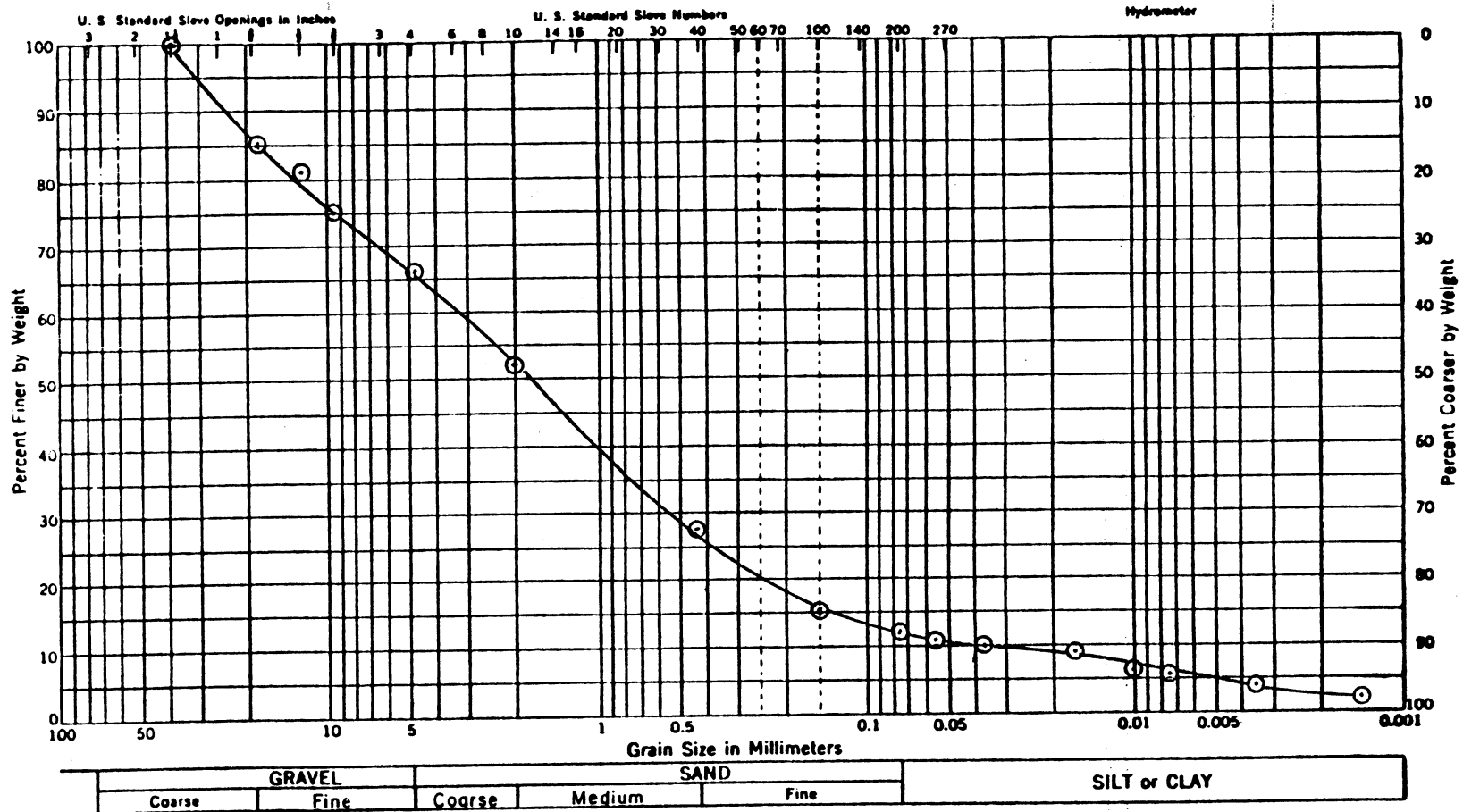


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX15	19.4				Fine sand (SP)				
S-1						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
61.5-63.5'									
						DRAWN	APPROVED	DATE	JOB No.
						K00/SMD	JAS	3-20-84	12959

3.5-19-200

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX15					Silty fine to coarse sand (SM)
S-2					
122.5-124.5'					

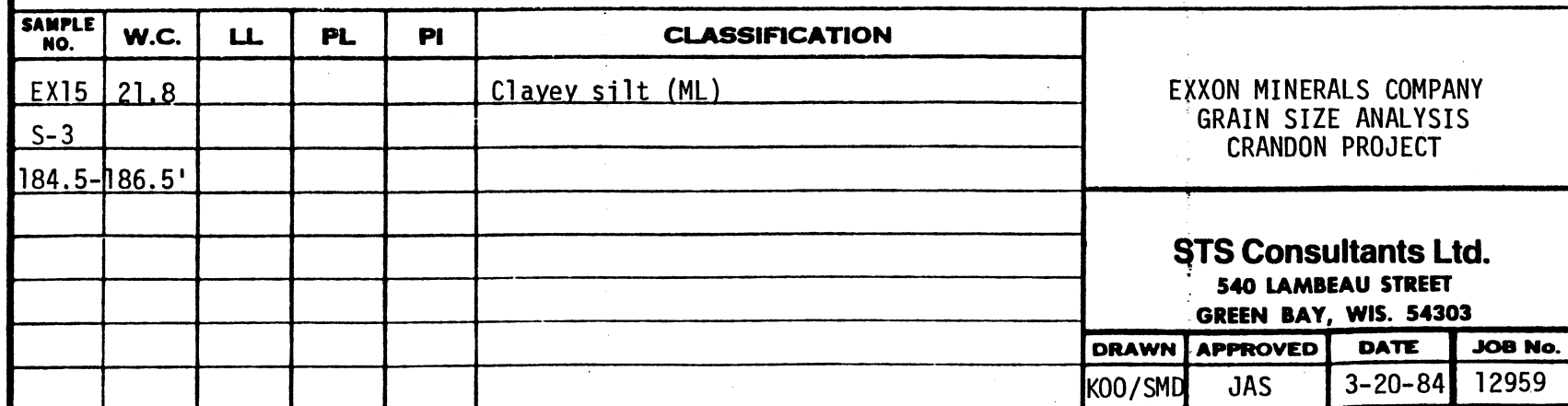
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

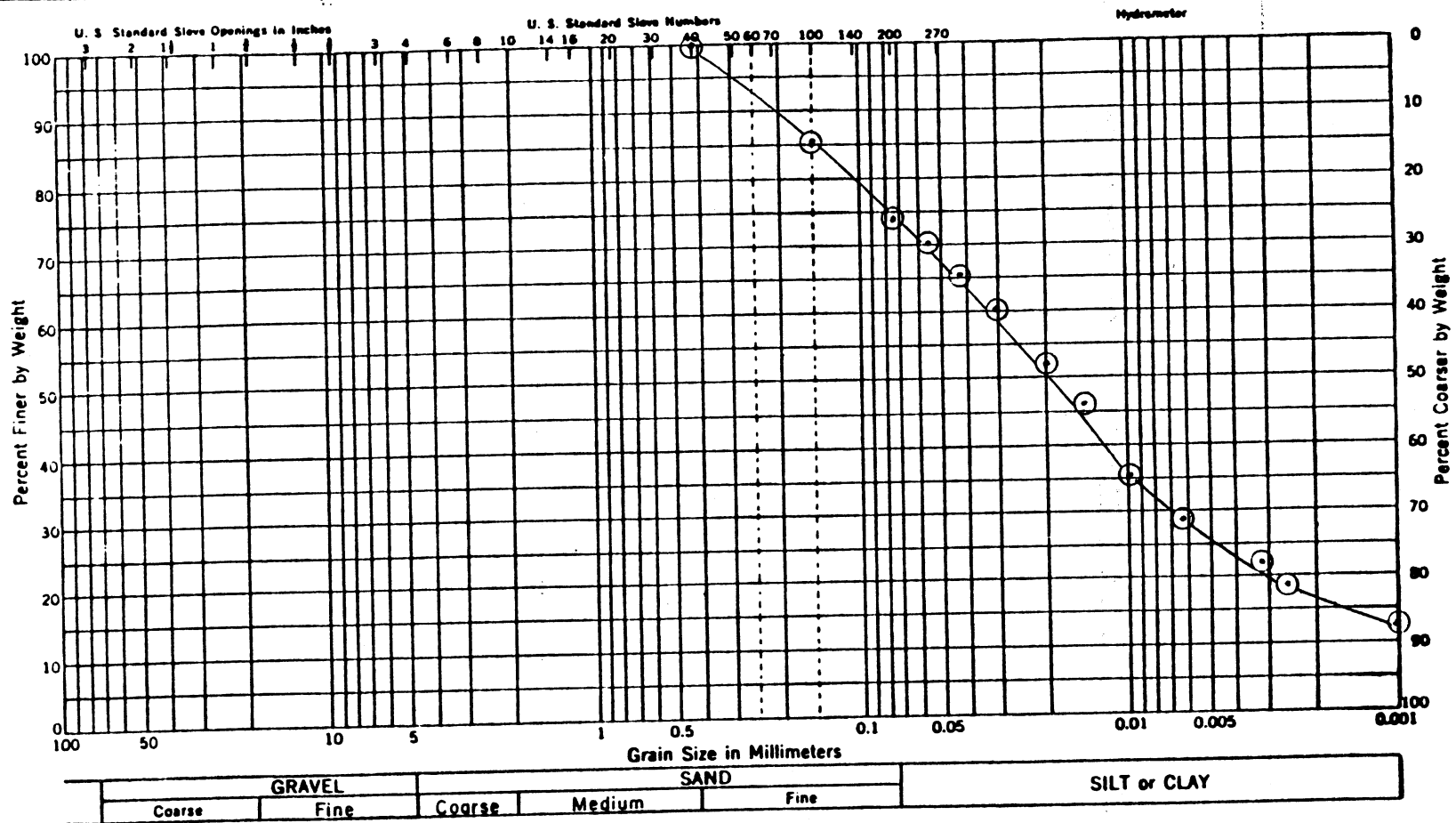
DRAWN	APPROVED	DATE	JOB No.
KOO/SMD	JAS	3-20-84	12959

3.5-19-201

3.5-19-202



UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX15	14.3%				Clayey silt (ML) -
S-4					
222.5-224.5'					

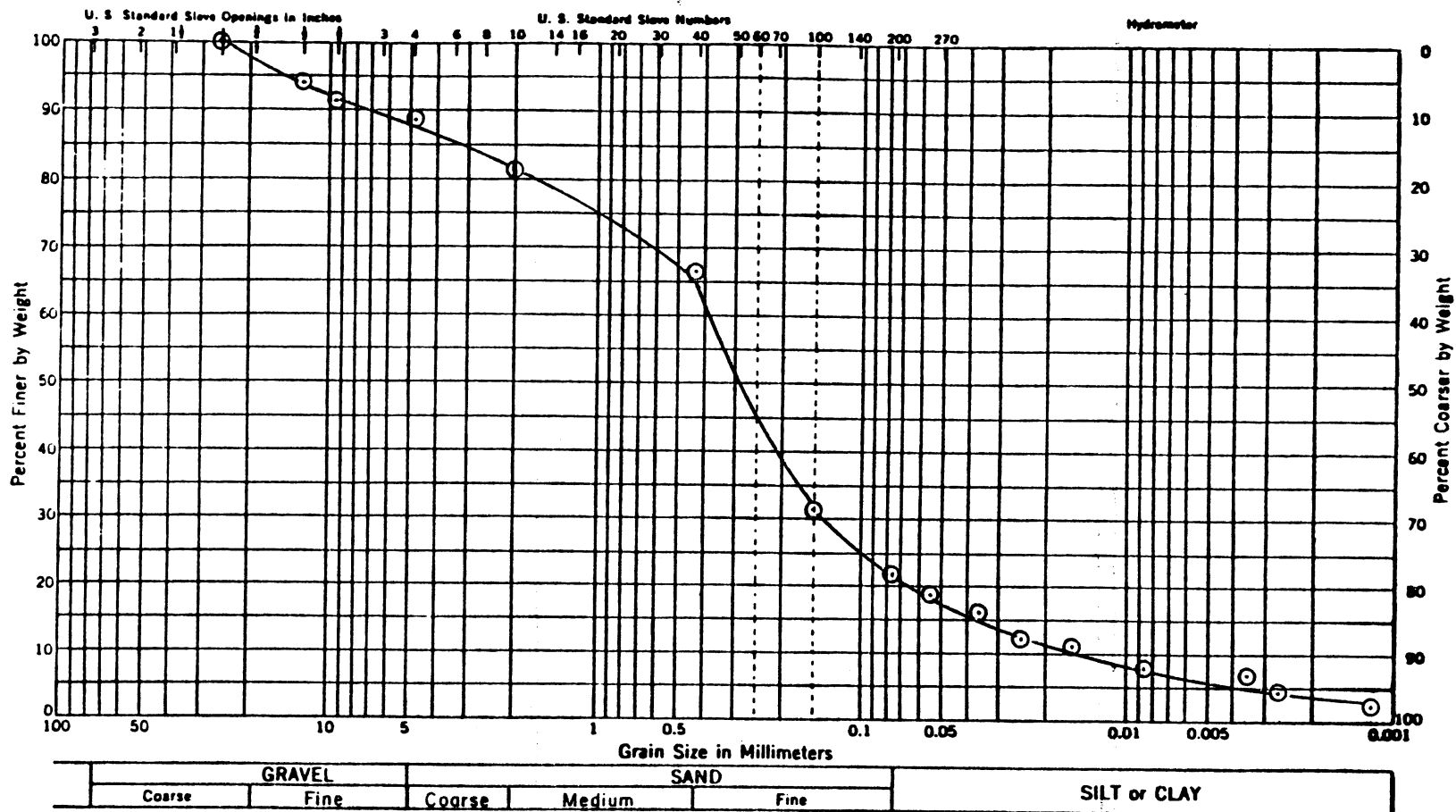
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	5-18-84	12959

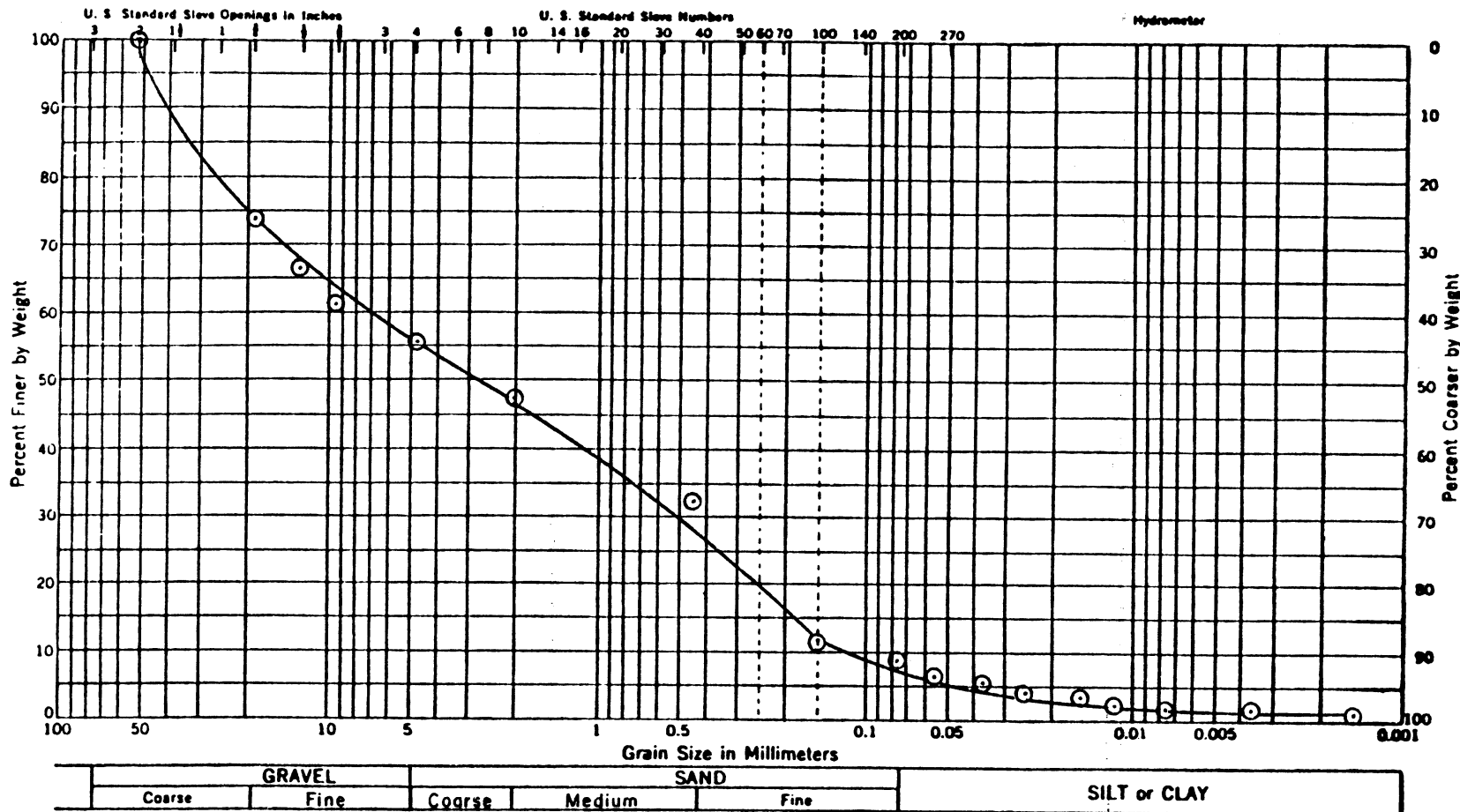
3.5-19-203

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
EX16	13.6				Silty fine to coarse sand (SM)				
S-1						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
68-70'									
						DRAWN	APPROVED	DATE	JOB No.
						K00/SMD	JAS	3-20-84	12959

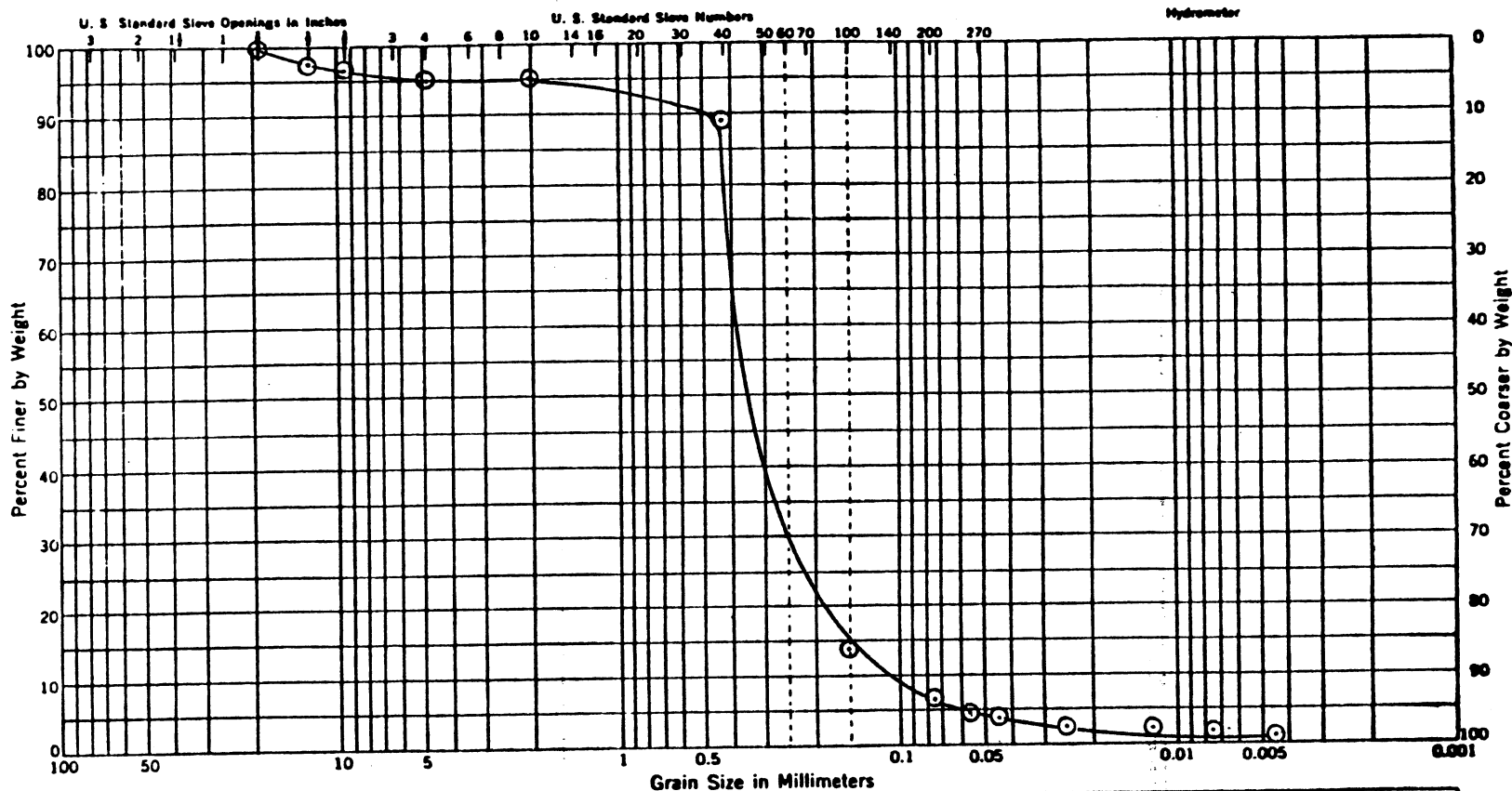
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
EX16	12.8				Slightly silty fine to coarse sand (SM-SP)				
S-2									
110-112'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						KOO/SMD	JAS	3-20-84	12959

3.5-19-205

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
EX16	21.2				Slightly silty fine to medium sand (SM-SP)
S-3					
140-142'					

EXXON MINERALS COMPANY
 GRAIN SIZE ANALYSIS
 CRANDON PROJECT

STS Consultants Ltd.
 540 LAMBEAU STREET
 GREEN BAY, WIS. 54303

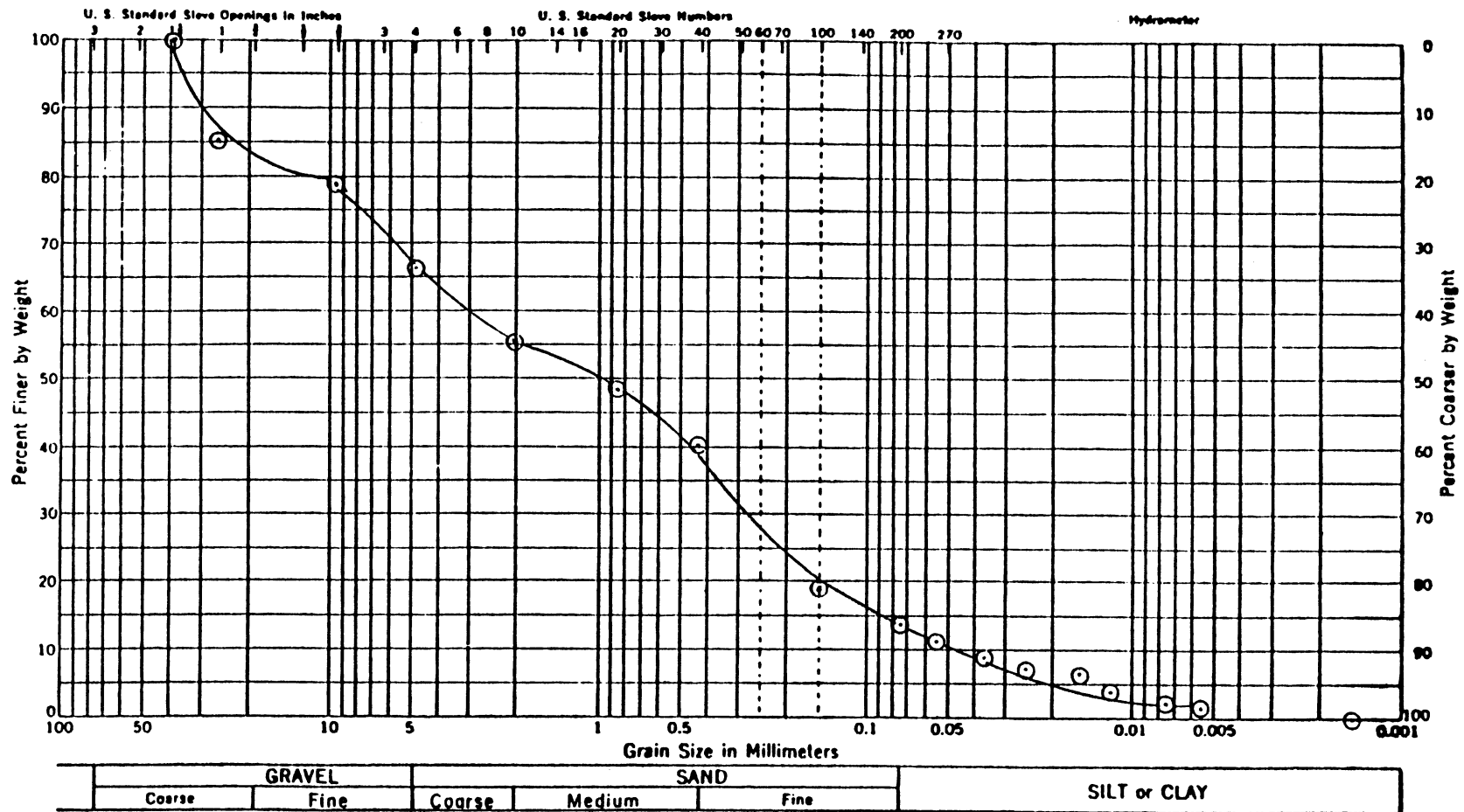
DRAWN	APPROVED	DATE	JOB No.
KOO/SMD	JAS	3-20-84	12959

3.5-19-206

Appendix 3-20

**Grain Size Reclaim Pond Borings Curves
From 1984 STS Consultants Ltd**

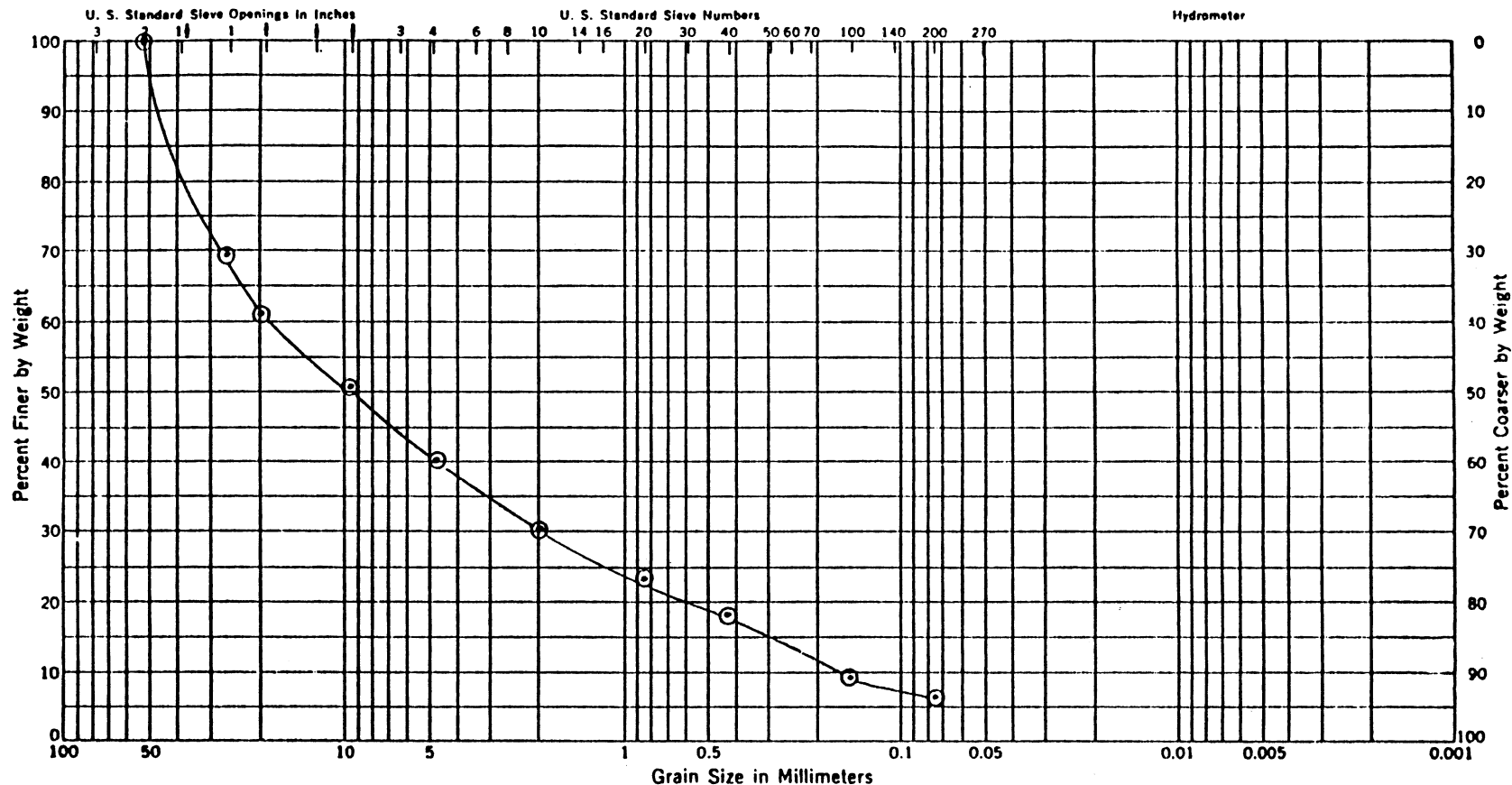
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
RP1					Silty fine to coarse sand (SM)				
S-1									
19-20.5'									
						DRAWN APPROVED DATE JOB No. K00/SMD JAS 3-20-84 12959			

3.5-20-1

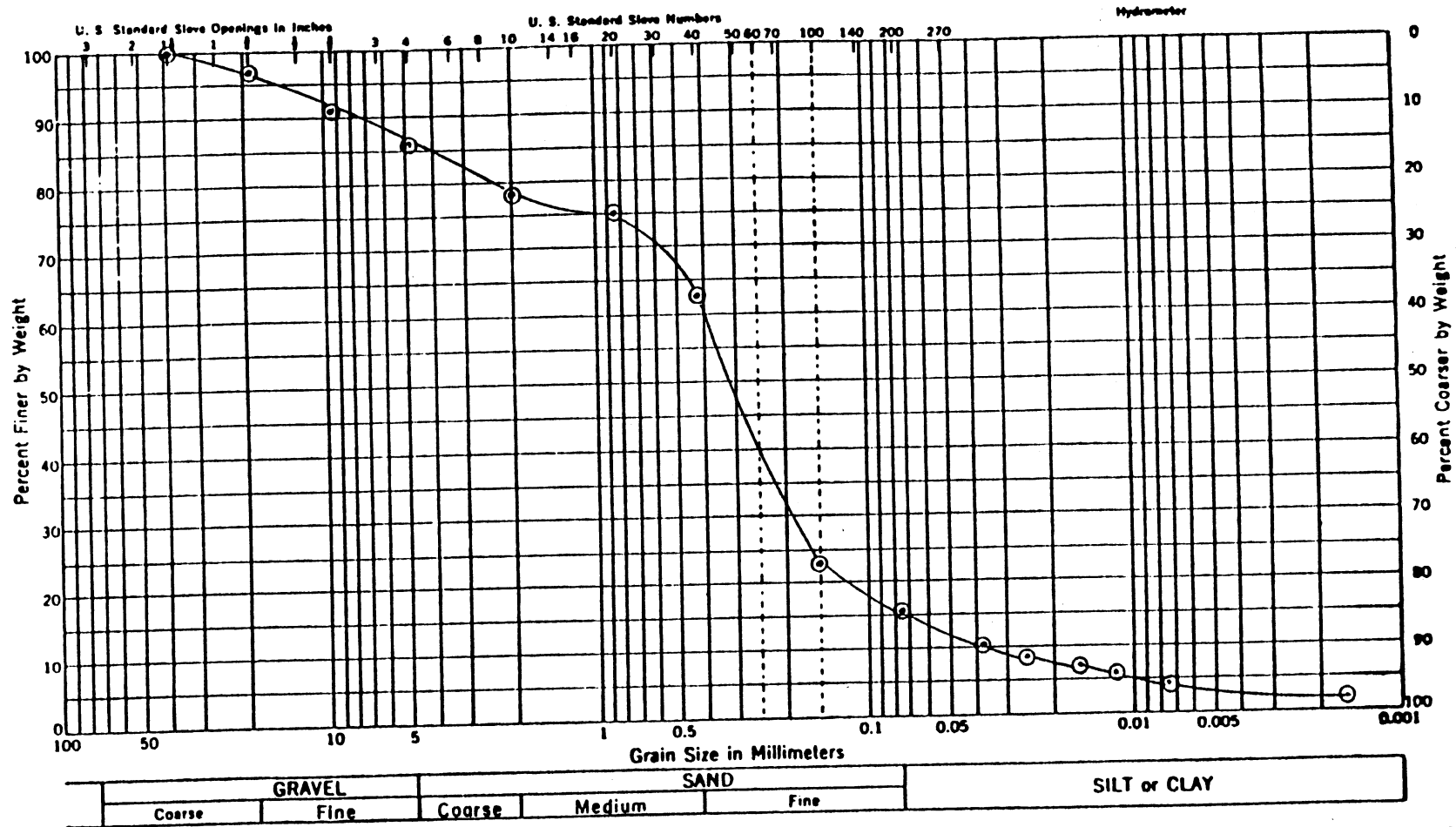
3.5-20-2



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
RP-1	S-2	22.5-24'							Slightly silty				
									fine to coarse				
									gravel (GM-GP)				
										STS CONSULTANTS LTD.			
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SMD	JAS	3-24-84	12959

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
RP-2					Silty fine to coarse sand (SM)
S-1					
23.0-24.2'					

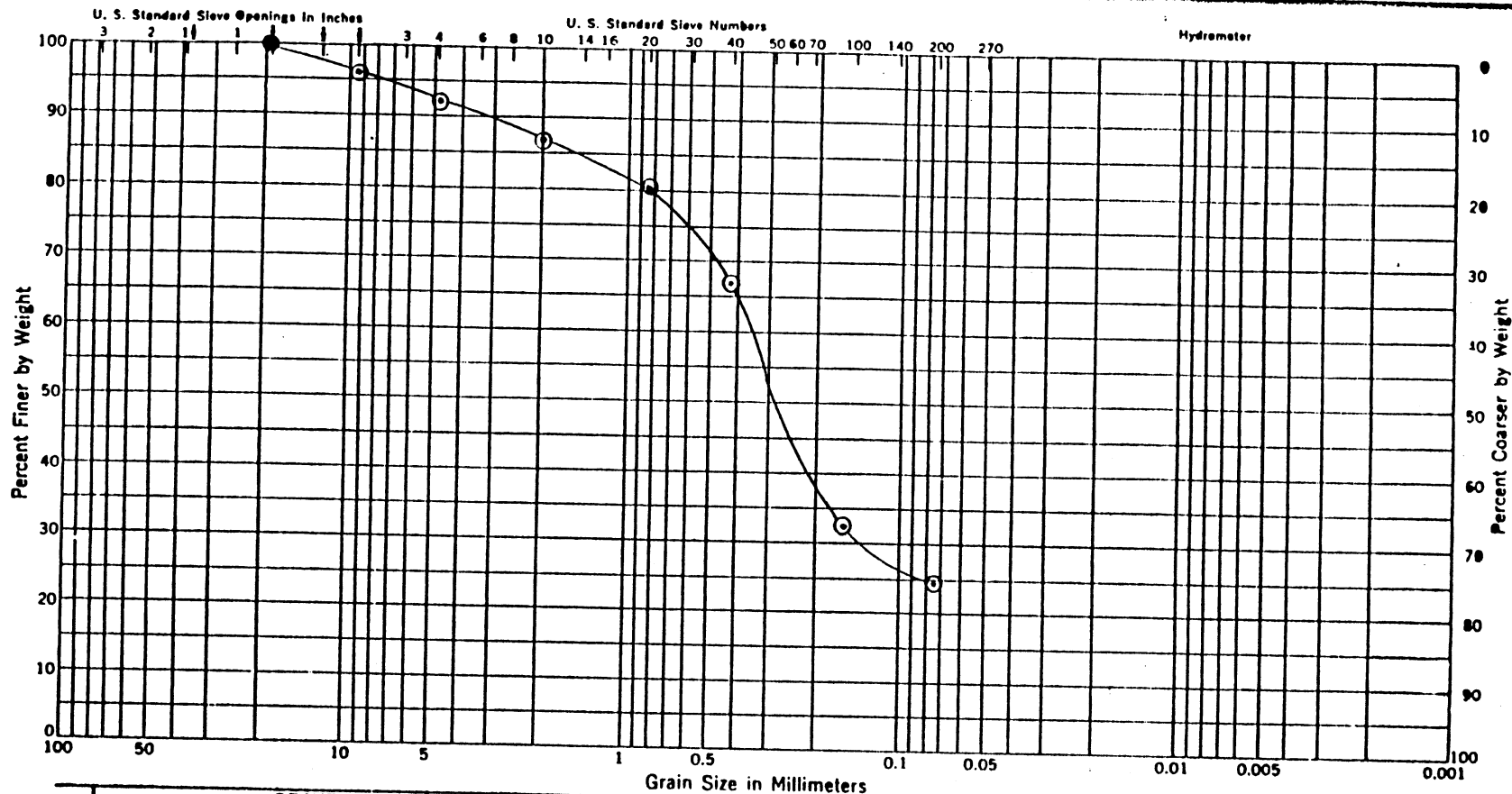
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-2-84	12959

3.5-20-3

3.5-20-4



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

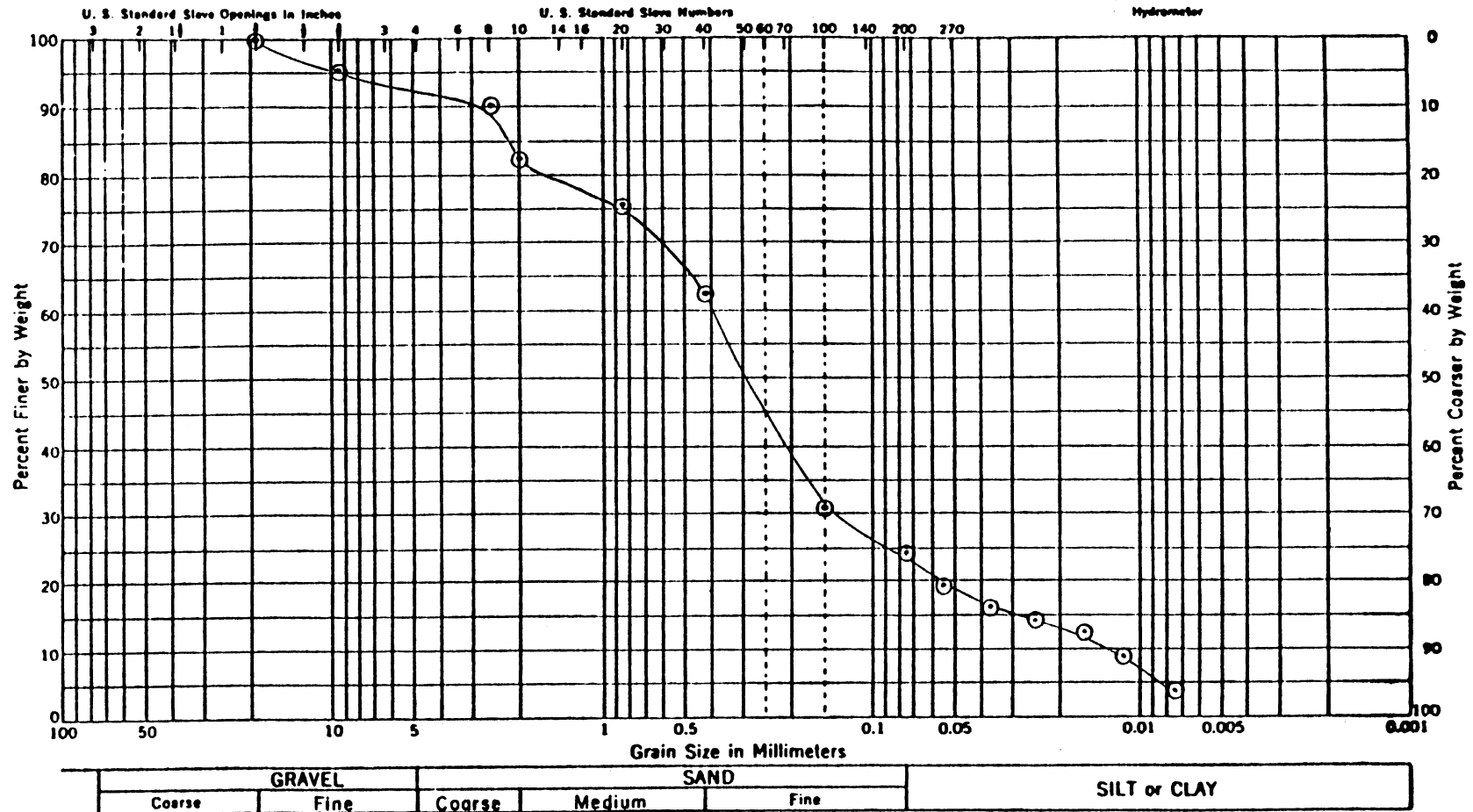
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION
RP-2	S-2	28-28.5'							Silty fine to coarse sand (SM)

EXXON MINERALS COMPANY
SIEVE ANALYSIS
CRANDON PROJECT

STS CONSULTANTS LTD.

DRAWN	APPROVED	DATE	JOB No.
JJT/SM	JAS	3-24-84	12959

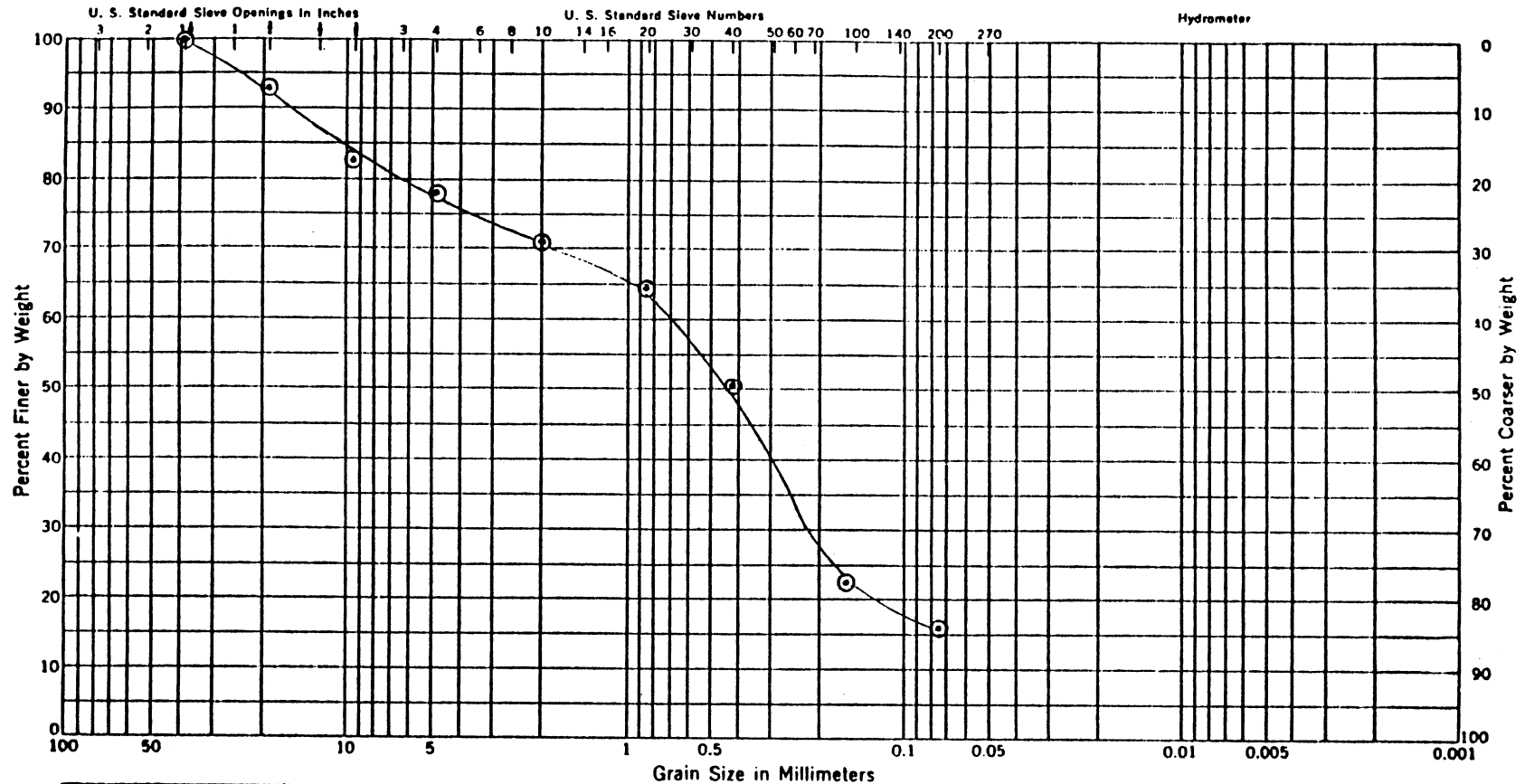
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
RP-2					Silty fine to coarse sand (SM)				
S-3									
33.0-34.0'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

3.5-20-5

3.5-20-6



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

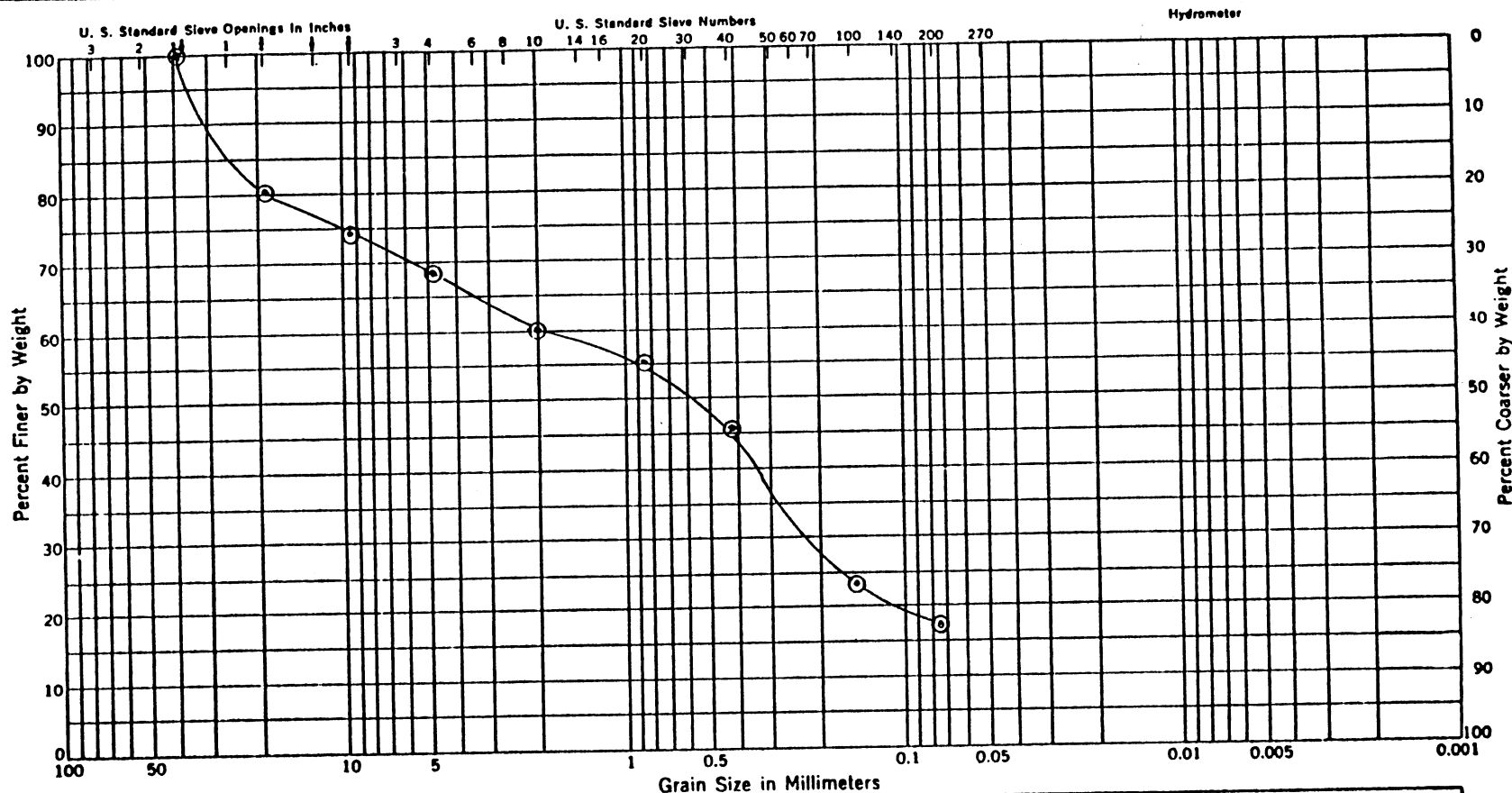
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION
RP-4	S-1	23-24.5'							Silty fine to coarse sand (SM)

EXXON MINERALS COMPANY
SIEVE ANALYSIS
CRANDON PROJECT

STS CONSULTANTS LTD.

DRAWN	APPROVED	DATE	JOB No.
JJT/SMD	JAS	3-24-84	12959

3.5-20-7



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

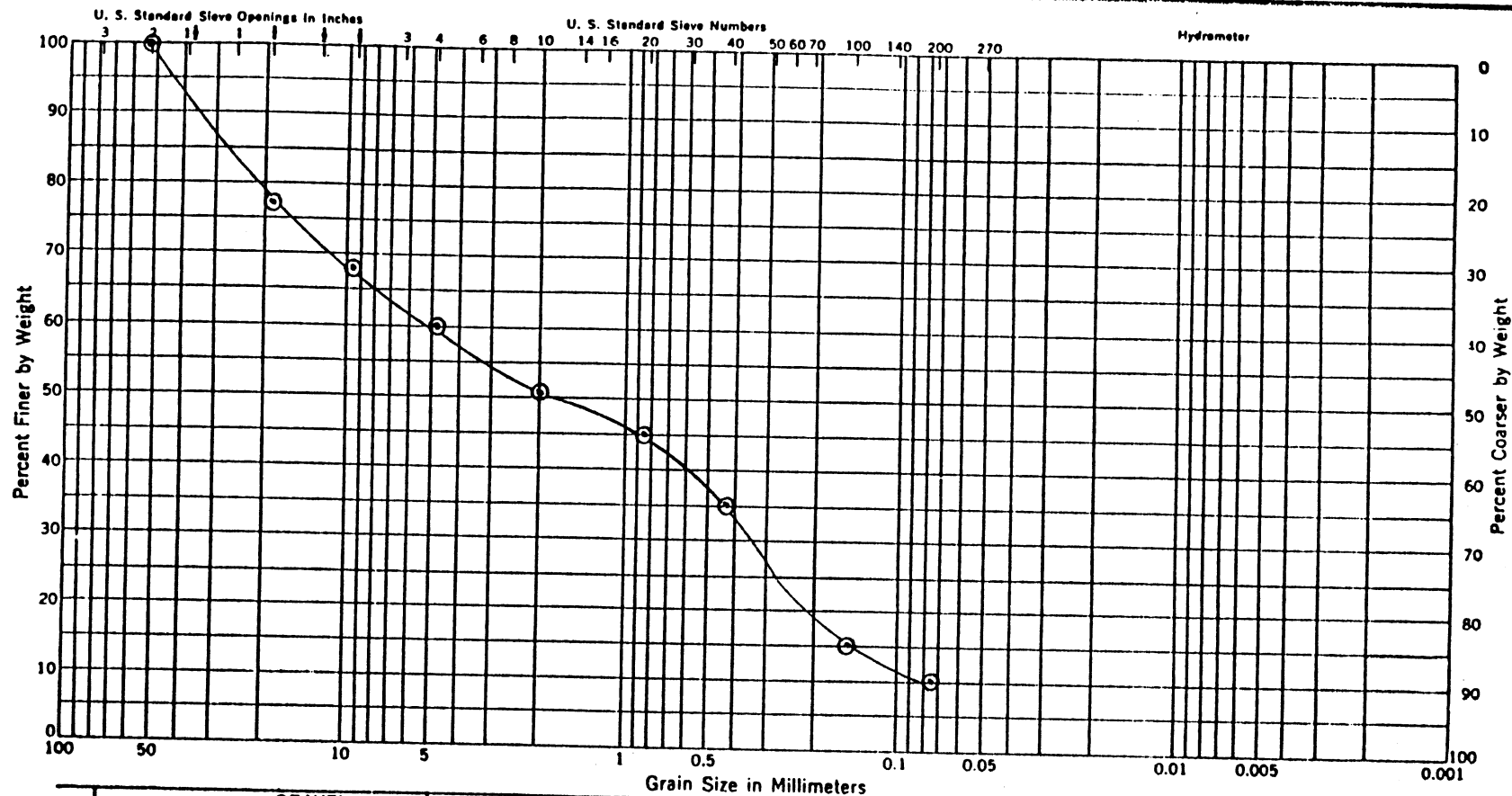
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION
RP-4	S-2	28-28.5'							Silty fine to coarse sand (SM)

EXXON MINERALS COMPANY
SIEVE ANALYSIS
CRANDON PROJECT

STS CONSULTANTS LTD.

DRAWN	APPROVED	DATE	JOB No.
JJT/SMI	JAS	3-24-84	12959

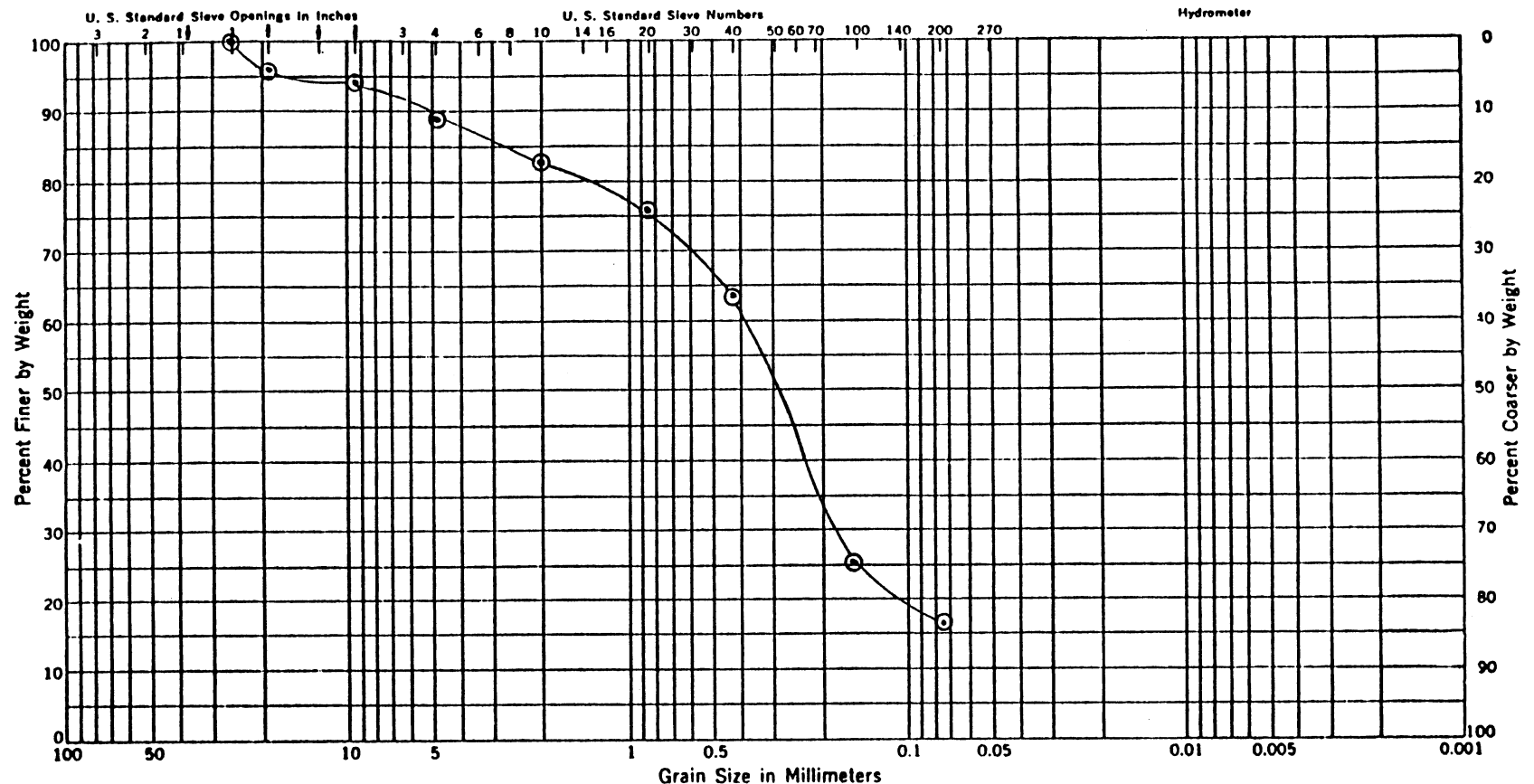
3.5-20-8



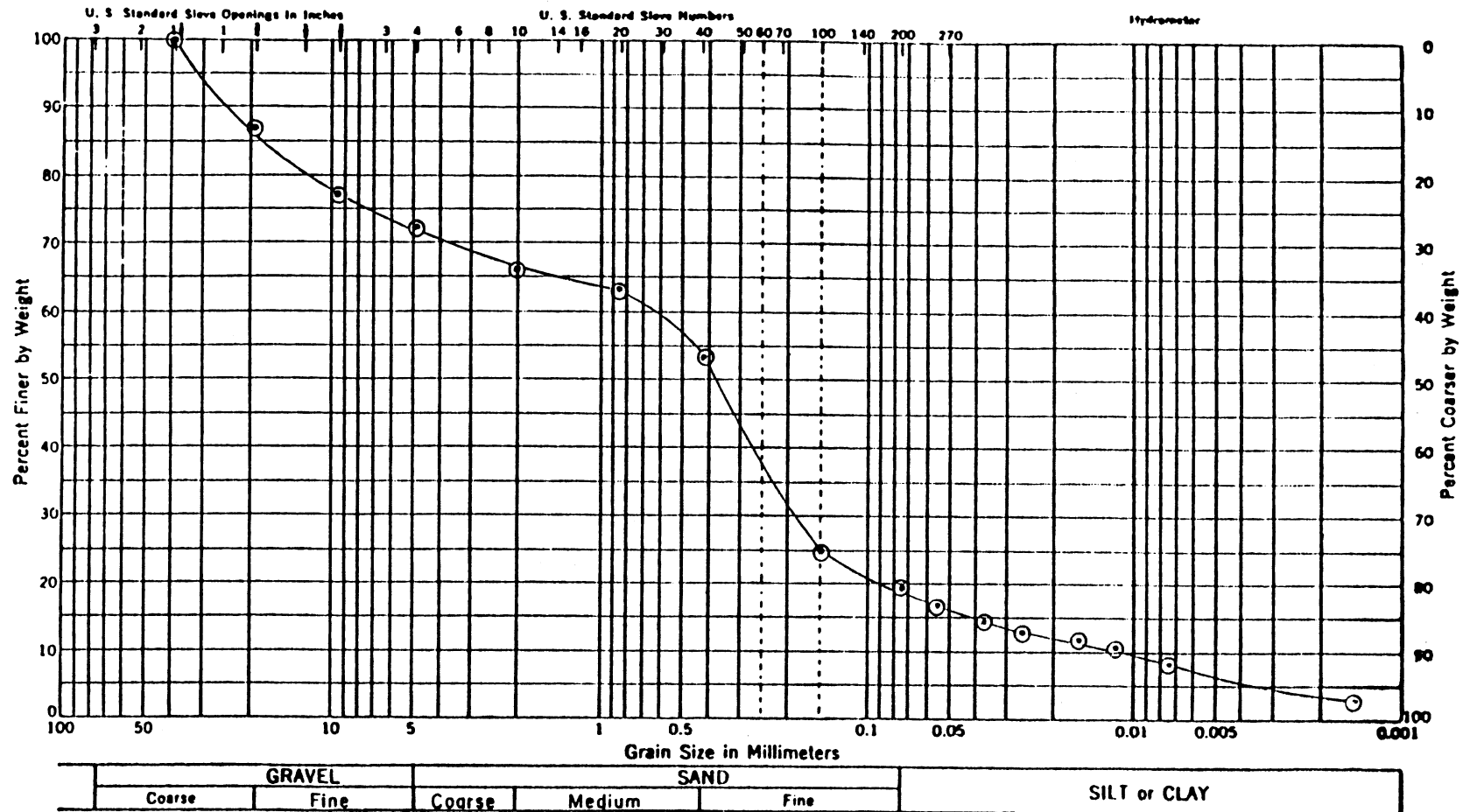
GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
RP-4	S-3	33-33.7'							Slightly silty fine to coarse sand (SM-SP)				
										STS CONSULTANTS LTD.			
										DRAWN APPROVED DATE JOB No.			
										JJT/SMI	JAS	3-24-84	12959

3.5-20-9

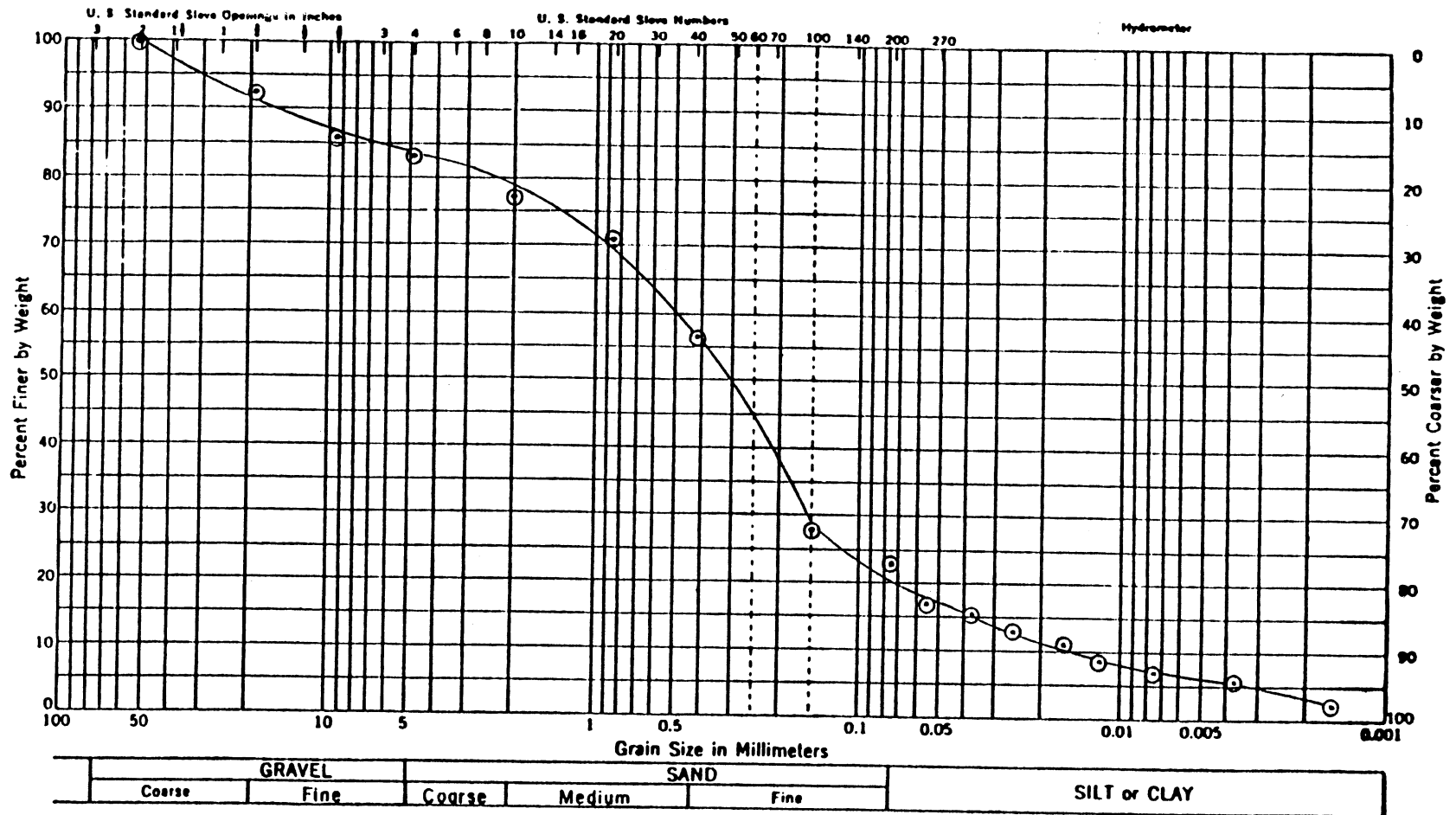


3.5-20-10



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
RP-5					Silty fine to coarse sand (SM)				
S-2									
34.0-35.0'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

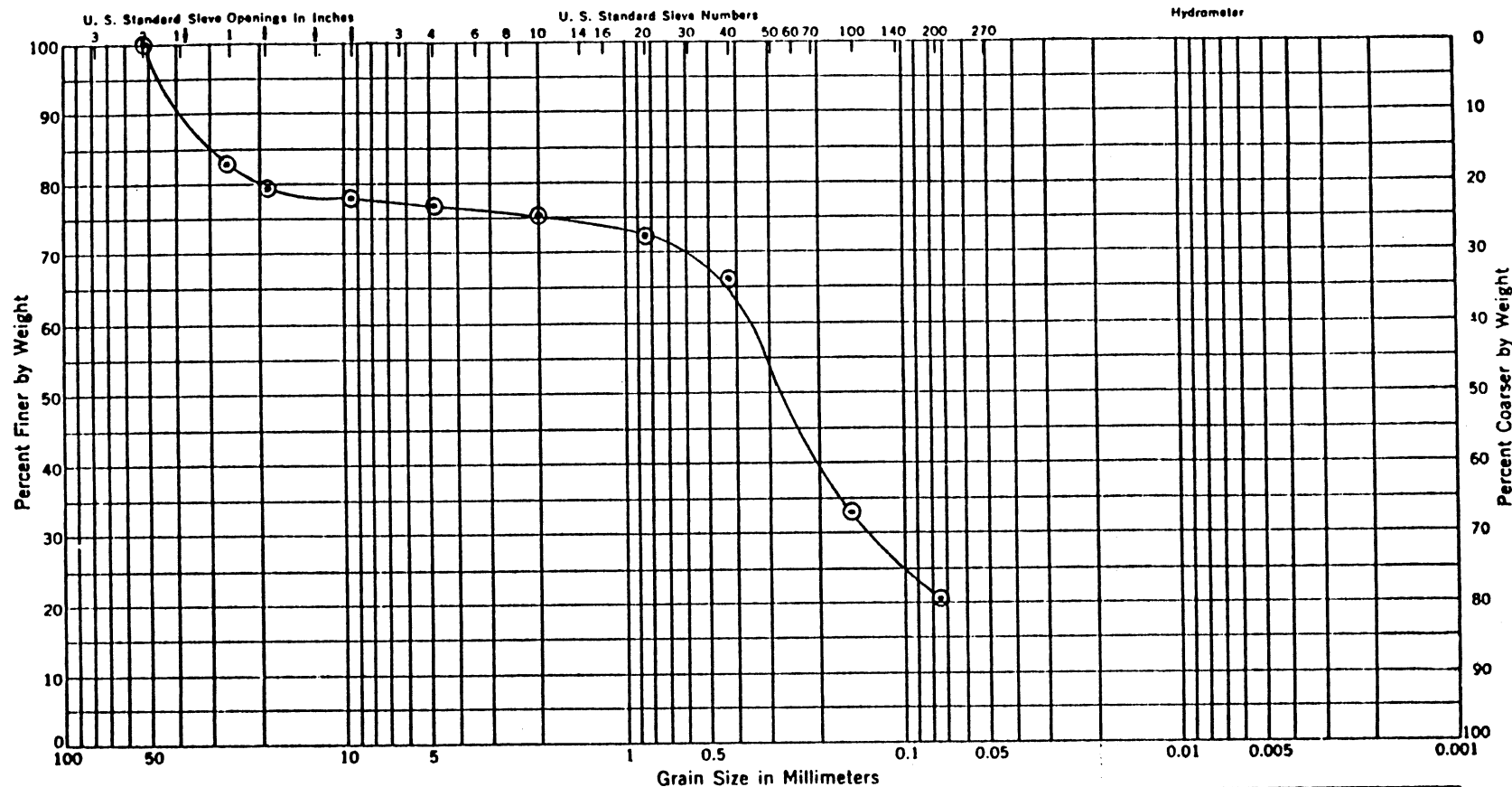
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
RP-5					Silty fine to coarse sand (SM)				
S-3									
39.0-40.0'									
						DRAWN APPROVED DATE JOB No.			
						JJT	JAS	4-2-84	12959

3.5-20-11

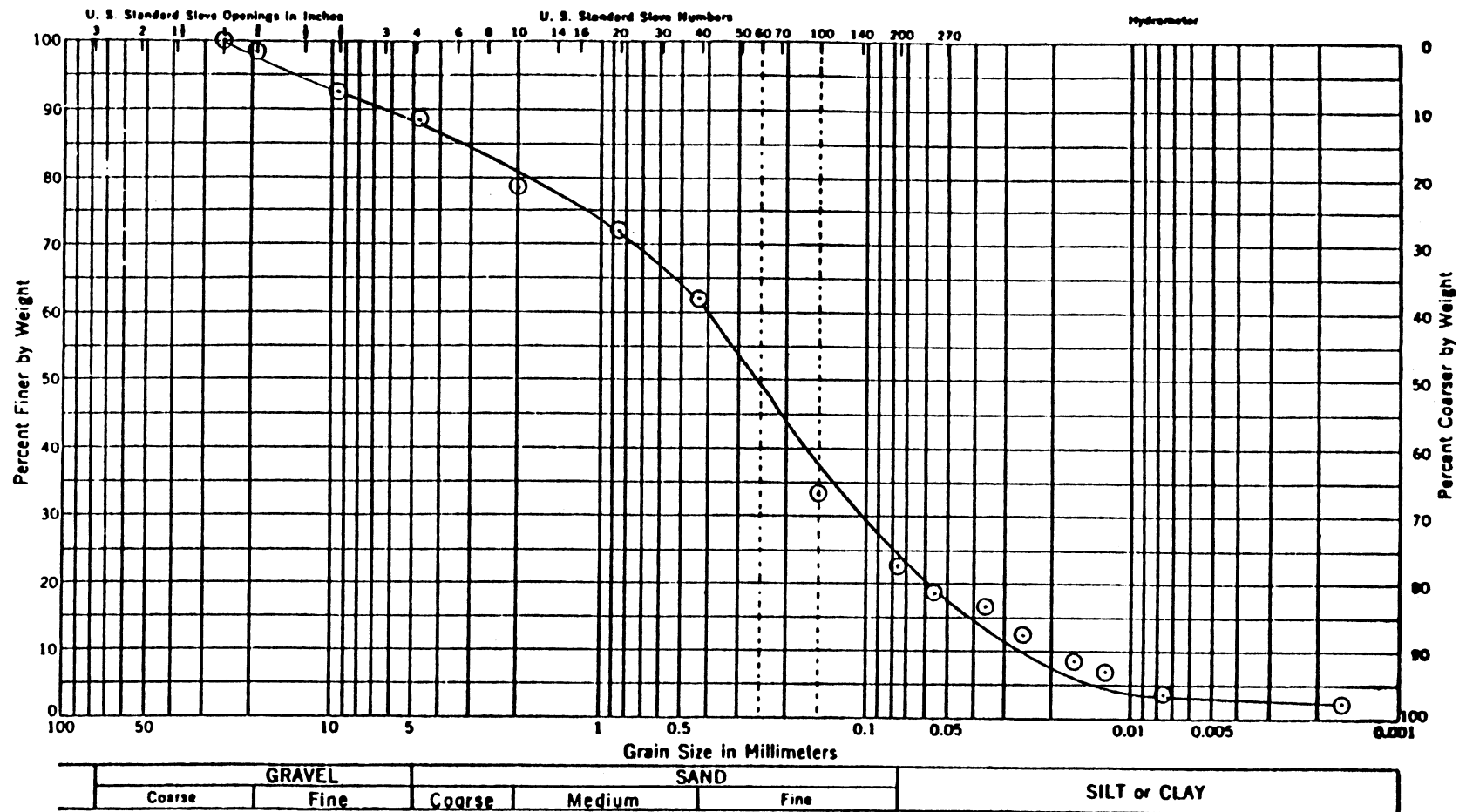
3:5-20-12



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
RP-8	S-2	24-25.5'							Silty fine to				
									coarse sand (SM)				
										STS CONSULTANTS LTD.			
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SMI	JAS	3-24-84	12959

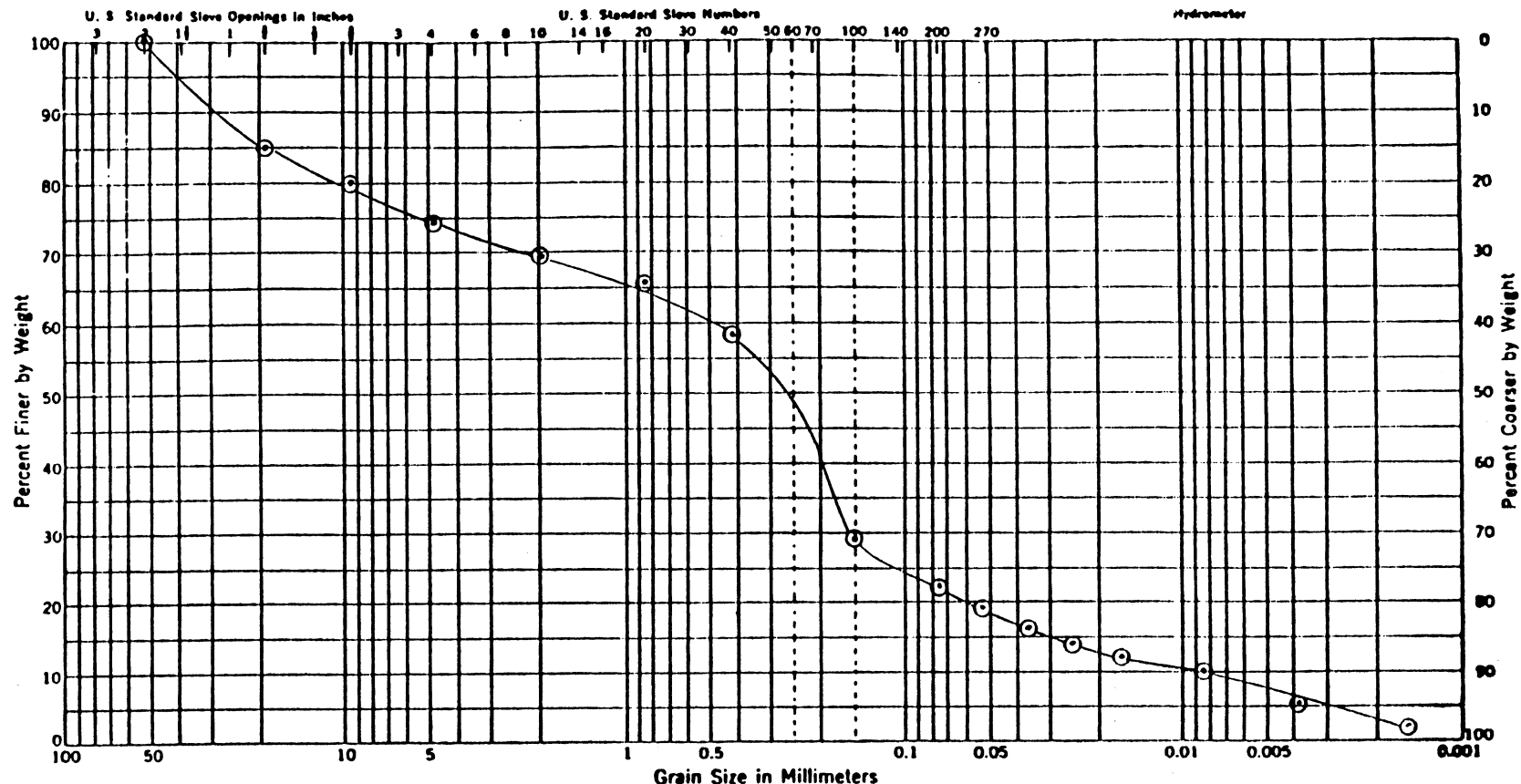
UNIFIED CLASSIFICATION SYSTEM



3.5-20-13

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
RP8					Silty fine to coarse sand (SM)				
S-3									
29-30.5									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						KOO/SMD	JAS	3-20-84	12959

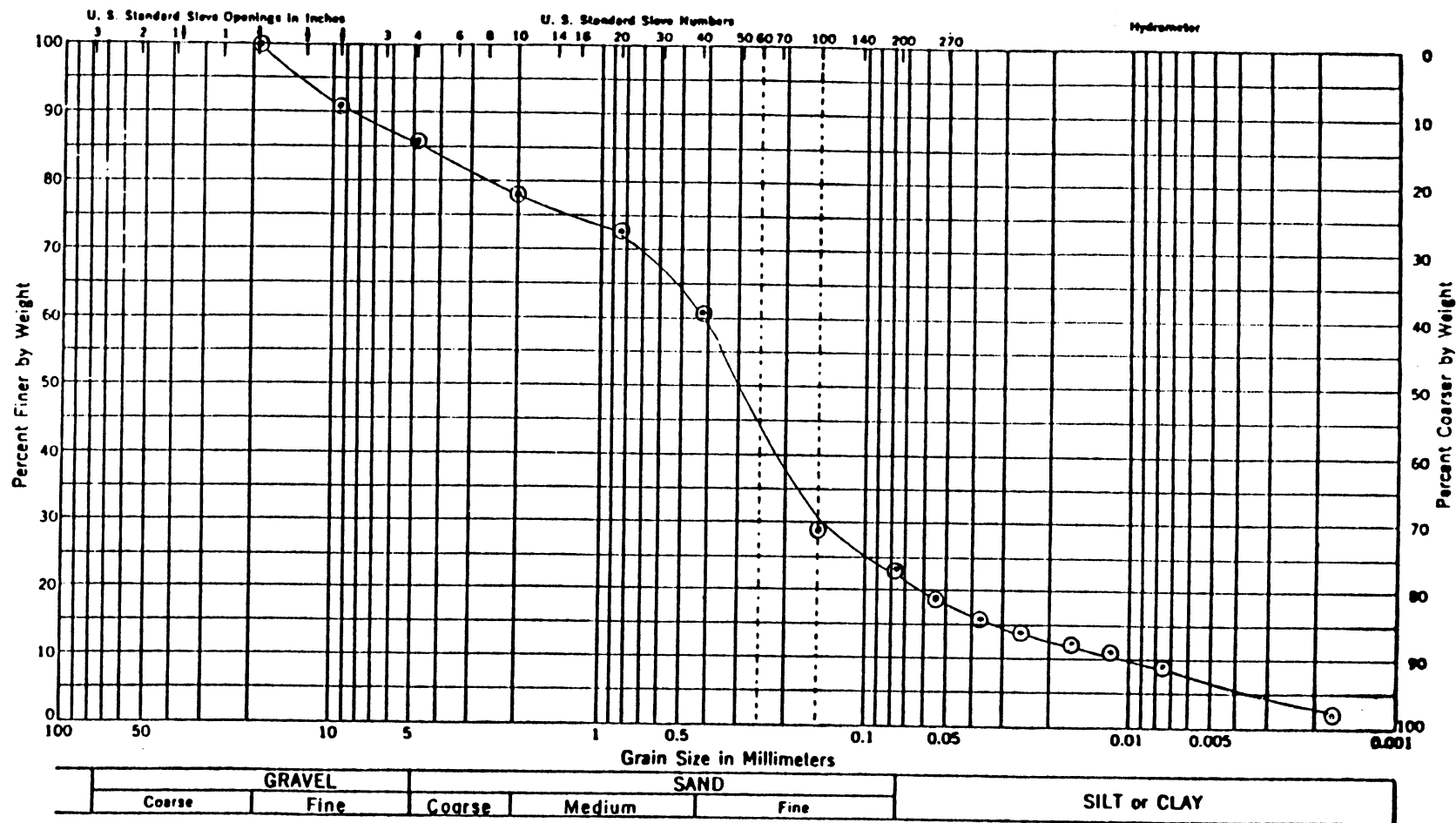
3.5-20-14



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
RP-9					Silty fine to coarse sand (SM)				
S-1									
23.0-24.5'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

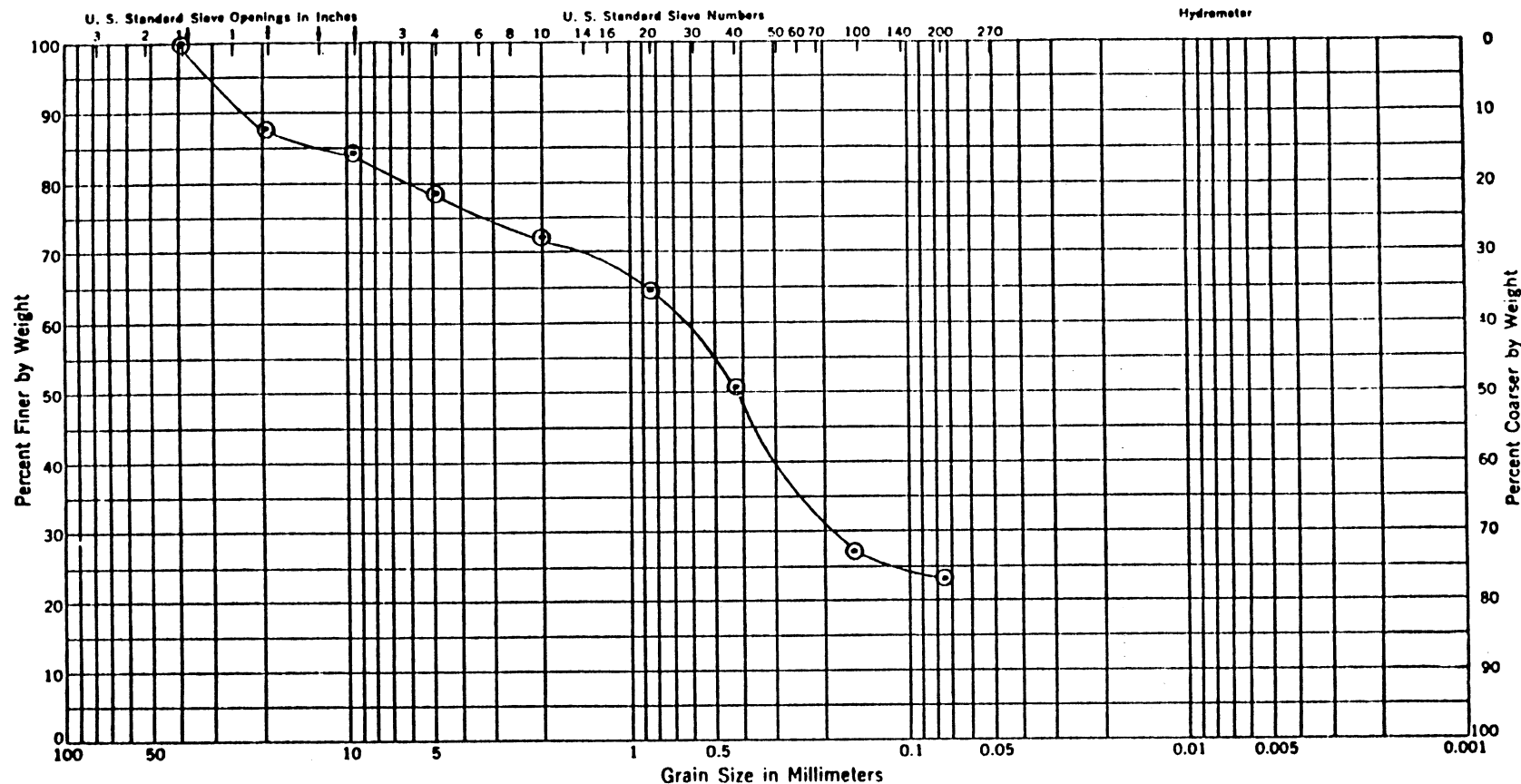
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
RP-9					Silty fine to coarse sand (SM)				
S-2									
28.0-	29.0'								
						DRAWN APPROVED DATE JOB No.			
						JJT	JAS	4-2-84	12959

3.5-20-15

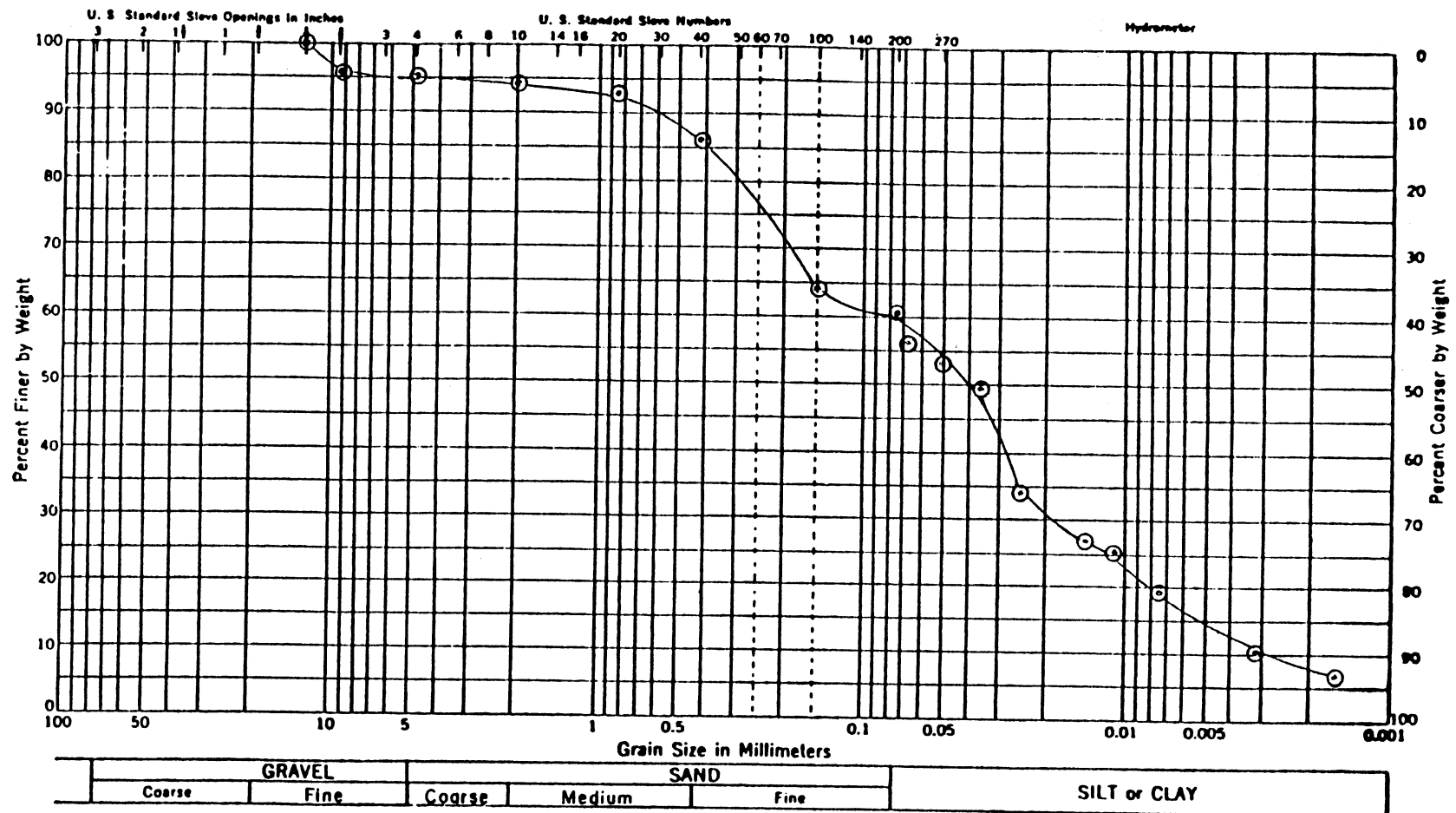
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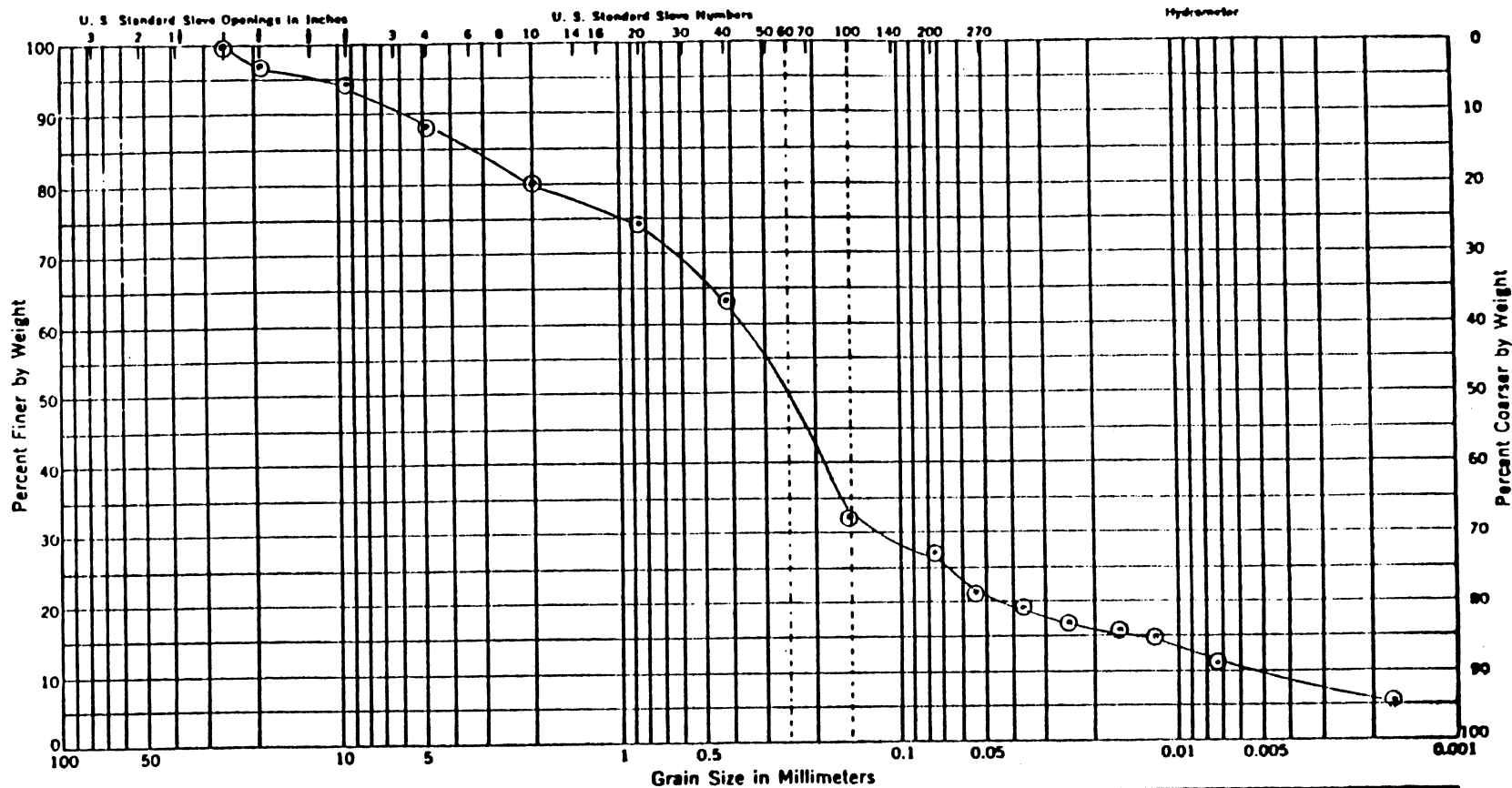


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
RP-9	S-3	33-34'							Silty fine to coarse sand (SM)				
										STS CONSULTANTS LTD.			
										DRAWN APPROVED DATE JOB No.			
										JJT/SMI	JAS	3-24-84	12959

UNIFIED CLASSIFICATION SYSTEM

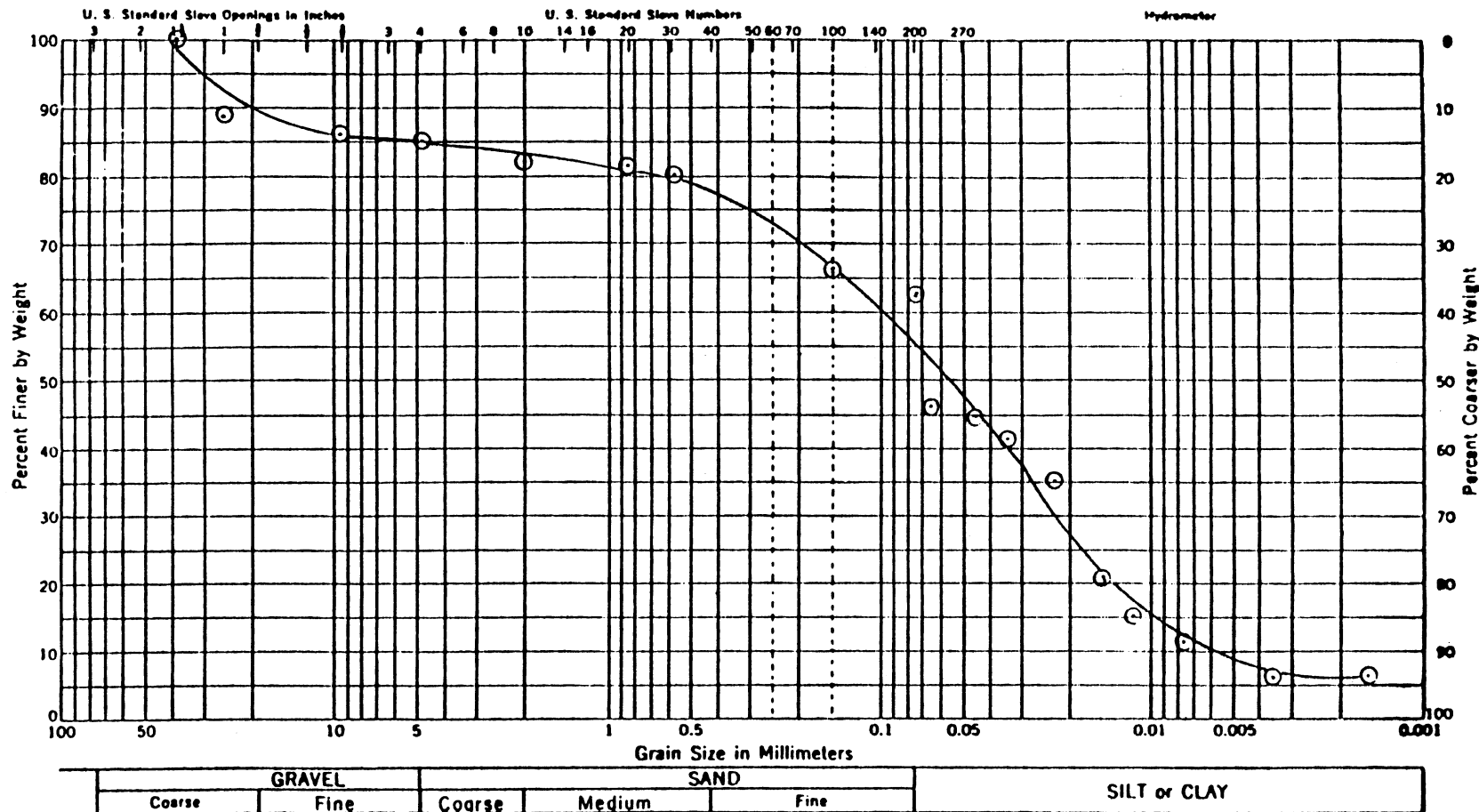




GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

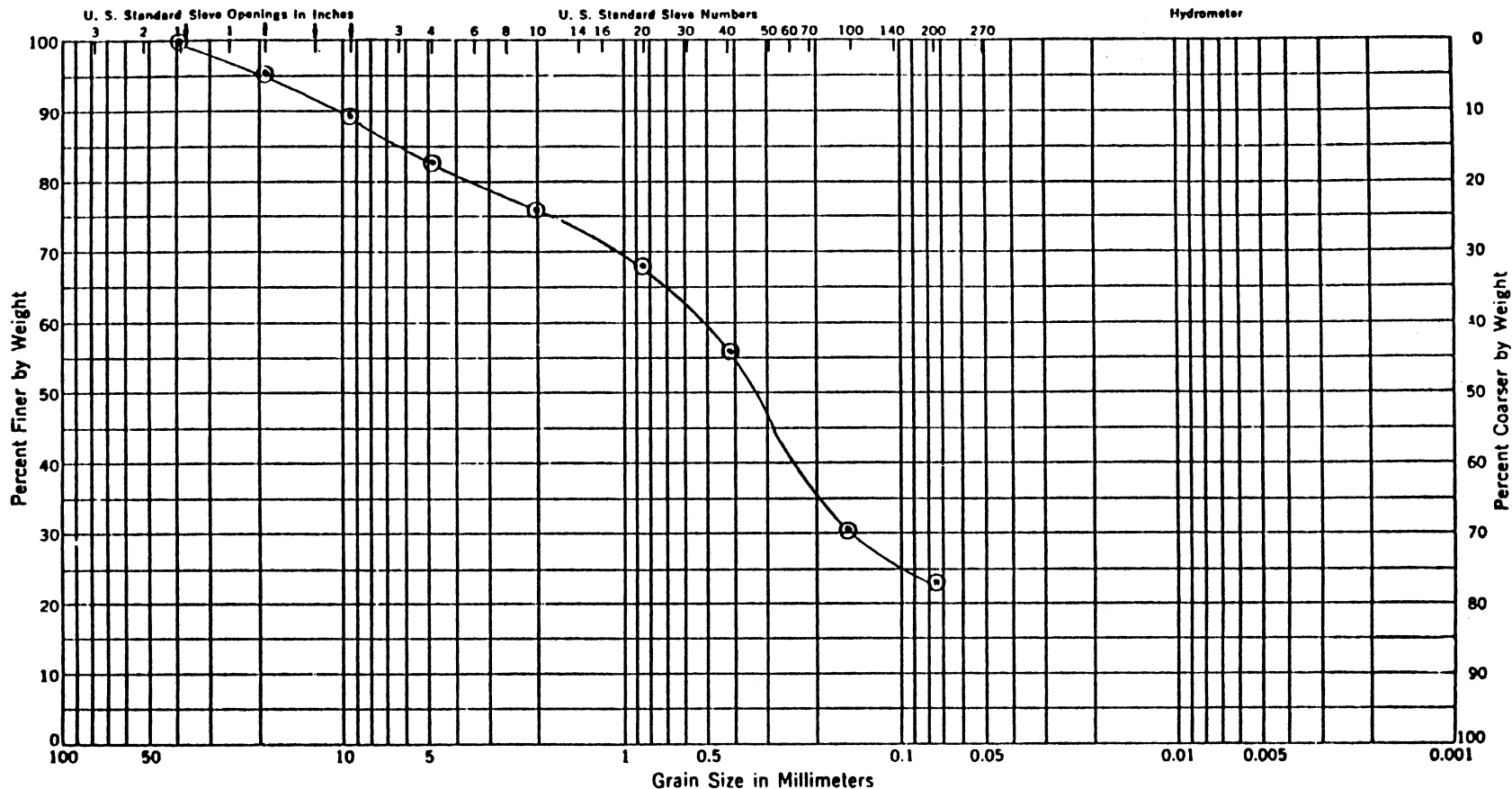
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
RP-10					Silty fine to coarse sand (SM)				
S-2									
5.0-6.5'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-2-84	12959

3.5-20-18

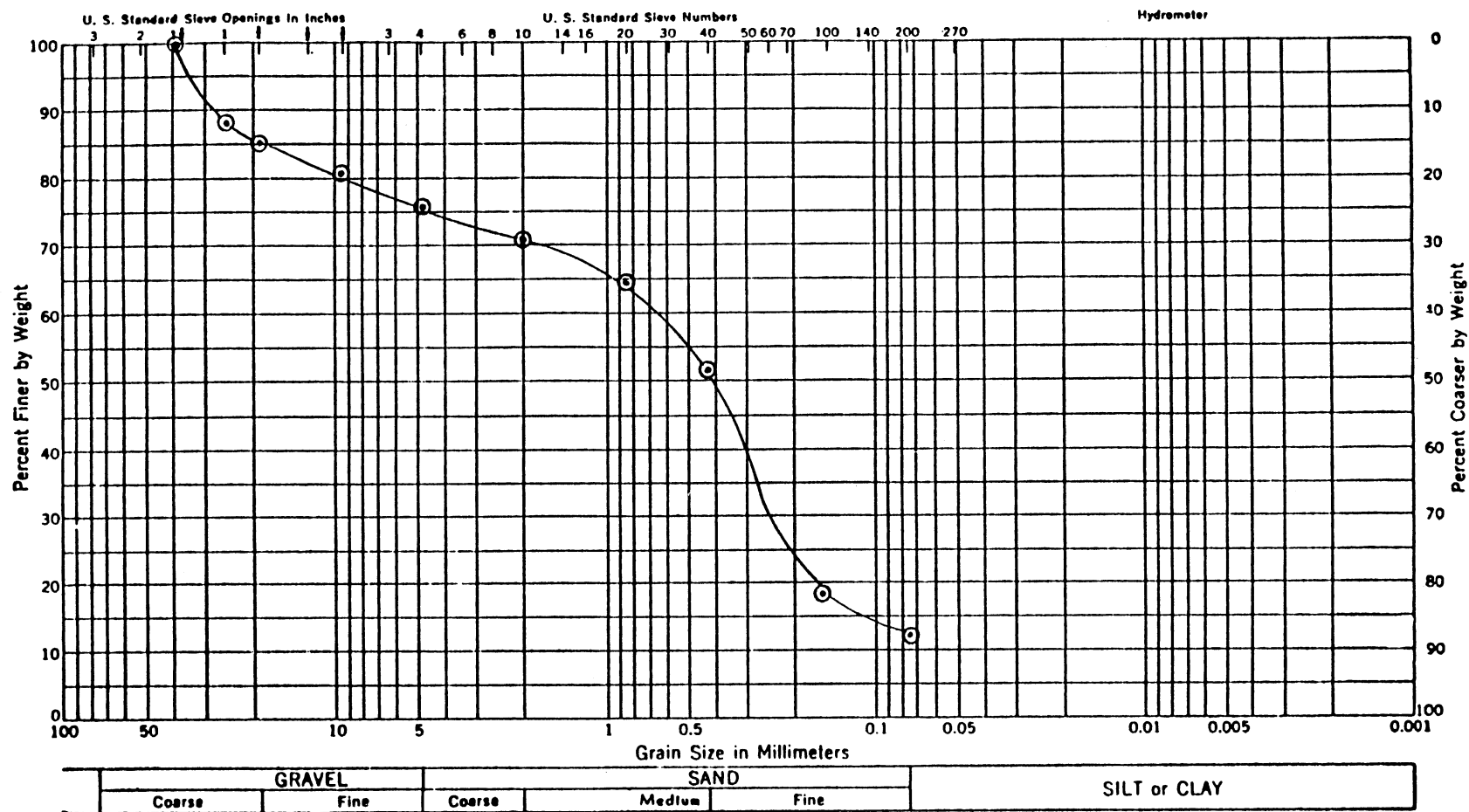


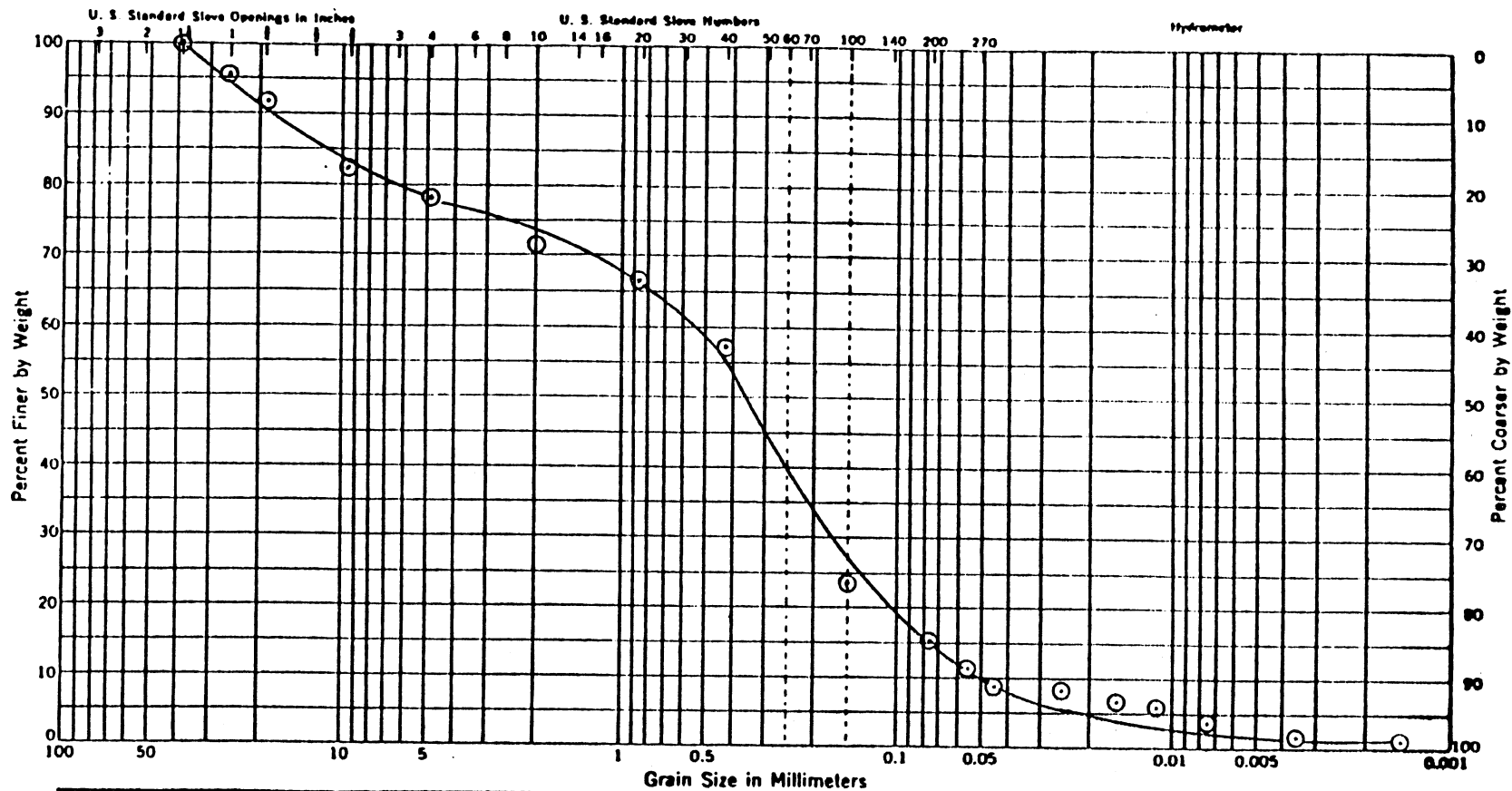
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
RP11					Sandy silt (ML)				
S-1									
0-1.5'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						KOO/SMD	JAS	3-20-84	12959

3.5-20-20



3.5-20-21



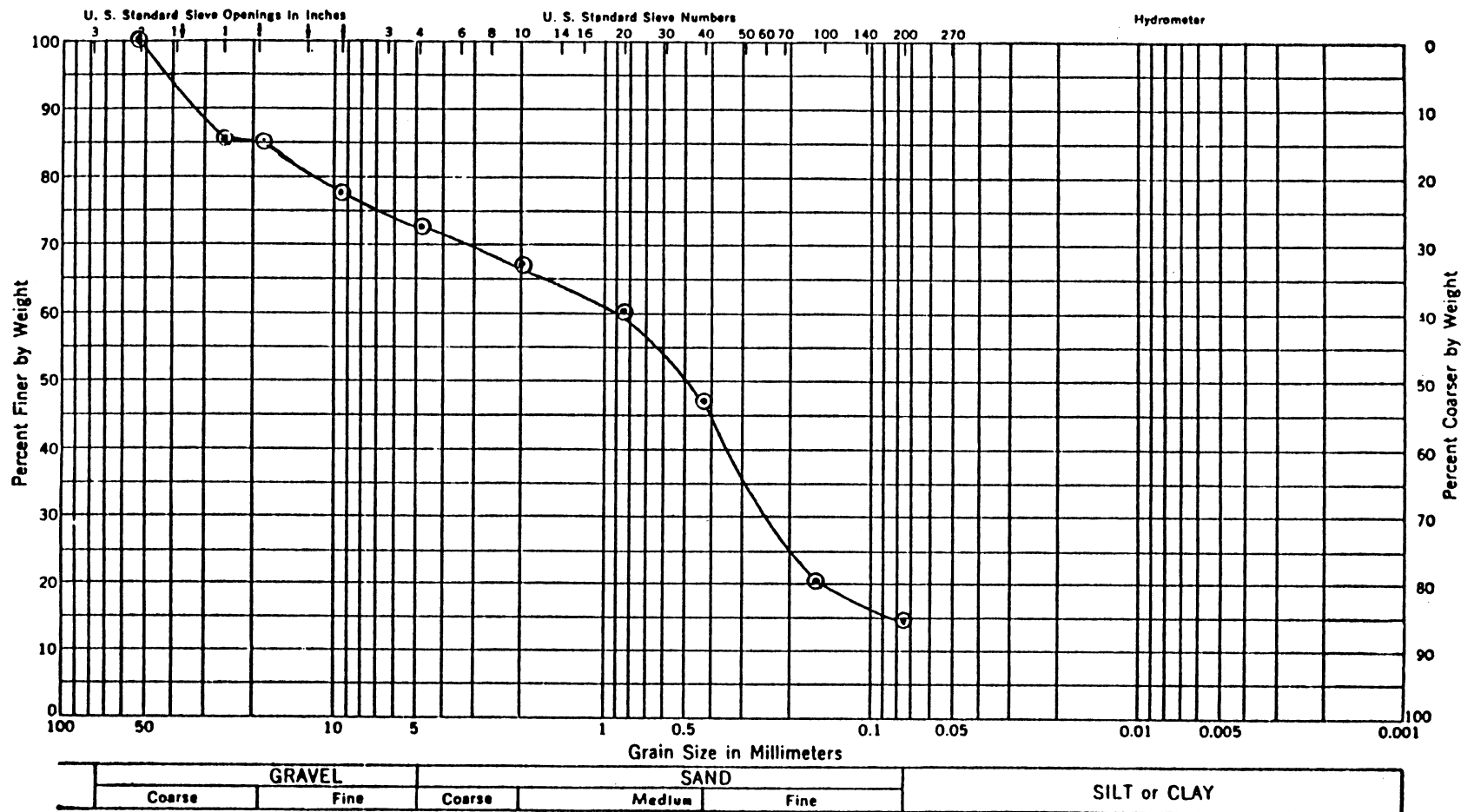


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
RP11					Silty fine to coarse sand (SM)				
S-3									
10-11'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						KOO/SMD	JAS	3-20-84	12959

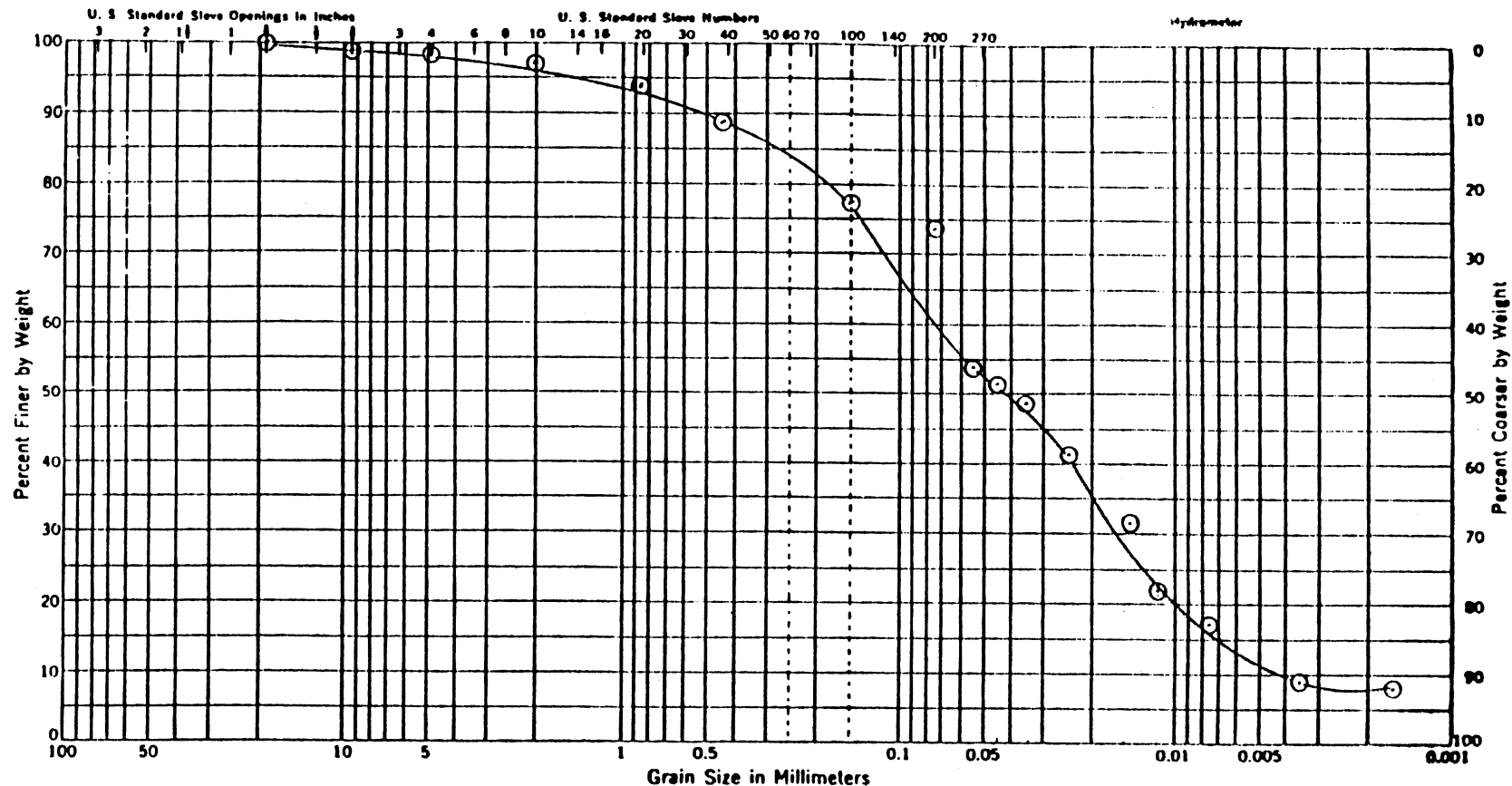
3.5-20-22

3.5-20-23



BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
RP-12	S-1	16-17'							Silty fine to coarse sand (SM)				
										STS CONSULTANTS LTD.			
										DRAWN	APPROVED	DATE	JOB No.
										JJT/SMD	JAS	3-24-84	12959

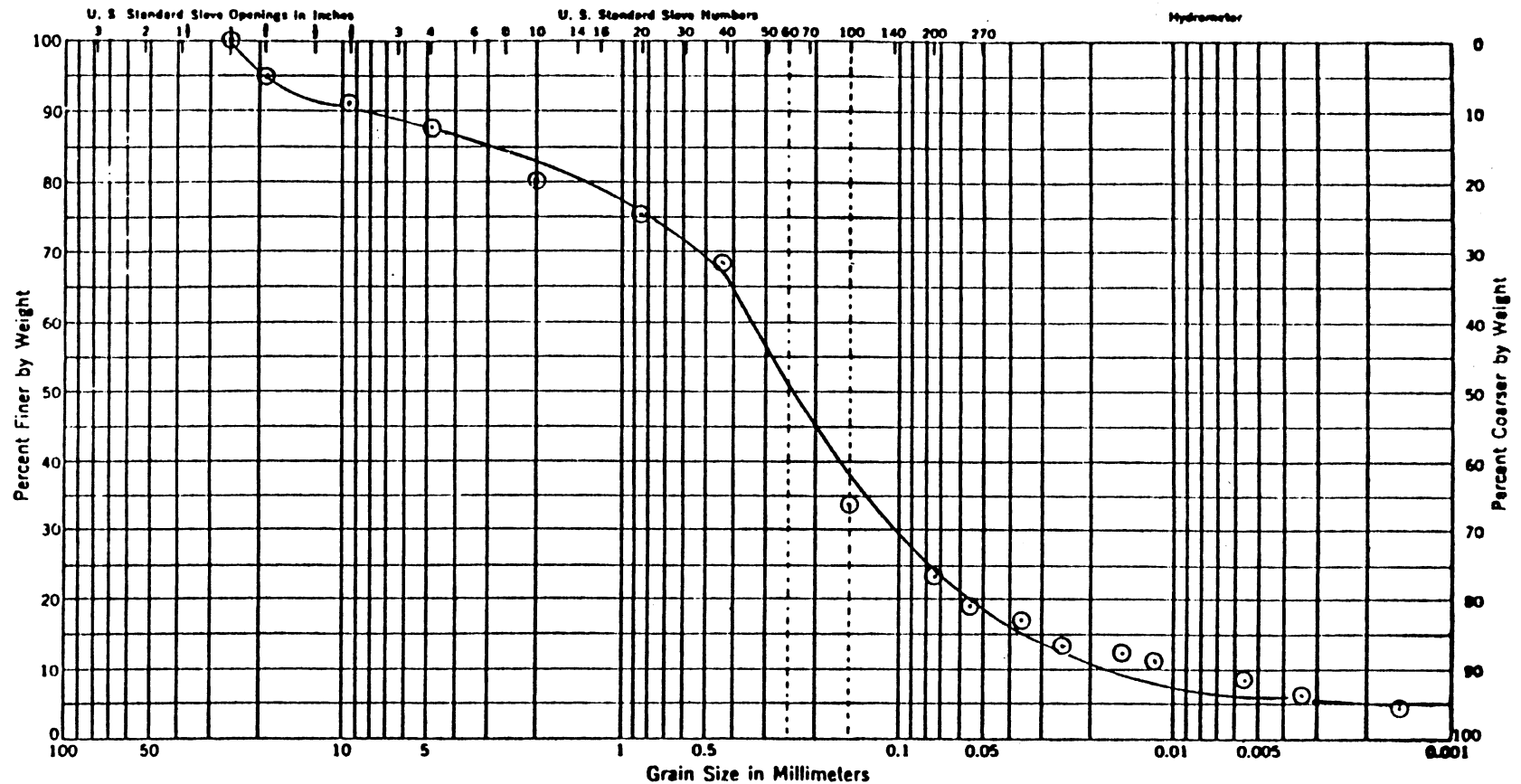
3.5-20-24



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
RP13					Sandy silt (ML)				
S-1									
0-1.5'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						KOO/SMI	JAS	3-20-84	12959

UNIFIED CLASSIFICATION SYSTEM

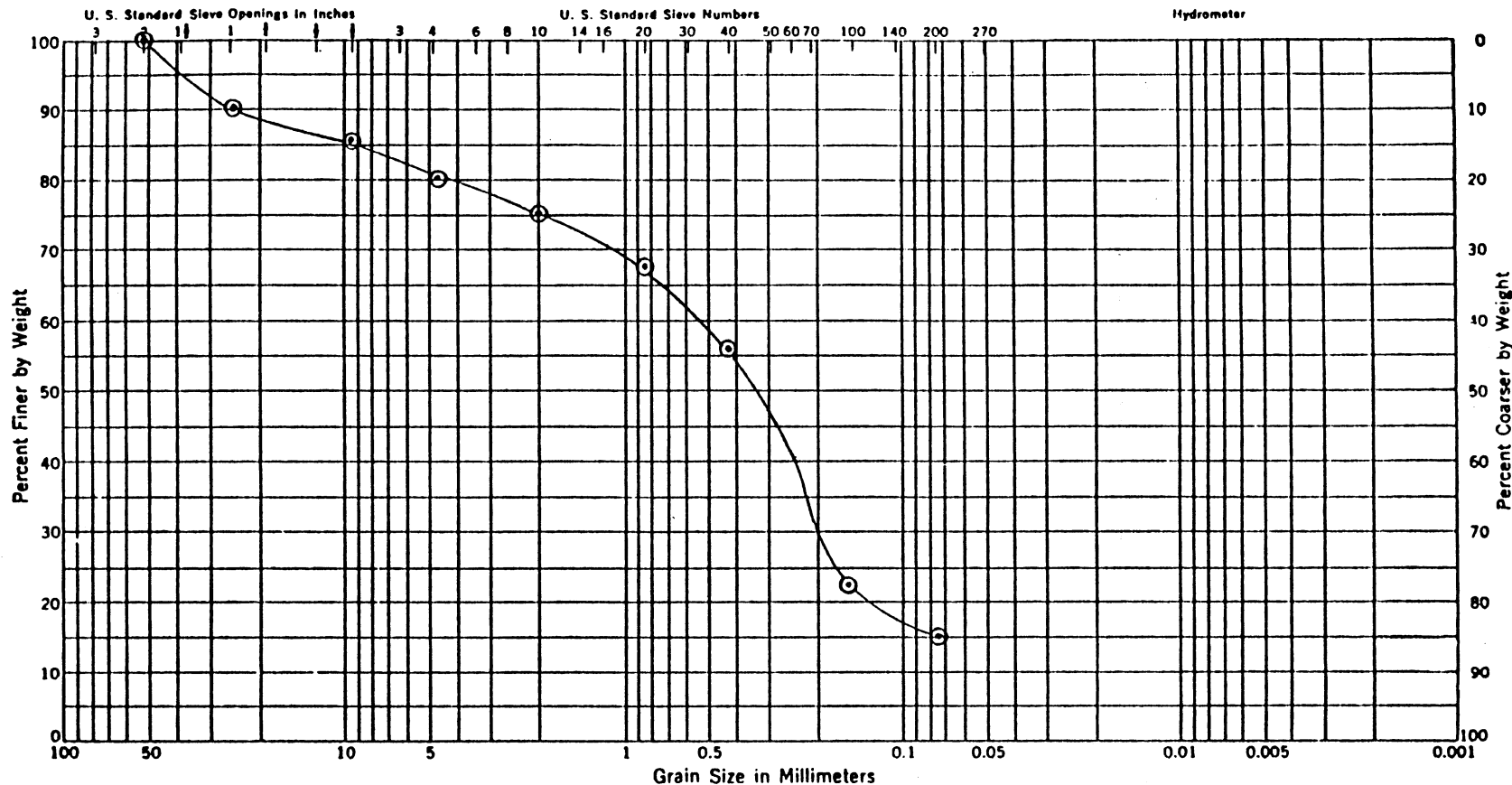


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

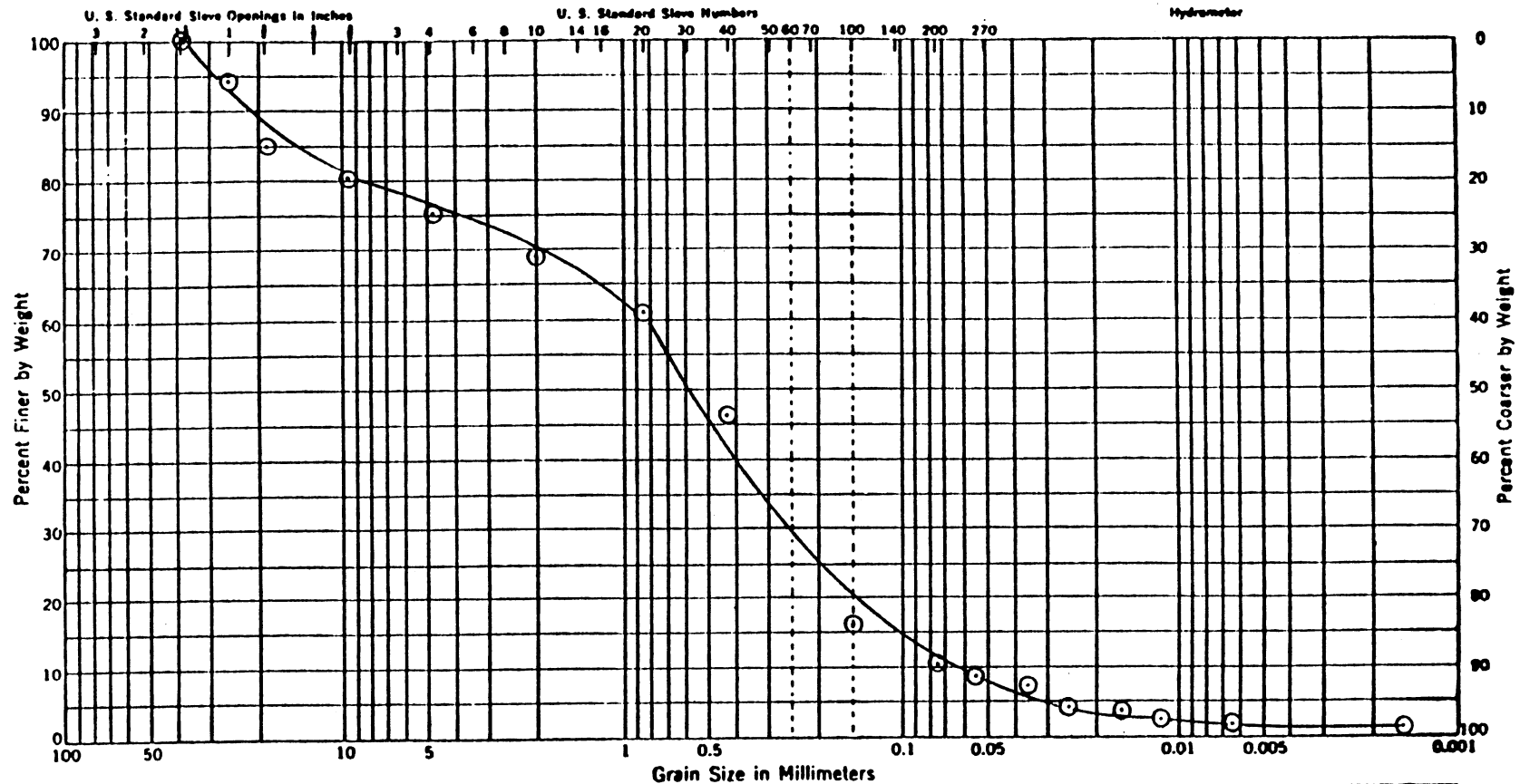
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
RP13					Silty fine to coarse sand (SM)				
S-2									
6-7.5'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						KOO/SMD	JAS	3-20-84	12959

3.5-20-25

3.5-20-26



UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
RP14					Slightly silty fine to coarse sand (SM-SP)
S-2					
18-19.5'					

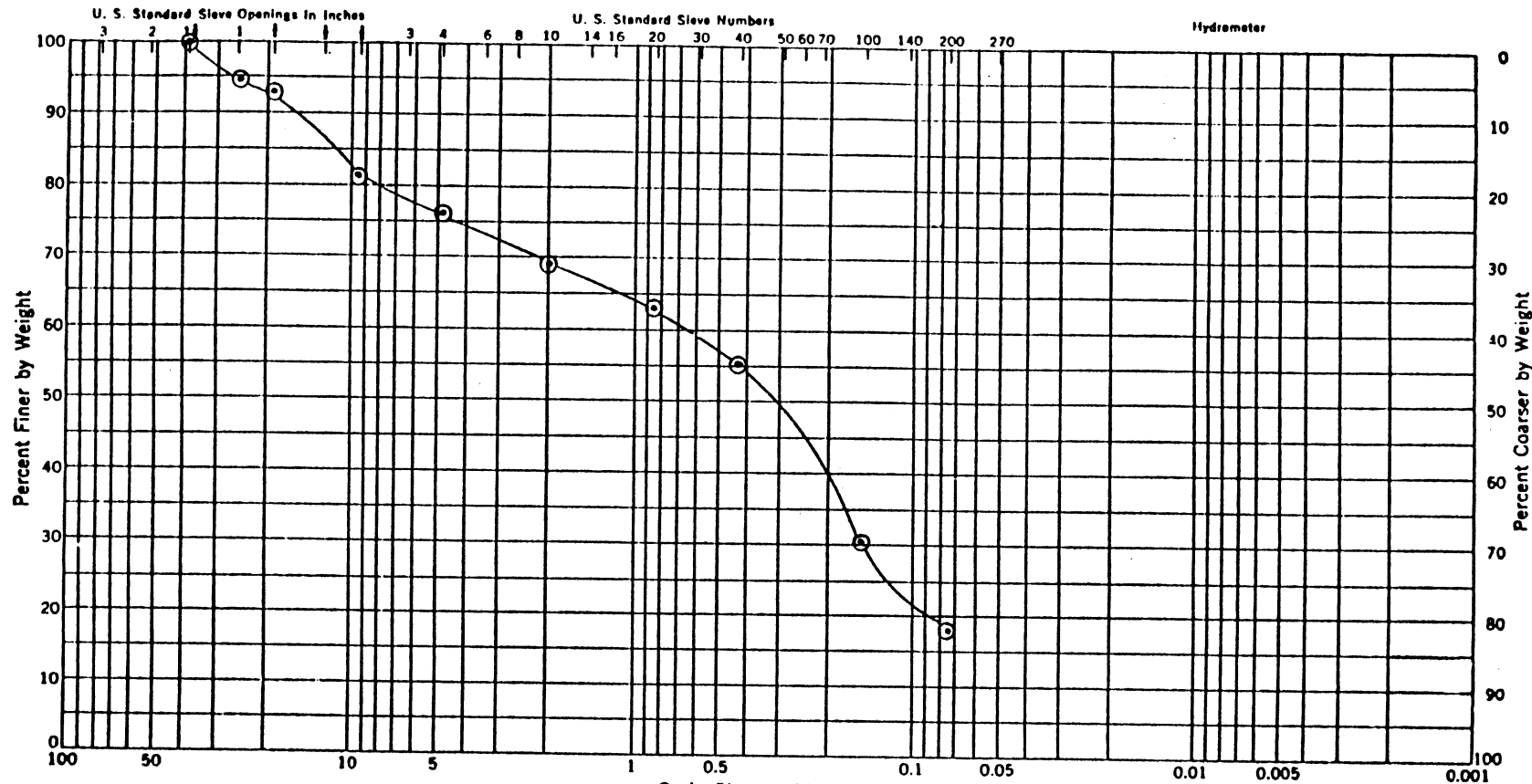
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
KOO/SMD	JAS	3-20-84	12959

3.5-20-27

3.5-20-28



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

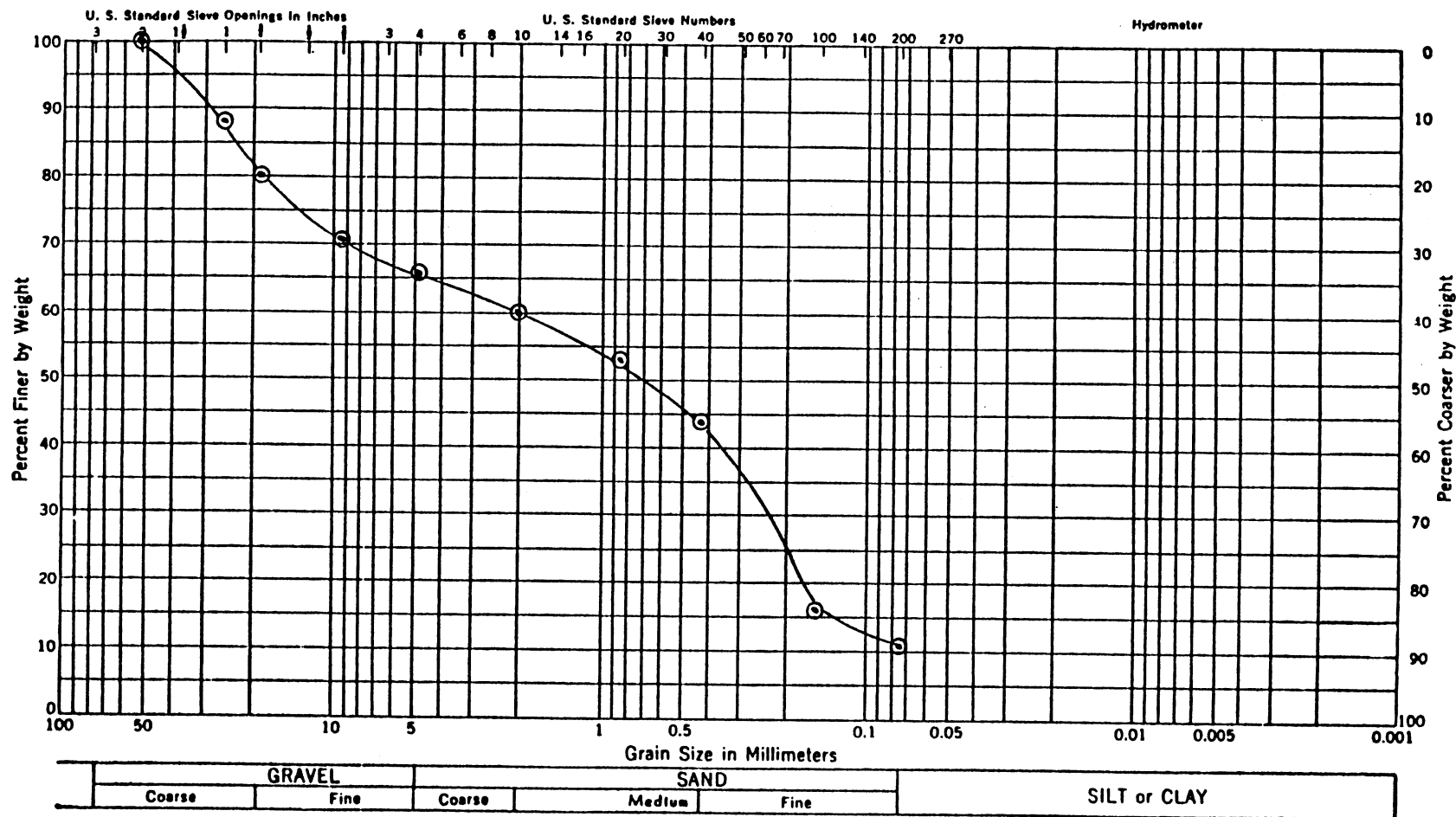
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION
RP-14	S-3	23-23.8'							Silty fine to coarse sand (SM)

EXXON MINERALS COMPANY
SIEVE ANALYSIS
CRANDON PROJECT

STS CONSULTANTS LTD.

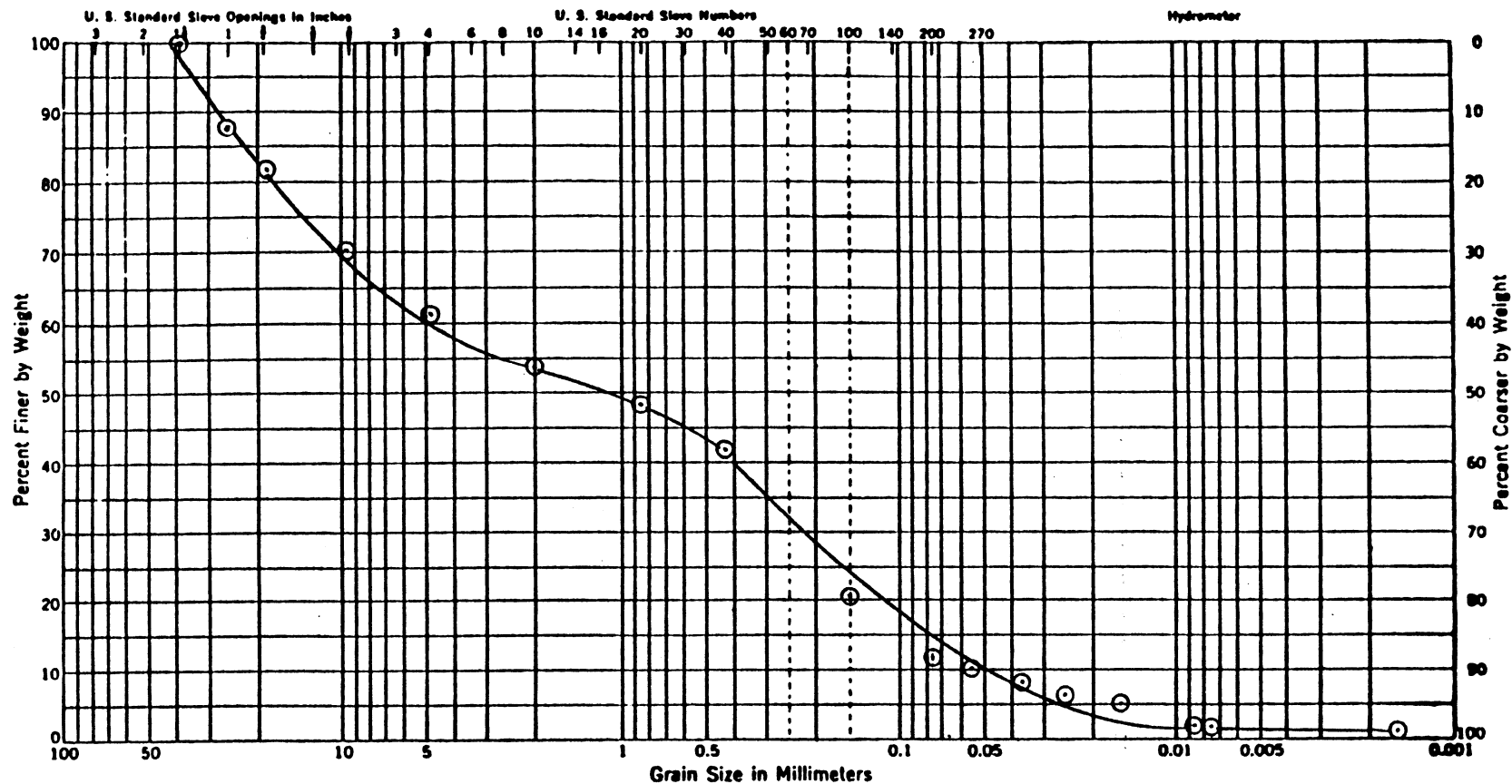
DRAWN	APPROVED	DATE	JOB No.
JJT/SMD	JAS	3-24-84	12959

3.5-20-29



BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	EXXON MINERALS COMPANY SIEVE ANALYSIS CRANDON PROJECT			
RP-15	S-1	13-14.5'							Slightly silty fine to coarse sand (SM-SP)				
										STS CONSULTANTS LTD.			
										DRAWN APPROVED DATE JOB No.			
										JJT/SMI	JAS	3-24-84	12959

UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

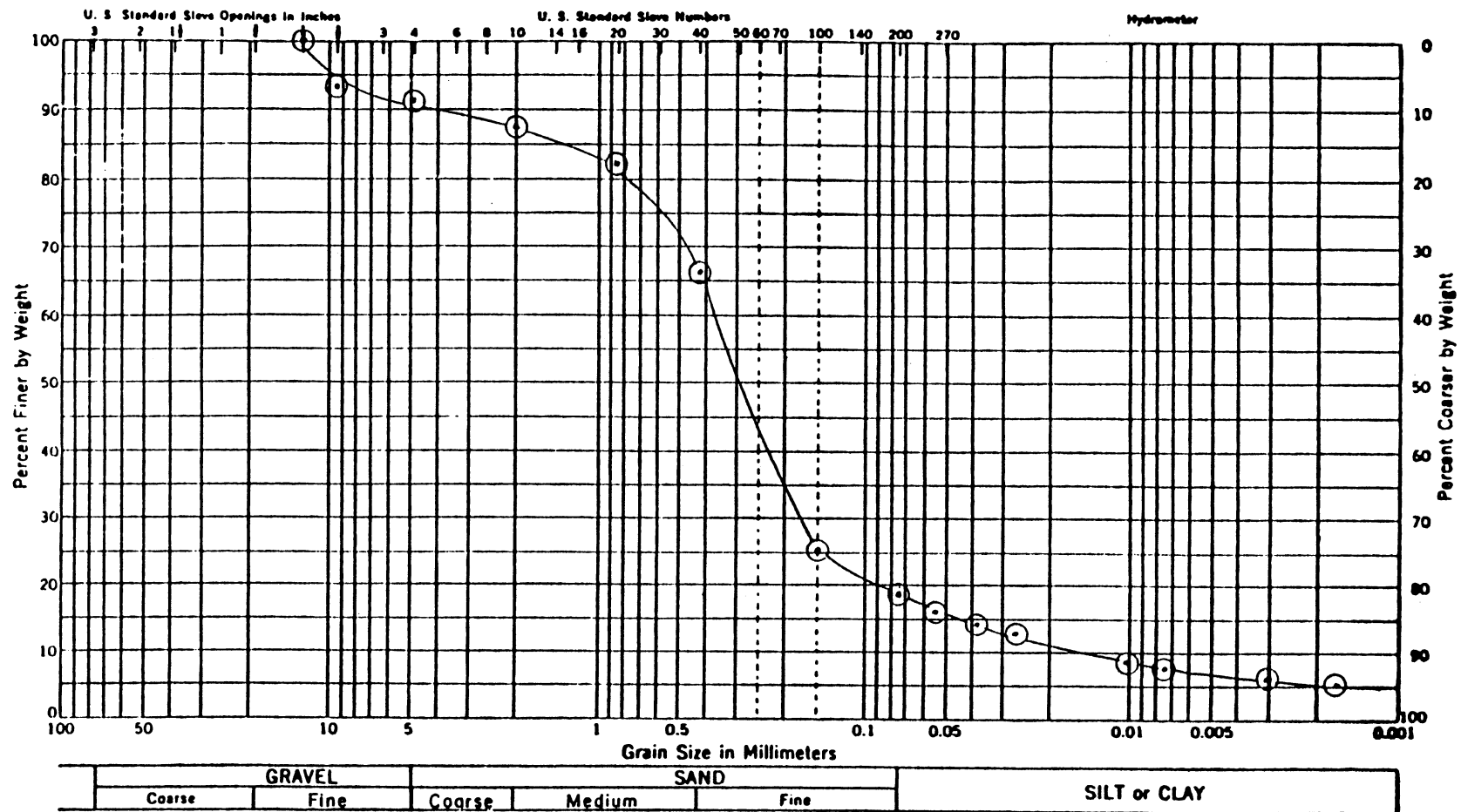
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
RP15					Silty fine to coarse sand (SM)				
S-2									
18-19.5'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						KOO/SMD	JAS	3-20-84	12959

3.5-20-30

Appendix 3.5-21

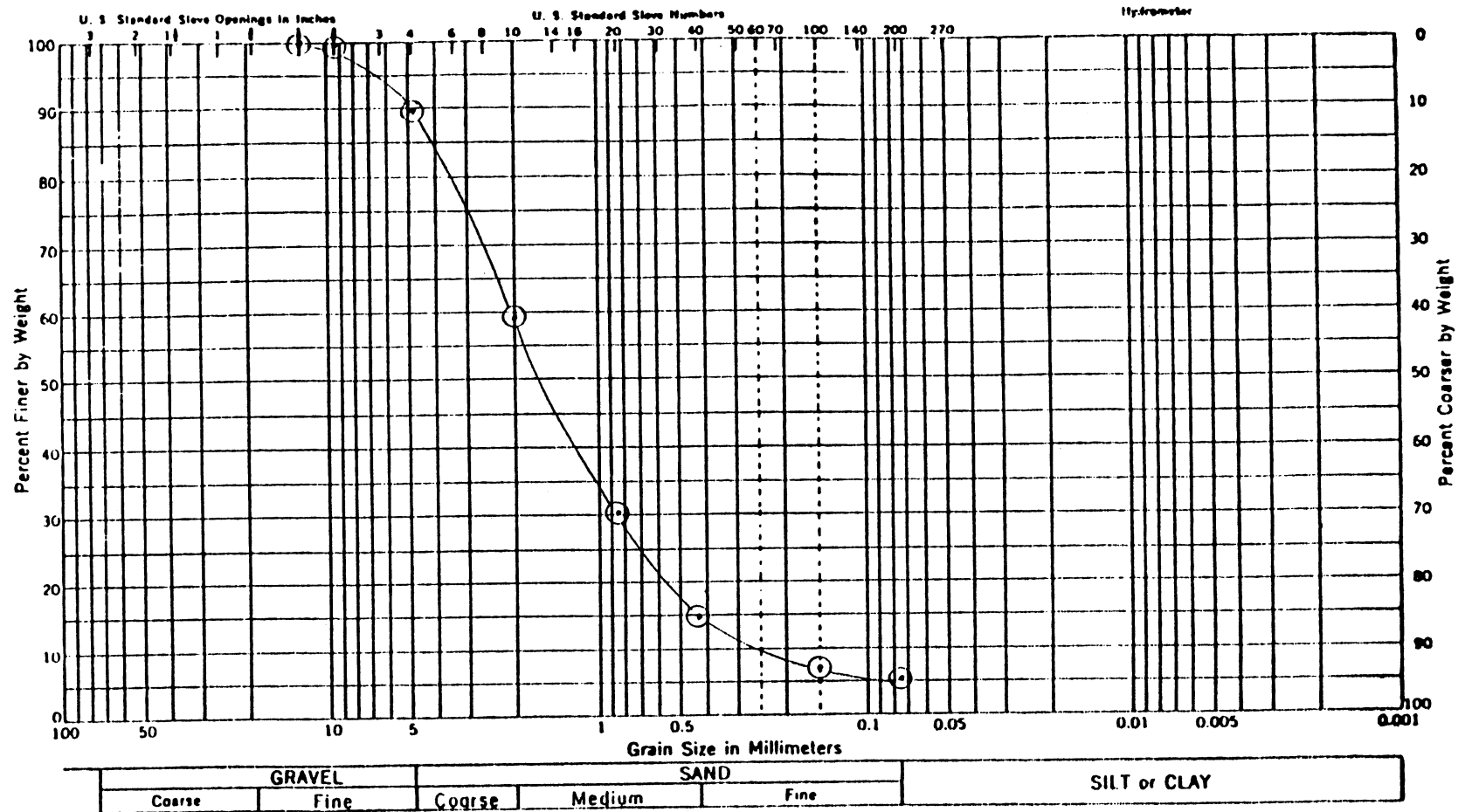
**Grain Size Curves for STS Consultants Ltd
1984 Tests on Samples From the G40 and G41 Series Borings**

UNIFIED CLASSIFICATION SYSTEM



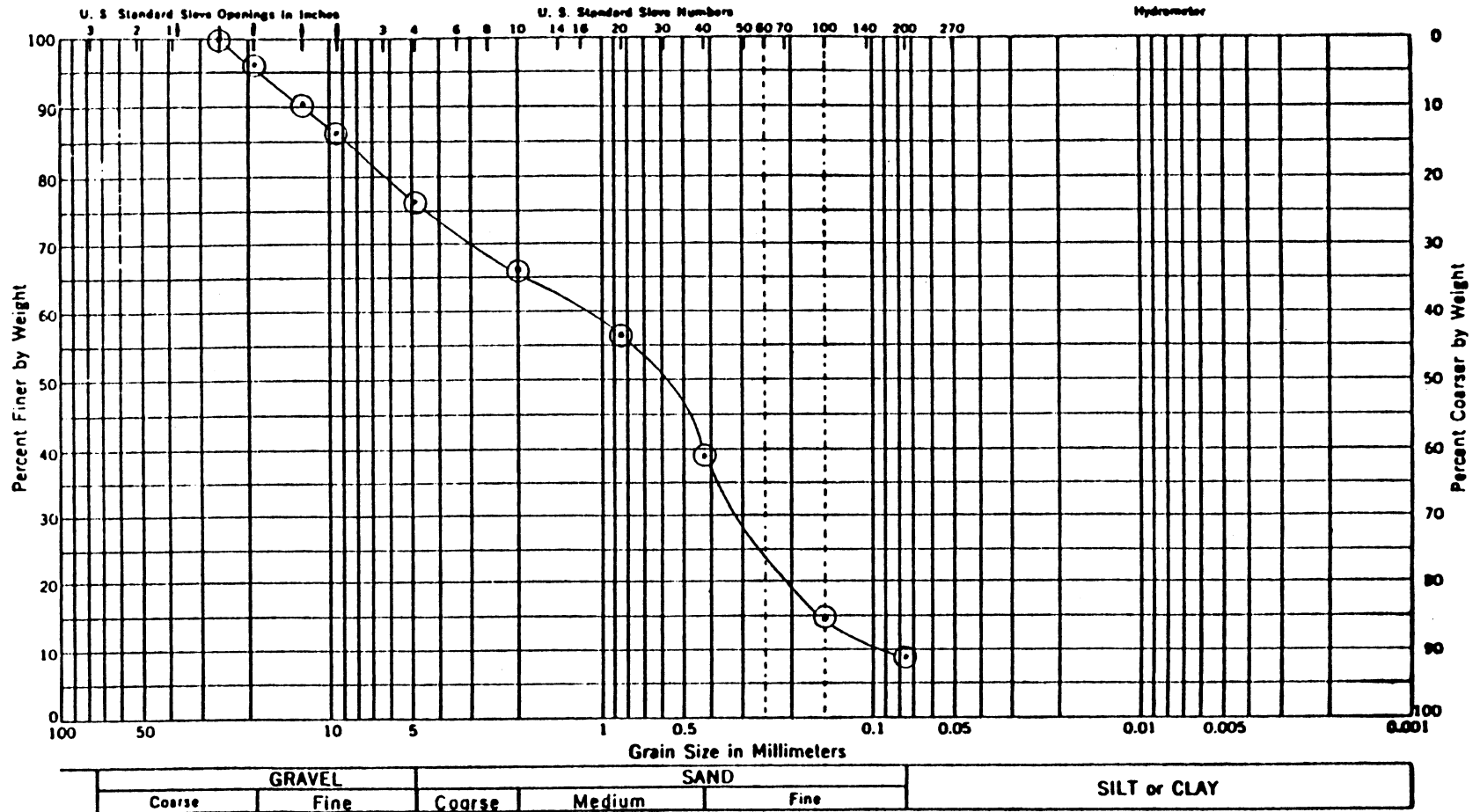
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
G40 X1					Silty fine to medium sand (SM)				
S-5									
40-42'									
						DRAWN SMD			
						APPROVED JAS			
						DATE 6-10-84			
						JOB No. 12959			

3.5-21-1



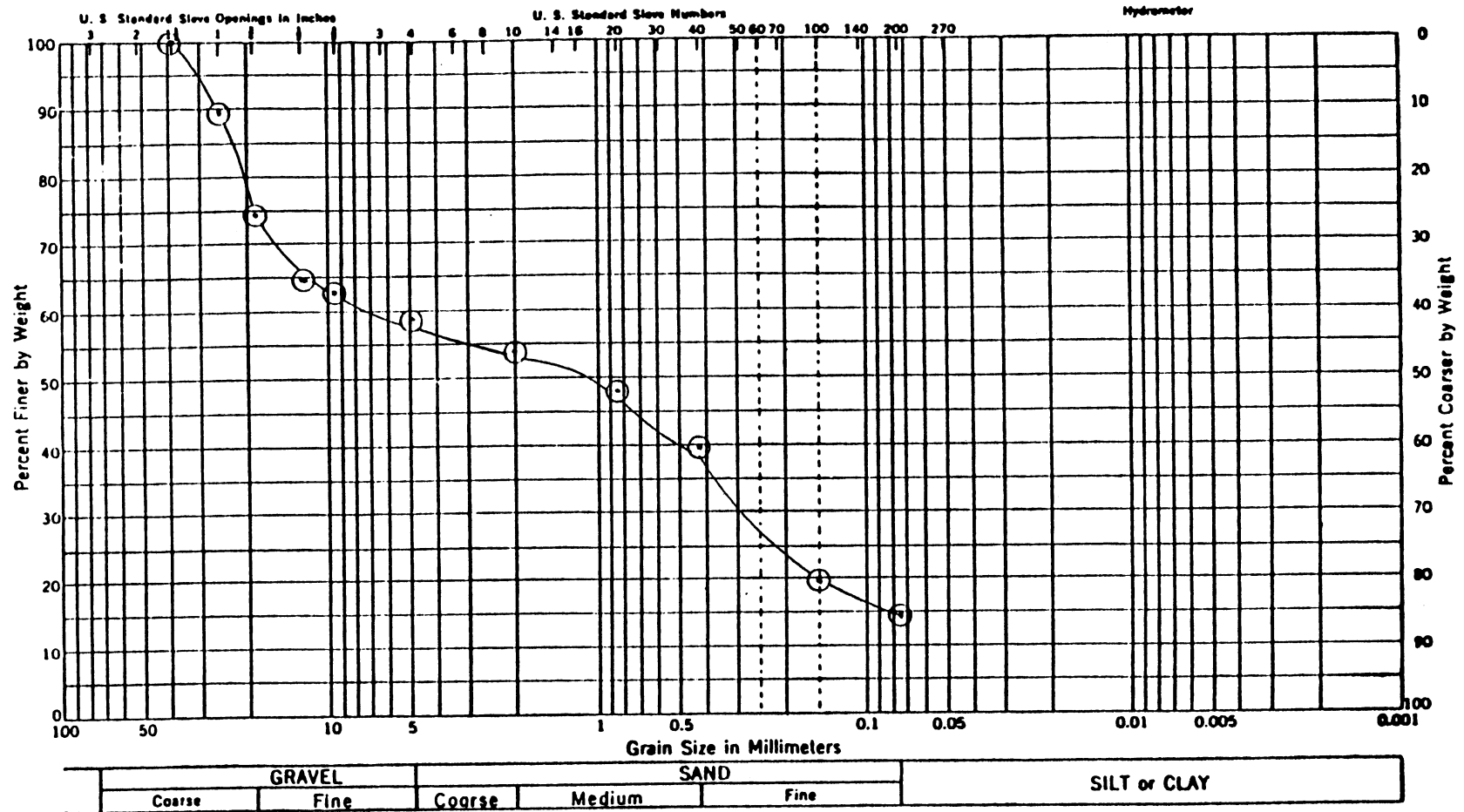
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G40 X1A					Slightly silty fine to coarse sand (SM-SP)				
S-8						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
70-75'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G40 X1					Slightly silty fine to coarse sand (SM-SP)				
S-11									
102-103.2'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

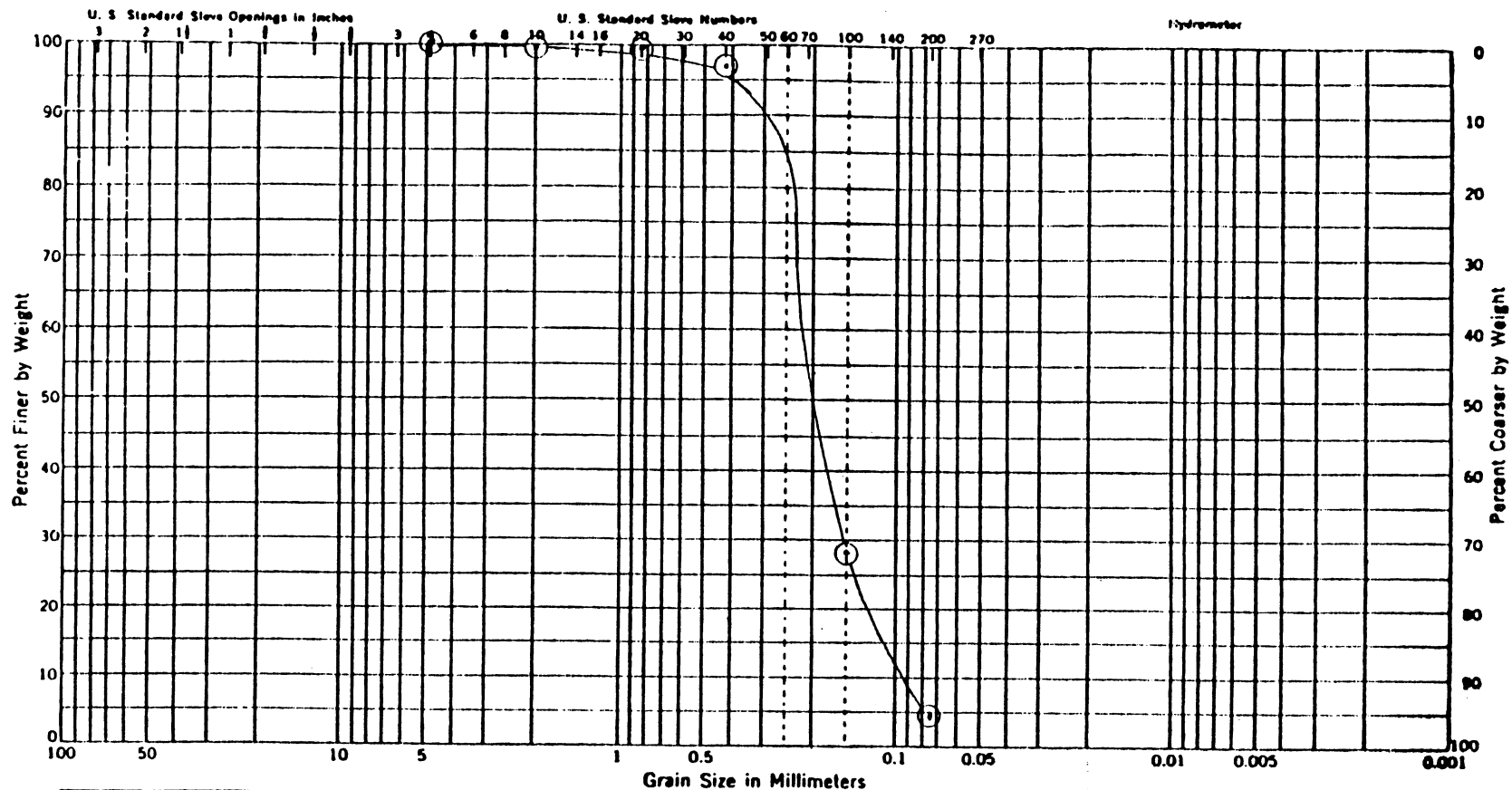
UNIFIED CLASSIFICATION SYSTEM



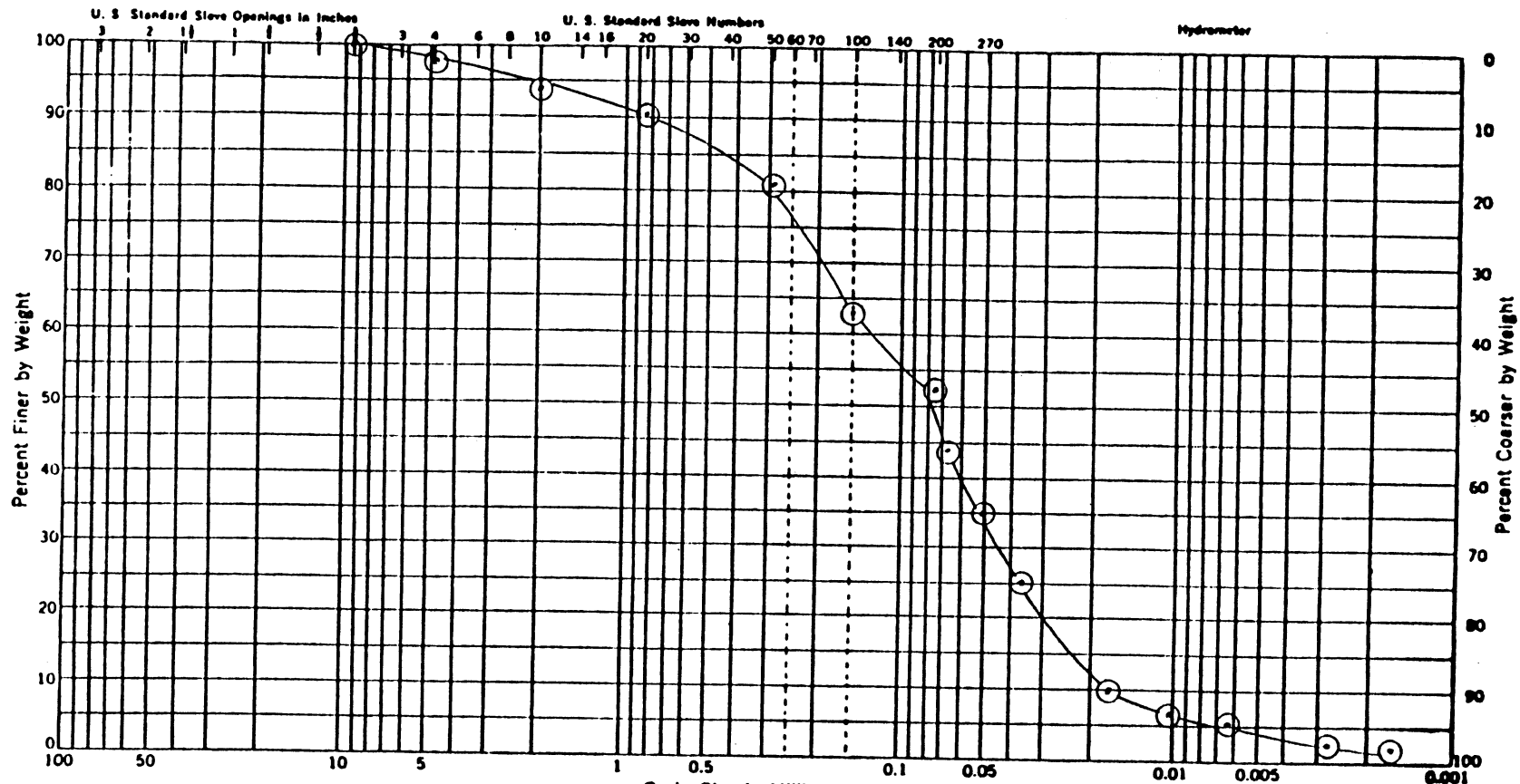
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G40 Y15 S-4 30-32'					Silty fine to coarse sand (SM)				
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

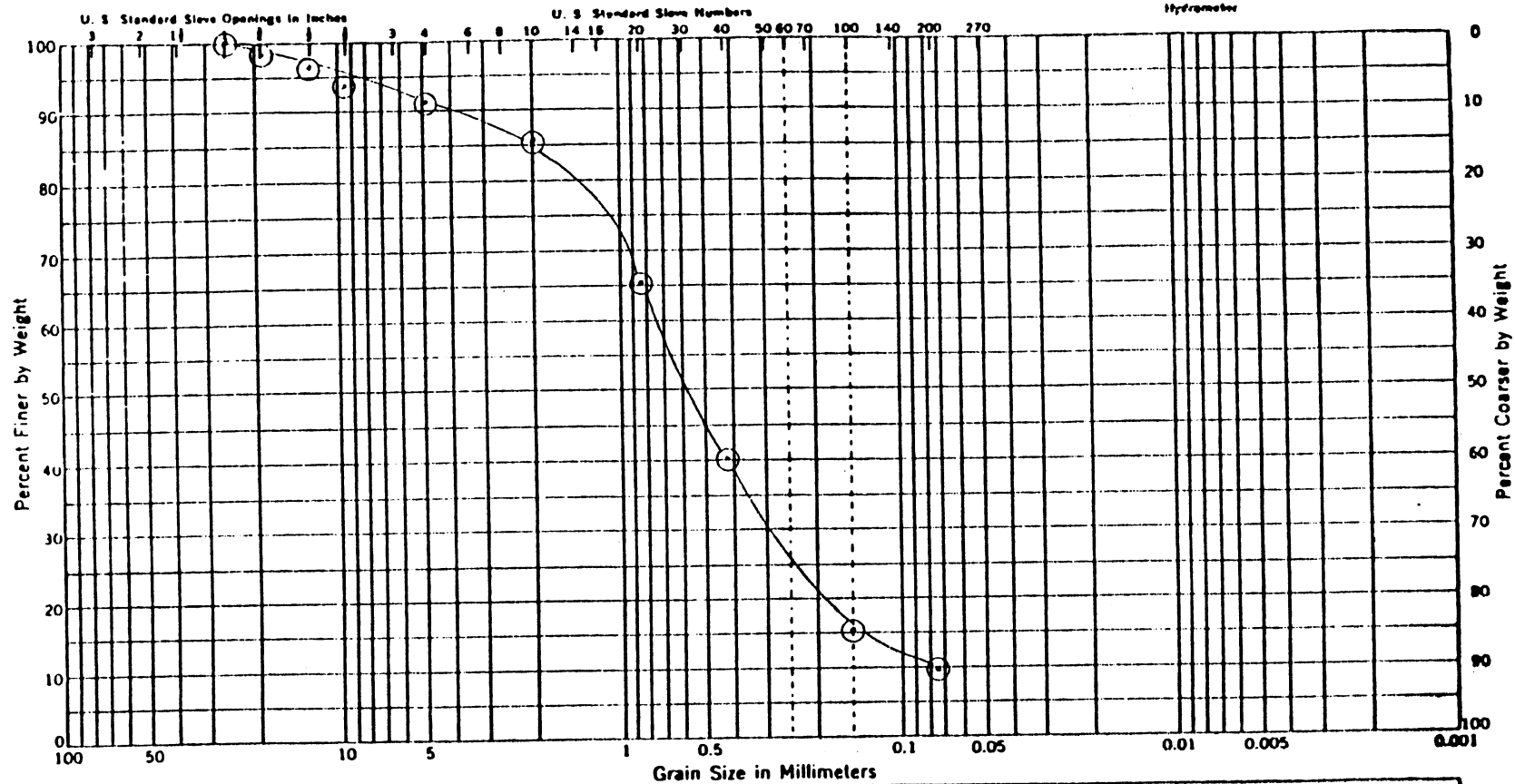
3.5-21-5

3.5-21-6



UNIFIED CLASSIFICATION SYSTEM





GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

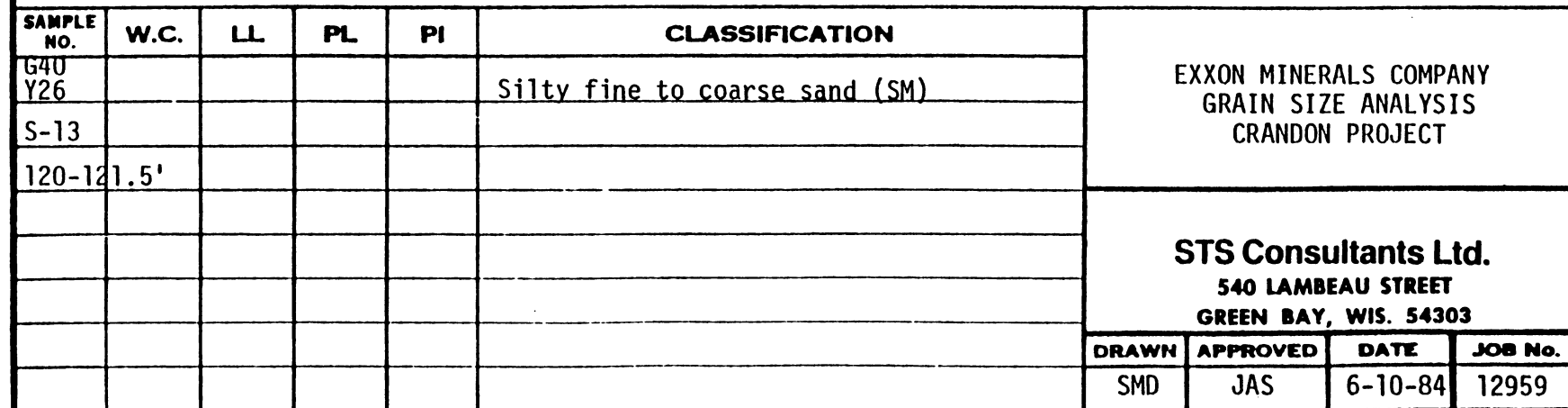
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G40					Slightly silty fine to coarse sand (SM-SP)
Y26					
S-5					
40-41.5'					

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

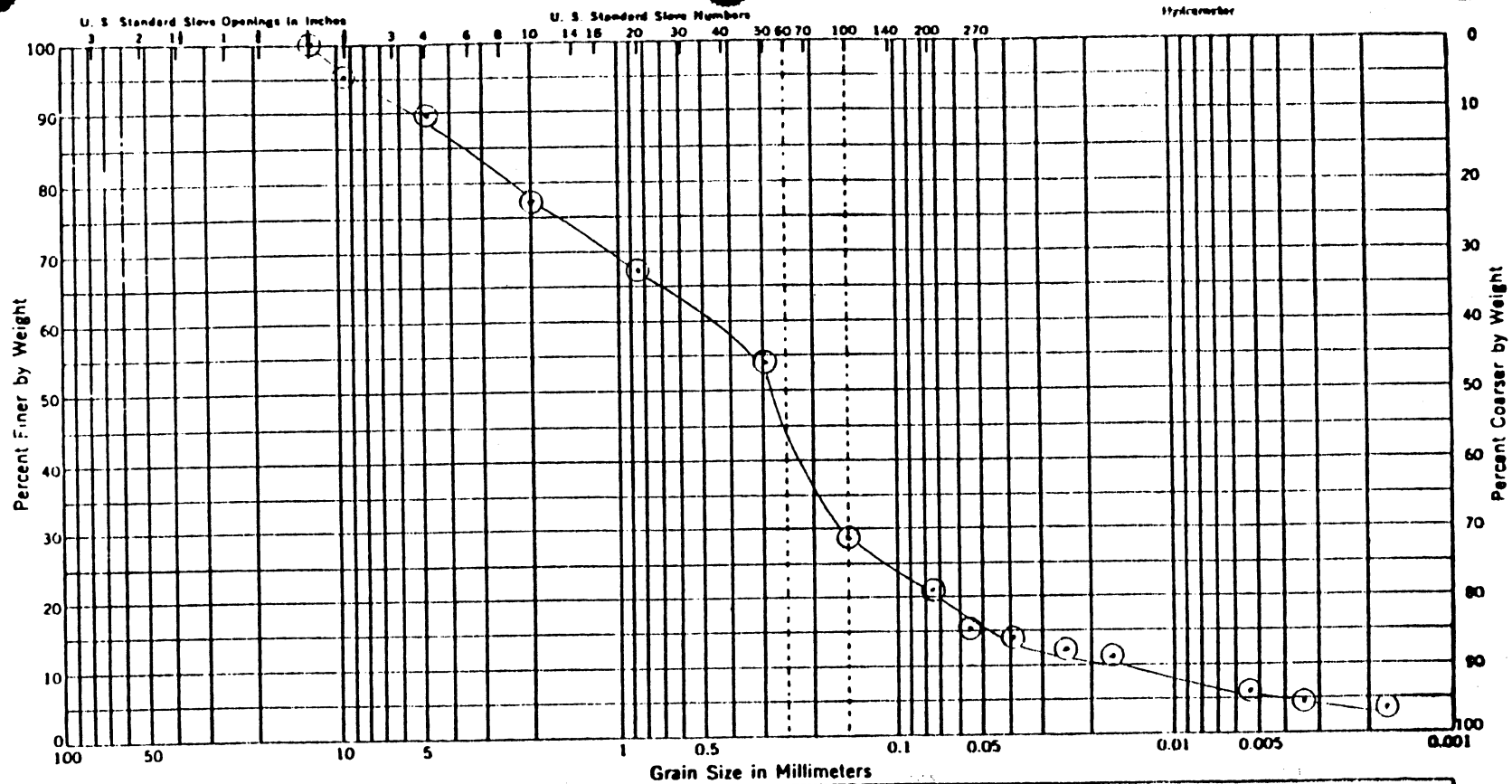
STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	6-10-84	12959

3.5-21-9

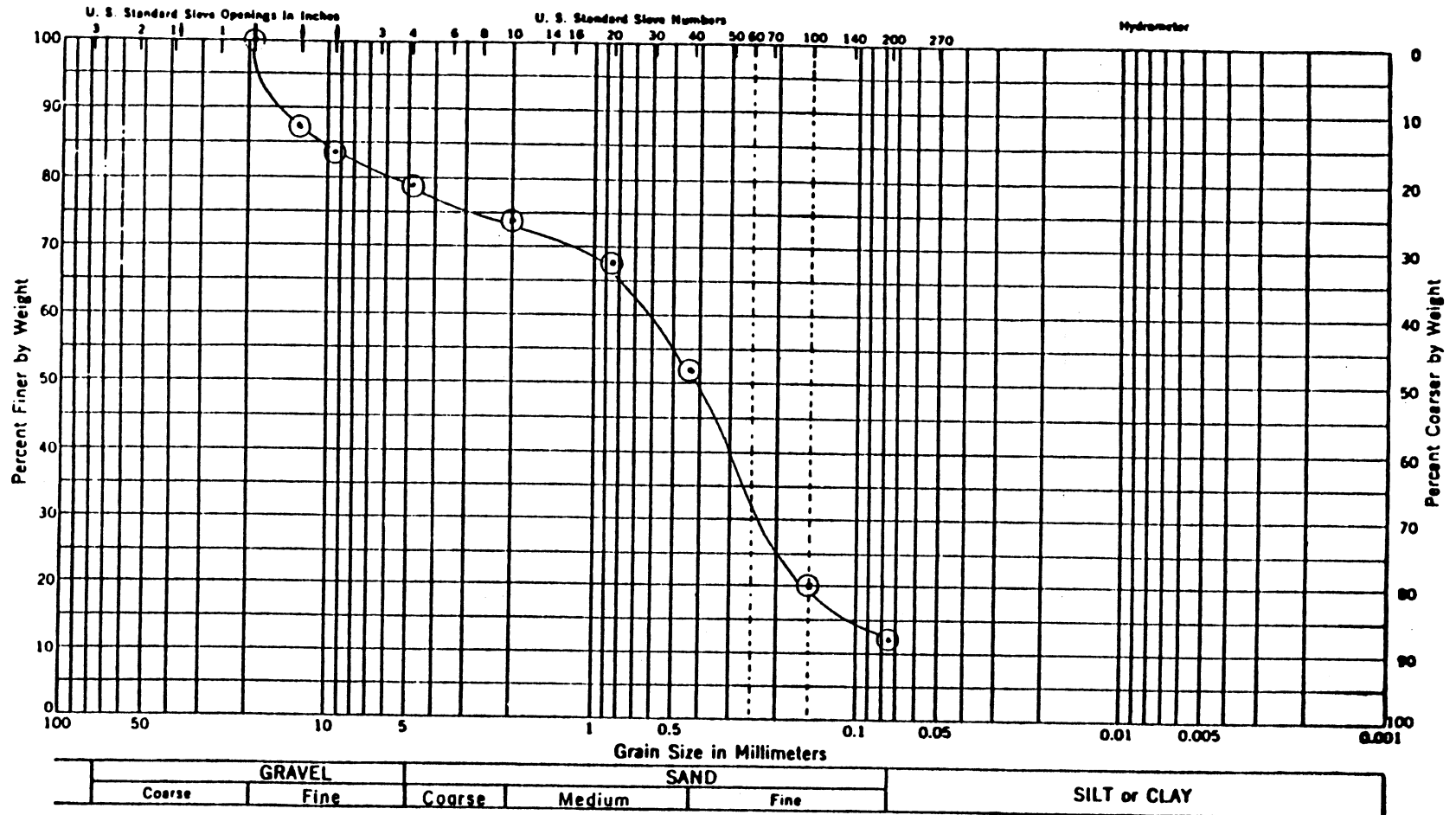


3.5-21-10



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G40 T30					Silty fine to coarse sand (SM)				
S-16						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
153.5-155'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

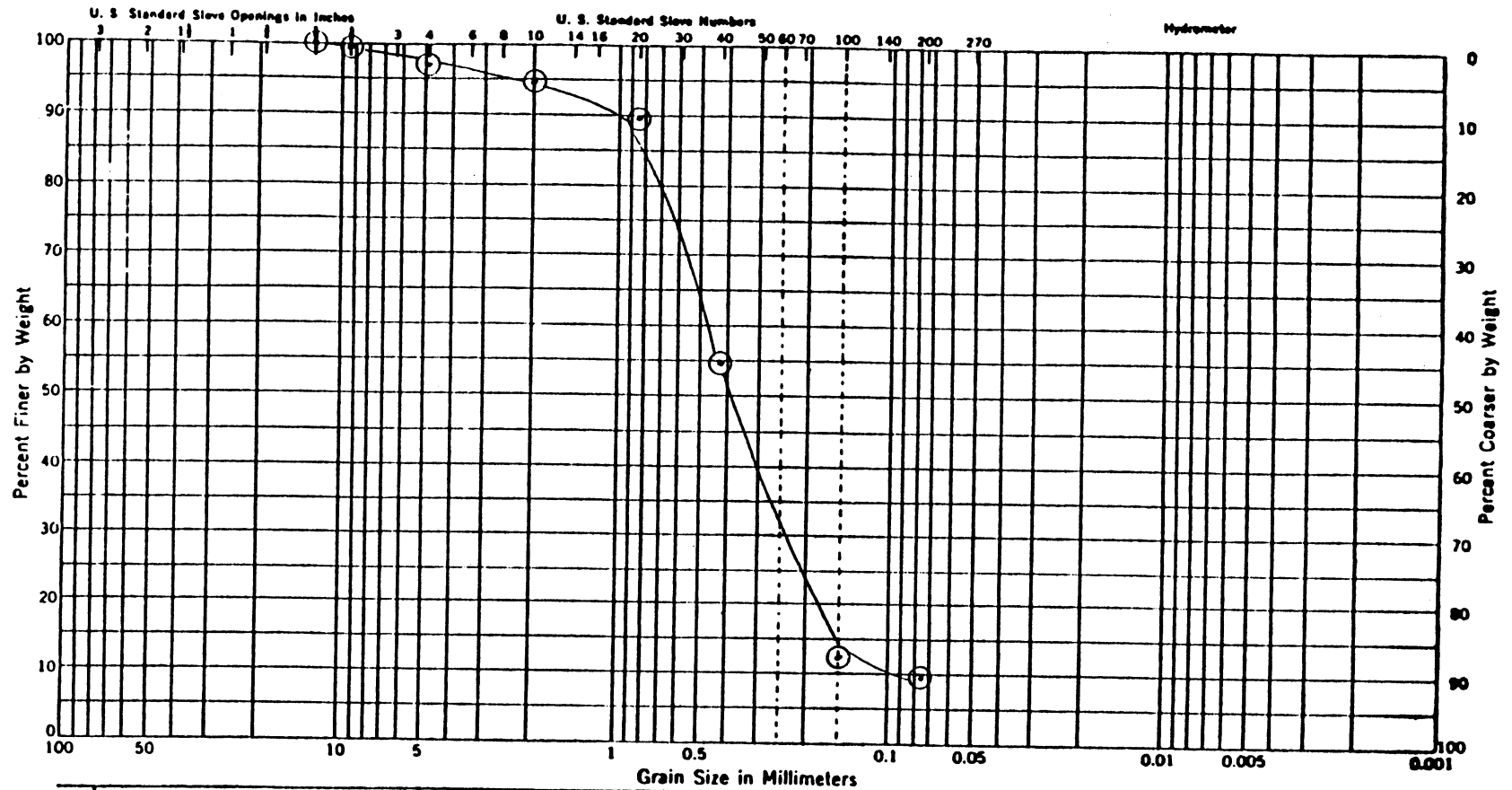
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G40 S17A					Silty fine to medium sand (SM)				
S5						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
20-21.5'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

3.5-21-11

UNIFIED CLASSIFICATION SYSTEM

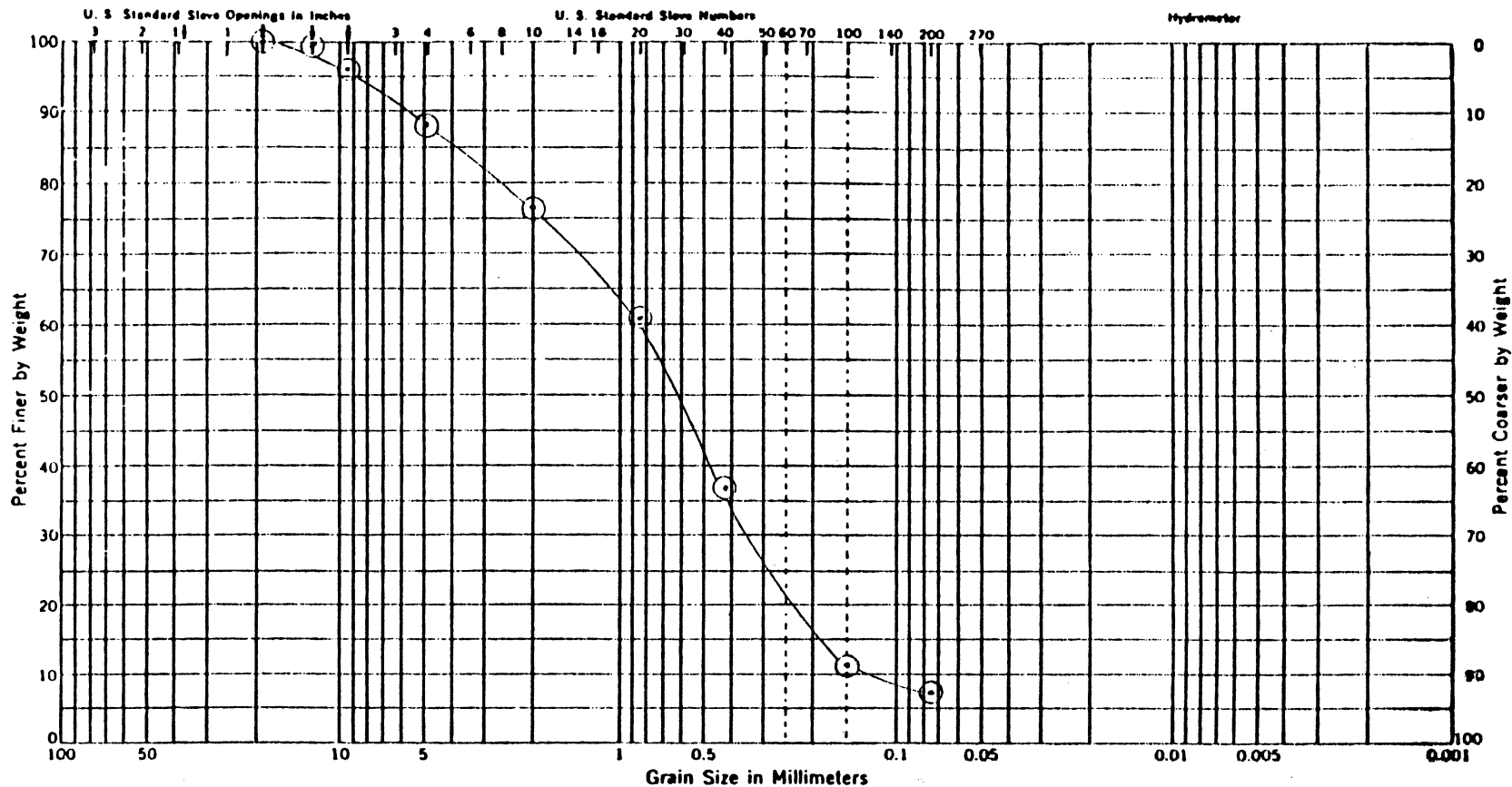


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G40 H27					Slightly silty fine to medium sand (SM-SP)				
S-14									
65-65.9'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

3.5-21-12

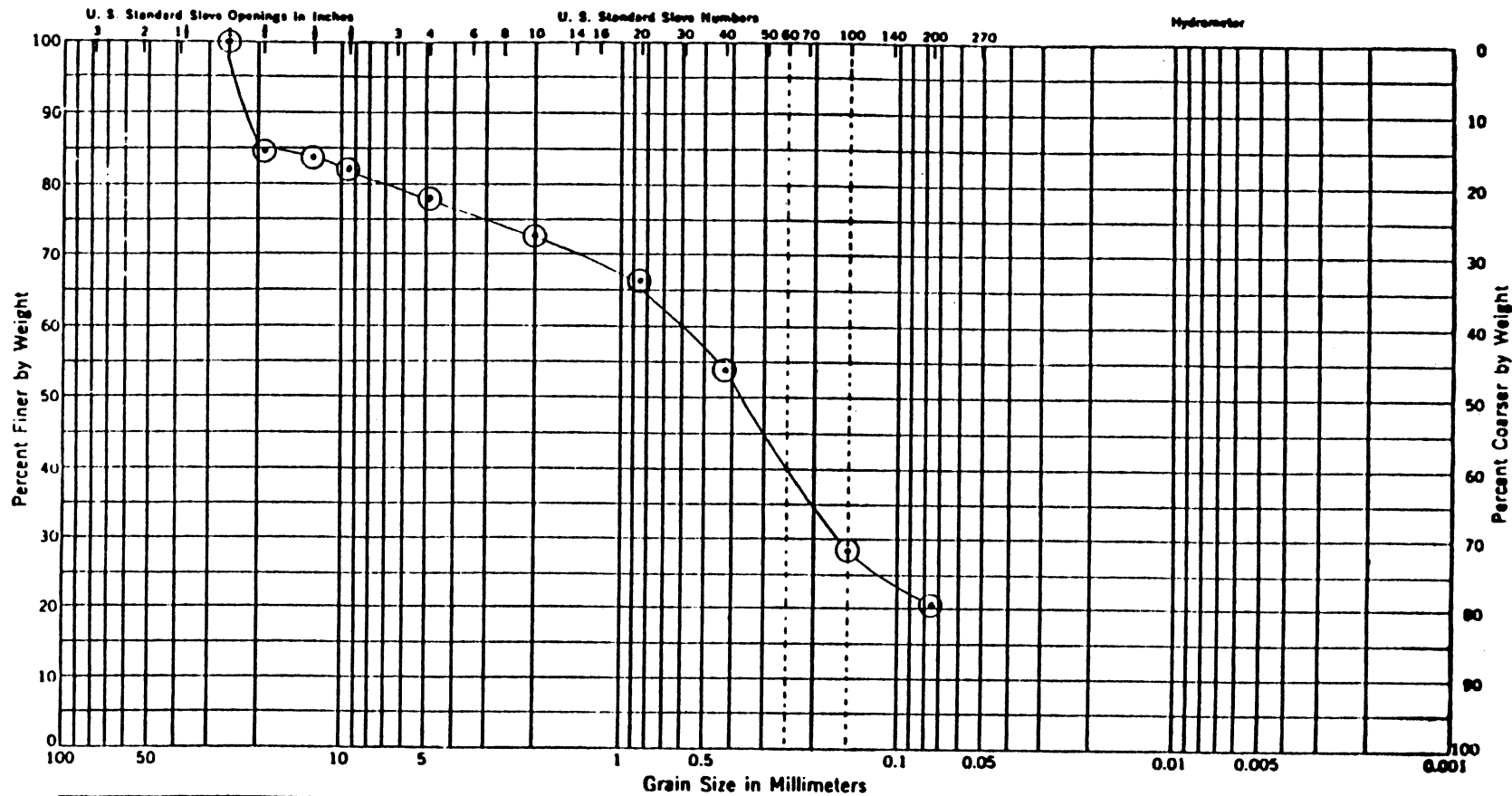
3.5-21-13



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
G40 H27					Slightly silty fine to coarse sand (SM-SP)				
S-19									
90-90.9'									
						DRAWN APPROVED DATE JOB No. SMD JAS 6-10-84 12959			

UNIFIED CLASSIFICATION SYSTEM

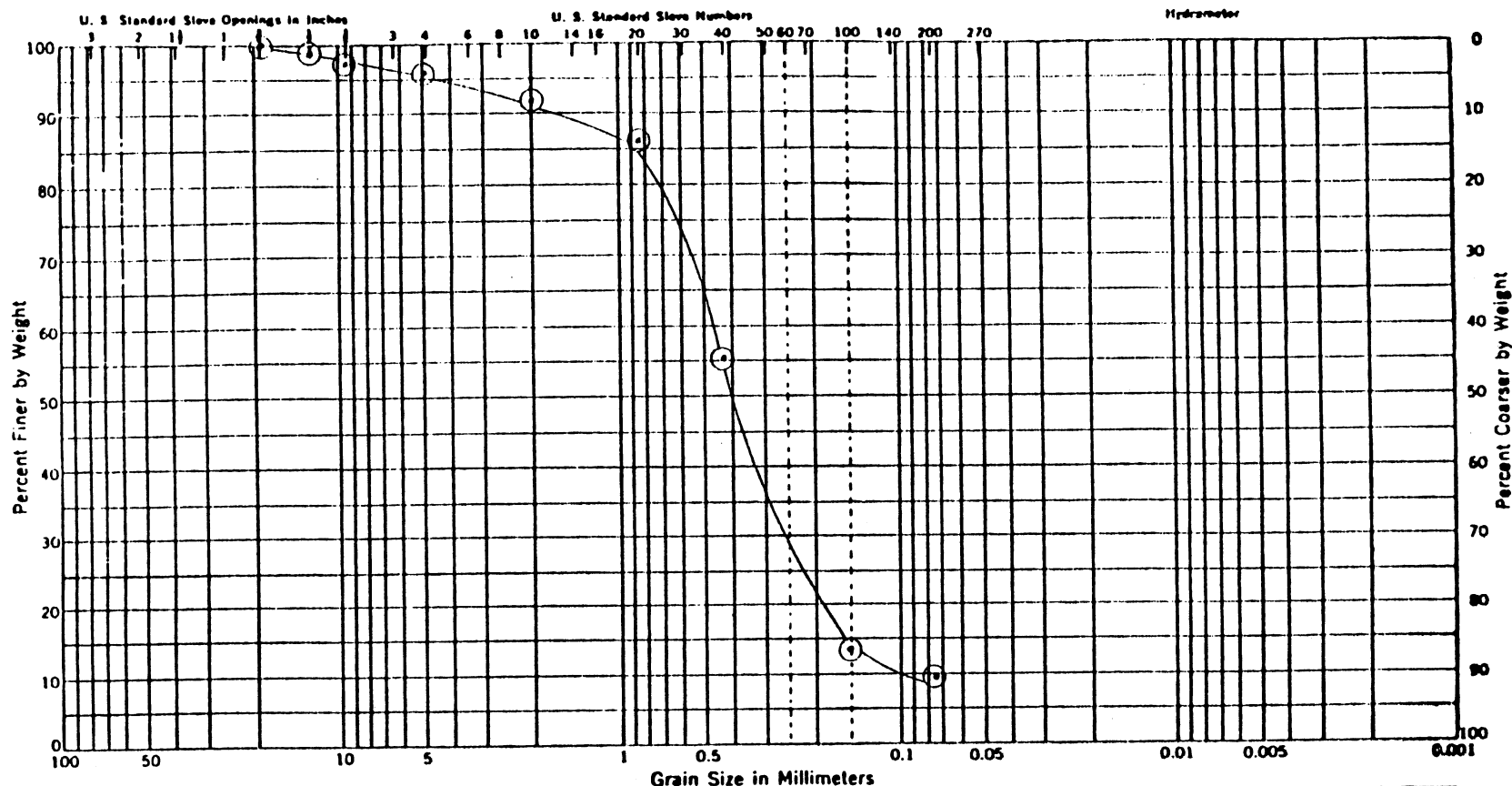


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
G40 M15					Silty fine to medium sand (SM)				
S11									
45-46'									
						DRAWN APPROVED DATE JOB No. SMD JAS 6-10-84 12959			

3.5-21-14

3.5-21-15



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

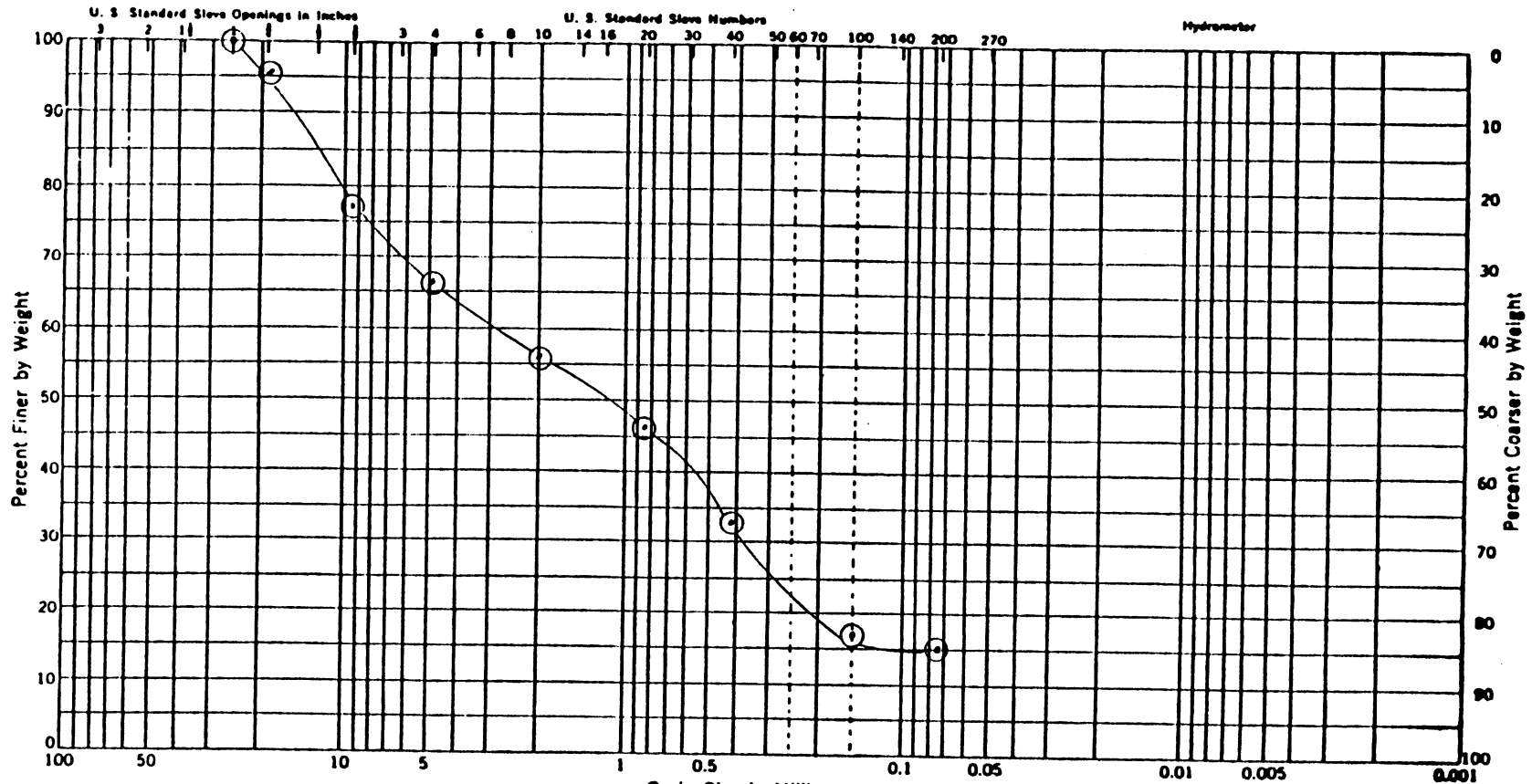
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G40					Slightly silty fine to medium sand (SM-SP)
M15					
S-21					
95-96.5'					

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

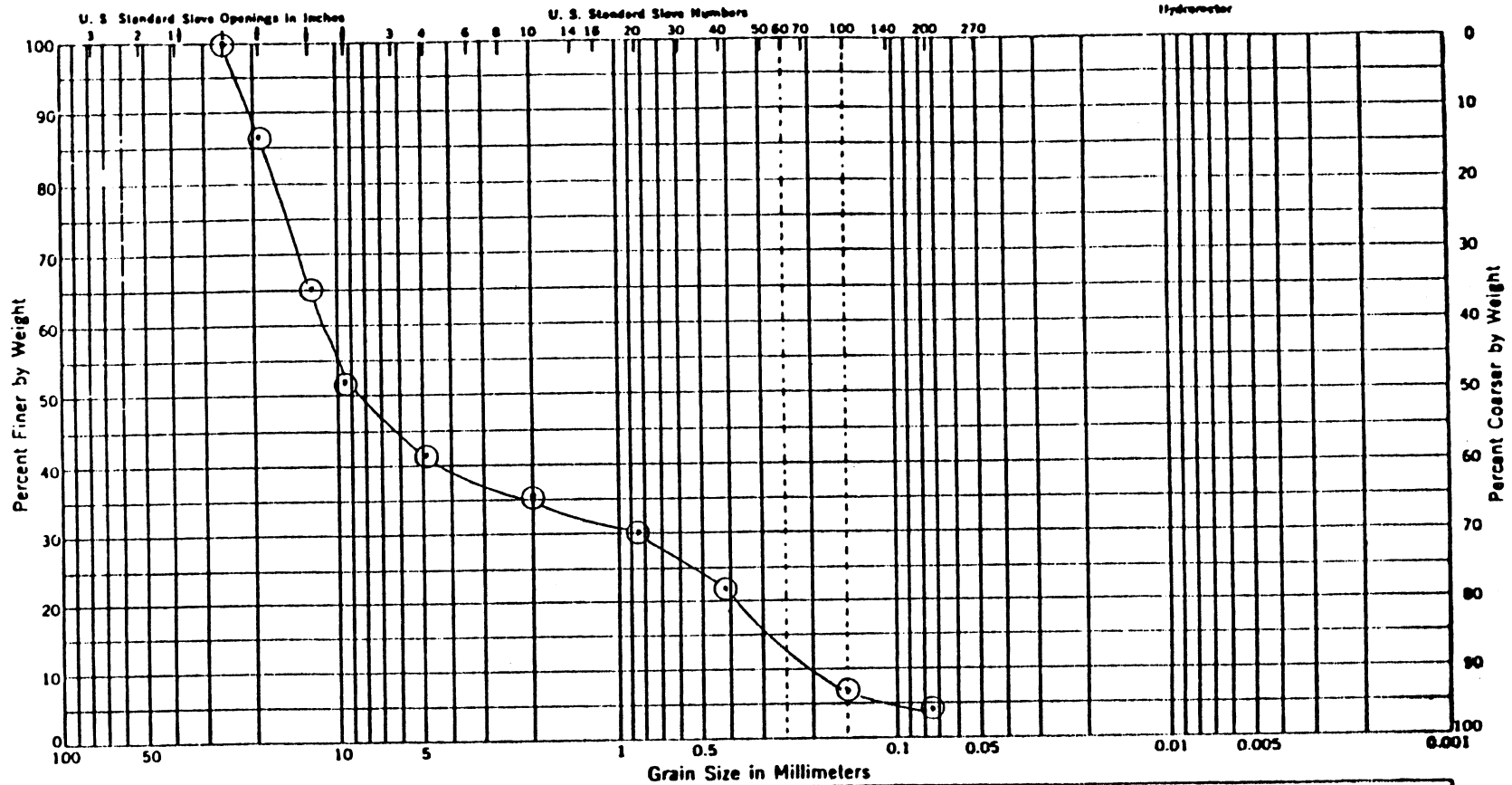
STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	6-10-84	12959

UNIFIED CLASSIFICATION SYSTEM



3.5-21-17



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

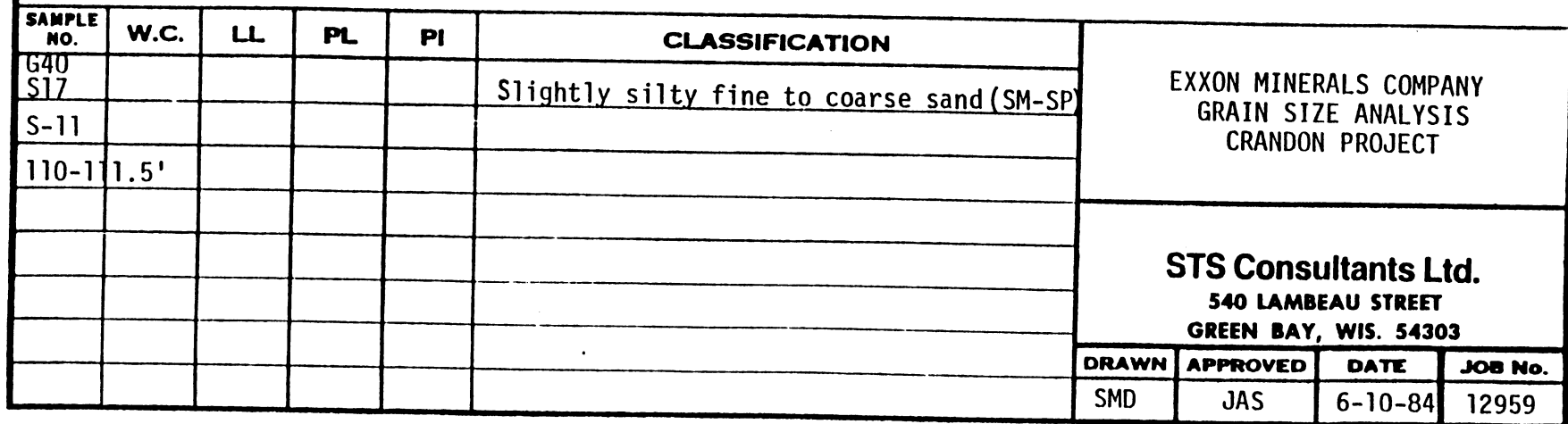
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G40					Fine to coarse gravel (GP)
S17					
S-5					
50-51.5'					

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

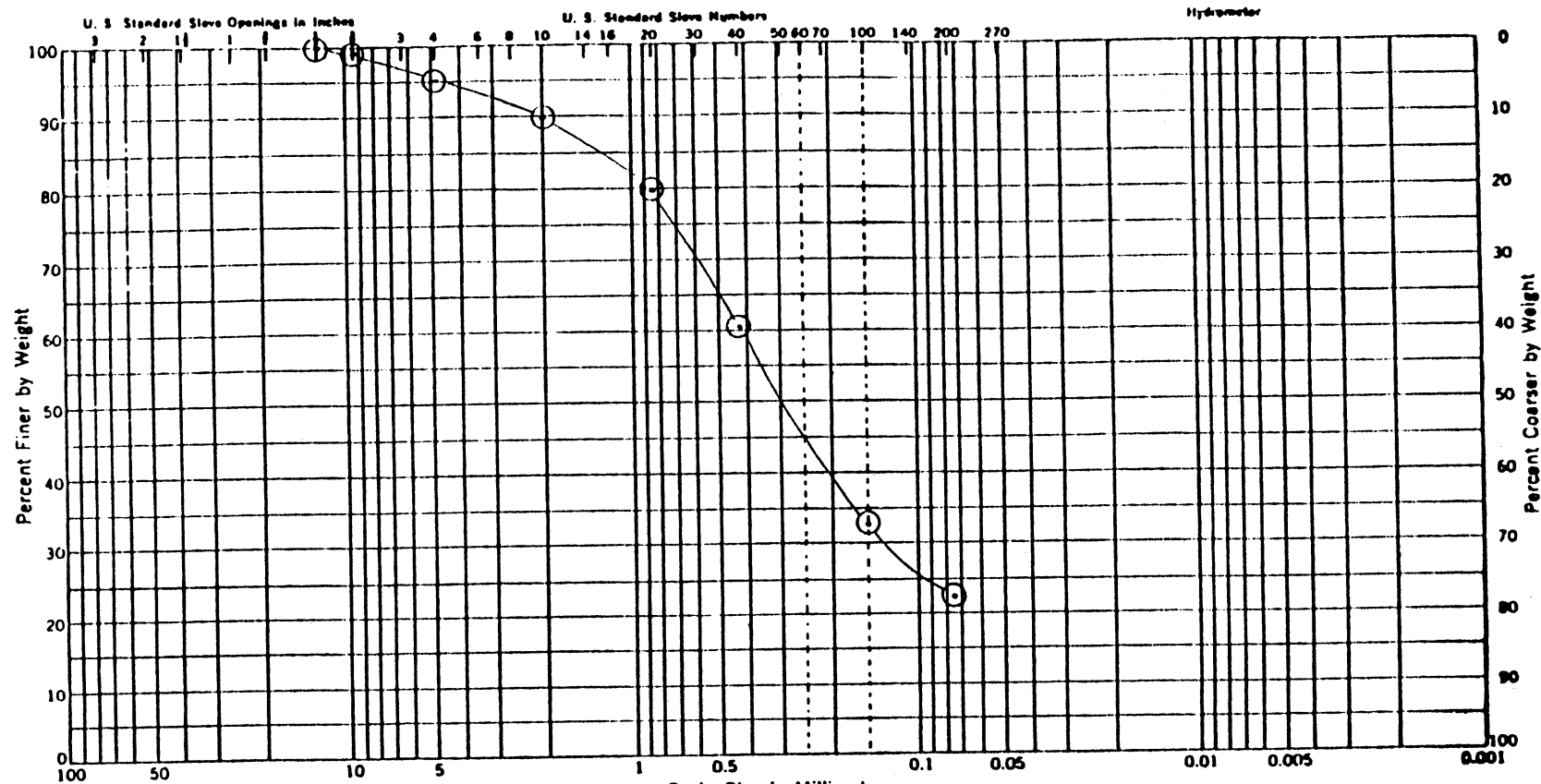
STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	6-10-84	12959

3.5-21-18



3.5-21-19



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

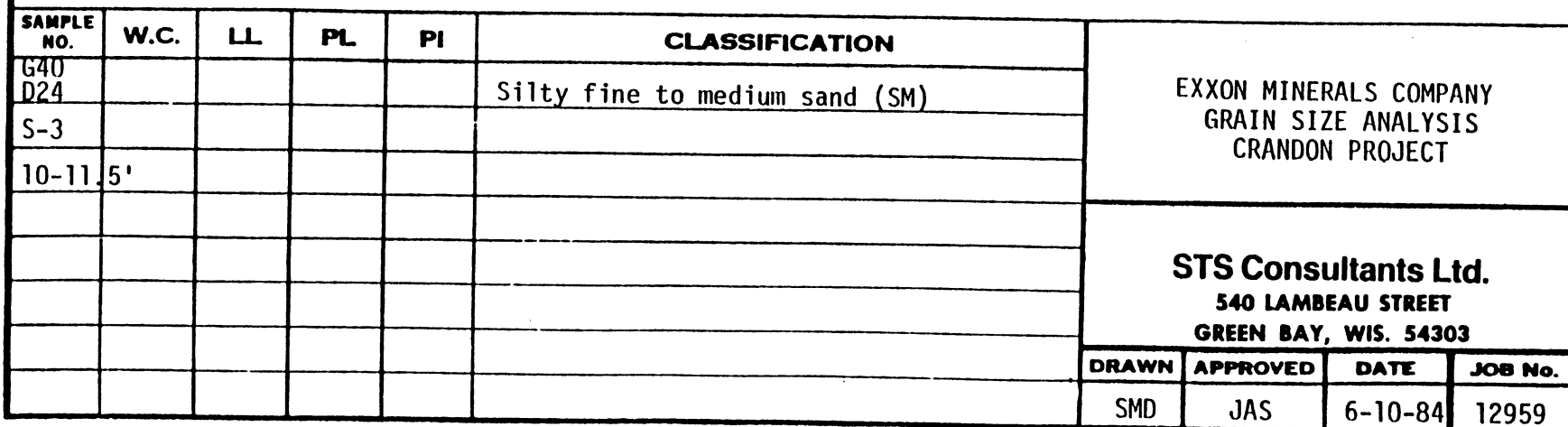
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G40 S17					Silty fine to coarse sand (SM)
S-15					
150-150.7'					

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

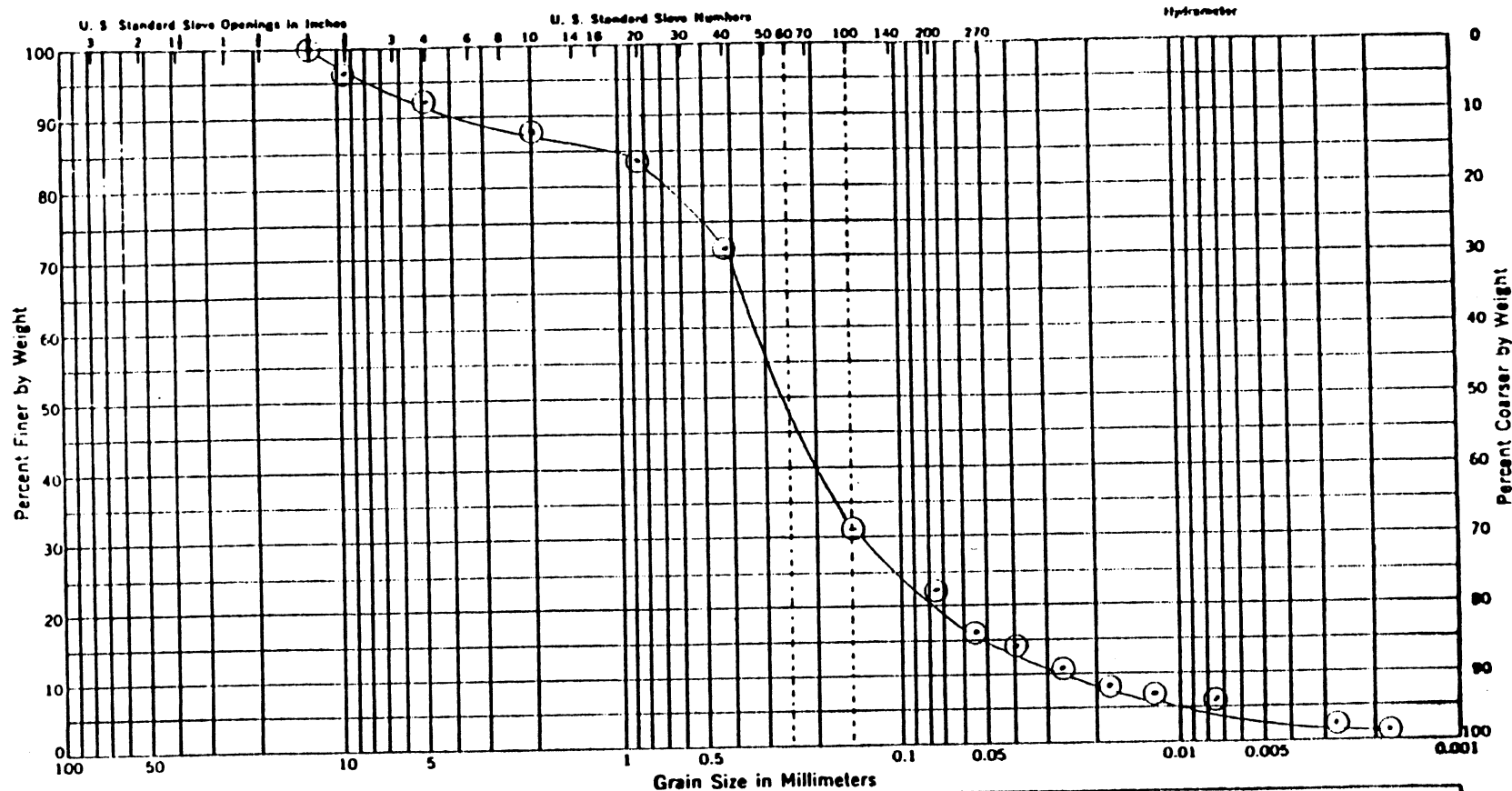
STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	6-10-84	12959

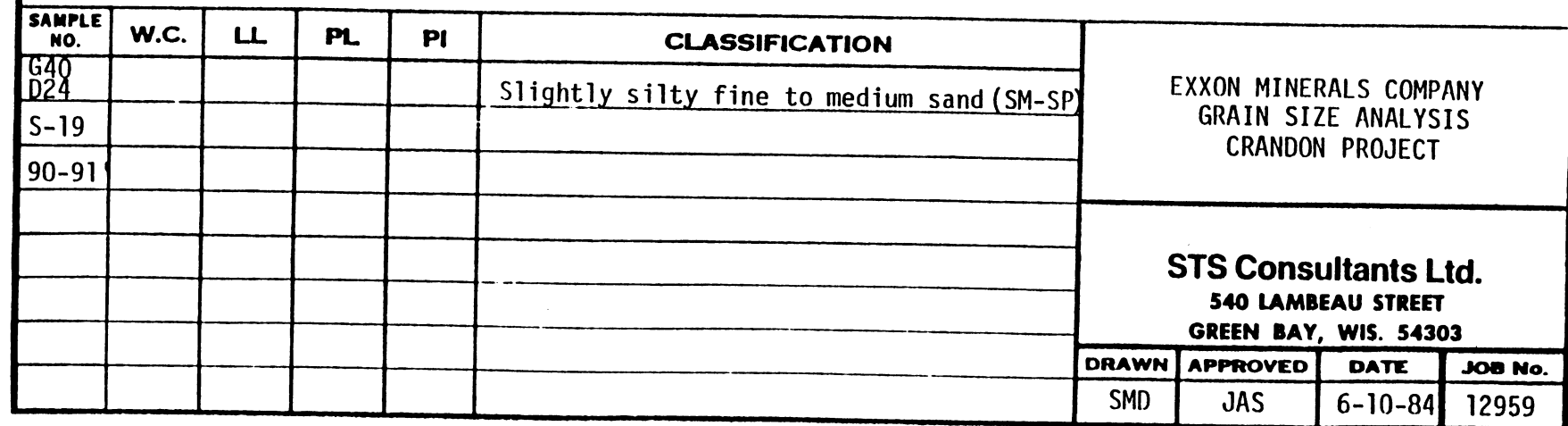
3.5-21-20



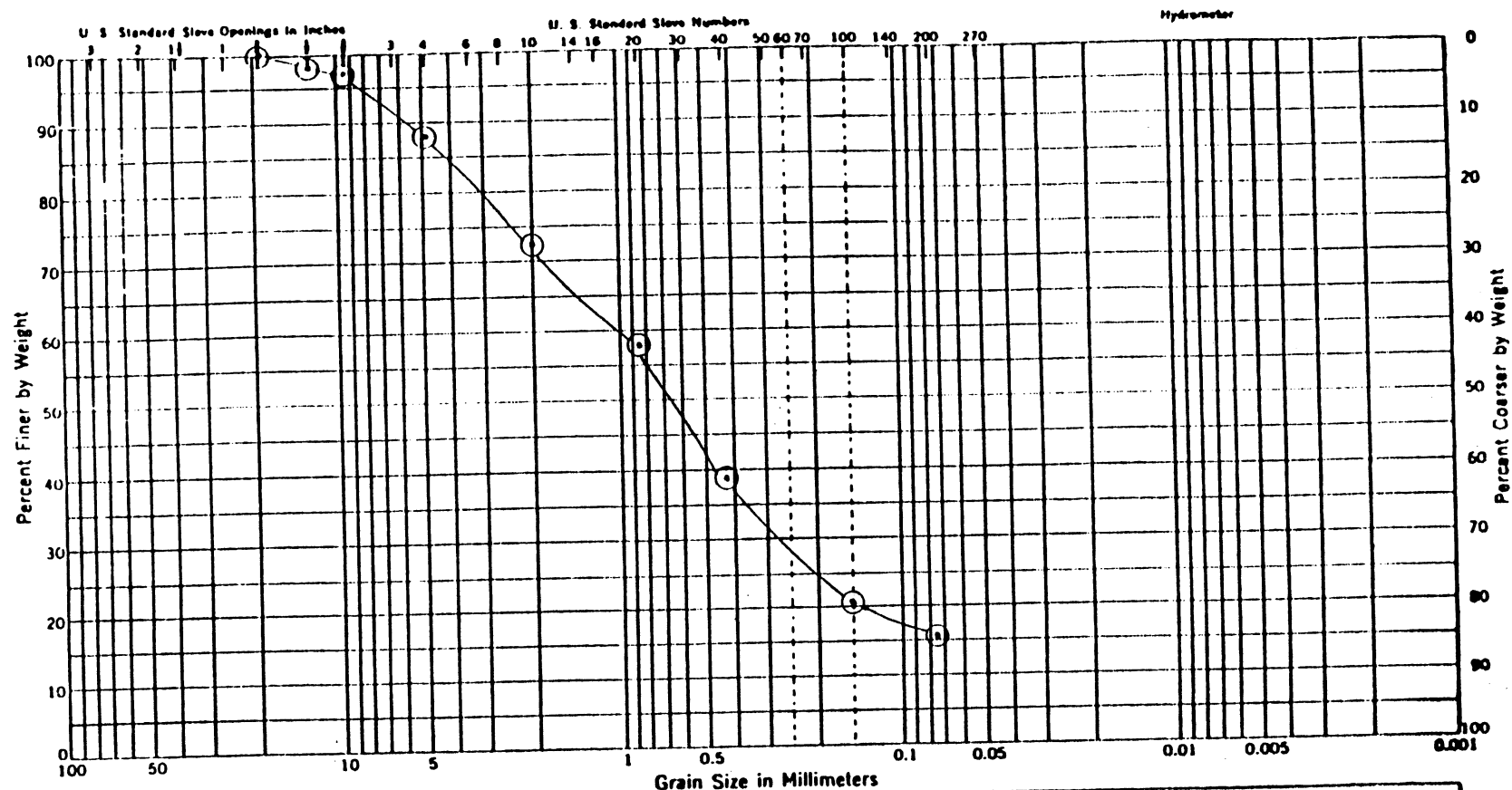
3.5-21-21



3.5-21-22



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GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G40 D24					Silty fine to coarse sand (SM)
S27					
160-1	60.8'				

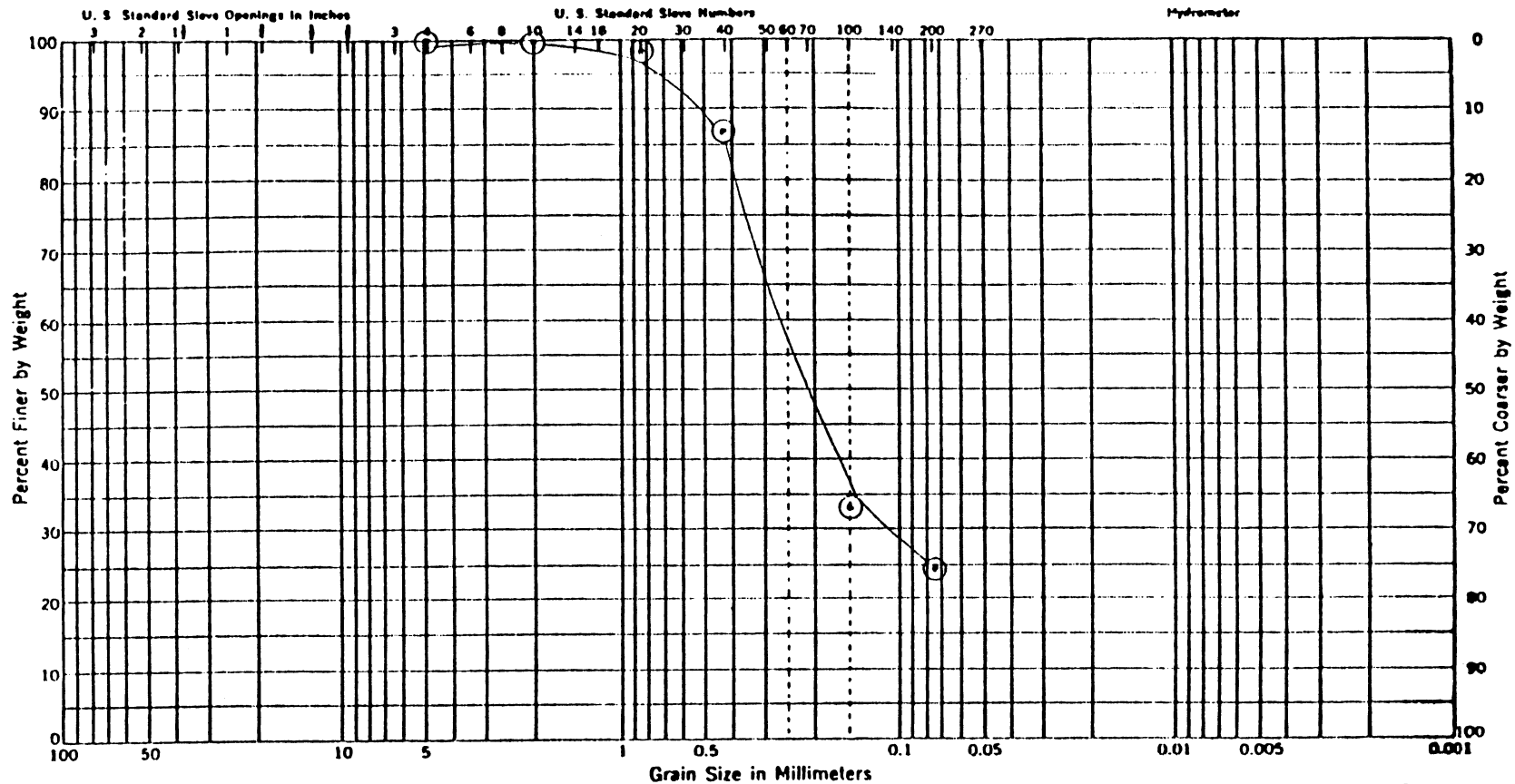
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

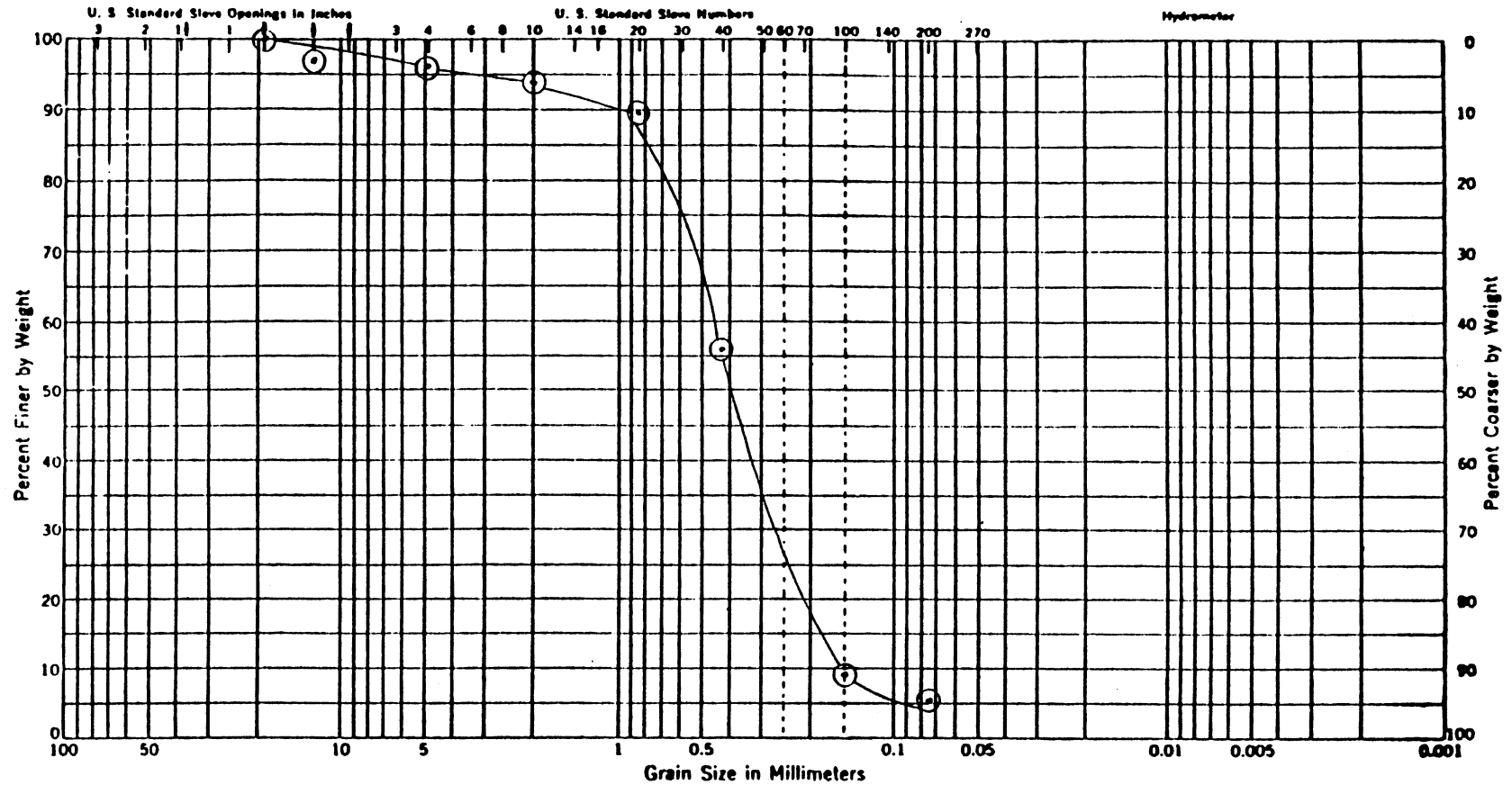
DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	6-10-84	12959

3.5-21-23

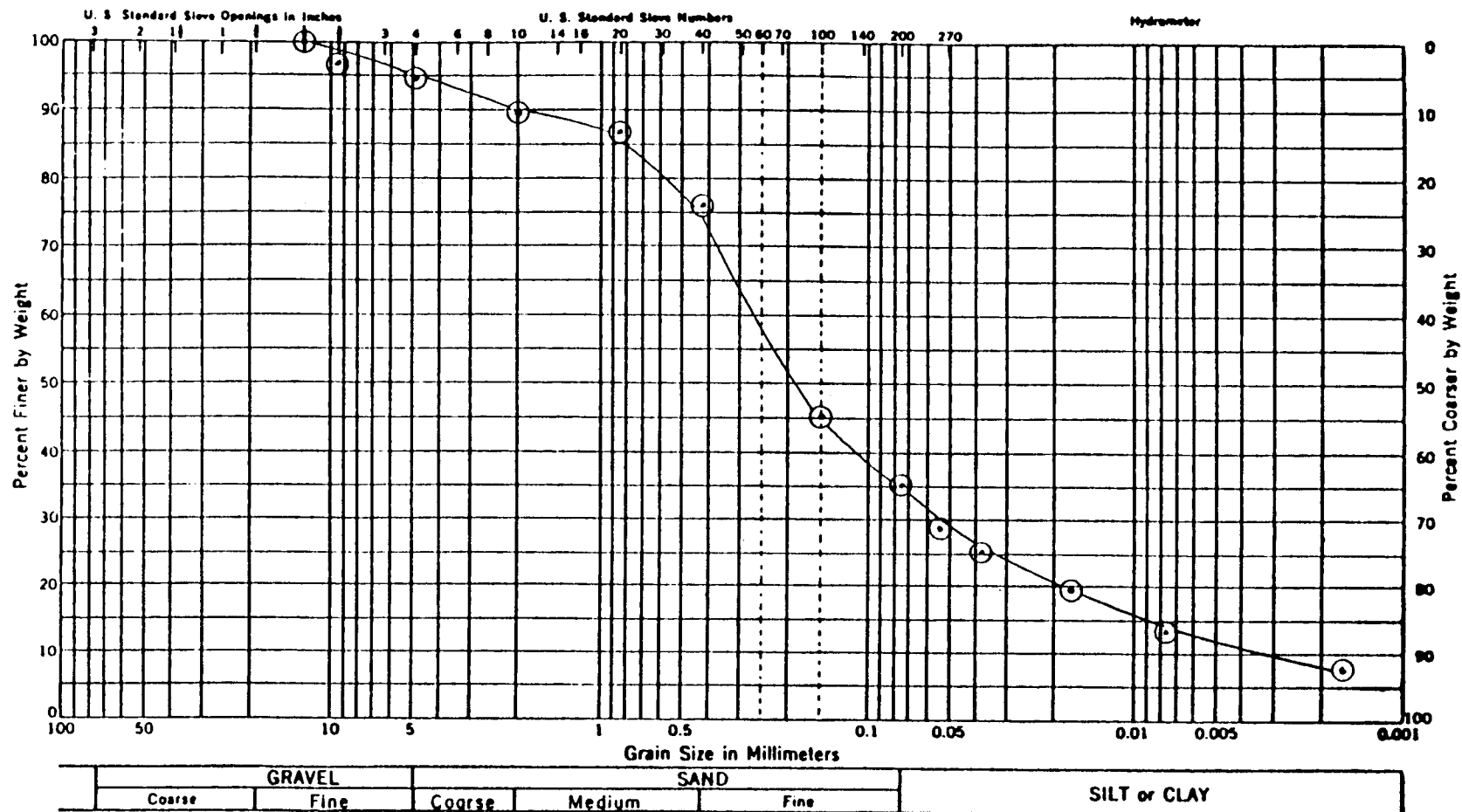
3.5-21-24



UNIFIED CLASSIFICATION SYSTEM

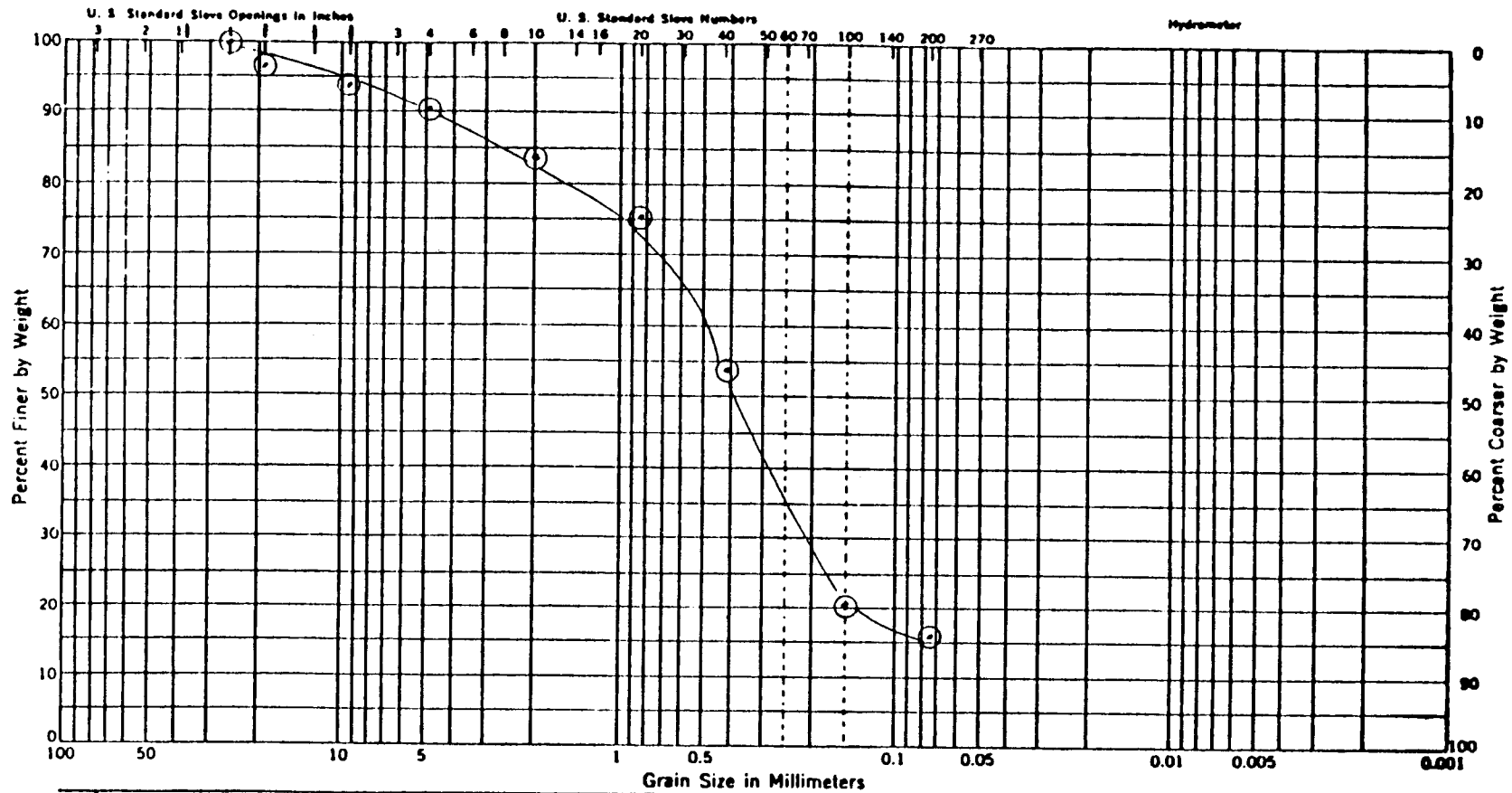


UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G40 H16					Silty fine sand (SM)				
S-34						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
220-220.7'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

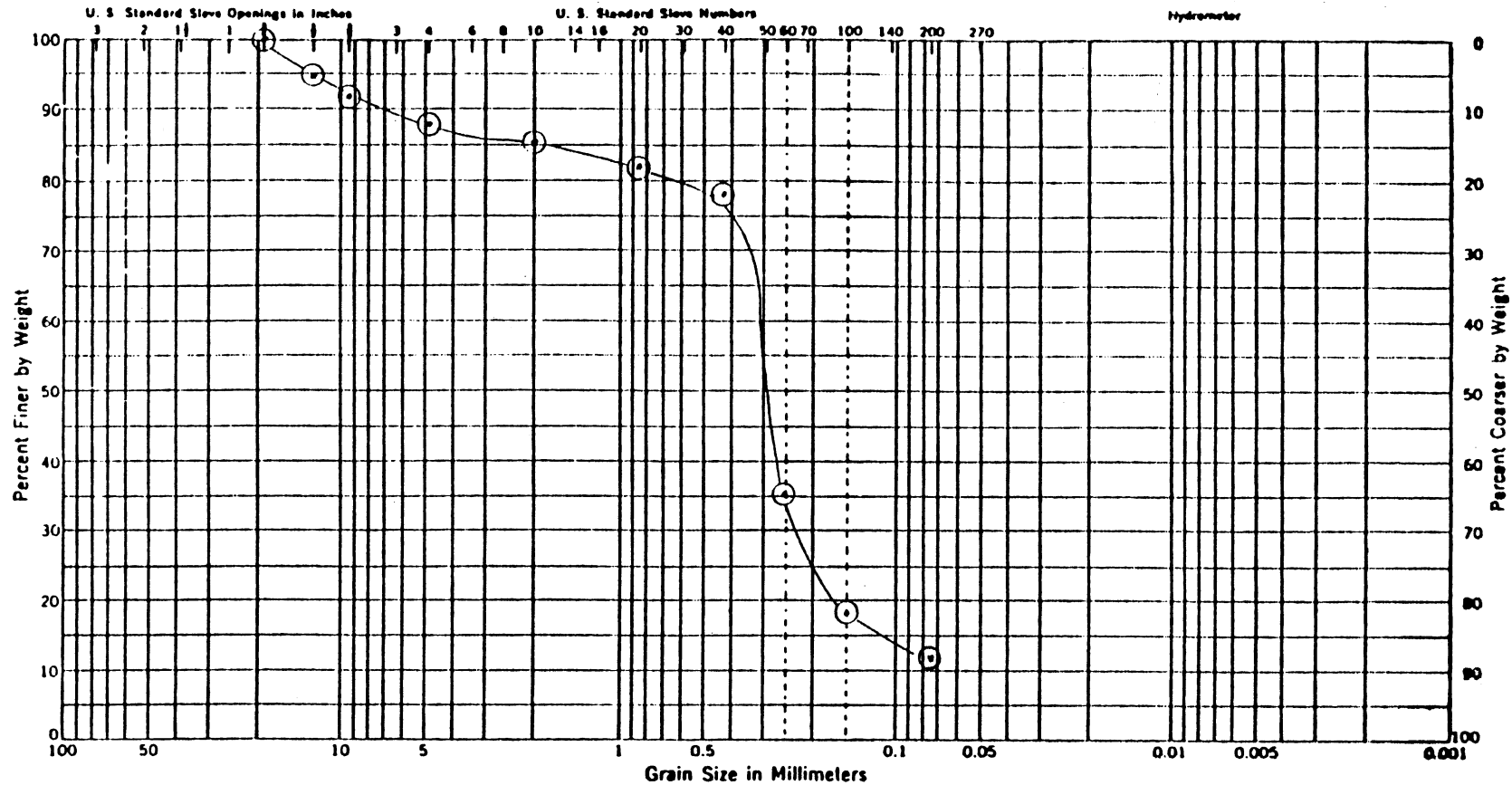
3.5-21-27



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G40 H27					Silty fine to coarse sand (SM)				
S-8									
35-35.8'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

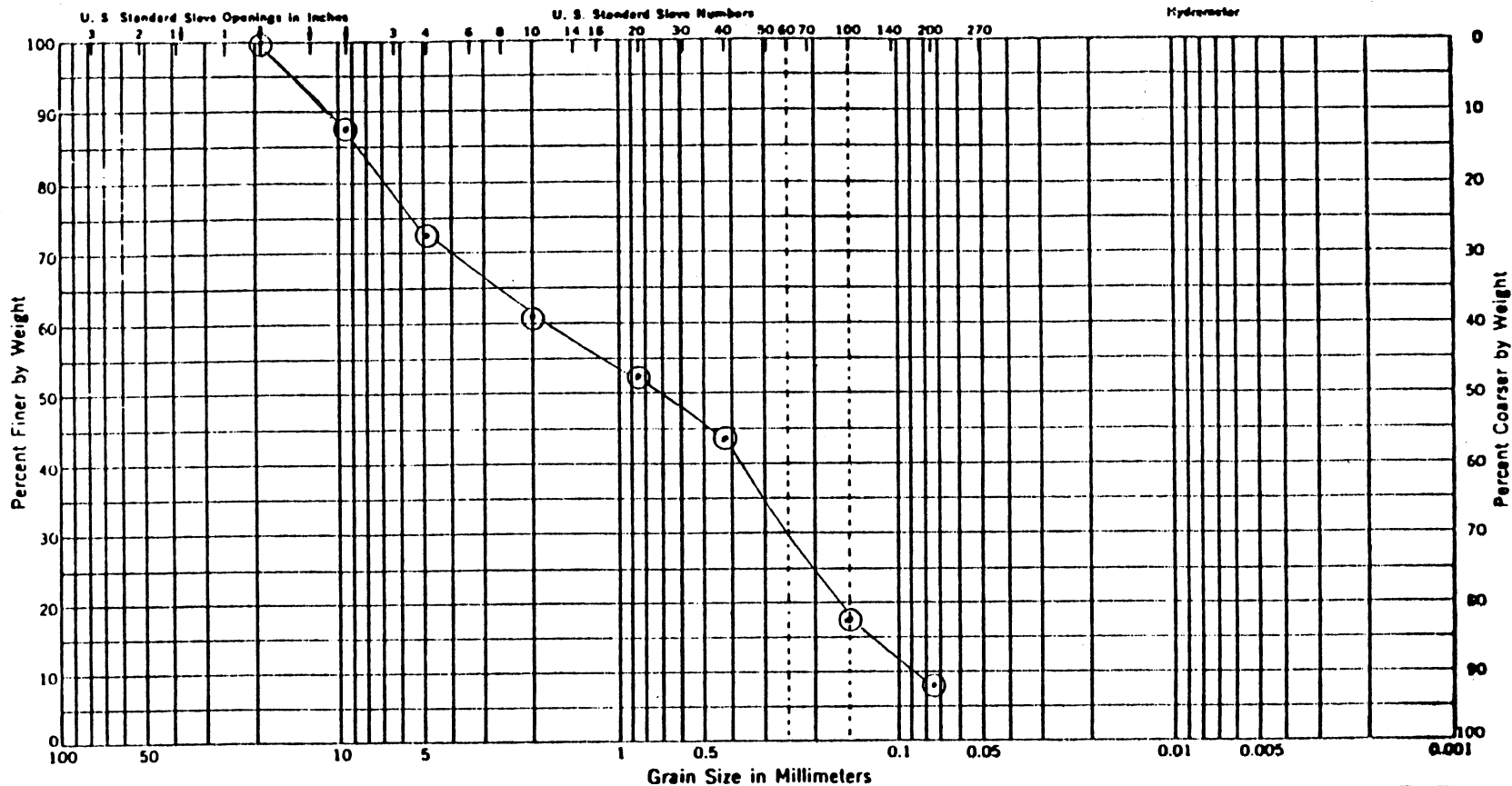
3.5-21-28



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41 C32					Silty fine to medium sand (SM)				
S6									
50-51.3'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

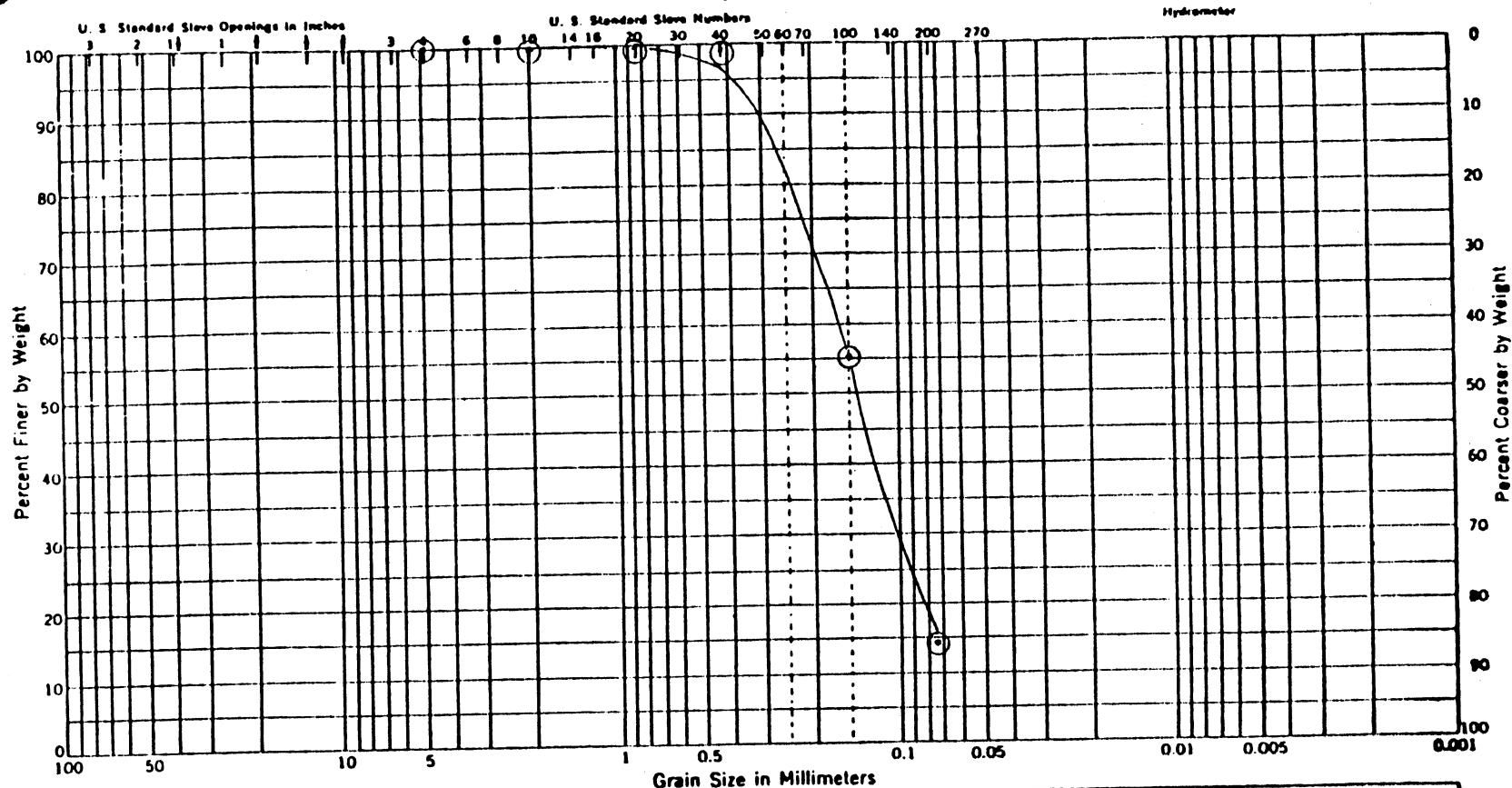
3.5-21-29



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41					Slightly silty fine to coarse sand (SM-SP)				
C15									
S-32									
200-200.7'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

3.5-21-30



U. S. Standard Sieve Opening sizes in inches

U. S. Standard Sieve Numbers

Hydrometer

Percent Finer by Weight

Percent Coarser by Weight

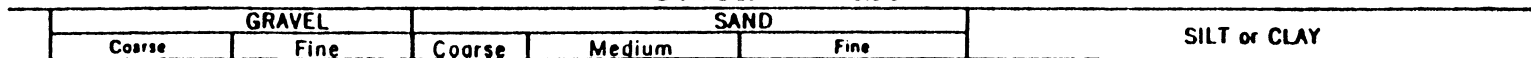
Grain Size in Millimeters

Grain Size (mm)	U.S. Standard Sieve	Percent Finer (%)
100	20	100
75	20	100
60	25	98
42.5	40	90
30	60	83
25	60	79
20	75	73
150	100	58
75	200	28
60	250	20

[illegible]

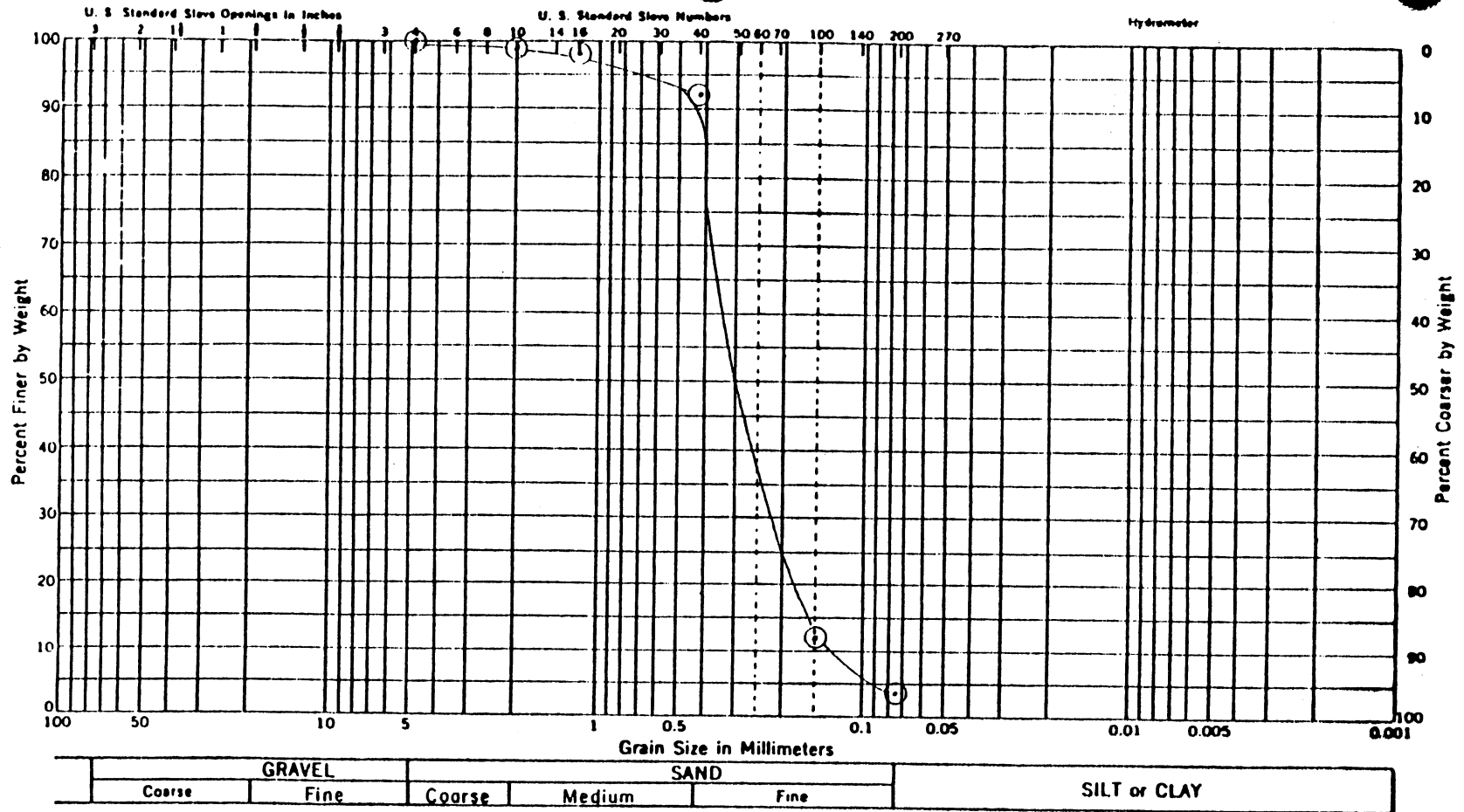
STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	5-18-84	12959

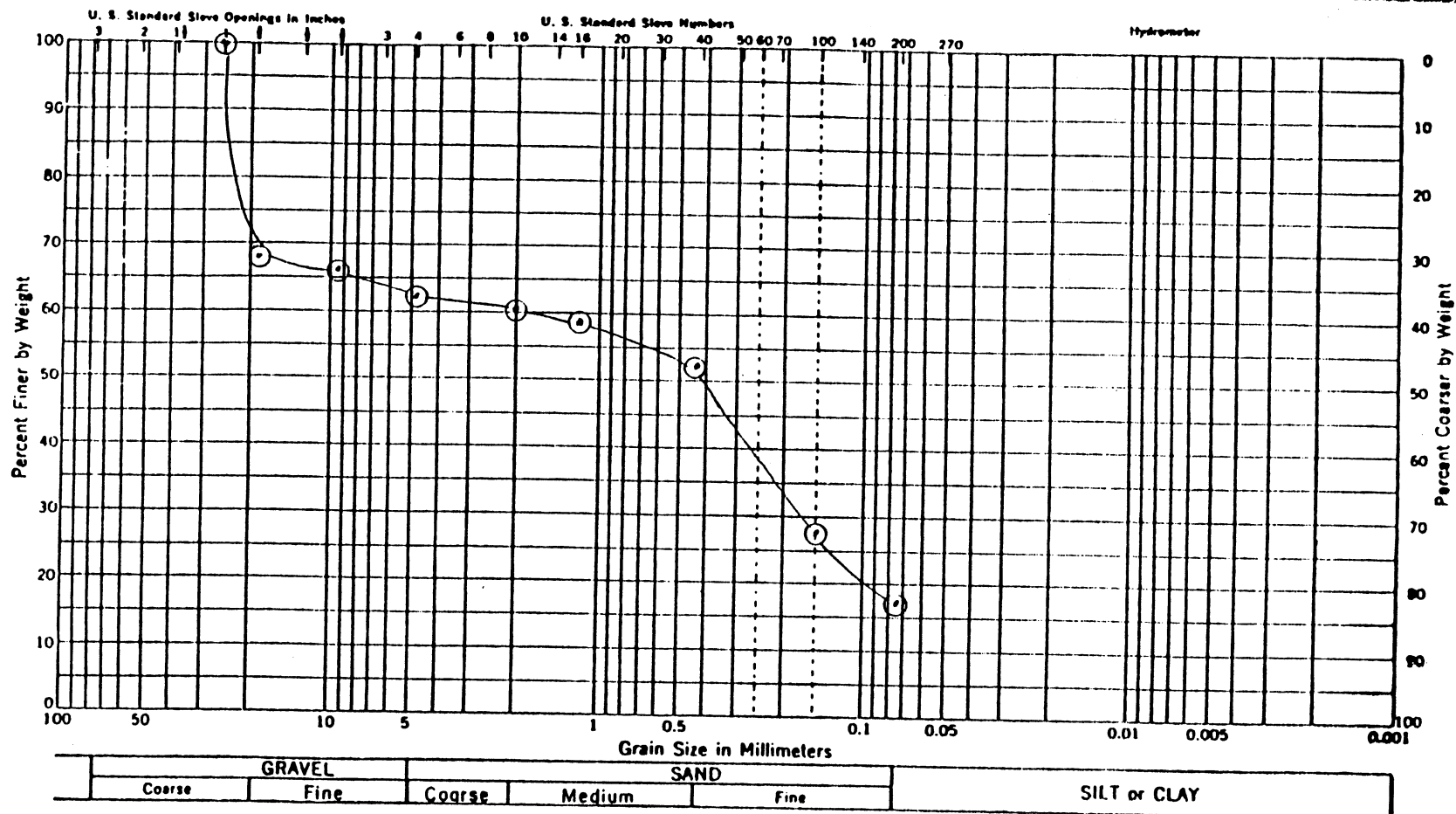


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3.5-21-33

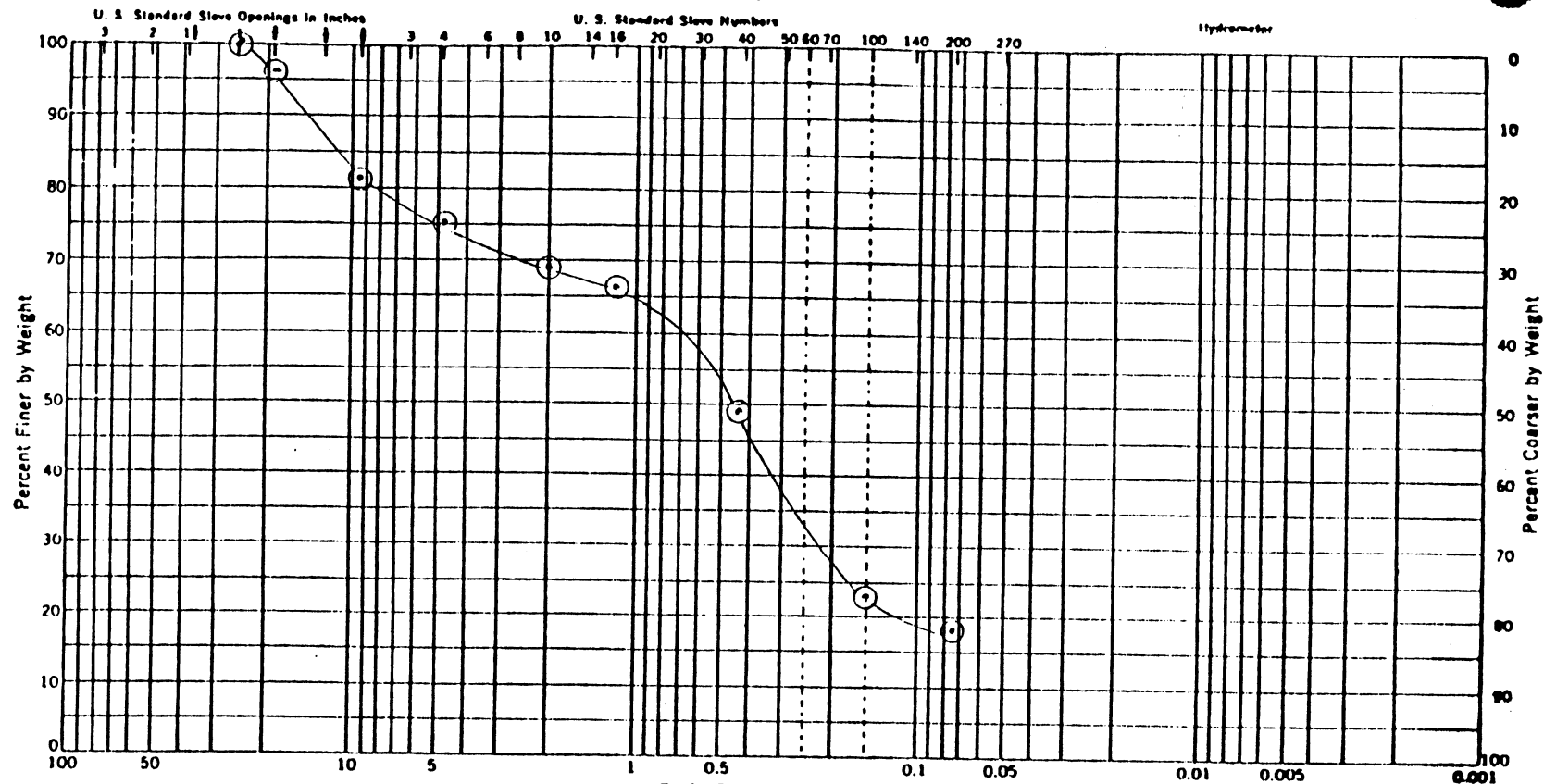


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT							
G41					Fine to medium sand (SP)								
C15													
S-5													
15-16.5'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303							
						DRAWN	APPROVED	DATE	JOB No.				
						SMD	JAS	5-18-84	12959				



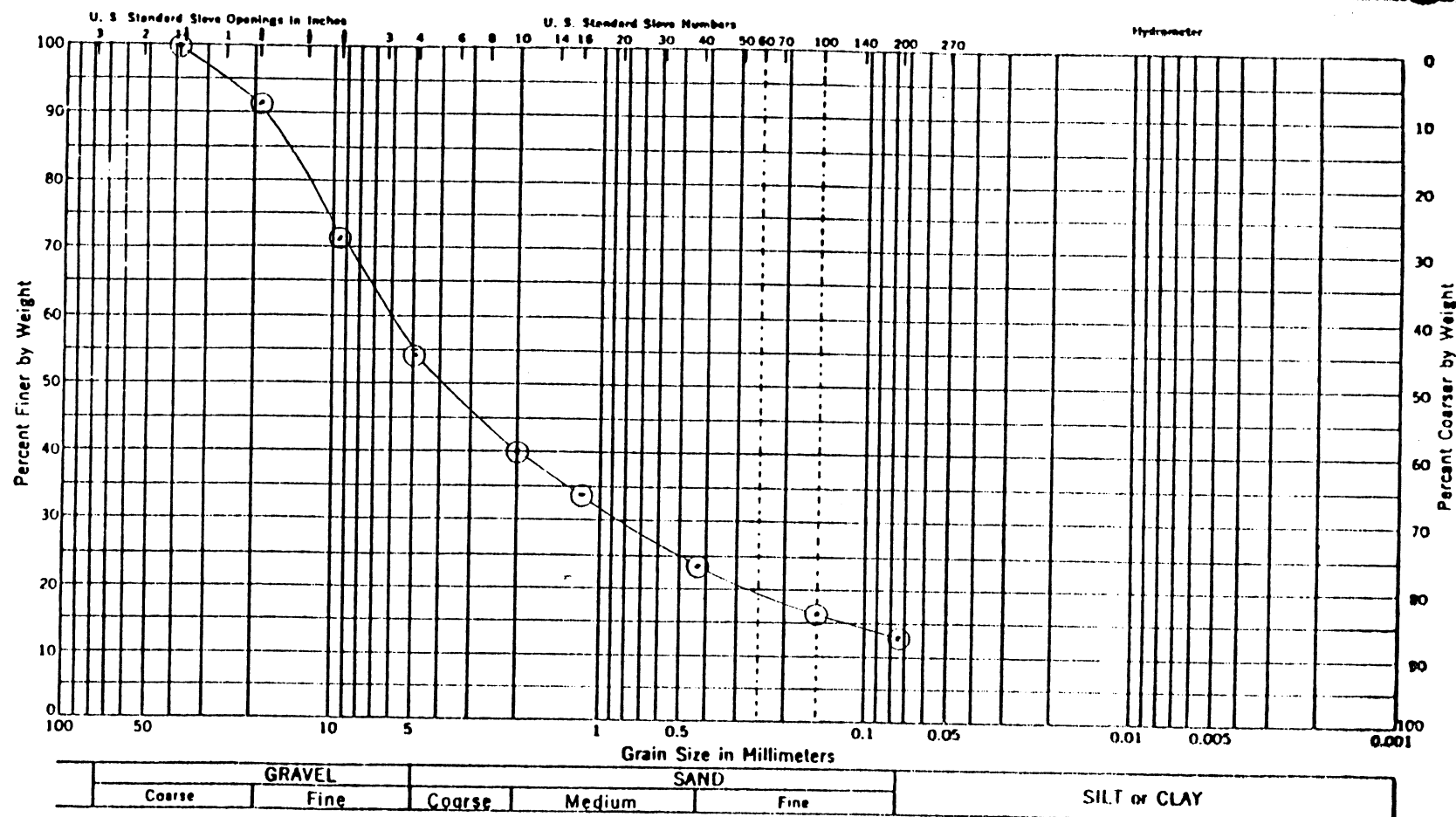
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41					Silty fine to coarse sand (SM)				
B12									
S-12									
110-111'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

3.5-21-35



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

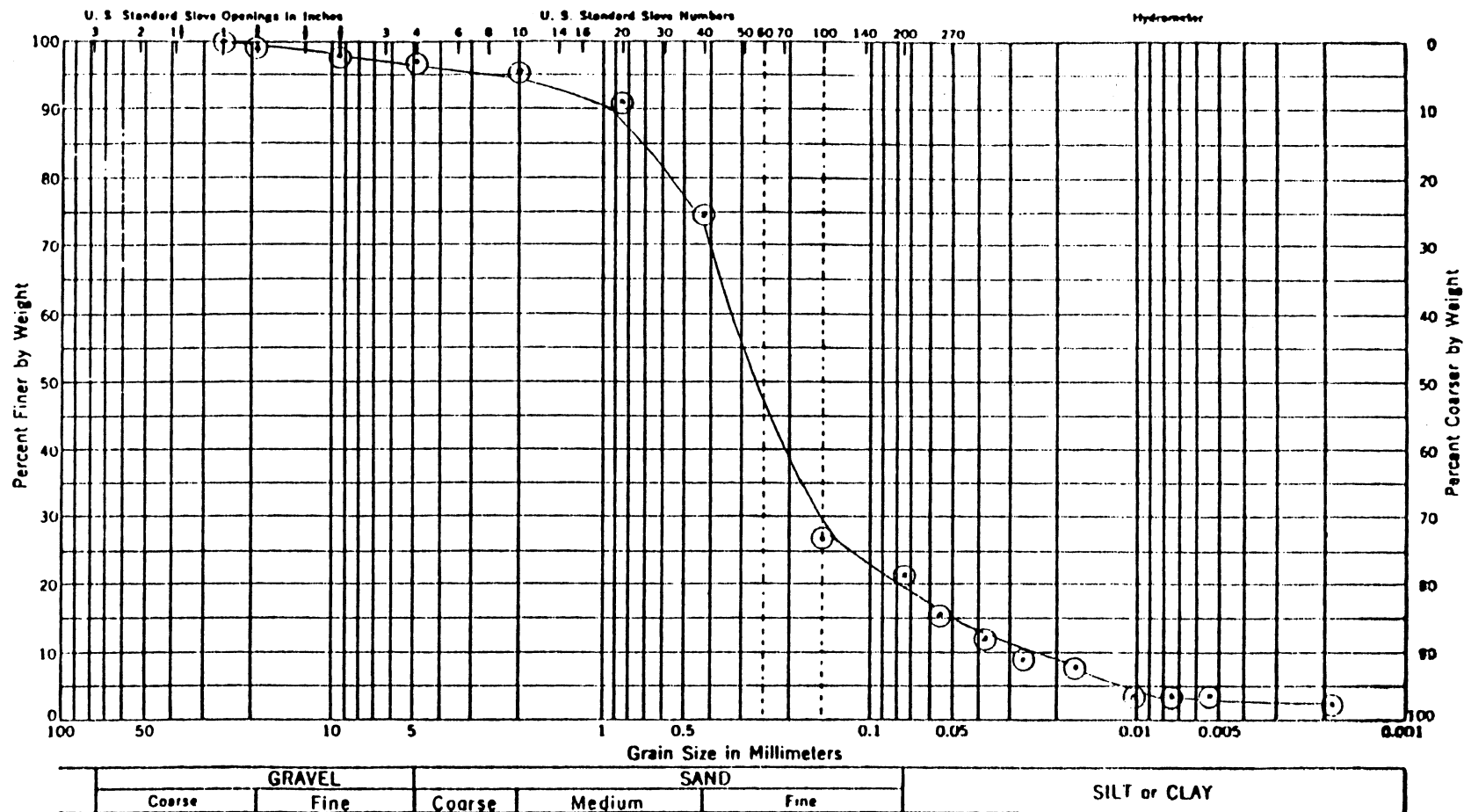
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41 B12					Silty fine to coarse sand (SM)				
S-5						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
40-41.5'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959



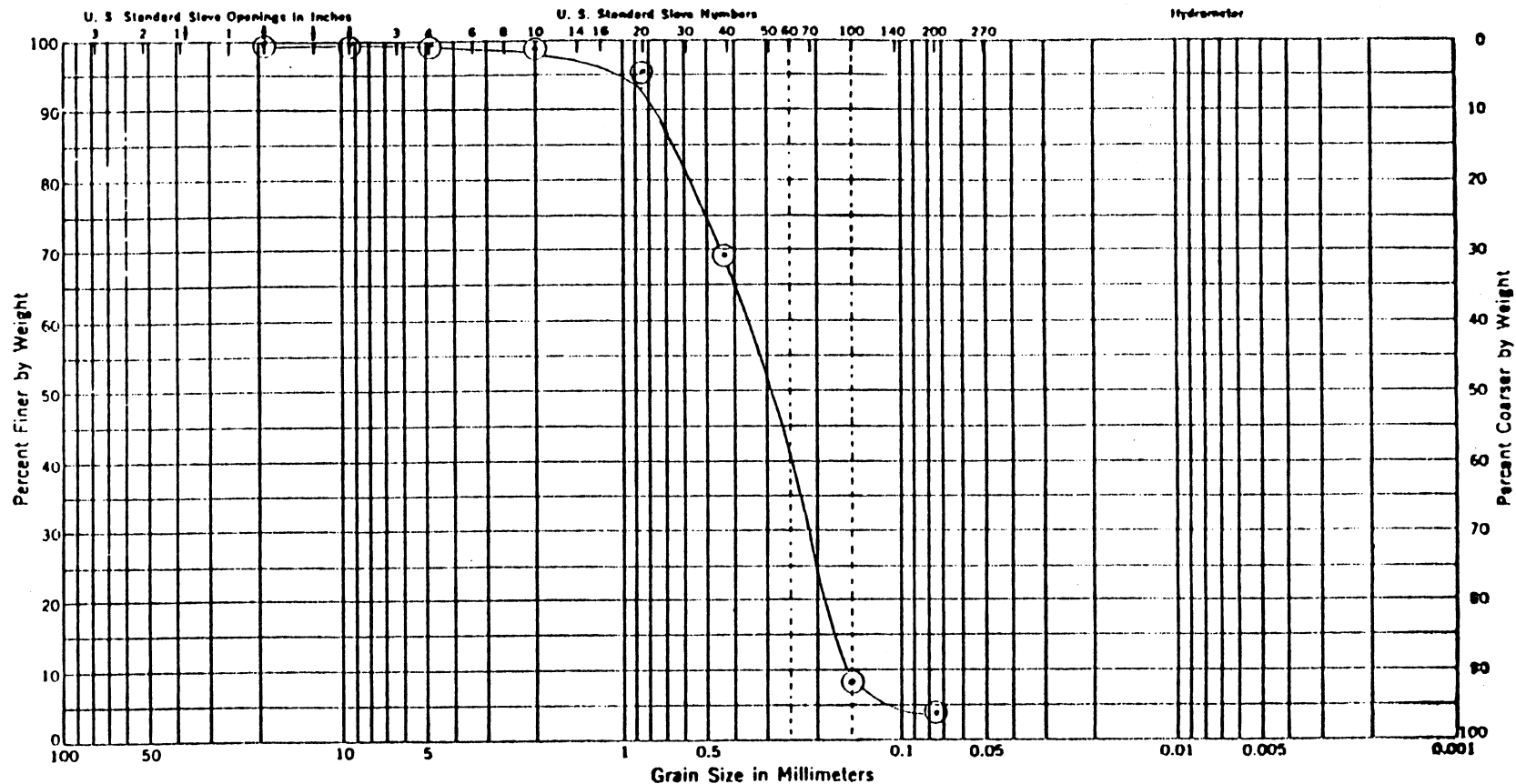
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41 B12					Silty fine to coarse sand (SM)				
S-2						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
10-11.5									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

3.5-21-36

3.5-21-37



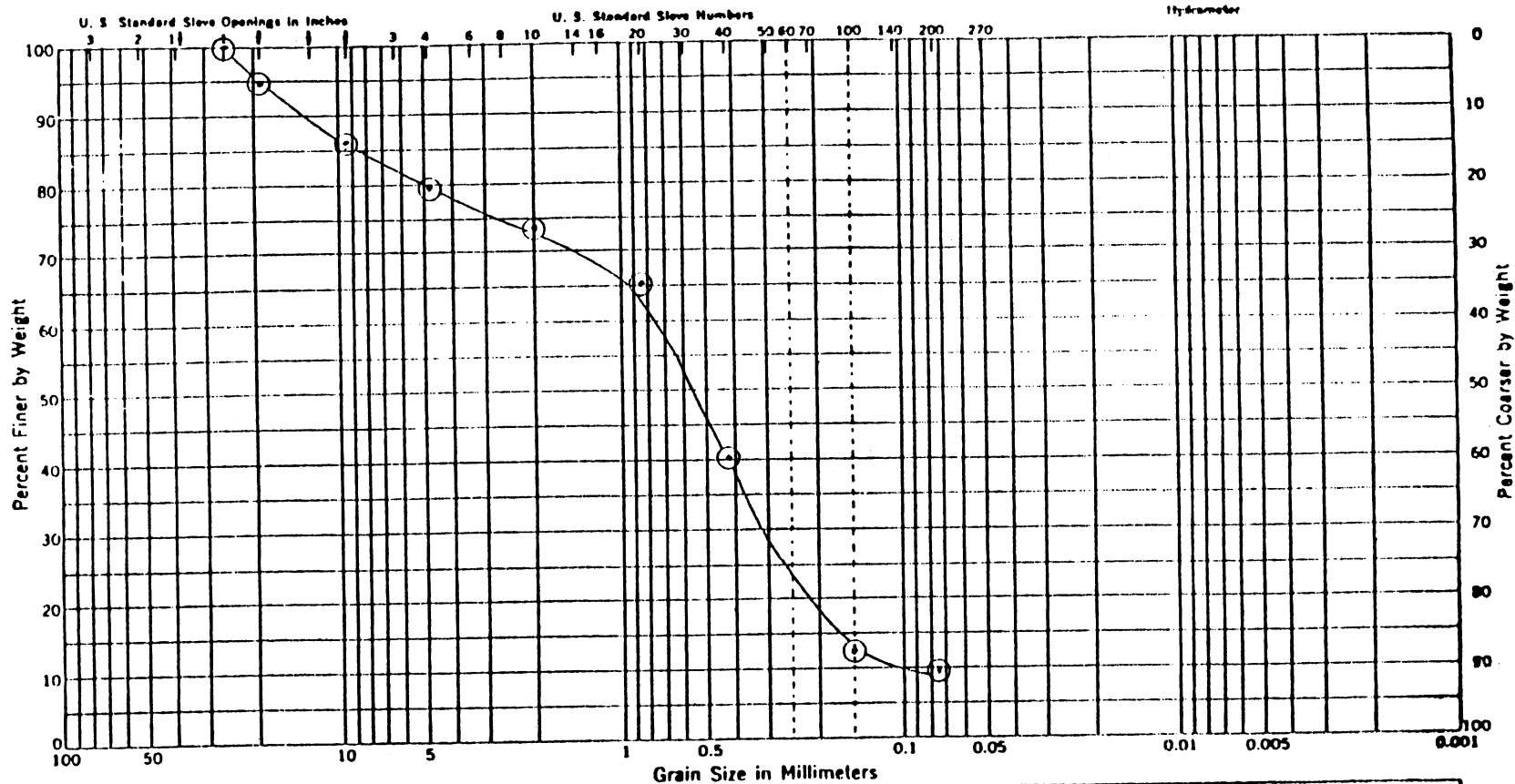
3.5-21-38



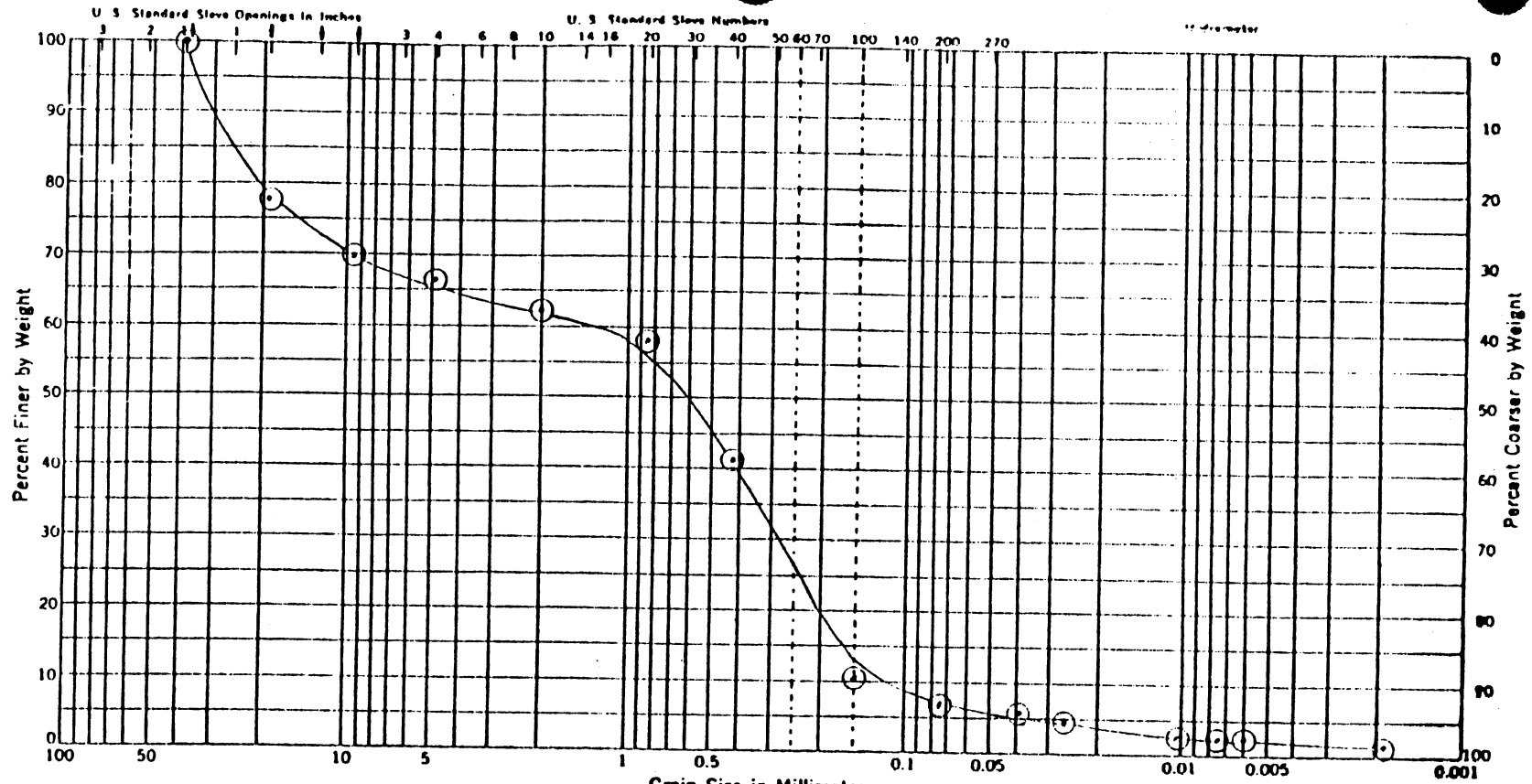
GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41 A24					Fine sand (SP)				
S-10									
80-81'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

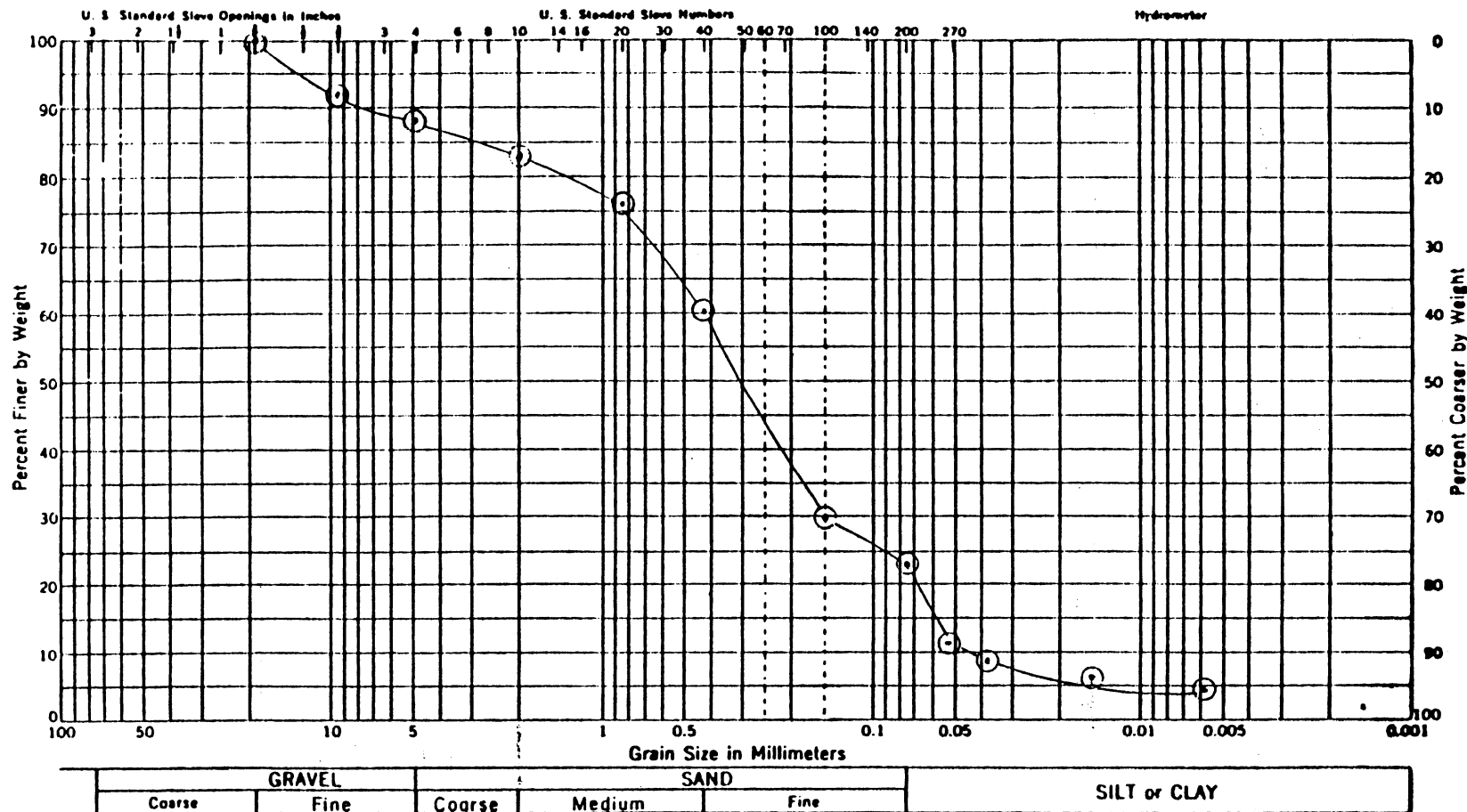
3.5-21-39



3.5-21-40

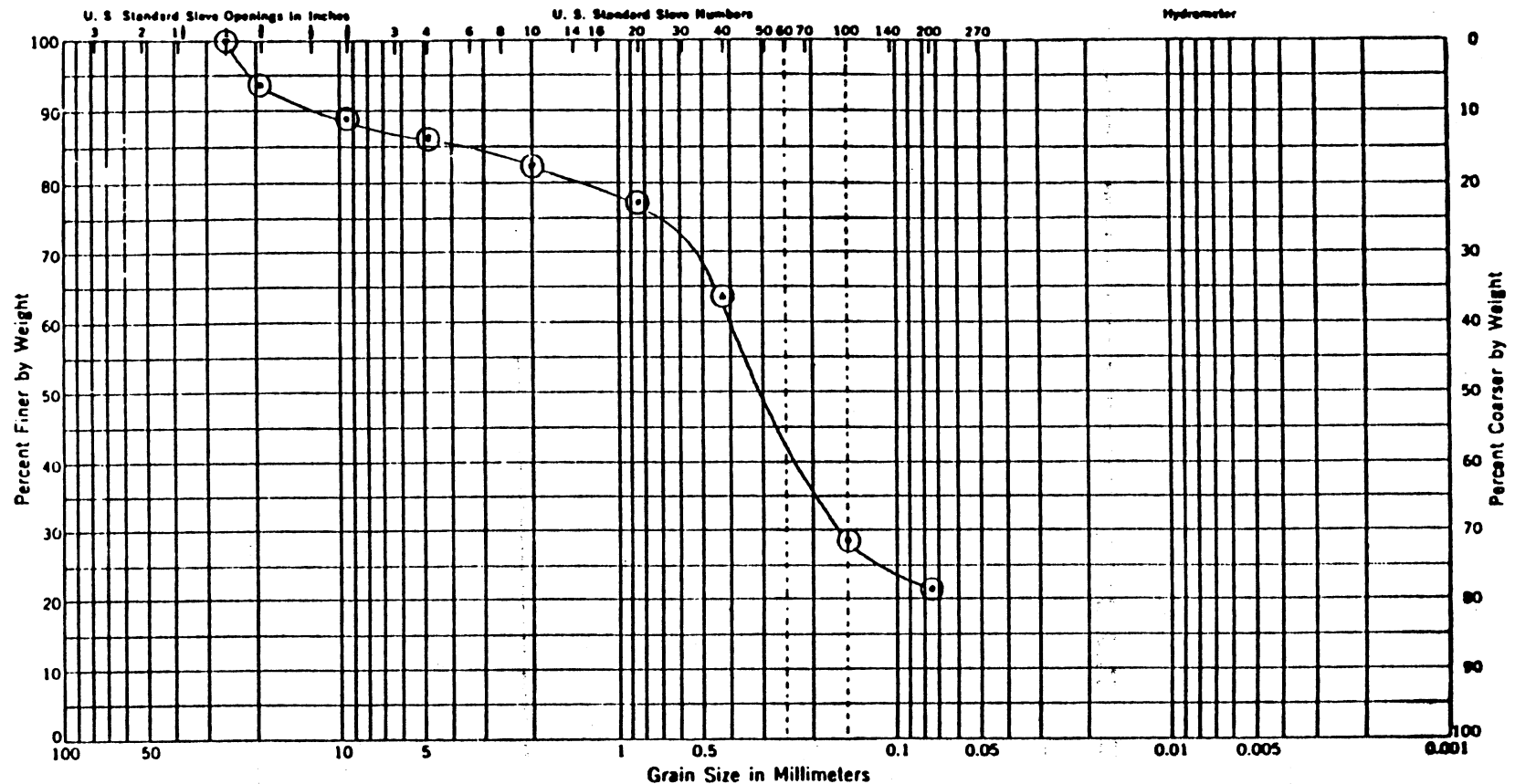


3.5-21-41



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
G41					Silty fine to coarse sand (SM)				
G13									
S18									
170-170.9'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G41					Silty fine to coarse sand (SM)
G13					
S-13					
120-122'					

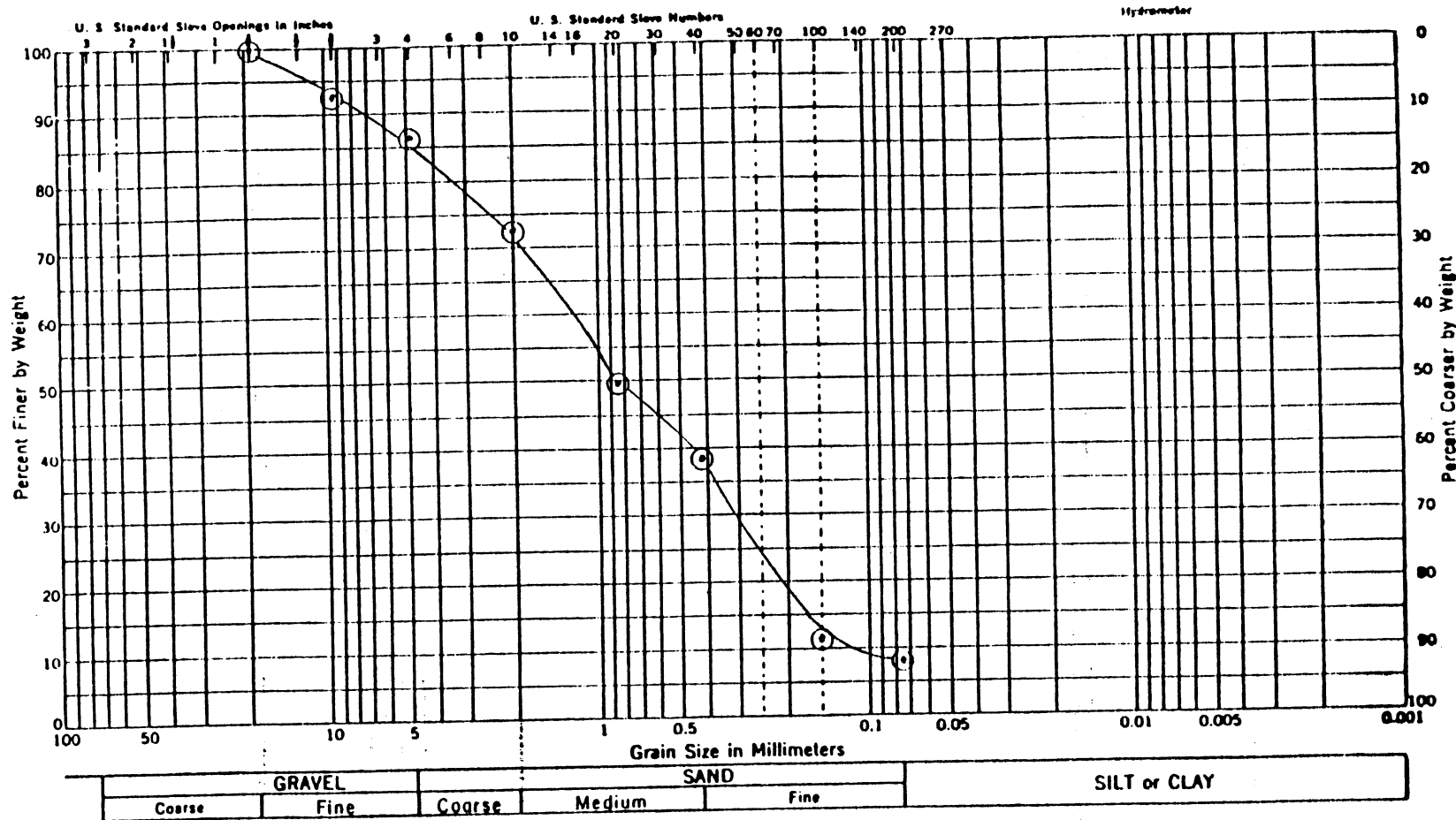
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	5-18-84	109

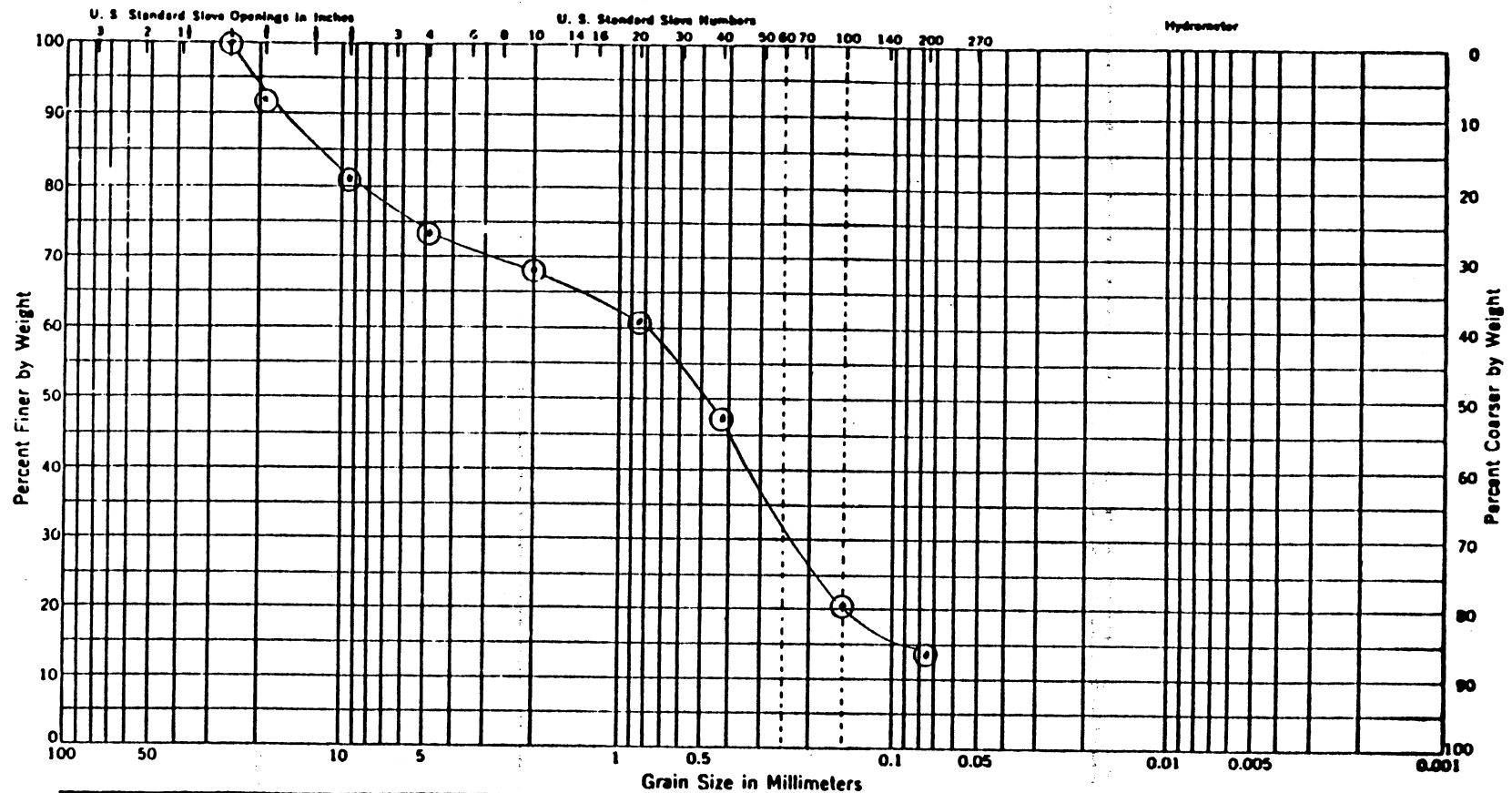
3.5-21-42

3.5-21-43



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41					Slightly silty fine to coarse sand (SM-SP)				
G13						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
S-12									
110-111	1.8'								
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G41					Silty fine to coarse sand (SM)
G13					
S-5					
43-45'					

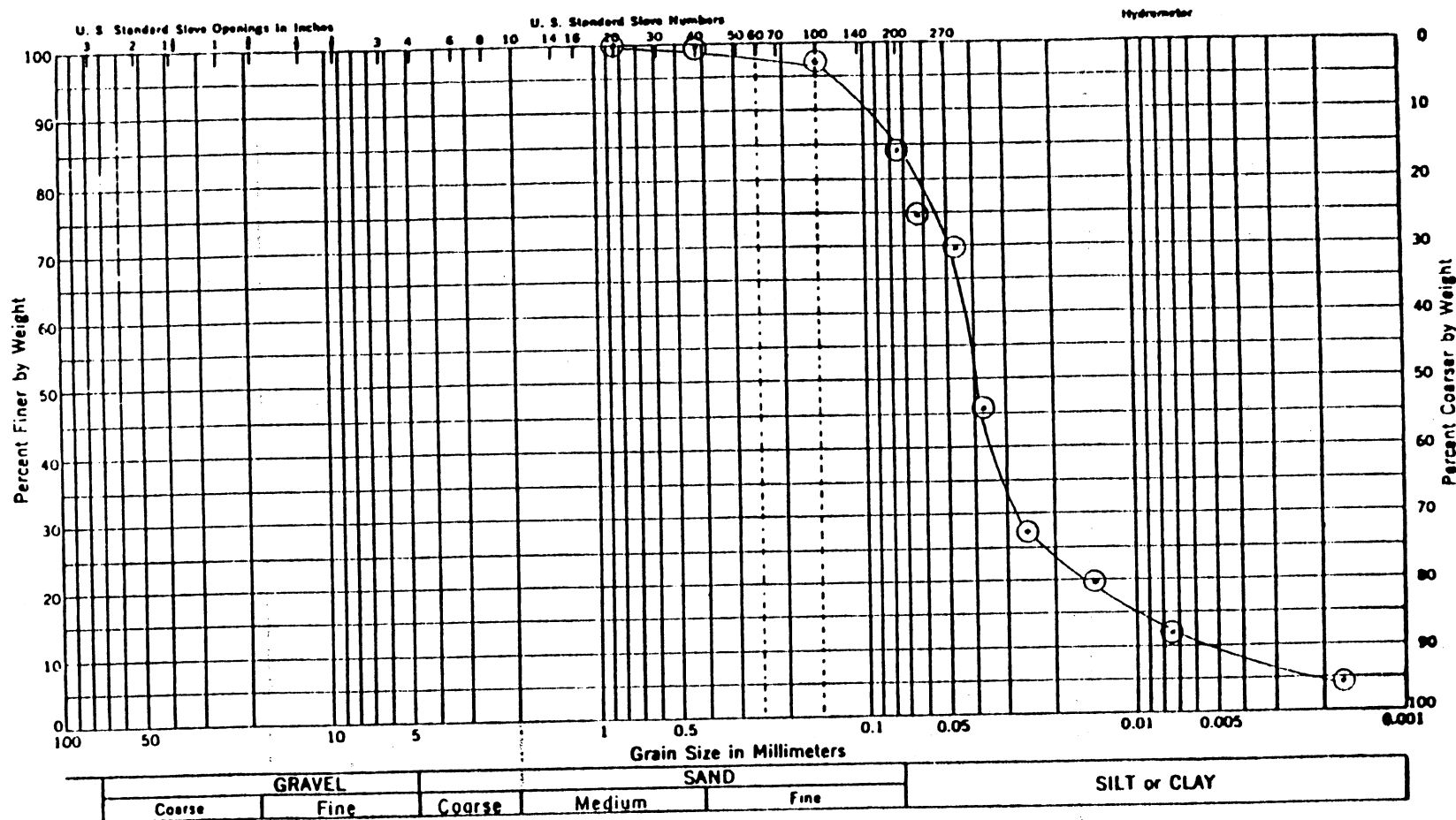
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

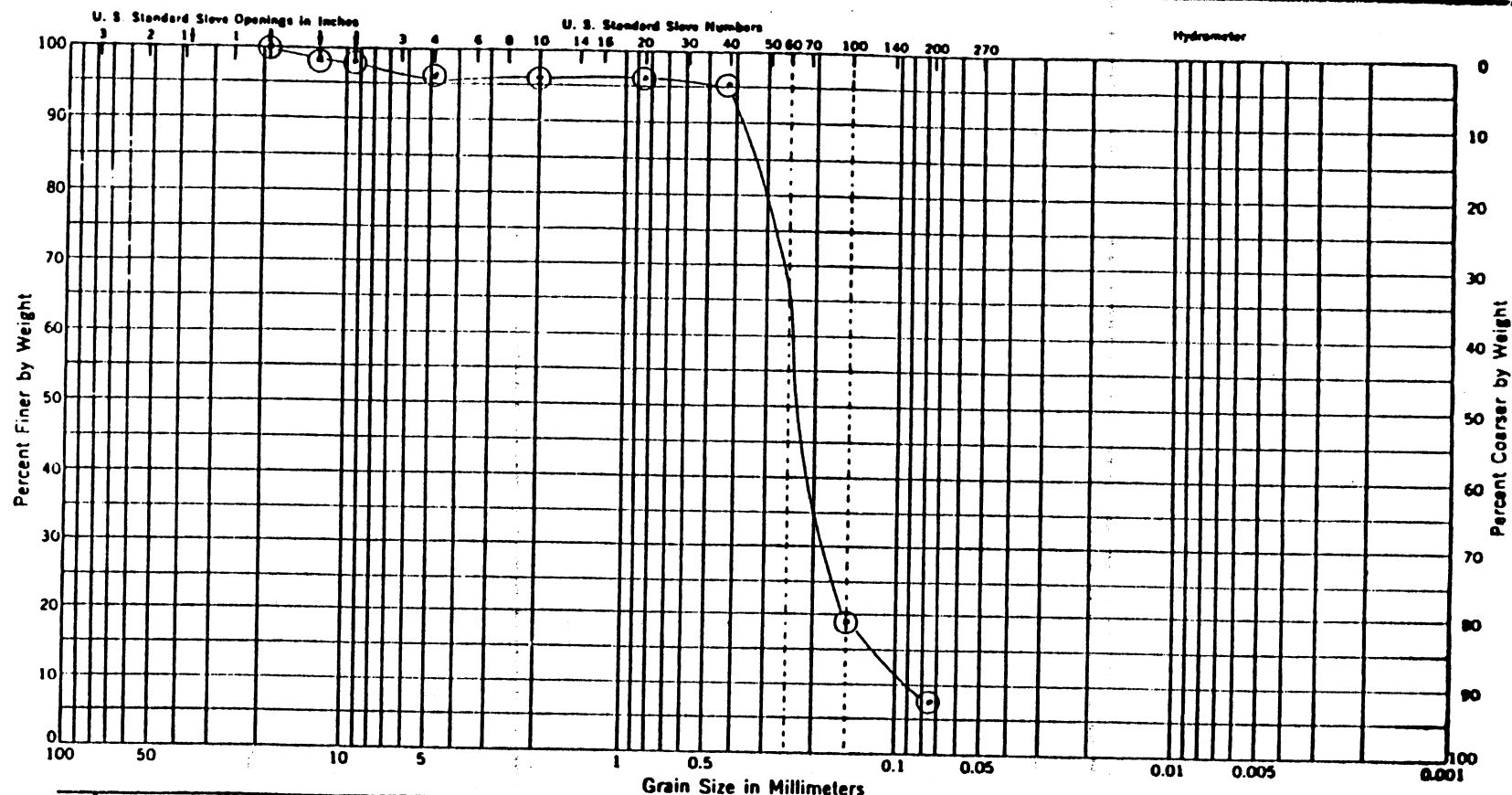
DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	5-18-84	1059

3.5-21-44

3.5-21-45



UNIFIED CLASSIFICATION SYSTEM



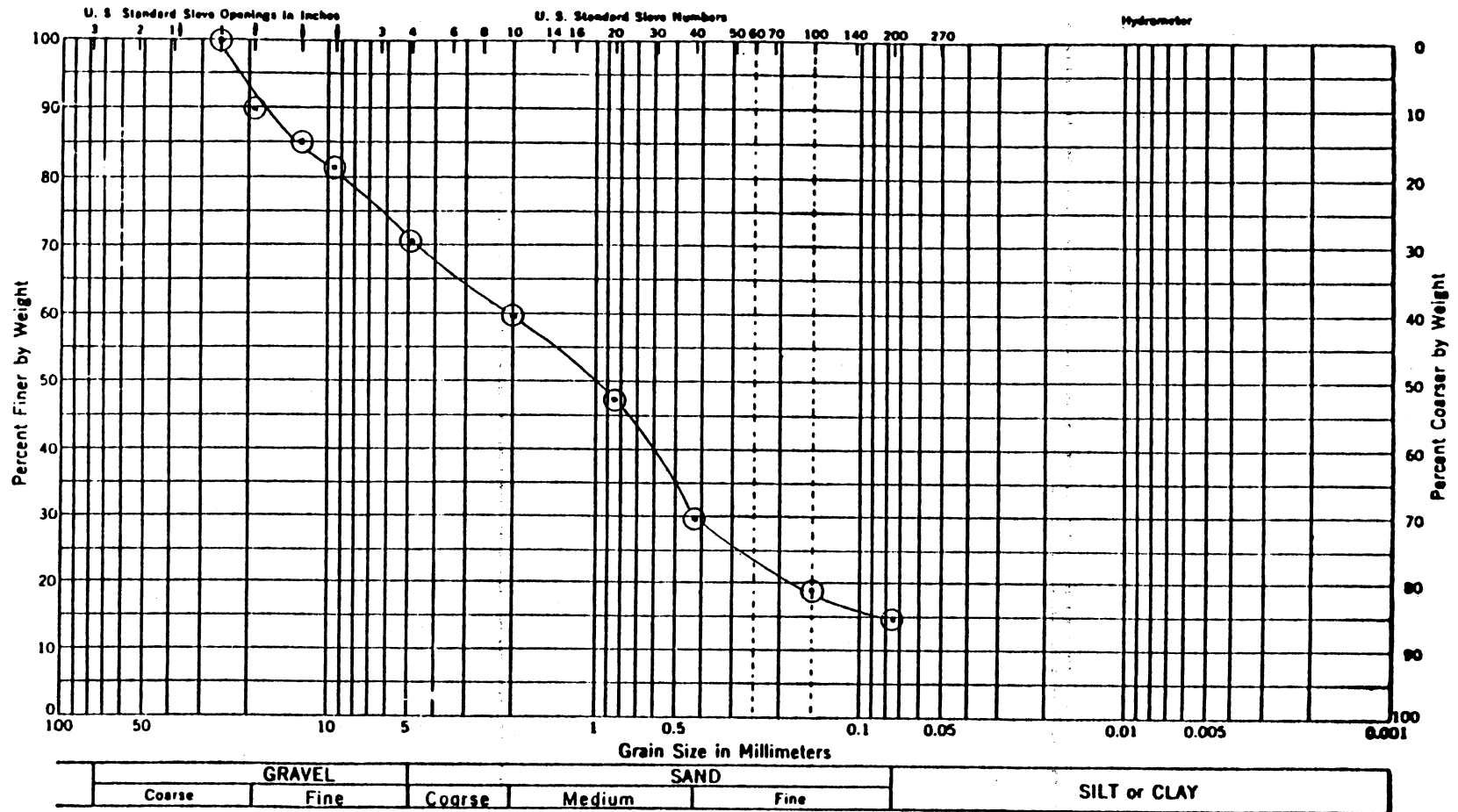
Grain size distribution curve for a soil sample. The graph plots Percent Finer by Weight (left y-axis, 0-100) and Percent Coarser by Weight (right y-axis, 100-0) against Grain Size in Millimeters (bottom x-axis, 100 to 0.001) and U.S. Standard Sieve Numbers (top x-axis, 3 to 270). The curve shows a soil with approximately 100% passing No. 10 sieve, 75% passing No. 40 sieve, and 10% passing No. 200 sieve.

Grain Size (mm)	Sieve Number	Percent Finer (%)
100	3	100
75	4	100
60	5	100
47.5	10	100
40	20	75
30	40	65
25	60	55
20	80	40
15	100	20
12.5	120	15
10	140	10

Soil Classification: SAND (Coarse)

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41					Slightly silty fine sand (SM-SP)				
E22									
S17									
140-141.5'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

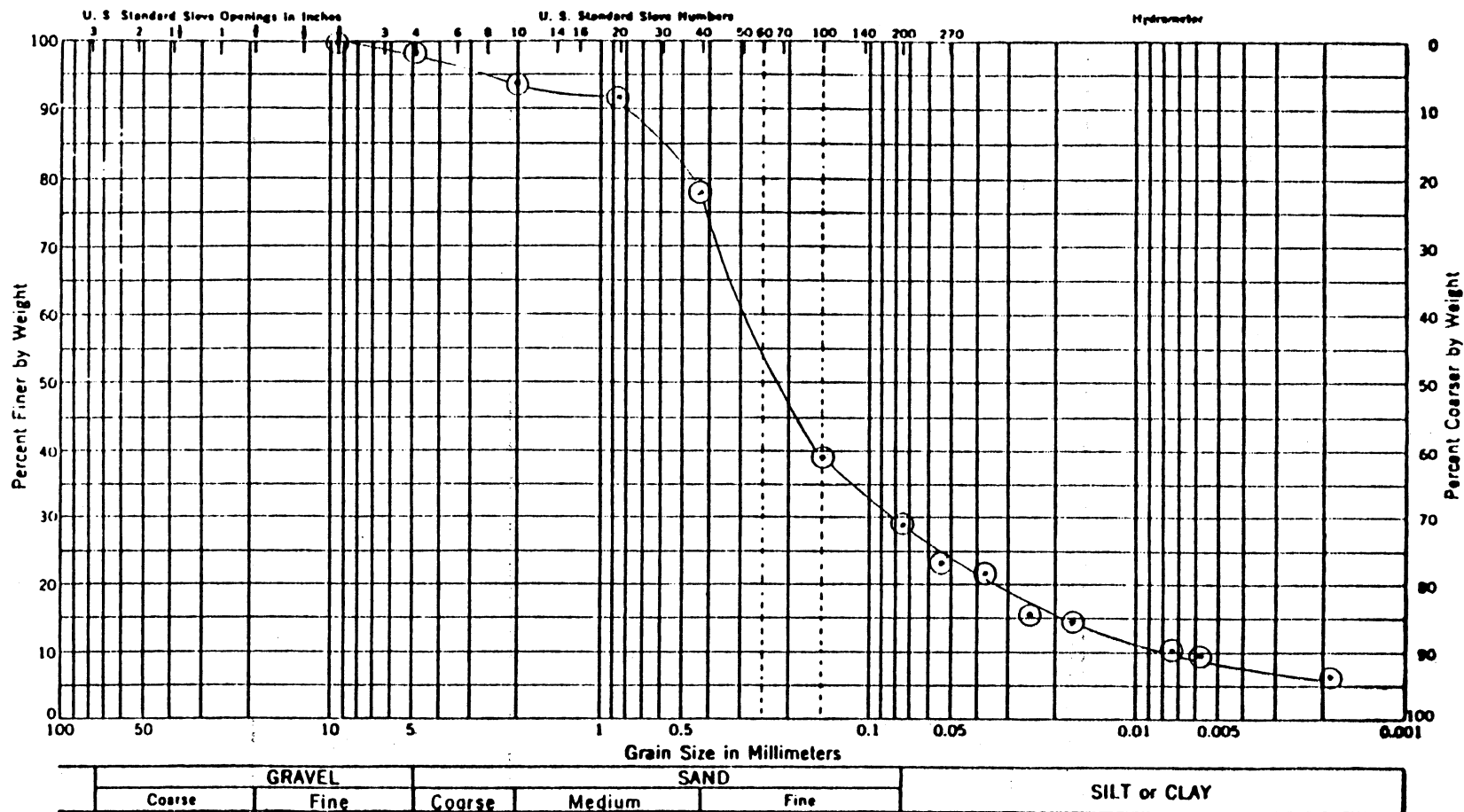
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41 E22					Silty fine to coarse sand (SM)				
S9						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
60-60.5'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	19

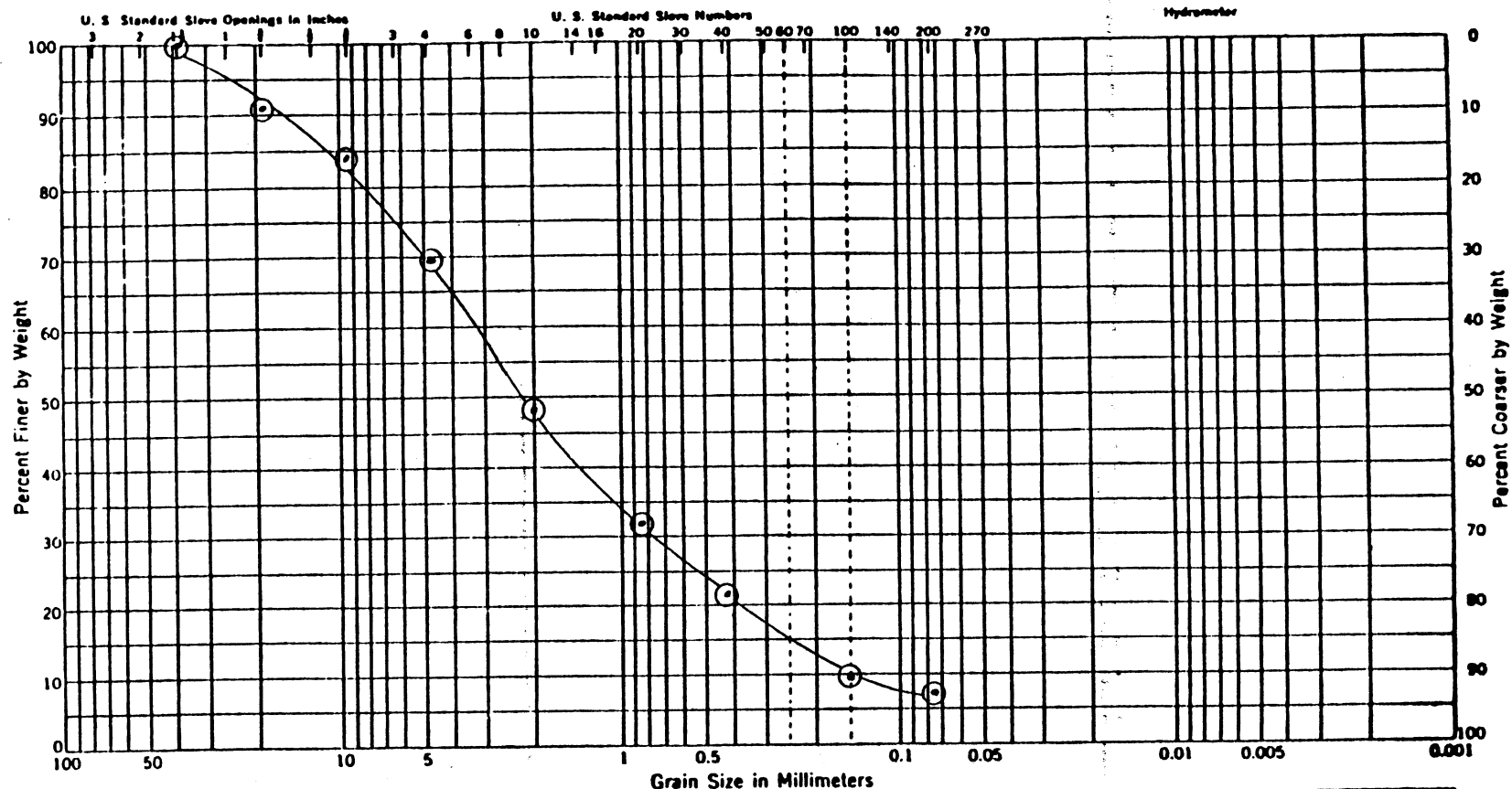
3.5-21-48

3.5-21-49

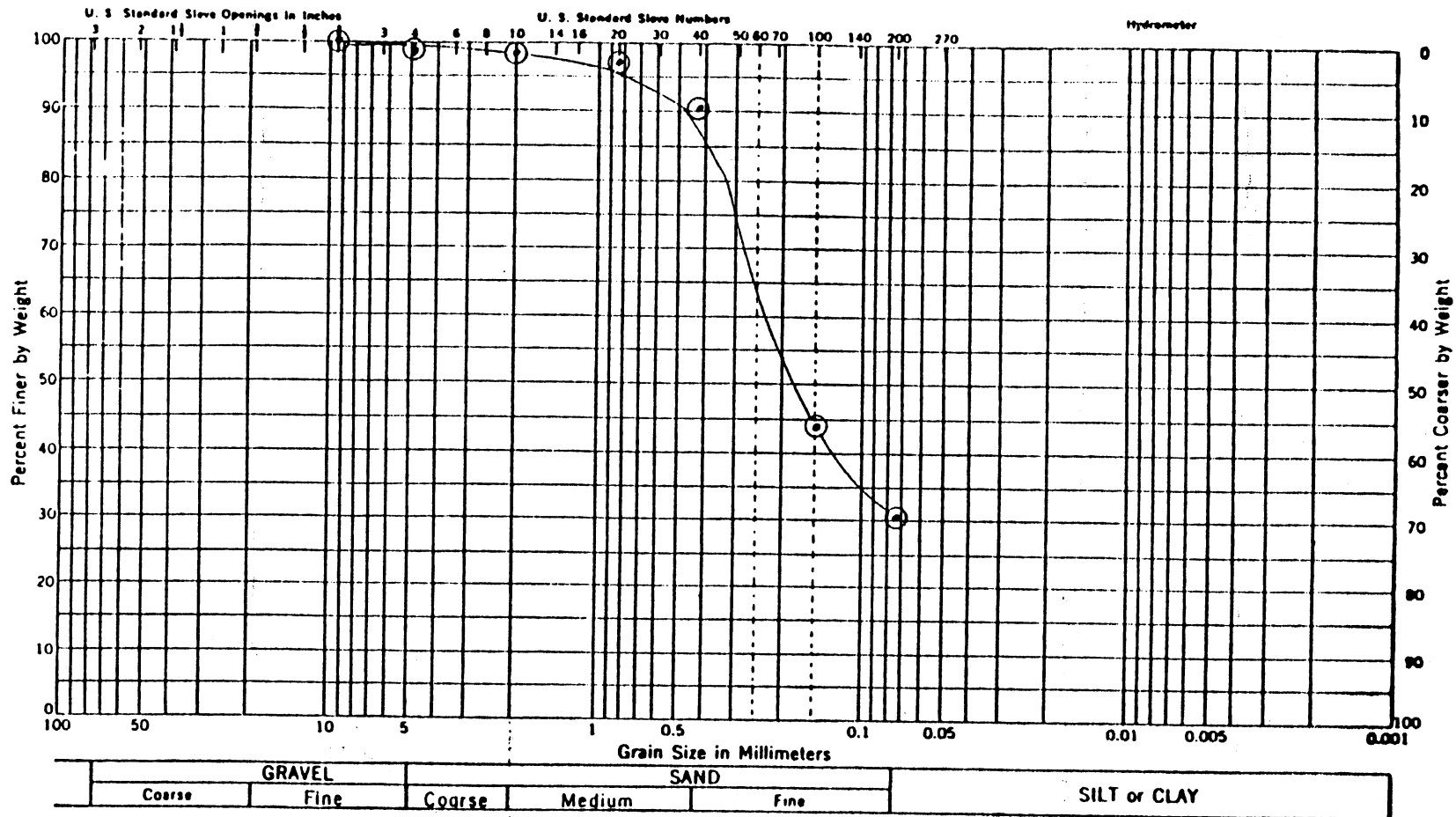


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41 E22A					Silty fine to medium sand (SM)				
S5									
41-42	1'								
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

UNIFIED CLASSIFICATION SYSTEM

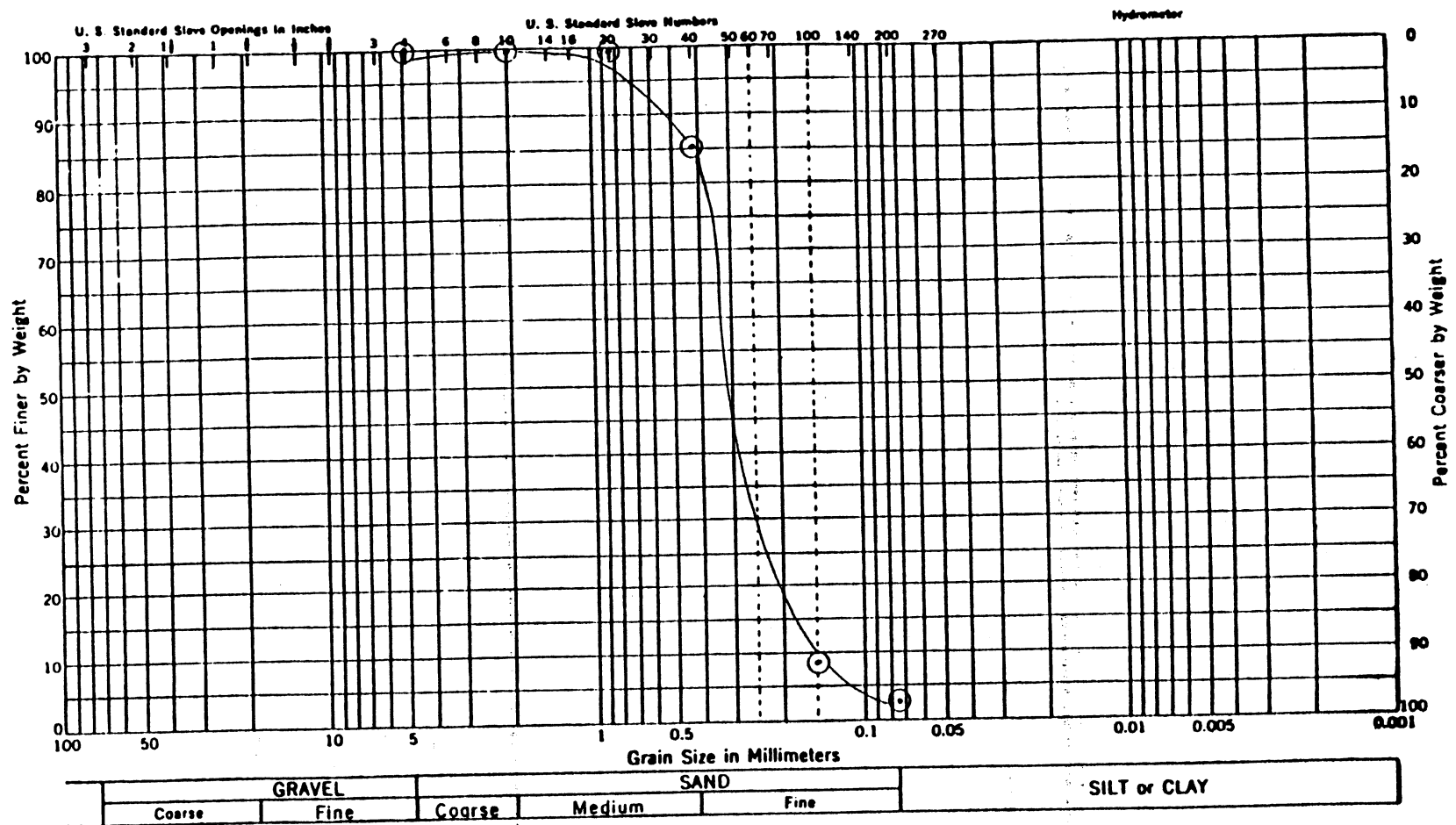


3.5-21-51



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION				
G 41					Silty fine sand (SM)	EXXON MINERALS COMPANY Grain Size Analysis Crandon Project			
E 19A									
SA-19									
180.0 - 182.0'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-16-84	12959

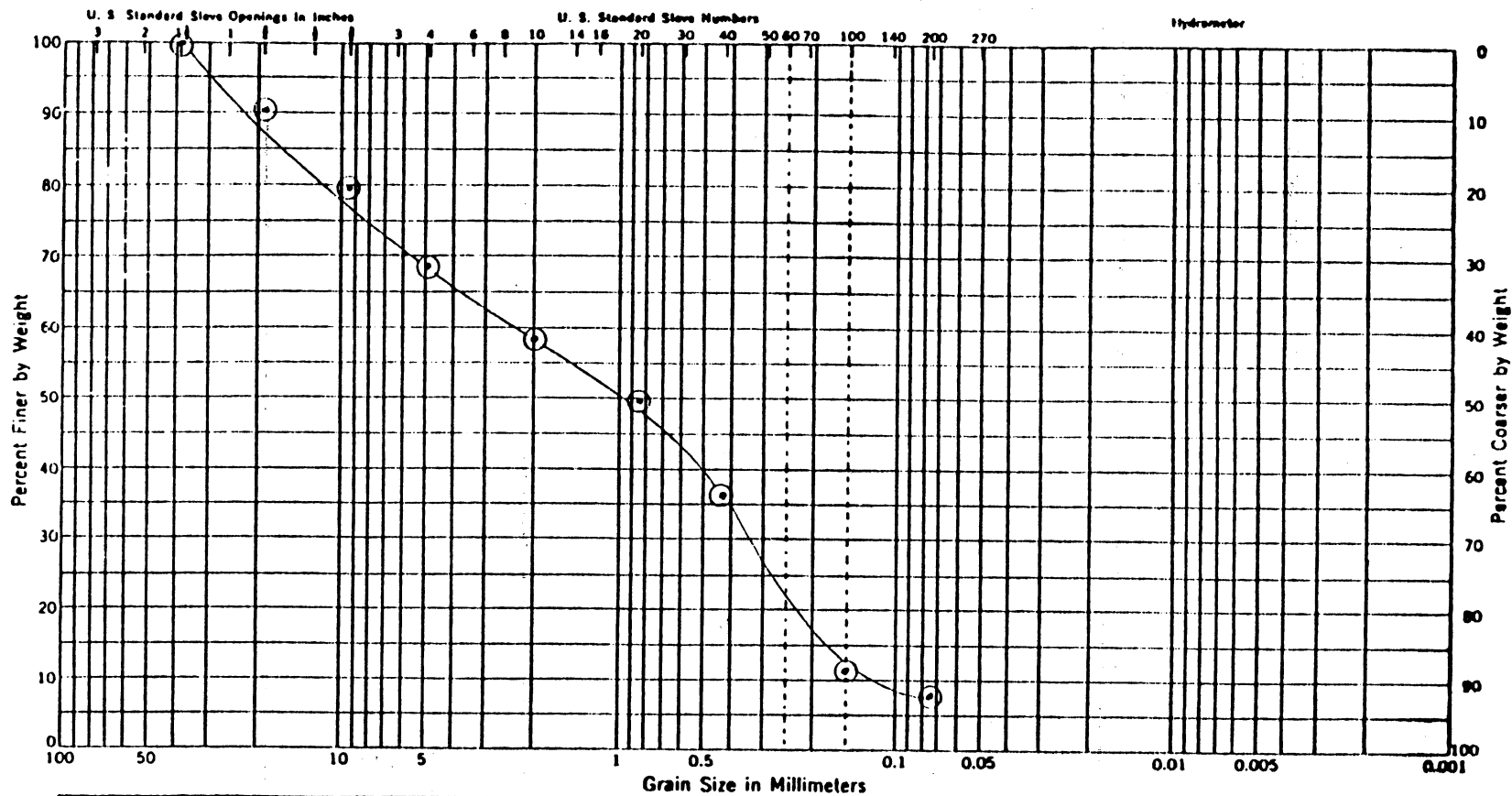
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY Grain Size Analysis Crandon Project			
G 41					Fine sand (SP)				
E 19A						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
SA-18									
170.0 - 171.3'									
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-16-84	100

3.5-21-52

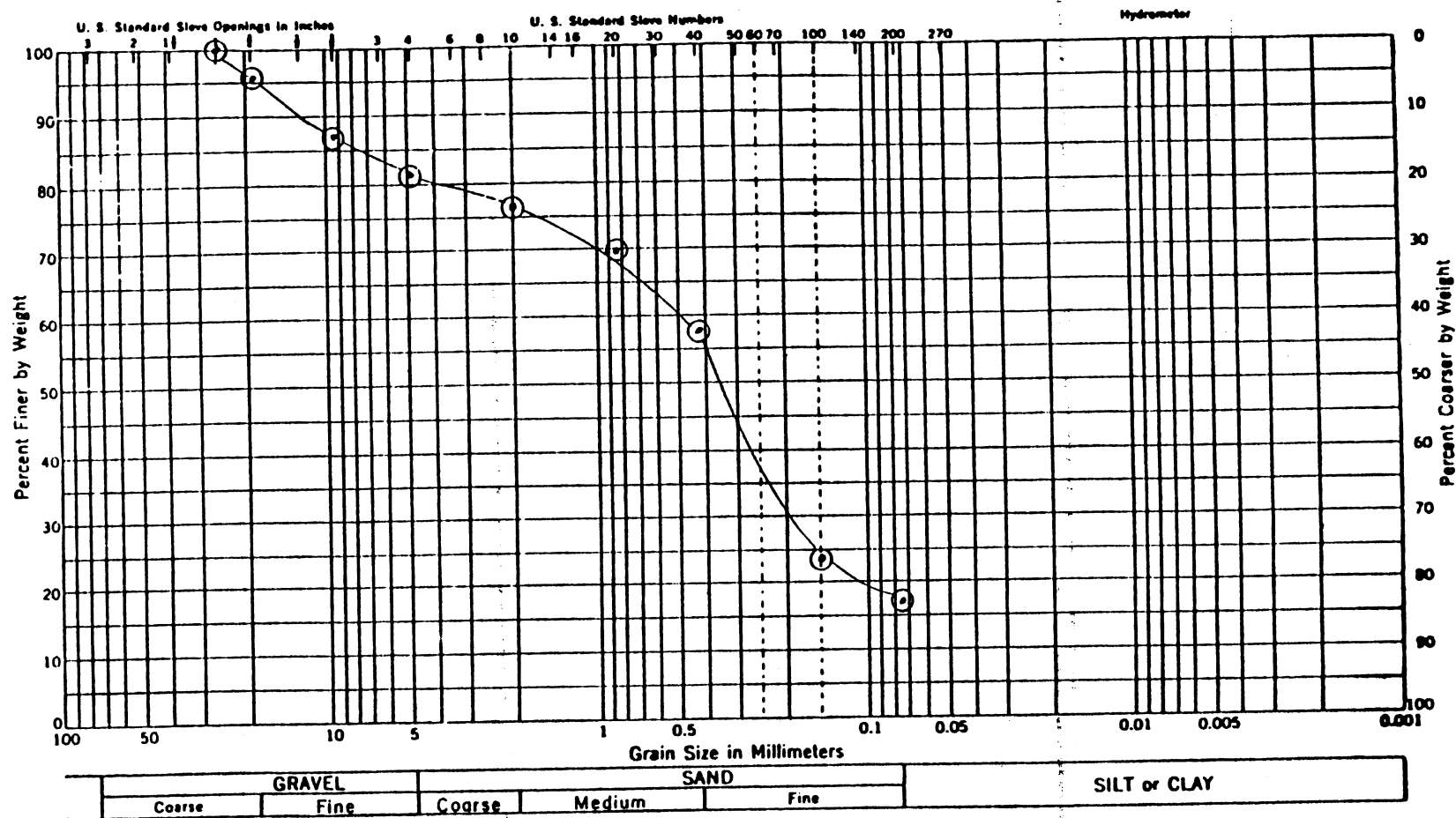
3.5-21-53



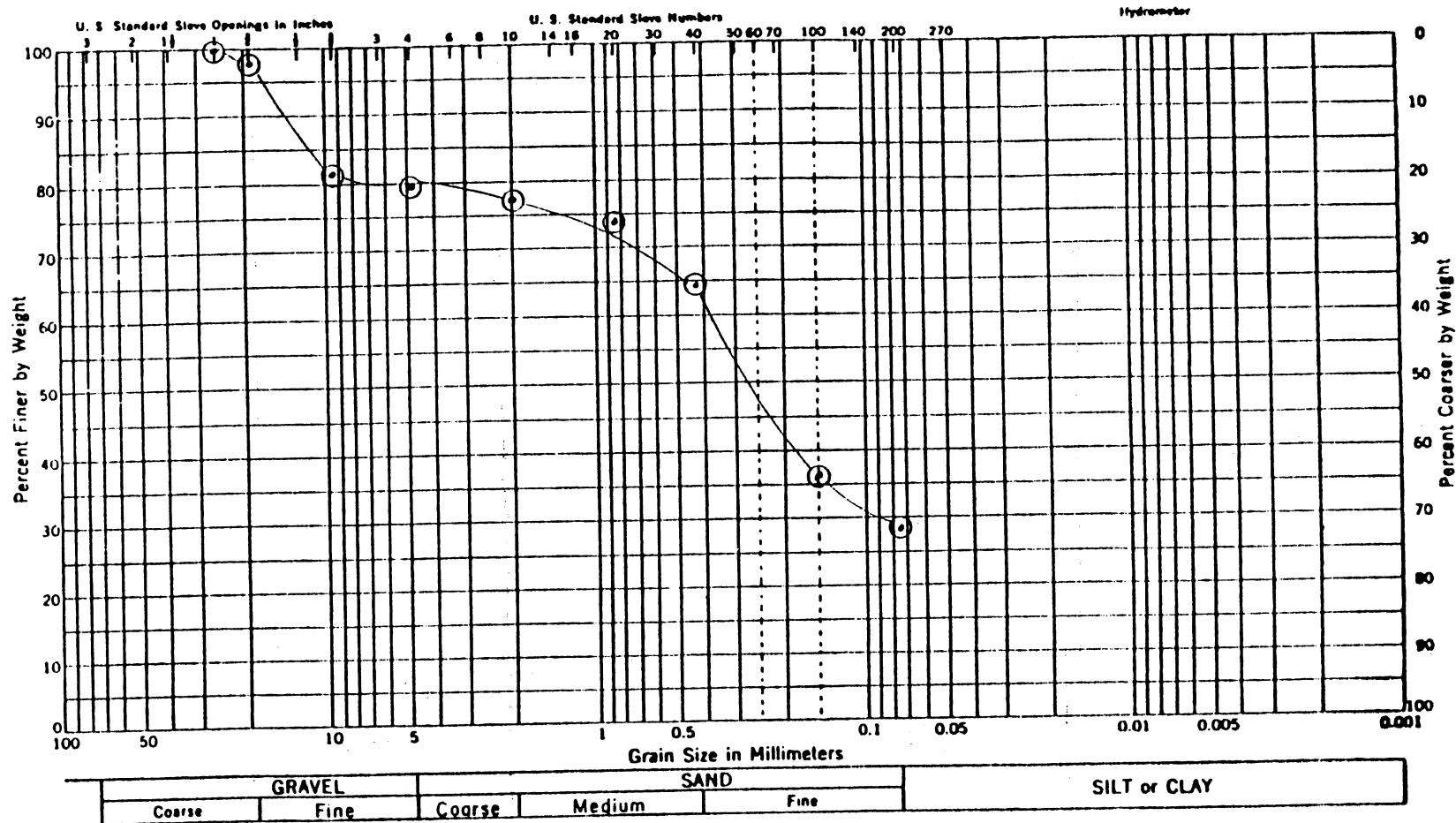
GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY Grain Size Analysis Crandon Project			
G 41					Slightly silty fine to coarse sand				
E 19A					(SM-SP)				
SA-12									
110.0 - 111.0'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-16-84	12959

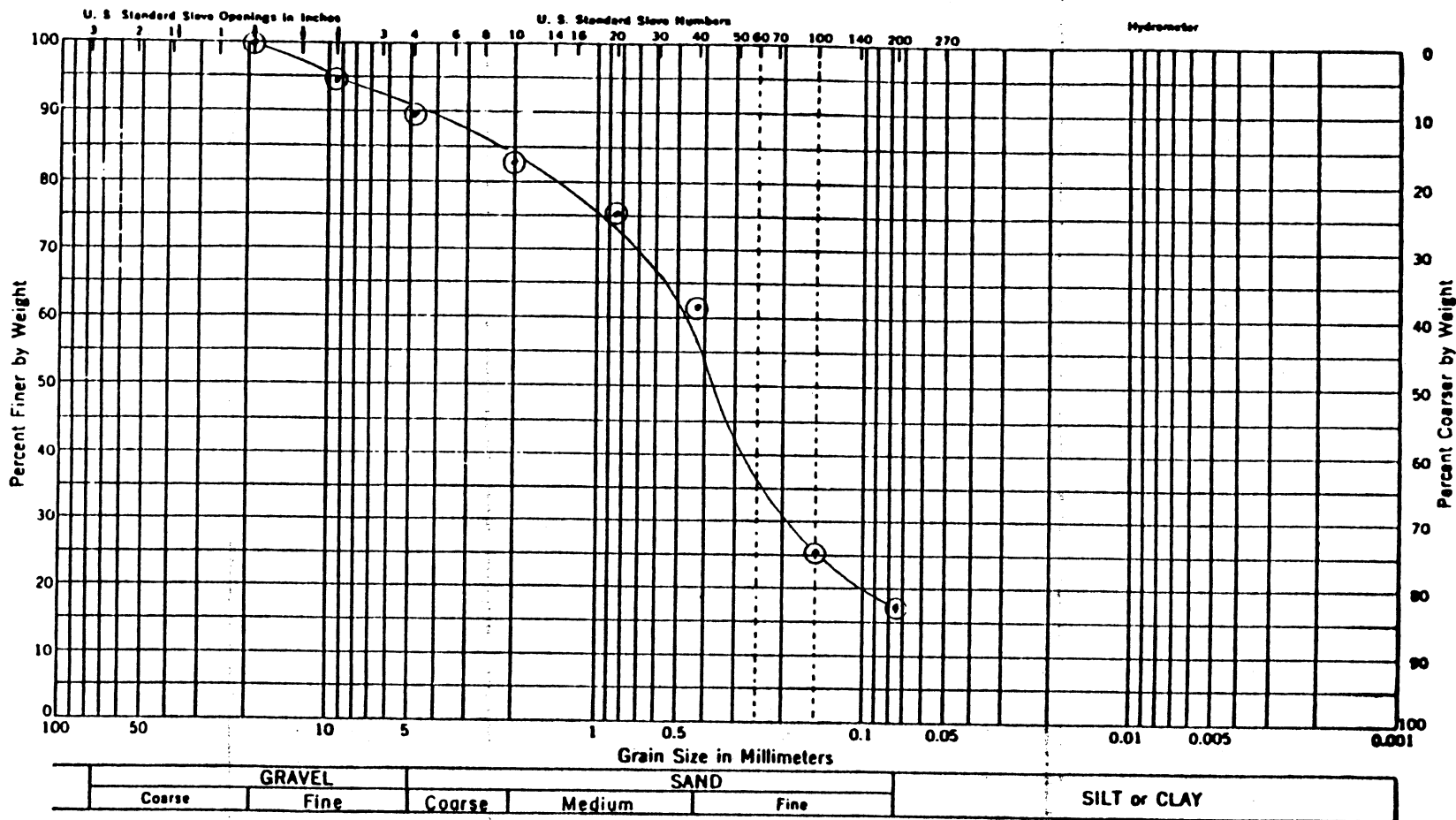
UNIFIED CLASSIFICATION SYSTEM



3.5-21-55



UNIFIED CLASSIFICATION SYSTEM



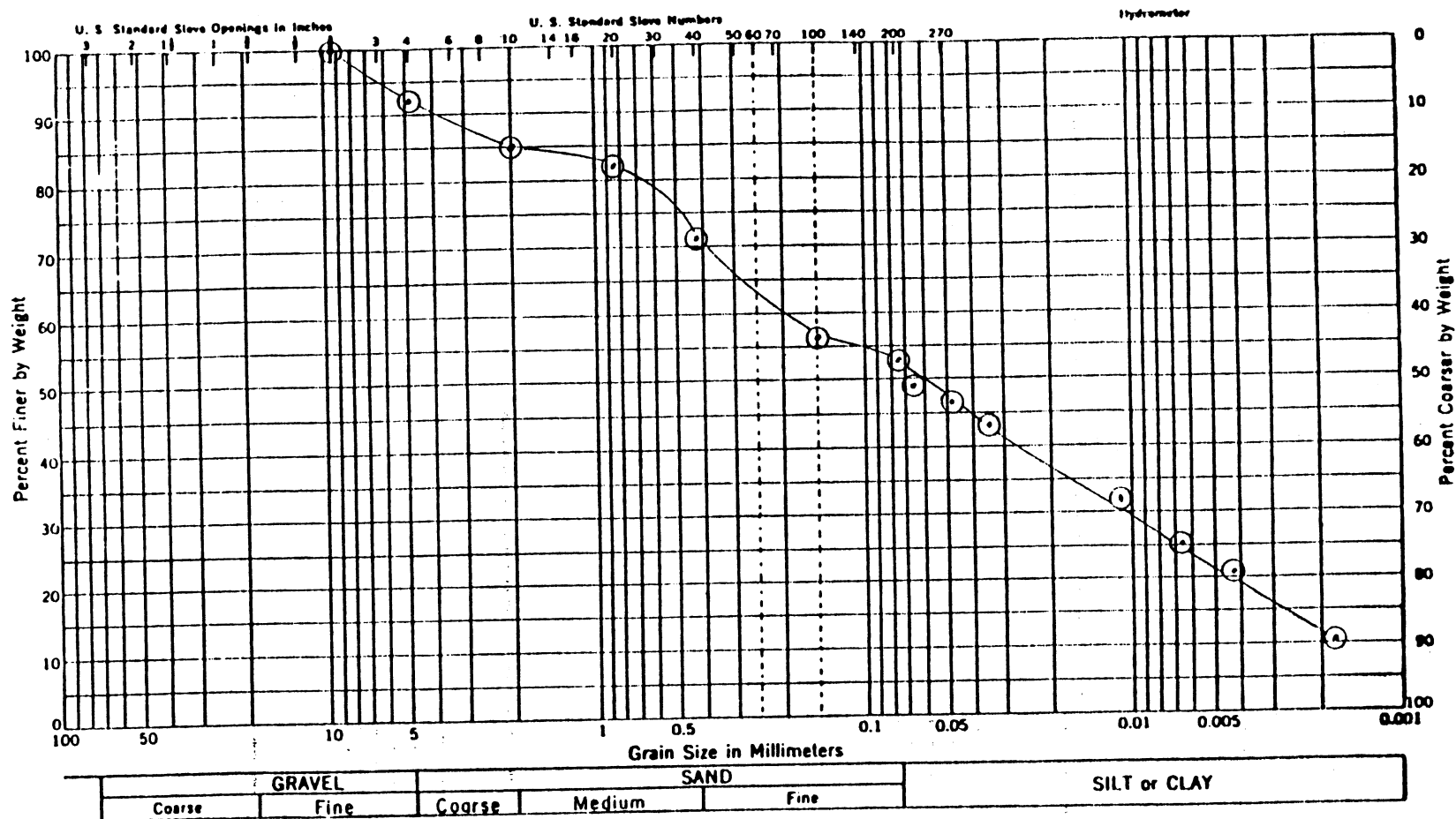
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G 41					Silty fine to coarse sand (SM)
E 19A					
SA-3					
20.0 - 21.5'					

EXXON MINERALS COMPANY
Grain Size Analysis
Crandon Project

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

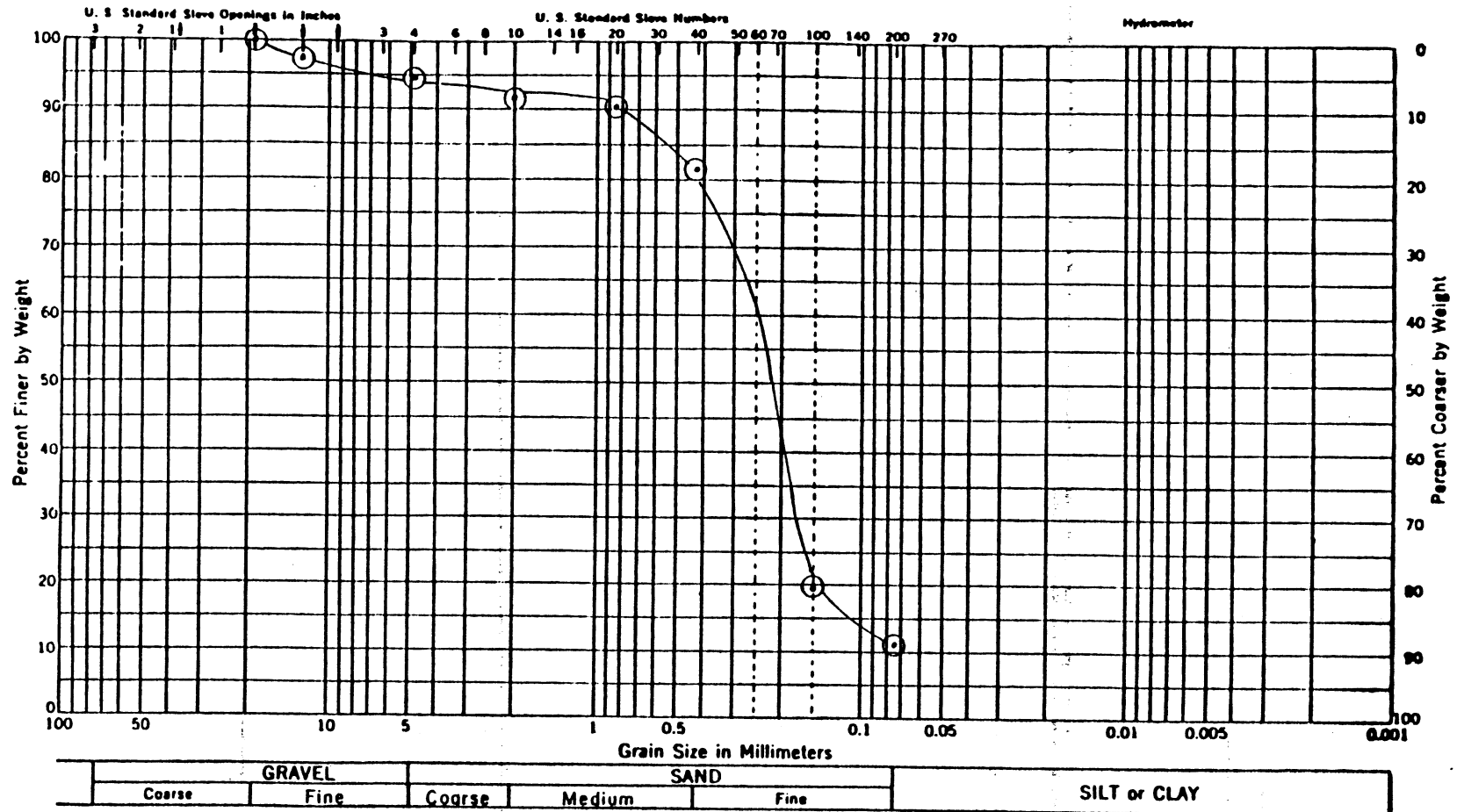
DRAWN	APPROVED	DATE	JOB No.
JJT	JAS	4-16-84	59

3.5-21-57



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41					Sandy silt (ML)				
E17									
S32									
234-235'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G41 ET7					Slightly silty fine sand (SM-SP)
S28					
195-196'					

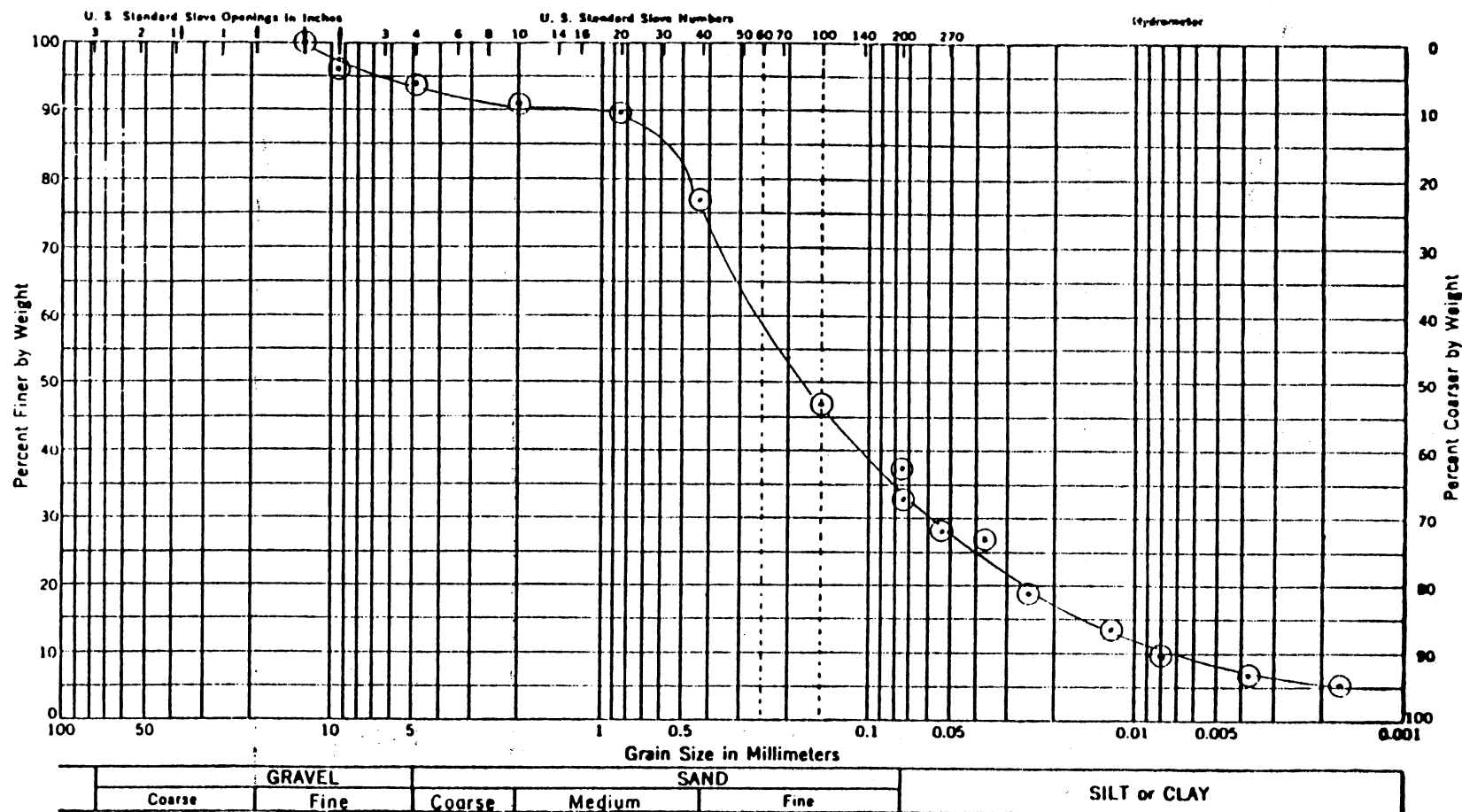
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	6-10-84	9

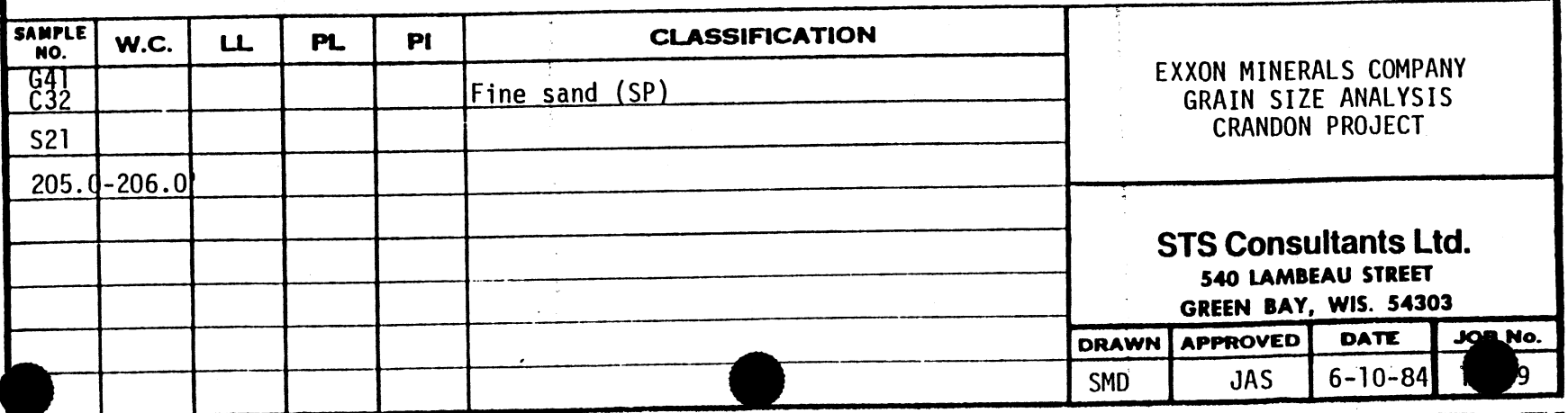
3.5-21-58

3.5-21-59

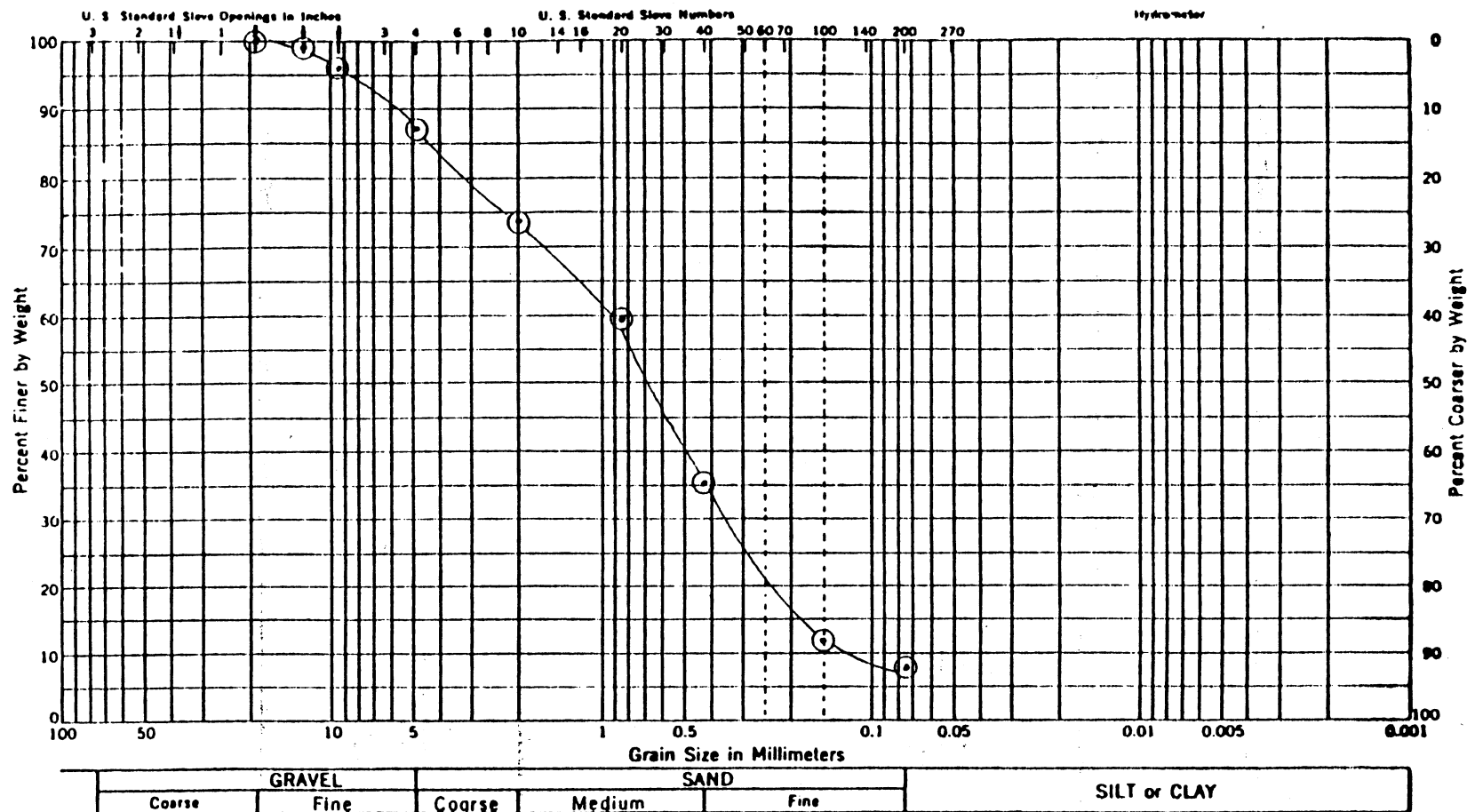


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
G41					Silty fine to medium sand (SM)				
C32									
S24									
232-233.5'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SHD	JAS	6-10-84	12959

3.5-21-60

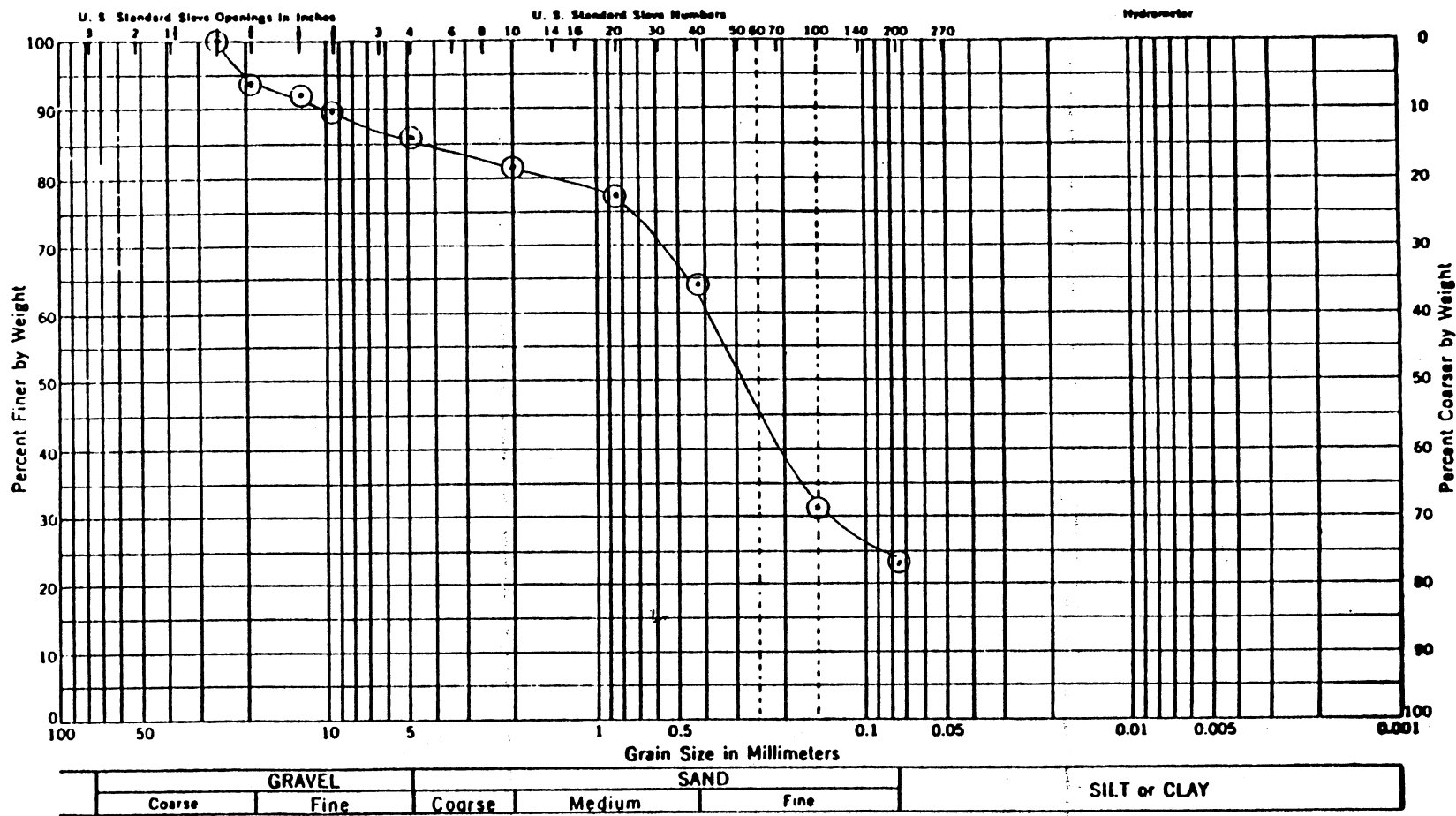


3.5-21-61



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41 C32					Slightly silty fine to coarse sand (SM-SP)				
S20						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
193-194.5'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G41					Silty fine to medium sand (SM)
C32					
S17					
161.5-163'					

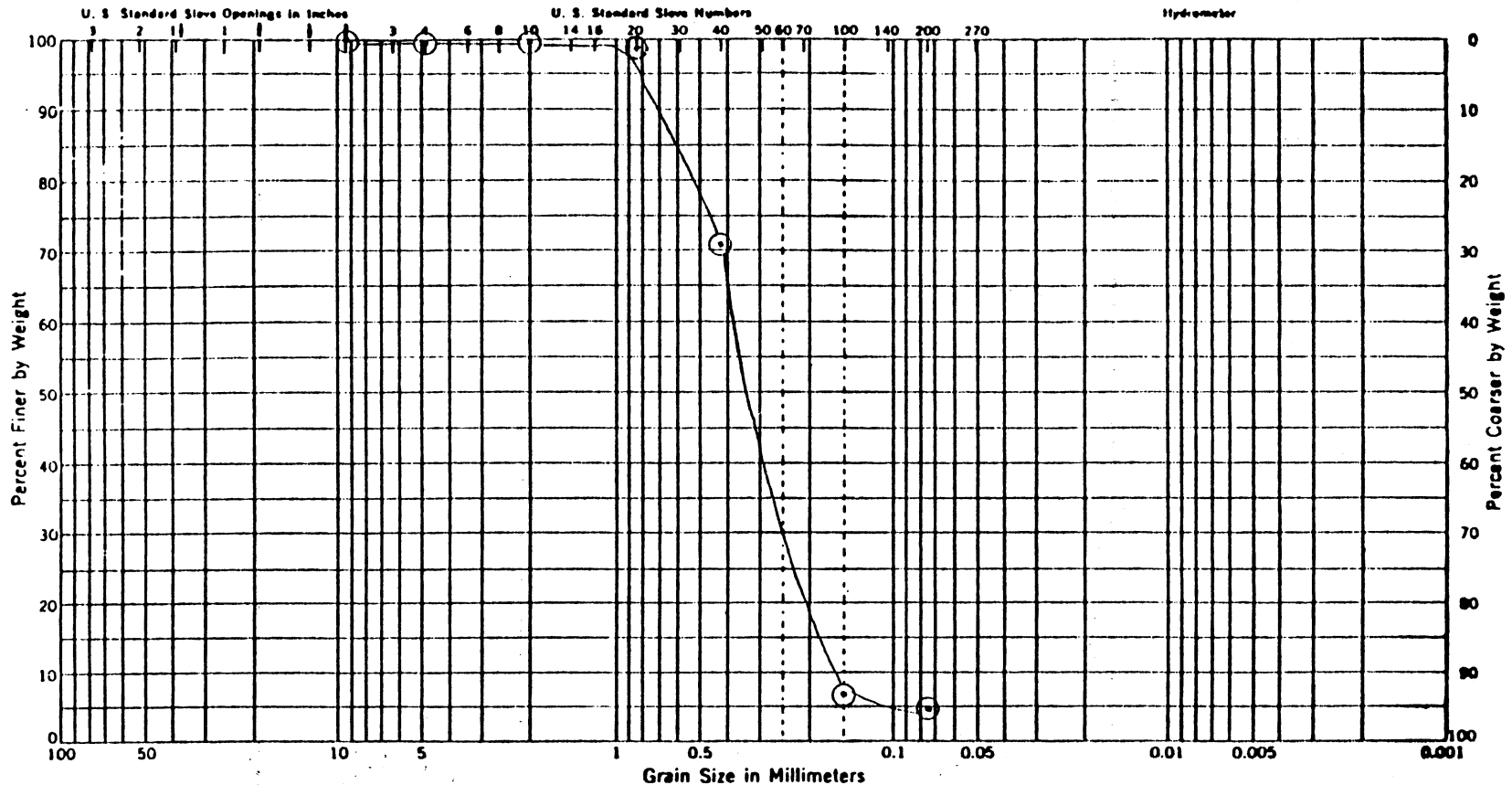
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	6-10-84	109

3.5-21-62

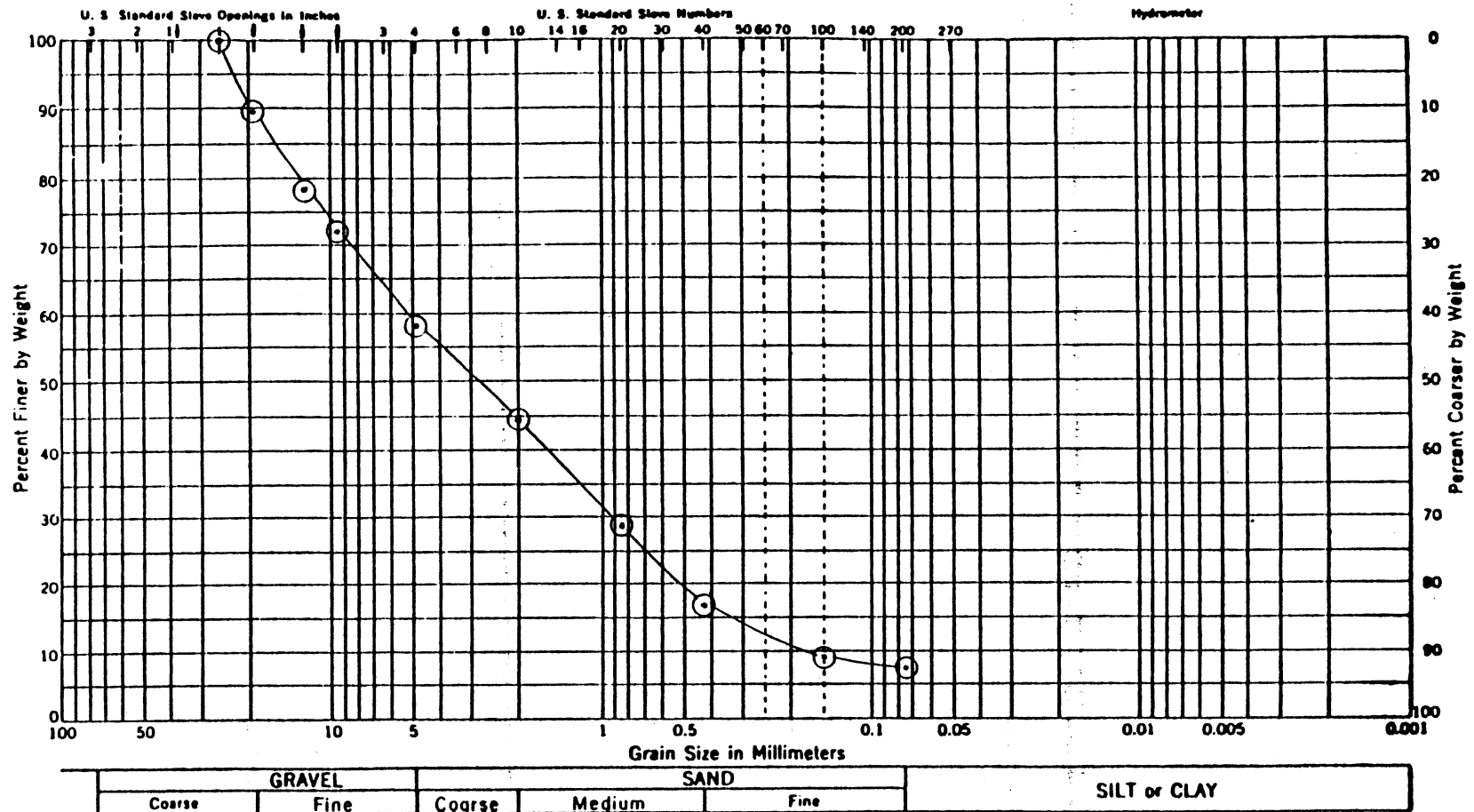
3.5-21-63



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41					Fine sand (SP)				
C32									
S16									
151-152'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G41 C32					Slightly silty fine to coarse sand (SM-SP)
S14					
130-131.5'					

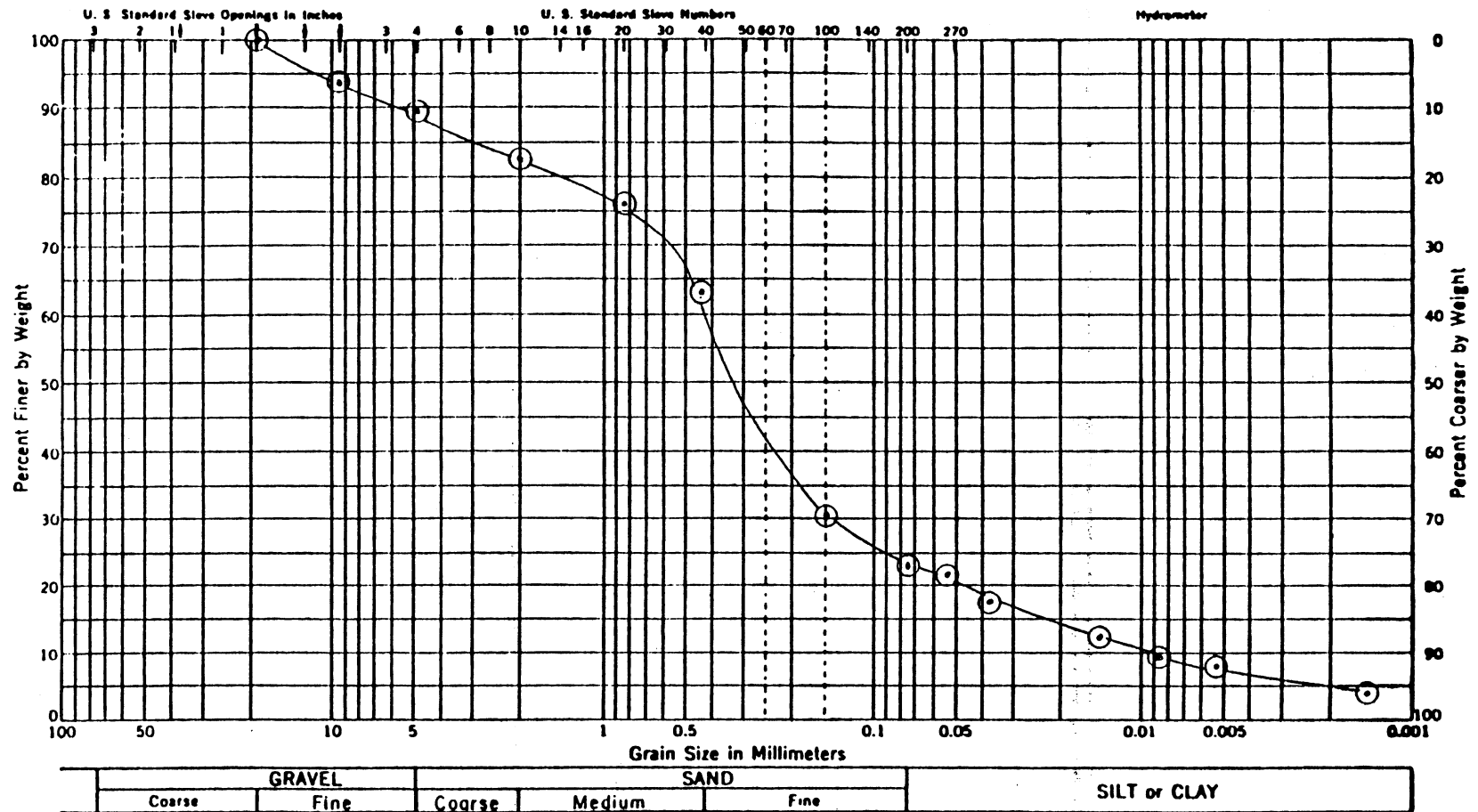
EXXON MINERALS COMPANY
 GRAIN SIZE ANALYSIS
 CRANDON PROJECT

STS Consultants Ltd.
 540 LAMBEAU STREET
 GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	6-10-84	1-59

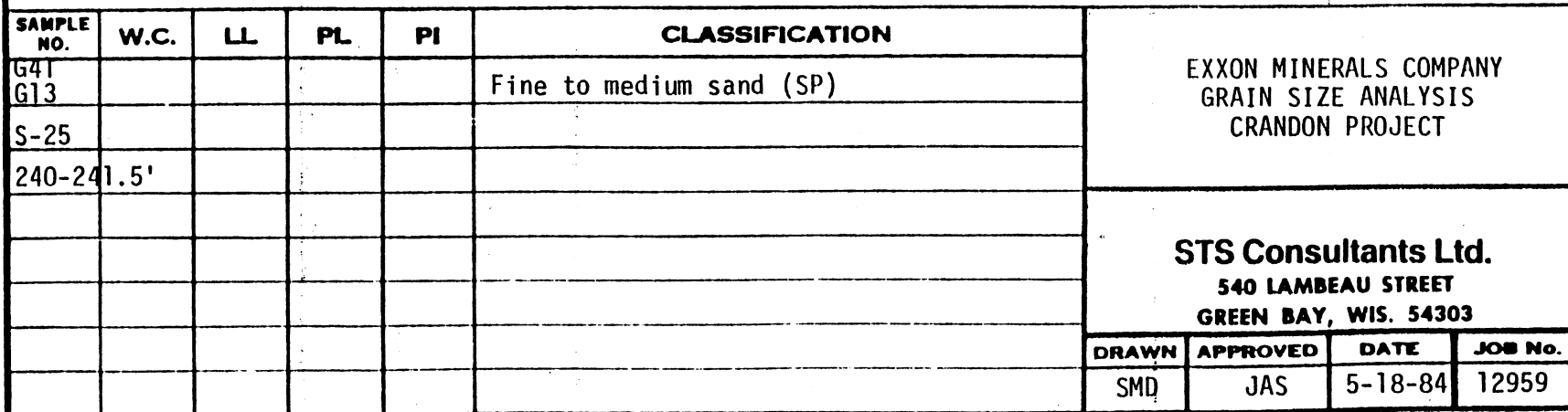
3.5-21-64

UNIFIED CLASSIFICATION SYSTEM

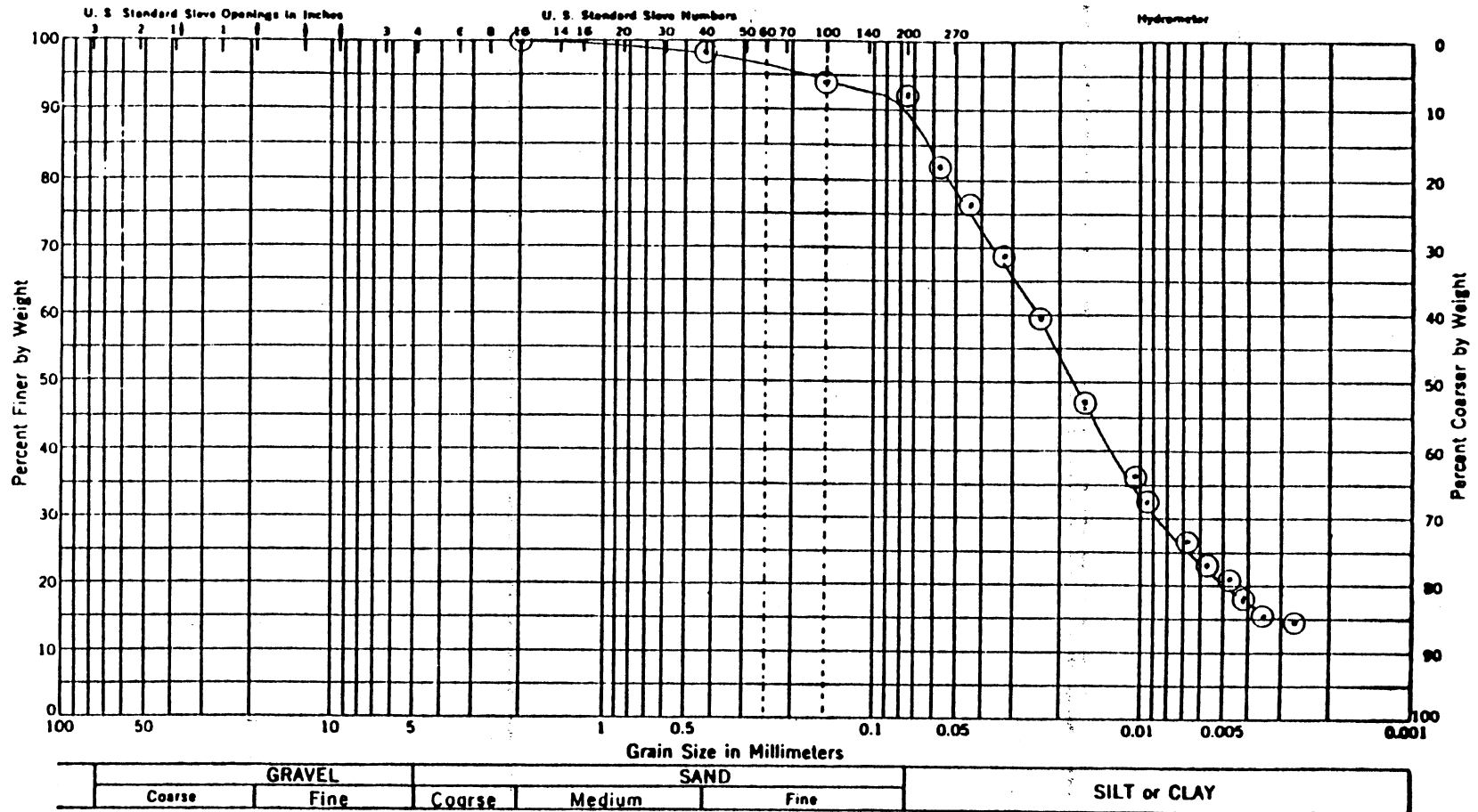


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41					Silty fine to coarse sand (SM)				
G13									
S23									
220-220.7'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

3.5-21-65

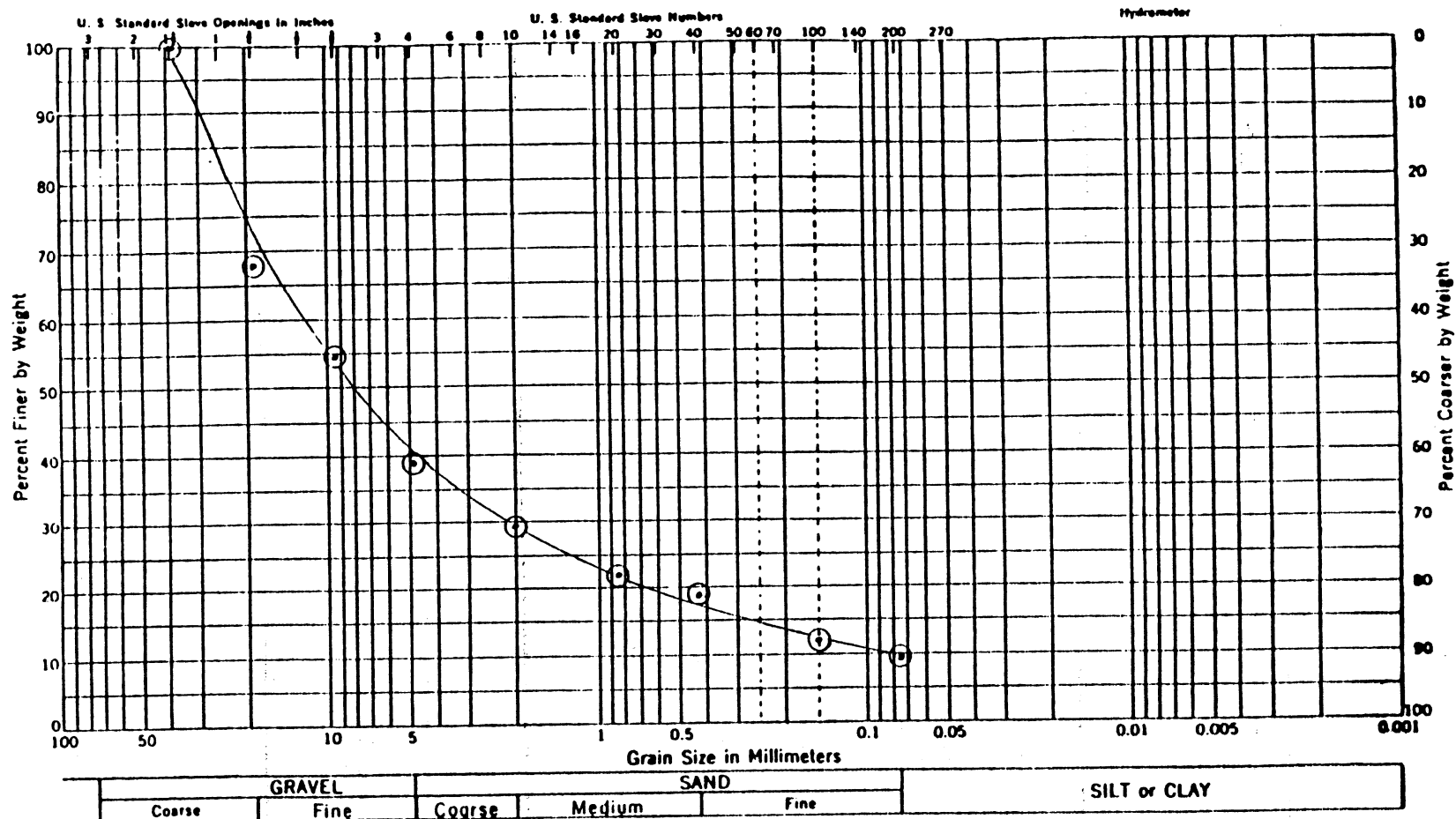


UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41					Silty clay (CL)				
G13						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
S31									
300-301'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

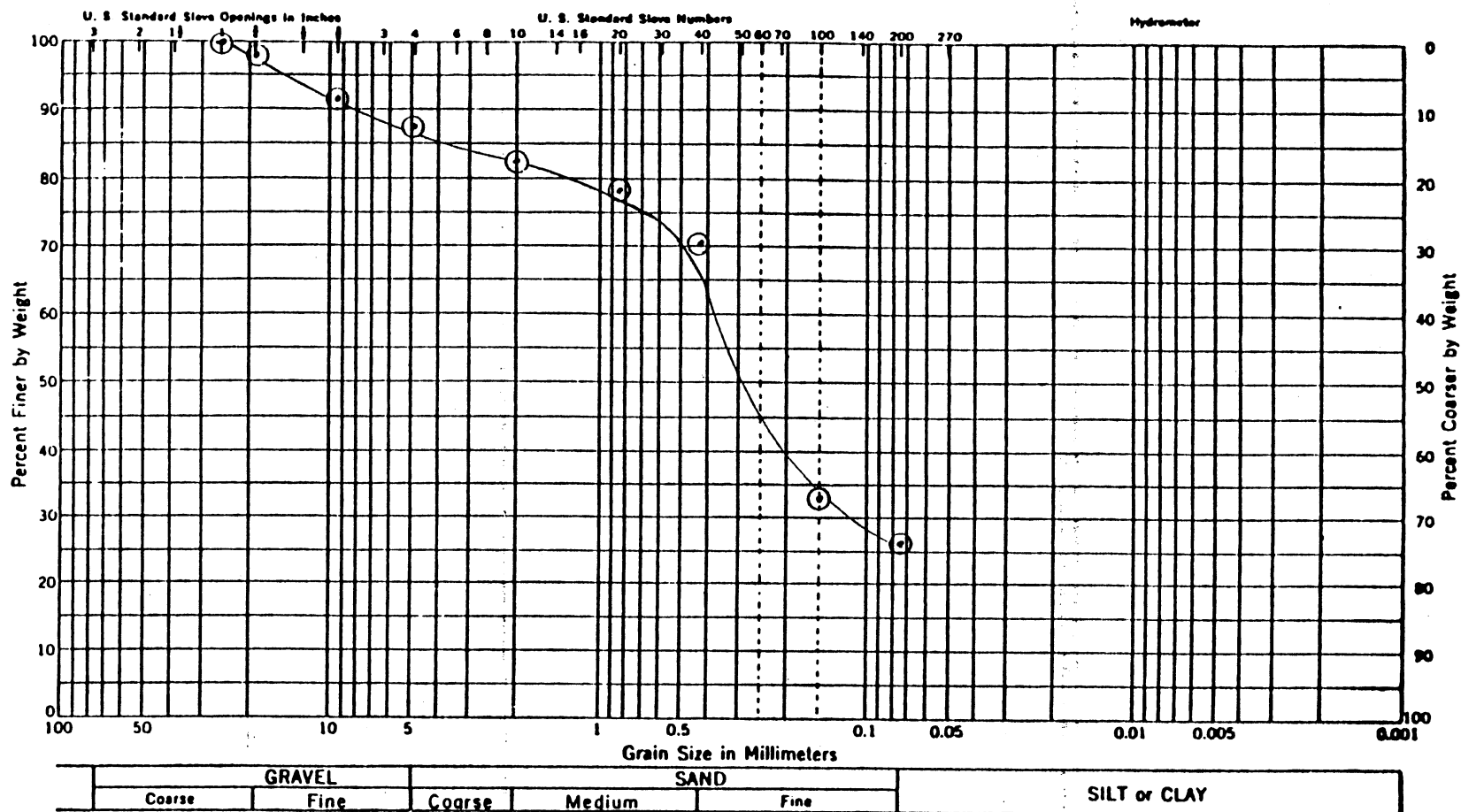
3.5-21-67



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY Grain Size Analysis Crandon Project			
G 41					Slightly silty fine to coarse gravel				
G 15					(GP-GM)				
SA-3									
54.0 - 55.0'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-16-84	12959

3.5-21-68

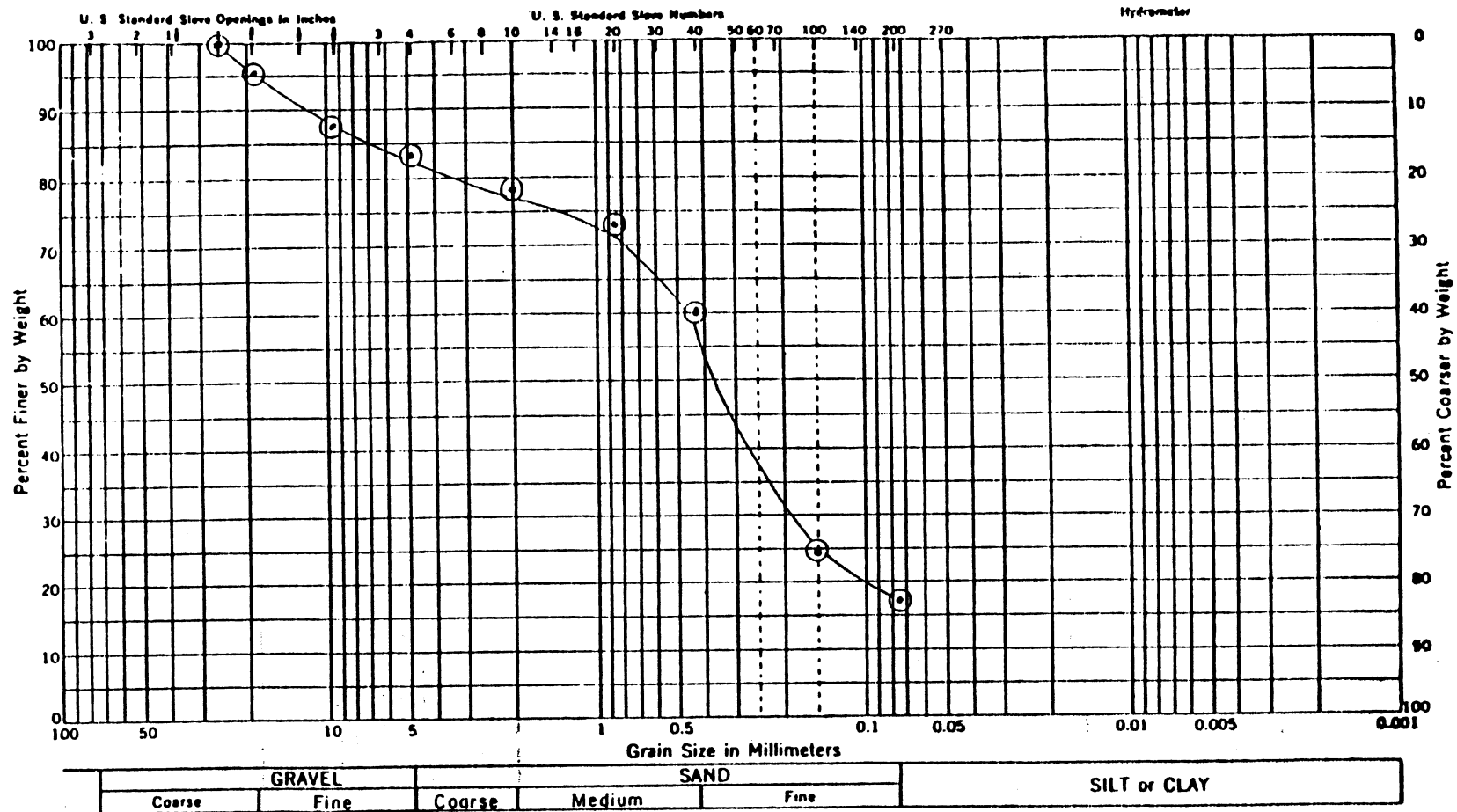
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY Grain Size Analysis Crandon Project			
G 41					Silty fine to coarse sand (SM)				
G 15									
SA-5A									
65.5 - 66.5'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-16-84	12959

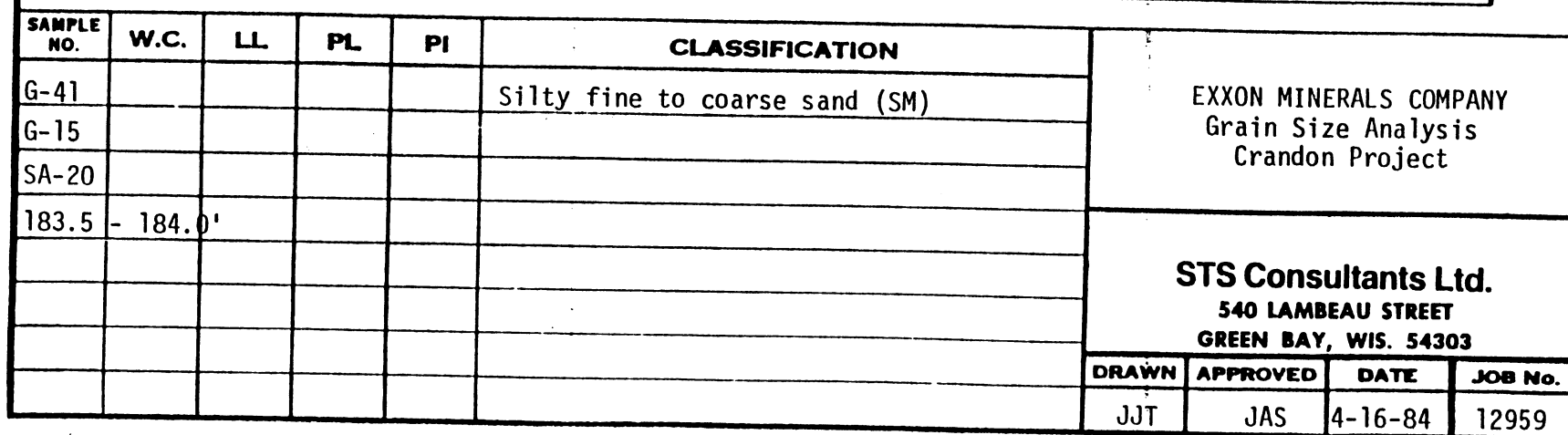
3.5-21-69

3.5-21-70

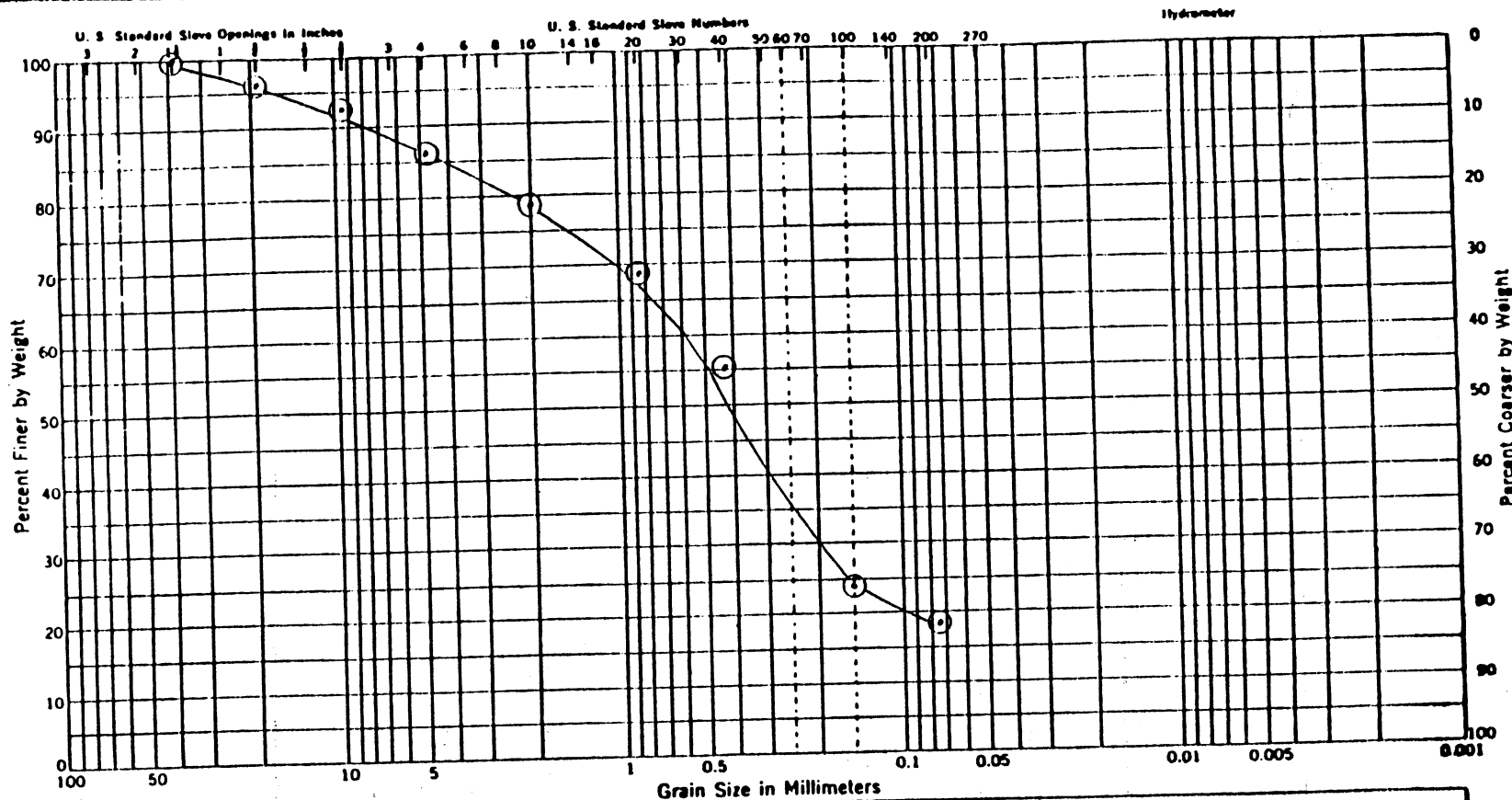


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY Grain Size Analysis Crandon Project			
G 41					Silty fine to coarse sand (SM)				
G 15						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
SA-15									
132 - 132.5'									
						DRAWN	APPROVED	DATE	JOB No.
						JJT	JAS	4-16-84	12959

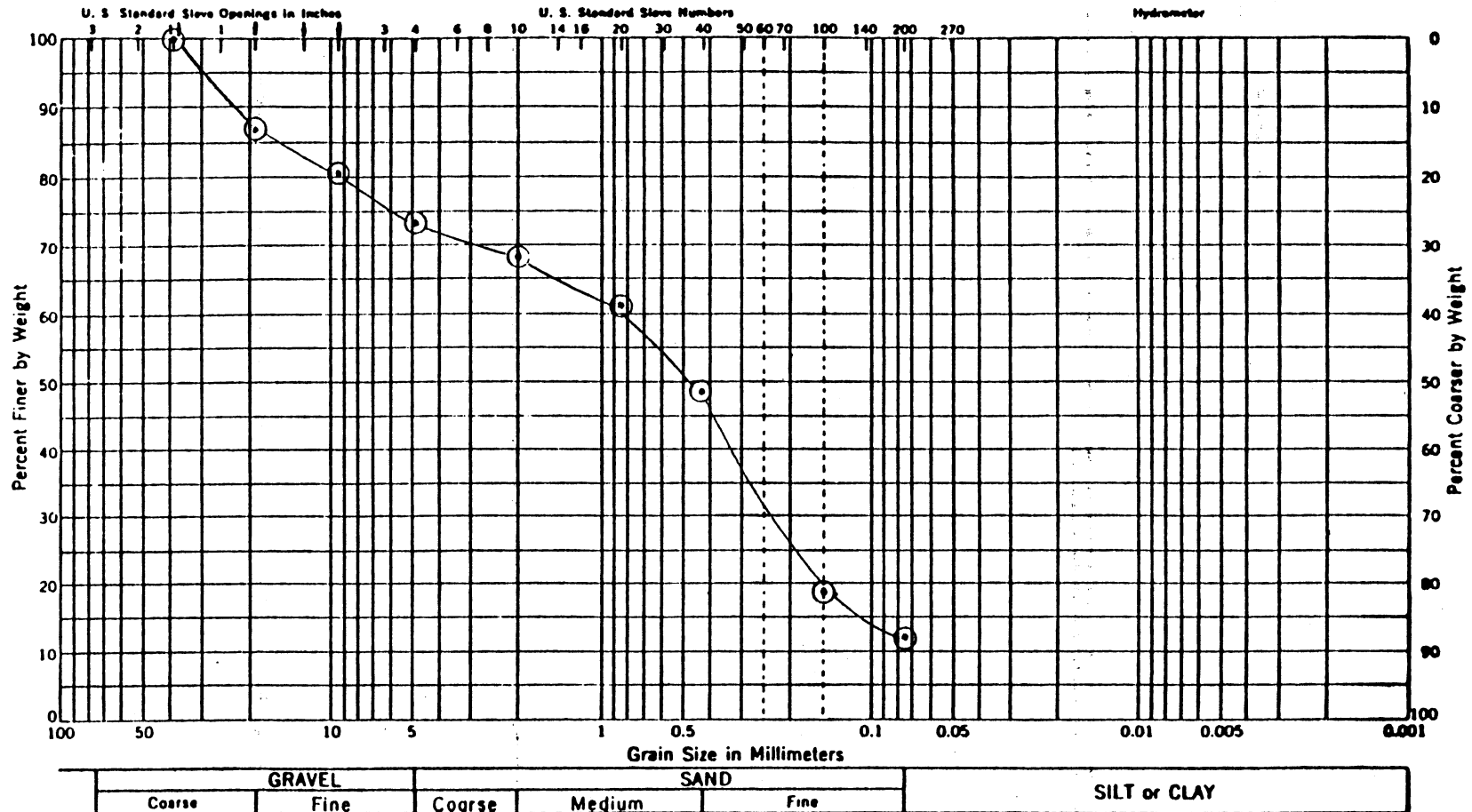
3.5-21-71



3.5-21-72

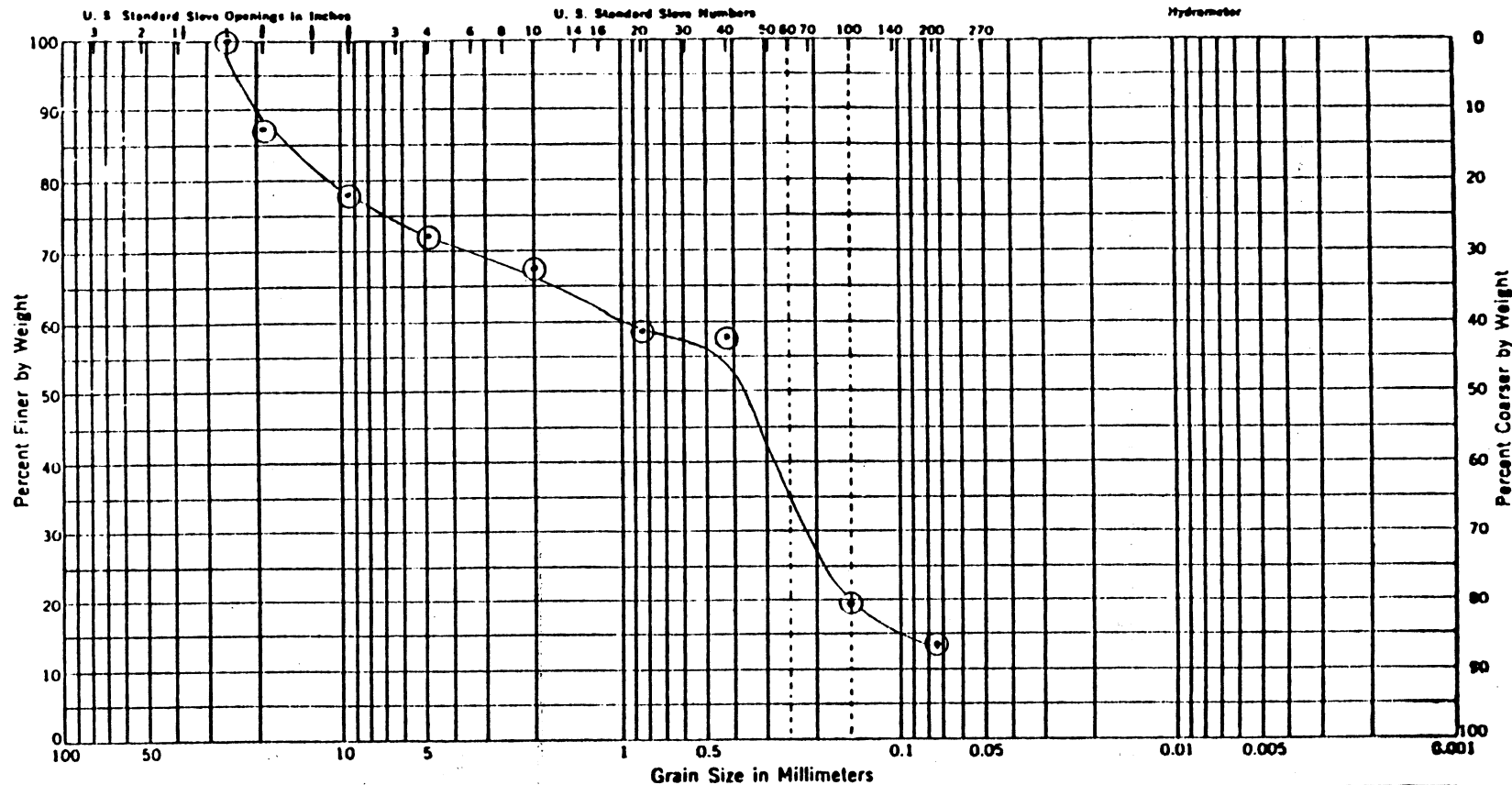


UNIFIED CLASSIFICATION SYSTEM

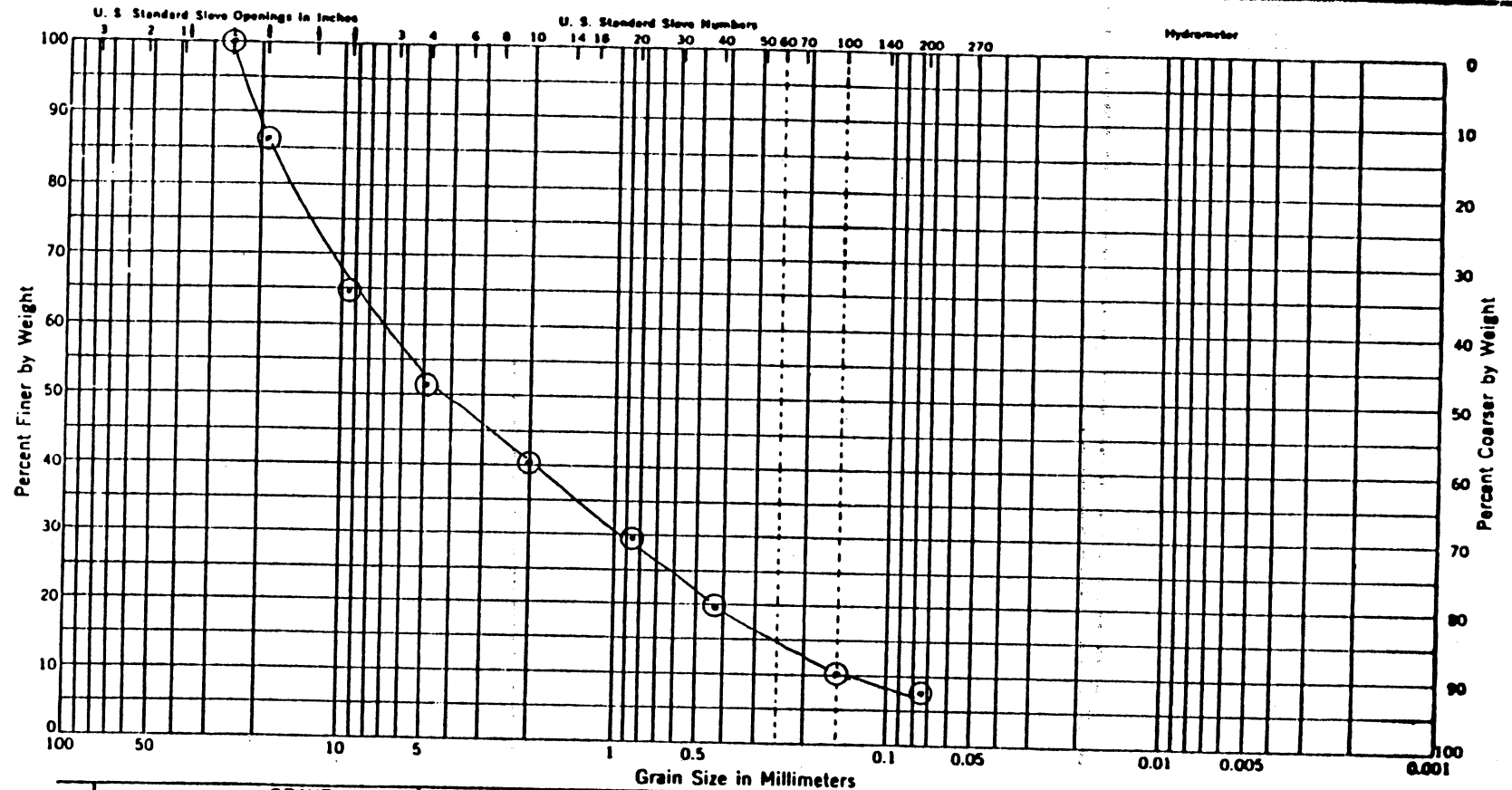


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41 H9					Silty fine to coarse sand (SM)				
SA-5									
40-41'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

3.5-21-73



UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G41					Slightly silty fine to coarse sand (SM-SP)
H9					
SA-10					
90-91'					

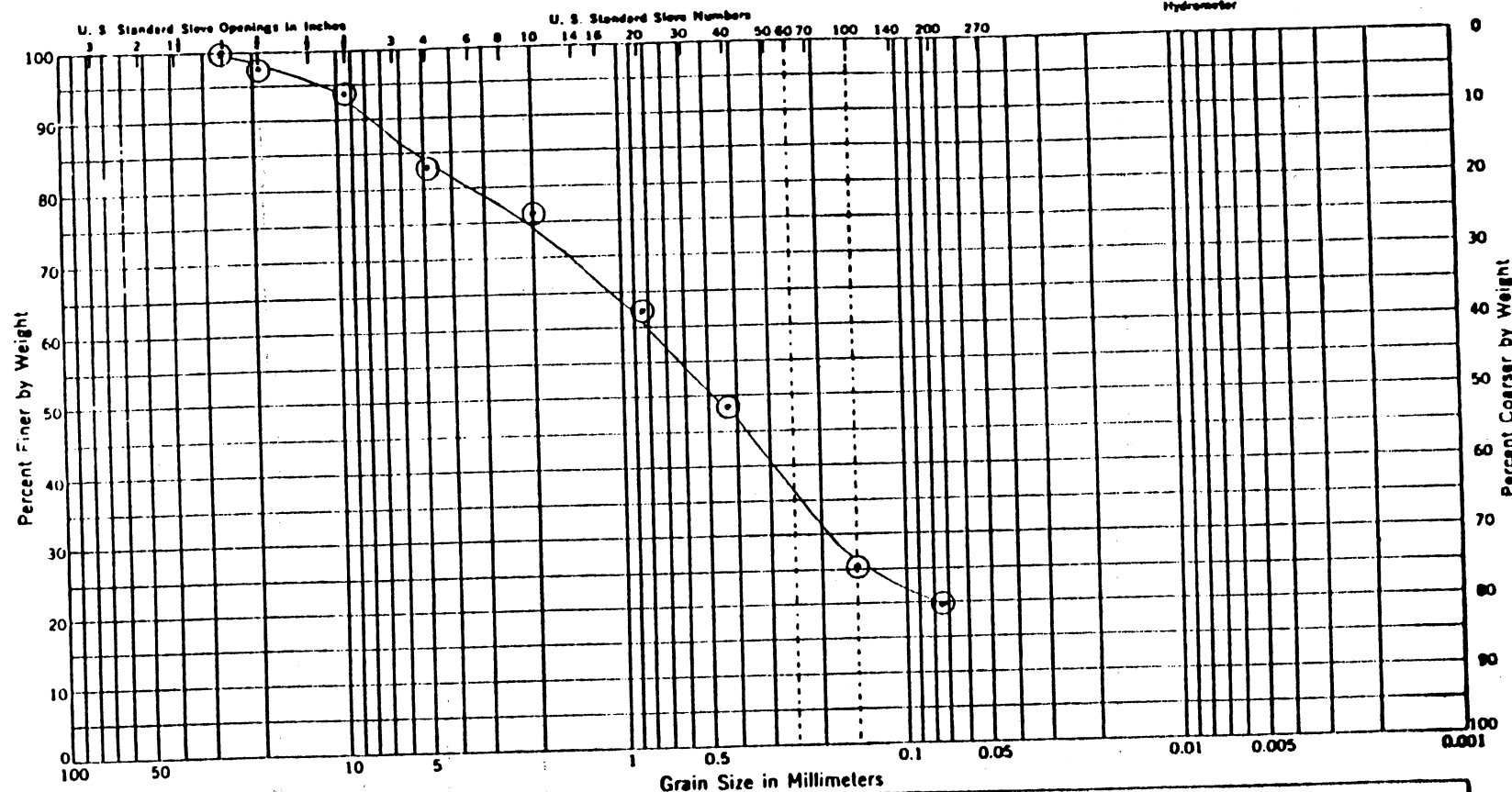
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

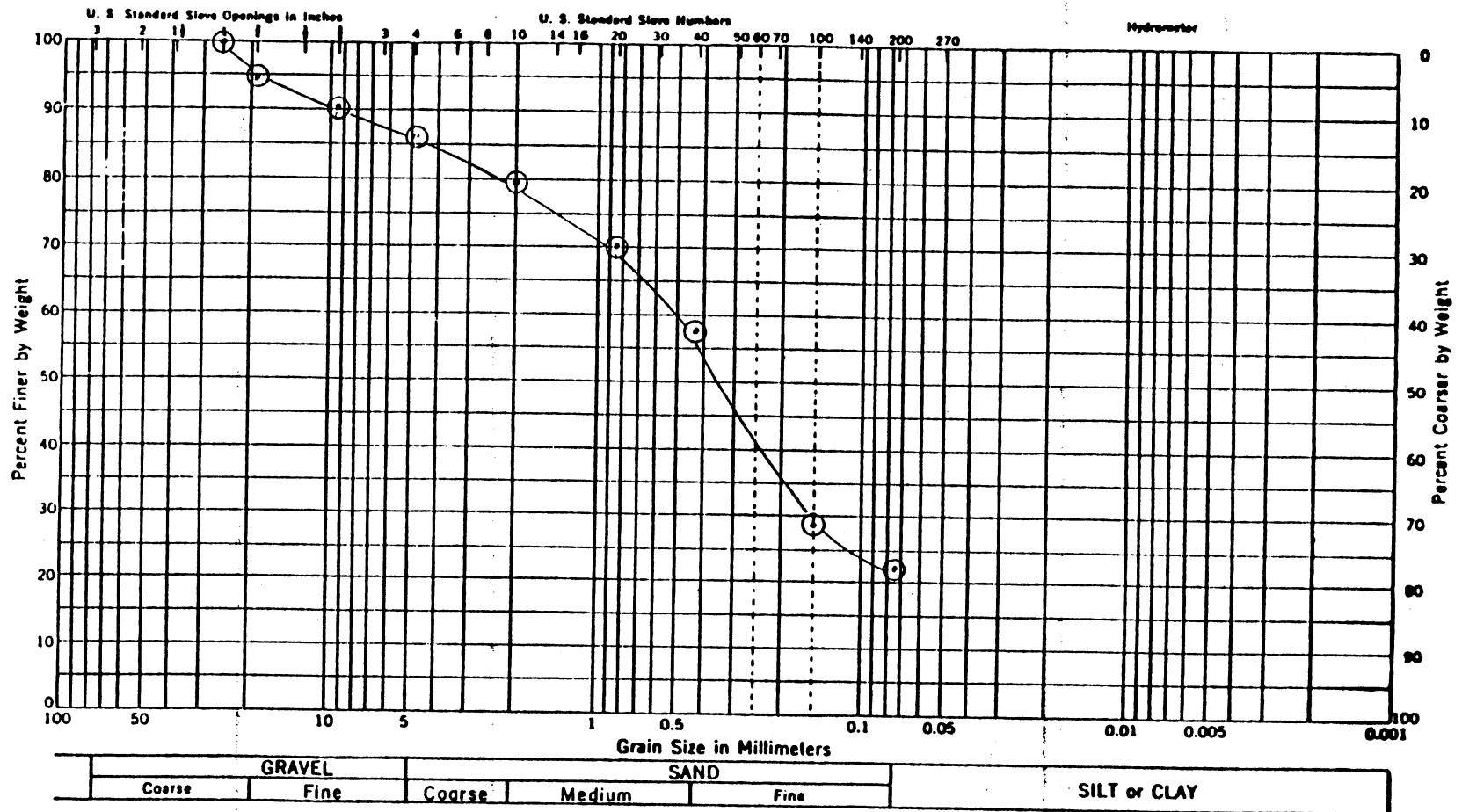
DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	5-18-84	12959

3.5-21-75

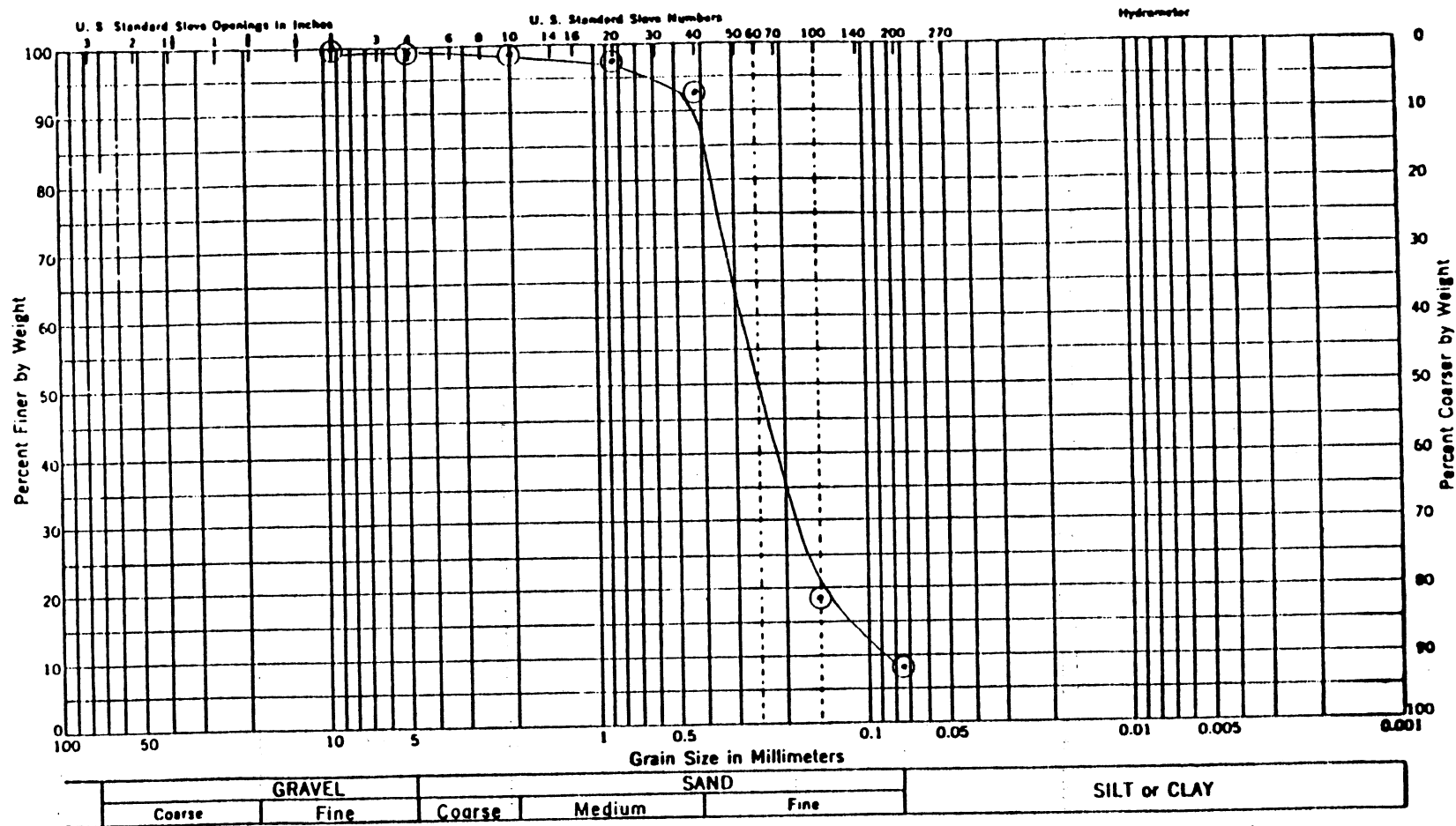
3.5-21-76



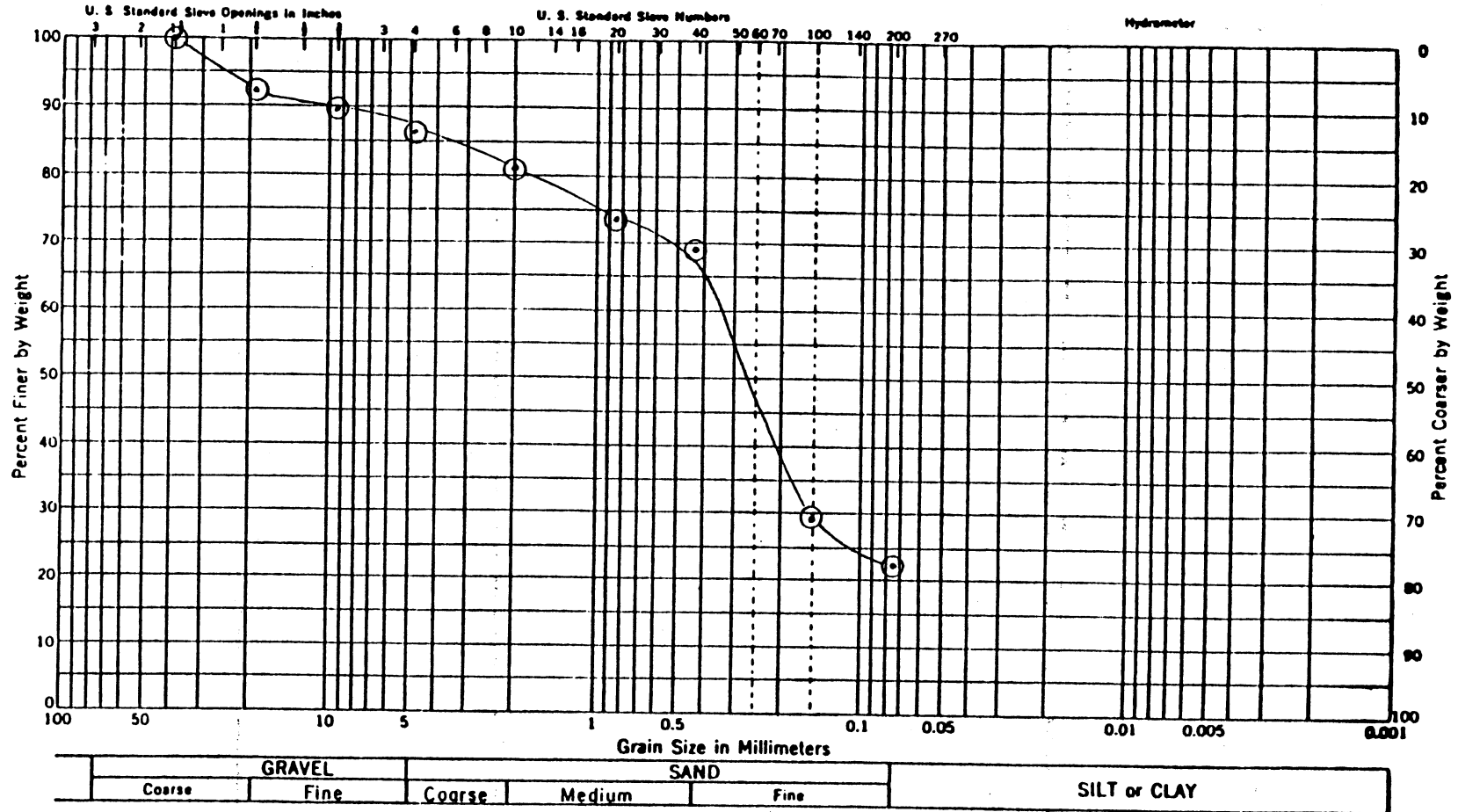
UNIFIED CLASSIFICATION SYSTEM



3.5-21-78



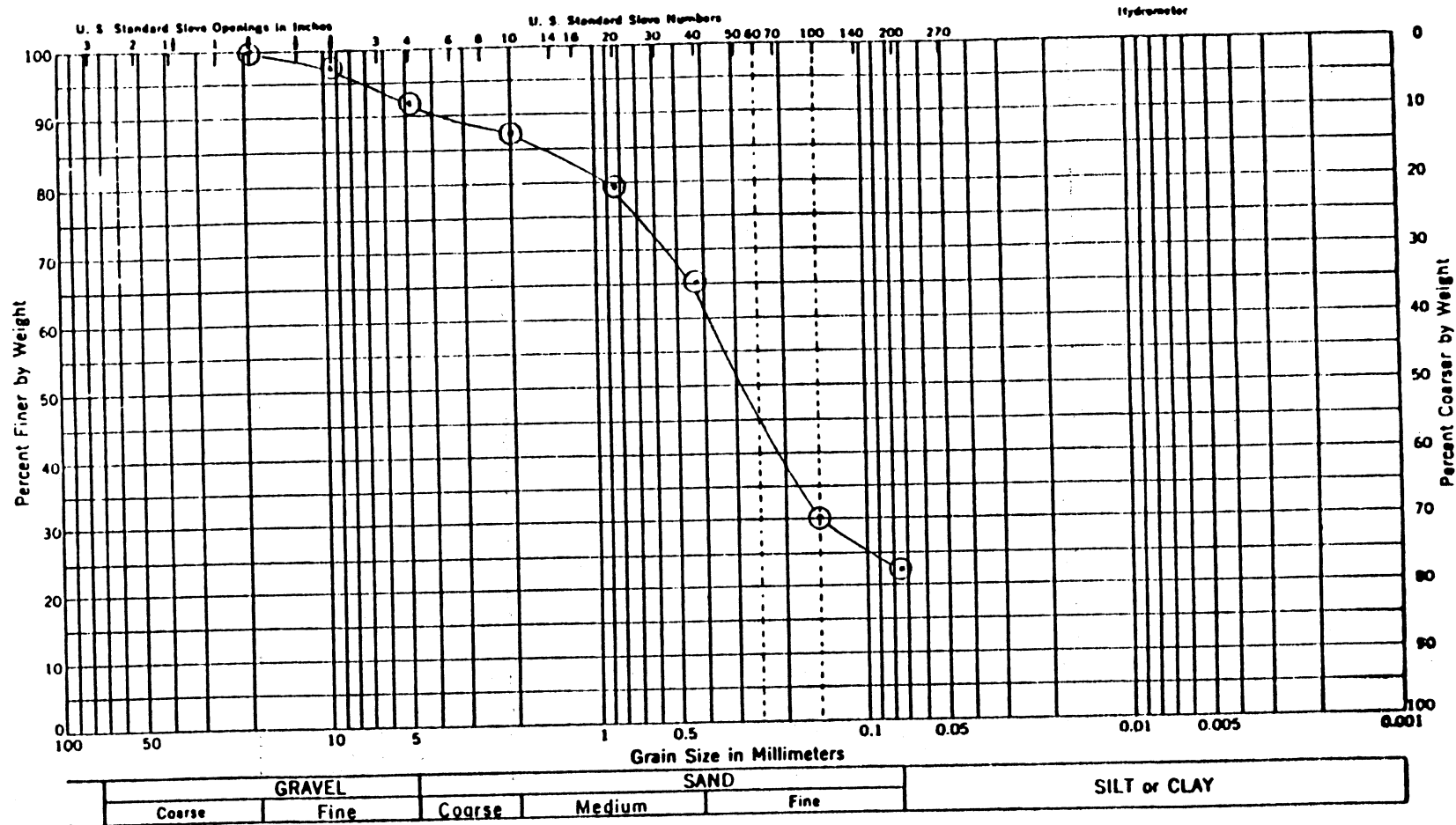
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41 H9					Silty fine to coarse sand (SM)				
SA-22						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
210.5-211.4'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

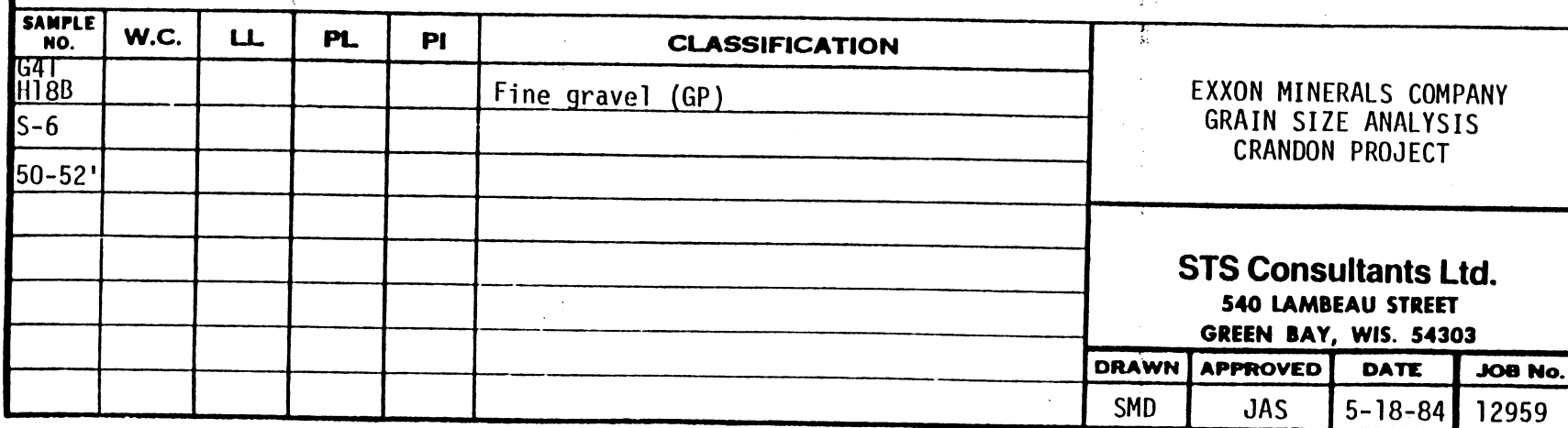
3.5-21-79

3.5-21-80

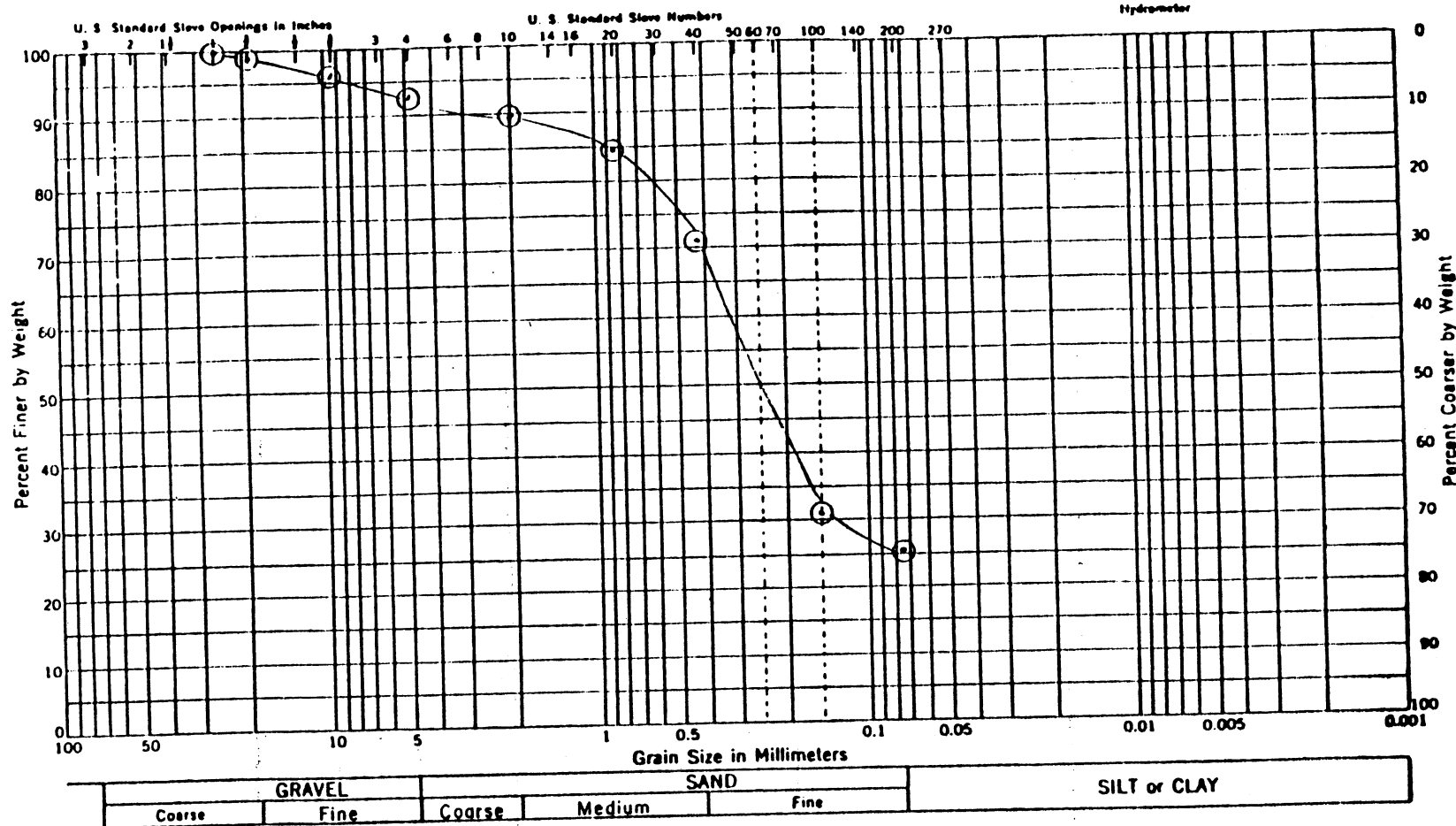


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41 H18B					Silty fine to coarse sand (SM)				
S-2						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
10-12'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

3.5-21-81

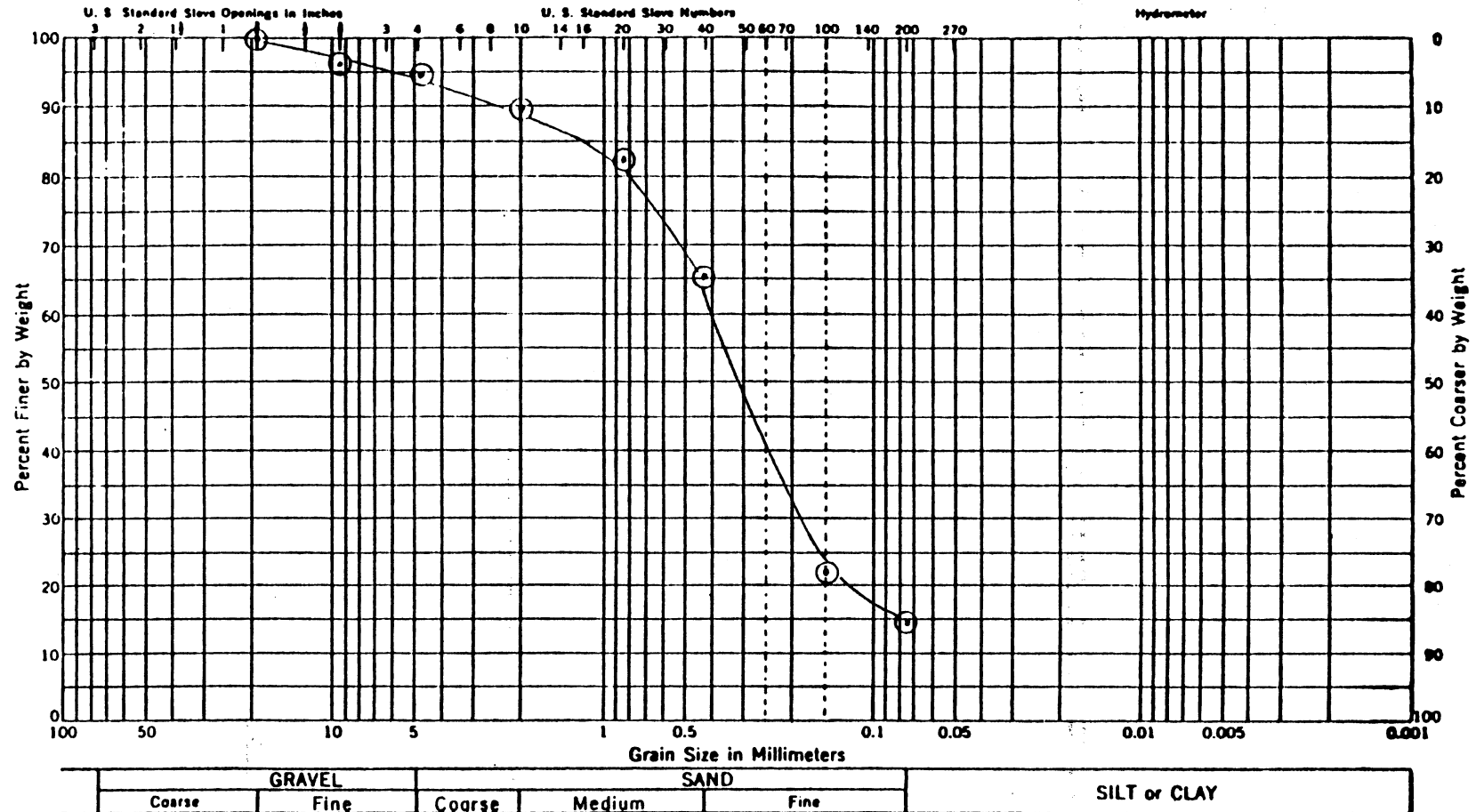


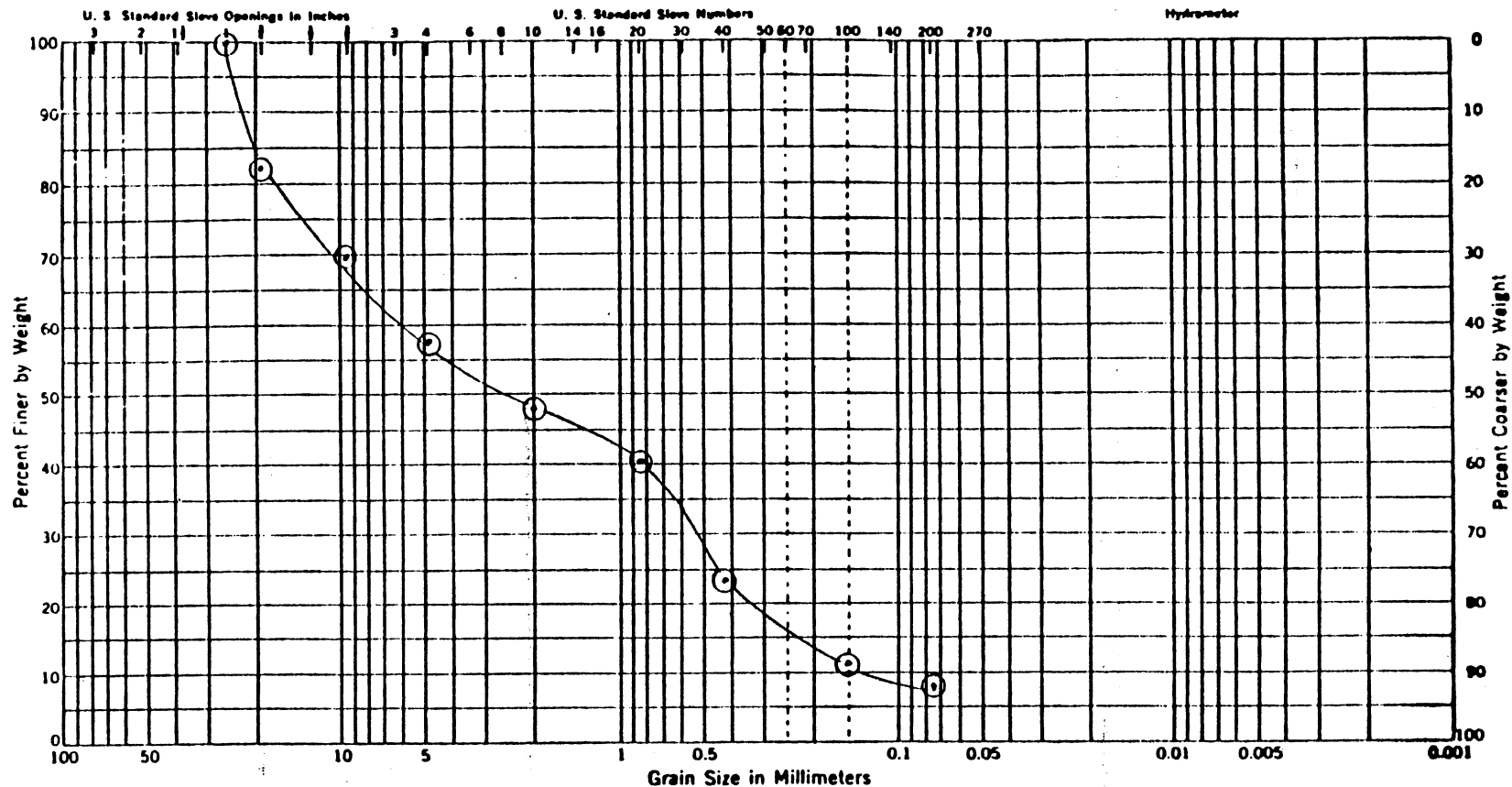
3.5-21-82



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41					Silty fine to coarse sand (SM)				
H18B						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
SA-8									
70-72'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

UNIFIED CLASSIFICATION SYSTEM

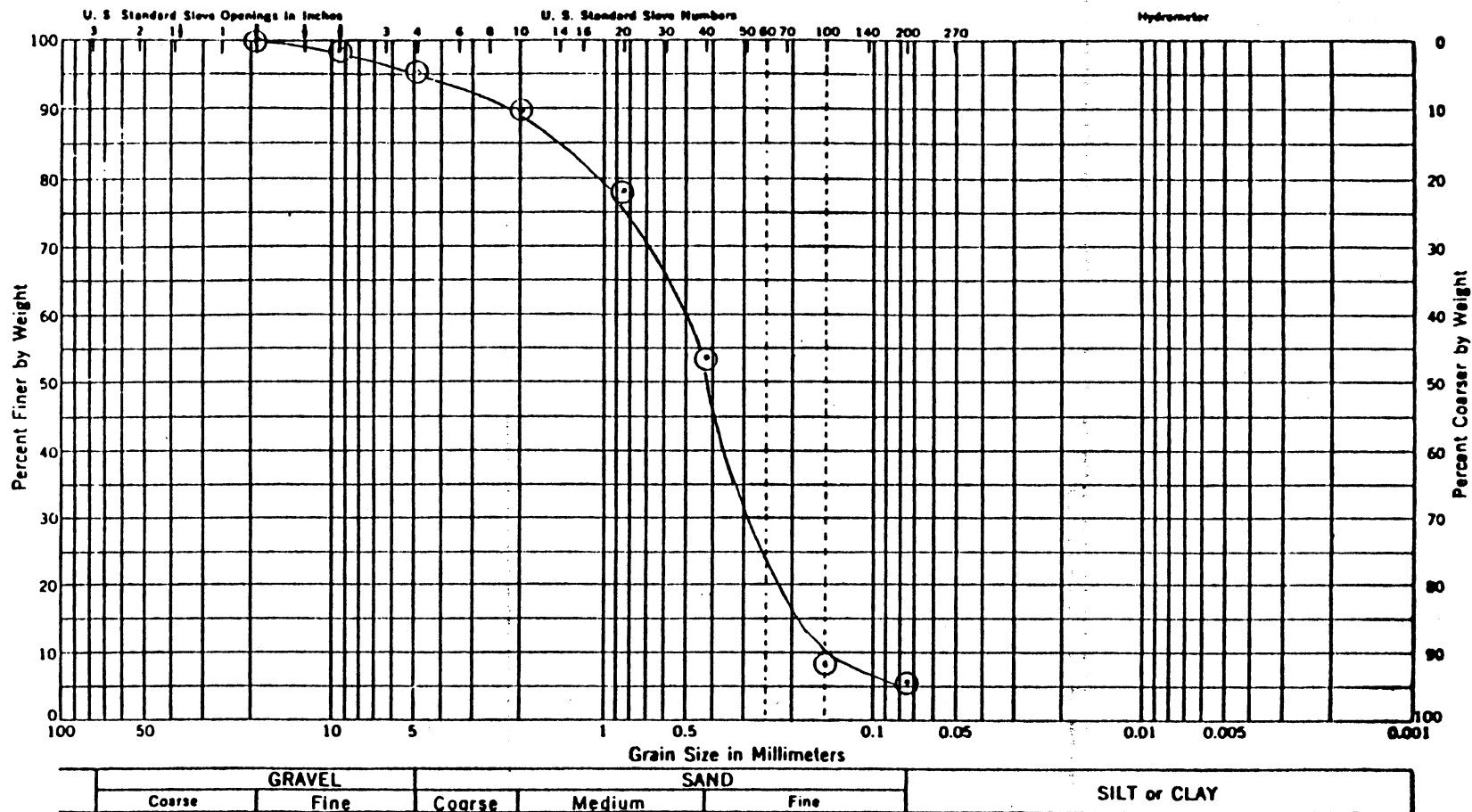




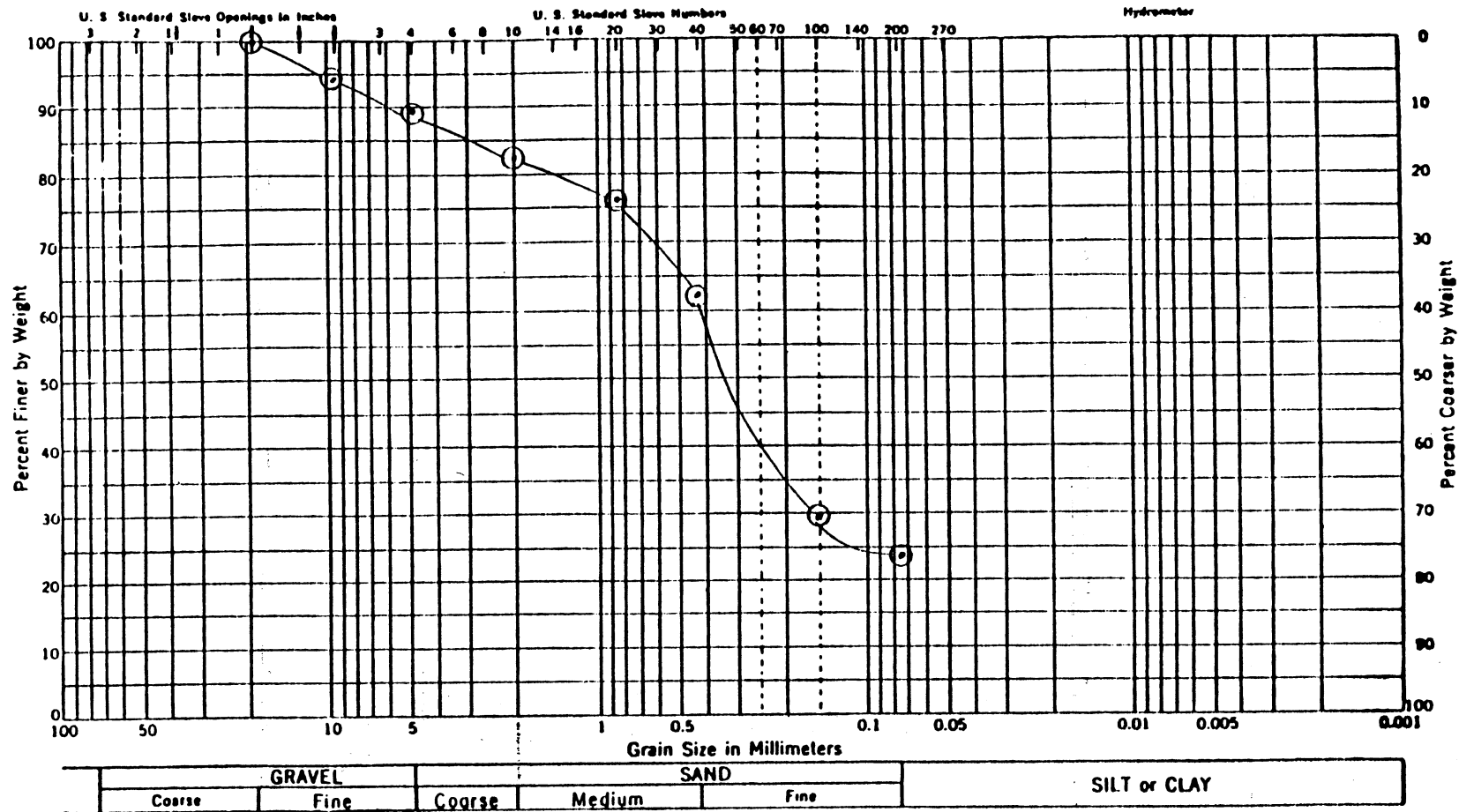
GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41					Slightly silty fine to coarse sand (SM-SP)				
H18B									
S-16									
150-152'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

UNIFIED CLASSIFICATION SYSTEM



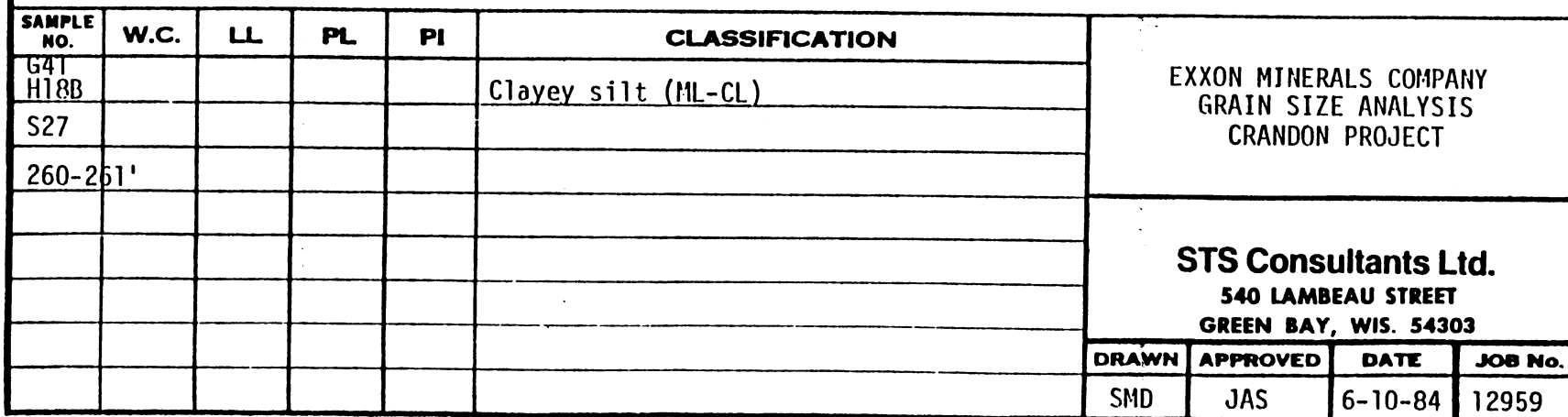
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41					Slightly silty fine to coarse sand (SM-SP)				
H18B									
S-17									
160-162'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959



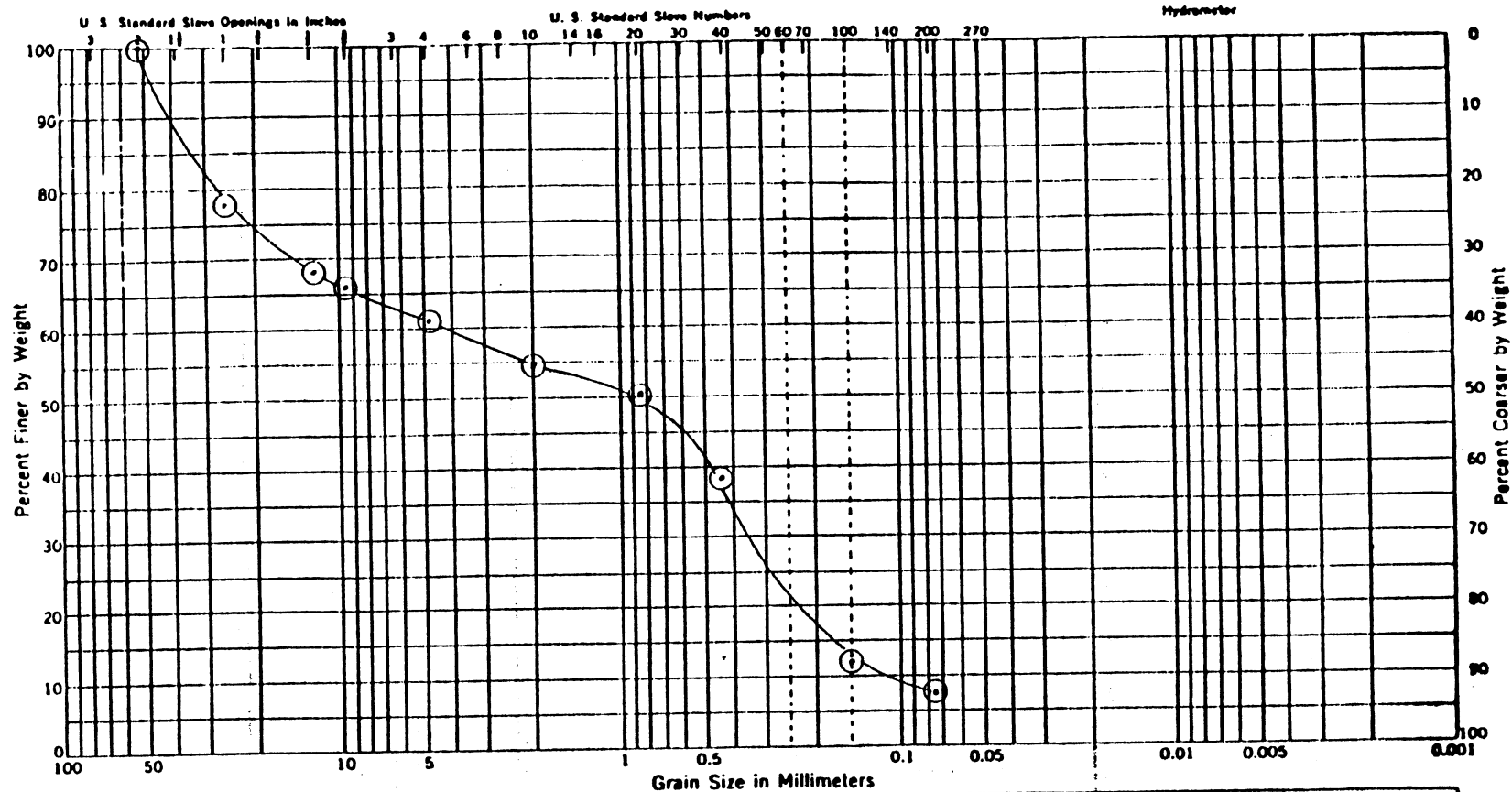
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41					Silty fine to coarse sand (SM)				
H18B						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
S-22									
210-211.5'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

3.5-21-86

3.5-21-87



3.5-21-88



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

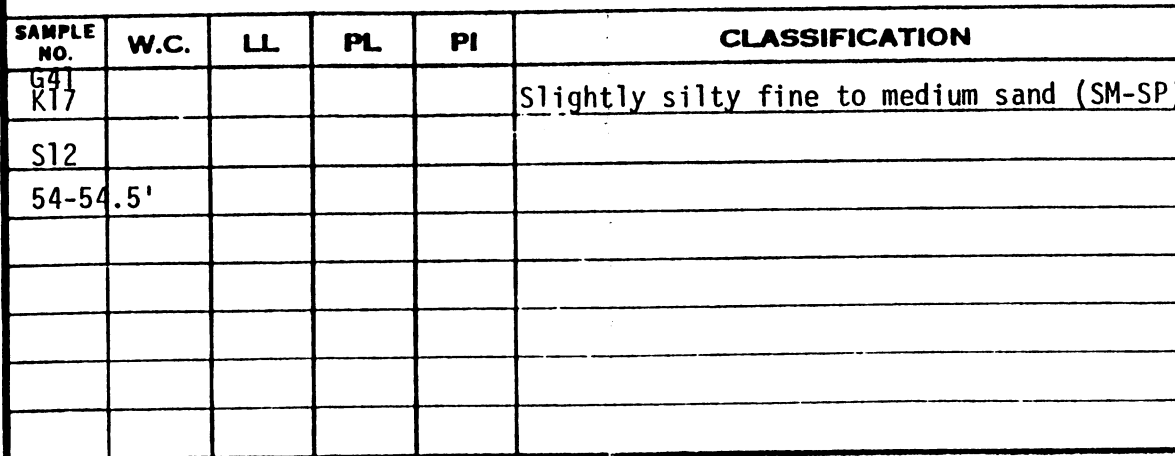
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G41					Slightly silty fine to coarse sand (SM-SP)
K17					
S6					
24-25.5'					

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	6-10-84	12959

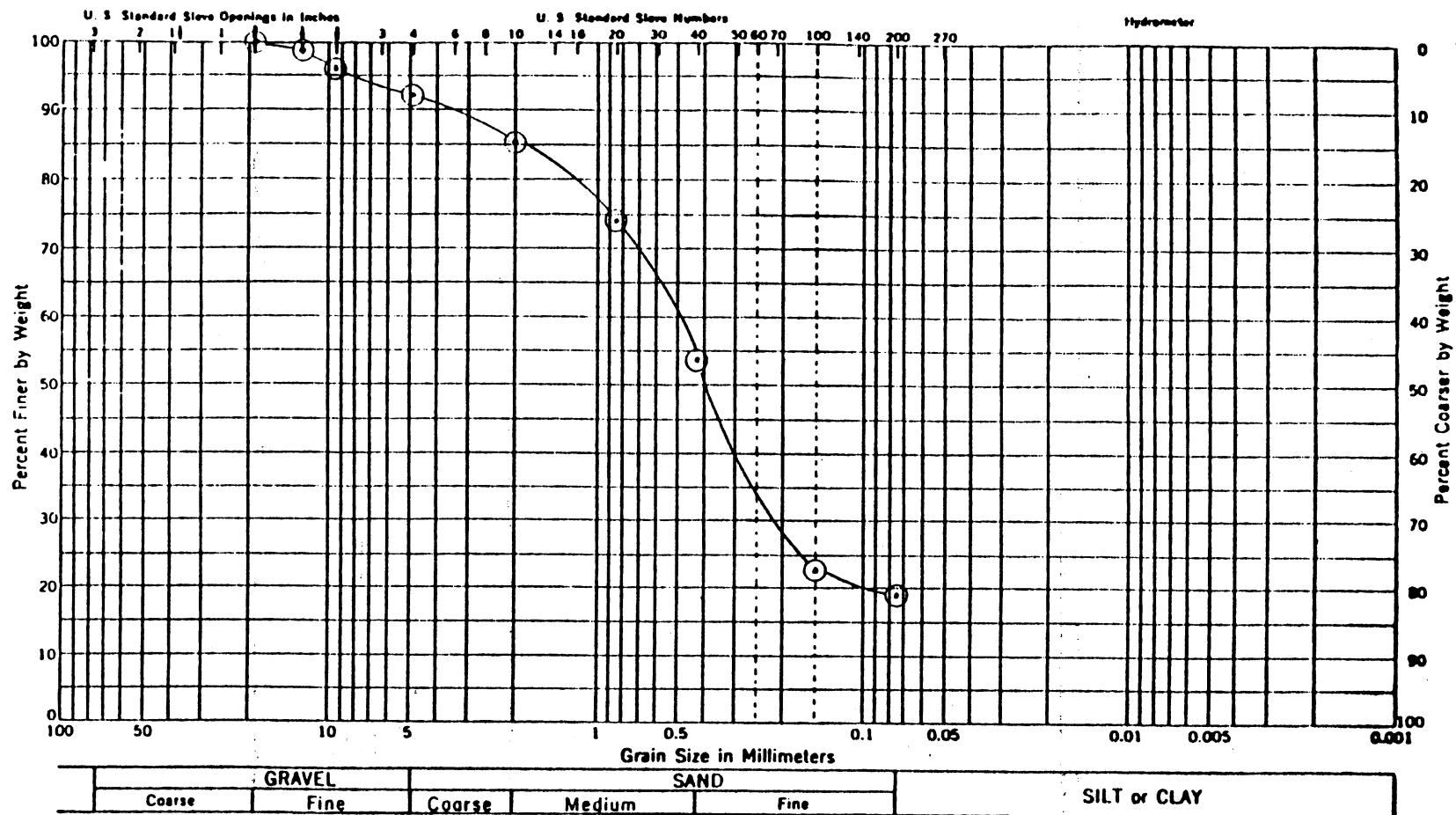
3.5-21-89



STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

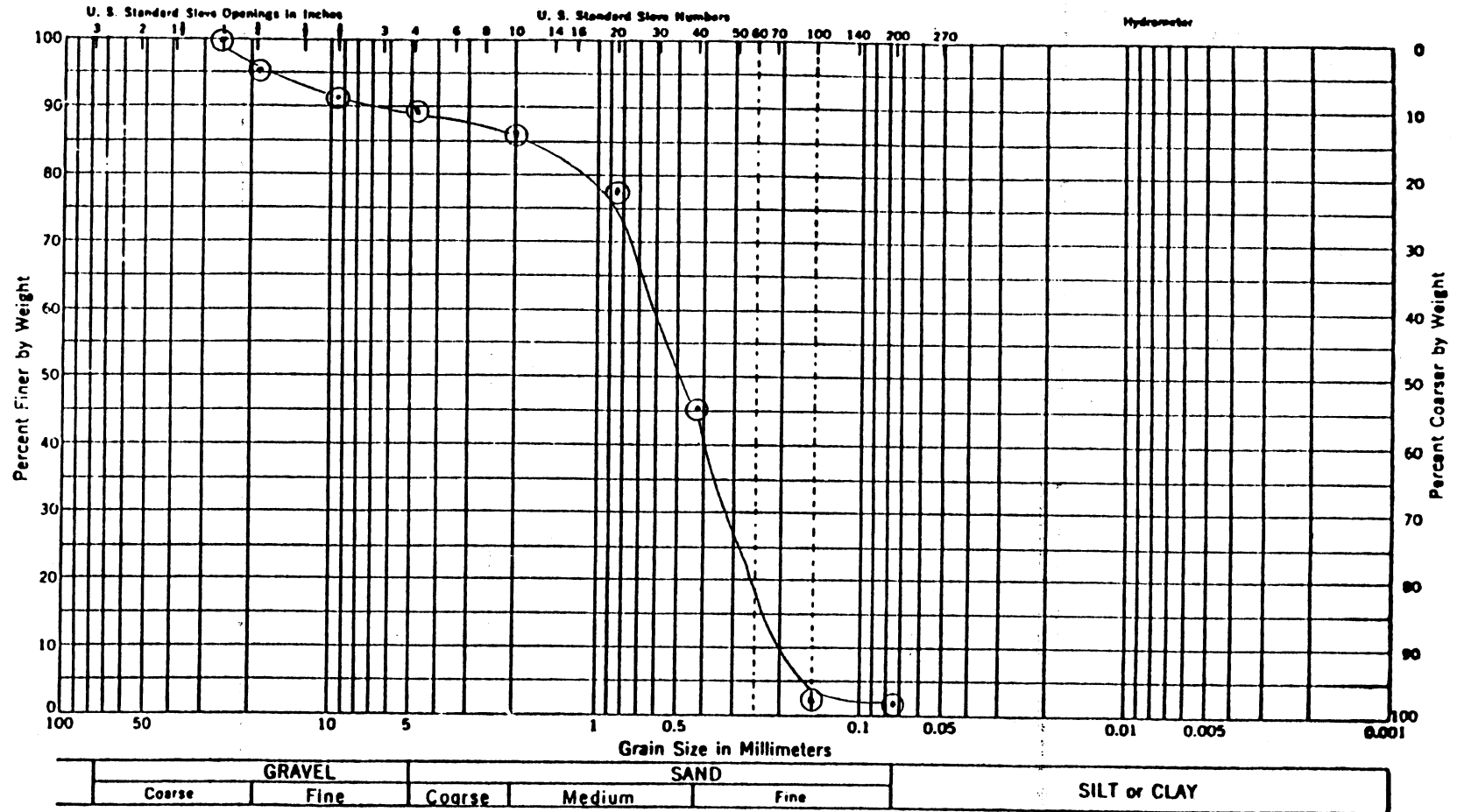
DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	6-10-84	12959

3.5-21-90



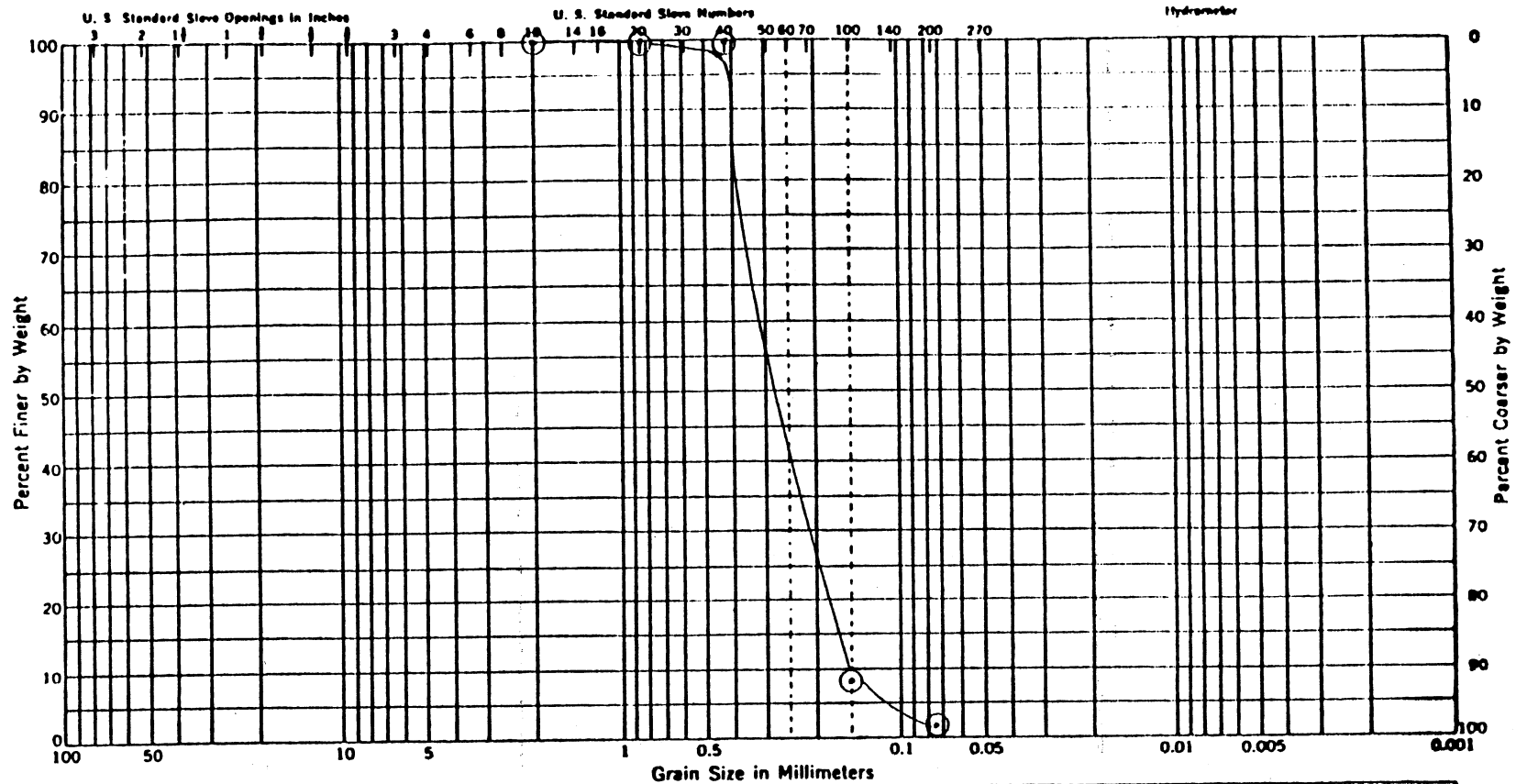
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41					Silty fine to coarse sand (SM)				
K17									
S16									
74-74.4'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
G41					Fine to coarse sand (SP)				
M11									
SA-2									
10-12'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

3.5-21-91

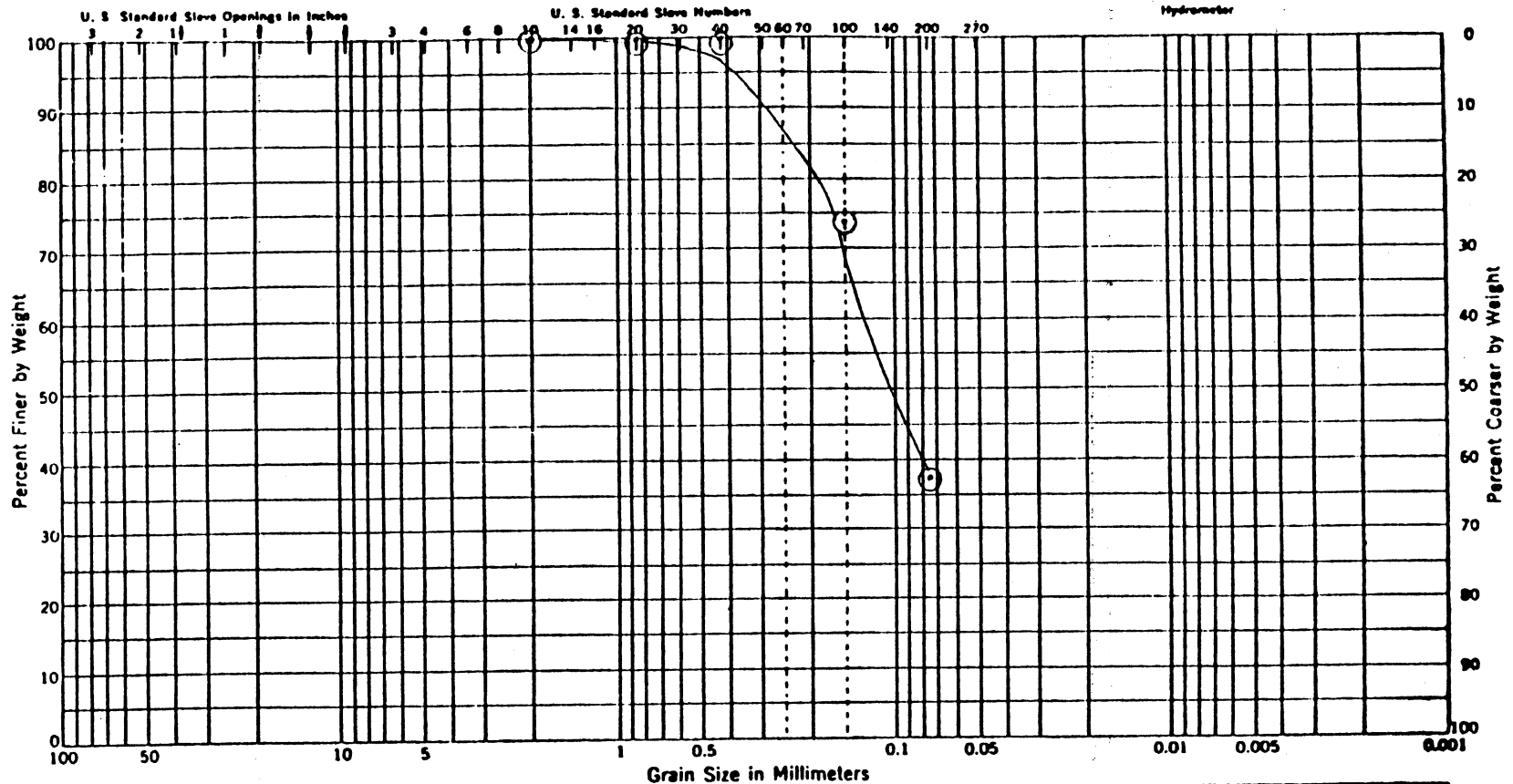


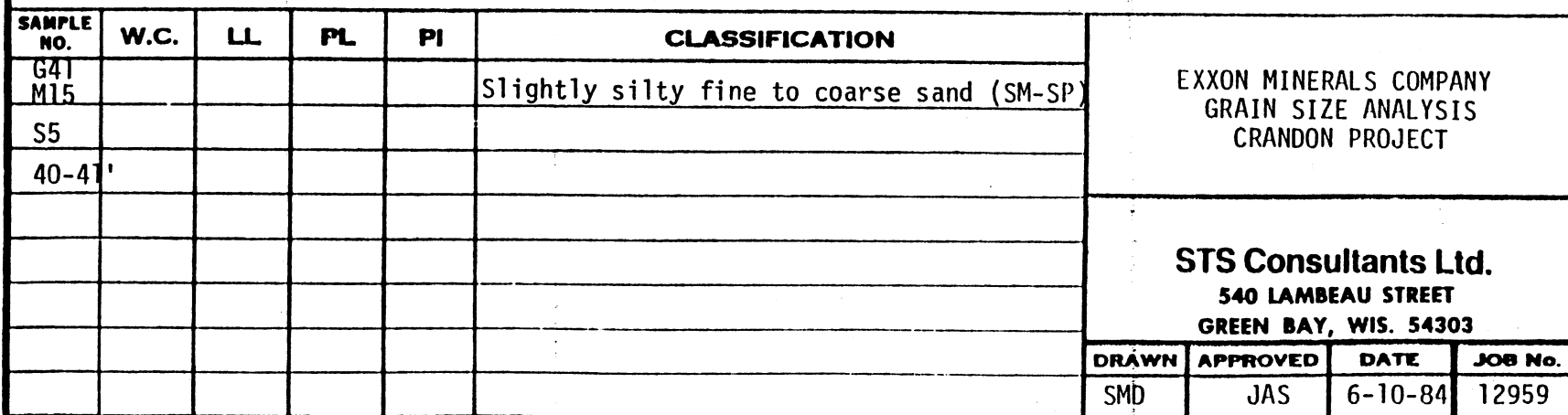
GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41					Fine sand (SP)				
M11									
SA-5									
38.5-40'						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

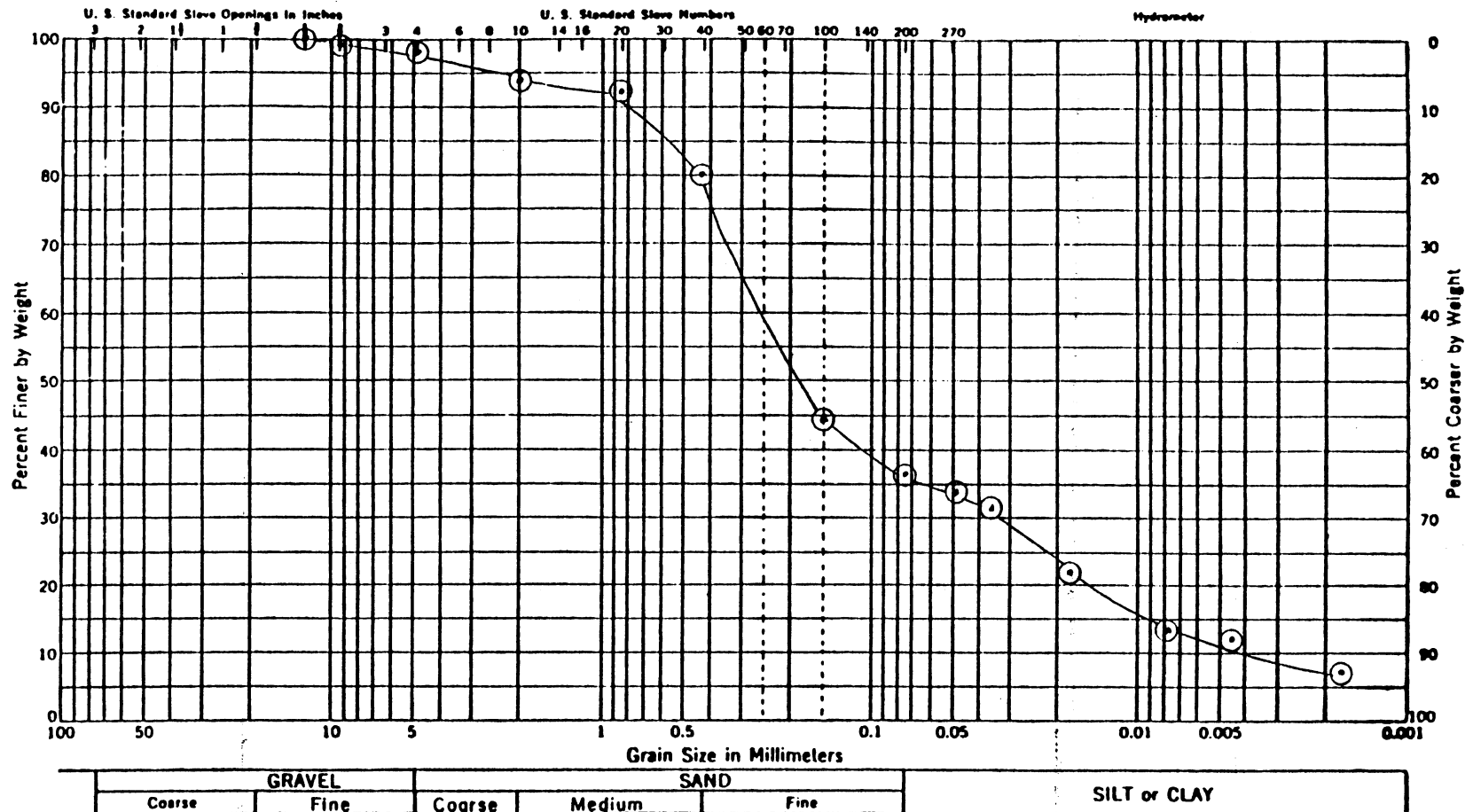
3.5-21-92

UNIFIED CLASSIFICATION SYSTEM





UNIFIED CLASSIFICATION SYSTEM

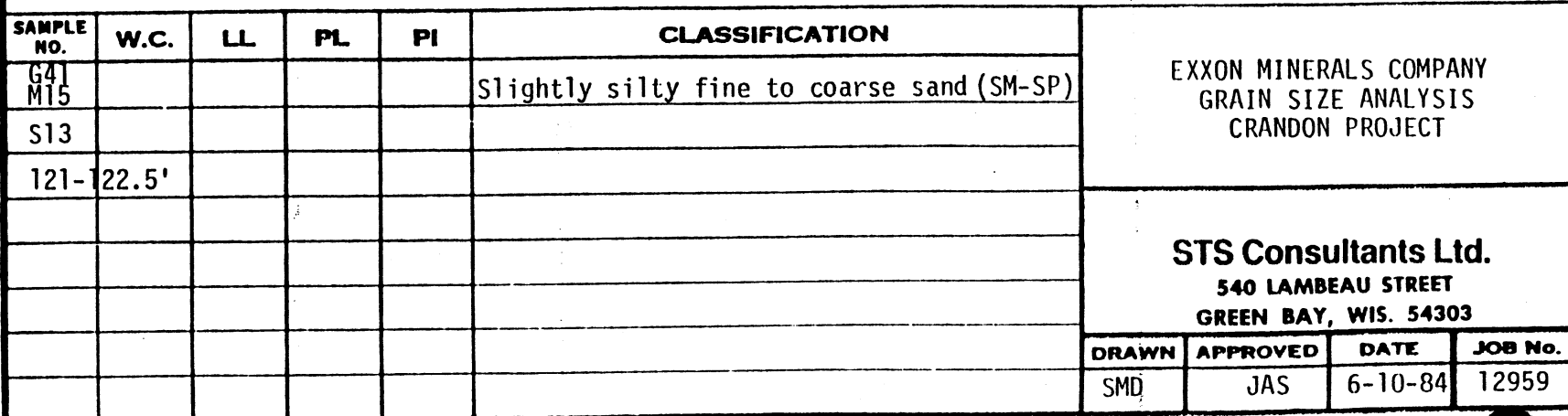


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G41 M15					Silty fine to medium sand (SM)
S10					
90-91	5'				

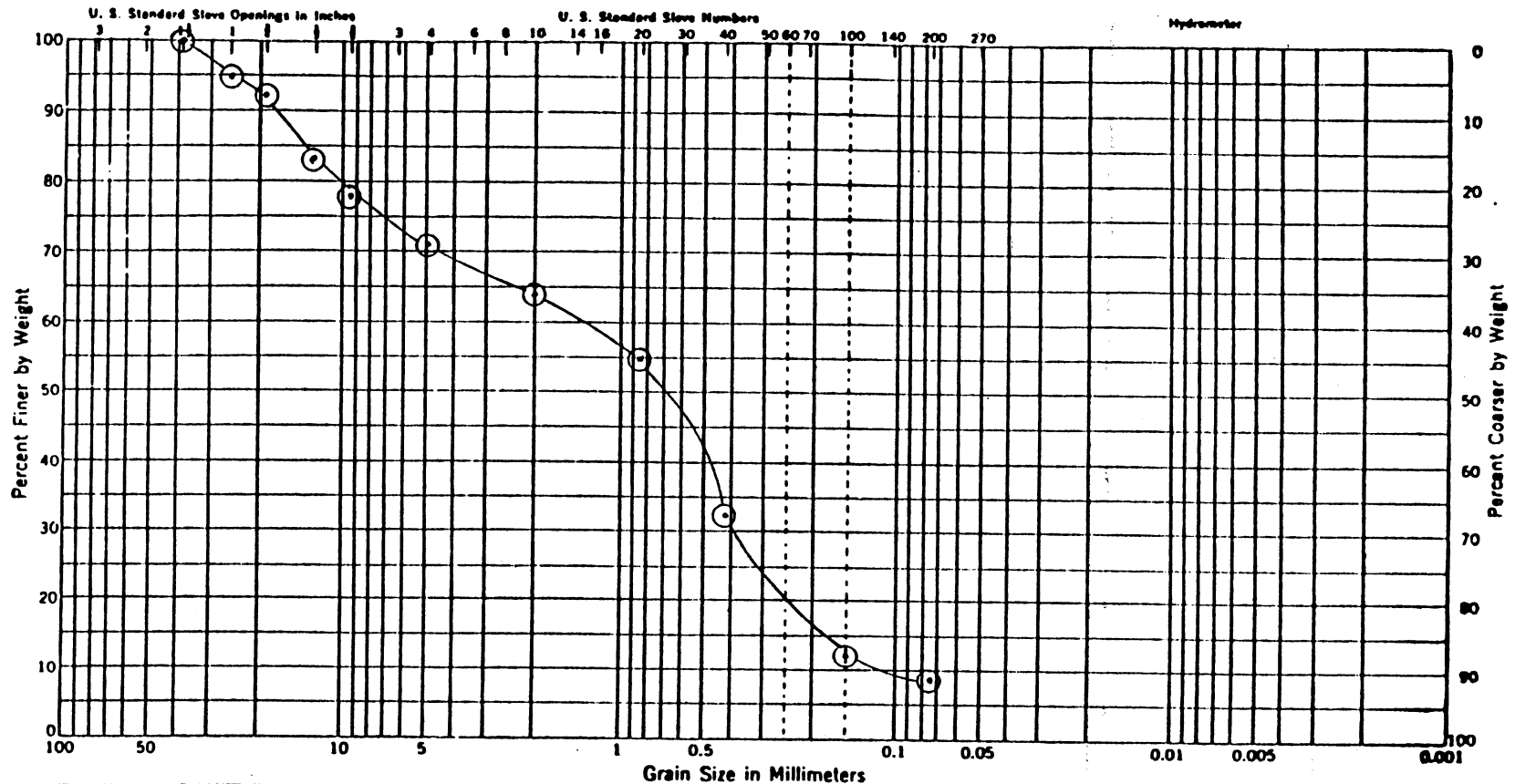
EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	6-10-84	12959

3.5-21-95

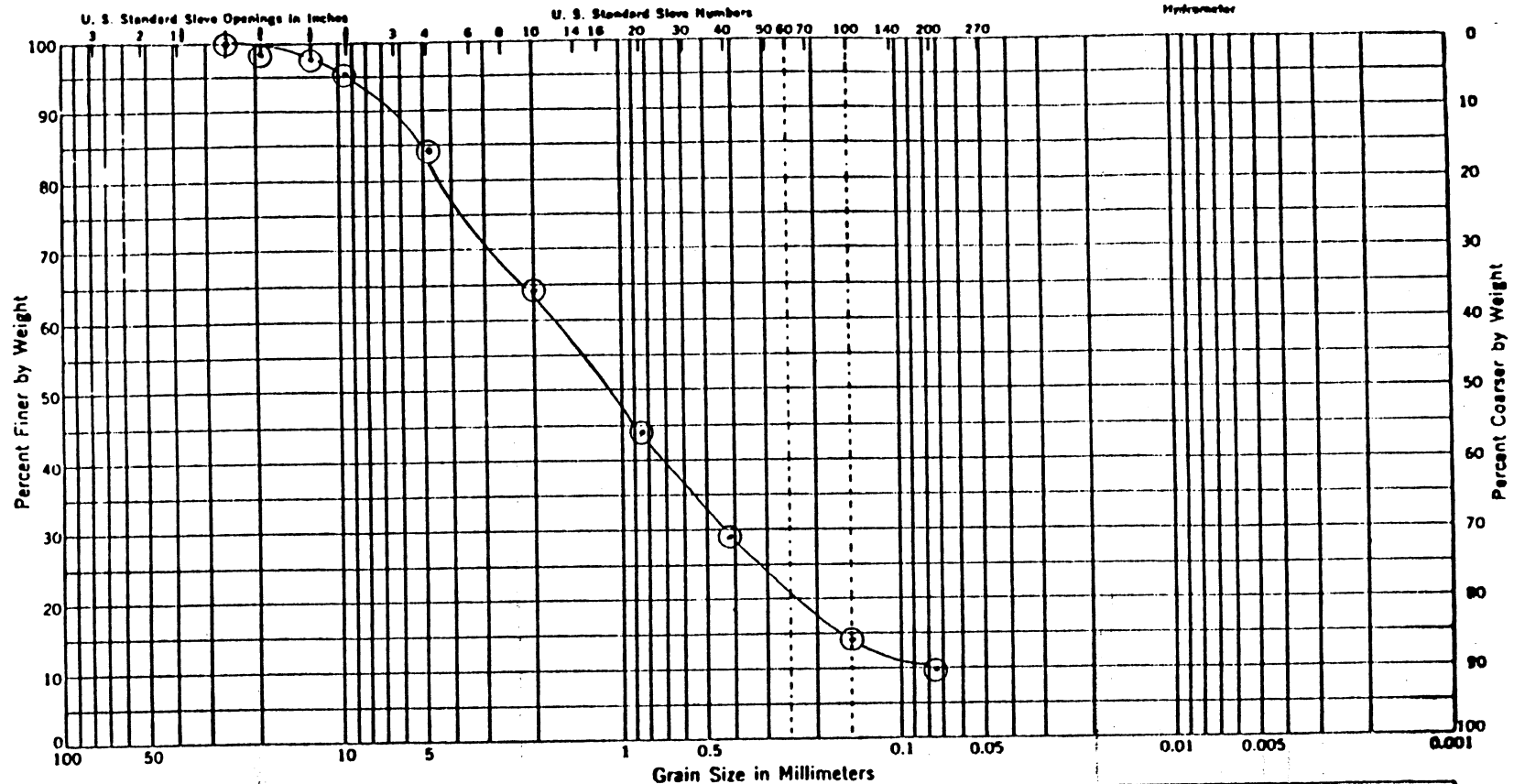
3.5-21-96



UNIFIED CLASSIFICATION SYSTEM



UNITED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G41					Slightly silty fine to coarse sand (SM-SP)
M15					
S18					
170-171.5'					

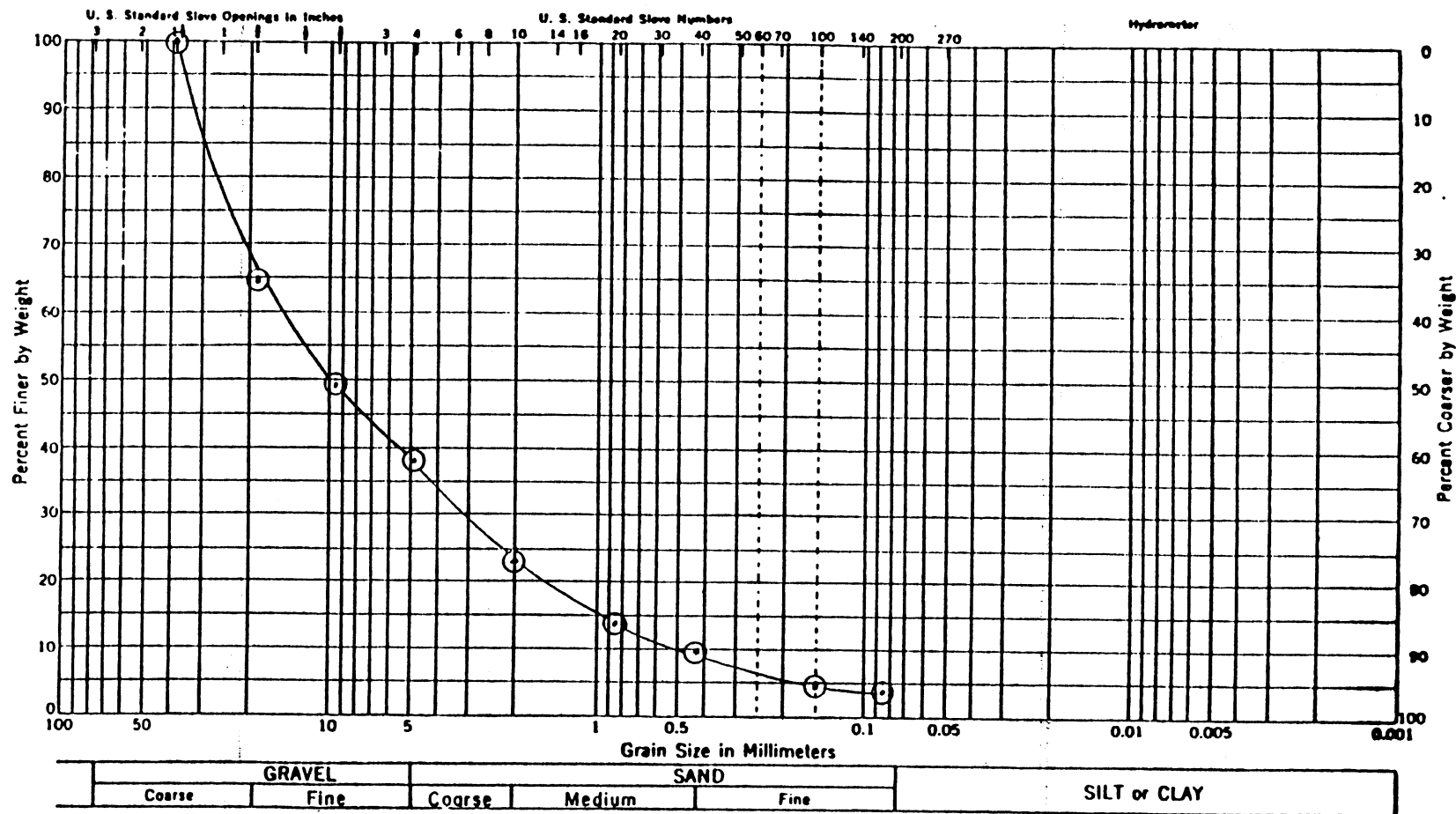
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

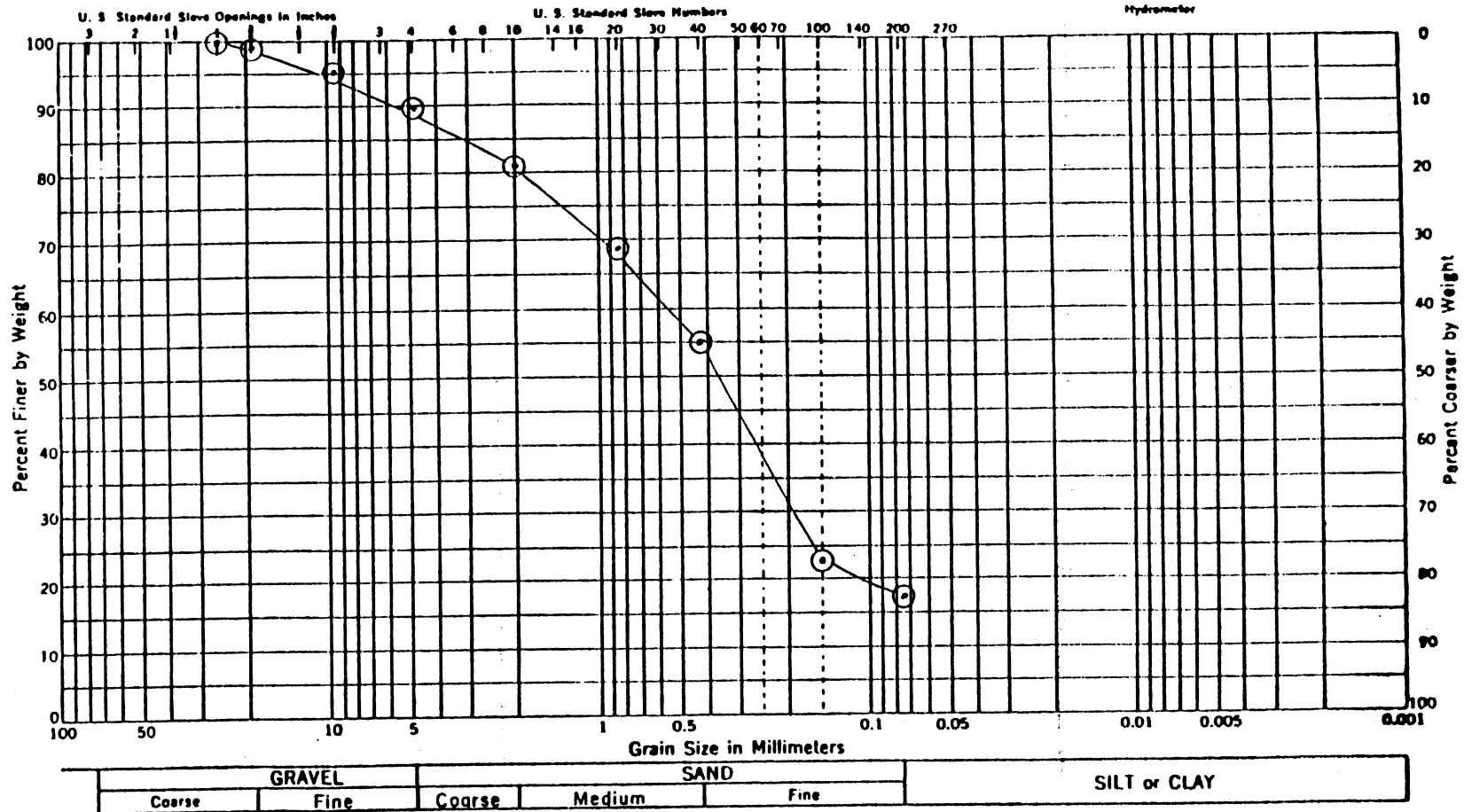
DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	6-10-84	12959

3.5-21-98

UNIFIED CLASSIFICATION SYSTEM

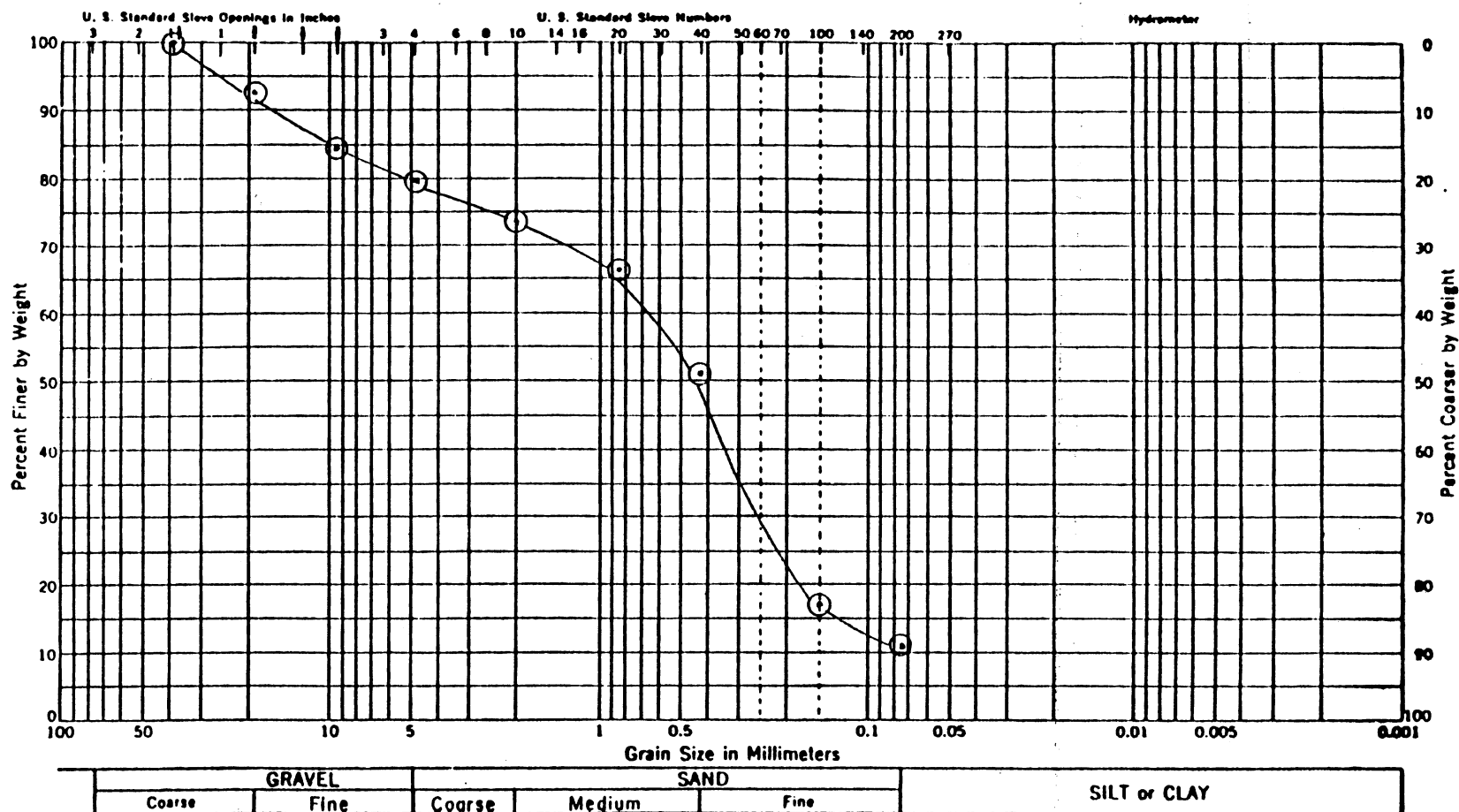


UNITED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41 P16					Silty fine to coarse sand (SM)				
SA-6						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
50-51.5'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

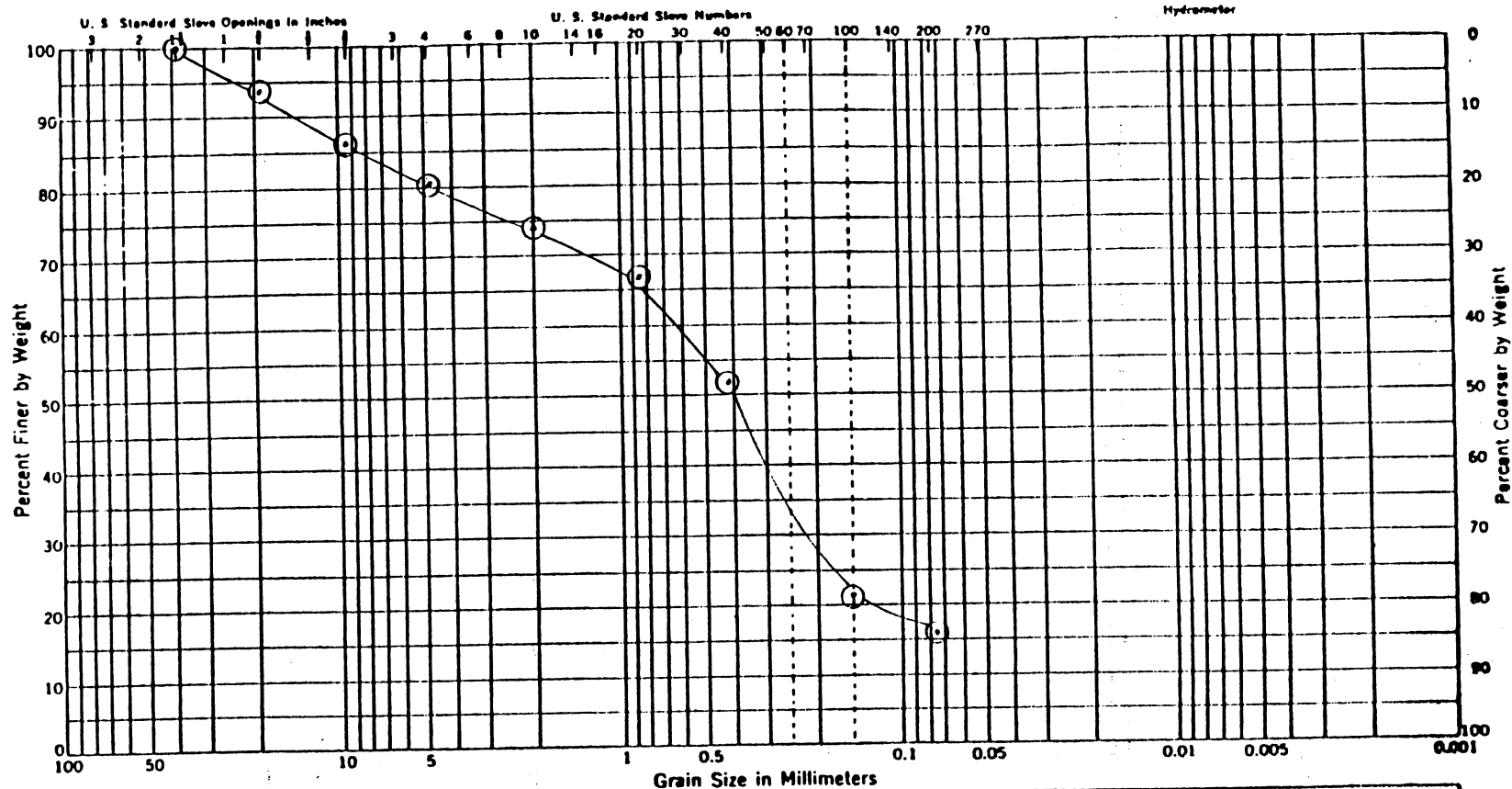
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41					Slightly silty fine to coarse sand (SM-SP)				
P16						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
SA-9									
80-81.5'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

3.5-21-101

3.5-21-102



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

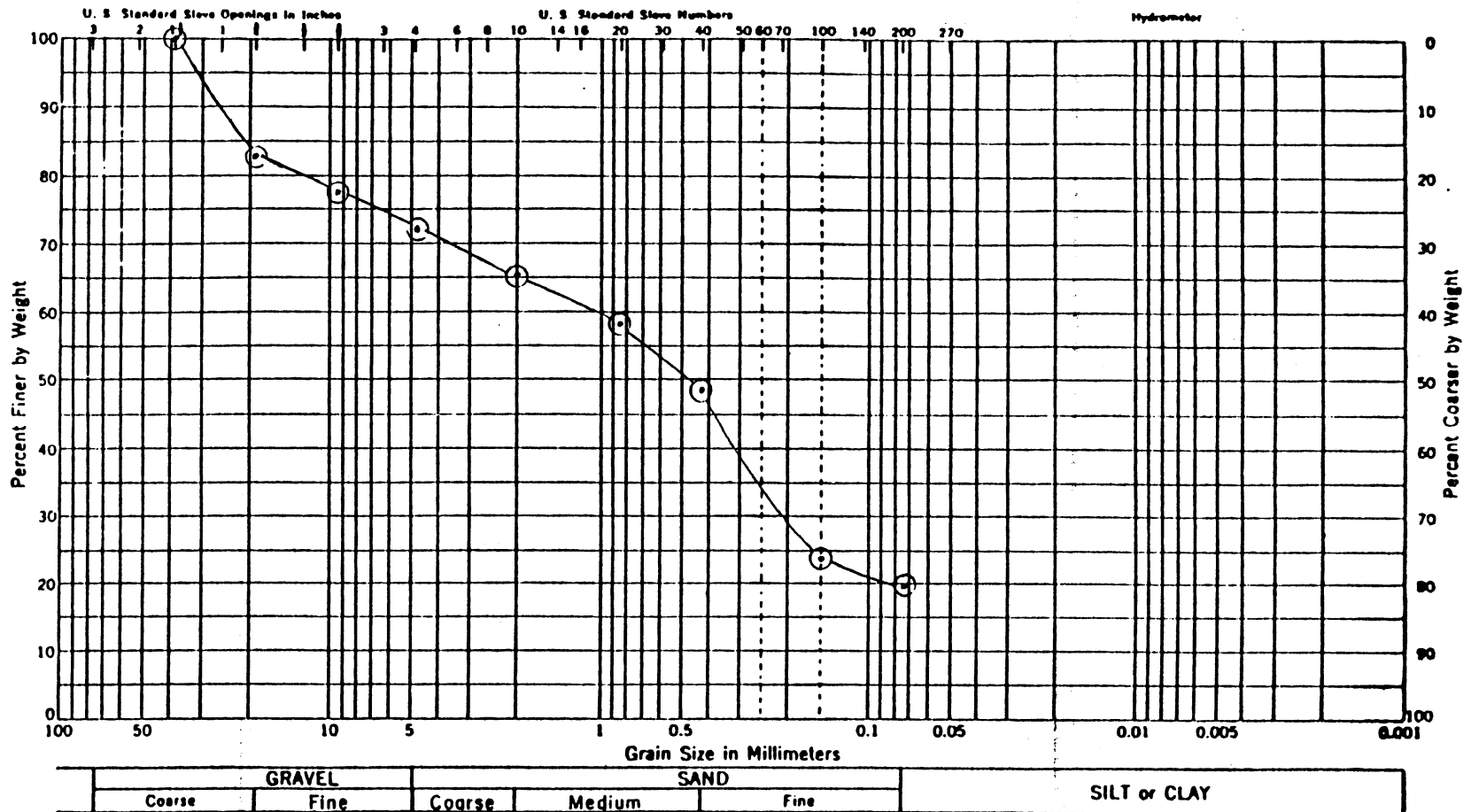
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G41					Silty fine to coarse sand (SM)
P16					
SA-10					
90-91.5'					

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	5-18-84	12959

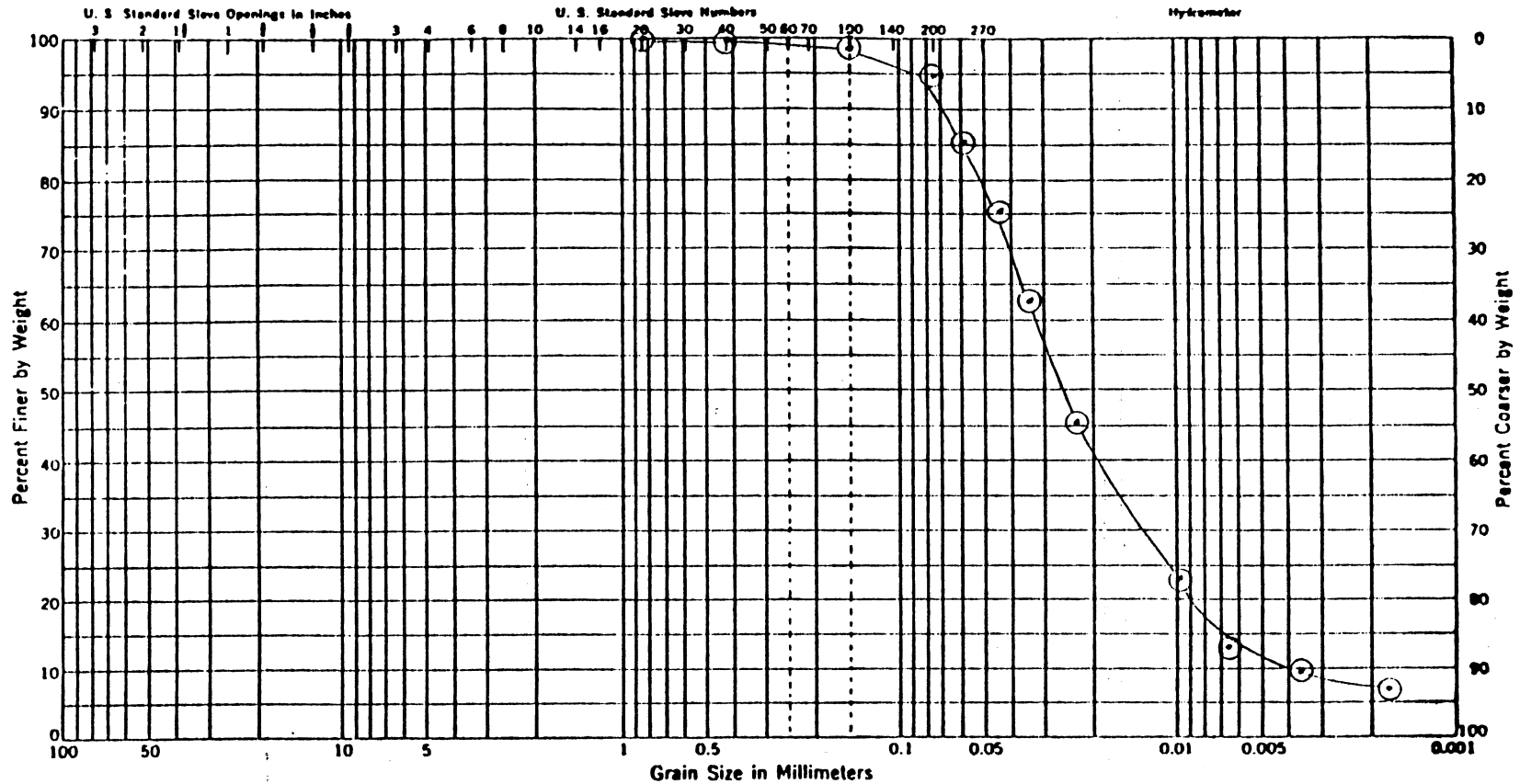
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41 P16					Silty fine to coarse sand (SM)				
SA-16						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
148.5-149.9'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

3.5-21-103

UNITED CLASSIFICATION SYSTEM



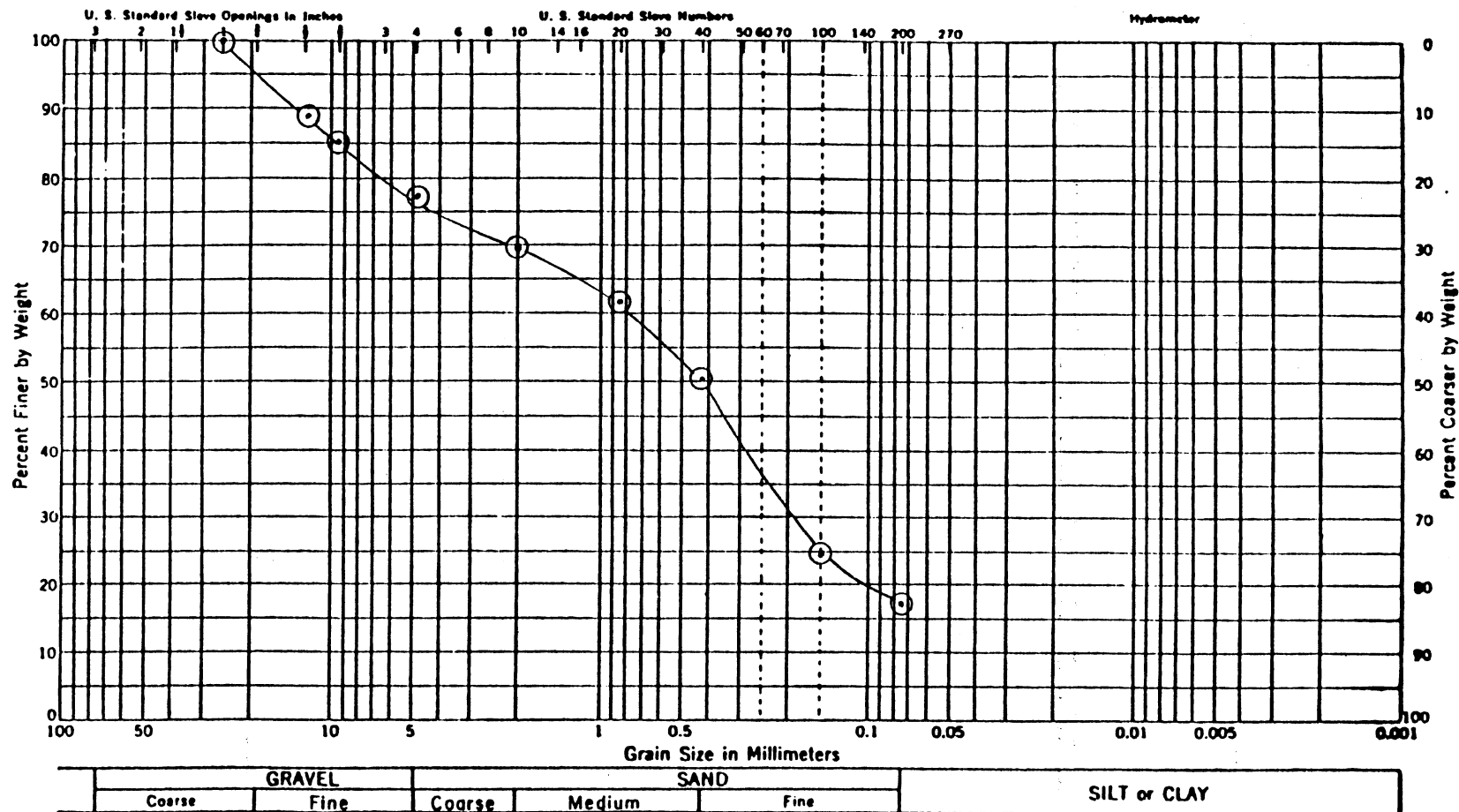
GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G41 P18					Silt (ML)
S4					
15-16 5'					

EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	6-10-84	12959

3.5-21-104

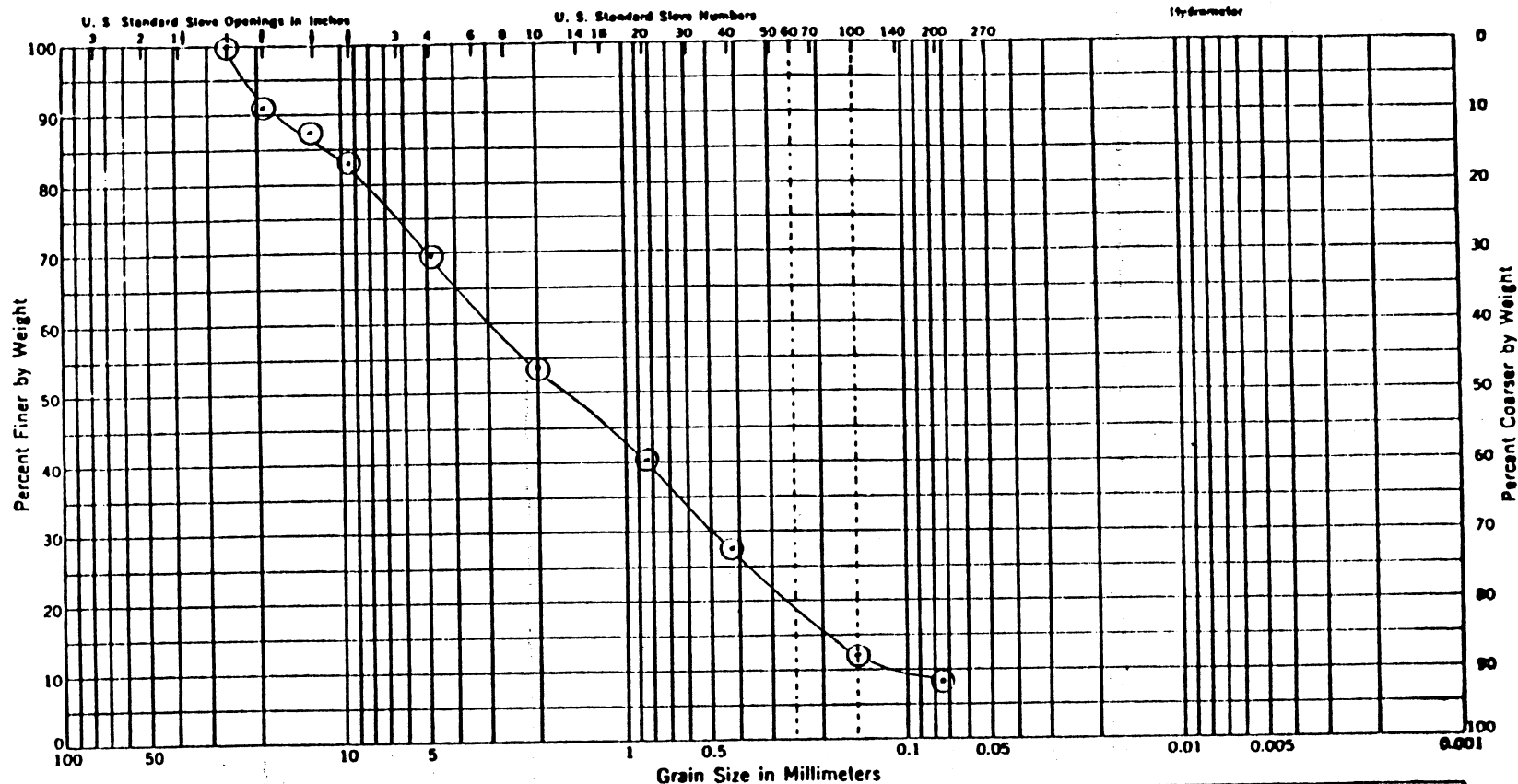
UNIFIED CLASSIFICATION SYSTEM



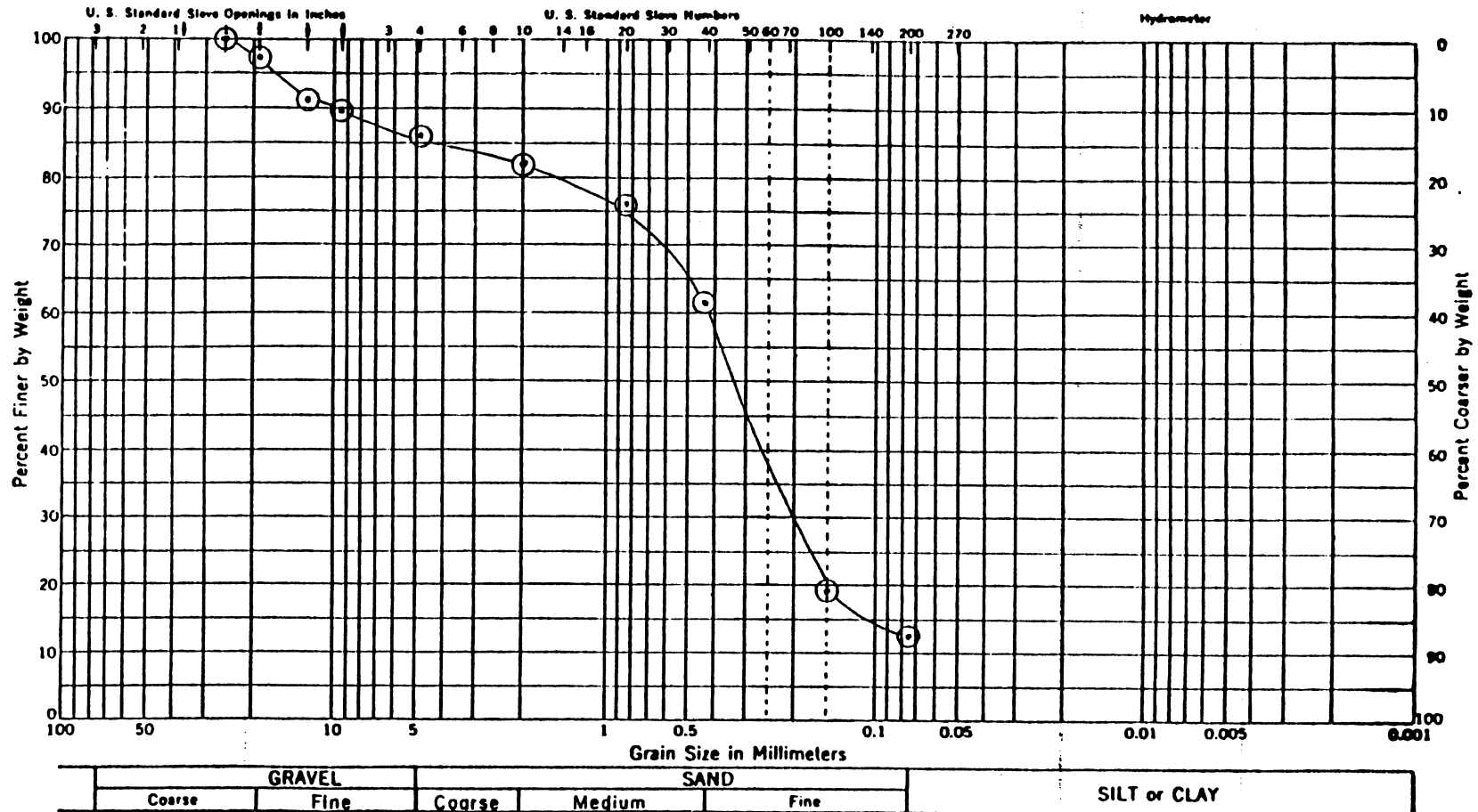
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41 P18					Silty fine to coarse sand (SM)				
S7						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
30-31.5'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

3.5-21-105

3.5-21-106

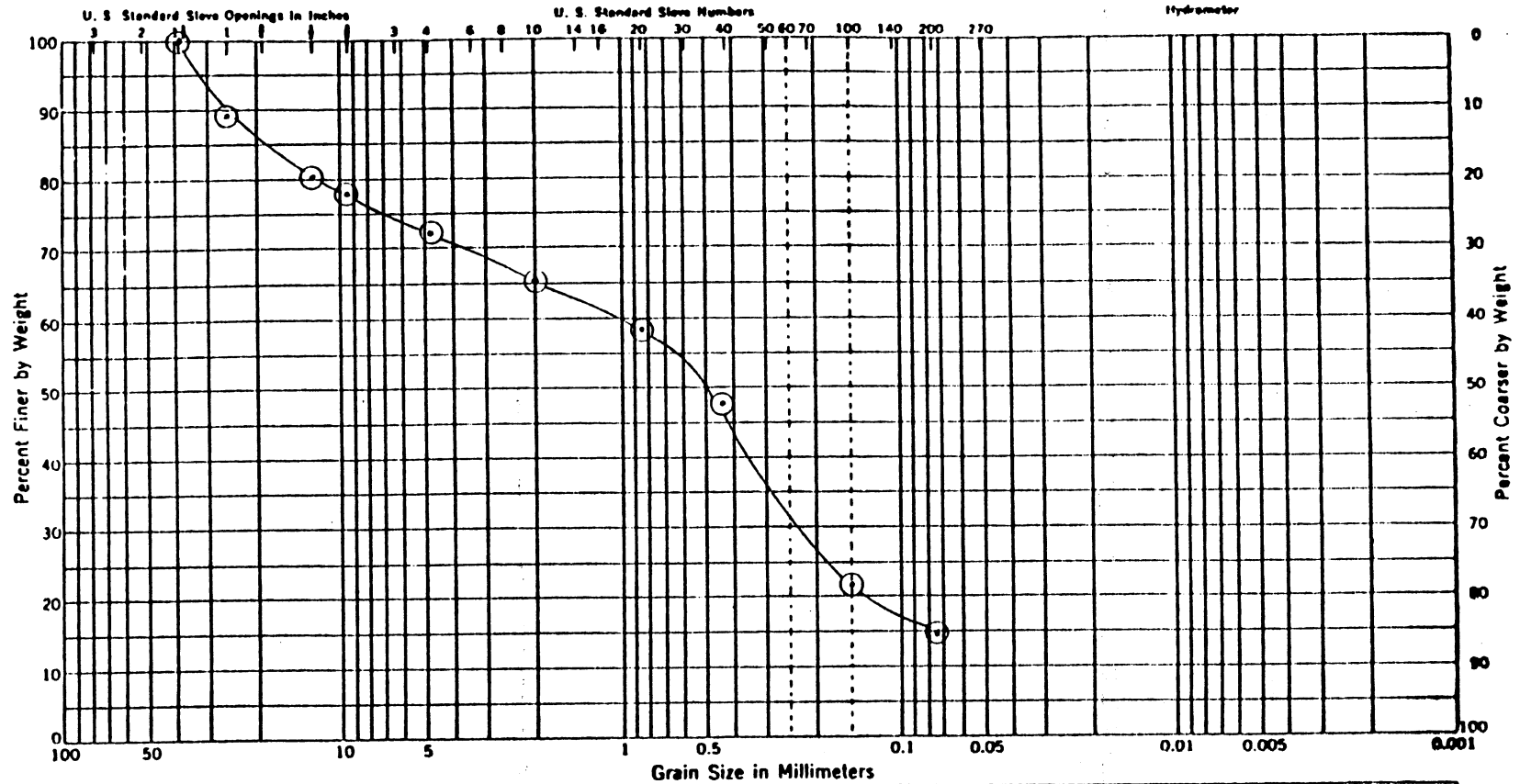


UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
G41 P18					Silty fine to medium sand (SM)				
SA18									
85-86.5'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	6-10-84	12959

3.5-21-107



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G41					Silty fine to coarse sand (SM)
P18					
S21					
100-101'					

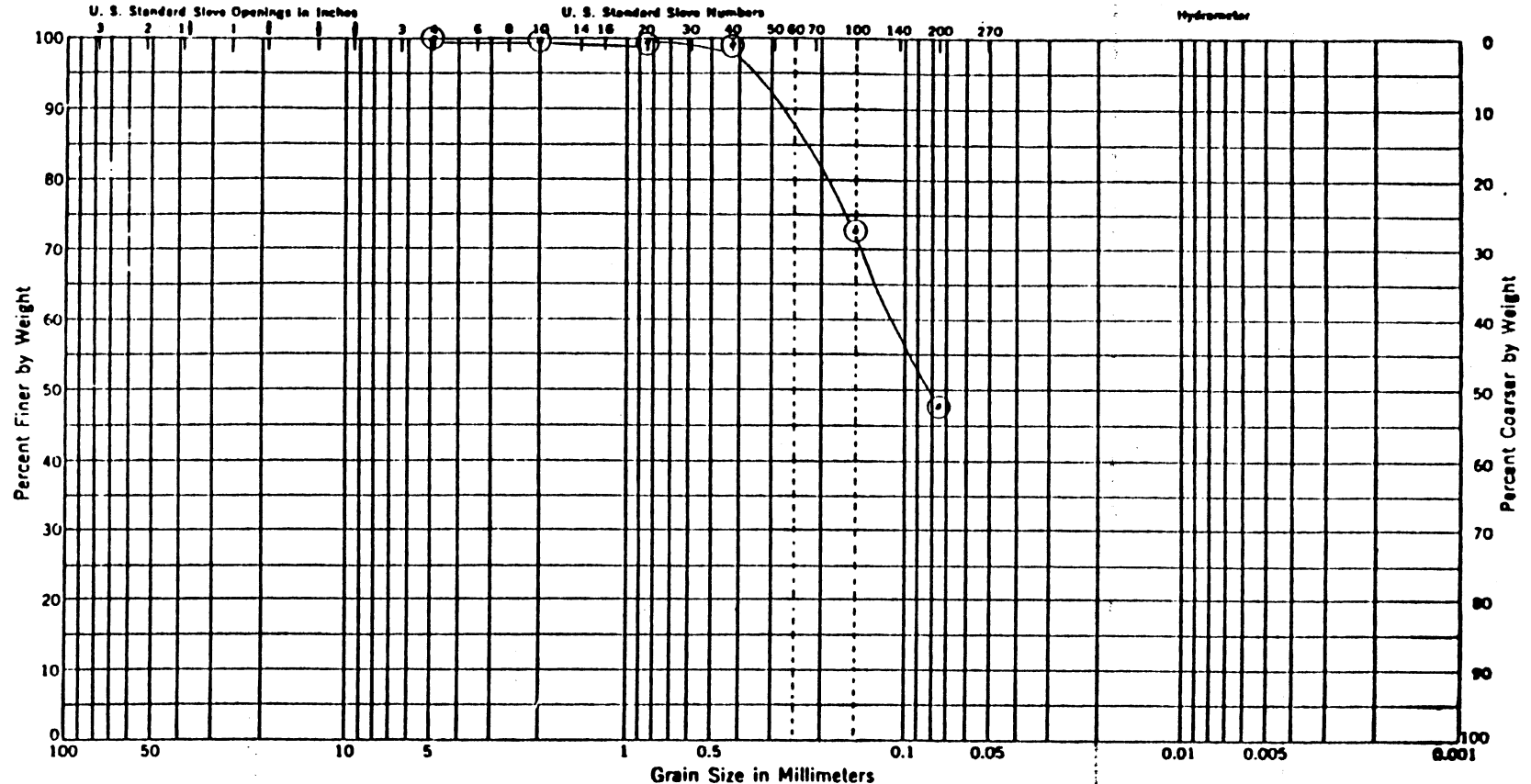
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	6-10-84	12959

3.5-21-108

UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
G41					Silty fine sand (SM)
Q22					
SA-3					
20.5-22'					

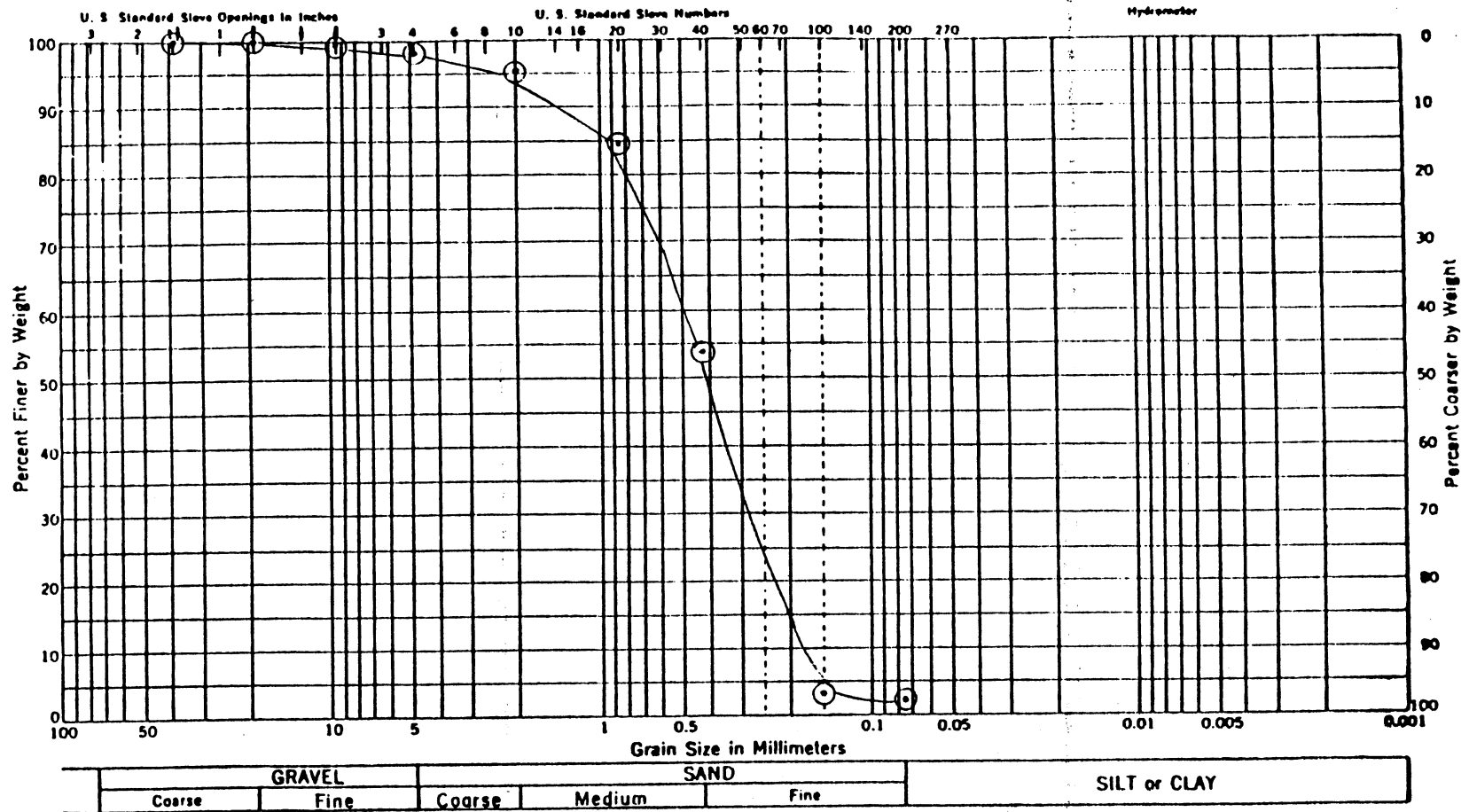
EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
SMD	JAS	5-18-84	12959

3.5-21-109

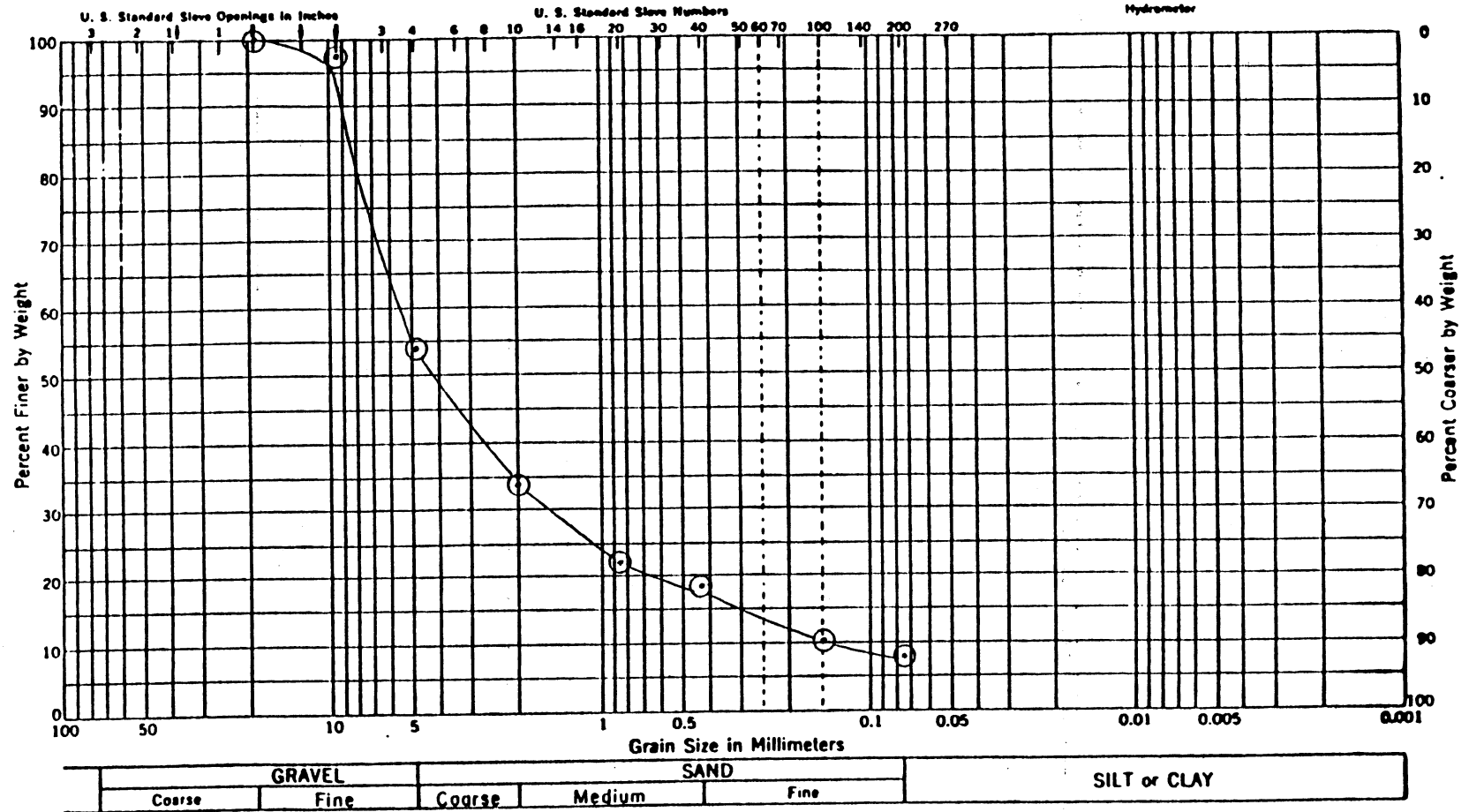
UNITED CLASSIFICATION SYSTEM

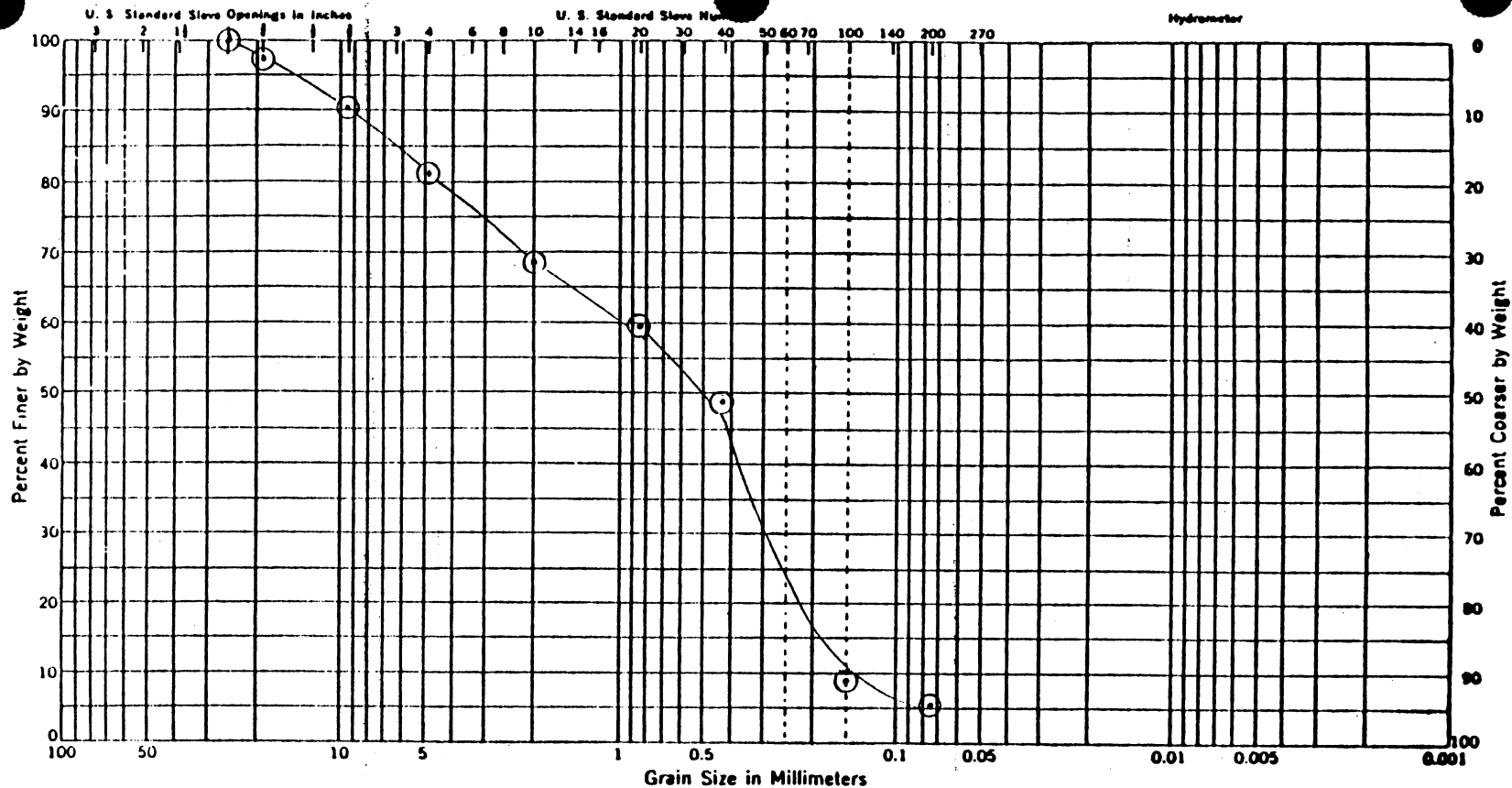


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41 Q22					Fine to medium sand (SP)				
SA-6						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
48.5-50.0'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

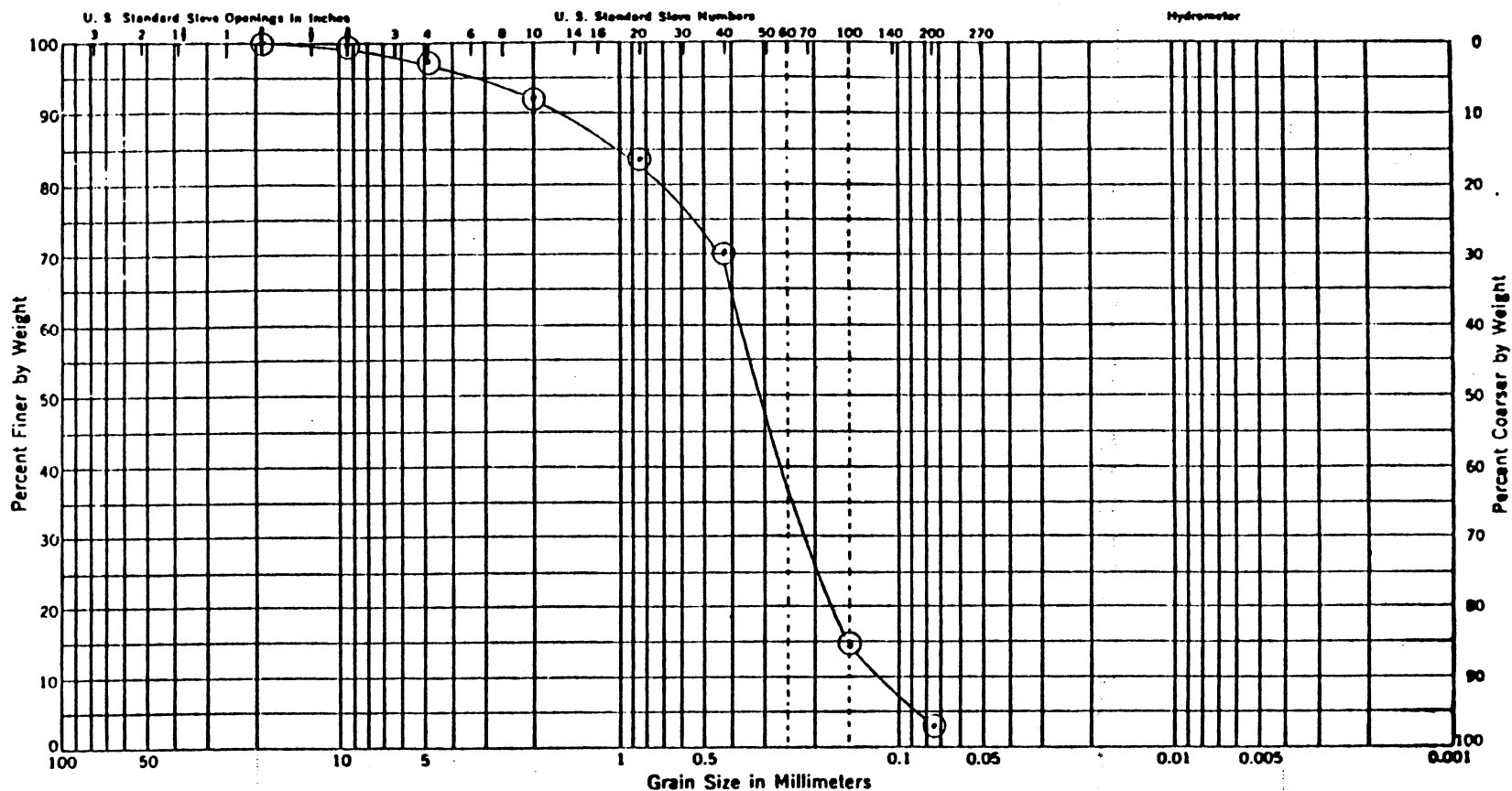
3.5-21-110

UNIFIED CLASSIFICATION SYSTEM

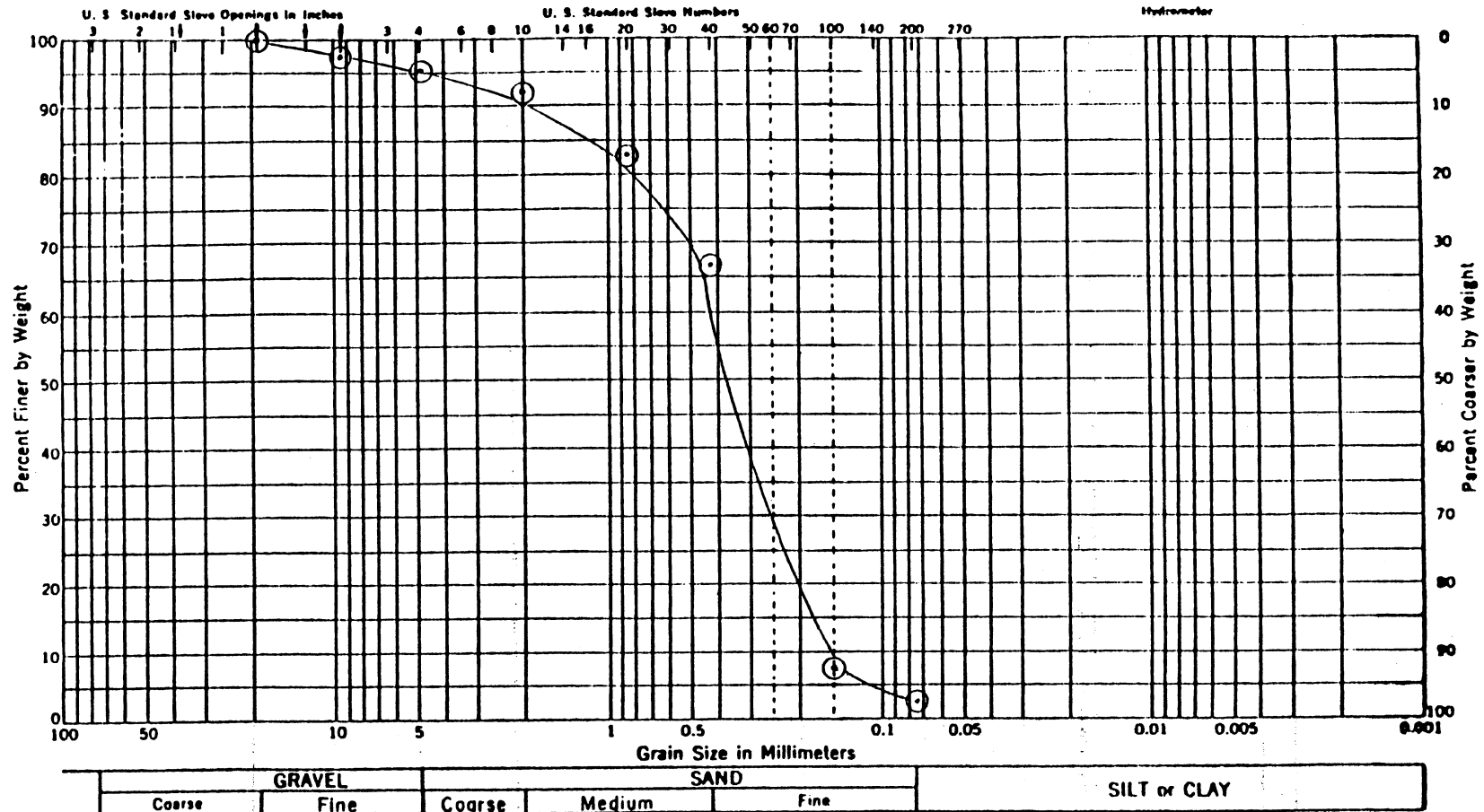




UNIFIED CLASSIFICATION SYSTEM

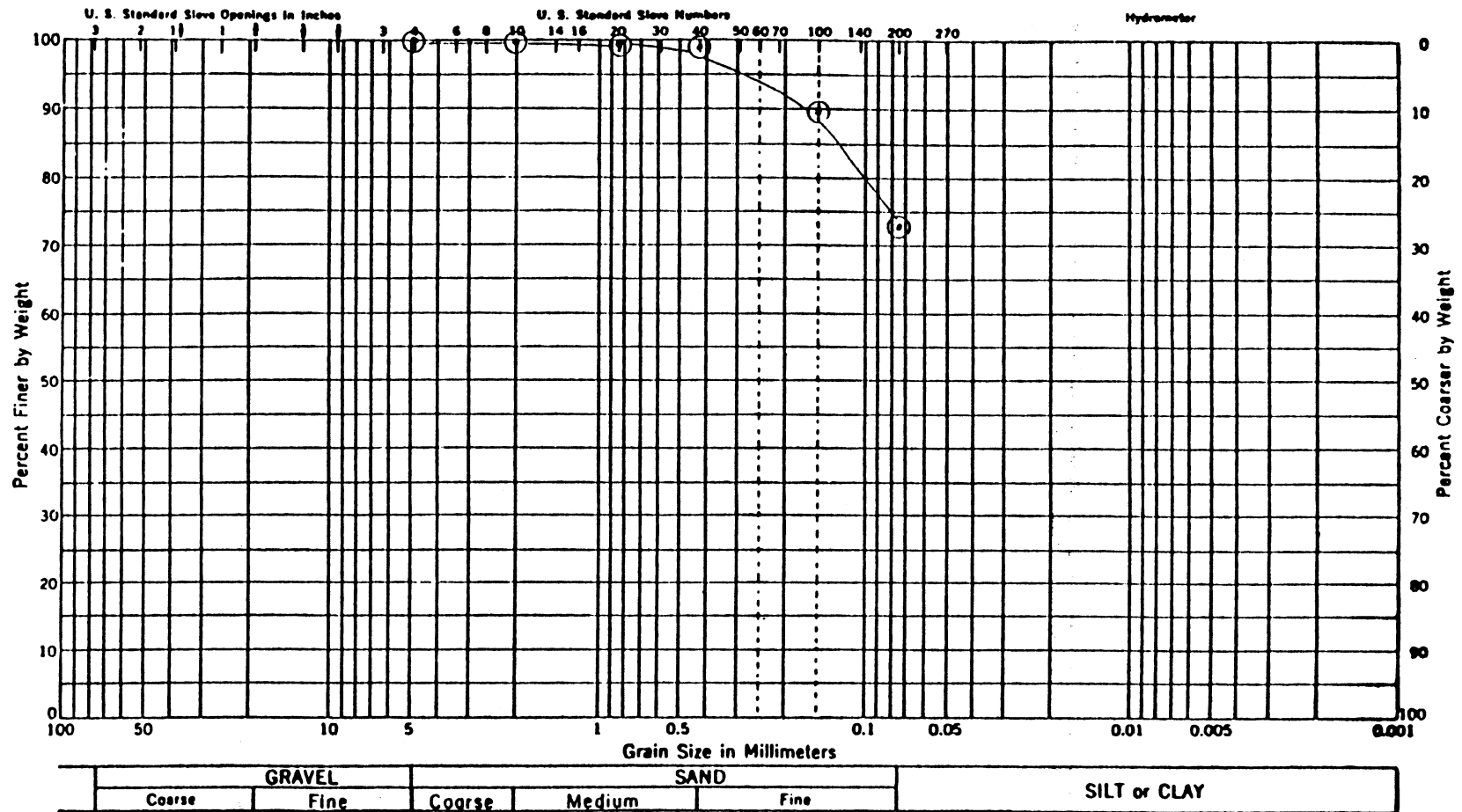


UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
G41 Q22					Fine to coarse sand (SP)				
SA-15									
138.5-140'									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

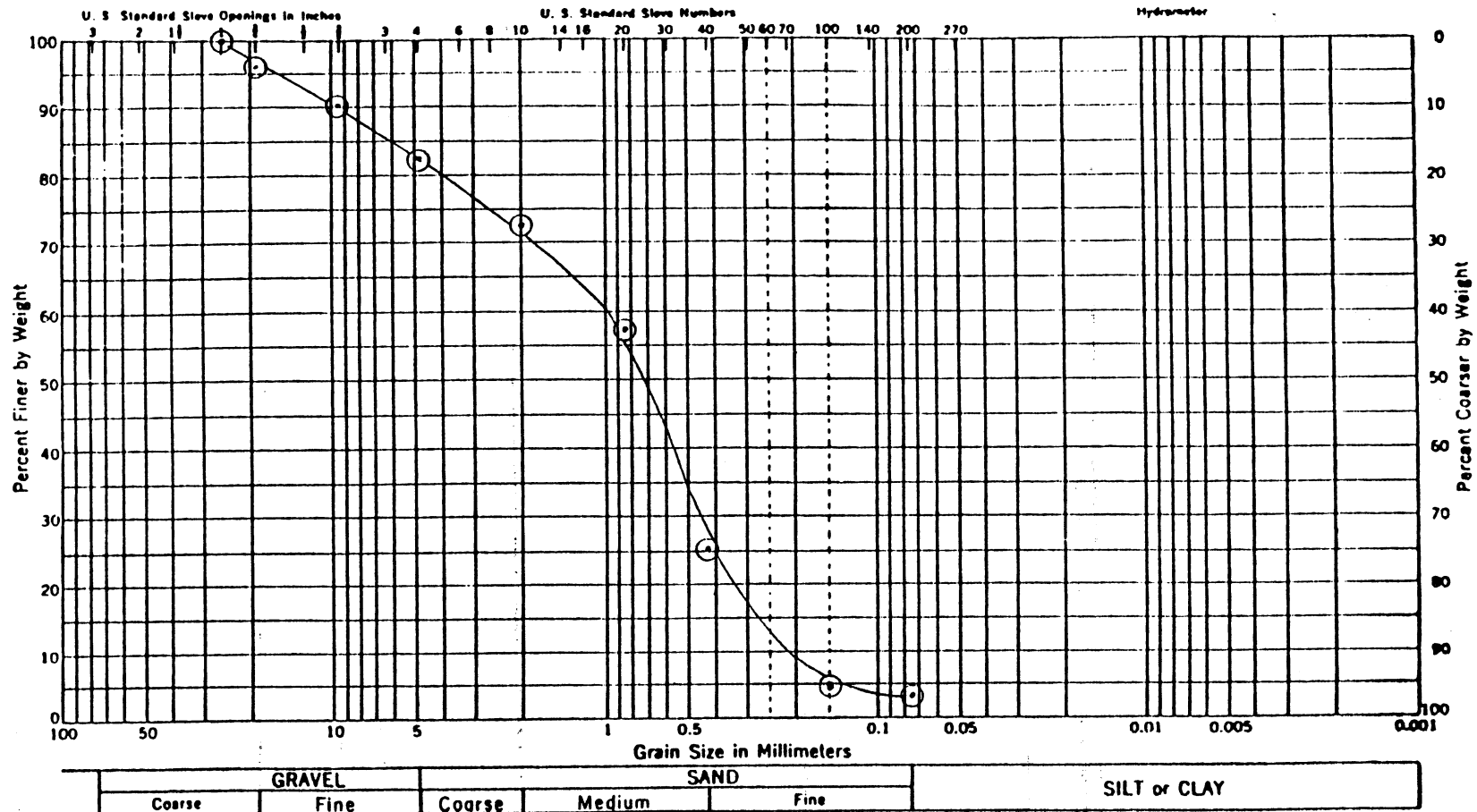
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41 Q22					Fine sandy silt (ML)				
SA-18						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
169-170.2'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

3.5-21-115

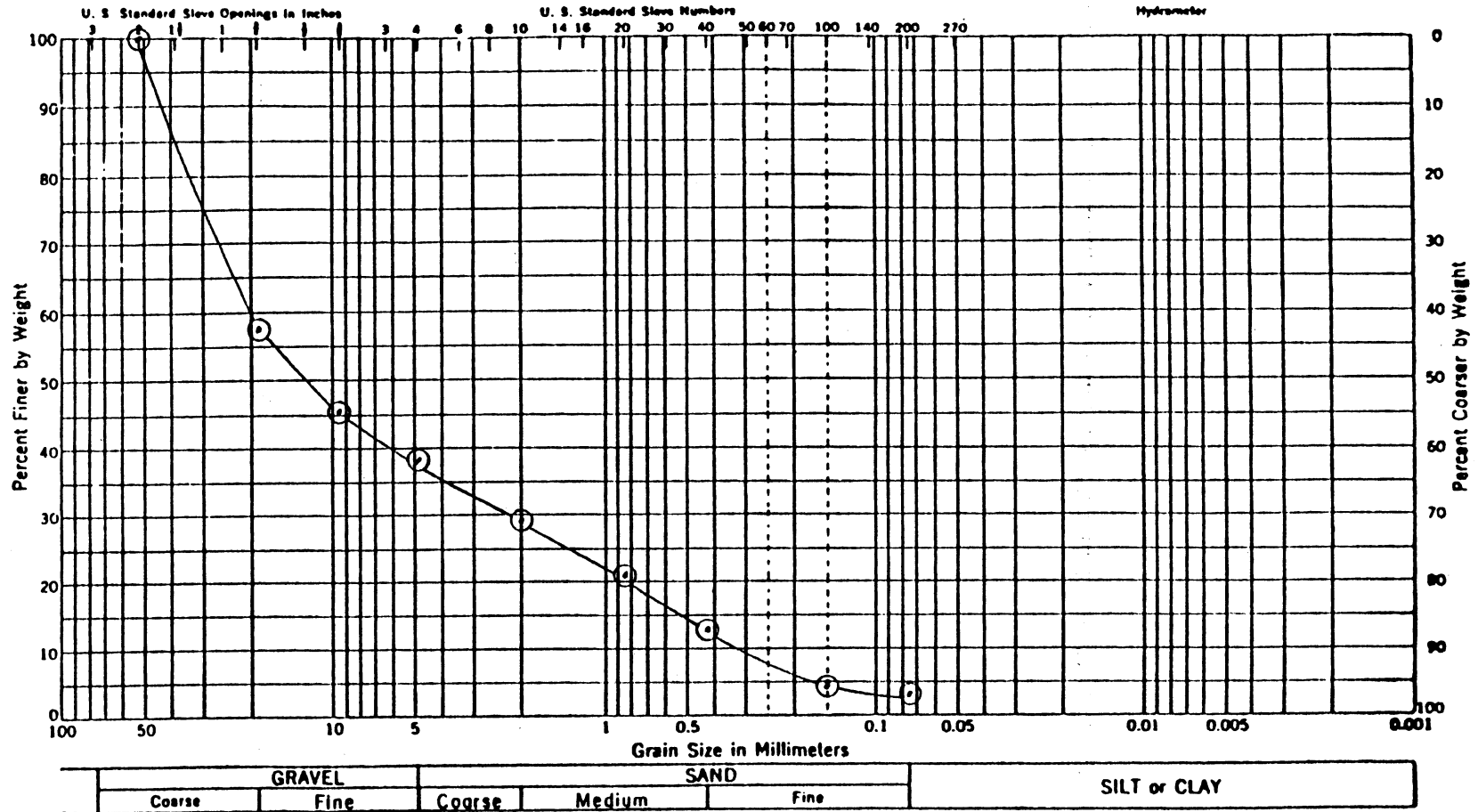
UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41 Q22					Fine to coarse sand (SP)				
SA-22						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
209-210.5'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

3.5-21-116

UNIFIED CLASSIFICATION SYSTEM



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	EXXON MINERALS COMPANY GRAIN SIZE ANALYSIS CRANDON PROJECT			
G41 Q22					Fine gravel (GP)				
SA-23						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
219-221'									
						DRAWN	APPROVED	DATE	JOB No.
						SMD	JAS	5-18-84	12959

3.5-21-117

Appendix 3.5-22

Grain Size and Proctor Curves For STS Consultants Ltd 1985 Tests on Samples from the Proposed MRDF Test Pits

STS Consultants Ltd.
540 LAMBEAU ST., GREEN BAY, WIS. 54303
PHONE (414) 494-9656

Date 11-8-85 Job Name Exxon - Crandon Project Job No. 14028

COMPACTION CONTROL REPORT

1. Laboratory Compaction Test Data

A. Description of Soil: Brown silty fine to coarse sand - with some gravel

Material Mark Lower till Classification SM AASHO
BPR

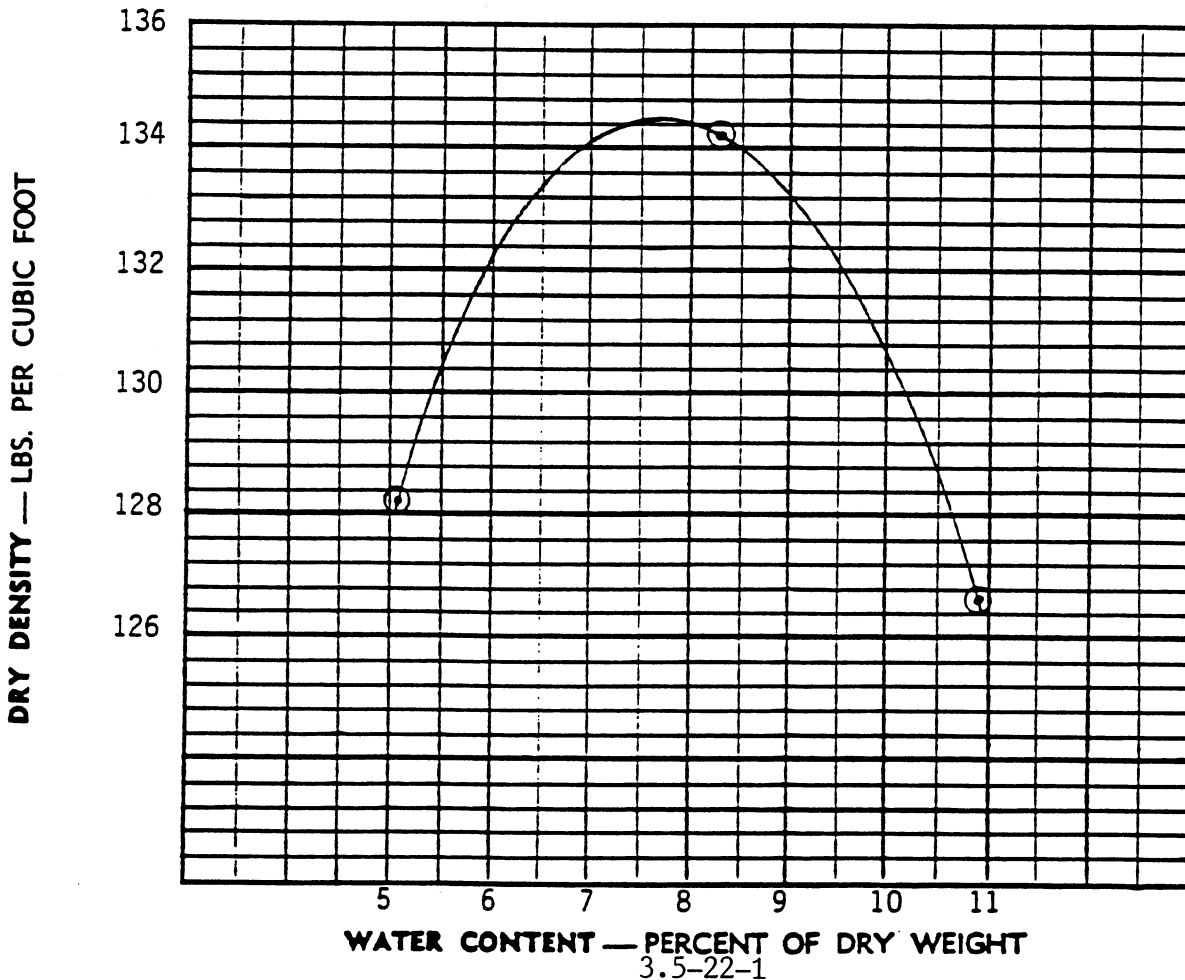
Source of Material Test pits at proposed MRDF
depth range 8 - 13'

Natural Water Content _____ % Natural Dry Density _____ PCF Specific Gravity _____

Liquid Limit _____ % Plastic Limit _____ % Plasticity Index _____

B. Test Procedure Used: ASTM D-698-78 Method "C"

C. Test Results: Optimum Water Content 7.7 %
Maximum Dry Density 134.5 PCF (at a Wet Density of _____ PCF)



Date 11-8-85 Job Name Exxon - Crandon Project Job No. 14028

COMPACTION CONTROL REPORT

1. Laboratory Compaction Test Data

A. Description of Soil: Reddish brown silty fine to coarse sand - trace of clay
and with some gravel

Material Mark Upper till Classification SM AASHO BPR

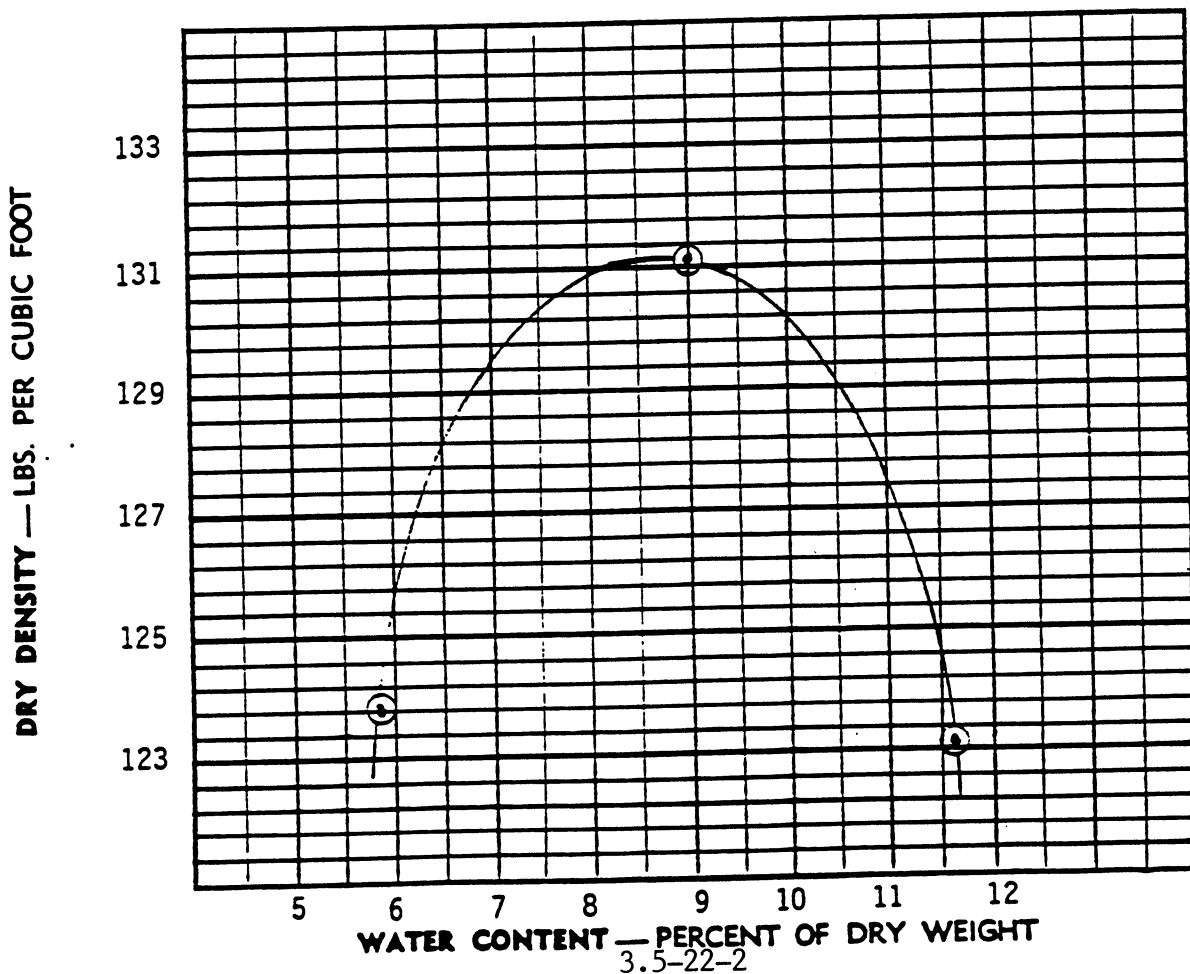
Source of Material Test pits at proposed MRDF
depth range 2-8'

Natural Water Content _____ % Natural Dry Density _____ PCF Specific Gravity _____

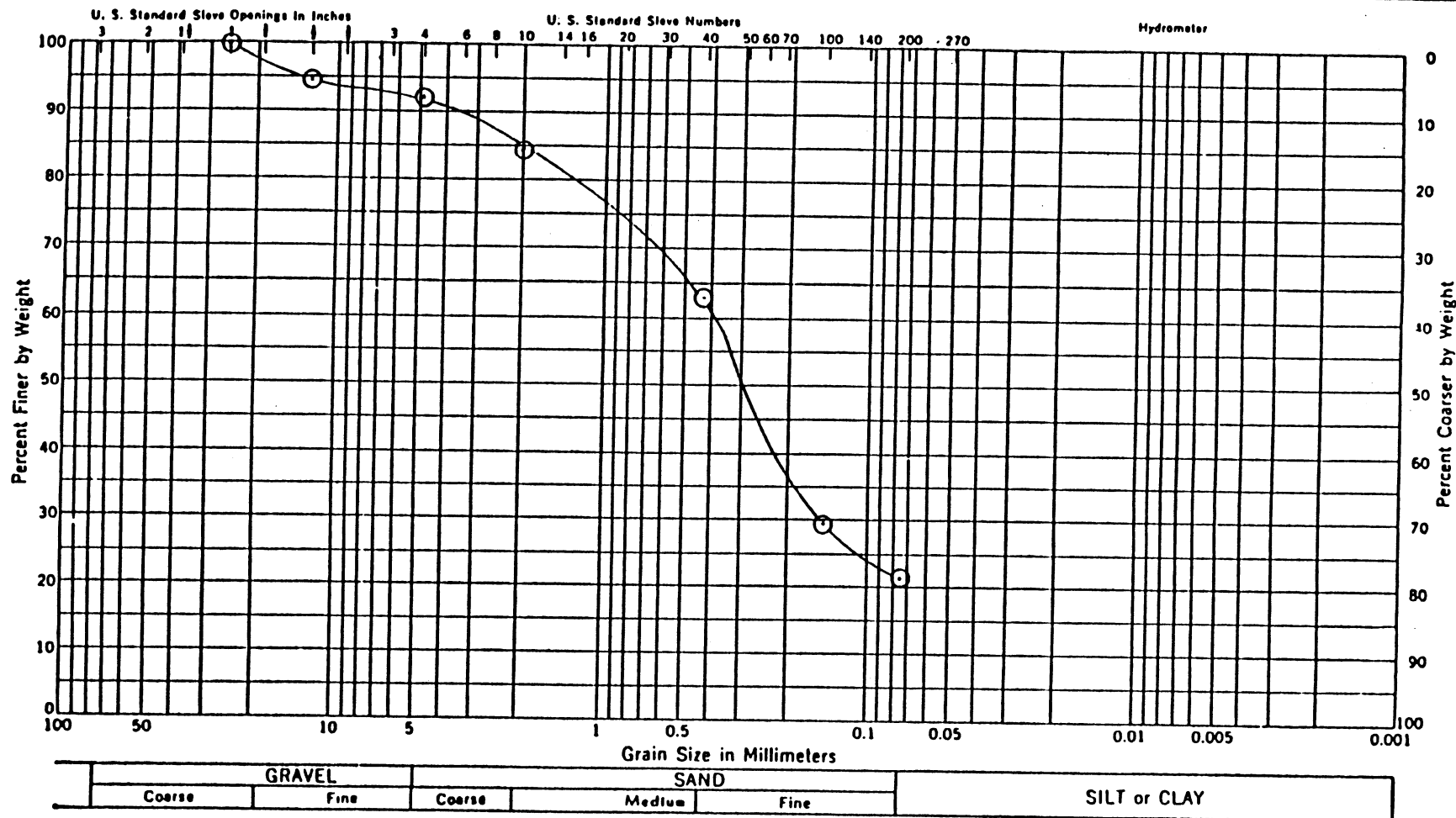
Liquid Limit _____ % Plastic Limit _____ % Plasticity Index _____

B. Test Procedure Used: ASTM D-698-78 Method "C"

C. Test Results: Optimum Water Content 8.7 %
Maximum Dry Density 131.3 PCF (at a Wet Density of _____ PCF)



3.5-22-3



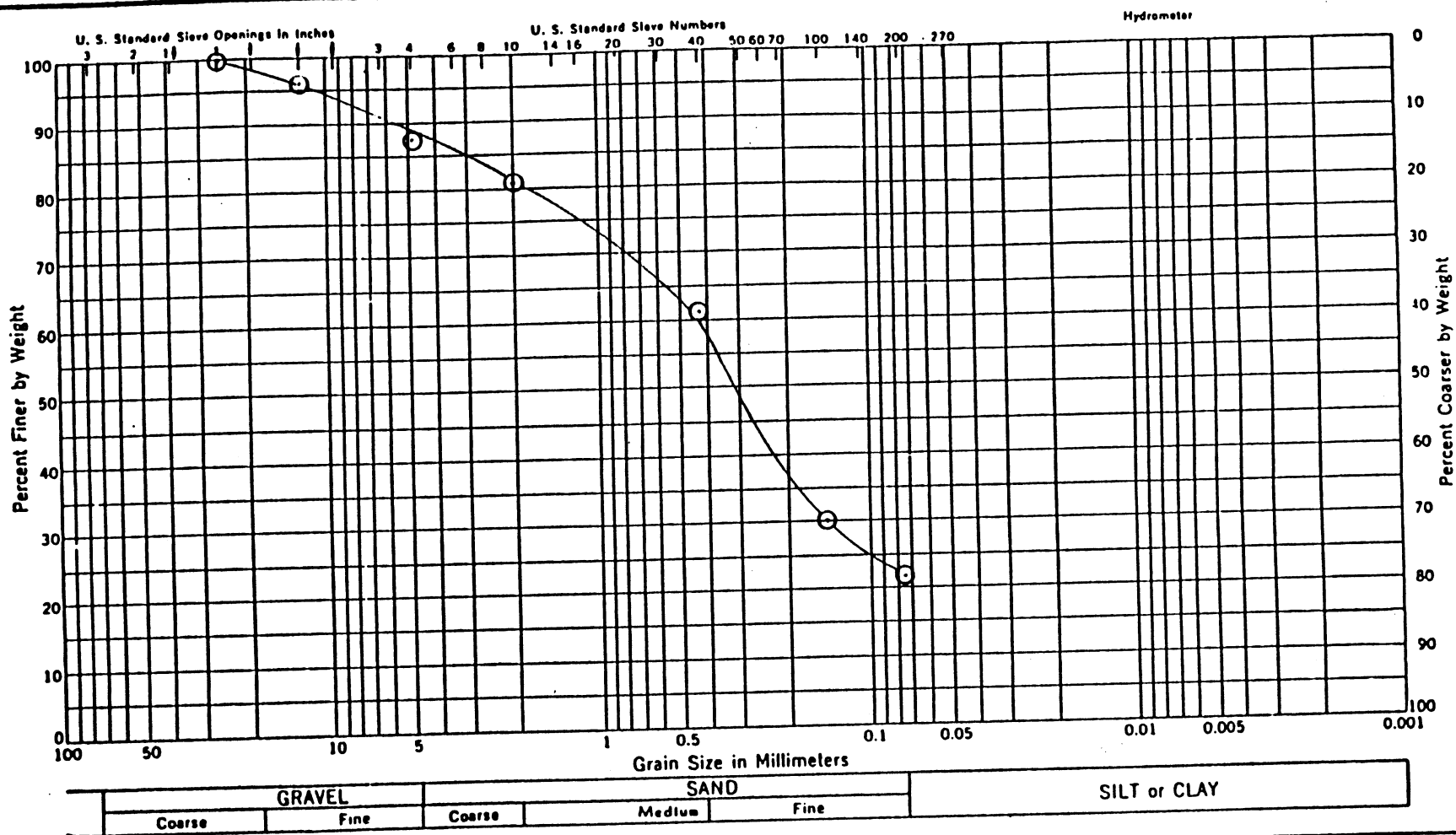
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION
TP-85-8	2-8								SM

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
KJC	TWK	11-11-85	14025

3.5-22-4



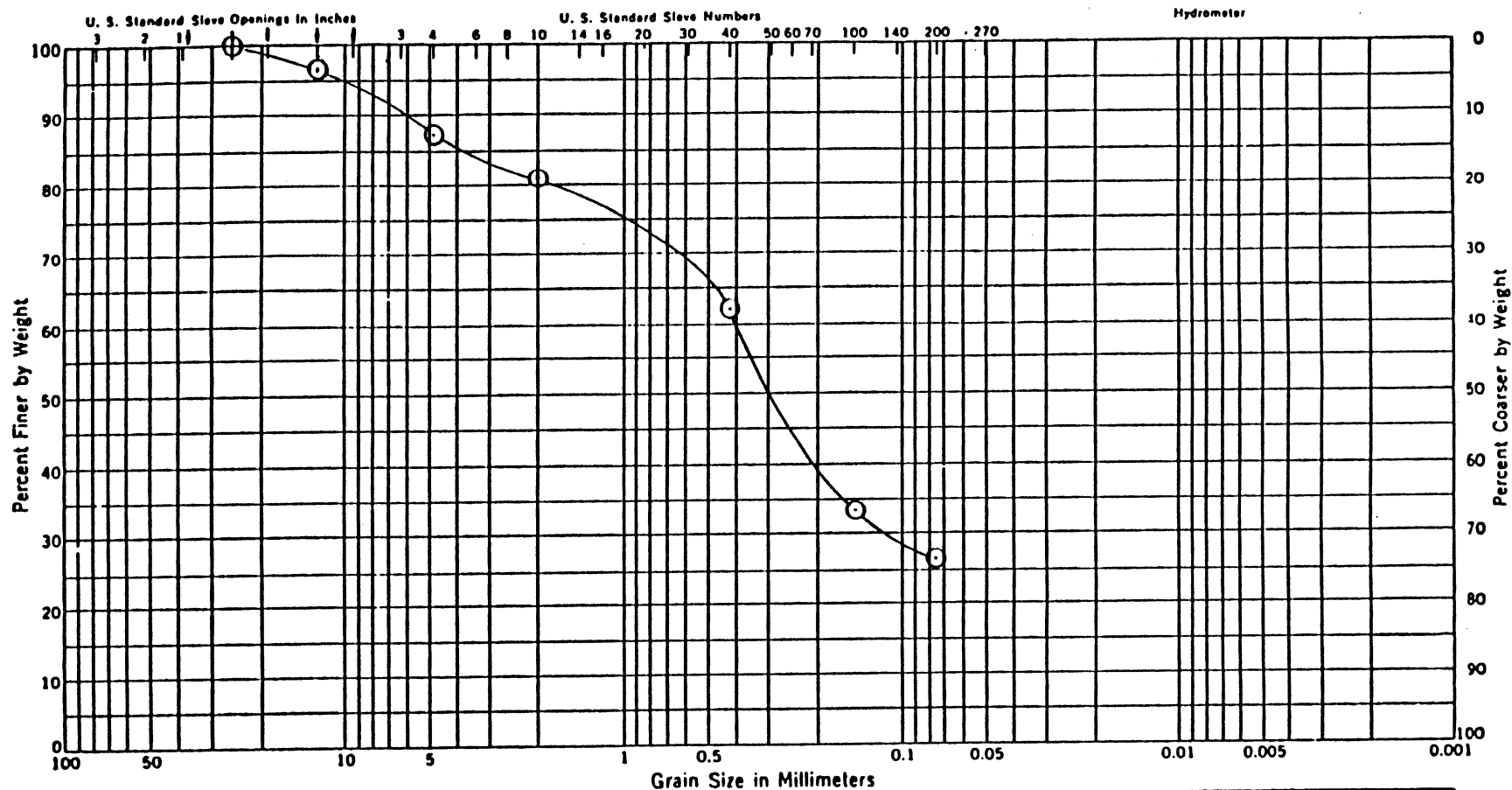
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION
TP-85-9		2-8							SM

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

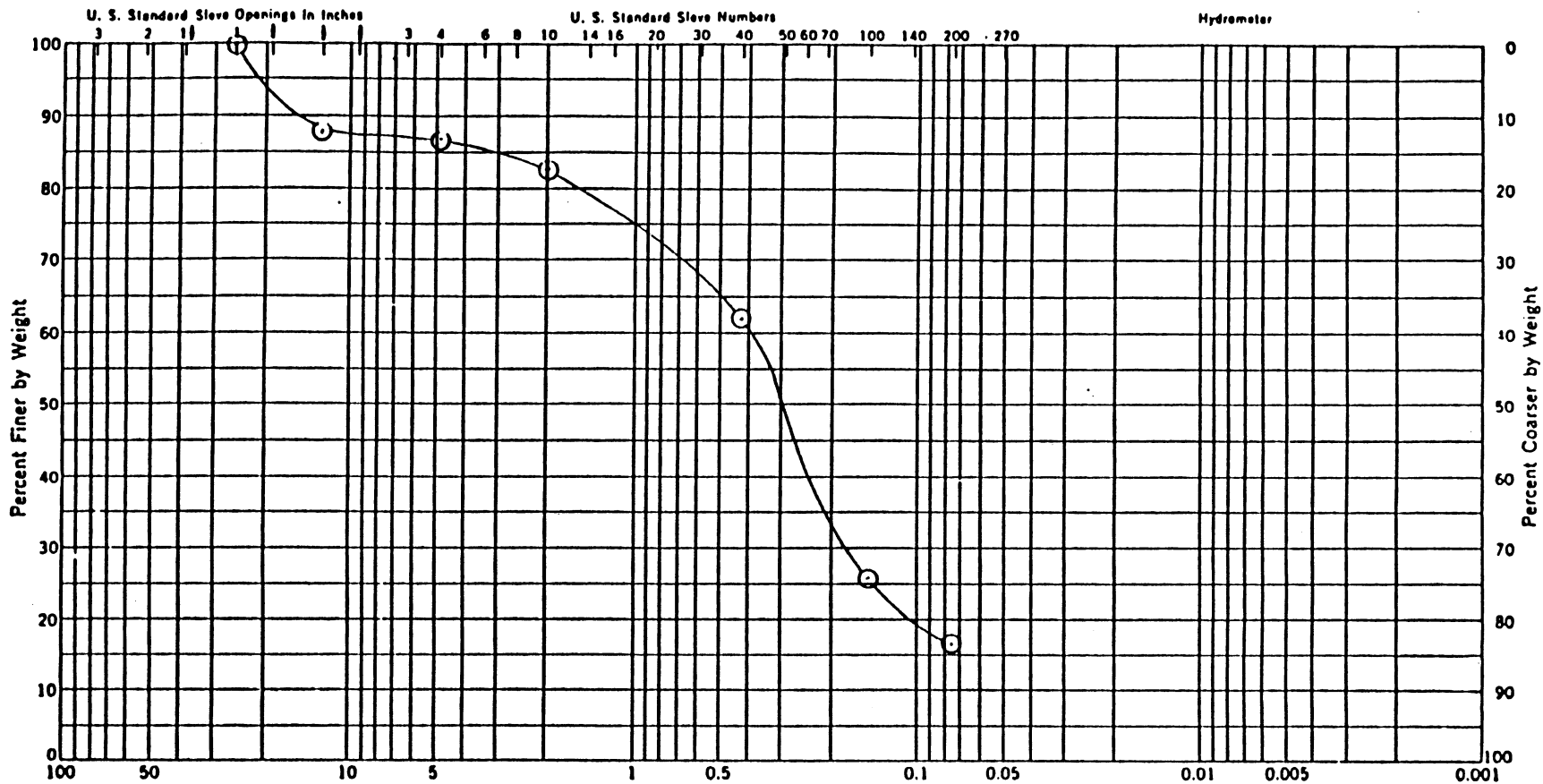
STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
HTC	JWK	11-11-85	123

3.5-22-5



3.5-22-6



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

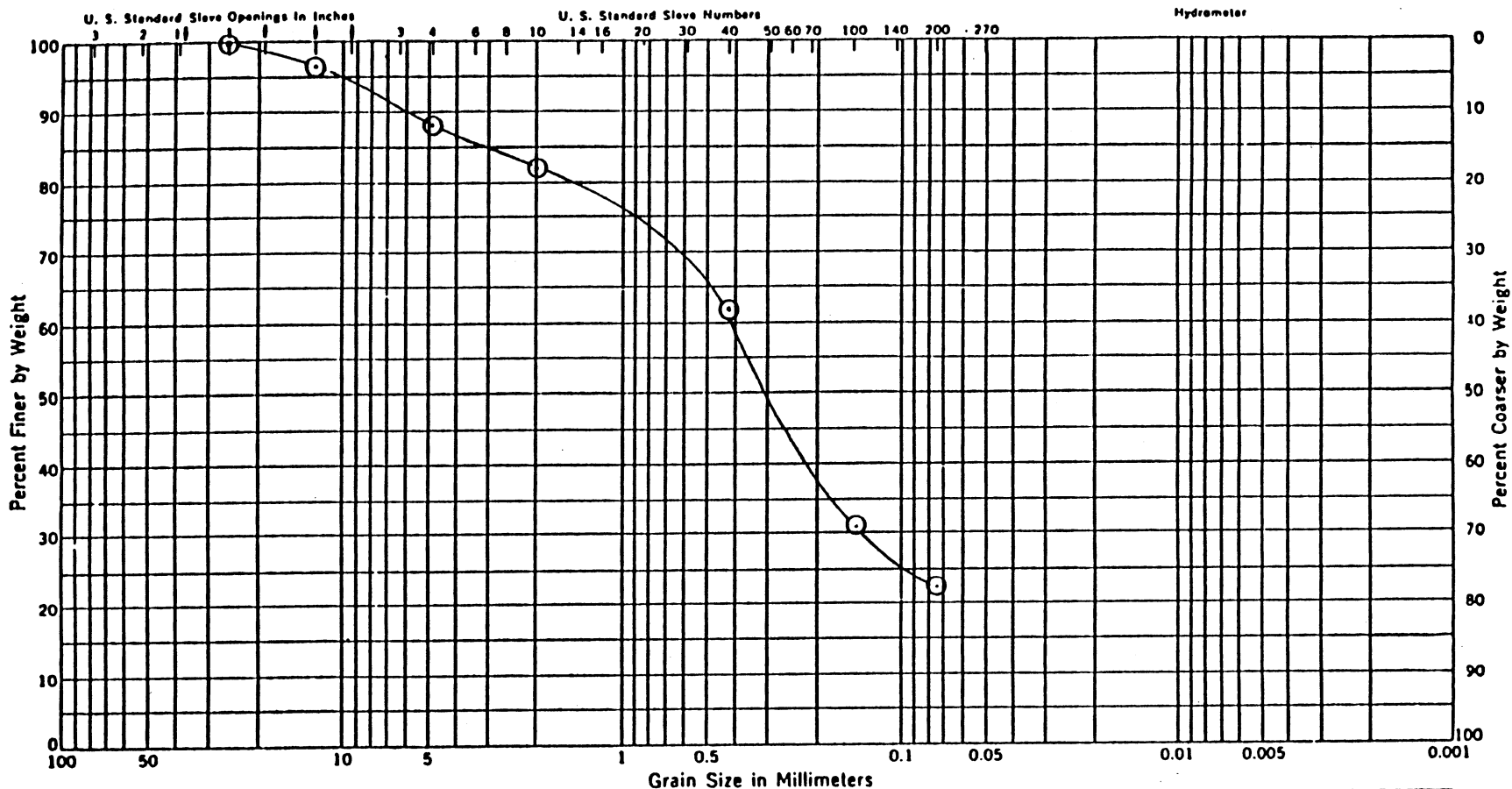
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION
TP-85-14	10-12								SM

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
ATC	TWL	11-11-95	1078

3.5-22-7



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

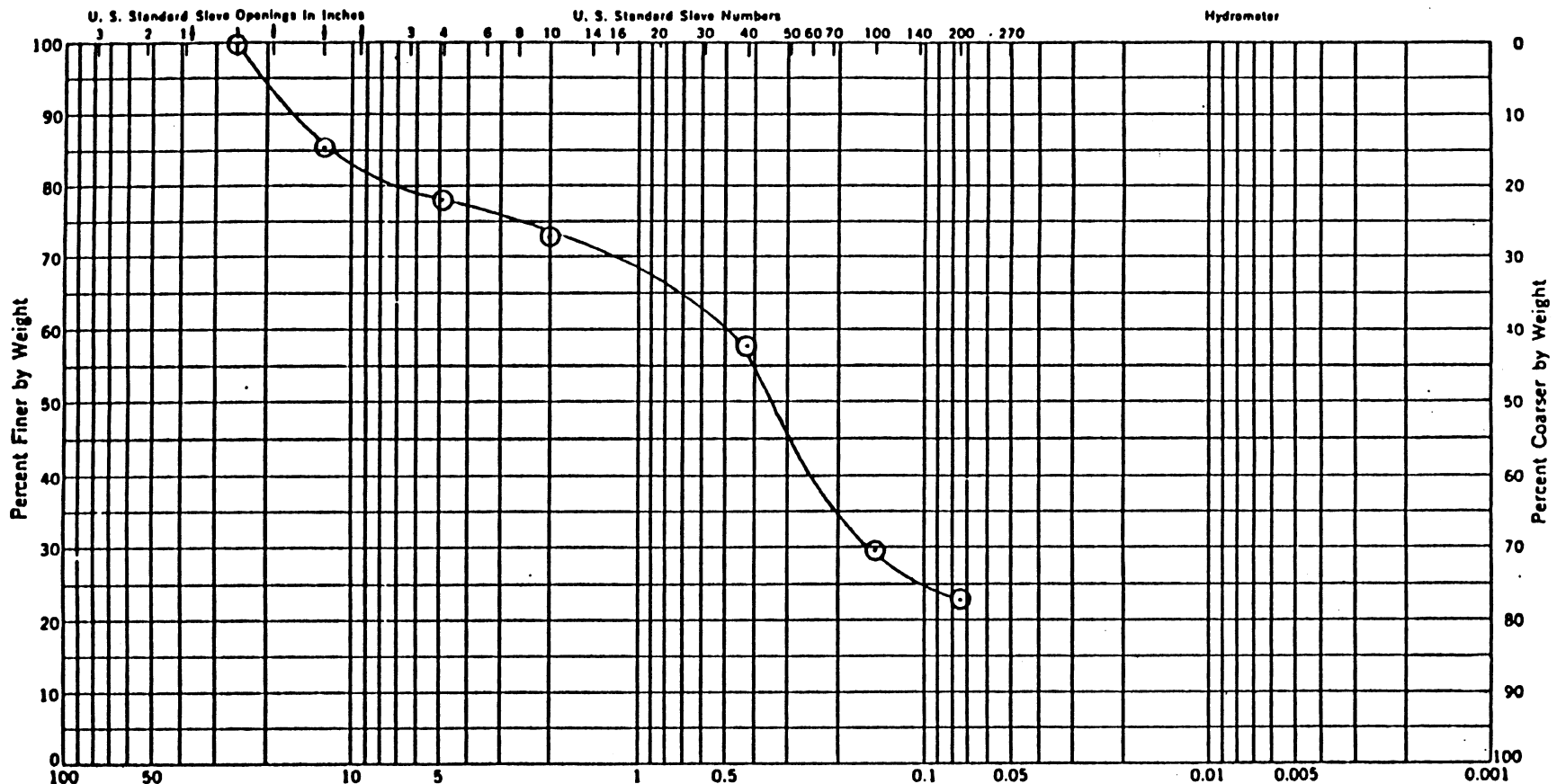
BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION
TP-85-15	5-7								SM

EXXON MINERALS COMPANY
GRAIN SIZE ANALYSIS
CRANDON PROJECT

STS Consultants Ltd.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
ETL	JWR	11-11-84	14028

3.5-22-8



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION
TP-85-17		10-12							SM

EXXON MINERALS COMPANY
 GRAIN SIZE ANALYSIS
 CRANDON PROJECT

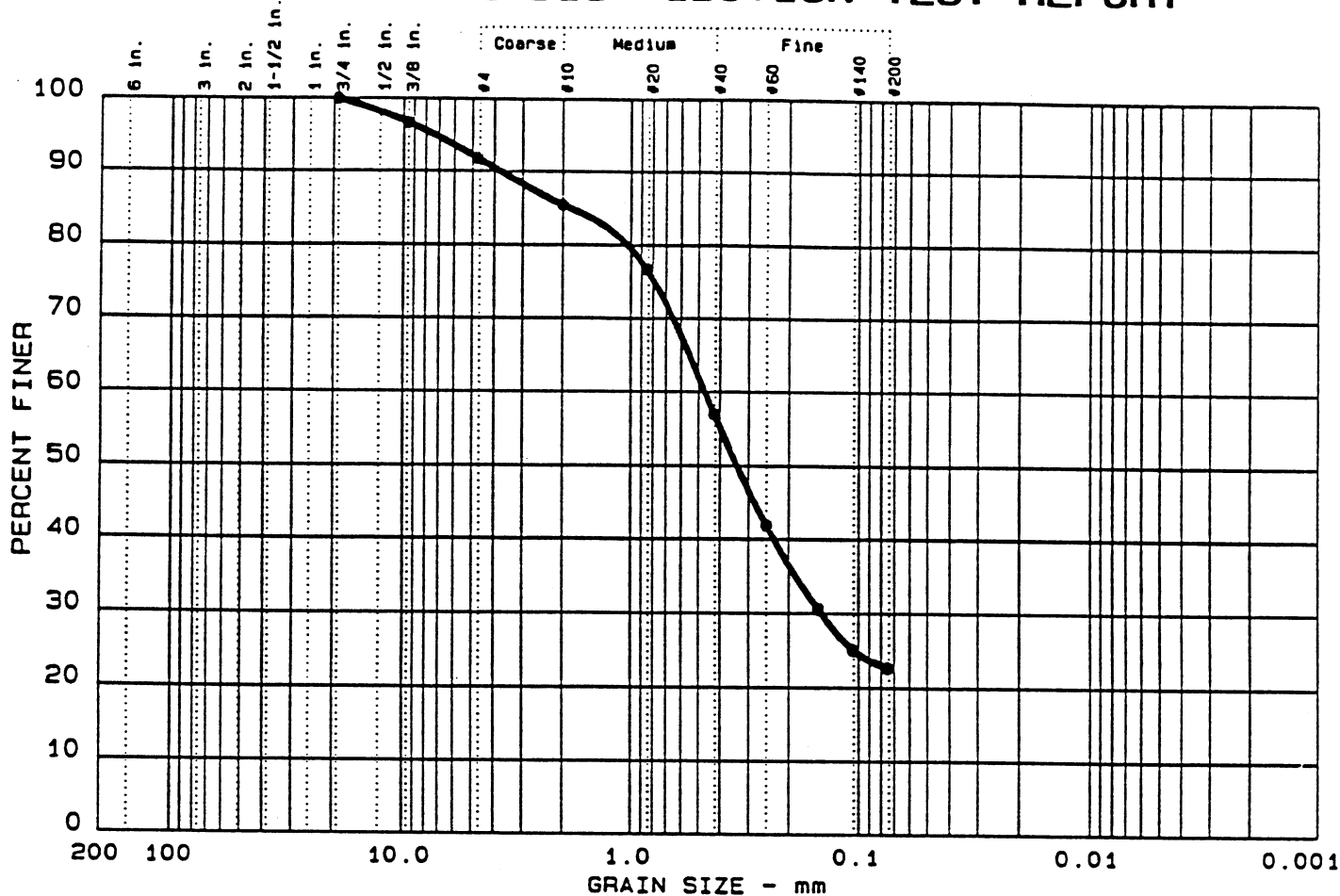
STS Consultants Ltd.
 540 LAMBEAU STREET
 GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
KJC	JWK	11-11-85	028

Appendix 3.5-23

**Grain Size Curves from 1994 Foth & Van Dyke
Verification Groundwater Monitoring Well Installations**

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	8.2	69.1	22.7		SM		

SIEVE inches size	PERCENT FINER		
•			
0.75	100.0		
0.375	96.7		
X GRAIN SIZE			
D ₆₀	0.47		
D ₃₀	0.14		
D ₁₀			
X COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
•			
4	91.8		
10	85.5		
20	76.7		
40	57.0		
60	41.9		
100	30.6		
140	25.1		
200	22.7		

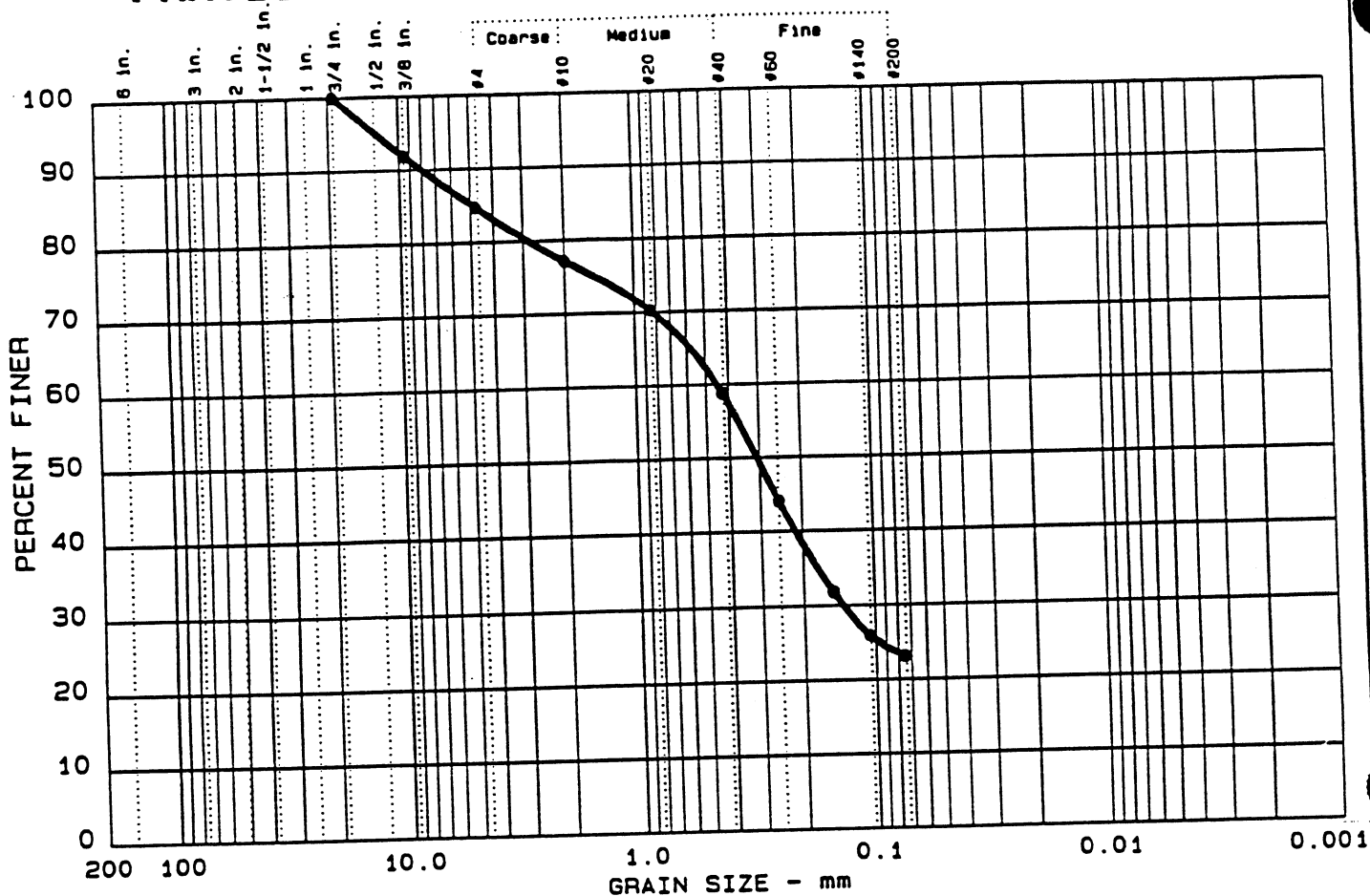
Sample information:
 • CMC-01 82.5'-84.5'
 Brown silty SAND

Remarks:
 TESTED BY: MAT
 CHECKED BY: *GP*

**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
 Project: CRANDON MINING CO. 3.5-23-1
 Date: JUNE 10, 1994
 Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	15.3	61.6	23.1		SM		

SIEVE inches size	PERCENT FINER		
0.75	100.0		
0.375	91.9		
GRAIN SIZE			
D ₆₀	0.45		
D ₃₀	0.14		
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
•			
4	84.7		
10	77.2		
20	70.3		
40	58.8		
60	44.1		
100	31.8		
140	25.9		
200	23.1		

Sample information:
 • CMC-01R 53.0'-55.0'
 Light red silty SAND
 with gravel

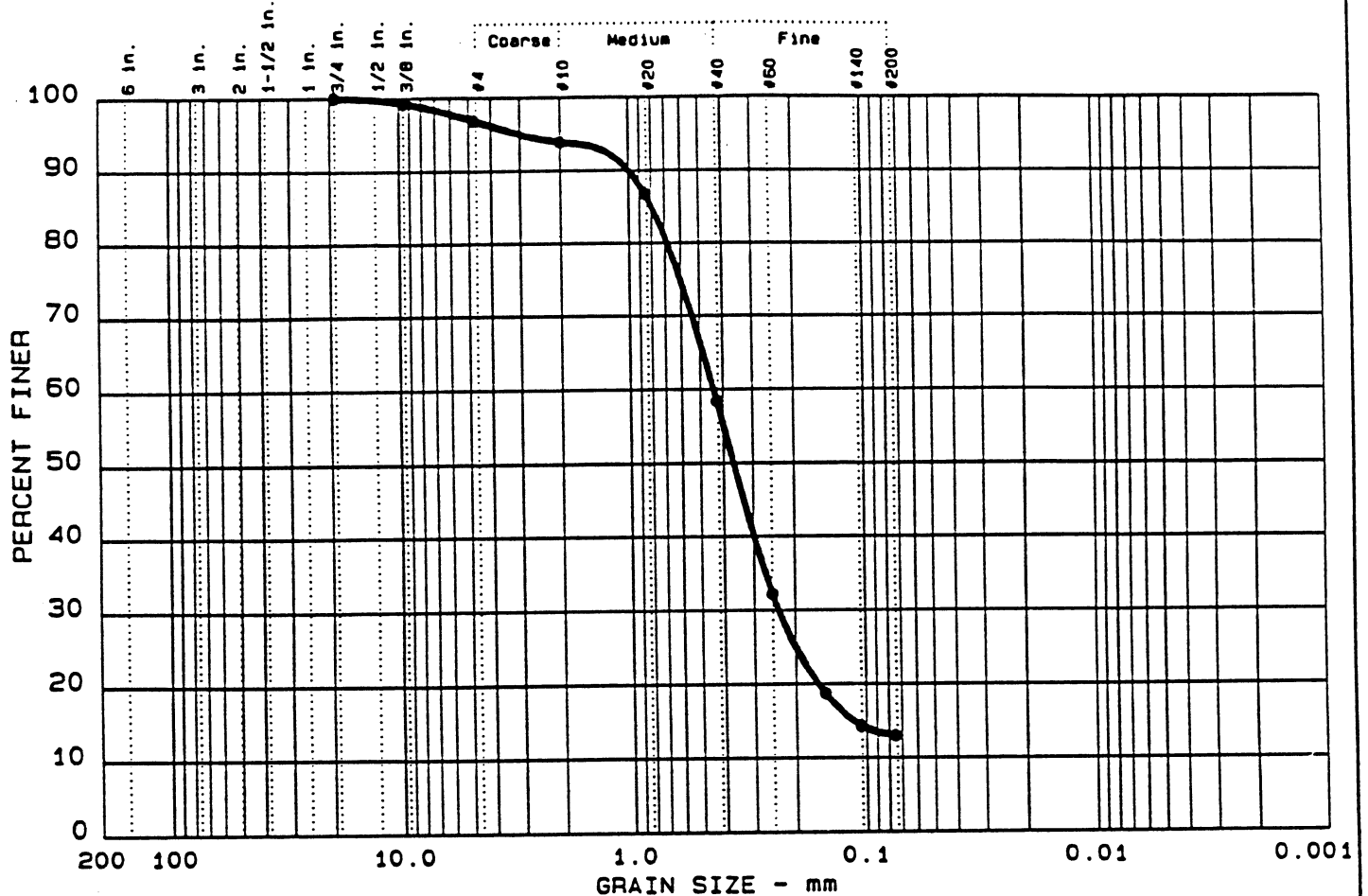
Remarks:
 TESTED BY: NL
 CHECKED BY: *GS*

**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
 Project: CRANDON MINING CO. 3.5-23-2
 Date: JUNE 10, 1994

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	3.1	83.9	13.0		SM		

SIEVE inches size	PERCENT FINER		
•			
0.75	100.0		
0.375	99.3		
GRAIN SIZE			
D ₆₀	0.44		
D ₃₀	0.24		
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
•			
4	96.9		
10	93.9		
20	86.8		
40	58.4		
60	32.2		
100	18.7		
140	14.3		
200	13.0		

Sample information:
 • CMC-01P 143.0'-145.0'
 Brown silty SAND

Remarks:
 TESTED BY: NL
 CHECKED BY: *CS*

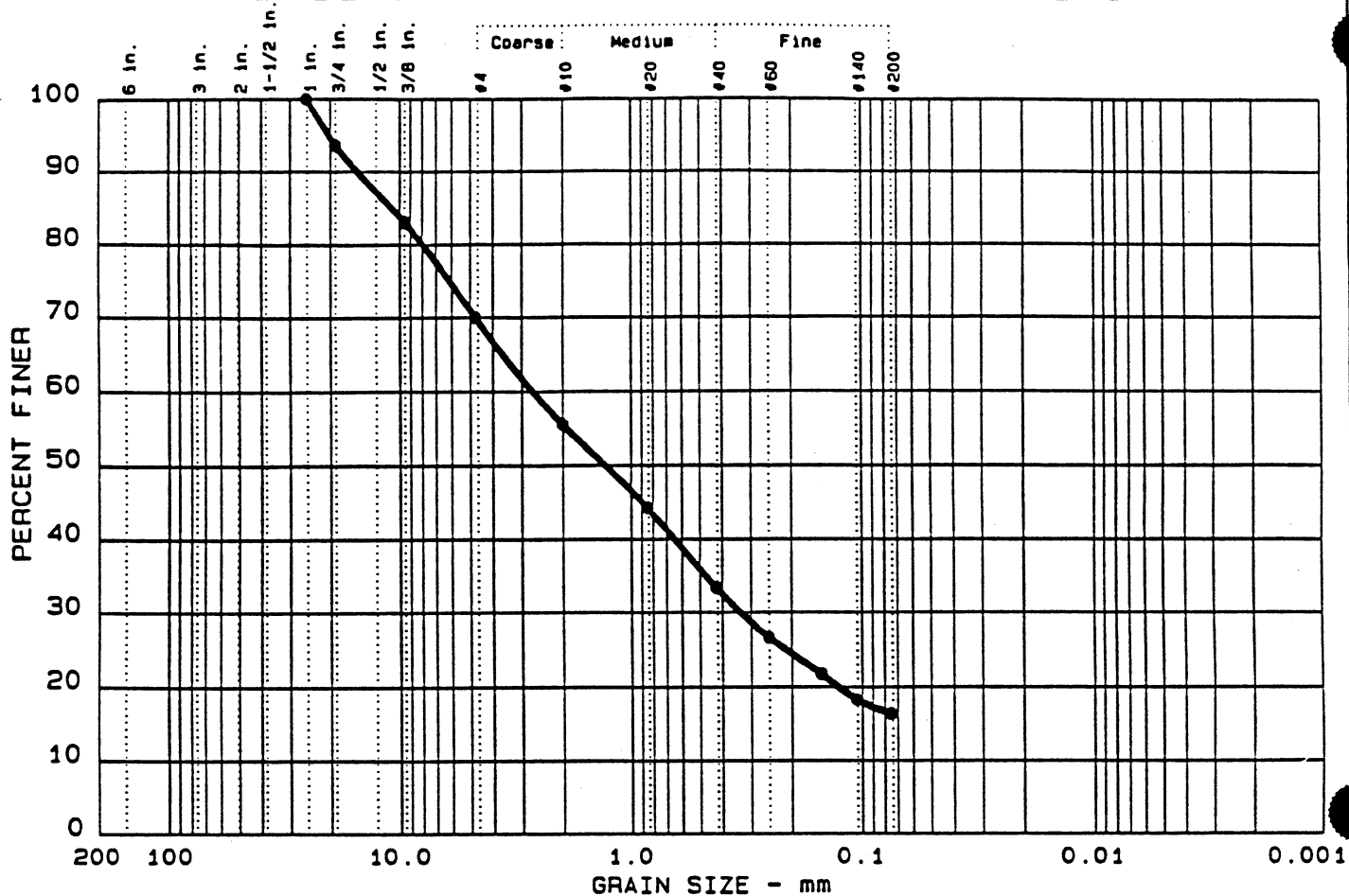
**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
 Project: CRANDON MINING CO. 3.5-23-3

Date: JUNE 10, 1994

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	30.0	53.6	16.4		SM		

SIEVE inches size	PERCENT FINER		
●			
1	100.0		
0.75	93.7		
0.375	83.1		
GRAIN SIZE			
D ₆₀	2.66		
D ₃₀	0.33		
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
●			
4	70.0		
10	55.6		
20	44.3		
40	33.4		
60	26.6		
100	21.7		
140	18.3		
200	16.4		

Sample information:
 ● CMC-02P 191.0'-193.0'
 Gray silty SAND;
 with gravel

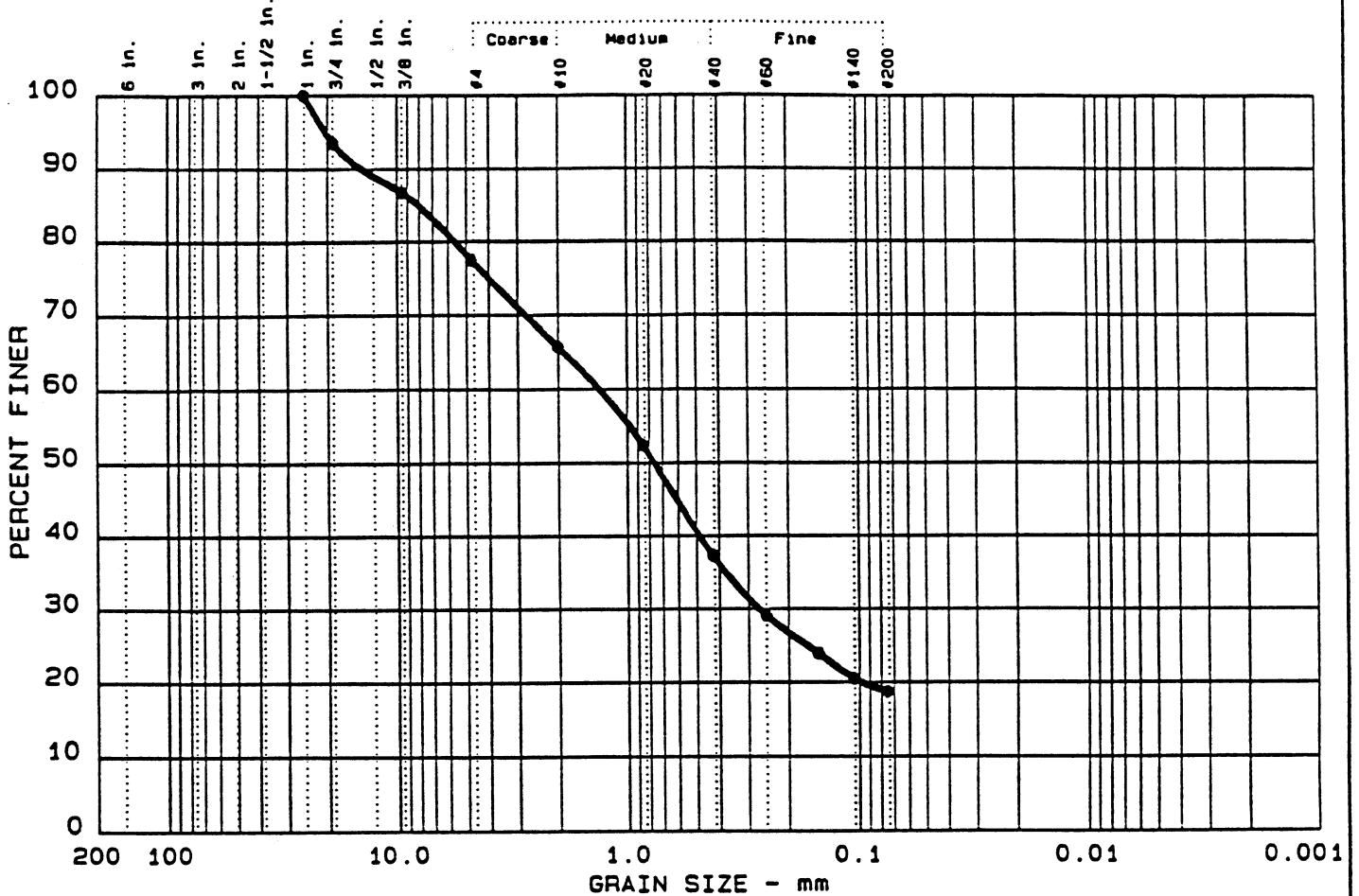
Remarks:
 TESTED BY: NL
 CHECKED BY: CF

**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
 Project: CRANDON MINING CO. 3.5-23-4
 Date: JUNE 10, 1994

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	22.5	58.8	18.7		SM		

SIEVE inches size	PERCENT FINER		
	●		
1	100.0		
0.75	93.6		
0.375	86.8		
	GRAIN SIZE		
D ₆₀	1.32		
D ₃₀	0.27		
D ₁₀			
	COEFFICIENTS		
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	●		
4	77.5		
10	65.7		
20	52.4		
40	37.3		
60	29.1		
100	23.9		
140	20.5		
200	18.7		

- CMC-03RR 113.0'-115.0'
Gray-brown silty SAND
with gravel

TESTED BY: NL
CHECKED BY: *CS*

**WOODWARD-CLYDE
CONSULTANTS**

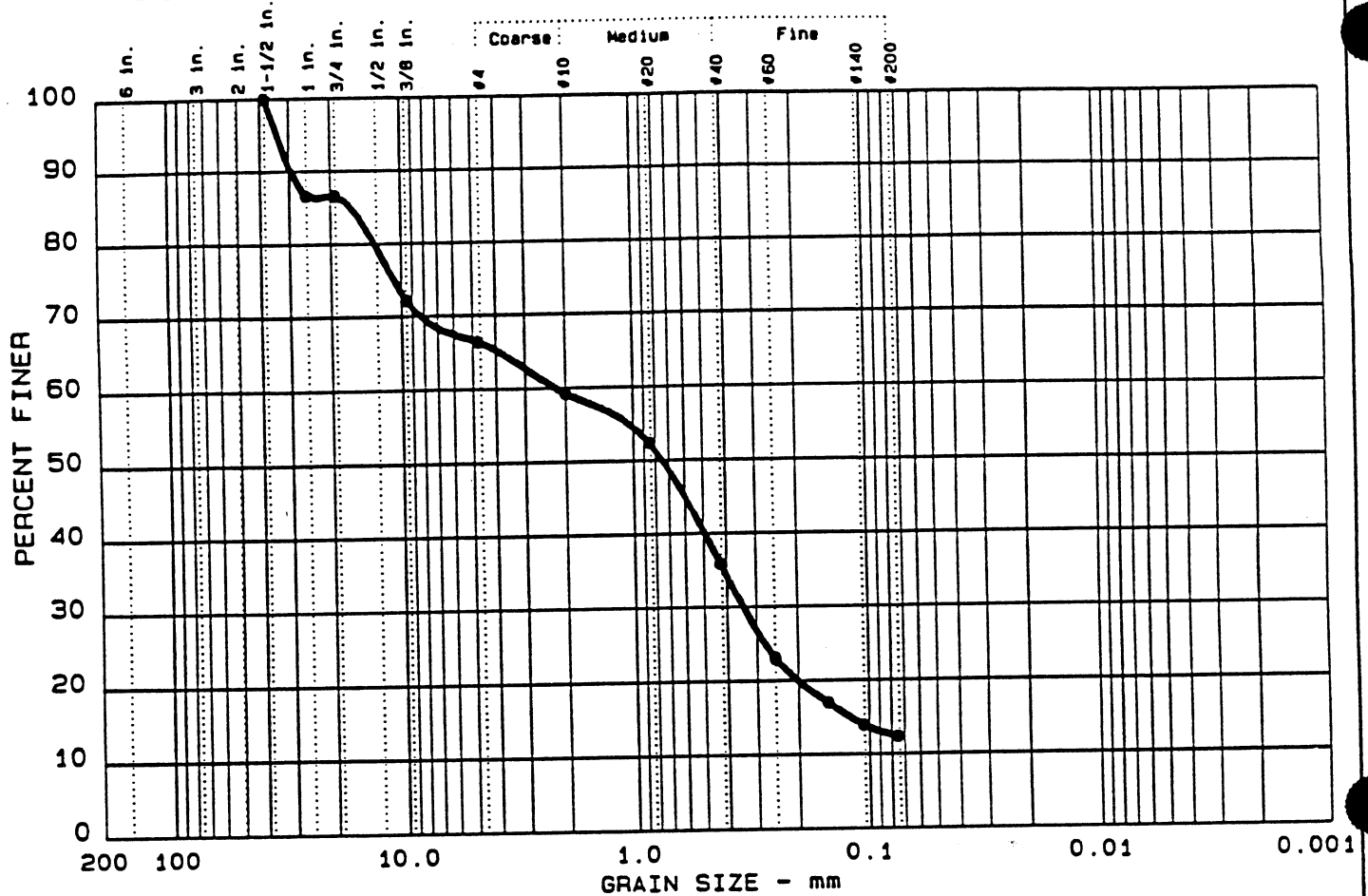
Project: CRANDON MINING CO.

Date: JUNE 10, 1994

3.5-23-5

Sheet No.

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	33.6	54.1	12.3		SM		

SIEVE inches size	PERCENT FINER		
●			
1.5	100.0		
1	86.6		
0.75	86.6		
0.375	72.2		
GRAIN SIZE			
D ₆₀	2.19		
D ₃₀	0.34		
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
●			
4	66.4		
10	59.3		
20	52.4		
40	35.9		
60	23.0		
100	17.0		
140	13.9		
200	12.3		

Sample information:

● CMC-03P 190.0'-191.0'
Brown silty SAND
with gravel

Remarks:

TESTED BY: NL

CHECKED BY: *CS*

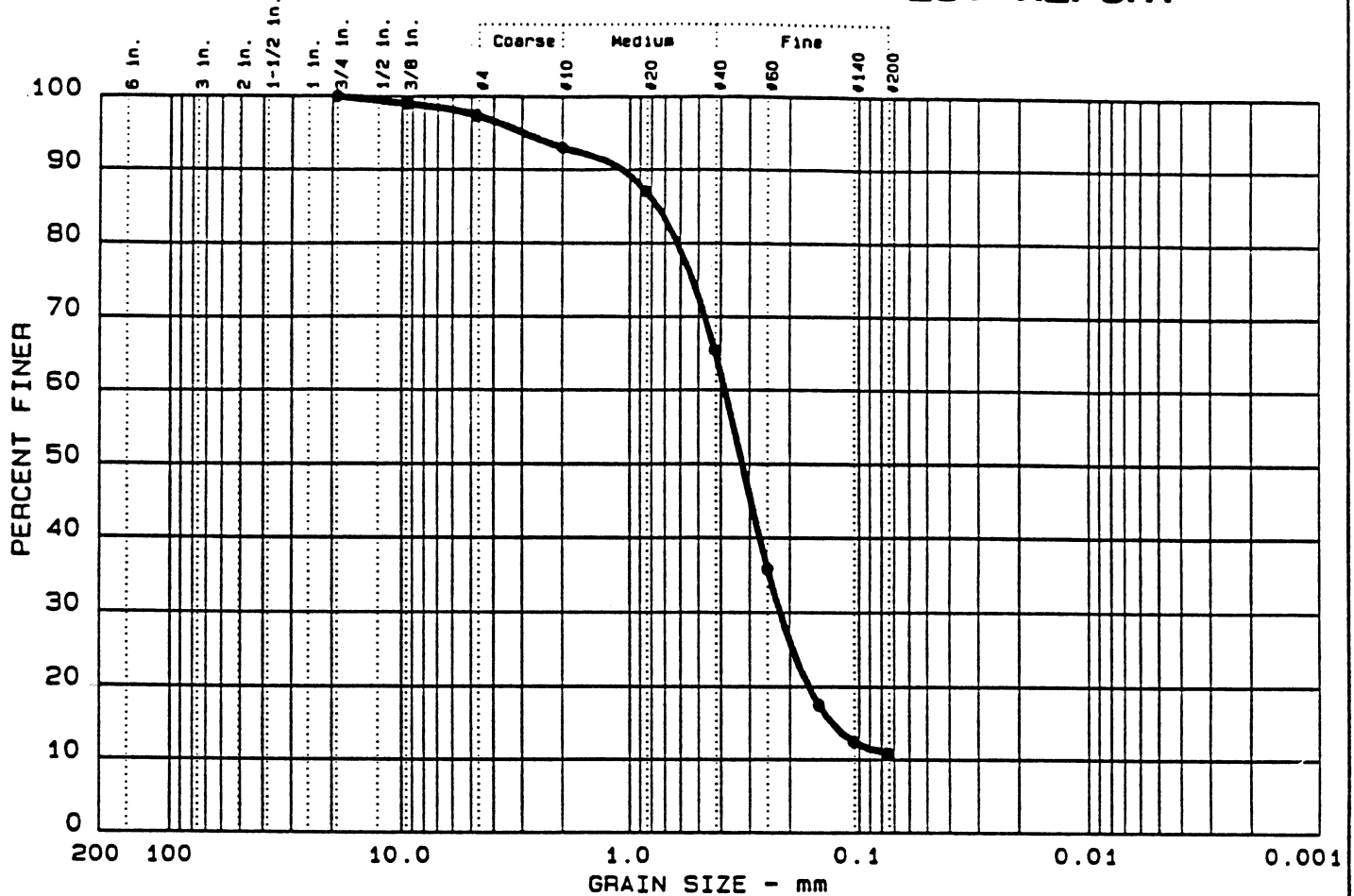
**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
Project: CRANDON MINING CO. 3.5-23-6

Date: JUNE 10, 1994

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	2.5	86.6	10.9		SP-SM		

SIEVE inches size	PERCENT FINER		
0.75	100.0		
0.375	99.0		
GRAIN SIZE			
D ₆₀	0.38		
D ₃₀	0.22		
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
4	97.5		
10	93.1		
20	87.1		
40	65.5		
60	35.8		
100	17.5		
140	12.5		
200	10.9		

Sample information:
 • CMC-04 108.0'-110.0'
 Brown poorly graded
 SAND; with silt

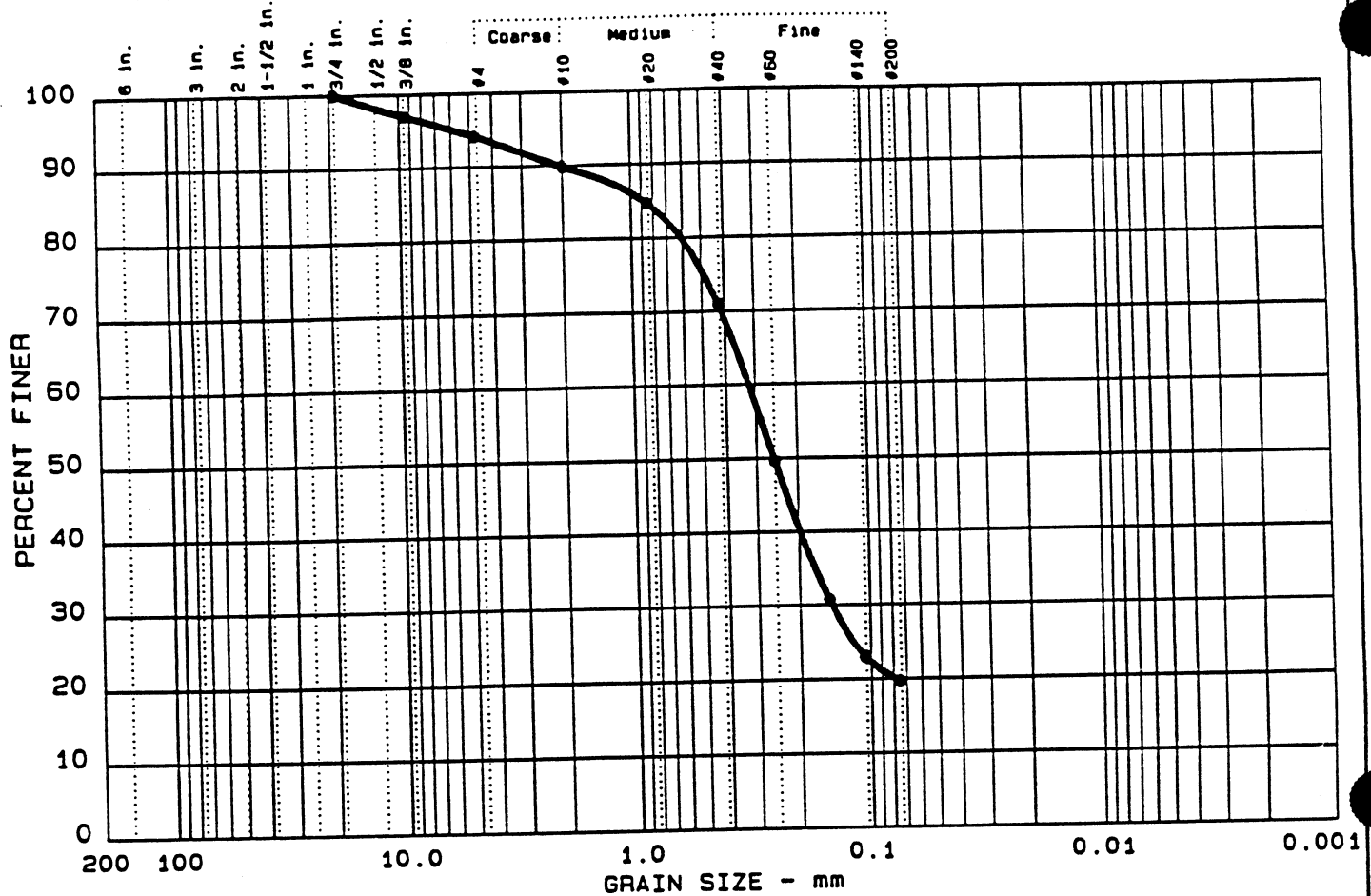
Remarks:
 TESTED BY: NL
 CHECKED BY: *GS*

**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
 Project: CRANDON MINING CO. 3.5-23-7
 Date: JUNE 10, 1994

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	5.9	74.4	19.7		SM		

SIEVE inches size	PERCENT FINER		
•			
0.75	100.0		
0.375	97.0		
GRAIN SIZE			
D ₆₀	0.32		
D ₃₀	0.15		
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
•			
4	94.1		
10	89.8		
20	84.7		
40	71.0		
60	49.6		
100	30.7		
140	23.0		
200	19.7		

Sample information:
 • CMC-05 73.4'-74.2'
 Light red silty SAND

Remarks:
 TESTED BY: NL
 CHECKED BY: *LES*

**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
 Project: CRANDON MINING CO. 3.5-23-8

Date: JUNE 10, 1994

Sheet No. _____

PERCENT FINER

GRAIN SIZE - mm

Grain Size (mm)	Percent Finer (%)
200	100
100	100
60	100
40	100
30	100
25	100
20	100
15	100
12.5	100
10	100
7.5	100
6	100
5	100
4	100
3.75	100
3.5	100
3.15	100
2.8	100
2.5	100
2.25	100
2	100
1.8	100
1.6	100
1.4	100
1.25	100
1.18	100
1.12	100
1.06	100
1.0	100
0.9	100
0.8	100
0.75	100
0.7	100
0.63	100
0.58	100
0.54	100
0.5	100
0.475	100
0.45	100
0.425	100
0.4	100
0.375	100
0.35	100
0.315	100
0.28	100
0.25	100
0.225	100
0.2	100
0.18	100
0.16	100
0.15	100
0.14	100
0.125	100
0.118	100
0.112	100
0.106	100
0.1	100
0.09	100
0.08	100
0.075	100
0.07	100
0.063	100
0.058	100
0.054	100
0.05	100
0.0475	100
0.045	100
0.0425	100
0.04	100
0.0375	100
0.035	100
0.0315	100
0.028	100
0.025	100
0.0225	100
0.02	100
0.018	100
0.016	100
0.015	100
0.014	100
0.0125	100
0.0118	100
0.0112	100
0.0106	100
0.01	100
0.009	100
0.008	100
0.0075	100
0.007	100
0.0063	100
0.0058	100
0.0054	100
0.005	100
0.00475	100
0.0045	100
0.00425	100
0.004	100
0.00375	100
0.0035	100
0.00315	100
0.0028	100
0.0025	100
0.00225	100
0.002	100
0.0018	100
0.0016	100
0.0015	100
0.0014	100
0.00125	100
0.00118	100
0.00112	100
0.00106	100
0.001	100
0.0009	100
0.0008	100
0.00075	100
0.0007	100
0.00063	100
0.00058	100
0.00054	100
0.0005	100
0.000475	100
0.00045	100
0.000425	100
0.0004	100
0.000375	100
0.00035	100
0.000315	100
0.00028	100
0.00025	100
0.000225	100
0.0002	100
0.00018	100
0.00016	100
0.00015	100
0.00014	100
0.000125	100
0.000118	100
0.000112	100
0.000106	100
0.0001	100
0.00009	100
0.00008	100
0.000075	100
0.00007	

Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	34.3	55.5	10.2		SP-SM		

SIEVE inches size	PERCENT FINER		
	●		
1.5	100.0		
1	89.4		
0.75	84.1		
0.375	75.0		
	GRAIN SIZE		
D ₆₀	3.02		
D ₃₀	0.44		
D ₁₀			
	COEFFICIENTS		
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	●		
4	65.7		
10	55.3		
20	45.2		
40	29.1		
60	18.3		
100	13.6		
140	11.4		
200	10.2		

Sample information:

- CMC-06P 145.0'-147.0'
Brown poorly graded
SAND with silt & gravel

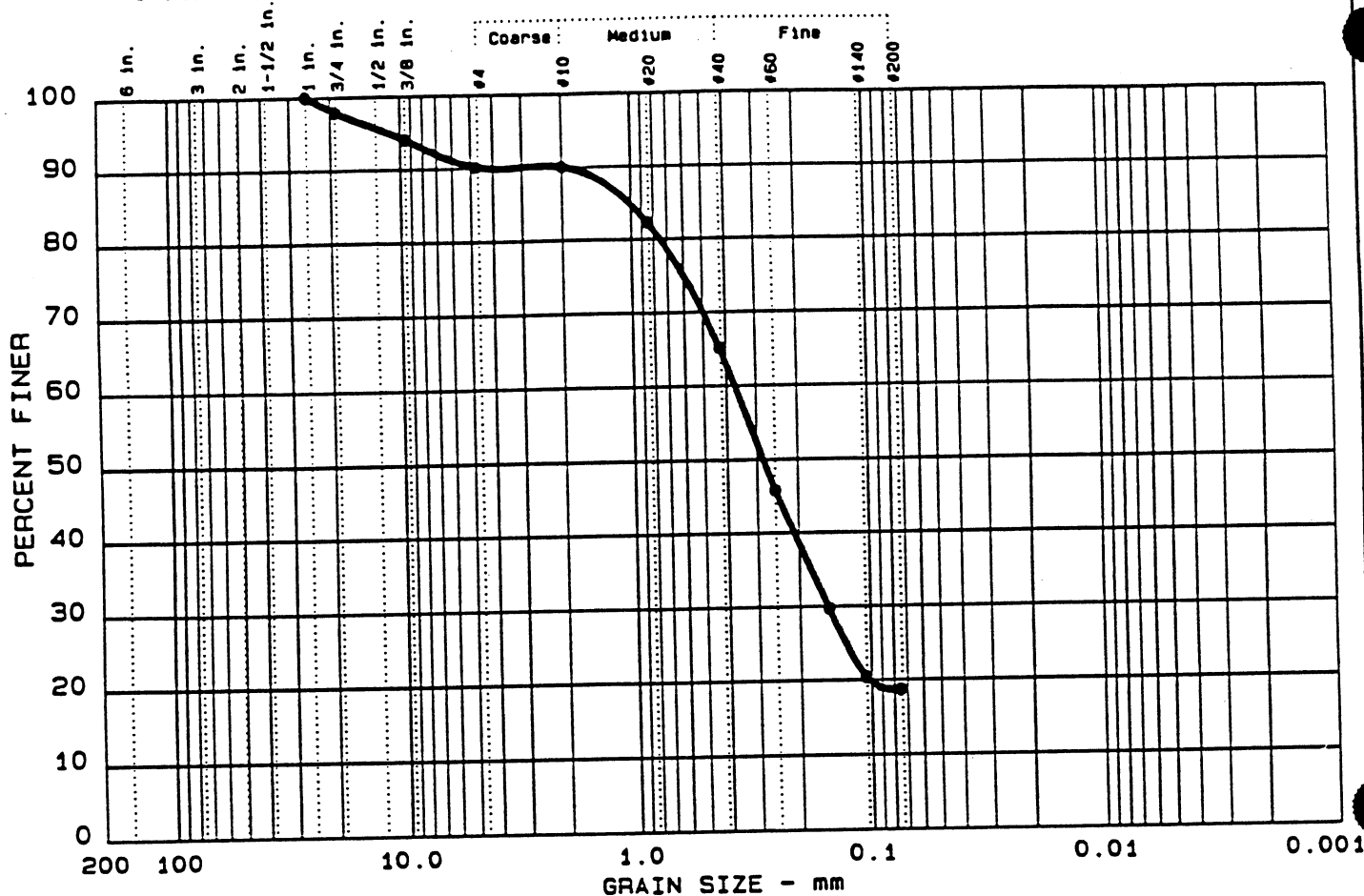
Remarks:

TESTED BY: NL

CHECKED BY: *CAF*

Project No.: 4E05140
Project: CRANDON MINING CO. 3.5-23-9
Date: JUNE 10, 1994 Sheet

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	9.8	71.5	18.7		SM		

SIEVE inches size	PERCENT FINER		
	●		
1	100.0		
0.75	98.0		
0.375	94.1		
GRAIN SIZE			
D ₆₀	0.37		
D ₃₀	0.15		
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	●		
4	90.2		
10	90.1		
20	82.3		
40	65.1		
60	45.8		
100	29.7		
140	20.4		
200	18.7		

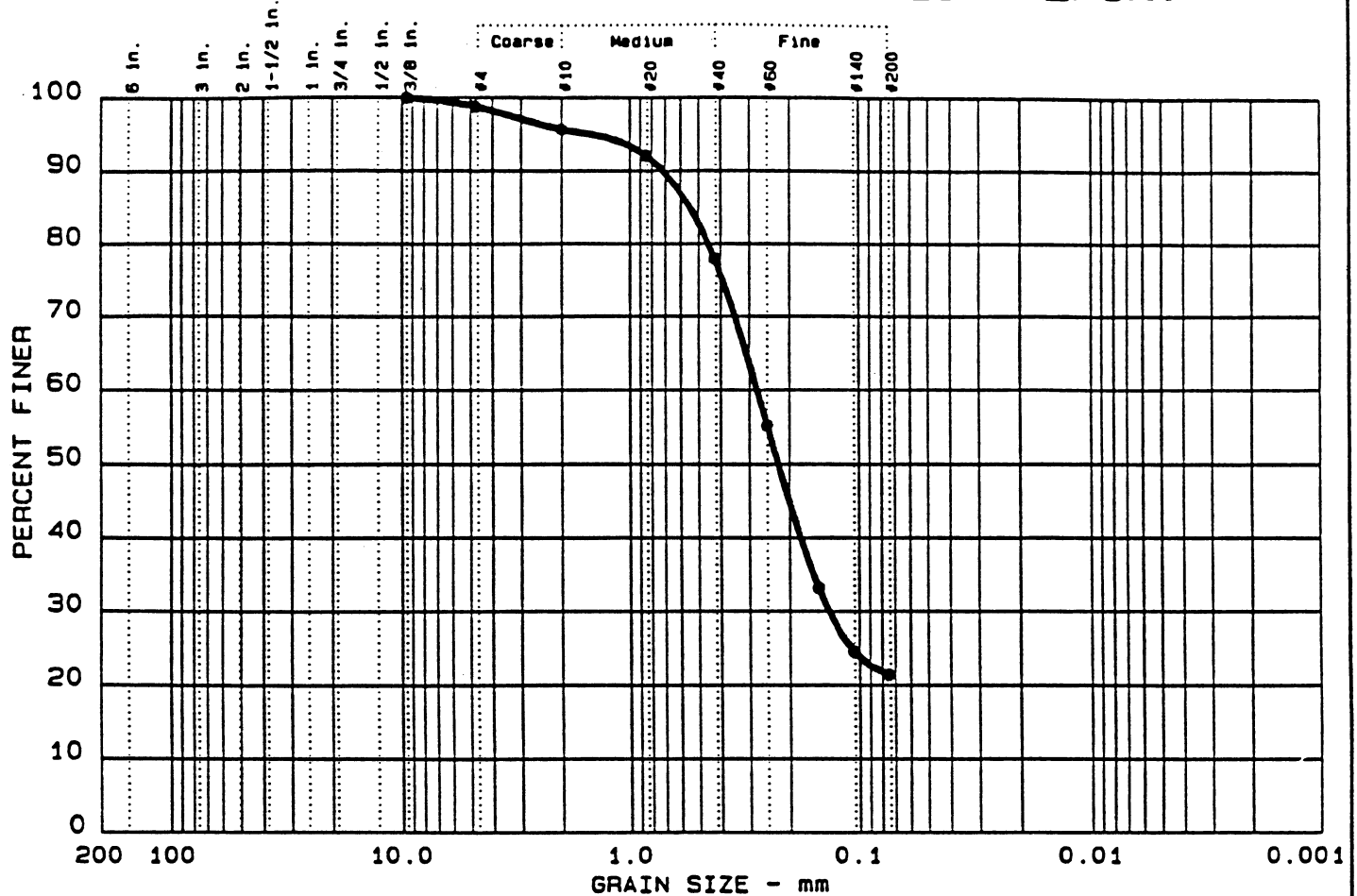
Sample information:
 ● CMC-07 40.0'-42.0'
 Light red silty SAND

Remarks:
 TESTED BY: NL
 CHECKED BY: *JS*

**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
 Project: CRANDON MINING CO. 3.5-23-10
 Date: JUNE 10, 1994
 Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	1.2	77.4	21.4		SM		

SIEVE inches size	PERCENT FINER		
•			
0.375	100.0		
X GRAIN SIZE			
D ₆₀	0.28		
D ₃₀	0.13		
D ₁₀			
X COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
•			
4	98.8		
10	95.7		
20	92.1		
40	77.9		
60	55.2		
100	33.2		
140	24.6		
200	21.4		

Sample information:
 • CMC-08 71.0'-73.0'
 Light red silty SAND

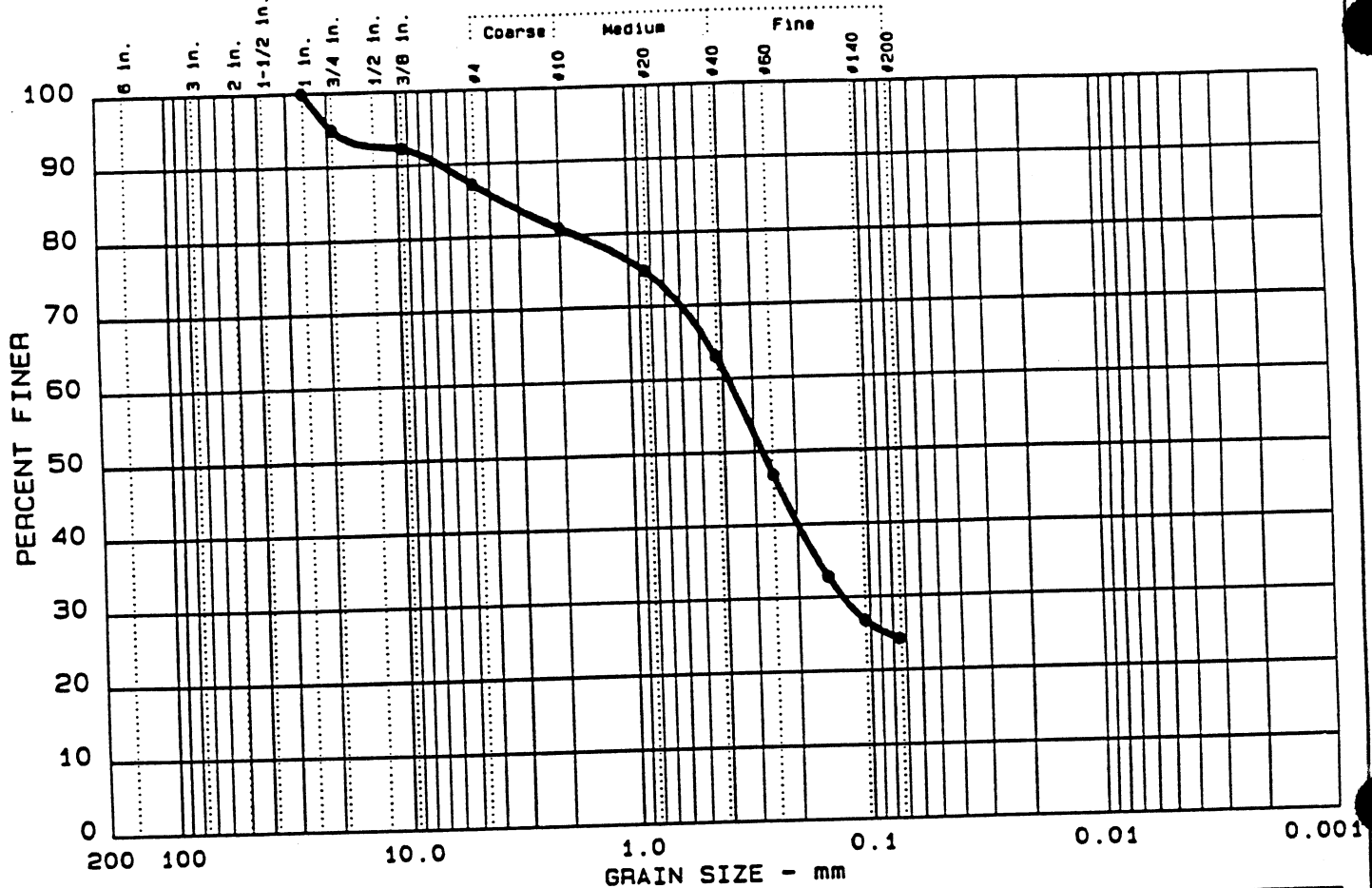
Remarks:
 TESTED BY: NL
 CHECKED BY: *LS*

**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
 Project: CRANDON MINING CO. 3.5-23-11
 Date: JUNE 10, 1994

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	12.8	63.0	24.2		SM		

SIEVE inches size	PERCENT FINER		
•			
1	100.0		
0.75	95.0		
0.375	92.3		
GRAIN SIZE			
D ₆₀	0.38		
D ₃₀	0.13		
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
•			
4	87.2		
10	80.9		
20	74.8		
40	63.0		
60	46.8		
100	32.8		
140	26.8		
200	24.2		

Sample information:
 • CMC-08P 93.0'-95.0'
 Light red silty SAND

Remarks:
 TESTED BY: NL
 CHECKED BY: *LS*

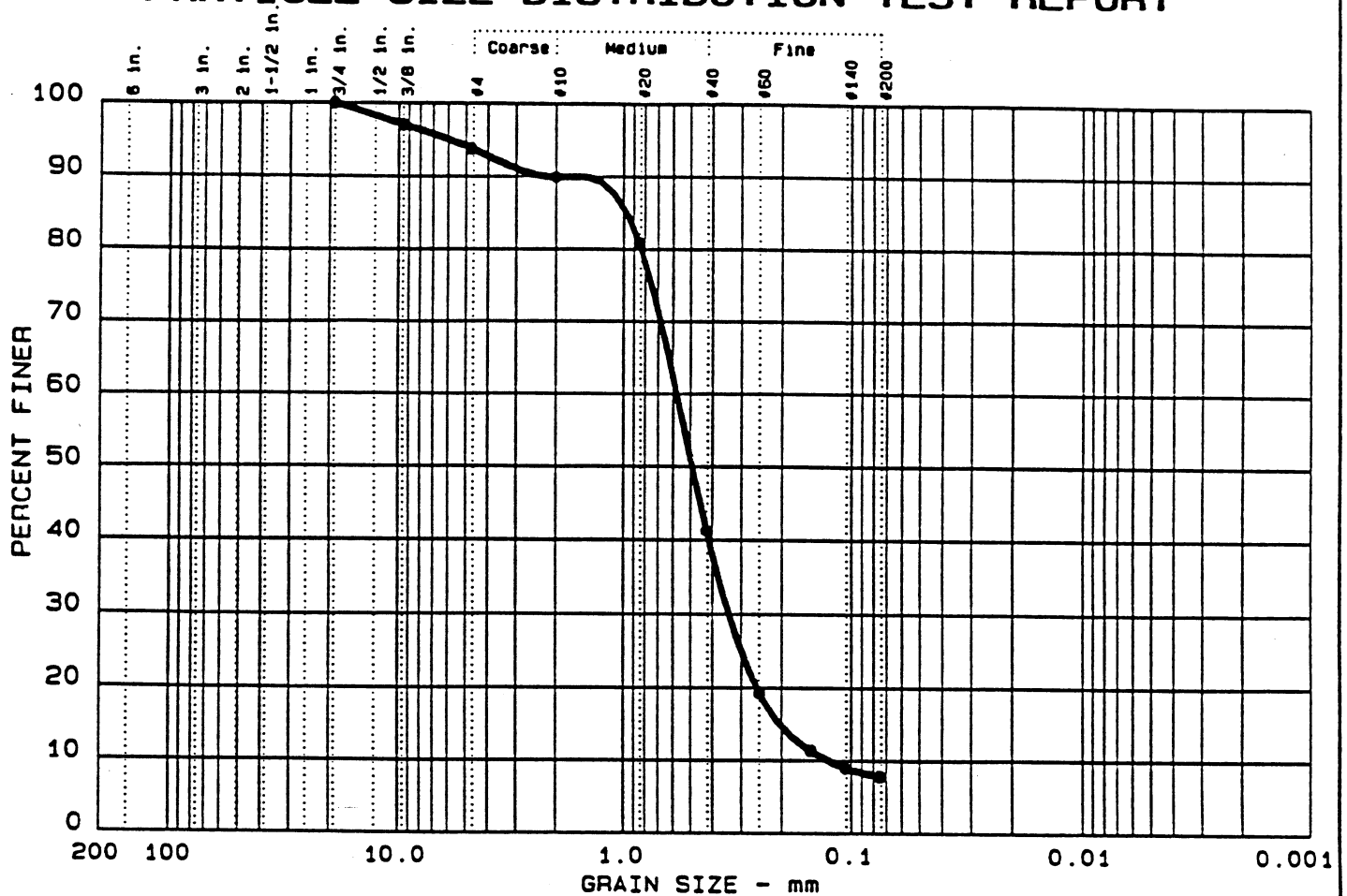
**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
 Project: CRANDON MINING CO. 3.5-23-12

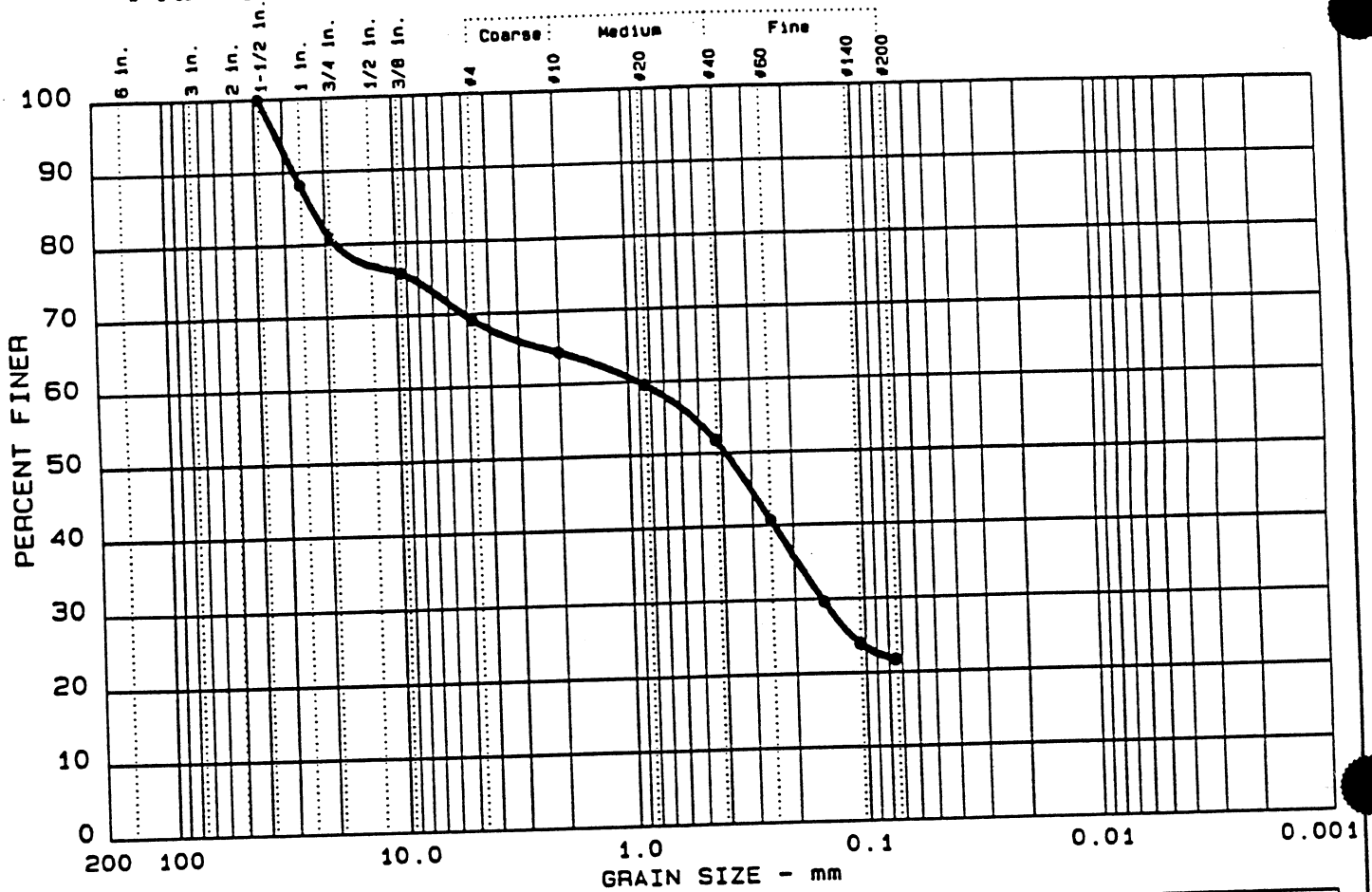
Date: JUNE 10, 1994

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	30.8	47.5	21.7		SM		

SIEVE inches size		PERCENT FINER		
	●			
1.5	100.0			
1	88.2			
0.75	80.9			
0.375	75.8			
		GRAIN SIZE		
D ₆₀	0.89			
D ₃₀	0.15			
D ₁₀				
		COEFFICIENTS		
C _c				
C _u				

SIEVE number size	PERCENT FINER		
	●		
4	69.2		
10	64.4		
20	59.6		
40	51.8		
60	40.8		
100	29.6		
140	23.9		
200	21.7		

Sample information:
● CMC-09P 137.0'-139.0'
Light red silty SAND
with gravel

Remarks:
TESTED BY: NL
CHECKED BY: CJB

**WOODWARD-CLYDE
CONSULTANTS**

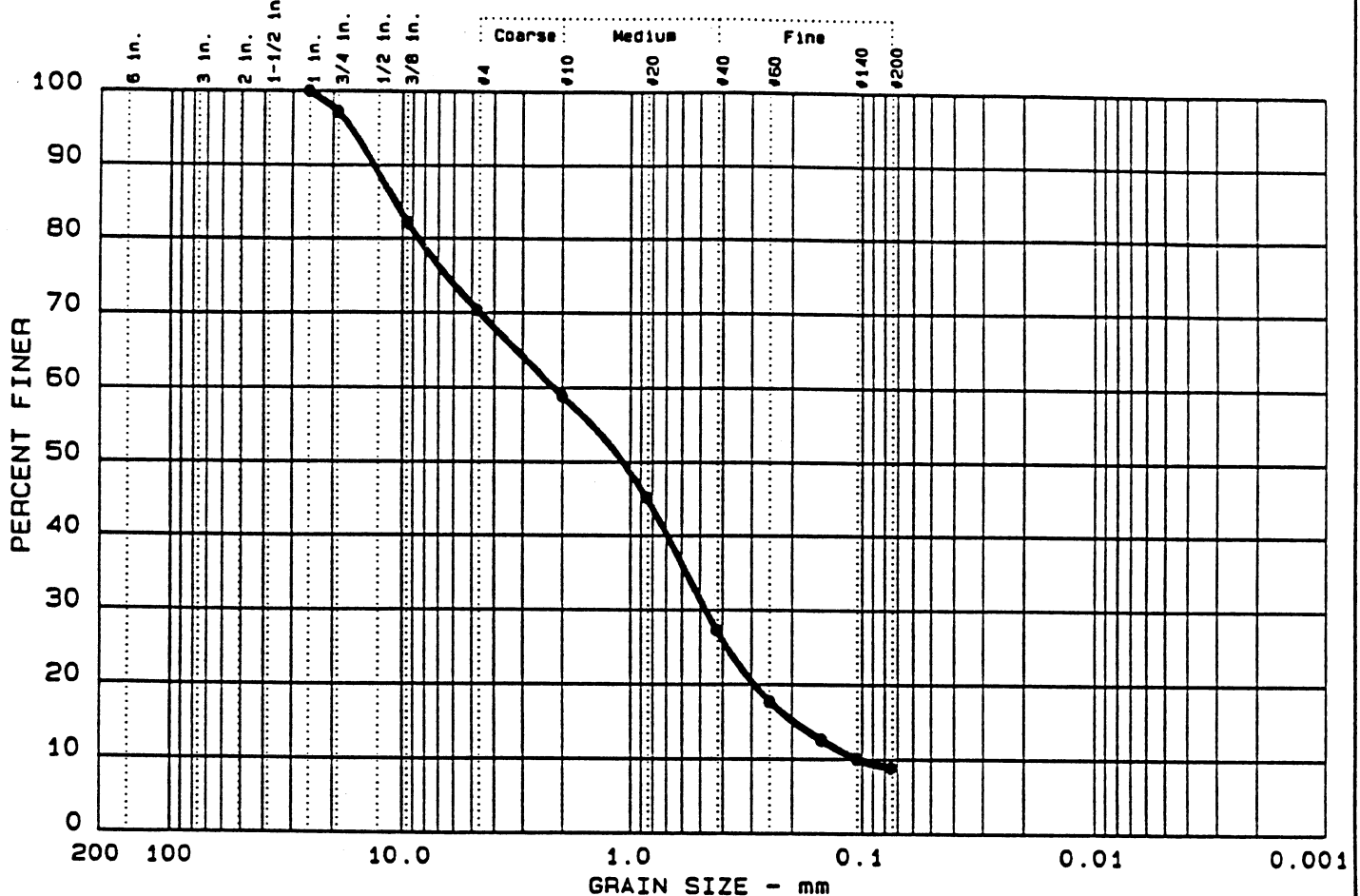
Project No.: 4E05140

Project: CRANDON MINING CO. 3.5-23-14

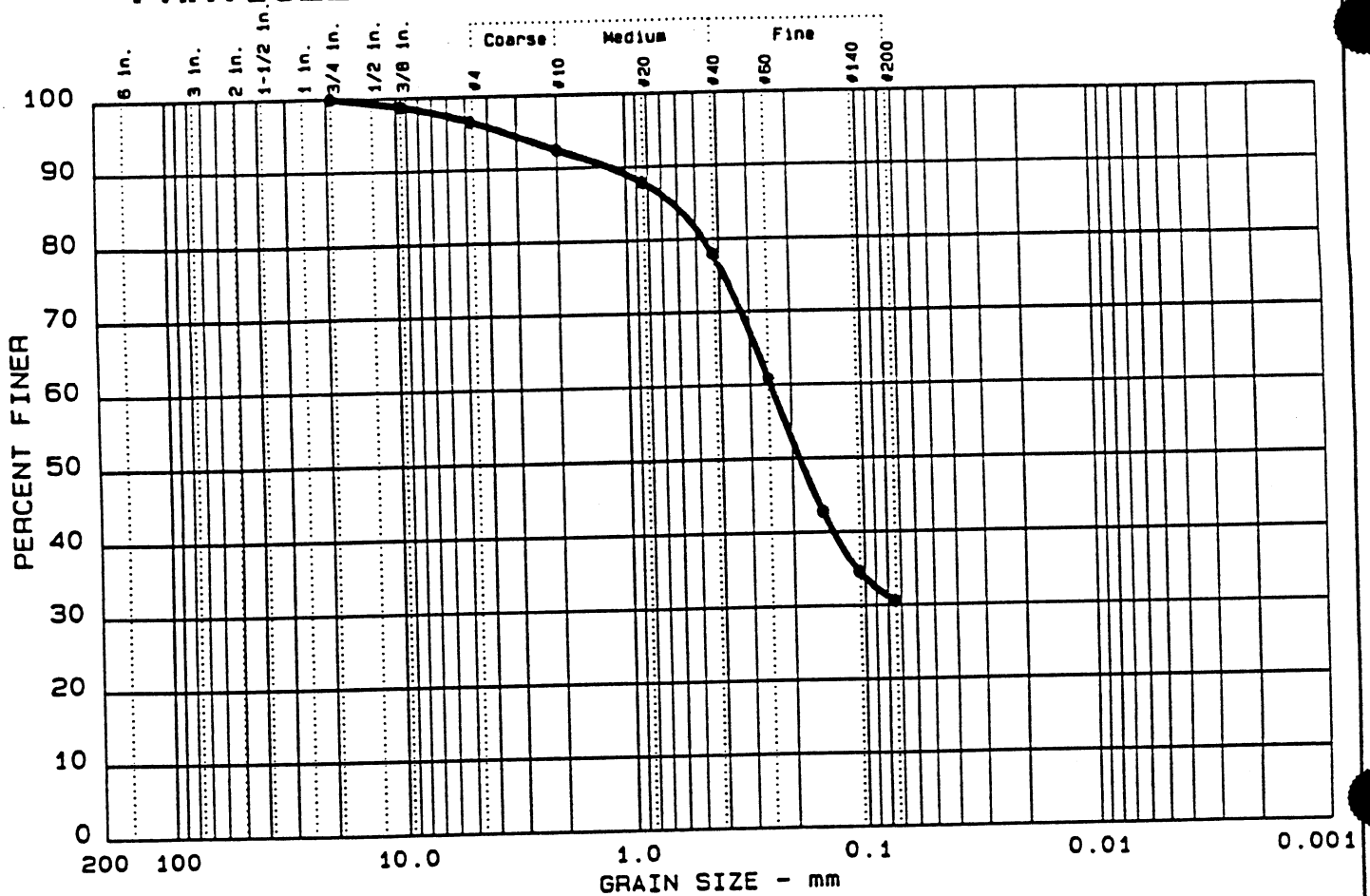
Date: JUNE 10, 1994

Sheet No .

PARTICLE SIZE DISTRIBUTION TEST REPORT



PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	3.4	66.0	30.6		SM		

SIEVE inches size	PERCENT FINER		
•	•		
0.75	100.0		
0.375	98.8		
X GRAIN SIZE			
D ₆₀	0.24		
D ₃₀			
D ₁₀			
X COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
•	•		
4	96.6		
10	92.5		
20	87.9		
40	78.0		
60	60.8		
100	42.8		
140	34.6		
200	30.6		

Sample information:
 • CMC-10P 82.0'-84.0'
 Reddish-brown silty
 SAND

Remarks:
 TESTED BY: NL
 CHECKED BY: *GB*

**WOODWARD-CLYDE
CONSULTANTS**

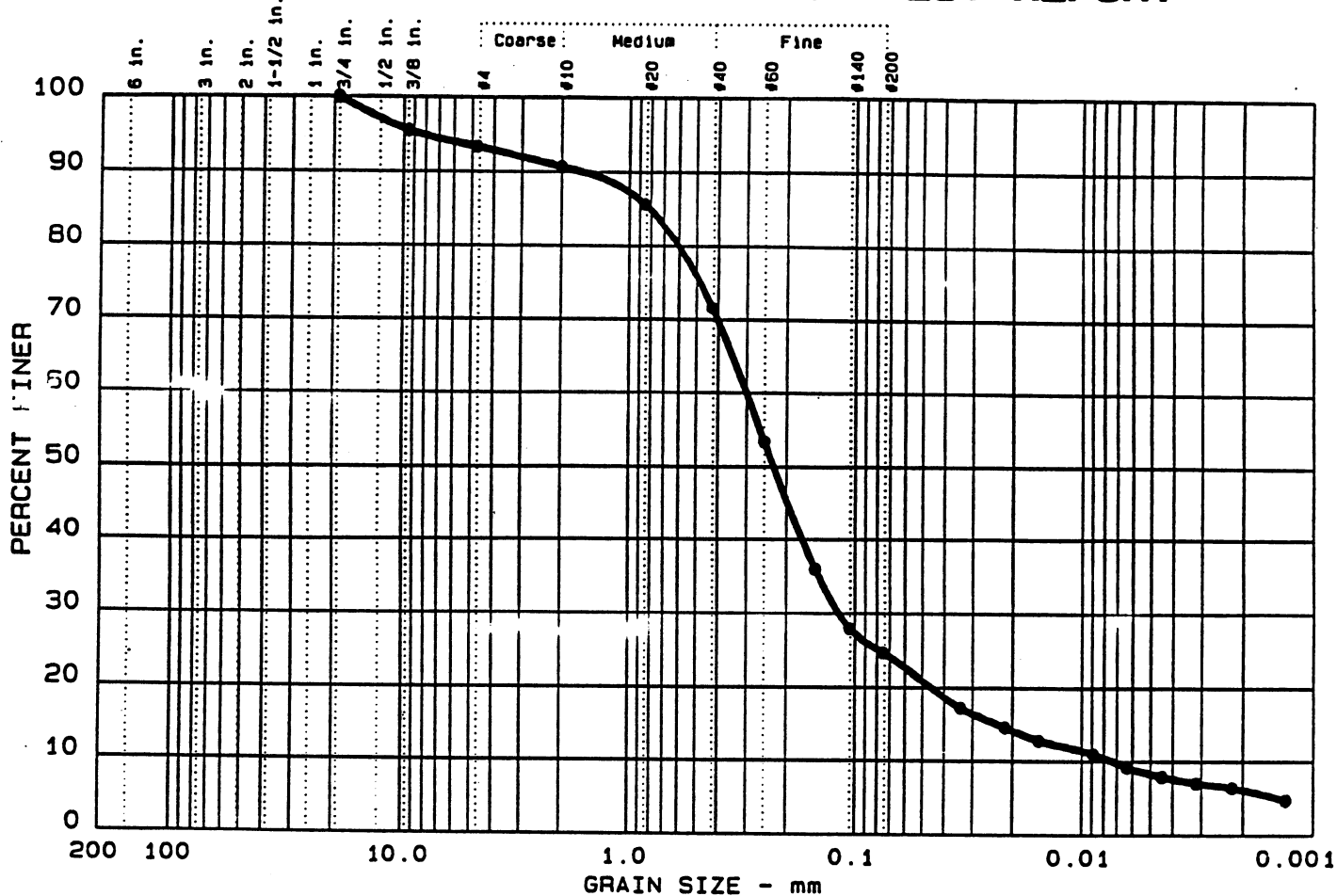
Project No.: 4E05140
 Project: CRANDON MINING CO. 3.5-23-16
 Date: JUNE 10, 1994

Sheet No. _____

Appendix 3.5-24

Grain Size Curves from 1994 Foth & Van Dyke Saprolite Boring and Well Installations

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	6.6	68.7	16.4	8.3	SC	NA	NA

SIEVE inches size	PERCENT FINER		
0.75	100.0		
0.375	95.6		
GRAIN SIZE			
D ₆₀	0.30		
D ₃₀	0.12		
D ₁₀	0.00		
COEFFICIENTS			
C _c	6.41		
C _u	41.0		

SIEVE number size	PERCENT FINER		
4	93.4		
10	90.7		
20	85.6		
40	71.6		
60	53.4		
100	36.0		
140	28.0		
200	24.7		

Sample information:
 • CMC-08P: 73-73.5'
 Red f-c SAND; some clay, trace fine gravel

Remarks:
 TESTED BY: NL
 CHECKED BY: *CBS*

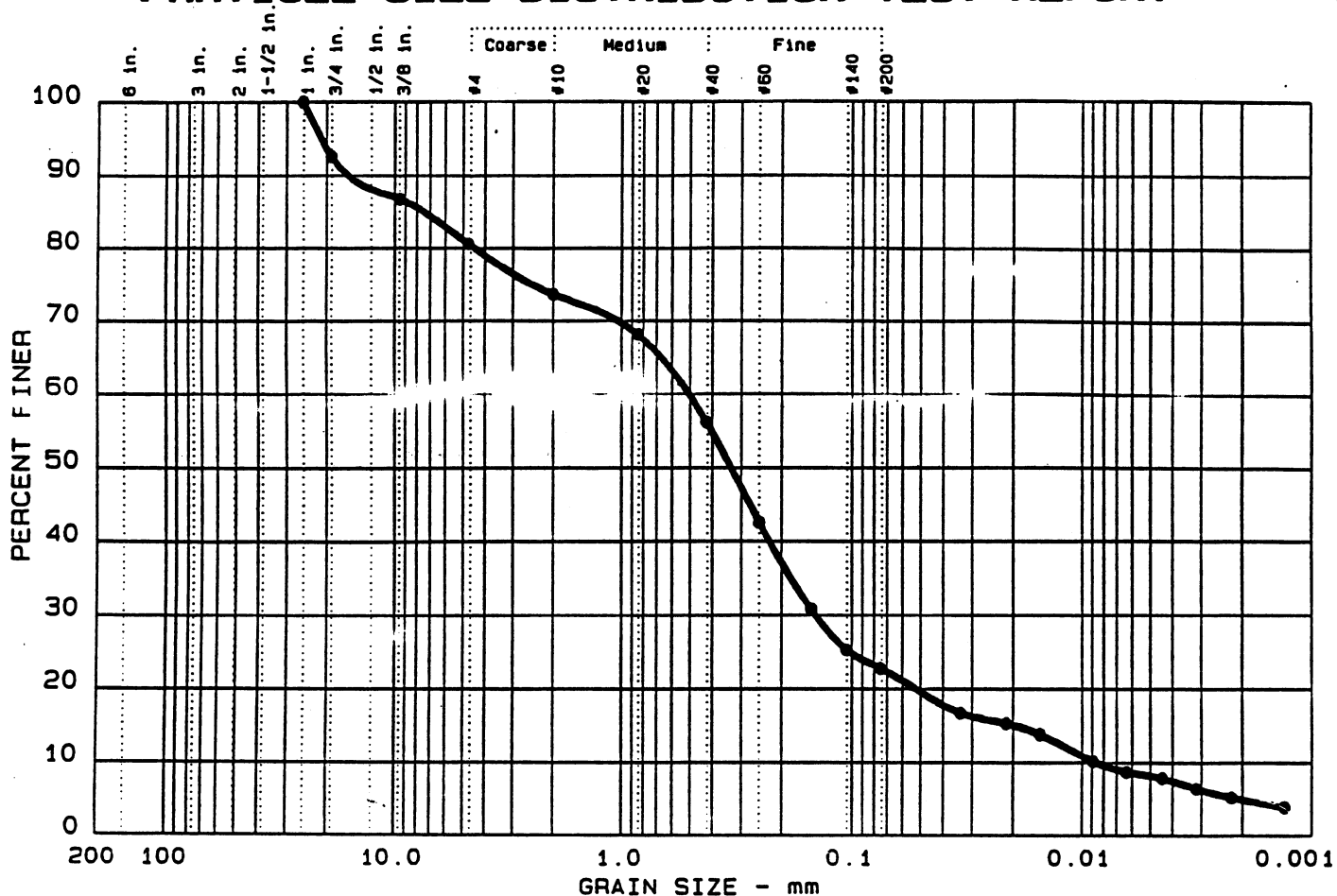
**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
 Project: CMC-HYDRO REPLACE

Date: DECEMBER 7, 1994

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	19.4	57.8	14.6	8.2	SM	NA	NA

SIEVE inches size	PERCENT FINER		
1	100.0		
0.75	92.6		
0.375	86.8		
X GRAIN SIZE			
D ₆₀	0.50		
D ₃₀	0.14		
D ₁₀	0.00		
X COEFFICIENTS			
C _c	4.79		
C _u	58.9		

SIEVE number size	PERCENT FINER		
4	80.6		
10	73.7		
20	68.2		
40	56.2		
60	42.6		
100	30.8		
140	25.3		
200	22.8		

Sample information:

• CMC-08P; 95-97'
Light brown f-c SAND;
some silt, fine gravel

Remarks:

TESTED BY: NL
CHECKED BY: *NL*

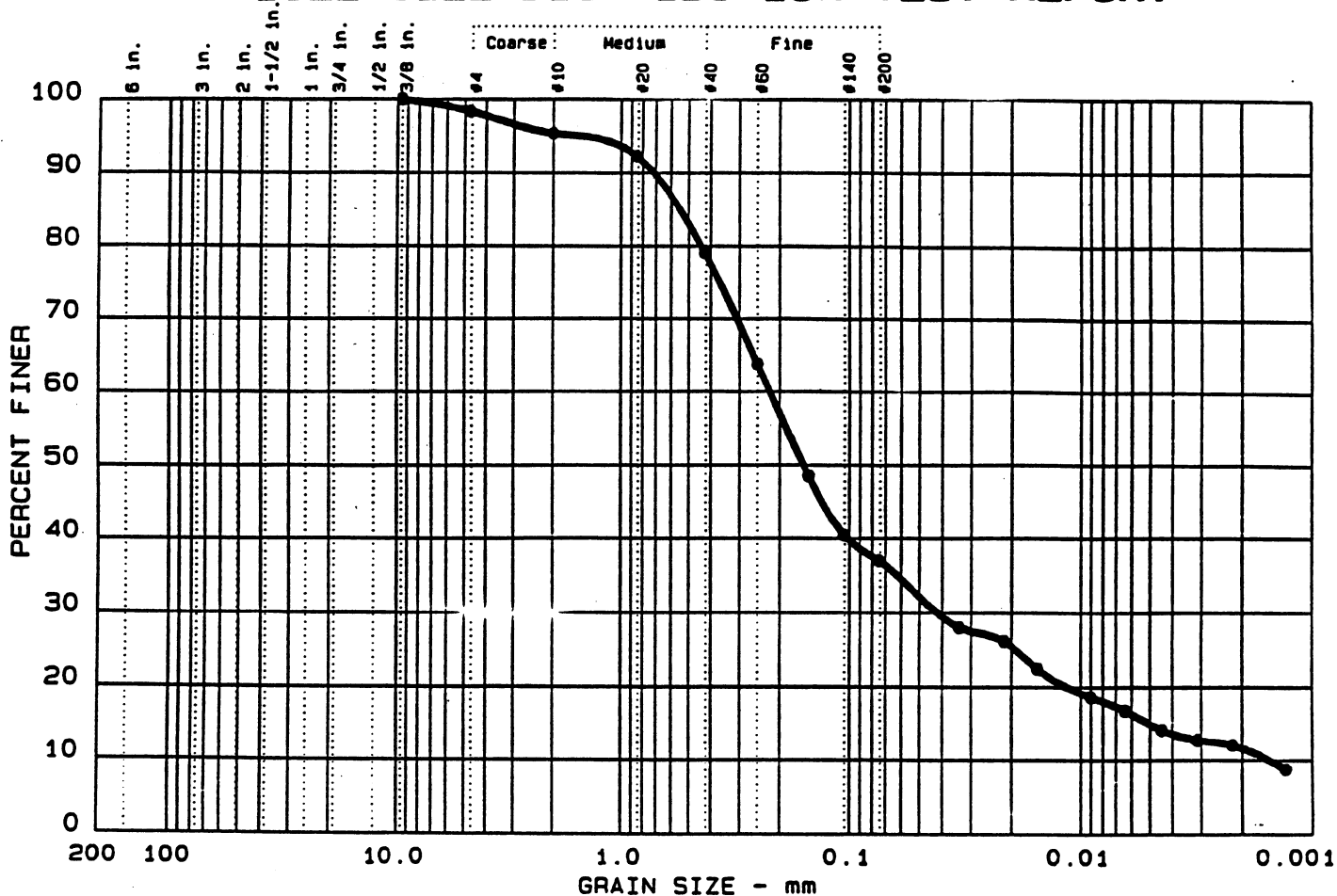
**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
Project: CMC-HYDRO REPLACE

Date: DECEMBER 7, 1994

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	1.6	61.3	22.2	14.9	SC	NA	NA

SIEVE inches size	PERCENT FINER		
0.375	100.0		
GRAIN SIZE			
D ₆₀	0.22		
D ₃₀	0.04		
D ₁₀	0.00		
COEFFICIENTS			
C _c	5.13		
C _u	144.5		

SIEVE number size	PERCENT FINER		
4	98.4		
10	95.4		
20	92.3		
40	79.1		
60	63.8		
100	48.5		
140	40.5		
200	37.1		

Sample information:

- CMC-09P: 147-147.8'
- Red clayey fine-coarse SAND; trace fine gravel

Remarks:

TESTED BY: NL

CHECKED BY: *LAJ*

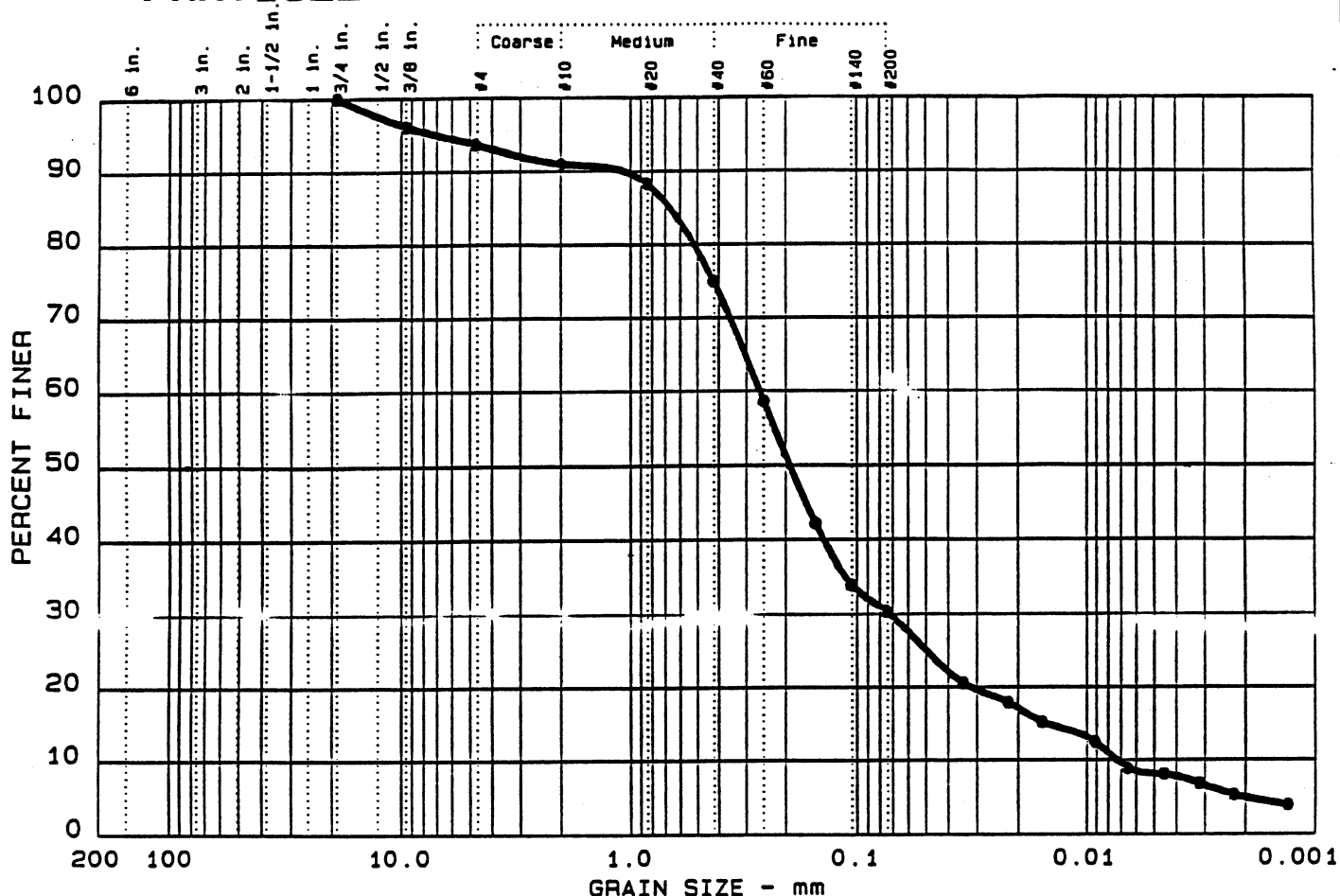
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CONSULTANTS**

Project No.: 4E05140
Project: CMC-HYDRO REPLACE

Date: DECEMBER 7, 1994

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	6.3	63.4	22.1	8.2	SC	NA	NA

SIEVE inches size	PERCENT FINER		
0.75	100.0		
0.375	96.1		
GRAIN SIZE			
D ₆₀	0.25		
D ₃₀	0.07		
D ₁₀	0.00		
COEFFICIENTS			
C _c	2.75		
C _u	35.5		

SIEVE number size	PERCENT FINER		
4	93.7		
10	91.0		
20	88.3		
40	75.0		
60	58.6		
100	42.2		
140	33.9		
200	30.3		

Sample information:

• CMC-10P; 84-84.5'
Red clayey fine-coarse
SAND; trace gravel

Remarks:

TESTED BY: NL
CHECKED BY: *CLP*

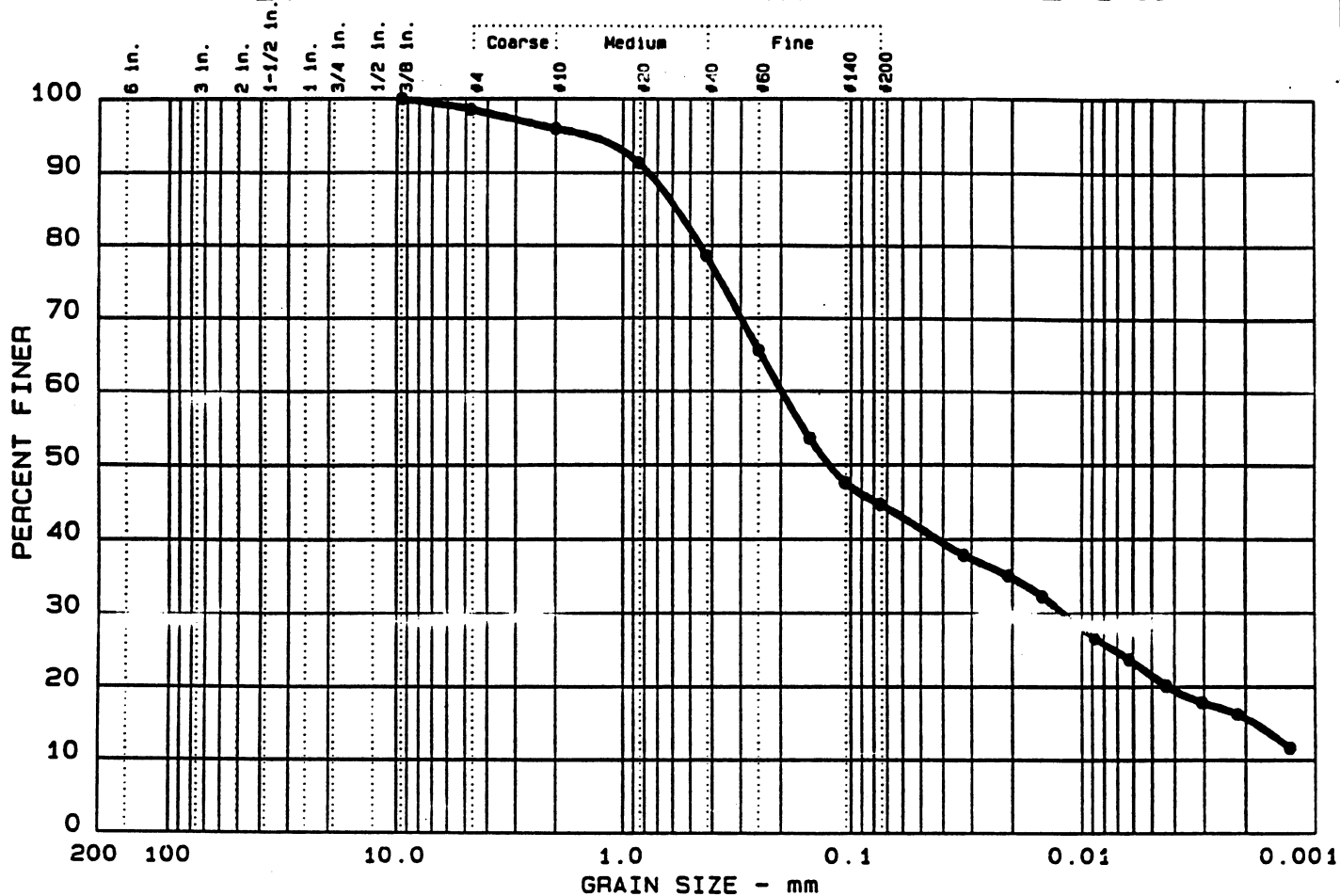
**WOODWARD-CLYDE
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Project No.: 4E05140
Project: CMC-HYDRO REPLACE

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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	1.4	53.9	23.2	21.5	SC	NA	NA

SIEVE inches size	PERCENT FINER		
0.375	100.0		
GRAIN SIZE			
D ₆₀	0.20		
D ₃₀	0.01		
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
4	98.6		
10	96.0		
20	91.4		
40	78.6		
60	65.6		
100	53.6		
140	47.6		
200	44.7		

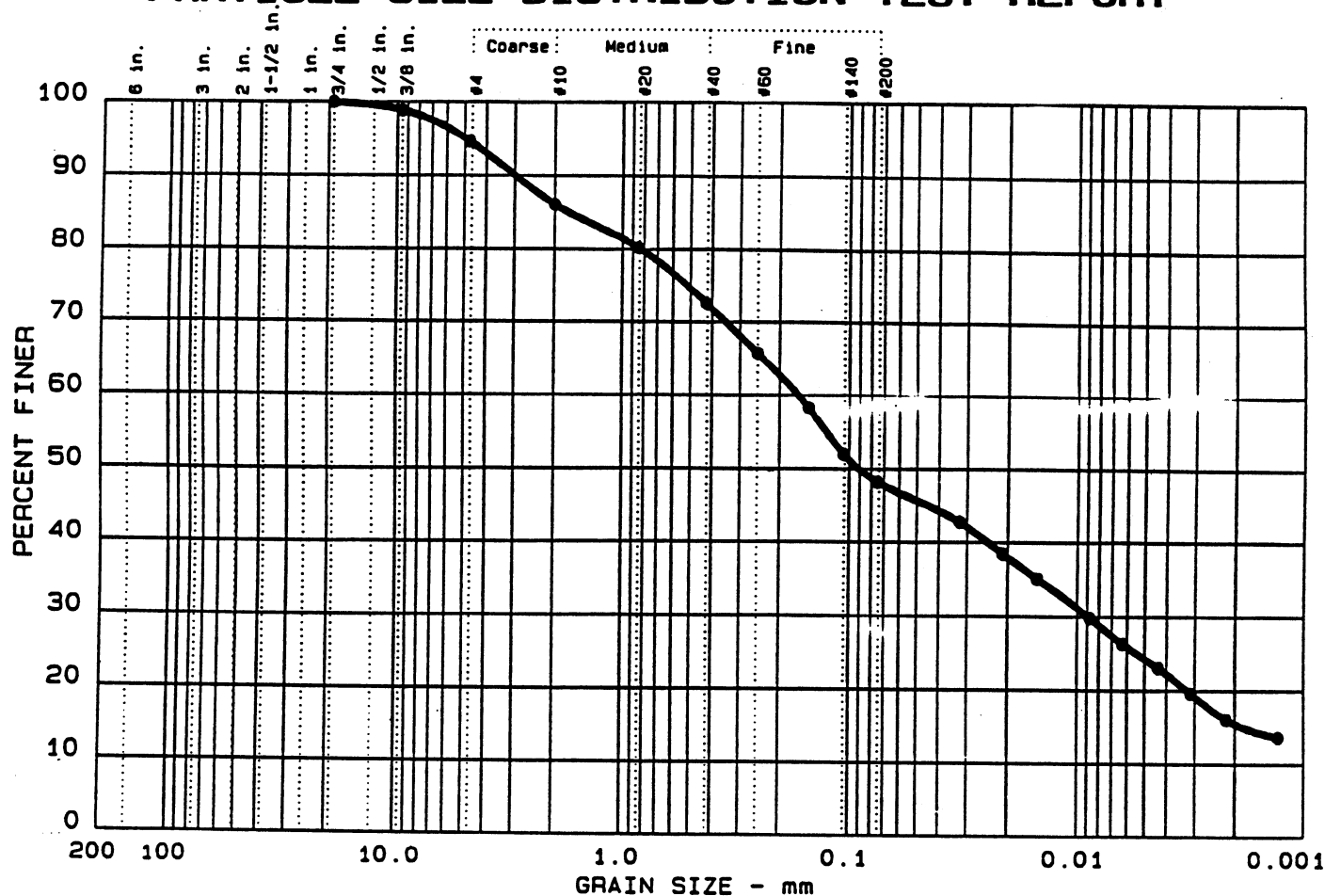
Sample information:
 ● CMC-10PP; 85'-87'
 Reddish brown clayey
 f-m SAND; trace gravel

Remarks:
 TESTED BY: SS
 CHECKED BY: *CAF*

**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
 Project: CMC-SAPROLITE INVESTIGATION
 Date: DECEMBER 7, 1994
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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	5.3	46.5	23.9	24.3	SC	35	12

SIEVE inches size	PERCENT FINER		
	●		
0.75	100.0		
0.375	98.9		
	GRAIN SIZE		
D ₆₀	0.16		
D ₃₀	0.01		
D ₁₀			
	COEFFICIENTS		
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	●		
4	94.7		
10	86.1		
20	80.2		
40	72.6		
60	65.7		
100	58.3		
140	52.0		
200	48.2		

Sample information:

● CMC-10PP; 95'-97'
Brown clayey f-c SAND:
trace fine gravel

Remarks:

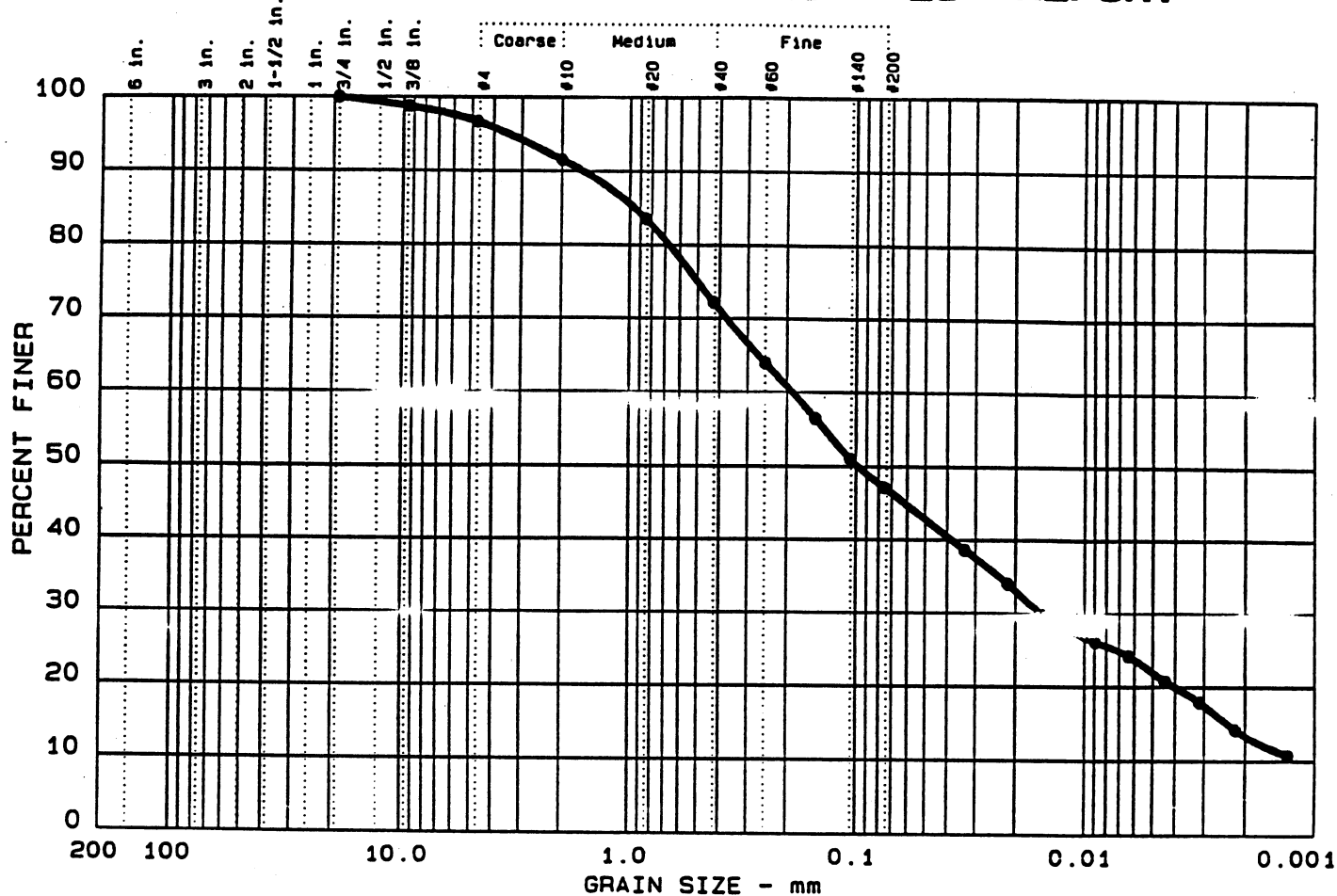
TESTED BY: NL

CHECKED BY: *CB*

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Project No.: 4E05140
 Project: CMC-SAPROLITE INVESTIGATION
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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	3.3	49.6	25.1	22.0	SC-SM	20	4

SIEVE inches size	PERCENT FINER		
●	●		
0.75	100.0		
0.375	98.8		
X GRAIN SIZE			
D ₆₀	0.19		
D ₃₀	0.02		
D ₁₀			
X COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
●	●		
4	96.7		
10	91.5		
20	83.6		
40	72.2		
60	63.9		
100	56.5		
140	51.0		
200	47.1		

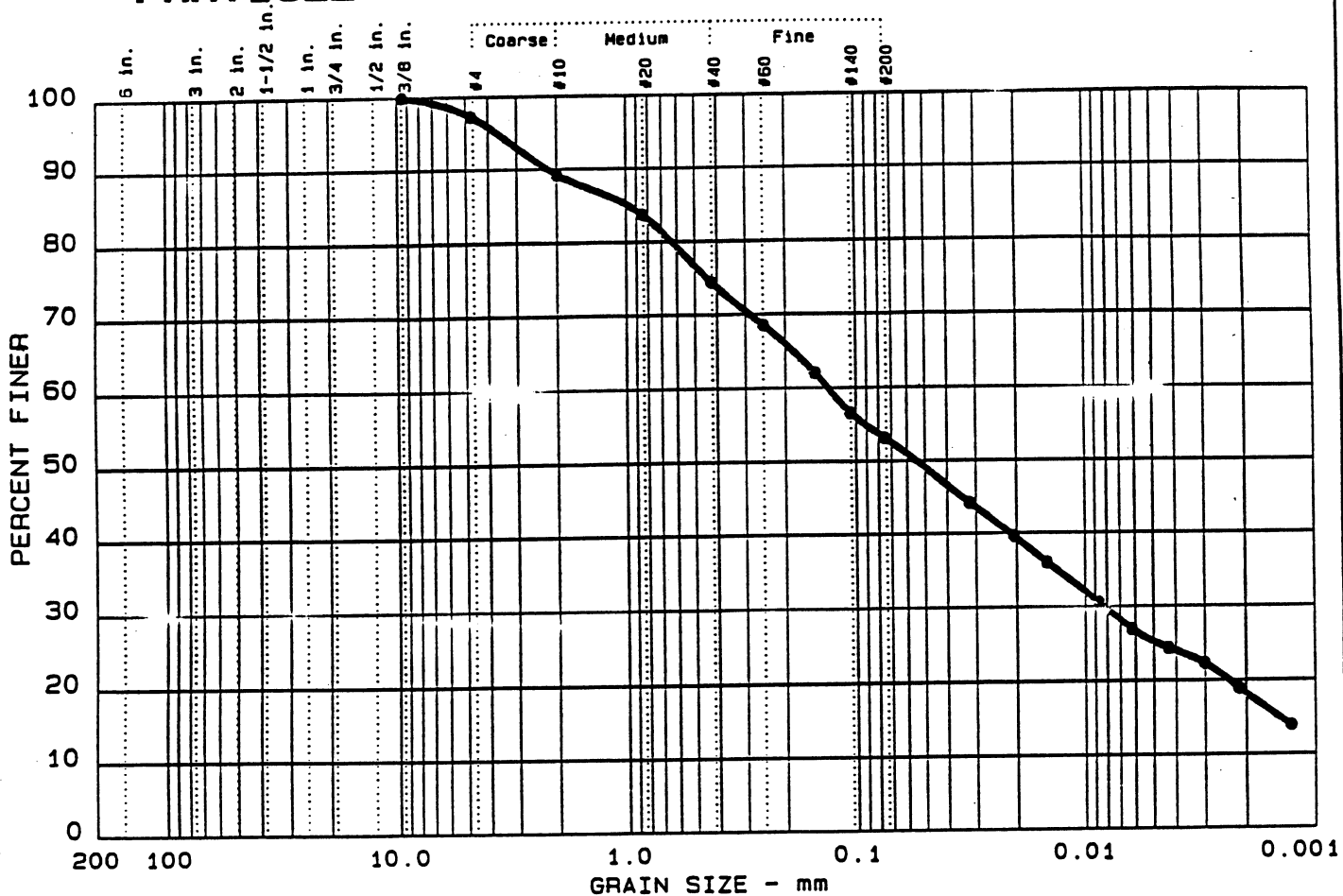
Sample information:
 ● CMC-10PP; 97'-100'
 Red silty clayey f-c
 SAND; trace gravel

Remarks:
 TESTED BY: NL
 CHECKED BY: *[Signature]*

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PARTICLE SIZE DISTRIBUTION TEST REPORT

[illegible]

SIEVE inches size	PERCENT FINER		
	●		
0.375	100.0		
	GRAIN SIZE		
D ₆₀	0.13		
D ₃₀	0.01		
D ₁₀			
	COEFFICIENTS		
C _c C _u			

SIEVE number size	PERCENT FINER		
	●		
4	97.3		
10	89.2		
20	83.7		
40	74.4		
60	68.5		
100	62.0		
140	56.6		
200	53.1		

Sample information:
● CMC-10PP; 102'-104'
Reddish brown sandy
CLAY, trace fine gravel

Remarks:
CHECKED BY: *CAF*
ATT. LIMITS WERE NOT
PERFORMED SO USCS CLASS.
CANNOT BE PROVIDED

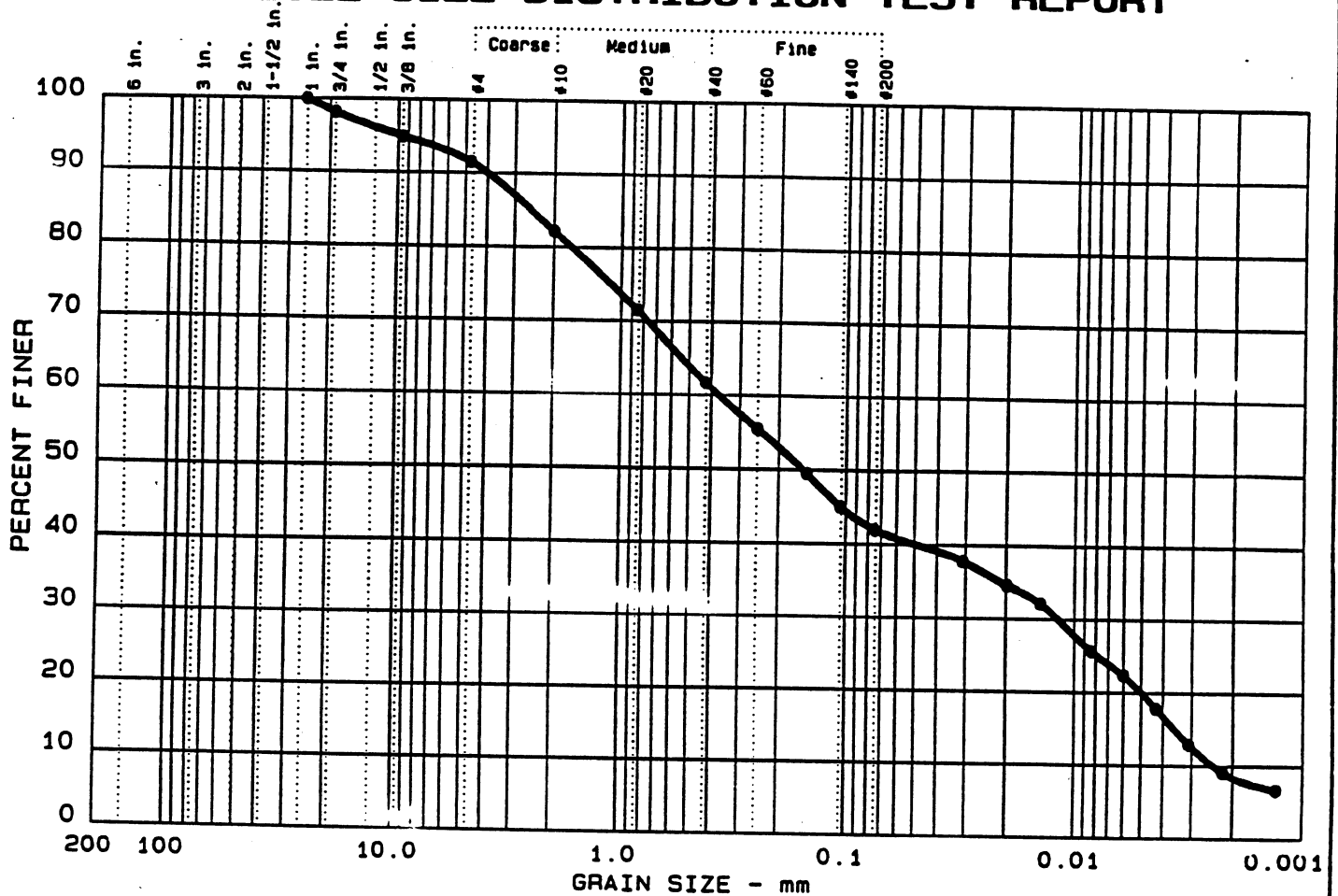
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Date: DECEMBER 7. 1994

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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3/4"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	8.5	49.5	21.9	20.1	SC	NA	NA

SIEVE inches size	PERCENT FINER		
●	●		
1	100.0		
0.75	98.2		
0.375	94.9		
GRAIN SIZE			
D ₆₀	0.37		
D ₃₀	0.01		
D ₁₀	0.00		
COEFFICIENTS			
C _c	0.15		
C _u	151.4		

SIEVE number size	PERCENT FINER		
●	●		
4	91.5		
10	82.2		
20	71.5		
40	61.7		
60	55.5		
100	49.5		
140	45.0		
200	42.0		

Sample information:

- CMC-10PP: 104'-106'
- Reddish brown clayey
- f-c SAND; trace gravel

Remarks:

TESTED BY: SS
CHECKED BY: *LS*

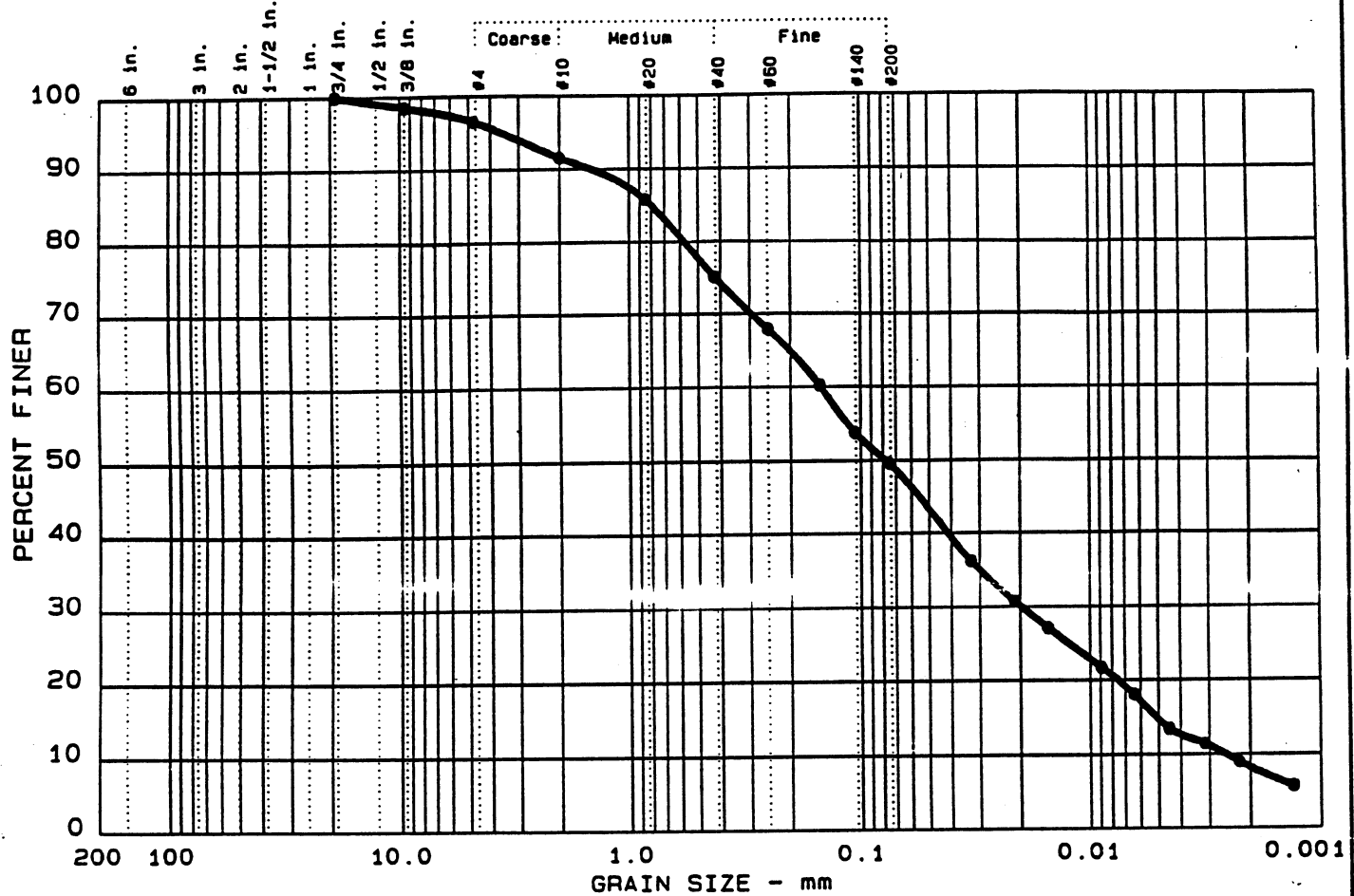
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Project No.: 4E05140
Project: CMC-SAPROLITE INVESTIGATION

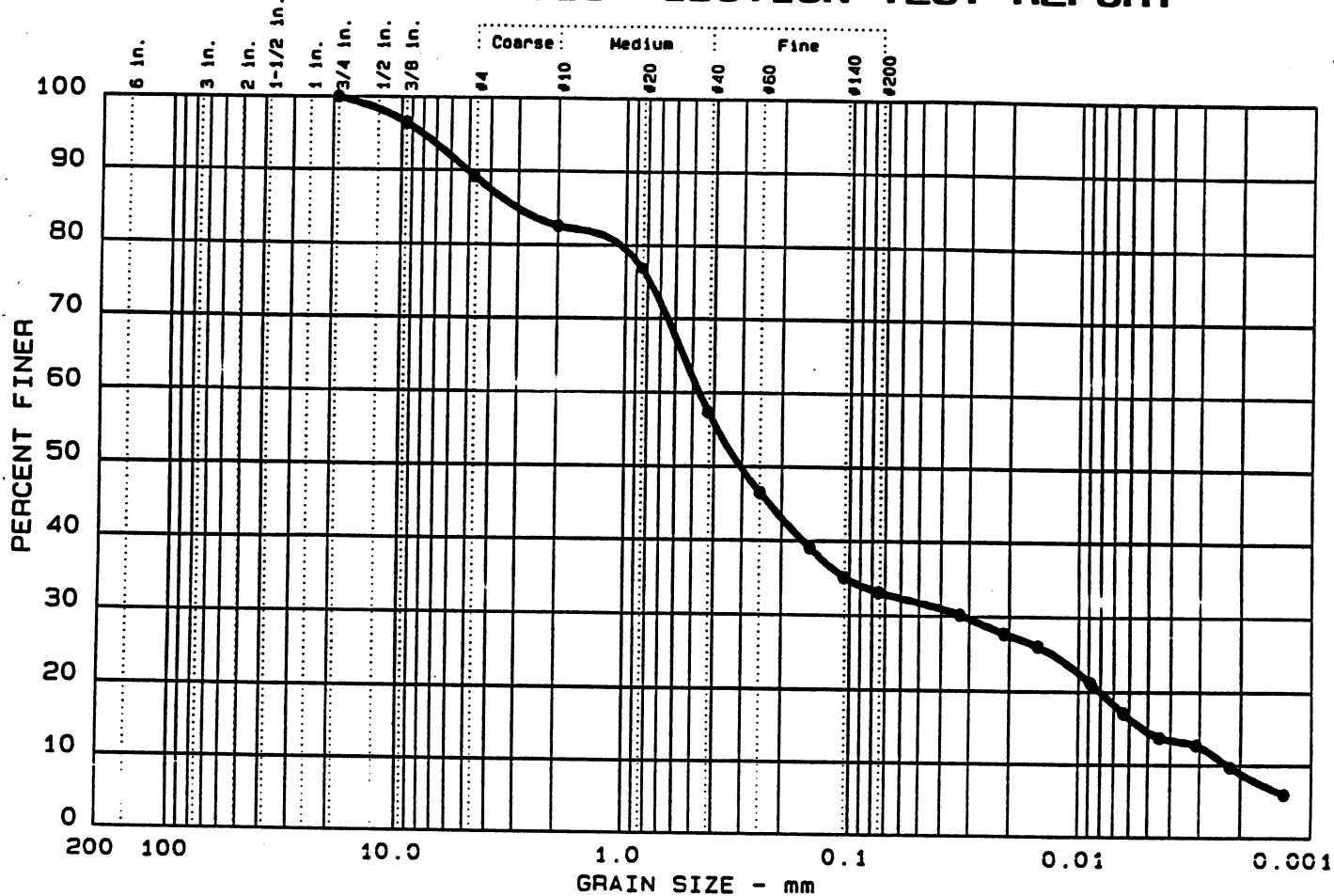
Date: DECEMBER 7, 1994

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PARTICLE SIZE DISTRIBUTION TEST REPORT



PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	10.7	56.2	18.6	14.5	SC	27	13

SIEVE inches size	PERCENT FINER		
0.75	100.0		
0.375	96.5		
GRAIN SIZE			
D ₆₀	0.47		
D ₃₀	0.03		
D ₁₀	0.00		
COEFFICIENTS			
C _c	0.97		
C _u	206.5		

SIEVE number size	PERCENT FINER		
4	89.3		
10	82.6		
20	76.9		
40	57.4		
60	46.5		
100	39.1		
140	35.1		
200	33.1		

Sample information:
 • CMC-11P: 198'-200'
 Reddish brown clayey
 f-c SAND; trace f gravel

Remarks:
 TESTED BY: SS
 CHECKED BY: *NL*

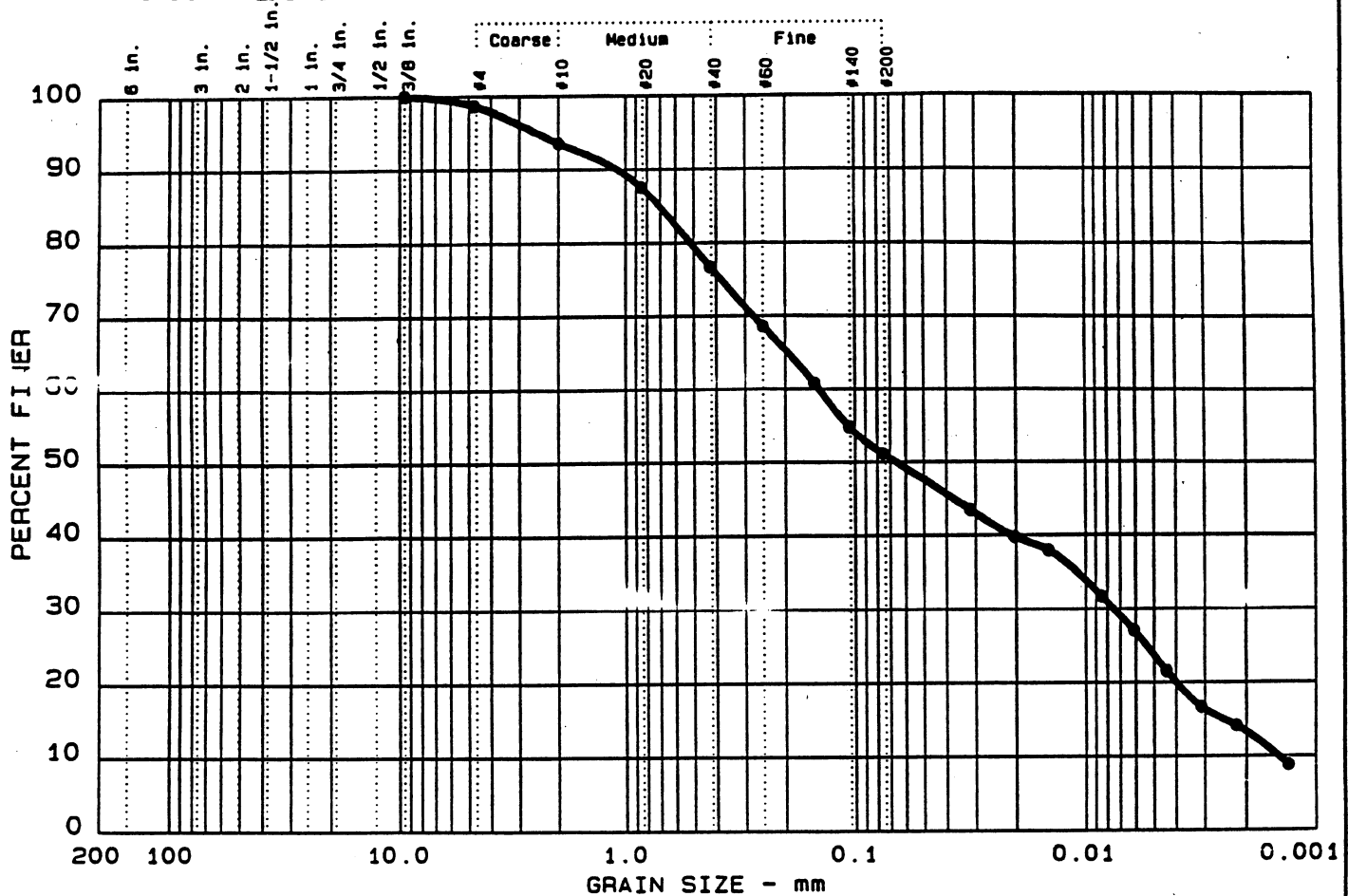
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Project No.: 4E05140
 Project: CMC-SAPROLITE INVESTIGATION

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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	1.3	47.6	27.4	23.7	CL-ML	24	7

SIEVE inches size	PERCENT FINER		
0.375	100.0		
GRAIN SIZE			
D ₆₀	0.14		
D ₃₀	0.01		
D ₁₀	0.00		
COEFFICIENTS			
C _c	0.27		
C _u	98.9		

SIEVE number size	PERCENT FINER		
4	98.7		
10	93.6		
20	87.6		
40	76.7		
60	68.6		
100	60.8		
140	54.8		
200	51.1		

Sample information:
 ● CMC-11P; 200'-205'
 Red sandy silty CLAY;
 trace gravel

Remarks:
 TESTED BY: NL
 CHECKED BY: *[Signature]*

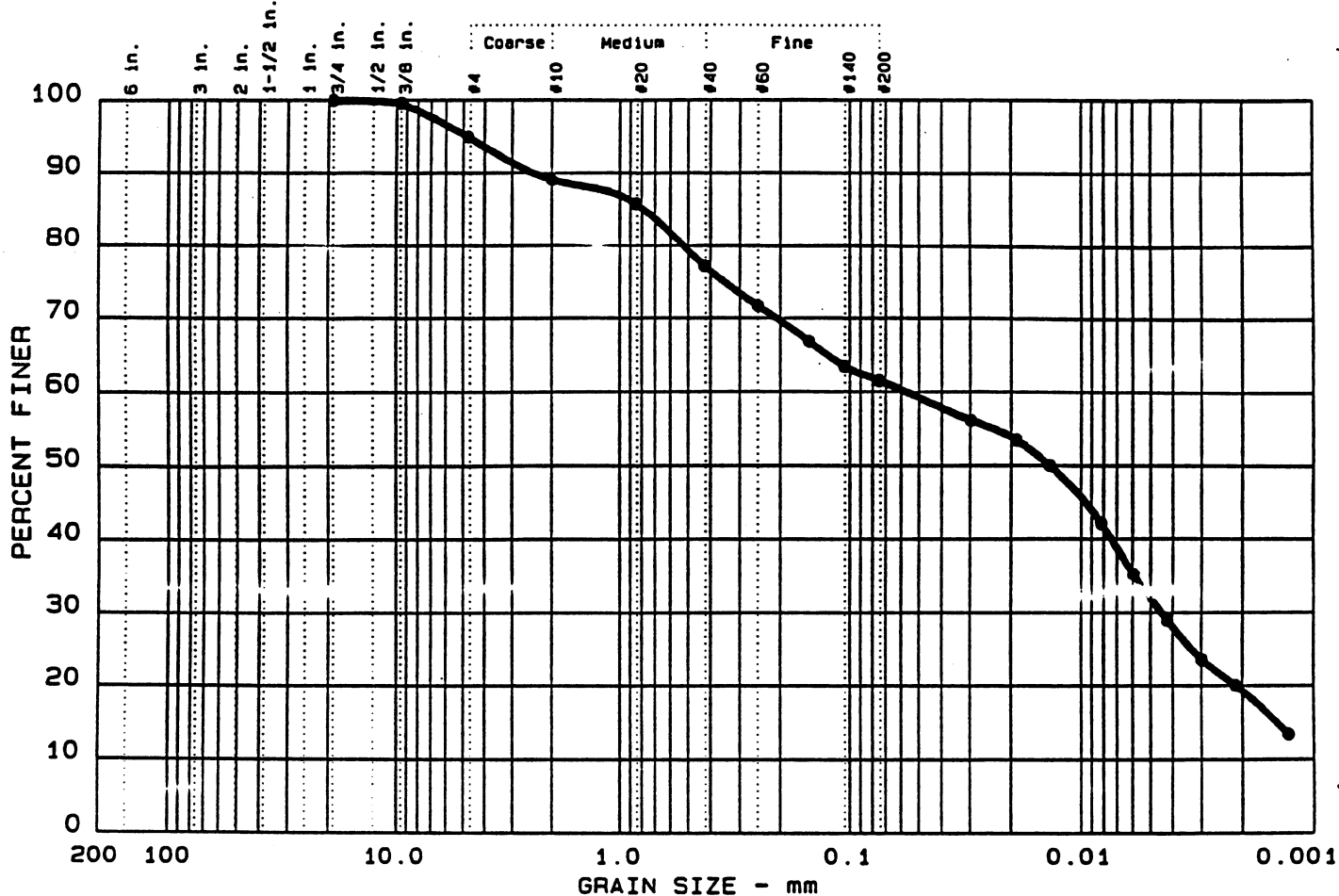
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Project No.: 4E05140
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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	5.0	33.5	29.6	31.9	CL	30	13

SIEVE inches size	PERCENT FINER		
	●		
0.75 0.375	100.0 99.6		
	GRAIN SIZE		
D ₆₀ D ₃₀ D ₁₀	0.004		
	COEFFICIENTS		
C _c C _u			

SIEVE number size	PERCENT FINER		
	●		
4	95.0		
10	89.1		
20	85.8		
40	77.2		
60	71.7		
100	66.8		
140	63.4		
200	61.5		

Sample information:

● CMC-11P; 205'-207'

Gray sandy CLAY; trace fine gravel

Remarks:

TESTED BY: SS

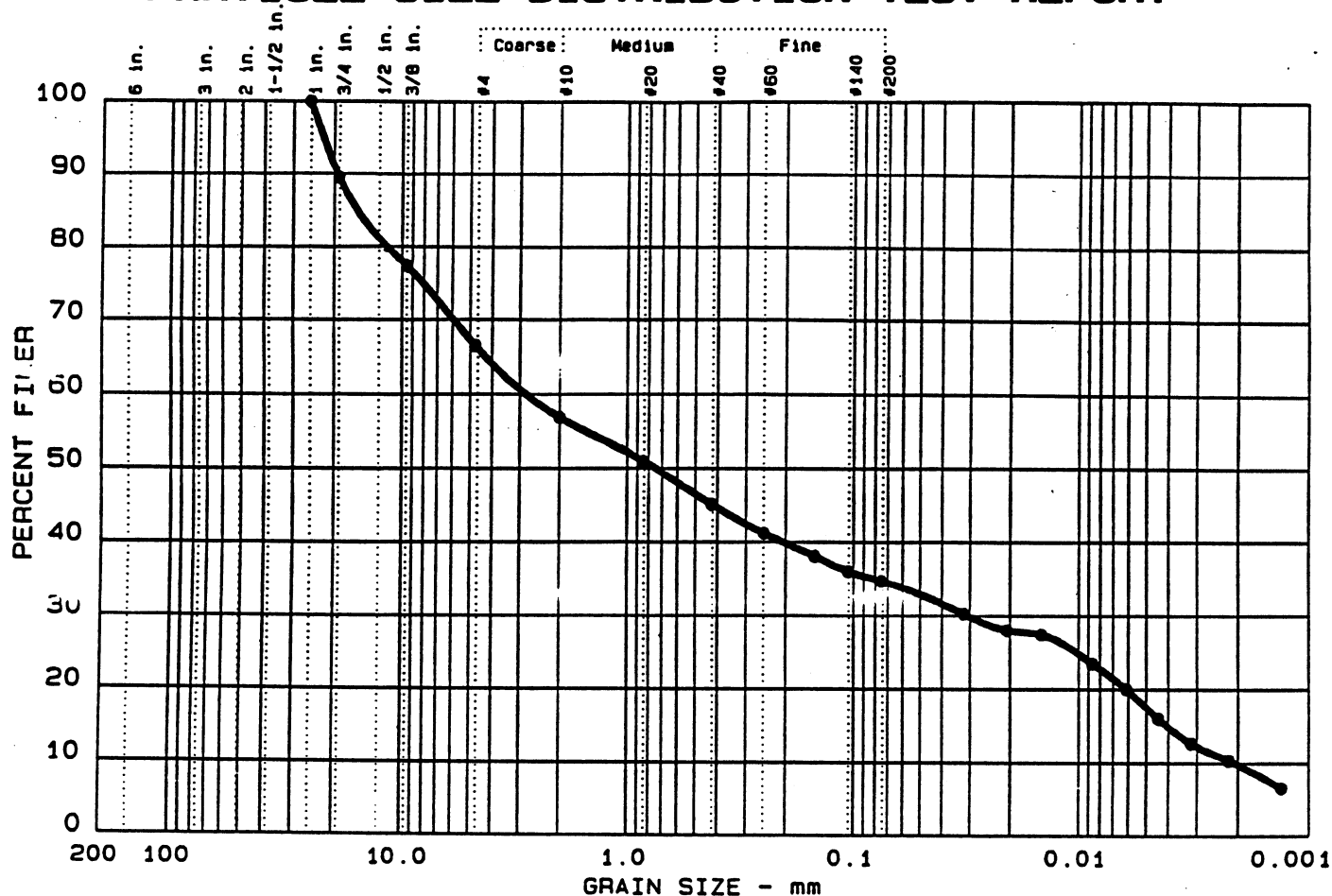
CHECKED BY: *NL*

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Project No.: 4E05140
 Project: CMC-SAPROLITE INVESTIGATION
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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	33.5	31.8	17.1	17.6	GC	NA	NA

SIEVE inches size	PERCENT FINER		
1	100.0		
0.75	89.5		
0.375	77.4		
GRAIN SIZE			
D ₆₀	2.82		
D ₃₀	0.03		
D ₁₀	0.00		
COEFFICIENTS			
C _c	0.16		
C _u	1364.		

SIEVE number size	PERCENT FINER		
4	66.5		
10	56.9		
20	51.0		
40	45.1		
60	41.2		
100	38.1		
140	36.0		
200	34.7		

Sample information:

• CMC-11P : 207'-211'
Gray & red sandy clayey
GRAVEL

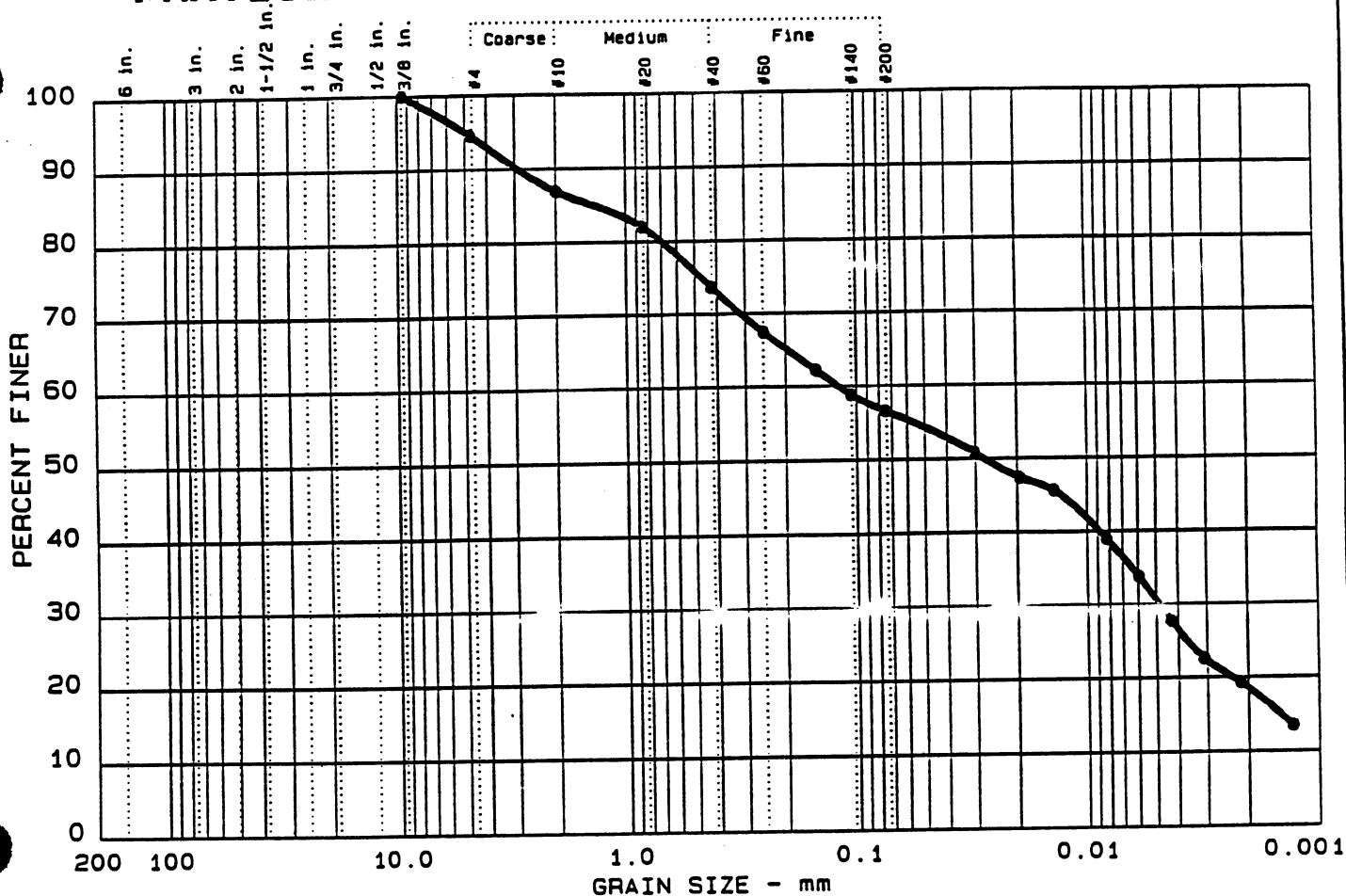
Remarks:

TESTED BY: NL
CHECKED BY: *as*

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Project: CMC-SAPROLITE INVESTIGATION
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PARTICLE SIZE DISTRIBUTION TEST REPORT

[illegible]

SIEVE inches size	PERCENT FINER		
	●		
0.375	100.0		
	GRAIN SIZE		
D ₆₀	0.12		
D ₃₀	0.005		
D ₁₀			
	COEFFICIENTS		
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	●		
4	94.6		
10	86.9		
20	82.0		
40	73.7		
60	67.4		
100	62.2		
140	58.8		
200	56.6		

Sample information:
● CMC-11P; 211'-212'
Red and gray sandy
CLAY; trace f gravel

Remarks:
CHECKED BY: CATS
ATT. LIMITS WERE NOT
PERFORMED SO USCS CLASS.
CANNOT BE PROVIDED

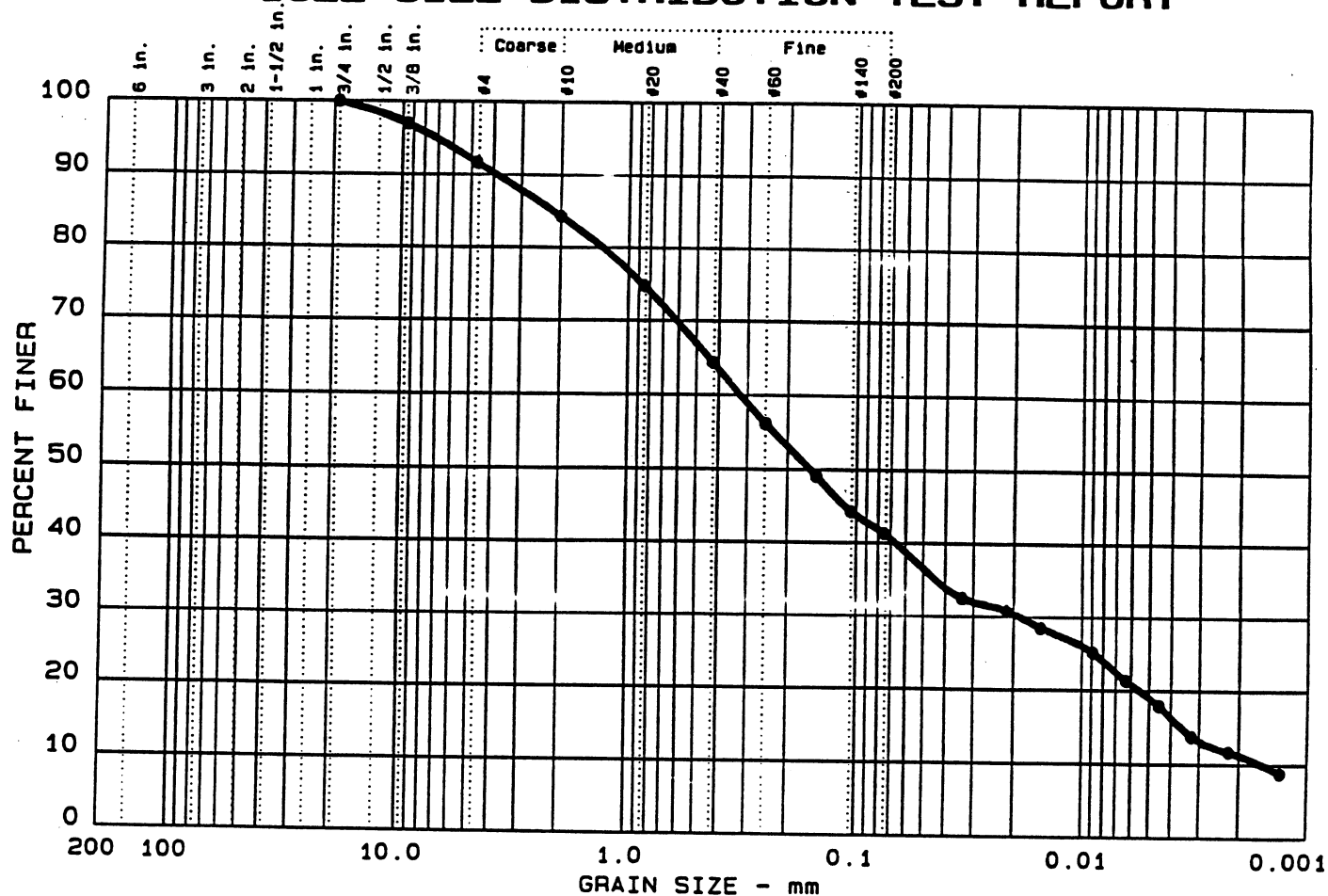
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CONSULTANTS**

Project No.: 4E05140
Project: CMC-SAPROLITE INVESTIGATION

Date: DECEMBER 9. 1994

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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	8.3	50.4	22.2	19.1	SM	NA	NA

SIEVE inches size	PERCENT FINER		
0.75	100.0		
0.375	97.0		
GRAIN SIZE			
D ₆₀	0.32		
D ₃₀	0.02		
D ₁₀	0.00		
COEFFICIENTS			
C _c	0.69		
C _u	204.2		

SIEVE number size	PERCENT FINER		
4	91.7		
10	84.3		
20	74.8		
40	64.4		
60	56.2		
100	49.1		
140	44.3		
200	41.3		

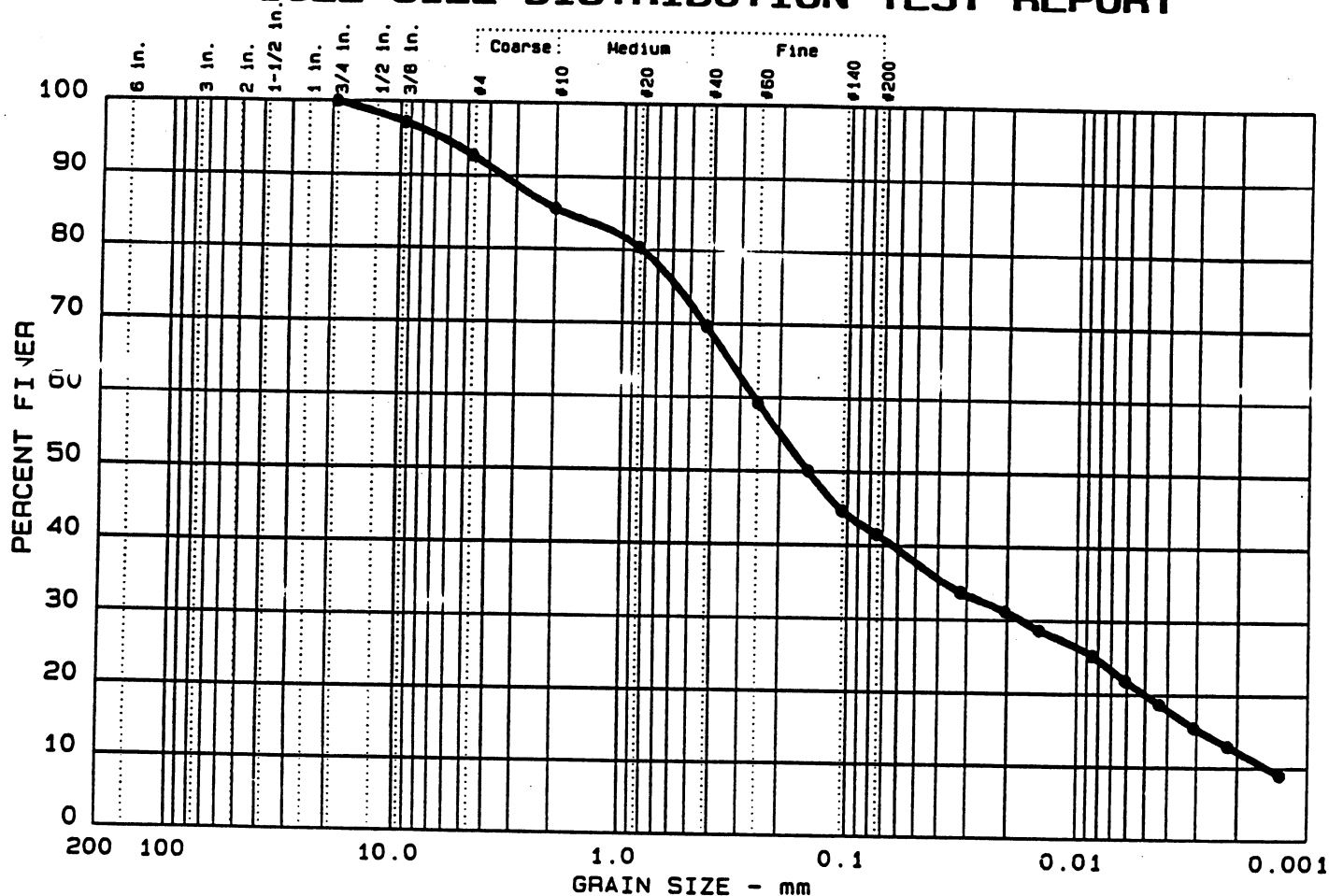
Sample information:
 • CMC-12P: 178'-181'
 Reddish brown clayey
 f-c SAND; trace f gravel

Remarks:
 TESTED BY: NL
 CHECKED BY: *CAZ*

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CONSULTANTS**

Project No.: 4E05140
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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	7.2	51.2	21.6	20.0	SC	NA	NA

SIEVE inches size	PERCENT FINER		
0.75	100.0		
0.375	97.2		
X GRAIN SIZE			
D ₆₀	0.26		
D ₃₀	0.02		
D ₁₀	0.00		
X COEFFICIENTS			
C _c	0.78		
C _u	173.8		

SIEVE number size	PERCENT FINER		
4	92.8		
10	85.6		
20	80.4		
40	69.7		
60	59.3		
100	50.1		
140	44.7		
200	41.6		

Sample information:
 ● CMC-12P: 181'-184'
 Reddish brown clayey
 f-c SAND; trace f gravel

Remarks:
 TESTED BY: NL
 CHECKED BY: *CS*

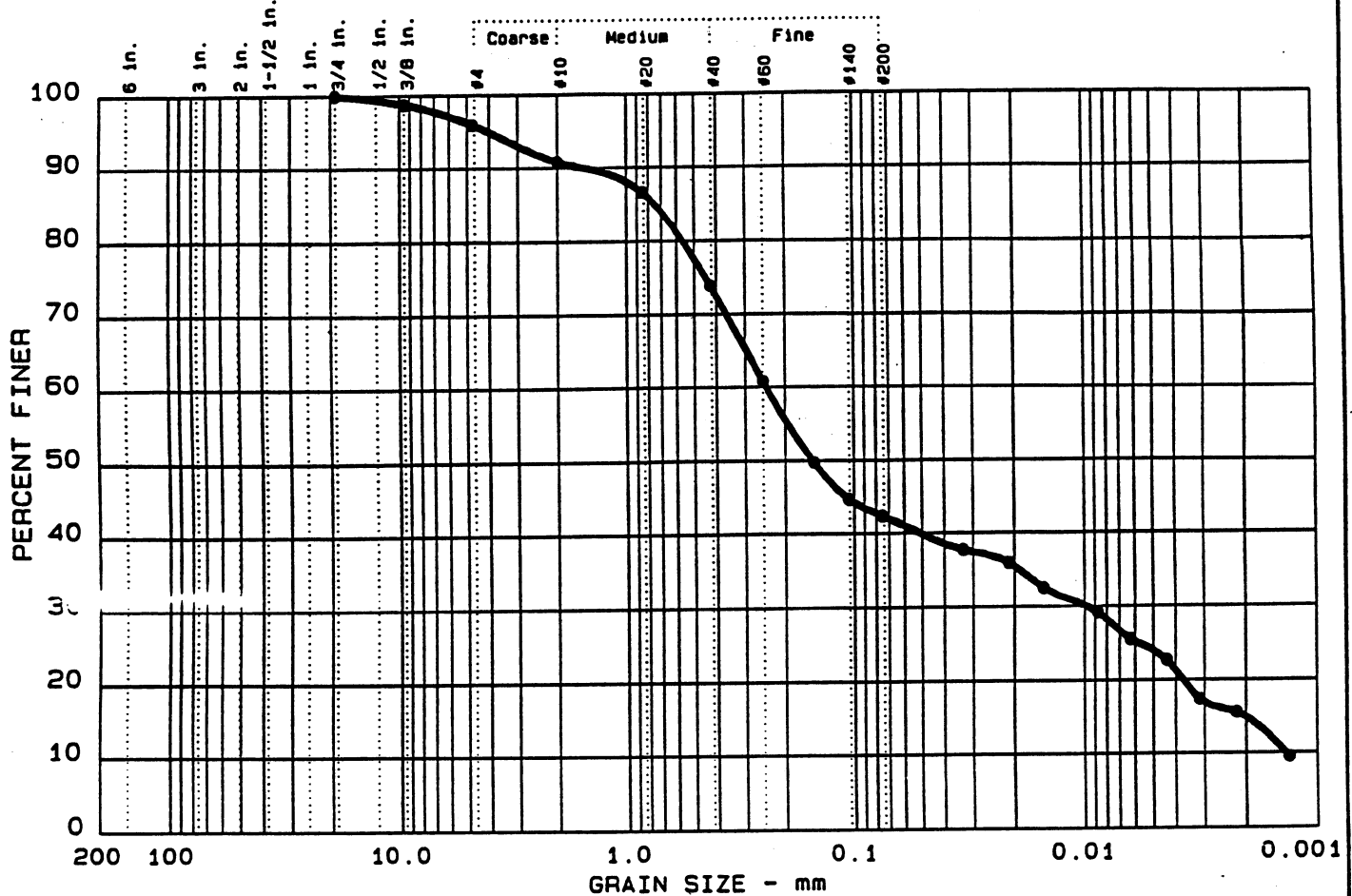
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CONSULTANTS**

Project No.: 4E05140
 Project: CMC-SAPROLITE INVESTIGATION

Date: DECEMBER 9, 1994

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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	4.0	53.6	18.3	24.1	SC-SM	20	7

SIEVE inches size	PERCENT FINER		
0.75	100.0		
0.375	98.8		
GRAIN SIZE			
D ₆₀	0.24		
D ₃₀	0.01		
D ₁₀	0.00		
COEFFICIENTS			
C _c	0.29		
C _u	177.8		

SIEVE number size	PERCENT FINER		
4	96.0		
10	90.8		
20	86.6		
40	73.9		
60	60.8		
100	49.7		
140	44.7		
200	42.4		

Sample information:
 • CMC-12P: 184'-185'
 Red silty clayey f-c
 SAND: trace gravel

Remarks:
 TESTED BY: NL
 CHECKED BY: CTS

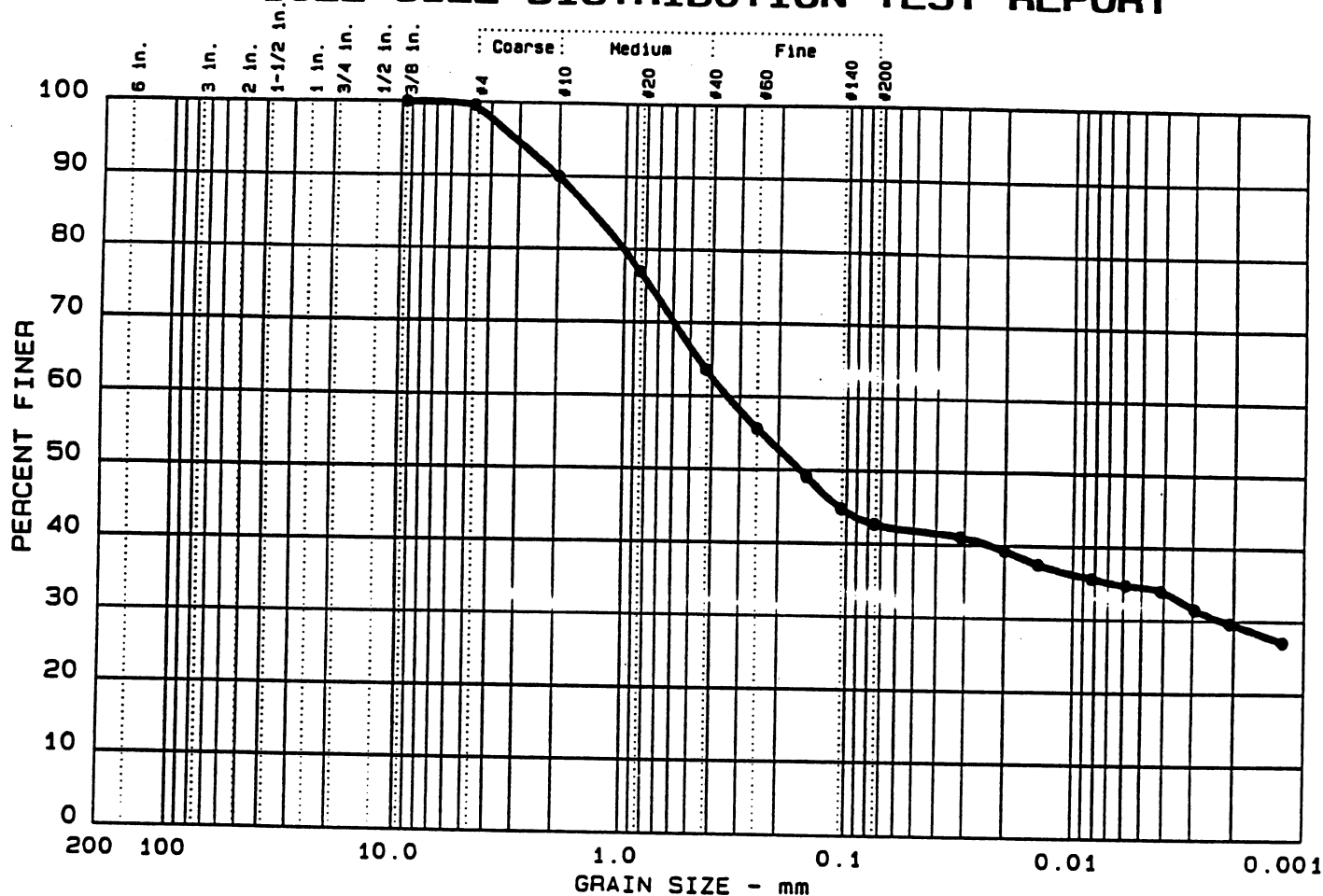
**WOODWARD-CLYDE
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Project No.: 4E05140
 Project: CMC-SAPROLITE INVESTIGATION

Date: DECEMBER 9, 1994

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	0.4	56.9	8.2	34.5	SC	32	13

SIEVE inches size	PERCENT FINER		
0.375	100.0		
GRAIN SIZE			
D ₆₀	0.34		
D ₃₀	0.002		
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
4	99.6		
10	90.0		
20	77.0		
40	63.6		
60	55.6		
100	49.1		
140	44.8		
200	42.7		

Sample information:

• CMC-12P: 185'-187'
Red clayey fine to coarse SAND

Remarks:

TESTED BY: NL
CHECKED BY: *CT*

**WOODWARD-CLYDE
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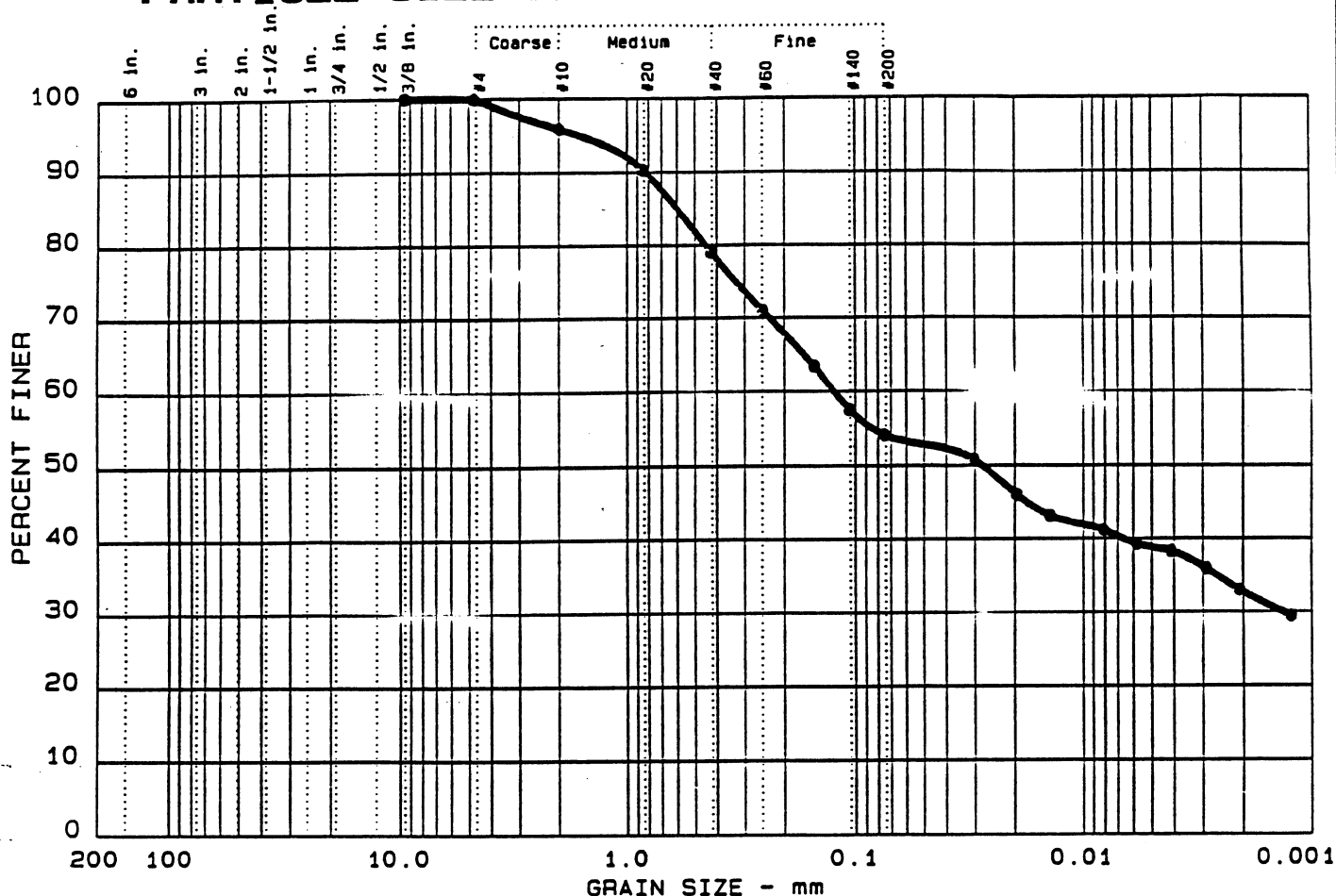
Project No.: 4E05140

Project: CMC-SAPROLITE INVESTIGATION

Date: DECEMBER 9, 1994

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	0.1	45.8	15.3	38.8	NA	NA	NA

SIEVE inches size	PERCENT FINER		
0.375	100.0		
GRAIN SIZE			
D ₆₀	0.12		
D ₃₀	0.001		
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
4	99.9		
10	95.9		
20	90.3		
40	79.0		
60	71.0		
100	63.4		
140	57.5		
200	54.1		

Sample information:
 ● CMC-12P; 191'-196'
 Red sandy CLAY

Remarks:
 CHECKED BY: *CJS*
 ATT. LIMITS WERE NOT
 PERFORMED SO USCS CLASS.
 CANNOT BE PROVIDED

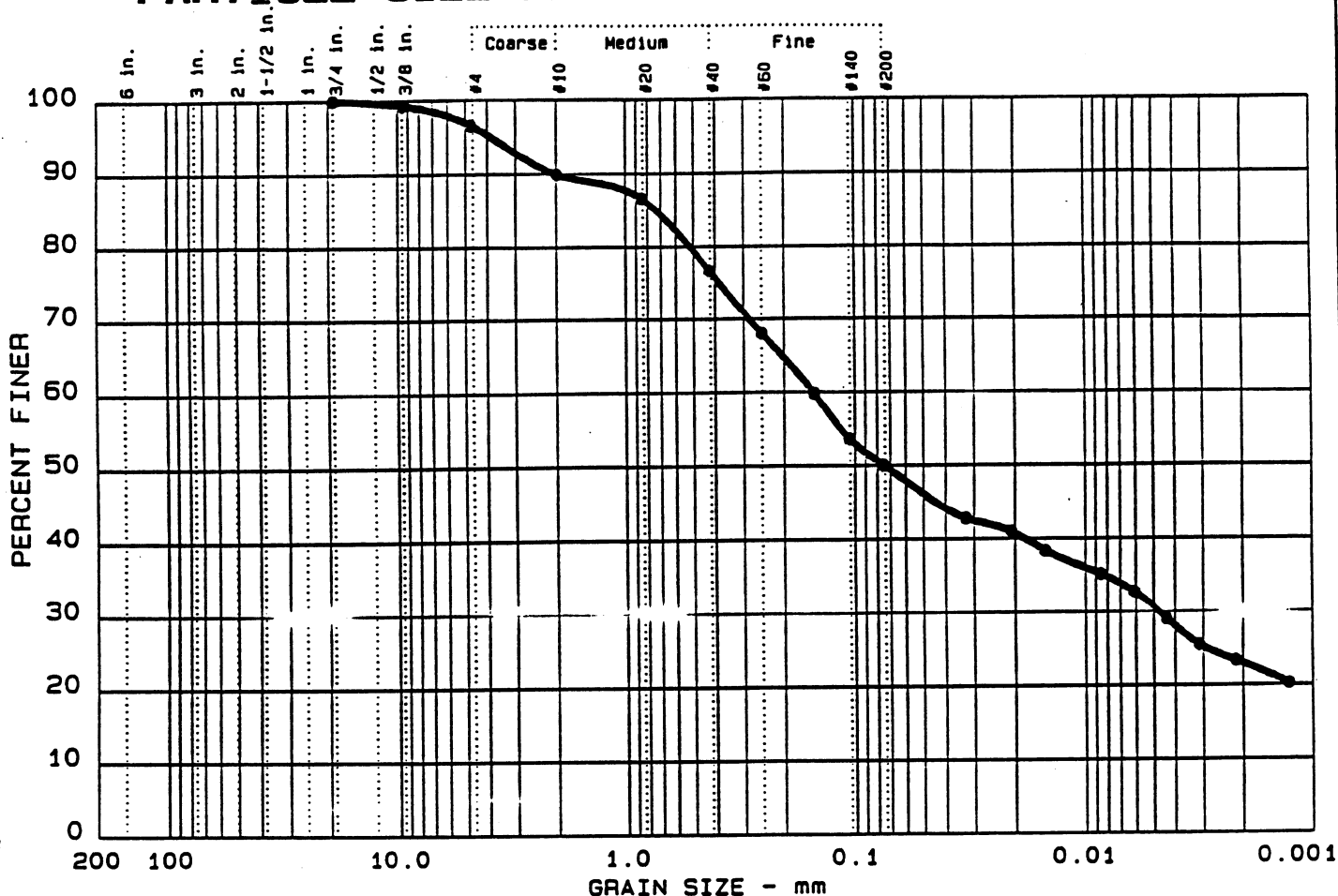
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CONSULTANTS**

Project No.: 4E05140
 Project: CMC-SAPROLITE INVESTIGATION

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Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	3.4	46.6	19.4	30.6	NA	NA	NA

SIEVE inches size	PERCENT FINER		
0.75	100.0		
0.375	99.3		
GRAIN SIZE			
D ₆₀	0.15		
D ₃₀	0.005		
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
4	96.6		
10	89.9		
20	86.6		
40	76.6		
60	68.0		
100	59.8		
140	53.6		
200	50.0		

Sample information:

● CMC-12P; 196'-199'
Red sandy CLAY; trace fine gravel

Remarks:

CHECKED BY: *CS*
ATT. LIMITS WERE NOT PERFORMED SO USCS CLASS. CANNOT BE PROVIDED

**WOODWARD-CLYDE
CONSULTANTS**

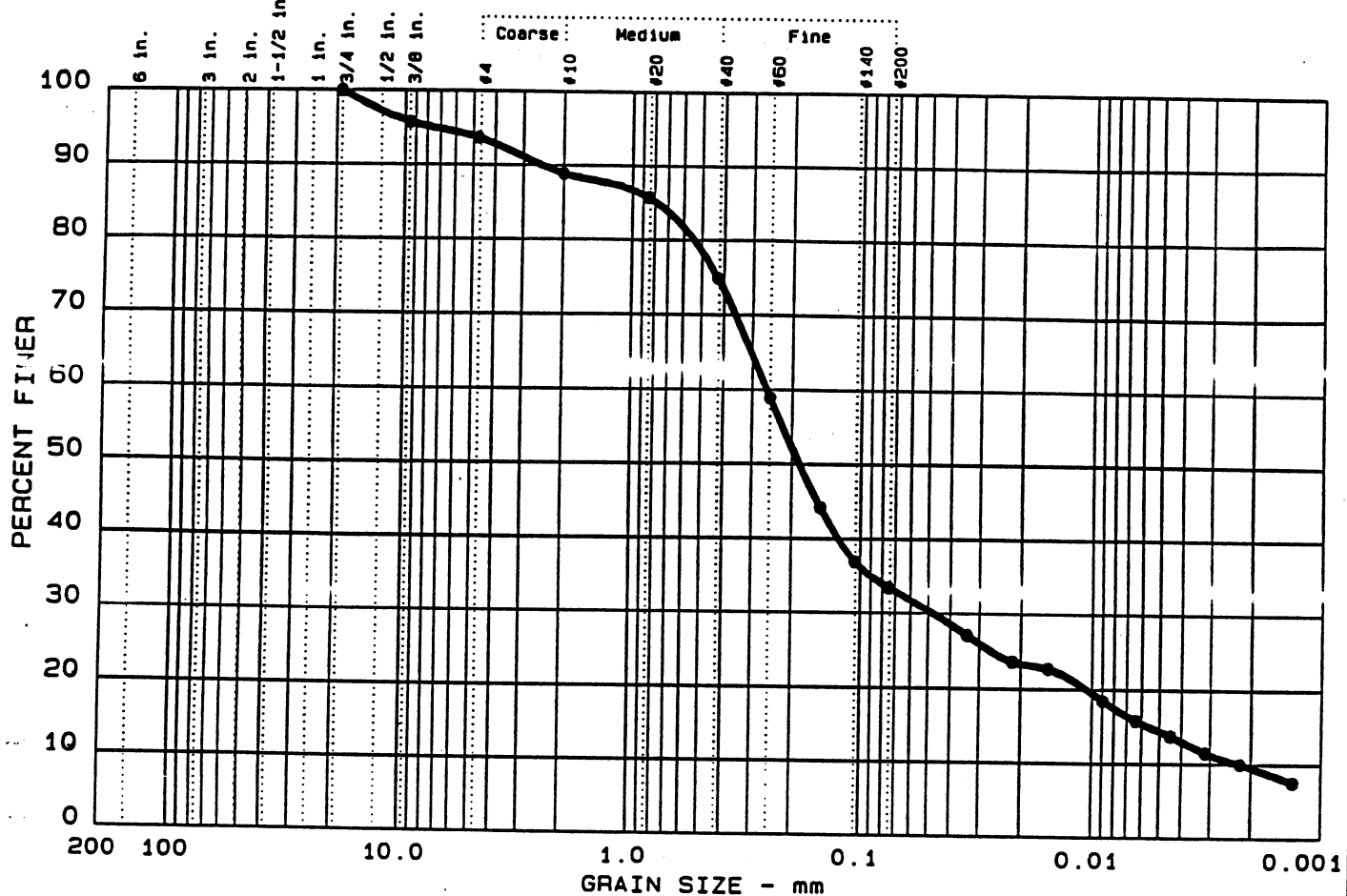
Project No.: 4E05140

Project: CMC-SAPROLITE INVESTIGATION

Date: DECEMBER 9, 1994

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	6.3	60.3	19.0	14.4	SC-SM	19	6

SIEVE inches size	PERCENT FINER		
0.75	100.0		
0.375	95.8		
GRAIN SIZE			
D ₆₀	0.26		
D ₃₀	0.05		
D ₁₀	0.00		
COEFFICIENTS			
C _c	3.85		
C _u	116.1		

SIEVE number size	PERCENT FINER		
4	93.7		
10	88.9		
20	85.7		
40	74.9		
60	58.9		
100	44.2		
140	36.9		
200	33.4		

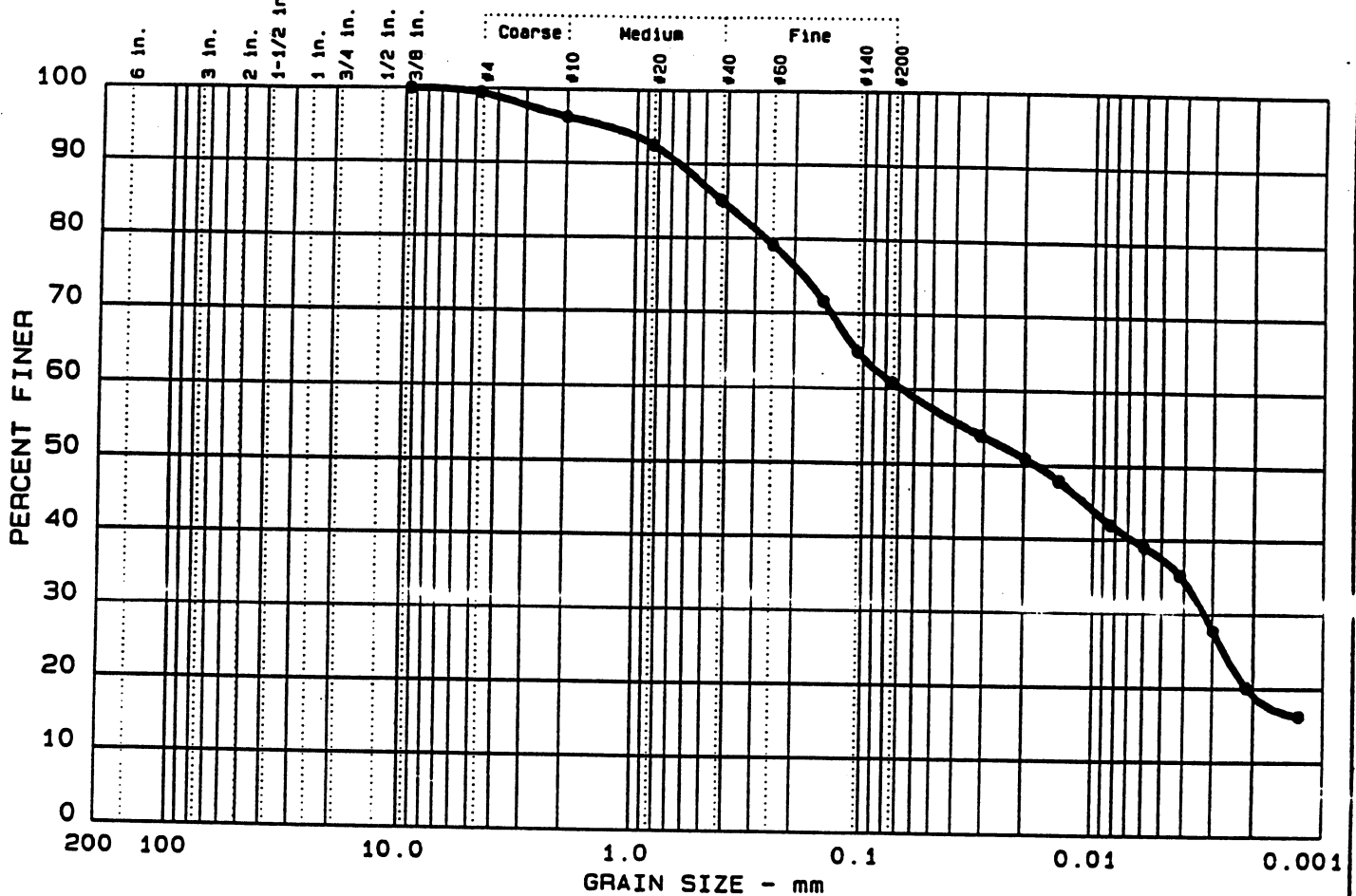
Sample information:
 ● CMC-13P: 192'-193'
 Red silty clayey f-c
 SAND; trace gravel

Remarks:
 TESTED BY: NL
 CHECKED BY: *GP*

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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	0.5	38.6	23.4	37.5	CL	30	14

SIEVE inches size	PERCENT FINER		
0.375	100.0		
GRAIN SIZE			
D ₆₀	0.003		
D ₃₀			
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
4	99.5		
10	96.3		
20	92.6		
40	85.1		
60	79.1		
100	71.6		
140	64.9		
200	60.9		

Sample information:
 • CMC-13P; 199'-201'
 Red sandy CLAY

Remarks:
 TESTED BY: SS
 CHECKED BY: *NL*

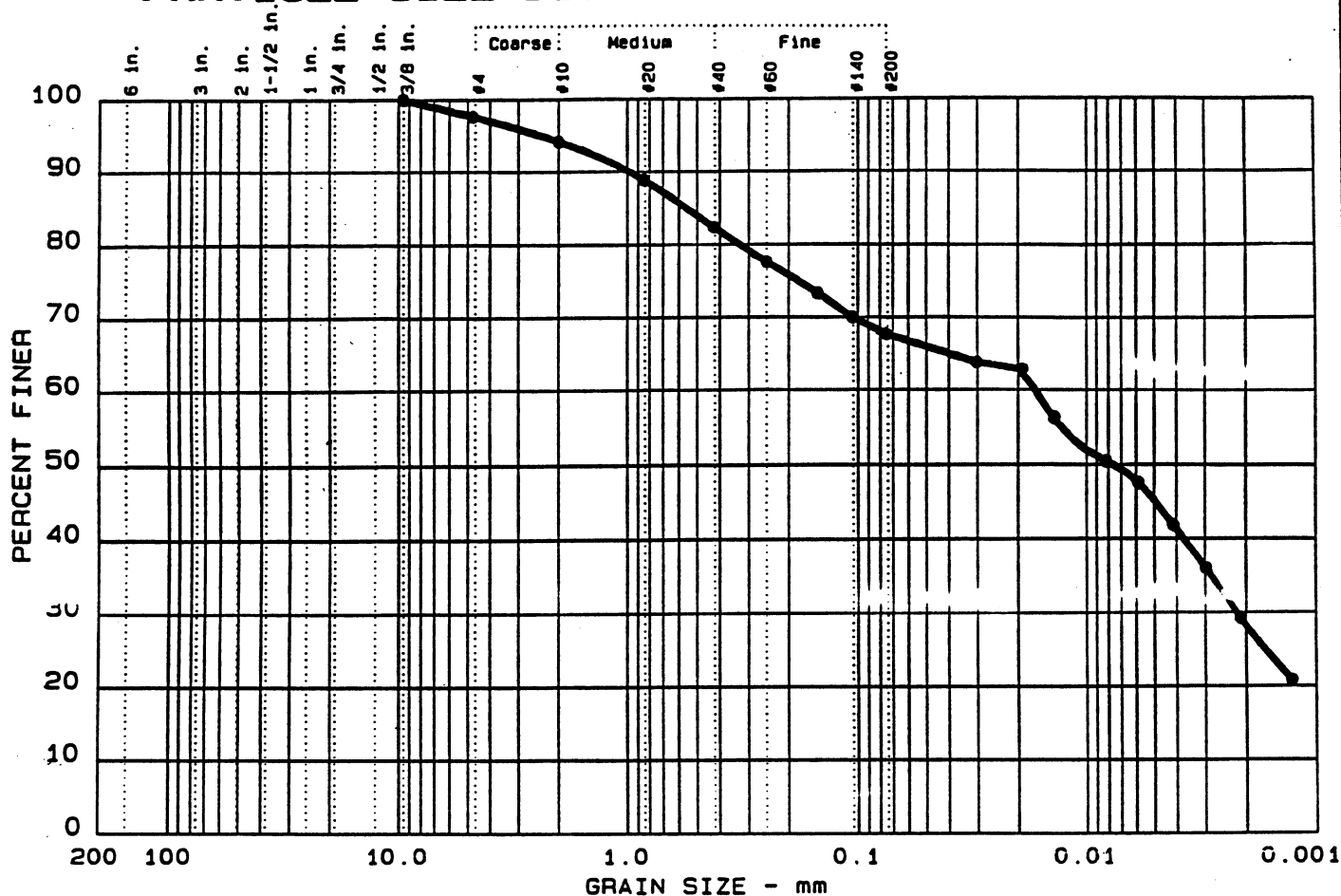
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Project No.: 4E05140
 Project: CMC-SAPROLITE INVESTIGATION

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Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	2.3	30.0	22.5	45.2	MH	62	23

SIEVE inches size	PERCENT FINER		
0.375	100.0		
GRAIN SIZE			
D ₆₀	0.002		
D ₃₀			
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
4	97.7		
10	94.2		
20	88.9		
40	82.4		
60	77.6		
100	73.3		
140	70.0		
200	67.7		

Sample information:

● CMC-OWA-1: 154'-156'
Red sandy clayey SILT;
fine gravel

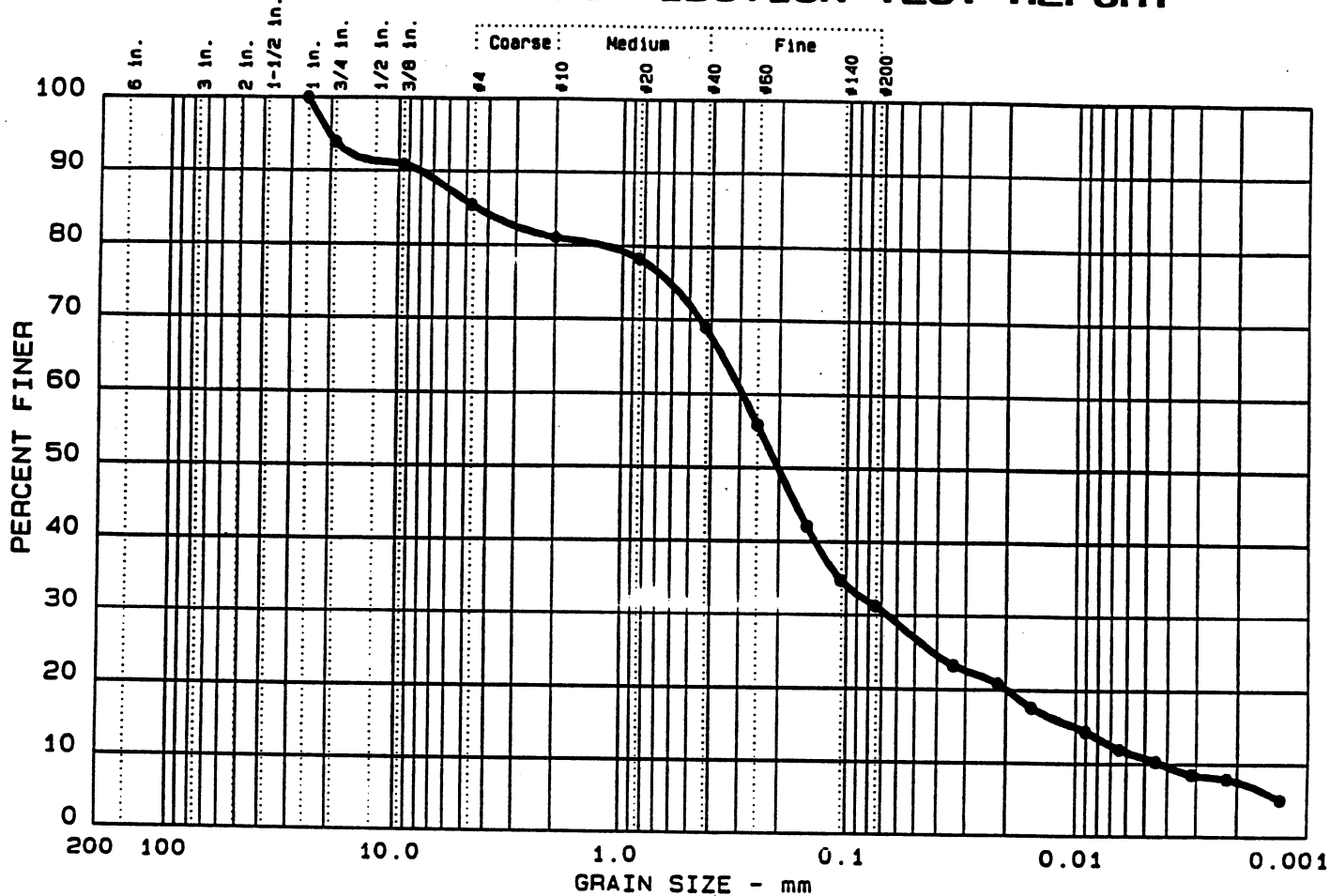
Remarks:

TESTED BY: NL
CHECKED BY: *[Signature]*

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Project No.: 4E05140
Project: CMC-SAPROLITE INVESTIGATION
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PARTICLE SIZE DISTRIBUTION TEST REPORT

[illegible]

SIEVE inches size	PERCENT FINER		
	●		
1	100.0		
0.75	94.0		
0.375	90.9		
	GRAIN SIZE		
D ₆₀	0.29		
D ₃₀	0.07		
D ₁₀	0.00		
	COEFFICIENTS		
C _c	3.47		
C _u	69.2		

SIEVE number size	PERCENT FINER		
	●		
4	85.5		
10	81.1		
20	78.3		
40	69.0		
60	55.9		
100	42.1		
140	34.8		
200	31.3		

Sample information:

- CMC-OWA-3; 129'-131'
Reddish brown clayey
f-m SAND; some f gravel

Remarks:

TESTED BY: SS

CHECKED BY:

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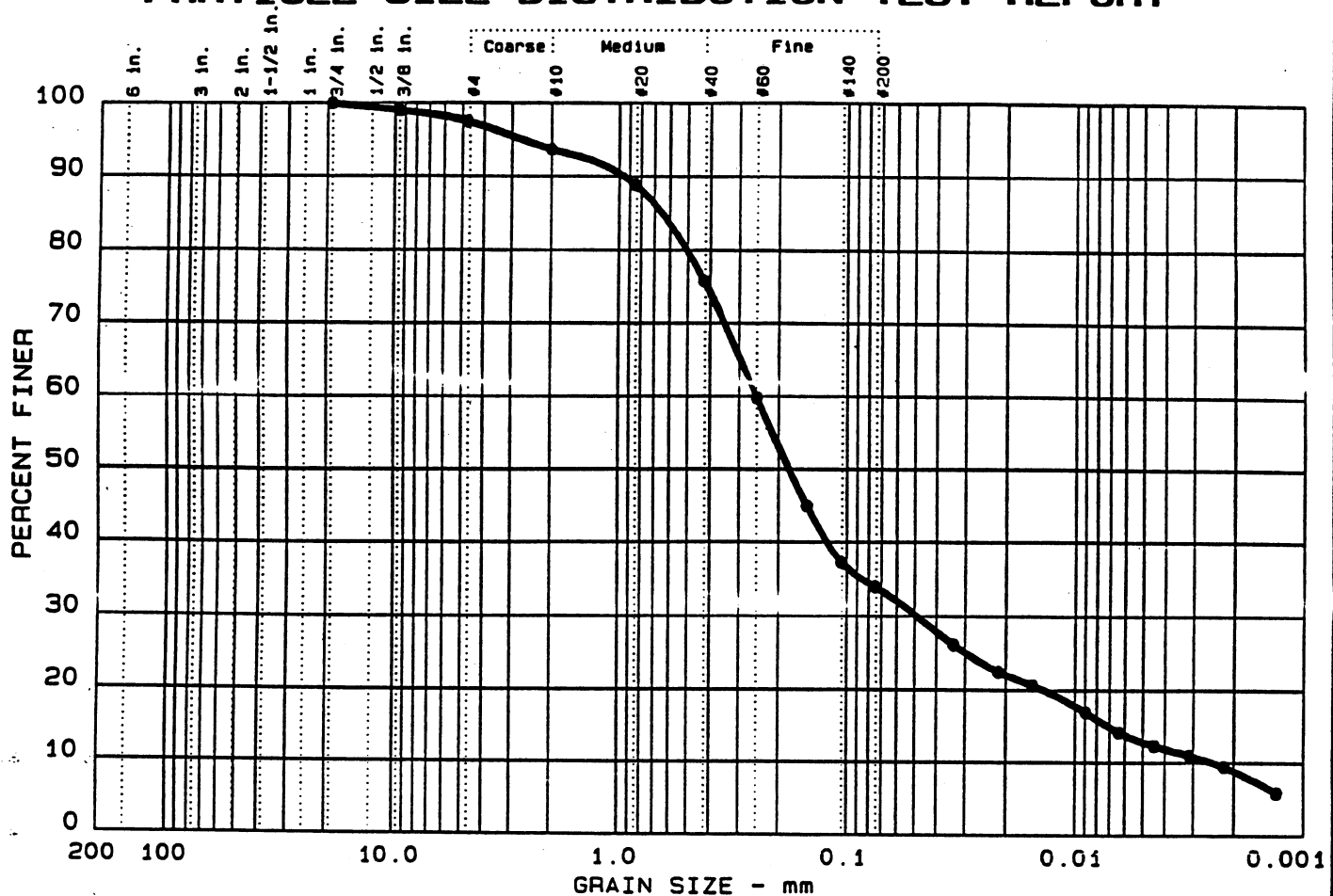
Project No.: 4E05140

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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	2.5	63.5	21.2	12.8	SC	NA	NA

SIEVE inches size	PERCENT FINER		
	●		
0.75	100.0		
0.375	99.0		
	GRAIN SIZE		
D ₆₀	0.25		
D ₃₀	0.05		
D ₁₀	0.00		
	COEFFICIENTS		
C _c	3.80		
C _u	102.3		

SIEVE number size	PERCENT FINER		
	●		
4	97.5		
10	93.7		
20	88.9		
40	75.8		
60	59.8		
100	44.9		
140	37.3		
200	34.0		

Sample information:

● CMC-OWA-4; 124'-126'
Red clayey fine-coarse
SAND; trace gravel

Remarks:

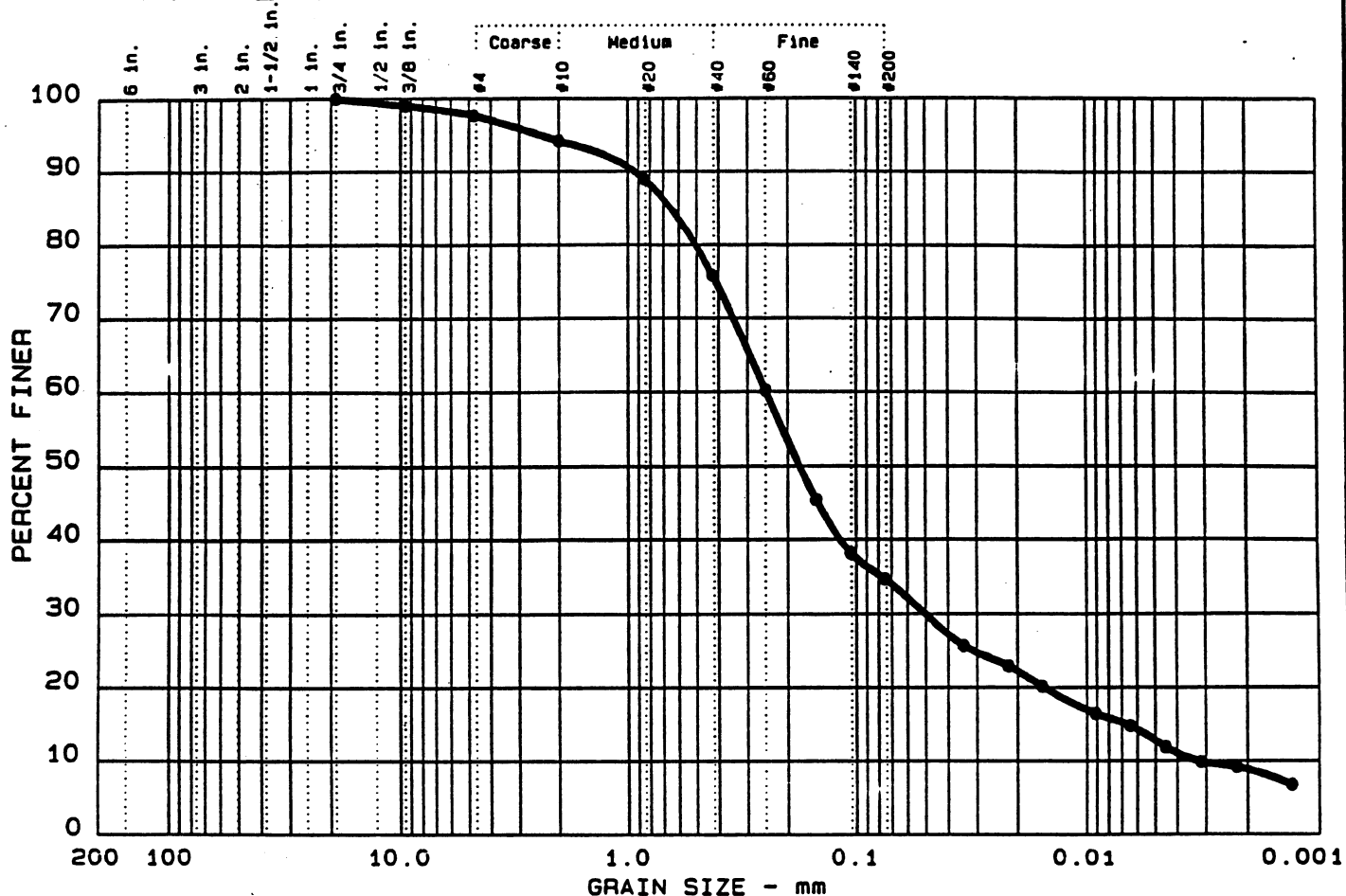
TESTED BY: SS

CHECKED BY: *OFF*

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CONSULTANTS**

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Project: CMC-SAPROLITE INVESTIGATION
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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	2.3	63.0	21.9	12.8	SC	NA	NA

SIEVE inches size	PERCENT FINER		
•			
0.75	100.0		
0.375	99.0		
GRAIN SIZE			
D ₆₀	0.25		
D ₃₀	0.05		
D ₁₀	0.00		
COEFFICIENTS			
C _c	3.20		
C _u	78.6		

SIEVE number size	PERCENT FINER		
•			
4	97.7		
10	94.2		
20	89.0		
40	75.8		
60	60.2		
100	45.4		
140	38.2		
200	34.7		

Sample information:

- CMC-OWA-5; 127'-129'
- Reddish brown clayey f-c SAND; trace f gravel

Remarks:

TESTED BY: SS

CHECKED BY: *WJ*

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Project: CMC-SAPROLITE INVESTIGATION

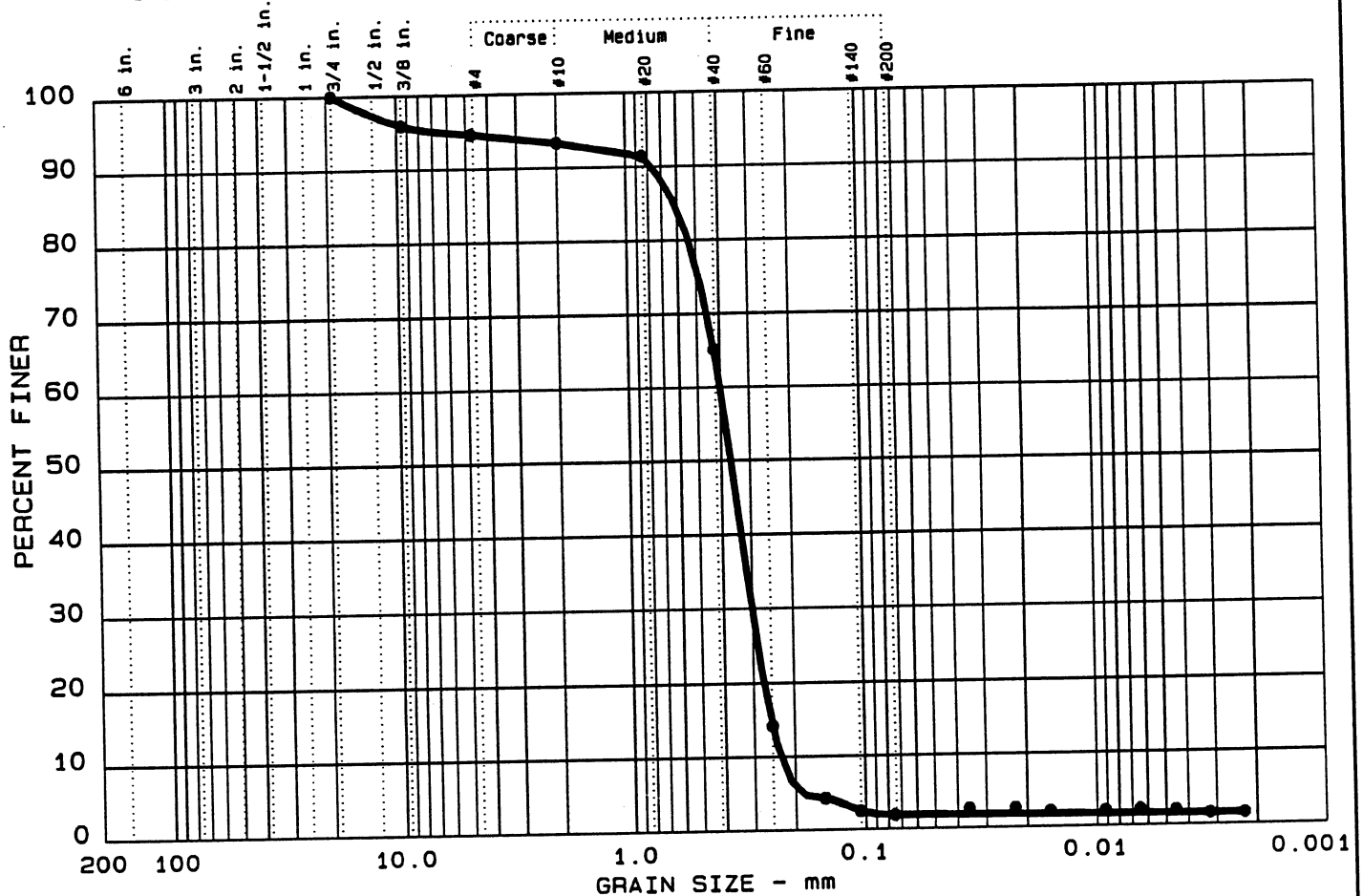
Date: DECEMBER 7, 1994

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Appendix 3.5-25

**Grain Size Curves From 1994 and 1995 Foth & Van Dyke
Soil Absorption Pond Test Pit Work**

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	5.4	92.7	0.3	1.6	SP	NA	NA

SIEVE inches size	PERCENT FINER		
0.75	100.0		
0.375	95.9		
GRAIN SIZE			
D ₆₀	0.40		
D ₃₀	0.30		
D ₁₀	0.23		
COEFFICIENTS			
C _c	0.98		
C _u	1.7		

SIEVE number size	PERCENT FINER		
4	94.6		
10	93.3		
20	91.4		
40	65.2		
60	14.2		
100	4.3		
140	2.5		
200	1.9		

Sample information:

- TPA-2, 17' DEPTH
- Brown f to c SAND; trace gravel and silt

Remarks:

TESTED BY: NL
CHECKED BY: GTS

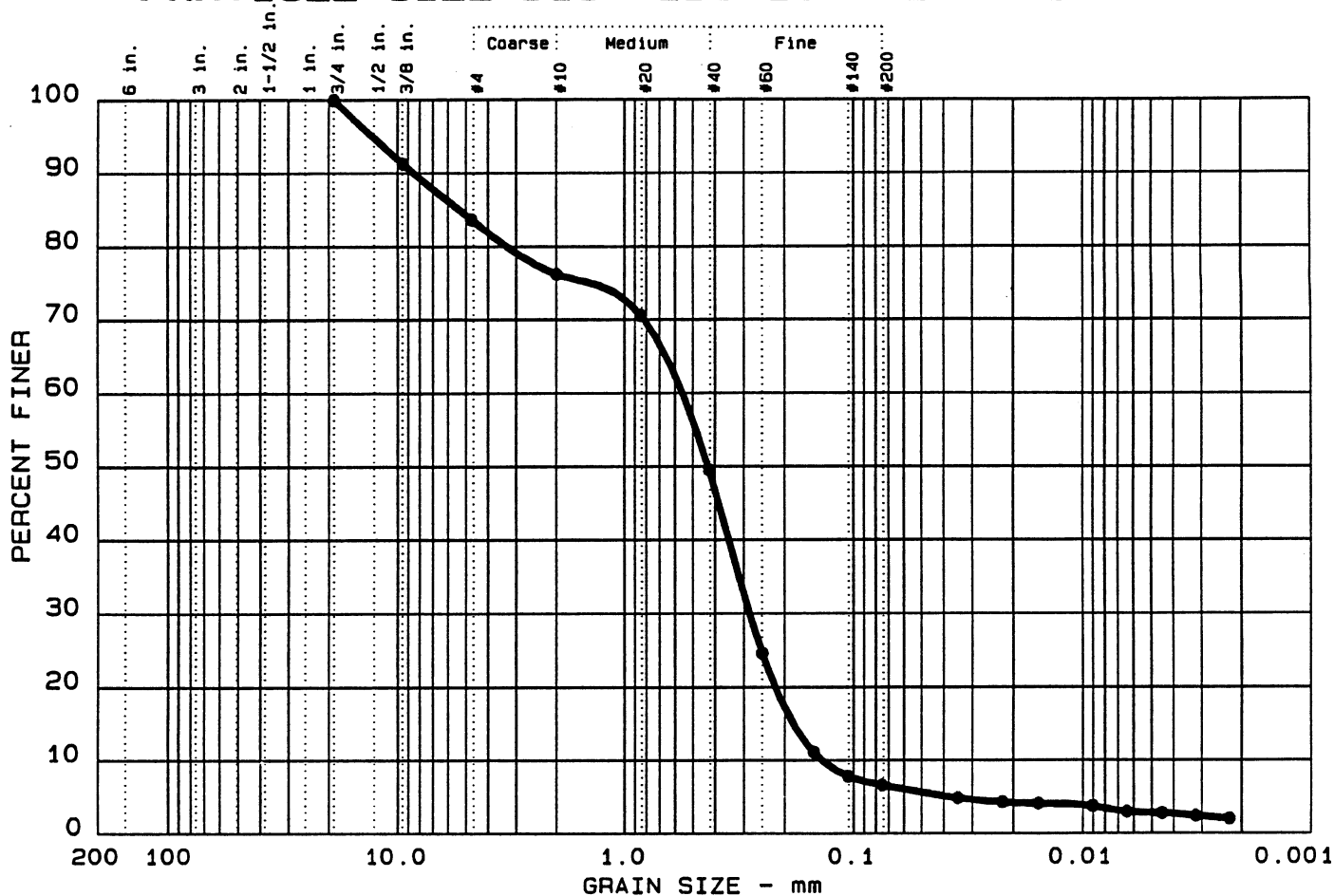
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Project No.: 4E05140
Project: Crandon Mining Co.

Date: February 22, 1995

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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	16.3	77.1	3.8	2.8	SP-SM	NA	NA

SIEVE inches size	PERCENT FINER		
●			
0.75	100.0		
0.375	91.3		
GRAIN SIZE			
D ₆₀	0.56		
D ₃₀	0.28		
D ₁₀	0.13		
COEFFICIENTS			
C _c	1.05		
C _u	4.1		

SIEVE number size	PERCENT FINER		
●			
4	83.7		
10	76.2		
20	70.6		
40	49.5		
60	24.6		
100	11.1		
140	7.8		
200	6.6		

Sample information:
 ● TPA-3, 17' DEPTH
 Brown f to c SAND; some
 gravel, trace silt

Remarks:
 TESTED BY: NL
 CHECKED BY: *CSM*

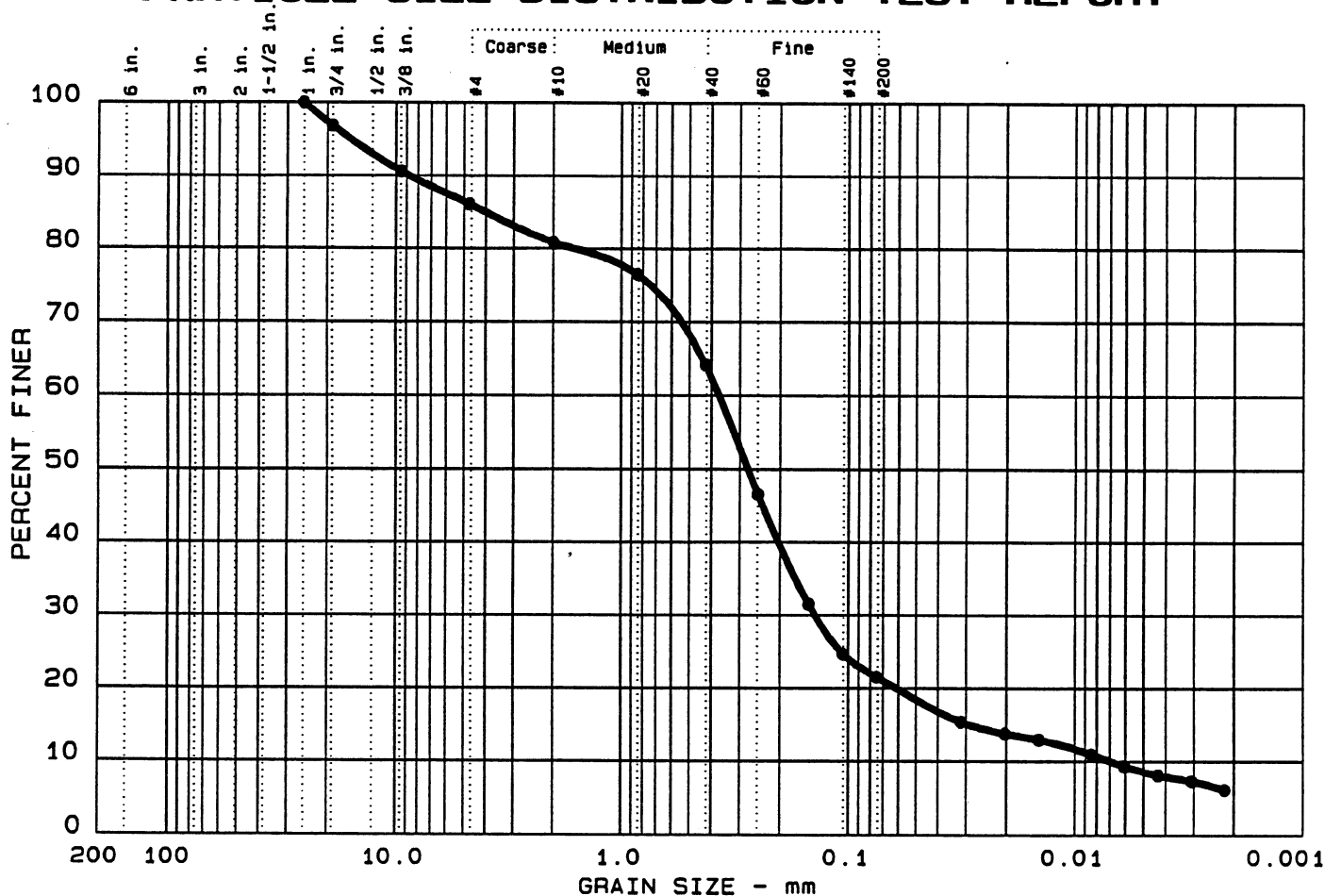
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 Project: Crandon Mining Co.

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PARTICLE SIZE DISTRIBUTION TEST REPORT



The graph displays the grain size distribution of a material. The y-axis represents the percentage of material finer than a given grain size, ranging from 0 to 100. The x-axis represents the grain size in millimeters on a logarithmic scale, ranging from 200 mm to 0.001 mm. The curve shows that approximately 100% of the material is finer than 200 mm, and the percentage of finer material decreases as the grain size decreases, reaching about 8% finer at 0.001 mm.

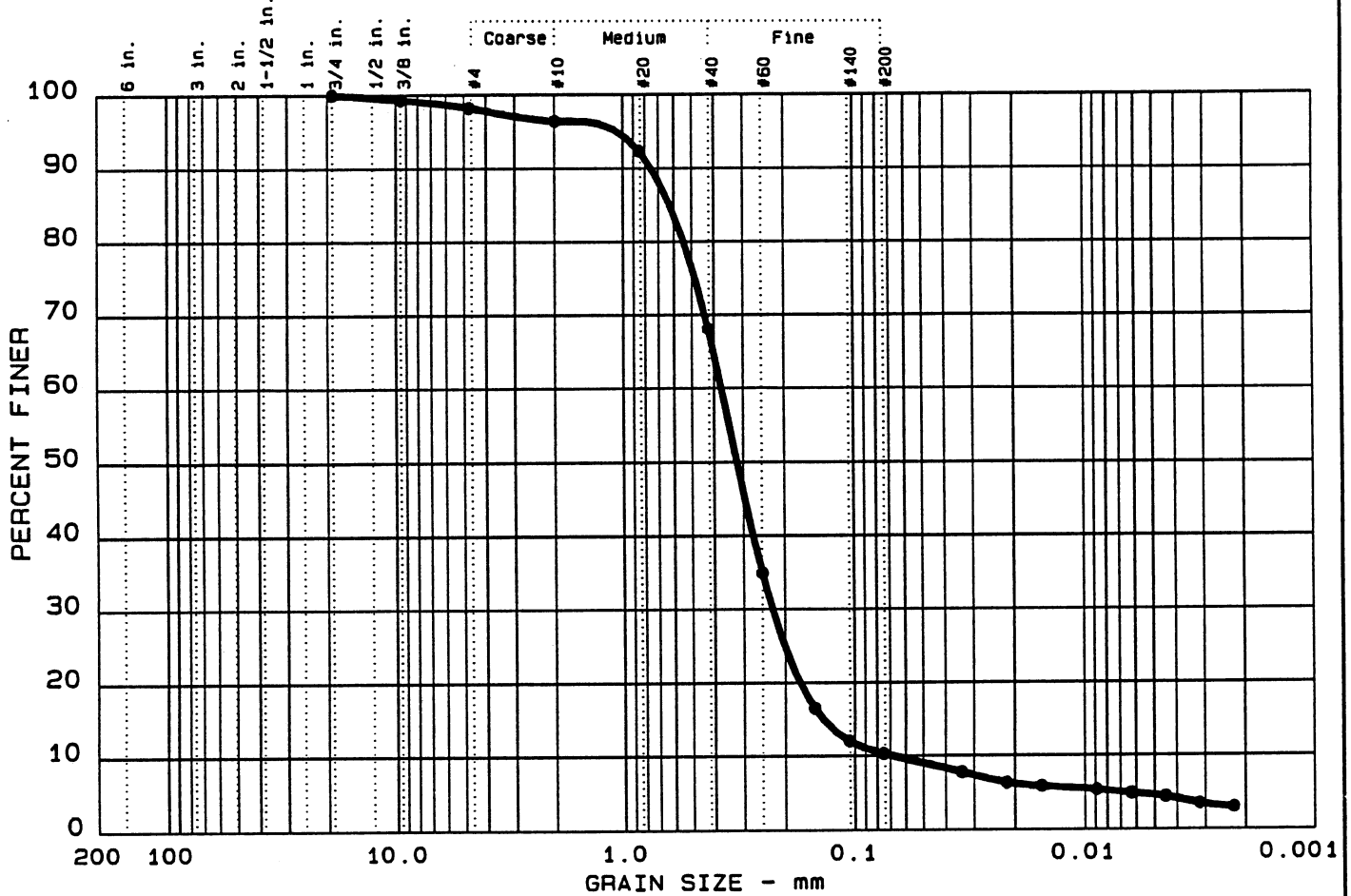
Grain Size (mm)	Percent Finer (%)
200	100
100	100
50	100
25	100
12.5	100
6.3	100
3.15	90
1.6	85
0.8	80
0.4	75
0.2	65
0.1	48
0.075	32
0.05	25
0.0375	22
0.025	18
0.0175	15
0.0125	14
0.00875	12
0.00625	10
0.0044	9
0.00315	8

SIEVE inches size	PERCENT FINER		
	●		
0.75	100.0		
0.375	90.1		
	GRAIN SIZE		
D ₆₀	0.38		
D ₃₀	0.14		
D ₁₀	0.00		
	COEFFICIENTS		
C _c	7.14		
C _u	50.8		

Remarks:
TESTED BY: NL
CHECKED BY: *CAT*

3.5-25-4

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	1.8	87.9	5.6	4.7	SP-SM	NA	NA

SIEVE inches size	PERCENT FINER		
	●		
0.75 0.375	100.0 99.3		
	GRAIN SIZE		
D ₆₀ D ₃₀ D ₁₀	0.37 0.23 0.06		
	COEFFICIENTS		
C _c C _u	2.06 5.6		

SIEVE number size	PERCENT FINER		
	●		
4	98.2		
10	96.4		
20	92.3		
40	68.1		
60	34.9		
100	16.5		
140	12.0		
200	10.3		

● TPA-15, 13' DEPTH
Brown f-c SAND; trace
gravel and silt

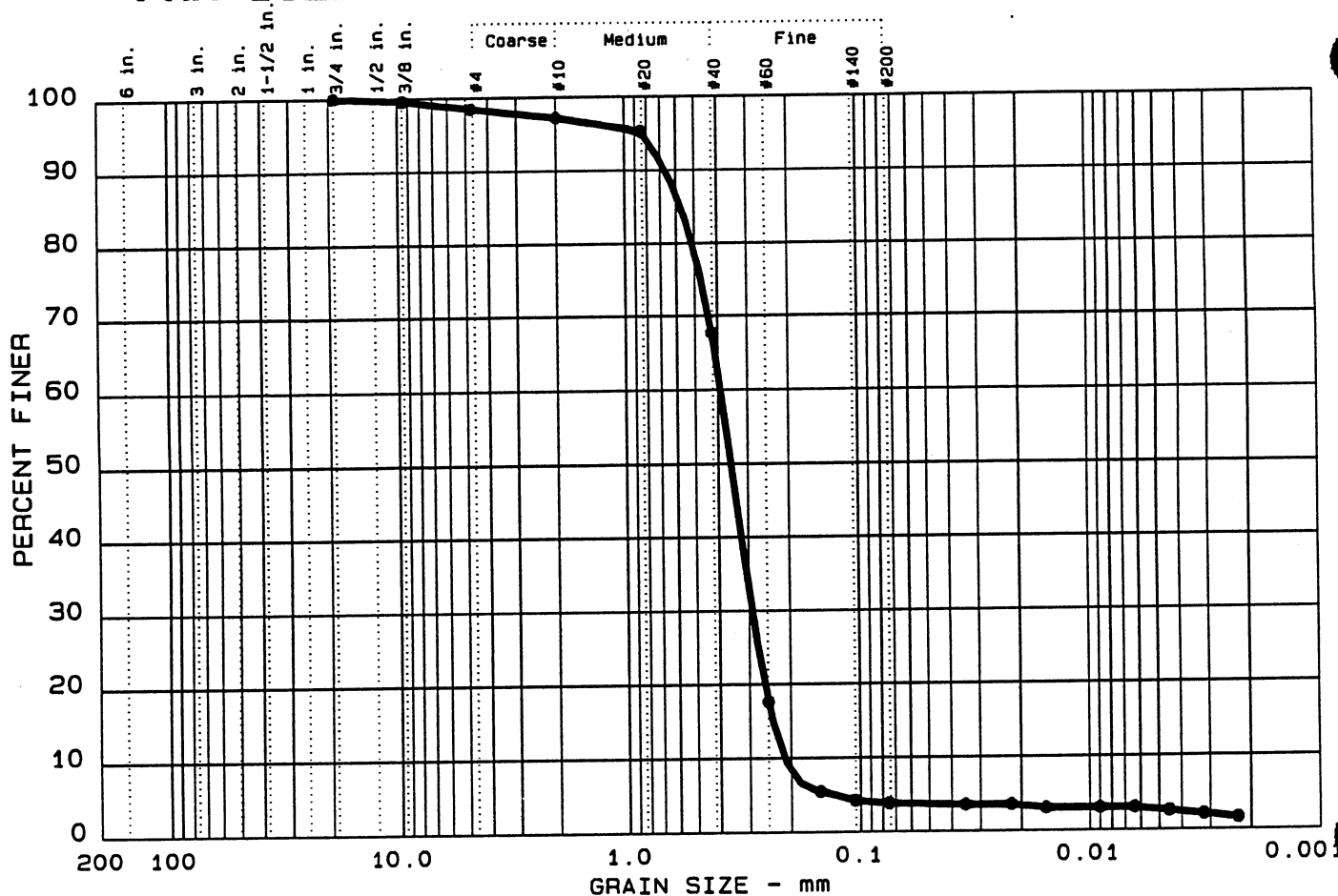
TESTED BY: NL
CHECKED BY: *Carly*

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CONSULTANTS**

Project: Crandon Mining Co.

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	1.5	94.7	1.1	2.7	SP	NA	NA

SIEVE inches size	PERCENT FINER		
●			
0.75	100.0		
0.375	99.6		
GRAIN SIZE			
D ₆₀	0.39		
D ₃₀	0.29		
D ₁₀	0.21		
COEFFICIENTS			
C _c	1.02		
C _u	1.8		

SIEVE number size	PERCENT FINER		
●			
4	98.5		
10	97.2		
20	95.3		
40	67.7		
60	17.6		
100	5.4		
140	4.2		
200	3.8		

Sample information:

● TPA-17, 13' DEPTH
Brown f-c SAND; trace gravel and silt

Remarks:

TESTED BY: NL
CHECKED BY: *CTJ*

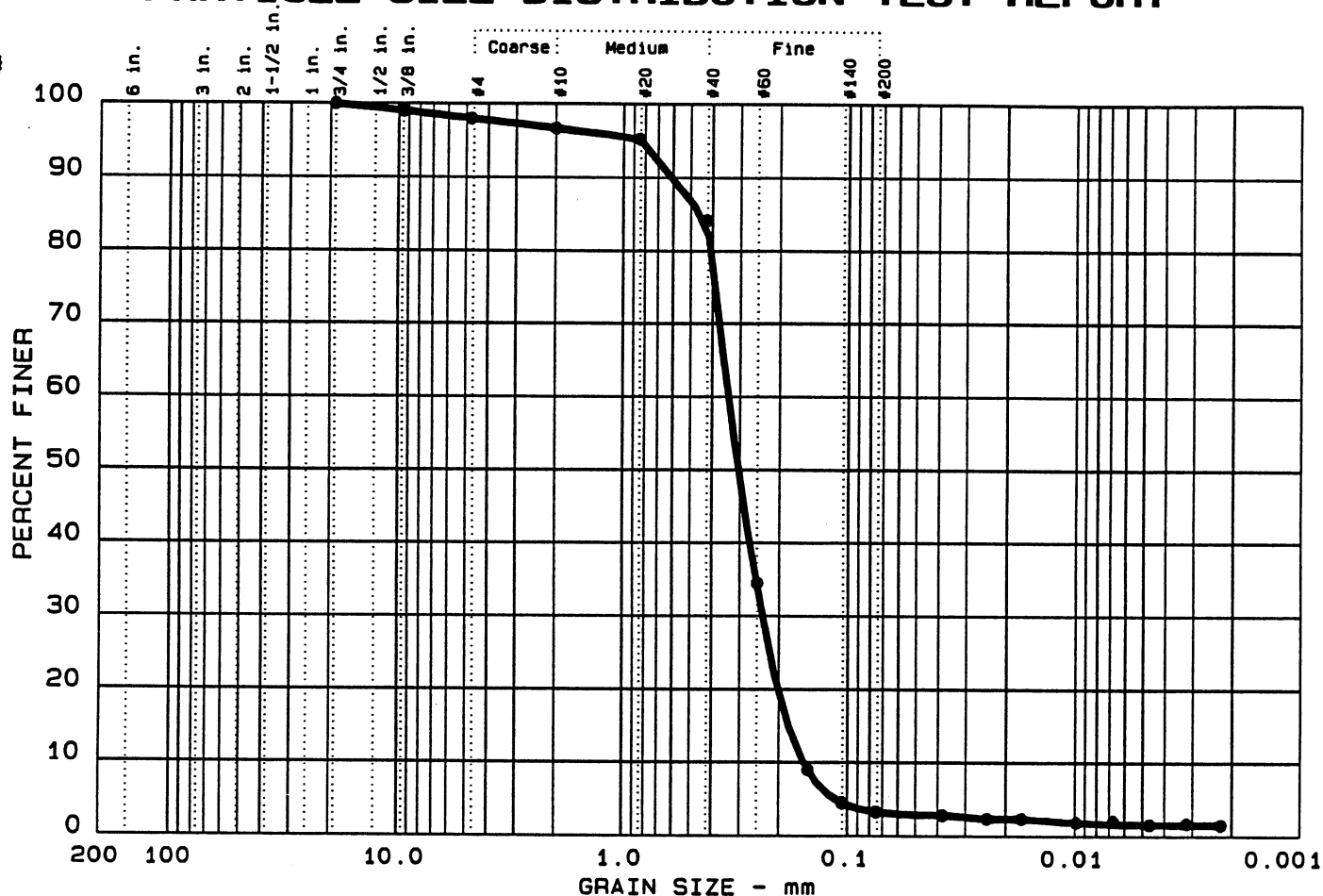
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Project No.: 4E05140
Project: Crandon Mining Co.

Date: February 22, 1995

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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	2.0	94.7	1.7	1.6	SP	NA	NA

SIEVE inches size	PERCENT FINER		
	●		
0.75	100.0		
0.375	99.0		
X GRAIN SIZE			
D ₆₀	0.34		
D ₃₀	0.24		
D ₁₀	0.15		
X COEFFICIENTS			
C _c	1.06		
C _u	2.2		

SIEVE number size	PERCENT FINER		
	●		
4	98.0		
10	96.7		
20	95.3		
40	84.2		
60	34.5		
100	9.0		
140	4.5		
200	3.3		

Sample information:
 ● TPE-1, 8'-9' DEPTH
 Brown f to c SAND;
 trace silt and gravel

Remarks:
 TESTED BY: NL
 CHECKED BY: *CB*

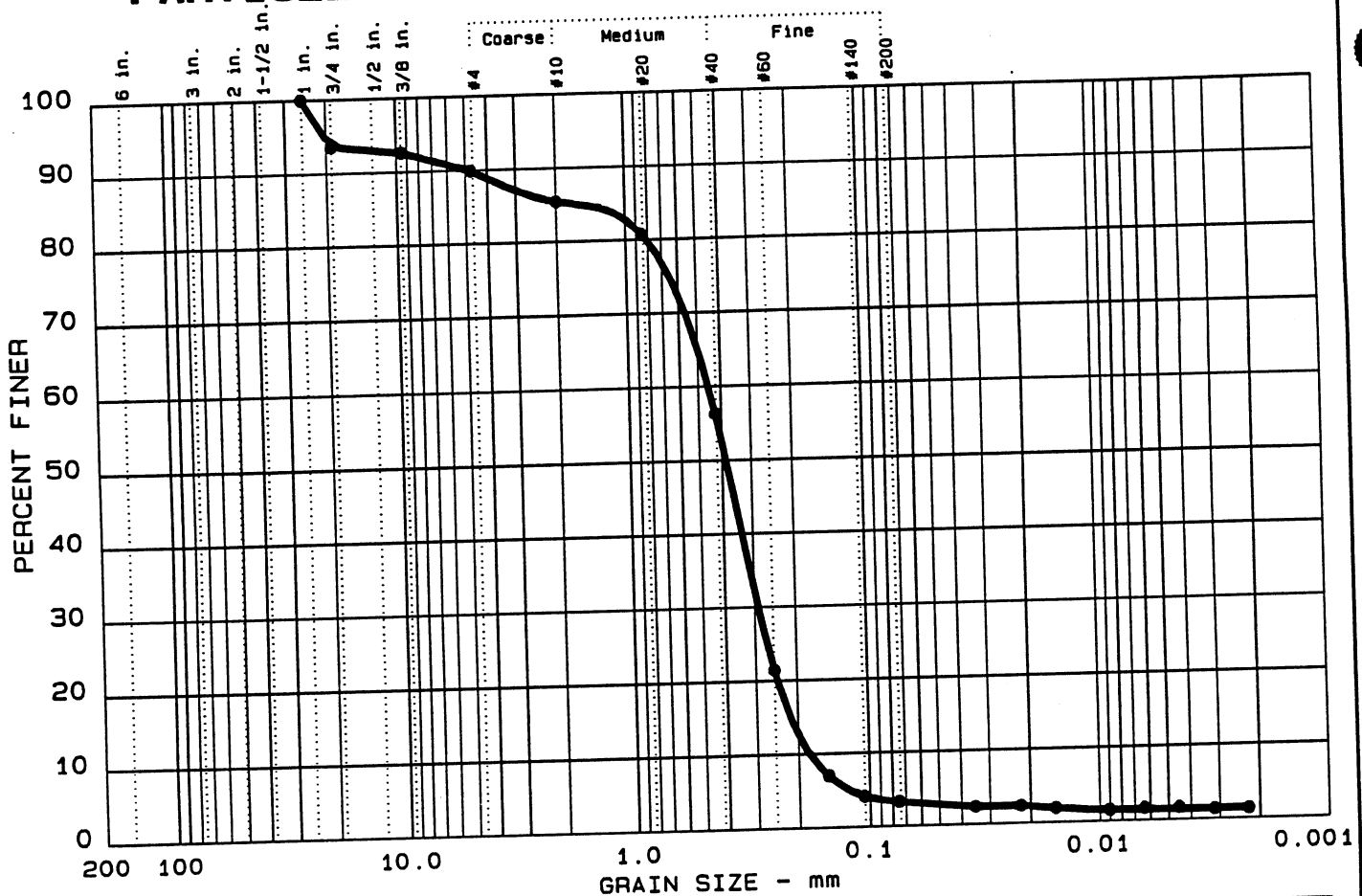
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 Project: Crandon Mining Co.

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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	10.1	86.6	1.9	1.4	SP	NA	NA

SIEVE inches size	PERCENT FINER		
1	100.0		
0.75	93.6		
0.375	92.6		
GRAIN SIZE			
D ₆₀	0.45		
D ₃₀	0.29		
D ₁₀	0.17		
COEFFICIENTS			
C _c	1.03		
C _u	2.5		

SIEVE number size	PERCENT FINER		
4	89.9		
10	85.4		
20	80.7		
40	56.3		
60	21.4		
100	7.0		
140	4.1		
200	3.3		

Sample information:
 • TPE-3, 8'-10' DEPTH
 Brown f to c SAND; trace
 gravel and silt

Remarks:
 TESTED BY: NL
 CHECKED BY: *CE*

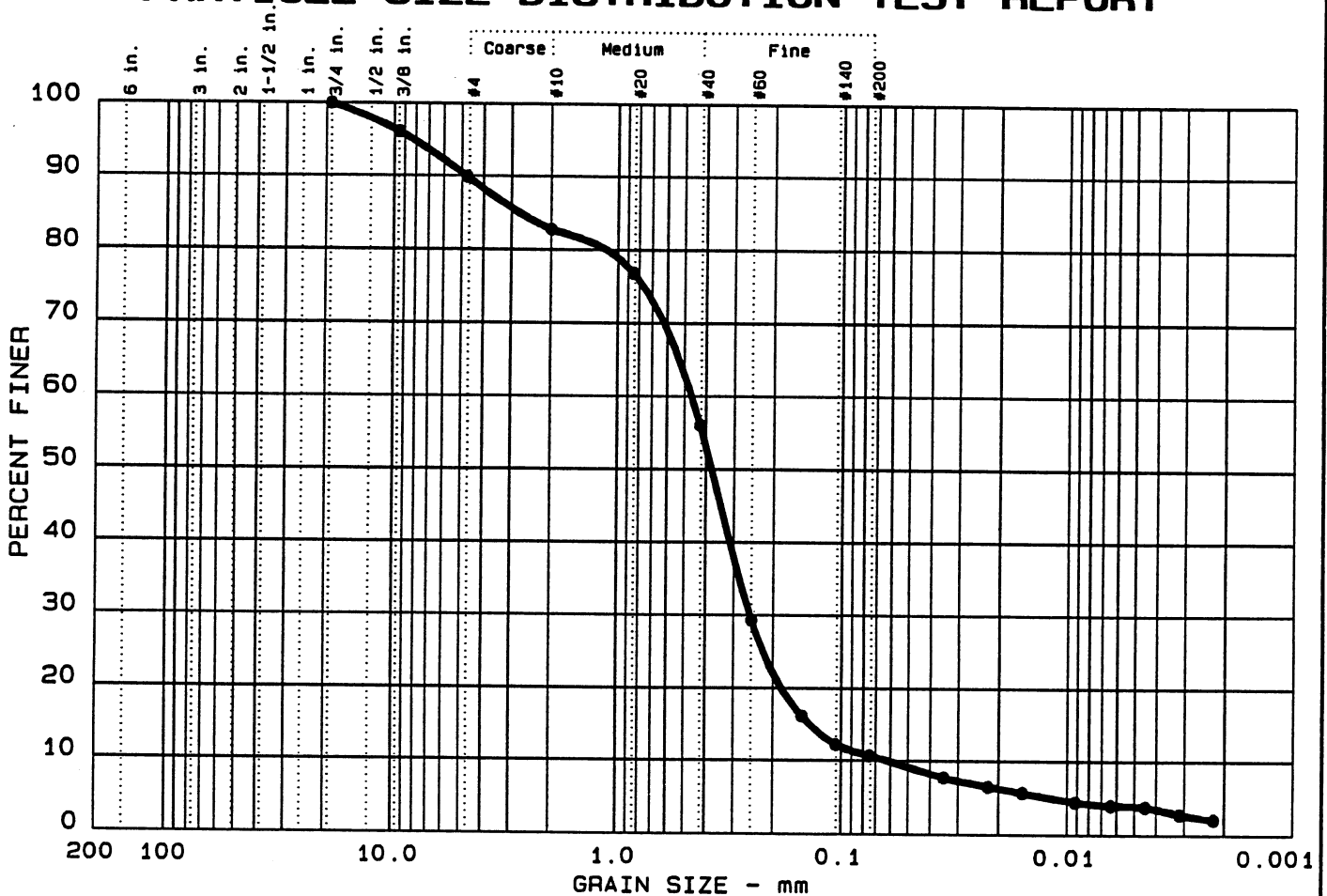
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Project No.: 4E05140
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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	10.1	79.2	6.8	3.9	SW-SM	NA	NA

SIEVE inches size	PERCENT FINER		
0.75	100.0		
0.375	96.1		
GRAIN SIZE			
D ₆₀	0.46		
D ₃₀	0.25		
D ₁₀	0.06		
COEFFICIENTS			
C _c	2.33		
C _u	7.8		

SIEVE number size	PERCENT FINER		
4	89.9		
10	82.8		
20	76.8		
40	56.0		
60	29.3		
100	16.1		
140	12.2		
200	10.7		

Sample information:

- TPE-3, 12'-14' DEPTH
Brown f to c SAND; trace gravel and silt

Remarks:

TESTED BY: NL
CHECKED BY: *CAT*

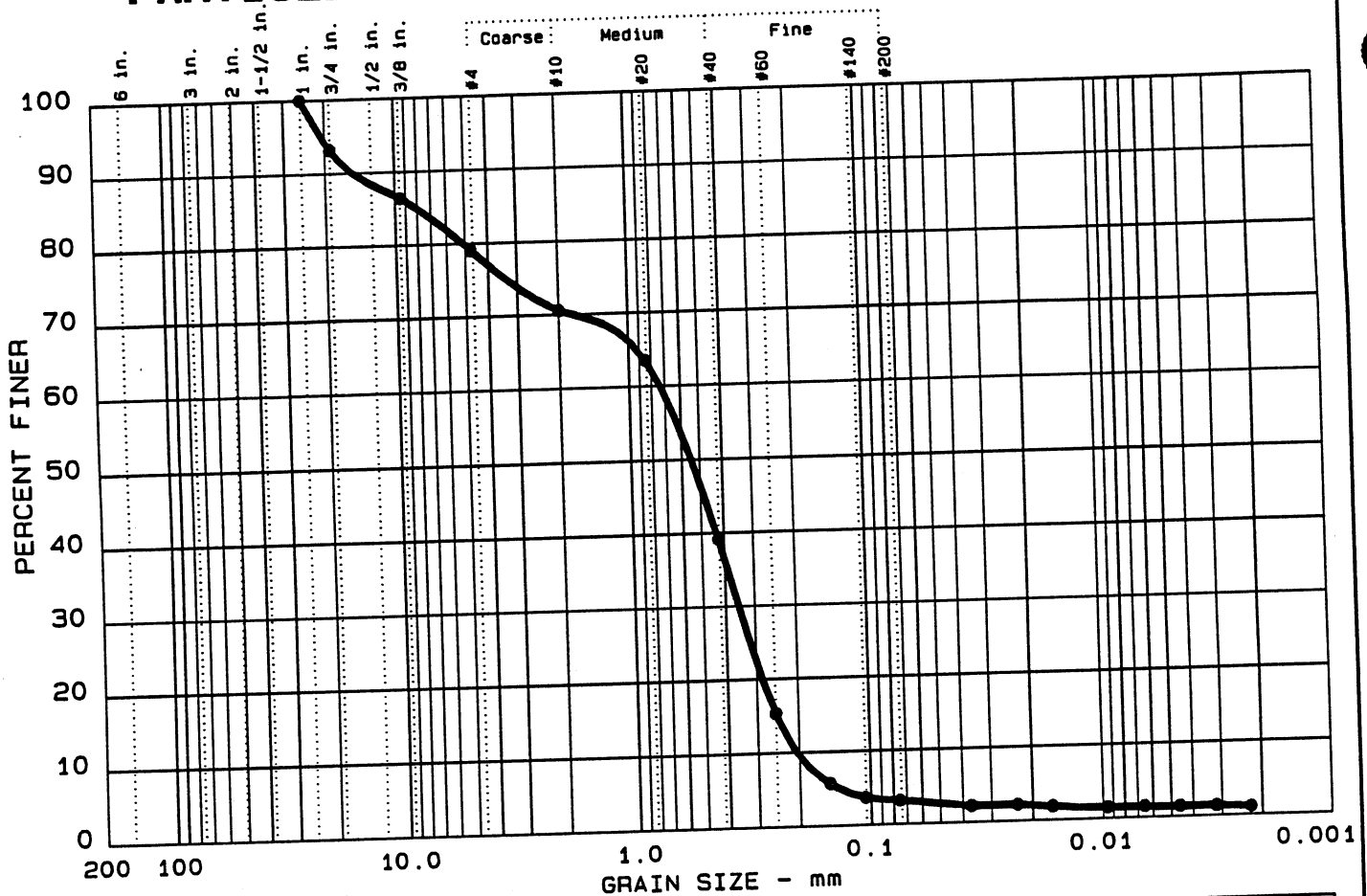
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Project No.: 4E05140
Project: Crandon Mining Co.

Date: February 17, 1995

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PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	20.9	75.9	1.8	1.4	SP	NA	NA

SIEVE inches size	PERCENT FINER		
●			
1	100.0		
0.75	93.2		
0.375	86.4		
GRAIN SIZE			
D ₆₀	0.73		
D ₃₀	0.35		
D ₁₀	0.20		
COEFFICIENTS			
C _c	0.82		
C _u	3.6		

SIEVE number size	PERCENT FINER		
●			
4	79.1		
10	70.6		
20	63.5		
40	39.2		
60	15.3		
100	5.7		
140	3.7		
200	3.2		

Sample information:
 ● TPE-5, 8'-9' DEPTH
 Brown f to c SAND; some
 gravel, trace silt

Remarks:
 TESTED BY: NL
 CHECKED BY: GJS

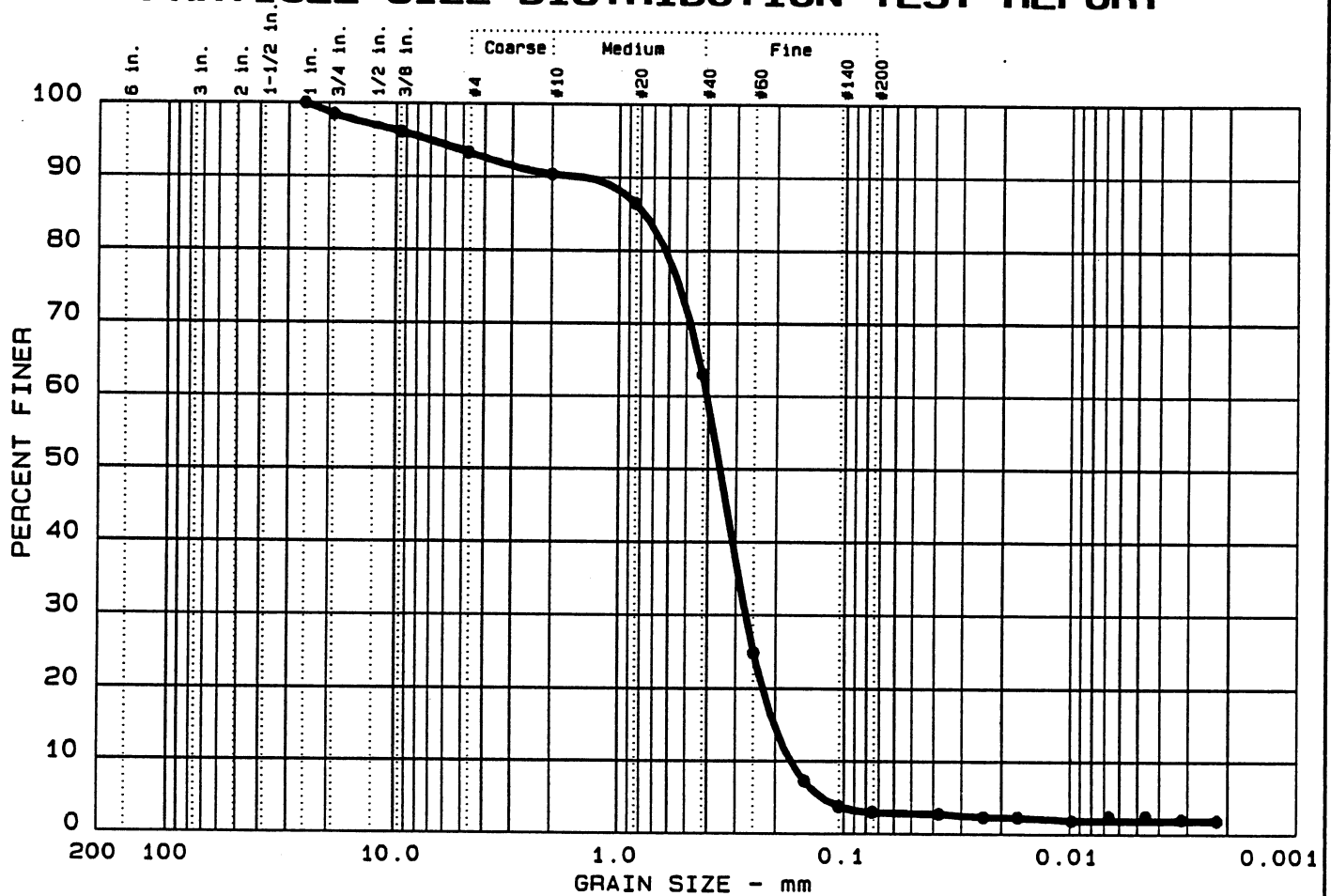
**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
 Project: Crandon Mining Co.

Date: February 17, 1995

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	6.7	90.3	3.0		SP	NA	NA

SIEVE inches size	PERCENT FINER		
•			
1	100.0		
0.75	98.5		
0.375	96.1		
GRAIN SIZE			
D ₆₀	0.41		
D ₃₀	0.27		
D ₁₀	0.17		
COEFFICIENTS			
C _c	1.06		
C _u	2.4		

SIEVE number size	PERCENT FINER		
•			
4	93.3		
10	90.4		
20	86.5		
40	63.0		
60	24.9		
100	7.3		
140	3.8		
200	3.0		

Sample information:
 • TPE-6, 8'-9' DEPTH
 Brown f to c SAND; trace gravel and silt

Remarks:
 TESTED BY: NL
 CHECKED BY: *GF*

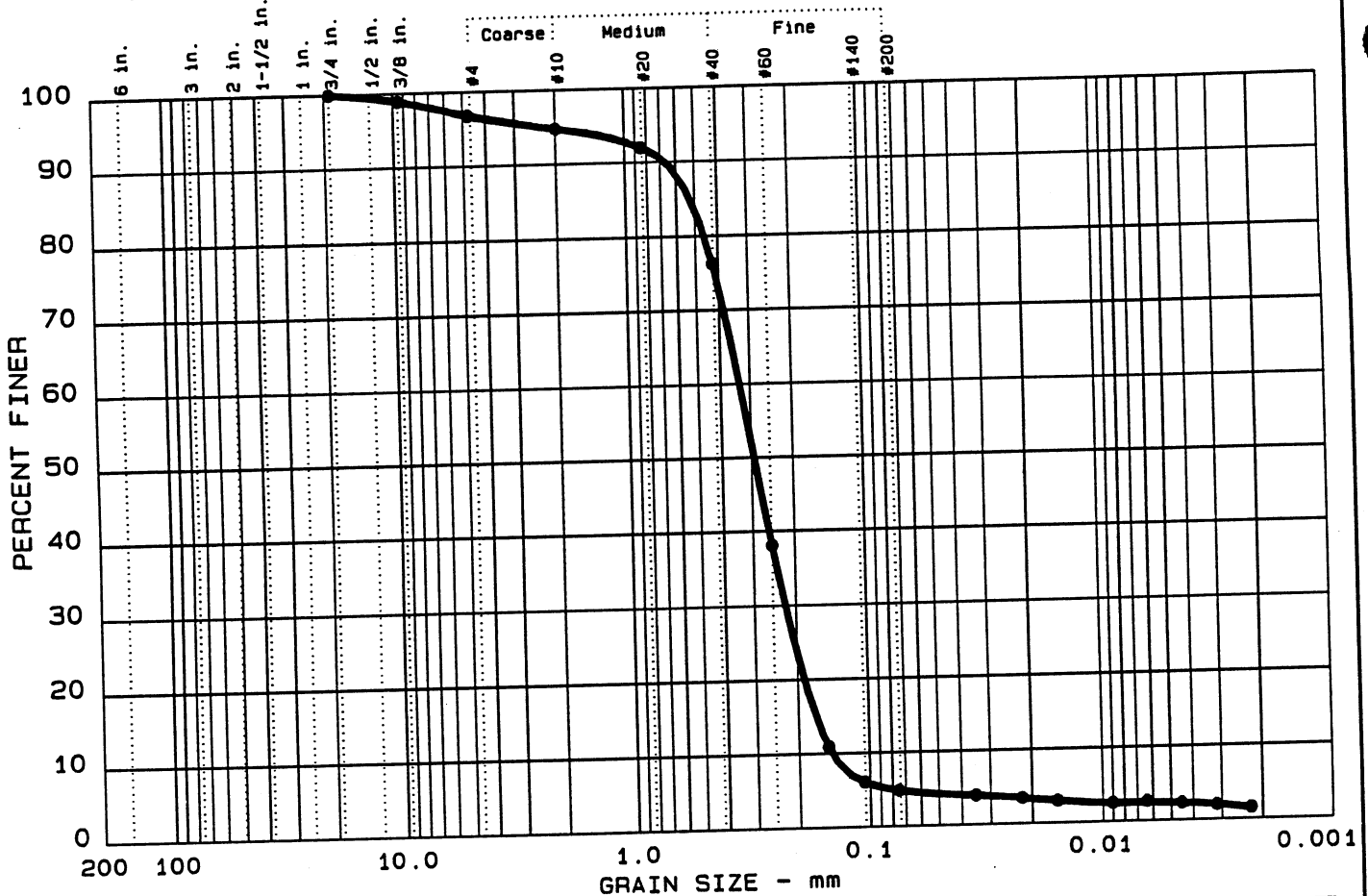
**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
 Project: Crandon Mining Co.

Date: February 17, 1995

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	3.2	92.0	2.5	2.3	SP	NA	NA

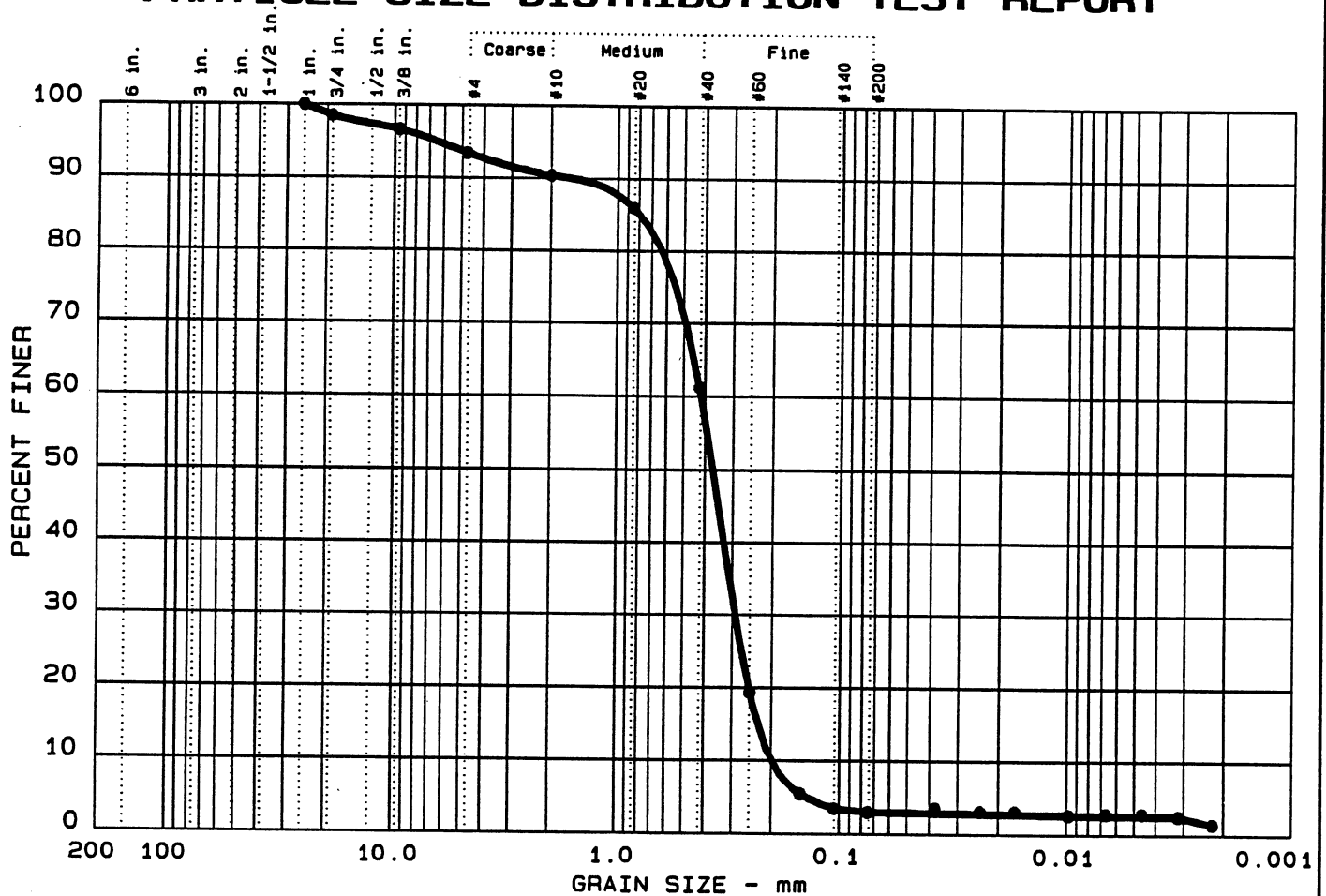
SIEVE inches size	PERCENT FINER		
●	●		
0.75	100.0		
0.375	98.9		
GRAIN SIZE			
D ₆₀	0.33		
D ₃₀	0.22		
D ₁₀	0.14		
COEFFICIENTS			
C _c	1.03		
C _u	2.3		

SIEVE number size	PERCENT FINER		
●	●		
4	96.8		
10	94.8		
20	92.0		
40	76.3		
60	38.1		
100	10.9		
140	6.0		
200	4.8		

Sample information:
 ● TPE-7, 8'-9' DEPTH
 Brown f to c SAND; trace gravel and silt

Remarks:
 TESTED BY: NL
 CHECKED BY: GJS

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	6.6	90.4	0.4	2.6	SP	NA	NA

SIEVE inches size	PERCENT FINER		
•			
1	100.0		
0.75	98.5		
0.375	96.6		
GRAIN SIZE			
D ₆₀	0.42		
D ₃₀	0.29		
D ₁₀	0.20		
COEFFICIENTS			
C _c	1.01		
C _u	2.1		

SIEVE number size	PERCENT FINER		
•			
4	93.4		
10	90.4		
20	86.0		
40	61.2		
60	19.3		
100	5.5		
140	3.5		
200	3.0		

Sample information:
 • TPE-8, 7'-8' DEPTH
 Brown f to c SAND; trace
 gravel and silt

Remarks:
 TESTED BY: NL
 CHECKED BY: *CAT*

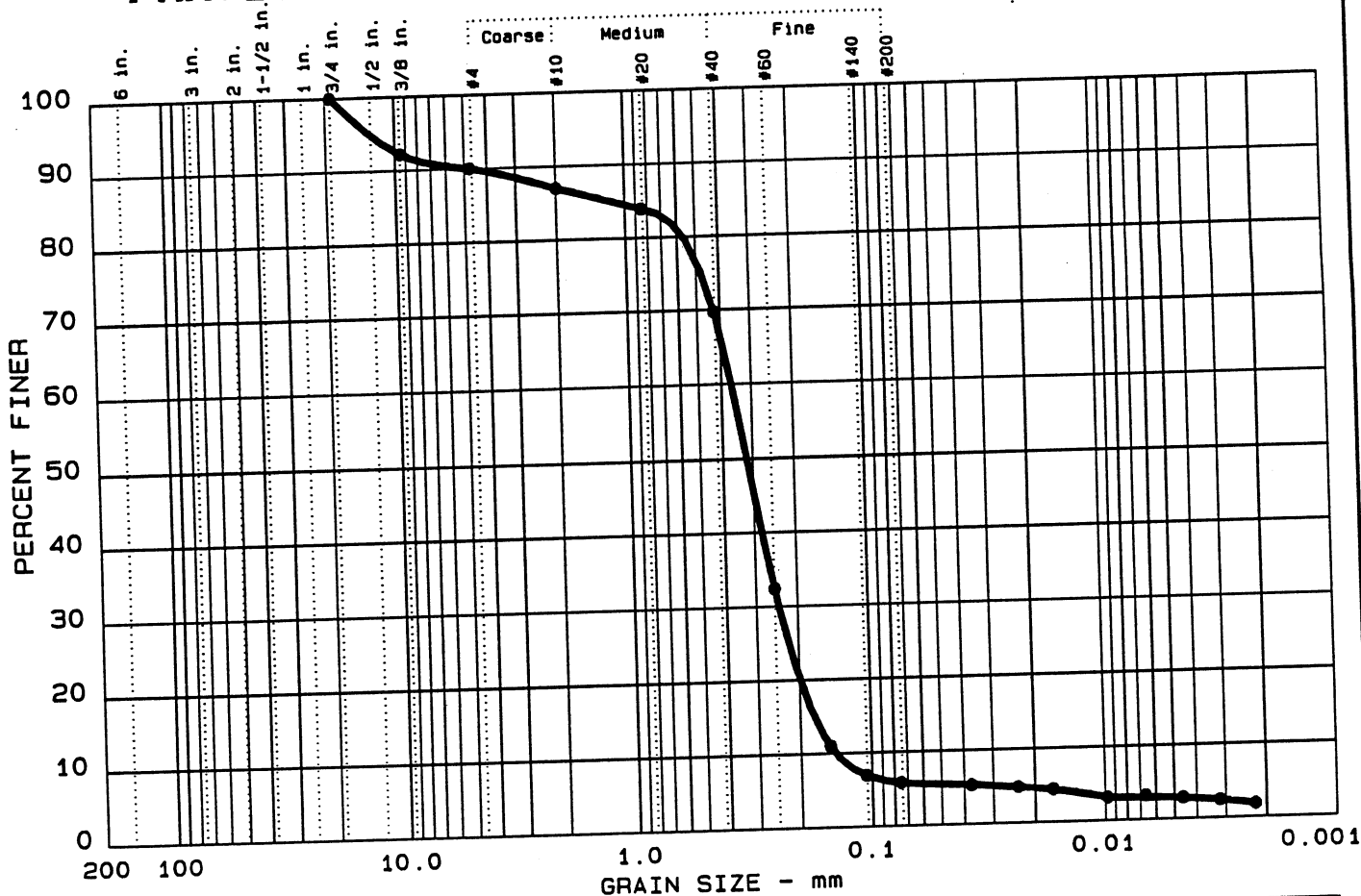
**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
 Project: Crandon Mining Co.

Date: February 17, 1995

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	10.0	84.2	2.9	2.9	SP-SM	NA	NA

SIEVE inches size	PERCENT FINER ●		
0.75	100.0		
0.375	92.2		
X GRAIN SIZE			
D ₆₀	0.36		
D ₃₀	0.24		
D ₁₀	0.14		
X COEFFICIENTS			
C _c	1.12		
C _u	2.6		

SIEVE number size	PERCENT FINER ●		
4	90.0		
10	87.0		
20	83.9		
40	69.7		
60	32.4		
100	11.0		
140	6.9		
200	5.8		

Sample information:

- TPE-9, 7'-8' DEPTH
- Brown f to c SAND; trace gravel and silt

Remarks:

TESTED BY: NL
CHECKED BY: GNF

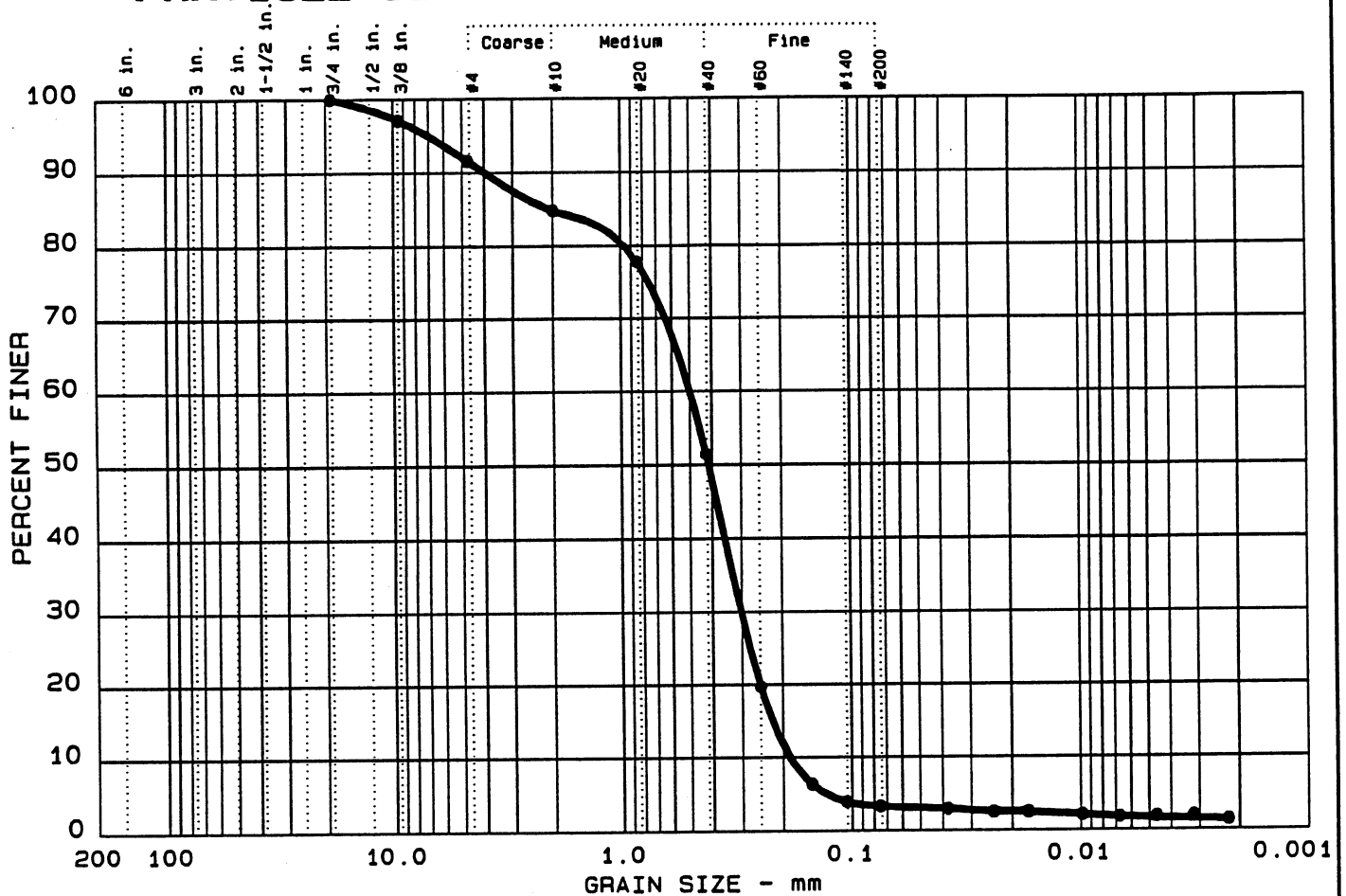
**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
Project: Crandon Mining Co.

Date: February 17, 1995

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	8.4	88.3	1.7	1.6	SP	NA	NA

SIEVE inches size	PERCENT FINER		
●	●		
0.75	100.0		
0.375	97.1		
GRAIN SIZE			
D ₆₀	0.50		
D ₃₀	0.30		
D ₁₀	0.18		
COEFFICIENTS			
C _c	0.97		
C _u	2.7		

SIEVE number size	PERCENT FINER		
●	●		
4	91.6		
10	84.8		
20	77.8		
40	51.4		
60	19.7		
100	6.3		
140	3.9		
200	3.3		

Sample information:
 ● TPE-10, 5'- 6' DEPTH
 Brown f to c SAND; trace
 gravel and silt

Remarks:
 TESTED BY: NL
 CHECKED BY: *CS*

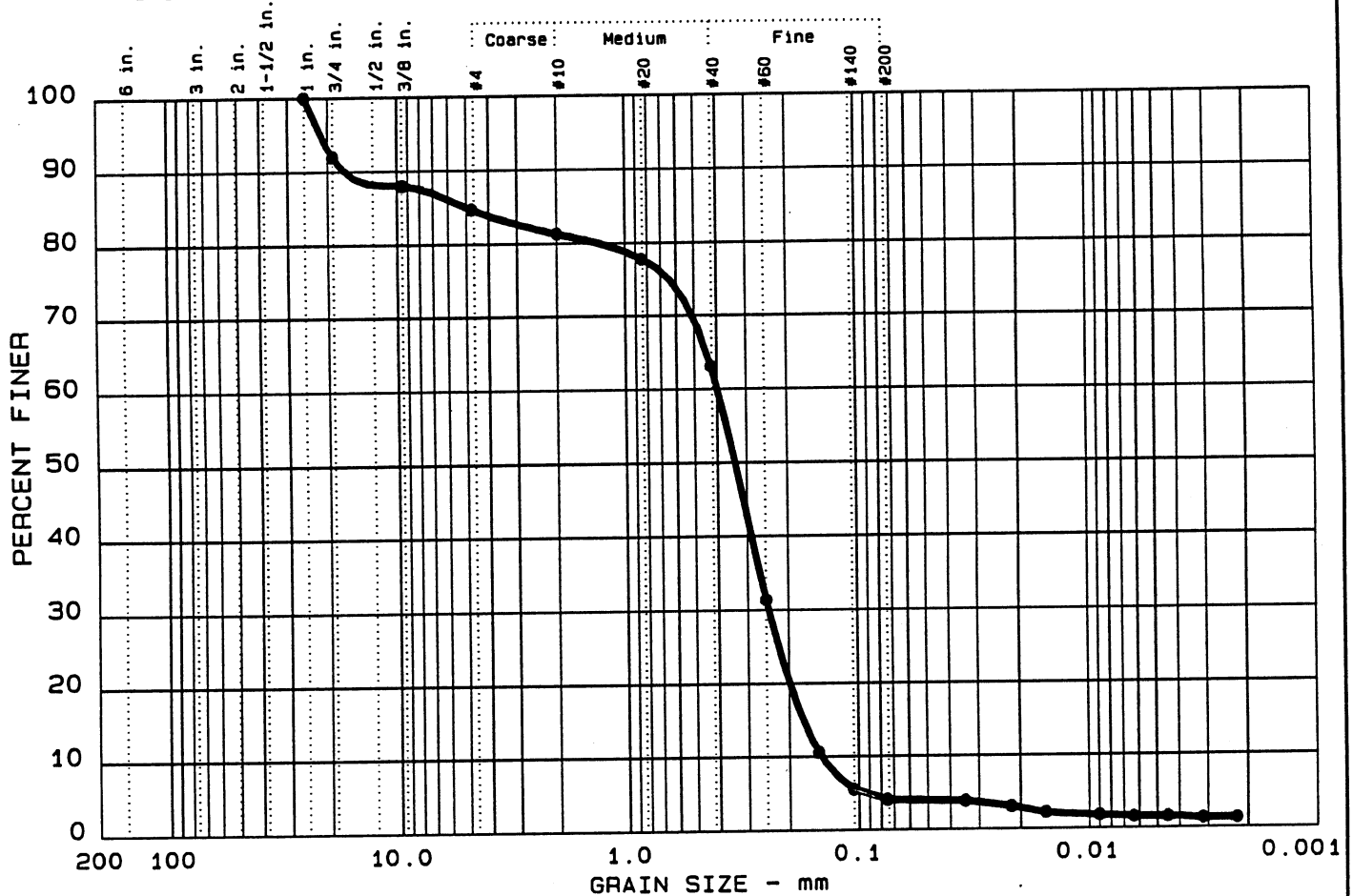
**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
 Project: Crandon Mining Co.

Date: February 17, 1995

Sheet No.

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	15.3	80.6	2.5	1.6	SP	NA	NA

SIEVE inches size	PERCENT FINER		
1	100.0		
0.75	92.0		
0.375	88.0		
GRAIN SIZE			
D ₆₀	0.40		
D ₃₀	0.24		
D ₁₀	0.14		
COEFFICIENTS			
C _c	1.03		
C _u	2.7		

SIEVE number size	PERCENT FINER		
4	84.7		
10	81.3		
20	77.8		
40	63.1		
60	31.4		
100	10.6		
140	5.5		
200	4.1		

Sample information:

- TPE-11, 5'- 6' DEPTH
Brown f to c SAND; some
gravel, trace silt

Remarks:

TESTED BY: NL
CHECKED BY: *GJF*

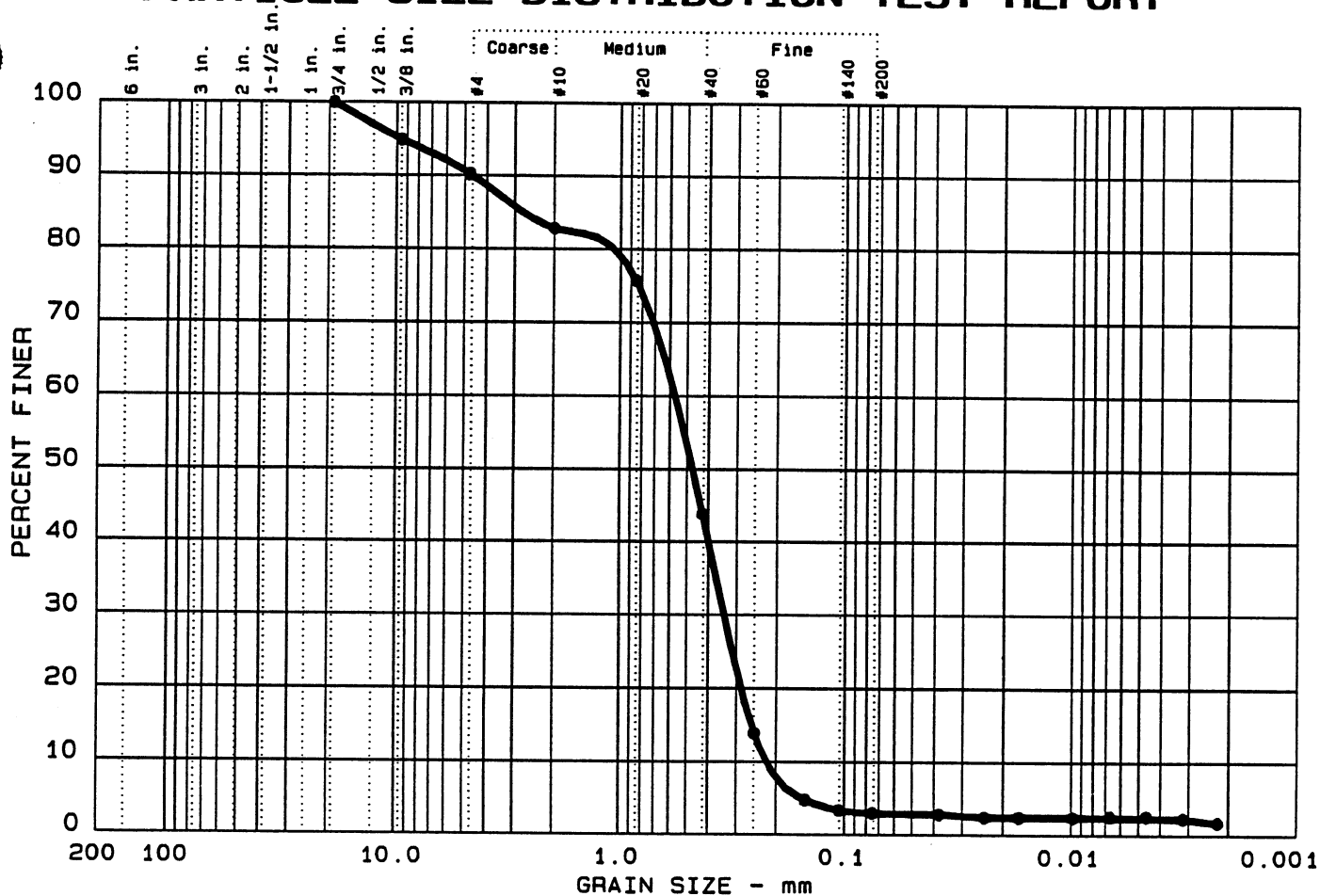
**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
Project: Crandon Mining Co.

Date: February 17, 1995

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
•	0.0	9.8	87.2	0.6	2.4	SP	NA	NA

SIEVE inches size	PERCENT FINER		
0.75	100.0		
0.375	94.9		
GRAIN SIZE			
D ₆₀	0.57		
D ₃₀	0.34		
D ₁₀	0.22		
COEFFICIENTS			
C _c	0.92		
C _u	2.6		

SIEVE number size	PERCENT FINER		
4	90.2		
10	82.8		
20	75.7		
40	43.8		
60	13.9		
100	4.8		
140	3.4		
200	3.0		

Sample information:

• TPE-12, 7'- 8' DEPTH
Brown f to c SAND; trace gravel and silt

Remarks:

TESTED BY: NL

CHECKED BY: GNT

**WOODWARD-CLYDE
CONSULTANTS**

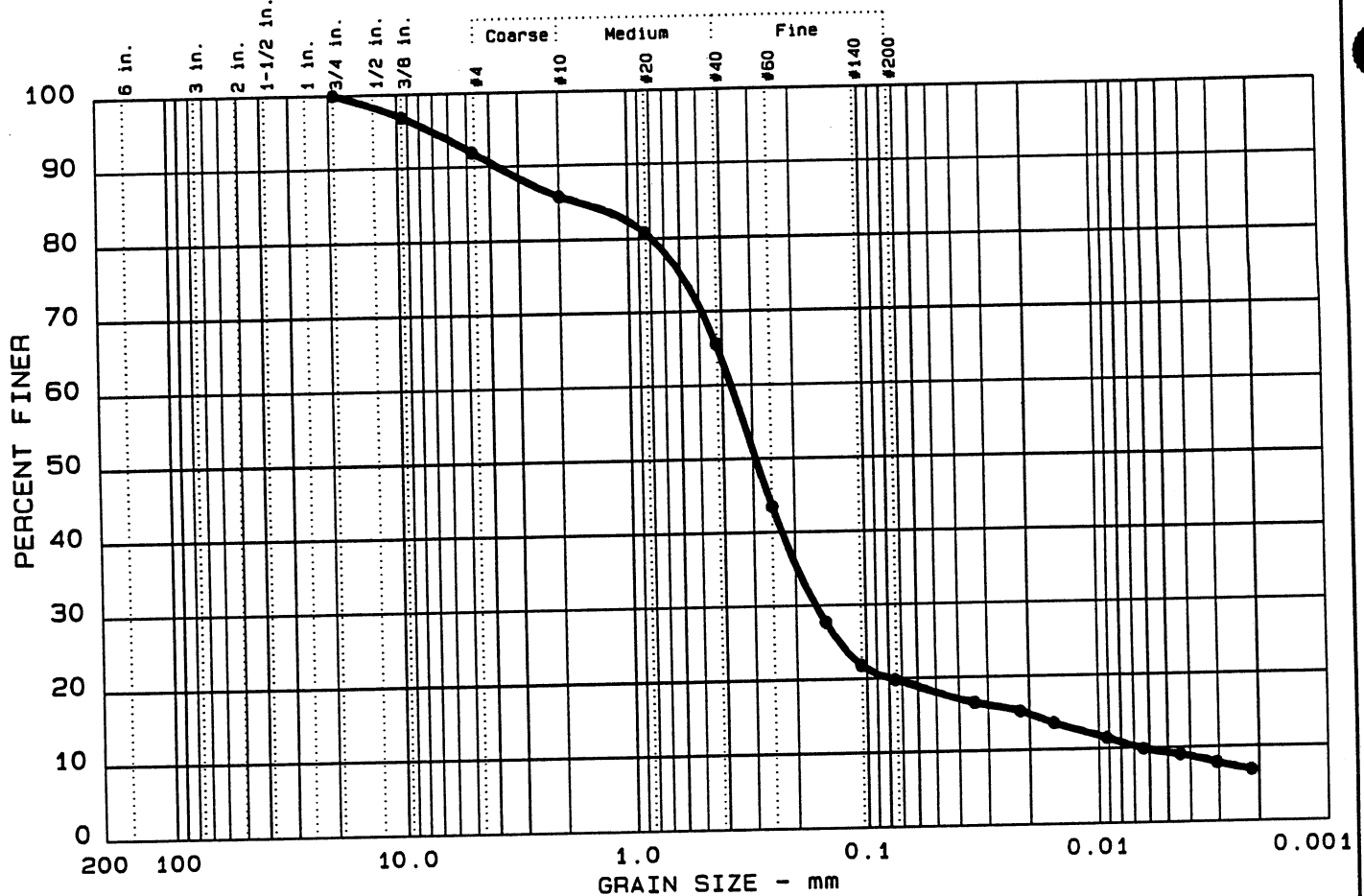
Project No.: 4E05140

Project: Crandon Mining Co.

Date: February 17, 1995

Sheet No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	8.1	72.1	10.5	9.3	SM	NA	NA

SIEVE inches size	PERCENT FINER		
●			
0.75	100.0		
0.375	96.8		
GRAIN SIZE			
D ₆₀	0.37		
D ₃₀	0.16		
D ₁₀	0.00		
COEFFICIENTS			
C _c	11.22		
C _u	56.2		

SIEVE number size	PERCENT FINER		
●			
4	91.9		
10	85.8		
20	80.8		
40	65.6		
60	43.5		
100	27.7		
140	21.8		
200	19.8		

Sample information:

- TPE-13, 8'-9' DEPTH
- Brown f to c SAND; trace gravel and silt

Remarks:

TESTED BY: NL
CHECKED BY: *CTJ*

**WOODWARD-CLYDE
CONSULTANTS**

Project No.: 4E05140
Project: Crandon Mining Co.

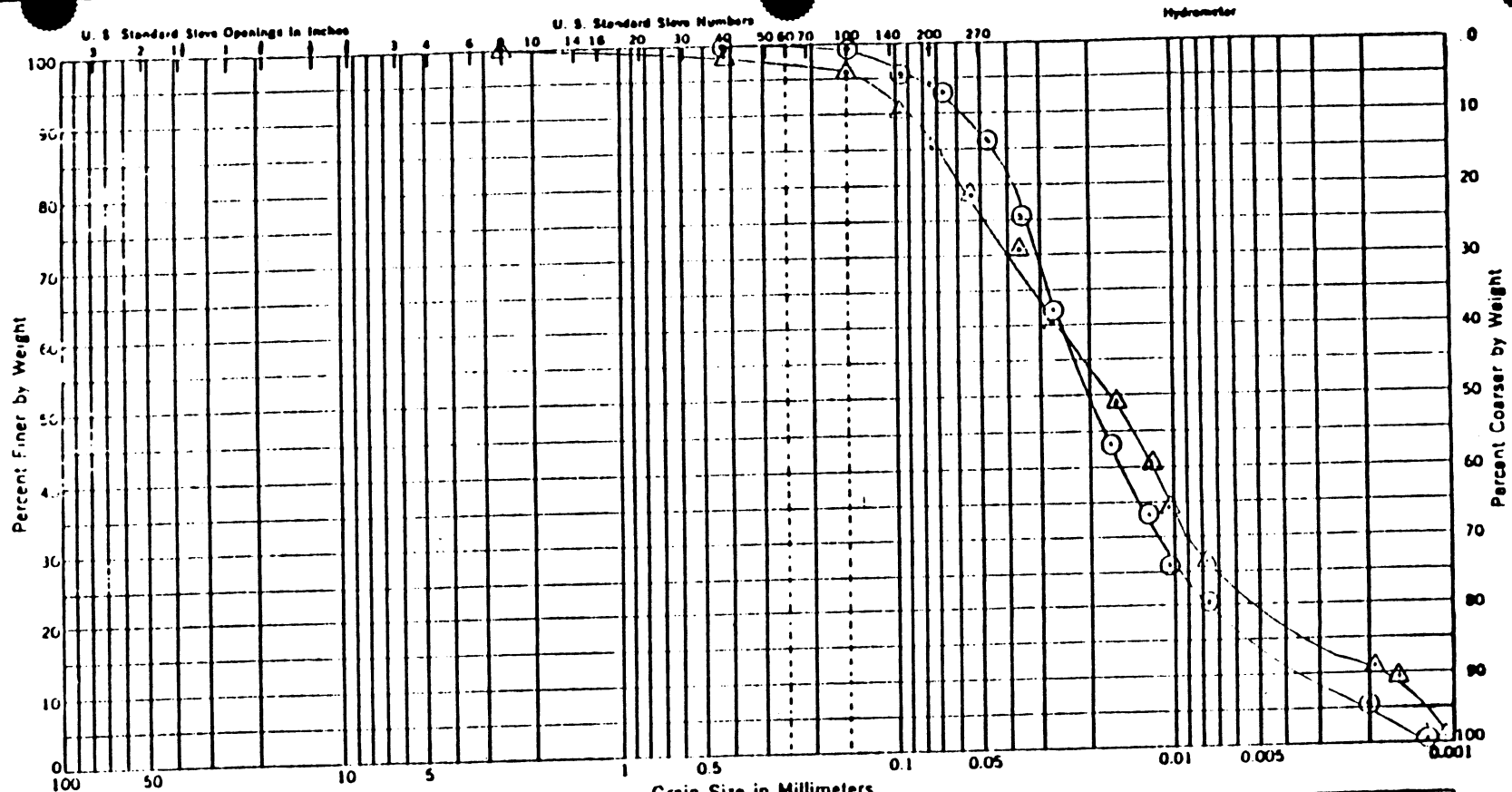
Date: February 17, 1995

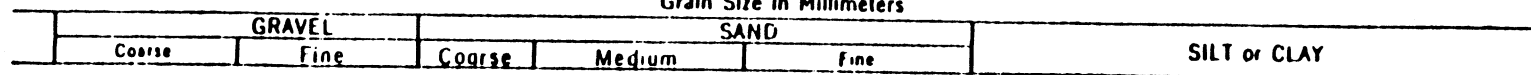
Sheet No. _____

Appendix 3.5-26

**Grain Size Curves and Permeability Test Results From
STS Consultants Ltd 1982 Little Sand Lake Borings**

3.5-26-1





SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
B-2 S-5	36.6				O Silty clay (CL)
B-2 S-12					Δ Fine to medium sand (SP)

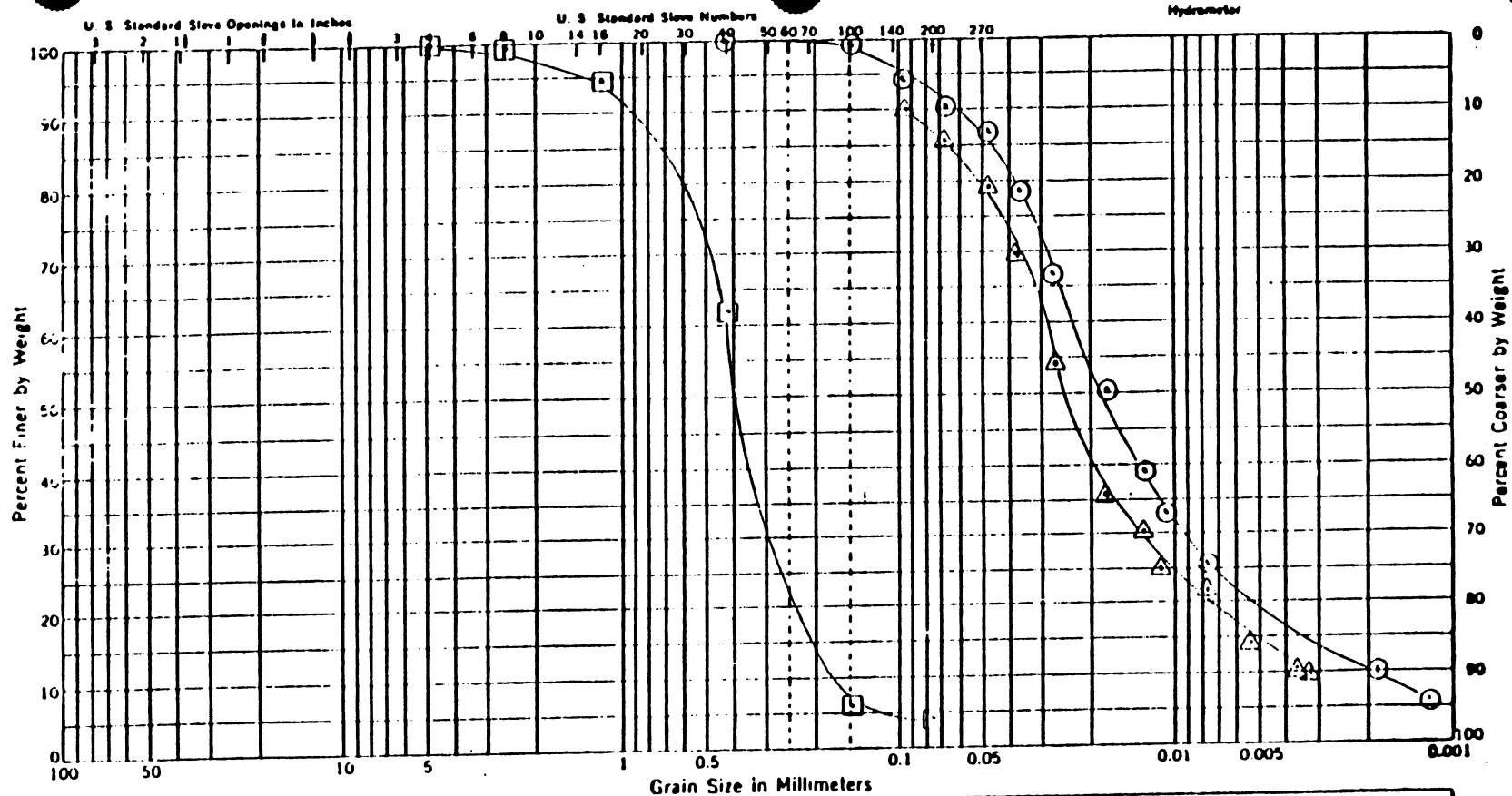
SEDIMENT SAMPLING
LITTLE SAND LAKE
EXXON MINERALS COMPANY

**SOIL TESTING SERVICES
OF WISCONSIN, INC.**

540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
	TWW	4-26-82	11728

3.5-26-3



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
B-3 S-8	56.3				○ Organic clayey silt (OL to ML)
B-3 S-12	35.9				△ Silty clay (CL)
B-3 S-15					□ Fine to medium sand (SP)

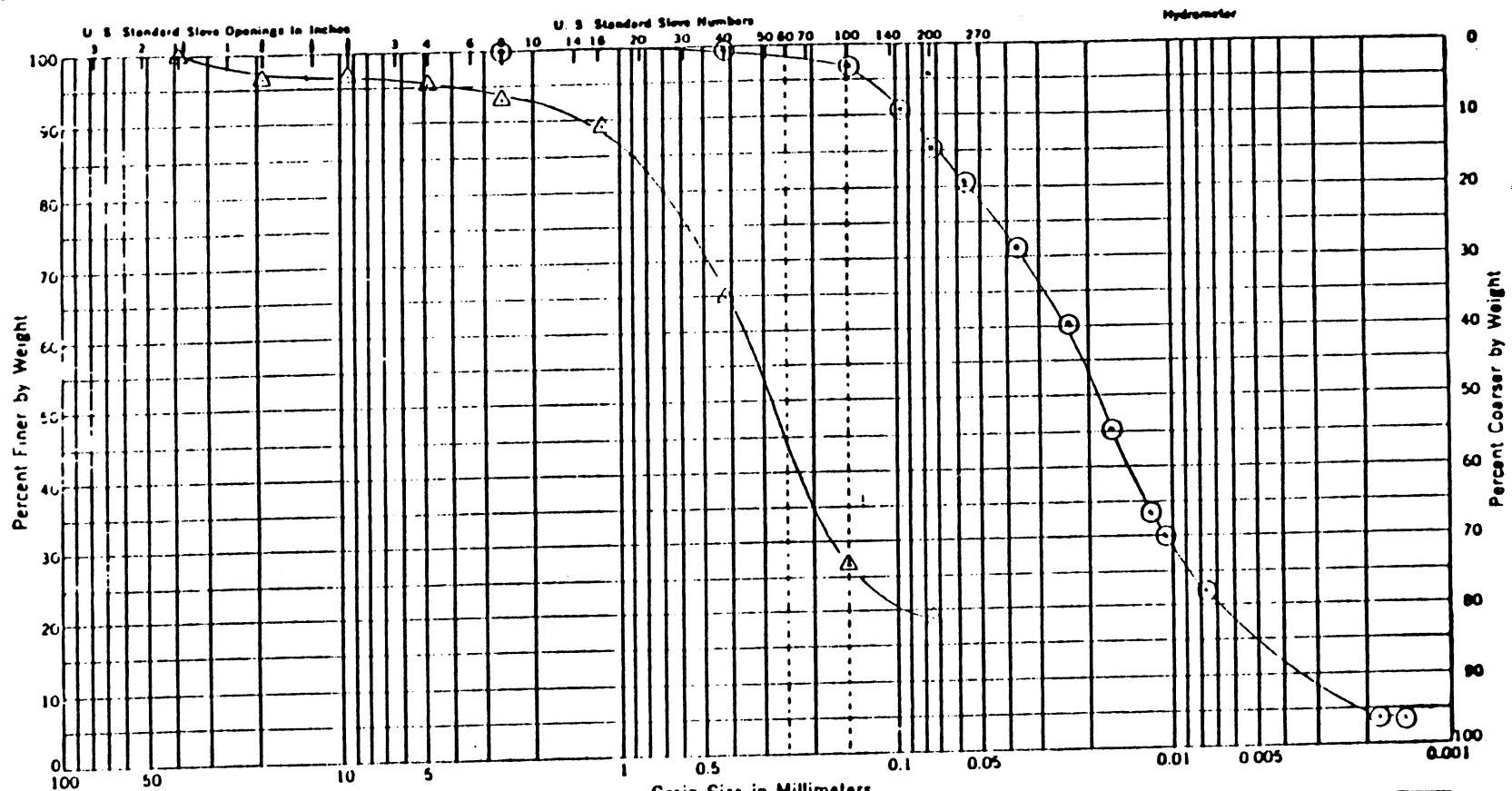
SEDIMENT SAMPLING
LITTLE SAND LAKE
EXXON MINERALS COMPANY

**SOIL TESTING SERVICES
OF WISCONSIN, INC.**

540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
	TWW	4-26-82	11728

3.5-26-4



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

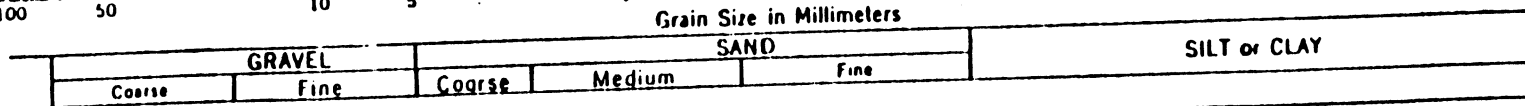
SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
B-4 S-9	43.3	32.0	15.8	16.2	○ Silty clay (CL)
B-4 S-16					△ Silty fine to medium sand (SM)

SEDIMENT SAMPLING
LITTLE SAND LAKE
EXXON MINERALS COMPANY

**SOIL TESTING SERVICES
OF WISCONSIN, INC.**

540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
	TWW	4-26-82	11728

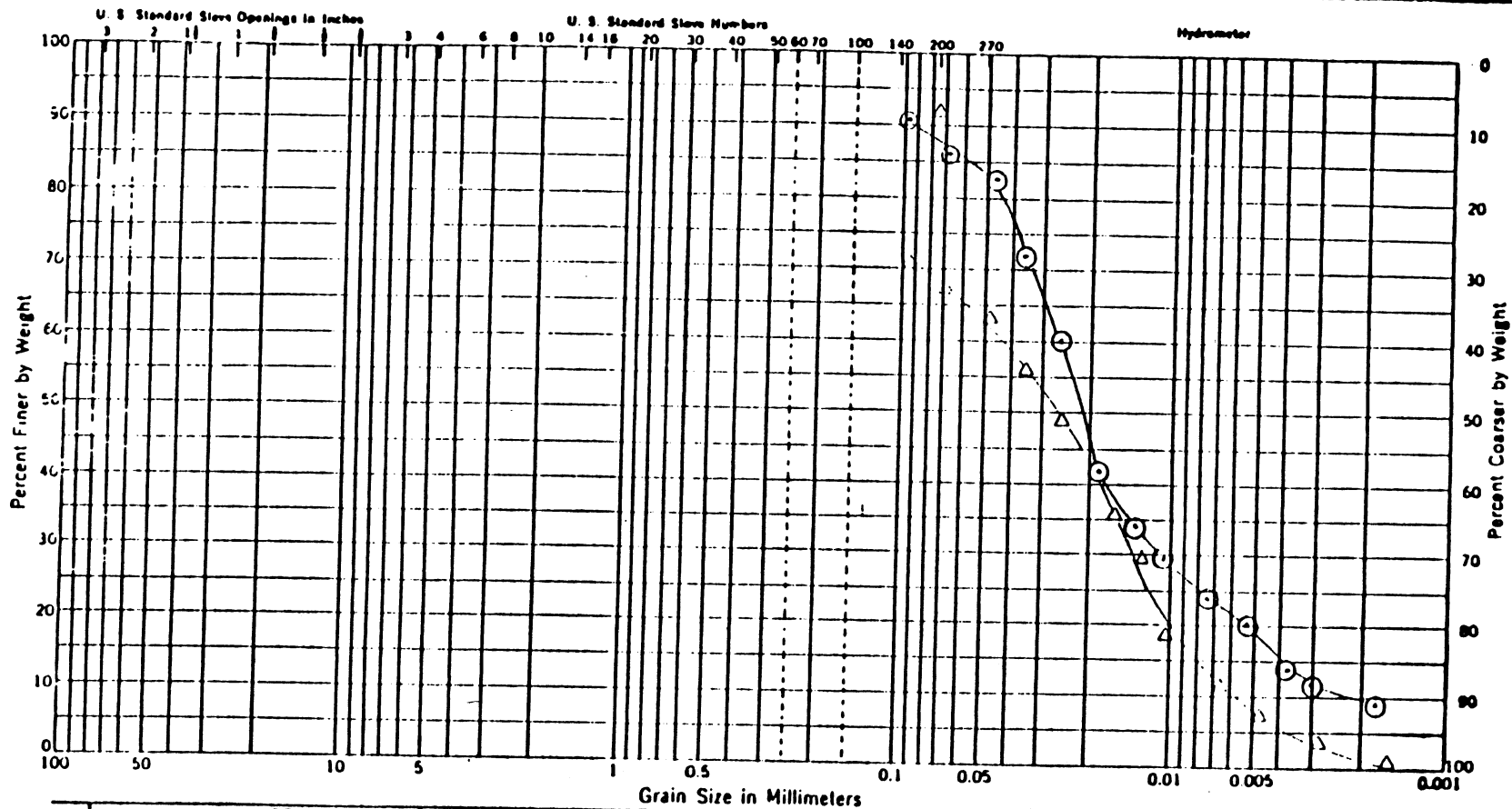


SEDIMENT SAMPLING
LITTLE SAND LAKE
EXXON MINERALS COMPANY

540 LAMBEAU STREET
GREEN BAY, WIS. 54303.

DRAWN	APPROVED	DATE	JOB No.
	TWW	4-26-82	11728

3.5-26-6



STS CONSULTANTS, LTD.

Project Sediment Sampling

STS Job No. 11728

Date 4-21-82

PERMEABILITY TEST CONSTANT HEAD

Boring: STS LSL-1
Sample: 9
Soil Description: Silty clay (CL)
Dry Unit Weight = 73.1 PCF
Water Content 51.5%
Sample Diameter = 1.88 inches
Sample Height = 17.63 inches

<u>Run No.</u>	<u>Head, inches</u>	<u>Duration, minutes</u>	<u>Permeability, cm/sec.</u>	<u>Remarks</u>
1	56.0	4280	1.4×10^{-7}	
2	56.0	1850	1.4×10^{-7}	
3	56.0	3900	1.1×10^{-7}	
4	55.5	4395	1.6×10^{-7}	
Average =			1.4×10^{-7}	

STS CONSULTANTS, LTD.

Project Sediment Sampling

STS Job No. 11728

Date 4-21-82

PERMEABILITY TEST CONSTANT HEAD

Boring: STS LSL-1

Sample: 15

Soil Description: Silty clay (CL)

Dry Unit Weight = 88.6 PCF

Water Content 33.6%

Sample Diameter = 1.88 inches

Sample Height = 16.75 inches

<u>Run No.</u>	<u>Head, inches</u>	<u>Duration, minutes</u>	<u>Permeability, cm/sec.</u>	<u>Remarks</u>
1	59	1175	1.4×10^{-7}	
2	59	2835	2.3×10^{-7}	
3	59	1455	1.3×10^{-7}	

Average = 1.7×10^{-7}

STS CONSULTANTS, LTD.

Project Sediment Sampling
STS Job No. 11728
Date 4-21-82

PERMEABILITY TEST CONSTANT HEAD

Boring: STS LSL-2
Sample: 5
Soil Description: Silty clay (CL)
Dry Unit Weight = 80.0 PCF
Water Content 36.6%
Sample Diameter = 2.85 inches
Sample Height = 17.5 inches

<u>Run No.</u>	<u>Head, inches</u>	<u>Duration, minutes</u>	<u>Permeability, cm/sec.</u>	<u>Remarks</u>
1	58.0	4015	6.9×10^{-7}	
2	57.5	1850	8.0×10^{-7}	
3	57.5	3900	7.3×10^{-7}	
4	57.5	4395	7.0×10^{-7}	
Average =			7.3×10^{-7}	

STS CONSULTANTS, LTD.

Project Sediment Sampling
STS Job No. 11728
Date 4-21-82

PERMEABILITY TEST CONSTANT HEAD

Boring: STS LSL-3
Sample: 8
Soil Description: Organic clayey silt (OL to ML)
Dry Unit Weight = 67.1 PCF
Water Content 56.3%
Sample Diameter = 1.88 inches
Sample Height = 16.75 inches

<u>Run No.</u>	<u>Head, inches</u>	<u>Duration, minutes</u>	<u>Permeability, cm/sec.</u>	<u>Remarks</u>
1	59	4035	3.8×10^{-7}	
2	58	1850	1.8×10^{-7}	
3	58	3900	4.5×10^{-7}	
4	58	4390	4.7×10^{-7}	
Average =			3.7×10^{-7}	

STS CONSULTANTS, LTD.

Project Sediment Sampling
STS Job No. 11728
Date 4-21-82

PERMEABILITY TEST CONSTANT HEAD

Boring: STS LSL-3
Sample: 12
Soil Description: Silty clay (CL)
Dry Unit Weight = 87.9 PCF
Water Content 35.9%
Sample Diameter = 1.78 inches
Sample Height = 8.72 inches

<u>Run No.</u>	<u>Head, inches</u>	<u>Duration, minutes</u>	<u>Permeability, cm/sec.</u>	<u>Remarks</u>
1	59	985	1.7×10^{-7}	
2	59	4320	1.7×10^{-7}	
3	59	1810	1.5×10^{-7}	
4	59	3900	1.1×10^{-7}	
Average =			1.5×10^{-7}	

STS CONSULTANTS, LTD.

Project Sediment Sampling

STS Job No. 11728

Date 4-21-82

PERMEABILITY TEST CONSTANT HEAD

Boring: STS LSL-4

Sample: 9

Soil Description: Silty clay (CL)

Dry Unit Weight = 81.0 PCF

Water Content 43.3%

Sample Diameter = 1.83 inches

Sample Height = 9.38 inches

<u>Run No.</u>	<u>Head, inches</u>	<u>Duration, minutes</u>	<u>Permeability, cm/sec.</u>	<u>Remarks</u>
1	58.5	2835	8.7×10^{-8}	
2	58.5	1455	8.5×10^{-8}	
3	58.5	4390	1.5×10^{-7}	
4	58.5	1310	1.1×10^{-7}	
Average =			1.1×10^{-7}	

STS CONSULTANTS, LTD.

Project Sediment Sampling

STS Job No. 11728

Date 4-21-82

PERMEABILITY TEST CONSTANT HEAD

Boring: STS LSL-5
Sample: 5
Soil Description: Silty clay (CL)
Dry Unit Weight = 78.5 PCF
Water Content 45.7%
Sample Diameter = 2.85 inches
Sample Height = 17.5 inches

<u>Run No.</u>	<u>Head, inches</u>	<u>Duration, minutes</u>	<u>Permeability, cm/sec.</u>	<u>Remarks</u>
1	43.0	170	1.5×10^{-4}	
2	41.5	60	1.6×10^{-4}	
3	40.5	35	1.7×10^{-4}	
			Average = 1.6×10^{-4}	

STS CONSULTANTS, LTD.

Project Sediment Sampling

STS Job No. 11728

Date 4-21-82

PERMEABILITY TEST CONSTANT HEAD

Boring: STS LSL-5

Sample: 9

Soil Description: Silty clay (CL)

Dry Unit Weight = 84.5 PCF

Water Content 37.3%

Sample Diameter = 1.88 inches

Sample Height = 15 inches

<u>Run No.</u>	<u>Head, inches</u>	<u>Duration, minutes</u>	<u>Permeability, cm/sec.</u>	<u>Remarks</u>
1	54.5	2840	1.5×10^{-7}	
2	54.5	1460	1.6×10^{-7}	
3	54.5	4380	1.6×10^{-7}	
4	54.5	1310	1.4×10^{-7}	

Average = 1.5×10^{-7}

STS CONSULTANTS, LTD.

Project Sediment Sampling
STS Job No. 11728
Date 4-21-82

PERMEABILITY TEST CONSTANT HEAD

Boring: STS LSL-6
Sample: 4
Soil Description: Organic silt (OH)
Dry Unit Weight = 41.8 PCF
Water Content 107.4%
Sample Diameter = 2.85 inches
Sample Height = 21.25 inches

<u>Run No.</u>	<u>Head, inches</u>	<u>Duration, minutes</u>	<u>Permeability, cm/sec.</u>	<u>Remarks</u>
1	150.5	2850	5.1×10^{-7}	
2	94.4	1460	6.2×10^{-7}	
3	41.0	4380	9.7×10^{-8}	
4	41.0	1310	2.4×10^{-7}	
Average =			3.7×10^{-7}	

STS CONSULTANTS, LTD.

Project Sediment Sampling
STS Job No. 11728
Date 4-21-82

PERMEABILITY TEST CONSTANT HEAD

Boring: STS LSL-6

Sample: 10

Soil Description: Silty clay (CL)

Dry Unit Weight = 86.8 PCF

Water Content 34.8%

Sample Diameter = 2.85 inches

Sample Height = 24.25 inches

<u>Run No.</u>	<u>Head, inches</u>	<u>Duration, minutes</u>	<u>Permeability, cm/sec.</u>	<u>Remarks</u>
1	42	260	1.6×10^{-6}	
2	42	4020	1.5×10^{-6}	
3	41	1810	1.7×10^{-6}	
4	41	3890	1.5×10^{-6}	
Average =			1.6×10^{-6}	

Appendix 3.5-27

**Grain Size Curves and Permeability Test Results From
STS Consultants LTD 1984 Duck, Skunk, Oak and Deep Hole Lake Borings**

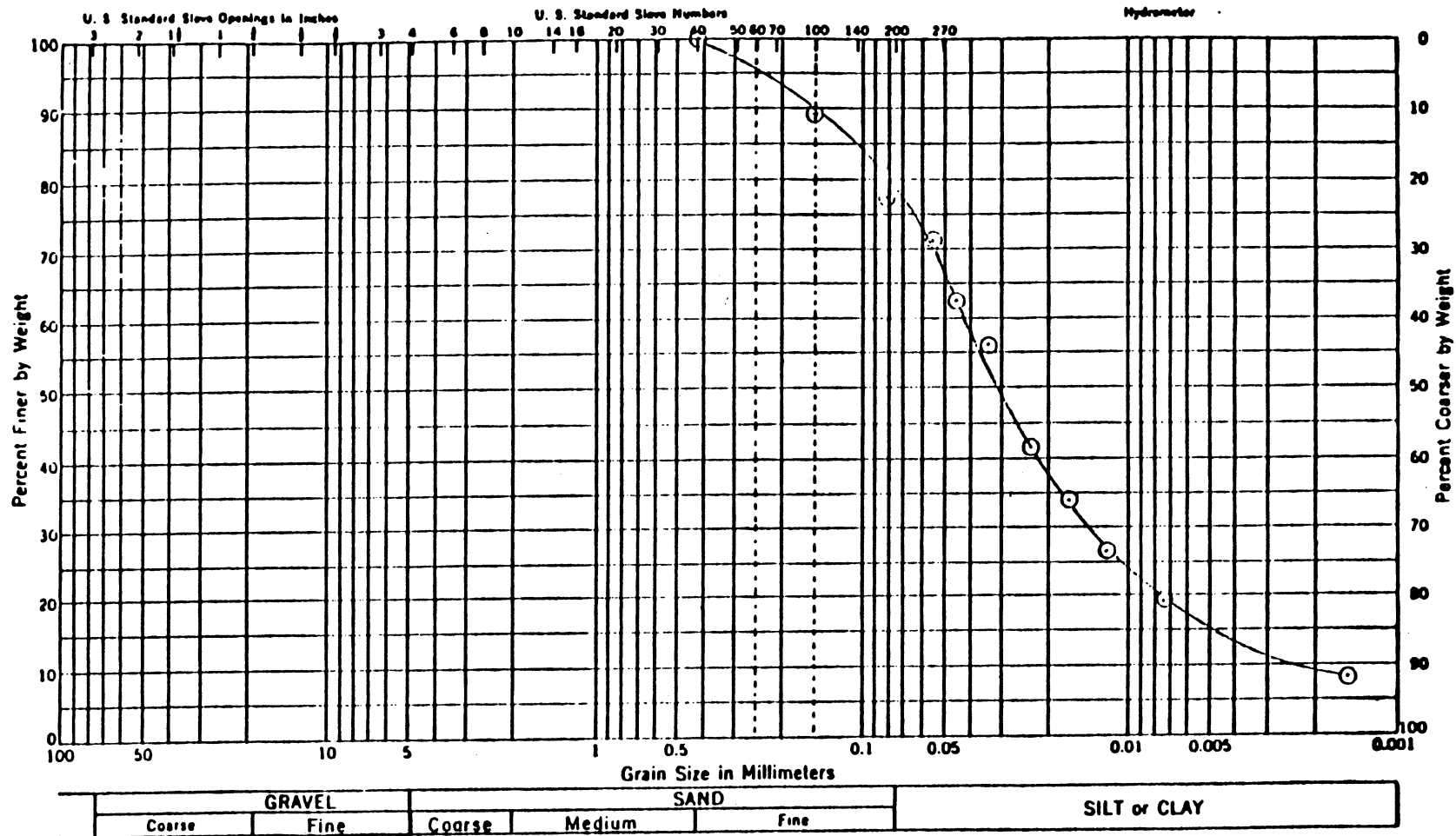
EXXON MINERALS COMPANY
CRANDON PROJECT
LAKE SEDIMENT BORINGS

TABLE 2: SUMMARY OF LABORATORY TEST RESULTS

<u>Boring No.</u>	<u>Sample No.</u>	<u>Depth (ft.)</u>	<u>Water Content(%)</u>	<u>Dry Unit Weight(pcf)</u>	<u>Organic Content(%)</u>	<u>% P-200</u>	<u>LL</u>	<u>PL</u>	<u>PI</u>	<u>USCS Classification</u>	<u>Permeability Coefficient(cm/sec)</u>
DL-1	10	25.5-28.0	19.9	104	-	78	-	-	-	(CL)	1.3×10^{-6}
DL-1	15	38.0-40.0	28.7	99	1.4	93	30.4	21.3	9.1	(CL)	1.0×10^{-7}
SL-2	1A	9.1-10.0	20.6	108	1.8	93	31.9	19.5	12.4	(CL)	4.3×10^{-8}
OL-1	4	37.5-39.5	27.2	103	-	88	-	-	-	(CL)	2.3×10^{-6}
OL-1	6	42.5-44.5	32.4	101	0.7	93	29.2	21.1	8.1	(CL)	3.5×10^{-7}
DHL-1	6	21.0-23.0	43.6	95	1.7	95	28.8	25.0	3.8	(ML)	6.8×10^{-7}
DHL-1	11	33.5-35.2	35.2	92	-	88	-	-	-	(ML)	6.8×10^{-8}

3.5-27-1

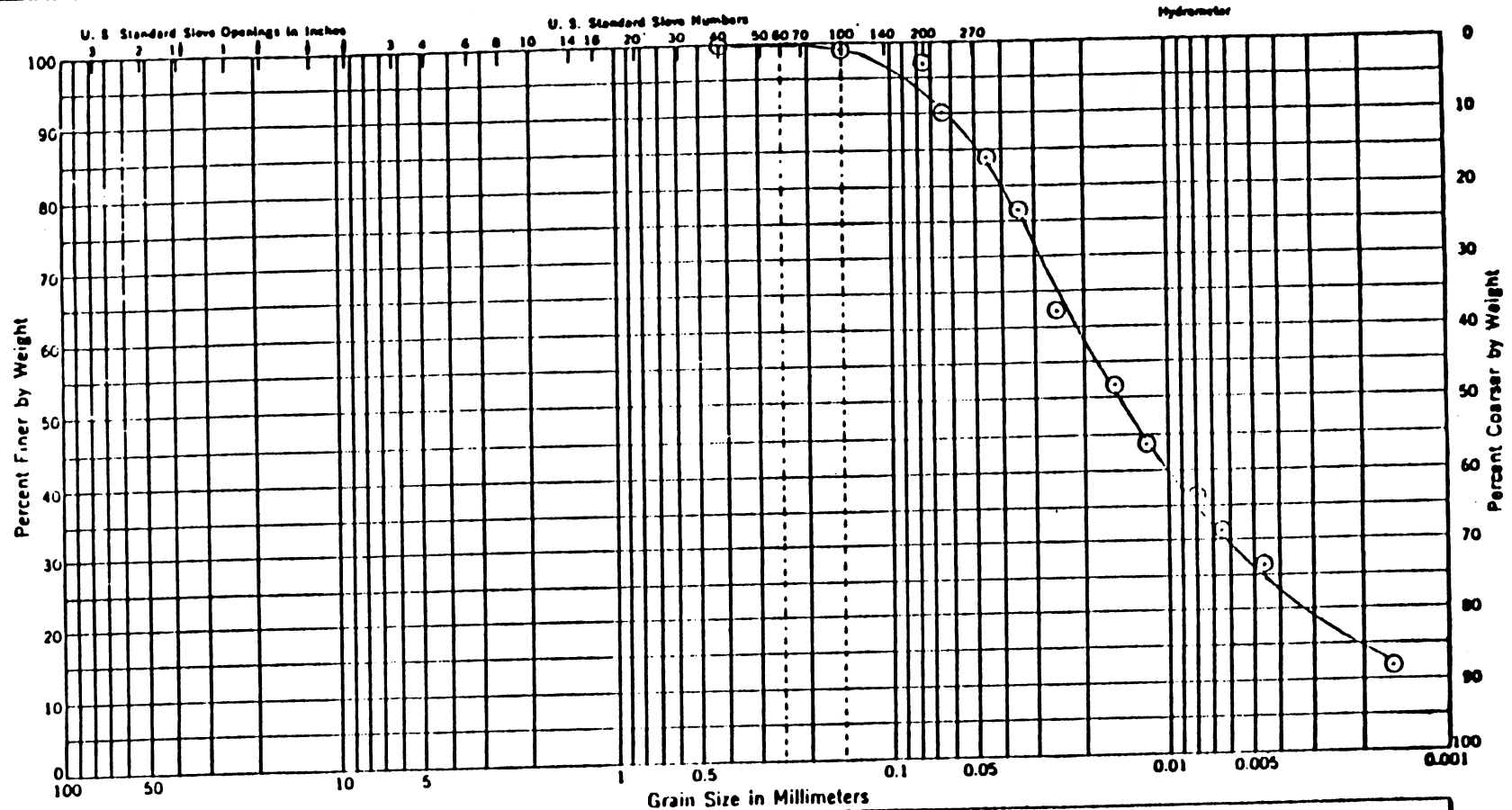
UNIFIED CLASSIFICATION SYSTEM



3.5-27-2

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	Grain Size Analysis			
DL-1	19.9				Gray very silty clay (Cl.) - with a little sand - trace of organics	Lake Sediment Borings Exxon Minerals Company Crandon, Wisconsin			
S-10									
						STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						K00	GMT	3-16-84	949

UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
DL-1	28.7	30.4	21.3	9.1	Gray very silty clay (CL) - with traces
S-15					of sand and organics

Grain Size Analysis

Lake Sediment Borings
Exxon Minerals Company
Crandon, Wisconsin

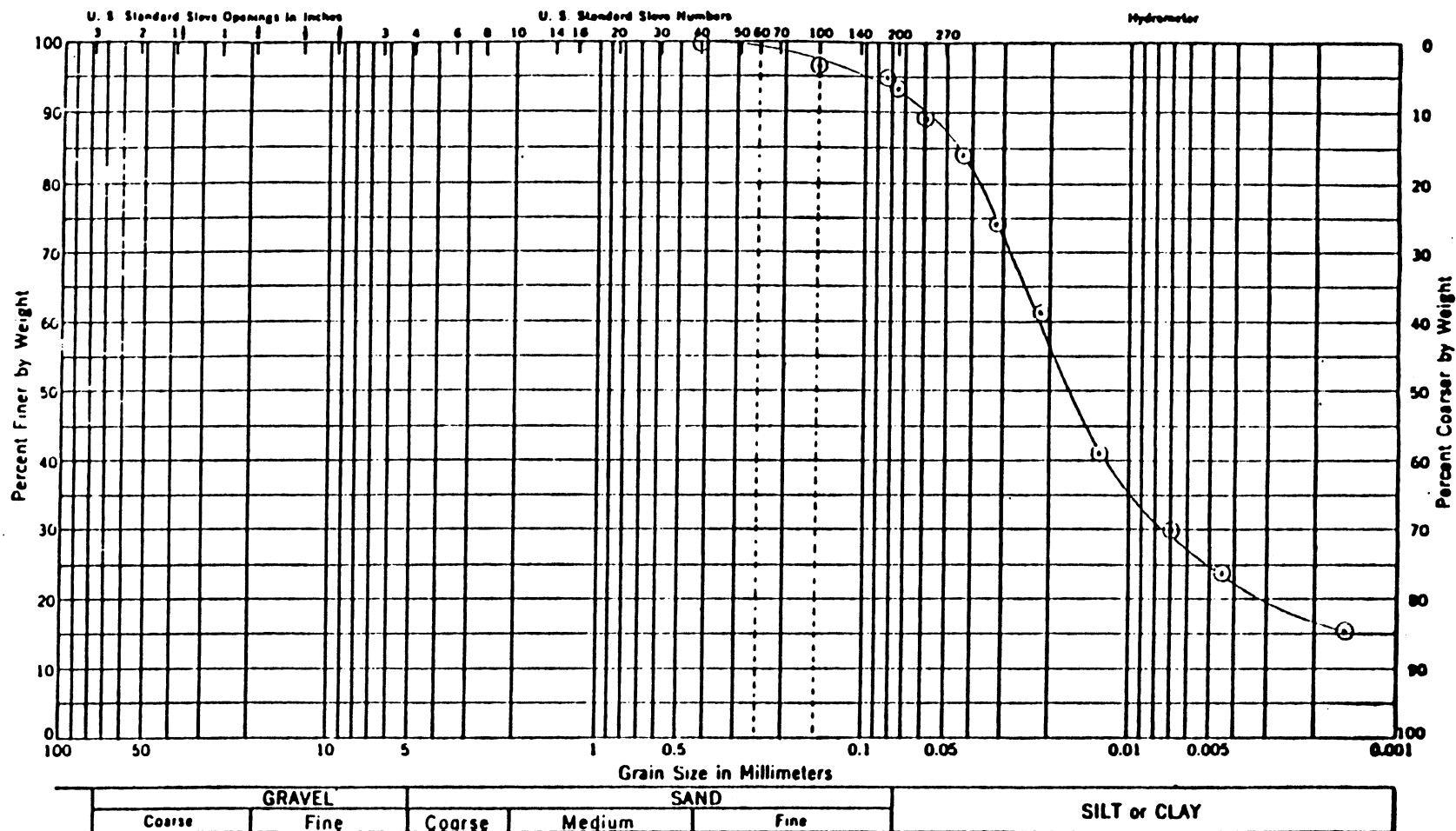
STS Consultants Ltd.

540 LAMBEAU STREET
GREEN BAY, WIS. 54303

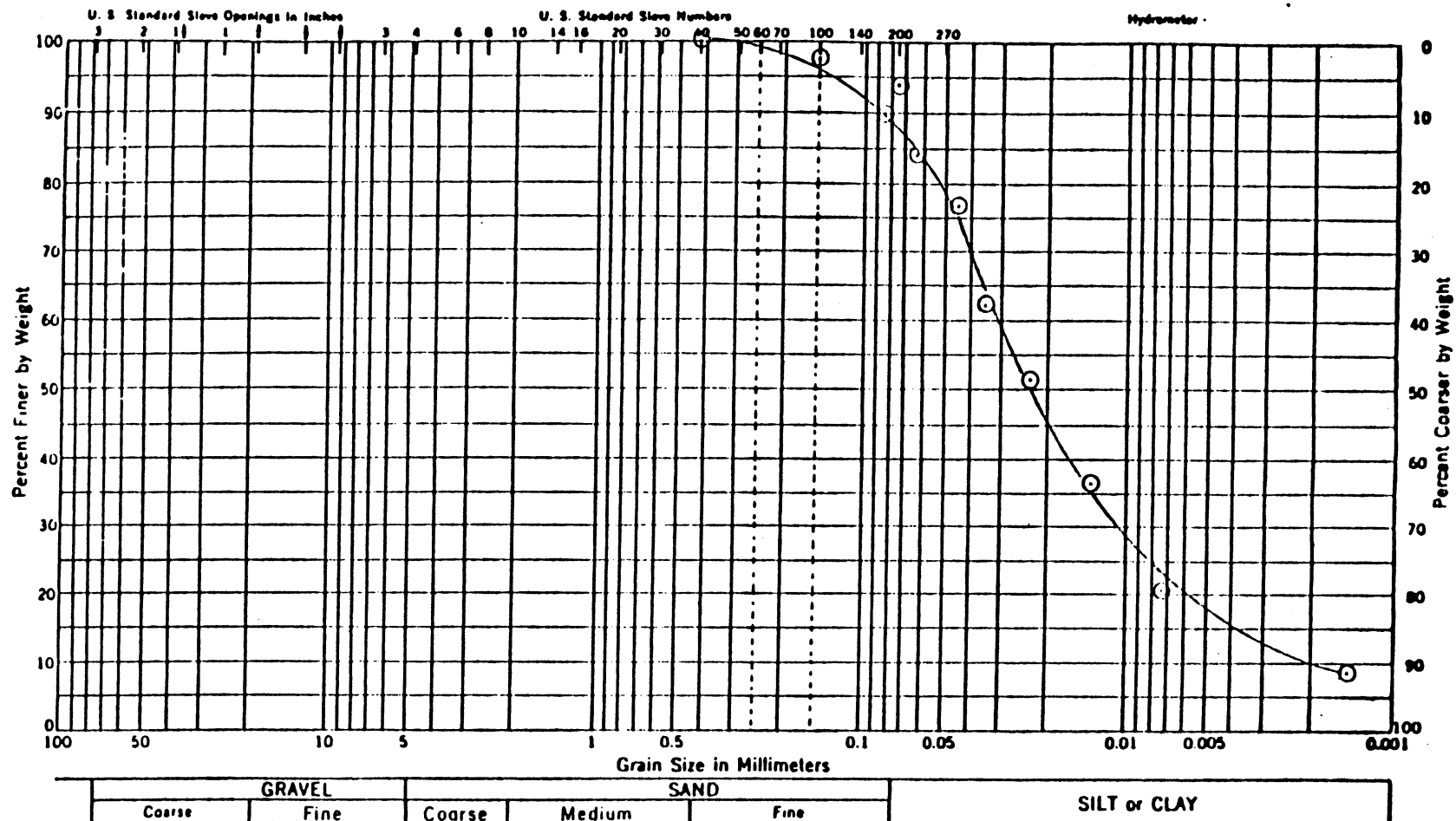
DRAWN	APPROVED	DATE	JOB No.
K00	GMT	3-16-84	12949

3.5-27-3

UNIFIED CLASSIFICATION SYSTEM

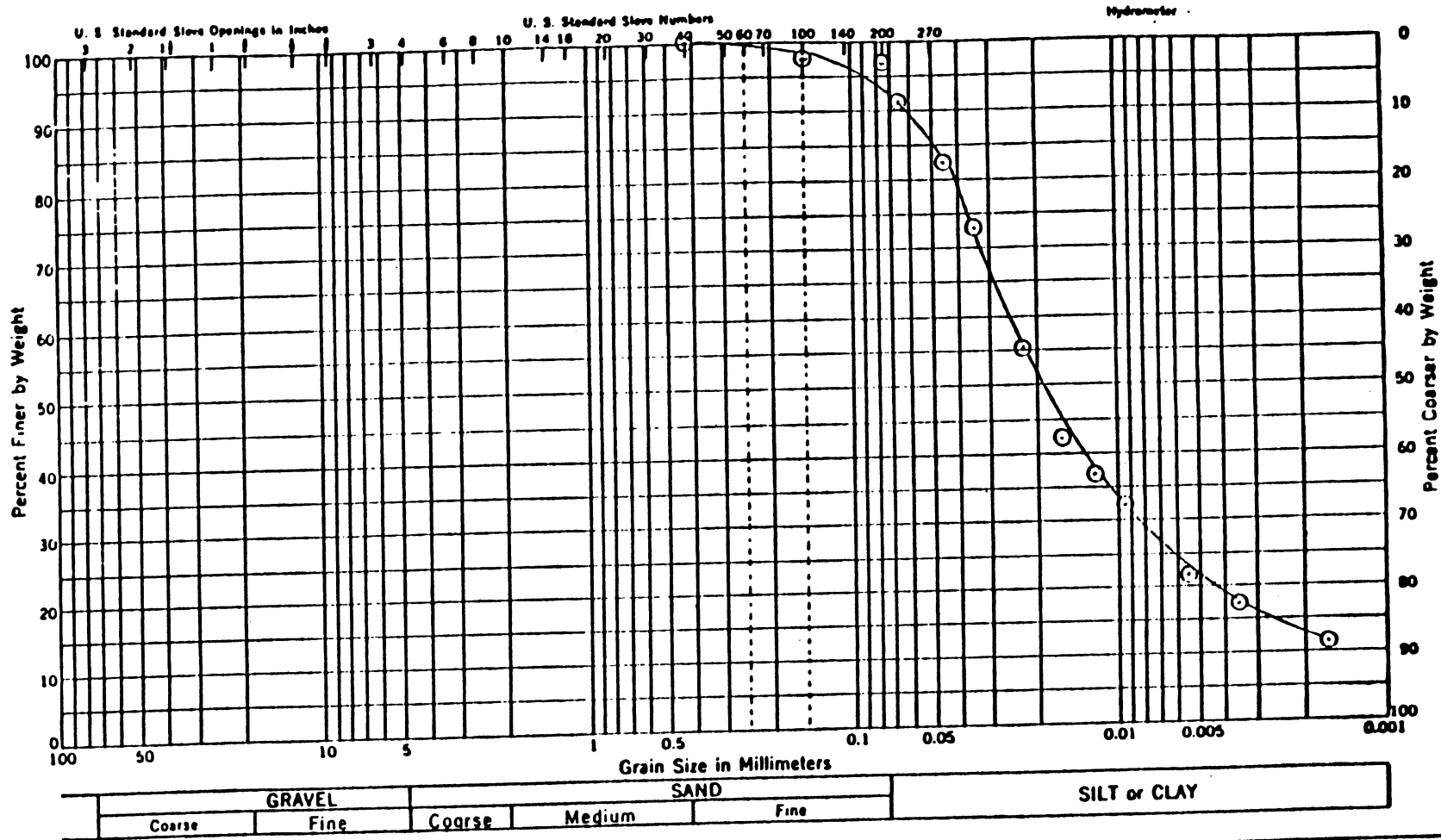


3.5-27-5

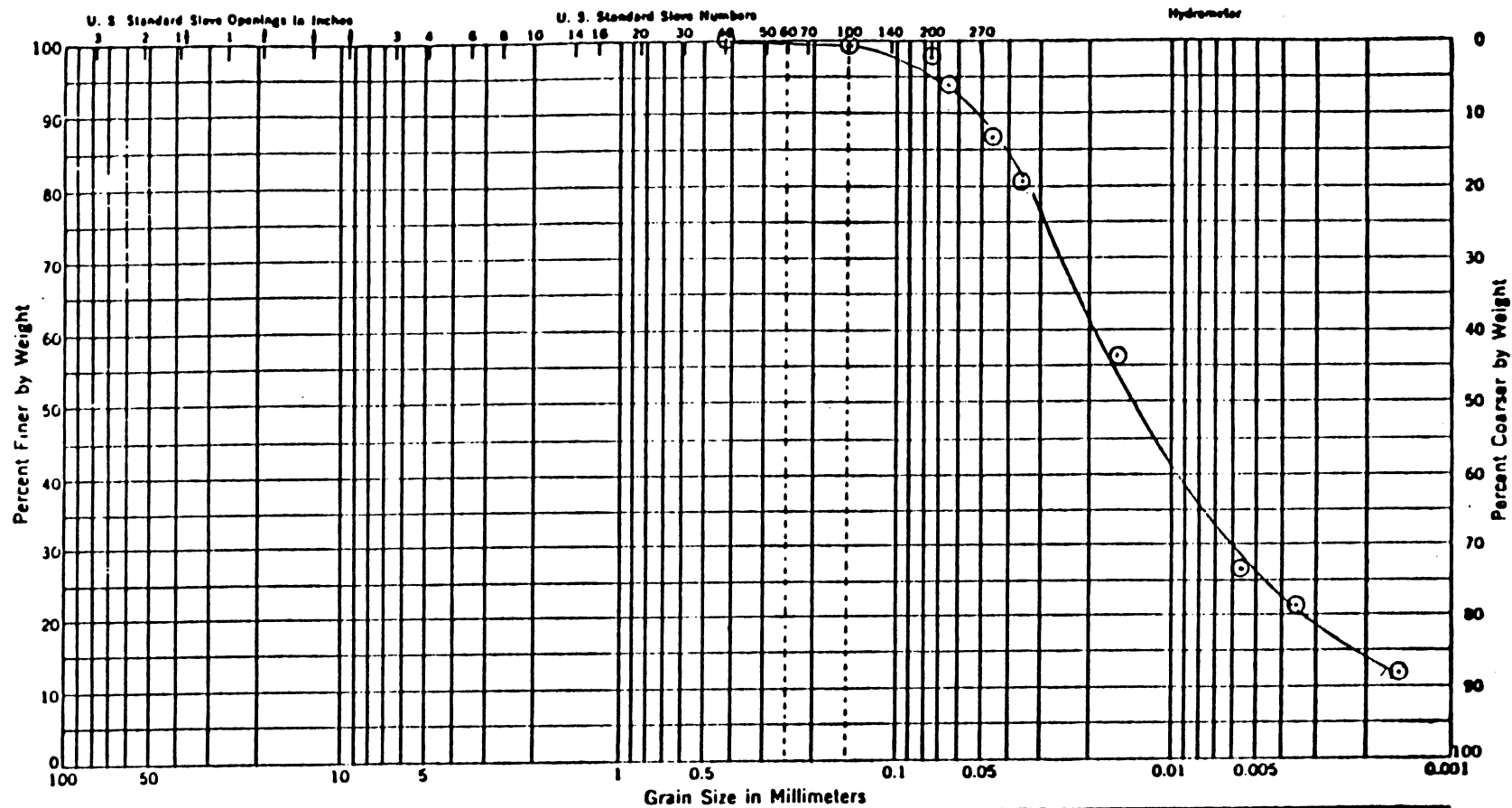


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	Grain Size Analysis Lake Sediment Borings Exxon Minerals Company Crandon, Wisconsin			
OL-1	27.2				Gray very silty clay (CL) - with a				
S-4					little sand - trace of organics	STS Consultants Ltd. 540 LAMBEAU STREET GREEN BAY, WIS. 54303			
						DRAWN	APPROVED	DATE	JOB No.
						K00	GMT	3-16-84	12949

UNIFIED CLASSIFICATION SYSTEM



UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
DHL-1	43.6	28.8	25.0	3.8	Gray silt (ML) - with traces of sand
S-6					and organics

Grain Size Analysis

Lake Sediment Borings
Exxon Minerals Company
Crandon, Wisconsin

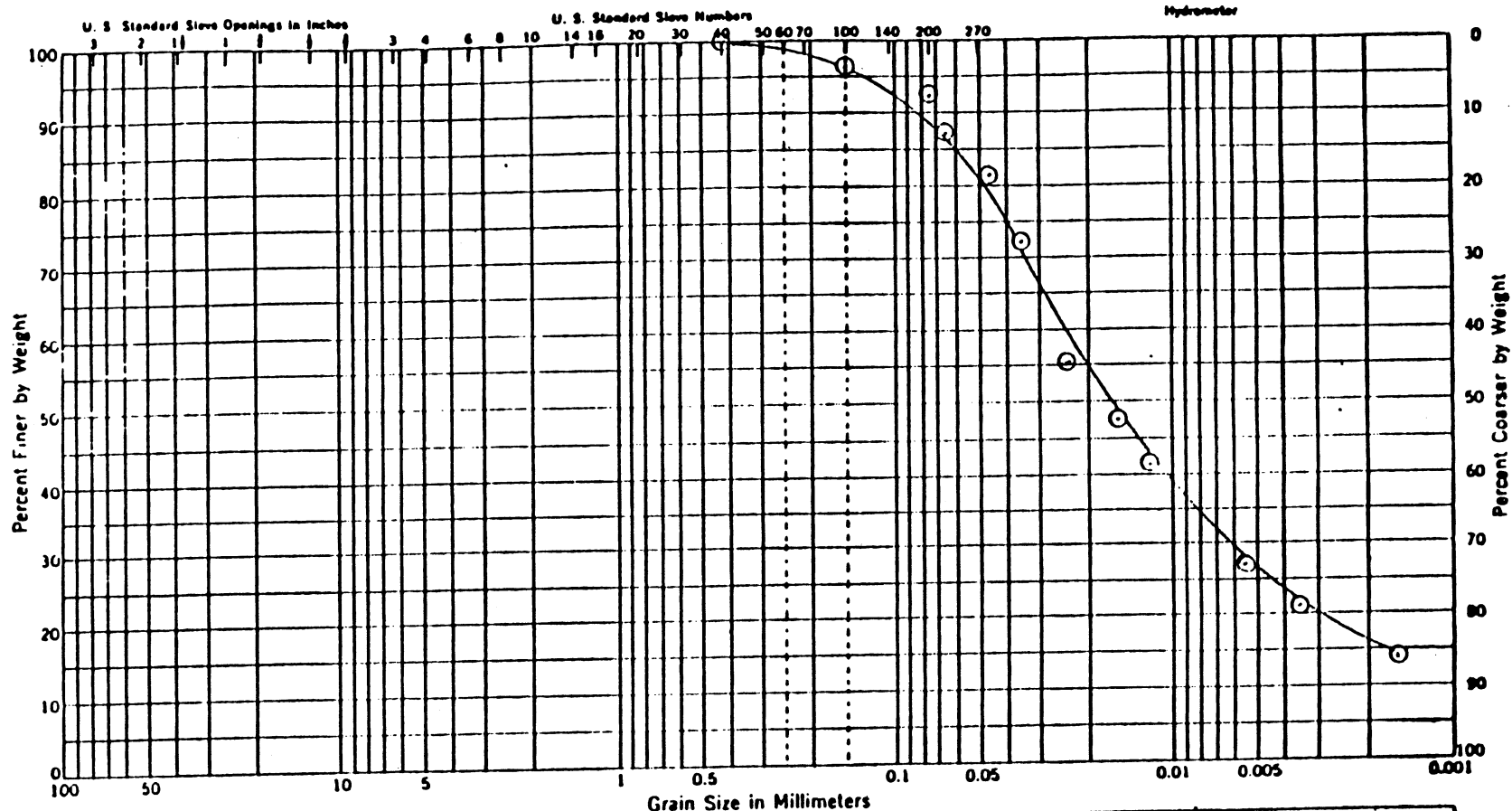
STS Consultants Ltd.

540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
KOO	GMT	3-16-84	12949

3.5-27-7

UNIFIED CLASSIFICATION SYSTEM



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
DHL-1	35.2				Gray silt (ML) - with a little sand - trace of organics
S-11					

Grain Size Analysis

Lake Sediment Borings
Exxon Minerals Company
Crandon, Wisconsin

STS Consultants Ltd.

540 LAMBEAU STREET
GREEN BAY, WIS. 54303

DRAWN	APPROVED	DATE	JOB No.
KOO	GMT	3-16-8	2949

3.5-27-8

STS CONSULTANTS LTD.

PERMEABILITY TEST

Constant Head

Project Exxon Lake Borings

STS Job No. 12949

Date 3-16-84

Sample DL-1, S-10

Soil Description Very silty clay (CL)

Sample Diameter = 2-3/4 inches

Sample Height = 9 inches

<u>Run No.</u>	<u>Head, inches</u>	<u>Duration, minutes</u>	<u>Permeability ^{cm}/sec</u>	<u>Remarks</u>
1	52	1435	1.2×10^{-6}	
2	51	1510	1.3×10^{-6}	
3	51	4230	1.3×10^{-6}	
		Average	1.3×10^{-6}	

STS CONSULTANTS LTD.

PERMEABILITY TEST

Constant Head

Project Exxon Lake Borings

STS Job No. 12949

Date 3-16-84

Sample DL-1, S-15

Soil Description Very silty clay (CL)

Sample Diameter = 1-7/8 inches

Sample Height = 9 inches

<u>Run No.</u>	<u>Head, inches</u>	<u>Duration, minutes</u>	<u>Permeability ^{cm}/sec</u>	<u>Remarks</u>
1	306	1250	1.0×10^{-7}	
2	306	1565	1.0×10^{-7}	
3	306	2940	1.0×10^{-7}	
		Average	1.0×10^{-7}	

STS CONSULTANTS LTD.

PERMEABILITY TEST

Constant Head

Project Exxon Lake Borings

STS Job No. 12949

Date 3-30-84

Sample SL-2, S-1.

Soil Description Very silty clay (CL)

Sample Diameter = 2-3/4 inches

Sample Height = 10-1/4 inches

<u>Run No.</u>	<u>Head, inches</u>	<u>Duration, minutes</u>	<u>Permeability</u> ^{cm} /sec	<u>Remarks</u>
1	442	5535	4.9×10^{-8}	
2	442	1080	3.8×10^{-8}	
3	442	480	4.2×10^{-8}	

Average = 4.3×10^{-8}

STS CONSULTANTS LTD.

PERMEABILITY TEST

Constant Head

Project Exxon Lake Borings

STS Job No. 12949

Date 3-16-84

Sample OL-1, S-4

Soil Description Very silty clay (CL)

Sample Diameter = 1-7/8 inches

Sample Height = 6 inches

<u>Run No.</u>	<u>Head, inches</u>	<u>Duration, minutes</u>	<u>Permeability ^{cm}/sec</u>	<u>Remarks</u>
1	52	1430	2.3×10^{-6}	
2	52	1510	2.3×10^{-6}	
3	52	4235	2.2×10^{-6}	
		Average	2.3×10^{-6}	

STS CONSULTANTS LTD.

PERMEABILITY TEST

Constant Head

Project Exxon Lake Borings

STS Job No. 12949

Date 3-16-84

Sample OL-1, S-6

Soil Description Very silty clay (CL)

Sample Diameter = 1-7/8 inches

Sample Height = 11-7/8 inches

<u>Run No.</u>	<u>Head, inches</u>	<u>Duration, minutes</u>	<u>Permeability ^{cm}/sec</u>	<u>Remarks</u>
1	334	1250	3.4×10^{-7}	
2	334	1425	3.6×10^{-7}	
3	334	1515	3.6×10^{-7}	
4	334	2930	<u>3.5×10^{-7}</u>	
		Average	3.5×10^{-7}	

STS CONSULTANTS LTD.

PERMEABILITY TEST

Constant Head

Project Exxon Lake Borings

STS Job No. 12949

Date 3-16-84

Sample DHL-1, S-6

Soil Description Gray silt (ML)

Sample Diameter = 1-7/8 inches

Sample Height = 6 inches

<u>Run No.</u>	<u>Head, inches</u>	<u>Duration, minutes</u>	<u>Permeability</u> ^{cm} /sec	<u>Remarks</u>
1	56	1185	6.8×10^{-7}	
2	56	1425	7.1×10^{-7}	
3	56	1585	6.7×10^{-7}	
4	56	2920	6.5×10^{-7}	
		Average	6.8×10^{-7}	

STS CONSULTANTS LTD.

PERMEABILITY TEST

Constant Head

Project Exxon Lake Borings

STS Job No. 12949

Date 3-16-84

Sample DHL-1, S-11

Soil Description Gray silt (ML)

Sample Diameter = 1-7/8 inches

Sample Height = 12-1/8 inches

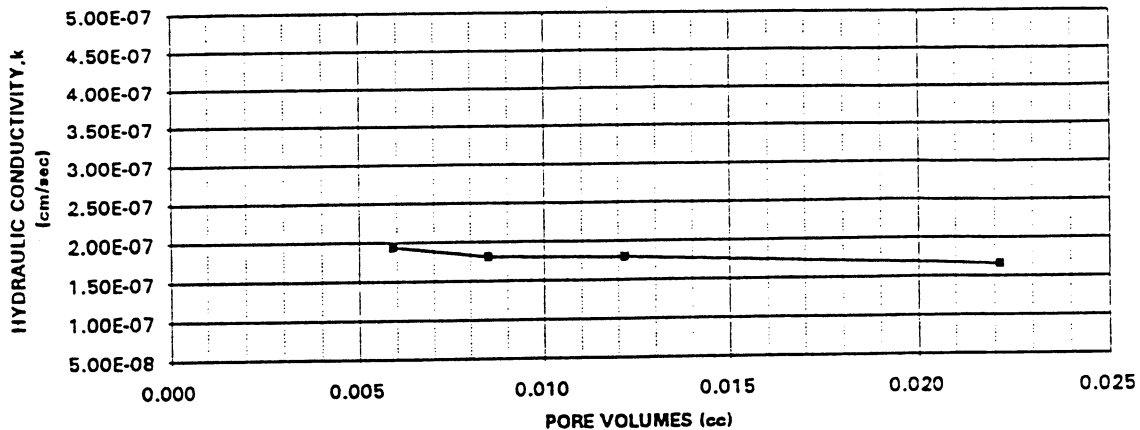
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1	334	1250	5.7×10^{-8}	
2	334	1425	7.4×10^{-8}	
3	334	1575	6.7×10^{-8}	
4	334	2930	7.4×10^{-8}	
		Average	6.8×10^{-8}	

Appendix 3.5-28

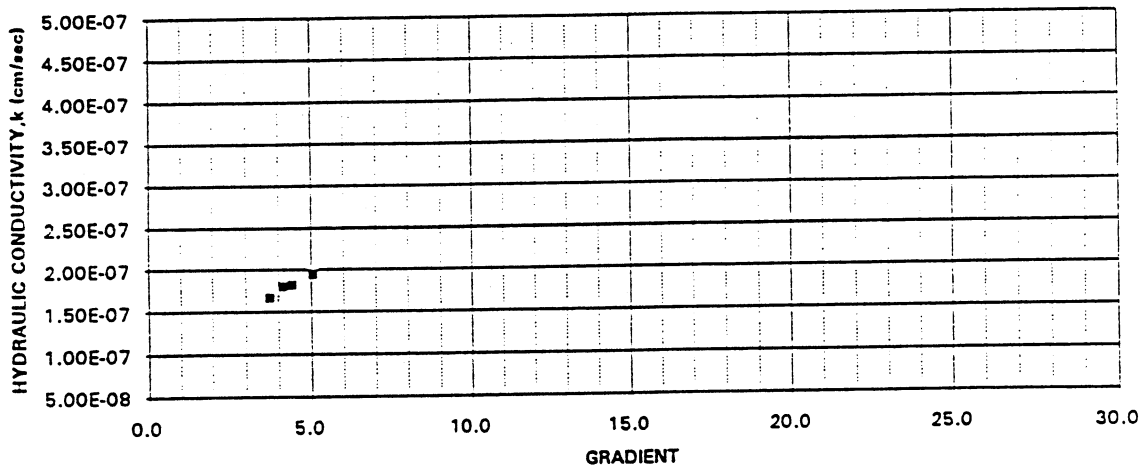
**Grain Size Curves and Permeability Test Results for 1994 Little Sand Lake;
Skunk and Duck Lake Wetlands; Bur Oak Swamp; Swamp Creek Cedars and
Wetlands Adjacent to Swamp Creek Boring Program**

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: LSL - 101 14'-16'

SPECIMEN DESCRIPTION: Gray lean CLAY, trace fine sand

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.04	6.97	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	38.93	38.16	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	4.74
SPECIMEN LENGTH, L (cm)	5.28	5.20	MINIMUM EFFECTIVE CONFINING STRESS (psi)	4.29
SPECIMEN VOLUME, V (cc)	205.53	198.41	CUMULATIVE PORE VOLUMES FLOW	0.02
WATER CONTENT (%)	31.5	31.3	PERMEANT	WATER
DRY DENSITY (pcf)	89.5	91.0		
SATURATION, n (%)	96.4	99.1	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	1.8E-07

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4EO5140

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY

Woodward-Clyde Consultants

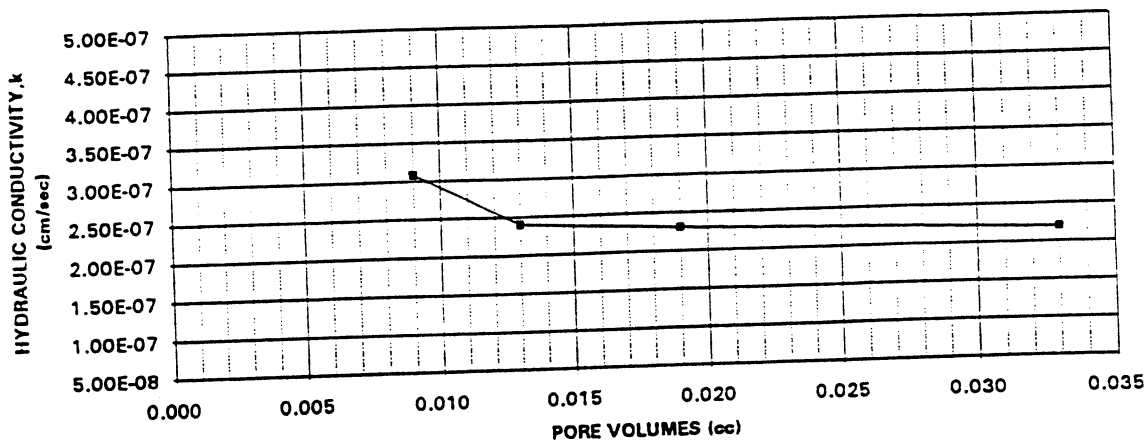
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REVIEWED BY: *JEL*

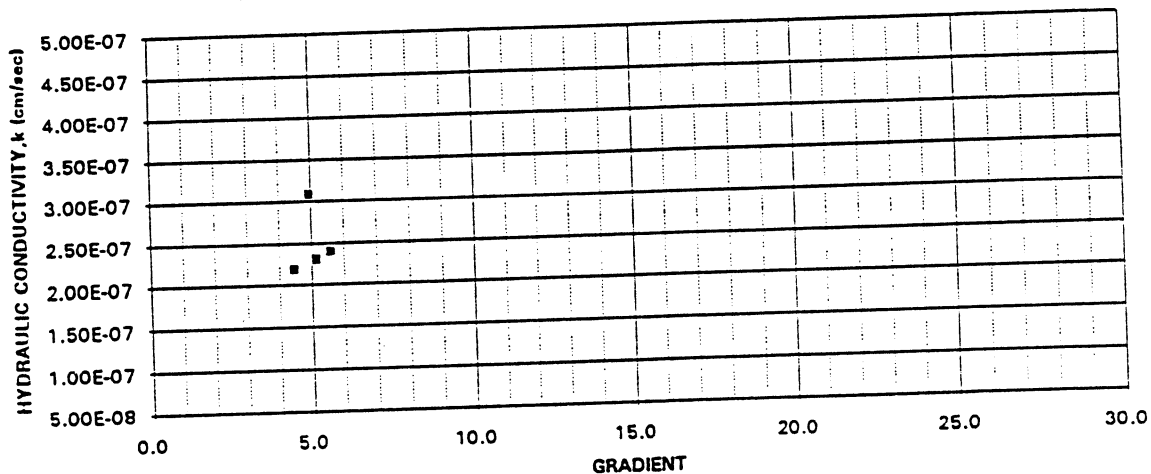
DATE: 25-Apr-94

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: LSL - 102 11'-13'

SPECIMEN DESCRIPTION: Gray lean CLAY, with fine sand

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.09	7.03	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	39.48	38.82	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	4.82
SPECIMEN LENGTH, L (cm)	5.15	5.12	MINIMUM EFFECTIVE CONFINING STRESS (psi)	4.29
SPECIMEN VOLUME, V (cc)	203.32	198.73	CUMULATIVE PORE VOLUMES FLOW	0.03
WATER CONTENT (%)	34.1	35.7	PERMEANT	WATER
DRY DENSITY (pcf)	86.5	86.1		
SATURATION, n (%)	97.3	100.6	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	2.5E-07

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4E05140

**FLEXIBLE WALL
HYDRAULIC
CONDUCTIVITY**

Woodward-Clyde Consultants

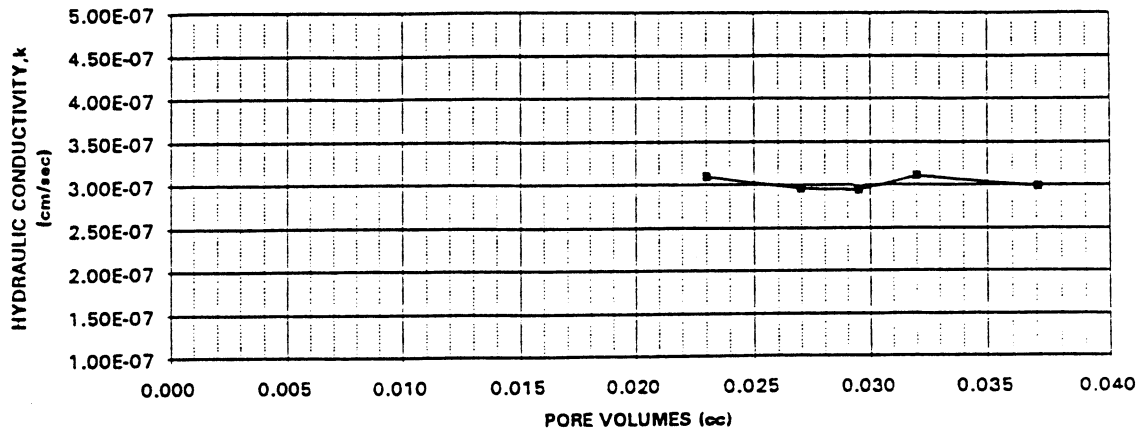
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REVIEWED BY: *[Signature]*

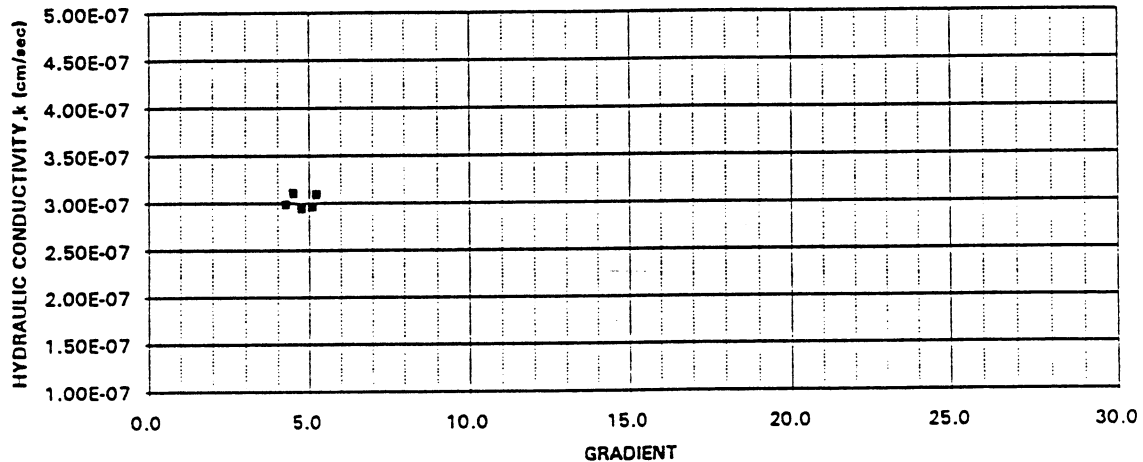
DATE: 25-Apr-94

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: LSL - 102B 12'-14'

SPECIMEN DESCRIPTION: Gray lean CLAY, little fine sand

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	6.98	6.89	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	38.27	37.28	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	4.82
SPECIMEN LENGTH, L (cm)	6.10	5.93	MINIMUM EFFECTIVE CONFINING STRESS (psi)	4.28
SPECIMEN VOLUME, V (cc)	233.42	221.10	CUMULATIVE PORE VOLUMES FLOW	0.04
WATER CONTENT (%)	35.9	25.9	PERMEANT	WATER
DRY DENSITY (pcf)	90.2	99.3		
SATURATION, n (%)	111.6	100.3	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	3.0E-07

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4EC5140

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY

Woodward-Clyde Consultants

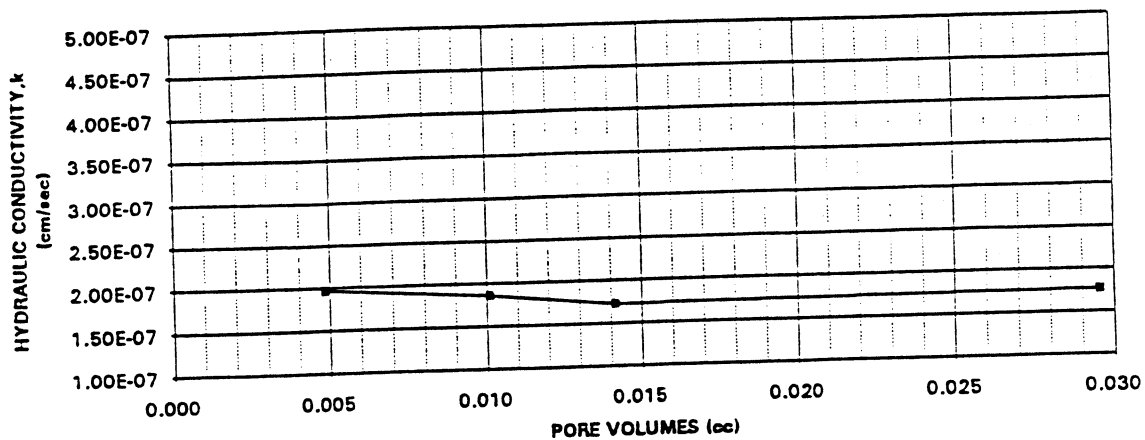
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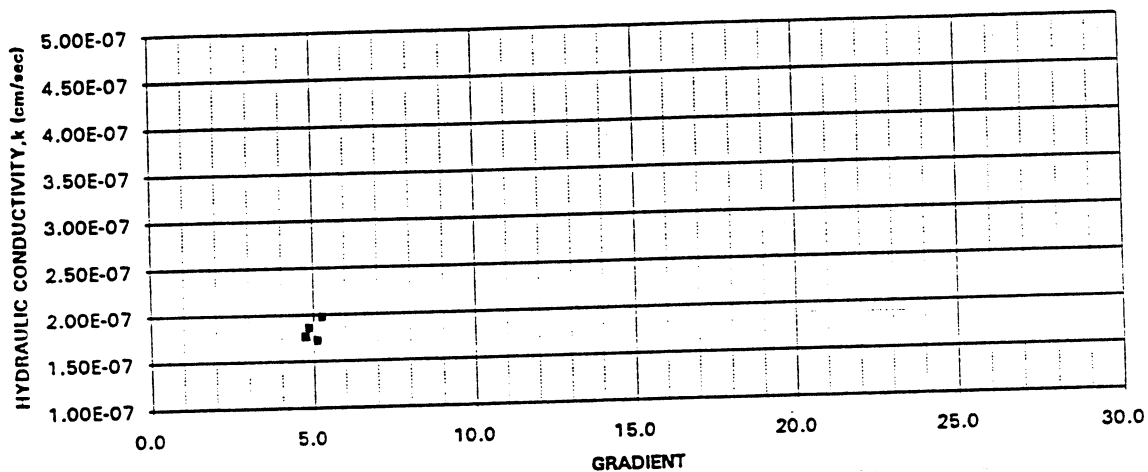
DATE: 25-Apr-94

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: LSL - 102B 16'-18'

SPECIMEN DESCRIPTION: Gray lean CLAY, little fine sand

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	6.81	6.76	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	36.42	35.89	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	4.77
SPECIMEN LENGTH, L (cm)	5.27	5.08	MINIMUM EFFECTIVE CONFINING STRESS (psi)	4.29
SPECIMEN VOLUME, V (cc)	191.95	182.33	CUMULATIVE PORE VOLUMES FLOW	0.03
WATER CONTENT (%)	30.9	30.2	PERMEANT	WATER
DRY DENSITY (pcf)	90.8	93.0		
SATURATION, n (%)	97.4	100.4	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	1.8E-07

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4EO5140

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY

Woodward-Clyde Consultants

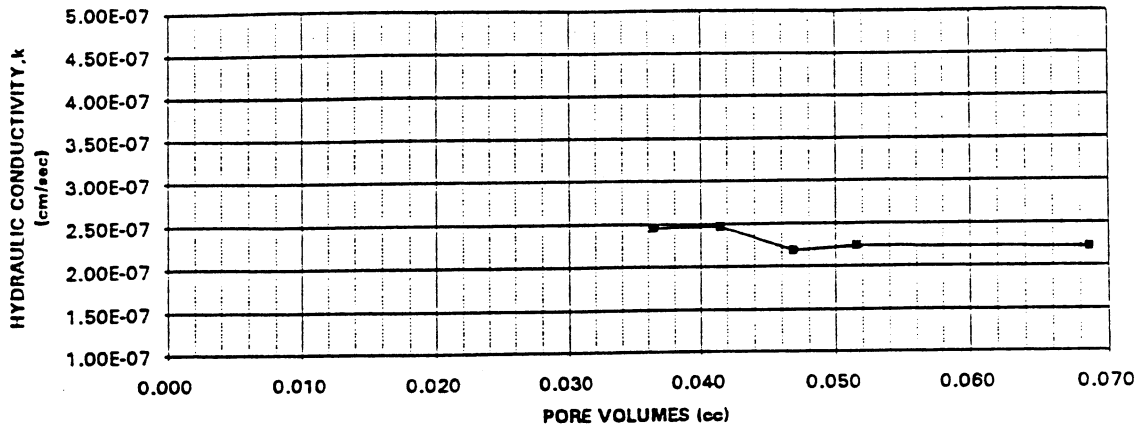
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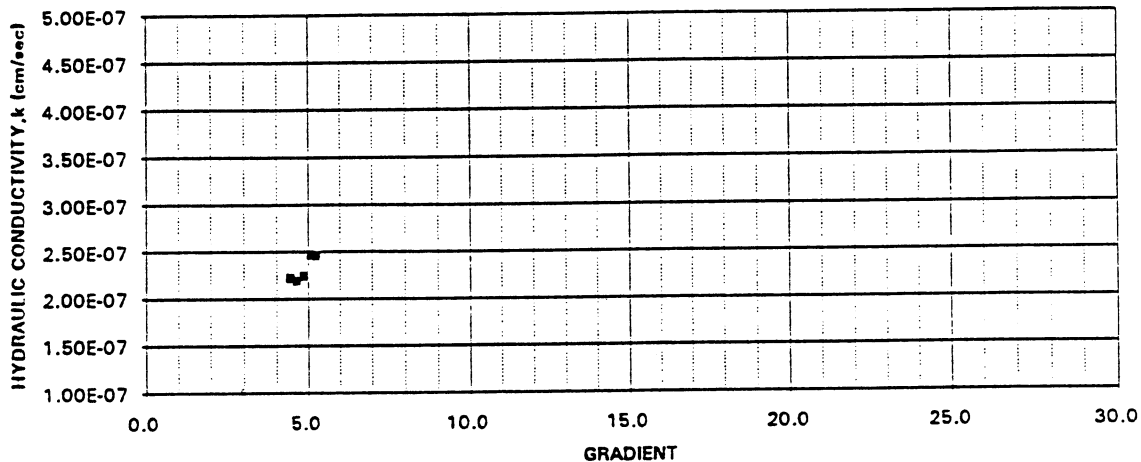
DATE: 27-Apr-94

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: LSL - 102B 24'-26'

SPECIMEN DESCRIPTION: Gray lean CLAY, with fine sand

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	6.95	6.87	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	37.94	37.07	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	5.0
SPECIMEN LENGTH, L (cm)	5.55	5.48	MINIMUM EFFECTIVE CONFINING STRESS (psi)	5.0
SPECIMEN VOLUME, V (cc)	210.55	203.14	CUMULATIVE PORE VOLUMES FLOW	0.07
WATER CONTENT (%)	31.1	26.3	PERMEANT	WATER
DRY DENSITY (pcf)	94.7	99.2		
SATURATION, n (%)	107.8	101.7	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	2.3E-07

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4EO5140

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY

Woodward-Clyde Consultants

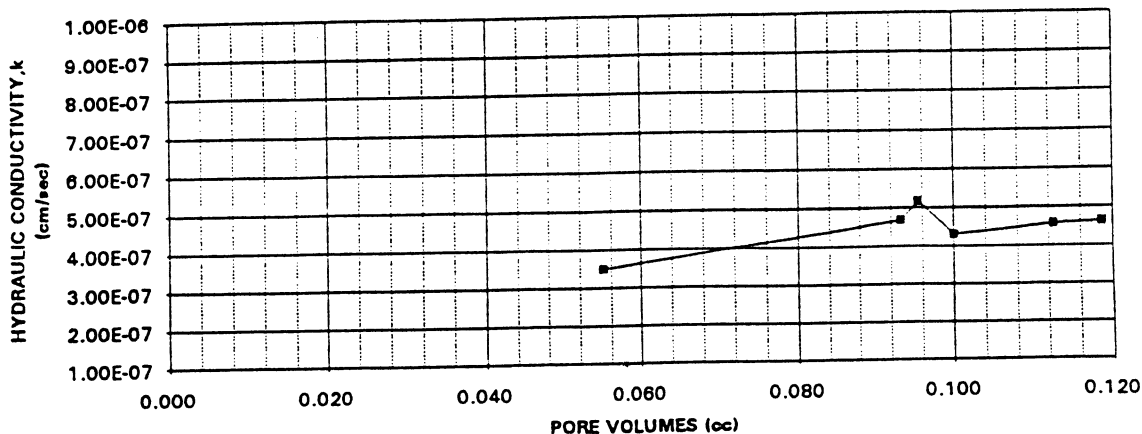
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REVIEWED BY: *24*

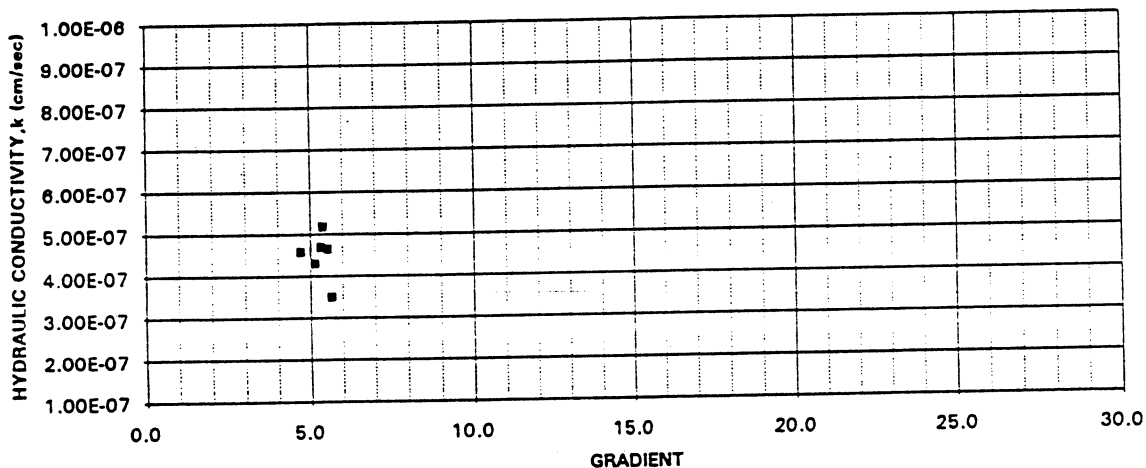
DATE: 27-Apr-94

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: LSL - 102B 28'-30'

SPECIMEN DESCRIPTION: Brown lean CLAY, trace fine sand

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.06	7.08	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	39.15	39.37	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	5.0
SPECIMEN LENGTH, L (cm)	6.17	5.82	MINIMUM EFFECTIVE CONFINING STRESS (psi)	5.0
SPECIMEN VOLUME, V (cc)	241.54	229.13	CUMULATIVE PORE VOLUMES FLOW	0.12
WATER CONTENT (%)	33.1	29.2	PERMEANT	WATER
DRY DENSITY (pcf)	89.6	94.4		
SATURATION, n (%)	101.5	100.6	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	4.5E-07

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4EO5140

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY

Woodward-Clyde Consultants

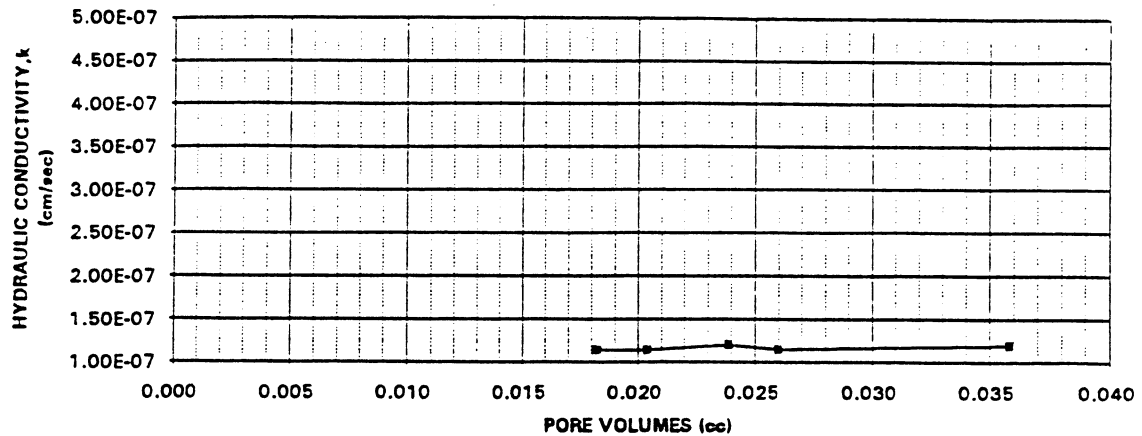
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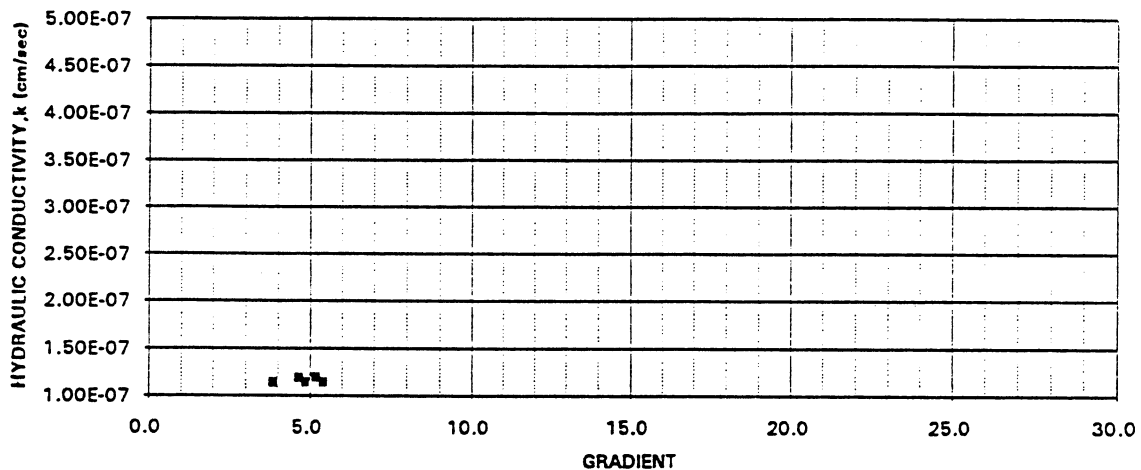
DATE: 14-Apr-94

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: LSL - 103 30'-33'

SPECIMEN DESCRIPTION: Gray silty CLAY, little fine sand

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.18	7.08	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	40.49	39.37	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	4.80
SPECIMEN LENGTH, L (cm)	6.64	6.16	MINIMUM EFFECTIVE CONFINING STRESS (psi)	4.22
SPECIMEN VOLUME, V (cc)	268.85	242.51	CUMULATIVE PORE VOLUMES FLOW	0.04
WATER CONTENT (%)	26.8	23.2	PERMEANT	WATER
DRY DENSITY (pcf)	95.9	103.8		
SATURATION, n (%)	95.5	100.7	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	1.2E-07

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4EO5140

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY

Woodward-Clyde Consultants

CHECKED BY: *[Signature]*

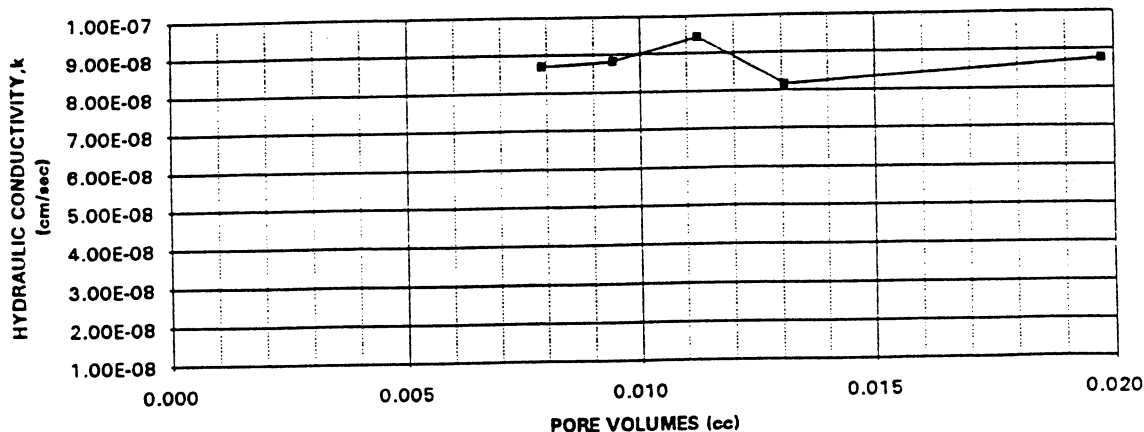
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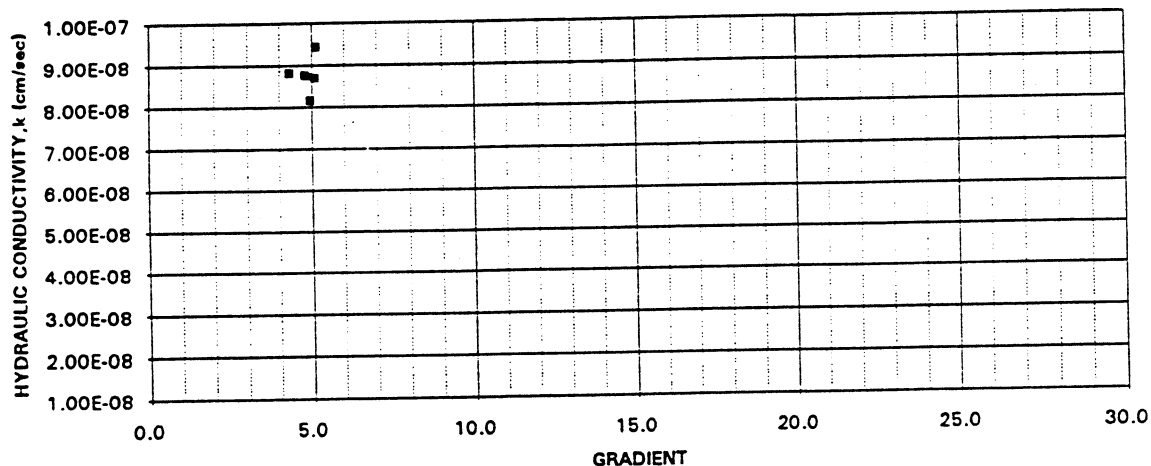
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TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: LSL - 103 33'-35'

SPECIMEN DESCRIPTION: Gray lean CLAY, little fine sand

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.11	6.96	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	39.70	38.05	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	5.0
SPECIMEN LENGTH, L (cm)	7.41	7.11	MINIMUM EFFECTIVE CONFINING STRESS (psi)	5.0
SPECIMEN VOLUME, V (cc)	294.20	270.51	CUMULATIVE PORE VOLUMES FLOW	0.02
WATER CONTENT (%)	32.4	24.9	PERMEANT	WATER
DRY DENSITY (pcf)	91.4	101.5		
SATURATION, n (%)	103.8	101.8	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	8.8E-08

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4EO5140

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY

Woodward-Clyde Consultants

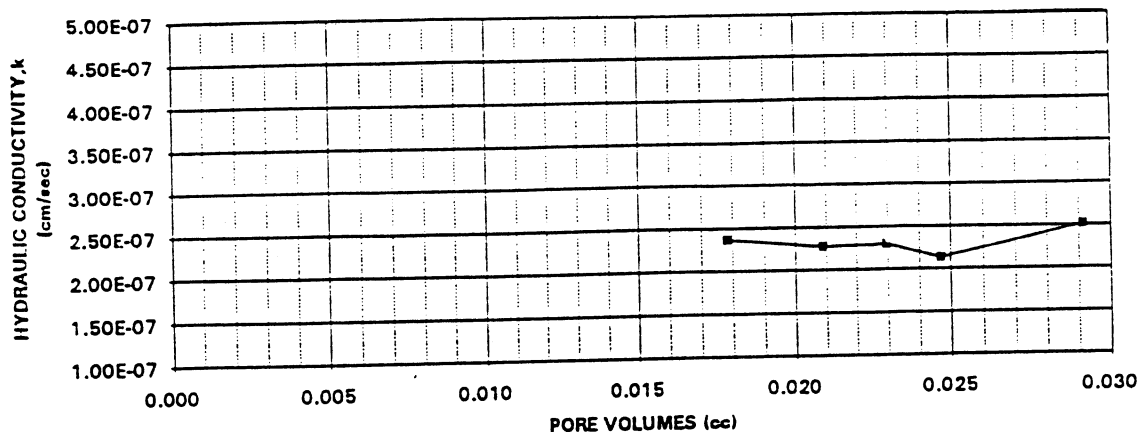
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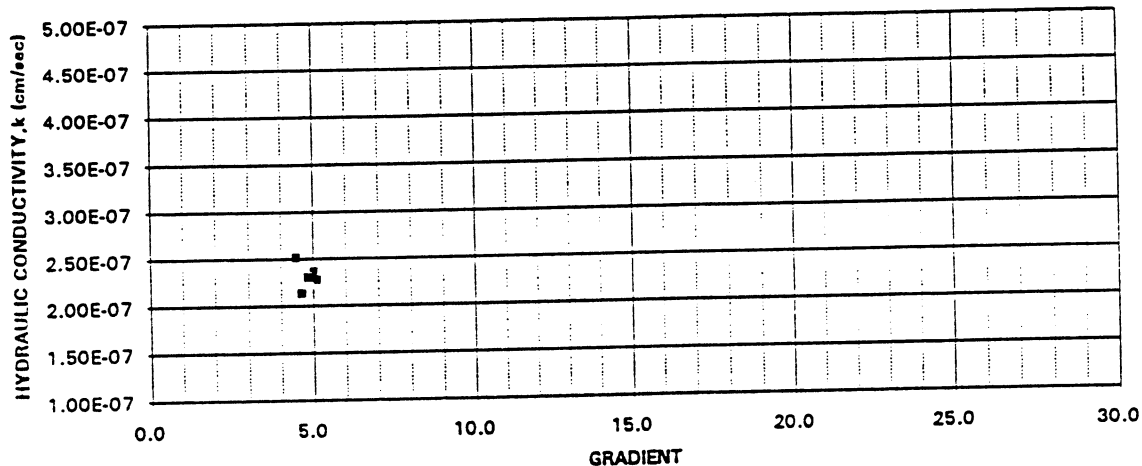
DATE: 14-Apr-94

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: LSL - 104A 15.4'-17.4'

SPECIMEN DESCRIPTION: Gray lean CLAY, little fine sand

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	6.96	6.86	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	38.05	36.96	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	4.88
SPECIMEN LENGTH, L (cm)	6.36	6.19	MINIMUM EFFECTIVE CONFINING STRESS (psi)	4.30
SPECIMEN VOLUME, V (cc)	241.97	228.79	CUMULATIVE PORE VOLUMES FLOW	0.03
WATER CONTENT (%)	32.1	26.5	PERMEANT	WATER
DRY DENSITY (pcf)	92.5	98.2		
SATURATION, n (%)	105.6	100.1	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	2.3E-07

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4EO5140

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY

Woodward-Clyde Consultants

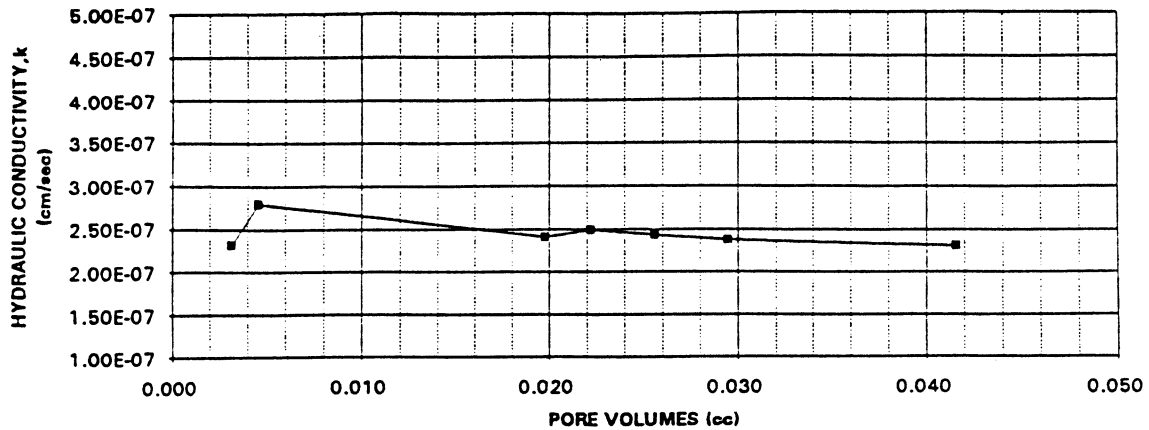
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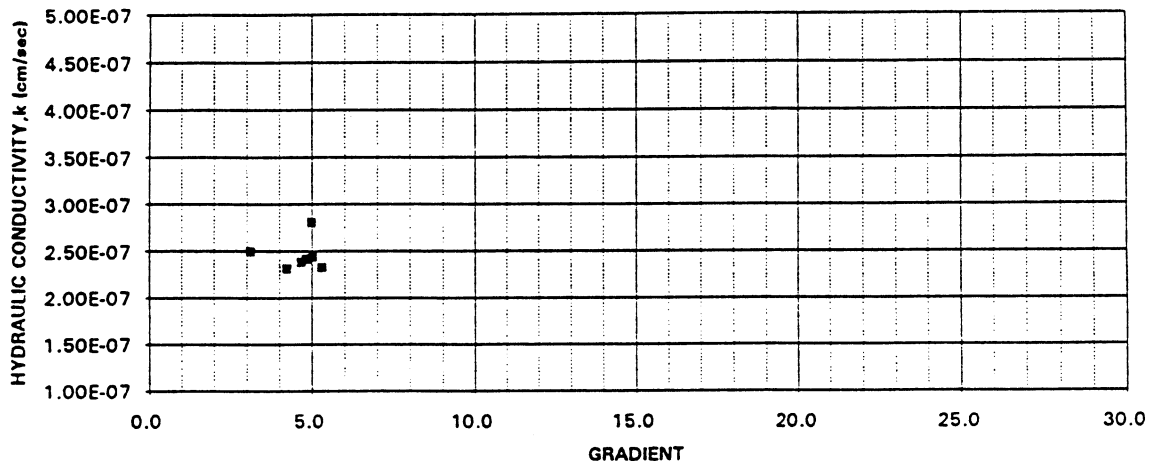
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TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: LSL - 104B 17-19'

SPECIMEN DESCRIPTION: Gray lean CLAY, little fine sand

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.16	7.05	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	40.26	39.04	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	5.0
SPECIMEN LENGTH, L (cm)	7.92	7.80	MINIMUM EFFECTIVE CONFINING STRESS (psi)	5.0
SPECIMEN VOLUME, V (cc)	318.89	304.48	CUMULATIVE PORE VOLUMES FLOW	0.04
WATER CONTENT (%)	31.9	29.3	PERMEANT	WATER
DRY DENSITY (pcf)	89.9	93.6		
SATURATION, n (%)	98.6	98.8	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	2.4E-07

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4E05140

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY

Woodward-Clyde Consultants

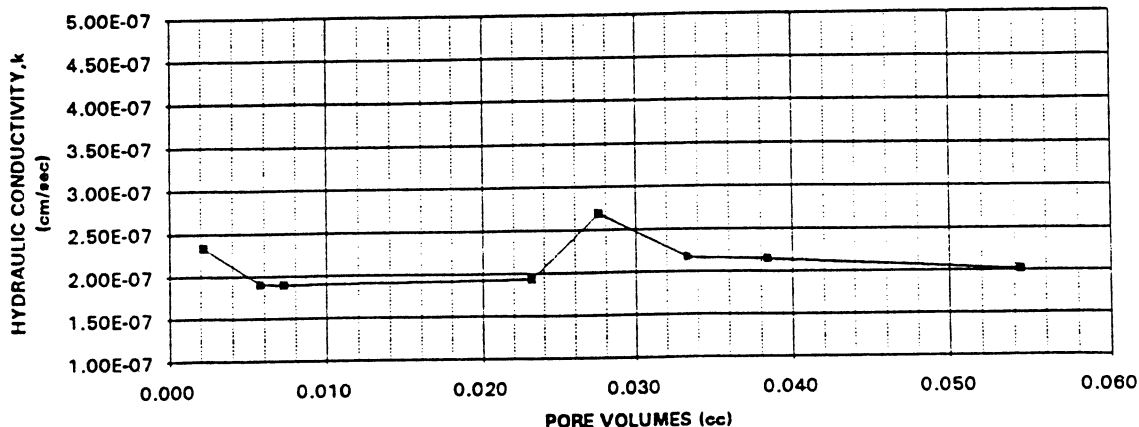
CHECKED BY: *GS*

REVIEWED BY: *JS*

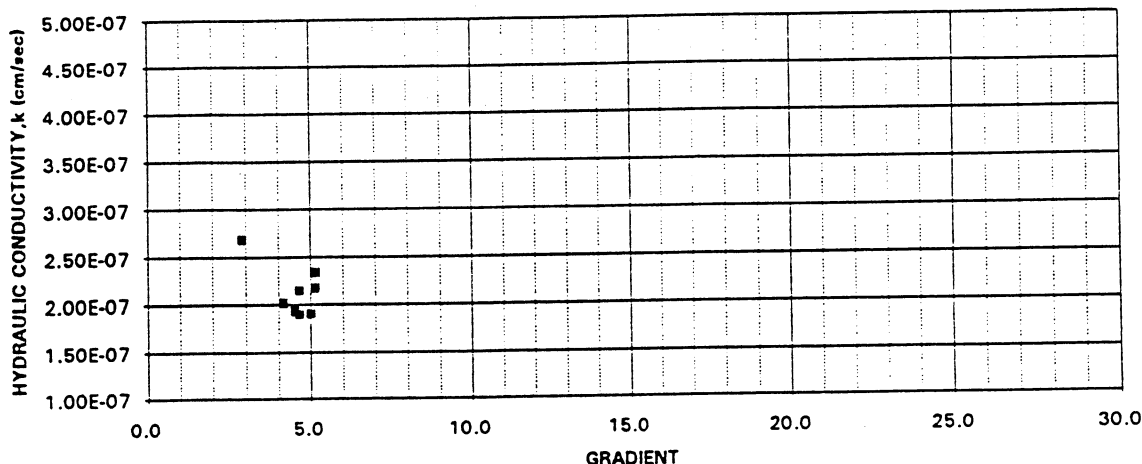
DATE: 14-Apr-94

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO:

LSL - 105 6'-8'

SPECIMEN DESCRIPTION:

Gray lean CLAY, little fine sand

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.13	6.97	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	39.93	38.16	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	5.0
SPECIMEN LENGTH, L (cm)	5.94	5.78	MINIMUM EFFECTIVE CONFINING STRESS (psi)	5.0
SPECIMEN VOLUME, V (cc)	237.17	220.54	CUMULATIVE PORE VOLUMES FLOW	0.05
WATER CONTENT (%)	34.0	26.4	PERMEANT	WATER
DRY DENSITY (pcf)	89.5	99.6		
SATURATION, n (%)	104.0	103.1	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	2.1E-07

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4E05140

**FLEXIBLE WALL
HYDRAULIC
CONDUCTIVITY**

Woodward-Clyde Consultants

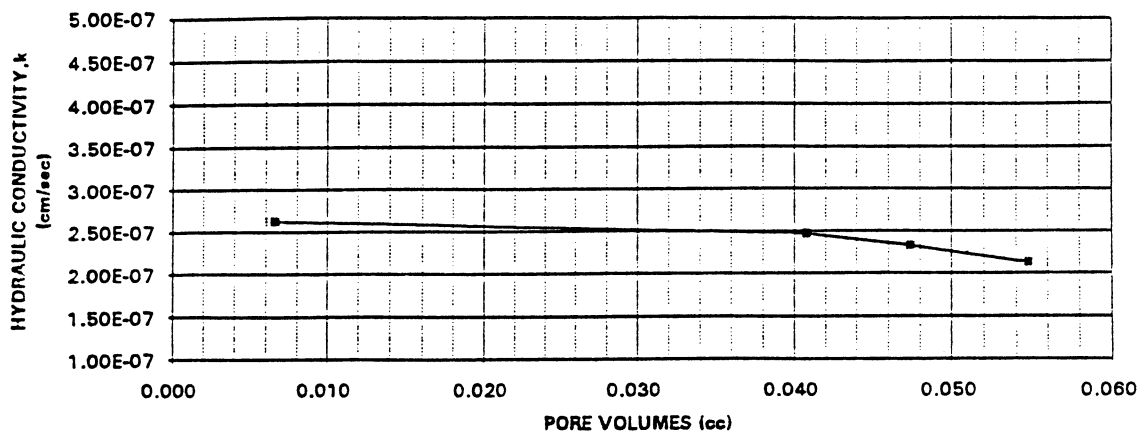
CHECKED BY *QTS*

REVIEWED BY *JPL*

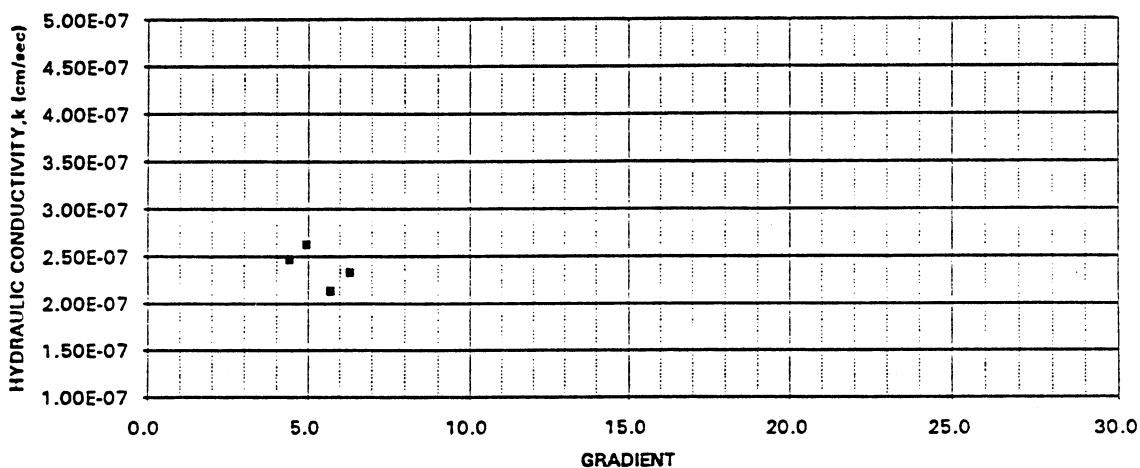
DATE: 14-Apr-94

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: LSL - 105 12'-14'

SPECIMEN DESCRIPTION: Brown lean CLAY, with fine sand

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.05	6.99	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	39.04	38.37	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	4.76
SPECIMEN LENGTH, L (cm)	5.52	5.27	MINIMUM EFFECTIVE CONFINING STRESS (psi)	4.21
SPECIMEN VOLUME, V (cc)	215.48	202.23	CUMULATIVE PORE VOLUMES FLOW	0.05
WATER CONTENT (%)	31.0	24.8	PERMEANT	WATER
DRY DENSITY (pcf)	95.4	103.0		
SATURATION, n (%)	109.4	105.4	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	2.4E-07

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4EO5140

**FLEXIBLE WALL
HYDRAULIC
CONDUCTIVITY**

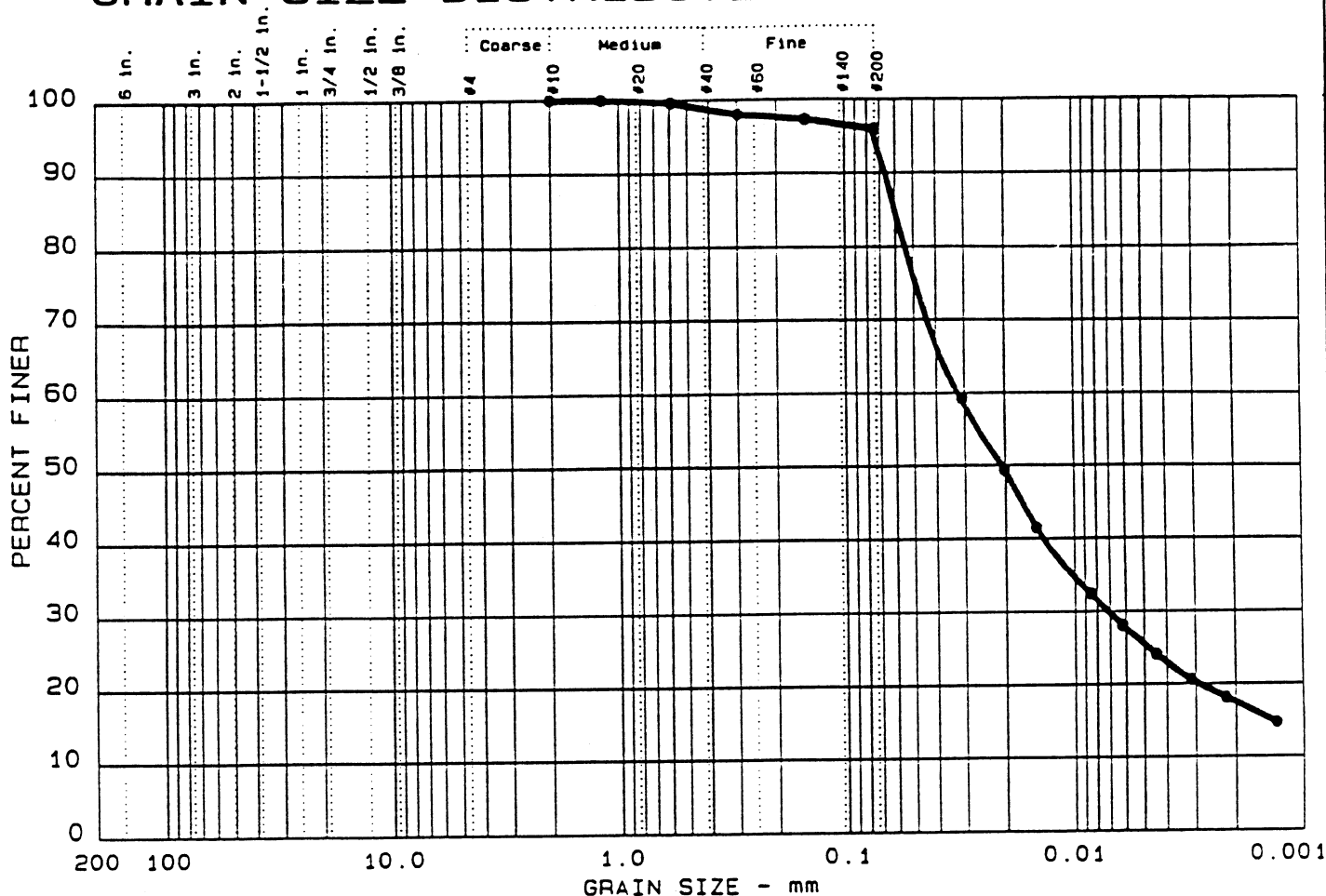
Woodward-Clyde Consultants

CHECKED BY: *GP*

REVIEWED BY: *[Signature]*

DATE: 26-Apr-94

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	0.0	4.0	70.6	25.4

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
31	12			0.02	0.007	0.0014			

MATERIAL DESCRIPTION	USCS
• Gray lean CLAY; trace fine sand	CL

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-LSL-101, 14-16'

Date: APRIL 14, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Remarks:

Tested by: NL

Checked by: *BS*

3.5-28-13

Sheet No. _____

The graph displays the grain size distribution of a sample. The y-axis represents the percentage of material finer than a given grain size, ranging from 0 to 100. The x-axis represents the grain size in millimeters on a logarithmic scale, ranging from 200 mm to 0.001 mm. The curve shows that approximately 95% of the sample is finer than 0.075 mm, and about 13% is finer than 0.0075 mm.

Grain Size (mm)	Percent Finer (%)
200	100
100	100
60	100
40	100
30	100
20	100
15	100
10	100
7.5	100
6	100
4.75	100
3.75	100
3.0	100
2.5	100
2.0	100
1.5	100
1.18	100
0.85	100
0.75	100
0.6	100
0.5	100
0.425	100
0.354	100
0.3	100
0.25	100
0.2	100
0.15	100
0.125	100
0.106	100
0.09	100
0.075	95
0.06	80
0.05	70
0.0425	60
0.0354	50
0.03	45
0.025	40
0.02	35
0.015	30
0.0125	25
0.0106	22
0.009	20
0.0075	18
0.006	16
0.005	15
0.00425	14
0.00354	13
0.003	13

[illegible]

Project No.: 4E05140 Project: CRANDON MINING CO • Sample: CMC-LSL 101, 20-22'	Remarks: Tested by: NL Checked by: <i>GTB</i>
Date: APRIL 14, 1994	3.5-28-14
GRAIN SIZE DISTRIBUTION TEST REPORT WOODWARD-CLYDE CONSULTANTS	
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PERCENT FINER

GRAIN SIZE - mm

6 in. 3 in. 2 in. 1-1/2 in. 1 in. 3/4 in. 1/2 in. 3/8 in. #4 #10 #20 #40 #60 #140 #200

Coarse Medium Fine

Grain Size (mm)	Percent Finer (%)
6.0	100
3.0	100
2.0	100
1.5	100
1.0	100
0.75	100
0.6	100
0.425	100
0.3	100
0.25	100
0.2	100
0.15	98
0.125	95
0.106	90
0.09	85
0.075	80
0.06	75
0.05	65
0.0425	52
0.0375	43
0.03	33
0.025	27
0.02	23
0.015	20
0.0125	18
0.0106	15

[illegible]

Project No.: 4E05140
Project: CRANDON MINING CO
● Sample: CMC-LSL-102, 11-13'

Date: APRIL 14, 1994

Remarks:

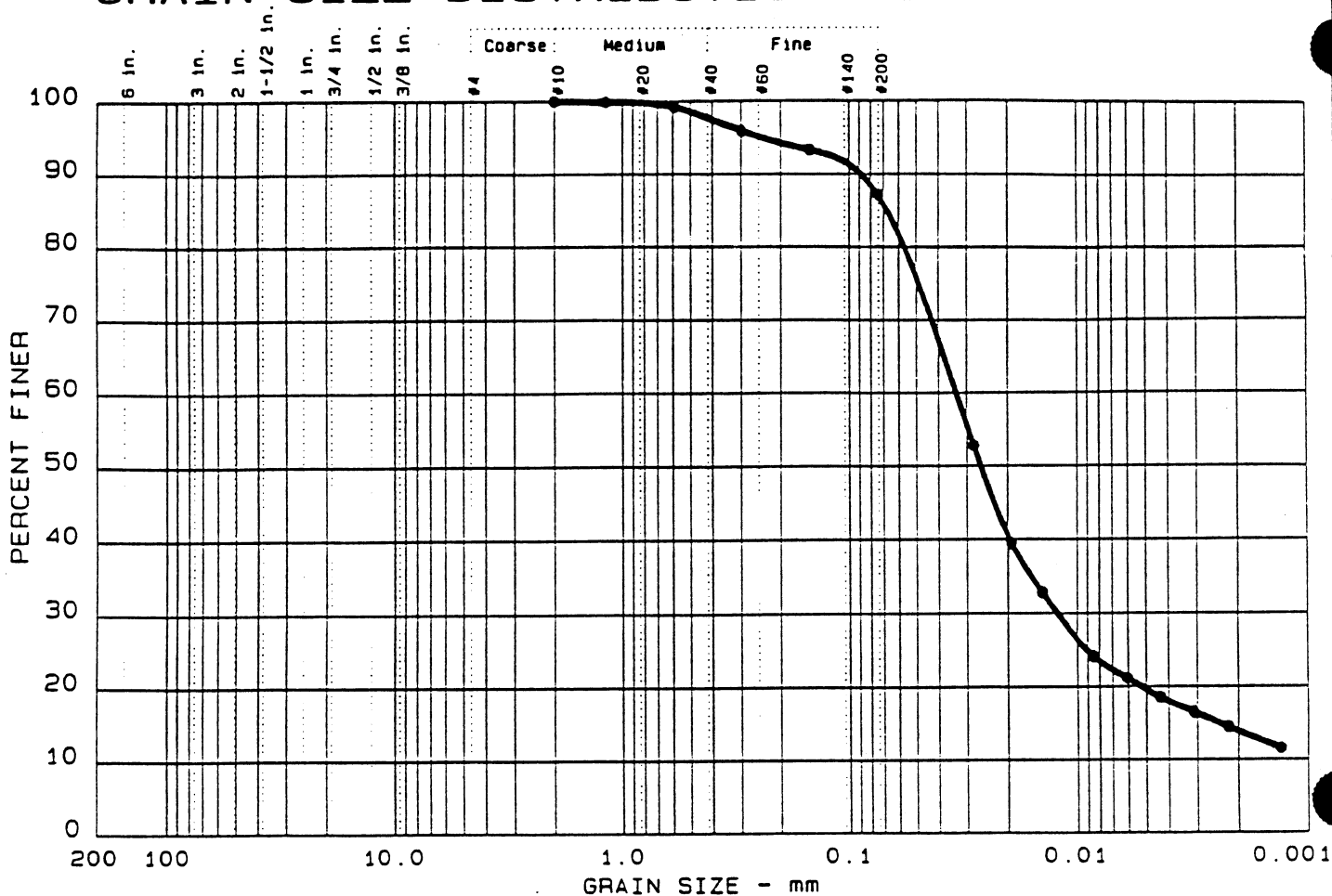
Tested by: NL

Checked by: CTS

3.5-28-15

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	0.0	12.8	67.6	19.6

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 26	7			0.03	0.012	0.0024			

MATERIAL DESCRIPTION	USCS
• Gray silty CLAY; little fine sand	CL-ML

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-LSL 102A, 16-18'

Remarks:
 Tested by: NL
 Checked by: *GS*

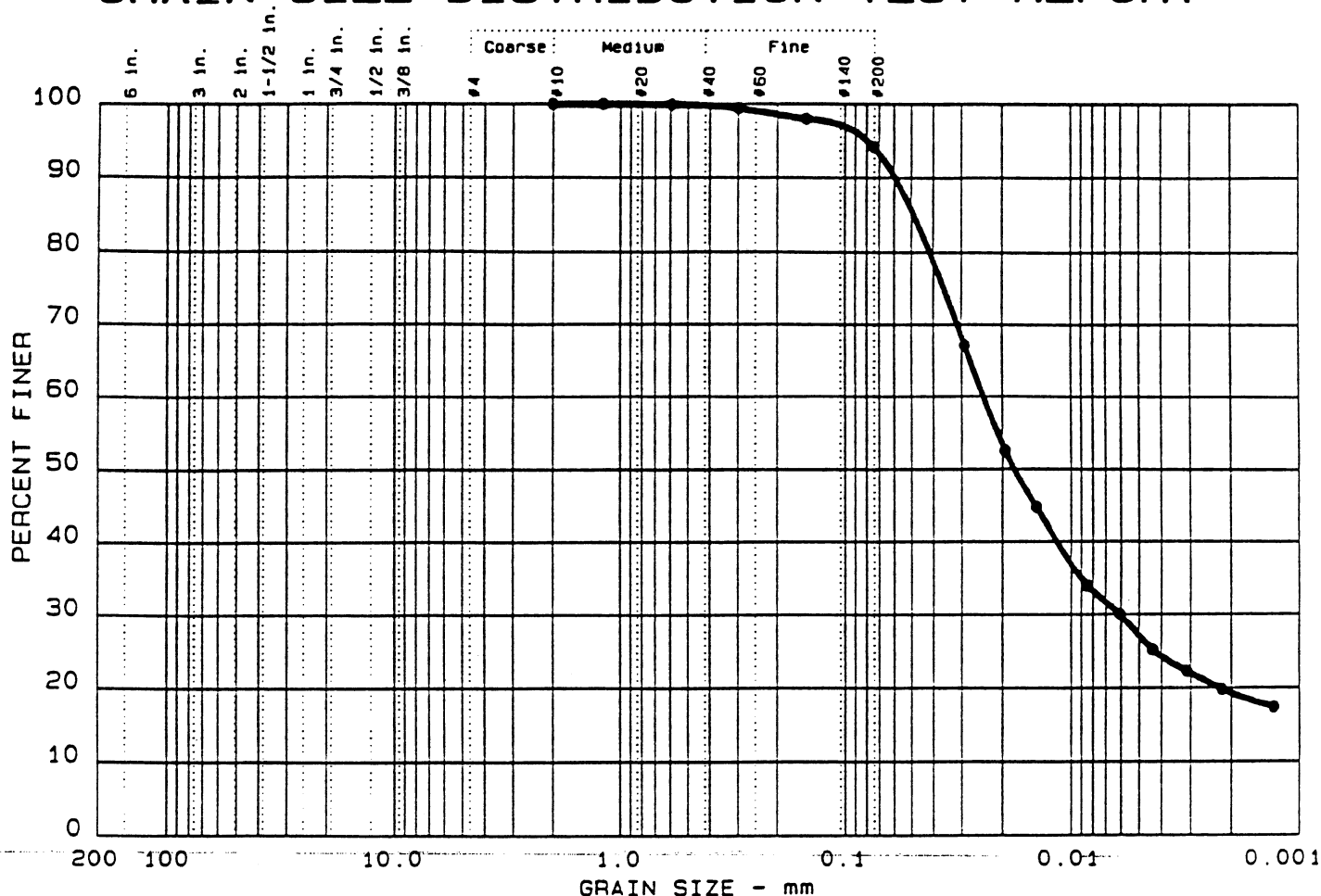
Date: APRIL 14, 1994

3.5-28-16

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	0.0	5.8	67.0	27.2

[illegible]

MATERIAL DESCRIPTION	USCS
• Gray lean CLAY; little fine sand	CL

Project No.: 4E05140
Project: CRANDON MINING CO
● Sample: CMC-LSL-102B, 16-18'

Date: APRIL 14, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Remarks:

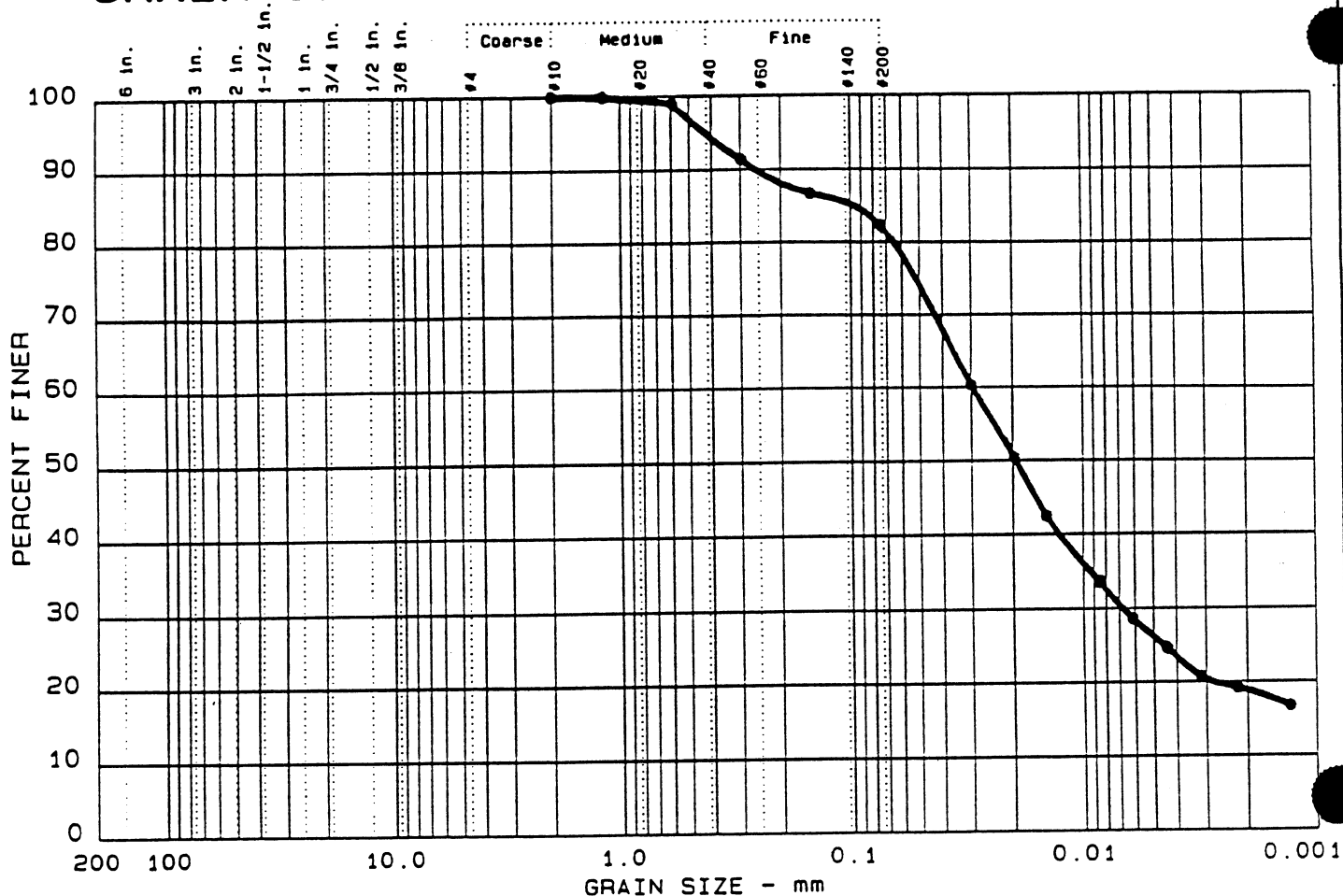
Tested by: NL

Checked by: GJS

3.5-28-17

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	0.0	17.7	56.1	26.2

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
29	11	0.10		0.02	0.007				

MATERIAL DESCRIPTION	USCS
• Gray lean CLAY: with fine sand	CL

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-LSL-102B, 24-26'

Date: APRIL 14, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Remarks:

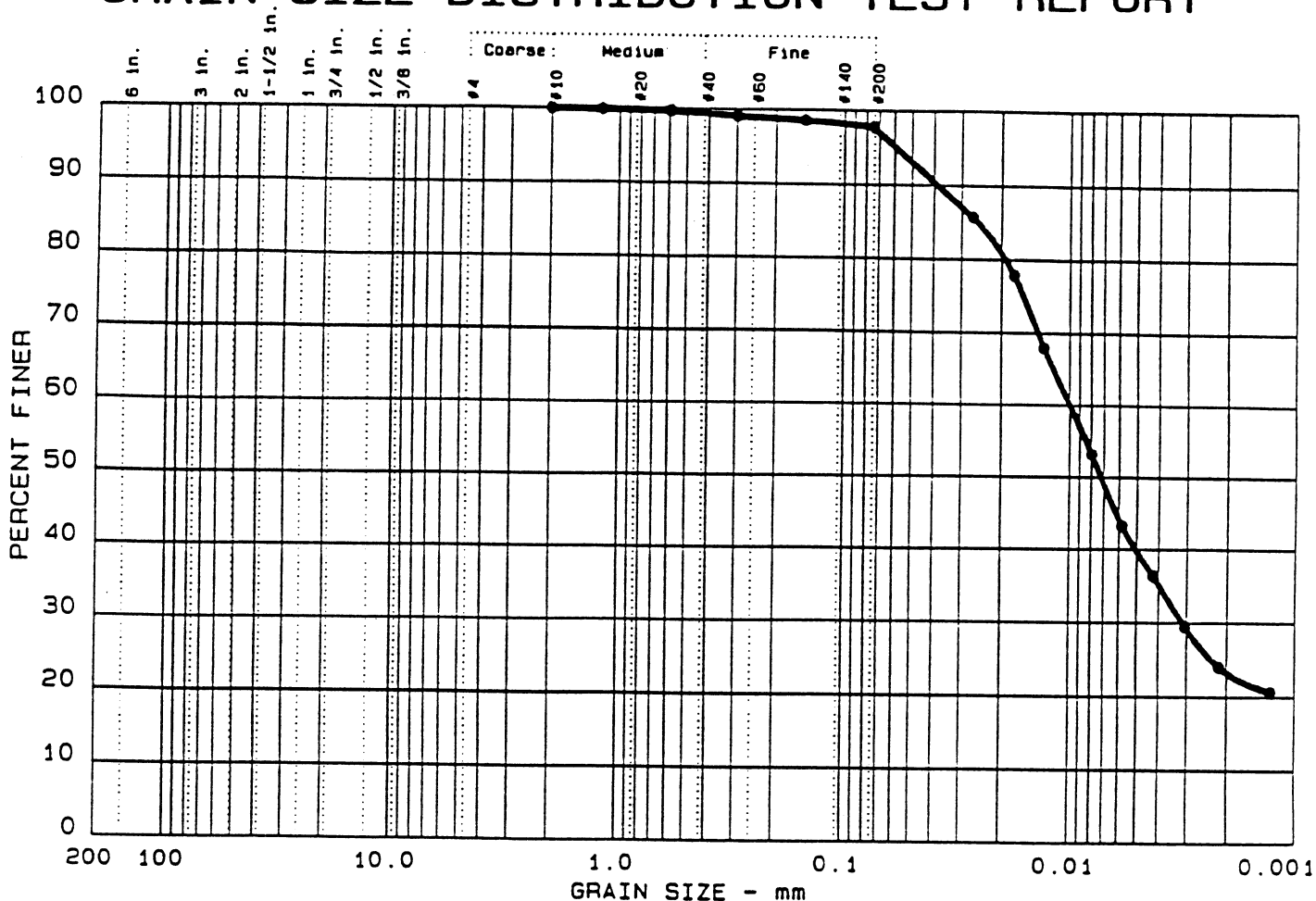
Tested by: NL

Checked by: *GJS*

3.5-28-18

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	0.0	2.2	58.0	39.8

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
28	9			0.01	0.003				

MATERIAL DESCRIPTION	USCS
• Brown lean CLAY; trace fine sand	CL

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-LSL-102B, 28-30'

Date: APRIL 14, 1994

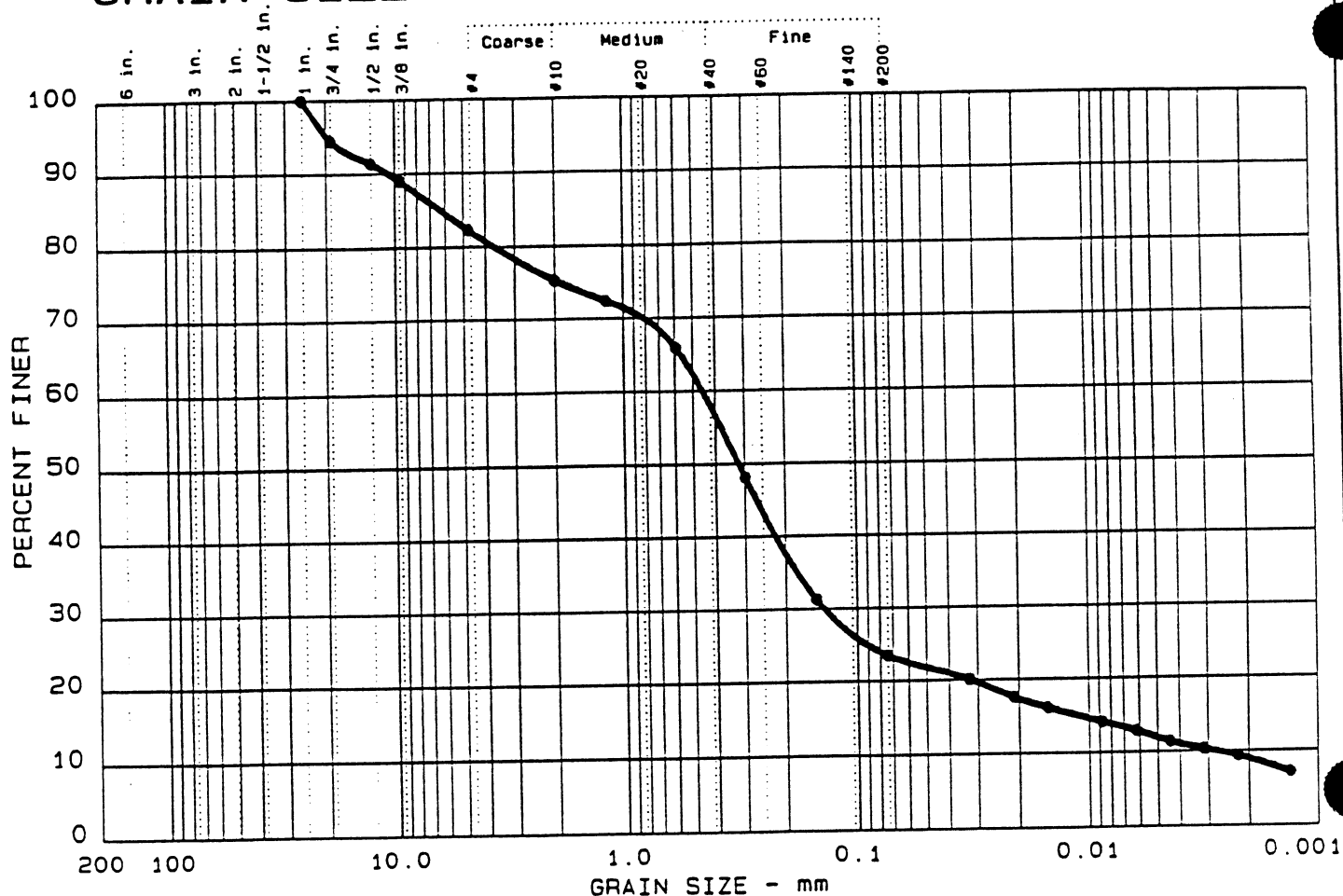
GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Remarks:
 Tested by: NL
 Checked by: GFS

3.5-28-19

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	17.7	58.8	11.6	11.9

[illegible]

MATERIAL DESCRIPTION		USCS
●	Brown clayey fine to coarse SAND; with gravel	SC

Project No.: 4E05140
Project: CRANDON MINING CO
● Sample: CMC-LSL 102B, 32-34'

Date: APRIL 14, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Remarks:

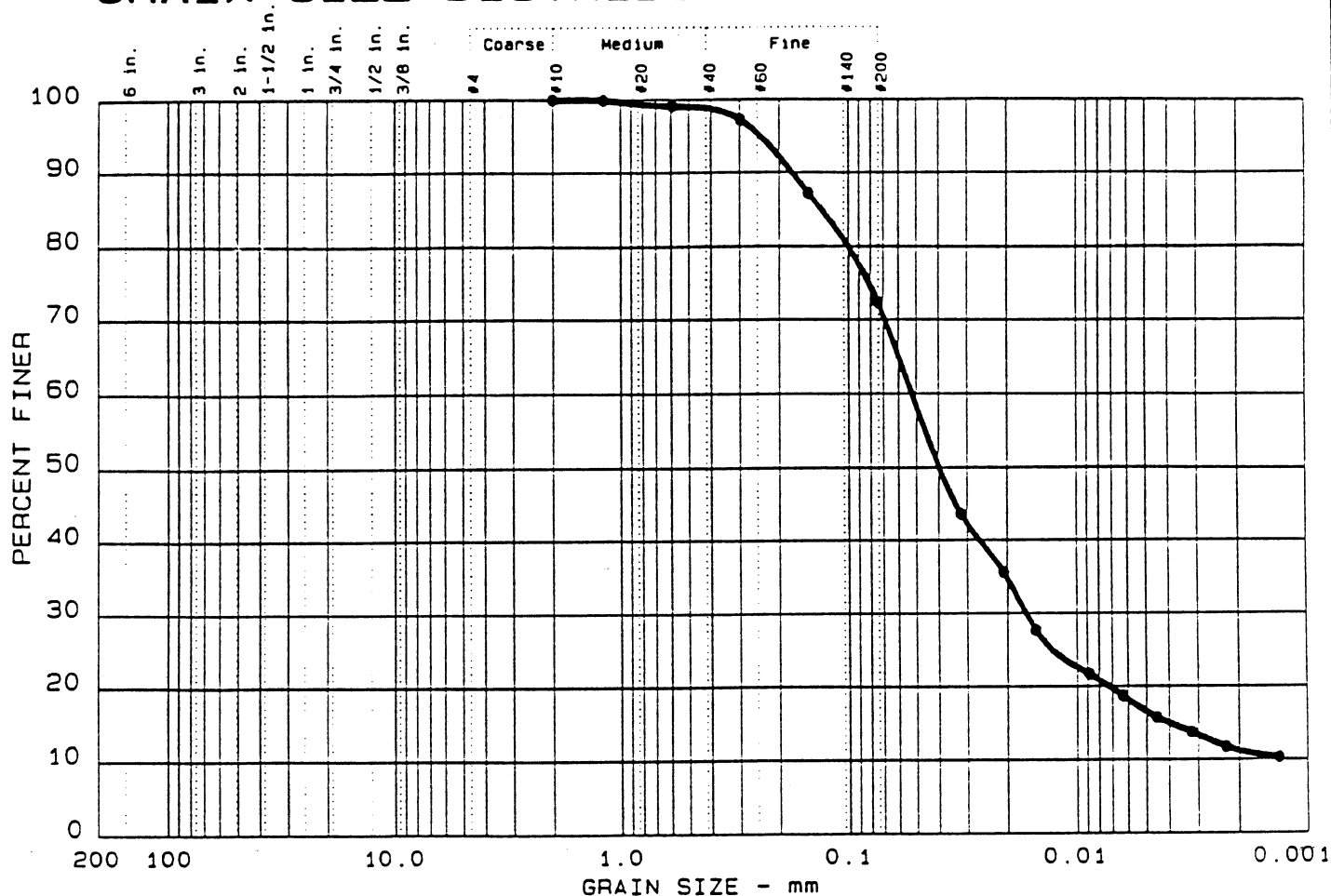
Tested by: NL

Checked by: GTS

3.5-28-20

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	0.0	27.6	55.8	16.6

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
24	9	0.13		0.04	0.017	0.0040			

MATERIAL DESCRIPTION	USCS
• Gray lean CLAY; with fine sand	CL

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-LSL 103, 18-19.6'

Date: APRIL 14, 1994

Remarks:

Tested by: NL

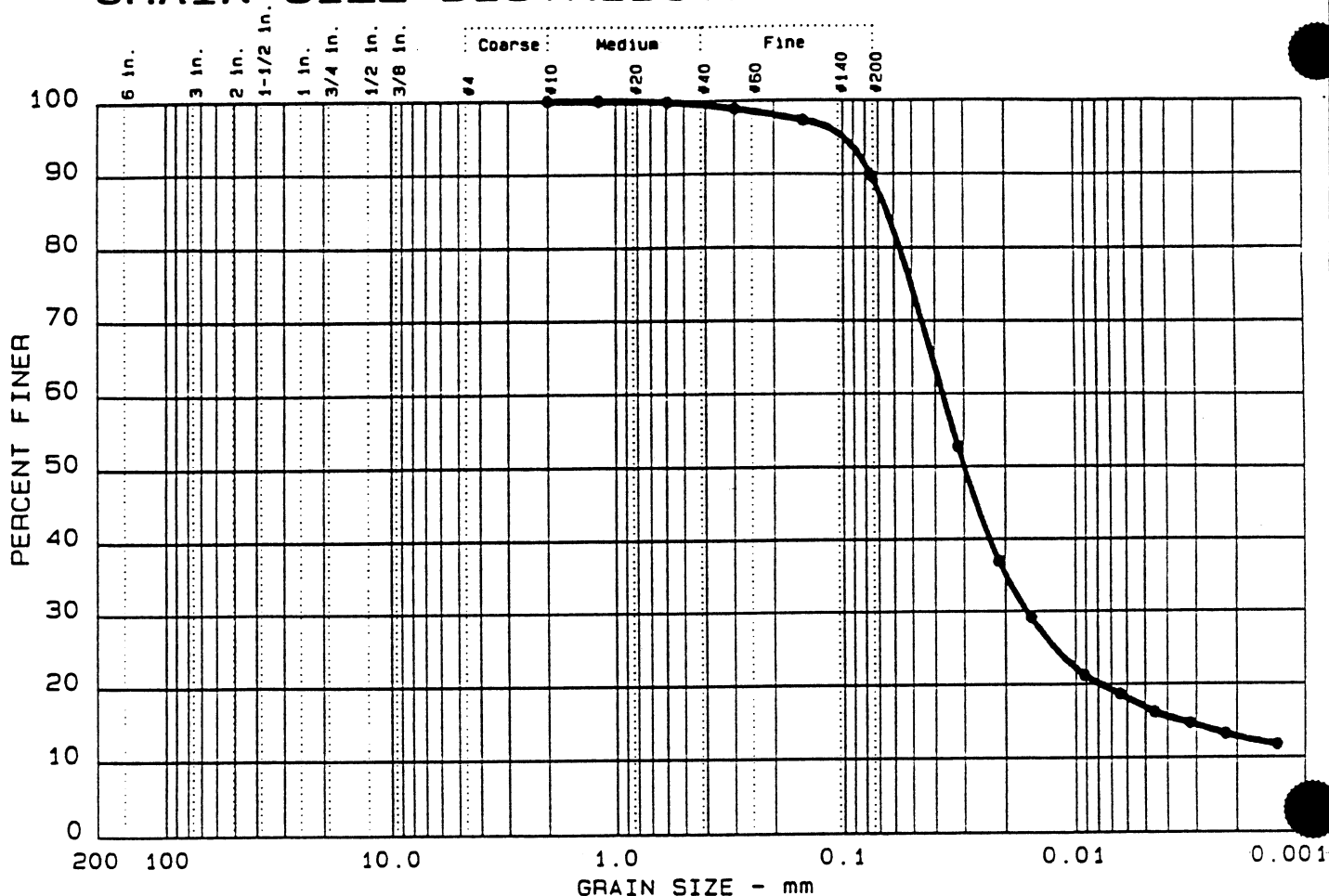
Checked by: *CJS*

3.5-28-21

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	0.0	10.4	72.8	16.8

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
25	7			0.03	0.016	0.0035			

MATERIAL DESCRIPTION

• Gray SILTY CLAY; little fine sand

USCS

CL-ML

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-LSL-103, 30-33'

Date: APRIL 14, 1994

Remarks:

Tested by: NL

Checked by: *GF*

3.5-28-22

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

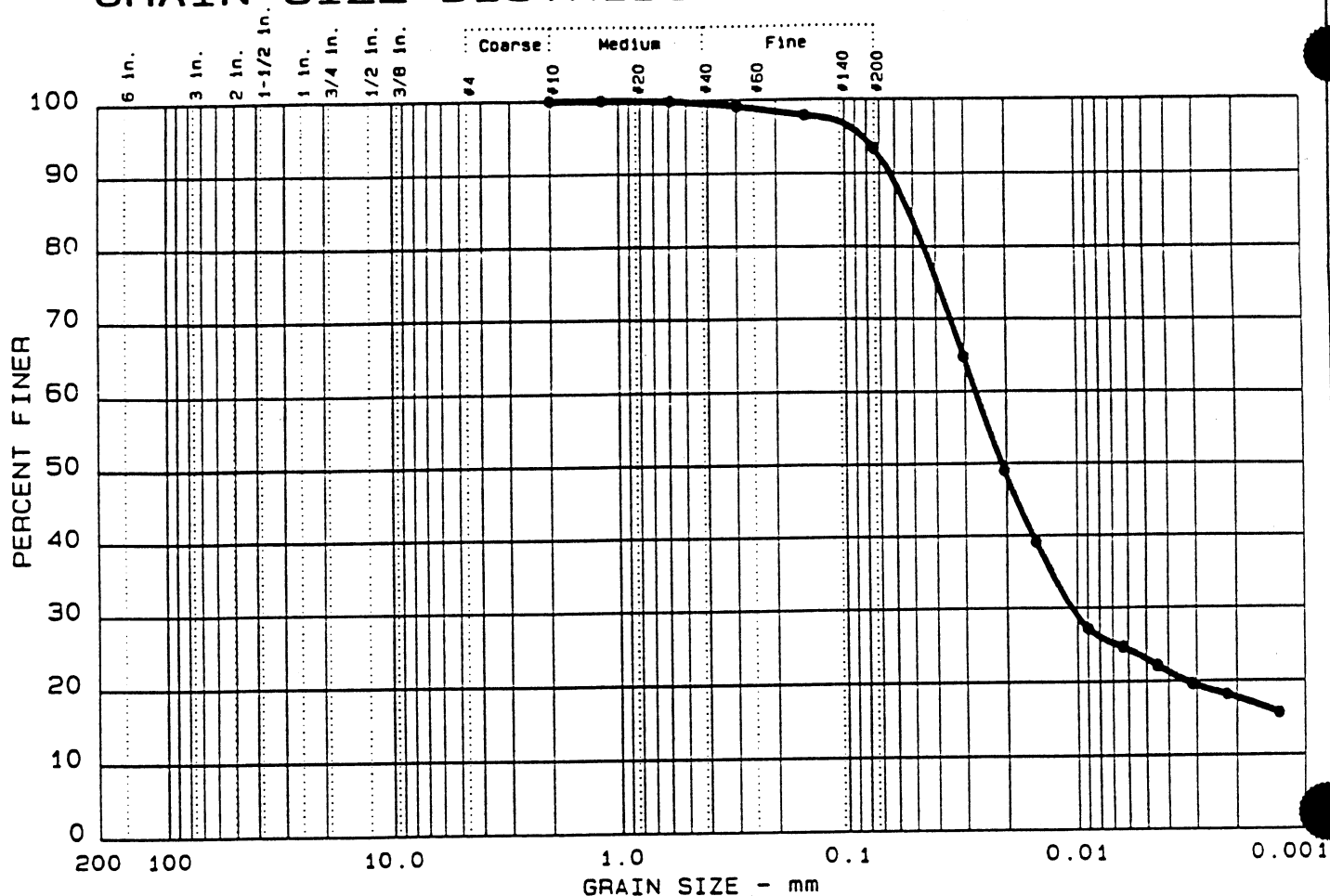
Grain size distribution curve showing Percent Finer versus Grain Size (mm). The curve is plotted on a semi-logarithmic scale. The Y-axis represents Percent Finer (0 to 100), and the X-axis represents Grain Size in mm (200 to 0.001). The curve shows a sharp drop between 0.1 mm and 0.075 mm, indicating a well-graded soil.

Grain Size (mm)	Percent Finer (%)
200	100
100	100
60	100
40	100
20	100
10	100
7.5	100
6.0	100
4.75	100
3.75	100
3.0	100
2.5	100
2.0	100
1.5	100
1.18	100
0.85	100
0.75	100
0.60	100
0.425	100
0.30	100
0.25	100
0.20	100
0.15	100
0.125	100
0.10	100
0.075	95
0.060	80
0.0425	63
0.030	50
0.025	37
0.020	32
0.015	28
0.0118	24
0.0085	21
0.0075	18
0.0060	17
0.00425	16
0.0030	15
0.0025	15
0.0020	15
0.0015	15
0.0010	15
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0.000425	15
0.00030	15
0.00025	15
0.00020	15
0.00015	15
0.000118	15
0.000085	15
0.000075	15
0.000060	15
0.0000425	15
0.000030	15
0.000025	15
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0.0000118	15
0.0000085	15
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0.000000020	15
0.000000015	15
0.0000000118	15
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0.0000000075	15
0.0000000060	15
0.00000000425	15
0.0000000030	15
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0.0000000000015	15
0.00000000000118	15
0.00000000000085	15
0.00000000000075	15
0.00000000000060	15
0.000000000000425	15
0.00000000000030	15

[illegible]

Project No.: 4E05140 Project: CRANDON MINING CO ● Sample: CMC-LSL-103, 33-35'	Remarks: Tested by: NL Checked by: <i>CLS</i>
Date: APRIL 14, 1994	3.5-28-23
GRAIN SIZE DISTRIBUTION TEST REPORT WOODWARD-CLYDE CONSULTANTS	
Sheet No. _____	

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	0.0	6.6	70.4	23.0

	LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
•	28	9			0.02	0.010				

MATERIAL DESCRIPTION	USCS
• Gray lean CLAY; little fine sand	CL

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-LSL-104A, 15.4-17.4'

Date: APRIL 14, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Remarks:

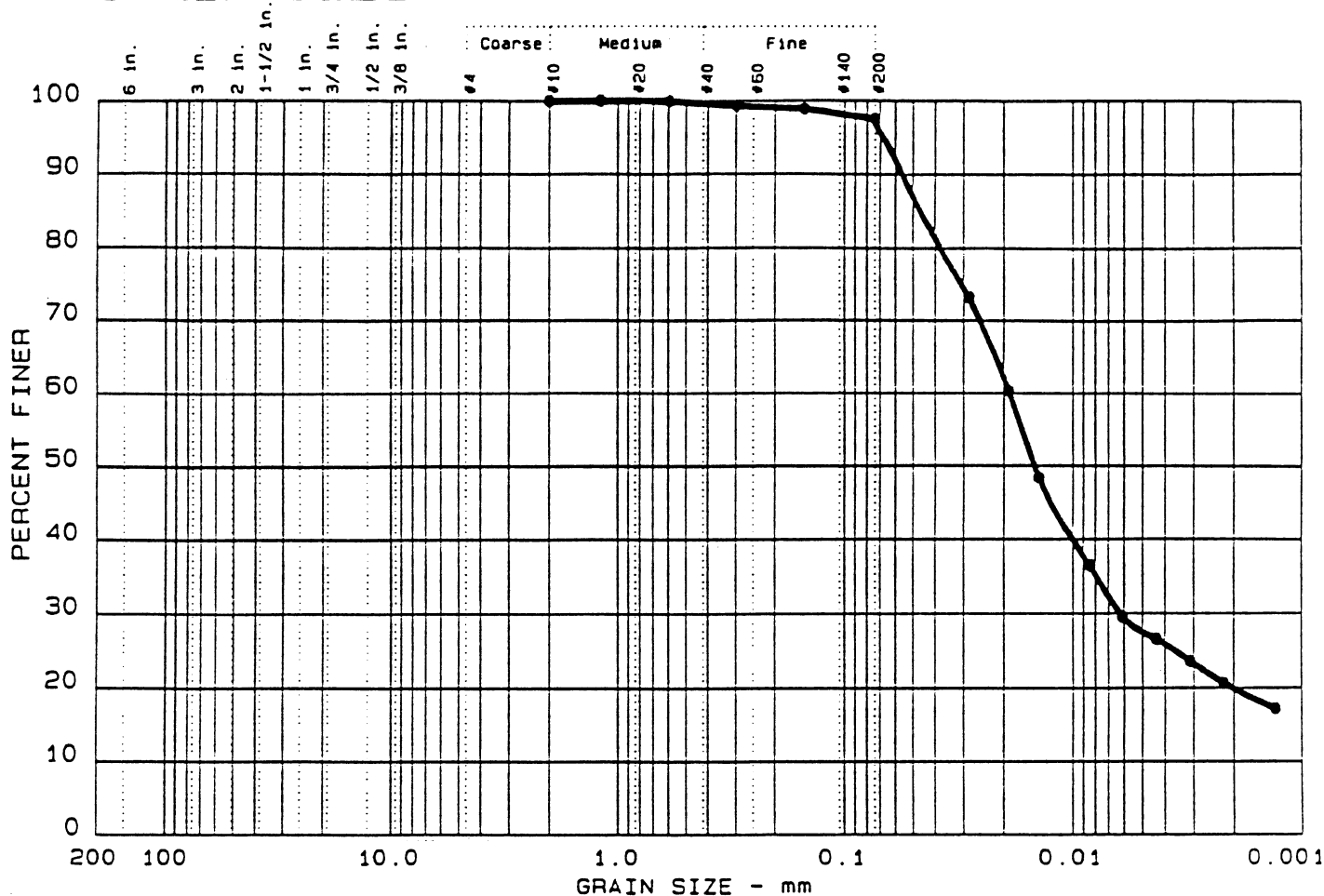
Tested by: NL

Checked by: *GW*

3.5-28-24

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	0.0	2.5	70.0	27.5

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
31	11			0.01	0.006				

MATERIAL DESCRIPTION	USCS
• Gray lean CLAY; trace fine sand	CL

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-LSL 104B, 12-14'

Date: APRIL 14, 1994

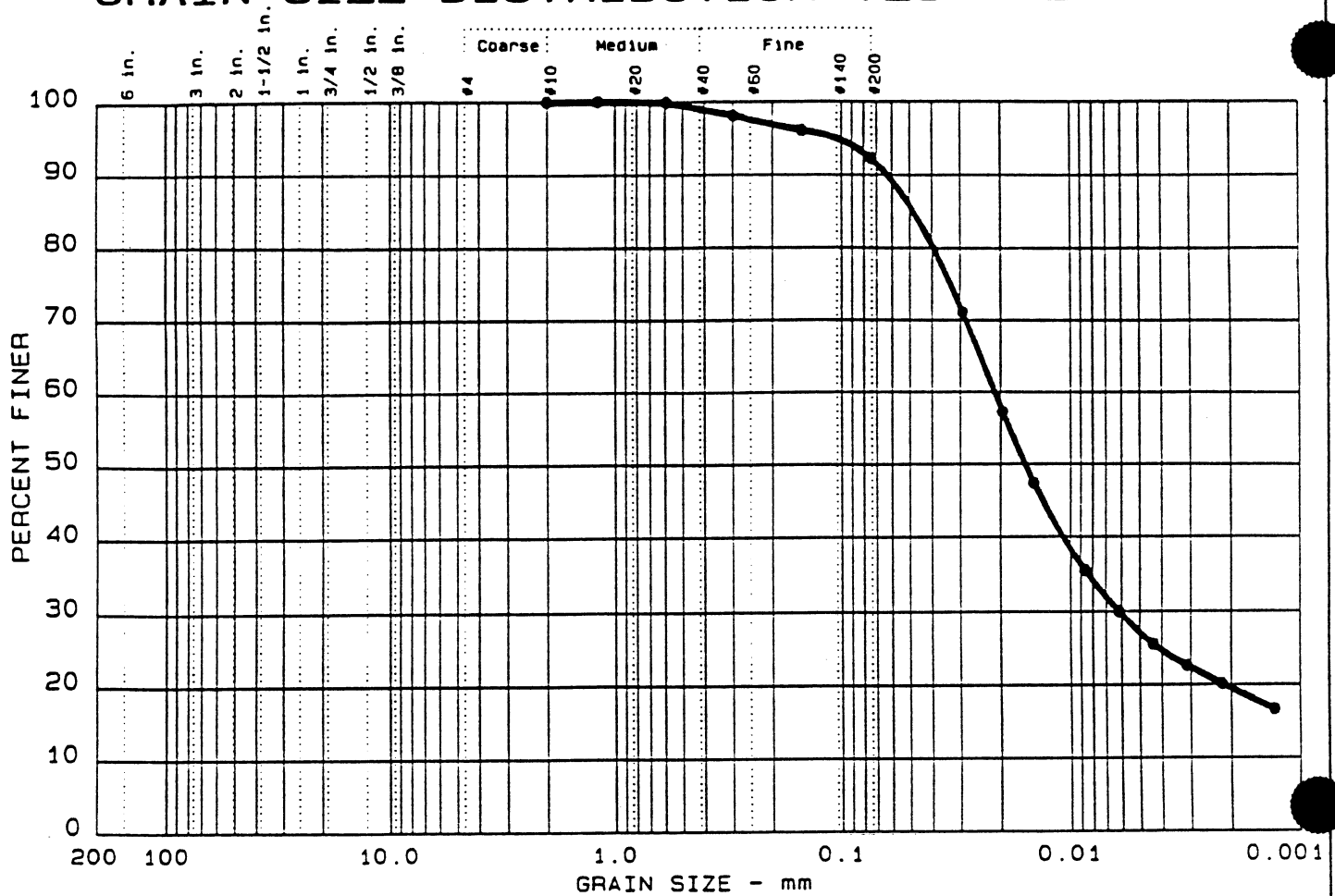
Remarks:
 Tested by: NL
 Checked by: *GS*

3.5-28-25

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	0.0	7.7	65.2	27.1

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
30	10			0.02	0.006				

MATERIAL DESCRIPTION	USCS
• Gray lean CLAY; little fine sand	CL

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-LSL-104B, 17-19'

Date: APRIL 14, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Remarks:

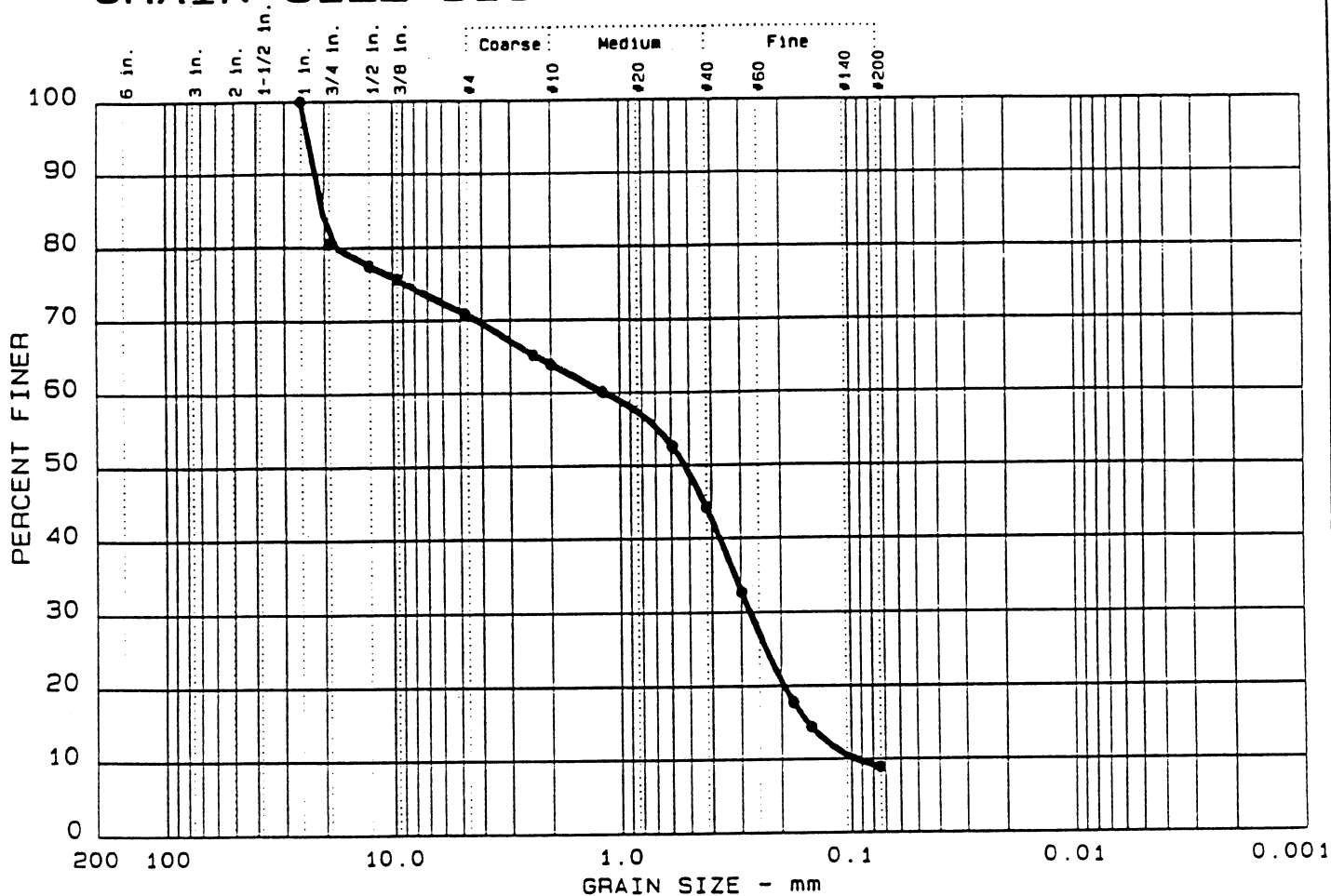
Tested by: NL

Checked by: *GB*

3.5-28-26

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



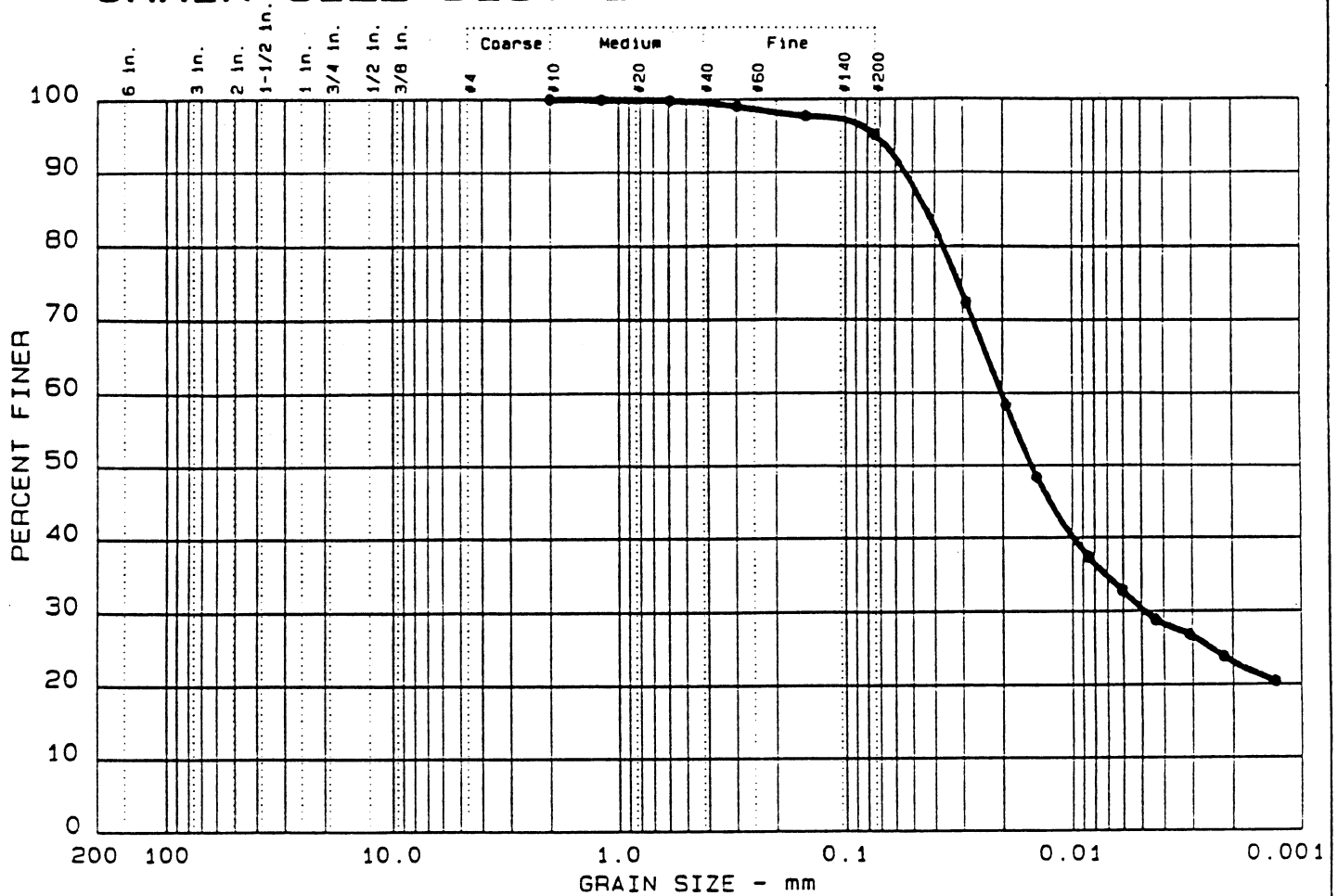
Grain size distribution curve showing Percent Finer versus Grain Size (mm). The curve is plotted on a semi-logarithmic scale. The Y-axis represents Percent Finer (0 to 100). The X-axis represents Grain Size in mm (logarithmic scale from 200 to 0.001). The curve shows a high percentage of fine material, with approximately 90% finer than 0.075 mm and 15% finer than 0.0075 mm.

Grain Size (mm)	Percent Finer (%)
200	100
100	100
50	100
25	100
12.5	100
6.3	100
3.15	100
1.6	100
0.85	100
0.425	100
0.25	100
0.15	98
0.075	90
0.0475	75
0.03	55
0.02	45
0.015	38
0.01	30
0.0075	28
0.006	25
0.00475	22
0.00375	20
0.003	19
0.0025	18
0.002	16

[illegible]

Project No.: 4E05140 Project: CRANDON MINING CO ● Sample: CMC-LSL-105, 6-8'	Remarks: Tested by: NL Checked by: <i>BTJ</i>
Date: APRIL 14, 1994	3.5-28-28
GRAIN SIZE DISTRIBUTION TEST REPORT WOODWARD-CLYDE CONSULTANTS	
Sheet No. _____	

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.0	4.9	64.7	30.4

[illegible]

MATERIAL DESCRIPTION	USCS
● Gray lean CLAY; trace fine sand	CL

Project No.: 4E05140
Project: CRANDON MINING CO
● Sample: CMC-LSL 105, 8-10'

Date: APRIL 14, 1994

Remarks:

Tested by: NL

Checked by: CTS

3.5-28-29

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Sheet No. _____

Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.0	19.7	55.2	25.1

[illegible]

MATERIAL DESCRIPTION	USCS
● Brown lean CLAY; with fine sand	CL

Remarks:

Tested by: NL

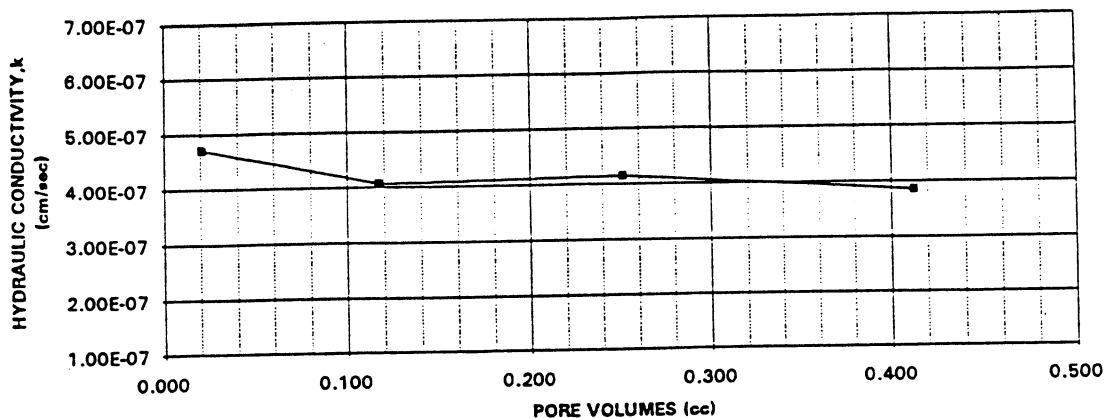
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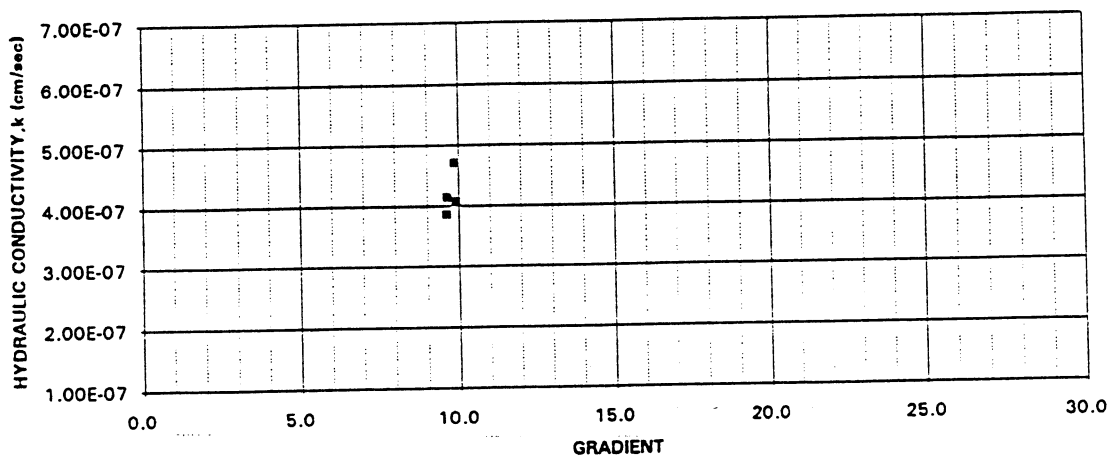
Sheet No. _____

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO:

SL - 103A 6'-8.5'

SPECIMEN DESCRIPTION:

Gray silty clayey fine to medium SAND

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	6.81	7.02	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	36.42	38.70	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	5.0
SPECIMEN LENGTH, L (cm)	6.12	5.73	MINIMUM EFFECTIVE CONFINING STRESS (psi)	5.0
SPECIMEN VOLUME, V (cc)	222.91	221.78	CUMULATIVE PORE VOLUMES FLOW	0.41
WATER CONTENT (%)	13.1	12.4	PERMEANT	WATER
DRY DENSITY (pcf)	124.5	124.8		
SATURATION, n (%)	100.2	95.7	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	4.2E-07

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4E05140

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY

Woodward-Clyde Consultants

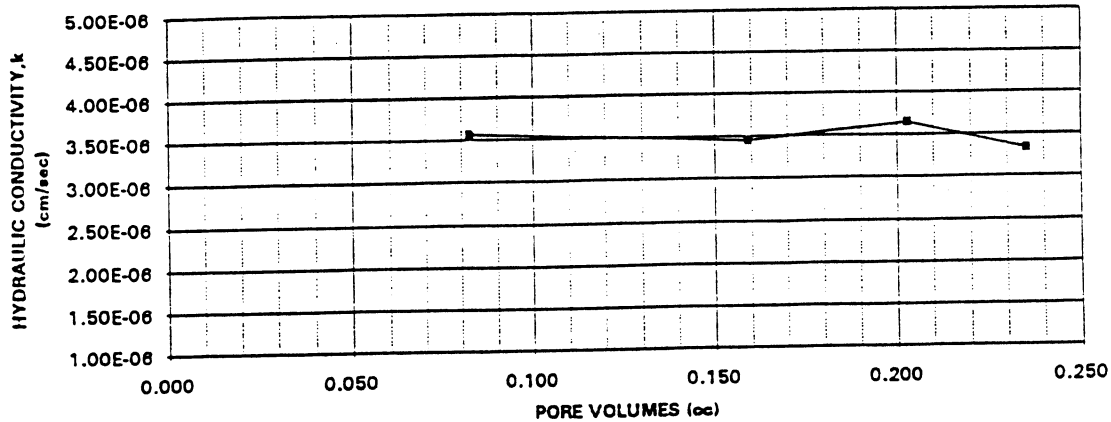
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REVIEWED BY: *JOB*

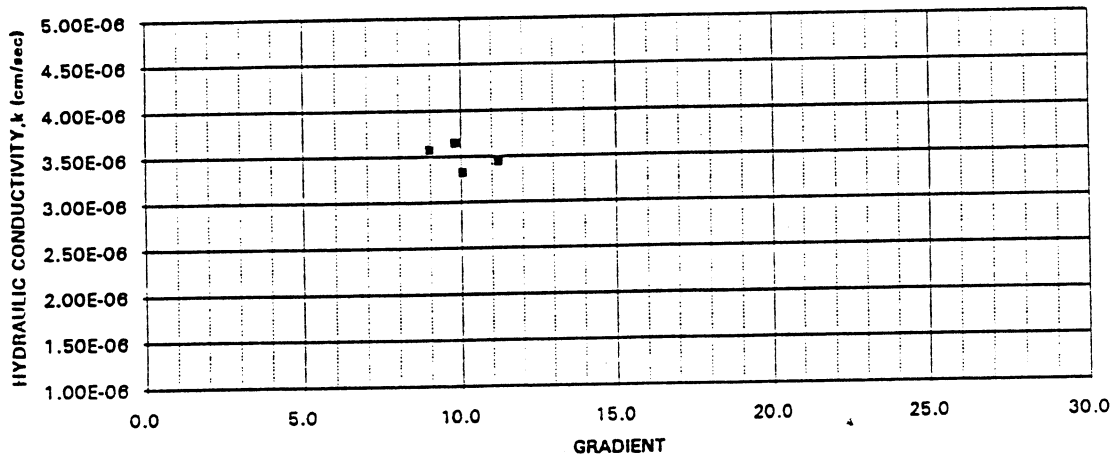
DATE: 14-Apr-94

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: SL - 103B 26'-28'

SPECIMEN DESCRIPTION: Gray lean CLAY, little fine sand

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.11	7.09	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	39.70	39.48	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	5.01
SPECIMEN LENGTH, L (cm)	5.63	5.58	MINIMUM EFFECTIVE CONFINING STRESS (psi)	4.04
SPECIMEN VOLUME, V (cc)	223.53	220.30	CUMULATIVE PORE VOLUMES FLOW	0.24
WATER CONTENT (%)	21.9	23.1	PERMEANT	WATER
DRY DENSITY (pcf)	105.7	104.4		
SATURATION, n (%)	99.5	101.6	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	3.5E-06

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4E05140

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY

Woodward-Clyde Consultants

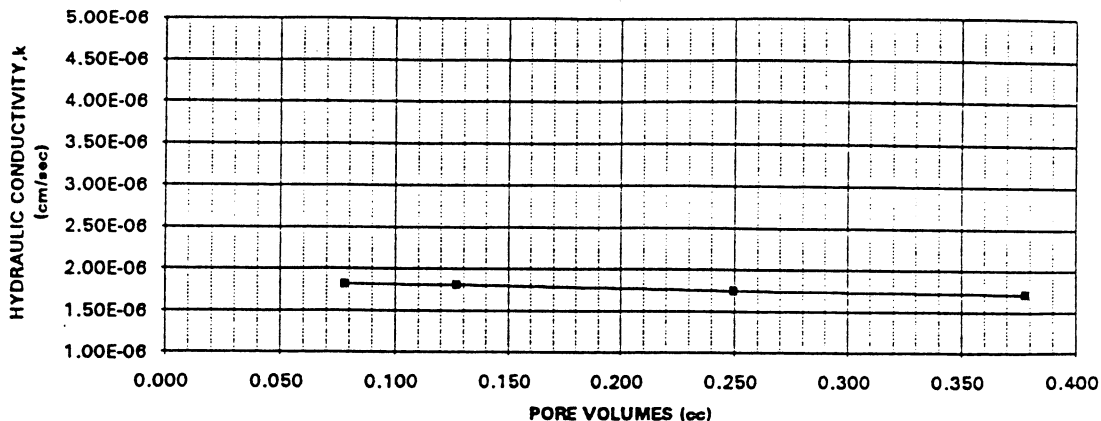
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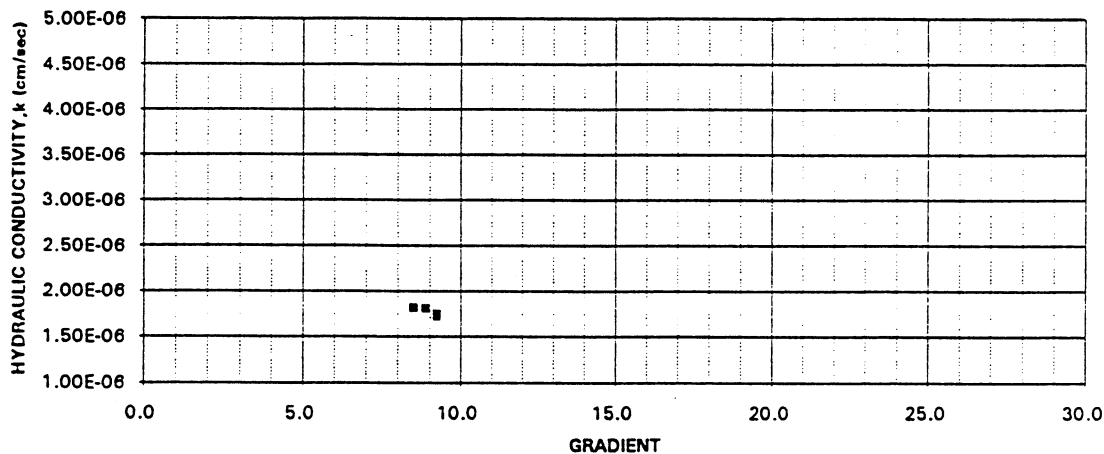
DATE: 19-Apr-94

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: SL - 104 4'-5'

SPECIMEN DESCRIPTION: Brown silty clayey fine to medium SAND

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.18	7.18	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	40.49	40.49	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	5.0
SPECIMEN LENGTH, L (cm)	6.30	6.19	MINIMUM EFFECTIVE CONFINING STRESS (psi)	5.0
SPECIMEN VOLUME, V (cc)	255.08	250.63	CUMULATIVE PORE VOLUMES FLOW	0.50
WATER CONTENT (%)	14.1	15.1	PERMEANT	WATER
DRY DENSITY (pcf)	116.2	117.9		
SATURATION, n (%)	84.7	95.0	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	1.8E-06

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4EO5140

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY

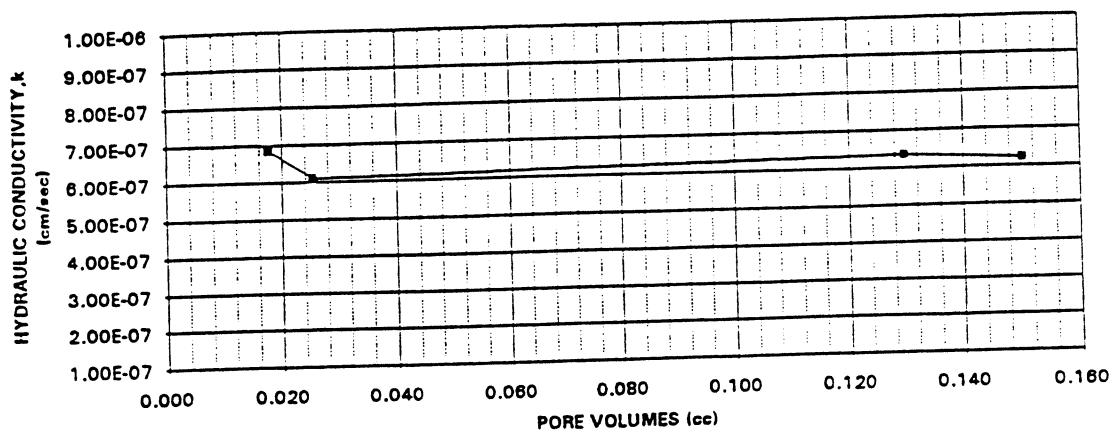
Woodward-Clyde Consultants

CHECKED BY: *BS*

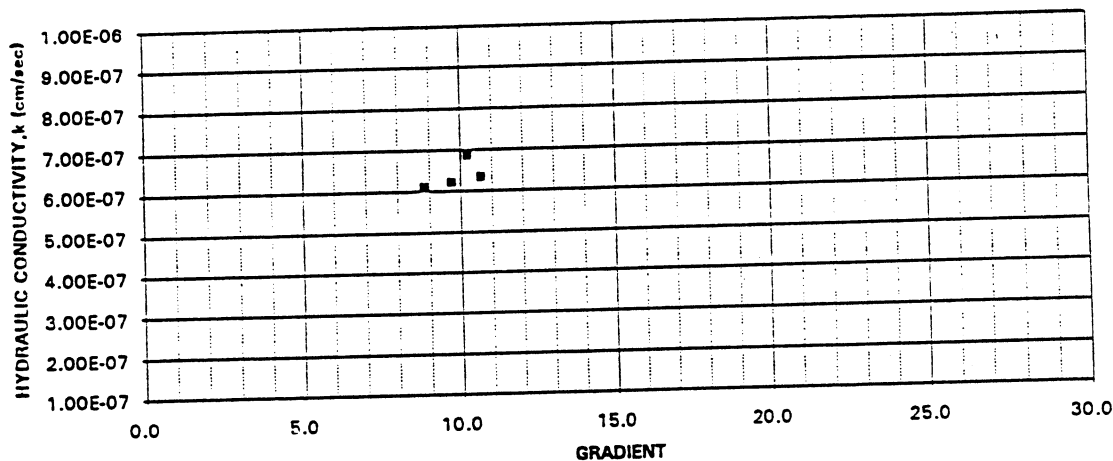
REVIEWED BY: *JK*

DATE: 14-Apr-94

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: SL - 104 16'-19'

SPECIMEN DESCRIPTION: Gray sandy silty CLAY

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.16	7.01	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	40.26	38.59	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	4.96
SPECIMEN LENGTH, L (cm)	5.52	5.38	MINIMUM EFFECTIVE CONFINING STRESS (psi)	4.07
SPECIMEN VOLUME, V (cc)	222.26	207.64	CUMULATIVE PORE VOLUMES FLOW	0.15
WATER CONTENT (%)	23.3	19.6	PERMEANT	WATER
DRY DENSITY (pcf)	102.5	110.0		
SATURATION, n (%)	97.8	99.5	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	6.4E-07

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4E05140

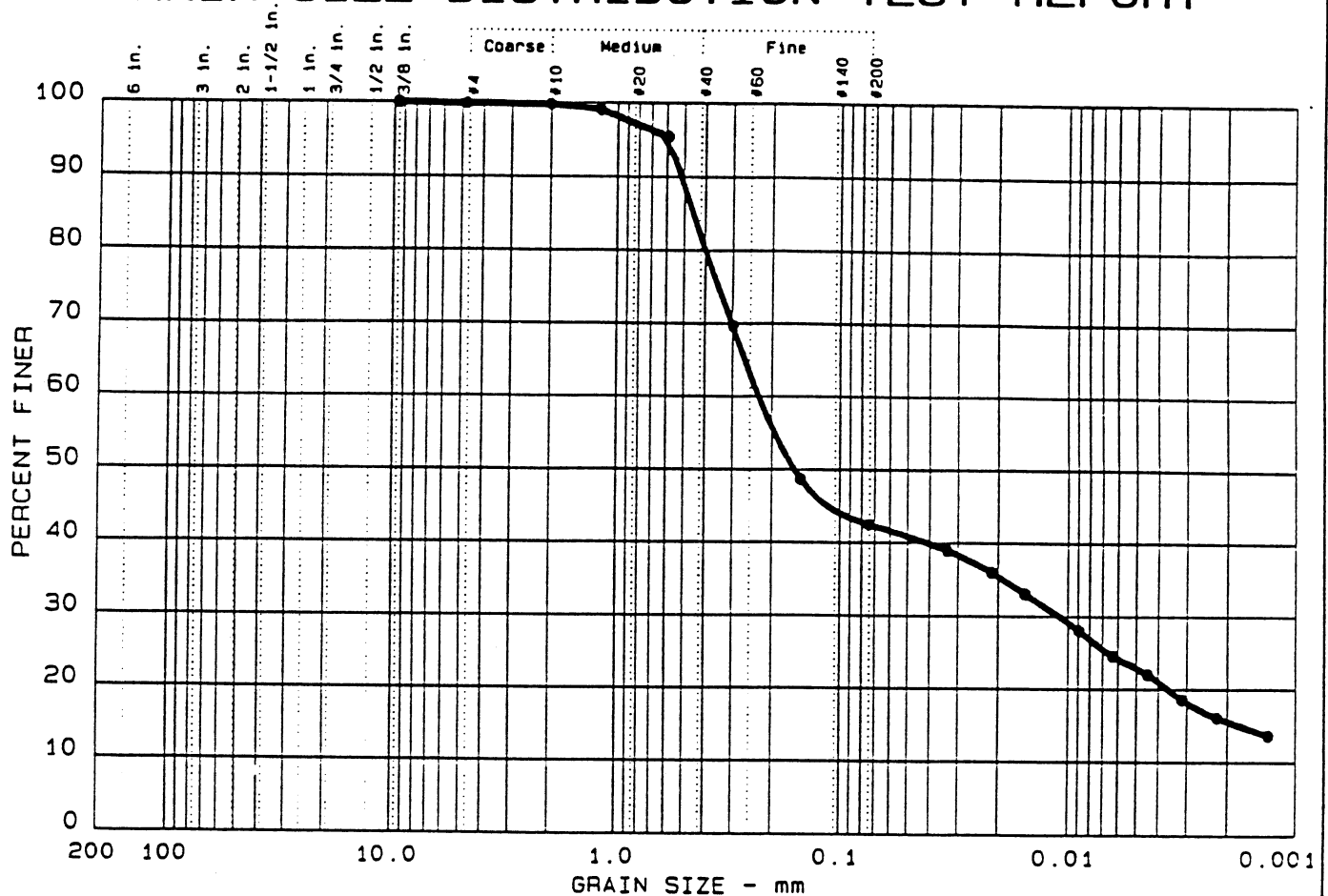
FLEXIBLE WALL
HYDRAULIC
CONDUCTIVITY

Woodward-Clyde Consultants

CHECKED BY: *GB*REVIEWED BY: *JS*

DATE: 21-Apr

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	0.1	57.4	19.6	22.9

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
19	6	0.45	0.23	0.16	0.011	0.0018			

MATERIAL DESCRIPTION	USCS
• Gray silty clayey fine to medium SAND	SC-SM

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-SL-103A, 6-8.5'

Date: APRIL 14, 1994

Remarks:

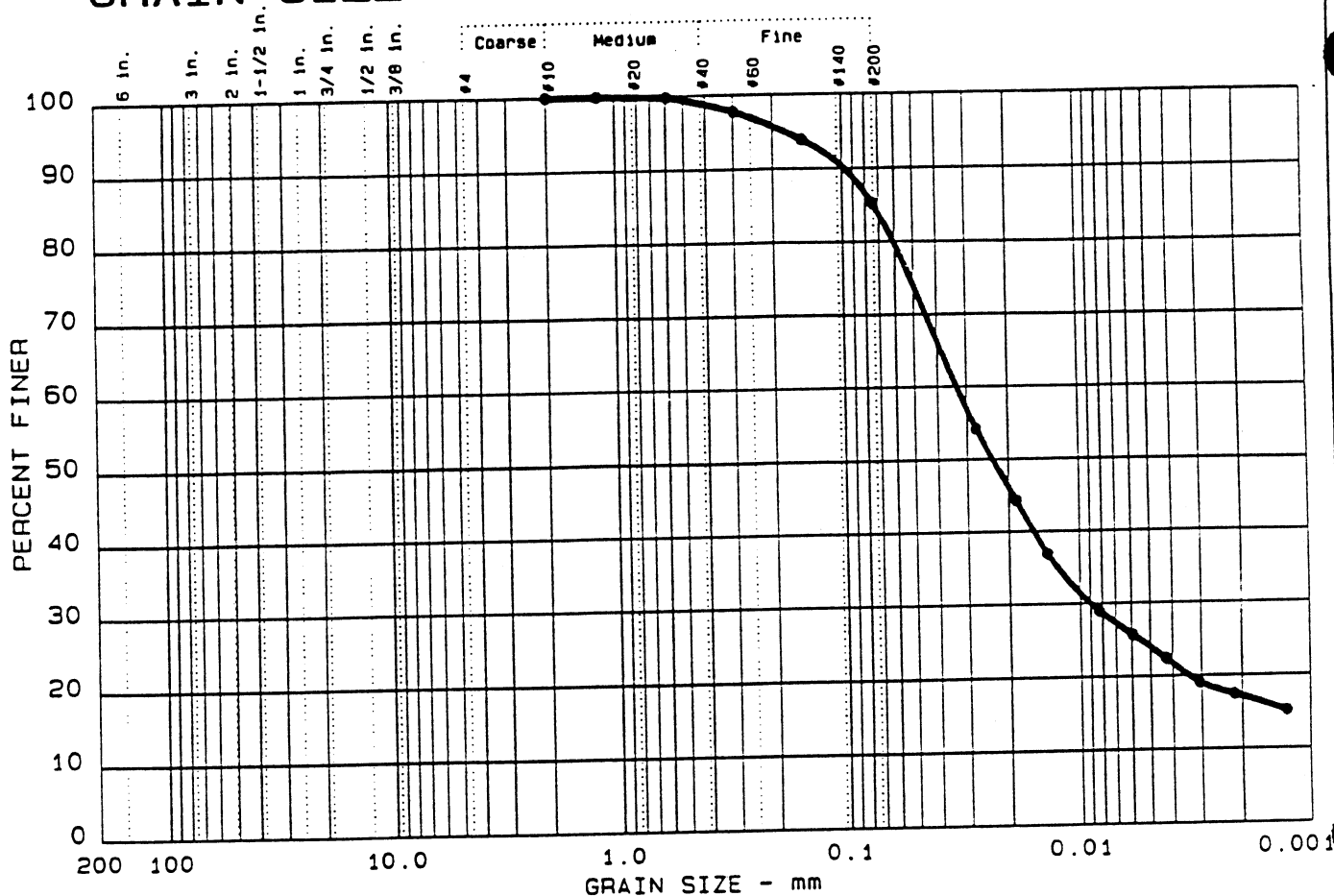
Tested by: NL

Checked by: *GP*

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	0.0	14.8	61.1	24.1

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
24	9			0.02	0.009				

MATERIAL DESCRIPTION	USCS
• Gray lean CLAY; little fine sand	CL

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-SL-103B, 26-28'

Date: APRIL 14, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

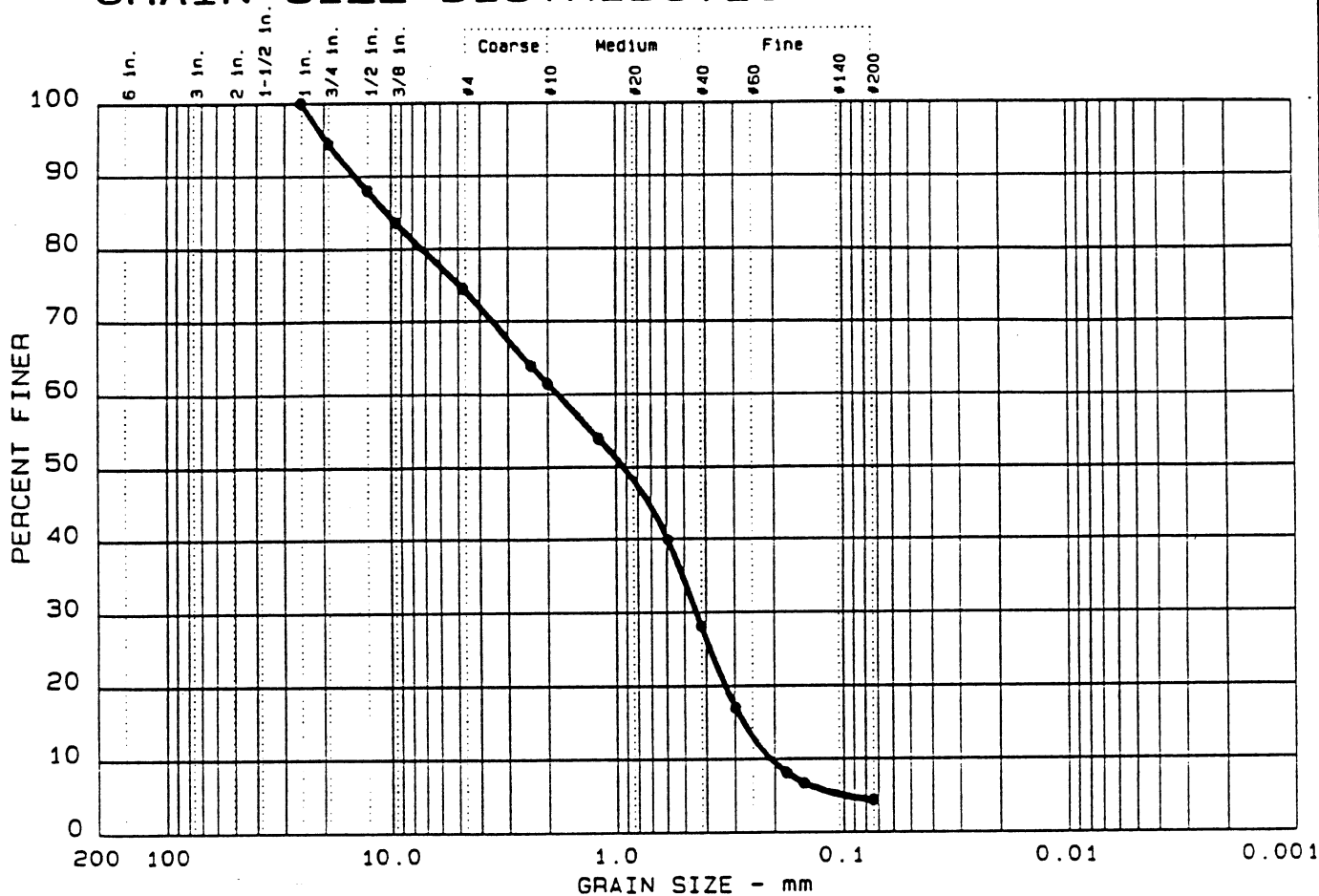
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Tested by: NL

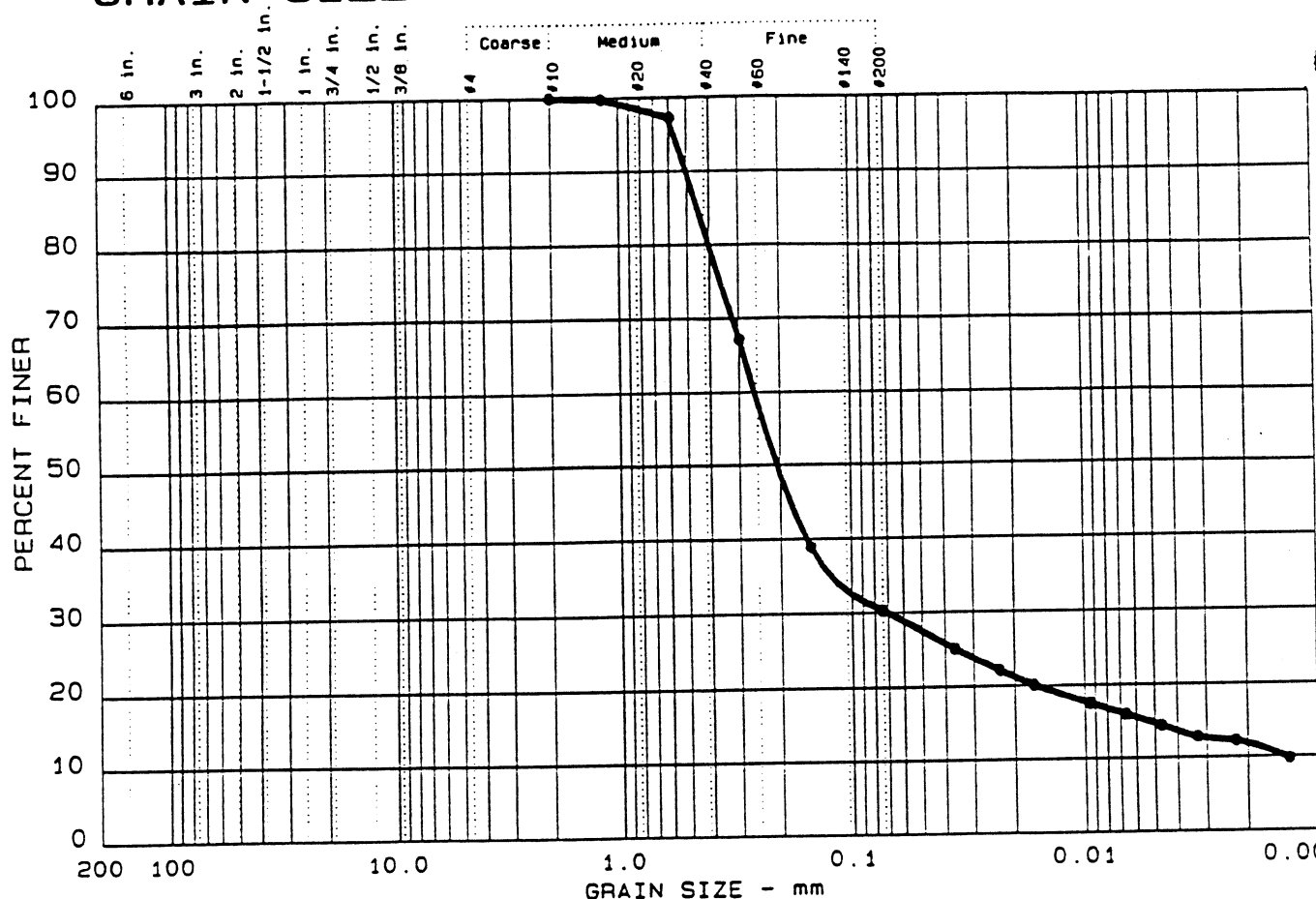
Checked by: *CTB*

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.0	69.7	15.6	14.7

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
16	4	0.45	0.26	0.21	0.071	0.0052	0.0014	14.26	188.8

MATERIAL DESCRIPTION	USCS
● Brown silty clayey fine to medium SAND	SC-SM

Project No.: 4E05140
 Project: CRANDON MINING CO
 ● Sample: CMC-SL-104, 4-6'

Date: APRIL 14, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

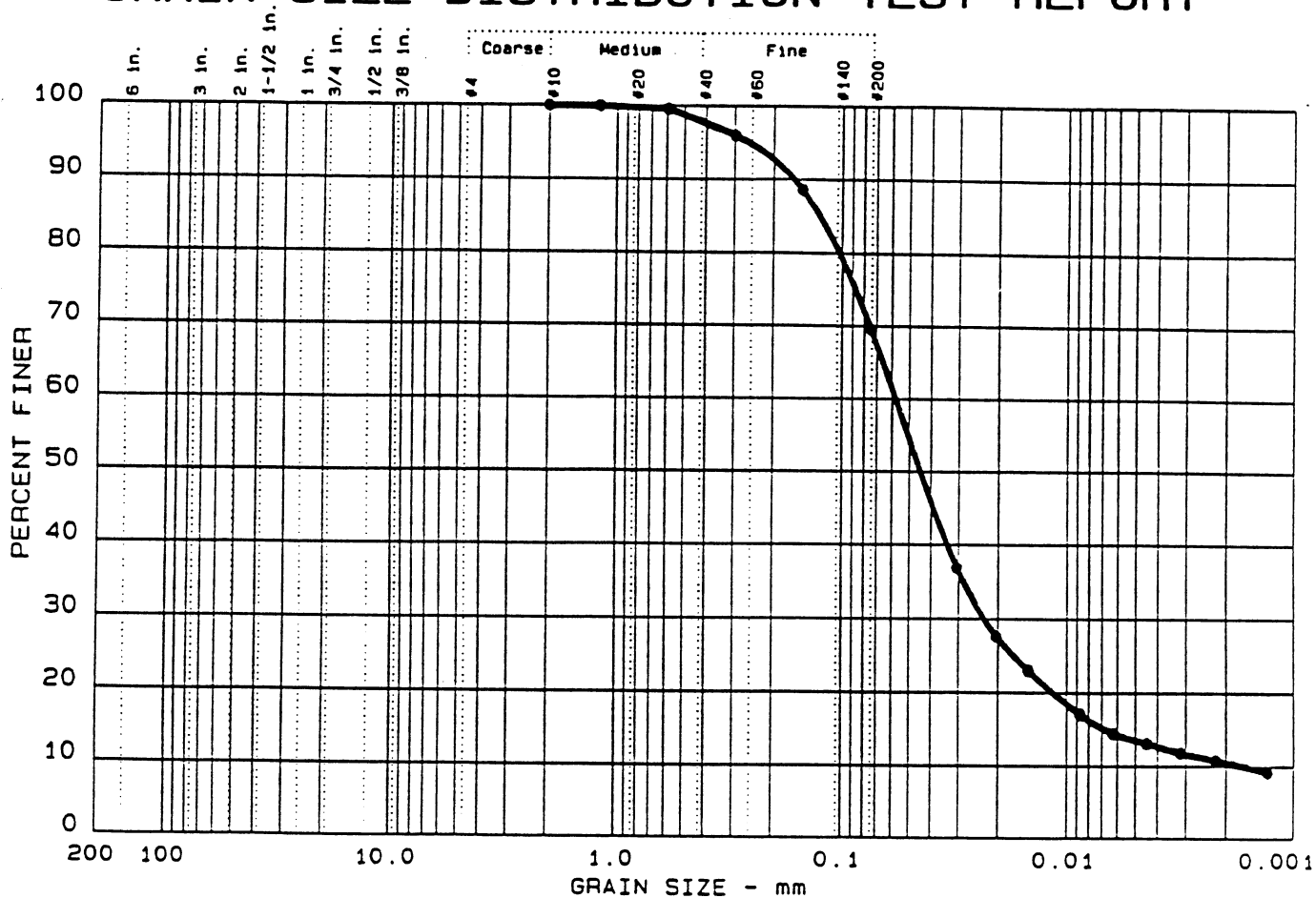
Remarks:

Tested by: NL

Checked by: *CS*

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



PERCENT FINER

GRAIN SIZE - mm

6 in. 3 in. 2 in. 1-1/2 in. 1 in. 3/4 in. 1/2 in. 3/8 in. #4 #10 #20 #40 #60 #140 #200

Coarse Medium Fine

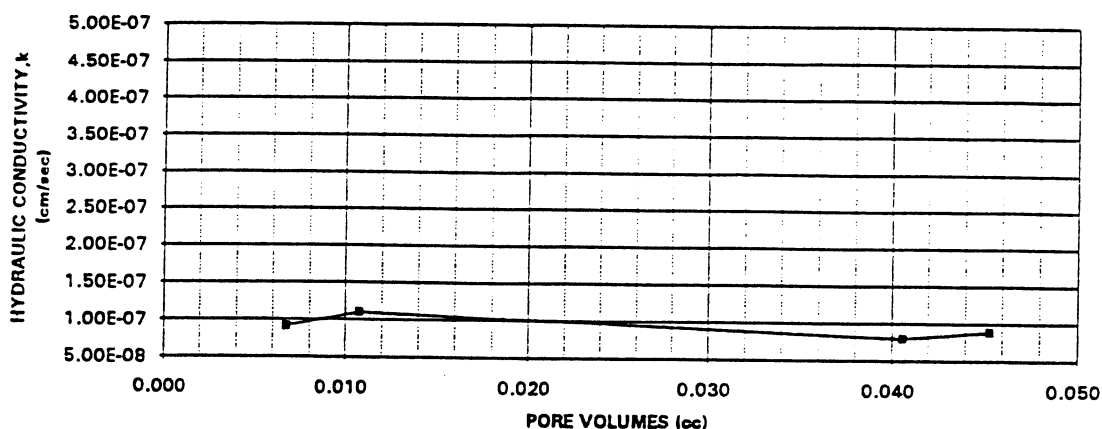
Grain Size (mm)	Percent Finer (%)
200	100
100	100
75	100
60	100
40	100
30	100
25	100
20	100
15	100
12.5	100
10	100
7.5	94
6	87
4.75	84
3.75	84
3	83
2.5	80
2	78
1.5	70
1.18	63
0.85	53
0.6	38
0.425	26
0.3	16
0.25	13
0.15	10

[illegible]

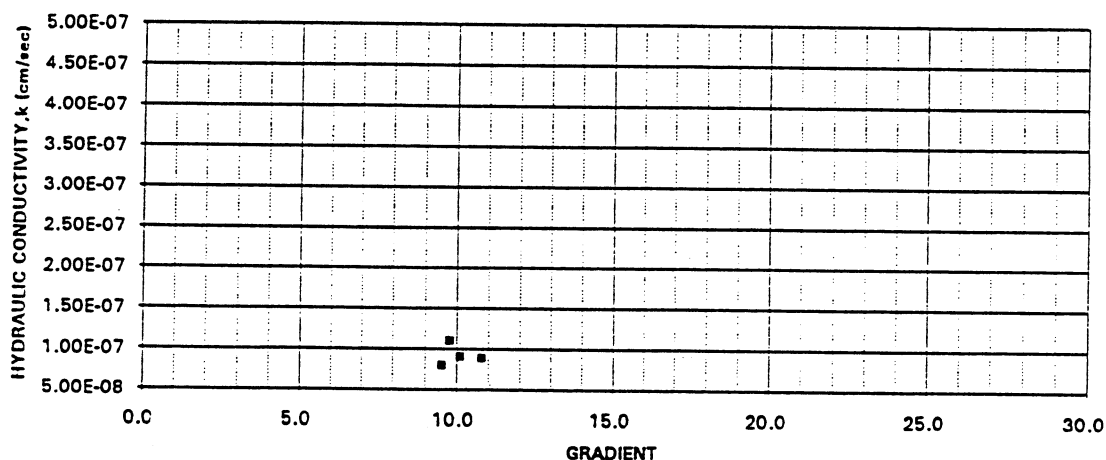
Project No.: 4E05140 Project: CRANDON MINING CO ● Sample: CMC-SL 104, 34-36'	Remarks: Tested by: NL Checked by: <i>CJS</i>
Date: APRIL 14, 1994	
GRAIN SIZE DISTRIBUTION TEST REPORT WOODWARD-CLYDE CONSULTANTS	
Sheet No. _____	

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: DL - 103A 4'-5'

SPECIMEN DESCRIPTION: Brown silty clayey fine to coarse SAND, little fine gravel

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	6.90	6.96	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	37.39	38.05	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	4.99
SPECIMEN LENGTH, L (cm)	5.70	5.40	MINIMUM EFFECTIVE CONFINING STRESS (psi)	4.04
SPECIMEN VOLUME, V (cc)	213.14	205.45	CUMULATIVE PORE VOLUMES FLOW	0.05
WATER CONTENT (%)	11.9	10.2	PERMEANT	WATER
DRY DENSITY (pcf)	124.2	128.9		
SATURATION, n (%)	90.2	89.9	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	9.3E-08

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4EO5140

FLEXIBLE WALL
HYDRAULIC
CONDUCTIVITY

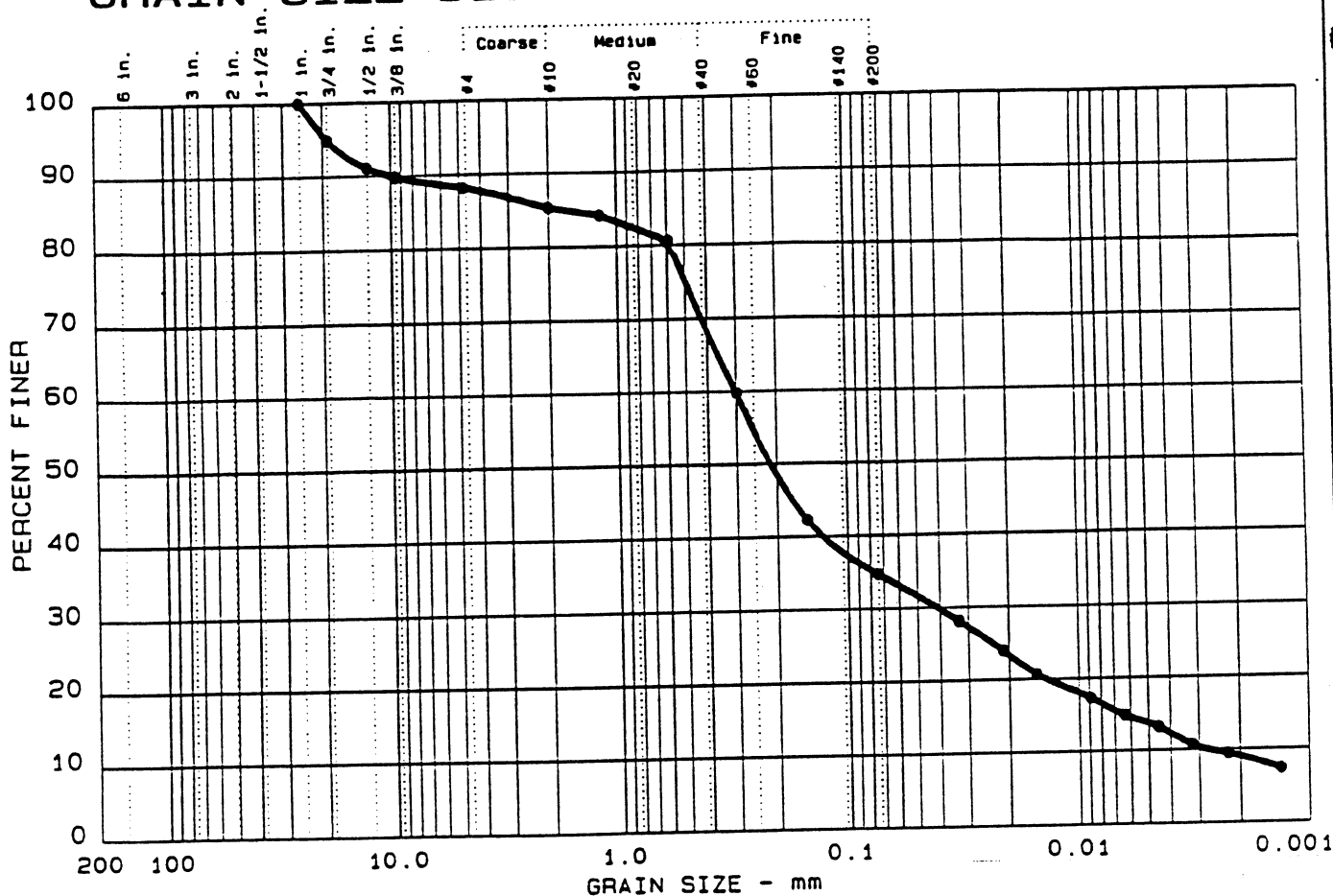
Woodward-Clyde Consultants

CHECKED BY: GJS

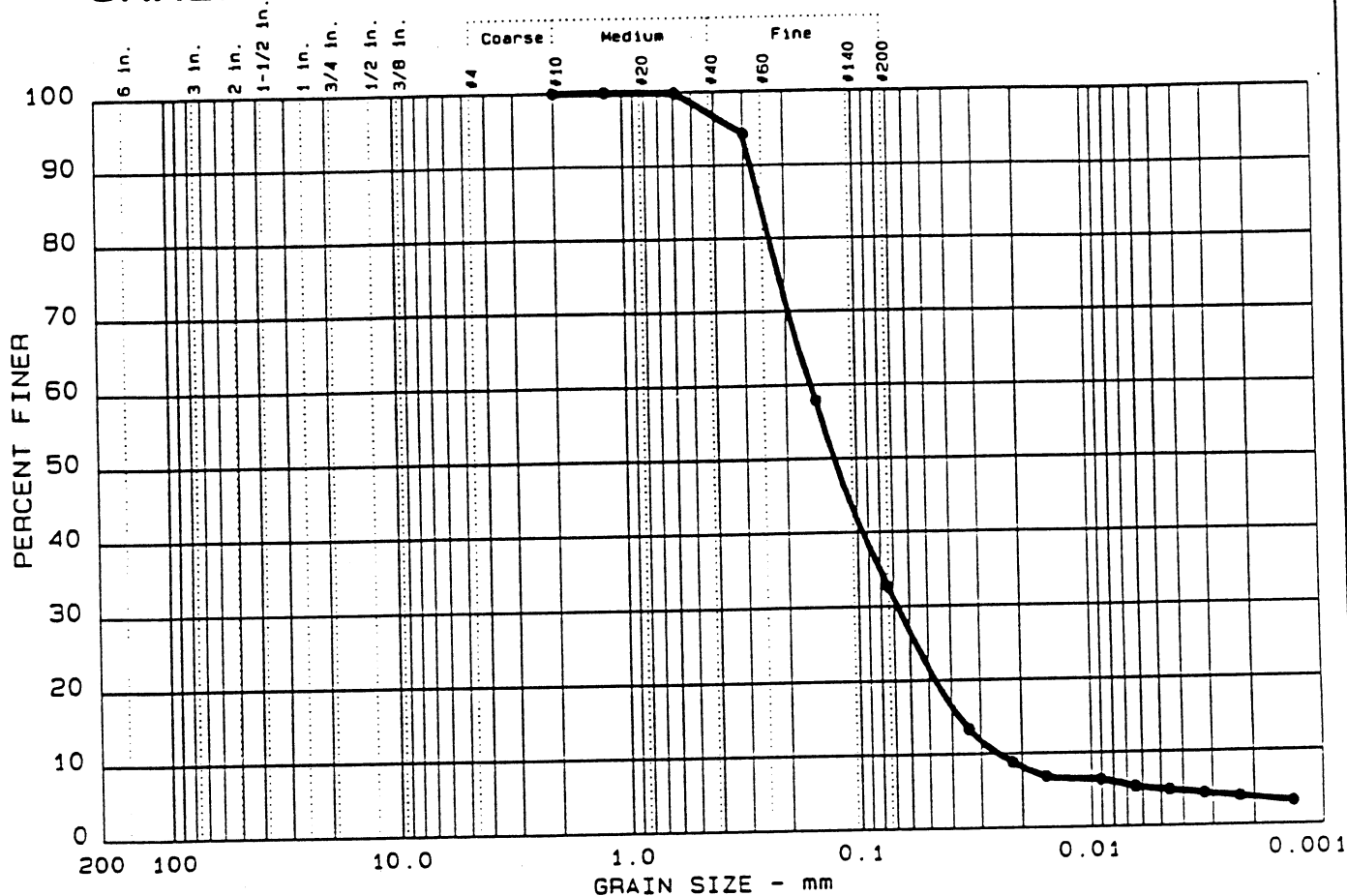
REVIEWED BY: [Signature]

DATE: 21-Apr-94

GRAIN SIZE DISTRIBUTION TEST REPORT



GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.0	67.4	27.6	5.0

[illegible]

MATERIAL DESCRIPTION		USCS
●	Brown silty fine SAND	SM

Project No.: 4E05140
Project: CRANDON MINING CO
● Sample: CMC-DL 103B, 20-22'

Date: APRIL 14, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Remarks:

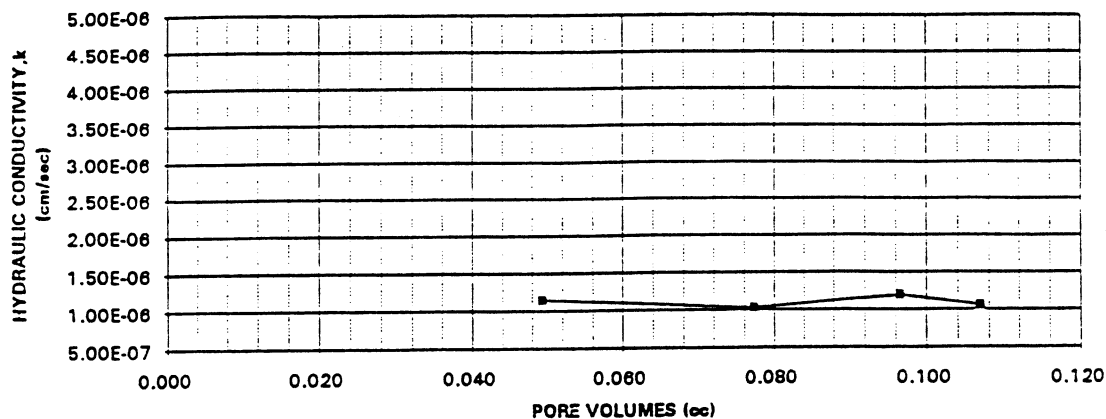
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Checked by: *GF*

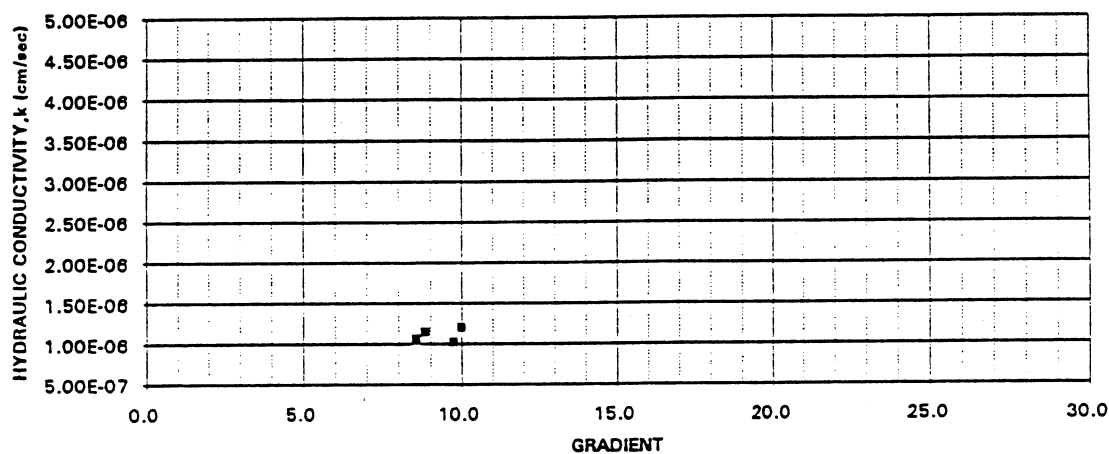
Sheet No. _____

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: BO - 101B 4'-5'

SPECIMEN DESCRIPTION: Brown silty clayey fine to medium SAND

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.18	7.18	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	40.49	40.49	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	5.04
SPECIMEN LENGTH, L (cm)	6.35	6.30	MINIMUM EFFECTIVE CONFINING STRESS (psi)	4.06
SPECIMEN VOLUME, V (cc)	257.11	255.08	CUMULATIVE PORE VOLUMES FLOW	0.11
WATER CONTENT (%)	16.4	16.3	PERMEANT	WATER
DRY DENSITY (pcf)	115.7	116.0		
SATURATION, n (%)	97.0	97.2	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	1.1E-06

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4EO5140

**FLEXIBLE WALL
HYDRAULIC
CONDUCTIVITY**

Woodward-Clyde Consultants

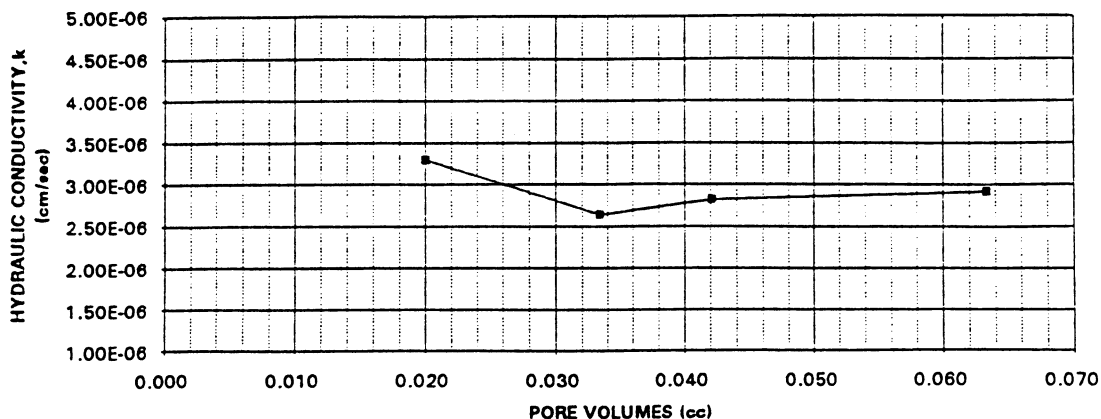
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REVIEWED BY: *SM*

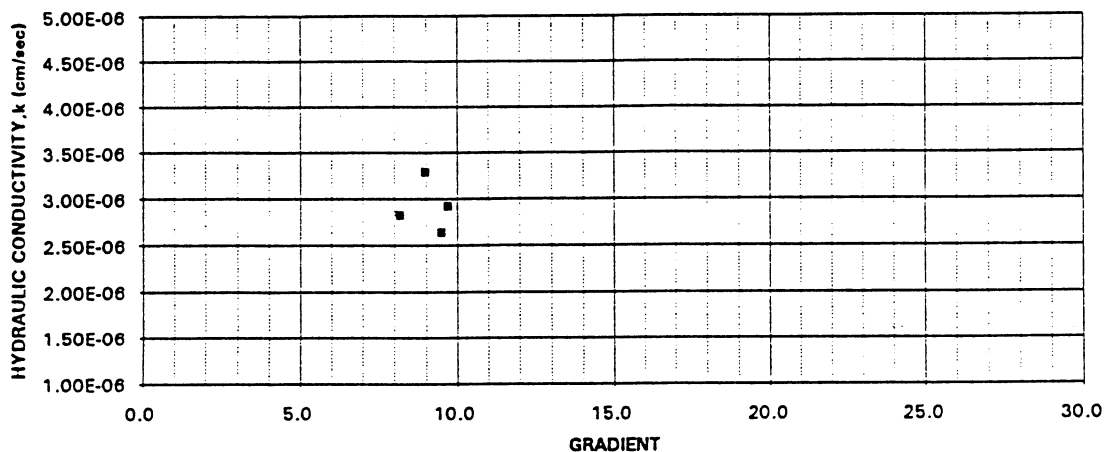
DATE: 19-Apr-94

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: BO - 101B 12'-14'

SPECIMEN DESCRIPTION: Brown lean CLAY, trace fine sand

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.13	7.09	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	39.93	39.48	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	5.03
SPECIMEN LENGTH, L (cm)	6.49	6.37	MINIMUM EFFECTIVE CONFINING STRESS (psi)	4.06
SPECIMEN VOLUME, V (cc)	259.13	251.49	CUMULATIVE PORE VOLUMES FLOW	0.06
WATER CONTENT (%)	33.2	29.0	PERMEANT	WATER
DRY DENSITY (pcf)	91.8	95.2		
SATURATION, n (%)	107.4	101.7	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	2.9E-06

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4EO5140

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY

Woodward-Clyde Consultants

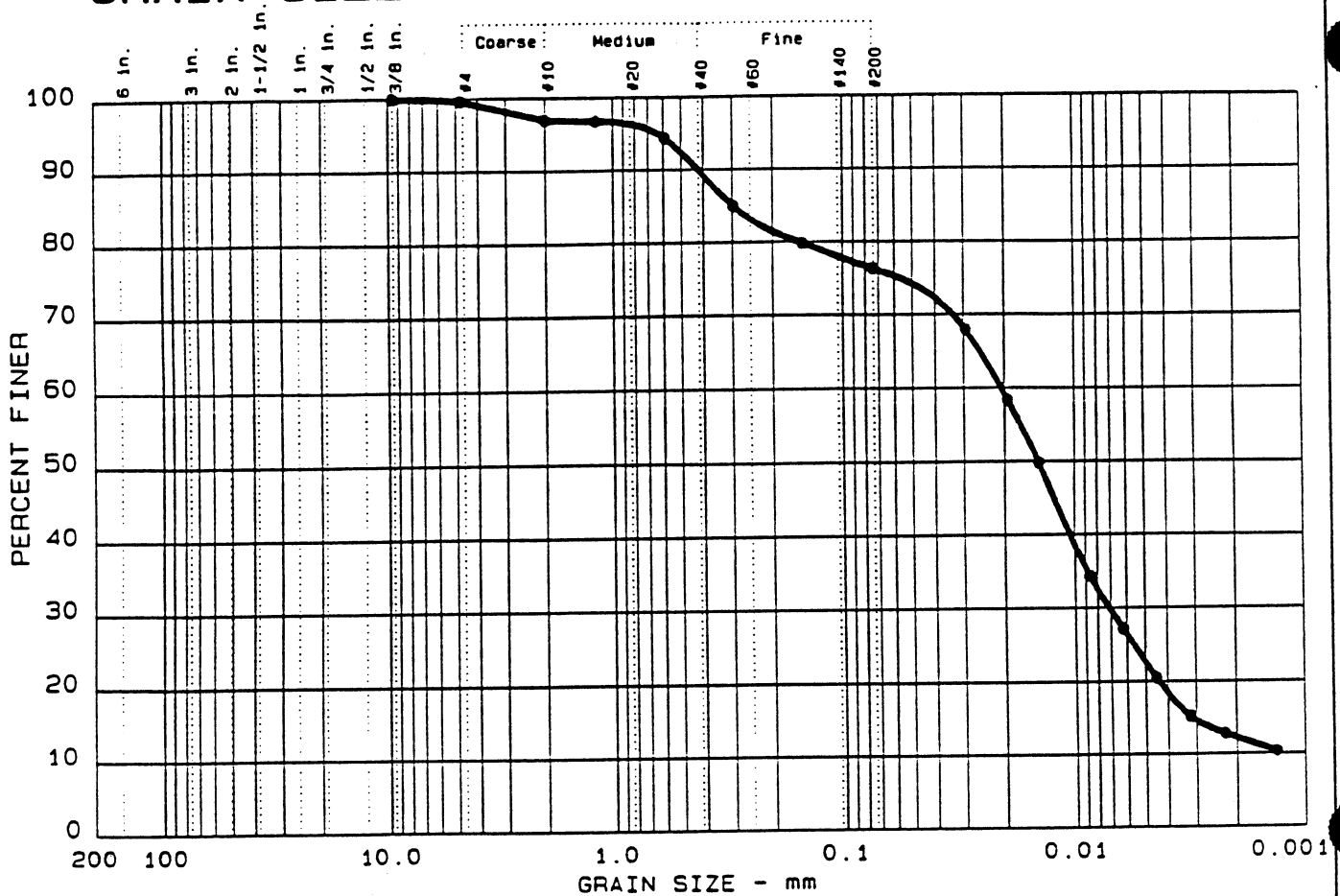
CHECKED BY: *GP*

REVIEWED BY: *201*

DATE 14-Apr-94

File:BO101B14.XLS

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	0.4	23.3	53.6	22.7

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 26	8	0.30		0.01	0.007	0.0031			

MATERIAL DESCRIPTION	USCS
• Brown lean CLAY; with sand	CL

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-80-101A, 14-16'

Date: APRIL 14, 1994

Remarks:

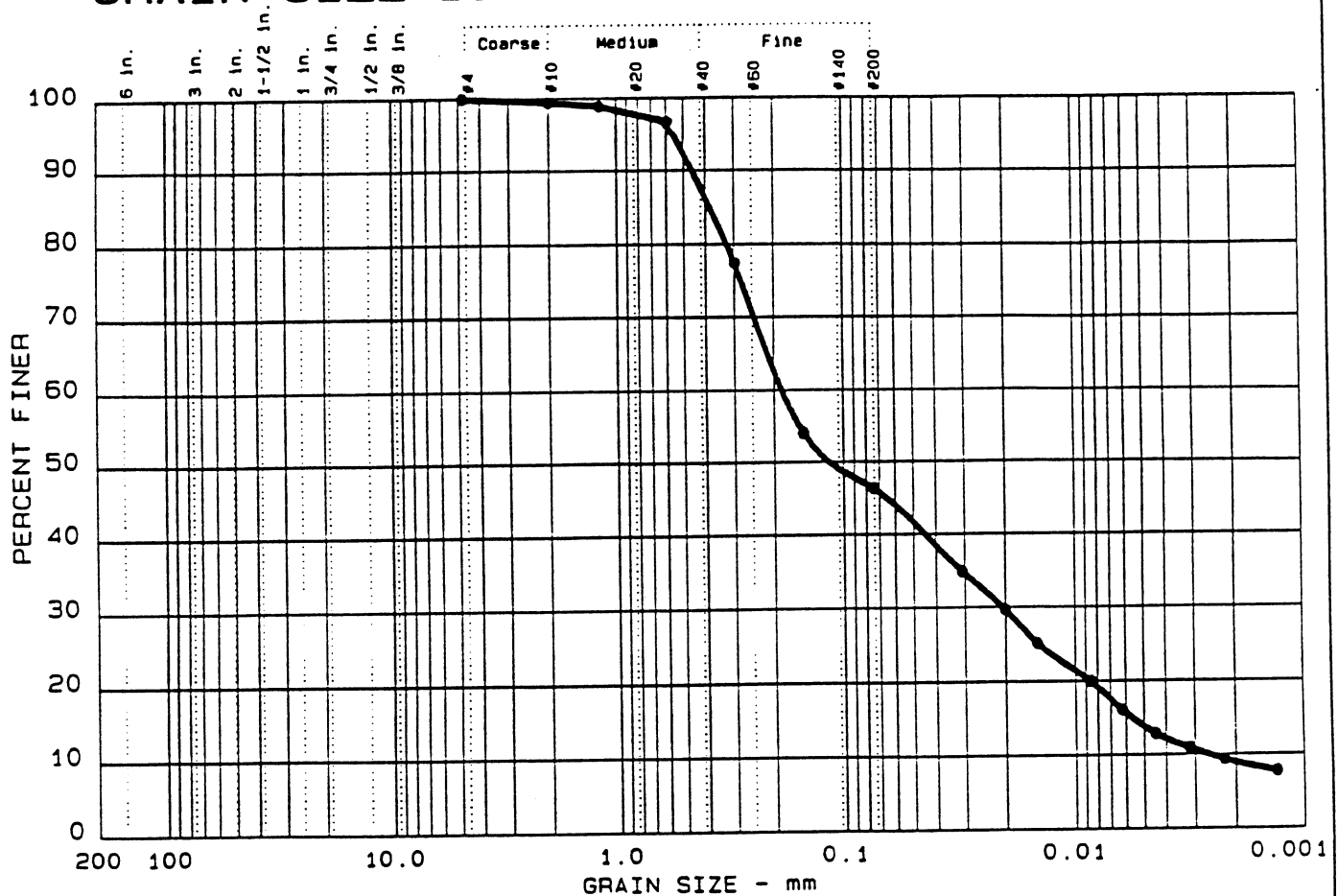
Tested by: NL

Checked by: GTS

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	0.0	53.7	32.5	13.8

[illegible]

MATERIAL DESCRIPTION	USCS
• Brown silty, clayey fine to medium SAND	SC-SM

Project No.: 4E05140
Project: CRANDON MINING CO
● Sample: CMC-BO-101B, 4-6'

Date: APRIL 14, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

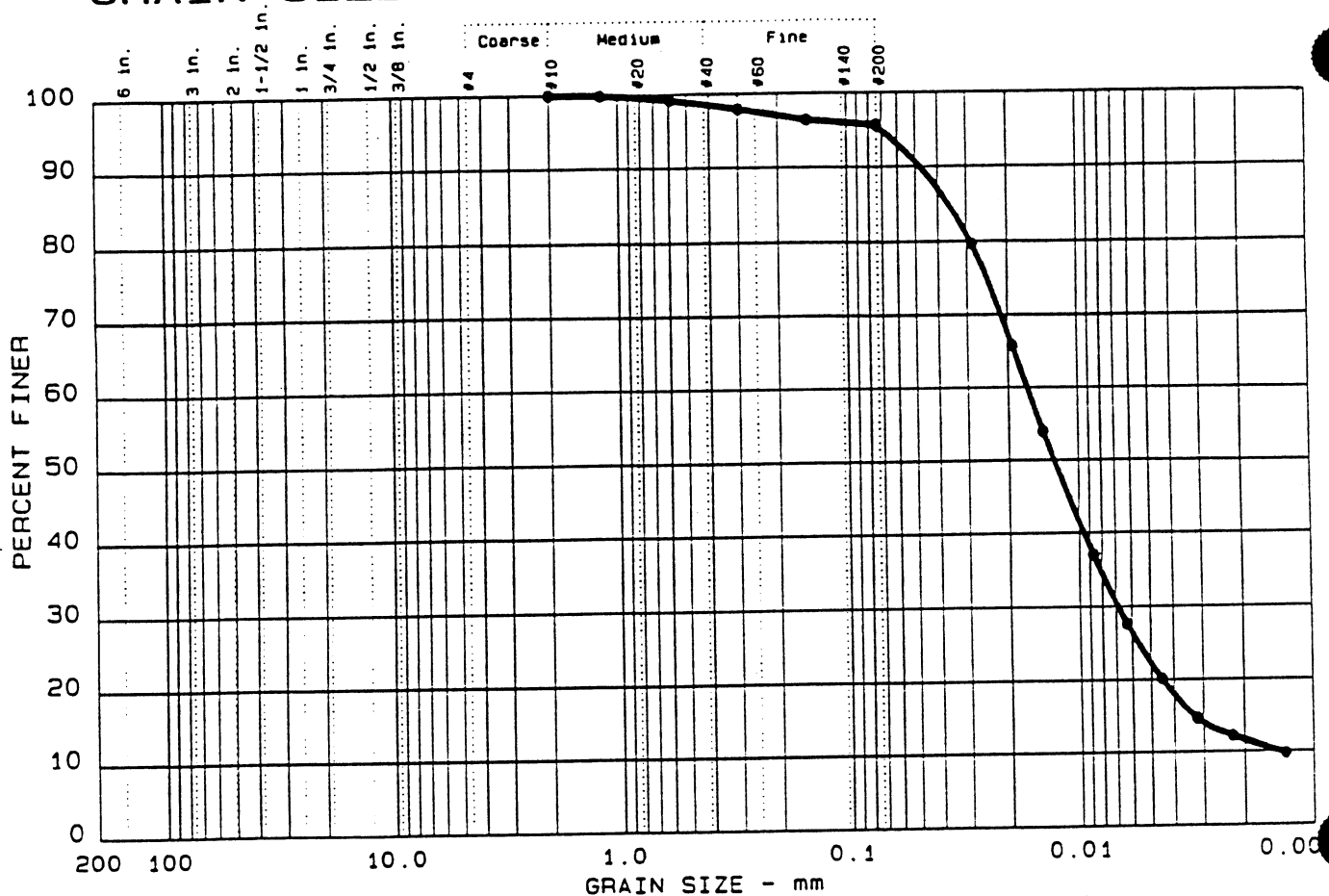
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Tested by: NL

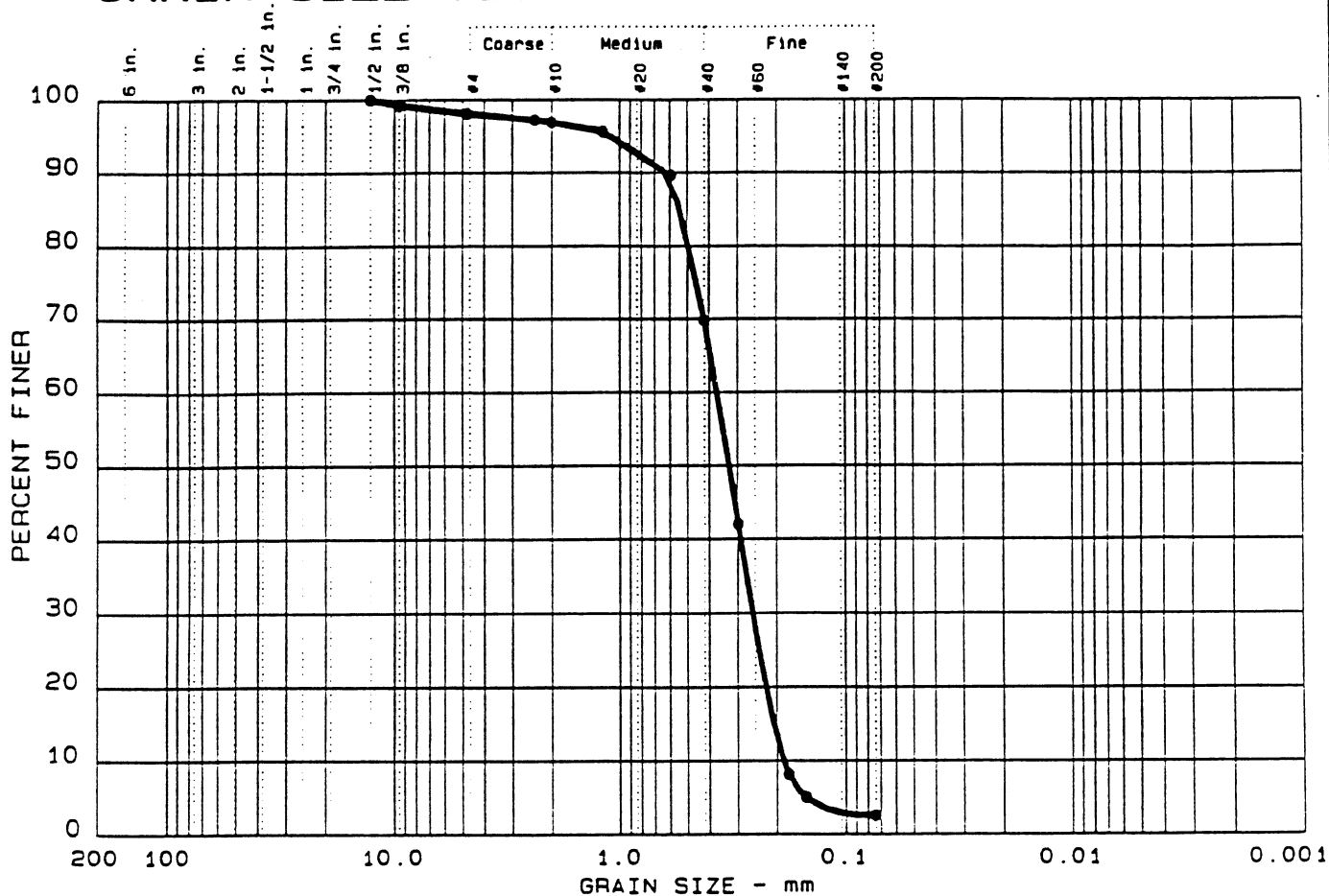
Checked by: *GTS*

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	1.8	95.6	2.6	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
•		0.54	0.37	0.33	0.256	0.2058	0.1856	0.96	2.0

MATERIAL DESCRIPTION	USCS
• Brown fine to coarse SAND; trace fine gravel	SP

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-B0-101B, 36-38'

Date: APRIL 14, 1994

Remarks:

Tested by: NL

Checked by: *GJS*

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Sheet No. _____

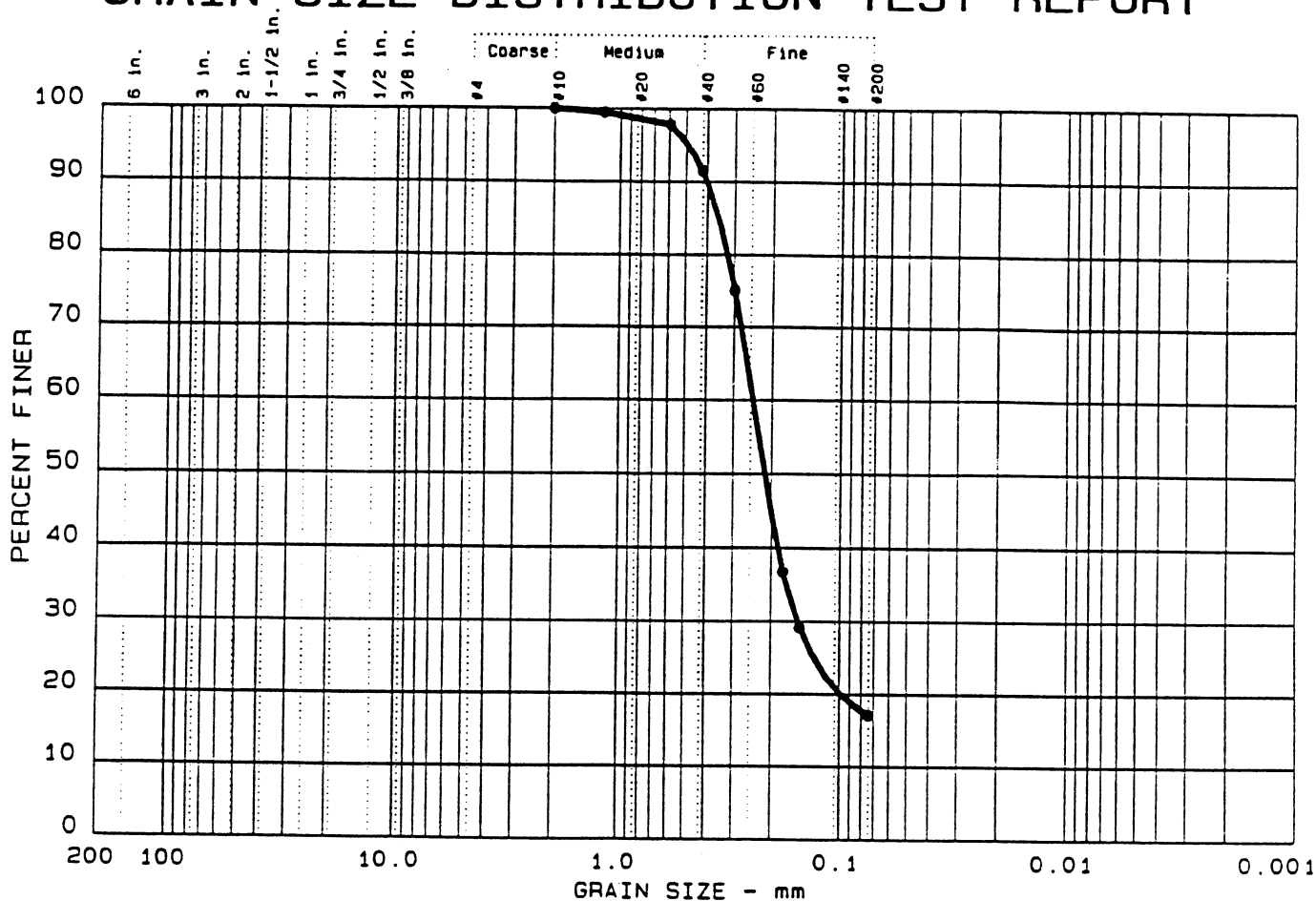
The graph shows a grain size distribution curve. The y-axis is labeled 'PERCENT FINER' and ranges from 0 to 100 in increments of 10. The x-axis is labeled 'GRAIN SIZE - mm' and is a logarithmic scale ranging from 200 to 0.001. The curve starts at 100% finer for a grain size of 4.75 mm and decreases to approximately 20% finer for a grain size of 0.075 mm. The curve is smooth and continuous, indicating a well-graded material.

Grain Size (mm)	Percent Finer (%)
4.75	100
2.5	92
1.5	88
1.0	82
0.75	78
0.6	75
0.5	72
0.425	70
0.375	65
0.3	55
0.25	45
0.2	35
0.15	28
0.125	25
0.1	22
0.075	20

[illegible]

Project No.: 4E05140 Project: CRANDON MINING CO ● Sample: CMC-B0-102, 16-18'	Remarks: Tested by: NL Checked by: <i>GS</i>
Date: APRIL 14, 1994	
GRAIN SIZE DISTRIBUTION TEST REPORT WOODWARD-CLYDE CONSULTANTS	
Sheet No. _____	

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	0.0	82.9	17.1	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
•		0.35	0.24	0.21	0.152				

MATERIAL DESCRIPTION	USCS
• Brown silty fine to coarse SAND	SM

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-B0-102, 35-37'

Date: APRIL 14, 1994

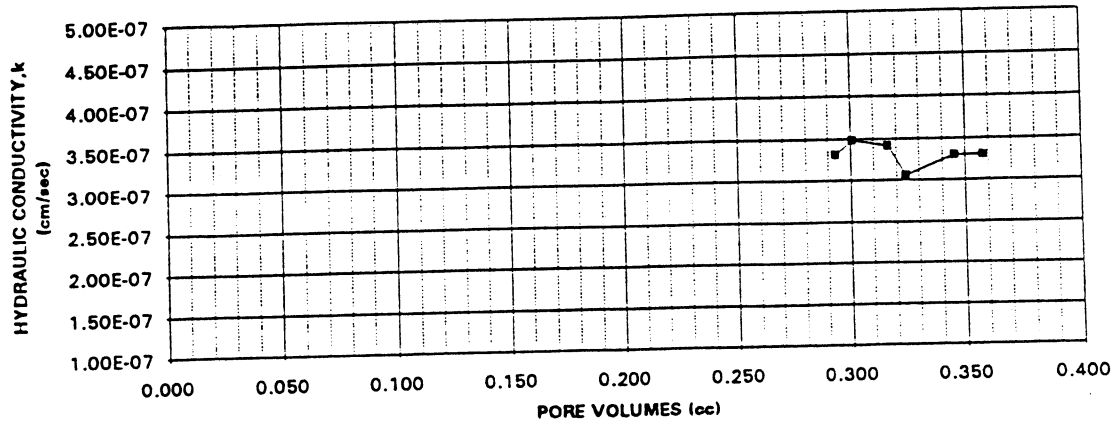
GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Remarks:
 Tested by: NL
 Checked by: *GAS*

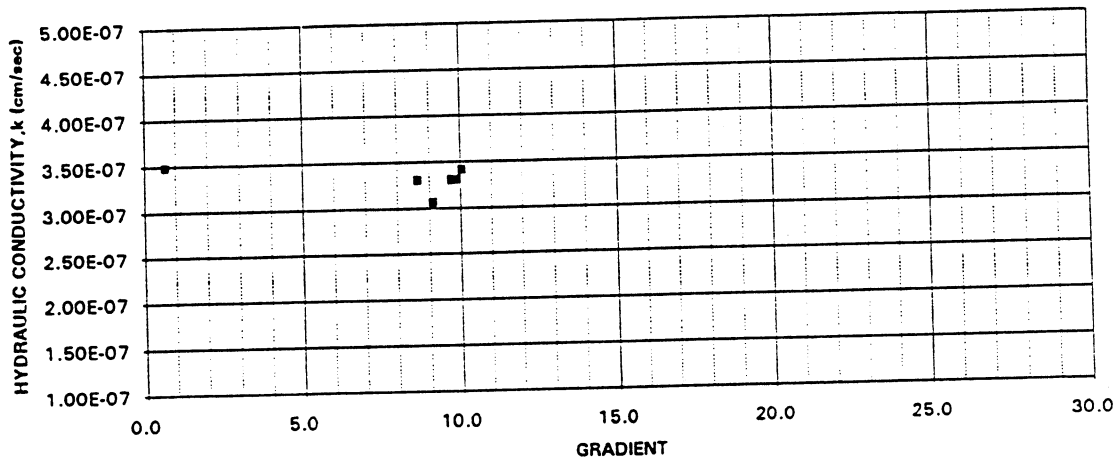
Sheet No. _____

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: SCC - 102A 2'-4'

SPECIMEN DESCRIPTION: Brown silty clayey fine to coarse SAND, little fine gravel

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.15	7.13	AVERAGE BACKPRESSURE (psi)	50.0
SPECIMEN AREA, A (cm)	40.15	39.93	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	5.0
SPECIMEN LENGTH, L (cm)	6.01	5.83	MINIMUM EFFECTIVE CONFINING STRESS (psi)	5.0
SPECIMEN VOLUME, V (cc)	241.31	232.78	CUMULATIVE PORE VOLUMES FLOW	0.36
WATER CONTENT (%)	16.3	12.9	PERMEANT	WATER
DRY DENSITY (pcf)	118.6	124.5		
SATURATION, n (%)	104.6	98.6	AVERAGE HYDRAULIC CONDUCTIVITY, k (cm/sec)	3.3E-07

PROJECT: CRANDON MINING CO.

PROJECT NUMBER: 4EO5140

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY

Woodward-Clyde Consultants

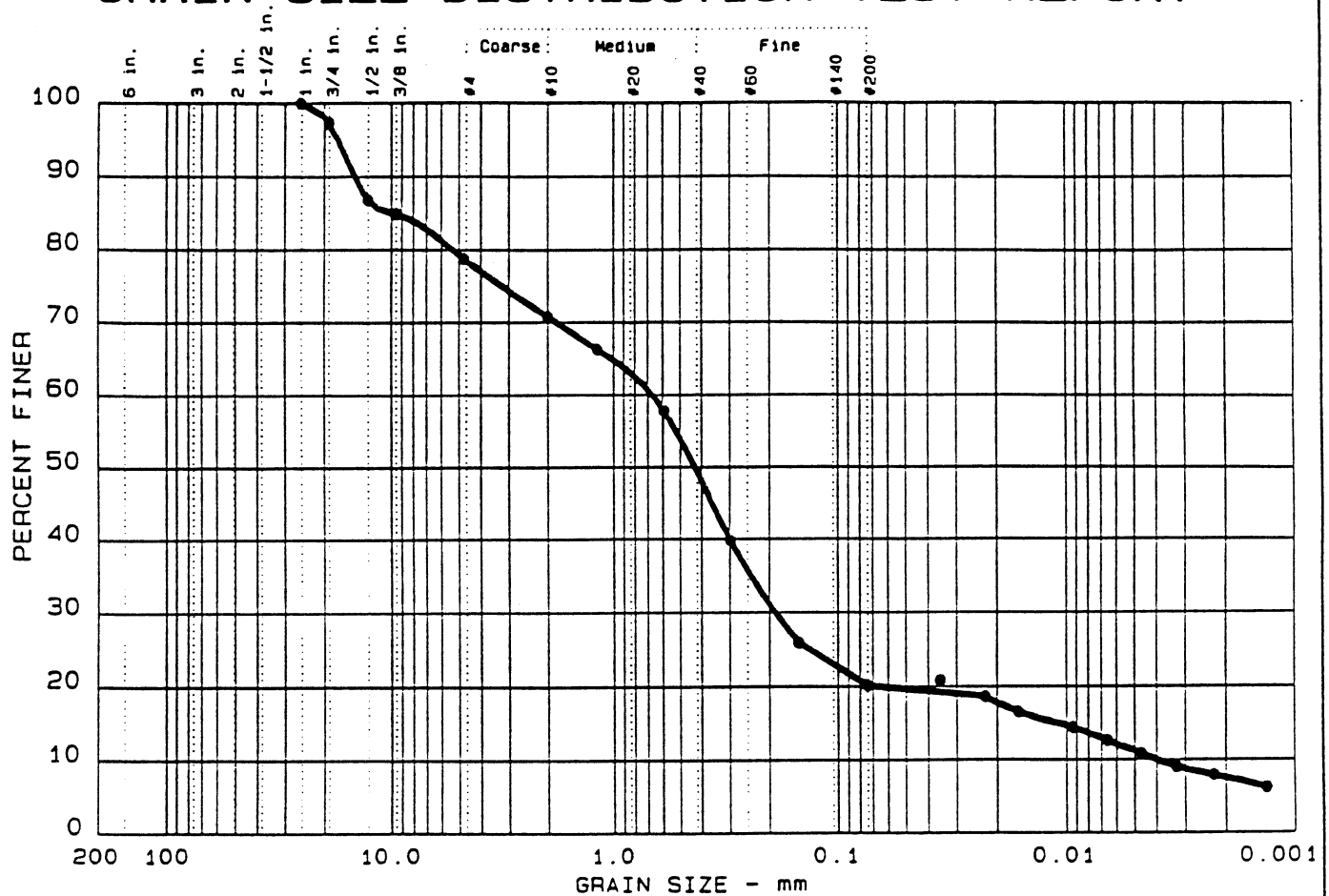
CHECKED BY: *GS*

REVIEWED BY: *JS*

DATE 14-ADT-94

File:SCC102A4.XLS

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	21.2	58.7	8.9	11.2

[illegible]

MATERIAL DESCRIPTION	USCS
● Brown clayey fine to coarse SAND; with fine gravel	SC

Project No.: 4E05140
Project: CRANDON MINING CO
● Sample: CMC-SCC-101, 6-8'

Date: APRIL 14, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

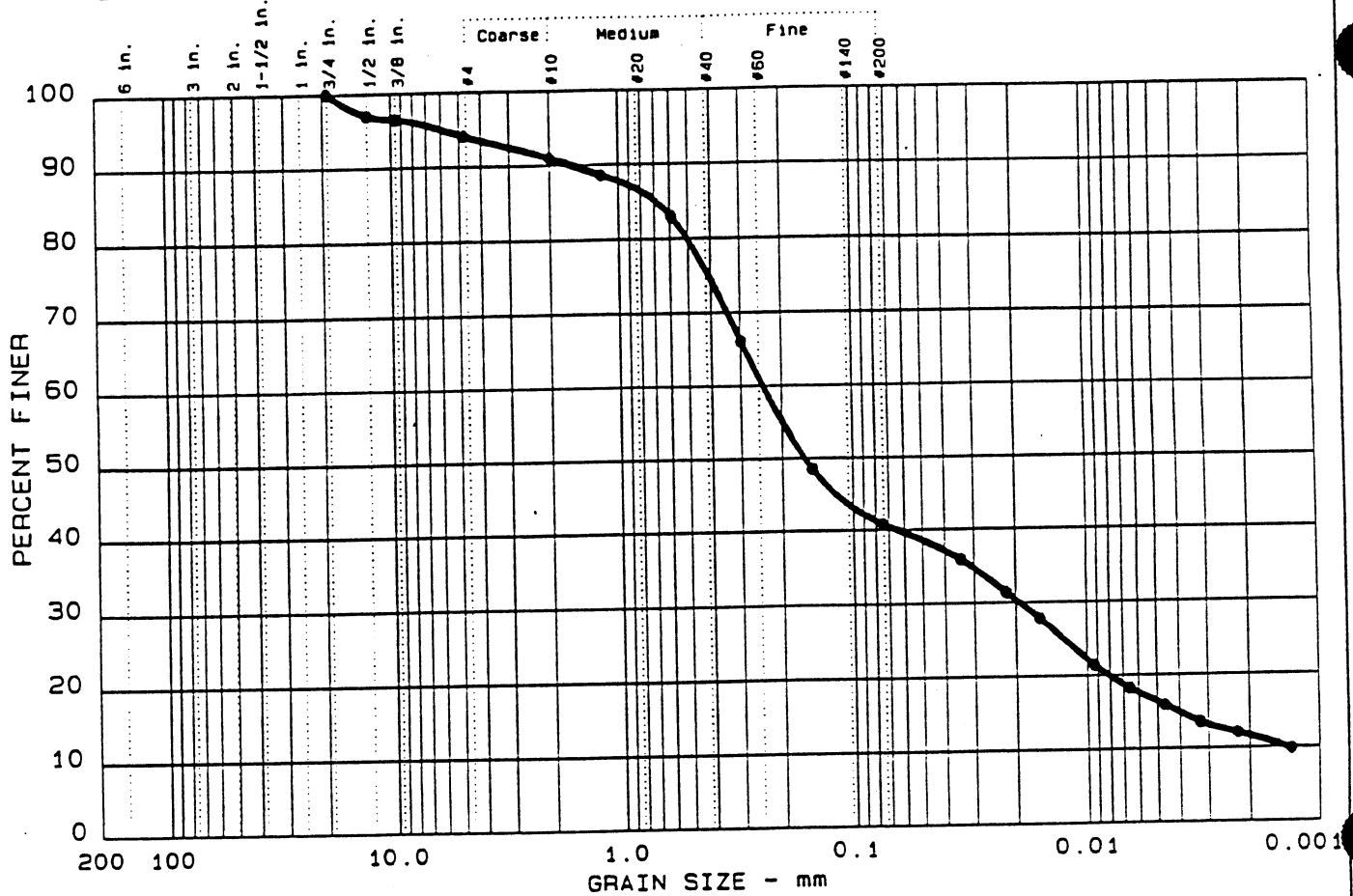
Remarks:

Tested by: NL

Checked by: GTS

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	5.9	53.3	24.4	16.4

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
•		0.68	0.24	0.16	0.019	0.0041	0.0014	1.11	175.8

MATERIAL DESCRIPTION	USCS
• Brown silty clayey fine to coarse SAND; little fine gravel	SC-SM

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-SCC-102A, 2-4'

Date: APRIL 14, 1994

Remarks:

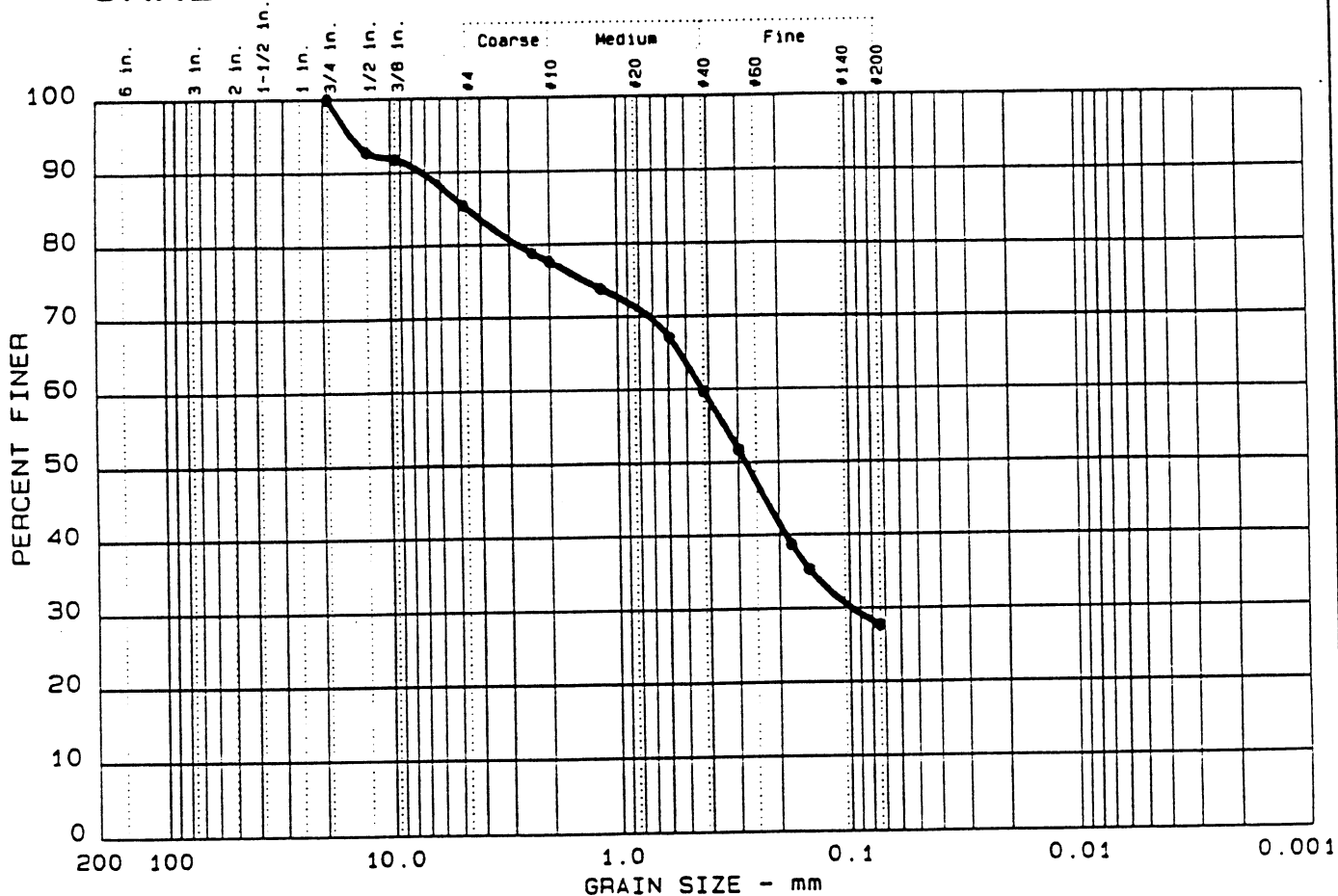
Tested by: NL

Checked by: *GO*

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	14.6	57.7	27.7	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
•		4.57	0.43	0.28	0.097				

MATERIAL DESCRIPTION	USCS
• Gray clayey fine to coarse SAND; little gravel	SC

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-SCC-102A, 8-10'

Date: APRIL 14, 1994

Remarks:

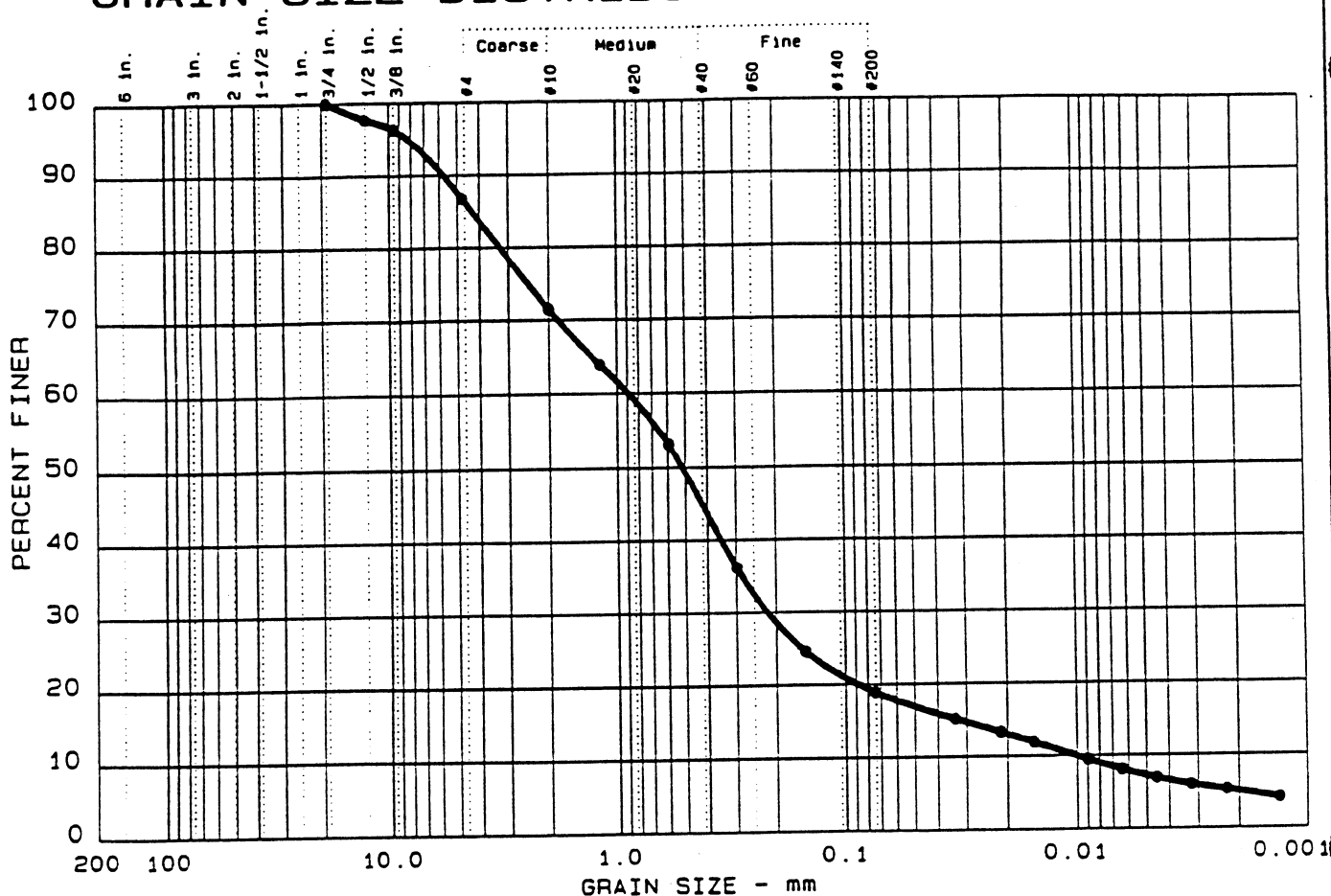
Tested by: NL

Checked by: GJS

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	13.2	67.9	11.6	7.3

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
•		4.27	0.88	0.51	0.216	0.0324	0.0099	5.37	89.1

MATERIAL DESCRIPTION	USCS
• Brown silty fine to coarse SAND; little fine gravel	SM

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-SCC-102B, 16-18'

Date: APRIL 14, 1994

Remarks:

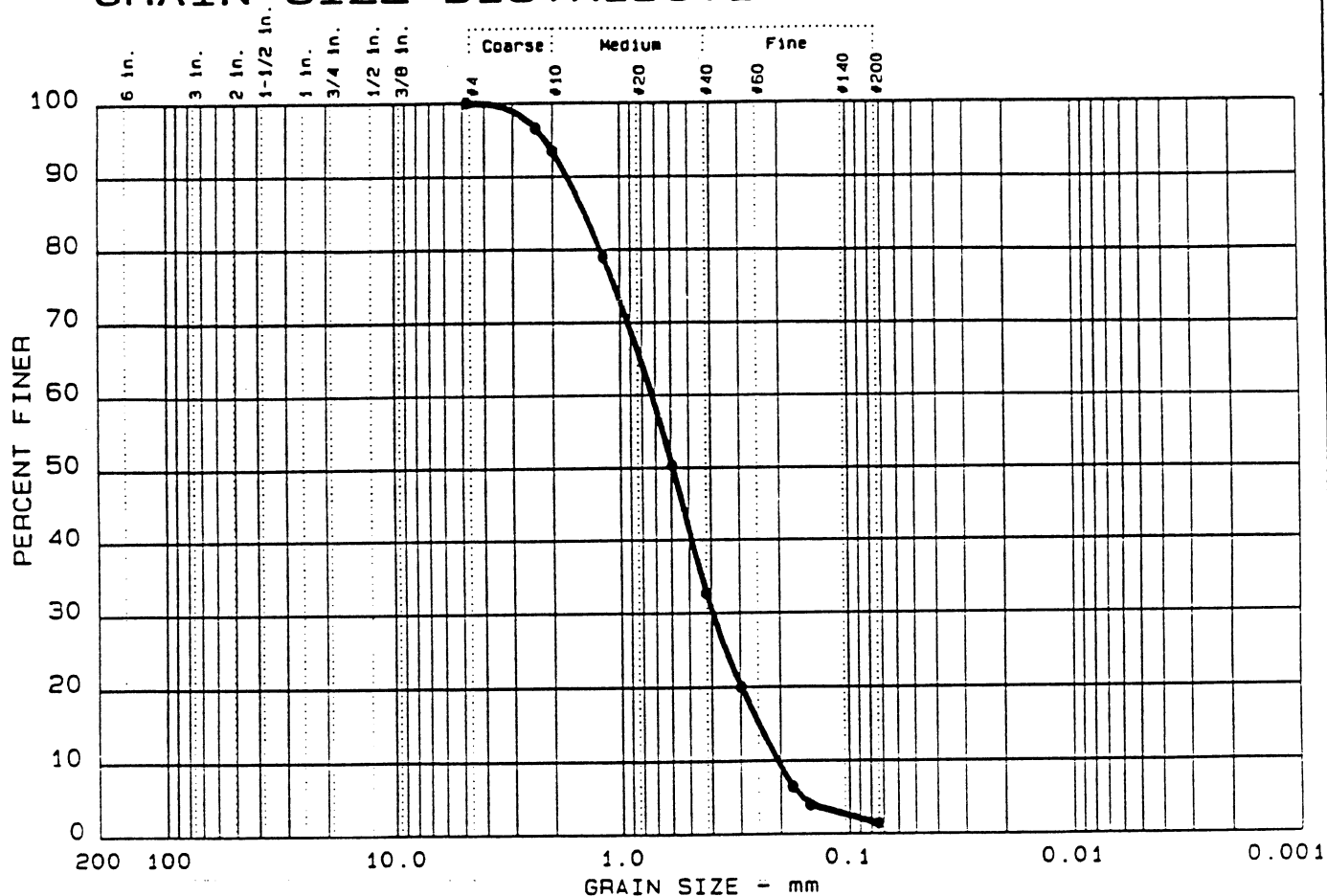
Tested by: NL

Checked by: GTS

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	0.0	98.6	1.4	

[illegible]

MATERIAL DESCRIPTION	USCS
● Gray fine to coarse SAND	SP

Project No.: 4E05140
Project: CRANDON MINING CO
● Sample: CMC-SC 101, 12.5-14.5'

Remarks:

Tested by: NL

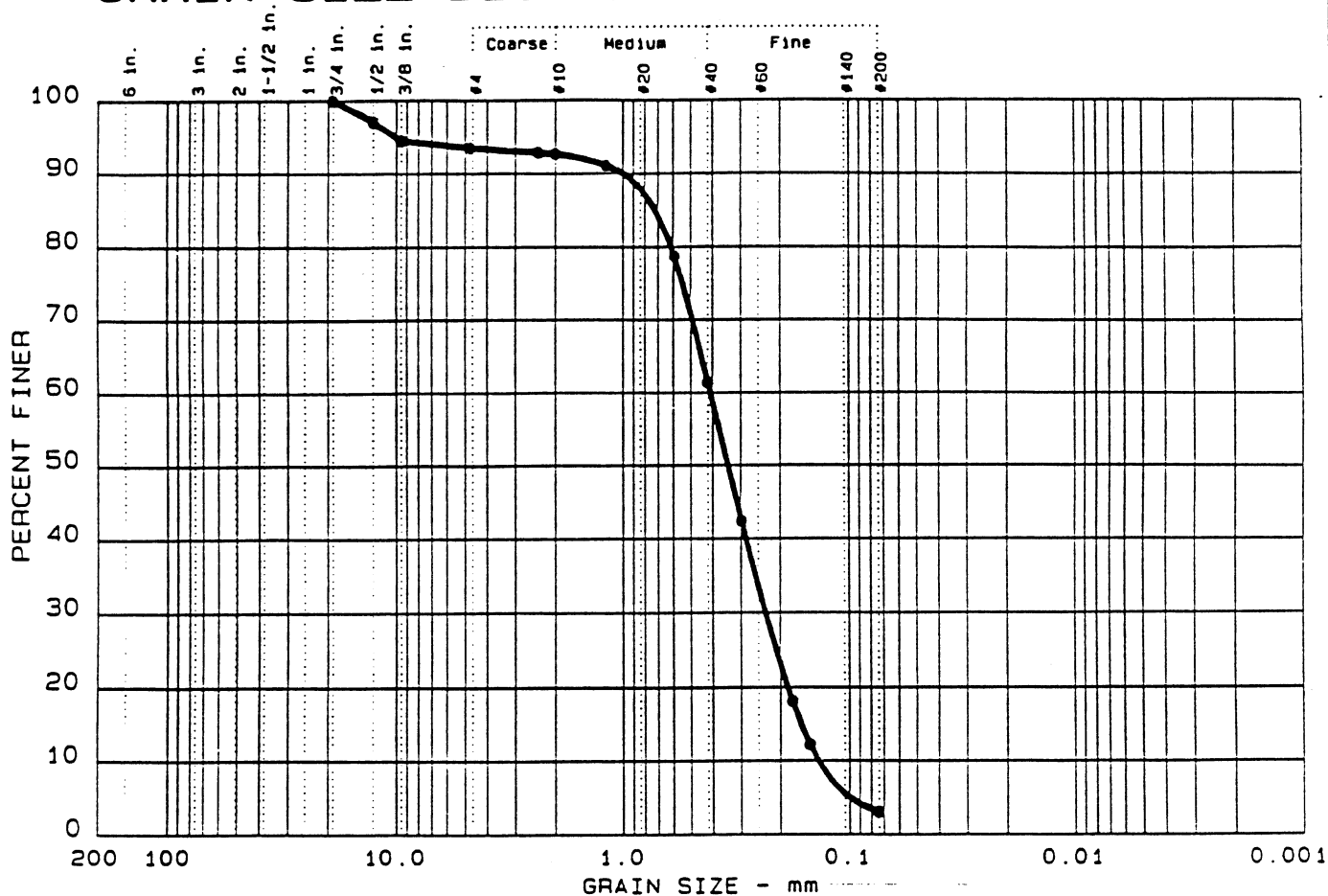
Checked by: *CS*

Date: APRIL 14, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



Symbol	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
•	0.0	6.5	90.5	3.0	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
•		0.72	0.41	0.34	0.233	0.1626	0.1368	0.97	3.0

MATERIAL DESCRIPTION	USCS
• Gray fine to coarse SAND; little gravel	SP

Project No.: 4E05140
 Project: CRANDON MINING CO
 • Sample: CMC-SC 102, 10-12'

Date: APRIL 14, 1994

Remarks:

Tested by: NL

Checked by: *CTS*

GRAIN SIZE DISTRIBUTION TEST REPORT
WOODWARD-CLYDE CONSULTANTS

Sheet No. _____

Appendix 3.5-29

Clay Mineral Analyses

F. Michael Wahl
GEOLOGIST - MINERALOGIST

3111 N. W. 18TH PLACE
GAINESVILLE, FLORIDA 32601

HOME: 904-378-7020
OFFICE: 904-392-2231

September 5, 1978

Mr. Lonnie Norman
DAMES & MOORE
1550 Northwest Highway
Park Ridge, Illinois 60068

Dear Mr. Norman:

The following report of investigation is submitted on completion of clay mineral analyses of 18 samples as received from your company in accordance with job # 8837-044 and your transmittal sheet dated August 8, 1978. All determinations are based on x-ray diffraction analyses. The relative abundances of non-clay minerals present in each sample are also reported.

REPORT OF INVESTIGATION

I. Test Results by Sample

Clay mineralogical results are reported as parts-in-ten of the total clay fraction, and as percentages of the total clay fraction. Reporting as parts-in-ten of the total mineral content is generally preferred to exact percentage listings, because limits of detectability are subject to at least a $\pm 2\%$ deviation.

The total abundance of each clay mineral constituent in the whole sample can only be calculated if the total amount of less-than-two micron material has been determined through hydrometer or other analyses. These more specific calculations can always be determined at a later date, if needed, using the data provided in this report. For the purpose of this report the significant data are type and relative amounts of clay minerals present.

It should be pointed out that the clay mineral content of all samples was extremely low, and that the sand and coarser fractions greatly exceeded the clay fraction.

All analyses were performed using a GE XRD-5 recording diffractometer. Each sample was x-rayed in powder form, as an oriented aggregate, and after exposure to an ethylene glycol atmosphere.

Sample DMA - 1 #3

Montmorillonite	=	9%	1- part-in-ten
Illite	=	43%	4+ parts-in-ten
Chlorite	=	39%	4- parts-in-ten
Kaolinite	=	9%	1- part-in-ten

(Chlorite is moderate to well crystallized)

Non-clay minerals = Quartz - Very abundant

Feldspar - Moderate

Sample DMA - 4 #1

Montmorillonite	=	74%	7+ parts-in-ten
Illite	=	4%	1- part-in-ten (trace)
Chlorite	=	14%	1+ part-in-ten
Kaolinite	=	8%	1- part-in-ten

(Crystallinity of chlorite is poor)

Non-clay minerals = Quartz - Very abundant

Feldspar - Minor

Sample DMA - 18 #1

Montmorillonite	=	62%	6+ parts-in-ten
Illite	=	22%	2+ parts-in-ten
Chlorite	=	12%	1+ part-in-ten
Kaolinite	=	4%	1- part-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals - Quartz - Very abundant

Feldspar - minor

Calcite - minor

Sample DMB - 1 #5

Montmorillonite	=	28%	3- parts-in-ten
Illite	=	32%	3+ parts-in-ten
Chlorite	=	34%	3+ parts-in-ten
Kaolinite	=	6%	1- part-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals = Quartz - Very abundant

Dolomite - moderate

Feldspar - minor

Sample DMB - 1 #10

Montmorillonite	=	44%	4+ parts-in-ten
Illite	=	26%	3- parts-in-ten
Chlorite	=	22%	2+ parts-in-ten
Kaolinite	=	8%	1- part-in-ten

(Chlorite is moderate to well crystallized)

Non-clay minerals = Quartz - Very abundant
Dolomite - abundant
Feldspar - minor

Sample DMB - 2 #4

Montmorillonite	=	13%	1+ part-in-ten
Illite	=	29%	3- parts-in-ten
Chlorite	=	58%	6- parts-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals - Quartz - Very abundant
Feldspar - moderate

Sample DMB - 5 #2

Montmorillonite	=	45%	4-5 parts-in-ten
Illite	=	40%	4 parts-in-ten
Chlorite	=	12%	1+ part-in-ten
Kaolinite	=	3%	1- part-in-ten (Trace)

(Chlorite is moderate to poorly crystallized)

Non-clay minerals	=	Quartz - Very abundant
		Feldspar - abundant

Sample DMB - 5 #19

Montmorillonite	=	36%	4- parts-in-ten
Illite	=	28%	3- parts-in-ten
Chlorite	=	27%	3- parts-in-ten
Kaolinite	=	9%	1- part-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals	=	Quartz - Very abundant
		Feldspar - moderate

Sample DMB - 6 #1

Montmorillonite	=	71%	7+ parts-in-ten
Illite	=	6%	1- part-in-ten
Chlorite	=	18%	2- parts-in-ten
Kaolinite	=	5%	1- part-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals = Quartz - Very abundant
Feldspar - Moderate

Sample DMB - 9 #3

Montmorillonite	=	30%	3 parts-in-ten
Illite	=	47%	5- parts-in-ten
Chlorite	=	17%	2- parts-in-ten
Kaolinite	=	6%	1- part-in-ten

(Chlorite is moderate to poorly crystallized)

Non-clay minerals = Quartz - Abundant
Feldspar - Minor

Sample DMB - 10 #7

Montmorillonite	=	15%	1+ part-in-ten
Illite	=	40%	4 parts-in-ten
Chlorite	=	39%	4- parts-in-ten
Kaolinite	=	6%	1- part-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals = Quartz - Very abundant
Dolomite - Moderate
Feldspar - Minor

Sample DMB - 11 #7

Montmorillonite	=	15%	1+ part-in-ten
Illite	=	36%	4- parts-in-ten
Chlorite	=	40%	4 parts-in-ten
Kaolinite	=	9%	1- part-in-ten

(Chlorite is moderate to poorly crystallized)

Non-clay minerals = Quartz - Very abundant
Feldspar - Moderate
Dolomite - Minor

Sample DMB - 14 #12

Montmorillonite	=	83%	8+ parts-in-ten
Illite	=	17%	2- parts-in-ten
Chlorite	=	Trace	

Non-clay minerals = Quartz - Very abundant
Feldspar - Minor

Sample DMB - 16 #11

Montmorillonite	=	43%	4+ parts-in-ten
Illite	=	24%	2+ parts-in-ten
Chlorite	=	28%	3- parts-in-ten
Kaolinite	=	5%	1- part-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals = Quartz - Very abundant
Feldspar - Abundant

Sample DMB - 20 #6

Montmorillonite	=	71%	7+ parts-in-ten
Illite	=	13%	1+ part-in-ten
Chlorite	=	10%	1 part-in-ten
Kaolinite	=	6%	1- part-in-ten

(Chlorite is moderate to poorly crystallized)

Non-clay minerals = Quartz - Very abundant
Feldspar - Abundant

Sample DMB - 22 #3

Montmorillonite	=	16%	2- parts-in-ten
Illite	=	48%	5- parts-in-ten
Chlorite	=	36%	4- parts-in-ten
Kaolinite	=	None	

(Chlorite is moderate to well crystallized)

Non-clay minerals = Quartz - Very abundant
Feldspar - Abundant
Dolomite - Minor

Sample DMB - 18 #6

Montmorillonite	=	37%	4- parts-in-ten
Illite	=	37%	4- parts-in-ten
Chlorite	=	21%	2+ parts-in-ten
Kaolinite	=	5%	1- part-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals	=	Quartz - Very abundant
		Feldspar - Moderate
		Dolomite - Moderate

Sample DMB - 19 #4

Montmorillonite	=	51%	5+ parts-in-ten
Illite	=	21%	2+ parts-in-ten
Chlorite	=	24%	2+ parts-in-ten
Kaolinite	=	4%	1- part-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals	=	Quartz - Very abundant
		Feldspar - Moderate
		Dolomite - Minor

II. Summary of Test Results

The analyses of all 18 samples shows a fairly consistent clay mineral suite in that montmorillonite, illite, and chlorite are present in all samples. Kaolinite, when present, was never abundant and in some cases its presence is questionable.

Quartz is the dominant non-clay mineral in all samples. Feldspar is also present, but in variable quantities from minor to abundant. Five sample contain dolomite, and one contains a minor amount of calcite.

Signed:

F. Michael Wahl

F. Michael Wahl Ph.D.

SAMPLE DATA SHEETS

Sample DMA-1 #3Location Wiscassin

1. Glycolated Slide

A. Montmorillonite (5°)

_____	_____	_____	_____
_____	<u>21</u>	<u>7</u>	<u>9</u> %
_____	3		

B. Illite (8.8°)

_____	_____	_____	_____
_____		<u>32</u>	<u>43</u> %

C. Chlorite-vermiculite
and Kaolinite (12.5°)

_____	_____	_____	_____
_____		<u>36</u>	<u>48</u> %

D. Mixed layered
material

_____	_____	_____	_____

_____	2		

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

<u>11</u>	<u>81</u> % of C	<u>39</u>
-----------	------------------	-----------

Kaolinite (24.9°)

<u>5</u>	<u>19</u> % of C	<u>9</u>
2		

III. Crystallinity of Chlorite Moderate to well crystallized

IV. Summary

Parts in 10

Montmorillonite

<u>9</u> %	<u>1-</u>
------------	-----------

Illite

<u>43</u> %	<u>4+</u>
-------------	-----------

Chlorite

<u>39</u> %	<u>4-</u>
-------------	-----------

Kaolinite

<u>9</u> %	<u>1-</u>
------------	-----------

Mixed layered

_____ %	_____
---------	-------

Sample DMA-4 #1Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

 149 50 74 %
3

B. Illite (8.8°)

 3 4 %C. Chlorite-vermiculite
and Kaolinite (12.5°) 15 22 %D. Mixed layered
material 2

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

562 % of C 14

Kaolinite (24.9°)

638 % of C 8

2

III. Crystallinity of Chlorite

Poor

IV. Summary

Parts in 10

Montmorillonite

74 %7+

Illite

4 %1- (Trace)

Chlorite

14 %1+

Kaolinite

8 %1-

Mixed layered

 %

Sample DMA - 18 #1

Location Wisconsin

Glycolated Slide

A. Montmorillonite (5°)

189 63 62 %
3

B. Illite (8.8°)

22 22 %

C. Chlorite-vermiculite
and Kaolinite (12.5°)

16 16 %

D. Mixed layered
material

2 %

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

10 74 % of C 12

Kaolinite (24.9°)

7 26 % of C 4
2

III. Crystallinity of Chlorite

Medium

IV. Summary

Parts in 10

Montmorillonite

62 % 6+

Illite

22 % 2+

Chlorite

12 % 1+

Kaolinite

4 % 1-

Mixed layered

2 % 0

Sample DMB-1 #5Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

_____	_____	_____	_____
_____	_____	90	30
_____	_____	3	28 %

B. Illite (8.8°)

_____	_____	_____	_____
_____	_____	34	32 %
_____	_____	_____	_____

C. Chlorite-vermiculite
and Kaolinite (12.5°)

_____	_____	_____	_____
_____	_____	43	40 %
_____	_____	_____	_____

D. Mixed layered
material

_____	_____	_____	_____
_____	_____	2	_____ %
_____	_____	_____	_____

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

12	86	% of C	34
----	----	--------	----

Kaolinite (24.9°)

4	14	% of C	6
---	----	--------	---

III. Crystallinity of Chlorite

Moderate

IV. Summary

Parts in 10

Montmorillonite

28 %	3-
------	----

Illite

32 %	3+
------	----

Chlorite

34 %	3+
------	----

Kaolinite

6 %	1-
-----	----

Mixed layered

_____ %	_____
---------	-------

Sample DMB-1 # 10

Location Wisconsin

Glycolated Slide

A. Montmorillonite (5°)

313 104 44 %
3

B. Illite (8.8°)

62 26 %

C. Chlorite-vermiculite
and Kaolinite (12.5°)

69 30 %

D. Mixed layered
material

2 %

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

16 73 % of C 22

Kaolinite (24.9°)

12 27 % of C 8
2

III. Crystallinity of Chlorite

Moderate To Well Crystallized

IV. Summary

Parts in 10

Montmorillonite

44 % 4+

Illite

26 % 3-

Chlorite

22 % 2+

Kaolinite

8 % 1-

Mixed layered

2 %

Sample DMB-2 #4Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

_____	_____	_____	_____
_____	19	6	13
_____	3		

B. Illite (8.8°)

_____		13	29

C. Chlorite-vermiculite
and Kaolinite (12.5°)

_____		26	58

D. Mixed layered
material

_____	2		

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

8	100	% of C	58
---	-----	--------	----

Kaolinite (24.9°)

0		% of C	0
---	--	--------	---

III. Crystallinity of Chlorite

Moderate

IV. Summary

Parts in 10

Montmorillonite

13	%	1+
----	---	----

Illite

29	%	3-
----	---	----

Chlorite

58	%	6-
----	---	----

Kaolinite

0	%	
---	---	--

Mixed layered

	%	
--	---	--

Sample DMB-5 #2Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

<u> </u>	<u>223</u>	<u>74</u>	<u>45</u> %
<u> </u>	3		
<u> </u>			

B. Illite (8.8°)

<u> </u>		<u>66</u>	<u>40</u> %
<u> </u>			
<u> </u>			

C. Chlorite-vermiculite
and Kaolinite (12.5°)

<u> </u>		<u>24</u>	<u>15</u> %
<u> </u>			
<u> </u>			

D. Mixed layered
material

<u> </u>			
<u> </u>	<u>2</u>		
<u> </u>			

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

<u>8</u>	<u>80</u>	% of C	<u>12</u>
----------	-----------	--------	-----------

Kaolinite (24.9°)

<u>4</u>	<u>20</u>	% of C	<u>3</u>
2			

III. Crystallinity of Chlorite

Moderate To Poor

IV. Summary

Parts in 10

Montmorillonite

<u>45</u> %	<u>4½</u>
-------------	-----------

Illite

<u>40</u> %	<u>4</u>
-------------	----------

Chlorite

<u>12</u> %	<u>1+</u>
-------------	-----------

Kaolinite

<u>3</u> %	<u>1- Trace</u>
------------	-----------------

Mixed layered

<u> </u> %	<u> </u>
---------------------	-------------------

Sample DMB-5 # 19Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

_____	_____	_____	_____
_____	81	27	36 %
_____	3		

B. Illite (8.8°)

_____	_____	_____	_____
_____		22	28 %

C. Chlorite-vermiculite
and Kaolinite (12.5°)

_____	_____	_____	_____
_____		27	36 %

D. Mixed layered
material

_____	_____	_____	_____

_____	2		

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

7	74	% of C	27
---	----	--------	----

Kaolinite (24.9°)

5	26	% of C	9
2			

III. Crystallinity of Chlorite

Moderate

IV. Summary

Parts in 10

Montmorillonite

36 %	4-
------	----

Illite

28 %	3-
------	----

Chlorite

27 %	3-
------	----

Kaolinite

9 %	1-
-----	----

Mixed layered

%	
---	--

sample DMB-6 #1 Location Wisconsin

Glycolated Slide

A. Montmorillonite (5°) _____
_____ 199 66 71 %
_____ 3

B. Illite (8.8°) _____
_____ 6 6 %

C. Chlorite-vermiculite and Kaolinite (12.5°) _____
_____ 21 23 %

D. Mixed layered material _____
_____ _____ %
_____ 2

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°) 8 76 % of C 18
Kaolinite (24.9°) 5 24 % of C 5
_____ 2

III. Crystallinity of Chlorite Moderate

IV. Summary

Parts in 10

Montmorillonite	<u>71</u> %	<u>7+</u>
Illite	<u>6</u> %	<u>1-</u>
Chlorite	<u>18</u> %	<u>2-</u>
Kaolinite	<u>5</u> %	<u>1-</u>
Mixed layered	_____ %	_____

Sample DMB-9 #3Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

<u> </u>	<u>88</u>	<u>29</u>	<u>30</u>	%
<u> </u>	3			
<u> </u>				

B. Illite (8.8°)

<u> </u>		<u>46</u>	<u>47</u>	%
<u> </u>				
<u> </u>				

C. Chlorite-vermiculite
and Kaolinite (12.5°)

<u> </u>		<u>23</u>	<u>23</u>	%
<u> </u>				
<u> </u>				

D. Mixed layered
material

<u> </u>				%
<u> </u>	2			
<u> </u>				

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

<u>4</u>	<u>73</u>	% of C	<u>17</u>
----------	-----------	--------	-----------

Kaolinite (24.9°)

<u>3</u>	<u>27</u>	% of C	<u>6</u>
2			

III. Crystallinity of Chlorite

Moderate To poor

IV. Summary

Parts in 10

Montmorillonite

<u>30</u>	%	<u>3</u>
-----------	---	----------

Illite

<u>47</u>	%	<u>5-</u>
-----------	---	-----------

Chlorite

<u>17</u>	%	<u>2-</u>
-----------	---	-----------

Kaolinite

<u>6</u>	%	<u>1-</u>
----------	---	-----------

Mixed layered

<u> </u>	%	<u> </u>
-------------------	---	-------------------

Sample DMB-10 #7Location Wisconsin

I. Glycolated Slide

A. Montmorillonite (5°)

<u> </u>	<u>24</u>	<u>8</u>	<u>15</u> %
<u> </u>	<u>3</u>		
<u> </u>			

B. Illite (8.8°)

<u> </u>		<u>21</u>	<u>40</u> %
<u> </u>			
<u> </u>			

C. Chlorite-vermiculite
and Kaolinite (12.5°)

<u> </u>		<u>24</u>	<u>45</u> %
<u> </u>			
<u> </u>			

D. Mixed layered
material

<u> </u>			
<u> </u>	<u>2</u>		
<u> </u>			

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

<u>12</u>	<u>86</u>	% of C	<u>39</u>
-----------	-----------	--------	-----------

Kaolinite (24.9°)

<u>4</u>	<u>14</u>	% of C	<u>6</u>
<u>2</u>			

III. Crystallinity of Chlorite

Medium

IV. Summary

Parts in 10

Montmorillonite

<u>15</u> %	<u>1+</u>
-------------	-----------

Illite

<u>40</u> %	<u>4</u>
-------------	----------

Chlorite

<u>39</u> %	<u>4</u>
-------------	----------

Kaolinite

<u>6</u> %	<u>1-</u>
------------	-----------

Mixed layered

<u> </u> %	<u> </u>
---------------------	-------------------

Sample DMB-11 #7Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

_____	_____	_____	_____
_____	<u>16</u>	<u>5</u>	<u>15</u> %
_____	3		

B. Illite (8.8°)

_____	_____	_____	_____
_____		<u>12</u>	<u>36</u> %

C. Chlorite-vermiculite
and Kaolinite (12.5°)

_____	_____	_____	_____
_____		<u>16</u>	<u>49</u> %

D. Mixed layered
material

_____	_____	_____	_____

_____	2		

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

<u>9</u>	<u>82</u>	% of C	<u>40</u>
----------	-----------	--------	-----------

Kaolinite (24.9°)

<u>4</u>	<u>18</u>	% of C	<u>9</u>
2			

III. Crystallinity of Chlorite

Moderate to poor

IV. Summary

Parts in 10

Montmorillonite

<u>15</u> %	<u>1+</u>
-------------	-----------

Illite

<u>36</u> %	<u>4-</u>
-------------	-----------

Chlorite

<u>40</u> %	<u>4</u>
-------------	----------

Kaolinite

<u>9</u> %	<u>1-</u>
------------	-----------

Mixed layered

_____ %	_____
---------	-------

Sample DMB-14 #12

Location Wiscasset

1. Glycolated Slide

A. Montmorillonite (50) _____

$$\frac{192}{3} \quad \frac{64}{1} \quad \frac{83}{1} \%$$

B. Illite (8.8°)

13 17 %

C. Chlorite-vermiculite
and Kaolinite (12.5%) _____

Trans _____

D. Mixed layered material

2

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3%) _____ % of C Trace

Kaolinite (24.9°) 2 % of C

2

III. Crystallinity of Chlorite

IV. Summary

Parts in 10

Montmorillonite 83 % 8+

Illite 17 ²/₁₀ 2-

Chlorite tr. % Trace

Kaolinite _____%

Mixed layered _____% _____

Sample DMB-11 #11Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (50°)

_____	_____	_____
_____	<u>139</u>	<u>46</u> <u>43</u> %
_____	3	

B. Illite (8.8°)

_____	_____	_____
_____		<u>25</u> <u>24</u> %

C. Chlorite-vermiculite
and Kaolinite (12.5°)

_____	_____	_____
_____		<u>35</u> <u>33</u> %

D. Mixed layered
material

_____	_____	_____

_____	2	

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

<u>12</u>	<u>86</u>	% of C <u>28</u>
-----------	-----------	------------------

Kaolinite (24.9°)

<u>4</u>	<u>14</u>	% of C <u>5</u>
2		

III. Crystallinity of Chlorite

Moderate

IV. Summary

Parts in 10

Montmorillonite

<u>43</u> %	<u>4+</u>
-------------	-----------

Illite

<u>24</u> %	<u>2+</u>
-------------	-----------

Chlorite

<u>28</u> %	<u>3-</u>
-------------	-----------

Kaolinite

<u>5</u> %	<u>1-</u>
------------	-----------

Mixed layered

_____ %	_____
---------	-------

ample DMB-18 #6 . Location Wisconsin

Glycolated Slide

A. Montmorillonite (5°) _____
_____ 80 27 37 %
_____ 3

B. Illite (8.8°) _____
_____ 27 37 %

C. Chlorite-vermiculite
and Kaolinite (12.5°) _____
_____ 18 26 %

D. Mixed layered
material _____
_____ _____ %
_____ 2

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°) 8 80 % of C 21
Kaolinite (24.9°) 4 20 % of C 5
2

III. Crystallinity of Chlorite Moderate

IV. Summary

Parts in 10

Montmorillonite	<u>37</u> %	<u>4-</u>
Illite	<u>37</u> %	<u>4-</u>
Chlorite	<u>21</u> %	<u>2+</u>
Kaolinite	<u>5</u> %	<u>1-</u>
Mixed layered	_____ %	_____

Sample DMB-19 #4Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

_____	_____	_____	_____
_____	<u>218</u>	<u>73</u>	<u>51</u> %
_____	3		

B. Illite (8.8°)

_____	_____	_____	_____
_____		<u>30</u>	<u>21</u> %

C. Chlorite-vermiculite
and Kaolinite (12.5°)

_____	_____	_____	_____
_____		<u>39</u>	<u>28</u> %

D. Mixed layered
material

_____	_____	_____	_____

_____	2		

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

<u>11</u>	<u>85</u>	% of C	<u>24</u>
-----------	-----------	--------	-----------

Kaolinite (24.9°)

<u>4</u>	<u>15</u>	% of C	<u>4</u>
2			

III. Crystallinity of Chlorite

Moderate

IV. Summary

Parts in 10

Montmorillonite

<u>51</u> %	<u>5+</u>
-------------	-----------

Illite

<u>21</u> %	<u>2+</u>
-------------	-----------

Chlorite

<u>27</u> %	<u>2+</u>
-------------	-----------

Kaolinite

<u>4</u> %	<u>1-</u>
------------	-----------

Mixed layered

_____ %	_____
---------	-------

Sample DMB-20 # 6Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°) 29839971%B. Illite (8.8°) 1913%C. Chlorite-vermiculite
and Kaolinite (12.5°) 2216%D. Mixed layered
material 2%

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)663

% of C

10Kaolinite (24.9°)737

% of C

62

III. Crystallinity of Chlorite

Moderate to poor

IV. Summary

Parts in 10

Montmorillonite

71 %7+

Illite

13 %1+

Chlorite

10 %1

Kaolinite

6 %1-

Mixed layered

 %

Sample DMB-22 #3Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

_____	_____	_____	_____
_____	<u>41</u>	<u>14</u>	<u>16</u> %
_____	3		

B. Illite (8.8°)

_____	_____	_____	_____
_____		<u>43</u>	<u>48</u> %

C. Chlorite-vermiculite
and Kaolinite (12.5°)

_____	_____	_____	_____
_____		<u>32</u>	<u>36</u> %

D. Mixed layered
material

_____	_____	_____	_____

_____	2		

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

<u>8</u>	<u>100</u>	% of C	<u>36</u>
----------	------------	--------	-----------

Kaolinite (24.9°)

<u>0</u>		% of C	<u>0</u>
----------	--	--------	----------

III. Crystallinity of Chlorite

Moderate to weak

IV. Summary

Parts in 10

Montmorillonite

<u>16</u> %	<u>2-</u>
-------------	-----------

Illite

<u>48</u> %	<u>5-</u>
-------------	-----------

Chlorite

<u>36</u> %	<u>4-</u>
-------------	-----------

Kaolinite

<u>-</u> %	
------------	--

Mixed layered

<u>-</u> %	
------------	--

Appendix 3.5-30

**Forest County Soil Data Sheets
Source: USDA-SCS Section IIA
Technical Guide, June 13, 1994, Draft**

SECTION II-A

SOIL LEGEND

FOREST COUNTY, WISCONSIN

Map Symbol	Map Unit Name
2	FORDUM LOAM, 0 TO 2 PERCENT SLOPES
17	CAPITOLA MUCK, 0 TO 2 PERCENT SLOPES, VERY STONY
18B	MUDLAKE SILT LOAM, 1 TO 6 PERCENT SLOPES, VERY STONY
19B	WABENO-MUDLAKE SILT LOAMS, 1 TO 15 PERCENT SLOPES, VERY STONY
19D	SOPERTON-MUDLAKE SILT LOAMS, 1 TO 35 PERCENT SLOPES, VERY STONY
20B	WABENO-GOODWIT SILT LOAMS, 1 TO 6 PERCENT SLOPES, VERY STONY
20C	WABENO-GOODMAN SILT LOAMS, 6 TO 15 PERCENT SLOPES, VERY STONY
20D	SOPERTON-GOODMAN SILT LOAMS, 15 TO 35 PERCENT SLOPES, VERY STONY
22B	ARGONNE-SARWET SANDY LOAMS, 1 TO 6 PERCENT SLOPES, VERY STONY
22C	LAONA-SARONA SANDY LOAMS, 6 TO 15 PERCENT SLOPES, VERY STONY
22D	LAONA-SARONA SANDY LOAMS, 15 TO 35 PERCENT SLOPES, VERY STONY
23D	METONGA-ROCK OUTCROP COMPLEX, 4 TO 60 PERCENT SLOPES, VERY STONY
26E	PELLISSIER GRAVELLY SANDY LOAM, 20 TO 45 PERCENT SLOPES, STONY
27	MINOCQUA MUCK, 0 TO 2 PERCENT SLOPES
30D	RUBICON LOAMY SAND, 15 TO 35 PERCENT SLOPES
51B	PADUS-WABENO SILT LOAMS, 1 TO 6 PERCENT SLOPES, VERY STONY
51C	PADUS-WABENO SILT LOAMS, 6 TO 15 PERCENT SLOPES, VERY STONY
51D	PADUS-SOPERTON, SILT LOAMS, 15 TO 35 PERCENT SLOPES, VERY STONY
100B	STAMBAUGH SILT LOAM, 0 TO 6 PERCENT SLOPES
100C	STAMBAUGH SILT LOAM, 6 TO 15 PERCENT SLOPES
100D	STAMBAUGH SILT LOAM, 15 TO 25 PERCENT SLOPES
103A	WHISKLAKE SILT LOAM, 0 TO 3 PERCENT SLOPES

SECTION II-A

SOIL LEGEND

FOREST COUNTY, WISCONSIN

Map Symbol	Map Unit Name
103X	WORMET SANDY LOAM, 0 TO 3 PERCENT SLOPES
105B	PADUS SANDY LOAM, 0 TO 6 PERCENT SLOPES
105C	PADUS SANDY LOAM, 6 TO 15 PERCENT SLOPES
105D	PADUS SANDY LOAM, 15 TO 35 PERCENT SLOPES
106B	PADUS-PENCE SANDY LOAMS, 0 TO 6 PERCENT SLOPES
106C	PADUS-PENCE SANDY LOAMS, 6 TO 15 PERCENT SLOPES
106D	PADUS-PENCE SANDY LOAMS, 15 TO 35 PERCENT SLOPES
107B	PENCE-VILAS COMPLEX, 0 TO 6 PERCENT SLOPES
107C	PENCE-VILAS COMPLEX, 6 TO 15 PERCENT SLOPES
107D	PENCE-VILAS COMPLEX, 15 TO 35 PERCENT SLOPES
109B	VANZILE SILT LOAM, 0 TO 6 PERCENT SLOPES
111B	PENCE SANDY LOAM, 0 TO 6 PERCENT SLOPES
111C	PENCE SANDY LOAM, 6 TO 15 PERCENT SLOPES
111D	PENCE SANDY LOAM, 15 TO 35 PERCENT SLOPES
113A	MANITOWISH SANDY LOAM, 0 TO 3 PERCENT SLOPES
115B	VILAS LOAMY SAND, 0 TO 6 PERCENT SLOPES
115C	VILAS LOAMY SAND, 6 TO 15 PERCENT SLOPES
117A	TIPLER SANDY LOAM, 0 TO 3 PERCENT SLOPES
117X	PADWOOD SANDY LOAM, 0 TO 6 PERCENT SLOPES
124	KINROSS MUCK, 0 TO 2 PERCENT SLOPES
126A	AU GRES LOAMY SAND, 0 TO 2 PERCENT SLOPES
126X	FLINK LOAMY SAND, 0 TO 3 PERCENT SLOPES
127B	CROSWELL LOAMY SAND, 0 TO 3 PERCENT SLOPES

SECTION II-A

SOIL LEGEND

FOREST COUNTY, WISCONSIN

Map Symbol	Map Unit Name
127X	CUBLAKE LOAMY SAND, 0 TO 3 PERCENT SLOPES
150B	FENCE SILT LOAM, 0 TO 6 PERCENT SLOPES
151A	GAASTRA SILT LOAM, 0 TO 3 PERCENT SLOPES
403A	WORCESTER SANDY LOAM, 0 TO 3 PERCENT SLOPES
707	LUPTON, CATHRO, AND MARKEY MUCKS, 0 TO 1 PERCENT SLOPES
714	LOXLEY, BESEMAN, AND DAWSON PEATS, 0 TO 1 PERCENT SLOPES
Pt	PITS, GRAVEL
ZZ901	WATER LESS THAN 40 ACRES

05/27/92

Nearly level, poorly drained and very poorly drained soil formed primarily in loamy alluvium over sand and gravelly sand. This map unit is not highly erodible. The land capability classification is 4W. This map unit is hydric.

Component Name: FORDUM

Classification: MOLLIC FLUVAQUENTS, COARSE-LOAMY, MIXED, NONACID, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay %	
		Unified	AASHTO			No. 4	No.10	No.40	No.200	<.002 mm	
0- 6	L	ML CL SM SC	A-4 A-6 A-2	0	0-15	35-100	25-100	20-100	15- 90	10-23	
6-26	SIL FSL GR-L	SM SC ML CL	A-2 A-4 A-1	0	0-15	35-100	25-100	20-100	10- 90	8-18	
26-60	S LFS GR-FS	SP SM GP SM	A-3 A-2 A-1	0	0-15	35-100	25-100	7- 95	1- 50	2- 5	
Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 6	20-35	3-15	1.4-1.5	0.6-2.	0.17-0.24	5.6-8.4	1- 1	-	4.-12.	LOW	0.24
6-26	15-30	3-10	1.4-1.5	0.6-6.	0.1-0.22	5.6-8.4	1- 2	-	1.-12.	LOW	0.43
26-60	-	NP	1.5-1.7	6.-20.	0.04- 0.1	5.6-8.4	0- 1	-	1.-12.	LOW	0.15
----- Wind Risk of Corrosion Potential											
----- Flooding-----			---- Water Table-(feet) ---			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost	
Frequency Duration		Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel	Concrete	Action

OCCASIONA LONG		MAR-JUN	+1-1.0	APPARENT	YEAR-ROUND	>60	D	4	0	HIGH	HIGH

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)		
Septic Tank Absorption Fields		SEVERE	Flooding	Ponding	Poor Filter
Daily Cover for Landfill		POOR	Seepage	Too Sandy	Ponding
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)		
Shallow Excavations		SEVERE	Cutbanks Cave	Ponding	
Dwellings Without Basements		SEVERE	Flooding	Ponding	
Dwellings With Basements		SEVERE	Flooding	Ponding	
Small Commercial Buildings		SEVERE	Flooding	Ponding	
Local Streets and Roads		SEVERE	Ponding	Flooding	Frost Action
Lawns, Landscaping, and Golf Fairways		SEVERE	Small Stones	Ponding	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)		
Roadfill		POOR	Wetness		
Sand		PROBABLE			
Gravel		IMPROBABLE	Too Sandy		
Topsoil		POOR	Small Stones	Wetness	
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)		
Pond Reservoir Area		SEVERE	Seepage		
Embankments, Dikes and Levees		SEVERE	Seepage	Piping	Ponding
Drainage		LIMITATION	Ponding	Flooding	Frost Action
Irrigation		LIMITATION	Ponding	Droughty	Flooding
Terraces and Diversions		LIMITATION	Erodes Easily	Ponding	Too Sandy
Grassed Waterways		LIMITATION	Wetness	Erodes Easily	Droughty

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)		
Camp Areas	SEVERE	Flooding	Small Stones	Ponding
Picnic Areas	SEVERE	Ponding	Small Stones	
Playgrounds	SEVERE	Small Stones	Ponding	
Paths and Trails	SEVERE	Ponding	Small Stones	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
-----	-----	-----	-----	-----	-----	-----	-----	-----

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	(E) SITE INDEX	WOODLAND PRODUCT- IVITY
2W	SLIGHT	SEVERE	SEVERE	SEVERE	SEVERE		balsam fir tamarack white spruce black spruce northern whitecedar red maple silver maple white ash	E E E E E EP EP EP	80 2

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level, poorly drained and very poorly drained soil formed in silty deposits and in the underlying loamy or sandy glacial till. This map unit is not highly erodible. The land capability classification is 6W. This map unit is prime farmland where drained and stones removed. This map unit is hydric.

Component Name: CABLE, STONY

Classification: TYPIC HAPLAQUEPTS, COARSE-LOAMY, MIXED, NONACID, FRIGID

ESTIMATED SOIL PROPERTIES

	Classification					>10	3-10	Percent < 3 in. passing sieve				Clay %	
Depth	USDA Texture	Unified			AASHTO	In.	Inches	No 4	No.10	No.40	No.200	<.002 mm	

0- 3	SIL	CL	CL-ML	SC	SC-SM	A-4	-	25-50	75-100	75-100	60-100	35- 90	12-16
3-37	SIL L FSL	SM	SC	ML	CL	A-2 A-4	-	0-25	75-100	75-100	50-100	30- 90	8-18
37-60	SL GR-SL GR-LS	SM	GM	ML	CL-ML	A-2 A-1 A-4	-	0-25	65-100	60-100	40- 90	15- 60	5-10

	Liquid	Plas-	Moist		Perme-	Available	Soil	CEC	CaCO3	Organic	Shrink	Erosion	
Depth	Limit	ticity	Bulk	Density	ability	Water Capacity	Reaction	(me/		Matter	Swell	Factor	
(In)		Index	g/cc		In/hr	(In./in)	(pH)	100g)	Pct	Pct	Potential	K	

0- 3	15-26	5-10	1.1-1.4		0.2-2.	0.1- 0.2	4.5-7.3	-	-	3.- 7.	LOW	0.37	
3-37	<33	NP-10	1.4-1.5		0.2-2.	0.1-0.22	4.5-7.3	-	-	-	LOW	0.37	
37-60	<23	NP-6	1.7-1.9		0.2-0.6	0.03-0.13	5.1-7.8	-	-	-	LOW	0.28	

									Wind	Risk of Corrosion		Potential	
Flooding-----			--- Water Table-(feet) ---			Bedrock-(in)	HYD	T	Erod.	Uncoated	Frost		
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Index	Steel	Concrete	Action

NONE	-	-	+1-1.0	APPARENT	YEAR-ROUND	>60		B/D	5	0	HIGH	HIGH	HIGH

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Ponding	Perchs Slowly
Daily Cover for Landfill		POOR	Small Stones	Ponding
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Ponding	
Dwellings Without Basements		SEVERE	Ponding	
Dwellings With Basements		SEVERE	Ponding	
Small Commercial Buildings		SEVERE	Ponding	
Local Streets and Roads		SEVERE	Ponding	Frost Action
Lawns, Landscaping, and Golf Fairways		SEVERE	Large Stones	Ponding
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		POOR	Wetness	
Sand		IMPROBABLE	Excess Fines	
Gravel		IMPROBABLE	Excess Fines	
Topsoil		POOR	Area Reclaim	Small Stones Wetness
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		MODERATE	Seepage	
Embankments, Dikes and Levees		SEVERE	Piping	Ponding
Drainage		LIMITATION	Ponding	Frost Action
Irrigation		LIMITATION	Large Stones	Ponding Droughty
Terraces and Diversions		LIMITATION	Large Stones	Erodes Easily Ponding
Grassed Waterways		LIMITATION	Large Stones	Wetness Erodes Easily

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Ponding
Picnic Areas	SEVERE	Ponding
Playgrounds	SEVERE	Ponding
Paths and Trails	SEVERE	Ponding

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
								2.5

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
2X	SLIGHT	SEVERE	SEVERE	SEVERE	SEVERE		white ash black ash quaking aspen balsam fir red maple white spruce black spruce	E E E EP EP EP EP	48 56 2

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, somewhat poorly drained soil formed in silty deposits and in the underlying loamy or sandy glacial till. This map unit is not highly erodible. The land capability classification is 6S. It is 2W where stones are removed. This map unit is prime farmland where drained and stones removed. This map unit may have hydric inclusions.

Component Name: MONICO, STONY

Classification: ENTIC HAPLAQUODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No. 4	No.10	No.40	No.200	
0- 6	SIL	ML CL-ML SM SC-SM	A-4	15-40	25-50	75-100	70-100	60-100	40- 90	8-15
6-32	FSL GR-L SIL	SM SC ML CL	A-4 A-2-4	0-15	0-25	65-100	60-100	50- 95	30- 85	3-18
32-38	SL GR-SL LS	SM GM GM-GC	A-2 A-1	0-15	0-25	60-100	60-100	30- 85	13- 35	2- 8
38-60	GR-LS LS GR-SL	SM GM GM-GC	A-2 A-1	0-15	0-25	60-100	60-100	30- 85	13- 35	2- 8

Depth (In)	Liquid Limit	Plas- ticity Index	Moist Bulk Density g/cc	Perme- ability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/ 100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 6	<35	NP-7	1.1-1.4	0.6-2.	0.09- 0.2	4.5-6.5	0- 1	-	1.- 4.	LOW	0.37
6-32	<35	NP-10	1.6-1.8	0.6-2.	0.06-0.19	4.5-6.5	0- 1	-	0.5- 1.	LOW	0.24
32-38	<20	NP-4	1.7-1.8	0.6-2.	0.04-0.12	5.1-7.3	0- 0	-	0.-0.5	LOW	0.17
38-60	<20	NP-4	1.7-1.8	0.6-2.	0.04-0.12	5.1-7.3	0- 0	-	0.-0.5	LOW	0.1

Flooding		Water Table-(feet)			Bedrock-(in)		HYD T		Wind Erod.		Risk of Corrosion		Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Index	Uncoated Steel	Concrete	Frost Action
NONE	-	-	1.0-3.0	PERCHED	NOV-MAY	>60		C	5	0	MODERATE	HIGH	HIGH

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Wetness	
Daily Cover for Landfill		POOR	Small Stones	Wetness
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Wetness
Dwellings Without Basements		SEVERE	Wetness	
Dwellings With Basements		SEVERE	Wetness	
Small Commercial Buildings		SEVERE	Wetness	
Local Streets and Roads		SEVERE	Frost Action	
Lawns, Landscaping, and Golf Fairways		SEVERE	Large Stones	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		FAIR	Large Stones	Wetness
Sand		IMPROBABLE	Excess Fines	
Gravel		IMPROBABLE	Excess Fines	
Topsoil		POOR	Small Stones	Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		MODERATE	Seepage	Slope
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Frost Action	Slope
Irrigation		LIMITATION	Slope	Large Stones
Terraces and Diversions		LIMITATION	Large Stones	Wetness
Grassed Waterways		LIMITATION	Large Stones	Wetness
				Cutbanks Cave
				Too Sandy
				Droughty

RECREATIONAL DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Camp Areas		SEVERE	Wetness	
Picnic Areas		MODERATE	Wetness	Small Stones
Playgrounds		SEVERE	Small Stones	Wetness
Paths and Trails		MODERATE	Large Stones	Wetness

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
								2.7

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3X	SLIGHT	MODERATE	SLIGHT	MODERATE	MODERATE		sugar maple yellow birch American basswood red maple white ash white spruce black spruce eastern white pine	E E E EP EP P P P	63 3

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road, Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level to gently sloping, moderately well drained soil formed in silty deposits and in the underlying loamy or sandy glacial till; and nearly level and gently sloping, somewhat poorly drained soil formed in silty deposits and in the underlying loamy or sandy glacial till. This map unit is potentially highly erodible. The land capability classification is 6S. It is 3E where stones are removed. This map unit may have hydric inclusions.

Component Name: WABENO, MODERATELY W

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC FRAGIORTHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No 4	No.10	No.40	No.200	
0- 6	SIL	ML CL-ML	A-4	1-5	5-20	90-100	85-100	75-100	60- 90	3-10
6-27	SIL L FSL	ML CL-ML SM SC-SM	A-4	0-5	0-20	90-100	85-100	60-100	35- 90	4-12
27-47	SL GR-SL LS	SM SC SP-SM SC-SM	A-1 A-2	0-5	0-30	70-100	65- 95	30- 65	10- 35	6-16
47-60	LS SL GR-LS	SM SC-SM SP-SM	A-1 A-2	0-5	0-30	70- 90	65- 90	30- 65	10- 25	3-10

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 6	<25	NP-6	1.2-1.5	0.6-2.	0.14-0.23	3.6- 6.	0- 1	-	1.- 2.	LOW	0.37
6-27	<25	NP-7	1.3-1.5	0.6-2.	0.17-0.24	3.6- 6.	0- 1	-	0.5- 1.	LOW	0.43
27-47	<30	NP-10	1.8- 2.	0.2-0.6	0.08-0.12	3.6- 6.	0- 1	-	0.-0.5	LOW	0.28
47-60	<23	NP-6	1.8- 2.	0.6-2.	0.03-0.05	4.5-6.5	0- 1	-	0.-0.5	LOW	0.28

Flooding			Water Table-(feet)			Bedrock-(in)	HYD	T	Erod.	Wind	Risk of Corrosion	Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact. Index	Steel	Concrete	Frost Action
NONE	-	-	1.5-3.5	PERCHED	NOV-JUN	>60		B	4	48	MODERATE HIGH	MODERATE

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)
Septic Tank Absorption Fields	SEVERE	Wetness
Daily Cover for Landfill	POOR	Small Stones

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Shallow Excavations	SEVERE	Cutbanks Cave
Dwellings Without Basements	MODERATE	Wetness
Dwellings With Basements	SEVERE	Wetness
Small Commercial Buildings	SEVERE	Slope
Local Streets and Roads	MODERATE	Wetness
Lawns, Landscaping, and Golf Fairways	MODERATE	Large Stones

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)
Roadfill	FAIR	Large Stones
Sand	IMPROBABLE	Excess Fines
Gravel	IMPROBABLE	Excess Fines
Topsoil	POOR	Large Stones

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)
Pond Reservoir Area	SEVERE	Slope
Embankments, Dikes and Levees	SEVERE	Seepage
Drainage	LIMITATION	Large Stones
Irrigation	LIMITATION	Slope
Terraces and Diversions	LIMITATION	Slope
Grassed Waterways	LIMITATION	Large Stones

RECREATIONAL DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)		
Camp Areas		MODERATE	Slope	Large Stones	Wetness
Picnic Areas		MODERATE	Slope	Wetness	Large Stones
Playgrounds		SEVERE	Large Stones	Slope	
Paths and Trails		MODERATE	Large Stones	Wetness	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
								2.2
								2.7

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3L	SLIGHT	MODERATE	SLIGHT	MODERATE	MODERATE		sugar maple yellow birch white ash American basswood eastern hemlock white spruce red pine	E E E E E P P	3 3 5 5 56

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level to gently sloping, moderately well drained soil formed in silty deposits and in the underlying loamy or sandy glacial till; and nearly level and gently sloping, somewhat poorly drained soil formed in silty deposits and in the underlying loamy or sandy glacial till. This map unit is potentially highly erodible. The land capability classification is 6S. It is 3E where stones are removed. This map unit may have hydric inclusions.

Component Name: MONICO, STONY

This map unit has 2 components, and 2 interpretation sheet.

Classification: ENTIC HAPLAQUODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification				>10	3-10	Percent < 3 in. passing sieve				Clay %
Depth	USDA Texture	Unified		AASHTO		In.	Inches	No 4	No.10	No.40	No.200	<.002 mm
0- 6	SIL	ML CL-ML	SM SC-SM	A-4		15-40	25-50	75-100	70-100	60-100	40- 90	8-15
6-32	FSL GR-L SIL	SM SC	ML CL	A-4 A-2-4		0-15	0-25	65-100	60-100	50- 95	30- 85	3-18
32-38	SL GR-SL LS	SM GM	GM-GC	A-2 A-1		0-15	0-25	60-100	60-100	30- 85	13- 35	2- 8
38-60	GR-LS LS GR-SL	SM GM	GM-GC	A-2 A-1		0-15	0-25	60-100	60-100	30- 85	13- 35	2- 8
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K	
0- 6	<35	NP-7	1.1-1.4	0.6-2.	0.09- 0.2	4.5-6.5	0- 1	-	1.- 4.	LOW	0.37	
6-32	<35	NP-10	1.6-1.8	0.6-2.	0.06-0.19	4.5-6.5	0- 1	-	0.5- 1.	LOW	0.24	
32-38	<20	NP-4	1.7-1.8	0.6-2.	0.04-0.12	5.1-7.3	0- 0	-	0.-0.5	LOW	0.17	
38-60	<20	NP-4	1.7-1.8	0.6-2.	0.04-0.12	5.1-7.3	0- 0	-	0.-0.5	LOW	0.1	
								Wind	Risk of Corrosion		Potential	
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost		
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP Fact.	Steel	Concrete	Action	
NONE	-	-	1.0-3.0	PERCHED	NOV-MAY	>60		C 5 0	MODERATE HIGH		HIGH	

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields	SEVERE	Wetness	
Daily Cover for Landfill	POOR	Small Stones	Wetness

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations	SEVERE	Cutbanks Cave	Wetness
Dwellings Without Basements	SEVERE	Wetness	
Dwellings With Basements	SEVERE	Wetness	
Small Commercial Buildings	SEVERE	Wetness	
Local Streets and Roads	SEVERE	Frost Action	
Lawns, Landscaping, and Golf Fairways	SEVERE	Large Stones	

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)	
Roadfill	FAIR	Large Stones	Wetness
Sand	IMPROBABLE	Excess Fines	
Gravel	IMPROBABLE	Excess Fines	
Topsoil	POOR	Small Stones	Area Reclaim

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)		
Pond Reservoir Area	MODERATE	Seepage	Slope	
Embankments, Dikes and Levees	SEVERE	Seepage	Piping	
Drainage	LIMITATION	Frost Action	Slope	Cutbanks Cave
Irrigation	LIMITATION	Slope	Large Stones	Wetness
Terraces and Diversions	LIMITATION	Large Stones	Wetness	Too Sandy
Grassed Waterways	LIMITATION	Large Stones	Wetness	Droughty

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Wetness
Picnic Areas	MODERATE	Wetness Small Stones
Playgrounds	SEVERE	Small Stones Wetness
Paths and Trails	MODERATE	Large Stones Wetness

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
								2.2
								2.7

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or.	WOODLAND SITE INDEX	WOODLAND PRODUCTIVITY
3X	SLIGHT	MODERATE	SLIGHT	MODERATE	MODERATE		TREES RECOMENDED TO PLANT (P)		
							sugar maple	E	63
							yellow birch	E	
							American basswood	E	
							red maple	EP	
							white ash	EP	
							white spruce	P	
							black spruce	P	
							eastern white pine	P	

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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Moderately steep and steep, well drained soil formed in silty deposits and in the underlying loamy or sandy glacial till; and nearly level and gently sloping, somewhat poorly drained soil formed in silty deposits and in the underlying loamy or sandy glacial till. This map unit is highly erodible. The land capability classification is 7S. It is 6E where stones are removed. This map unit may have hydric inclusions.

Component Name: WABENO, WELL DRAINED

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC FRAGIORTHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Classification													
Depth	USDA Texture		Unified		AASHTO		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay %
									No 4	No.10	No.40	No.200	<.002 mm
0- 6	SIL		ML CL-ML		A-4		1-5	5-20	90-100	85-100	75-100	60- 90	3-10
6-27	SIL L FSL		ML CL-ML SM SC-SM		A-4		0-5	0-20	90-100	85-100	60-100	35- 90	4-12
27-47	SL GR-SL LS		SM SC SP-SM SC-SM		A-1 A-2		0-5	0-30	70-100	65- 95	30- 65	10- 35	6-16
47-60	LS SL GR-LS		SM SC-SM SP-SM		A-1 A-2		0-5	0-30	70- 90	65- 90	30- 65	10- 25	3-10
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K		
0- 6	<25	NP-6	1.2-1.5	0.6-2.	0.14-0.23	3.6- 6.	0- 1	-	1.- 2.	LOW	0.37		
6-27	<25	NP-7	1.3-1.5	0.6-2.	0.17-0.24	3.6- 6.	0- 1	-	0.5- 1.	LOW	0.43		
27-47	<30	NP-10	1.8- 2.	0.2-0.6	0.08-0.12	3.6- 6.	0- 1	-	0.-0.5	LOW	0.28		
47-60	<23	NP-6	1.8- 2.	0.6-2.	0.03-0.05	4.5-6.5	0- 1	-	0.-0.5	LOW	0.28		
Wind									Risk of Corrosion		Potential		
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost			
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel	Concrete	Action		
NONE	-	-	>6.0	-	-	>60	B	4 48	MODERATE	HIGH	MODERATE		

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Perchs Slowly	Slope
Daily Cover for Landfill		POOR	Small Stones	Slope
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Slope
Dwellings Without Basements		SEVERE	Slope	
Dwellings With Basements		SEVERE	Slope	
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		SEVERE	Slope	
Lawns, Landscaping, and Golf Fairways		SEVERE	Slope	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		POOR	Slope	
Sand		IMPROBABLE	Excess Fines	
Gravel		IMPROBABLE	Excess Fines	
Topsoil		POOR	Large Stones	Area Reclaim Slope
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Slope	
Embankments, Dikes and Levees		SEVERE	Seepage	
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Large Stones Rooting Depth
Terraces and Diversions		LIMITATION	Slope	Large Stones Erodes Easily
Grassed Waterways		LIMITATION	Large Stones Slope	Erodes Easily

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Camp Areas	SEVERE	Slope	
Picnic Areas	SEVERE	Slope	
Playgrounds	SEVERE	Large Stones	Slope
Paths and Trails	SEVERE	Slope	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
								1.3
								2.7

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3R	MODERATE	MODERATE	SLIGHT	MODERATE	MODERATE	NORTH	sugar maple yellow birch white ash American basswood eastern hemlock white spruce red pine	E 67 E 72 E 78 E 74 E 56 P P	3 3 5 5

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Component Name: MONICO, STONY

This map unit has 2 components, and 2 interpretation sheet.

Classification: ENTIC HAPLAQUODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Classification													
Depth	USDA Texture	Unified		AASHTO		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay %	
								No. 4	No.10	No.40	No.200	<.002 mm	
0- 6	SIL	ML CL-ML	SM SC-SM	A-4		15-40	25-50	75-100	70-100	60-100	40- 90	8-15	
6-32	FSL GR-L SIL	SM SC ML CL		A-4 A-2-4		0-15	0-25	65-100	60-100	50- 95	30- 85	3-18	
32-38	SL GR-SL LS	SM GM GM-GC		A-2 A-1		0-15	0-25	60-100	60-100	30- 85	13- 35	2- 8	
38-60	GR-LS LS GR-SL	SM GM GM-GC		A-2 A-1		0-15	0-25	60-100	60-100	30- 85	13- 35	2- 8	
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K		
0- 6	<35	NP-7	1.1-1.4	0.6-2.	0.09- 0.2	4.5-6.5	0- 1	-	1.- 4.	LOW	0.37		
6-32	<35	NP-10	1.6-1.8	0.6-2.	0.06-0.19	4.5-6.5	0- 1	-	0.5- 1.	LOW	0.24		
32-38	<20	NP-4	1.7-1.8	0.6-2.	0.04-0.12	5.1-7.3	0- 0	-	0.-0.5	LOW	0.17		
38-60	<20	NP-4	1.7-1.8	0.6-2.	0.04-0.12	5.1-7.3	0- 0	-	0.-0.5	LOW	0.1		
Flooding			Water Table-(feet)			Bedrock-(in)	HYD	T	Erod.	Risk of Corrosion		Potential	
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Index	Uncoated Steel	Concrete	Frost Action
NONE	-	-	1.0-3.0	PERCHED	NOV-MAY	>60		C	5	0	MODERATE	HIGH	HIGH

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Wetness	
Daily Cover for Landfill		POOR	Small Stones	Wetness
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Wetness
Dwellings Without Basements		SEVERE	Wetness	
Dwellings With Basements		SEVERE	Wetness	
Small Commercial Buildings		SEVERE	Wetness	
Local Streets and Roads		SEVERE	Frost Action	
Lawns, Landscaping, and Golf Fairways		SEVERE	Large Stones	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		FAIR	Large Stones	Wetness
Sand		IMPROBABLE	Excess Fines	
Gravel		IMPROBABLE	Excess Fines	
Topsoil		POOR	Small Stones	Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		MODERATE	Seepage	Slope
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Frost Action	Slope
Irrigation		LIMITATION	Slope	Large Stones
Terraces and Diversions		LIMITATION	Large Stones	Wetness
Grassed Waterways		LIMITATION	Large Stones	Wetness

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)		
Camp Areas	SEVERE	Wetness		
Picnic Areas	MODERATE	Wetness	Small Stones	
Playgrounds	SEVERE	Small Stones	Wetness	
Paths and Trails	MODERATE	Large Stones	Wetness	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
								1.3
								2.7

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or	WOODLAND SITE	PRODUCT- IVITY
							TREES RECOMENDED TO PLANT (P)	INDEX	
3X	SLIGHT	MODERATE	SLIGHT	MODERATE	MODERATE		sugar maple	E 63	3
							yellow birch	E	
							American basswood	E	
							red maple	EP	
							white ash	EP	
							white spruce	P	
							black spruce	P	
							eastern white pine	P	

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, moderately well drained soils formed in silty deposits and in the underlying loamy or sandy glacial till. This map unit is potentially highly erodible. The land capability classification is 6S. It is 2E where stones are removed. This map unit is prime farmland where stones are removed.

Component Name: GOODMAN, STONY, MODER

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC HAPLORHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Unified	Classification	AASHTO	>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
No. 4	No.10	No.40	No.200								
0-3	SIL	ML CL-ML	A-4		1-3	0-10	90-100	85-100	85-100	75-100	5-12
3-5	SIL SI	ML	A-4		1-3	0-10	90-100	85-100	85-100	75-100	4-10
5-19	SIL	ML CL-ML	A-4		1-5	0-10	90-100	85-100	70-100	60-90	8-14
19-25	SIL SI	ML CL-ML	A-4		1-5	0-10	90-100	85-100	70-100	60-90	8-14
25-45	FSL GR-LS L	ML CL-ML SM SP-SM	A-4 A-1-B A-2-4		2-10	0-10	65-100	55-95	20-90	8-75	2-12
45-60	SL FSL GR-LS	SC-SM SM SP-SM	A-4 A-1-B A-2-4		2-10	0-10	65-100	55-95	20-85	8-50	2-12

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0-3	<23	NP-6	1.4-1.5	0.6-2.	0.19-0.24	3.6-6.5	0-1	-	2-4.	LOW	0.37
3-5	<21	NP-4	1.5-1.6	0.6-2.	0.18-0.24	3.6-6.5	0-1	-	0.5-1.	LOW	0.43
5-19	<25	NP-7	1.5-1.6	0.6-2.	0.17-0.22	3.6-6.5	0-1	-	0-0.5	LOW	0.43
19-25	<25	NP-7	1.5-1.6	0.6-2.	0.17-0.22	3.6-6.5	0-1	-	0-0.5	LOW	0.43
25-45	<23	NP-6	1.5-1.7	0.6-2.	0.05-0.18	3.6-6.5	0-1	-	0-0.5	LOW	0.28
45-60	<23	NP-6	1.5-1.8	0.6-2.	0.05-0.16	5.1-6.5	0-1	-	0-0.5	LOW	0.28

Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRF	Fact.	Index	Steel	Concrete	Potential
NONE	-	-	2.0-3.0	PERCHED	NOV-MAY	>60		B	5	0	LOW	HIGH	MODERATE

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)
Septic Tank Absorption Fields	SEVERE	Wetness
Daily Cover for Landfill	POOR	Seepage

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Shallow Excavations	SEVERE	Cutbanks Cave
Dwellings Without Basements	MODERATE	Wetness
Dwellings With Basements	SEVERE	Wetness
Small Commercial Buildings	MODERATE	Wetness
Local Streets and Roads	MODERATE	Wetness
Lawns, Landscaping, and Golf Fairways	MODERATE	Large Stones

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)
Roadfill	FAIR	Wetness
Sand	PROBABLE	
Gravel	PROBABLE	
Topsoil	POOR	Small Stones

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)
Pond Reservoir Area	MODERATE	Seepage
Embankments, Dikes and Levees	SEVERE	Seepage
Drainage	LIMITATION	Slope
Irrigation	LIMITATION	Slope

3.5-30-18

Rooting Depth

RECREATIONAL DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Camp Areas		MODERATE	Wetness	
Picnic Areas		MODERATE	Wetness	
Playgrounds		MODERATE	Large Stones	Slope Small Stones
Paths and Trails		SEVERE	Erodes Easily	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
								3.2
								2.5

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or	WOODLAND SITE	PRODUCT- IVITY
							TREES RECOMENDED TO PLANT (P)	INDEX	
3X	SLIGHT	MODERATE	SLIGHT	MODERATE	SEVERE	NORTH	sugar maple	E 69	3
							yellow birch	E	
							paper birch	E	
							bigtooth aspen	E	
							quaking aspen	E	
							American basswood	E 68	3
							white spruce	P	
							red pine	P	
							eastern white pine	P	

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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Nearly level and gently sloping, moderately well drained soils formed in silty deposits and in the underlying loamy or sandy glacial till. This map unit is potentially highly erodible. The land capability classification is 6S. It is 2E where stones are removed. This map unit is prime farmland where stones are removed.

Component Name: WABENO, MODERATELY W

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC FRAGIORTHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay %	
		Unified	AASHTO			No 4	No.10	No.40	No.200	<.002 mm	
0- 6	SIL	ML CL-ML	A-4	1-5	5-20	90-100	85-100	75-100	60- 90	3-10	
6-27	SIL L FSL	ML CL-ML SM SC-SM	A-4	0-5	0-20	90-100	85-100	60-100	35- 90	4-12	
27-47	SL GR-SL LS	SM SC SP-SM SC-SM	A-1 A-2	0-5	0-30	70-100	65- 95	30- 65	10- 35	6-16	
47-60	LS SL GR-LS	SM SC-SM SP-SM	A-1 A-2	0-5	0-30	70- 90	65- 90	30- 65	10- 25	3-10	

Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 6	<25	NP-6	1.2-1.5	0.6-2.	0.14-0.23	3.6- 6.	0- 1	-	1.- 2.	LOW	0.37
6-27	<25	NP-7	1.3-1.5	0.6-2.	0.17-0.24	3.6- 6.	0- 1	-	0.5- 1.	LOW	0.43
27-47	<30	NP-10	1.8- 2.	0.2-0.6	0.08-0.12	3.6- 6.	0- 1	-	0.-0.5	LOW	0.28
47-60	<23	NP-6	1.8- 2.	0.6-2.	0.03-0.05	4.5-6.5	0- 1	-	0.-0.5	LOW	0.28

Flooding			Water Table-(feet)			Bedrock-(in)		HYD T Erod.		Risk of Corrosion		Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact. Index	Steel	Concrete	Frost Action
NONE	-	-	1.5-3.5	PERCHED	NOV-JUN	>60		B	4 48	MODERATE	HIGH	MODERATE

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Wetness	Percs Slowly
Daily Cover for Landfill		POOR	Small Stones	

BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Wetness
Dwellings Without Basements		MODERATE	Wetness	Large Stones
Dwellings With Basements		SEVERE	Wetness	
Small Commercial Buildings		MODERATE	Wetness	Large Stones
Local Streets and Roads		MODERATE	Wetness	Frost Action
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	Wetness

CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		FAIR	Large Stones	Wetness
Sand		IMPROBABLE	Excess Fines	
Gravel		IMPROBABLE	Excess Fines	
Topsoil		POOR	Large Stones	Area Reclaim

WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		MODERATE	Seepage	Slope
Dike, Dams, Dikes and Levees		SEVERE	Seepage	
Drainage		LIMITATION	Large Stones	Slope Cutbanks Cave
Irrigation		LIMITATION	Slope	Large Stones Wetness
Terraces and Diversions		LIMITATION	Large Stones	Erodes Easily
Grassed Waterways		LIMITATION	Large Stones	Erodes Easily

RECREATIONAL DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Camp Areas		MODERATE	Large Stones	Wetness
Picnic Areas		MODERATE	Wetness	Large Stones
Playgrounds		SEVERE	Large Stones	
Paths and Trails		MODERATE	Large Stones	Wetness

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
								3.2
								2.5

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3L	SLIGHT	MODERATE	SLIGHT	MODERATE	MODERATE	NORTH	sugar maple yellow birch white ash American basswood eastern hemlock white spruce red pine	E 67 E 72 E 78 E 74 E 56 P P	3 3 5 5

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

05/27/92

Sloping, moderately well drained soils formed in silty deposits and in the underlying loamy or sandy glacial till. This map unit is potentially highly erodible. The land capability classification is 6S. It is 3E where stones are removed.

Component Name: GOODMAN, STONY, MODER

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC HAPLORHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No 4	No.10	No.40	No.200	
0- 3	SIL	ML CL-ML	A-4	1-3	0-10	90-100	85-100	85-100	75-100	5-12
3- 5	SIL SI	ML	A-4	1-3	0-10	90-100	85-100	85-100	75-100	4-10
5-19	SIL	ML CL-ML	A-4	1-5	0-10	90-100	85-100	70-100	60- 90	8-14
19-25	SIL SI	ML CL-ML	A-4	1-5	0-10	90-100	85-100	70-100	60- 90	8-14
25-45	FSL GR-LS L	ML CL-ML SM SP-SM	A-4 A-1-B A-2-4	2-10	0-10	65-100	55- 95	20- 90	8- 75	2-12
45-60	SL FSL GR-LS	SC-SM SM SP-SM	A-4 A-1-B A-2-4	2-10	0-10	65-100	55- 95	20- 85	8- 50	2-12

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 3	<23	NP-6	1.4-1.5	0.6-2.	0.19-0.24	3.6-6.5	0- 1	-	2.- 4.	LOW	0.37
3- 5	<21	NP-4	1.5-1.6	0.6-2.	0.18-0.24	3.6-6.5	0- 1	-	0.5- 1.	LOW	0.43
5-19	<25	NP-7	1.5-1.6	0.6-2.	0.17-0.22	3.6-6.5	0- 1	-	0.-0.5	LOW	0.43
19-25	<25	NP-7	1.5-1.6	0.6-2.	0.17-0.22	3.6-6.5	0- 1	-	0.-0.5	LOW	0.43
25-45	<23	NP-6	1.5-1.7	0.6-2.	0.05-0.18	3.6-6.5	0.- 1	-	0.-0.5	LOW	0.28
45-60	<23	NP-6	1.5-1.8	0.6-2.	0.05-0.16	5.1-6.5	0.- 1	-	0.-0.5	LOW	0.28

-----										Wind	Risk of Corrosion	Potential	
Flooding-----			--- Water Table-(feet) ---			Bedrock-(in)	HYD	T	Erod.	Uncoated	Frost		
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Index	Steel	Concrete	Action
-----										-----	-----	-----	
NONE	-	-	2.0-3.0	PERCHED	NOV-MAY	>60		B	5	0	LOW	HIGH	MODERATE

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Wetness	
Daily Cover for Landfill		POOR	Seepage	Small Stones
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Wetness
Dwellings Without Basements		MODERATE	Wetness	Slope
Dwellings With Basements		SEVERE	Wetness	
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		MODERATE	Wetness	Slope Frost Action
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	Slope
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		FAIR	Wetness	
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Small Stones	Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Slope	
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Slope	Cutbanks Cave
Irrigation		LIMITATION	Slope	Wetness Rooting Depth
Terraces and Diversions		LIMITATION	Slope	Erodes Easily Wetness

3.5-30-22

RECREATIONAL DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Camp Areas		MODERATE	Slope	Wetness
Picnic Areas		MODERATE	Slope	Wetness
Playgrounds		SEVERE	Slope	
Paths and Trails		SEVERE	Erodes Easily	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
								3.
								2.2

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3X	SLIGHT	MODERATE	SLIGHT	MODERATE	SEVERE	NORTH	sugar maple yellow birch paper birch bigtooth aspen quaking aspen American basswood white spruce red pine eastern white pine	E E E E E E P P P	69 68 3

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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05/27/92

Sloping, moderately well drained soils formed in silty deposits and in the underlying loamy or sandy glacial till. This map unit is potentially highly erodible. The land capability classification is 6S. It is 3E where stones are removed.

Component Name: WABENO, MODERATELY W

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC FRAGIORTHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No 4	No.10	No.40	No.200	
0-6	SIL	ML CL-ML	A-4	1-5	5-20	90-100	85-100	75-100	60- 90	3-10
6-27	SIL L FSL	ML CL-ML SM SC-SM	A-4	0-5	0-20	90-100	85-100	60-100	35- 90	4-12
27-47	SL GR-SL LS	SM SC SP-SM SC-SM	A-1 A-2	0-5	0-30	70-100	65- 95	30- 65	10- 35	6-16
47-60	LS SL GR-LS	SM SC-SM SP-SM	A-1 A-2	0-5	0-30	70- 90	65- 90	30- 65	10- 25	3-10

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0-6	<25	NP-6	1.2-1.5	0.6-2.	0.14-0.23	3.6- 6.	0- 1	-	1.- 2.	LOW	0.37
6-27	<25	NP-7	1.3-1.5	0.6-2.	0.17-0.24	3.6- 6.	0- 1	-	0.5- 1.	LOW	0.43
27-47	<30	NP-10	1.8- 2.	0.2-0.6	0.08-0.12	3.6- 6.	0- 1	-	0.-0.5	LOW	0.28
47-60	<23	NP-6	1.8- 2.	0.6-2.	0.03-0.05	4.5-6.5	0- 1	-	0.-0.5	LOW	0.28

Flooding		Water Table-(feet)		Bedrock-(in)		HYD	T	Erod.	Uncoated	Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP Fact.	Index	Steel Concrete
NONE	-	-	1.5-3.5	PERCHED	NOV-JUN	>60		B	4	48
										MODERATE HIGH
										MODERATE

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields	SEVERE	Wetness	Percs Slowly
Daily Cover for Landfill	POOR	Small Stones	

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations	SEVERE	Cutbanks Cave	Wetness
Dwellings Without Basements	MODERATE	Wetness	Slope
Dwellings With Basements	SEVERE	Wetness	Large Stones
Small Commercial Buildings	SEVERE	Slope	
Local Streets and Roads	MODERATE	Wetness	Slope
Lawns, Landscaping, and Golf Fairways	MODERATE	Large Stones	Wetness
			Frost Action
			Slope

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)	
Roadfill	FAIR	Large Stones	Wetness
Sand	IMPROBABLE	Excess Fines	
Gravel	IMPROBABLE	Excess Fines	
Topsoil	POOR	Large Stones	Area Reclaim

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area	SEVERE	Slope	
Embankments, Dikes and Levees	SEVERE	Seepage	
Drainage	LIMITATION	Large Stones	Slope
Irrigation	LIMITATION	Slope	Large Stones
Terraces and Diversions	LIMITATION	Slope	Large Stones
Grassed Waterways	LIMITATION	Large Stones	Slope
			Cutbanks Cave
			Wetness
			Erodes Easily
			Erodes Easily

RECREATIONAL DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)		
Camp Areas		MODERATE	Slope	Large Stones	Wetness
Picnic Areas		MODERATE	Slope	Wetness	Large Stones
Playgrounds		SEVERE	Large Stones	Slope	
Paths and Trails		MODERATE	Large Stones	Wetness	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
								3.
								2.2

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or	WOODLAND SITE PRODUCT- INDEX IVITY
3L	SLIGHT	MODERATE	SLIGHT	MODERATE	MODERATE	NORTH	TREES RECOMENDED TO PLANT (P)	
							sugar maple	E 67 3
							yellow birch	E 72 3
							white ash	E 78 5
							American basswood	E 74 5
							eastern hemlock	E 56
							white spruce	P
							red pine	P

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Moderately steep and steep, well drained soils formed in silty deposits and in the underlying loamy or sandy glacial till. This map unit is highly erodible. The land capability classification is 7S. It is 6E where stones are removed.

Component Name: GOODMAN, STONY

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC HAPLORHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No. 4	No.10	No.40	No.200	
0-3	SIL	ML CL-ML	A-4	1-3	0-10	90-100	85-100	85-100	75-100	5-12
3-5	SIL SI	ML	A-4	1-3	0-10	90-100	85-100	85-100	75-100	4-10
5-19	SIL	ML CL-ML	A-4	1-5	0-10	90-100	85-100	70-100	60- 90	8-14
19-25	SIL SI	ML CL-ML	A-4	1-5	0-10	90-100	85-100	70-100	60- 90	8-14
25-45	FSL GR-LS L	ML CL-ML SM SP-SM	A-4 A-1-B A-2-4	2-10	0-10	65-100	55- 95	20- 90	8- 75	2-12
45-60	SL FSL GR-LS	SC-SM SM SP-SM	A-4 A-1-B A-2-4	2-10	0-10	65-100	55- 95	20- 85	8- 50	2-12

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0-3	<23	NP-6	1.4-1.5	0.6-2.	0.19-0.24	3.6-6.5	0- 1	-	2.- 4.	LOW	0.37
3-5	<21	NP-4	1.5-1.6	0.6-2.	0.18-0.24	3.6-6.5	0- 1	-	0.5- 1.	LOW	0.43
5-19	<25	NP-7	1.5-1.6	0.6-2.	0.17-0.22	3.6-6.5	0- 1	-	0.-0.5	LOW	0.43
19-25	<25	NP-7	1.5-1.6	0.6-2.	0.17-0.22	3.6-6.5	0- 1	-	0.-0.5	LOW	0.43
25-45	<23	NP-6	1.5-1.7	0.6-2.	0.05-0.18	3.6-6.5	0.- 1	-	0.-0.5	LOW	0.28
45-60	<23	NP-6	1.5-1.8	0.6-2.	0.05-0.16	5.1-6.5	0.- 1	-	0.-0.5	LOW	0.28

Flooding-----			Water Table-(feet) ---			Bedrock-(in)		HYD	T	Wind	Risk of Corrosion		Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Erod.	Uncoated	Steel	Frost
										Index	Concrete		Action
NONE	-	-	>6.0	-	-	>60		B	5	0	LOW	HIGH	MODERATE

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Slope	
Daily Cover for Landfill		POOR	Seepage	Small Stones

BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Slope
Dwellings Without Basements		SEVERE	Slope	
Dwellings With Basements		SEVERE	Slope	
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		SEVERE	Slope	
Lawns, Landscaping, and Golf Fairways		SEVERE	Slope	

CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		POOR	Slope	
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Small Stones	Area Reclaim

WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Slope	
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Rooting Depth
Terraces and Diversions		LIMITATION	Slope	Erodes Easily

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Slope
Picnic Areas	SEVERE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	SEVERE	Erodes Easily

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
								2.6
								1.3

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3R	SLIGHT	MODERATE	SLIGHT	SLIGHT	SEVERE	NORTH	sugar maple yellow birch paper birch bigtooth aspen quaking aspen American basswood white spruce red pine eastern white pine	E 69 E E E E 68 P P P	3

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Moderately steep and steep, well drained soils formed in silty deposits and in the underlying loamy or sandy glacial till. This map unit is highly erodible. The land capability classification is 7S. It is 6E where stones are removed.

Component Name: WABENO, WELL DRAINED

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC FRAGIORTHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification				>10	3-10	Percent < 3 in. passing sieve				Clay %
Depth	USDA Texture	Unified		AASHTO		In.	Inches	No 4	No.10	No.40	No.200	<.002 mm
-----	-----	-----		-----		-----	-----	-----	-----	-----	-----	-----
0- 6	SIL	ML CL-ML		A-4		1-5	5-20	90-100	85-100	75-100	60- 90	3-10
6-27	SIL L FSL	ML CL-ML SM SC-SM		A-4		0-5	0-20	90-100	85-100	60-100	35- 90	4-12
27-47	SL GR-SL LS	SM SC SP-SM SC-SM		A-1 A-2		0-5	0-30	70-100	65- 95	30- 65	10- 35	6-16
47-60	LS SL GR-LS	SM SC-SM SP-SM		A-1 A-2		0-5	0-30	70- 90	65- 90	30- 65	10- 25	3-10

Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K	
(In)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
0- 6	<25	NP-6	1.2-1.5	0.6-2.	0.14-0.23	3.6- 6.	0- 1	-	1.- 2.	LOW	0.37	
6-27	<25	NP-7	1.3-1.5	0.6-2.	0.17-0.24	3.6- 6.	0- 1	-	0.5- 1.	LOW	0.43	
27-47	<30	NP-10	1.8- 2.	0.2-0.6	0.08-0.12	3.6- 6.	0- 1	-	0.-0.5	LOW	0.28	
47-60	<23	NP-6	1.8- 2.	0.6-2.	0.03-0.05	4.5-6.5	0- 1	-	0.-0.5	LOW	0.28	
-----								Wind	Risk of Corrosion		Potential	
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost		
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel	Concrete	Action	
-----			-----			-----	-----	-----	-----		-----	
NONE	-	-	>6.0	-	-	>60	B	4 48	MODERATE HIGH		MODERATE	

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Percs Slowly	Slope
Daily Cover for Landfill		POOR	Small Stones	Slope
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Slope
Dwellings Without Basements		SEVERE	Slope	
Dwellings With Basements		SEVERE	Slope	
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		SEVERE	Slope	
Lawns, Landscaping, and Golf Fairways		SEVERE	Slope	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		POOR	Slope	
Sand		IMPROBABLE	Excess Fines	
Gravel		IMPROBABLE	Excess Fines	
Topsoil		POOR	Large Stones	Area Reclaim Slope
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Slope	
Embankments, Dikes and Levees		SEVERE	Seepage	
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Large Stones Rooting Depth
Terraces and Diversions		LIMITATION	Slope	Large Stones Erodes Easily
Grassed Waterways		LIMITATION	Large Stones	Slope Erodes Easily

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Camp Areas	SEVERE	Slope	
Picnic Areas	SEVERE	Slope	
Playgrounds	SEVERE	Large Stones	Slope
Paths and Trails	SEVERE	Slope	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
								2.6
								1.3

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3R	MODERATE	MODERATE	SLIGHT	MODERATE	MODERATE	NORTH	sugar maple yellow birch white ash American basswood eastern hemlock white spruce red pine	E 67 E 72 E 78 E 74 E 56 P P	3 3 5 5

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, moderately well drained soils formed in loamy deposits and in the underlying loamy or sandy glacial till. This map unit is not highly erodible. The land capability classification is 6S. It is 2E where stones are removed. This map unit is prime farmland where stones are removed.

Component Name: SARONA, MODERATELY W

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC HAPLORHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No. 4	No.10	No.40	No.200	
0-3	FSL	SM SC-SM ML CL-ML	A-2 A-4	0	0-7	75-100	75-100	45- 85	25- 55	4-15
3-18	SL FSL LS	SM SC-SM ML CL-ML	A-2 A-4 A-1	0-1	0-7	75-100	75-100	40- 95	12- 55	4-12
18-34	LS SL	SM SC-SM SP-SM	A-2 A-1 A-4	0-1	0-7	65-100	65-100	40- 90	12- 40	5-12
34-60	LS SL	SM SC-SM SP-SM	A-2 A-1 A-4	0-1	0-7	65- 95	65- 95	40- 80	12- 40	4-15

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0-3	15-20	2-7	1.4-1.6	0.6-2.	0.1-0.18	4.5-6.5	0- 1	-	1.- 3.	LOW	0.24
3-18	<20	NP-7	1.5-1.6	0.6-2.	0.07-0.17	4.5-6.5	0- 1	-	0.- 1.	LOW	0.24
18-34	<20	NP-7	1.6-1.7	0.6-2.	0.06-0.14	4.5-6.5	0- 1	-	0.-0.5	LOW	0.24
34-60	<20	NP-7	1.6-1.7	0.6-2.	0.06-0.13	5.1-6.5	0- 1	-	0.-0.5	LOW	0.24

Flooding			Water Table-(feet)			Bedrock-(in)		HYD T		Wind Erod.	Risk of Corrosion		Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Pact.	Index	Uncoated Steel	Concrete	Frost Action
NONE	-	-	2.5-6.0	APPARENT	SEP-JUN	>60		B	5	86	LOW	HIGH	MODERATE

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Wetness	
Daily Cover for Landfill		POOR	Seepage	
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	
Dwellings Without Basements		SLIGHT		
Dwellings With Basements		MODERATE	Wetness	
Small Commercial Buildings		SLIGHT		
Local Streets and Roads		MODERATE	Frost Action	
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	Droughty
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		FAIR	Wetness	
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Small Stones	
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		MODERATE	Seepage	Slope
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Slope	Cutbanks Cave
Irrigation		LIMITATION	Slope	Wetness
Terraces and Diversions		LIMITATION	Wetness	Too Sandy
Grassed Waterways		LIMITATION	Droughty	Soil Blowing

RECREATIONAL DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Camp Areas		SLIGHT		
Picnic Areas		SLIGHT		
Playgrounds		MODERATE	Slope	Small Stones
Paths and Trails		SLIGHT		

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corr. Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
								2.5
								2.5

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or	WOODLAND SITE	PRODUCT- IVITY
							TREES RECOMMENDED TO PLANT (P)	INDEX	
3L	SLIGHT	MODERATE	SLIGHT	SLIGHT	SEVERE	NORTH	sugar maple	E 64	3
							white ash	E 75	5
							quaking aspen	E	
							northern red oak	E 72	5
							American basswood	E 70	5
							white spruce	P	
							red pine	P	
							eastern white pine	P	

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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Nearly level and gently sloping, moderately well drained soils formed in loamy deposits and in the underlying loamy or sandy glacial till. This map unit is not highly erodible. The land capability classification is 6S. It is 2E where stones are removed. This map unit is prime farmland where stones are removed.

Component Name: WABENO, MODERATELY W

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC FRAGIORTHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No. 4	No.10	No.40	No.200	
0-5	FSL	ML CL-ML SM SC-SM	A-4	1-5	5-20	90-100	85-100	60- 85	35- 55	3-10
5-23	SIL L FSL	ML CL-ML SM SC-SM	A-4	0-5	0-20	90-100	85-100	60-100	35- 90	4-12
23-42	SL GR-SL LS	SM SC SP-SM SC-SM	A-1 A-2	0-5	0-30	70-100	65- 95	30- 65	10- 35	6-16
42-60	LS SL GR-LS	SM SC-SM SP-SM	A-1 A-2	0-5	0-30	70- 90	65- 90	30- 65	10- 25	3-10

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0-5	<23	NP-6	1.2-1.5	0.6-2.	0.11-0.21	3.6- 6.	0- 1	-	1.- 2.	LOW	0.24
5-23	<25	NP-7	1.3-1.5	0.6-2.	0.17-0.24	3.6- 6.	0- 1	-	0.5- 1.	LOW	0.43
23-42	<30	NP-10	1.8- 2.	0.2-0.6	0.08-0.12	3.6- 6.	0- 1	-	0.-0.5	LOW	0.28
42-60	<23	NP-6	1.8- 2.	0.6-2.	0.03-0.05	4.5-6.5	0- 1	-	0.-0.5	LOW	0.28

Flooding-----			Water Table-(feet) ---			Bedrock-(in)	HYD	T	Wind	Risk of Corrosion		Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP	Fact.	Erod.	Uncoated	Steel	Frost
										Concrete		Action
NONE	-	-	1.5-3.5	PERCHED	NOV-JUN	>60	B	4	56	MODERATE	HIGH	MODERATE

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields	SEVERE	Wetness	Percs Slowly
Daily Cover for Landfill	POOR	Small Stones	

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations	SEVERE	Cutbanks Cave	Wetness
Dwellings Without Basements	MODERATE	Wetness	Large Stones
Dwellings With Basements	SEVERE	Wetness	
Small Commercial Buildings	MODERATE	Wetness	Large Stones
Local Streets and Roads	MODERATE	Wetness	Frost Action
Lawns, Landscaping, and Golf Fairways	MODERATE	Large Stones	Wetness

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)	
Roadfill	FAIR	Large Stones	Wetness
Sand	IMPROBABLE	Excess Fines	
Gravel	IMPROBABLE	Excess Fines	
Topsoil	POOR	Large Stones	Area Reclaim

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)		
Pond Reservoir Area	MODERATE	Seepage	Slope	
Embankments, Dikes and Levees	SEVERE	Seepage		
Drainage	LIMITATION	Large Stones	Slope	Cutbanks Cave
Irrigation	LIMITATION	Slope	Large Stones	Wetness
Terraces and Diversions	LIMITATION	Large Stones	Erodes Easily	
Grassed Waterways	LIMITATION	Large Stones	Erodes Easily	

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Camp Areas	MODERATE	Large Stones	Wetness
Picnic Areas	MODERATE	Wetness	Large Stones
Playgrounds	SEVERE	Large Stones	
Paths and Trails	MODERATE	Large Stones	Wetness

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
								2.5
								2.5

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3L	SLIGHT	MODERATE	SLIGHT	MODERATE	MODERATE	NORTH	sugar maple yellow birch white ash American basswood eastern hemlock white spruce red pine	E E E E E P P	67 72 78 74 56

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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05/27/92

Sloping, well drained soils formed in loamy deposits and in the underlying loamy and sandy glacial till. This map unit is potentially highly erodible. The land capability classification is 6S. It is 3E where stones are removed.

Component Name: SARONA, STONY

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC HAPLORTHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification				>10	3-10	Percent < 3 in. passing sieve				Clay %		
Depth	USDA Texture	Unified		AASHTO		In.	Inches	No 4	No.10	No.40	No.200	<.002 mm		
-----	-----	-----		-----		-----	-----	-----	-----	-----	-----	-----		
0- 3	FSL	SM	SC-SM	ML	CL-ML	A-2	A-4	0-1	25-50	75-100	75-100	45- 85	25- 55	4-15
3-18	FSL SL LS	SM	SC-SM	ML	CL-ML	A-2	A-4 A-1	0-1	0-7	75-100	75-100	40- 95	13- 55	4-12
18-34	SL L LS	SM	SC-SM	SP-SM		A-2	A-1 A-4	0-1	0-7	65-100	65-100	40- 90	12- 40	5-12
34-60	SL LS	SM	SC-SM	SP-SM		A-2	A-1 A-4	0-1	0-7	65- 95	65- 95	40- 80	12- 40	4-15

Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K			
(In)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----			
0- 3	15-20	2-7	1.4-1.6	0.6-2.	0.08-0.15	4.5-6.5	0- 1	-	1.- 3.	LOW	0.24			
3-18	<20	NP-7	1.5-1.6	0.6-2.	0.07-0.17	4.5-6.5	0- 1	-	0.- 1.	LOW	0.24			
18-34	<20	NP-7	1.6-1.7	0.6-2.	0.08-0.19	4.5-6.5	0- 1	-	0.-0.5	LOW	0.24			
34-60	<20	NP-7	1.6-1.7	0.6-2.	0.05-0.13	5.1-6.5	0- 1	-	0.-0.5	LOW	0.24			

Flooding-----			Water Table-(feet) ---			Bedrock-(in)	HTD	T	Wind Eroded	Risk of Corrosion		Potential Frost Action		
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Index	Steel	Concrete		
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
NONE	-	-	>6.0	-	-	>60	B	5	0	LOW	HIGH		MODERATE	

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		MODERATE	Slope	
Daily Cover for Landfill		POOR	Seepage	
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	
Dwellings Without Basements		MODERATE	Slope	
Dwellings With Basements		MODERATE	Slope	
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		MODERATE	Slope Frost Action	
Lawns, Landscaping, and Golf Fairways		SEVERE	Large Stones	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		GOOD		
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Small Stones	
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Slope	
Embankments, Dikes and Levees		SEVERE	Seepage Piping	
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope Droughty	
Terraces and Diversions		LIMITATION	Slope Too Sandy	
Grassed Waterways		LIMITATION	Slope Droughty	

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	MODERATE	Slope
Picnic Areas	MODERATE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	MODERATE	Large Stones

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
								2.2
								2.2

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or	SITE INDEX	WOODLAND PRODUCT- IVITY
3X	SLIGHT	MODERATE	SLIGHT	SLIGHT	MODERATE	NORTH	TREES RECOMENDED TO PLANT (P)		
							sugar maple	E 64	3
							white ash	E 75	5
							quaking aspen	E	
							northern red oak	E 72	5
							American basswood	E 70	5
							white spruce	P	
							red pine	P	
							eastern white pine	P	

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Sloping, well drained soils formed in loamy deposits and in the underlying loamy and sandy glacial till. This map unit is potentially highly erodible. The land capability classification is 6S. It is 3E where stones are removed.

Component Name: WABENO, WELL DRAINED

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC FRAGIORTHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No. 4	No.10	No.40	No.200	
0-5	FSL	ML CL-ML SM SC-SM	A-4	1-5	5-20	90-100	85-100	60- 85	35- 55	3-10
5-23	SIL L FSL	ML CL-ML SM SC-SM	A-4	0-5	0-20	90-100	85-100	60-100	35- 90	4-12
23-42	SL GR-SL LS	SM SC SP-SM SC-SM	A-1 A-2	0-5	0-30	70-100	65- 95	30- 65	10- 35	6-16
42-60	LS SL GR-LS	SM SC-SM SP-SM	A-1 A-2	0-5	0-30	70- 90	65- 90	30- 65	10- 25	3-10

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0-5	<23	NP-6	1.2-1.5	0.6-2.	0.11-0.21	3.6- 6.	0- 1	-	1.- 2.	LOW	0.24
5-23	<25	NP-7	1.3-1.5	0.6-2.	0.17-0.24	3.6- 6.	0- 1	-	0.5- 1.	LOW	0.43
23-42	<30	NP-10	1.8- 2.	0.2-0.6	0.08-0.12	3.6- 6.	0- 1	-	0.-0.5	LOW	0.28
42-60	<23	NP-6	1.8- 2.	0.6-2.	0.03-0.05	4.5-6.5	0- 1	-	0.-0.5	LOW	0.28

Flooding-----			Water Table-(feet) ---			Bedrock-(in)		HYD T		Wind Erod.		Risk of Corrosion		Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Index	Uncoated Steel	Concrete	Frost Action	
NONE	-	-	>6.0	-	-	>60		B	4	56	MODERATE	HIGH		MODERATE

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Percs Slowly	
Daily Cover for Landfill		POOR	Small Stones	

BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	
Dwellings Without Basements		MODERATE	Slope	Large Stones
Dwellings With Basements		MODERATE	Slope	Large Stones
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		MODERATE	Slope	Frost Action
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	Slope

CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		FAIR	Large Stones	
Sand		IMPROBABLE	Excess Fines	
Gravel		IMPROBABLE	Excess Fines	
Topsoil		POOR	Large Stones	Area Reclaim

WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Slope	
Embankments, Dikes and Levees		SEVERE	Seepage	
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Large Stones
Terraces and Diversions		LIMITATION	Slope	Large Stones
Grassed Waterways		LIMITATION	Large Stones	Slope

RECREATIONAL DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)		
Camp Areas		MODERATE	Slope	Large Stones	Perchs Slowly
Picnic Areas		MODERATE	Slope	Large Stones	Perchs Slowly
Playgrounds		SEVERE	Large Stones	Slope	
Paths and Trails		MODERATE	Large Stones		

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
								2.2
								2.2

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3L	SLIGHT	MODERATE	SLIGHT	MODERATE	MODERATE	NORTH	sugar maple yellow birch white ash American basswood eastern hemlock white spruce red pine	E 67 E 72 E 78 E 74 E 56 P P	3 3 5 5

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

05/27/92

Moderately steep and steep, well drained soil formed in loamy deposits and in the underlying loamy and sandy glacial till. This soil is highly erodible. The land capability classification is 7S. It is 6E where stones are removed.

Component Name: SARONA, STONY

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC HAPLORHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay %	
		Unified	AASHTO			No 4	No.10	No.40	No.200	<.002 mm	
0- 3	FSL	SM SC-SM ML CL-ML	A-2 A-4	0-1	25-50	75-100	75-100	45- 85	25- 55	4-15	
3-18	FSL SL LS	SM SC-SM ML CL-ML	A-2 A-4 A-1	0-1	0-7	75-100	75-100	40- 95	13- 55	4-12	
18-34	SL L LS	SM SC-SM SP-SM	A-2 A-1 A-4	0-1	0-7	65-100	65-100	40- 90	12- 40	5-12	
34-60	SL LS	SM SC-SM SP-SM	A-2 A-1 A-4	0-1	0-7	65- 95	65- 95	40- 80	12- 40	4-15	
Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 3	15-20	2-7	1.4-1.6	0.6-2.	0.08-0.15	4.5-6.5	0- 1	-	1.- 3.	LOW	0.24
3-18	<20	NP-7	1.5-1.6	0.6-2.	0.07-0.17	4.5-6.5	0- 1	-	0.- 1.	LOW	0.24
18-34	<20	NP-7	1.6-1.7	0.6-2.	0.08-0.19	4.5-6.5	0- 1	-	0.-0.5	LOW	0.24
34-60	<20	NP-7	1.6-1.7	0.6-2.	0.05-0.13	5.1-6.5	0- 1	-	0.-0.5	LOW	0.24
							Wind	Risk of Corrosion		Potential	
Flooding-----							HYD	T	Erod.	Uncoated	Frost
Frequency Duration Months							GRP	Fact.	Index	Steel	Concrete
NONE							B	5	0	LOW	HIGH
											MODERATE

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Slope	
Daily Cover for Landfill		POOR	Seepage	Slope
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Slope
Dwellings Without Basements		SEVERE	Slope	
Dwellings With Basements		SEVERE	Slope	
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		SEVERE	Slope	
Lawns, Landscaping, and Golf Fairways		SEVERE	Large Stones	Slope
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		POOR	Slope	
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Small Stones	Slope
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Slope	
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Droughty
Terraces and Diversions		LIMITATION	Slope	Too Sandy
Grassed Waterways		LIMITATION	Slope	Droughty

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Slope
Picnic Areas	SEVERE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	SEVERE	Slope

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
								1.3
								1.3

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3R	SLIGHT	MODERATE	SLIGHT	SLIGHT	MODERATE	NORTH	sugar maple white ash quaking aspen northern red oak American basswood white spruce red pine eastern white pine	E 64 E 75 E E 72 E 70 P P P	3 5 5 5

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Moderately steep and steep, well drained soil formed in loamy deposits and in the underlying loamy and sandy glacial till. This soil is highly erodible. The land capability classification is 7S. It is 6E where stones are removed.

Component Name: WABENO, WELL DRAINED

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC FRAGIORTHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification				>10	3-10	Percent < 3 in. passing sieve				Clay %	
Depth	USDA Texture	Unified		AASHTO		In.	Inches	No 4	No.10	No.40	No.200	<.002 mm	
0- 5	FSL	ML	CL-ML	SM	SC-SM	A-4	1-5	5-20	90-100	85-100	60- 85	35- 55	3-10
5-23	SIL L FSL	ML	CL-ML	SM	SC-SM	A-4	0-5	0-20	90-100	85-100	60-100	35- 90	4-12
23-42	SL GR-SL LS	SM	SC	SP-SM	SC-SM	A-1 A-2	0-5	0-30	70-100	65- 95	30- 65	10- 35	6-16
42-60	LS SL GR-LS	SM	SC-SM	SP-SM		A-1 A-2	0-5	0-30	70- 90	65- 90	30- 65	10- 25	3-10
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K		
0- 5	<23	NP-6	1.2-1.5	0.6-2.	0.11-0.21	3.6- 6.	0- 1	-	1.- 2.	LOW	0.24		
5-23	<25	NP-7	1.3-1.5	0.6-2.	0.17-0.24	3.6- 6.	0- 1	-	0.5- 1.	LOW	0.43		
23-42	<30	NP-10	1.8- 2.	0.2-0.6	0.08-0.12	3.6- 6.	0- 1	-	0.-0.5	LOW	0.28		
42-60	<23	NP-6	1.8- 2.	0.6-2.	0.03-0.05	4.5-6.5	0- 1	-	0.-0.5	LOW	0.28		
								Wind	Risk of Corrosion		Potential		
Flooding			Water Table-(feet)			Bedrock-(in)	HYD	T	Erod.	Uncoated		Frost	
Frequency Duration		Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Index	Steel	Concrete	Action
NONE		-	-	>6.0	-	-	>60	B	4	56	MODERATE HIGH		MODERATE

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Percs Slowly	Slope
Daily Cover for Landfill		POOR	Small Stones	Slope
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Slope
Dwellings Without Basements		SEVERE	Slope	
Dwellings With Basements		SEVERE	Slope	
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		SEVERE	Slope	
Lawns, Landscaping, and Golf Fairways		SEVERE	Slope	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		POOR	Slope	
Sand		IMPROBABLE	Excess Fines	
Gravel		IMPROBABLE	Excess Fines	
Topsoil		POOR	Large Stones	Area Reclaim Slope
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Slope	
Embankments, Dikes and Levees		SEVERE	Seepage	
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Large Stones Rooting Depth
Terraces and Diversions		LIMITATION	Slope	Large Stones Erodes Easily
Grassed Waterways		LIMITATION	Large Stones Slope	Erodes Easily

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Slope
Picnic Areas	SEVERE	Slope
Playgrounds	SEVERE	Large Stones Slope
Paths and Trails	SEVERE	Slope

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
								1.3
								1.3

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3R	MODERATE	MODERATE	SLIGHT	MODERATE	MODERATE	NORTH	sugar maple yellow birch white ash American basswood eastern hemlock white spruce red pine	E 67 E 72 E 78 E 74 E 56 P P	3 3 5 5

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Gently sloping to very steep, well drained soil formed in loamy deposits and in the underlying loamy or sandy glacial till underlain by igneous or metamorphic bedrock with areas of exposed bedrock at the surface. This map unit is potentially highly erodible. The land capability classification is 7E.

Component Name: MICHIGAMME

This map unit has 2 components, and 2 interpretation sheet.

Classification: TYPIC HAPLORHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No 4	No.10	No.40	No.200	
0- 4	VFSL	SM ML	A-4	0	0-20	90-100	75-100	65- 90	35- 60	3-15
4-25	SIL FSL SL	SM ML SC-SM CL-ML	A-2-4 A-4 A-1-B	0	0-20	95-100	75-100	45- 95	20- 80	3-15
25-28	GR-FSL FSL LS	SM SP-SM	A-2-4 A-4 A-1-B	0	0-20	75-100	50- 95	25- 80	5- 50	3-10
28-32	UWB			-	-	-	-	-	-	-

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 4	<20	NP-4	1.3-1.6	0.6-2.	0.16-0.22	3.6-6.5	0- 1	-	1.- 4.	LOW	0.37
4-25	<25	NP-7	1.4-1.6	0.6-2.	0.13-0.24	3.6-6.5	0- 1	-	-	LOW	0.2
25-28	<20	NP-4	1.5-1.9	0.6-2.	0.05-0.16	4.5-6.5	0- 0	-	-	LOW	0.2
28-32	-	-	-	E-2-0.06	-	-	-	-	-	-	-

Flooding			Water Table-(feet)			Bedrock-(in)	HYD	T	Erod.	Uncoated	Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP	Fact.	Index	Steel Concrete	Frost Action
NONE	-	-	>6.0	-	-	20-40 HARD	C	4	86	LOW HIGH	MODERATE

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)
Septic Tank Absorption Fields	SEVERE	Depth To Rock Slope
Daily Cover for Landfill	POOR	Depth To Rock Slope

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Shallow Excavations	SEVERE	Depth To Rock Cutbanks Cave Slope
Dwellings Without Basements	SEVERE	Slope
Dwellings With Basements	SEVERE	Depth To Rock Slope
Small Commercial Buildings	SEVERE	Slope
Local Streets and Roads	SEVERE	Slope
Lawns, Landscaping, and Golf Fairways	SEVERE	Slope

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)
Roadfill	POOR	Depth To Rock Slope
Sand	IMPROBABLE	Excess Fines
Gravel	IMPROBABLE	Excess Fines
Topsoil	POOR	Small Stones Slope

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)
Pond Reservoir Area	SEVERE	Slope
Embankments, Dikes and Levees	SEVERE	Piping
Drainage	LIMITATION	Deep To Water
Irrigation	LIMITATION	Slope Soil Blowing Depth To Rock
Terraces and Diversions	LIMITATION	Slope Large Stones Depth To Rock
Grassed Waterways	LIMITATION	Large Stones Slope Erodes Easily

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Slope
Picnic Areas	SEVERE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	SEVERE	Slope Erodes Easily

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
								1.3

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or	WOODLAND SITE	PRODUCT- IVITY
							TREES RECOMENDED TO PLANT (P)	INDEX	
3R	MODERATE	MODERATE	SLIGHT	SLIGHT	MODERATE	NORTH	balsam fir red maple sugar maple yellow birch bigtooth aspen black cherry eastern hemlock white spruce eastern white pine	E E E 60 E 60 E E EP P	3 3

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
Amur maple	12	common ninebark	8	eastern white pine	24	green ash	21
jack pine	20	lilac	8	red pine	26	Roselow sargent crabapple	8
Siberian crabapple	20	Siberian peashrub	8	white spruce	20	-	

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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Gently sloping to very steep, well drained soil formed in loamy deposits and in the underlying loamy or sandy glacial till underlain by igneous or metamorphic bedrock with areas of exposed bedrock at the surface. This map unit is potentially highly erodible. The land capability classification is 7E.

Component Name: ROCK OUTCROP
Classification:

This map unit has 2 components, and 2 interpretation sheet.

ESTIMATED SOIL PROPERTIES

		Classification					>10	3-10	Percent < 3 in. passing sieve				Clay %	
Depth	USDA Texture	Unified		AASHTO			In.	Inches	No. 4	No.10	No.40	No.200	<.002 mm	
0-60	UWB						-	-	-	-	-	-	-	
	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K			
Depth (In)														
0-60	-	-	-	>20.	-	-	-	-	-	-	-	-		
Flooding					Water Table-(feet)			Bedrock-(in)		HYD T	Erod.	Wind	Risk of Corrosion	Potential
Frequency		Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Index	Uncoated Steel	Concrete	Frost Action
NONE		-	-	>6.0	-	-	0-4	HARD						

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Depth To Rock	
Daily Cover for Landfill		POOR	Depth To Rock	
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Depth To Rock	
Dwellings Without Basements		SEVERE	Depth To Rock	
Dwellings With Basements		SEVERE	Depth To Rock	
Small Commercial Buildings		SEVERE	Depth To Rock	
Local Streets and Roads		SEVERE	Depth To Rock	
Lawns, Landscaping, and Golf Fairways		SEVERE	Depth To Rock	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		POOR	Depth To Rock	
Sand		IMPROBABLE	Thin Layer	
Gravel		IMPROBABLE	Thin Layer	
Topsoil		POOR	Depth To Rock	
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Depth To Rock	
Embankments, Dikes and Levees		SLIGHT		
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Depth To Rock	
Terraces and Diversions		LIMITATION	Depth To Rock	
Grassed Waterways		LIMITATION	Depth To Rock	

RECREATIONAL DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Camp Areas		SEVERE	Depth To Rock	
Picnic Areas		SEVERE	Depth To Rock	
Playgrounds		SEVERE	Depth To Rock	
Paths and Trails		SEVERE	Slope	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
								1.3

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Steep and very steep, somewhat excessively drained soil formed in thin loamy deposits and in the underlying cobbly and gravelly sandy glacial drift. This map unit is highly erodible. The land capability classification is 7S.

Component Name: ELDERON, STONY

Classification: TYPIC DYSTROCHREPTS, SANDY-SKELETAL, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification				>10	3-10	Percent < 3 in. passing sieve				Clay %			
Depth	USDA Texture	Unified		AASHTO		In.	Inches	No 4	No.10	No.40	No.200	<.002 mm			
0- 6	SL	SM	SP-SM	GM	GP-GM	A-1	A-2	A-4	-	25-50	30- 95	30- 95	20- 70	10- 40	4-10
6-20	CBV-COSL CBV-LCOS	SM	SP-SM	GM	GP-GM	A-1			-	25-50	30- 70	30- 70	15- 50	5- 25	2-10
20-28	CBV-LCOS GR-COS	SM	SP	GM	GP	A-1			-	25-50	30- 70	30- 70	10- 50	1- 25	2- 8
CBV-S															
28-60	CBV-COS CB-COS GR-S	SM	SP	GM	GP	A-1			-	25-50	30- 70	25- 70	10- 50	1- 20	1- 6
	Liquid	Plas-	Moist		Perme-	Available		Soil	CEC	CaCO3	Organic	Shrink	Erosion		
Depth	Limit	ticity	Bulk	Density	ability	Water	Capacity	Reaction	(me/		Matter	Swell	Factor		
(In)		Index	g/cc		In/hr	(In./in)		(pH)	100g)	Pct	Pct	Potential	K		
0- 6	<20	NP-4	1.4-1.7		2.-6.	0.05-0.14		5.1-7.3	-	-	2.- 5.	LOW	0.24		
6-20	<25	NP-4	1.6-1.7		6.-20.	0.03-0.12		5.1-7.3	-	-	-	LOW	0.1		
20-28	-	NP	1.6-1.7		6.-20.	E-2-0.05		5.1-7.3	-	-	-	LOW	0.1		
28-60	-	NP	1.5-1.7		>20.	E-2-0.05		6.6-7.8	-	-	-	LOW	0.1		
											Wind	Risk of Corrosion		Potential	
Flooding			Water Table-(feet)			Bedrock-(in)		HYD	T	Erod.	Uncoated		Frost		
Frequency		Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Index	Steel	Concrete	Action	
NONE		-	-	>6.0	-	-	>60	A	3	0	LOW	MODERATE		LOW	

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Poor Filter	Slope
Daily Cover for Landfill		POOR	Seepage	Too Sandy Small Stones
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Slope
Dwellings Without Basements		SEVERE	Slope	
Dwellings With Basements		SEVERE	Slope	
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		SEVERE	Slope	
Lawns, Landscaping, and Golf Fairways		SEVERE	Small Stones	Large Stones Droughty
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		POOR	Slope	
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Small Stones	Area Reclaim Slope
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	Slope
Embankments, Dikes and Levees		SEVERE	Seepage	Large Stones
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Large Stones Droughty
Terraces and Diversions		LIMITATION	Slope	Large Stones Too Sandy
Grassed Waterways		LIMITATION	Large Stones	Slope Droughty

RECREATIONAL DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Camp Areas		SEVERE	Slope	Small Stones
Picnic Areas		SEVERE	Slope	Small Stones
Playgrounds		SEVERE	Slope	Small Stones
Paths and Trails		SEVERE	Slope	Small Stones

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	WOODLAND SITE INDEX	PRODUCT- IVITY
3R	MODERATE	MODERATE	MODERATE	SLIGHT	SLIGHT	NORTH	red maple sugar maple yellow birch northern red oak American basswood red pine eastern white pine	E E E E E P P	59 3

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level, poorly drained and very poorly drained soil formed in loamy deposits underlain by sand and gravelly sand glacial outwash. This map unit is not highly erodible. The land capability classification is 6W. This map unit is hydric.

Component Name: MINOCQUA

Classification: TYPIC HAPLAQUEPTS, COARSE-LOAMY OVER SANDY OR SANDY-SKELETAL, MIXED, NONACID, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification				>10	3-10	Percent < 3 in. passing sieve				Clay %
Depth	USDA Texture	Unified		AASHTO		In.	Inches	No 4	No.10	No.40	No.200	<.002 mm
0- 4	MUCK	PT		A-8		0	0	-	-	-	-	-
4-28	SIL L SL	SC SM CL ML		A-2 A-4 A-6		0-1	0-7	80-100	75-100	45-100	25- 90	10-18
28-60	GR-COS S GR-S	SP SM GP GM		A-1 A-3 A-2		0-1	0-7	35-100	30-100	5- 70	0- 30	0- 3
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K	
0- 4	-	-	0.2-0.4	2.-6.	0.35-0.45	4.5-7.8	2- 2	-	60.-90.	LOW	0.1	
4-28	<35	NP-13	1.5-1.6	0.6-2.	0.11-0.19	4.5-7.8	0- 1	0- 5	0.- 2.	LOW	0.37	
28-60	-	NP	1.8-1.9	6.-20.	0.02-0.04	4.5-7.8	0.- 0	0- 5	0.-0.5	LOW	0.1	
								Wind	Risk of Corrosion		Potential	
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated		Frost	
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel	Concrete	Action	
NONE	-	-	+1-1.0 APPARENT YEAR-ROUND			>60	B/D	4 134	HIGH	HIGH	HIGH	

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)		
Septic Tank Absorption Fields		SEVERE	Ponding	Poor Filter	
Daily Cover for Landfill		POOR	Seepage	Too Sandy	Small Stones
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)		
Shallow Excavations		SEVERE	Cutbanks Cave	Ponding	
Dwellings Without Basements		SEVERE	Ponding		
Dwellings With Basements		SEVERE	Ponding		
Small Commercial Buildings		SEVERE	Ponding		
Local Streets and Roads		SEVERE	Ponding	Frost Action	
Lawns, Landscaping, and Golf Fairways		SEVERE	Ponding	Excess Humus	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)		
Roadfill		POOR	Wetness		
Sand		PROBABLE			
Gravel		PROBABLE			
Topsoil		POOR	Excess Humus	Small Stones	Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)		
Pond Reservoir Area		SEVERE	Seepage		
Embankments, Dikes and Levees		SEVERE	Seepage	Piping	Ponding
Drainage		LIMITATION	Ponding	Frost Action	Cutbanks Cave
Irrigation		LIMITATION	Ponding	Soil Blowing	
Terraces and Diversions		LIMITATION	Erodes Easily	Ponding	Too Sandy
Grassed Waterways		LIMITATION	Wetness	Erodes Easily	

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Camp Areas	SEVERE	Ponding	Excess Humus
Picnic Areas	SEVERE	Ponding	Excess Humus
Playgrounds	SEVERE	Excess Humus	Ponding
Paths and Trails	SEVERE	Ponding	Excess Humus

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
						3.		3.4

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
7W	SLIGHT	SEVERE	SEVERE	SEVERE	SEVERE	NORTH	balsam fir black ash tamarack quaking aspen northern whitecedar red maple white ash white spruce black spruce	E E E E E EP EP P P	54 55 55 2

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, excessively drained soil formed in sandy glacial outwash. This map unit is not highly erodible. The land capability classification is 6S.

Component Name: RUBICON

Classification: ENTIC HAPLORHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Classification						>10	3-10	Percent < 3 in. passing sieve				Clay %
Depth	USDA Texture	Unified	AASHTO			In.	Inches	No. 4	No.10	No.40	No.200	<.002 mm
0- 4	S	SM SP-SM SP	A-2	A-3	A-1	0	0	95-100	75-100	35- 70	0- 15	0- 5
4-15	S	SM SP-SM SP	A-2	A-3	A-1	0	0	95-100	75-100	35- 70	0- 15	0-10
15-60	S COS	SP SP-SM SM	A-1	A-2	A-3	0	0	95-100	75-100	30- 70	0- 15	0- 5
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K	
0- 4	-	NP	1.3-1.5	6.-20.	0.05-0.09	4.5- 6.	0- 0	-	0.5- 2.	LOW	0.15	
4-15	-	NP	1.3-1.6	6.-20.	0.04-0.08	4.5- 6.	0- 0	-	0.-0.5	LOW	0.15	
15-60	-	NP	1.4-1.6	6.-20.	0.04-0.06	4.5-6.5	0- 0	-	-	LOW	0.15	
								Wind	Risk of Corrosion		Potential	
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost		
Frequency Duration		Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel	Concrete	Action	
NONE		-	>6.0	-	-	>60	A	5	250	LOW	HIGH	LOW
SANITARY FACILITIES				RATING		RESTRICTIVE FEATURE(S)						
Septic Tank Absorption Fields				SEVERE		Poor Filter						
Daily Cover for Landfill												
BUILDING SITE DEVELOPMENT				RATING		RESTRICTIVE FEATURE(S)						
Shallow Excavations				SEVERE		Cutbanks Cave						
Dwellings Without Basements				SLIGHT								
Dwellings With Basements				SLIGHT								
Small Commercial Buildings				SLIGHT								
Local Streets and Roads				SLIGHT								
Lawns, Landscaping, and Golf Fairways				SEVERE		Droughty						
CONSTRUCTION MATERIAL				RATING		RESTRICTIVE FEATURE(S)						
Roadfill				GOOD								
Sand				PROBABLE								
Gravel				IMPROBABLE		Too Sandy						
Topsoil				POOR		Too Sandy Small Stones Area Reclaim						
WATER MANAGEMENT				RATING		RESTRICTIVE FEATURE(S)						
Pond Reservoir Area				SEVERE		Seepage						
Embankments, Dikes and Levees				SEVERE		Seepage Piping						
Drainage				LIMITATION		Deep To Water						
Irrigation				LIMITATION		Slope Droughty Fast Intake						
Terraces and Diversions				LIMITATION		Too Sandy Soil Blowing						
Grassed Waterways				LIMITATION		Droughty						

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Too Sandy
Picnic Areas	SEVERE	Too Sandy
Playgrounds	SEVERE	Too Sandy
Paths and Trails	SEVERE	Too Sandy

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
				35	2.3		3.3	1.3

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY	
4S	SLIGHT	MODERATE	MODERATE	SLIGHT	SLIGHT	NORTH	red maple paper birch bigtooth aspen quaking aspen northern red oak jack pine red pine eastern white pine	E E E E E EP EP EP	57 66 60 53 53 45	2 5 4 5 6 5

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
eastern redcedar	14	eastern white pine	22	hollygrape	6	jack pine	18
lilac	8	Peking cotoneaster	6	red pine	18	Siberian peashrub	8
silver buffaloberry	8	smooth sumac	8	staghorn sumac	8	-	

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Sloping, excessively drained soil formed in sandy glacial outwash. This map unit is potentially highly erodible. The land capability classification is 6S.

Component Name: RUBICON

Classification: ENTIC HAPLORTHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Classification															
Depth	USDA Texture		Unified		AASHTO		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay %		
									No. 4	No.10	No.40	No.200	<.002 mm		
0- 4	S		SM	SP-SM	SP	A-2	A-3	A-1	0	0	95-100	75-100	35- 70	0- 15	0- 5
4-15	S		SM	SP-SM	SP	A-2	A-3	A-1	0	0	95-100	75-100	35- 70	0- 15	0-10
15-60	S	COS	SP	SP-SM	SM	A-1	A-2	A-3	0	0	95-100	75-100	30- 70	0- 15	0- 5
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K				
0- 4	-	NP	1.3-1.5	6.-20.	0.05-0.09	4.5- 6.	0- 0	-	0.5- 2.	LOW	0.15				
4-15	-	NP	1.3-1.6	6.-20.	0.04-0.08	4.5- 6.	0- 0	-	0.-0.5	LOW	0.15				
15-60	-	NP	1.4-1.6	6.-20.	0.04-0.06	4.5-6.5	0- 0	-	-	LOW	0.15				
									Wind	Risk of Corrosion		Potential			
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost					
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP Fact.	Index	Steel	Concrete	Action			
NONE	-	-	>6.0	-	-	>60	A	5	250	LOW	HIGH	LOW			

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Poor Filter	
Daily Cover for Landfill		POOR	Seepage	Too Sandy
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	
Dwellings Without Basements		MODERATE	Slope	
Dwellings With Basements		MODERATE	Slope	
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		MODERATE	Slope	
Lawns, Landscaping, and Golf Fairways		SEVERE	Droughty	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		GOOD		
Sand		PROBABLE		
Gravel		IMPROBABLE	Too Sandy	
Topsoil		POOR	Too Sandy	Small Stones Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	Slope
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Droughty Fast Intake
Terraces and Diversions		LIMITATION	Slope	Too Sandy Soil Blowing
Grassed Waterways		LIMITATION	Slope	Droughty

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Too Sandy
Picnic Areas	SEVERE	Too Sandy
Playgrounds	SEVERE	Slope
Paths and Trails	SEVERE	Too Sandy

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
				30	2.1		3.1	1.1

WOODLAND INTERPRETATIONS

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
4S	SLIGHT	MODERATE	MODERATE	SLIGHT	SLIGHT	NORTH	red maple paper birch bigtooth aspen quaking aspen northern red oak jack pine red pine eastern white pine	E E E 66 E 60 E EP 53 EP 53 EP 45	2 5 4 5 6 5

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
eastern redcedar	14	eastern white pine.	22	hollygrape	6	jack pine	18
lilac	8	Peking cotoneaster	6	red pine	18	Siberian peashrub	8
silver buffaloberry	8	smooth sumac	8	staghorn sumac	8	-	-

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Moderately steep and steep, excessively drained soil formed in sandy glacial outwash. This map unit is potentially highly erodible. The land capability classification is 7S.

Component Name: RUBICON

Classification: ENTIC HAPLORHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Classification												
Depth	USDA Texture	Unified		AASHTO		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay %
								No 4	No.10	No.40	No.200	<.002 mm
0- 4	LS	SM	SP-SM	A-2	A-1	0	0	95-100	75-100	35- 75	10- 30	0-10
4-15	S	SM	SP-SM SP	A-2	A-3 A-1	0	0	95-100	75-100	35- 70	0- 15	0-10
15-60	S COS	SP	SP-SM SM	A-1	A-2 A-3	0	0	95-100	75-100	30- 70	0- 15	0- 5
Depth	Liquid Limit	Plas- ticity Index	Moist Bulk Density g/cc	Perme- ability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/ 100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K	
0- 4	-	NP	1.3-1.5	6.-20.	0.1-0.12	4.5- 6.	0- 0	-	0.5- 2.	LOW	0.17	
4-15	-	NP	1.3-1.6	6.-20.	0.04-0.08	4.5- 6.	0- 0	-	0.-0.5	LOW	0.15	
15-60	-	NP	1.4-1.6	6.-20.	0.04-0.06	4.5-6.5	0- 0	-	-	LOW	0.15	
								Wind	Risk of Corrosion		Potential	
Flooding				Water Table-(feet)		Bedrock-(in)	HYD T	Erod.	Uncoated	Frost		
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP Fact.	Index	Steel	Concrete	Action
NONE	-	-	>6.0	-	-	>60	A	5	134	LOW	HIGH	LOW

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Poor Filter	Slope
Daily Cover for Landfill		POOR	Seepage	Too Sandy Slope
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Slope
Dwellings Without Basements		SEVERE	Slope	
Dwellings With Basements		SEVERE	Slope	
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		SEVERE	Slope	
Lawns, Landscaping, and Golf Fairways		SEVERE	Droughty	Slope
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		POOR	Slope	
Sand		PROBABLE		
Gravel		IMPROBABLE	Too Sandy	
Topsoil		POOR	Too Sandy	Slope
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	Slope
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Droughty Fast Intake
Terraces and Diversions		LIMITATION	Slope	Too Sandy Soil Blowing
Grassed Waterways		LIMITATION	Slope	Droughty

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Slope
Picnic Areas	SEVERE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	SEVERE	Slope

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY	
4R	MODERATE	MODERATE	MODERATE	SLIGHT	SLIGHT	NORTH	red maple paper birch bigtooth aspen quaking aspen northern red oak jack pine red pine eastern white pine	E E E E E EP EP EP	57 66 60 53 53 45	2 5 4 5 6 5

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
eastern redcedar	14	eastern white pine	22	hollygrape	6	jack pine	18
lilac	8	Peking cotoneaster	6	red pine	18	Siberian peashrub	8
silver buffaloberry	8	smooth sumac	8	staghorn sumac	8	-	

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, well drained soil formed in silty and loamy deposits and in the underlying stratified sand and gravelly sand glacial outwash, and moderately well drained soil formed in silty and loamy deposits and in the underlying loamy or sandy glacial till. This map unit is potentially highly erodible. The land capability classification is 6S. It is 2E where stones are removed. This map unit is prime farmland where stones are removed. This map unit may have hydric inclusions.

Component Name: PADUS, WELL DRAINED

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC HAPLORHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Classification											
Depth	USDA Texture	Unified		AASHTO	>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay %
							No. 4	No.10	No.40	No.200	<.002 mm
0- 3	SIL	ML CL-ML CL		A-4	0	0-9	80-100	75-100	65-100	50- 90	6-15
3-28	FSL SL L	SM SC ML CL		A-2 A-4 A-1-B	0	0-9	55-100	50-100	30- 95	15- 75	5-18
28-33	GR-LS S GR-SL	SM SP GP GM		A-2 A-4 A-1 A-3	0	0-9	30-100	25-100	15- 75	2- 40	2-10
33-60	SR- S G	SP SP-SM GP GP-GM		A-1 A-2 A-3	0	0-9	30-100	25-100	10- 70	1- 12	0- 3
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 3	<30	NP-10	1.4-1.5	0.6-6.	0.17-0.24	4.5-6.5	0- 1	-	2.- 4.	LOW	0.37
3-28	<30	NP-10	1.4-1.6	0.6-6.	0.09-0.22	4.5-6.5	0- 1	-	0.-0.5	LOW	0.24
28-33	<25	NP-4	1.4-1.6	0.6-6.	0.05-0.14	4.5-6.5	0.- 0	-	0.-0.5	LOW	0.1
33-60	-	NP	1.5-1.8	6.-20.	0.02-0.06	5.1-6.5	0.- 0	-	0.-0.5	LOW	0.1
							Wind	Risk of Corrosion		Potential	
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost	
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel	Concrete	Action
NONE	-	-	>6.0	-	-	>60	B 4	56	LOW	HIGH	MODERATE

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Poor Filter	
Daily Cover for Landfill		POOR	Seepage	Too Sandy Small Stones
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	
Dwellings Without Basements		SLIGHT		
Dwellings With Basements		SLIGHT		
Small Commercial Buildings		SLIGHT		
Local Streets and Roads		MODERATE	Frost Action	
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	Droughty
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		GOOD		
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Small Stones	Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Droughty
Terraces and Diversions		LIMITATION	Too Sandy	
Grassed Waterways		LIMITATION	Droughty	Rooting Depth

3.5-30-56

RECREATIONAL DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Camp Areas		SLIGHT		
Picnic Areas		SLIGHT		
Playgrounds		MODERATE	Slope	Small Stones
Paths and Trails		SLIGHT		

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
								2.8
								2.5

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or	WOODLAND SITE	PRODUCT- IVITY
3L	SLIGHT	MODERATE	SLIGHT	SLIGHT	MODERATE	NORTH	TREES RECOMENDED TO PLANT (P)	INDEX	
							sugar maple	E 67	3
							white ash	E	
							bigtooth aspen	E 78	6
							northern red oak	E 70	4
							American basswood	E	
							red pine	EP	
							white spruce	P	
							eastern white pine	P	

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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Nearly level and gently sloping, well drained soil formed in silty and loamy deposits and in the underlying stratified sand and gravelly sand glacial outwash, and moderately well drained soil formed in silty and loamy deposits and in the underlying loamy or sandy glacial till. This map unit is potentially highly erodible. The land capability classification is 6S. It is 2E where stones are removed. This map unit is prime farmland where stones are removed. This map unit may have hydric inclusions.

Component Name: WABENO, MODERATELY W

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC FRAGIORTHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Classification												
Depth	USDA Texture		Unified		AASHTO	>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay %
								No 4	No.10	No.40	No.200	<.002 mm
0- 6	SIL		ML CL-ML		A-4	1-5	5-20	90-100	85-100	75-100	60- 90	3-10
6-27	SIL L FSL		ML CL-ML SM SC-SM		A-4	0-5	0-20	90-100	85-100	60-100	35- 90	4-12
27-47	SL GR-SL LS		SM SC SP-SM SC-SM		A-1 A-2	0-5	0-30	70-100	65- 95	30- 65	10- 35	6-16
47-60	LS SL GR-LS		SM SC-SM SP-SM		A-1 A-2	0-5	0-30	70- 90	65- 90	30- 65	10- 25	3-10
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K	
0- 6	<25	NP-6	1.2-1.5	0.6-2.	0.14-0.23	3.6- 6.	0- 1	-	1.- 2.	LOW	0.37	
6-27	<25	NP-7	1.3-1.5	0.6-2.	0.17-0.24	3.6- 6.	0- 1	-	0.5- 1.	LOW	0.43	
27-47	<30	NP-10	1.8- 2.	0.2-0.6	0.08-0.12	3.6- 6.	0- 1	-	0.-0.5	LOW	0.28	
47-60	<23	NP-6	1.8- 2.	0.6-2.	0.03-0.05	4.5-6.5	0- 1	-	0.-0.5	LOW	0.28	
Flooding							Wind	Risk of Corrosion		Potential		
Frequency	Duration	Months	Depth	Kind	Months	Depth	HYD T	Erod.	Uncoated	Concrete	Frost	
						Hard.	GRP Fact.	Index	Steel		Action	
NONE	-	-	1.5-3.5	PERCHED	NOV-JUN	>60	B	4	48	MODERATE	HIGH	MODERATE

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Wetness	Perchs Slowly
Daily Cover for Landfill		POOR	Small Stones	
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Wetness
Dwellings Without Basements		MODERATE	Wetness	Large Stones
Dwellings With Basements		SEVERE	Wetness	
Small Commercial Buildings		MODERATE	Wetness	Large Stones
Local Streets and Roads		MODERATE	Wetness	Frost Action
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	Wetness
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		FAIR	Large Stones	Wetness
Sand		IMPROBABLE	Excess Fines	
Gravel		IMPROBABLE	Excess Fines	
Topsoil		POOR	Large Stones	Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		MODERATE	Seepage	Slope
Embankments, Dikes and Levees		SEVERE	Seepage	
Drainage		LIMITATION	Large Stones	Slope
Irrigation		LIMITATION	Slope	Large Stones
Terraces and Diversions		LIMITATION	Large Stones	Erodes Easily
Grassed Waterways		LIMITATION	Large Stones	Erodes Easily

RECREATIONAL DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Camp Areas		MODERATE	Large Stones	Wetness
Picnic Areas		MODERATE	Wetness	Large Stones
Playgrounds		SEVERE	Large Stones	
Paths and Trails		MODERATE	Large Stones	Wetness

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
								2.8
								2.5

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3L	SLIGHT	MODERATE	SLIGHT	MODERATE	MODERATE	NORTH	sugar maple yellow birch white ash American basswood eastern hemlock white spruce red pine	E E E E E P P	67 72 78 74 56 3 3 5 5

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Route 2, Box 2355, Spooner, WI. 54801-1403, Phone: 715-635-3505

Sloping, well drained soil formed in silty and loamy deposits and in the underlying stratified sand and gravelly sand glacial outwash, and moderately well drained soil formed in silty and loamy deposits and in the underlying loamy or sandy glacial till. This map unit is potentially highly erodible. The land capability classification is 6S. It is 3E where stones are removed. This map unit may have hydric inclusions.

Component Name: PADUS, WELL DRAINED

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC HAPLORTHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay %	
		Unified	AASHTO			No. 4	No. 10	No. 40	No. 200	<.002 mm	
0-3	SIL	ML CL-ML CL	A-4	0	0-9	80-100	75-100	65-100	50- 90	6-15	
3-28	FSL SL L	SM SC ML CL	A-2 A-4 A-1-B	0	0-9	55-100	50-100	30- 95	15- 75	5-18	
28-33	GR-LS S GR-SL	SM SP GP GM	A-2 A-4 A-1 A-3	0	0-9	30-100	25-100	15- 75	2- 40	2-10	
33-60	SR- S G	SP SP-SM GP GP-GM	A-1 A-2 A-3	0	0-9	30-100	25-100	10- 70	1- 12	0- 3	
Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0-3	<30	NP-10	1.4-1.5	0.6-6.	0.17-0.24	4.5-6.5	0- 1	-	2.- 4.	LOW	0.37
3-28	<30	NP-10	1.4-1.6	0.6-6.	0.09-0.22	4.5-6.5	0- 1	-	0.-0.5	LOW	0.24
28-33	<25	NP-4	1.4-1.6	0.6-6.	0.05-0.14	4.5-6.5	0.- 0	-	0.-0.5	LOW	0.1
33-60	-	NP	1.5-1.8	6.-20.	0.02-0.06	5.1-6.5	0.- 0	-	0.-0.5	LOW	0.1

Flooding-----		Water Table-(feet) ---			Bedrock-(in)	HYD T	Wind	Risk of Corrosion		Potential	
Frequency Duration		Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Erod. Index	Uncoated Steel	Concrete	Frost Action
NONE		-	>6.0	-	-	>60	R	4 56	LOW	HIGH	MODERATE

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)		
Septic Tank Absorption Fields	SEVERE	Poor Filter		
Daily Cover for Landfill	POOR	Seepage	Too Sandy	Small Stones

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)		
Shallow Excavations	SEVERE	Cutbanks Cave		
Dwellings Without Basements	MODERATE	Slope		
Dwellings With Basements	MODERATE	Slope		
Small Commercial Buildings	SEVERE	Slope		
Local Streets and Roads	MODERATE	Slope	Frost Action	
Lawns, Landscaping, and Golf Fairways	MODERATE	Large Stones	Droughty	Slope

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)		
Roadfill	GOOD			
Sand	PROBABLE			
Gravel	PROBABLE			
Topsoil	POOR	Small Stones	Area Reclaim	

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)		
Pond Reservoir Area	SEVERE	Seepage	Slope	
Embankments, Dikes and Levees	SEVERE	Seepage	Piping	
Drainage	LIMITATION	Deep To Water		
Irrigation	LIMITATION	Slope	Droughty	
Terraces and Diversions	LIMITATION	Slope	Too Sandy	
Grassed Waterways	LIMITATION	Slope	Droughty	Rooting Depth

3.5-30-60

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	MODERATE	Slope
Picnic Areas	MODERATE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	SLIGHT	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
								2.6
								2.2

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	WOODLAND SITE INDEX	PRODUCT- IVITY
3L	SLIGHT	MODERATE	SLIGHT	SLIGHT	MODERATE	NORTH	sugar maple white ash bigtooth aspen northern red oak American basswood red pine white spruce eastern white pine	E E E E E EP P P	67 3 78 6 40 4

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

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Sloping, well drained soil formed in silty and loamy deposits and in the underlying stratified sand and gravelly sand glacial outwash, and moderately well drained soil formed in silty and loamy deposits and in the underlying loamy or sandy glacial till. This map unit is potentially highly erodible. The land capability classification is 6S. It is 3E where stones are removed. This map unit may have hydric inclusions.

Component Name: WABENO, MODERATELY W

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC FRAGIORTHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification		>10	3-10	Percent < 3 in. passing sieve				Clay %		
Depth	USDA Texture	Unified	AASHTO	In.	Inches	No 4	No.10	No.40	No.200	<.002 mm		
0- 6	SIL	ML CL-ML	A-4	1-5	5-20	90-100	85-100	75-100	60- 90	3-10		
6-27	SIL L FSL	ML CL-ML SM SC-SM	A-4	0-5	0-20	90-100	85-100	60-100	35- 90	4-12		
27-47	SL GR-SL LS	SM SC SP-SM SC-SM	A-1 A-2	0-5	0-30	70-100	65- 95	30- 65	10- 35	6-16		
47-60	LS SL GR-LS	SM SC-SM SP-SM	A-1 A-2	0-5	0-30	70- 90	65- 90	30- 65	10- 25	3-10		
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K	
0- 6	<25	NP-6	1.2-1.5	0.6-2.	0.14-0.23	3.6- 6.	0- 1	-	1.- 2.	LOW	0.37	
6-27	<25	NP-7	1.3-1.5	0.6-2.	0.17-0.24	3.6- 6.	0- 1	-	0.5- 1.	LOW	0.43	
27-47	<30	NP-10	1.8- 2.	0.2-0.6	0.08-0.12	3.6- 6.	0- 1	-	0.-0.5	LOW	0.28	
47-60	<23	NP-6	1.8- 2.	0.6-2.	0.03-0.05	4.5-6.5	0- 1	-	0.-0.5	LOW	0.28	
								Wind	Risk of Corrosion		Potential	
Flooding			Water Table-(feet)		Bedrock-(in)	HYD	T	Erod.	Uncoated	Frost		
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP Fact.	Index	Steel	Concrete	Action
NONE	-	-	1.5-3.5	PERCHED	NOV-JUN	>60	B	4	48	MODERATE	HIGH	MODERATE

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields	SEVERE	Wetness	Percs Slowly
Daily Cover for Landfill	POOR	Small Stones	

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations	SEVERE	Cutbanks Cave	Wetness
Dwellings Without Basements	MODERATE	Wetness	Slope
Dwellings With Basements	SEVERE	Wetness	
Small Commercial Buildings	SEVERE	Slope	
Local Streets and Roads	MODERATE	Wetness	Slope
Lawns, Landscaping, and Golf Fairways	MODERATE	Large Stones	Wetness

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)	
Roadfill	FAIR	Large Stones	Wetness
Sand	IMPROBABLE	Excess Fines	
Gravel	IMPROBABLE	Excess Fines	
Topsoil	POOR	Large Stones	Area Reclaim

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area	SEVERE	Slope	
Embankments, Dikes and Levees	SEVERE	Seepage	
Drainage	LIMITATION	Large Stones	Slope
Irrigation	LIMITATION	Slope	Large Stones
Terraces and Diversions	LIMITATION	Slope	Large Stones
Grassed Waterways	LIMITATION	Large Stones	Slope

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RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)		
Camp Areas	MODERATE	Slope	Large Stones	Wetness
Picnic Areas	MODERATE	Slope	Wetness	Large Stones
Playgrounds	SEVERE	Large Stones	Slope	
Paths and Trails	MODERATE	Large Stones	Wetness	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
								2.6
								2.2

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY	
3L	SLIGHT	MODERATE	SLIGHT	MODERATE	MODERATE	NORTH	sugar maple yellow birch white ash American basswood eastern hemlock white spruce red pine	E E E E E P P	67 72 78 74 56	3 3 5 5

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Moderately steep and steep, well drained soil formed in silty and loamy deposits and in the underlying stratified sand and gravelly sand glacial outwash, and well drained soil formed in silty and loamy deposits and in the underlying loamy or sandy glacial till. This map unit is highly erodible. The land capability classification is 7S. It is 6E where stones are removed. This map unit may have hydric inclusions.

Component Name: PADUS, WELL DRAINED

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC HAPLORHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification				>10	3-10	Percent < 3 in. passing sieve				Clay %	
Depth	USDA Texture	Unified		AASHTO		In.	Inches	No. 4	No.10	No.40	No.200	<.002 mm	
-----	-----	-----		-----		-----	-----	-----	-----	-----	-----	-----	
0- 3	SIL	ML	CL-ML	CL	A-4	0	0-9	80-100	75-100	65-100	50- 90	6-15	
3-28	FSL SL L	SM	SC	ML CL	A-2 A-4 A-1-B	0	0-9	55-100	50-100	30- 95	15- 75	5-18	
28-33	GR-LS S GR-SL	SM	SP	GP GM	A-2 A-4 A-1 A-3	0	0-9	30-100	25-100	15- 75	2- 40	2-10	
33-60	SR- S G	SP	SP-SM	GP GP-GM	A-1 A-2 A-3	0	0-9	30-100	25-100	10- 70	1- 12	0- 3	

	Liquid	Plas-	Moist	Perme-	Available	Soil	CEC	CaCO3	Organic	Shrink	Erosion		
Depth	Limit	ticity	Bulk Density	ability	Water Capacity	Reaction	(me/		Matter	Swell	Factor		
(In)		Index	g/cc	In/hr	(In./in)	(pH)	100g)	Pct	Pct	Potential	K		
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
0- 3	<30	NP-10	1.4-1.5	0.6-6.	0.17-0.24	4.5-6.5	0- 1	-	2.- 4.	LOW	0.37		
3-28	<30	NP-10	1.4-1.6	0.6-6.	0.09-0.22	4.5-6.5	0- 1	-	0.-0.5	LOW	0.24		
28-33	<25	NP-4	1.4-1.6	0.6-6.	0.05-0.14	4.5-6.5	0.- 0	-	0.-0.5	LOW	0.1		
33-60	-	NP	1.5-1.8	6.-20.	0.02-0.06	5.1-6.5	0.- 0	-	0.-0.5	LOW	0.1		

Flooding-----		--- Water Table-(feet) ---			Bedrock-(in)	HYD	T	Wind	Risk of Corrosion		Potential		
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Index	Steel	Concrete	Frost
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	Action
NONE	-	-	>6.0	-	-	>60		B	4	56	LOW	HIGH	MODERATE

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields	SEVERE	Poor Filter	Slope
Daily Cover for Landfill	POOR	Seepage	Too Sandy

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations	SEVERE	Cutbanks Cave	Slope
Dwellings Without Basements	SEVERE	Slope	
Dwellings With Basements	SEVERE	Slope	
Small Commercial Buildings	SEVERE	Slope	
Local Streets and Roads	SEVERE	Slope	
Lawns, Landscaping, and Golf Fairways	SEVERE	Slope	

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)	
Roadfill	POOR	Slope	
Sand	PROBABLE		
Gravel	PROBABLE		
Topsoil	POOR	Small Stones	Area Reclaim

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area	SEVERE	Seepage	Slope
Embankments, Dikes and Levees	SEVERE	Seepage	Piping
Drainage	LIMITATION	Deep To Water	
Irrigation	LIMITATION	Slope	Droughty
Terraces and Diversions	LIMITATION	Slope	Too Sandy
Grassed Waterways	LIMITATION	Slope	Droughty

3.5-30-64

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Slope
Picnic Areas	SEVERE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	SEVERE	Slope

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
								2.
								1.3

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	WOODLAND SITE INDEX	PRODUCT- IVITY
3R	MODERATE	MODERATE	SLIGHT	SLIGHT	MODERATE	NORTH	sugar maple white ash bigtooth aspen northern red oak American basswood red pine white spruce eastern white pine	E E E E E EP P P	67 3 78 4

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Moderately steep and steep, well drained soil formed in silty and loamy deposits and in the underlying stratified sand and gravelly sand glacial outwash, and well drained soil formed is silty and loamy deposits and in the underlying loamy or sandy glacial till. This map unit is highly erodible. The land capability classification is 7S. It is 6E where stones are removed. This map unit may have hydric inclusions.

Component Name: WABENO, WELL DRAINED

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC FRAGIORTHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification			>10	3-10	Percent < 3 in. passing sieve				Clay %
Depth	USDA Texture	Unified		AASHTO	In.	Inches	No 4	No.10	No.40	No.200	<.002 mm
-----	-----	-----		-----	-----	-----	-----	-----	-----	-----	-----
0- 6	SIL	ML CL-ML		A-4	1-5	5-20	90-100	85-100	75-100	60- 90	3-10
6-27	SIL L FSL	ML CL-ML SM SC-SM		A-4	0-5	0-20	90-100	85-100	60-100	35- 90	4-12
27-47	SL GR-SL LS	SM SC SP-SM SC-SM		A-1 A-2	0-5	0-30	70-100	65- 95	30- 65	10- 35	6-16
47-60	LS SL GR-LS	SM SC-SM SP-SM		A-1 A-2	0-5	0-30	70- 90	65- 90	30- 65	10- 25	3-10

	Liquid	Plas-	Moist	Perme-	Available	Soil	CEC	CaCO3	Organic	Shrink	Erosion
Depth	Limit	ticity	Bulk Density	ability	Water Capacity	Reaction	(me/		Matter	Swell	Factor
(In)		Index	g/cc	In/hr	(In./in)	(pH)	100g)	Pct	Pct	Potential	K
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
0- 6	<25	NP-6	1.2-1.5	0.6-2.	0.14-0.23	3.6- 6.	0- 1	-	1.- 2.	LOW	0.37
6-27	<25	NP-7	1.3-1.5	0.6-2.	0.17-0.24	3.6- 6.	0- 1	-	0.5- 1.	LOW	0.43
27-47	<30	NP-10	1.8- 2.	0.2-0.6	0.08-0.12	3.6- 6.	0- 1	-	0.-0.5	LOW	0.28
47-60	<23	NP-6	1.8- 2.	0.6-2.	0.03-0.05	4.5-6.5	0- 1	-	0.-0.5	LOW	0.28
-----									Wind	Risk of Corrosion	Potential
Flooding-----			Water Table-(feet) ---			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost	
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel	Concrete	Action
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NONE	-	-	>6.0	-	-	>60	B	4 48	MODERATE	HIGH	MODERATE

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)
Septic Tank Absorption Fields	SEVERE	Percs Slowly Slope
Daily Cover for Landfill	POOR	Small Stones Slope

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Shallow Excavations	SEVERE	Cutbanks Cave Slope
Dwellings Without Basements	SEVERE	Slope
Dwellings With Basements	SEVERE	Slope
Small Commercial Buildings	SEVERE	Slope
Local Streets and Roads	SEVERE	Slope
Lawns, Landscaping, and Golf Fairways	SEVERE	Slope

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)
Roadfill	POOR	Slope
Sand	IMPROBABLE	Excess Fines
Gravel	IMPROBABLE	Excess Fines
Topsoil	POOR	Large Stones Area Reclaim Slope

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)
Pond Reservoir Area	SEVERE	Slope
Embankments, Dikes and Levees	SEVERE	Seepage
Drainage	LIMITATION	Deep To Water
Irrigation	LIMITATION	Slope Large Stones Rooting Depth
Terraces and Diversions	LIMITATION	Slope Large Stones Erodes Easily
Grassed Waterways	LIMITATION	Large Stones Slope Erodes Easily

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Slope
Picnic Areas	SEVERE	Slope
Playgrounds	SEVERE	Large Stones Slope
Paths and Trails	SEVERE	Slope

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
								2.
								1.3

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	WOODLAND SITE INDEX	PRODUCT- IVITY
3R	MODERATE	MODERATE	SLIGHT	MODERATE	MODERATE	NORTH	sugar maple yellow birch white ash American basswood eastern hemlock white spruce red pine	E 67 E 72 E 78 E 74 E 56 P P	3 3 5 5

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, well drained soil formed in silty deposits overlying stratified sand and gravelly coarse sand glacial outwash. This map unit is potentially highly erodible. The land capability classification is 2E. This map unit is prime farmland.

Component Name: STAMBAUGH

Classification: ALFIC HAPLORTHODS, COARSE-SILTY OVER SANDY OR SANDY-SKELETAL, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Classification											
Depth	USDA Texture	Unified		AASHTO	>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay %
							No. 4	No.10	No.40	No.200	<.002 mm
0-14	SIL	ML	CL-ML	A-4	0	0-8	100-100	90-100	80-100	55- 90	5-15
14-35	SI SIL VFSL	ML	CL-ML CL	A-4	0	0-8	100-100	90-100	80-100	80- 95	3-18
35-60	GR-S GRV-S	SP	SP-SM	A-1	0	0-15	70- 90	25- 60	15- 40	0- 10	0- 8
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0-14	15-26	2-7	1.1-1.6	0.6-2.	0.21-0.24	4.5- 6.	0- 1	-	1.- 3.	LOW	0.37
14-35	15-30	2-9	1.3-1.7	0.2-0.6	0.2-0.22	4.5- 6.	0- 1	-	-	LOW	0.32
35-60	-	NP	1.5-1.7	>20.	0.02-0.04	5.1-6.5	0- 0	-	-	LOW	0.1
								Wind	Risk of Corrosion		Potential
Flooding				Water Table-(feet)		Bedrock-(in)	HYD T	Erod.	Uncoated		Frost
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel	Concrete	Action
NONE	-	-	>6.0	-	-	>60	B 4	56	LOW	MODERATE	MODERATE

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Percs Slowly	Poor Filter
Daily Cover for Landfill		POOR	Thin Layer	
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	
Dwellings Without Basements		SLIGHT		
Dwellings With Basements		SLIGHT		
Small Commercial Buildings		SLIGHT		
Local Streets and Roads		MODERATE	Frost Action	
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		GOOD		
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Area Reclaim	
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	
Embankments, Dikes and Levees		SEVERE	Piping	
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	
Terraces and Diversions		FAVORABLE		
Grassed Waterways		FAVORABLE		

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Camp Areas	MODERATE	Percs Slowly	
Picnic Areas	MODERATE	Percs Slowly	
Playgrounds	MODERATE	Slope	Percs Slowly
Paths and Trails	SLIGHT		

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
75	12			75	4.2	3.5	6.6	3.6

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3L	SLIGHT	MODERATE	SLIGHT	SLIGHT	SEVERE	NORTH	balsam fir E red maple E sugar maple E 61 3 yellow birch E American basswood E eastern hemlock E eastern white pine EP white spruce P red pine P		

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
Amur maple	12	common ninebark	8	eastern redcedar	14	eastern white pine	24
green ash	21	jack pine	20	lilac	8	Manchurian crabapple	15
nannyberry viburnum	14	red pine	22	Roselow sargent crabapple	8	Siberian peashrub	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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05/27/92

100C STAMBAUGH SILT LOAM, 6 TO 15 PERCENT SLOPES

sloping, well drained soil formed in silty deposits overlying stratified sand and gravelly coarse sand glacial outwash. This map unit is potentially highly erodible. The land capability classification is 3E.

Component Name: STAMBAUGH

Classification: ALFIC HAPLORHODS, COARSE-SILTY OVER SANDY OR SANDY-SKELETAL, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification		>10	3-10	Percent < 3 in. passing sieve				Clay %	
Depth	USDA Texture	Unified	AASHTO	In.	Inches	No 4	No.10	No.40	No.200	<.002 mm	
0-14	SIL	ML CL-ML	A-4	0	0-8	100-100	90-100	80-100	55- 90	5-15	
14-35	SI SIL VFSL	ML CL-ML CL	A-4	0	0-8	100-100	90-100	80-100	80- 95	8-18	
35-60	GR-S GRV-S	SP SP-SM	A-1	0	0-15	70- 90	25- 60	15- 40	0- 10	0- 8	
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0-14	15-26	2-7	1.1-1.6	0.6-2.	0.21-0.24	4.5- 6.	0- 1	-	1.- 3.	LOW	0.37
14-35	15-30	2-9	1.3-1.7	0.2-0.6	0.2-0.22	4.5- 6.	0- 1	-	-	LOW	0.32
35-60	-	NP	1.5-1.7	>20.	0.02-0.04	5.1-6.5	0- 0	-	-	LOW	0.1
								Wind	Risk of Corrosion		Potential
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated		Frost
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel	Concrete	Action
NONE	-	-	>6.0	-	-	>60	B	4	56	LOW	MODERATE

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Percs Slowly	Poor Filter
Daily Cover for Landfill		POOR	Thin Layer	
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	
Dwellings Without Basements		MODERATE	Slope	
Dwellings With Basements		MODERATE	Slope	
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		MODERATE	Slope	Frost Action
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	Slope
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		GOOD		
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Area Reclaim	
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	Slope
Embankments, Dikes and Levees		SEVERE	Piping	
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	
Terraces and Diversions		LIMITATION	Slope	
Grassed Waterways		LIMITATION	Slope	

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	MODERATE	Slope
Picnic Areas	MODERATE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	SLIGHT	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
70	11			70	4.	3.3	6.4	3.4

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3L	SLIGHT	MODERATE	SLIGHT	SLIGHT	SEVERE	NORTH	balsam fir red maple sugar maple yellow birch American basswood eastern hemlock eastern white pine white spruce red pine	E E E 61 E E E EP P P	3

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
Amur maple	12	common ninebark	8	eastern redcedar	14	eastern white pine	24
green ash	21	jack pine	20	lilac	9	Manchurian crabapple	15
nannyberry viburnum	14	red pine	22	Roselow sargent crabapple	8	Siberian peashrub	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Sloping, well drained soil formed in silty deposits overlying stratified sand and gravelly coarse sand glacial outwash. This map unit is highly erodible. The land capability classification is 6E.

Component Name: STAMBAUGH

Classification: ALFIC HAPLORHODS, COARSE-SILTY OVER SANDY OR SANDY-SKELETAL, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

ESTIMATED SOIL PROPERTIES											
Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm	
		Unified	AASHTO			No. 4	No.10	No.40	No.200		
0-14	SIL	ML CL-ML	A-4	0	0-8	100-100	90-100	80-100	55- 90	5-15	
14-35	SI SIL VFSL	ML CL-ML CL	A-4	0	0-8	100-100	90-100	80-100	80- 95	8-18	
35-60	GR-S GRV-S	SP SP-SM	A-1	0	0-15	70- 90	25- 60	15- 40	0- 10	0- 8	
Depth (In)	Liquid Limit	Plas- ticity Index	Moist Bulk Density g/cc	Perme- ability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/ 100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0-14	15-26	2-7	1.1-1.6	0.6-2.	0.21-0.24	4.5- 6.	0- 1	-	1.- 3.	LOW	0.37
14-35	15-30	2-9	1.3-1.7	0.2-0.6	0.2-0.22	4.5- 6.	0- 1	-	-	LOW	0.32
35-60	-	NP	1.5-1.7	>20.	0.02-0.04	5.1-6.5	0- 0	-	-	LOW	0.1
Flooding			Water Table-(feet)			Bedrock-(in)	HYD	T	Wind	Risk of Corrosion	Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Erod.	Uncoated	Frost
								Fact.	Index	Steel	Concrete
NONE	-	-	>6.0	-	-	>60	B	4	55	LOW	MODERATE
											MODERATE

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Percs Slowly	Poor Filter
Daily Cover for Landfill		POOR	Slope	Thin Layer
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Slope
Dwellings Without Basements		SEVERE	Slope	
Dwellings With Basements		SEVERE	Slope	
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		SEVERE	Slope	
Lawns, Landscaping, and Golf Fairways		SEVERE	Slope	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		FAIR	Slope	
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Area Reclaim	Slope
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	Slope
Embankments, Dikes and Levees		SEVERE	Piping	
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	
Terraces and Diversions		LIMITATION	Slope	
Grassed Waterways		LIMITATION	Slope	

RECREATIONAL DEVELOPMENT

Camp Areas

Picnic Areas

Playgrounds

Paths and Trails

RATING

SEVERE

SEVERE

SEVERE

MODERATE

Slope

Slope

Slope

Slope

RESTRICTIVE FEATURE(S)

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
				60	3.6	2.9	6.	3.

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3R	MODERATE	MODERATE	SLIGHT	SLIGHT	SEVERE	NORTH	balsam fir red maple sugar maple yellow birch American basswood eastern hemlock eastern white pine white spruce red pine	E E E E E E EP P P	61 3

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
Amur maple	12	common ninebark	8	eastern redcedar	14	eastern white pine	24
green ash	21	jack pine	20	lilac	8	Manchurian crabapple	15
nannyberry viburnum	14	red pine	22	Roselow sargent crabapple	8	Siberian peashrub	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, somewhat poorly drained soil formed in silty and loamy deposits underlain by sand and gravelly coarse sand glacial outwash. The land capability classification is 2W. This map unit is prime farmland where drained. This map unit may have hydric inclusions.

Component Name: WORCESTER

Classification: AQUALFIC HAPLORHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Classification												
Depth	USDA Texture		Unified		AASHTO	>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay %
								No. 4	No.10	No.40	No.200	<.002 mm
0- 6	SIL		ML CL SM SC		A-4	-	0-7	80-100	75-100	65-100	45- 90	6-15
6-17	L SL SIL		SM SC-SM ML CL-ML		A-2 A-4	-	0-7	80-100	75-100	35- 95	12- 80	8-18
17-36	L SL GR-SL		SM SC ML CL		A-2 A-4 A-1	-	0-7	50-100	45-100	25- 95	10- 80	8-18
36-60	S GR-S GRV-S		SP SP-SM GP GP-GM		A-1 A-2 A-3	-	0-7	30-100	25-100	10- 70	1- 12	0- 3
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K	
0- 6	20-30	3-10	1.4-1.5	0.6-2.	0.16-0.24	4.5-6.5	-	-	1- 3.	LOW	0.37	
6-17	15-20	2-7	1.4-1.7	0.6-2.	0.09-0.22	4.5-6.5	-	-	-	LOW	0.32	
17-36	15-25	3-10	1.4-1.7	0.6-2.	0.06-0.19	4.5-6.5	-	-	-	LOW	0.32	
36-60	-	NP	1.3- 2.	6.-20.	0.02-0.07	5.1-6.5	-	-	-	LOW	0.15	
Wind								Risk of Corrosion		Potential		
Flooding			Water Table-(feet)			Bedrock-(in)	HYD	T	Erod.	Uncoated	Frost	
Frequency	Duration	Months	Depth	Kind.	Months	Depth	Hard.	GRP	Fact.	Index	Steel	
										Concrete	Action	
NONE	-	-	1.0-3.0	APPARENT	NOV-MAY	>60		C	4	56	HIGH	
										HIGH	HIGH	

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields	SEVERE	Wetness	Poor Filter
Daily Cover for Landfill	POOR	Seepage	Too Sandy
			Small Stones

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations	SEVERE	Cutbanks Cave	Wetness
Dwellings Without Basements	SEVERE	Wetness	
Dwellings With Basements	SEVERE	Wetness	
Small Commercial Buildings	SEVERE	Wetness	
Local Streets and Roads	SEVERE	Frost Action	
Lawns, Landscaping, and Golf Fairways	MODERATE	Large Stones	Wetness
			Droughty

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)	
Roadfill	FAIR	Wetness	
Sand	PROBABLE		
Gravel	PROBABLE		
Topsoil	POOR	Small Stones	Area Reclaim

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area	SEVERE	Seepage	
Embankments, Dikes and Levees	SEVERE	Seepage	Piping
Drainage	LIMITATION	Frost Action	Cutbanks Cave
Irrigation	LIMITATION	Wetness	Droughty
Terraces and Diversions	LIMITATION	Wetness	Too Sandy
Grassed Waterways	LIMITATION	Wetness	Droughty
			Rooting Depth

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Wetness
Picnic Areas	MODERATE	Wetness
Playgrounds	SEVERE	Wetness
Paths and Trails	MODERATE	Wetness

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
70	10			70	3.8	3.	6.3	3.4

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
ZW	SLIGHT	SEVERE	SLIGHT	MODERATE	MODERATE	NORTH	balsam fir sugar maple yellow birch red maple white spruce eastern white pine	E E E EP EP P	55 2

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	common ninebark	8	eastern white pine	30	lilac	10
hannyberry viburnum	8	northern whitecedar	15	red maple	30	redosiar dogwood	8
silky dogwood	10	silver maple	30	white ash	30	white spruce	20

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, well drained soil formed in loamy deposits and in the underlying stratified sand and gravelly sand glacial outwash. This map unit is not highly erodible. The land capability classification is 2E. This map unit is prime farmland.

Component Name: PADUS, WELL DRAINED

Classification: ALFIC HAPLORHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No. 4	No.10	No.40	No.200	
0- 4	FSL	SM	A-2 A-4 A-1-B	0	0-9	80-100	75-100	45- 85	20- 50	3-10
4-25	FSL SL L	SM SC ML CL	A-2 A-4 A-1-B	0	0-9	55-100	50-100	30- 95	15- 75	5-18
25-60	SR- S G	SP SP-SM GP GP-GM	A-1 A-2 A-3	0	0-9	30-100	25-100	10- 70	1- 12	0- 3

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
	<25	NP-4	1.4-1.7	0.6-6.	0.1-0.15	4.5-6.5	0- 1	-	0.5- 2.	LOW	0.24
0- 4	<25	NP-4	1.4-1.7	0.6-6.	0.1-0.15	4.5-6.5	0- 1	-	0.5- 2.	LOW	0.24
4-25	<30	NP-10	1.4-1.6	0.6-6.	0.09-0.22	4.5-6.5	0- 1	-	0.-0.5	LOW	0.24
25-60	-	NP	1.5-1.8	6.-20.	0.02-0.06	5.1-6.5	0.- 0	-	0.-0.5	LOW	0.1

Flooding		Water Table-(feet)		Bedrock-(in)		Wind		Risk of Corrosion		Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	HYD T GRP Fact. Index	Uncoated Steel	Concrete	Frost Action
CNE	-	-	>6.0	-	-	>60	B 4 86	LOW	HIGH	MODERATE

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Poor Filter	
Daily Cover for Landfill		POOR	Seepage	Too Sandy Small Stones

BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	
Dwellings Without Basements		SLIGHT		
Dwellings With Basements		SLIGHT		
Small Commercial Buildings		SLIGHT		
Local Streets and Roads		MODERATE	Frost Action	
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	Droughty

CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		GOOD		
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Small Stones	Area Reclaim

WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Droughty Soil Blowing
Canals and Diversions		LIMITATION	Too Sandy	Soil Blowing
Grassed Waterways		LIMITATION	Droughty	Rooting Depth

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SLIGHT	
Picnic Areas	SLIGHT	
Playgrounds	MODERATE	Slope
Paths and Trails	SLIGHT	Small Stones

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
70	11			70	4.	3.	6.	3.2

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES and/or TREES RECOMENDED TO PLANT (P)	(E)	WOODLAND SITE INDEX	PRODUCT- IVITY
3L	SLIGHT	MODERATE	SLIGHT	SLIGHT	MODERATE	NORTH	sugar maple white ash bigtooth aspen northern red oak American basswood red pine white spruce eastern white pine	E E E E E EP P P	67 78 70	3 6 4

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

05/27/92

Sloping, well drained soil formed in loamy deposits and in the underlying stratified sand and gravelly sand glacial outwash. This map unit is potentially highly erodible. The land capability classification is 3E.

Component Name: PADUS, WELL DRAINED

Classification: ALFIC HAPLORTHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification				>10	3-10	Percent < 3 in. passing sieve				Clay %
Depth	USDA Texture	Unified		AASHTO		In.	Inches	No 4	No.10	No.40	No.200	<.002 mm
0- 4	FSL	SM		A-2 A-4	A-1-B	0	0-9	80-100	75-100	45- 85	20- 50	3-10
4-25	FSL SL L	SM SC ML CL		A-2 A-4	A-1-B	0	0-9	55-100	50-100	30- 95	15- 75	5-18
25-60	SR- S G	SP SP-SM GP GP-GM		A-1 A-2	A-3	0	0-9	30-100	25-100	10- 70	1- 12	0- 3
		Liquid	Plas-	Moist	Perme-	Available	Soil	CEC	CaCO3	Organic	Shrink	Erosion
Depth	Limit	ticity	Bulk	Density	ability	Water	Reaction	(me/	Pct	Matter	Swell	Factor
(In)		Index	g/cc		In/hr	Capacity	(pH)	100g)		Pct	Potential	K
0- 4	<25	NP-4	1.4-1.7	0.6-6.	0.1-0.15	4.5-6.5	4.5-6.5	0- 1	-	0.5- 2.	LOW	0.24
4-25	<30	NP-10	1.4-1.6	0.6-6.	0.09-0.22	4.5-6.5	4.5-6.5	0- 1	-	0.-0.5	LOW	0.24
25-60	-	NP	1.5-1.8	6.-20.	0.02-0.06	5.1-6.5	5.1-6.5	0.- 0	-	0.-0.5	LOW	0.1
		Flooding-----		Water Table-(feet) ---		Bedrock-(in)	HYD	T	Erod.	Risk of Corrosion		Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP	Fact.	Index	Steel	Concrete	Action
NONE	-	-	>6.0	-	-	>60	B	4	96	LOW	HIGH	MODERATE

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Poor Filter	
Daily Cover for Landfill		POOR	Seepage	Too Sandy Small Stones
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	
Dwellings Without Basements		MODERATE	Slope	
Dwellings With Basements		MODERATE	Slope	
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		MODERATE	Slope	Frost Action
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	Droughty Slope
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		GOOD		
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Small Stones	Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	Slope
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Droughty Soil Blowing
Terraces and Diversions		LIMITATION	Slope	Too Sandy Soil Blowing
Grassed Waterways		LIMITATION	Slope	Droughty Rooting Depth

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	MODERATE	Slope
Picnic Areas	MODERATE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	SLIGHT	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
65	10			65	3.8	2.8	5.8	3.

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3L	SLIGHT	MODERATE	SLIGHT	SLIGHT	MODERATE	NORTH	sugar maple white ash bigtooth aspen northern red oak American basswood red pine white spruce eastern white pine	E E E E E EP P P	67 3 78 6 70 4

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	6

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Moderately steep and steep, well drained soil formed in loamy deposits and in the underlying stratified sand and gravelly sand glacial outwash. This map unit is highly erodible. The land capability classification is 6E.

Component Name: PADUS, WELL DRAINED

Classification: ALFIC HAPLORHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No. 4	No.10	No.40	No.200	
0- 4	FSL	SM	A-2 A-4 A-1-B	0	0-9	80-100	75-100	45- 85	20- 50	3-10
4-25	FSL SL L	SM SC ML CL	A-2 A-4 A-1-B	0	0-9	55-100	50-100	30- 95	15- 75	5-18
25-60	SR- S G	SP SP-SM GP GP-GM	A-1 A-2 A-3	0	0-9	30-100	25-100	10- 70	1- 12	0- 3

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 4	<25	NP-4	1.4-1.7	0.6-6.	0.1-0.15	4.5-6.5	0- 1	-	0.5- 2.	LOW	0.24
4-25	<30	NP-10	1.4-1.6	0.6-6.	0.09-0.22	4.5-6.5	0- 1	-	0.-0.5	LOW	0.24
25-60	-	NP	1.5-1.8	6.-20.	0.02-0.06	5.1-6.5	0.- 0	-	0.-0.5	LOW	0.1

Flooding			Water Table-(feet)			Bedrock-(in)	HYD	T	Erod.	Uncoated	Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP	Fact.	Index	Steel	Concrete
NONE	-	-	>6.0	-	-	>60	B	4	86	LOW	HIGH

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)		
Septic Tank Absorption Fields		SEVERE	Poor Filter	Slope	
Daily Cover for Landfill		POOR	Seepage	Too Sandy	Small Stones

BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)		
Shallow Excavations		SEVERE	Cutbanks Cave	Slope	
Dwellings Without Basements		SEVERE	Slope		
Dwellings With Basements		SEVERE	Slope		
Small Commercial Buildings		SEVERE	Slope		
Local Streets and Roads		SEVERE	Slope		
Lawns, Landscaping, and Golf Fairways		SEVERE	Slope		

CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)		
Roadfill		POOR	Slope		
Sand		PROBABLE			
Gravel		PROBABLE			
Topsoil		POOR	Small Stones	Area Reclaim	Slope

WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)		
Pond Reservoir Area		SEVERE	Seepage	Slope	
Embankments, Dikes and Levees		SEVERE	Seepage	Piping	
Drainage		LIMITATION	Deep To Water		
Irrigation		LIMITATION	Slope	Droughty	Soil Blowing
Terraces and Diversions		LIMITATION	Slope	Too Sandy	Soil Blowing
Grassed Waterways		LIMITATION	Slope	Droughty	Rooting Depth

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Slope
Picnic Areas	SEVERE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	SEVERE	Slope

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
				55	3.4	2.4	5.4	2.4

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3R	MODERATE	MODERATE	SLIGHT	SLIGHT	MODERATE	NORTH	sugar maple white ash bigtooth aspen northern red oak American basswood red pine white spruce eastern white pine	E E E E E EP P P	67 3 78 4

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, well drained soils formed in loamy deposits and in the underlying stratified sand and gravelly sand glacial outwash. This map unit is potentially highly erodible. The land capability classification is 3E.

Component Name: PADUS, WELL DRAINED

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC HAPLORHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification				>10	3-10	Percent < 3 in. passing sieve				Clay %
Depth	USDA Texture	Unified		AASHTO		In.	Inches	No 4	No.10	No.40	No.200	<.002 mm
0- 4	FSL	SM		A-2	A-4 A-1-B	0	0-9	80-100	75-100	45- 85	20- 50	3-10
4-25	FSL SL L	SM SC ML CL		A-2	A-4 A-1-B	0	0-9	55-100	50-100	30- 95	15- 75	5-18
25-60	SR- S G	SP SP-SM GP GP-GM		A-1	A-2 A-3	0	0-9	30-100	25-100	10- 70	1- 12	0- 3
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K	
0- 4	<25	NP-4	1.4-1.7	0.6-6.	0.1-0.15	4.5-6.5	0- 1	-	0.5- 2.	LOW	0.24	
4-25	<30	NP-10	1.4-1.6	0.6-6.	0.09-0.22	4.5-6.5	0- 1	-	0.-0.5	LOW	0.24	
25-60	-	NP	1.5-1.8	6.-20.	0.02-0.06	5.1-6.5	0.- 0	-	0.-0.5	LOW	0.1	
								Wind	Risk of Corrosion		Potential	
Flooding				Water Table-(feet)		Bedrock-(in)	HYD T	Erod.	Uncoated		Frost	
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel	Concrete	Action	
NONE	-	-	>6.0	-	-	>60	B	4	86	LOW HIGH	MODERATE	

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Poor Filter	
Daily Cover for Landfill		POOR	Seepage	Too Sandy Small Stones
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	
Dwellings Without Basements		SLIGHT		
Dwellings With Basements		SLIGHT		
Small Commercial Buildings		SLIGHT		
Local Streets and Roads		MODERATE	Frost Action	
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	Droughty
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		GOOD		
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Small Stones	Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Droughty Soil Blowing
Terraces and Diversions		LIMITATION	Too Sandy	Soil Blowing
Grassed Waterways		LIMITATION	Droughty	Rooting Depth

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SLIGHT	
Picnic Areas	SLIGHT	
Playgrounds	MODERATE	Slope
Paths and Trails	SLIGHT	Small Stones

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
70	11			70	4.	3.	6.	3.2
60	10			55	3.5	2.5	5.	2.5

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	WOODLAND SITE INDEX	PRODUCT- IVITY
3L	SLIGHT	MODERATE	SLIGHT	SLIGHT	MODERATE	NORTH	sugar maple white ash bigtooth aspen northern red oak American basswood red pine white spruce eastern white pine	E E E E E EP P P	67 78 70 4 3

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, well drained soils formed in loamy deposits and in the underlying stratified sand and gravelly sand glacial outwash. This map unit is potentially highly erodible. The land capability classification is 3E.

Component Name: PENCE

This map unit has 2 components, and 2 interpretation sheet.

Classification: ENTIC HAPLORHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification		>10	3-10	Percent < 3 in. passing sieve				Clay %			
Depth	USDA Texture	Unified	AASHTO	In.	Inches	No 4	No.10	No.40	No.200	<.002 mm			
0- 2	SL	SM ML	A-4 A-2 A-1	0	0-15	85-100	75-100	45- 85	20- 55	3-11			
2-14	SL L GR-SL	SM ML CL-ML SC-SM	A-4 A-2 A-1	0-4	0-15	55-100	50-100	30- 95	15- 75	2-12			
14-20	GR-COS LS S	SM SP-SM GM GP-GM	A-2 A-1 A-3	0-4	0-15	55-100	50-100	25- 75	2- 30	2-10			
20-60	GR-COS S SG	SP SM	A-1 A-3 A-2	0-4	0-15	55- 85	50- 75	15- 55	2- 15	0- 4			
	Liquid Plas-	Moist	Perme-	Available	Soil	CEC	CaCO3	Organic	Shrink	Erosion			
Depth	Limit	ticity	Bulk Density	ability	Water Capacity	Reaction	(me/	Matter	Swell	Factor			
(In)		Index	g/cc	In/hr	(In./in)	(pH)	100g)	Pct	Pct	Potential	K		
0- 2	<21	NP-4	1.2-1.6	2.-6.	0.1-0.18	4.5-6.5	0- 1	-	1.- 3.	LOW	0.24		
2-14	<25	NP-7	1.4-1.5	2.-6.	0.1-0.15	4.5-6.5	0.- 1	-	0.-0.5	LOW	0.24		
14-20	-	NP	1.6-1.8	2.-20.	0.05-0.08	4.5-6.5	0.- 1	-	0.-0.5	LOW	0.1		
20-60	-	NP	1.4-1.8	6.-20.	0.02-0.05	5.1-6.5	0.- 0	-	0.-0.5	LOW	0.1		
								Wind	Risk of Corrosion		Potential		
flooding			Water Table-(feet)			bedrock-(in)	MYD T	Erod.	Uncoated		Frost		
Frequency		Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP Fact.	Index	Steel	Concrete	Action
NONE		-	-	>6.0	-	-	>60	B	3	86	LOW	MODERATE	LOW

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Poor Filter	
Daily Cover for Landfill		POOR	Seepage	Too Sandy Small Stones
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	
Dwellings Without Basements		SLIGHT		
Dwellings With Basements		SLIGHT		
Small Commercial Buildings		SLIGHT		
Local Streets and Roads		SLIGHT		
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	Droughty
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		GOOD		
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Too Sandy	Small Stones Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	
Embankments, Dikes and Levees		SEVERE	Seepage	
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Droughty
Terraces and Diversions		LIMITATION	Too Sandy	Soil Blowing
Grassed Waterways		LIMITATION	Droughty	Rooting Depth

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Camp Areas	SLIGHT		
Picnic Areas	SLIGHT		
Playgrounds	MODERATE	Slope	Small Stones
Paths and Trails	SLIGHT		

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
70	11			70	4.	3.	6.	3.2
60	10			55	3.5	2.5	5.	2.5

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES and/or TREES RECOMMENDED TO PLANT (P)	(E)	SITE INDEX	WOODLAND PRODUCT- IVITY
3S	SLIGHT	MODERATE	SLIGHT	SLIGHT	SLIGHT	NORTH	balsam fir sugar maple yellow birch paper birch quaking aspen American basswood red pine eastern white pine jack pine	E E E E E E EP EP P	59	3

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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Sloping, well drained soils formed in loamy deposits and in the underlying stratified sand and gravelly sand glacial outwash. This map unit is potentially highly erodible. The land capability classification is 4E.

Component Name: PADUS, WELL DRAINED

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC HAPLORTHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification			>10	3-10	Percent < 3 in. passing sieve				Clay %
Depth	USDA Texture	Unified		AASHTO	In.	Inches	No 4	No.10	No.40	No.200	<.002 mm
0- 4	FSL	SM		A-2 A-4 A-1-B	0	0-9	80-100	75-100	45- 85	20- 50	3-10
4-25	FSL SL L	SM SC ML CL		A-2 A-4 A-1-B	0	0-9	55-100	50-100	30- 95	15- 75	5-18
25-60	SR- S G	SP SP-SM GP GP-GM		A-1 A-2 A-3	0	0-9	30-100	25-100	10- 70	1- 12	0- 3
	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 4	<25	NP-4	1.4-1.7	0.6-6.	0.1-0.15	4.5-6.5	0- 1	-	0.5- 2.	LOW	0.24
4-25	<30	NP-10	1.4-1.6	0.6-6.	0.09-0.22	4.5-6.5	0- 1	-	0.-0.5	LOW	0.24
25-60	-	NP	1.5-1.8	6.-20.	0.02-0.06	5.1-6.5	0.- 0	-	0.-0.5	LOW	0.1
								Wind	Risk of Corrosion		Potential
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated		Frost
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel	Concrete	Action
NONE	-	-	>6.0	-	-	>60	B	4	86	LOW	HIGH

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Poor Filter	
Daily Cover for Landfill		POOR	Seepage	Too Sandy Small Stones
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	
Dwellings Without Basements		MODERATE	Slope	
Dwellings With Basements		MODERATE	Slope	
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		MODERATE	Slope	Frost Action
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	Droughty Slope
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		GOOD		
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Small Stones	Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	Slope
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Droughty Soil Blowing
Terraces and Diversions		LIMITATION	Slope	Too Sandy Soil Blowing
Grassed Waterways		LIMITATION	Slope	Droughty Rooting Depth

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	MODERATE	Slope
Picnic Areas	MODERATE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	SLIGHT	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
65	10			65	3.8	2.8	5.8	3.
55	9			50	3.3	2.3	4.8	2.3

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3L	SLIGHT	MODERATE	SLIGHT	SLIGHT	MODERATE	NORTH	sugar maple white ash bigtooth aspen northern red oak American basswood red pine white spruce eastern white pine	E E E E E EP P P	67 3 78 4

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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Sloping, well drained soils formed in loamy deposits and in the underlying stratified sand and gravelly sand glacial outwash. This map unit is potentially highly erodible. The land capability classification is 4E.

Component Name: PENCE

This map unit has 2 components, and 2 interpretation sheet.

Classification: ENTIC HAPLORHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification				>10	3-10	Percent < 3 in. passing sieve				Clay %
Depth	USDA Texture	Unified		AASHTO		In.	Inches	No 4	No.10	No.40	No.200	<.002 mm
----	-----	-----		-----		---	-----	-----	-----	-----	-----	-----
0- 2	SL	SM	ML	A-4	A-2 A-1	0	0-15	85-100	75-100	45- 85	20- 55	3-11
2-14	SL L GR-SL	SM	ML CL-ML SC-SM	A-4	A-2 A-1	0-4	0-15	55-100	50-100	30- 95	15- 75	2-12
14-20	GR-COS LS S	SM	SP-SM GM GP-GM	A-2	A-1 A-3	0-4	0-15	55-100	50-100	25- 75	2- 30	2-10
20-60	GR-COS S SG	SP	SM	A-1	A-3 A-2	0-4	0-15	55- 85	50- 75	15- 55	2- 15	0- 4

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
	<21	NP-4	1.2-1.6	2.-6.	0.1-0.18	4.5-6.5	0- 1	-	1.- 3.	LOW	0.24
0-2	<21	NP-4	1.2-1.6	2.-6.	0.1-0.18	4.5-6.5	0- 1	-	1.- 3.	LOW	0.24
2-14	<25	NP-7	1.4-1.5	2.-6.	0.1-0.15	4.5-6.5	0- 1	-	0.-0.5	LOW	0.24
14-20	-	NP	1.6-1.8	2.-20.	0.05-0.08	4.5-6.5	0- 1	-	0.-0.5	LOW	0.1
20-60	-	NP	1.4-1.8	6.-20.	0.02-0.05	5.1-6.5	0- 0	-	0.-0.5	LOW	0.1

Flooding			Water Table-(feet)			Bedrock-(in)		HYD T	Erod.	Risk of Corrosion		Potential	
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP Fact.	Index	Steel	Concrete	Frost Action	
NONE			>6.0			>60		B	3	86	LOW	MODERATE	LOW

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields	SEVERE	Poor Filter	
Daily Cover for Landfill	POOR	Seepage	Too Sandy Small Stones

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations	SEVERE	Cutbanks Cave	
Dwellings Without Basements	MODERATE	Slope	
Dwellings With Basements	MODERATE	Slope	
Small Commercial Buildings	SEVERE	Slope	
Local Streets and Roads	MODERATE	Slope	
Lawns, Landscaping, and Golf Fairways	MODERATE	Large Stones	Droughty Slope

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)	
Roadfill	GOOD		
Sand	PROBABLE		
Gravel	PROBABLE		
Topsoil	POOR	Too Sandy	Small Stones Area Reclaim

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area	SEVERE	Seepage	Slope
Embankments, Dikes and Levees	SEVERE	Seepage	
Drainage	LIMITATION	Deep To Water	
Irrigation	LIMITATION	Slope	Droughty
Terraces and Diversions	LIMITATION	Slope	Too Sandy Soil Blowing
Grassed Waterways	LIMITATION	Slope	Droughty Rooting Depth

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	MODERATE	Slope
Picnic Areas	MODERATE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	SLIGHT	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
65	10			65	3.8	2.8	5.8	3.
55	9			50	3.3	2.3	4.8	2.3

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	WOODLAND SITE INDEX	WOODLAND PRODUCT- IVITY
3S	SLIGHT	MODERATE	SLIGHT	SLIGHT	SLIGHT	NORTH	balsam fir E sugar maple E 59 3 yellow birch E paper birch E quaking aspen E American basswood E red pine EP 59 7 eastern white pine EP 57 8 jack pine F		

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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Moderately steep and steep, well drained soils formed in loamy deposits and in the underlying stratified sand and gravelly sand glacial outwash. This map unit is highly erodible. The land capability classification is 7E.

Component Name: PADUS, WELL DRAINED

This map unit has 2 components, and 2 interpretation sheet.

Classification: ALFIC HAPLORHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification				>10	3-10	Percent < 3 in. passing sieve				Clay %		
Depth	USDA Texture	Unified		AASHTO		In.	Inches	No. 4	No.10	No.40	No.200	<.002 mm		
0- 4	FSL	SM		A-2	A-4 A-1-B	0	0-9	80-100	75-100	45- 85	20- 50	3-10		
4-25	FSL SL L	SM SC ML CL		A-2	A-4 A-1-B	0	0-9	55-100	50-100	30- 95	15- 75	5-18		
25-60	SR- S G	SP SP-SM GP GP-GM		A-1	A-2 A-3	0	0-9	30-100	25-100	10- 70	1- 12	0- 3		
	Liquid	Plas-	Moist	Perme-	Available	Soil	CEC	CaCO3	Organic	Shrink	Erosion			
Depth	Limit	ticity	Bulk Density	ability	Water Capacity	Reaction	(me/		Matter	Swell	Factor			
(In)		Index	g/cc	In/hr	(In./in)	(pH)	100g)	Pct	Pct	Potential	K			
0- 4	<25	NP-4	1.4-1.7	0.6-6.	0.1-0.15	4.5-6.5	0- 1	-	0.5- 2.	LOW	0.24			
4-25	<30	NP-10	1.4-1.6	0.6-6.	0.09-0.22	4.5-6.5	0- 1	-	0.-0.5	LOW	0.24			
25-60	-	NP	1.5-1.8	6.-20.	0.02-0.06	5.1-6.5	0.- 0	-	0.-0.5	LOW	0.1			
								Wind	Risk of Corrosion		Potential			
Flooding-----				--- Water Table-(feet) ---		Bedrock-(in)	HYD	T	Erod.	Uncoated		Frost		
Frequency		Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Index	Steel	Concrete	Action
NONE	-	-	>6.0	-	-	>60	B	4	86	LOW	HIGH	MODERATE		

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Poor Filter	Slope
Daily Cover for Landfill		POOR	Seepage	Too Sandy
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Slope
Dwellings Without Basements		SEVERE	Slope	
Dwellings With Basements		SEVERE	Slope	
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		SEVERE	Slope	
Lawns, Landscaping, and Golf Fairways		SEVERE	Slope	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		POOR	Slope	
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Small Stones	Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	Slope
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Droughty
Terraces and Diversions		LIMITATION	Slope	Too Sandy
Grassed Waterways		LIMITATION	Slope	Droughty

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Slope
Picnic Areas	SEVERE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	SEVERE	Slope

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
				55	3.4	2.4	5.4	2.4
				45	2.9	1.9	4.4	1.7

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3R	MODERATE	MODERATE	SLIGHT	SLIGHT	MODERATE	NORTH	sugar maple white ash bigtooth aspen northern red oak American basswood red pine white spruce eastern white pine	E E E E E EP P P	67 78 70 4

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Moderately steep and steep, well drained soils formed in loamy deposits and in the underlying stratified sand and gravelly sand glacial outwash. This map unit is highly erodible. The land capability classification is 7E.

Component Name: PENCE

This map unit has 2 components, and 2 interpretation sheet.

Classification: ENTIC HAPLORHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay %	
		Unified	AASHTO			No 4	No.10	No.40	No.200	<.002 mm	
0-2	SL	SM ML	A-4 A-2 A-1	0	0-15	85-100	75-100	45- 85	20- 55	3-11	
2-14	SL L GR-SL	SM ML CL-ML SC-SM	A-4 A-2 A-1	0-4	0-15	55-100	50-100	30- 95	15- 75	2-12	
14-20	GR-COS LS S	SM SP-SM GM GP-GM	A-2 A-1 A-3	0-4	0-15	55-100	50-100	25- 75	2- 30	2-10	
20-60	GR-COS S SG	SP SM	A-1 A-3 A-2	0-4	0-15	55- 85	50- 75	15- 55	2- 15	0- 4	
Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0-2	<21	NP-4	1.2-1.6	2.-6.	0.1-0.18	4.5-6.5	0- 1	-	1.- 3.	LOW	0.24
2-14	<25	NP-7	1.4-1.5	2.-6.	0.1-0.15	4.5-6.5	0- 1	-	0.-0.5	LOW	0.24
14-20	-	NP	1.6-1.8	2.-20.	0.05-0.08	4.5-6.5	0- 1	-	0.-0.5	LOW	0.1
20-60	-	NP	1.4-1.8	6.-20.	0.02-0.05	5.1-6.5	0- 0	-	0.-0.5	LOW	0.1
Wind Risk of Corrosion Potential											
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost	
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP	Fact. Index	Steel	Concrete	Action
NONE	-	-	>6.0	-	-	>60	B	3 - 96	LOW	MODERATE	LOW

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Poor Filter	Slope
Daily Cover for Landfill		POOR	Seepage	Too Sandy Small Stones
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Slope
Dwellings Without Basements		SEVERE	Slope	
Dwellings With Basements		SEVERE	Slope	
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		SEVERE	Slope	
Lawns, Landscaping, and Golf Fairways		SEVERE	Slope	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		POOR	Slope	
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Too Sandy	Small Stones Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	Slope
Embankments, Dikes and Levees		SEVERE	Seepage	
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Droughty
Terraces and Diversions		LIMITATION	Slope	Too Sandy Soil Blowing
Grassed Waterways		LIMITATION	Slope	Droughty Rooting Depth

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Slope
Picnic Areas	SEVERE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	SEVERE	Slope

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
				55	3.4	2.4	5.4	2.4
				45	2.9	1.9	4.4	1.7

WOODLAND INTERPRETATIONS

WOODLAND ORD. STB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES and/or TREES RECOMENDED TO PLANT (P)	(E)	SITE INDEX	WOODLAND PRODUCT- IVITY
3R	MODERATE	MODERATE	SLIGHT	SLIGHT	SLIGHT	NORTH	balsam fir sugar maple yellow birch paper birch quaking aspen American basswood red pine eastern white pine jack pine	E E E E E E EP EP P	59 59 57	3 7 8

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, well drained soil formed in loamy deposits and in the underlying stratified sand and gravelly coarse sand glacial outwash, and excessively drained soil formed in sandy glacial outwash. This map unit is potentially highly erodible. The land capability classification is 3E.

Component Name: PENCE

This map unit has 2 components, and 2 interpretation sheet.

Classification: ENTIC HAPLORHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No. 4	No.10	No.40	No.200	
0- 2	SL	SM ML	A-4 A-2 A-1	0	0-15	85-100	75-100	45- 85	20- 55	3-11
2-14	SL L GR-SL	SM ML CL-ML SC-SM	A-4 A-2 A-1	0-4	0-15	55-100	50-100	30- 95	15- 75	2-12
14-20	GR-COS LS S	SM SP-SM GM GP-GM	A-2 A-1 A-3	0-4	0-15	55-100	50-100	25- 75	2- 30	2-10
20-60	GR-COS S SG	SP SM	A-1 A-3 A-2	0-4	0-15	55- 85	50- 75	15- 55	2- 15	0- 4

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 2	<21	NP-4	1.2-1.6	2.-6.	0.1-0.18	4.5-6.5	0- 1	-	1.- 3.	LOW	0.24
2-14	<25	NP-7	1.4-1.5	2.-6.	0.1-0.15	4.5-6.5	0.- 1	-	0.-0.5	LOW	0.24
14-20	-	NP	1.6-1.8	2.-20.	0.05-0.08	4.5-6.5	0.- 1	-	0.-0.5	LOW	0.1
20-60	-	NP	1.4-1.8	6.-20.	0.02-0.05	5.1-6.5	0.- 0	-	0.-0.5	LOW	0.1

Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Wind Ero.	Risk of Corrosion	Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Uncoated Steel	Frost Action
NONE	-	-	>6.0	-	-	>60	B	3	.86	LOW MODERATE LOW

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)		
Septic Tank Absorption Fields	SEVERE	Poor Filter		
Daily Cover for Landfill	POOR	Seepage	Too Sandy	Small Stones

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)		
Shallow Excavations	SEVERE	Cutbanks Cave		
Dwellings Without Basements	SLIGHT			
Dwellings With Basements	SLIGHT			
Small Commercial Buildings	SLIGHT			
Local Streets and Roads	SLIGHT			
Lawns, Landscaping, and Golf Fairways	MODERATE	Large Stones	Droughty	

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)		
Roadfill	GOOD			
Sand	PROBABLE			
Gravel	PROBABLE			
Topsoil	POOR	Too Sandy	Small Stones	Area Reclaim

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)		
Pond Reservoir Area	SEVERE	Seepage		
Embankments, Dikes and Levees	SEVERE	Seepage		
Drainage	LIMITATION	Deep To Water		
Irrigation	LIMITATION	Slope	Droughty	
Terraces and Diversions	LIMITATION	Too Sandy	Soil Blowing	
Grassed Waterways	LIMITATION	Droughty	Rooting Depth	

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Camp Areas	SLIGHT		
Picnic Areas	SLIGHT		
Playgrounds	MODERATE	Slope	Small Stones
Paths and Trails	SLIGHT		

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
60	10			55	3.5	2.5	5.	2.5
45	7			40	2.5	1.9	4.	1.8

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3S	SLIGHT	MODERATE	SLIGHT	SLIGHT	SLIGHT	NORTH	balsam fir E sugar maple E 59 3 yellow birch E paper birch E quaking aspen E American basswood E red pine EP 59 7 eastern white pine EP 57 6 jack pine P		

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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Nearly level and gently sloping, well drained soil formed in loamy deposits and in the underlying stratified sand and gravelly coarse sand glacial outwash, and excessively drained soil formed in sandy glacial outwash. This map unit is potentially highly erodible. The land capability classification is 3E.

Component Name: VILAS

This map unit has 2 components, and 2 interpretation sheet.

Classification: ENTIC HAPLORTHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No. 4	No.10	No.40	No.200	
0- 7	LS	SM SP-SM	A-1 A-2	0	0	80-100	75-100	35- 90	12- 30	2- 6
7-15	LS	SP-SM SM	A-1 A-2	0	0	80-100	75-100	35- 90	12- 30	2- 6
15-29	S	SM SP-SM	A-1 A-2 A-3	0	0	80-100	75-100	35- 90	5- 20	1- 3
29-60	S	SP SP-SM SM	A-1 A-2 A-3	0	0	80-100	75-100	35- 90	1- 20	0- 3

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 7	-	NP	1.4-1.6	6.-20.	0.09-0.12	4.5-6.5	-	-	0.5- 1.	LOW	0.17
7-15	-	NP	1.5-1.6	6.-20.	0.07-0.12	4.5-6.5	-	-	-	LOW	0.17
15-29	-	NP	1.5-1.7	6.-20.	0.05-0.08	4.5-6.5	-	-	-	LOW	0.17
29-50	-	NP	1.5-1.7	6.-20.	0.04-0.07	5.1-6.5	-	-	-	LOW	0.17

Flooding			Water Table-(feet)			Bedrock-(in)		HYD T		Erod.		Risk of Corrosion		Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Index	Steel	Concrete	Frost	Action
NONE	-	-	>6.0	-	-	>60		A	5	134	LOW	HIGH		LOW

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields	SEVERE	Poor Filter	
Daily Cover for Landfill	POOR	Seepage	Too Sandy

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations	SEVERE	Cutbanks Cave	
Dwellings Without Basements	SLIGHT		
Dwellings With Basements	SLIGHT		
Small Commercial Buildings	SLIGHT		
Local Streets and Roads	SLIGHT		
Lawns, Landscaping, and Golf Fairways	MODERATE	Droughty	

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)	
Roadfill	GOOD		
Sand	PROBABLE		
Gravel	IMPROBABLE	Too Sandy	
Topsoil	POOR	Too Sandy	

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area	SEVERE	Seepage	
Embankments, Dikes and Levees	SEVERE	Seepage	Piping
Drainage	LIMITATION	Deep To Water	
Irrigation	LIMITATION	Slope	Droughty
Terraces and Diversions	LIMITATION	Too Sandy	Soil Blowing
Grassed Waterways	LIMITATION	Droughty	

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)		
Camp Areas	MODERATE	Too Sandy		
Picnic Areas	MODERATE	Too Sandy		
Playgrounds	MODERATE	Slope	Small Stones	Too Sandy
Paths and Trails	MODERATE	Too Sandy		

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
60	10			55	3.5	2.5	5.	2.5
45	7			40	2.5	1.9	4.	1.8

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	(E) SITE INDEX	WOODLAND PRODUCT- IVITY
6A	SLIGHT	SLIGHT	SLIGHT	SLIGHT	SLIGHT	NORTH	balsam fir red maple paper birch quaking aspen northern pin oak northern red oak jack pine red pine eastern white pine	E E E E E E EP 65 EP 57 EP 56	7 6 8

RECOMMENDED WOODBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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Sloping, well drained soil formed in loamy deposits and in the underlying stratified sand and gravelly coarse sand glacial outwash, and excessively drained soil formed in sandy glacial outwash. This map unit is potentially highly erodible. The land capability classification is 4E.

Component Name: PENCE

This map unit has 2 components, and 2 interpretation sheet.

Classification: ENTIC HAPLORTHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification		>10	3-10	Percent < 3 in. passing sieve				Clay %		
Depth	USDA Texture	Unified	AASHTO	In.	Inches	No 4	No.10	No.40	No.200	<.002 mm		
0- 2	SL	SM ML	A-4 A-2 A-1	0	0-15	85-100	75-100	45- 85	20- 55	3-11		
2-14	SL L GR-SL	SM ML CL-ML SC-SM	A-4 A-2 A-1	0-4	0-15	55-100	50-100	30- 95	15- 75	2-12		
14-20	GR-COS LS S	SM SP-SM GM GP-GM	A-2 A-1 A-3	0-4	0-15	55-100	50-100	25- 75	2- 30	2-10		
20-60	GR-COS S SG	SP SM	A-1 A-3 A-2	0-4	0-15	55- 85	50- 75	15- 55	2- 15	0- 4		
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K	
0- 2	<21	NP-4	1.2-1.6	2.-6.	0.1-0.18	4.5-6.5	0- 1	-	1.- 3.	LOW	0.24	
2-14	<25	NP-7	1.4-1.5	2.-6.	0.1-0.15	4.5-6.5	0.- 1	-	0.-0.5	LOW	0.24	
14-20	-	NP	1.6-1.8	2.-20.	0.05-0.08	4.5-6.5	0.- 1	-	0.-0.5	LOW	0.1	
20-60	-	NP	1.4-1.8	6.-20.	0.02-0.05	5.1-6.5	0.- 0	-	0.-0.5	LOW	0.1	
								Wind	Risk of Corrosion		Potential	
Flooding			Water Table-(feet)			Bedrock-(in)	HTD T	Erod.	Uncoated	Frost		
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel	Concrete	Action	
NONE	-	-	>6.0	-	-	>60	B	3	86	LOW	MODERATE	LOW

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)		
Septic Tank Absorption Fields		SEVERE	Poor Filter		
Daily Cover for Landfill		POOR	Seepage	Too Sandy	Small Stones
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)		
Shallow Excavations		SEVERE	Cutbanks Cave		
Dwellings Without Basements		MODERATE	Slope		
Dwellings With Basements		MODERATE	Slope		
Small Commercial Buildings		SEVERE	Slope		
Local Streets and Roads		MODERATE	Slope		
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	Droughty	Slope
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)		
Roadfill		GOOD			
Sand		PROBABLE			
Gravel		PROBABLE			
Topsoil		POOR	Too Sandy	Small Stones	Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)		
Pond Reservoir Area		SEVERE	Seepage	Slope	
Embankments, Dikes and Levees		SEVERE	Seepage		
Drainage		LIMITATION	Deep To Water		
Irrigation		LIMITATION	Slope	Droughty	
Terraces and Diversions		LIMITATION	Slope	Too Sandy	Soil Blowing
Grassed Waterways		LIMITATION	Slope	Droughty	Rooting Depth

RECREATIONAL DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Camp Areas		MODERATE	Slope	
Picnic Areas		MODERATE	Slope	
Playgrounds		SEVERE	Slope	
Paths and Trails		SLIGHT		

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
55	9			50	3.3	2.3	4.8	2.3
45	7			35	2.3	1.7	3.8	1.5

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	(E) SITE INDEX	WOODLAND PRODUCT- IVITY
3S	SLIGHT	MODERATE	SLIGHT	SLIGHT	SLIGHT	NORTH	balsam fir sugar maple yellow birch paper birch quaking aspen American basswood red pine eastern white pine jack pine	E E E E E E EP EP P	59 3 7 6

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road, Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Sloping, well drained soil formed in loamy deposits and in the underlying stratified sand and gravelly coarse sand glacial outwash, and excessively drained soil formed in sandy glacial outwash. This map unit is potentially highly erodible. The land capability classification is 4E.

Component Name: VILAS

This map unit has 2 components, and 2 interpretation sheet.

Classification: ENTIC HAPLORTHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No 4	No.10	No.40	No.200	
0- 7 LS		SM SP-SM	A-1 A-2	0	0	80-100	75-100	35- 90	12- 30	2- 6
7-15 LS		SP-SM SM	A-1 A-2	0	0	80-100	75-100	35- 90	12- 30	2- 6
15-29 S		SM SP-SM	A-1 A-2 A-3	0	0	80-100	75-100	35- 90	5- 20	1- 3
29-60 S		SP SP-SM SM	A-1 A-2 A-3	0	0	80-100	75-100	35- 90	1- 20	0- 3

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 7	-	NP	1.4-1.6	6.-20.	0.09-0.12	4.5-6.5	-	-	0.5- 1.	LOW	0.17
7-15	-	NP	1.5-1.6	6.-20.	0.07-0.12	4.5-6.5	-	-	-	LOW	0.17
15-29	-	NP	1.5-1.7	6.-20.	0.05-0.08	4.5-6.5	-	-	-	LOW	0.17
29-60	-	NP	1.5-1.7	6.-20.	0.04-0.07	5.1-6.5	-	-	-	LOW	0.17

Flooding			Water Table-(feet)			Bedrock-(in)		HYD T Erod.		Risk of Corrosion		Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact. Index	Steel	Concrete	Frost Action
NONE	-	-	>6.0	-	-	>60	'	A	5 134	LOW	HIGH	LOW

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)
Septic Tank Absorption Fields	SEVERE	Poor Filter
Daily Cover for Landfill	POOR	Seepage

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Shallow Excavations	SEVERE	Cutbanks Cave
Dwellings Without Basements	MODERATE	Slope
Dwellings With Basements	MODERATE	Slope
Small Commercial Buildings	SEVERE	Slope
Local Streets and Roads	MODERATE	Slope
Lawns, Landscaping, and Golf Fairways	MODERATE	Droughty

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)
Roadfill	GOOD	
Sand	PROBABLE	
Gravel	IMPROBABLE	Too Sandy
Topsoil	POOR	Too Sandy

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)
Pond Reservoir Area	SEVERE	Seepage
Embankments, Dikes and Levees	SEVERE	Seepage
Drainage	LIMITATION	Deep To Water
Irrigation	LIMITATION	Slope
Terraces and Diversions	LIMITATION	Slope
Grassed Waterways	LIMITATION	Slope

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Camp Areas	MODERATE	Slope	Too Sandy
Picnic Areas	MODERATE	Slope	Too Sandy
Playgrounds	SEVERE	Slope	
Paths and Trails	MODERATE	Too Sandy	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
55	9			50	3.3	2.3	4.8	2.3
45	7			35	2.3	1.7	3.8	1.5

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
6A	SLIGHT	SLIGHT	SLIGHT	SLIGHT	SLIGHT	NORTH	balsam fir red maple paper birch quaking aspen northern pin oak northern red oak jack pine red pine eastern white pine	E E E E E E EP EP EP	65 7 6 8

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Moderately steep and steep, well drained soil formed in loamy deposits and in the underlying stratified sand and gravelly coarse sand glacial outwash, and excessively drained soil formed in sandy glacial outwash. This map unit is highly erodible. The land capability is 7E.

Component Name: PENCE

This map unit has 2 components, and 2 interpretation sheet.

Classification: ENTIC HAPLORHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No 4	No.10	No.40	No.200	
0-2	SL	SM ML	A-4 A-2 A-1	0	0-15	85-100	75-100	45- 85	20- 55	3-11
2-14	SL L GR-SL	SM ML CL-ML SC-SM	A-4 A-2 A-1	0-4	0-15	55-100	50-100	30- 95	15- 75	2-12
14-20	GR-COS LS S	SM SP-SM GM GP-GM	A-2 A-1 A-3	0-4	0-15	55-100	50-100	25- 75	2- 30	2-10
20-60	GR-COS S SG	SP SM	A-1 A-3 A-2	0-4	0-15	55- 85	50- 75	15- 55	2- 15	0- 4

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0-2	<21	NP-4	1.2-1.6	2.-6.	0.1-0.18	4.5-6.5	0- 1	-	1.- 3.	LOW	0.24
2-14	<25	NP-7	1.4-1.5	2.-6.	0.1-0.15	4.5-6.5	0.- 1	-	0.-0.5	LOW	0.24
14-20	-	NP	1.6-1.8	2.-20.	0.05-0.08	4.5-6.5	0.- 1	-	0.-0.5	LOW	0.1
20-60	-	NP	1.4-1.8	6.-20.	0.02-0.05	5.1-6.5	0.- 0	-	0.-0.5	LOW	0.1

-----					Wind			Risk of Corrosion		Potential			
----- Flooding-----		--- Water Table-(feet) ---			Bedrock-(in)		HYD T	Erod.	Uncoated	Frost			
Frequency	Duration	---Months	Depth	Kind	Months	Depth	Hard.	GRP Fact.	Index	Steel	Concrete	Action	
-----					-----			-----			-----		
NONE		-	>6.0	-	-	>60		B	3	86	LOW	MODERATE	LOW

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)		
Septic Tank Absorption Fields	SEVERE	Poor Filter	Slope	
Daily Cover for Landfill	POOR	Seepage	Too Sandy	Small Stones

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)		
Shallow Excavations	SEVERE	Cutbanks Cave	Slope	
Dwellings Without Basements	SEVERE	Slope		
Dwellings With Basements	SEVERE	Slope		
Small Commercial Buildings	SEVERE	Slope		
Local Streets and Roads	SEVERE	Slope		
Lawns, Landscaping, and Golf Fairways	SEVERE	Slope		

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)		
Roadfill	POOR	Slope		
Sand	PROBABLE			
Gravel	PROBABLE			
Topsoil	POOR	Too Sandy	Small Stones	Area Reclaim

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)		
Pond Reservoir Area	SEVERE	Seepage	Slope	
Embankments, Dikes and Levees	SEVERE	Seepage		
Drainage	LIMITATION	Deep To Water		
Irrigation	LIMITATION	Slope	Droughty	
Terraces and Diversions	LIMITATION	Slope	Too Sandy	Soil Blowing
Grassed Waterways	LIMITATION	Slope	Droughty	Rooting Depth

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Slope
Picnic Areas	SEVERE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	SEVERE	Slope

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
					2.9	1.9	4.4	1.7
					2.	1.3	3.3	1.1

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	(E) SITE INDEX	WOODLAND PRODUCT- IVITY
3R	MODERATE	MODERATE	SLIGHT	SLIGHT	SLIGHT	NORTH	balsam fir sugar maple yellow birch paper birch quaking aspen American basswood red pine eastern white pine jack pine	E E E E E E EP EP P	3 7 6

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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Moderately steep and steep, well drained soil formed in loamy deposits and in the underlying stratified sand and gravelly coarse sand glacial outwash, and excessively drained soil formed in sandy glacial outwash. This map unit is highly erodible. The land capability is 7E.

Component Name: VILAS

This map unit has 2 components, and 2 interpretation sheet.

Classification: ENTIC HAPLORHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay %	
		Unified	AASHTO			No. 4	No. 10	No. 40	No. 200	<.002 mm	
0- 7	LS	SM SP-SM	A-1 A-2	0	0	80-100	75-100	35- 90	12- 30	2- 6	
7-15	LS	SP-SM SM	A-1 A-2	0	0	80-100	75-100	35- 90	12- 30	2- 6	
15-29	s	SM SP-SM	A-1 A-2 A-3	0	0	80-100	75-100	35- 90	5- 20	1- 3	
29-60	s	SP SP-SM SM	A-1 A-2 A-3	0	0	80-100	75-100	35- 90	1- 20	0- 3	
Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 7	-	NP	1.4-1.6	6.-20.	0.09-0.12	4.5-6.5	-	-	0.5- 1.	LOW	0.17
7-15	-	NP	1.5-1.6	6.-20.	0.07-0.12	4.5-6.5	-	-	-	LOW	0.17
15-29	-	NP	1.5-1.7	6.-20.	0.05-0.08	4.5-6.5	-	-	-	LOW	0.17
29-60	-	NP	1.5-1.7	6.-20.	0.04-0.07	5.1-6.5	-	-	-	LOW	0.17
							Wind	Risk of Corrosion		Potential	
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost	
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel	Concrete	Action
NONE			>6.0			>60	2	5 134	LOW	HIGH	LOW

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Poor Filter	Slope
Daily Cover for Landfill		POOR	Seepage	Too Sandy Slope
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Slope
Dwellings Without Basements		SEVERE	Slope	
Dwellings With Basements		SEVERE	Slope	
Small Commercial Buildings		SEVERE	Slope	
Local Streets and Roads		SEVERE	Slope	
Lawns, Landscaping, and Golf Fairways		SEVERE	Slope	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		POOR	Slope	
Sand		PROBABLE		
Gravel		IMPROBABLE	Too Sandy	
Topsoil		POOR	Too Sandy	Slope
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	Slope
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Droughty Fast Intake
Terraces and Diversions		LIMITATION	Slope	Too Sandy Soil Blowing
Grassed Waterways		LIMITATION	Slope	Droughty

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Slope
Picnic Areas	SEVERE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	SEVERE	Slope

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
					2.9	1.9	4.4	1.7
					2.	1.3	3.3	1.1

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	(E) SITE INDEX	WOODLAND PRODUCT- IVITY
6R	MODERATE	MODERATE	SLIGHT	SLIGHT	SLIGHT	NORTH	balsam fir red maple paper birch quaking aspen northern pin oak northern red oak jack pine red pine eastern white pine	E E E E E E EP 65 EP 57 EP 56	7 6 8

RECOMMENDED WENDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, moderately well drained soil formed in silty deposits overlying stratified sand and gravelly coarse sand glacial outwash. This map unit is not highly erodible. The land capability classification is 2E. This map unit is prime farmland.

Component Name: STAMBAUGH, MODERATE

Classification: ALFIC HAPLORHODS, COARSE-SILTY OVER SANDY OR SANDY-SKELETAL, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification		>10	3-10	Percent < 3 in. passing sieve				Clay %	
Depth	USDA Texture	Unified	AASHTO	ln.	Inches	No 4	No.10	No.40	No.200	<.002 mm	
0-14	SIL	ML CL-ML	A-4	0	0-8	100-100	90-100	80-100	55- 90	5-15	
14-30	SI SIL VFSL	ML CL-ML CL	A-4	0	0-8	100-100	90-100	80-100	80- 90	5-18	
30-60	GR-S GRV-S	SP SP-SM	A-1	0	0-15	70- 90	25- 60	15- 40	0- 10	0- 8	
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0-14	15-25	2-7	1.1-1.7	0.6-2.	0.21-0.24	4.5- 6.	0- 1	-	1.- 3.	LOW	0.37
14-30	15-30	2-9	1.2-1.7	0.2-0.6	0.2-0.22	4.5- 6.	0- 1	-	-	LOW	0.32
30-60	-	NP	1.4-1.7	>20.	0.02-0.04	5.1-6.5	0- 0	-	-	LOW	0.1
							Wind	Risk of Corrosion		Potential	
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost	
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRF Fact.	Index	Steel	Concrete	Action
NONE	-	-	2.5-5.0	APPARENT	NOV-APR	>60	B	4	56	LOW	MODERATE MODERATE

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Wetness	Percs Slowly
Daily Cover for Landfill		POOR	Thin Layer	Poor Filter
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	
Dwellings Without Basements		SLIGHT		
Dwellings With Basements		MODERATE	Wetness	
Small Commercial Buildings		SLIGHT		
Local Streets and Roads		MODERATE	Frost Action	
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		FAIR	Wetness	
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Area Reclaim	
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	
Embankments, Dikes and Levees		SEVERE	Piping	
Drainage		FAVORABLE		
Irrigation		LIMITATION	Wetness	
Terraces and Diversions		LIMITATION	Wetness	
Grassed Waterways		FAVORABLE		

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	MODERATE	Percs Slowly
Picnic Areas	MODERATE	Percs Slowly
Playgrounds	MODERATE	Slope
Paths and Trails	SLIGHT	Percs Slowly

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
75	12			75	4.2	3.5	6.6	3.6

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3L	SLIGHT	MODERATE	SLIGHT	SLIGHT	SEVERE	NORTH	balsam fir E red maple E sugar maple E 61 3 yellow birch E American basswood E eastern hemlock E eastern white pine EP white spruce P red pine P		

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
Amur maple	12	common ninebark	8	eastern redcedar	14	eastern white pine	24
green ash	21	jack pine	20	lilac	8	Manchurian crabapple	15
nannyberry viburnum	14	red pine	22	Roselow sargent crabapple	8	Siberian peashrub	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, well drained soil formed in loamy deposits and in the underlying stratified sand and gravelly coarse sand glacial outwash. This map unit is potentially highly erodible. The land capability classification is 3E.

Component Name: PENCE

Classification: ENTIC HAPLORHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification				>10	3-10	Percent < 3 in. passing sieve				Clay %
Depth	USDA Texture	Unified		AASHTO		In.	Inches	No 4	No.10	No.40	No.200	<.002 mm
0- 2	SL	SM ML		A-4 A-2 A-1	0	0-15	85-100	75-100	45- 85	20- 55	3-11	
2-14	SL L GR-SL	SM ML CL-ML SC-SM		A-4 A-2 A-1	0-4	0-15	55-100	50-100	30- 95	15- 75	2-12	
14-20	GR-COS LS S	SM SP-SM GM GP-GM		A-2 A-1 A-3	0-4	0-15	55-100	50-100	25- 75	2- 30	2-10	
20-60	GR-COS S SG	SP SM		A-1 A-3 A-2	0-4	0-15	55- 85	50- 75	15- 55	2- 15	0- 4	
	Liquid	Plas-	Moist	Perme-	Available	Soil	CEC	CaCO3	Organic	Shrink	Erosion	
Depth	Limit	ticity	Bulk Density	ability	Water Capacity	Reaction	(me/		Matter	Swell	Factor	
(In)		Index	g/cc	In/hr	(In./in)	(pH)	100g)	Pct	Pct	Potential	K	
0- 2	<21	NP-4	1.2-1.6	2.-6.	0.1-0.18	4.5-6.5	0- 1	-	1.- 3.	LOW	0.24	
2-14	<25	NP-7	1.4-1.5	2.-6.	0.1-0.15	4.5-6.5	0.- 1	-	0.-0.5	LOW	0.24	
14-20	-	NP	1.6-1.8	2.-20.	0.05-0.08	4.5-6.5	0.- 1	-	0.-0.5	LOW	0.1	
20-60	-	NP	1.4-1.8	6.-20.	0.02-0.05	5.1-6.5	0.- 0	-	0.-0.5	LOW	0.1	
								Wind	Risk or Corrosion		Potential	
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost		
Frequency Duration		Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel	Concrete	Action	
NONE			>6.0	-	-	>60	B	3 86	LOW	MODERATE	LOW	

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Poor Filter	
Daily Cover for Landfill		POOR	Seepage	Too Sandy Small Stones
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	
Dwellings Without Basements		SLIGHT		
Dwellings With Basements		SLIGHT		
Small Commercial Buildings		SLIGHT		
Local Streets and Roads		SLIGHT		
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	Droughty
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		GOOD		
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Too Sandy	Small Stones Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	
Embankments, Dikes and Levees		SEVERE	Seepage	
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Droughty
Terraces and Diversions		LIMITATION	Too Sandy	Soil Blowing
Grassed Waterways		LIMITATION	Droughty	Rooting Depth

3.5-30-108

RECREATIONAL DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Camp Areas		SLIGHT		
Picnic Areas		SLIGHT		
Playgrounds		MODERATE	Slope	Small Stones
Paths and Trails		SLIGHT		

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
60	10			55	3.5	2.5	5.	2.5

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3S	SLIGHT	MODERATE	SLIGHT	SLIGHT	SLIGHT	NORTH	balsam fir sugar maple yellow birch paper birch quaking aspen American basswood red pine eastern white pine jack pine	E E E E E E EP EP P	3 7 8

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Sloping, well drained soil formed in loamy deposits and in the underlying stratified sand and gravelly coarse sand glacial outwash. This map unit is potentially highly erodible. The land capability classification is 4E.

Component Name: PENCE

Classification: ENTIC HAPLORHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification				>10	3-10	Percent < 3 in. passing sieve				Clay %	
Depth	USDA Texture	Unified		AASHTO		In.	Inches	No 4	No.10	No.40	No.200	<.002 mm	
-----	-----	-----		-----		-----	-----	-----	-----	-----	-----	-----	
0- 2	SL	SM	ML	A-4	A-2 A-1	0	0-15	85-100	75-100	45- 85	20- 55	3-11	
2-14	SL L GR-SL	SM	ML CL-ML SC-SM	A-4	A-2 A-1	0-4	0-15	55-100	50-100	30- 95	15- 75	2-12	
14-20	GR-COS LS S	SM	SP-SM GM GP-GM	A-2	A-1 A-3	0-4	0-15	55-100	50-100	25- 75	2- 30	2-10	
20-60	GR-COS S SG	SP	SM	A-1	A-3 A-2	0-4	0-15	55- 85	50- 75	15- 55	2- 15	0- 4	

	Liquid	Plas-	Moist	Perme-	Available	Soil	CEC	CaCO3	Organic	Shrink	Erosion		
Depth	Limit	ticity	Bulk Density	ability	Water Capacity	Reaction	(me/		Matter	Swell	Factor		
(In)		Index	g/cc	In/hr	(In./in)	(pH)	100g)	Pct	Pct	Potential	K		
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----		
0- 2	<21	NP-4	1.2-1.6	2.-6.	0.1-0.18	4.5-6.5	0- 1	-	1.- 3.	LOW	0.24		
2-14	<25	NP-7	1.4-1.5	2.-6.	0.1-0.15	4.5-6.5	0.- 1	-	0.-0.5	LOW	0.24		
14-20	-	NP	1.6-1.8	2.-20.	0.05-0.08	4.5-6.5	0.- 1	-	0.-0.5	LOW	0.1		
20-60	-	NP	1.4-1.8	6.-20.	0.02-0.05	5.1-6.5	0.- 0	-	0.-0.5	LOW	0.1		
-----								Wind	Risk of Corrosion		Potential		
----- Flooding-----			---- Water Table-(feet) ---			Bedrock-(in)	HYD	T	Erod.	Uncoated	Frost		
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Index	Steel	Concrete	Action
-----			-----			-----	-----	-----		-----		-----	
NONE	-	-	>6.0	-	-	>60		B	3	86	LOW	MODERATE	LOW

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)		
Septic Tank Absorption Fields		SEVERE	Poor Filter		
Daily Cover for Landfill		POOR	Seepage	Too Sandy	Small Stones
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)		
Shallow Excavations		SEVERE	Cutbanks Cave		
Dwellings Without Basements		MODERATE	Slope		
Dwellings With Basements		MODERATE	Slope		
Small Commercial Buildings		SEVERE	Slope		
Local Streets and Roads		MODERATE	Slope		
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	Droughty	Slope
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)		
Roadfill		GOOD			
Sand		PROBABLE			
Gravel		PROBABLE			
Topsoil		POOR	Too Sandy	Small Stones	Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)		
Pond Reservoir Area		SEVERE	Seepage	Slope	
Embankments, Dikes and Levees		SEVERE	Seepage		
Drainage		LIMITATION	Deep To Water		
Irrigation		LIMITATION	Slope	Droughty	
Terraces and Diversions		LIMITATION	Slope	Too Sandy	Soil Blowing
Grassed Waterways		LIMITATION	Slope	Droughty	Rooting Depth

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	MODERATE	Slope
Picnic Areas	MODERATE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	SLIGHT	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
55	9			50	3.3	2.3	4.8	2.3

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	WOODLAND SITE INDEX	PRODUCT- IVITY
3S	SLIGHT	MODERATE	SLIGHT	SLIGHT	SLIGHT	NORTH	balsam fir E sugar maple E 59 3 yellow birch E paper birch E quaking aspen E American basswood E red pine EP 59 7 eastern white pine EP 57 8 jack pine P		

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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Moderately steep and steep, well drained soil formed in loamy deposits and in the underlying stratified sand and gravelly coarse sand glacial outwash. This map unit is highly erodible. The land capability classification is 7E.

Component Name: PENCE

Classification: ENTIC HAPLORTHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification			>10	3-10	Percent < 3 in. passing sieve				Clay %	
Depth	USDA Texture	Unified	AASHTO			In.	Inches	No. 4	No.10	No.40	No.200	<.002 mm
0- 2	SL	SM ML	A-4	A-2	A-1	0	0-15	85-100	75-100	45- 85	20- 55	3-11
2-14	SL L GR-SL	SM ML CL-ML SC-SM	A-4	A-2	A-1	0-4	0-15	55-100	50-100	30- 95	15- 75	2-12
14-20	GR-COS LS S	SM SP-SM GM GP-GM	A-2	A-1	A-3	0-4	0-15	55-100	50-100	25- 75	2- 30	2-10
20-60	GR-COS S SG	SP SM	A-1	A-3	A-2	0-4	0-15	55- 85	50- 75	15- 55	2- 15	0- 4
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K	
0- 2	<21	NP-4	1.2-1.6	2.-6.	0.1-0.18	4.5-6.5	0- 1	-	1.- 3.	LOW	0.24	
2-14	<25	NP-7	1.4-1.5	2.-6.	0.1-0.15	4.5-6.5	0.- 1	-	0.-0.5	LOW	0.24	
14-20	-	NP	1.6-1.8	2.-20.	0.05-0.08	4.5-6.5	0.- 1	-	0.-0.5	LOW	0.1	
20-60	-	NP	1.4-1.8	6.-20.	0.02-0.05	5.1-6.5	0.- 0	-	0.-0.5	LOW	0.1	
								Wind	Risk of Corrosion		Potential	
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost		
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP Fact.	Index	Steel Concrete	Action	
NONE	-	-	>6.0	-	-	>60	B	3	86	LOW MODERATE	LOW	

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)		
Septic Tank Absorption Fields		SEVERE	Poor Filter	Slope	
Daily Cover for Landfill		POOR	Seepage	Too Sandy	Small Stones
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)		
Shallow Excavations		SEVERE	Cutbanks Cave	Slope	
Dwellings Without Basements		SEVERE	Slope		
Dwellings With Basements		SEVERE	Slope		
Small Commercial Buildings		SEVERE	Slope		
Local Streets and Roads		SEVERE	Slope		
Lawns, Landscaping, and Golf Fairways		SEVERE	Slope		
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)		
Roadfill		POOR	Slope		
Sand		PROBABLE			
Gravel		PROBABLE			
Topsoil		POOR	Too Sandy	Small Stones	Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)		
Pond Reservoir Area		SEVERE	Seepage	Slope	
Embankments, Dikes and Levees		SEVERE	Seepage		
Drainage		LIMITATION	Deep To Water		
Irrigation		LIMITATION	Slope	Droughty	
Terraces and Diversions		LIMITATION	Slope	Too Sandy	Soil Blowing
Grassed Waterways		LIMITATION	Slope	Droughty	Rooting Depth

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Slope
Picnic Areas	SEVERE	Slope
Playgrounds	SEVERE	Slope
Paths and Trails	SEVERE	Slope

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
					2.9	1.9	4.4	1.7

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3R	MODERATE	MODERATE	SLIGHT	SLIGHT	SLIGHT	NORTH	balsam fir E sugar maple E 59 3 yellow birch E paper birch E quaking aspen E American basswood E red pine EP 59 7 eastern white pine EP 57 8 jack pine P		

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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nearly level and gently sloping, moderately well drained soil formed in loamy deposits and in the underlying stratified sand and gravelly coarse sand glacial outwash. This map unit is not highly erodible. The land capability classification is 3S.

Component Name: MANITOWISH

Classification: ENTIC HAPLORTHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Classification												>10	3-10	Percent < 3 in. passing sieve				Clay %			
Depth	USDA Texture		Unified		AASHTO		In.	Inches	No 4	No.10	No.40	No.200	<.002 mm								
0- 4	SL		SM ML		A-4		-	0-7	90-100	85-100	50- 85	35- 55	4-10								
4-16	SL L FSL		SM SC-SM ML CL-ML		A-4 A-2		-	0-7	85-100	85-100	45- 95	30- 75	5-15								
16-22	LCOS GR-LS LFS		SM SC-SM GM GM-GC		A-2 A-1 A-3 A-4		-	0-8	55-100	50-100	20- 90	5- 50	3-12								
22-60	COS GR-S GR-COS		SP SP-SM GP GP-GM		A-1 A-3 A-2		-	0-15	50-100	50-100	20- 70	0- 12	0- 3								
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K										
0- 4	<21	NP-4	1.3-1.7	2.-6.	0.11-0.18	4.5-6.5	-	-	1.- 3.	LOW	0.24										
4-16	<25	NP-7	1.4-1.7	2.-6.	0.1-0.19	4.5-6.5	-	-	-	LOW	0.24										
16-22	<25	NP-6	1.5-1.6	2.-6.	0.04-0.12	4.5-6.5	-	-	-	LOW	0.1										
22-60	-	NP	1.5-1.7	6.-20.	0.02-0.07	5.6-6.5	-	-	-	LOW	0.1										
								Wind	Risk of Corrosion		Potential										
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost											
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel	Concrete	Action										
NONE	-	-	3.0-6.0	APPARENT	NOV-MAY	>60	B	3	86	LOW	MODERATE	LOW									

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)		
Septic Tank Absorption Fields		SEVERE	Wetness	Poor Filter	
Daily Cover for Landfill		POOR	Seepage	Too Sandy	Small Stones
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)		
Shallow Excavations		SEVERE	Cutbanks Cave		
Dwellings Without Basements		SLIGHT			
Dwellings With Basements		MODERATE	Wetness		
Small Commercial Buildings		SLIGHT			
Local Streets and Roads		SLIGHT			
Lawns, Landscaping, and Golf Fairways		MODERATE	Droughty	Large Stones	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)		
Roadfill		GOOD			
Sand		PROBABLE			
Gravel		PROBABLE			
Topsoil		POOR	Small Stones	Area Reclaim	Too Sandy
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)		
Pond Reservoir Area		SEVERE	Seepage		
Embankments, Dikes and Levees		SEVERE	Seepage	Piping	
Drainage		LIMITATION	Deep To Water		
Irrigation		LIMITATION	Droughty	Soil Blowing	
Terraces and Diversions		LIMITATION	Too Sandy	Soil Blowing	
Grassed Waterways		LIMITATION	Droughty		

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SLIGHT	
Picnic Areas	SLIGHT	
Playgrounds	MODERATE	Small Stones
Paths and Trails	SLIGHT	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
65	10			60	3.5	3.	5.2	2.6

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	(E) SITE INDEX	WOODLAND PRODUCT- IVITY
3S	SLIGHT	MODERATE	MODERATE	SLIGHT	MODERATE	NORTH	sugar maple quaking aspen red pine eastern white pine jack pine	E E EP EP P	60 59 7 3

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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Nearly level and gently sloping, excessively drained soil formed in sandy glacial outwash. This map unit is not highly erodible. The land capability classification is 4S.

Component Name: VILAS

Classification: ENTIC HAPLORTHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification				>10	3-10	Percent < 3 in. passing sieve				Clay %
Depth	USDA Texture	Unified		AASHTO		In.	Inches	No 4	No.10	No.40	No.200	<.002 mm

0- 7	LS	SM SP-SM		A-1 A-2		0	0	80-100	75-100	35- 90	12- 30	2- 6
7-15	LS	SP-SM SM		A-1 A-2		0	0	80-100	75-100	35- 90	12- 30	2- 6
15-29	S	SM SP-SM		A-1 A-2 A-3		0	0	80-100	75-100	35- 90	5- 20	1- 3
29-60	S	SP SP-SM SM		A-1 A-2 A-3		0	0	80-100	75-100	35- 90	1- 20	0- 3

	Liquid	Plas-	Moist	Perme-	Available	Soil	CEC	CaCO3	Organic	Shrink	Erosion	
Depth	Limit	ticity	Bulk Density	ability	Water Capacity	Reaction	(me/		Matter	Swell	Factor	
(In)		Index	g/cc	In/hr	(In./in)	(pH)	100g)	Pct	Pct	Potential	K	

0- 7	-	NP	1.4-1.6	6.-20.	0.09-0.12	4.5-6.5	-	-	0.5- 1.	LOW	0.17	
7-15	-	NP	1.5-1.6	6.-20.	0.07-0.12	4.5-6.5	-	-	-	LOW	0.17	
15-29	-	NP	1.5-1.7	6.-20.	0.05-0.08	4.5-6.5	-	-	-	LOW	0.17	
29-60	-	NP	1.5-1.7	6.-20.	0.04-0.07	5.1-6.5	-	-	-	LOW	0.17	
-----									Wind	Risk of Corrosion	Potential	
----- Flooding-----					Water Table-(feet)	Bedrock-(in)	HYD	T	Erod.	Uncoated	Frost	
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact. Index	Steel	Concrete	Action

NONE	-	-	>6.0	-	-	>60		A	5 134	LOW	HIGH	LOW

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Poor Filter	
Daily Cover for Landfill		POOR	Seepage	Too Sandy
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	
Dwellings Without Basements		SLIGHT		
Dwellings With Basements		SLIGHT		
Small Commercial Buildings		SLIGHT		
Local Streets and Roads		SLIGHT		
Lawns, Landscaping, and Golf Fairways		MODERATE	Droughty	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		GOOD		
Sand		PROBABLE		
Gravel		IMPROBABLE	Too Sandy	
Topsoil		POOR	Too Sandy	
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Deep To Water	
Irrigation		LIMITATION	Slope	Droughty Fast Intake
Terraces and Diversions		LIMITATION	Too Sandy	Soil Blowing
Grassed Waterways		LIMITATION	Droughty	

RECREATIONAL DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Camp Areas		MODERATE	Too Sandy	
Picnic Areas		MODERATE	Too Sandy	
Playgrounds		MODERATE	Slope	Small Stones
Paths and Trails		MODERATE	Too Sandy	Too Sandy

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain	Corn Silage	Soybeans	Wheat	Oats	Alfalfa Hay	Red Clover Hay	Improved Pasture	Permanent Pasture
bu/a	tons/a	bu/a	bu/a	bu/a	tons/acre	tons/acre	AUM	AUM
				40	2.5		4.	1.8

WOODLAND INTERPRETATIONS

WOODLAND	EROSION	EQUIPMENT	SEEDLING	WIND TH.	PLANT	INTERP	COMMONLY EXISTING TREES (E)	WOODLAND
ORD. SYB.	HAZARD	LIMITATION	MORTALITY	HAZARD	COMPETITION	ASPECT	and/or	SITE
							TREES RECOMMENDED TO PLANT (P)	INDEX
6A	SLIGHT	SLIGHT	SLIGHT	SLIGHT	SLIGHT	NORTH		
							balsam fir	E
							red maple	E
							paper birch	E
							quaking aspen	E
							northern pin oak	E
							northern red oak	E
							jack pine	EP 65 7
							red pine	EP 57 6
							eastern white pine	EP 56 8

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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Sloping, excessively drained soil formed in sandy glacial outwash. This map unit is potentially highly erodible. The land capability classification is 6S.

Component Name: VILAS

Classification: ENTIC HAPLORHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No. 4	No.10	No.40	No.200	
0- 7	LS	SM SP-SM	A-1 A-2	0	0	80-100	75-100	35- 90	12- 30	2- 6
7-15	LS	SP-SM SM	A-1 A-2	0	0	80-100	75-100	35- 90	12- 30	2- 6
15-29	S	SM SP-SM	A-1 A-2 A-3	0	0	80-100	75-100	35- 90	5- 20	1- 3
29-60	S	SP SP-SM SM	A-1 A-2 A-3	0	0	80-100	75-100	35- 90	1- 20	0- 3

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 7	-	NP	1.4-1.6	6.-20.	0.09-0.12	4.5-6.5	-	-	0.5- 1.	LOW	0.17
7-15	-	NP	1.5-1.6	6.-20.	0.07-0.12	4.5-6.5	-	-	-	LOW	0.17
15-29	-	NP	1.5-1.7	6.-20.	0.05-0.08	4.5-6.5	-	-	-	LOW	0.17
29-60	-	NP	1.5-1.7	6.-20.	0.04-0.07	5.1-6.5	-	-	-	LOW	0.17

Flooding			Water Table-(feet)			Bedrock-(in)	HYD	T	Erod.	Wind	Risk of Corrosion	Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP	Fact.	Index	Steel	Concrete	Frost Action
NONE	-	-	>6.0	-	-	>60	A	5	134	LOW	HIGH	LOW

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)
Septic Tank Absorption Fields	SEVERE	Poor Filter
Daily Cover for Landfill	POOR	Seepage

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Shallow Excavations	SEVERE	Cutbanks Cave
Dwellings Without Basements	MODERATE	Slope
Dwellings With Basements	MODERATE	Slope
Small Commercial Buildings	SEVERE	Slope
Local Streets and Roads	MODERATE	Slope
Lawns, Landscaping, and Golf Fairways	MODERATE	Droughty

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)
Roadfill	GOOD	
Sand	PROBABLE	
Gravel	IMPROBABLE	Too Sandy
Topsoil	POOR	Too Sandy

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)
Pond Reservoir Area	SEVERE	Seepage
Embankments, Dikes and Levees	SEVERE	Seepage
Drainage	LIMITATION	Deep To Water
Irrigation	LIMITATION	Slope
Terraces and Diversions	LIMITATION	Slope
Grassed Waterways	LIMITATION	Slope

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)		
Camp Areas	MODERATE	Slope	Too Sandy	
Picnic Areas	MODERATE	Slope	Too Sandy	
Playgrounds	SEVERE	Slope		
Paths and Trails	MODERATE	Too Sandy		

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
				35	2.3		3.8	1.5

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
6A	SLIGHT	SLIGHT	SLIGHT	SLIGHT	SLIGHT	NORTH	balsam fir red maple paper birch quaking aspen northern pin oak northern red oak jack pine red pine eastern white pine	E E E E E E EP 65 EP 57 EP 56	7 6 8

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, moderately well drained soil formed in loamy deposits and in the underlying stratified sand and gravelly sand glacial outwash. This map unit is not highly erodible. The land capability classification is 2E. This map unit is prime farmland.

Component Name: PADUS, MODERATELY WE

Classification: ALFIC HAPLORHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay %	
		Unified	AASHTO			No. 4	No. 10	No. 40	No. 200	<.002 mm	
0- 5	FSL	SM	A-2 A-4 A-1-B	0	0-9	80-100	75-100	45- 85	20- 50	3-10	
5-33	FSL SL L	SM SC ML CL	A-2 A-4 A-1-B	0	0-9	55-100	50-100	30- 95	15- 75	5-18	
33-60	SR- S G	SP SP-SM GP GP-GM	A-1 A-2 A-3	0	0-9	30-100	25-100	10- 70	1- 12	0- 3	
Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 5	<25	NP-4	1.4-1.7	0.6-6.	0.1-0.15	4.5-6.5	0- 1	-	0.5- 2.	LOW	0.24
5-33	<30	NP-10	1.4-1.6	0.6-6.	0.09-0.22	4.5-6.5	0- 1	-	0.-0.5	LOW	0.24
33-60	-	NP	1.5-1.8	6.-20.	0.02-0.06	5.1-6.5	0.- 0	-	0.-0.5	LOW	0.1
Wind Risk of Corrosion Potential											
Flooding			Water Table-(feet)			Bedrock-(in)		HYD T	Erod.	Uncoated	Frost
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Index	Action
NONE	-	-	2.5-4.0	PERCHED	NOV-MAY	>60		B	4	86	MODERATE

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Wetness	Poor Filter
Daily Cover for Landfill		POOR	Seepage	Too Sandy Small Stones
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	
Dwellings Without Basements		SLIGHT		
Dwellings With Basements		MODERATE	Wetness	
Small Commercial Buildings		SLIGHT		
Local Streets and Roads		MODERATE	Frost Action	
Lawns, Landscaping, and Golf Fairways		MODERATE	Large Stones	Droughty
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		FAIR	Wetness	
Sand		PROBABLE		
Gravel		PROBABLE		
Topsoil		POOR	Small Stones	Area Reclaim
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Slope	Cutbanks Cave
Irrigation		LIMITATION	Slope	Wetness Droughty
Terraces and Diversions		LIMITATION	Wetness	Too Sandy Soil Blowing
Grassed Waterways		LIMITATION	Droughty	Rooting Depth

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SLIGHT	
Picnic Areas	SLIGHT	
Playgrounds	MODERATE	Slope
Paths and Trails	SLIGHT	Small Stones

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
70	11			70	4.	3.	6.	3.2

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3L	SLIGHT	MODERATE	SLIGHT	SLIGHT	MODERATE	NORTH	sugar maple white ash bigtooth aspen northern red oak American basswood red pine white spruce eastern white pine	E E E E E EP P P	67 3 78 4

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, moderately well drained soil formed in loamy deposits and in the underlying stratified sand and gravelly sand glacial outwash underlain by loamy glacial till or lacustrine deposits. This map unit is not highly erodible. The land capability classification is 2E. This map unit is prime farmland.

Component Name: PADUS, LOAMY SUBSTRA

Classification: ALFIC HAPLORTHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10	3-10	Percent < 3 in. passing sieve				Clay %
		Unified	AASHTO	In.	Inches	No 4	No.10	No.40	No.200	<.002 mm
0- 5	SL	SM SC-SM	A-2 A-4 A-1	-	0-7	80-100	75-100	45- 85	20- 50	3-15
5-29	FSL SL L	SM SC ML CL	A-2 A-4 A-1	-	0-7	80-100	75-100	45- 95	20- 90	5-18
29-32	GR-LS S GR-SL	SM SP SP-SM GP	A-2 A-4 A-1 A-3	-	0-7	55-100	50-100	25- 75	2- 40	2-10
32-45	S GR-S GRV-S	SP SP-SM GP GP-GM	A-1 A-2 A-3	-	0-7	30-100	25-100	10- 70	1- 12	0- 3
45-60	SR- VFS SIL	SM SC ML CL	A-2 A-4	0	0	100-100	90-100	65- 95	20- 85	5-15

Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 5	<25	NP-7	1.4-1.7	0.6-6.	0.1-0.15	4.5-6.5	-	-	1- 2.	LOW	0.24
5-29	<30	NP-10	1.4-1.6	0.6-6.	0.09-0.22	4.5-6.5	-	-	-	LOW	0.24
29-32	<25	NP-4	1.4-1.6	0.6-6.	0.05-0.14	4.5-6.5	-	-	-	LOW	0.1
32-45	-	NP	1.5-1.8	6.-20.	0.02-0.06	5.1-6.5	-	-	-	LOW	0.1
45-60	<30	NP-10	1.4-1.7	0.2-0.6	0.1-0.18	5.1-6.5	-	-	-	LOW	0.32

Flooding			Water Table-(feet)			Bedrock-(in)	HYD	T	Wind	Risk of Corrosion	Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Index	Frost
NONE	-	-	2.0-6.0	PERCHED	SEP-JUN	>60		B	4	86	MODERATE

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)		
Septic Tank Absorption Fields	SEVERE	Wetness	Percs Slowly	Poor Filter
Daily Cover for Landfill	POOR	Thin Layer		

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)		
Shallow Excavations	SEVERE	Cutbanks Cave	Wetness	
Dwellings Without Basements	MODERATE	Wetness		
Dwellings With Basements	SEVERE	Wetness		
Small Commercial Buildings	MODERATE	Wetness		
Local Streets and Roads	MODERATE	Wetness	Frost Action	
Lawns, Landscaping, and Golf Fairways	MODERATE	Large Stones	Droughty	

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)		
Roadfill	FAIR	Wetness		
Sand	IMPROBABLE	Excess Fines		
Gravel	IMPROBABLE	Excess Fines		
Topsoil	POOR	Small Stones		

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)		
Pond Reservoir Area	SEVERE	Seepage		
Embankments, Dikes and Levees	SEVERE	Piping		
Drainage	LIMITATION	Slope		
Irrigation	LIMITATION	Slope	Wetness	Droughty
Terraces and Diversions	LIMITATION	Wetness	Soil Blowing	

RECREATIONAL DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)		
Camp Areas		MODERATE	Wetness		
Picnic Areas		MODERATE	Wetness		
Playgrounds		MODERATE	Slope	Small Stones	Wetness
Paths and Trails		SLIGHT			

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
70	11			65	3.8	2.8	5.8	3.

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3L	SLIGHT	MODERATE	SLIGHT	SLIGHT	MODERATE	NORTH	red maple sugar maple yellow birch paper birch white ash eastern hophornbeam bigtooth aspen northern red oak American basswood white spruce red pine eastern white pine	E E E E E E E E P P P	67 3

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	10	eastern redcedar	15	eastern white pine	30
gray dogwood	8	jack pine	30	lilac	10	manyflower cotoneaster	6
Norway spruce	20	red pine	30	Siberian peashrub	8	silky dogwood	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level, poorly drained soil formed in mucky and sandy deposits overlying sandy glacial outwash. This map unit is not highly erodible. The land capability classification is 6W. This map unit is hydric.

Component Name: KINROSS, MUCKY SURFA

Classification: TYPIC HAPLAQUODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification			>10	3-10	Percent < 3 in. passing sieve				Clay %		
Depth	USDA Texture	Unified		AASHTO	In.	Inches	No 4	No.10	No.40	No.200	<.002 mm		
0- 6	MUCK	PT		A-8	0	0	-	-	-	-	-		
6-39	S FS LS	SP-SM SM		A-3 A-2-4	0	0	100-100	90-100	50- 80	5- 30	0-10		
39-60	S FS	SP-SM SM		A-3 A-2-4	0	0	100-100	90-100	50- 80	5- 30	0-10		
	Liquid	Plas-	Moist	Perme-	Available	Soil	CEC	CaCO3	Organic	Shrink	Erosion		
Depth	Limit	ticity	Bulk Density	ability	Water Capacity	Reaction	(me/		Matter	Swell	Factor		
(In)		Index	g/cc	In/hr	(In./in)	(pH)	100g)	Pct	Pct	Potential	K		
0- 6	-	NP	0.1-0.3	2.-6.	0.35-0.45	3.6- 5.	2- 2	-	20.-70.		0.1		
6-39	-	NP	1.4-1.7	6.-20.	0.04-0.09	3.6- 6.	0- 1	-	1.- 4.	LOW	0.15		
39-60	-	NP	1.4-1.7	6.-20.	0.04-0.06	4.5-6.5	0- 0	-	-	LOW	0.15		
								Wind	Risk of Corrosion		Potential		
Flooding			Water Table-(feet)			Bedrock-(in)	HYD	T	Erod.	Uncoated	Frost		
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Index	Steel	Concrete	Action
NONE	-	-	+1-1.0 APPARENT YEAR-ROUND			>60		A/D	5	134	HIGH	MODERATE	MODERATE

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Ponding	Poor Filter
Daily Cover for Landfill		POOR	Seepage	Too Sandy
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Ponding
Dwellings Without Basements		SEVERE	Ponding	
Dwellings With Basements		SEVERE	Ponding	
Small Commercial Buildings		SEVERE	Ponding	
Local Streets and Roads		SEVERE	Ponding	
Lawns, Landscaping, and Golf Fairways		SEVERE	Ponding	Excess Humus
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		POOR	Wetness	
Sand		PROBABLE		
Gravel		IMPROBABLE	Too Sandy	
Topsoil		POOR	Too Sandy	Wetness
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Ponding	Cutbanks Cave
Irrigation		LIMITATION	Ponding	
Terraces and Diversions		LIMITATION	Ponding	Too Sandy
Grassed Waterways		LIMITATION	Wetness	Soil Blowing

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Ponding
Picnic Areas	SEVERE	Ponding
Playgrounds	SEVERE	Ponding
Paths and Trails	SEVERE	Ponding

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
								2.5

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
ZW	SLIGHT	SEVERE	SEVERE	SEVERE	SEVERE	NORTH	balsam fir E red maple E tamarack E jack pine E black spruce E quaking aspen E 45 northern whitecedar E		2

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level, somewhat poorly drained soil formed in sandy glacial outwash. This map unit is not highly erodible. The land capability classification is 4W. This map unit may have hydric inclusions.

Component Name: AU GRES

Classification: ENTIC HAPLAQUODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Classification												>10	3-10	Percent < 3 in. passing sieve				Clay %
Depth	USDA Texture		Unified		AASHTO		In.	Inches	No 4	No.10	No.40	No.200	<.002 mm					
0- 4	LS		SM SP-SM	SC-SM	A-2-4	A-1-B	0	0	95-100	85-100	40- 75	10- 30	10-15					
4-29	S LS		SP-SM	SM SC-SM	A-2-4	A-3 A-1-B	0	0	95-100	85-100	40- 75	5- 30	1-15					
29-60	S		SP-SM	SM	A-3	A-2-4 A-1-B	0	0	95-100	85-100	40- 60	5- 15	0- 8					
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K							
0- 4	<25	NP-7	1.3-1.5	6.-20.	0.07-0.09	3.6-7.3	0- 1	-	2.- 4.	LOW	0.17							
4-29	<25	NP-7	1.5-1.7	6.-20.	0.06-0.09	4.5-7.3	0- 0	-	-	LOW	0.15							
29-60	-	NP	1.5-1.7	6.-20.	0.05-0.07	5.1-7.3	0- 0	-	-	LOW	0.15							
									Wind	Risk of Corrosion		Potential						
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost								
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP Fact.	Index	Steel	Concrete	Action						
NONE	-	-	0.5-1.5	APPARENT	NOV-MAY	>60	B	5	134	LOW	MODERATE	MODERATE						

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Wetness	Poor Filter
Daily Cover for Landfill		POOR	Seepage	Too Sandy
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Wetness
Dwellings Without Basements		SEVERE	Wetness	
Dwellings With Basements		SEVERE	Wetness	
Small Commercial Buildings		SEVERE	Wetness	
Local Streets and Roads		SEVERE	Wetness	
Lawns, Landscaping, and Golf Fairways		SEVERE	Wetness	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		POOR	Wetness	
Sand		PROBABLE		
Gravel		IMPROBABLE	Too Sandy	
Topsoil		POOR	Too Sandy	Wetness
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Cutbanks Cave	Wetness
Irrigation		LIMITATION	Wetness	Droughty
Terraces and Diversions		LIMITATION	Wetness	Too Sandy
Grassed Waterways		LIMITATION	Wetness	Droughty

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Wetness
Picnic Areas	SEVERE	Wetness
Playgrounds	SEVERE	Wetness
Paths and Trails	SEVERE	Wetness

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
50	8			45	2.5	2.5	4.6	2.2

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
6W	SLIGHT	SEVERE	MODERATE	SEVERE	SEVERE	NORTH	balsam fir red maple yellow birch paper birch jack pine bigtooth aspen quaking aspen northern whitecedar eastern hemlock eastern white pine Norway spruce white spruce red pine	E E 65 E E E 51 E E 70 E E EP P P F	3 5 6

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Amur maple	15	common ninebark	8	eastern white pine	30
green ash	30	imperial Carolina poplar	60	jack pine	25	Manchurian crabapple	25
nannyberry viburnum	12	Norway spruce	26	silky dogwood	8	white spruce	20

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, somewhat poorly drained soil formed in sandy glacial outwash over loamy glacial till or lacustrine deposits. This map unit is not highly erodible. The land capability classification is 4W. This map unit may have hydric inclusions.

Component Name: AU GRES, LOAMY SUBST

Classification: ENTIC HAPLAQUODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No 4	No.10	No.40	No.200	
0- 2	LS	SM SP-SM	A-2 A-1	0	0	95-100	85-100	40- 75	10- 30	0-10
2-28	s	SM SP-SM	A-3 A-2 A-1	0	0	95-100	85-100	40- 70	5- 15	0- 5
28-43	s	SP-SM	A-3 A-2 A-1	0	0	95-100	85-100	40- 70	5- 10	0- 5
43-60	SR- VFS SI	CL SC SC-SM CL-ML	A-6 A-4 A-2	0	0	100-100	90-100	65- 95	20- 85	10-25

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 2	<20	NP-4	1.2-1.6	2.-6.	0.1-0.12	4.5-5.5	0- 1	-	-	-	-
2-28	-	NP	1.4-1.8	6.-20.	0.05-0.07	5.1- 6.	0- 0	-	1.- 2.	LOW	0.17
28-43	-	NP	1.5-1.7	6.-20.	0.04-0.06	5.1-6.5	0- 0	-	-	LOW	0.15
43-60	20-34	4-14	1.3-1.9	0.2-0.6	0.05-0.21	5.6-6.5	0- 1	-	-	LOW	0.15
										LOW	0.24

Flooding			Water Table-(feet)			Bedrock-(in)		HYD T		Wind	Risk of Corrosion		Potential
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Erod. Index	Uncoated Steel	Concrete	Frost Action
NONE	-	-	1.0-2.0	PERCHED	NOV-MAY	>60		B	5	134	LOW	MODERATE	LOW

SANITARY FACILITIES

Septic Tank Absorption Fields
Daily Cover for Landfill

RATING

SEVERE

POOR

Wetness
Seepage

RESTRICTIVE FEATURE(S)

Perchs Slowly
Too Sandy
Poor Filter
Wetness

BUILDING SITE DEVELOPMENT

Shallow Excavations
Dwellings Without Basements
Dwellings With Basements
Small Commercial Buildings
Local Streets and Roads
Lawns, Landscaping, and Golf Fairways

RATING

SEVERE

SEVERE

SEVERE

SEVERE

MODERATE

MODERATE

RESTRICTIVE FEATURE(S)

Cutbanks Cave
Wetness
Wetness
Wetness
Wetness
Wetness
Droughty

CONSTRUCTION MATERIAL

Roadfill
Sand
Gravel
Topsoil

RATING

FAIR

IMPROBABLE

IMPROBABLE

POOR

Wetness
Thin Layer
Too Sandy
Too Sandy

RESTRICTIVE FEATURE(S)

WATER MANAGEMENT

Pond Reservoir Area
Bankments, Dikes and Levees
Drainage
Irrigation
Terraces and Diversions
Grassed Waterways

RATING

SEVERE

SEVERE

LIMITATION

LIMITATION

LIMITATION

LIMITATION

RESTRICTIVE FEATURE(S)

Seepage
Seepage
Cutbanks Cave
Wetness
Wetness
Wetness
Droughty
Too Sandy
Droughty
Soil Blowing
Rooting Depth

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Wetness
Picnic Areas	MODERATE	Wetness
Playgrounds	SEVERE	Wetness
Paths and Trails	MODERATE	Too Sandy

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
50	8			45	2.5	2.5	4.6	2.2

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	WOODLAND SITE INDEX	PRODUCT- IVITY
6W	SLIGHT	SEVERE	SLIGHT	MODERATE	SEVERE	NORTH	balsam fir red maple paper birch northern pin oak red pine eastern white pine white spruce	E E E E EP EP P	56 6

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	eastern white pine	30	green ash	30	lilac	10
Manchurian crabapple	25	nannyberry viburnum	12	northern whitecedar	15	Norway spruce	26
red pine	26	Roselow sargent crabapple	8	silky dogwood	8	white spruce	20

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, moderately well drained soil formed in sandy glacial outwash. This map unit is not highly erodible. The land capability classification is 4S.

Component Name: CROSWELL

Classification: ENTIC HAPLORTHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

	Classification					>10	3-10	Percent < 3 in. passing sieve				Clay %	
Depth	USDA Texture	Unified		AASHTO		In.	Inches	No 4	No.10	No.40	No.200	<.002 mm	

0- 3	LS	SM	SP-SM	SC-SM	A-2	A-1-B	0	0	90-100	75-100	40- 75	10- 30	5-15
3-28	S LS	SP-SM	SM	SP	A-3	A-2-4 A-1-B	0	0	90-100	75-100	40- 75	3- 30	0-10
28-60	S	SP-SM	SM	SP	A-3	A-2-4 A-1-B	0	0	90-100	75-100	40- 70	3- 15	0-10

	Liquid	Plas-	Moist	Perme-	Available	Soil	CEC	CaCO3	Organic	Shrink	Erosion		
Depth	Limit	ticity	Bulk Density	ability	Water Capacity	Reaction	(me/		Matter	Swell	Factor		
(In)		Index	g/cc	In/hr	(In./in)	(pH)	100g)	Pct	Pct	Potential	K		

0- 3	<25	NP-7	1.3-1.5	6.-20.	0.09-0.12	3.6-7.3	0- 0	-	0.5- 2.	LOW	0.17		
3-28	-	NP	1.4-1.6	6.-20.	0.06- 0.1	4.5-7.3	0- 0	-	-	LOW	0.15		
28-60	-	NP	1.5-1.6	6.-20.	0.05-0.07	5.1-8.4	0- 0	-	-	LOW	0.15		

								Wind	Risk of Corrosion		Potential		
Flooding-----					Water Table-(feet) ---		Bedrock-(in)	HYD	T	Erod.	Uncoated	Frost	
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact.	Index	Steel	Concrete	Action
-----					-----		-----		-----		-----		-----
NONE	-	-	2.0-4.0	APPARENT	NOV-MAY	>60	A	5	134	LOW	MODERATE	LOW	

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Wetness	Poor Filter
Daily Cover for Landfill		POOR	Seepage	Too Sandy
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Cutbanks Cave	Wetness
Dwellings Without Basements		MODERATE	Wetness	
Dwellings With Basements		SEVERE	Wetness	
Small Commercial Buildings		MODERATE	Wetness	
Local Streets and Roads		MODERATE	Wetness	
Lawns, Landscaping, and Golf Fairways		MODERATE	Droughty	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		FAIR	Wetness	
Sand		PROBABLE		
Gravel		IMPROBABLE	Too Sandy	
Topsoil		POOR	Too Sandy	
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	
Embankments, Dikes and Levees		SEVERE	Seepage	Piping
Drainage		LIMITATION	Cutbanks Cave	
Irrigation		LIMITATION	Wetness	Droughty
Terraces and Diversions		LIMITATION	Wetness	Too Sandy
Grassed Waterways		LIMITATION	Droughty	

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Camp Areas	MODERATE	Wetness	Too Sandy
Picnic Areas	MODERATE	Wetness	Too Sandy
Playgrounds	MODERATE	Small Stones	Too Sandy
Paths and Trails	MODERATE	Too Sandy	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
50	8			45	2.5		4.3	2.

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
5S	SLIGHT	SLIGHT	SLIGHT	MODERATE	MODERATE	NORTH	red maple paper birch jack pine bigtooth aspen quaking aspen black cherry northern red oak red pine eastern white pine white spruce	E E E E E E E EP EP P	 54 53 69 68 55

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
Amur maple	10	eastern redcedar	15	eastern white pine	26	jack pine	20
lilac	10	manyflower cotoneaster	6	red pine	20	Siberian peashrub	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, moderately well drained soil formed in sandy glacial outwash over loamy glacial till or lacustrine deposits. This map unit is not highly erodible. The land capability classification is 4S.

Component Name: CROSWELL, LOAMY SUBS

Classification: ENTIC HAPLORTHODS, SANDY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification		>10	3-10	Percent < 3 in. passing sieve				Clay %	
Depth	USDA Texture	Unified	AASHTO	In.	Inches	No 4	No.10	No.40	No.200	<.002 mm	
0- 5	LS	SM	A-2 A-1	0	0	90-100	85-100	40- 75	15- 30	0-10	
5-21	S LS	SP-SM SM SP	A-3 A-2 A-1	0	0	90-100	85-100	40- 75	0- 30	0-10	
21-49	S	SP-SM SM SP	A-3 A-2 A-1	0	0	90-100	85-100	40- 70	0- 25	0- 5	
49-60	SR- FS SIL	CL SC SC-SM CL-ML	A-6 A-4 A-2	0	0	100-100	90-100	65- 95	20- 90	10-25	
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 5	<20	NP-4	1.2-1.6	6.-20.	0.09-0.12	4.5- 6.	0- 0	-	0.5- 2.	LOW	0.17
5-21	<20	NP-4	1.4-1.8	6.-20.	0.06- 0.1	5.1-6.5	0- 0	-	-	LOW	0.15
21-49	-	NP	1.5-1.7	6.-20.	0.04-0.06	5.1-6.5	0- 0	-	-	LOW	0.15
49-60	20-35	4-15	1.3-1.9	0.2-0.6	0.05-0.21	5.1-7.8	0- 1	0-10	-	LOW	0.24
								Wind	Risk of Corrosion		Potential
Flooding			water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost	
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRF Fact.	Index	Steel	Concrete	Action
NONE	-	-	2.0-5.0	PERCHED	NOV-MAY	>60	A 5	134	LOW	MODERATE	LOW

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields	SEVERE	Wetness	Percs Slowly
Daily Cover for Landfill	POOR	Seepage	Too Sandy

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations	SEVERE	Cutbanks Cave	Wetness
Dwellings Without Basements	MODERATE	Wetness	
Dwellings With Basements	SEVERE	Wetness	
Small Commercial Buildings	MODERATE	Wetness	
Local Streets and Roads	MODERATE	Wetness	
Lawns, Landscaping, and Golf Fairways	MODERATE	Droughty	

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)	
Roadfill	FAIR	Wetness	
Sand	IMPROBABLE	Thin Layer	
Gravel	IMPROBABLE	Too Sandy	
Topsoil	POOR	Too Sandy	

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area	SEVERE	Seepage	
Embankments, Dikes and Levees	SEVERE	Seepage	Piping
Drainage	LIMITATION	Cutbanks Cave	
Irrigation	LIMITATION	Wetness	Droughty
Terraces and Diversions	LIMITATION	Wetness	Too Sandy
Grassed Waterways	LIMITATION	Droughty	Rooting Depth

RECREATIONAL DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Camp Areas		MODERATE	Wetness	Too Sandy
Picnic Areas		MODERATE	Wetness	Too Sandy
Playgrounds		MODERATE	Small Stones	Too Sandy
Paths and Trails		MODERATE	Too Sandy	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
50	8			45	2.5		4.3	2.

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	(E) SITE INDEX	WOODLAND PRODUCT- IVITY
7A	SLIGHT	SLIGHT	SLIGHT	SLIGHT	MODERATE	NORTH	red maple paper birch bigtooth aspen quaking aspen northern pin oak northern red oak American basswood jack pine red pine eastern white pine	E E E E E E E EP EP EP	60 7

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
Austrian pine	16	buffaloberry	5	eastern redcedar	14	eastern white pine	22
jack pine	18	lilac	8	Manchurian crabapple	25	Peking cotoneaster	6
red pine	18	Siberian peashrub	8	smooth sumac	8	staghorn sumac	8

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level and gently sloping, moderately well drained soil formed in silty and loamy deposits underlain by stratified silty, loamy and sandy lacustrine deposits. This map unit is not highly erodible. The land capability classification is 2E. This map unit is prime farmland.

Component Name: ALCONA, MODERATELY W

Classification: ALFIC HAPLORHODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay % <.002 mm
		Unified	AASHTO			No. 4	No.10	No.40	No.200	
0- 3	VFSL	SM SC-SM ML CL-ML	A-4 A-2-4	0	0-8	95-100	90-100	55- 95	25- 65	5-15
3- 9	LFS VFSL GR-SL	SM ML SC CL	A-4 A-2-4	0	0-8	85-100	70-100	55- 95	15- 65	5-15
9-17	LS LVFS GR-VFSL	SM ML SC CL	A-4 A-2-4 A-1-B	0	0-8	85-100	70-100	35- 75	15- 65	5-15
17-31	SL VFSL L	SC SC-SM CL CL-ML	A-2-4 A-4	0	0-8	95-100	90-100	55- 85	25- 70	10-20
31-60	SR- FS SIL	SM ML SC-SM CL-ML	A-4 A-2-4	0	0-8	95-100	90-100	60- 95	25- 85	5-18

Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0- 3	<25	NP-7	1.1-1.6	0.6-6.	0.12-0.18	4.5-7.3	0- 1	-	1.- 3.	LOW	0.37
3- 9	<30	NP-10	1.3-1.7	0.6-6.	0.1-0.17	4.5-7.3	0- 0	-	-	LOW	0.17
9-17	<30	NP-10	1.4-1.7	0.6-6.	0.08-0.17	5.1-7.8	0- 0	-	-	LOW	0.17
17-31	20-30	4-10	1.4-1.7	0.6-2.	0.13- 0.2	5.1-7.8	0- 0	-	-	LOW	0.24
31-60	<30	NP-7	1.5-1.7	0.6-2.	0.08- 0.2	5.1-7.8	0- 0	-	-	LOW	0.24

-----										Wind	Risk of Corrosion	Potential
----- Flooding -----		---- Water Table-(feet) ---			Bedrock-(in)		HYD	T	Erod.	Uncoated	Frost	
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP	Fact. Index	Steel	Concrete	Action
-----		-----			-----		-----	-----	-----	-----		-----
NONE	-	-	2.5-6.0	PERCHED	SEP-MAY	>60		B	5 86	MODERATE	LOW	MODERATE

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields	SEVERE	Wetness	
Daily Cover for Landfill	POOR	Too Sandy	

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations	SEVERE	Cutbanks Cave	
Dwellings Without Basements	SLIGHT		
Dwellings With Basements	MODERATE	Wetness	
Small Commercial Buildings	SLIGHT		
Local Streets and Roads	MODERATE	Frost Action	
Lawns, Landscaping, and Golf Fairways	MODERATE	Large Stones	Droughty

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)	
Roadfill	FAIR	Wetness	
Sand	IMPROBABLE	Excess Fines	
Gravel	IMPROBABLE	Excess Fines	
Topsoil	POOR	Too Sandy	

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area	MODERATE	Seepage	Slope
Embankments, Dikes and Levees	SEVERE	Piping	
Drainage	LIMITATION	Slope	Cutbanks Cave
Irrigation	LIMITATION	Slope	Wetness
Terraces and Diversions	LIMITATION	Wetness	Too Sandy
Grassed Waterways	LIMITATION	Wetness	Droughty

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SLIGHT	
Picnic Areas	SLIGHT	
Playgrounds	MODERATE	Slope
Paths and Trails	SLIGHT	

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
70	11			65	4.	2.8	5.3	2.7

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3L	SLIGHT	MODERATE	SLIGHT	SLIGHT	MODERATE	NORTH	red maple sugar maple yellow birch American beech white ash northern red oak American basswood red pine eastern white pine white spruce	E E E E E E E EP EP P	61 3

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	8	arrowwood	12	eastern white pine	26	imperial Carolina poplar	55
lilac	10	Manchurian crabapple	18	nannyberry viburnum	12	Norway spruce	22
red pine	26	Siberian peashrub	8	silky dogwood	8	white spruce	20

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level, somewhat poorly drained soil formed in silty deposits underlain by stratified silty, loamy and sandy lacustrine deposits. This map unit is not highly erodible. The land capability classification is 2W. This map unit is prime farmland where drained. This map unit may have hydric inclusions.

Component Name: GAASTRA

Classification: ALFIC HAPLAQUODS, COARSE-LOAMY, MIXED, FRIGID

ESTIMATED SOIL PROPERTIES

		Classification		>10	3-10	Percent < 3 in. passing sieve				Clay %	
Depth	USDA Texture	Unified	AASHTO	In.	Inches	No 4	No.10	No.40	No.200	<.002 mm	
0- 3	SIL	CL-ML CL	A-4	0	0	95-100	90-100	85-100	50- 90	10-18	
3-16	SIL SL	ML CL SM SC	A-4	0	0	95-100	90-100	60-100	35- 60	6-18	
16-40	SIL VFSL FSL	CL-ML CL SC SC-SM	A-4 A-6	0	0	95-100	90-100	85-100	40- 90	10-18	
40-60	SIL FSL VFSL	CL-ML CL SC SC-SM	A-4	0	0	95-100	90-100	85-100	40- 90	10-18	
	Liquid	Plas-	Moist	Perme-	Available	Soil	CEC	CaCO3	Organic	Shrink	Erosion
Depth	Limit	ticity	Bulk Density	ability	Water Capacity	Reaction	(me/		Matter	Swell	Factor
(In)		Index	g/cc	In/hr	(In./in)	(pH)	100g)	Pct	Pct	Potential	K
0- 3	20-30	5-10	1.4-1.6	0.6-2.	0.2-0.24	4.5-6.5	1- 1	-	3.- 4.	LOW	0.37
3-16	<30	NP-10	1.4-1.6	0.6-2.	0.15-0.22	5.1-6.5	0- 1	-	-	LOW	0.37
16-40	20-35	5-15	1.5-1.7	0.2-0.6	0.15-0.22	4.5-6.5	0- 1	-	-	LOW	0.37
40-60	20-30	5-10	1.5-1.7	0.2-0.6	0.14-0.22	5.1-7.3	0- 1	-	-	LOW	0.37
									Wind	Risk of Corrosion	Potential
Flooding-----			Water Table-(feet) ---			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost	
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel Concrete	Action	
NONE	-	-	1.0-2.0	APPARENT	NOV-MAY	>60	C	5 56	MODERATE MODERATE	HIGH	

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Wetness	Percs Slowly
Daily Cover for Landfill		POOR	Wetness	
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Wetness	
Dwellings Without Basements		SEVERE	Wetness	
Dwellings With Basements		SEVERE	Wetness	
Small Commercial Buildings		SEVERE	Wetness	
Local Streets and Roads		SEVERE	Frost Action	
Lawns, Landscaping, and Golf Fairways		MODERATE	Wetness	
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		FAIR	Wetness	
Sand		IMPROBABLE	Excess Fines	
Gravel		IMPROBABLE	Excess Fines	
Topsoil		GOOD		
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		MODERATE	Seepage	
Embankments, Dikes and Levees		SEVERE	Piping	Wetness
Drainage		LIMITATION	Frost Action	
Irrigation		LIMITATION	Wetness	
Terraces and Diversions		LIMITATION	Erodes Easily	Wetness
Grassed Waterways		LIMITATION	Wetness	Erodes Easily

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Wetness
Picnic Areas	MODERATE	Wetness
Playgrounds	SEVERE	Wetness
Paths and Trails	MODERATE	Wetness

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
75	12			70	3.	3.	6.	3.2

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3W	SLIGHT	SEVERE	SLIGHT	MODERATE	SEVERE	NORTH	balsam fir E red maple E sugar maple E yellow birch E white ash E black ash E quaking aspen E American basswood E American elm E white spruce EP eastern white pine P	65	3

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	arrowwood	12	common ninebark	8	eastern white pine	30
green ash	30	Manchurian crabapple	25	nannyberry viburnum	12	northern whitecedar	15
Norway spruce	26	Roselow sargent crabapple	8	silky dogwood	8	white spruce	20

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level, very poorly drained soils formed in organic material more than 51 inches thick or underlain by loamy glacial till or lacustrine deposits at depths of 16 to 51 inches. This map unit is not highly erodible unless drained. The land capability classification is 6W. This map unit is hydric.

Component Name: SEELYEVILLE

This map unit has 2 components, and 2 interpretation sheet.

Classification: TYPIC BOROSAPRISTS, EUIC

ESTIMATED SOIL PROPERTIES

		Classification		>10	3-10	Percent < 3 in. passing sieve				Clay %		
Depth	USDA Texture	Unified	AASHTO	In.	Inches	No 4	No.10	No.40	No.200	<.002 mm		
0-10	MUCK	PT	A-8	0	0	-	-	-	-	-		
10-60	MUCK MPT	PT	A-8	0	0	-	-	-	-	-		
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K	
0-10	-	-	0.1-0.3	0.2-6.	0.35-0.45	4.5-7.3	2- 2	-	25.-99.		0.1	
10-60	-	-	0.1-0.3	0.2-6.	0.35-0.45	4.5-7.3	2- 2	-	25.-99.			
								Wind	Risk of Corrosion		Potential	
Flooding				Water Table-(feet)		Bedrock-(in)	HYD T	Erod.	Uncoated	Frost		
Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard.	GRP Fact.	Index	Steel	Concrete	Action
WONE	-	-	+2-2.0 APPARENT YEAR-ROUND			>60		A/D	5 134	HIGH	MODERATE	HIGH

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)		
Septic Tank Absorption Fields	SEVERE	Subsides	Ponding	Percs Slowly
Daily Cover for Landfill	POOR	Ponding	Excess Humus	

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)		
Shallow Excavations	SEVERE	Excess Humus	Ponding	
Dwellings Without Basements	SEVERE	Subsides	Ponding	Low Strength
Dwellings With Basements	SEVERE	Subsides	Ponding	Low Strength
Small Commercial Buildings	SEVERE	Subsides	Ponding	Low Strength
Local Streets and Roads	SEVERE	Subsides	Ponding	Frost Action
Lawns, Landscaping, and Golf Fairways	SEVERE	Ponding	Excess Humus	

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)		
Roadfill	POOR	Wetness		
Sand	IMPROBABLE	Excess Humus		
Gravel	IMPROBABLE	Excess Humus		
Topsoil	POOR	Excess Humus	Wetness	

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)		
Pond Reservoir Area	SEVERE	Seepage		
Embankments, Dikes and Levees	SEVERE	Excess Humus	Ponding	
Drainage	LIMITATION	Ponding	Subsides	Frost Action
Irrigation	LIMITATION	Ponding	Soil Blowing	
Terraces and Diversions	LIMITATION	Ponding	Soil Blowing	
Grassed Waterways	LIMITATION	Wetness		

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Camp Areas	SEVERE	Ponding	Excess Humus
Picnic Areas	SEVERE	Ponding	Excess Humus
Playgrounds	SEVERE	Excess Humus	Ponding
Paths and Trails	SEVERE	Ponding	Excess Humus

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
								4.2
								4.

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
3W	SLIGHT	SEVERE	SEVERE	SEVERE	SEVERE	NORTH	black ash balsam fir tamarack black spruce northern whitecedar	E 55 EP 45 EP 56 EP 34 EP 30	2 6 4 3 3

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
common ninebark	7	golden willow	33	imperial Carolina poplar	50	white willow	33
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

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Route 2, Box 2355, Spooner, WI 54801-1403, Phone: 715-635-3505

Nearly level, very poorly drained soils formed in organic material more than 51 inches thick or underlain by loamy glacial till or lacustrine deposits at depths of 16 to 51 inches. This map unit is not highly erodible unless drained. The land capability classification is 6W. This map unit is hydric.

Component Name: CATHRO

This map unit has 2 components, and 2 interpretation sheet.

Classification: TERRIC BOROSAPRISTS, LOAMY, MIXED, EUIC

ESTIMATED SOIL PROPERTIES

	Classification					>10	3-10	Percent < 3 in. passing sieve				Clay %
Depth	USDA Texture	Unified		AASHTO		In.	Inches	No 4	No.10	No.40	No.200	<.002 mm
0-14	MUCK	PT		A-8		0	0	-	-	-	-	-
14-19	MUCK	PT		A-8		0	0	-	-	-	-	-
19-60	L SICL SL	SC-SM CL-ML SC CL		A-4 A-6		0	0-5	80-100	65-100	60-100	35- 90	10-30
	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K	
0-14	-	-	0.3-0.4	0.2-6.	0.45-0.55	4.5-7.8	2- 2	-	60.-85.		0.1	
14-19	-	-	0.2-0.3	0.2-6.	0.35-0.45	4.5-7.8	2- 2	-	60.-85.			
19-60	20-40	4-20	1.5-1.7	0.2-2.	0.11-0.22	5.6-8.4	0- 1	5-25	0.-0.5	LOW	0.32	
								Wind	Risk of Corrosion		Potential	
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated		Frost	
Frequency Duration		Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel	Concrete	Action	
NONE		-	-	+1-1.0 APPARENT YEAR-ROUND		>60	A/D	5 134	HIGH	LOW	HIGH	

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Ponding	Percs Slowly
Daily Cover for Landfill		POOR	Ponding	
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Excess Humus	Ponding
Dwellings Without Basements		SEVERE	Subsides	Ponding
Dwellings With Basements		SEVERE	Subsides	Ponding
Small Commercial Buildings		SEVERE	Subsides	Ponding
Local Streets and Roads		SEVERE	Subsides	Ponding
Lawns, Landscaping, and Golf Fairways		SEVERE	Ponding	Excess Humus
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		POOR	Wetness	
Sand		IMPROBABLE	Excess Fines	
Gravel		IMPROBABLE	Excess Fines	
Topsoil		POOR	Excess Humus	Wetness
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	
Embankments, Dikes and Levees		SEVERE	Piping	Ponding
Drainage		LIMITATION	Ponding	Subsides
Irrigation		LIMITATION	Ponding	Soil Blowing
Terraces and Diversions		LIMITATION	Ponding	Soil Blowing
Grassed Waterways		LIMITATION	Wetness	

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Camp Areas	SEVERE	Ponding	Excess Humus
Picnic Areas	SEVERE	Ponding	Excess Humus
Playgrounds	SEVERE	Excess Humus	Ponding
Paths and Trails	SEVERE	Ponding	Excess Humus

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
								4.2
								4.

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMENDED TO PLANT (P)	SITE INDEX	WOODLAND PRODUCT- IVITY
5W	SLIGHT	SEVERE	SEVERE	SEVERE	SEVERE	NORTH	balsam fir red maple paper birch tamarack black spruce northern whitecedar white spruce	E E E E E E EP	5 2 2 2 2

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Nearly level, very poorly drained soils formed in acid organic material more than 51 inches thick or underlain by loamy glacial till or lacustrine deposits at depths of 16 to 51 inches. This map unit is not highly erodible unless drained. The land capability classification is 6W. This map unit is hydric.

Component Name: LOXLEY

This map unit has 2 components, and 2 interpretation sheet.

Classification: TYPIC BOROSAPRISTS, DYSIC

ESTIMATED SOIL PROPERTIES

Depth	USDA Texture	Classification		>10 In.	3-10 Inches	Percent < 3 in. passing sieve				Clay %	
		Unified	AASHTO			No. 4	No. 10	No. 40	No. 200	<.002 mm	
0-12	MPT	PT	A-8	0	0	-	-	-	-	-	
12-60	MUCK	PT	A-8	0	0	-	-	-	-	-	
Depth (In)	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO ₃ Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K
0-12	-	-	0.3-0.4	0.6-6.	0.45-0.55	3.6-4.5	1- 2	-	70.-90.		0.1
12-60	-	-	0.1-0.3	0.2-6.	0.35-0.45	3.6-4.5	1- 2	-	70.-90.		
										Wind	Potential
										Risk of Corrosion	
										Uncoated	Frost
										Steel	Action
										Concrete	
NONE				+1-1.0 APPARENT YEAR-ROUND		>60	A/D	5	56	HIGH	HIGH

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)		
Septic Tank Absorption Fields	SEVERE	Subsides	Ponding	Percs Slowly
Daily Cover for Landfill	POOR	Ponding	Excess Humus	Too Acid

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)		
Shallow Excavations	SEVERE	Excess Humus	Ponding	
Dwellings Without Basements	SEVERE	Subsides	Ponding	Low Strength
Dwellings With Basements	SEVERE	Subsides	Ponding	Low Strength
Small Commercial Buildings	SEVERE	Subsides	Ponding	Low Strength
Local Streets and Roads	SEVERE	Subsides	Ponding	Frost Action
Lawns, Landscaping, and Golf Fairways	SEVERE	Too Acid	Ponding	Excess Humus

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)		
Roadfill	POOR	Wetness	Low Strength	
Sand	IMPROBABLE	Excess Humus		
Gravel	IMPROBABLE	Excess Humus		
Topsoil	POOR	Excess Humus	Wetness	Too Acid

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)		
Pond Reservoir Area	SEVERE	Seepage		
Embankments, Dikes and Levees	SEVERE	Excess Humus	Ponding	
Drainage	LIMITATION	Ponding	Subsides	Frost Action
Irrigation	LIMITATION	Ponding	Too Acid	
Terraces and Diversions	LIMITATION	Ponding		
Grassed Waterways	LIMITATION	Wetness		

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)			
Camp Areas	SEVERE	Ponding	Excess Humus	Too Acid	
Picnic Areas	SEVERE	Ponding	Excess Humus	Too Acid	
Playgrounds	SEVERE	Excess Humus	Ponding	Too Acid	
Paths and Trails	SEVERE	Ponding	Excess Humus		

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanemt Pasture AUM
								3.3
								2.3

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	(E) SITE INDEX	WOODLAND PRODUCT- IVITY
2W	SLIGHT	SEVERE	SEVERE	SEVERE	SEVERE	NORTH	balsam fir tamarack black spruce	E E E	15 2

RECOMMENDED WINDBREAK SPECIES AND EXPECTED HEIGHT AT 20 YEARS

Plant Name	Height	Plant Name	Height	Plant Name	Height	Plant Name	Height
American cranberrybush	10	Carolina poplar	60	common ninebark	8	eastern white pine	30
gray dogwood	8	green ash	30	lilac	10	nannyberry viburnum	15
northern whitecedar	20	Norway spruce	30	Siberian crabapple	25	silky dogwood	8

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Nearly level, very poorly drained soils formed in acid organic material more than 51 inches thick or underlain by loamy glacial till or lacustrine deposits at depths of 16 to 51 inches. This map unit is not highly erodible unless drained. The land capability classification is 6W. This map unit is hydric.

Component Name: BESEMAN

This map unit has 2 components, and 2 interpretation sheet.

Classification: TERRIC BOROSAPRISTS, LOAMY, MIXED, DYSIC

ESTIMATED SOIL PROPERTIES

Classification				>10	3-10	Percent < 3 in. passing sieve				Clay %		
Depth	USDA Texture	Unified	AASHTO	In.	Inches	No 4	No.10	No.40	No.200	<.002 mm		
0-12	MPT	PT	A-8	0	0	-	-	-	-	-		
12-36	SP	PT	A-8	0	0	-	-	-	-	-		
36-60	L SL	CL ML SM SC	A-2 A-4 A-6	-	0-2	75-100	65-100	40- 95	25- 75	10-28		
Depth	Liquid Limit	Plasticity Index	Moist Bulk Density g/cc	Permeability In/hr	Available Water Capacity (In./in)	Soil Reaction (pH)	CEC (me/100g)	CaCO3 Pct	Organic Matter Pct	Shrink Swell Potential	Erosion Factor K	
0-12	-	-	0.1-0.2	0.6-6.	0.55-0.65	3.6-4.4	-	-	25.-99.		0.1	
12-36	-	-	0.1-0.3	0.6-6.	0.55-0.65	3.6-4.4	-	-	-			
36-60	<30	NP-12	1.5- 2.	0.2-0.6	0.11-0.18	3.6-7.3	-	-	-	MODERATE		
								Wind	Risk of Corrosion		Potential	
Flooding			Water Table-(feet)			Bedrock-(in)	HYD T	Erod.	Uncoated	Frost		
Frequency	Duration	Months	Depth	Kind	Months	Depth Hard.	GRP Fact.	Index	Steel	Concrete	Action	
NONE	-	-	+2-1.0 APPARENT YEAR-ROUND			>60	A/D	5	56	HIGH	HIGH	HIGH

SANITARY FACILITIES		RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields		SEVERE	Ponding	Percs Slowly
Daily Cover for Landfill		POOR	Ponding	Excess Humus
BUILDING SITE DEVELOPMENT		RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations		SEVERE	Excess Humus	Ponding
Dwellings Without Basements		SEVERE	Ponding	Low Strength
Dwellings With Basements		SEVERE	Ponding	
Small Commercial Buildings		SEVERE	Ponding	Low Strength
Local Streets and Roads		SEVERE	Ponding	Frost Action
Lawns, Landscaping, and Golf Fairways		SEVERE	Ponding	Excess Humus
CONSTRUCTION MATERIAL		RATING	RESTRICTIVE FEATURE(S)	
Roadfill		POOR	Wetness	
Sand		IMPROBABLE	Excess Humus	
Gravel		IMPROBABLE	Excess Humus	
Topsoil		POOR	Excess Humus	Wetness
WATER MANAGEMENT		RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area		SEVERE	Seepage	
Embankments, Dikes and Levees		SEVERE	Excess Humus	Ponding
Drainage		LIMITATION	Ponding	Subsides
Irrigation		LIMITATION	Ponding	Rooting Depth
Terraces and Diversions		LIMITATION	Ponding	
Grassed Waterways		LIMITATION	Wetness	Rooting Depth

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Camp Areas	SEVERE	Ponding	Excess Humus
Picnic Areas	SEVERE	Ponding	Excess Humus
Playgrounds	SEVERE	Excess Humus	Ponding
Paths and Trails	SEVERE	Ponding	Excess Humus

CROPS AND PASTURE YIELDS

Crop yields in this table are averages for high level management where the crop is commonly grown on the map unit.

Corn Grain bu/a	Corn Silage tons/a	Soybeans bu/a	Wheat bu/a	Oats bu/a	Alfalfa Hay tons/acre	Red Clover Hay tons/acre	Improved Pasture AUM	Permanent Pasture AUM
								3.3
								2.3

WOODLAND INTERPRETATIONS

WOODLAND ORD. SYB.	EROSION HAZARD	EQUIPMENT LIMITATION	SEEDLING MORTALITY	WIND TH. HAZARD	PLANT COMPETITION	INTERP ASPECT	COMMONLY EXISTING TREES (E) and/or TREES RECOMMENDED TO PLANT (P)	SITE INDEX	WOODLAND PROTECT- IVITY
2W	SLIGHT	SEVERE	SEVERE	SEVERE	SEVERE	NORTH	black ash tamarack black spruce	E E EP	65 35 25
									3 2 2

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
Route 2, Box 2355, Spooner, WI 54881-1403, Phone: 715-635-3505

Component Name: PITS, GRAVEL

Classification:

ESTIMATED SOIL PROPERTIES

		Classification				>10	3-10	Percent < 3 in. passing sieve				Clay %
Depth	USDA Texture	Unified		AASHTO		In.	Inches	No. 4	No.10	No.40	No.200	<.002 mm
-----		-----		-----		-----		-----		-----		-----
0-60	SG	GP	SP	GP-GM	SP-SM	-	0-10	-	-	-	-	0- 2

	Liquid	Plas-	Moist	Perme-	Available	Soil	CEC	CaCO3	Organic	Shrink	Erosion	
Depth	Limit	ticity	Bulk Density	ability	Water Capacity	Reaction	(me/		Matter	Swell	Factor	
(In)		Index	g/cc	In/hr	(In./in)	(pH)	100g)	Pct	Pct	Potential	K	
-----		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
0-60	-	-	-	6.-20.	0.02-0.07	-	-	-	-			

								Wind	Risk of Corrosion		Potential	
----- Flooding-----				--- Water Table-(feet) ---		Bedrock-(in)	HYD	T	Erod.	Uncoated		Frost
Frequency Duration		Months	Depth	Kind	Months	Depth Hard.	GRP	Fact.	Index	Steel	Concrete	Action
-----		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NONE	-	-	>6.0	-	-	>60	A					

SANITARY FACILITIES	RATING	RESTRICTIVE FEATURE(S)	
Septic Tank Absorption Fields	SEVERE	Poor Filter	
Daily Cover for Landfill	POOR	Seepage	Too Sandy

BUILDING SITE DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)	
Shallow Excavations	SEVERE	Cutbanks Cave	
Dwellings Without Basements	SLIGHT		
Dwellings With Basements	SLIGHT		
Small Commercial Buildings	SLIGHT		
Local Streets and Roads	SLIGHT		
Lawns, Landscaping, and Golf Fairways	SEVERE	Droughty	

CONSTRUCTION MATERIAL	RATING	RESTRICTIVE FEATURE(S)	
Roadfill	GOOD		
Sand	PROBABLE		
Gravel	PROBABLE		
Topsoil	POOR	Too Sandy	

WATER MANAGEMENT	RATING	RESTRICTIVE FEATURE(S)	
Pond Reservoir Area	SEVERE	Seepage	
Embankments, Dikes and Levees	SEVERE	Seepage	Piping
Drainage	LIMITATION	Deep To Water	
Irrigation	LIMITATION	Droughty	Fast Intake
Terraces and Diversions	LIMITATION	Too Sandy	
Grassed Waterways	LIMITATION	Droughty	

RECREATIONAL DEVELOPMENT	RATING	RESTRICTIVE FEATURE(S)
Camp Areas	SEVERE	Too Sandy
Picnic Areas	SEVERE	Too Sandy
Playgrounds	SEVERE	Too Sandy
Paths and Trails	SEVERE	Too Sandy

For more information contact: Area Resource Soil Scientist, Soil Conservation Service, Hwy 70 E. and Timberland Road,
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Appendix 3.5-31

Data Regarding the Preparation of the Composites Used in the Waste Characterization Studies

- Appendix 3.5-31 Table 1. Sulfur and Sulfide Mineral Content Data for the Core Intervals Used to Prepare the Master Waste Rock Composites.
- Appendix 3.5-31 Table 1a. Location and Geologic Formation of the Samples Collected to Prepare the Waste Rock Master Composites.
- Appendix 3.5-31 Table 2. Thirty-Foot Continuous Intercepts Selected for the ARD Evaluation.
- Appendix 3.5-31 Table 3. Location and Geologic Formation of the Samples Collected to Prepare the Waste Rock High Sulfur Composites.
- Appendix 3.5-31 Figures 1-8. Particle Size Distribution and Weight of the Waste Rock Composites.
- July 5, 1994 Letter from A.J. Erickson, Jr., (ECM) to K.W. Collison (CMC) Regarding the Representativeness of the Master Ore Composite.
- Lakefield Research Progress Report No. 30. *Head Analyses and Description of Composite Samples*, 1979. Compares the Composition of the Zinc (Massive) Ore and Copper (Stringer) Ore Composites.
- Appendix 3.5-31 Tables 4a and 4b. Bulk Chemical Composition of the Zinc (Massive) and Copper (Stringer) Ore 1979 Master Composites.
- Appendix 3.5-31 Table 5. Location and Weight of the Samples Collected to Prepare the Unweathered Ore Composite.
- Appendix 3.5-31 Table 6. Location and Weight of the Samples Collected to Prepare the Weathered Ore and Waste Rock Composite.
- Appendix 3.5-31 Figure 9. Location of the Pierce Points of the Cores Selected for Collection of Ore Samples for Compositing.

Appendix 3.5-31 Table 1. Sulfur and Sulfide Mineral Content Data for the Core Intervals Used to Prepare the Master Waste Rock Composites.

Appendix 3.5-31

**Table 1. Sulfur and Sulfide Mineral Content Data for the Core Intervals
Used to Prepare the Master Waste Rock Composites**

Skunk Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 009	80-385	NA	<0.1-4	139-140	1.71
				159-160	9.11
				339-340	0.02
				380-381	0.01
DDH 021	690-700	0.03	1		
	700-720	0.02	0.5		
	720-740	0.01	0.5		
	740-760	0.04	0.5-1.5		
	760-800	0.01	1.5		
	800-820	0.10	1.5		
	820-838	0.04	1.5		
DDH 023	451-833	NA	0.5		
DDH 044	121-377	NA	0.1	329-330	0.05
	377-619	NA	0.5	538-540	<0.01
				548-550	<0.01
				555-556	0.02
				557-559	<0.01
				566-568	<0.01
				575-577	<0.01
	619-637	NA	0.1		
DDH 091	73-175	NA	0.1		
	175-195	NA	5		

Appendix 3.5-31 Table 1 (continued).

Skunk Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 091	195-200	NA	0.1		
	200-492	NA	0.5		
	492-495	NA	3		
	495-581	NA	0.5-1.0		
DDH 092	83-200	NA	0.5		
	200-257	NA	9		
	257-396	NA	0.1	313-315	0.09
				322-324	0.01
				332-334	0.01
DDH 144	493-526	NA	0.1		
	526-600	NA	0.5-0.6		
	600-700	NA	NE		
	700-796	NA	0.1		

Appendix 3.5-31 Table 1 (continued).

Rice Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 009	385-400	NA	4		
	400-492	NA	<0.1		
	492-520	0.02	<0.1		
	520-540	0.01	<0.1		
	540-560	0.01	<0.1		
	560-580	0.05	<0.1		
	580-600	0.01	<0.1		
	600-620	0.02	<0.1		
	620-640	0.12	<0.1		
	640-662	0.01	<0.1		
DDH 015	1922-2297	NA	0.5		
DDH 016	2150-2376	NA	NE	2325-2326	0.03
DDH 021	840-860	0.05	1.5		
	860-880	0.06	1.5		
	880-900	0.03	1.5		
	900-920	0.02	0.5		
	920-940	0.02	0.5		
	940-960	0.10	0.5		
	960-980	0.01	0.5		
	980-1000	0.05	0.5		
	1000-1020	0.06	0.5		
	1020-1040	0.03	0.5		

Appendix 3.5-31 Table 1 (continued).

Rice Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 021	1040-1060	0.01	0.5		
	1060-1080	0.04	0.5		
	1080-1100	0.01	0.5		
	1100-1120	0.02	0.5		
	1120-1140	0.3	0.5	1122-1123	2.80
	1140-1160	0.05	0.5		
	1160-1180	0.06	0.5		
	1180-1200	0.02	0.5		
	1200-1220	0.02	0.5		
	1220-1240	0.04	0.5		
	1240-1260	0.36	0.5		
	1260-1280	0.01	0.5		
	1280-1300	0.01	0.5		
	1300-1320	0.01	0.5		
	1320-1340	0.07	0.5		
	1340-1360	0.01	0.5		
	1360-1380	0.01	0.5		
	1380-1400	0.01	0.5		
	1400-1420	0.01	0.5		
	1420-1440	0.01	0.5		
	1440-1460	0.01	0.5		
	1460-1462	0.62	0.5		

Appendix 3.5-31 Table 1 (continued).

Rice Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 023	835-1148	NA	0.5	974-975	0.32
				1041-1043	0.05
				1050-1052	0.24
				1059-1061	0.03
				1068-1070	0.01
				1077-1079	0.06
	1148-1176	0.24	0.5		
	1176-1196	0.01	0.5		
	1196-1216	0.05	0.5		
	1216-1236	0.01	0.5		
	1236-1256	0.04	0.5		
	1256-1276	0.03	0.5		
	1276-1296	0.01	0.5		
	1296-1300	0.03	0.5		
DDH 024	961-1100	NA	1	1028-1029	0.10
	1100-1148	NA	0.5	1132-1133	0.03
	1148-1168	0.07	0.5		
	1168-1188	0.16	0.5		
	1188-1208	0.09	0.5		
	1208-1228	0.06	0.5		
	1228-1248	0.05	0.5		
	1248-1268	0.17	0.5		

Appendix 3.5-31 Table 1 (continued).

Rice Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 024	1268-1279	0.06	0.5		
DDH 044	639-903	NA	0.1	754-756	0.02
				764-766	0.01
				774-776	0.01
				883-884	0.02
DDH 046	1210-1214	NA	0.5		
	1214-1293	NA	2		
	1293-1400	NA	0.5		
	1400-1902	NA	NE	1834-1835	0.02
DDH 091	583-656	NA	0.5		
	656-670	0.04	0.5		
	670-690	0.03	0.5		
	690-710	0.02	0.5		
	710-730	0.01	0.5		
	730-750	0.01	0.5		
	750-770	0.03	0.5		
	770-790	0.01	0.5		
	790-791	6.4	0.5		
DDH 092	398-492	NA	0.1		
	492-500	0.30	0.1		
	500-506	0.30	0.5		
	506-526	0.08	0.5		

Appendix 3.5-31 Table 1 (continued).

Rice Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 092	526-546	0.09	0.5		
	546-566	0.03	0.5		
	566-573	0.02	0.5		
DDH 149	1100-1312	NA	0.1	1119-1120	0.03
	1312-1325	0.03	0.1		
	1325-1345	0.01	0.1		
	1345-1364	0.05	0.1		
DDH 160	1759-1772	0.04	NE		
	1772-1792	0.02	NE		
	1792-1812	0.02	NE		
	1812-1832	0.02	NE		
	1832-1852	0.01	NE		
	1852-1872	0.02	NE		
	1872-1892	0.01	NE		
	1892-1912	0.01	NE		
	1912-1932	0.02	NE		
	1932-1952	0.10	NE		
	1952-1972	0.13	NE		
	1972-1992	0.02	NE	1975-1977	0.01
				1985-1987	0.02
	1992-2012	0.11	1	1994-1996	0.01
	2012-2032	0.05	NE	2020-2021	0.03

Appendix 3.5-31 Table 1 (continued).

Rice Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 160	2032-2052	0.05	NE		
	2052-2057	0.02	NE		
DDH 163	1641-1951	NA	NE	1782-1783	0.02
				1835-1836	1.74
				1874-1875	0.04
	1951-1991	NA	1.5		
	1991-2057	NA	NE		
DDH 172	1000-1500	NA	NE	1093-1094	0.01
	1500-1647	NA	0.1	1504-1506	<0.01
				1513-1515	<0.01
				1522-1524	<0.01
	1647-1729	NA	0.5		

Appendix 3.5-31 Table 1 (continued).

Upper Mole Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 009	664-680	0.01	<0.1		
	680-700	0.01	<0.1		
	700-720	0.05	<0.1		
	720-740	0.37	<0.1		
	740-749	0.02	<0.1		
DDH 015	2259-2297	NA	0.5		
	2297-2319	0.01	0.5		
	2319-2339	0.02	0.5		
	2339-2359	0.04	0.5		
	2359-2379	0.01	0.5		
	2379-2399	0.01	0.5		
	2399-2419	0.05	0.5		
	2419-2434	0.07	0.5		
DDH 016	2378-2461	NA	NE		
	2461-2485	0.06	NE		
	2485-2499	0.07	NE		
DDH 020	562-571	0.03	0.1		
	571-591	0.04	0.1		
	591-611	0.03	0.1		
	611-631	0.04	0.5		
	631-650	0.03	0.5		
DDH 021	1461-1480	0.62	0.5		

Appendix 3.5-31 Table 1 (continued).

Upper Mole Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 021	1480-1500	0.01	0.5		
	1500-1520	0.01	1		
	1520-1540	0.03	1	1527-1528	0.01
	1540-1560	0.01	1		
	1560-1580	0.02	1		
	1580-1600	0.01	1		
	1600-1620	0.01	1		
	1620-1625	0.01	1		
DDH 023	1302-1316	0.03	0.5		
	1316-1336	0.01	0.5		
	1336-1356	0.10	0.5		
	1356-1376	0.18	0.5		
	1376-1396	0.29	0.5		
	1396-1416	0.09	0.5		
	1416-1435	0.02	0.5		
DDH 024	1281-1288	0.06	0.5		
	1288-1308	0.02	0.5		
	1308-1328	0.34	0.5		
	1328-1348	0.78	0.5		
	1348-1368	1.68	0.5		
	1368-1388	0.20	0.5		
	1388-1408	0.07	0.5		

Appendix 3.5-31 Table 1 (continued).

Upper Mole Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 024	1408-1423	0.03	0.5		
DDH 044	903-1000	NA	0.1		
	1000-1051	NA	0.5		
DDH 046	1904-1969	NA	NE/2		
	1969-1981	0.18	2/NE		
	1981-2001	0.05	NE/0.5		
	2001-2021	0.18	0.5	2009-2010	0.80
				2028-2030	<0.01
				2037-2039	<0.01
				2046-2048	0.06
				2055-2057	0.02
	2021-2041	0.02	0.5		
	2041-2061	0.04	0.5/NE		
	2061-2081	0.01	NE		
	2081-2101	0.04	NE		
	2101-2121	0.13	NE		
	2121-2141	0.07	NE		
	2141-2161	0.03	NE		
	2161-2181	0.03	NE		
	2181-2201	0.02	NE		
	2201-2211	0.01	NE		
DDH 073	1339-1344	0.11	0.1		

Appendix 3.5-31 Table 1 (continued).

Upper Mole Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 073	1344-1364	0.10	0.1		
	1364-1384	0.17	0.1	1372-1374	0.08
				1381-1383	<0.01
	1384-1404	0.25	0.5	1390-1392	0.03
	1404-1424	2.12	0.5		
	1424-1442	0.18	0.5		
DDH 091	793-810	6.4	2		
	810-830	0.05	0.5-2		
	830-850	0.02	0.5		
	850-870	0.04	0.5		
	870-890	0.04	0.5		
	890-891	0.01	0.5		
DDH 092	575-606	0.02	0.5		
	606-626	0.03	0.5		
	626-646	0.02	0.5		
	646-666	0.03	0.5		
	666-680	0.02	0.5		
DDH 131	1161-1176	0.46	0.1	1163-1165	<0.01
				1168-1169	0.01
				1171-1173	0.19
	1176-1196	0.14	0.1	1180-1182	0.17
	1196-1216	0.31	0.1	1207-1208	6.32

Appendix 3.5-31 Table 1 (continued).

Upper Mole Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 131	1216-1236	0.40	0.01	1234-1235	3.50
	1236-1256	0.03	0.1		
	1256-1276	0.02	2		
	1276-1296	0.14	2		
	1296-1316	0.09	2	1302-1303	0.22
	1316-1336	0.17	2		
	1336-1356	0.46	2	1346-1347	1.51
	1356-1376	0.98	0.5		
	1376-1396	0.13	0.5		
	1396-1416	0.21	0.5		
	1416-1436	0.09	0.5		
	1436-1452	0.18	0.5		
DDH 132	992-994	0.03	0.1		
	994-1014	0.03	0.1		
	1014-1034	0.14	0.1		
	1034-1054	0.52	0.1		
	1054-1074	1.71	0.1		
	1074-1082	0.34	0.1		
DDH 140	2540-2815	NA	0.5		
	2815-2860	NA	0.2		
	2860-2923	NA	0.5		
DDH 149	1364-1365	0.05	0.1		

Appendix 3.5-31 Table 1 (continued).

Upper Mole Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 149	1365-1385	0.01	0.1		
	1385-1405	0.41	0.1		
	1405-1425	0.03	0.1		
	1425-1445	0.01	0.1		
	1445-1465	0.01	0.1		
	1465-1485	0.02	0.1		
	1485-1505	0.01	0.1		
	1505-1525	0.05	0.1		
	1525-1545	0.06	0.1		
	1545-1565	0.19	0.1		
	1565-1570	0.03	0.1		
DDH 154	1309-1345	NA	1		
	1345-1452	NA	0.5		
	1452-1498	NA	1		
DDH 160	2057-2072	0.02	NE		
	2072-2092	0.07	NE		
	2092-2112	0.02	NE		
	2112-2132	0.03	NE		
	2132-2152	0.02	NE		
	2152-2172	0.02	NE		
	2172-2192	0.02	NE		
	2192-2212	0.06	NE		

Appendix 3.5-31 Table 1 (continued).

Upper Mole Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 160	2212-2232	0.04	NE		
	2232-2252	0.06	NE		
	2252-2272	0.02	NE		
	2272-2292	0.58	NE		
	2292-2312	0.13	NE		
	2312-2332	0.02	NE		
	2332-2352	0.02	NE/2		
	2352-2372	0.37	2		
	2372-2392	0.20	2		
	2392-2412	0.10	2		
	2412-2432	0.22	2	2421-2422	1.14
	2432-2452	0.04	2	2434-2435	1.03
	2452-2471	0.05	2		
DDH 163	2203-2801	NA	NE		
DDH 176	761-880	NA	0.1		

Appendix 3.5-31 Table 1 (continued).

Lower Mole Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 006	795-850	NA	NE		
	850-900	NA	4		
	900-903	1.28	4		
	903-931	1.28	2		
DDH 009	751-760	0.02	<0.1		
	760-780	0.04	<0.1		
	780-800	0.01	<0.1		
	800-820	0.08	<0.1		
	820-861	8	<0.1		
DDH 015	2436-2439	0.07	0.5		
	2439-2459	0.03	0.5		
	2459-2479	0.02	0.5		
	2479-2499	0.12	0.5		
	2499-2519	0.04	0.5		
	2519-2535	0.07	0.5		
DDH 016	2918-2925	0.23	NE		
	2925-2945	0.11	NE		
	2945-2965	0.02	NE		
	2965-2985	0.05	NE	2979-2999	0.01
	2985-3005	0.03	NE		
	3005-3025	0.26	NE	3007-3009	0.03
				3017-3019	0.01

Appendix 3.5-31 Table 1 (continued).

Lower Mole Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 020	652-671	0.41	0.5		
	671-691	4.63	0.5-5		
	691-711	1.01	1	707-708	3.24
	711-731	0.53	1		
	731-751	0.07	1		
	751-755	7.04	1		
DDH 021	1640-1660	0.09	1	1647-1648	0.36
	1660-1680	0.03	1		
	1680-1690	0.15	1		
	1690-1700	0.08	1		
	1700-1710	0.12	1		
	1710-1715	0.19	1		
	1715-1725	0.15	1		
	1725-1730	0.25	1		
DDH 023	1437-1456	0.16	0.5		
	1456-1476	0.16	0.5	1456-1457	0.10
	1476-1480	NA	0.5		
	1480-1483	3.26	0.5		
DDH 024	1425-1428	0.03	0.5		
	1428-1448	0.05	0.5		
	1448-1468	0.01	0.5		
	1468-1488	0.01	0.5		

Appendix 3.5-31 Table 1 (continued).

Lower Mole Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 024	1488-1508	0.03	0.5		
	1508-1528	0.01	0.5		
	1528-1548	0.01	0.5		
	1548-1560	19	0.5		
DDH 035	2255-2262	0.02	1		
	2262-2282	0.02	1		
	2282-2302	0.01	1		
	2302-2322	0.03	1	2315-2316	0.08
	2322-2342	0.05	1		
	2342-2362	0.03	1		
	2362-2370	NA	1		
DDH 037	2148-2164	0.01	NE		
	2164-2184	0.14	NE		
	2184-2204	0.05	NE	2184-2185	0.19
	2204-2224	0.76	NE/2		
	2224-2244	0.10	2		
	2244-2254	2.32	2		
DDH 038	1631-1645	0.46	1.5		
	1645-1665	0.69	1.5		
	1665-1685	1.91	1.5-6		
	1685-1705	0.45	1.5		
	1705-1725	0.10	1.5-2.5		

Appendix 3.5-31 Table 1 (continued).

Lower Mole Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 038	1725-1737	2.55	2.5		
DDH 042	2130-2135	0.03	NE		
	2135-2155	0.04	NE		
	2155-2175	0.01	NE		
	2175-2195	0.01	NE		
	2195-2215	0.30	NE		
	2215-2235	0.24	NE/<1		
	2235-2255	0.30	1	2235-2236	1.33
	2255-2275	0.06	1		
	2275-2291	0.53	1		
DDH 044	1053-1178	NA	0.5		
DDH 045	2038-2060	NA	NE		
	2060-2151	NA	1	2067-2069	0.06
				2077-2079	0.05
				2086-2088	0.03
				2098-2100	0.04
DDH 046	2213-2221	0.01	NE		
	2221-2241	0.01	NE		
	2241-2261	0.06	NE		
	2261-2281	0.18	NE		
	2281-2301	0.07	NE	2295-2296	2.04
	2301-2321	0.60	2		

Appendix 3.5-31 Table 1 (continued).

Lower Mole Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 068	1854-2026	NA	NE	1880-1882	0.01
				1889-1891	<0.01
				1898-1900	0.02
				1971-1972	0.03
DDH 069	1415-1469	NA	3		
	1469-1516	NA	2		
	1516-1519	NA	1		
DDH 073	1444-1464	0.04	0.5		
	1464-1484	0.18	0.1		
	1484-1504	0.08	0.1		
	1504-1524	0.04	0.1		
	1524-1544	0.07	0.1		
	1544-1564	0.04	0.1	1549-1550	0.70
	1564-1579	0.55	0.1		
DDH 085	897-936	NA	NE		
	936-977	NA	2		
	977-1019	NA	1		
DDH 091	893-910	0.01	0.5		
	910-930	0.06	0.5-1		
	930-950	0.02	1	949-950	3.79
	950-970	0.05	1-0.5		
	970-990	0.02	0.5		

Appendix 3.5-31 Table 1 (continued).

Lower Mole Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 091	990-999	8.9	0.5		
DDH 092	682-686	0.02	0.5		
	686-706	0.10	0.5		
	706-726	0.10	0.5	725-726	2.95
	726-746	0.43	0.5	734-735	0.04
	746-766	0.23	0.5		
	766-784	0.20	0.5		
DDH 128	2063-2187	NA	NE	2112-2113	2.26
DDH 131	1452-1456	0.18	0.5		
	1456-1476	0.27	0.5	1469-1470	0.60
	1476-1577	NA	0.5		
DDH 132	1082-1094	0.34	0.1		
	1094-1114	0.05	0.1-0.5		
	1114-1134	0.20	0.5	1133-1133.5	10.8
	1134-1154	1.04	0.5	1139-1140	0.61
	1154-1174	40	0.5		
	1174-1194	14	0.5		
	1194-1212	2.6	0.5		
DDH 133	1175-1295	NA	1	1224-1225	0.17
DDH 137	1706-1710	0.15	NE		
	1710-1730	0.03	NE		
	1730-1750	0.02	NE		

Appendix 3.5-31 Table 1 (continued).

Lower Mole Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 137	1750-1770	0.01	NE		
	1770-1790	0.05	NE		
	1790-1810	0.02	NE		
	1810-1830	0.01	NE		
	1830-1850	0.02	NE		
	1850-1870	0.04	NE		
	1870-1872	NA	NE		
DDH 138	1717-1887	NA	NE	1797-1798	0.24
DDH 139	2857-3005	NA	0.2		
DDH 140	2925-3029	NA	0.5-2		
DDH 149	1572-1605	0.03	0.1-0.2		
	1605-1625	0.07	0.2		
	1625-1645	0.03	0.2	1641-1642	0.09
	1645-1665	0.02	0.2		
	1665-1685	0.03	0.2		
	1685-1705	0.02	0.1-0.2		
	1705-1725	0.11	0.5-5		
DDH 150	1494-1510	0.03	1		
	1510-1530	0.10	1		
	1530-1550	0.09	2		
	1550-1570	0.14	2		
	1570-1590	0.36	1-2		

Appendix 3.5-31 Table 1 (continued).

Lower Mole Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 150	1590-1606	10	1		
DDH 154	1500-1659	NA	0.5	1595-1596	0.32
DDH 159	1710-1800	NA	0.5	1767-1768	0.31
	1800-1892	NA	0.1		
DDH 160	2473-2492	0.03	2	2421-2422	1.14
				2434-2435	1.03
	2492-2512	0.04	2		
	2512-2532	0.03	2		
	2532-2552	0.03	2		
	2552-2568	1.36	2		
DDH 163	2803-2900	NA	NE		
	2900-2921	NA	18		
DDH 165	2199-2200	0.07	NE		
	2200-2220	0.02	NE		
	2220-2240	0.02	NE		
	2240-2260	0.03	NE/1		
	2260-2280	0.81	1		
	2280-2300	0.06	1/NE	2289-2290	0.39
	2300-2320	0.05	NE		
	2320-2321	9.1	NE		
DDH 176	882-900	NA	0.1		
	900-925	NA	1		

Appendix 3.5-31 Table 1 (continued).

Lower Mole Lake Formation

Mineral Exploration Boring	Exploration Interval, Downhole ft.	Exploration Sulfur Assay %	Estimated Sulfide Mineral Content %	ABA Subinterval, Downhole ft.	ABA Sulfur Assay %
DDH 176	925-985	NA	0.1	926-927	3.73
	985-1021	NA	1.5	993-995	0.09
				1002-1004	0.24
				1010-1012	0.34
				1019-1021	0.15
DDH 181	2863-3001	NA	0.5		
DDH 270	2021-2179	NA	NE	2082-2083	0.05
DDH 271	2097-2259	NA	NE	2209-2210	0.16

Prepared by: JET
Checked by: DJL

Appendix 3.5-31 Table 1a. Location and Geologic Formation of the Samples Collected to Prepare the Waste Rock Master Composites.

Appendix 3.5-31 Table 1a

**Location and Geologic Formation of the Samples Collected
to Prepare the Waste Rock Master Composites**

Mineral Exploration Boring	Interval Sampled (downhole, in feet)	Geologic Formation
DDH: 6	795-931	Lower Mole Lake
DDH: 9	80-385	Skunk Lake
DDH: 9	387-662	Rice Lake
DDH: 9	664-749	Upper Mole Lake
DDH: 9	751-861	Lower Mole Lake
DDH: 15	1922-2257	Rice Lake
DDH: 15	2259-2434	Upper Mole Lake
DDH: 15	2436-2535	Lower Mole Lake
DDH: 16	2150-2376	Rice Lake
DDH: 16	2378-2499	Upper Mole Lake
DDH: 16	2918-3026	Lower Mole Lake
DDH: 20	562-650	Upper Mole Lake
DDH: 20	652-755	Lower Mole Lake
DDH: 21	690-838	Skunk Lake
DDH: 21	840-1462	Rice Lake
DDH: 21	1464-1625	Upper Mole Lake
DDH: 21	1627-1736	Lower Mole Lake
DDH: 23	451-833	Skunk Lake
DDH: 23	835-1300	Rice Lake
DDH: 23	1302-1435	Upper Mole Lake
DDH: 23	1437-1483	Lower Mole Lake
DDH: 24	961-1279	Rice Lake
DDH: 24	1281-1423	Upper Mole Lake
DDH: 24	1425-1560	Lower Mole Lake
DDH: 35	2255-2370	Lower Mole Lake

Appendix 3.5-31 Table 1a, continued

Mineral Exploration Boring	Interval Sampled (downhole, in feet)	Geologic Formation
DDH: 37	2148-2254	Lower Mole Lake
DDH: 38	1631-1737	Lower Mole Lake
DDH: 42	2130-2291	Lower Mole Lake
DDH: 44	121-637	Skunk Lake
DDH: 44	639-903	Rice Lake
DDH: 44	903-1051	Upper Mole Lake
DDH: 44	1053-1178	Lower Mole Lake
DDH: 45	2038-2151	Lower Mole Lake
DDH: 46	1210-1902	Rice Lake
DDH: 46	1904-2211	Upper Mole Lake
DDH: 46	2213-2323	Lower Mole Lake
DDH: 68	1854-2026	Lower Mole Lake
DDH: 69	1415-1519	Lower Mole Lake
DDH: 73	1339-1442	Upper Mole Lake
DDH: 73	1444-1579	Lower Mole Lake
DDH: 85	897-1019	Lower Mole Lake
DDH: 91	73-581	Skunk Lake
DDH: 91	583-791	Rice Lake
DDH: 91	793-891	Upper Mole Lake
DDH: 91	893-999	Lower Mole Lake
DDH: 92	83-396	Skunk Lake
DDH: 92	398-573	Rice Lake
DDH: 92	575-680	Upper Mole Lake
DDH: 92	682-784	Lower Mole Lake
DDH: 128	2063-2187	Lower Mole Lake
DDH: 131	1161-1452	Upper Mole Lake
DDH: 131	1452-1577	Lower Mole Lake

Appendix 3.5-31 Table 1a, continued

Mineral Exploration Boring	Interval Sampled (downhole, in feet)	Geologic Formation
DDH: 132	992-1082	Upper Mole Lake
DDH: 132	1082-1212	Lower Mole Lake
DDH: 133	1175-1295	Lower Mole Lake
DDH: 137	1706-1872	Lower Mole Lake
DDH: 138	1717-1887	Lower Mole Lake
DDH: 139	2857-3005	Lower Mole Lake
DDH: 140	2540-2923	Upper Mole Lake
DDH: 140	2925-3029	Lower Mole Lake
DDH: 144	493-800	Skunk Lake
DDH: 149	1100-1364	Rice Lake
DDH: 149	1364-1570	Upper Mole Lake
DDH: 149	1572-1725	Lower Mole Lake
DDH: 150	1494-1606	Lower Mole Lake
DDH: 154	1309-1498	Upper Mole Lake
DDH: 154	1500-1659	Lower Mole Lake
DDH: 159	1710-1892	Lower Mole Lake
DDH: 160	1759-2057	Rice Lake
DDH: 160	2057-2471	Upper Mole Lake
DDH: 160	2473-2568	Lower Mole Lake
DDH: 163	1641-2201	Rice Lake
DDH: 163	2203-2801	Upper Mole Lake
DDH: 163	2803-2921	Lower Mole Lake
DDH: 165	2199-2321	Lower Mole Lake
DDH: 172	1000-1729	Rice Lake
DDH: 176	761-880	Upper Mole Lake
DDH: 176	882-1021	Lower Mole Lake
DDH: 181	2863-3001	Lower Mole Lake

Appendix 3.5-31 Table 1a, continued

Mineral Exploration Boring	Interval Sampled (downhole, in feet)	Geologic Formation
DDH: 270	2021-2179	Lower Mole Lake
DDH: 271	2097-2259	Lower Mole Lake

Prepared by: JET
Checked by: DJL

**Appendix 3.5-31 Table 2. Thirty-Foot Continuous Intercepts Selected
for the ARD Evaluation**

Appendix 3.5-31 Table 2

Thirty Foot Continuous Intercepts Selected for the ARD Evaluation

Thirty-foot continuous intercepts of the borings used to form the waste rock master composites, listed by geologic formation. Ten percent of the intercepts within each formation were randomly selected for ARD evaluation. Each of the selected intercepts is printed in bold.

Skunk Lake Formation

Mineral Exploration Boring	Intervals Sampled (downhole, in feet)		
DDH: 9	80-110	110-140	140-170
	170-200	200-230	230-260
	260-290	290-320	320-350
	350-380		
DDH: 21	690-720	720-750	750-780
	780-810		
DDH: 23	451-481	481-511	511-541
	541-571	571-601	601-631
	631-661	661-691	691-721
	721-751	751-781	781-811
DDH: 44	121-151	151-181	181-211
	211-241	241-271	271-301
	301-331	331-361	361-391
	391-421	421-451	451-481
	481-511	511-541	541-571
	571-601	601-631	
DDH: 91	73-103	103-133	133-163
	163-193	193-223	223-253
	253-283	283-313	313-343
	343-373	373-403	403-433
	433-463	463-493	493-523

Appendix 3.5-31 Table 2, continued

Mineral Exploration Boring	Intervals Sampled (downhole, in feet)		
	523-553		
DDH: 92	81-111	111-141	141-171
	171-201	201-231	231-261
	261-291	291-321	321-351
	351-381		
DDH: 144	492-522	522-552	552-582
	582-612	612-642	642-672
	672-702	702-732	732-762
	762-792		

Rice Lake Formation

Mineral Exploration Boring	Intervals Sampled (downhole, in feet)		
DDH: 9	380-410	410-440	440-470
	470-500	500-530	530-560
	560-590	590-620	620-650
DDH: 15	1922-1952	1952-1982	1982-2012
	2012-2042	2042-2072	2072-2102
	2102-2132	2132-2162	2162-2192
	2192-2222	2222-2252	
DDH: 16	2150-2180	2180-2210	2210-2240
	2240-2270	2270-2300	2300-2330
	2330-2360		
DDH: 21	810-840	840-870	870-900
	900-930	930-960	960-990
	990-1020	1020-1050	1050-1080
	1080-1110	1110-1140	1140-1170

Appendix 3.5-31 Table 2, continued

Mineral Exploration Boring	Intervals Sampled (downhole, in feet)		
	1170-1200	1200-1230	1230-1260
	1260-1290	1290-1320	1320-1350
	1350-1380	1380-1410	1410-1440
DDH: 23	811-841	841-871	871-901
	901-931	931-961	961-991
	991-1021	1021-1051	1051-1081
	1081-1111	1111-1141	1141-1171
	1171-1201	1201-1231	1231-1261
	1261-1291		
DDH: 24	961-991	991-1021	1021-1051
	1051-1081	1081-1111	1111-1141
	1141-1171	1171-1201	1201-1231
	1231-1261		
DDH: 44	631-661	661-691	691-721
	721-751	751-781	781-811
	811-841	841-871	871-901
DDH: 46	1214-1244	1244-1274	1274-1304
	1304-1334	1334-1364	1364-1394
	1394-1424	1424-1454	1454-1484
	1484-1514	1514-1544	1544-1574
	1574-1604	1604-1634	1634-1664
	1664-1694	1694-1724	1724-1754
	1754-1784	1784-1814	1814-1844
	1844-1874		
DDH: 91	553-583	583-613	613-643
	643-673	673-703	703-733
	733-763		

Appendix 3.5-31 Table 2, continued

Mineral Exploration Boring	Intervals Sampled (downhole, in feet)		
DDH: 92	381-411	411-441	441-471
	471-501	501-531	531-561
DDH: 149	1100-1130	1130-1160	1160-1190
	1190-1220	1220-1250	1250-1280
	1280-1310	1310-1340	
DDH: 160	1759-1789	1789-1819	1819-1849
	1849-1879	1879-1909	1909-1939
	1939-1969	1969-1999	1999-2029
DDH: 163	1641-1671	1671-1701	1701-1731
	1731-1761	1761-1791	1791-1821
	1821-1851	1851-1881	1881-1911
	1911-1941	1941-1971	1971-2001
	2001-2031	2031-2061	2061-2091
	2091-2121	2121-2151	2151-2181
DDH: 172	1000-1030	1030-1060	1060-1090
	1090-1120	1120-1150	1150-1180
	1180-1210	1210-1240	1240-1270
	1270-1300	1285-1315¹	1330-1360
	1360-1390	1390-1420	1420-1450
	1450-1480	1500-1530²	1510-1540
	1540-1570	1570-1600	1600-1630
	1630-1660	1660-1690	1690-1720

¹ original interval was 1300-1330

² original interval was 1480-1510

Appendix 3.5-31 Table 2, continued

Upper Mole Lake Formation

Mineral Exploration Boring	Intervals Sampled (downhole, in feet)		
DDH: 9	650-680	680-710	710-740
DDH: 15	2252-2282	2282-2312	2312-2342
	2342-2372	2372-2402	2402-2432
DDH: 16	2360-2390	2390-2420	2420-2450
	2450-2480		
DDH: 20	562-592	592-622	
DDH: 21	1440-1470	1470-1500	1500-1530
	1530-1560	1560-1590	1590-1620
DDH: 23	1291-1321	1321-1351	1351-1381
DDH: 24	1261-1291	1291-1321	1321-1351
	1351-1381	1381-1411	
DDH: 44	901-931	931-961	961-991
	991-1021	1021-1051	
DDH: 46	1874-1904	1904-1934	1934-1964
	1964-1994	1994-2024	2024-2054
	2054-2084	2084-2114	2114-2144
	2144-2174	2174-2204	
DDH: 73	1339-1369	1369-1399	1399-1429
DDH: 91	763-793	793-823	823-853
	853-883		
DDH: 92	561-591	591-621	621-651
DDH: 131	1159-1189	1189-1219	1219-1249
	1249-1279	1279-1309	1309-1339
	1339-1369	1369-1399	1399-1249
DDH: 132	992-1022	1022-1052	1052-1082
DDH: 140	2542-2572	2572-2602	2602-2632

Appendix 3.5-31 Table 2, continued

Mineral Exploration Boring	Intervals Sampled (downhole, in feet)		
	2632-2662	2662-2692	2692-2722
	2722-2752	2752-2782	2782-2812
	2812-2842	2842-2872	2872-2902
DDH: 149	1340-1370	1370-1400	1400-1430
	1430-1460	1460-1490	1490-1520
	1520-1550		
DDH: 154	1309-1339	1339-1369	1369-1399
	1399-1429	1429-1459	1459-1489
DDH: 160	2029-2059	2059-2089	2089-2119
	2119-2149	2149-2179	2179-2209
	2209-2239	2239-2269	2269-2299
	2299-2329	2329-2359	2359-2389
	2389-2419	2419-2449	
DDH: 163	2181-2211	2211-2241	2241-2271
	2271-2301	2301-2331	2331-2361
	2361-2391	2391-2421	2421-2451
	2451-2481	2481-2511	2511-2541
	2541-2571	2571-2601	2601-2631
	2631-2661	2661-2691	2691-2721
	2721-2751	2751-2781	
DDH: 176	761-791	791-821	821-851
	851-881		

Appendix 3.5-31 Table 2, continued

Lower Mole Lake Formation

Mineral Exploration Boring	Intervals Sampled (downhole, in feet)		
DDH: 6	811-841	841-871	871-901
	901-931		
DDH: 9	741-771	771-801	801-831
	831-861		
DDH: 15	2444-2474	2474-2504	2504-2534
DDH: 16	2936-2966	2966-2996	2996-3026
DDH: 20	635-685	685-715	715-745
	745-775		
DDH: 21	1616-1646	1646-1676	1676-1706
	1706-1736		
DDH: 23	1394-1424	1424-1454	1454-1484
DDH: 24	1411-1441	1441-1471	1471-1501
	1501-1531	1531-1561	
DDH: 35	2250-2280	2280-2310	2310-2340
	2340-2370		
DDH: 37	2164-2194	2194-2224	2224-2254
DDH: 38	1647-1677	1677-1707	1707-1737
DDH: 42	2142-2172	2172-2202	2202-2232
	2232-2262	2262-2292	
DDH: 44	1057-1087	1087-1117	1117-1147
	1147-1177		
DDH: 45	2032-2062	2062-2092	2092-2122
	2122-2152		
DDH: 46	2203-2233	2233-2263	2263-2293
	2293-2323		
DDH: 68	1846-1876	1876-1906	1906-1936

Appendix 3.5-31 Table 2, continued

Mineral Exploration Boring	Intervals Sampled (downhole, in feet)		
	1936-1966	1966-1996	1996-2026
DDH: 69	1430-1460	1460-1490	1490-1520
DDH: 73	1429-1459	1459-1489	1489-1519
	1519-1549	1549-1579	
DDH: 85	899-929	929-959	959-989
	989-1019		
DDH: 91	880-910	910-940	940-970
	970-1000		
DDH: 92	664-694	694-724	724-754
	754-784		
DDH: 128	2067-2097	2097-2127	2127-2157
	2157-2187		
DDH: 131	1457-1487	1487-1517	1517-1547
	1547-1577		
DDH: 132	1092-1122	1122-1152	1152-1182
	1182-1212		
DDH: 133	1175-1205	1205-1235	1235-1265
	1265-1295		
DDH: 137	1722-1752	1752-1782	1782-1812
	1812-1842	1842-1872	
DDH: 138	1737-1767	1767-1797	1797-1827
	1827-1857	1857-1887	
DDH: 139	2855-2885	2885-2915	2915-1945
	2945-2975	2975-3005	
DDH: 140	2904-2934	2934-2964	2964-2994
	2994-3024		
DDH: 149	1576-1606	1606-1636	1636-1666

Appendix 3.5-31 Table 2, continued

Mineral Exploration Boring	Intervals Sampled (downhole, in feet)		
	1666-1696	1696-1726	
DDH: 150	1516-1546	1546-1576	1576-1606
DDH: 154	1509-1539	1539-1569	1569-1599
	1599-1629	1629-1659	
DDH: 159	1712-1742	1742-1772	1772-1802
	1802-1832	1832-1862	1862-1892
DDH: 160	2449-2479	2479-2509	2509-2539
	2539-2569		
DDH: 163	2801-2831	2831-2861	2861-2891
	2891-2921		
DDH: 165	2201-2231	2231-2261	2261-2291
	2291-2321		
DDH: 176	901-931	931-961	961-991
	991-1021		
DDH: 181	2880-2910	2910-2940	2940-2970
	2970-3000		
DDH: 270	2029-2059	2059-2089	2089-2119
	2119-2149	2149-2179	
DDH: 271	2109-2139	2139-2169	2169-2199
	2199-2229	2229-2259	

Prepared by: JET
Checked by: DJL

**Appendix 3.5-31 Table 3. Location and Geologic Formation of the Samples Collected
to Prepare the Waste Rock High Sulfur Composites**

Appendix 3.5-31 Table 3

**Location and Geologic Formation of the Samples Collected
to Prepare the Waste Rock High Sulfur Composites**

Mineral Exploration Boring	Interval Sampled (downhole, in feet)	Geologic Formation
DDH: 5	367-392	Lower Mole Lake
DDH: 6	911-931	Lower Mole Lake
DDH: 13	724-728 748-768 991-995	Rice Lake
DDH: 13	1505-1525	Upper Mole Lake
DDH: 16	750-790 820-840 856-876	Skunk Lake
DDH: 18	529-549 570-590	Upper Mole Lake
DDH: 20	766-785	Lower Mole Lake
DDH: 28	1185-1205	Lower Mole Lake
DDH: 31	1704-1714 1729-1741	Upper Mole Lake
DDH: 38	1185-1228 1245-1265	Upper Mole Lake
DDH: 47	895-931 940-958	Rice Lake
DDH: 49	330-350 380-400 524-544 554-574 604-624 645-665 730-749 754-764	Skunk Lake
DDH: 64	860-870 877-887 900-910 930-940	Upper Mole Lake
DDH: 64	1357-1377	Lower Mole Lake

Appendix 3.5-31 Table 3, continued

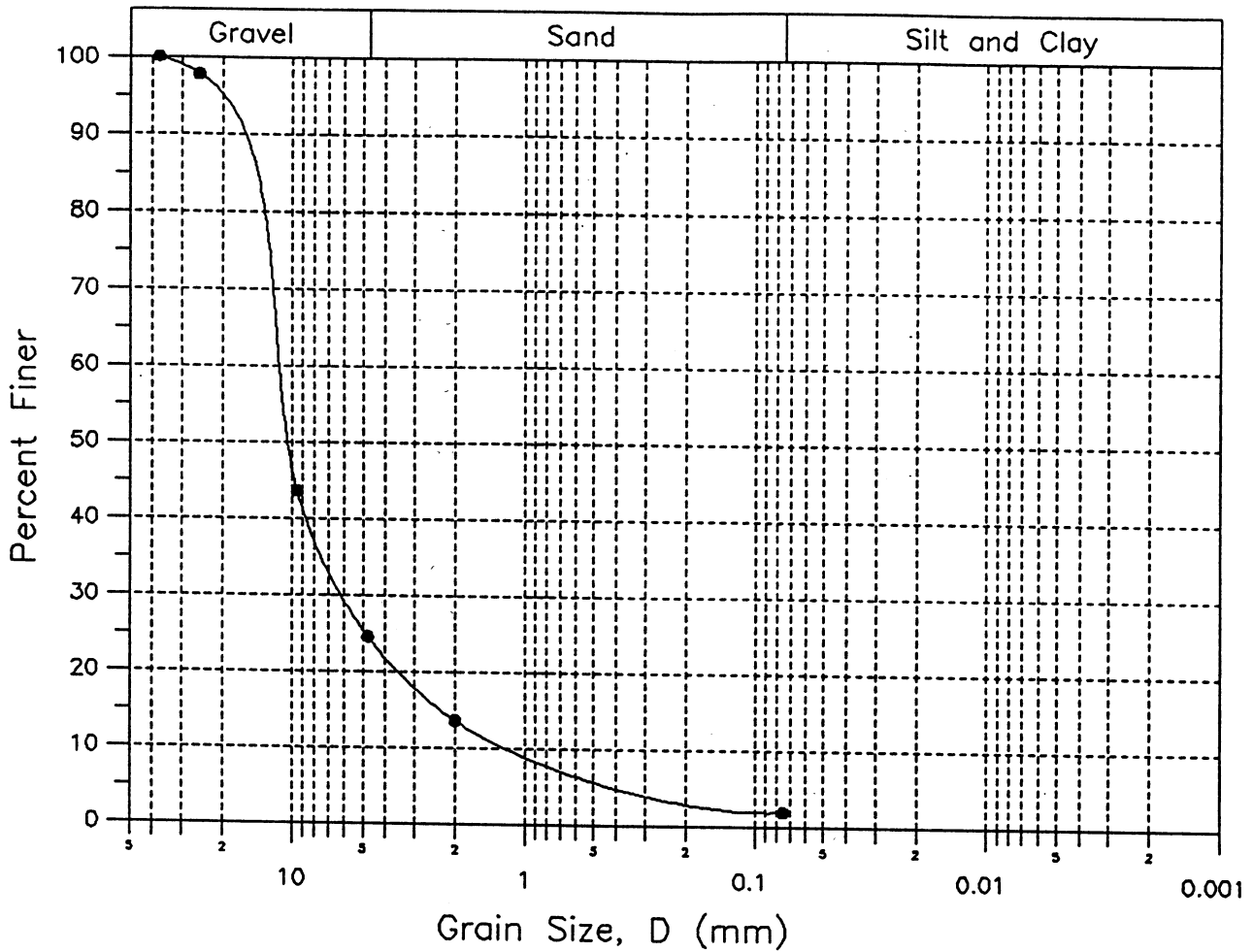
Mineral Exploration Boring	Interval Sampled (downhole, in feet)	Geologic Formation
DDH: 64	1357-1377	Lower Mole Lake
DDH: 71	299-305	Lower Mole Lake
DDH: 76	319-334	Lower Mole Lake
DDH: 81	245-255	Lower Mole Lake
DDH: 84	442-460	Rice Lake
DDH: 91	790-800 885-900	Upper Mole Lake
DDH: 95	250-260	Lower Mole Lake
DDH: 122	2012-2023	Upper Mole Lake
DDH: 132	1174-1184 1196-1223	Lower Mole Lake
DDH: 161	1641-1651 1665-1675	Upper Mole Lake
DDH: 194	834-844	Upper Mole Lake
DDH: 198	1179-1189	Upper Mole Lake

Prepared by: JET
Checked by: DJL

**Appendix 3.5-31 Figures 1-8. Particle Size Distribution and Weight
of the Waste Rock Composites**

Appendix 3.5-31 Figure 1

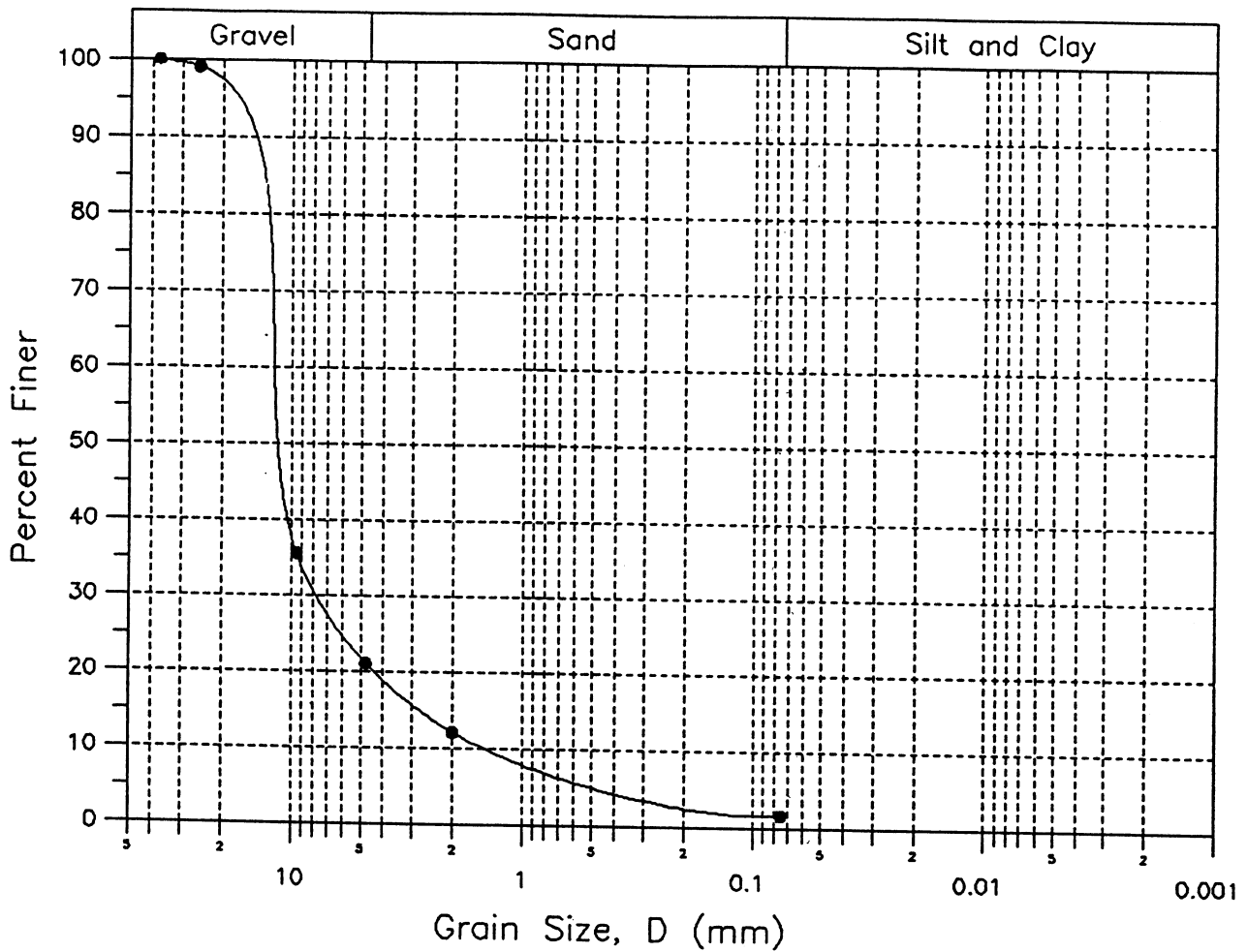
Particle Size Distribution and Weight of the Skunk Lake Master Composite



Sieve	Wt. Retained (pounds)	Percent Retained	Percent Finer
1½"	0	0	100
1"	4	2.2	97.8
¾"	101	54.2	43.6
#4	35.5	19.1	24.6
#10	20.5	11.0	13.5
#200	21.5	11.6	1.9
pan	3.5	1.9	0
TOTALS	186.0	100.0	

Appendix 3.5-31 Figure 2

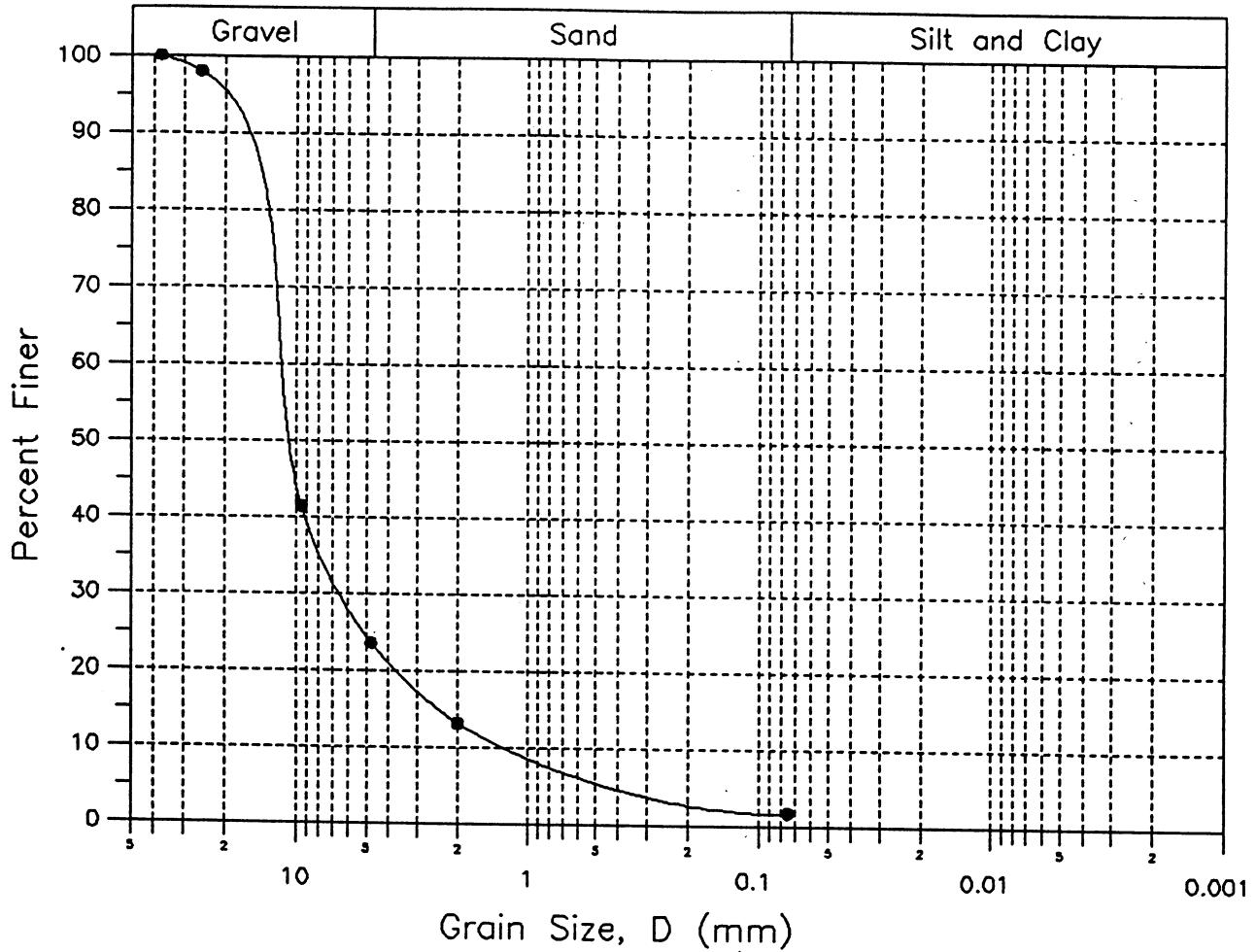
Particle Size Distribution and Weight of the Rice Lake Master Composite



Sieve	Wt. Retained (pounds)	Percent Retained	Percent Finer
1½"	0	0	100
1"	2.5	0.9	99.1
¾"	177	63.6	35.5
#4	40.5	14.5	21.0
#10	25	9.0	12.0
#200	29	10.4	1.6
pan	4.5	1.6	0
TOTALS	278.5	100.0	

Appendix 3.5-31 Figure 3

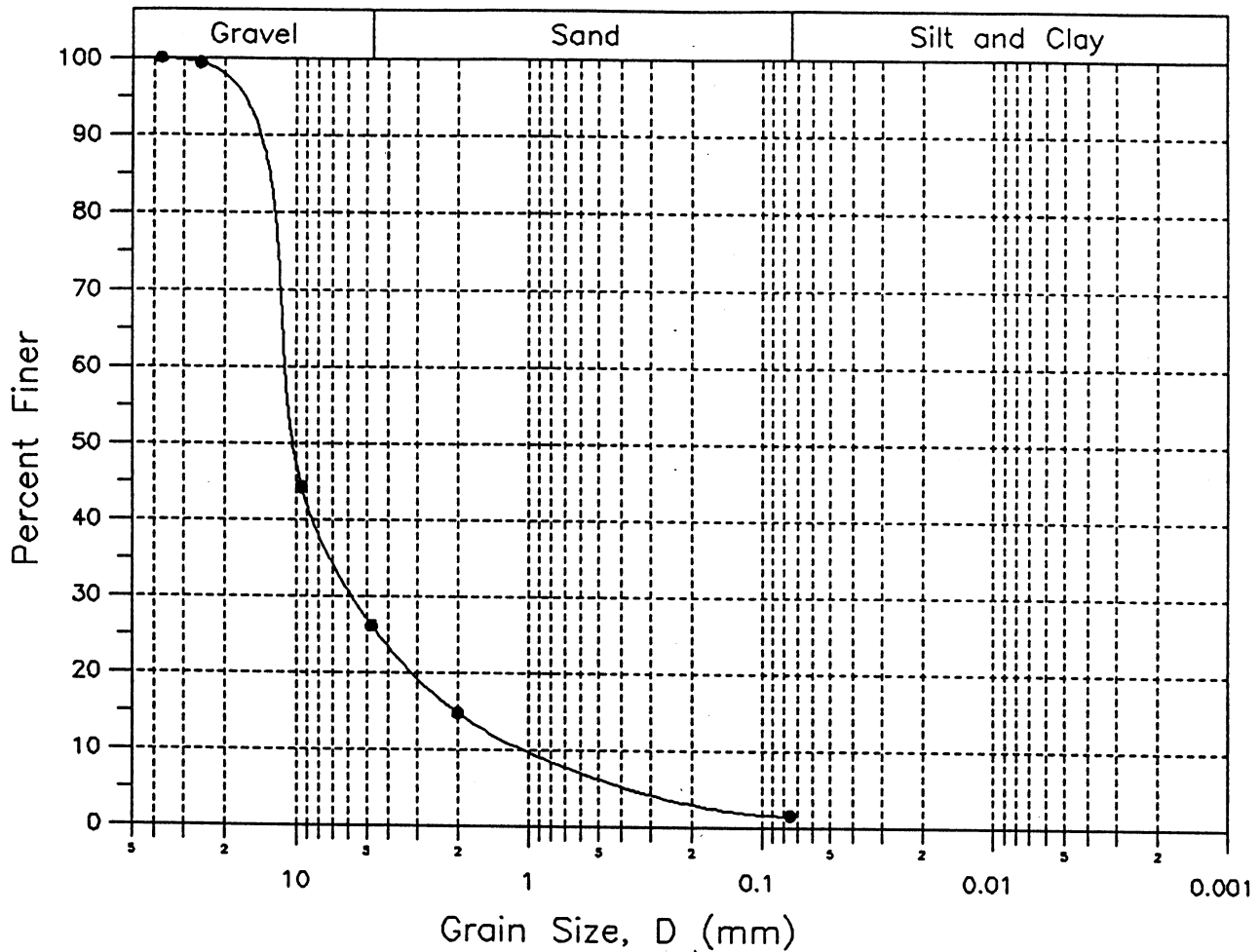
Particle Size Distribution and Weight of the Upper Mole Lake Master Composite



Sieve	Wt. Retained (pounds)	Percent Retained	Percent Finer
1½"	0	0	100
1"	6	2.0	98
¾"	165.5	56.6	41.1
#4	52.5	17.9	23.5
#10	30.5	10.4	13.1
#200	33.5	11.4	1.7
pan	5	1.7	0
TOTALS	293	100.0	

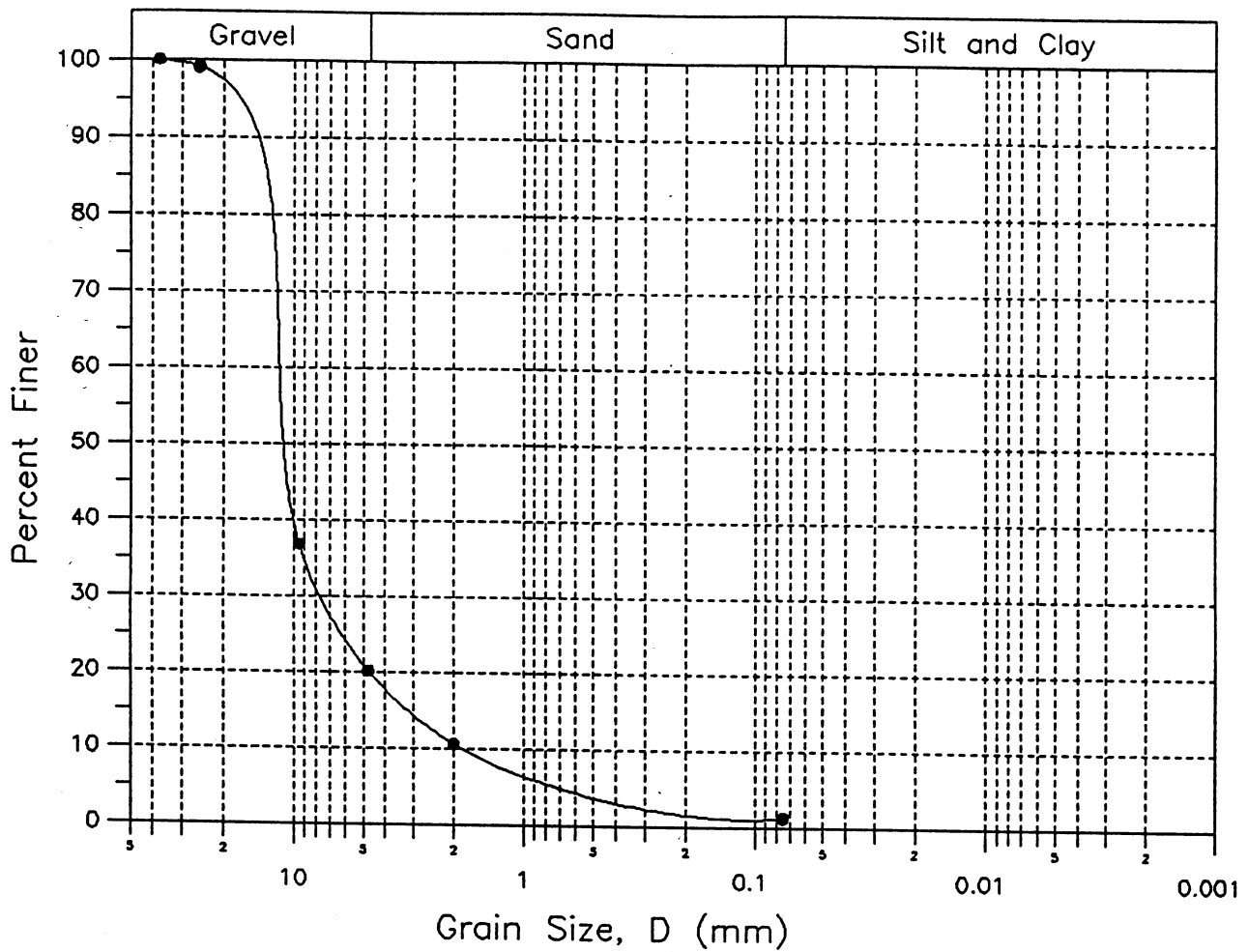
Appendix 3.5-31 Figure 4

Particle Size Distribution and Weight of the Lower Mole Lake Master Composite



Appendix 3.5-31 Figure 5

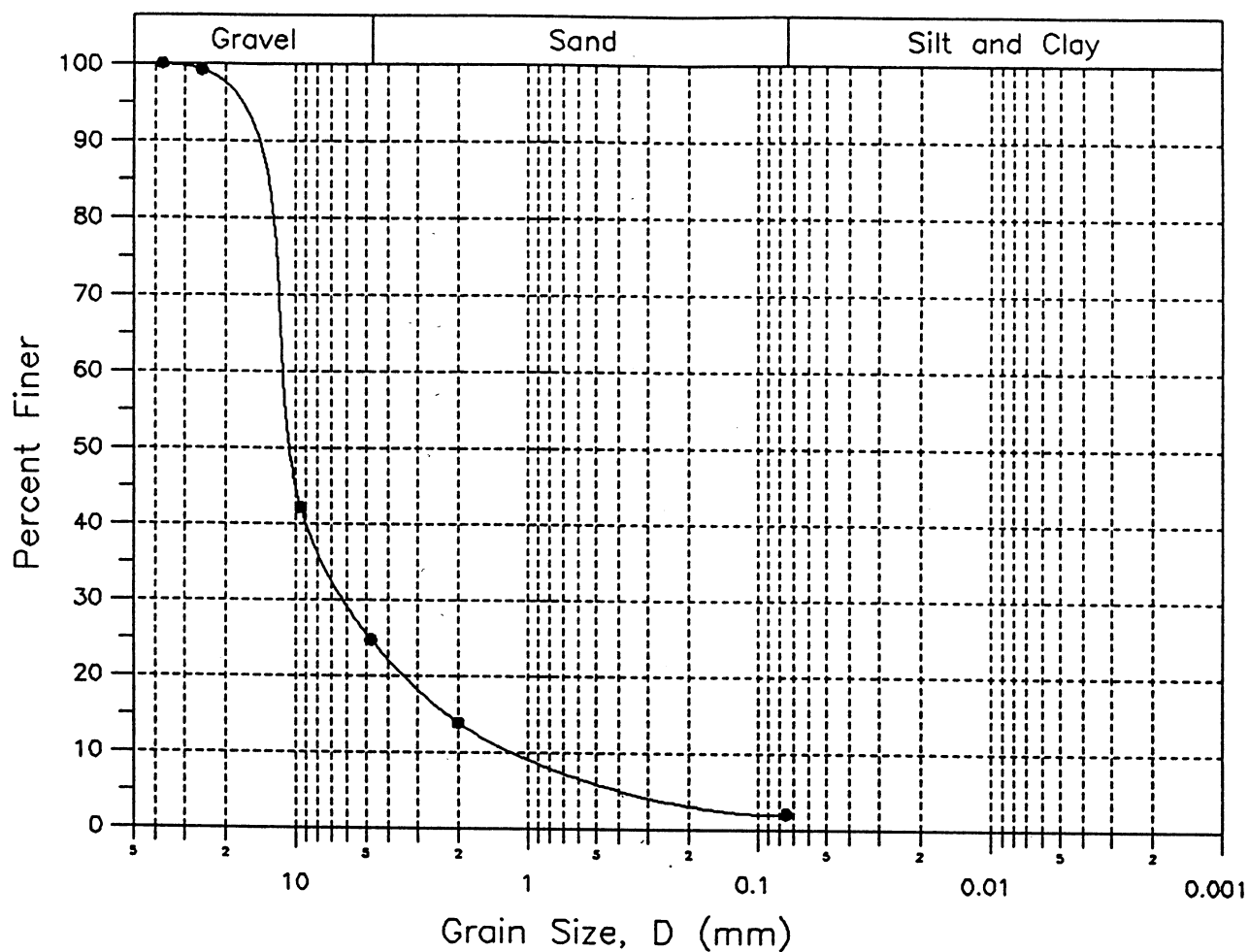
Particle Size Distribution and Weight of the Skunk Lake High Sulfur Composite



Sieve	Wt. Retained (pounds)	Percent Retained	Percent Finer
1½"	0	0	100
1"	1.5	0.9	99.1
¾"	101	62.3	36.8
#4	27	16.7	20.1
#10	15.5	9.6	10.5
#200	15	9.3	1.2
pan	2	1.2	0
TOTALS	162	100.0	

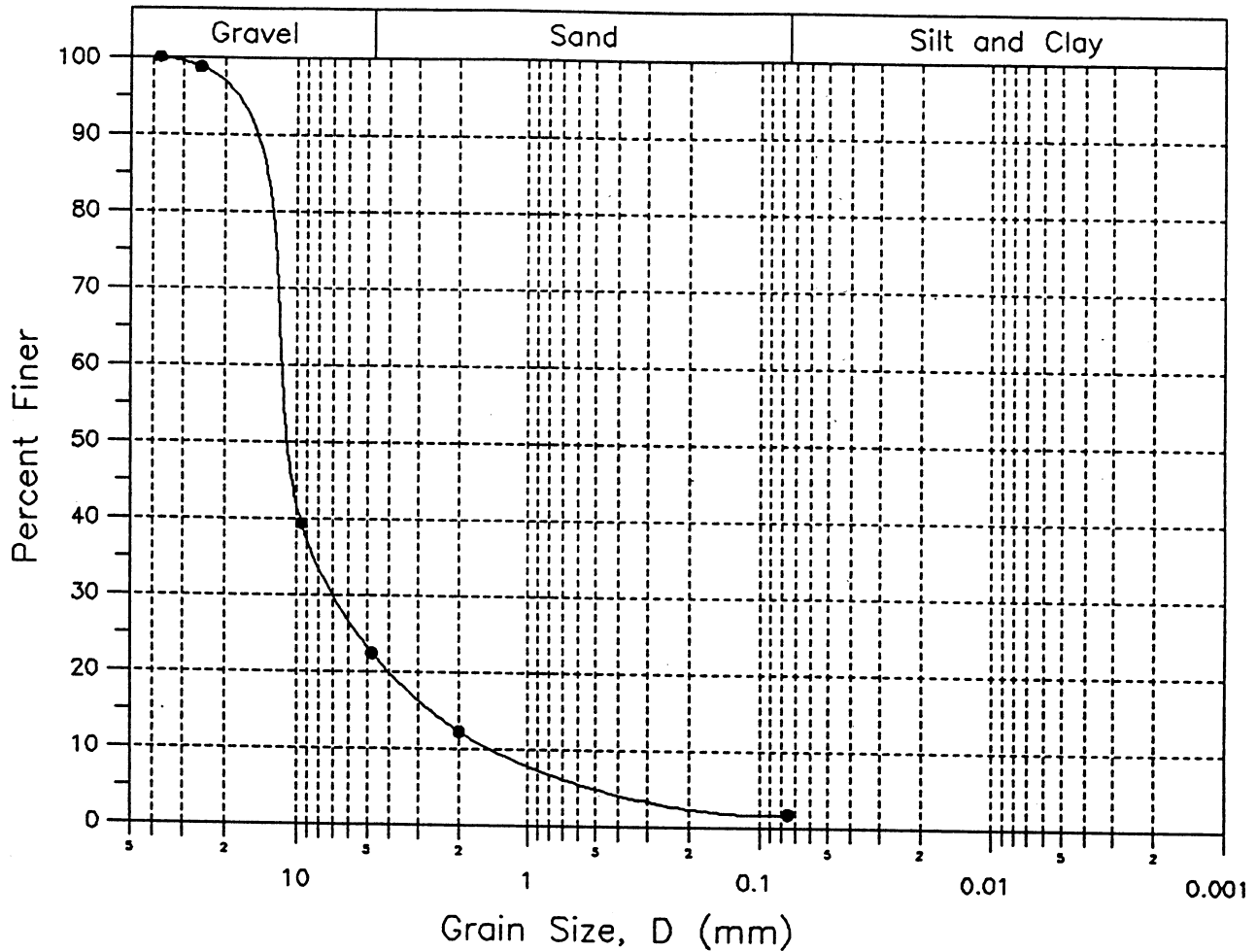
Appendix 3.5-31 Figure 6

Particle Size Distribution and Weight of the Rice Lake High Sulfur Composite



Appendix 3.5-31 Figure 7

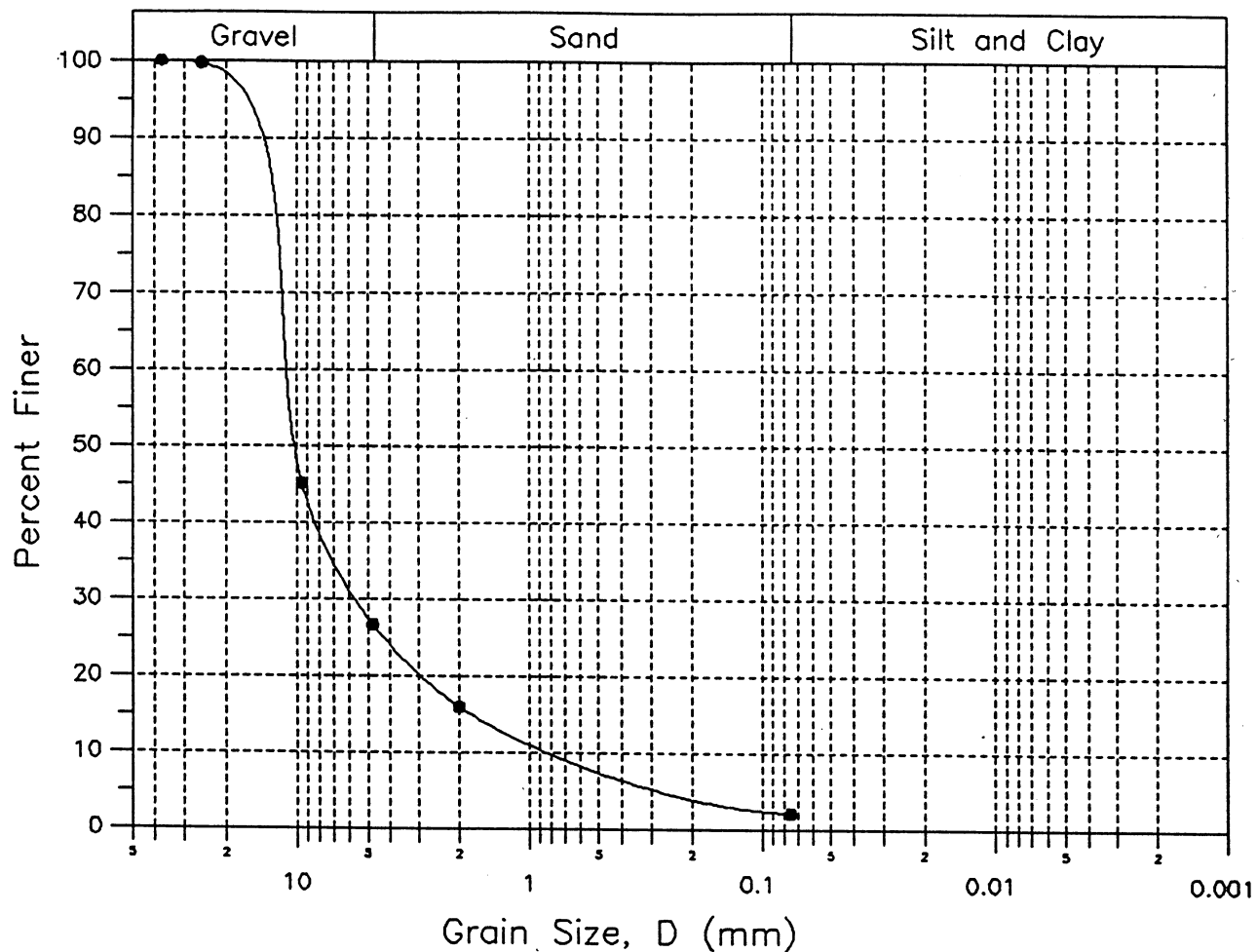
Particle Size Distribution and Weight of the Upper Mole Lake High Sulfur Composite



Sieve	Wt. Retained (pounds)	Percent Retained	Percent Finer
1½"	0	0	100
1"	2	1.2	98.8
¾"	102.5	59.5	39.3
#4	29	16.9	22.4
#10	17.5	10.2	12.2
#200	18	10.5	1.7
pan	3	1.7	0
TOTALS	172	100.0	

Appendix 3.5-31 Figure 8

Particle Size Distribution and Weight of the Lower Mole Lake High Sulfur Composite



Sieve	Wt. Retained (pounds)	Percent Retained	Percent Finer
1½"	0	0	100
1"	0.5	0.3	99.7
¾"	89.5	54.7	45.0
#4	30	18.4	26.6
#10	17.5	10.7	15.9
#200	22.5	13.8	2.1
pan	3.5	2.1	0
TOTALS	163.5	100.0	

**July 5, 1994 Letter from A.J. Erickson, Jr., (ECM) to K.W. Collison (CMC) Regarding
the Representativeness of the Master Ore Composite**

(Certain data has been omitted due to its proprietary nature.)

Crandon Mining Company

7 N. BROWN ST., 3RD FLOOR
RHINELANDER, WI 54501-3161

July 5, 1994

K. W. Collison, Vice President
Crandon Mining Company
7 North Braun St.
Rhinelander, WI.

Dear Ken:

The following documents sampling and sample selection for metallurgical testing during the recent Crandon Mining Company 1993/1994 Confirmation Drilling Program.

Summary

- The 1993/1994 Crandon Mining Company drilling program provided over 8000 feet of NQ & HQ diamond drill core from 11 holes for analysis.
- 625, generally 5' samples, were sent for assay. Samples represented hanging wall, zinc zone mineralization, and footwall copper stringer zone material.
- 179 of the samples, totaling 1016', were in ore grade and thickness ($>3\%Zn$ and $>10'$ thick) material. The holes were well distributed over the main portion of zinc deposit, a portion containing 24 million tons or approximately 80% of the deposit. This portion of the deposit is defined by 71 holes. (The entire zinc mineralization is defined by 100 holes, and includes thin and marginal mineralization in the deep eastern and extreme west end of the deposit).
- Single hole composites were compiled from 10 of the 11 holes although only 9 contained significant ore intercepts. Weight based hanging wall and footwall dilution material (15% total) was included in each single hole composite. 209 samples totaling 1106' were used in this compositing.
- An Average Grade Composite was compiled using 9 of the 11 holes. 179 samples totaling 906' were used to provide material of approximately average head grade, 9.4% zinc. This composite provides material for both metallurgical testing and a representative grade material for tailings characterization. The average grade was achieved by combining samples in weights appropriate for the portion of the ore zone represented. (11% for 2511 and 89% for 2011).
- Overall there is only modest geologic variability laterally in the zinc zone. Hole to hole correlation of pulses of mineralization is usually, although not always, straightforward. Zinc grade varies but predictably as one approaches the edge of the deposit. Isolated sporadic assays of other metals, such as gold, arsenic, and lead are seen but no significant pattern other than the nearer surface weathering effects are apparent. Some mineralogic variability, i.e. the weathered zones, local talc mineralization, and sporadic arsenopyrite, is seen and samples reflecting these mineralogic changes are included in the composites.
- Previous metallurgical sampling, compositing and testing, although based on a different cutoff grade (1.25% Cu equivalent rather than $3\%Zn$) provided material in the same zinc grade range as the current program.

3.5-31-29



- Overall the current program provides material for compositing that is representative of the zinc ore body, anticipated mill head grades, and attendant tailings. Sulfide content, while being much higher in the zinc ores, is of similar mineralogy in both zinc and copper ores although proportions of individual species vary with ore type. The material sampled tests the main portion of the tonnage, approximates estimated reserve grade, samples known grade and mineralogic variability, and is quite similar to previous work which was equally representative.

Drilling Program

Eleven new holes, numbered 262 through 272 were drilled in the program. As in previous work a combination of rotary overburden drilling (1944'), air hammer, hanging wall drilling (10320'), and NQ & HQ diameter diamond core drilling (8359') was used to achieve the desired objectives of confirming existing data, and providing new data and material for additional metallurgical testing. (Analytical work was carried out on the material obtained by diamond drilling). The holes were well distributed throughout the main tonnage area of the zinc ore body and provide material from which to construct composite samples representative of various portions of the zinc zone, the entire zinc deposit, and the waste (tailing) that will be placed in the Tailings Management Area.

The attached long sections, Figure 1, and 1a show the distribution of the holes in relation to reserve tonnage. The holes are well distributed within an area of thick continuous zinc mineralization which holds the bulk of the tonnage, 24 million tons (80%). Mineralization in the other areas of the deposit, the west with 2 million tons (7%), or the deep east with 4 million tons (13%) while being similar in overall character to the main tonnage area tend to be thinner and more erratic as these areas are nearer the known edge of zinc mineralization. Other than this thinning there is little lateral variability in the overall character of zinc mineralization. Multiple pulses of mineralization occur, each with its own internal variability, however, these pulses and hence the entire zone are correlatable laterally for considerable distances. Other than the zinc grade variation, nearer surface weathering effects, and one local area of talc alteration there are no significant large scale variations in mineralogy within the zinc ore body. The zinc grade variation is a reflection of the change in sphalerite to pyrite ratio. Trace element variability is likely to reflect this lack of lateral zoning in mineralogy as well. There is an occasional hole with higher gold grade, or higher lead, and arsenopyrite is sporadically present, however, this material as well as weathered samples and talc have been included in the composites.

Sampling

The attached, Figure 2, illustrates the drill cutting/core processing and sample preparation procedure carried out during the drilling program.

A total of 625 samples of split (sawn) core were prepared and shipped to Lakefield Research, Lakefield, Ontario, Canada, for routine sample preparation and assaying. The samples provide the material for analysis of core drilled in the hanging wall of the zinc mineralization, the zinc zone itself, and in the footwall immediately beneath the zinc zone. More further removed stringer copper zone areas were sampled as appropriate. (No metallurgical testing of stringer copper zone mineralization is anticipated in the program). After receipt of assays, the limits of zinc mineralization, the "ore intercept", defined as > 10' of 3% zinc were identified. Those intercepts are shown in Table 1, which follows:

Table 1
Zinc > 3% and Thickness > 10'

Hole	From	To	Ft.	"Zone"	Zn%	Cu%	Pb%	AgOz	AuOz	Fe%
262	618	671	53							17.70
263	625	825	200							24.74
264	1263	1353	90							20.08
265	1942	2047	105							25.72
266	517	532	15							13.60
	547	611	64							26.94
267	1633	1738	105							21.15
268	1218	1293	75							23.75
	1323	1353	30							20.22
269	990	1114	124							25.89
270	2183	2293	110							22.97
271	2269	2304	35							23.75
272	2360	2370	10							27.25

11 holes 179 samples 1016 feet 13 intercepts

Individual Hole Composites (single hole composites) were made for 10 of the drill holes, 262 thru 271. Hole 272 contained no significant zinc mineralization and 271 is marginal as the better grade mineralization is thin and irregular in this hole as would be expected near the edge of the zone. The individual hole composites were constructed by adding hanging wall and footwall material to the sulfide samples in sufficient quantity to represent a 15% tonnage dilution factor. 10% of the material was taken from the hanging wall of the intercept and 5% from the footwall of the intercept. The following table, Table 2, summarizes the diluted intercepts. (It should be noted that this table shows dilution based on hanging wall and footwall footage. During compositing a tonnage dilution was allowed for by taking the appropriate weight of the hanging wall (10%) and footwall (5%) material based on the weight of material in the > 3% zinc intercept.)

Table 2
Footage Diluted Plus 3% Zinc Intercepts

Hole	From	To	"Zone"	Ft.	Zn%	Cu%	Pb%	AgOz	AuOz	Fe%
262	608	676	2011	68						16.29
263	615	830	2011	215						24.05
264	1253	1358	2011	105						18.51
265	1932	2052	2511	120						23.74
266	537	616	2011	79						23.86
267	1623	1743	2511	120						19.31
268	1208	1298	2011	90						22.67
	1313	1358	2011	45						19.50
269	980	1119	2011	139						23.95
270	2173	2298	2511	125						21.33

9 holes 209 samples 1106 feet 10 Intercepts

The Average Deposit Grade Composite was made by combining material from selected assay intervals from 9 of the holes, 262 thru 270. Holes 271 and 272 were not used as they contained only low or marginal grade material as was discussed above and were located near the edge of the 2511 portion of the main mineralized part of the deposit.

The holes selected represent two zones within the main area for mineralization in the deposit: the 2011/2021 horizons identified as areas 2011E and 2011 LC on Figure 1a; and the 2511 zone identified as 2511 Reserve Confirmation in the figure.

The following table, Table 3, has been rearranged by zone (2511 & 2011) and summarizes the holes and interval limits used in making the average grade composite. This table simply identify the limits of the drill hole intercepts used in making the composite, all sample intervals between these limits were not used. A number of higher grade individual samples were removed, sporadically, not in any consistent pattern, to lower the grade of the final composite sample to approximate the currently estimated average zinc grade (9.4%) of the reserve.

Table 3
Average Grade Composite - Holes & Intercept Limits

Hole	From	To	Ft.	"Zone"	Zn%	Cu%	Pb%	AgOz	AuOz	Fe%
265	1932	2052	80	2511						24.04
267	1623	1743	110	2511						20.27
270	2173	2298	110	2511						19.64
264	1253	1358	90	2011						18.58
268	1208	1298	85	2011						22.63
	1313	1358	45	2011						19.50
269	980	1119	109	2011						25.48
262	608	676	63	2011						15.80
263	615	830	150	2011						25.23
266	537	616	64	2011						25.59
9 holes	179 samples	906 feet	10 intercepts							

Details of the specific samples used are provided in the attached Appendix A, which identifies each sample interval selected.

Table 4, below provides summary data on the average grade in the two zones, 2511 and 2011, for the material selected for the average grade composite.

Table 4
Zone Average Grade

Zone	Hole No.	Zn%	Cu%	Pb%	AgOz	AuOz	Fe%
2511	(265,267,270)						21.04
2011	(264,268,269,289,286,282)						22.56

The current deposit reserve is estimated at 30 million tons of 9.4% zinc. 3.3 million tons (11%) of the reserve are in the 2511 Zone and 26.7 million tons (89%) are contained in the 2011 Zone. Combining the sample material from the two zones, detailed in Appendix A, with 11% by weight from the 2511 Zone and 89% by weight from the 2011 Zone results in a theoretical average composite grade of 9.18% zinc. The actual grade will be slightly higher, 9.5% zinc, as the above calculation is based on a 15% footage dilution which is actually greater dilution than the 15% by weight dilution used in compositing.

Appendix A also identifies some mineralogical variations that were included to improve the representativity of the average grade composite for both mill head grade and final tailings disposal. Three items are to be noted. 1.) Approximately 9 to 10% of the deposit zinc reserve consists of "weathered" material. Accordingly 15 samples (8.3%) of this type material from three holes, 262, 266, 269, was included in the 179 samples composite. 2.) Talc is known to be present in earlier holes drilled in the 2511 Zone. Accordingly 2 holes, 267 and 270, provide 10 samples from the new drilling which contain visible talc. Two other holes 265 and 269 may also contain a bit of talc. 3.) Arsenopyrite is sporadically observed in minor amounts throughout the deposit. Accordingly, one hole 268 provided a sample with visible arsenopyrite and one hole 270 may contain some arsenopyrite.

Statistics

A total of 272 holes have been drilled in and about the Crandon deposit of which at most 100, including the recent program, contain ore grade and thickness zinc mineralization. These 100 holes are used for deposit delineation and reserve calculation. Nine holes of the total have been included in the most recent average grade composite and these are in an area containing 24 million tons (80%) of the total deposit reserve. (71 of the 100 total holes define this 24 million tons of zinc mineralization. The nine holes thus represent 13% of total drilling in this area.) As mentioned above, mineralization in these holes is similar in character to that in earlier drilled holes and the horizons of mineralization are clearly correlatable.

Previous Metallurgical Testing

Previous metallurgical test work, Phase I, II, III, and IV as well as Pilot Plant work utilized individual hole samples or composites from holes for varying purposes. This earlier work was generally on composites of similar all be it slightly lower zinc grade than the current work. Correspondingly copper grade was slightly higher. The basis for this variation lies in cut-off grade strategy prevailing at the time of the earlier testing. At that time the cutoff grade was assumed to be a 1.25% copper equivalent grade. This results in an increased although still relatively small portion of the total reserve with higher copper content occurring near the base of the zinc mineralization. Further, in that credit was taken for all metals some low zinc grade material near the top of the zinc horizons was carried by its slightly higher silver content. In spite of these variations the grades were comparable to the current work. Drill holes were of course distributed throughout the zinc deposit as with the current program. Table 5 below, abstracted from the Crandon Project 1992 JET report summarizes much of the earlier test work and clearly indicates the grade similarity and representative nature of the current sampling.

Table 5
Initial Metallurgical Sampling - Phase I, II, and III

<u>Sample</u>	<u>Holes</u>	<u>Core</u>	<u>Samples</u>	<u>Zn%</u>	<u>Cu%</u>	<u>Pb%</u>	<u>Ag oz.</u>	<u>Au oz.</u>
Composite No. 1 (OMC1)	7	767	151					
Composite No. 2 (MMC2)	21	1890	686					
Initial Mining Block Subset	(7)	(992)	187					
Crown Pillar Master Composite	<u>5</u>	<u>472</u>	<u>90</u>					
Subtotal	33	3129	927					
Composite No. 3(OMC3)	32	2465	481					
(Waste and Backfill)								

Bench Scale Metallurgical Sampling - Phase IV

<u>Ore Type</u>	<u>Holes</u>	<u>Zn%</u>	<u>Cu%</u>	<u>Pb%</u>	<u>Ag oz</u>	<u>Au oz</u>
Normal Ore	5	6.5-13.1	0.4-0.5	0.2-0.8	0.6-1.7	0.01-0.1
Talc Ore	2	9.9-15.5	0.3-0.8	0.4-1.7	0.9-1.2	0.0-0.8
Lead Zinc Ore	4	3.9-12.8	0.1-0.2	1.0-2.7	2.2-0.9	0.0-0.1
Copper Zinc (Bedded)	4	2.3-7.2	0.3-0.8	0.1-0.3	0.3-0.9	0.0-0.0
Red Oxidized Ore	<u>4</u>	<u>0.1-15.0</u>	<u>0.2-10.0</u>	<u>0.1-2.8</u>	<u>0.5-18.8</u>	<u>6.2-0.6</u>
Total	19	0.1-15.0	0.2-10.0	0.1-2.8	0.3-18.8	0.0-0.6

Pilot Plant Testing - Phase I (6" core)

<u>Samp No.</u>	<u>Ore Type</u>	<u>Holes</u>	<u>Core</u>	<u>No. of Samp.</u>	<u>Tons</u>	<u>Zn%</u>	<u>Cu%</u>	<u>Pb%</u>	<u>AgOz</u>	<u>AuOz</u>
M1	Average Grade	6	283	17	9.2					
M2	Above Average Grade	6	660	29	3.8					
M3	Below Average Grade	7	600	30	9.4					
M4	Altered Material M1- M3	6	----	----	2.1					
M5	Waste Rock (HW & FW)	5	421	20	1.6					
MPP	M1 to M4 Blend	7	----	----	----					

Appendix B, attached, provides details of hole selection in the earlier test work as well as the grade of various test material. Also included in Appendix B is a set of small Longitudinal Sections showing the location of drill holes used in the testing.

Sincerely,

A handwritten signature in black ink, appearing to read "C. J. Evers", written in a cursive style.

J:\AJE\Cran_Con

3.5-31-36

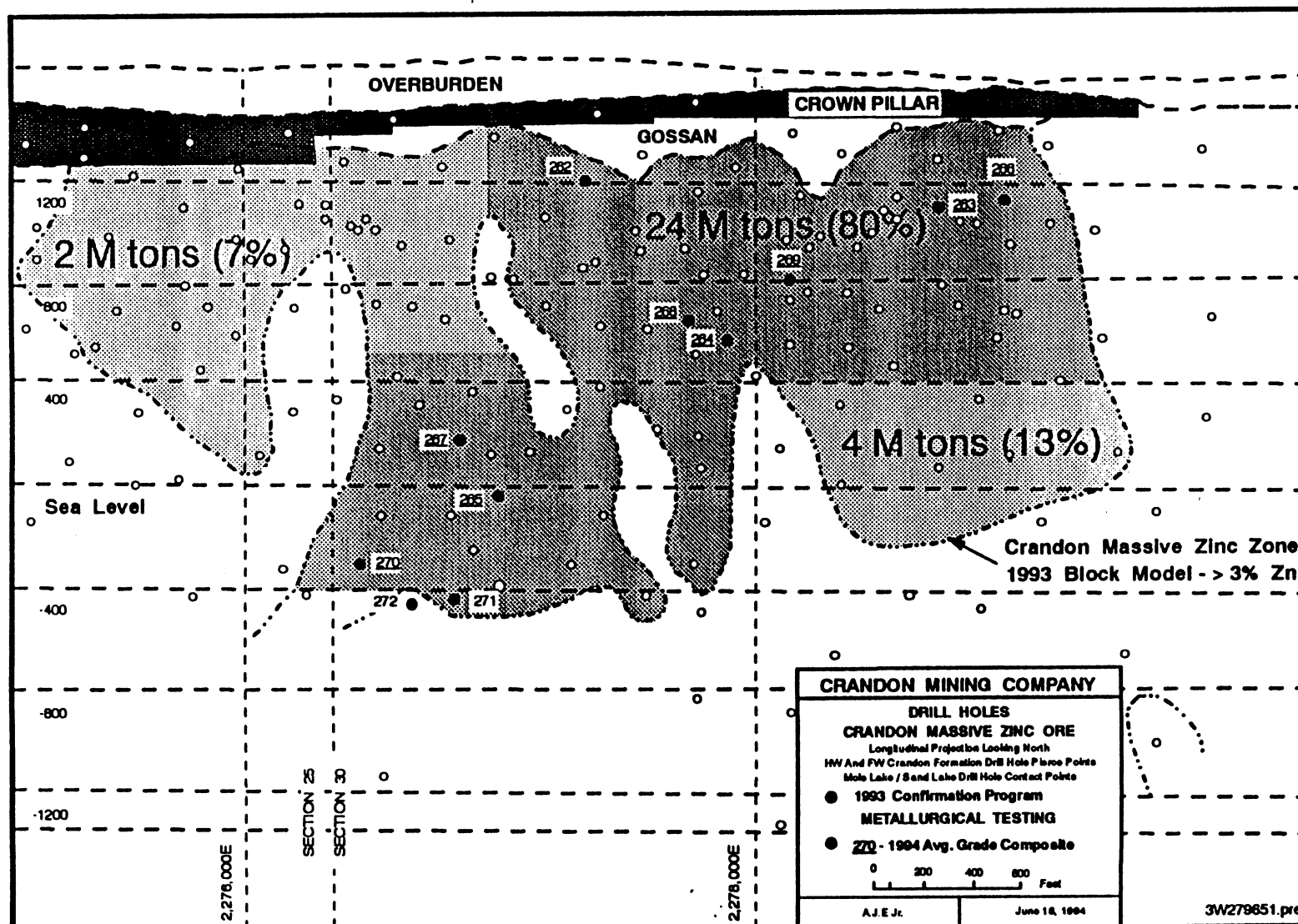


Figure 1

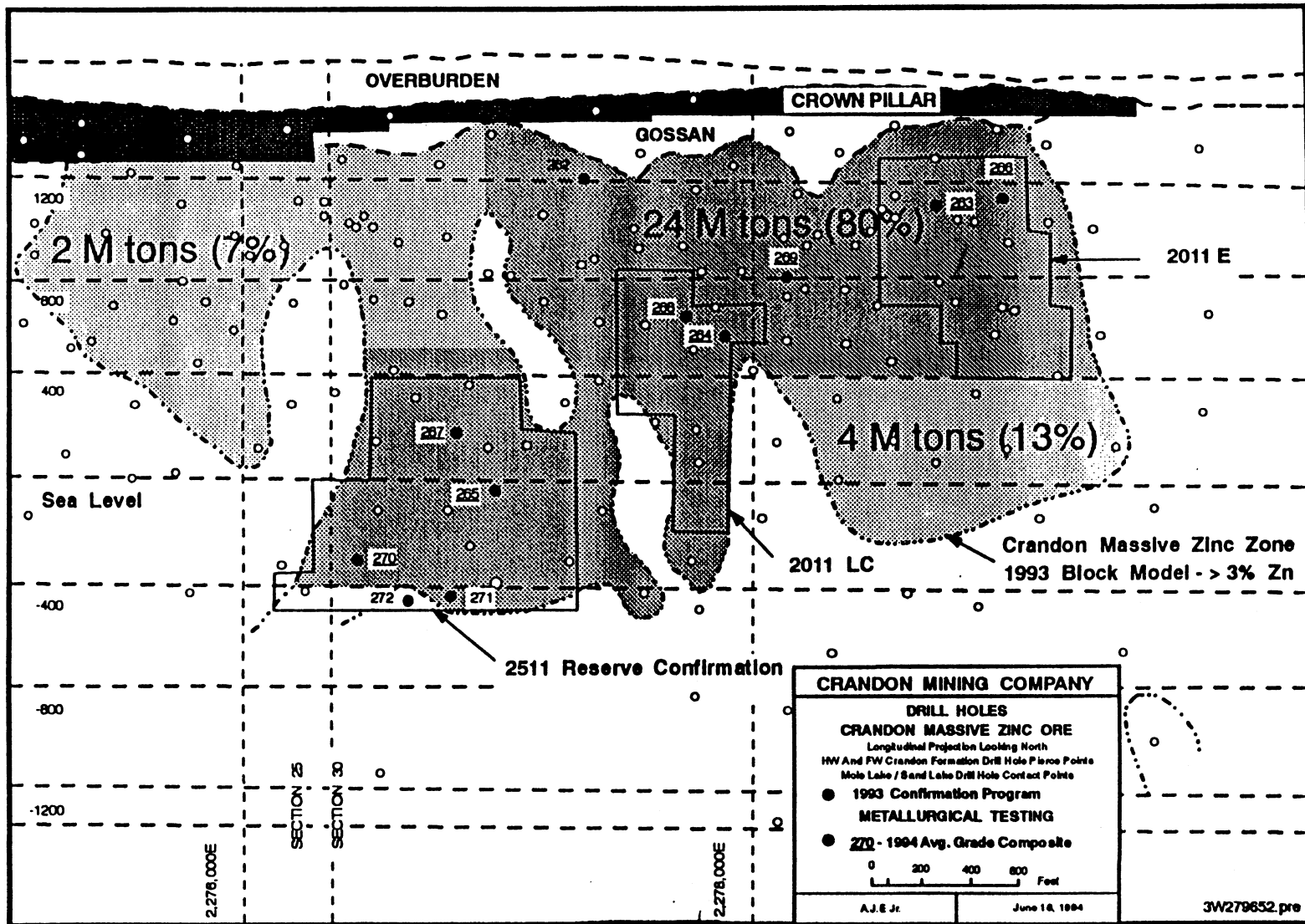


Figure 1a

CRANDON 1993 CONFIRMATION DRILL SAMPLING

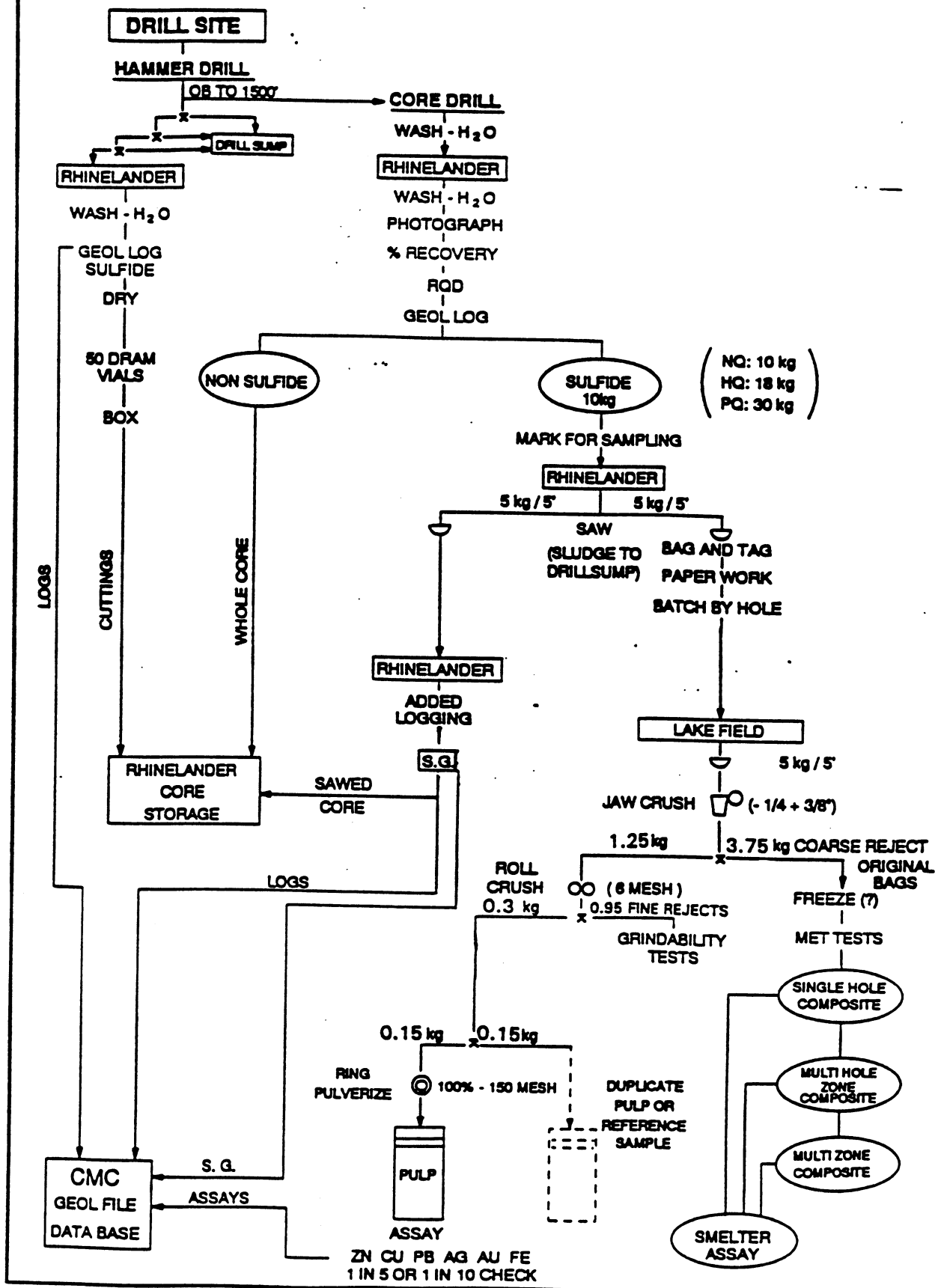


Figure - 2

3.5-31-38

1K226621

Appendix A

CRANDON DDH FILE:			PLUS 3% ZN CUTOFF			METALLURGICAL COMPOSITING					COMPOSITED INTERCEPTS, HW & FW							AVG GRADE COMPOSITE							
MODIFIED 6/8/94 BY ADDING 16 SAMPLES TO 2011 ZONE AFTER DISCUSSION WITH KWC												MINERALOGY ADDED 7/1/94													
HOLE NO	FDIST FEET	TDIST FEET	THK FT	OR TY	GEO ZNE	ZN %	CU %	PB %	AG OZ	AU OZ	FE %	THK FT	ZN %	CU %	PB %	AG OZ	AU OZ	FE %	TS	FM MB	LITH	MD A	MD B	MD H	HO LE
265	1932.0	1937.0	5.0	HW	2511						8.49	Hw													
265	1937.0	1942.0	5.0	HW	2511						7.79	Hw													
265	1942.0	1947.0	5.0	MS	2511						25.50	Zn													
265	1947.0	1952.0	5.0	MS	2511						27.80	Zn													
265	1952.0	1957.0	5.0	MS	2511						29.00	Zn													
265	1957.0	1962.0	5.0	MS	2511						29.10	Zn													
265	1962.0	1967.0	5.0	MS	2511						29.50	Zn													
265	1967.0	1972.0	5.0	MS	2511						26.80	Zn													
265	1972.0	1977.0	5.0	MS	2511						30.50	Zn													
265	1977.0	1982.0	5.0	MS	2511						24.50	Zn													
265	2007.0	2012.0	5.0	MS	2511						18.60	Zn													
265	2017.0	2022.0	5.0	MS	2511						28.80	Zn												Talc?	
265	2022.0	2027.0	5.0	MS	2511						24.50	Zn													
265	2027.0	2032.0	5.0	MS	2511						27.80	Zn													
265	2042.0	2047.0	5.0	MS	2511						32.70	Zn													
265	2047.0	2052.0	5.0	FW	2511						13.30	80.0						24.04							
267	1623.0	1628.0	5.0	HW	2511						5.59	Hw									MLP				
267	1628.0	1633.0	5.0	HW	2511						6.13	Hw									MLP				
267	1633.0	1638.0	5.0	MS	2511						20.40	Zn									CR	MASU			
267	1638.0	1643.0	5.0	MS	2511						17.10	Zn									CR	MASU			
267	1648.0	1653.0	5.0	MS	2511						25.80	Zn									CR	ARGL	PYR		
267	1653.0	1658.0	5.0	MS	2511						29.40	Zn									CR	MASU			
267	1658.0	1663.0	5.0	MS	2511						30.30	Zn									CR	MASU			
267	1663.0	1668.0	5.0	MS	2511						34.50	Zn									CR	MASU			
267	1668.0	1673.0	5.0	MS	2511						23.90	Zn									CR	MASU			
267	1673.0	1678.0	5.0	MS	2511						21.50	Zn									CR	MASU			
267	1678.0	1683.0	5.0	MS	2511						26.20	Zn									CR	MASU			
267	1683.0	1688.0	5.0	MS	2511						25.90	Zn									CR	MASU			
267	1693.0	1698.0	5.0	MS	2511						19.30	Zn									CR	MASU			Talc
267	1698.0	1703.0	5.0	MS	2511						22.70	Zn									CR	MASU			Talc
267	1703.0	1708.0	5.0	MS	2511						27.70	Zn									CR	MASU			Talc
267	1708.0	1713.0	5.0	MS	2511						20.80	Zn									CR	MASU			Talc
267	1713.0	1718.0	5.0	MS	2511						16.80	Zn									CR	MASU			Talc
267	1718.0	1723.0	5.0	MS	2511						17.90	Zn									CR	MASU			Talc
267	1723.0	1728.0	5.0	MS	2511						12.80	Zn									CR	ARGL	PYR		
267	1728.0	1733.0	5.0	MS	2511						19.60	Zn									CR	MASU			
267	1733.0	1738.0	5.0	MS	2511						14.10	Zn									CR	ARGL	PYR		
267	1738.0	1743.0	5.0	FW	2511						7.43	110.0						20.27			CR				
270	2173.0	2178.0	5.0	HW	2511						5.77	Hw													
270	2178.0	2183.0	5.0	HW	2511						8.30	Hw													
270	2183.0	2188.0	5.0	MS	2511						25.60	Zn													
270	2188.0	2193.0	5.0	MS	2511						38.50	Zn													
270	2198.0	2203.0	5.0	MS	2511						20.70	Zn													
270	2203.0	2208.0	5.0	MS	2511						21.10	Zn													

3.5-31-40

CRANDON DDH FILE:			PLUS 3% ZN CUTOFF				METALLURGICAL COMPOSITING						COMPOSITED INTERCEPTS, HW & FW						AVG GRADE COMPOSITE						
MODIFIED 6/6/94 BY ADDING 16 SAMPLES TO 2011 ZONE AFTER DISCUSSION WITH KWC												MINERALOGY ADDED 7/1/94													
HOLE NO	FDIST FEET	TDIST FEET	THK FT	OR TY	GEO ZNE	ZN %	CU %	PB %	AG OZ	AU OZ	FE %	THK FT	ZN %	CU %	PB %	AG OZ	AU OZ	FE %	TS	FM MB	LITH	MD A	MD B	MD H	HOLE LE
270	2208.0	2213.0	5.0	MS	2511						15.40	Zn													
270	2213.0	2218.0	5.0	MS	2511						13.40	Zn													
270	2218.0	2223.0	5.0	MS	2511						15.80	Zn													
270	2223.0	2228.0	5.0	MS	2511						13.80	Zn													
270	2228.0	2233.0	5.0	MS	2511						12.30	Zn													
270	2233.0	2238.0	5.0	MS	2511						22.70	Zn													
270	2243.0	2248.0	5.0	MS	2511						28.60	Zn													
270	2248.0	2253.0	5.0	MS	2511						21.60	Zn													
270	2253.0	2258.0	5.0	MS	2511						21.50	Zn													
270	2258.0	2263.0	5.0	MS	2511						20.10	Zn													
270	2263.0	2268.0	5.0	MS	2511						16.70	Zn													
270	2268.0	2273.0	5.0	MS	2511						23.40	Zn	2511 Zone Composite Includes Dilution											Talc	
270	2278.0	2283.0	5.0	MS	2511						28.50	Zn	Holes 265, 267, & 270												Talc
270	2283.0	2288.0	5.0	MS	2511						22.60	Zn						21.04							Talc
270	2288.0	2293.0	5.0	MS	2511						21.90	Zn													Talc
270	2293.0	2298.0	5.0	FW	2511						13.70	110.0						19.64							Asp ?
264	1253.0	1258.0	5.0	HW	2011						8.69	Hw													
264	1258.0	1263.0	5.0	HW	2011						8.19	Hw													
264	1263.0	1268.0	5.0	MS	2011						18.30	Zn													
264	1268.0	1273.0	5.0	MS	2011						24.70	Zn													
264	1273.0	1278.0	5.0	MS	2011						10.90	Zn													
264	1278.0	1283.0	5.0	MS	2011						20.00	Zn													
264	1293.0	1298.0	5.0	MS	2011						21.00	Zn													
264	1298.0	1303.0	5.0	MS	2011						22.20	Zn													
264	1308.0	1313.0	5.0	MS	2011						25.20	Zn													
264	1313.0	1318.0	5.0	MS	2011						29.70	Zn													
264	1318.0	1323.0	5.0	MS	2011						22.60	Zn													
264	1323.0	1328.0	5.0	MS	2011						20.20	Zn													
264	1328.0	1333.0	5.0	MS	2011						21.10	Zn													
264	1333.0	1338.0	5.0	MS	2011						19.90	Zn													
264	1338.0	1343.0	5.0	MS	2011						21.20	Zn													
264	1343.0	1348.0	5.0	MS	2011						16.30	Zn													
264	1348.0	1353.0	5.0	MS	2011						13.70	Zn													
264	1353.0	1358.0	5.0	FW	2011						10.50	90.0						18.58							
268	1208.0	1213.0	5.0	HW	2011						9.72	Hw													
268	1213.0	1218.0	5.0	HW	2011						8.59	Hw													
268	1218.0	1223.0	5.0	MS	2011						13.00	Zn													Asp
268	1223.0	1228.0	5.0	MS	2011						19.30	Zn													
268	1228.0	1233.0	5.0	MS	2011						21.20	Zn													
268	1233.0	1238.0	5.0	MS	2011						17.20	Zn													
268	1238.0	1243.0	5.0	MS	2011						17.70	Zn													
268	1243.0	1248.0	5.0	MS	2011						22.80	Zn													
268	1248.0	1253.0	5.0	MS	2011						25.80	Zn													
268	1253.0	1258.0	5.0	MS	2011						29.10	Zn													

CRANDON DDH FILE:					PLUS 3% ZN CUTOFF					METALLURGICAL COMPOSITING					COMPOSITED INTERCEPTS, HW & FW					AVG GRADE COMPOSITE							
MODIFIED 6/8/94 BY ADDING 16 SAMPLES TO 2011 ZONE AFTER DISCUSSION WITH KWC															MINERALOGY ADDED 7/1/94												
HOLE NO	FDIST FEET	TDIST FEET	THK FT	OR TY	GEO ZNE	ZN %	CU %	PB %	AG OZ	AU OZ	FE %	THK FT	ZN %	CU %	PB %	AG OZ	AU OZ	FE %	TS	FM MB	LITH	MD A	MD B H	HO LE			
266	598.0	601.0	5.0	MS	2011						29.80	Zn												Weath			
266	608.0	611.0	5.0	MS	2011						27.70	Zn												Weath			
266	611.0	616.0	5.0	FW	2011						23.70	64.0						25.59									
			906																								
179	Sample Intervals Used																										
179 x 3.75 Kg/sample = 671 Kg of available material.																											
A.	Equal amounts of each sample from holes 265, 267, and 270 above will provide a composite of zone 2511 that will approximate 13.28 % zinc.											Total Ft	2011 Zone Composite Includes Dilution Holes 264, 268, 269, 263, 266, 262														
B.	Equal amounts of each sample from holes 264, 268, 269, 263, 266, and 262 above will provide a composite of zone 2011 that will approximate 8.67% zinc.											608.0								22.56							
C.	Combining the two zone composites, 11% by weight of 2511 and 89 % by weight of 2011, should provide an ore body composite of approximately 9.179% zinc.																										
D.	Actual grade of final composite will be slightly higher as weight dilution will be used in compositing. This table shows footage dilution in excess of 15%																										
Note.																											

Table 5-2

**SUMMARY OF DRILL HOLES USED IN THE VARIOUS COMPOSITE
SAMPLES FOR METALLURGICAL TESTING**

- Drill Holes used in Table 5-4 Samples

Composite No. 1 (OMC1)	4, 6, 9, 17, 18C, 20, 22
Composite No. 2 (MMC2)	21, 23, 24, 25, 28, 44, 48, 61, 64, 65, 66, 67, 69, 70, 74, 84, 85, 88, 91, 92, 94
Initial Mining Block	28, 44, 67, 69, 70, 74, 85
Crown Pillar Master Composite:	71, 79, 81, 86, 87
Composite No. 3 (backfill/waste):	2, 3, 21, 22, 23, 24, 25, 28, 35, 37, 44, 45, 48, 54, 61, 62, 64, 65, 66, 67, 68, 69, 70, 73, 74, 84, 85, 88, 91, 92, 94, 98
- Drill Holes used in Table 5-5 Samples

Normal Ore	132, 170, 171, 173, 190 /
Talc Ore	68, 137
Lead Zinc Ore	37, 45, 123, 143
Copper Zinc (Bedded)	169B, 176B, 188, 189
Red Oxidized Ore	72, 129, 177, 191
- Drill Holes used in Table 5-6 Samples

M1 Average Grade	209, 210, 211, 213, 216, 217
M2 Above Average Grade	209, 210, 211, 213, 216, 217
M3 Below Average Grade	209, 210, 211, 213, 216, 217, 218
M4 Altered Material M1-M3	209, 210, 213, 216
M5 Waste Rock (HW & FW)	209, 210, 211, 213, 218
MPP M1-M4 Blend	209, 210, 211, 213, 216, 217, 218
- Drill Holes used in Table 5-8 Samples

110	209, 218, 258, 259, 260, 261
230	209, 210, 258, 259, 260, 261
310	212, 218, 258, 259, 260, 261
410	209, 210, 258, 259, 260, 261
- Drill Holes used in Table 5-9 Samples

Dilution (A)	209, 210, 213, 258, 260, 261
Weathered Massive Ore (C)	258, 260
Massive Ore (D)	258, 259, 260, 261

Table 5-4

INITIAL METALLURGICAL SAMPLING - PHASE I, II, AND III

Sample	#	FL	#	Grade: % or Oz/ST				
	Holes	Core	Samples	Zn	Cu	Pb	Ag	Au
Composite No 1 (OMC1)	7	767	151					
Composite No 2 (MMC2)	21	1890	686					
Initial Mining Block Subset	(7)	(992)	187					
Crown Pillar Master Composite	5	472	90					
Subtotal	33	3129	927					
Composite No 3 (OMC3)	32	2465	481					
(Waste and Backfill)								

Table 5-5

BENCH SCALE METALLURGICAL SAMPLING - PHASE IV

Ore Type	#	Grade Range (Rounded): % or Oz/ST				
	Holes	Zn	Cu	Pb	Ag	Au
Normal Ore	5					
Talc Ore	2					
Lead Zinc Ore	4					
Copper Zinc (Bedded)	4					
Red Oxidized Ore	4					
Total	19					

Table 5-6

PILOT PLANT TESTING - PHASE I

Sample	Ore Type	#	PL	#	Grade: Percent or Oz/ST					
		Holes	Core	Sample	Tons	Zn	Cu	Pb	Ag	Au
M1	Average Grade	6	283							
M2	Above Average Grade	6	600							
M3	Below Average Grade	7	600							
M4	Altered Material M1-M3	6	—							
M5	Waste Rock (H-W & F-W)	5	421							
MPP	M1 to M4 blend	7	—							

Note: Material from the six-inch drill core selected for inclusion in samples M1 - M3 was based on visual estimates of grade. Subsequent assays, as shown in this table, confirm the estimates except for zinc in M1 and M2.

Table 5-9

PILOT PLANT TESTING, PHASE II

Lakefield 54,000 lb. Composite

Sample	#	FL	#	Tons	Grade: % or Oz/ST				
	Holes	Core	Samples		Zn	Cu	Pb	Ag	Au
Dilution (A)	7	108	12	1.7					
Weathered Ore (C)	2	101	9	2.6					
Massive Ore (D)	4	736	20	19.8					
	7	945	41	24.1					

3.5-31-44

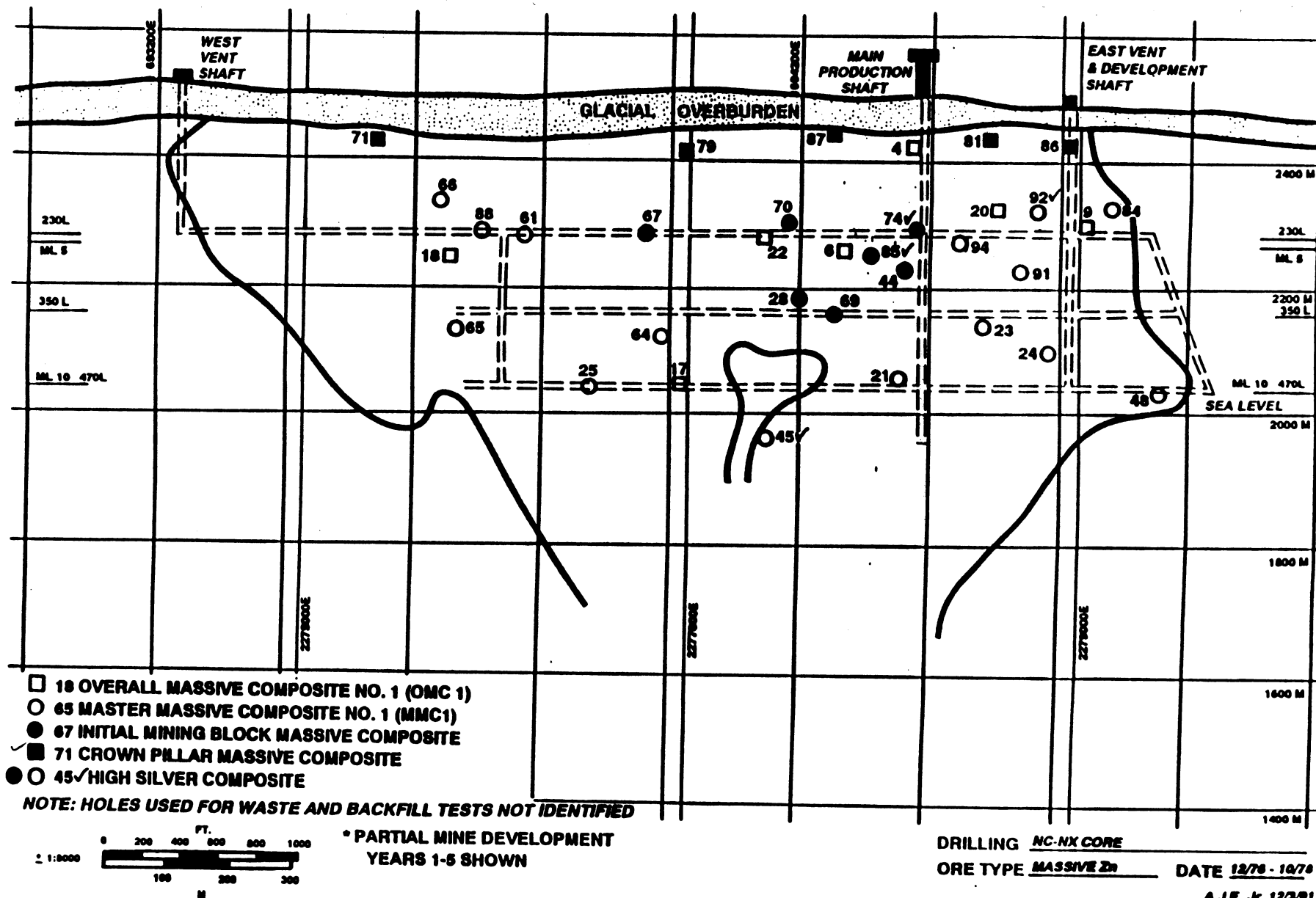


FIGURE 5-1

LONGITUDINAL SECTION - CRANDON ORE BODY
LOCATION OF DRILL HOLES IN PHASE I, II, & III BENCH SCALE METALLURGICAL TESTING

3.5-31-45

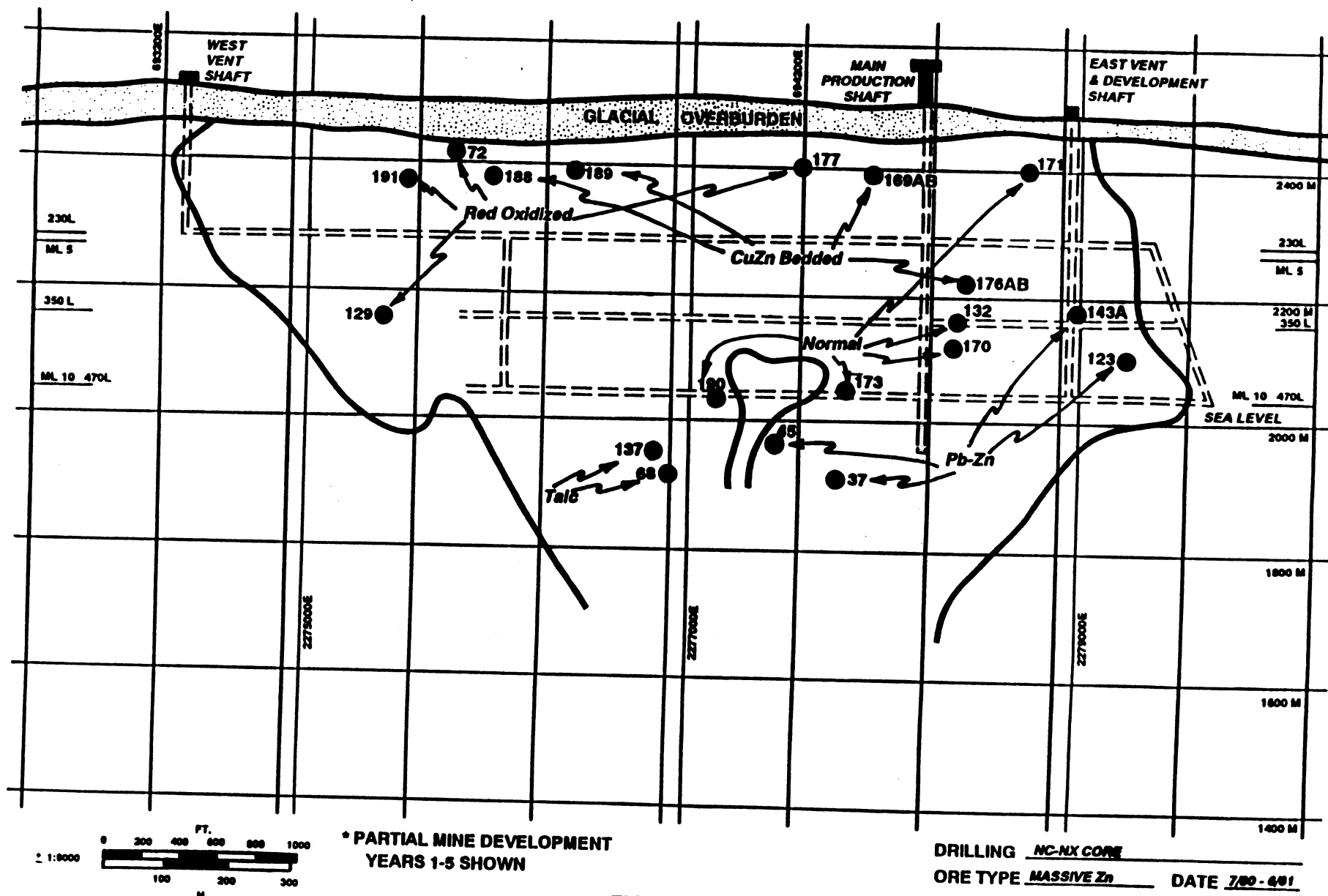


FIGURE 5-2
LONGITUDINAL SECTION - CRANDON ORE BODY
LOCATION OF DRILL HOLES IN PHASE IV BENCH SCALE METALLURGICAL TESTING

FIGURE 5-3

**LONGITUDINAL SECTION - CRANDON ORE BODY
LOCATION OF DRILL HOLES IN PHASE I PILOT PLANT**

Lakefield Research Progress Report No. 30. *Head Analyses and Description of Composite Samples, 1979.* Compares the Composition of the Zinc (Massive) Ore and Copper (Stringer) Ore Composites.

HEAD ANALYSES AND
DESCRIPTION OF COMPOSITE SAMPLES

3
from the Crandon Project

Progress Report No. 30

Project No. L.R. 1976

Note:

This report refers to the samples as received.

The practice of this Company in issuing reports of this nature is to require the recipient not to publish the report or any part thereof without the written consent of Lakefield Research of Canada Limited.

LAKEFIELD RESEARCH OF CANADA LIMITED
Lakefield, Ontario
May 23, 1979

FILE MAN MET.
Sub MT. L.K.
Sub PI
Keywords PR 30
TESTS 0

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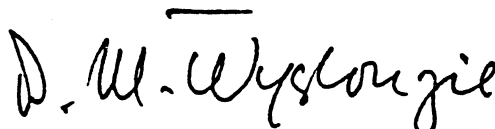
I N T R O D U C T I O N

During a meeting in Lakefield on March 28, 1979, Mr. C.I. Wilmot of Exxon Minerals Company, U.S.A., requested that the head analyses of all samples used in the Metallurgical Investigations should be summarized in one Report. For this purpose the data from Progress Reports No. 4, 5, 18 and 20 were used.

This report contains:

- 1) Description of the composite samples.
- 2) A listing of all holes, intercepts and weights used to prepare the composites.
- 3) The complete head analyses (chemical and spectrographic analyses).

LAKEFIELD RESEARCH OF CANADA LIMITED



D.M. Wyslouzil, P. Eng.,

Manager.



S. Bulatovic, P. Eng.,

Project Metallurgist.

C O M P O S I T E S

During the period December, 1976 to October, 1978, several shipments of drill-core samples were received at Lakefield from which three main composites were prepared for each ore type. In addition, several other composites were prepared on the Massive and the Stringer ores, representing the Intial Mining Block, the Crown Pillar and a High Silver Composite.

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Description of Composite Samples - Continued

1.2. Composite No. 2

This composite consisted of samples from drill-holes No. 13 to 96..

COPPER ORE

Table No. 2 - Hole Composites used for Preparation of Master (Stringer) Composite No.2

Hole Composite No.	Total Feet in Hole	No. of Samples in Hole	Weight, % Used for Composite
SK-13	158.5	29	7.23
SK-21	103.8	21	7.49
SK-25	35.0	7	0.71
SK-38	87.0	17	3.65
SK-47	15.0	3	0.62
SK-54	100	20	15.85
SK-61	190.0	38	7.61
SK-64	62	12	1.66
SK-65	20	3	4.09
SK-66	63	11	4.06
SK-67	15	5	8.12
SK-77	65	13	3.78
SK-78	24	5	5.42
SK-85	15	2	2.54
SK-88	200.0	40	15.86
SK-89	50	10	6.67
SK-96	60.0	11	4.59
Total Calc.	1263.3	247	100.00
Direct Assays			

Composite No. 2 was prepared from uncrushed drill-core received during October, 1977. From the same shipment the Initial Mining Block (Table No. 3) and Crown Pillar Composites (Table No. 4) were prepared.

Description of Composite Samples - Continued

2.2. Composite No. 2 - Cont'd

ZINC ORE

Table No. 7 - Hole Composites Used for Preparation of Master (Massive) Composite No. 2

Hole Composite No.	Total Feet in Hole	No. of Samples in Hole	Weight, % Used for Compositing
SK-21	16.2	4	0.73
SK-23	178.2	37	9.99
SK-24	113.0	23	5.66
SK-25	20.0	4	0.49
SK-28	266.8	54	9.23
SK-44	125.0	22	1.26
SK-48	63.5	14	1.44
SK-61	31.5	6	0.33
SK-64	40.0	8	1.89
SK-65	35.0	7	1.99
SK-66	22.0	4	0.69
SK-67	34.0	6	1.18
SK-69	116.0	22	3.95
SK-70	195.0	37	13.82
SK-74	167.0	31	6.59
SK-84	20.0	4	1.69
SK-85	88.0	15	7.46
SK-88	55.0	11	1.55
SK-91	55.0	11	2.24
SK-92	110.0	22	8.65
SK-94	139.0	26	19.17
Total Calc.	1890.2	368	100.00
Direct Assays			

From the same shipment, the Initial Mining Block (Table No. 8) and Crown Pillar (Table No. 9) composites were prepared. About 90 tests were conducted on these composites and reported in Progress Reports No. 13 to 29.

Head Analyses - Continued

1.2. Composite No. 2 - Cont'd

Table No. 14 - Head Analyses Copper Ore (Stringer Ore)

Element		Assays, %, oz/t		
		Master Composite	Initial Mining Block Comp.	Crown Pillar Composite
Copper	(Cu)	2.61	3.32	1.78
Zinc	(Zn)	0.74	0.81	2.01
Iron	(Fe)	10.90	11.10	13.30
Nickel	(Ni)	0.0025	N.A.	0.0026
Lead	(Pb)	0.06	0.13	0.05
Bismuth	(Bi)	0.015	N.A.	0.016
Cadmium	(Cd)	0.0021	N.A.	0.0052
Chlorine	(Cl)	0.006	N.A.	0.01
Cobalt	(Co)	0.006	N.A.	0.0075
Indium	(In)	0.0011	N.A.	0.0011
Manganese	(Mn)	0.058	N.A.	0.031
Mercury	(Hg)	0.0006	N.A.	0.0003
Molybdenum	(Mo)	0.0005	N.A.	0.0005
Arsenic	(As)	0.059	N.A.	0.12
Antimony	(Sb)	0.011	N.A.	0.016
Tin	(Sn)	0.005	N.A.	0.005
Selenium	(Se)	0.01	N.A.	0.0085
Sulphur	(S)	8.40	8.88	12.59
Silica	(SiO ₂)	61.80	N.A.	58.10
Alumina	(Al ₂ O ₃)	6.52	N.A.	6.05
Lime	(CaO)	0.15	N.A.	0.04
Magnesia	(MgO)	2.28	N.A.	2.17
Sodium	(Na ₂ O)	0.08	N.A.	0.084
Potassium	(K ₂ O)	0.49	N.A.	0.49
Gold	(Au)	0.005	0.005	0.005
Silver	(Ag)	0.46	0.73	0.45

N.A. - not assayed

The head samples were also sent to various laboratories for analyses and the assays are compared in Table No. 15.

Head Analyses - Continued

2.2. Composite No. 2 - Cont'd

Table No. 19 - Head Analyses - (Massive Ore) ZINC ORE

Element		Assays, %, oz/t		
		Master Composite	Initial Mining Block Comp.	Crown Pillar Composite
Zinc	(Zn)	8.37	9.02	8.01
Copper	(Cu)	0.45	0.41	1.15
Lead	(Pb)	0.69	0.84	1.30
Iron	(Fe)	23.70	22.50	29.80
Nickel	(Ni)	0.0031	N.A.	0.0039
Bismuth	(Bi)	0.016	N.A.	0.018
Cadmium	(Cd)	0.022	N.A.	0.022
Chromium	(Cr)	0.0031	N.A.	0.005
Cobalt	(Co)	0.0095	N.A.	0.011
Indium	(In)	0.0015	N.A.	0.0023
Manganese	(Mn)	0.05	N.A.	0.011
Mercury	(Hg)	0.0007	N.A.	0.0009
Molybdenum	(Mo)	0.0006	N.A.	0.0008
Arsenic	(As)	0.21	N.A.	0.37
Antimony	(Sb)	0.023	N.A.	0.03
Tin	(Sn)	0.006	N.A.	0.005
Selenium	(Se)	0.0009	N.A.	0.0084
Sulphur	(S)	30.60	29.5	39.50
Silica	(SiO ₂)	25.80	N.A.	15.15
Alumina	(Al ₂ O ₃)	3.42	N.A.	1.64
Lime	(CaO)	0.39	N.A.	0.03
Magnesia	(MgO)	2.18	N.A.	0.25
Sodium	(Na ₂ O)	0.05	N.A.	0.02
Potassium	(K ₂ O)	0.44	N.A.	0.35
Gold	(Au)	0.04	0.04	0.04
Silver	(Ag)	0.96	0.99	1.58

The head samples from Master Composite, Initial Mining Block Composite and Crown Pillar Composite were sent to Skyline Inc. and Hazen Inc. Laboratories for assays and the results are compared in Table No. 20.

**Appendix 3.5-31 Tables 4a and 4b. Bulk Chemical Composition of the Zinc (Massive)
and Copper (Stringer) Ore 1979 Master Composites**

Appendix 3.5-31 Table 4a

Composition of Zinc Ore 1979 Lakefield Research Master Composite

Parameter	Reported Concentration (% or oz/t)	Converted Concentration (mg/kg)
Aluminum	3.42 % (Al ₂ O ₃)	18,100 (Al)
Antimony	0.023 %	230
Arsenic	0.21 %	2,100
Cadmium	0.022 %	220
Calcium	0.39 % (CaO)	2,800 (Ca)
Chromium	0.0031 %	31
Cobalt	0.0095 %	95
Copper	0.45 %	4,500
Gold	0.04 oz/t	1.2
Iron	23.7 %	237,000
Lead	0.69 %	6,900
Magnesium	2.18 % (MgO)	13,100 (Mg)
Manganese	0.05 %	500
Mercury	0.0007 %	7
Nickel	0.0031 %	31
Potassium	0.44 % (K ₂ O)	3,600 (K)
Selenium	0.0009 %	9
Silicon	25.8 % (SiO ₂)	121,000 (Si)
Silver	0.96 oz/t	30
Sodium	0.05 % (Na ₂ O)	400 (Na)
Sulfur (total)	30.6 %	306,000
Tin	0.006 %	60
Zinc	8.37 %	83,700

Prepared by: JET
Checked by: DJL

Appendix 3.5-31 Table 4b

Composition of Copper Ore 1979 Lakefield Research Master Composite

Parameter	Reported Concentration (% or oz/t)	Converted Concentration (mg/kg)
Aluminum	6.52 % (Al ₂ O ₃)	34,500 (Al)
Antimony	0.011 %	110
Arsenic	0.059 %	590
Cadmium	0.0021 %	21
Calcium	0.15 % (CaO)	1,100 (Ca)
Chromium	NA	--
Cobalt	0.006 %	60
Copper	2.61 %	26,100
Gold	0.005 oz/t	0.16
Iron	10.9 %	109,000
Lead	0.06 %	600
Magnesium	2.28 % (MgO)	13,700 (Mg)
Manganese	0.058 %	580
Mercury	0.0006 %	6
Nickel	0.0025 %	25
Potassium	0.49 % (K ₂ O)	4,100 (K)
Selenium	0.01 %	100
Silicon	61.8 % (SiO ₂)	289,000 (Si)
Silver	0.46 oz/t	14
Sodium	0.08 % (Na ₂ O)	600 (Na)
Sulfur (total)	8.40 %	84,000
Tin	0.005 %	50
Zinc	0.74 %	7,400

Prepared by: JET
Checked by: DJL

**Appendix 3.5-31 Table 5. Location and Weight of the Samples Collected to Prepare
the Unweathered Ore Composite**

Appendix 3.5-31 Table 5

Location and Weight of the Samples Collected to Prepare the Unweathered Ore Composite

Mineral Exploration Boring	Interval Sampled (downhole, in feet)	Sample Weight (grams)
DDH: 15	2550-2560 2577-2585 2602-2605 2644-2646	6,446.28 7,221.01 2,037.24 786.59
DDH: 48	1714-1734	8,276.74
DDH: 58	560-571 1473-1476.5	3,359.58 2,174.00
DDH: 61	766-786 972-978	16,357.10 1,996.25
DDH: 78	781-786	1,480.90
DDH: 91	1130-1164	17,708.41
DDH: 125	1249-1292	18,625.04
DDH: 129	1200-1208 1215-1220 1261-1264	3,253.09
DDH: 140	3051-3061	8,674.00
DDH: 145	1230-1246	2,244.94
DDH: 159	1949-1980 2151-2153 2162-2164	19,317.46
DDH: 192	2625-2632 2771-2785	9,335.53 5,879.58
DDH: 233	824-845 856.5-858	6,934.78
DDH: 237	1016-1053	18,185.20
DDH: 247	1033-1061 1193-1198	9,816.27 4,441.34

Prepared by: JET
Checked by: DJL

**Appendix 3.5-31 Table 6. Location and Weight of the Samples Collected to Prepare
the Weathered Ore and Waste Rock Composite**

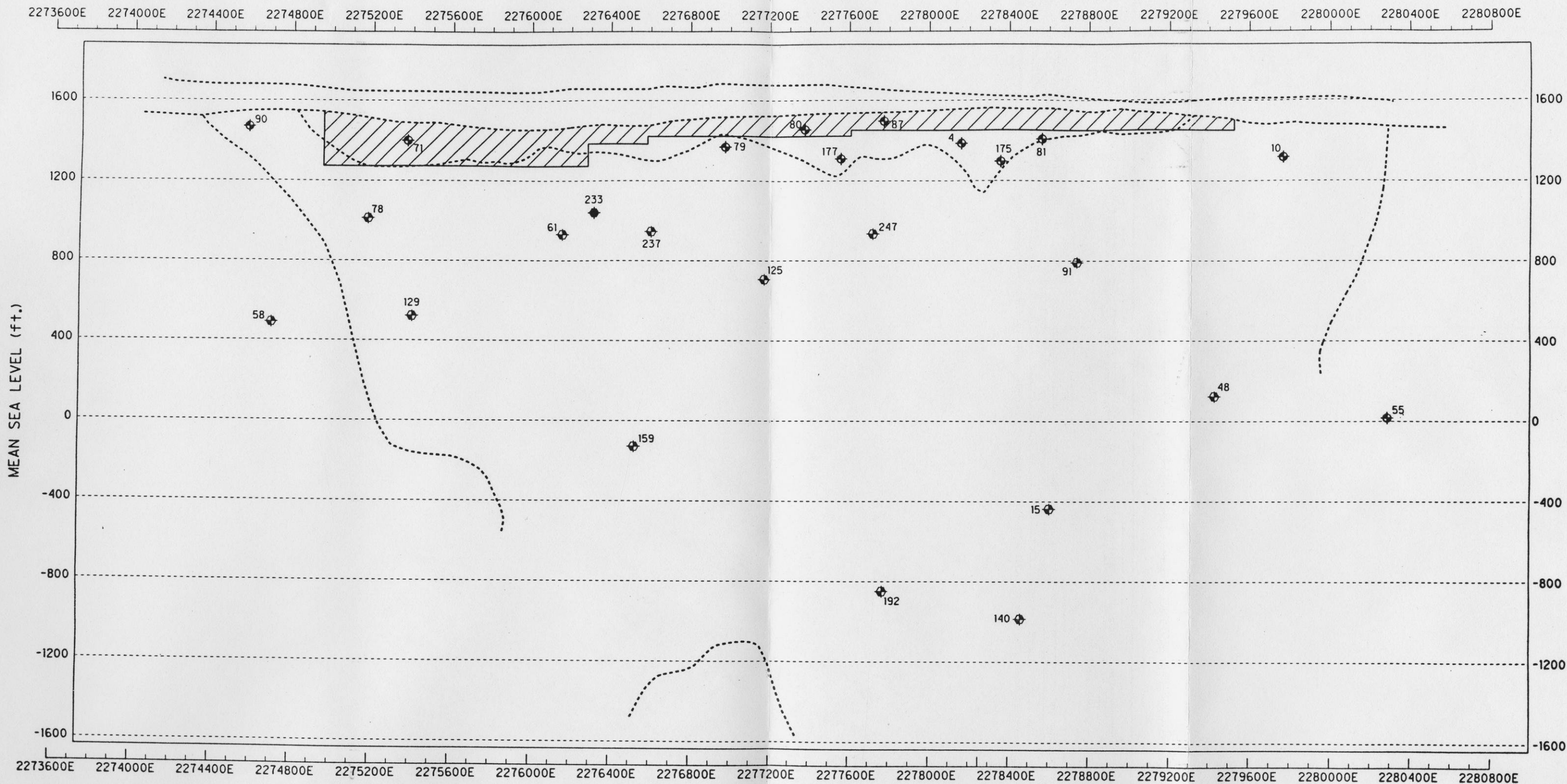
Appendix 3.5-31 Table 6

Location and Weight of the Samples Collected to Prepare the Weathered Ore and Waste Rock Composite

Mineral Exploration Boring	Intervals Sampled (downhole, in feet)	Sample Weight (grams)
DDH: 4	237-241 630-636	5,888.2
DDH: 10	229-239 336-342	4,655.8 2,753.6
DDH: 55	1023-1027 1132-1136	5,759.0
DDH: 71	328-330	5,759.5
DDH: 71	449-456 553-560	3,739.5
DDH: 71	564-571	2,769.2
DDH: 79	416-423	4,733.8
DDH: 80	266-268 270-272 360-365	5,123.9
DDH: 81	301-310	5,085.1
DDH: 81	349-358 453-458	5,282.5
DDH: 87	237-245 376-386	4,316.9
DDH: 90	310-317 346-360	5,736.3
DDH: 175	461-463 643-647	6,295.8
DDH: 177	532-557 573-585	5,757.2
DDH: 233	824-845 856.6-858	4,643.3

Prepared by: JET
Checked by: DJL

**Appendix 3.5-31 Figure 9. Location of the Pierce Points of the Cores Selected for
Collection of Ore Samples for Compositing**



Foth & Van Dyke			
REVISED	DATE	BY	DESCRIPTION
CHECKED BY:		JKS1	DATE: MAY '95
APPROVED BY:		JET	DATE: MAY '95
APPROVED BY:		GWS	DATE: MAY '95

 Crandon Mining Company	
APPENDIX 3.5-31 FIGURE 9 CRANDON ZINC ORE DEPOSIT LONGITUDINAL PROJECTION LOOKING NORTH HW AND CRANDON FORMATION DRILL HOLE PIERCE POINT	
Scale: AS SHOWN	Date: MAY, 1995
Prepared By: Foth & Van Dyke	By: JRB2

Appendix 3.5-32

Static Test Methods and Analytical Data

- Letter from M. L. Nebel (BHP) to K. Barrett (ECM) Containing Soil Geochemical Analysis.
- Lakefield Research ABA Data and Bulk Chemical Composition of the Waste Rock Composites, the Master Ore Composite and the Tailings.
- Chemex Labs ABA Data.
- Appendix 3.5-32 Table 1. Bulk Chemical Data Conversions and Calculations for the Waste Rock Composites.
- Appendix 3.5-32 Figure 1. Waste Characterization Flow Sheet.
- Appendix 3.5-32 Table 2. Bulk Chemical Data Conversions and Calculations for the Master Ore Composite and Tailings.
- Composition of the Residual Process Water.
- Appendix 3.5-32 Table 3. Explanation of ABA Units Used in the Text and Appendix Tables, and a Comparison of these Terms with those Used by Lakefield Research and Chemex Labs.
- WRC Evaluation Data.
- Appendix 3.5-32 Table 4. Summary of the 1994 ABA Determinations and WRC Values for the Initial Waste Rock Investigation.
- Appendix 3.5-32 Tables 5-8. 1995 ABA Determinations of the Randomly Selected Waste Rock Cores, Calculated Statistical Parameters, and Comparisons with the Master Waste Rock Composites.
- Notes Regarding the May 8, 1996 Visitation to the CMC Core Storage Facility in Rhinelander, Wisconsin and the Results of the Scintillometer Evaluations of Ore and Waste Rock.

**Letter from M. L. Nebel (BHP) to K. Barrett (ECM) Containing Soil
Geochemical Analysis**

K. E. BARRETT

AUG 16 1993

BHP Minerals
International Inc.

1106 Military Road
P.O. Box 834
Rhinelander, Wisconsin 54501 USA
Telephone (715) 362-1991
Facsimile (715) 362-1756

August 12, 1993

Mr. Ken Barrett
Exxon Coal and Minerals Co.
P.O. Box 1314
Houston, TX 77251-1314

~~Ken Barrett~~
AJE
Pls File



BHP
Minerals

Dear Ken:

We have completed our soil sampling over the Crandon deposit, and I am pleased to enclose a copy of the data we collected. Please find herein:

--A copy of the idealized control grid we used, superimposed on a 7.5" topo base map. For purposes of this study, we used the SE corner of section 25 as our zero point.

--A listing of all of the samples taken, with their grid coordinate locations. All of the traverses were done with Silva and hip chain. Traverses were closed and sample site locations corrected.

--A copy of the geochemical analysis certificate for all samples. All but a few samples were B-horizon soils sieved to -200 mesh. The few stream sediment samples are so noted on the sample list.

Thanks once again for your cooperation on this study. And best wishes in developing the project.

Sincerely,

Mark

Mark L. Nebel

FILE MAIN GC
Sub EX
Sub

Keywords Surface geochemistry
Soil sampling



SAMPLE	GRID	QUAD	LOCATION
11823	CRANDON	MOLE LAKE	L10W,2+00N
11824	CRANDON	MOLE LAKE	L10W,4+00N
11825	CRANDON	MOLE LAKE	L10W,8+00N
11826	CRANDON	MOLE LAKE	L10W,12+00N
11827	CRANDON	MOLE LAKE	L10W,16+00N
11828	CRANDON	MOLE LAKE	L10W,20+00N
11829	CRANDON	MOLE LAKE	L10W,24+00N
11830	CRANDON	MOLE LAKE	L10W,28+00N
11831	CRANDON	MOLE LAKE	L10W,32+00N
11832	CRANDON	MOLE LAKE	L10W,36+00N
11833	CRANDON	MOLE LAKE	L10W,40+00N
11834	CRANDON	MOLE LAKE	L10W,44+00N
11835	CRANDON	MOLE LAKE	L10W,48+00N
11836	CRANDON	MOLE LAKE	L10W,52+00N
11837	CRANDON	MOLE LAKE	L10W,53+70N
11838	CRANDON	MOLE LAKE	L10W,55+70N
11839	CRANDON	MOLE LAKE	L70W,16+18N
11840	CRANDON	MOLE LAKE	L70W,20+18N
11841	CRANDON	MOLE LAKE	L70W,20+18N
11842	CRANDON	MOLE LAKE	L70W,24+18N
11843	CRANDON	MOLE LAKE	L70W,25+43N
11844	CRANDON	MOLE LAKE	L70W,28+73N
11845	CRANDON	MOLE LAKE	L70W,31+21N
11846	CRANDON	MOLE LAKE	L70W,31+91N
11847	CRANDON	MOLE LAKE	L60W,34+00N
11848	CRANDON	MOLE LAKE	L60W,30+00N
11849	CRANDON	MOLE LAKE	L60W,26+00N
11850	CRANDON	MOLE LAKE	L60W,22+00N
11851	CRANDON	MOLE LAKE	L60W,18+00N
11852	CRANDON	MOLE LAKE	L60W,14+00N
11853	CRANDON	MOLE LAKE	L60W,12+00N
11854	CRANDON	MOLE LAKE	L70W,10+38N
11855	CRANDON	MOLE LAKE	L70W,6+38N
11856	CRANDON	MOLE LAKE	L70W,2+30N
11857	CRANDON	MOLE LAKE	L70W,0+38N
11858	CRANDON	MOLE LAKE	L60W,10+00N
11859	CRANDON	MOLE LAKE	L60W,8+00N

SAMPLE	GRID	QUAD	LOCATION
11860	CRANDON	MOLE LAKE	L00W,4+00N
11861	CRANDON	MOLE LAKE	L00W,7+50N
11862	CRANDON	MOLE LAKE	L00W,9+20N
11863	CRANDON	MOLE LAKE	L00W,12+00N
11864	CRANDON	MOLE LAKE	L00W,15+24N
11865	CRANDON	MOLE LAKE	L00W,19+24N
11866	CRANDON	MOLE LAKE	L00W,23+24N
11867	CRANDON	MOLE LAKE	L00W,27+24N
11868	CRANDON	MOLE LAKE	L1E,31+24N
11869	CRANDON	MOLE LAKE	L1E,35+24N
11870	CRANDON	MOLE LAKE	L1E,39+24N
11871	CRANDON	MOLE LAKE	L1E,43+24N
11872	CRANDON	MOLE LAKE	L1E,47+24N
11873	CRANDON	MOLE LAKE	L1E,49+00N
11874	CRANDON	MOLE LAKE	L1E,53+00N
11875	CRANDON	MOLE LAKE	L1E,57+00N
11876	CRANDON	MOLE LAKE	L10W,54+60N
11877	CRANDON	MOLE LAKE	L10W,51+10N
11878	CRANDON	MOLE LAKE	L10W,49+18N
11879	CRANDON	MOLE LAKE	L10W,45+18N
11880	CRANDON	MOLE LAKE	L10W,41+18N
11881	CRANDON	MOLE LAKE	L10W,38+18N
11882	CRANDON	MOLE LAKE	L10W,33+18N
11883	CRANDON	MOLE LAKE	L10W,29+18N
11884	CRANDON	MOLE LAKE	L10W,25+18N
11885	CRANDON	MOLE LAKE	L20W,4+00N
11886	CRANDON	MOLE LAKE	L20W,8+00N
11887	CRANDON	MOLE LAKE	L20W,12+00N
11888	CRANDON	MOLE LAKE	L20W,16+00N
11889	CRANDON	MOLE LAKE	L20W,20+00N
11890	CRANDON	MOLE LAKE	L20W,24+00N
11891	CRANDON	MOLE LAKE	L20W,28+00N
11892	CRANDON	MOLE LAKE	L20W,32+00N
11893	CRANDON	MOLE LAKE	L20W,36+00N
11894	CRANDON	MOLE LAKE	L20W,38+75N
11895	CRANDON	MOLE LAKE	L20W,43+05N
11896	CRANDON	MOLE LAKE	L20W,44+72N

SAMPLE	GRID	QUAD	LOCATION
11897	CRANDON	MOLE LAKE	L20W,48+50N
11898	CRANDON	MOLE LAKE	L20W,50+25N
11899	CRANDON	MOLE LAKE	L20W,51+65N
11900	CRANDON	MOLE LAKE	L20W,54+55N
11901	CRANDON	MOLE LAKE	L30W,55+50N
11902	CRANDON	MOLE LAKE	L30W,53+64N
11903	CRANDON	MOLE LAKE	L30W,49+00N
11904	CRANDON	MOLE LAKE	L30W,47+75N
11905	CRANDON	MOLE LAKE	L30W,46+37N
11906	CRANDON	MOLE LAKE	L30W,44+08N
11907	CRANDON	MOLE LAKE	L30W,41+32
11908	CRANDON	MOLE LAKE	L30W,36+98N
11909	CRANDON	MOLE LAKE	L30W,32+00N
11910	CRANDON	MOLE LAKE	L30W,28+00N
11911	CRANDON	MOLE LAKE	L30W,24+00N
11912	CRANDON	MOLE LAKE	L30W,20+00N
11913	CRANDON	MOLE LAKE	L30W,16+00N
11914	CRANDON	MOLE LAKE	L30W,12+00N
11915	CRANDON	MOLE LAKE	L30W,8+00N
11916	CRANDON	MOLE LAKE	L30W,4+85N
11917	CRANDON	MOLE LAKE	L30W,0+00N
11918	CRANDON	MOLE LAKE	L20W,4+50S
11919	CRANDON	MOLE LAKE	L20W,8+10S
11920	CRANDON	MOLE LAKE	L20W,12+10S
11921	CRANDON	MOLE LAKE	L20W,16+10S
11922	CRANDON	MOLE LAKE	L20W,20+10S
11923	CRANDON	MOLE LAKE	L20W,24+10S
11924	CRANDON	MOLE LAKE	L30W,0+70N
11925	CRANDON	MOLE LAKE	L30W,2+80S
11926	CRANDON	MOLE LAKE	L30E,0+0N
11927	CRANDON	MOLE LAKE	L10W,16+00N
11928	CRANDON	MOLE LAKE	L30E,5+80N
11929	CRANDON	MOLE LAKE	L30E,9+80N
11930	CRANDON	MOLE LAKE	L30E,12+90N
11931	CRANDON	MOLE LAKE	L30E,16+50N
11932	CRANDON	MOLE LAKE	L30E,18+30N
11933	CRANDON	MOLE LAKE	L30E,22+30N

SAMPLE	GRID	QUAD	LOCATION
11934	CRANDON	MOLE LAKE	L30E,24+10N
11935	CRANDON	MOLE LAKE	L30E,28+10N
11936	CRANDON	MOLE LAKE	L30E,32+10N
11937	CRANDON	MOLE LAKE	L30E,36+00N
11938	CRANDON	MOLE LAKE	L30E,40+00N
11939	CRANDON	MOLE LAKE	L30E,43+00N
11940	CRANDON	MOLE LAKE	L60W,6+00N
11941	CRANDON	MOLE LAKE	L60W,6+00N
11942	CRANDON	MOLE LAKE	L60W,4+00N
11943	CRANDON	MOLE LAKE	L60W,0+00N
11944	CRANDON	MOLE LAKE	L40W,6+00N
11945	CRANDON	MOLE LAKE	L40W,9+66N
11946	CRANDON	MOLE LAKE	L40W,10+70N
11947	CRANDON	MOLE LAKE	L40W,12+22N
11948	CRANDON	MOLE LAKE	L40W,13+47N
11949	CRANDON	MOLE LAKE	L40W,14+88N
11950	CRANDON	MOLE LAKE	L38W,17+41N
11951	CRANDON	MOLE LAKE	L36+80W,18+58
11952	CRANDON	MOLE LAKE	L35W,20+08N
11953	CRANDON	MOLE LAKE	L35W,21+72N
11954	CRANDON	MOLE LAKE	L40W,25+72N
11955	CRANDON	MOLE LAKE	L40W,29+72N
11956	CRANDON	MOLE LAKE	L40W,33+72N
11957	CRANDON	MOLE LAKE	L40W,37+72N
11958	CRANDON	MOLE LAKE	L40W,41+72N
11959	CRANDON	MOLE LAKE	L40W,45+19N
11960	CRANDON	MOLE LAKE	L40W,46+46N
11961	CRANDON	MOLE LAKE	L40W,50+46N
11962	CRANDON	MOLE LAKE	L40W,52+50N
11963	CRANDON	MOLE LAKE	L40W,54+50N
11964	CRANDON	MOLE LAKE	L40W,56+50N
11965	CRANDON	MOLE LAKE	L50W,49+50N
11966	CRANDON	MOLE LAKE	L50W,43+50N
11967	CRANDON	MOLE LAKE	L50W,42+20N
11968	CRANDON	MOLE LAKE	L50W,37+63N
11969	CRANDON	MOLE LAKE	L50W,33+10N
11970	CRANDON	MOLE LAKE	L50W,29+70N

SAMPLE	GRID	QUAD	LOCATION
11971	CRANDON	MOLE LAKE	L50W,25+70N
11972	CRANDON	MOLE LAKE	L50W,21+70N
11973	CRANDON	MOLE LAKE	L50W,17+20N
11974	CRANDON	MOLE LAKE	L50W,16+00N
11975	CRANDON	MOLE LAKE	L50W,14+60N
11976	CRANDON	MOLE LAKE	L50W,11+50N
11977	CRANDON	MOLE LAKE	L50W,9+60N
11978	CRANDON	MOLE LAKE	L50W,5+20N
11979	CRANDON	MOLE LAKE	L50W,2+10N
11980	CRANDON	MOLE LAKE	L50W,1+40S
11981	CRANDON	MOLE LAKE	L50W,3+40S
11982	CRANDON	MOLE LAKE	L50W,4+80S
11983	CRANDON	MOLE LAKE	L50W,8+80S
11984	CRANDON	MOLE LAKE	L50W,12+80S
11985	CRANDON	MOLE LAKE	L40W,12+80S
11986	CRANDON	MOLE LAKE	L40W,9+60S
11987	CRANDON	MOLE LAKE	L40W,5+60S
11988	CRANDON	MOLE LAKE	L40W,1+60S
11989	CRANDON	MOLE LAKE	L40W,2+40N
11990	CRANDON	MOLE LAKE	L10W,0+80S
11991	CRANDON	MOLE LAKE	L10W,3+90S
11992	CRANDON	MOLE LAKE	L10W,7+90S
11993	CRANDON	MOLE LAKE	L10W,11+90S
11994	CRANDON	MOLE LAKE	L10W,15+90S
11995	CRANDON	MOLE LAKE	L10W,18+40S
11996	CRANDON	MOLE LAKE	L10W,20+80S
11997	CRANDON	MOLE LAKE	L10W,23+50S
11998	CRANDON	MOLE LAKE	L00W,17+90S
11999	CRANDON	MOLE LAKE	L00W,16+10S
12000	CRANDON	MOLE LAKE	L00W,13+40S
12001	CRANDON	MOLE LAKE	L00W,9+40S
12002	CRANDON	MOLE LAKE	L00W,5+40S
12003	CRANDON	MOLE LAKE	L00W,1+60S
12004	CRANDON	MOLE LAKE	L10E,3+00S
12005	CRANDON	MOLE LAKE	L10E,5+70S
12006	CRANDON	MOLE LAKE	L10E,7+40S
12007	CRANDON	MOLE LAKE	L10E,9+90S

SAMPLE	GRID	QUAD	LOCATION
12008	CRANDON	MOLE LAKE	L10E,13+00S
12009	CRANDON	MOLE LAKE	L20E,8+00S
12010	CRANDON	MOLE LAKE	L20E,4+00S
12011	CRANDON	MOLE LAKE	L30E,47+00N
12012	CRANDON	MOLE LAKE	L30E,51+00N
12013	CRANDON	MOLE LAKE	L30E,55+00N
12014	CRANDON	MOLE LAKE	L30E,59+00N
12015	CRANDON	MOLE LAKE	L30E,60+40N
12016	CRANDON	MOLE LAKE	L30E,64+40N
12017	CRANDON	MOLE LAKE	L30E,65+90N
12018	CRANDON	MOLE LAKE	L35E,62+00N
12019	CRANDON	MOLE LAKE	L37+20,57+00N
12020	CRANDON	MOLE LAKE	L38+40E,52+80
12021	CRANDON	MOLE LAKE	L38+40E,48+20
12022	CRANDON	MOLE LAKE	L38+40E,44+20
12023	CRANDON	MOLE LAKE	L38E,40+80N
12024	CRANDON	MOLE LAKE	L38E,36+40N
12025	CRANDON	MOLE LAKE	L37+50E,30+00
12026	CRANDON	MOLE LAKE	L30E,27+50N
12027	CRANDON	MOLE LAKE	L37E,23+00N
12028	CRANDON	MOLE LAKE	L37E,19+00N
12029	CRANDON	MOLE LAKE	L37E,16+80N
12030	CRANDON	MOLE LAKE	L20E,4+00N
12031	CRANDON	MOLE LAKE	L20E,8+00N
12032	CRANDON	MOLE LAKE	L20E,12+00N
12033	CRANDON	MOLE LAKE	L20E,16+00N
12034	CRANDON	MOLE LAKE	L20E,20+00N
12035	CRANDON	MOLE LAKE	L20E,24+00N
12036	CRANDON	MOLE LAKE	L20E,28+00N
12037	CRANDON	MOLE LAKE	L20E,32+00N
12038	CRANDON	MOLE LAKE	L20E,36+00N
12039	CRANDON	MOLE LAKE	L20E,40+00N
12040	CRANDON	MOLE LAKE	L20E,44+00N
12041	CRANDON	MOLE LAKE	L20E,48+00N
12042	CRANDON	MOLE LAKE	L20E,52+00N
12043	CRANDON	MOLE LAKE	L20E,56+00N
12044	CRANDON	MOLE LAKE	L20E,60+00N

SAMPLE	GRID	QUAD	LOCATION
12045	CRANDON	MOLE LAKE	L20E,63+80N
17252M SED 12046	CRANDON	MOLE LAKE	L4E,58+00N
17252M SED 12047	CRANDON	MOLE LAKE	L8E,45+00N
12048	CRANDON	MOLE LAKE	L80W,38+60N
12054	CRANDON	MOLE LAKE	L20E,2+00S
12055	CRANDON	MOLE LAKE	L10E,0+00N
12056	CRANDON	MOLE LAKE	L10E,4+00N
12057	CRANDON	MOLE LAKE	L10E,8+00N
12058	CRANDON	MOLE LAKE	L10E,12+00N
12059	CRANDON	MOLE LAKE	L10E,16+00N
12060	CRANDON	MOLE LAKE	L10E,20+00N
12061	CRANDON	MOLE LAKE	L10E,24+00N
12062	CRANDON	MOLE LAKE	L10E,25+10N
12063	CRANDON	MOLE LAKE	L10E,27+35N
12064	CRANDON	MOLE LAKE	L10E,29+60N
12065	CRANDON	MOLE LAKE	L10E,31+85N
12066	CRANDON	MOLE LAKE	L10E,35+85N
12067	CRANDON	MOLE LAKE	L10E,39+22N
12068	CRANDON	MOLE LAKE	L10E,43+22N
12069	CRANDON	MOLE LAKE	L10E,47+22N
12070	CRANDON	MOLE LAKE	L10E,51+22N
12071	CRANDON	MOLE LAKE	L10E,55+22N
12072	CRANDON	MOLE LAKE	L10E,57+72N

AA
LL

GEOCHEMICAL ANALYSIS CERTIFICATE

AA
LL

BHP Minerals International (FI) PROJECT 4071 File # 93-1809 Page 1

P.O. Box 834, Rhineland WI U.S.A. 54501 Submitted by: William Cronk

SAMPLE#	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Tl	Hg	Sn
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%	ppm	%	%	%	%	%	ppm	ppm	ppm	ppm
CRA 11823	<1	9	10	35	.1	14	5	106	1.94	4	<5	<2	4	13	.5	<2	<2	32	.12	.023	19	23	.33	73	.08	4	1.52	.01	.06	2	<5	<1	<1
CRA 11824	<1	11	11	50	.1	15	5	394	1.97	2	<5	<2	3	17	<.2	<2	<2	30	.21	.041	19	23	.38	97	.08	<2	1.35	.01	.08	2	<5	<1	<1
CRA 11825	<1	13	11	38	.1	10	3	218	1.89	2	<5	<2	3	15	.4	<2	<2	29	.19	.028	21	18	.28	86	.07	4	1.11	.01	.08	2	<5	<1	1
CRA 11826	<1	10	9	50	.1	14	5	559	2.14	2	<5	<2	3	17	<.2	<2	<2	31	.20	.055	20	21	.30	124	.07	3	1.27	.01	.07	1	<5	<1	<1
CRA 11827	<1	14	8	50	.1	15	6	355	2.48	<2	<5	<2	4	16	.6	<2	<2	39	.16	.035	20	27	.35	82	.08	4	1.64	.01	.08	1	<5	<1	<1
CRA 11828	<1	46	7	53	<.1	23	8	508	3.19	8	<5	<2	7	24	.2	<2	2	51	.24	.043	27	41	.48	124	.09	4	1.92	.01	.11	2	<5	1	<1
CRA 11829	<1	8	6	52	.1	9	5	836	2.03	<2	<5	<2	2	17	<.2	<2	<2	30	.16	.058	18	20	.24	139	.06	3	1.13	.01	.06	2	<5	<1	<1
CRA 11830	1	14	8	41	<.1	11	5	194	2.06	3	<5	<2	4	15	.2	<2	<2	35	.13	.026	23	25	.31	92	.08	2	1.71	.01	.06	1	<5	1	<1
CRA 11831	1	17	5	45	.1	14	5	304	2.29	<2	<5	<2	<2	15	<.2	<2	<2	32	.16	.039	22	25	.47	99	.06	5	1.72	.01	.09	1	<5	<1	<1
CRA 11832	1	14	10	54	.1	9	6	449	2.79	6	<5	<2	2	16	.4	<2	2	39	.17	.057	22	26	.36	91	.07	3	1.80	.01	.08	1	<5	1	<1
CRA 11833	1	16	4	63	.1	13	5	357	2.43	<2	<5	<2	<2	20	.7	<2	<2	39	.20	.041	23	28	.36	127	.06	4	1.74	.01	.08	1	<5	<1	<1
CRA 11834	1	11	8	37	.1	16	4	145	1.98	<2	<5	<2	3	14	.4	<2	<2	32	.13	.019	20	24	.33	74	.08	3	1.56	.01	.06	1	<5	<1	<1
CRA 11835	1	11	6	84	.1	12	7	2352	2.38	2	<5	<2	<2	19	.4	<2	3	33	.18	.073	18	22	.24	188	.05	3	1.52	<.01	.09	1	<5	1	<1
CRA 11836	<1	6	9	36	<.1	11	3	147	1.62	<2	<5	<2	3	14	.2	<2	<2	28	.12	.033	16	19	.25	98	.07	6	1.30	.01	.07	1	<5	<1	<1
CRA 11837	<1	12	6	20	<.1	7	3	76	1.20	<2	<5	<2	<2	16	<.2	<2	<2	22	.16	.019	52	17	.21	67	.05	2	1.27	.01	.05	1	<5	<1	<1
CRA 11838	<1	18	7	67	<.1	23	6	249	1.83	<2	<5	<2	6	26	.6	<2	<2	30	.94	.041	17	36	.68	63	.12	8	1.35	.03	.10	1	<5	<1	1
CRA 11839	<1	8	7	44	.2	12	4	254	2.59	<2	<5	<2	3	14	.2	<2	<2	34	.14	.055	16	23	.28	112	.06	4	1.75	.01	.06	1	<5	<1	<1
CRA 11840	<1	3	5	9	<.1	1	<1	45	.41	<2	<5	<2	2	9	.2	<2	2	12	.06	.007	15	7	.07	38	.07	<2	.39	<.01	.04	<1	<5	<1	<1
CRA 11841	<1	3	6	11	<.1	4	1	53	.50	<2	<5	<2	2	10	.3	2	2	13	.08	.008	15	9	.10	42	.07	3	.45	.01	.04	<1	<5	<1	<1
CRA 11842	<1	5	9	31	<.1	8	3	88	1.37	<2	<5	<2	2	14	.5	<2	<2	26	.15	.012	17	18	.28	86	.08	3	1.45	.01	.07	1	<5	<1	<1
RE CRA 11842	1	6	13	29	<.1	9	3	89	1.35	2	<5	<2	2	13	.4	<2	<2	25	.14	.011	17	18	.28	85	.08	4	1.43	.01	.07	1	<5	<1	<1
CRA 11843	1	10	15	59	.1	8	2	126	1.28	<2	<5	<2	<2	17	.2	<2	<2	23	.23	.044	18	19	.25	99	.04	4	1.36	.01	.08	<1	<5	<1	<1
CRA 11844	1	7	5	40	<.1	16	5	490	2.28	6	<5	<2	2	17	<.2	<2	<2	34	.16	.040	17	22	.25	139	.06	3	1.64	.01	.06	2	<5	<1	<1
CRA 11845	<1	5	4	11	<.1	2	1	64	1.01	<2	<5	<2	2	12	.2	<2	<2	18	.10	.009	18	10	.05	71	.05	2	.40	<.01	.05	<1	<5	<1	<1
CRA 11846	<1	8	7	20	<.1	14	4	68	1.11	<2	<5	<2	<2	16	<.2	<2	<2	21	.14	.025	19	25	.25	97	.03	2	2.25	.01	.06	1	<5	<1	<1
CRA 11847	1	12	19	50	.1	11	4	532	2.58	<2	<5	<2	<2	19	.5	<2	3	36	.26	.099	14	24	.22	138	.05	3	1.78	.01	.09	1	<5	1	1
CRA 11848	1	10	15	59	<.1	13	5	702	2.65	4	<5	<2	<2	20	.5	<2	<2	37	.21	.095	16	23	.25	147	.05	5	1.68	.01	.08	2	<5	2	<1
CRA 11849	1	9	6	42	.1	12	5	299	2.40	3	<5	<2	3	17	.9	<2	<2	33	.18	.106	15	22	.24	95	.06	5	1.65	.01	.07	1	<5	<1	1
CRA 11850	1	7	8	38	.2	8	4	496	2.07	2	<5	<2	2	12	.2	<2	<2	31	.11	.047	17	19	.21	103	.06	5	1.13	.01	.06	2	<5	<1	<1
CRA 11851	<1	14	10	36	<.1	14	3	131	2.39	4	<5	<2	3	17	<.2	<2	<2	42	.15	.022	23	26	.31	81	.08	4	1.75	.01	.07	1	<5	<1	<1
CRA 11852	1	14	8	39	<.1	18	7	260	2.82	2	<5	<2	5	14	<.2	<2	<2	43	.14	.063	19	30	.38	90	.08	5	2.00	.01	.07	2	<5	<1	<1
CRA 11853	<1	8	3	40	<.1	14	5	281	2.23	2	<5	<2	2	13	.2	<2	<2	30	.13	.062	15	21	.24	100	.06	5	1.38	<.01	.06	1	<5	<1	<1
CRA 11854	1	7	8	38	<.1	12	4	656	2.29	2	<5	<2	3	18	<.2	<2	<2	30	.20	.073	18	20	.26	176	.06	5	1.40	.01	.07	1	<5	<1	<1
CRA 11855	1	6	11	50	.1	14	5	291	2.29	<2	<5	<2	3	20	<.2	<2	<2	32	.22	.087	16	22	.28	135	.07	3	1.65	.01	.07	1	<5	<1	<1
CRA 11856	<1	6	7	52	.1	9	4	417	2.11	<2	<5	<2	3	17	.6	<2	<2	31	.11	.040	15	20	.24	121	.07	4	1.25	.01	.05	1	<5	<1	<1
CRA 11857	<1	6	3	43	.1	11	5	283	2.12	<2	<5	<2	3	16	<.2	<2	<2	28	.12	.058	16	19	.25	106	.06	4	1.20	.01	.07	1	<5	<1	<1
CRA 11858	<1	7	8	25	<.1	9	2	59	.81	<2	<5	<2	<2	8	.3	<2	<2	16	.07	.042	14	19	.19	48	.04	3	1.24	<.01	.06	<1	<5	<1	2
STANDARD C	19	66	36	136	7.0	72	32	1089	4.09	43	21	7	38	53	19.6	14	21	58	.51	.086	42	63	.92	189	.10	34	1.94	.06	.15	10	<5	3	16

ICP - .500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
 THIS LEACH IS PARTIAL FOR MN FE SR CA P LA CR MG BA TI B W AND LIMITED FOR NA K AND AL
 - SAMPLE TYPE: -200 SOIL Samples beginning 'RE' are duplicate samples.

DATE RECEIVED: AUG 4 1993 DATE REPORT MAILED: Aug 9/93 SIGNED BY: C. Leong, D. TOYE, C. LEONG, J. WANG; CERTIFIED B.C. ASSAYERS

3.5-32-11



BHP Minerals International (WI) PROJECT 4071 FILE # 93-1809

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AA ANALYTICAL

SAMPLE#	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Tl	Hg	Sn
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%	ppm	%	%	%	%	%	ppm	ppm	ppm	ppm
CRA 11859	<1	5	5	18	<.1	6	1	76	.59	<2	<5	<2	<2	11	<.2	<2	<2	10	.09	.027	13	10	.11	85	.02	3	.69	<.01	.05	<1	<5	<1	1
CRA 11860	1	12	6	31	.1	18	5	216	2.18	4	<5	<2	5	12	<.2	<2	<2	34	.11	.015	17	23	.34	67	.08	<2	1.31	<.01	.05	1	<5	<1	<1
CRA 11861	<1	8	6	35	.1	11	4	431	2.10	<2	<5	<2	<2	12	<.2	<2	3	29	.12	.032	16	19	.25	74	.05	3	1.19	<.01	.05	<1	<5	<1	<1
CRA 11862	<1	28	7	90	<.1	14	5	169	2.18	<2	<5	<2	4	10	.2	<2	32	.09	.012	17	23	.34	57	.08	2	1.21	<.01	.05	<1	<5	<1	<1	
CRA 11863	<1	11	6	31	<.1	16	4	215	2.22	<2	<5	<2	5	12	<.2	<2	<2	34	.11	.014	17	25	.35	65	.08	3	1.32	<.01	.05	<1	<5	<1	<1
CRA 11864	1	12	7	67	.1	18	4	556	1.72	<2	<5	<2	3	9	<.2	<2	<2	27	.07	.029	17	25	.28	110	.07	4	1.74	.01	.06	<1	<5	<1	<1
RE CRA 11864	<1	13	8	66	.1	18	4	559	1.71	<2	<5	<2	3	8	<.2	<2	<2	27	.07	.028	16	25	.28	111	.07	2	1.74	<.01	.06	<1	<5	<1	<1
CRA 11865	1	17	21	61	<.1	17	6	447	2.29	<2	<5	<2	4	19	<.2	<2	2	34	.18	.117	17	24	.34	121	.06	3	1.43	<.01	.09	1	<5	<1	18
CRA 11866	1	10	8	52	.1	15	5	1473	2.32	<2	<5	<2	3	17	<.2	<2	2	33	.20	.077	17	22	.33	135	.06	3	1.52	.01	.09	1	<5	<1	<1
CRA 11867	<1	8	9	31	<.1	13	3	115	1.32	<2	<5	<2	<2	11	.2	<2	<2	20	.09	.039	19	17	.28	76	.05	5	1.31	<.01	.06	<1	<5	<1	<1
CRA 11868	1	10	8	35	<.1	13	4	228	1.74	4	<5	<2	2	9	<.2	<2	<2	27	.08	.029	19	21	.32	70	.06	4	1.43	<.01	.05	<1	<5	1	<1
CRA 11869	<1	9	2	39	<.1	12	4	236	1.85	3	<5	<2	<2	9	<.2	<2	2	26	.08	.034	16	22	.28	60	.05	2	1.45	.01	.05	<1	<5	1	<1
CRA 11870	<1	6	4	41	.1	7	3	147	2.04	<2	<5	<2	<2	10	<.2	<2	<2	25	.10	.030	15	16	.20	73	.05	2	1.20	<.01	.05	1	<5	<1	1
CRA 11871	<1	8	6	32	<.1	11	4	193	1.90	<2	<5	<2	2	10	.4	<2	<2	28	.09	.026	15	19	.27	62	.06	<2	1.25	<.01	.05	<1	<5	<1	<1
CRA 11872	1	9	7	34	.1	14	4	167	2.50	<2	<5	<2	3	12	<.2	<2	3	37	.11	.025	18	24	.30	66	.07	3	1.53	<.01	.05	<1	<5	<1	<1
CRA 11873	<1	11	7	26	<.1	10	6	247	2.11	<2	<5	<2	5	10	<.2	<2	2	35	.10	.016	18	24	.31	54	.08	<2	1.16	<.01	.05	<1	<5	<1	<1
CRA 11874	<1	6	5	35	<.1	9	4	156	2.09	<2	<5	<2	3	7	<.2	<2	<2	31	.06	.028	14	21	.28	62	.06	<2	1.44	<.01	.05	<1	<5	<1	<1
CRA 11875	<1	25	7	36	.1	38	8	343	2.94	3	<5	<2	6	15	<.2	<2	<2	43	.40	.029	20	33	.59	50	.10	6	1.40	.01	.08	1	<5	<1	<1
CRA 11876	<1	11	7	24	<.1	13	3	102	1.74	2	<5	<2	2	14	<.2	<2	<2	32	.13	.011	46	29	.31	78	.08	3	1.51	.01	.05	<1	<5	1	<1
CRA 11877	<1	4	4	34	<.1	7	2	156	1.04	<2	<5	<2	2	10	.4	<2	<2	17	.11	.017	15	16	.21	60	.06	<2	.93	<.01	.05	1	<5	<1	<1
CRA 11879	<1	13	3	43	.1	12	5	329	2.25	<2	<5	<2	2	16	<.2	<2	<2	33	.18	.031	18	24	.31	90	.06	<2	1.41	.01	.07	1	<5	<1	<1
CRA 11880	<1	10	4	39	.1	13	4	186	2.33	2	<5	<2	3	12	<.2	<2	<2	33	.13	.036	19	23	.29	63	.07	3	1.33	.01	.06	<1	<5	<1	<1
CRA 11881	<1	9	6	44	.1	9	3	142	2.34	2	<5	<2	2	14	<.2	<2	<2	30	.17	.048	17	20	.26	74	.06	2	1.24	<.01	.06	1	<5	<1	<1
CRA 11882	<1	8	9	36	.1	8	3	129	1.75	4	<5	<2	2	11	<.2	<2	2	26	.10	.021	16	18	.26	60	.06	3	1.09	<.01	.05	<1	<5	<1	<1
CRA 11883	1	12	8	37	.1	14	4	255	1.97	5	<5	<2	2	11	<.2	<2	<2	30	.10	.036	19	22	.32	70	.06	<2	1.60	<.01	.06	<1	<5	<1	<1
CRA 11884	<1	6	7	41	.1	11	4	250	2.12	<2	<5	<2	2	12	<.2	2	4	27	.12	.069	15	18	.24	92	.05	2	1.16	<.01	.06	1	<5	<1	<1
CRA 11885	<1	7	3	41	.1	14	4	158	2.29	<2	<5	<2	3	11	.2	<2	<2	31	.11	.043	15	22	.28	72	.06	<2	1.61	<.01	.05	<1	<5	<1	<1
CRA 11886	<1	7	7	54	<.1	9	6	231	2.39	3	<5	<2	3	12	<.2	<2	<2	32	.12	.073	15	21	.27	95	.06	5	1.53	<.01	.06	<1	<5	<1	<1
CRA 11887	<1	7	11	44	.1	14	5	179	2.44	4	<5	<2	4	10	.2	2	<2	32	.09	.071	16	22	.27	74	.06	4	1.52	<.01	.08	<1	<5	<1	<1
CRA 11888	<1	10	6	37	<.1	16	5	166	2.28	<2	<5	<2	4	10	.2	<2	<2	34	.09	.022	17	24	.33	61	.08	3	1.49	<.01	.05	1	<5	<1	<1
CRA 11889	<1	8	8	41	.1	12	5	170	2.20	<2	<5	<2	2	18	<.2	<2	<2	31	.18	.048	16	21	.29	80	.06	2	1.38	<.01	.05	1	<5	1	<1
CRA 11890	<1	11	8	43	.1	14	5	153	3.01	<2	<5	<2	3	14	<.2	<2	<2	40	.14	.074	17	26	.32	82	.07	<2	1.71	<.01	.07	<1	<5	<1	<1
CRA 11891	<1	17	10	30	.1	26	6	170	2.24	4	<5	<2	5	15	<.2	<2	<2	41	.15	.017	23	27	.37	56	.09	<2	1.32	<.01	.06	1	<5	<1	<1
CRA 11892	1	10	12	39	.1	12	5	102	2.32	2	<5	<2	3	13	<.2	<2	<2	31	.11	.035	16	23	.23	71	.05	2	1.97	<.01	.06	1	<5	<1	<1
CRA 11893	1	11	4	38	.1	11	4	147	2.07	<2	<5	<2	2	11	<.2	<2	<2	31	.10	.021	18	24	.31	58	.07	<2	1.43	.01	.05	<1	<5	<1	<1
CRA 11894	1	12	9	56	<.1	27	7	300	2.86	6	<5	<2	4	11	<.2	<2	<2	44	.11	.042	20	28	.35	70	.08	2	1.85	.01	.07	<1	<5	<1	<1
CRA 11895	<1	7	7	41	<.1	11	4	126	2.65	3	<5	<2	2	10	<.2	<2	<2	34	.08	.038	13	21	.26	70	.06	2	1.68	<.01	.06	<1	<5	<1	<1
STANDARD C	17	61	35	125	6.6	63	29	999	3.96	38	18	6	35	55	17.8	14	21	53	.52	.086	38	56	.91	192	.09	32	1.88	.06	.14	11	<5	1	16

Sample type: -200 SOIL. Samples beginning 'RE' are duplicate samples.

3.5-32-12



SAMPLE#	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Tl	Hg	Sn
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%	ppm	%	%	%	%	%	ppm	ppm	ppm	ppm
CRA 11896	1	4	8	23	<.1	6	2	79	1.91	<2	<5	<2	3	9	<.2	<2	<2	28	.08	.023	14	15	.13	58	.06	<2	1.40	<.01	.05	1	<5	<1	<1
CRA 11897	1	8	8	38	<.1	14	4	185	2.49	2	<5	<2	4	10	.2	<2	2	37	.08	.027	15	25	.30	82	.08	2	1.94	.01	.06	1	<5	1	<1
CRA 11898	<1	18	10	23	<.1	64	5	428	2.02	4	<5	<2	4	19	<.2	<2	<2	42	.22	.030	45	41	.33	89	.10	<2	1.81	.01	.07	<1	<5	<1	<1
CRA 11899	1	9	10	16	<.1	14	2	58	3.01	22	<5	<2	3	28	.5	<2	<2	76	.81	.057	32	149	.26	179	.06	4	2.73	.01	.07	2	<5	<1	<1
CRA 11900	1	5	6	29	<.1	15	4	114	1.81	<2	<5	<2	4	12	<.2	<2	<2	28	.16	.016	15	23	.37	60	.10	2	1.43	.01	.04	1	<5	<1	<1
CRA 11901	1	17	6	57	.1	39	6	330	1.20	5	8	<2	2	34	.6	<2	2	37	1.87	.042	12	46	.44	69	.05	5	.91	.01	.05	<1	<5	<1	3
CRA 11902	1	8	7	18	.1	13	6	97	3.48	<2	<5	<2	7	9	.7	<2	<2	42	.11	.037	13	38	.14	78	.08	6	4.29	.01	.06	<1	<5	<1	<1
CRA 11904	1	7	7	28	<.1	15	4	121	2.53	3	<5	<2	4	13	.4	<2	<2	40	.11	.020	14	24	.26	73	.08	<2	1.83	<.01	.05	1	<5	<1	<1
CRA 11905	<1	9	4	21	<.1	14	5	139	2.13	<2	<5	<2	6	16	<.2	<2	<2	30	.16	.005	21	26	.37	60	.10	<2	1.21	.01	.04	<1	<5	<1	<1
CRA 11906	<1	8	8	38	<.1	36	3	109	.97	<2	<5	<2	3	24	.4	<2	<2	20	.46	.029	18	20	.34	61	.10	5	1.08	.01	.05	<1	<5	<1	1
CRA 11907	<1	12	10	62	.1	11	6	619	1.09	<2	<5	<2	<2	33	.7	<2	<2	20	.56	.069	37	20	.21	153	.02	4	1.31	.01	.06	<1	<5	<1	2
CRA 11908	<1	5	7	27	.1	3	1	64	.55	<2	<5	<2	2	11	<.2	<2	<2	15	.09	.010	17	11	.15	53	.07	3	.81	.01	.04	1	<5	<1	<1
CRA 11909	1	14	7	47	<.1	15	4	286	2.30	3	<5	<2	2	18	.2	<2	2	39	.16	.030	19	27	.33	112	.08	4	1.73	.01	.08	1	<5	<1	<1
CRA 11910	1	13	9	52	.1	15	5	452	2.55	<2	<5	<2	2	15	<.2	<2	<2	37	.13	.054	19	27	.29	104	.06	5	2.06	.01	.10	1	<5	<1	<1
CRA 11911	1	7	7	52	.1	13	4	256	2.17	3	<5	<2	2	14	<.2	<2	<2	32	.13	.058	17	21	.25	90	.06	2	1.56	.01	.07	1	<5	<1	1
CRA 11912	1	11	8	48	<.1	17	6	231	2.56	<2	<5	<2	4	15	<.2	<2	<2	38	.14	.045	20	27	.39	95	.09	4	1.77	.01	.07	1	<5	<1	<1
CRA 11913	<1	12	7	56	<.1	16	5	258	2.41	3	<5	<2	3	17	.4	<2	<2	36	.16	.058	21	25	.34	110	.08	2	1.95	.01	.09	<1	<5	<1	<1
CRA 11914	1	13	10	50	<.1	16	5	245	2.16	4	<5	<2	3	14	.7	<2	<2	34	.14	.049	20	25	.32	98	.06	4	2.11	.01	.08	1	<5	1	<1
CRA 11915	1	13	5	46	.1	15	5	571	2.37	<2	<5	<2	3	17	<.2	<2	<2	36	.15	.046	24	25	.31	101	.07	4	1.84	.01	.08	1	<5	<1	<1
CRA 11916	1	10	9	48	.1	16	5	780	1.81	3	<5	<2	2	17	.4	<2	<2	31	.17	.034	20	25	.30	96	.07	4	1.55	.01	.07	<1	<5	<1	<1
RE CRA 11916	1	9	8	49	.1	12	5	798	1.86	<2	<5	<2	2	17	.2	<2	<2	32	.17	.035	20	23	.31	100	.07	<2	1.59	.01	.07	1	<5	<1	<1
CRA 11917	1	7	8	40	<.1	7	3	272	2.01	<2	<5	<2	2	16	<.2	<2	<2	30	.17	.045	17	18	.21	113	.07	4	.99	.01	.07	1	<5	<1	<1
CRA 11918	<1	14	8	27	<.1	11	3	95	1.61	2	<5	<2	5	14	<.2	<2	<2	29	.12	.016	31	22	.28	66	.09	3	1.29	.01	.05	<1	<5	<1	<1
CRA 11919	1	7	10	30	.2	7	2	48	.59	<2	<5	<2	<2	10	<.2	<2	<2	17	.06	.113	18	19	.14	59	.03	4	1.89	.01	.09	1	<5	1	2
CRA 11920	1	15	5	48	.1	15	6	309	2.16	<2	<5	<2	2	16	.3	<2	<2	34	.13	.038	20	24	.31	116	.06	2	2.13	.01	.08	<1	<5	<1	<1
CRA 11920 (A)	<1	15	13	48	<.1	20	5	285	2.28	<2	<5	<2	3	17	<.2	<2	3	37	.15	.039	21	28	.38	107	.07	5	2.19	.01	.09	1	<5	1	<1
CRA 11921	<1	27	11	37	<.1	21	8	337	2.72	7	<5	<2	5	17	<.2	<2	<2	45	.20	.041	24	29	.43	96	.09	2	2.04	.01	.08	1	<5	<1	<1
CRA 11922	1	9	10	51	.1	11	5	169	2.65	4	<5	<2	2	15	.4	<2	<2	36	.15	.047	16	22	.28	123	.07	3	1.67	.01	.08	1	<5	<1	1
CRA 11923	1	10	8	45	.1	13	6	318	2.27	<2	<5	<2	3	17	.3	<2	<2	35	.17	.043	17	24	.31	99	.07	3	1.60	.01	.07	1	<5	<1	<1
CRA 11924	<1	7	9	45	<.1	9	2	69	.88	<2	<5	<2	<2	10	.2	<2	2	19	.08	.045	16	18	.19	60	.06	5	1.38	<.01	.09	<1	<5	<1	<1
CRA 11925	1	3	9	28	<.1	1	1	34	.25	<2	<5	<2	<2	7	<.2	<2	<2	10	.04	.020	16	9	.08	38	.03	3	.74	<.01	.07	<1	<5	<1	1
CRA 11926	1	9	9	33	.1	16	3	133	1.42	<2	<5	<2	3	10	<.2	<2	<2	27	.08	.023	16	25	.26	47	.07	4	1.76	<.01	.07	1	<5	<1	<1
CRA 11927	<1	18	12	37	.1	36	6	245	1.99	7	<5	<2	7	20	.2	<2	<2	40	.18	.027	30	29	.38	100	.09	6	1.65	.01	.09	1	<5	<1	<1
CRA 11928	1	9	6	38	.3	15	4	107	1.93	<2	<5	<2	4	10	<.2	<2	<2	27	.09	.014	17	22	.30	62	.08	5	1.57	.01	.05	<1	<5	1	<1
CRA 11929	1	8	8	44	<.1	14	4	151	2.40	3	<5	<2	2	10	.3	<2	<2	36	.09	.026	16	23	.28	51	.07	4	1.65	.01	.06	1	<5	1	<1
CRA 11930	1	17	11	33	<.1	14	5	155	2.51	<2	<5	<2	4	13	<.2	<2	<2	41	.10	.018	16	28	.39	91	.10	3	2.10	.01	.07	<1	<5	<1	<1
CRA 11931	<1	7	3	44	.1	16	5	195	2.11	<2	<5	<2	2	21	.2	<2	<2	37	.19	.021	16	24	.30	113	.08	4	1.65	.01	.06	1	<5	1	<1
STANDARD C	17	60	34	125	6.3	65	29	1005	3.96	41	17	6	36	52	18.4	14	20	55	.52	.086	39	57	.91	195	.09	33	1.82	.06	.14	11	<5	1	17

Sample type: -200 SOIL. Samples beginning 'RE' are duplicate samples.

3.5-32-13



BHP Minerals International (WI) PROJECT 4071 FILE # 93-1809

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SAMPLE#	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Tl	Hg	Sn
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%	ppm	%	%	%	%	%	ppm	ppm	ppm	ppm
CRA 11932	1	9	5	37	.1	13	5	181	1.75	4	<5	<2	<2	14	<.2	<2	<2	27	.14	.059	17	22	.25	94	.05	2	1.67	.01	.06	1	<5	<1	<1
CRA 11933	<1	6	6	41	.1	15	6	192	2.31	4	<5	<2	2	11	<.2	2	<2	32	.10	.037	12	23	.26	128	.07	4	1.79	.01	.06	1	<5	<1	<1
CRA 11934	<1	8	8	41	<.1	13	4	181	1.51	4	<5	<2	2	11	<.2	<2	<2	23	.10	.048	16	19	.24	77	.05	3	1.29	.01	.06	1	<5	1	<1
CRA 11935	<1	9	9	35	.1	14	5	165	2.49	2	<5	<2	3	14	<.2	<2	<2	35	.15	.063	14	22	.29	88	.06	<2	1.45	<.01	.05	1	<5	<1	<1
CRA 11936	<1	10	8	38	<.1	13	5	368	2.30	6	<5	<2	<2	10	<.2	<2	<2	34	.08	.037	17	22	.29	65	.06	3	1.35	.01	.05	1	<5	<1	<1
CRA 11937	<1	13	7	47	<.1	12	5	232	2.86	5	<5	<2	3	14	<.2	<2	<2	37	.16	.050	14	24	.33	78	.07	5	1.44	<.01	.06	1	<5	<1	<1
CRA 11938	<1	8	5	47	<.1	13	4	179	2.44	2	<5	<2	3	10	<.2	<2	<2	34	.09	.036	15	22	.30	64	.06	3	1.39	<.01	.05	<1	<5	<1	<1
CRA 11939	1	6	8	34	<.1	12	7	235	1.67	6	<5	<2	2	11	<.2	<2	<2	26	.10	.028	16	21	.25	96	.06	2	1.70	.01	.05	<1	<5	<1	<1
CRA 11940	<1	7	10	42	.1	6	4	385	1.68	<2	<5	<2	<2	15	<.2	<2	<2	24	.15	.033	15	15	.16	97	.05	3	.81	<.01	.05	<1	<5	<1	<1
CRA 11941	<1	5	6	41	<.1	8	4	343	1.70	<2	<5	<2	<2	14	<.2	<2	<2	24	.14	.034	16	15	.16	98	.05	3	.80	<.01	.05	1	<5	<1	<1
CRA 11942	<1	4	8	26	<.1	5	1	156	.59	<2	<5	<2	<2	15	<.2	<2	<2	11	.15	.015	15	9	.11	94	.04	3	.46	<.01	.05	1	<5	1	<1
CRA 11943	<1	7	<2	37	<.1	10	4	692	1.66	<2	<5	<2	2	14	<.2	<2	<2	26	.14	.031	13	17	.22	194	.05	<2	.91	<.01	.05	<1	<5	<1	<1
CRA 11944	<1	8	10	48	<.1	12	6	419	2.18	4	<5	<2	3	18	<.2	<2	<2	31	.20	.080	15	22	.30	148	.06	2	1.46	.01	.06	1	<5	<1	<1
CRA 11945	1	15	12	41	.1	15	6	560	1.99	5	<5	<2	<2	18	<.2	<2	<2	32	.16	.027	17	23	.26	122	.05	<2	1.81	.01	.07	<1	<5	<1	<1
CRA 11946	<1	8	11	37	<.1	16	6	629	2.01	<2	<5	<2	2	12	.2	<2	2	29	.10	.019	15	23	.30	80	.06	3	1.44	.01	.06	1	<5	<1	<1
CRA 11947	<1	8	9	38	<.1	14	4	165	1.79	7	<5	<2	3	10	<.2	<2	<2	26	.08	.014	16	20	.25	80	.07	2	1.37	<.01	.05	1	<5	<1	<1
CRA 11948	<1	13	7	42	<.1	20	6	235	2.43	5	<5	<2	4	16	<.2	<2	<2	34	.12	.020	19	27	.37	96	.07	2	1.76	.01	.06	1	<5	<1	<1
CRA 11949	<1	7	8	33	<.1	12	4	96	1.73	<2	<5	<2	3	11	<.2	<2	<2	26	.09	.012	15	20	.27	71	.06	<2	1.30	.01	.04	1	<5	<1	<1
CRA 11950	1	8	18	33	<.1	22	5	112	2.47	5	<5	<2	4	13	<.2	2	<2	36	.11	.022	20	25	.28	96	.06	2	1.86	<.01	.05	1	<5	<1	<1
CRA 11951	<1	9	8	21	<.1	12	4	100	2.25	5	<5	<2	4	13	<.2	<2	<2	35	.12	.011	17	22	.24	72	.07	<2	1.44	.01	.04	<1	<5	<1	<1
RE CRA 11951	<1	8	8	20	<.1	17	3	102	2.25	<2	<5	<2	4	13	<.2	<2	<2	35	.12	.011	16	22	.24	71	.07	2	1.42	.01	.04	<1	<5	<1	<1
CRA 11952	1	14	11	30	<.1	13	5	95	1.91	3	<5	<2	2	19	<.2	<2	<2	31	.14	.019	23	22	.28	128	.06	<2	1.57	.01	.06	<1	<5	<1	<1
CRA 11953	<1	12	10	19	<.1	12	3	70	1.59	3	<5	<2	3	10	<.2	<2	<2	26	.07	.013	28	18	.22	65	.05	2	1.29	<.01	.04	<1	<5	<1	<1
CRA 11954	<1	8	8	42	<.1	12	4	189	1.88	2	<5	<2	3	11	<.2	<2	<2	26	.10	.028	15	19	.24	82	.06	3	1.36	<.01	.05	1	<5	<1	<1
CRA 11955	<1	10	4	31	<.1	15	5	197	2.21	2	<5	<2	4	13	<.2	<2	<2	35	.12	.022	14	24	.32	74	.07	4	1.30	<.01	.04	<1	<5	<1	<1
CRA 11956	<1	4	8	24	<.1	5	3	142	1.58	2	<5	<2	2	11	<.2	<2	<2	21	.11	.039	12	12	.13	66	.05	2	.91	<.01	.05	1	<5	<1	<1
CRA 11957	<1	10	13	38	<.1	11	5	649	2.08	<2	<5	<2	<2	20	<.2	<2	<2	30	.20	.046	19	19	.22	119	.05	4	1.27	.01	.06	<1	<5	<1	<1
CRA 11958	<1	6	7	33	<.1	10	4	293	2.03	5	<5	<2	<2	18	<.2	<2	<2	30	.17	.036	13	18	.20	107	.05	4	.94	.01	.05	1	<5	<1	<1
CRA 11959	<1	11	10	19	<.1	18	3	76	1.00	<2	<5	<2	<2	15	<.2	<2	<2	18	.17	.028	20	18	.22	55	.05	3	1.56	.01	.05	<1	<5	<1	1
CRA 11960	<1	<1	7	5	<.1	3	1	36	.23	5	<5	<2	<2	7	<.2	<2	<2	7	.05	.009	14	5	.05	33	.03	<2	.48	.01	.03	<1	<5	<1	<1
CRA 11961	1	6	4	31	<.1	8	2	114	2.23	5	<5	<2	2	9	<.2	<2	<2	41	.07	.038	12	17	.16	54	.07	4	1.02	.01	.06	<1	<5	<1	<1
CRA 11962	<1	12	11	14	.1	11	3	89	.94	<2	<5	<2	<2	22	<.2	<2	2	21	.20	.028	32	19	.13	88	.04	<2	1.18	.01	.04	<1	<5	<1	<1
CRA 11963	<1	21	7	31	<.1	15	5	120	1.51	<2	<5	<2	4	16	<.2	<2	<2	38	.42	.038	20	31	.33	37	.08	2	.85	.01	.06	<1	<5	<1	<1
CRA 11964	1	11	6	32	.1	16	3	162	1.00	3	5	<2	<2	22	<.2	<2	3	20	1.23	.028	10	23	.35	36	.05	5	.57	.04	.03	<1	<5	1	2
CRA 11965	<1	13	4	26	<.1	12	2	145	1.25	3	<5	<2	<2	24	.2	<2	<2	52	.95	.049	23	34	.32	66	.03	5	1.13	.01	.05	<1	<5	<1	2
CRA 11966	<1	50	8	26	.1	21	5	122	1.74	3	7	<2	5	22	<.2	<2	<2	41	.84	.036	57	198	.42	81	.05	4	1.67	.01	.07	<1	<5	<1	<1
CRA 11967	<1	14	14	27	<.1	15	4	93	1.40	4	<5	<2	<2	23	<.2	<2	<2	30	.79	.033	18	40	.32	69	.05	<2	1.20	.01	.04	1	<5	<1	1
STANDARD C	17	63	34	122	6.8	64	30	1085	3.96	43	18	6	33	53	17.1	14	16	52	.51	.086	37	57	.90	188	.09	32	1.88	.05	.13	11	<5	2	16

Sample type: -200 SOIL. Samples beginning 'RE' are duplicate samples.

3.5-32-14



SAMPLE#	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	V	Tl	Hg	Sn
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%	ppm	%	ppm	%	%	%	%	ppm	ppm	ppm	ppm
CRA 11968	1	10	12	70	.1	14	5	887	2.19	<2	<5	<2	<2	22	<2	<2	2	33	.27	.053	14	22	.22	190	.05	4	1.61	.01	.07	1	<5	<1	<1
CRA 11969	1	9	9	38	<.1	16	5	391	2.67	<2	<5	<2	4	17	<.2	<2	<2	39	.17	.052	15	26	.29	104	.07	<2	1.30	.01	.07	<1	<5	<1	<1
CRA 11970	1	3	6	16	.1	7	6	362	1.30	<2	<5	<2	2	15	<.2	<2	<2	21	.11	.026	15	11	.08	85	.05	2	.59	.01	.05	1	<5	<1	<1
CRA 11971	<1	6	5	44	.1	14	4	184	2.40	<2	<5	<2	4	13	.7	<2	<2	36	.12	.074	16	22	.26	87	.07	5	1.41	.01	.07	1	<5	1	<1
CRA 11972	<1	7	9	42	.1	11	4	607	1.68	<2	<5	<2	<2	21	.7	<2	<2	24	.22	.041	17	16	.20	161	.05	2	1.00	.01	.06	<1	<5	1	<1
CRA 11973	1	7	3	21	.1	7	3	489	1.25	<2	<5	<2	<2	10	<.2	<2	<2	19	.10	.024	16	12	.10	60	.05	<2	.77	.01	.05	1	<5	<1	<1
CRA 11974	1	9	6	35	.1	17	4	102	1.60	<2	<5	<2	2	12	.3	<2	4	28	.11	.032	16	22	.27	84	.07	4	1.63	.01	.07	<1	<5	<1	<1
CRA 11975	1	10	9	32	.1	16	3	84	1.56	<2	<5	<2	<2	12	<.2	<2	<2	31	.09	.030	23	22	.24	102	.05	<2	1.99	.01	.07	1	<5	<1	<1
CRA 11976	1	8	10	34	<.1	18	5	134	2.14	<2	<5	<2	3	12	<.2	<2	<2	35	.09	.022	21	25	.28	84	.08	3	1.76	.01	.06	<1	<5	<1	<1
CRA 11977	<1	10	4	49	<.1	14	5	272	1.70	2	<5	<2	3	11	.4	<2	<2	27	.10	.031	17	23	.30	77	.07	2	1.63	.01	.07	<1	<5	<1	<1
CRA 11978	1	6	12	41	.1	9	3	106	1.80	4	<5	<2	2	14	.4	<2	<2	28	.10	.098	15	19	.20	92	.06	2	1.61	<.01	.08	<1	<5	<1	<1
CRA 11979	<1	5	12	22	<.1	6	1	38	.44	2	<5	<2	<2	12	<.2	<2	<2	13	.09	.026	14	13	.10	48	.03	5	.93	.01	.08	<1	<5	<1	2
CRA 11980	<1	5	11	21	.1	9	2	34	.46	<2	<5	<2	<2	6	<.2	<2	<2	13	.05	.046	12	16	.11	31	.03	2	1.33	<.01	.06	<1	<5	<1	2
CRA 11981	<1	9	11	24	.1	9	1	53	.53	<2	<5	<2	<2	16	<.2	<2	<2	13	.16	.038	21	16	.15	94	.04	2	1.00	<.01	.06	<1	<5	<1	1
CRA 11982	<1	21	10	36	.1	14	4	105	2.13	<2	<5	<2	2	23	.4	<2	3	36	.23	.059	46	28	.33	127	.06	3	1.76	.01	.06	1	<5	1	<1
CRA 11983	<1	9	8	29	<.1	13	5	280	2.24	3	<5	<2	3	15	<.2	<2	<2	35	.13	.034	18	23	.29	72	.07	<2	1.22	.01	.06	1	<5	<1	<1
CRA 11984	<1	30	5	42	<.1	26	10	444	3.44	7	<5	<2	8	19	.6	<2	<2	53	.27	.082	24	39	.59	114	.12	4	2.86	.01	.16	1	<5	<1	<1
CRA 11985	<1	3	7	9	<.1	3	1	18	.13	3	<5	<2	<2	16	<.2	<2	<2	5	.07	.037	18	6	.04	79	.01	2	.49	<.01	.05	<1	<5	1	1
RE CRA 11985	<1	4	7	8	<.1	3	1	15	.12	<2	<5	<2	<2	16	<.2	<2	<2	5	.07	.038	17	6	.03	78	.01	3	.48	<.01	.05	<1	<5	<1	1
CRA 11986	<1	2	6	19	<.1	2	1	31	.13	3	<5	<2	<2	11	<.2	<2	<2	5	.08	.024	15	5	.04	53	.01	2	.32	.01	.05	<1	<5	<1	1
CRA 11987	<1	9	6	48	.1	19	6	399	2.19	3	<5	<2	4	22	.7	<2	<2	36	.19	.051	17	25	.33	133	.08	3	1.63	.01	.07	<1	<5	1	<1
CRA 11988	<1	6	10	40	<.1	8	4	420	1.98	<2	<5	<2	3	14	<.2	2	<2	30	.13	.045	17	18	.21	97	.07	2	1.01	.01	.06	1	<5	1	<1
CRA 11989	<1	6	10	40	<.1	8	4	244	1.89	<2	<5	<2	2	16	<.2	<2	<2	27	.15	.047	17	18	.20	122	.06	2	1.32	.01	.07	<1	<5	<1	<1
CRA 11990	<1	6	10	26	.1	7	2	50	.65	2	<5	<2	<2	11	<.2	<2	<2	16	.08	.029	16	14	.15	66	.03	3	1.15	.01	.08	<1	<5	<1	1
CRA 11991	1	9	9	41	<.1	15	4	104	2.46	<2	<5	<2	2	12	<.2	<2	<2	38	.10	.035	18	28	.33	89	.05	5	2.15	.01	.08	1	<5	<1	<1
CRA 11992	<1	12	4	33	<.1	19	6	186	2.19	3	<5	<2	7	15	.2	<2	<2	37	.12	.014	23	27	.39	66	.11	4	1.36	.01	.06	<1	<5	<1	<1
CRA 11993	1	9	20	45	<.1	13	6	627	2.14	2	<5	<2	3	15	.2	<2	<2	35	.16	.044	15	23	.31	112	.07	4	1.31	.01	.07	1	<5	1	<1
CRA 11994	1	12	9	93	<.1	16	7	1216	2.28	2	<5	<2	2	22	.6	<2	<2	34	.28	.065	14	23	.32	220	.06	2	1.49	.01	.07	<1	<5	<1	<1
CRA 11995	<1	9	12	66	<.1	12	5	1593	2.02	<2	<5	<2	<2	19	<.2	<2	<2	29	.21	.045	16	20	.27	172	.05	3	1.35	.01	.09	1	<5	<1	1
CRA 11996	<1	8	11	63	.1	10	5	3728	1.60	<2	<5	<2	<2	24	.7	<2	<2	21	.26	.059	16	15	.17	274	.04	3	1.10	.01	.10	1	<5	<1	1
CRA 11997	1	9	9	80	.1	13	4	313	1.46	<2	<5	<2	<2	11	<.2	<2	<2	25	.08	.059	17	23	.28	138	.05	6	2.08	.01	.09	<1	<5	<1	<1
CRA 11998	<1	16	6	33	<.1	13	6	201	2.12	<2	<5	<2	6	16	.3	<2	2	35	.19	.016	18	27	.43	71	.10	7	1.42	.01	.08	1	<5	<1	<1
CRA 11999	<1	5	13	35	<.1	6	4	384	1.56	<2	<5	<2	2	14	.3	<2	<2	21	.15	.051	15	14	.16	109	.05	4	.88	.01	.08	1	<5	<1	1
CRA 12000	<1	9	7	43	<.1	15	5	268	2.13	5	<5	<2	4	26	<.2	<2	<2	36	.29	.053	16	24	.34	96	.08	5	1.36	.01	.07	<1	<5	1	<1
CRA 12001	<1	4	6	47	<.1	10	3	378	1.79	<2	<5	<2	2	13	<.2	<2	<2	27	.14	.037	17	17	.21	97	.06	3	1.05	.01	.06	<1	<5	<1	<1
CRA 12002	<1	10	7	67	<.1	9	4	1154	1.78	<2	<5	<2	2	16	<.2	<2	<2	24	.15	.049	18	17	.20	206	.05	4	.95	.01	.08	<1	<5	<1	<1
CRA 12003	<1	11	11	51	<.1	13	6	525	2.17	7	<5	<2	2	21	.2	<2	<2	33	.22	.060	17	22	.29	117	.06	4	1.47	.01	.08	1	<5	<1	<1
STANDARD C	17	60	37	125	6.8	65	30	997	3.96	39	20	7	35	56	12.7	14	17	54	.52	.086	38	58	.91	195	.09	33	1.88	.06	.14	11	<5	2	16

Sample type: -200 SOIL. Samples beginning 'RE' are duplicate samples.

3.5-32-15



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SAMPLE#	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Tn	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Tl	Hg	Sn
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%	ppm	%	%	%	%	%	ppm	ppm	ppm	ppm
CRA 12004	<1	12	9	32	<1	13	5	142	2.07	3	<5	<2	5	13	<2	<2	<2	34	.11	.010	21	24	.35	52	.10	<2	1.20	.01	.06	<1	<5	<1	<1
CRA 12005	1	9	7	67	.1	12	3	171	1.29	<2	<5	<2	<2	17	.2	<2	<2	23	.21	.089	14	21	.28	192	.06	4	1.48	.01	.07	<1	<5	1	<1
CRA 12006	<1	8	7	41	.1	6	1	98	.42	<2	<5	<2	<2	13	.2	<2	<2	12	.18	.033	15	13	.12	80	.04	2	.78	.01	.05	1	<5	<1	<1
CRA 12007	1	8	8	49	.1	13	4	178	2.45	5	<5	<2	2	11	<2	<2	<2	32	.11	.054	14	20	.24	80	.07	3	1.20	.01	.06	<1	<5	<1	<1
CRA 12008	1	8	19	25	.1	4	1	105	.71	3	<5	<2	<2	14	<2	<2	<2	10	.21	.039	12	17	.10	49	.03	3	.51	.01	.06	1	<5	<1	2
CRA 12009	1	3	12	19	<1	2	1	43	.17	7	<5	<2	<2	8	<2	<2	<2	8	.09	.014	14	6	.07	28	.03	3	.48	<.01	.06	<1	<5	<1	2
CRA 12010	<1	2	9	14	<1	<1	<1	53	.12	<2	<5	<2	2	7	<2	<2	<2	5	.08	.013	16	5	.03	41	.04	<2	.25	.01	.04	<1	<5	<1	<1
CRA 12011	<1	8	9	44	<1	13	5	124	2.43	<2	<5	<2	<2	12	<2	<2	<2	33	.12	.044	15	21	.29	101	.06	2	1.45	.01	.06	1	<5	<1	<1
CRA 12012	1	9	10	38	<1	12	5	155	2.13	2	<5	<2	2	11	<2	<2	<2	31	.09	.025	15	22	.26	58	.07	4	1.51	.01	.05	<1	<5	<1	<1
CRA 12013	1	12	7	47	<1	14	5	183	2.65	<2	<5	<2	2	14	<2	<2	3	38	.13	.034	17	26	.34	83	.07	5	1.89	.01	.06	<1	<5	<1	<1
CRA 12014	1	11	7	62	<1	18	5	199	1.81	<2	<5	<2	<2	14	.2	<2	<2	31	.14	.068	18	26	.33	84	.07	<2	1.77	.01	.08	<1	<5	<1	<1
CRA 12015	<1	17	11	38	<1	25	8	663	2.57	8	<5	<2	4	14	<2	<2	<2	41	.14	.028	22	30	.41	75	.09	3	1.79	.01	.07	<1	<5	<1	<1
CRA 12016	1	15	5	33	<1	16	6	227	3.25	5	<5	<2	3	14	<2	<2	<2	44	.16	.034	14	29	.40	81	.09	4	2.04	.01	.07	<1	<5	<1	<1
CRA 12017	<1	10	6	24	<1	22	5	235	1.87	<2	<5	<2	4	14	<2	<2	<2	32	.21	.014	19	22	.37	59	.11	2	1.10	.01	.04	<1	<5	<1	<1
CRA 12018	1	16	9	31	<1	10	6	195	2.34	<2	<5	<2	4	15	<2	<2	<2	39	.16	.016	27	25	.39	60	.09	2	1.40	.01	.06	<1	<5	<1	<1
CRA 12019	<1	18	6	31	<1	11	4	110	2.04	<2	<5	<2	2	20	<2	<2	<2	37	.30	.028	40	68	.31	80	.06	3	1.50	.01	.05	1	<5	<1	<1
CRA 12020	<1	18	9	43	<1	17	8	187	2.00	<2	<5	<2	3	16	<2	<2	<2	37	.38	.030	30	28	.40	113	.07	4	1.82	.01	.07	<1	<5	<1	<1
CRA 12021	<1	15	5	33	<1	16	9	273	3.40	12	<5	<2	7	15	<2	<2	<2	66	.38	.021	37	59	.47	82	.10	2	1.61	.01	.07	1	<5	<1	<1
CRA 12022	1	9	8	20	<1	8	2	98	1.94	2	<5	<2	2	13	<2	<2	2	36	.13	.013	20	19	.21	60	.07	<2	1.10	.01	.05	<1	<5	<1	<1
CRA 12023	<1	13	8	28	<1	10	7	183	1.85	2	<5	<2	4	14	.2	<2	<2	33	.26	.017	24	22	.32	80	.06	2	1.18	.01	.05	<1	<5	<1	<1
CRA 12024	<1	13	7	53	<1	13	5	207	1.70	<2	<5	<2	2	12	<2	<2	2	25	.18	.033	17	26	.35	58	.07	2	1.68	.01	.08	<1	<5	<1	<1
CRA 12025	1	9	9	38	.1	14	4	165	2.50	4	<5	<2	4	9	<2	<2	<2	37	.08	.024	14	24	.24	72	.08	4	2.07	.01	.06	<1	<5	<1	<1
CRA 12026	<1	5	10	12	<1	3	1	67	.79	<2	<5	<2	3	9	<2	<2	<2	17	.07	.010	16	9	.08	50	.07	2	.55	<.01	.04	<1	<5	<1	<1
CRA 12027	<1	6	6	35	.1	9	3	154	1.71	<2	<5	<2	<2	12	<2	<2	<2	23	.12	.045	16	17	.22	88	.05	<2	1.16	.01	.07	<1	<5	<1	<1
CRA 12028	1	11	8	42	.1	14	6	218	2.45	3	<5	<2	2	14	<2	<2	<2	39	.16	.032	15	26	.34	87	.08	5	1.65	.01	.07	1	<5	<1	<1
RE CRA 12028	<1	9	9	42	.1	15	5	217	2.44	4	<5	<2	2	13	<2	<2	<2	39	.16	.030	15	25	.34	88	.08	2	1.63	.01	.07	1	<5	<1	<1
CRA 12029	<1	7	5	61	<1	14	4	226	2.18	<2	<5	<2	<2	16	.2	<2	<2	28	.20	.034	15	21	.33	125	.06	<2	1.68	.01	.08	<1	<5	<1	<1
CRA 12030	<1	6	3	78	.1	10	4	251	1.86	<2	<5	<2	2	16	<2	<2	<2	25	.18	.035	15	19	.23	176	.07	2	.94	.01	.06	<1	<5	<1	<1
CRA 12031	<1	9	5	38	<1	14	5	177	2.13	<2	<5	<2	3	10	<2	<2	<2	36	.09	.014	15	24	.32	55	.08	3	1.44	.01	.05	1	<5	<1	<1
CRA 12032	<1	6	8	54	<1	9	5	257	2.06	<2	<5	<2	2	14	<2	<2	<2	27	.14	.043	17	18	.22	76	.06	2	1.23	.01	.07	1	<5	<1	<1
CRA 12033	<1	6	5	46	<1	13	4	179	2.12	<2	<5	<2	2	12	<2	<2	<2	28	.12	.041	16	20	.29	77	.07	<2	1.32	.01	.06	<1	<5	<1	<1
CRA 12034	<1	8	8	42	<1	14	5	149	2.35	<2	<5	<2	3	12	.2	<2	<2	36	.13	.043	16	24	.32	78	.07	<2	1.62	<.01	.07	<1	<5	<1	<1
CRA 12035	<1	8	8	43	<1	9	4	169	2.53	<2	<5	<2	3	12	<2	<2	<2	35	.12	.059	16	22	.27	79	.07	2	1.52	.01	.07	1	<5	<1	<1
CRA 12036	<1	12	7	35	<1	14	5	186	2.32	2	<5	<2	3	11	<2	<2	<2	36	.10	.023	18	24	.35	60	.08	2	1.42	.01	.06	1	<5	<1	<1
CRA 12037	1	18	15	34	<1	17	4	162	2.22	<2	<5	<2	3	14	<2	<2	<2	35	.17	.040	20	26	.42	81	.08	4	1.81	.01	.07	1	<5	<1	<1
CRA 12038	<1	12	10	36	<1	11	5	192	2.00	<2	<5	<2	<2	11	<2	<2	<2	32	.09	.022	16	23	.31	65	.06	<2	1.63	.01	.07	<1	<5	<1	<1
CRA 12039	1	9	7	49	<1	11	3	229	1.96	<2	<5	<2	<2	10	.2	<2	<2	29	.08	.027	15	21	.24	60	.06	<2	1.85	<.01	.06	1	<5	<1	<1
STANDARD C	17	62	35	123	6.8	64	30	988	3.96	37	18	7	34	55	17.8	14	15	53	.52	.086	38	56	.91	193	.09	32	1.88	.06	.14	11	<5	2	16

Sample type: -200 SOIL. Samples beginning 'RE' are duplicate samples.

3.5-32-16



AA ANALYTICAL

BHP Minerals International (WI) PROJECT 4071 FILE # 93-1809

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AA ANALYTICAL

SAMPLE#	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Tl	Hg	Sn
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	%	ppm	ppm	%	ppm	%	%	%	%	%	ppm	ppm	ppm	ppm
CRA 12040	1	13	8	41	.1	13	5	383	2.64	<2	<5	<2	<2	26	.2	<2	<2	33	.33	.076	14	24	.36	107	.07	4	1.61	.01	.08	1	<5	<1	<1
CRA 12041	1	10	6	52	.1	13	4	246	2.40	2	<5	<2	<2	15	.6	<2	<2	35	.16	.044	15	22	.29	105	.07	<2	1.42	.01	.07	1	<5	<1	<1
CRA 12042	<1	12	11	42	<.1	14	4	187	2.34	<2	<5	<2	<2	12	<.2	<2	2	36	.11	.027	17	25	.31	83	.07	3	1.67	<.01	.05	<1	<5	<1	<1
CRA 12043	<1	10	12	51	.1	12	3	133	2.89	3	<5	<2	<2	14	.2	<2	<2	40	.16	.056	16	24	.32	86	.06	2	1.62	.01	.06	1	<5	<1	<1
CRA 12044	1	9	8	38	.1	15	4	153	2.14	3	<5	<2	3	10	.3	2	<2	35	.10	.022	16	22	.30	63	.08	2	1.46	.01	.04	1	<5	<1	<1
CRA 12045	1	12	9	20	.1	10	4	145	1.92	<2	<5	<2	2	11	.2	<2	2	33	.28	.019	21	20	.25	74	.07	5	1.51	.01	.04	<1	<5	1	<1
CRA 12046	1	24	21	82	.2	13	12	2103	3.72	2	<5	<2	<2	15	.7	<2	<2	59	.14	.097	14	30	.24	107	.05	2	1.90	.01	.10	<1	<5	<1	<1
CRA 12047	1	18	25	49	.1	9	7	822	2.35	<2	<5	<2	<2	16	.3	<2	<2	35	.16	.086	11	18	.18	82	.03	3	1.19	.01	.09	1	<5	<1	2
CRA 12048	1	44	12	35	<.1	29	6	256	2.45	2	12	<2	5	22	<.2	<2	<2	99	.64	.050	98	75	.51	159	.07	7	3.32	.03	.08	<1	<5	<1	<1
CRA 12054	<1	5	9	38	<.1	4	1	87	.31	3	<5	<2	<2	13	.2	<2	<2	9	.14	.018	17	11	.09	74	.05	4	.55	.01	.06	<1	<5	1	<1
CRA 12055	<1	12	10	50	.1	19	6	252	2.39	4	<5	<2	4	13	.2	<2	<2	41	.14	.022	19	27	.40	65	.09	4	1.45	.01	.07	1	<5	<1	<1
CRA 12056	<1	11	9	72	.1	10	4	1403	2.24	3	<5	<2	<2	24	.2	<2	<2	34	.27	.052	19	20	.18	178	.06	3	.95	.01	.08	1	<5	<1	<1
CRA 12057	1	9	9	47	.2	14	4	203	2.22	3	<5	<2	2	15	.3	<2	<2	33	.17	.039	17	21	.28	83	.07	5	1.43	.01	.06	<1	<5	1	<1
CRA 12058	<1	10	10	51	<.1	10	3	177	2.39	3	<5	<2	<2	21	<.2	<2	<2	31	.24	.080	15	19	.29	110	.06	<2	1.32	<.01	.08	1	<5	<1	<1
CRA 12059	<1	20	12	50	<.1	15	7	464	2.58	2	<5	<2	5	18	.7	<2	<2	40	.24	.035	22	26	.46	110	.08	4	1.56	.01	.08	2	<5	<1	<1
CRA 12060	<1	9	6	34	.1	11	3	155	2.16	<2	<5	<2	2	13	.6	<2	<2	31	.12	.052	16	20	.26	79	.07	4	1.24	.01	.06	1	<5	<1	<1
CRA 12061	<1	9	9	34	.1	12	2	109	2.54	3	<5	<2	2	12	.2	<2	<2	34	.12	.029	13	20	.22	75	.06	2	1.71	<.01	.06	1	<5	<1	1
CRA 12062	1	9	12	29	<.1	9	3	84	1.76	2	<5	<2	3	10	.5	<2	<2	40	.08	.014	13	21	.22	76	.07	<2	1.89	.01	.05	<1	<5	<1	<1
CRA 12063	<1	7	11	42	.1	11	3	70	.83	<2	<5	<2	<2	13	.3	<2	<2	18	.15	.052	19	20	.24	62	.06	3	1.52	.01	.05	1	<5	<1	1
RE CRA 12063	<1	8	8	41	<.1	9	2	67	.81	<2	<5	<2	<2	12	.6	<2	<2	18	.14	.051	19	20	.23	65	.06	3	1.49	.01	.05	<1	<5	<1	<1
CRA 12064	<1	7	7	36	.1	9	1	52	.67	<2	<5	<2	<2	11	.2	<2	3	15	.09	.026	17	17	.19	56	.04	<2	1.45	.01	.05	<1	<5	<1	<1
CRA 12065	<1	10	8	34	<.1	12	3	109	1.58	<2	<5	<2	2	13	.5	<2	<2	33	.13	.058	16	26	.28	57	.06	3	1.86	<.01	.06	<1	<5	<1	<1
CRA 12066	<1	19	8	32	<.1	14	7	401	2.47	4	<5	<2	6	19	<.2	<2	<2	41	.16	.026	24	27	.34	92	.08	2	1.66	.01	.07	<1	<5	<1	<1
CRA 12067	<1	10	12	35	<.1	12	4	139	1.65	<2	<5	<2	2	10	.2	<2	<2	33	.08	.013	16	22	.31	63	.08	3	1.45	.01	.05	<1	<5	<1	<1
CRA 12068	<1	8	7	38	.1	11	4	115	1.88	<2	<5	<2	2	9	.2	<2	<2	30	.08	.020	17	19	.28	60	.07	<2	1.38	<.01	.05	1	<5	<1	<1
CRA 12069	<1	14	9	38	<.1	11	4	138	1.85	<2	<5	<2	<2	12	<.2	<2	<2	31	.09	.031	17	22	.31	70	.06	3	1.78	.01	.07	<1	<5	<1	<1
CRA 12070	1	8	3	33	.1	10	3	101	1.60	<2	<5	<2	3	10	<.2	<2	<2	28	.08	.015	17	18	.26	58	.07	2	1.35	<.01	.05	1	<5	<1	<1
CRA 12071	1	6	6	27	<.1	6	2	95	2.04	<2	<5	<2	<2	9	.2	<2	<2	28	.08	.020	15	15	.18	45	.07	<2	1.11	<.01	.05	<1	<5	<1	<1
CRA 12072	<1	10	13	29	.1	10	4	144	1.74	<2	<5	<2	2	14	.4	<2	<2	35	.17	.031	22	21	.26	75	.07	2	1.20	.01	.05	1	<5	<1	<1
STANDARD C	18	59	38	127	6.8	66	31	1013	3.96	41	21	6	34	55	19.2	14	21	55	.50	.087	38	57	.94	192	.09	32	1.88	.06	.14	11	<5	1	17

Sample type: -200 SOIL. Samples beginning 'RE' are duplicate samples.

3.5-32-17

**ACME ANALYTICAL LABORATORIES LTD.**

852 E. Hastings St. Vancouver, B.C. Canada V6A 1R6

Phone: (604) 253-3158

Fax: (604) 253-1716

To: Mr. Russ Janeshek.**Date:** Dec 14/93.**Company:** Foth & Van Dyke.**Fax:** 1-414-497-8516.**From:** Clarence Leong**Pages to follow:** 9.

All GCP data are control by our internal standard call standard C, the official values is listed under "Mean". The standard C is certified by Canmet standards such as CH3 & PRC-1a which were send one or twice a year by Government of Canada to monitor all the laboratories in Canada. Attached are the information

Regards

CANMET

Certificate of Analysis

PTC-1a

Noble Metals-Bearing Sulphide Concentrate

RECOMMENDED VALUES

Constituent	Ag µg/g	Au µg/g	Cu wt %	Ni wt %	Pd µg/g	Pt µg/g	Rh µg/g
Mean	56.0	1.31	13.51	10.13	4.48	2.72	0.33
95% confidence limits	± 1.4	± 0.11	± 0.11	± 0.09	± 0.12	± 0.11	± 0.06

DESCRIPTION

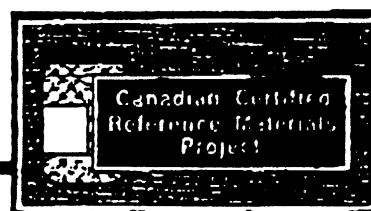
CCRMP has replaced reference material PTC-1 with a more recent sample. PTC-1a is a noble metals-bearing sulphide flotation concentrate of Sudbury ore. Elements certified include the noble metals, copper and nickel. Informational values are also presented for arsenic, cobalt, iron, lead and sulphur.

The raw material for PTC-1a was donated by INCO from its Clarabelle mill in Copper Cliff, Ontario. PTC-1a is composed of chalcopyrite, pentlandite, and pyrrhotite, with small amounts of pyrite, and gangue minerals.

Approximately 300 kg of material was dried, comminuted and sieved to obtain a sub-74 micrometer (-200 mesh) product. It was blended in a 570-L conical blender and bottled in 200-gram units.

Homogeneity measurements for gold, palladium and platinum were performed by an independent laboratory employing fire-assay preconcentrations with atomic absorption finish. Homogeneity measurements were also confirmed at CANMET.

PTC-1a was found to be sufficiently homogeneous with respect to its gold, palladium and platinum distributions to qualify as a candidate reference material.



Projet canadien des matériaux de référence

PAGE 79101 **

CERTIFICATION

Nineteen industrial, commercial, and government laboratories participated in an interlaboratory certification program. Up to 14 elements were analyzed by methods of each laboratory's choice. A statistical analysis of the data yielded recommended values for gold, copper, nickel, palladium, platinum, rhodium, and silver. Provisional values were assigned for arsenic, cobalt, iridium, iron, lead, ruthenium and sulphur.

LEGAL NOTICE

The Canadian Certified Reference Materials Project has prepared this reference material and statistically evaluated the analytical data of the inter-laboratory certification program to the best of its ability. The purchaser, by receipt hereof, releases and indemnifies the Canadian Certified Reference Materials Project from and against all liability and costs arising out of the use of this material and information.

REFERENCE

The preparation and certification procedures used for PTC-1a will be given in CANMET report CCRMP 92-JE which is in preparation. This report will be made available free of charge on application to:

Coordinator, CCRMP
CANMET (EMR)
555 Booth Street
Ottawa, Ontario, Canada
K1A 0G1

Phone: (613) 995-4738
Telefax: (613) 943-0573
Telex: 053-3395

PROVISIONAL VALUES

Constituent	As wt %	Co wt %	Fe wt %	Ir µg/g	Pb wt %	Ru µg/g	S wt %
Mean	0.012	0.30	34.6	0.11	0.05	0.21	31.8
95% confidence limits	± 0.009	± 0.01	± 0.7	± 0.03	± 0.01	± 0.01	± 0.9
No. of sets	3	10	4	4	5	4	5
No. of results	13	53	21	20	23	20	22

Pour obtenir la version française du présent certificat d'analyse, prière de s'adresser au Coordinateur du PCMR.

ACME ANALYTICAL LABORATORIES LTD.

852 B EASTINGS ST. VANCOUVER B.C. V6A 1R6

PHONE (604) 253-3158 FAX (604) 253-1716

AA
LL

ASSAY CERTIFICATE

CANMET PROJECT CCRMP File # 92-0359

Minerals Technology Branch, Ottawa ON K1A 0G1

AA
LL

SAMPLE#	Mo %	Cu %	Pb %	Zn %	Ag g/t	Ni %	Co %	Mn %	Fe %	As %	U %	Th %	Sr %	Cd %	Sb %	Bi %	Au** ppb	Pt** ppb	Pd** ppb	Rh** ppb
PTC-1a	.001	13.55	.05	.01	52.99	10.14	.29	.01	35.20	.02	.01	.01	.01	.01	.01	.01	1025	2470	4308	530
PTC-1a	.001	13.43	.06	.01	59.74	10.00	.29	.02	34.84	.02	.01	.01	.01	.01	.01	.01	1237	2742	3912	323
PTC-1a	.001	13.39	.05	.01	59.74	10.02	.29	.01	34.67	.01	.01	.01	.01	.01	.01	.01	1137	2511	3802	329
PTC-1a	.001	13.70	.04	.01	53.68	10.17	.29	.01	35.28	.02	.01	.01	.01	.01	.01	.01	1116	2135	4034	339
PTC-1a	.001	13.72	.06	.01	51.45	10.11	.29	.01	35.53	.01	.01	.01	.01	.01	.01	.01	1354	2976	3961	309
PTM-1a	.001	25.88	.02	.01	14.32	48.96	2.13	.02	1.54	.24	.01	.01	.01	.01	.01	.01	2832	5841	8923	731
PTM-1a	.001	26.09	.03	.01	14.20	49.07	2.13	.02	1.44	.25	.01	.01	.01	.01	.01	.01	2680	5254	8426	717
PTM-1a	.002	25.60	.03	.01	13.83	48.63	2.12	.02	1.43	.25	.01	.01	.01	.01	.01	.01	2831	6377	8567	700
PTM-1a	.001	26.72	.02	.01	14.32	49.28	2.15	.01	1.64	.24	.01	.01	.01	.01	.01	.01	2592	5467	8084	696
PTM-1a	.001	26.06	.02	.01	14.32	48.45	2.12	.01	1.52	.24	.01	.01	.01	.01	.01	.01	2725	6194	8219	763

- 1 GM SAMPLE NOT LEACHED IN 75 ML AQUA - REGIA, ANALYSIS BY ICP. AU** PT** PO** RH** FIRE ASSAY AND ANALYSIS BY ICP/GRAPHITE FURNACE.
- SAMPLE TYPE: PULP

DATE RECEIVED: FEB 17 1992 DATE REPORT MAILED: March 25/92 SIGNED BY: *C. Leong* D. TOYE, C. LEONG, J. WANG; CERTIFIED B.C. ASSAYERS

P. 04/11

604 253 1716 TO 1-414-4978516

3.5-32-21

DEC 14'93 15:15 FR ACME LABS

Energy, Mines and
Resources CanadaEnergie, Mines et
Ressources Canada**CANMET**Canada Centre for
Mineral and Energy
TechnologyCentre canadien de la
technologie des
minéraux et de l'énergie

NEW CCRMP MATERIAL

April 1993

CH-3

Sulphide Matrix Gold-Bearing Reference Material

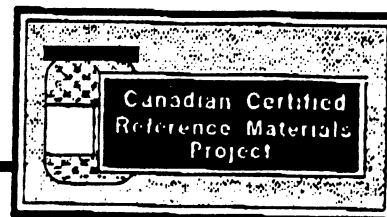
CCRMP has replaced reference material CH-2 with a somewhat different, better-characterized sample. CH-3 has been certified for arsenic, calcium oxide, copper, gold, iron, silicon dioxide, silver, sulphur, and zinc. Fifteen more elements have been assigned provisional values and means for nine more are given for information.

The source for CH-3 is a gold-bearing material obtained from Westminer Canada Limited from its mine in Chibougamau, Quebec, the same source as CH-2. CH-3 was made by blending raw mill feed and waste-rock material.

The ore-grade sample was found to contain pyrite, pyrrhotite, magnetite, siderite, chloritoid, and chalcopryrite with traces of sphalerite, arsenopyrite, chlorite, quartz, and gold. The main gold-bearing mineral was found to be electrum, which occurred as inclusions in the pyrite and chalcopryrite. The waste-rock sample contained mainly silicate minerals.

The raw mill feed sample, weighing 600 kg, was received in the form of wet 3-cm chips. It was dried, crushed and milled to pass a 74 μm (200 mesh) screen. Approximately 1000 kg of waste rock was received in the form of 30-cm chunks. These chunks were broken, crushed and milled to obtain 450 kg of -74 μm product; the oversize was discarded.

Based on gold assays of test samples, a blend of 227 kg of ore-grade and 295 kg of waste rock was prepared according to a split-blending scheme. The resulting material (CH-3) was bottled in 200-gram units. Each bottle was sealed under nitrogen in a laminated aluminum foil-mylar pouch to prevent oxidation.



Projet canadien des matériaux de référence

Canada

The homogeneity of the stock with respect to its gold content was confirmed at CANMET and at a commercial laboratory using bottles chosen according to a stratified random sampling scheme.

Twenty-five industrial, commercial, and government laboratories participated in an interlaboratory certification program. Up to 56 elements were analyzed by methods of each laboratory's choice. A statistical analysis of the data yielded recommended values for nine constituents and a further fifteen elements had provisional values assigned. The means for nine more elements are given for information. Data for the remaining elements was either inadequate or inconclusive, but will be disclosed in the final report.

CH-3 is priced at \$155 per 200-g unit and is available upon pre-payment by any of the following methods:

VISA or MASTERCARD
Cheque
Money Order
Bank to Bank telegraphic transfer

Payable to:
Receiver General for Canada
(ref. CCRMP).

Canadian customers will be invoiced GST, if applicable, and provincial sales tax at the rate set by the province in which they are located.

Mail payment to:

CCRMP
Attention: Robert Beaudoin
CANMET (EMR)
555 Booth Street
Ottawa, Ontario, Canada
K1A 0G1

A CANMET report describing this reference material is in preparation and will be available at no charge upon request to the Coordinator of CCRMP.

Coordinator, CCRMP
CANMET (EMR)
555 Booth Street
Ottawa, Ontario, Canada
K1A 0G1

Phone: (613) 995-4738
Telefax: (613) 943-0573
Telex: 053-3395

RECOMMENDED VALUES

Constituent	Ag µg/g	As µg/g	Au µg/g	CaO wt %	Cu wt %	Fe wt %	S wt %	SiO ₂ wt %	Zn µg/g
Mean	2.63	143.	1.40	6.35	0.83	12.65	2.82	40.3	164.
95% confidence limits	± 0.20	± 14.	± 0.03	± 0.13	± 0.02	± 0.25	± 0.03	± 1.1	± 15.

3.5-32-24

DEC 14 '93 15:17 FR ACME LABS

604 253 1716 TO 1-414-4978516

P.07/11

ACME ANALYTICAL LABORATORIES LTD. 552 HASTINGS ST. VANCOUVER B.C. V6A 1R6 PHONE (604) 253-3158 FAX (604) 253-1716

AA **AA**

GEOCHEMICAL ANALYSIS CERTIFICATE

CANMET File # 92-2548
Mineral Technology Branch Ottawa ON K1A 0G1

SAMPLE#	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	M	Au*	Hg	As	Sb	Bi	Ge	Se	Te	
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppb	ppb	ppm	ppm	ppm	ppm	ppm	ppm	ppm
CH-3	1 6730	2 150				92 251	1688	11.00	12	5	ND	1 11				2 2	47 3.96	.009		5 16	2.36	1 03	3 3.28	.05	.03						1480	5 93.1	.1			.3	.1	.5	
CH-3	1 6934	6 152				98 261	1764	11.45	139	5	ND	1 11				2 3	49 4.17	.010		5 16	2.47	1 03	2 3.41	.05	.03						1460	5 106.5	.1	1.0		.1	.1	.2	
CH-3	1 6450	5 150				86 242	1679	10.93	125	5	ND	1 10				2 2	47 3.94	.010		4 15	2.36	1 03	2 3.28	.05	.03						1470	5 101.8	.1	1.0		.2	.1	.4	
CH-3	1 6600	3 148				96 248	1709	11.14	128	5	ND	1 10				2 2	48 4.02	.008		4 17	2.40	1 03	2 3.33	.05	.03						1450	5 105.0	.1	1.0		.1	.1	.1	
CH-3	2 6547	2 141				93 245	1689	11.01	124	5	ND	1 10				2 5	46 3.97	.009		4 16	2.37	6 03	2 3.29	.05	.03						1390	5 106.6	.1	1.0		.1	.1	.1	

ICP - .500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN FE SR CA P LA CR HG BA TI B W AND LIMITED FOR NA K AND AL. AU DETECTION LIMIT BY ICP IS 3 PPM.
- SAMPLE TYPE: PULP AU* ANALYSIS BY ACID LEACH/AA FROM 10 GM SAMPLE. HG ANALYSIS BY FLAMELESS AA.
AS SB BI GE SE TE ANALYSIS BY HYDRIDE ICP, GE - PARTIAL LEACHED. GE - HF AGUA REGIA DIGESTION, ANALYSIS BY AA.

DATE RECEIVED: AUG 14 1992 DATE REPORT MAILED: Nov 12/92 SIGNED BY: *C. Leong* D. TOYE, C. LEONG, J. WANG; CERTIFIED B.C. ASSAYERS

3.5-32-25

DEC 14 '93 15:18 FR ACME LABS

604 253 1716 TO 1-414-4978516

P.03/11

ACME ANALYTICAL LABORATORIES LTD.

4521 EASTYNDI ST. VANCOUVER B.C. V6N 1X6

PHONE (604) 253-3158 FAX (604) 253-1716

AA
LL

WHOLE ROCK ICP ANALYSIS

CANMET File # 92-2548

Mineral Technology Branch Ottawa ON K1A 0G8

AA
LL

SAMPLE#	SiO2	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO	Cr2O3	Ba	Sr	Zr	Nb	LOI	SUM
	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	%	%
CH-3	43.06	16.85	19.10	4.47	6.43	1.49	.59	.55	.11	.28	.007	16	62	20	1	5 6.3	99.21
CH-3	42.98	16.74	18.79	4.46	6.55	1.49	.70	.54	.10	.26	.005	13	62	23	12	5 6.5	99.13
CH-3	43.25	16.81	18.79	4.49	6.44	1.50	.66	.55	.12	.26	.005	13	62	20	1	5 6.3	99.19
CH-3	43.69	16.43	18.65	4.45	6.39	1.47	.68	.53	.07	.24	.004	26	62	21	1	5 6.5	99.14
CH-3	43.92	16.33	18.47	4.49	6.46	1.50	.69	.52	.09	.29	.005	38	62	18	12	5 6.4	99.15

.200 GRAM SAMPLES ARE FUSED WITH 1.2 GRAM OF LiBO2 AND ARE DISSOLVED IN 100 MLS 5% HNO3.
- SAMPLE TYPE: PULP

DATE RECEIVED: AUG 14 1992 DATE REPORT MAILED: Nov 12/92 SIGNED BY: *C. Leong* D. TOYE, C. LEONG, J. WANG; CERTIFIED B.C. ASSAYERS

ACME ANALYTICAL LABORATORIES LTD.

852 B. HASTINGS ST. VANCOUVER B.C. V6A 1K6

PHONE (604) 253-8158 FAX (604) 253-1716

AA
11

ASSAY CERTIFICATE

CANMET File # 92-2548R

AA
11

SAMPLE#

Cu
%

CH-3

.808

CH-3

.814

CH-3

.822

CH-3

.808

CH-3

.813

1 GR SAMPLE LEACHED IN 50 ML AQUA - REGIA, ANALYSIS BY ICP.
- SAMPLE TYPE: PULP

DATE RECEIVED: JAN 8 1993

DATE REPORT MAILED:

Jan 13/93

SIGNED BY: *C. Leong* .O. TOYE, C. LEONG, J. WANG; CERTIFIED B.C. ASSAYERS

97-32-26

P. 09/11

604 253 1716 TO 1-414-4978516

DEC 14 '93 15:19 FR ACME LABS

**ACME ANALYTICAL LABORATORIES LTD.**

852 E. Hastings St. Vancouver, B.C. Canada V6A 1R6

Phone: (604) 253-3158 Fax: (604) 253-1716

30 ELEMENTS ICP ANALYSIS(AQUA- REGIA DIGESTION)

METHOD:- 0.5 g sample digested in test tube, with 3 ml 3-1-2 HCL-HNO₃-H₂O at 95 deg. C for one hr. and diluted to 10 ml with distilled water. Analyze by ICP.
Partial for Fe, Sr, Ca, P, La, Cr, Mg, Ba, Tl, B, W, Na, K & Al.

Each set of analysis up to 36 samples include:-

1. One solution std. and two solution blanks at the beginning and end of the set.
2. One internal std (std C), one duplicate, one blank and one granite blank.
3. Pure stds (up to 37 elements) will be analyzed routinely to monitor and correct matrix & spectra interferences.

Detection		Detection		Detection	
Ag	0.1 ppm	Cr	1 ppm	P	0.001 %
Al	0.01 %	Cu	1 ppm	Pb	2 ppm
As	2 ppm	Fe	0.01 %	Sb	2 ppm
Au	2 ppm	K	0.01 %	Sr	1 ppm
B	2 ppm	La	2 ppm	Th	2 ppm
Ba	2 ppm	Mg	0.01 %	Ti	0.01 %
Bi	2 ppm	Mn	1 ppm	U	5 ppm
Ca	0.01 %	Mo	1 ppm	V	2 ppm
Cd	0.2 ppm	Na	0.01 %	W	1 ppm
Co	1 ppm	Ni	1 ppm	Zn	1 ppm

<u>Element</u>	<u>Mean</u>	<u>Std. Dev.</u>
Mo	17.913	.263
Cu	56.437	1.315
Pb	40.000	1.904
Zn	138.313	2.952
Ni	71.563	2.179
Co	29.625	.719
Mn	1160.625	25.981
Fe	4.306	.051
V	56.000	1.789
W	13.750	.829
Ag	201.801	.098
As	42.569	1.428
Sb	18.456	1.499
Bi	19.475	1.210
Au	50.312	2.272
Hg	1500	121
Ba	784	28
LOI	11.30	.1
Sn	24.875	2.604
Cr	61.000	2.716

PROVISIONAL VALUES for CH-3

Constituent	Al ₂ O ₃ wt %	Ba µg/g	C wt %	Co µg/g	Cr µg/g	K ₂ O wt %	LOI wt %	HgO wt %	Mn wt %
Mean	16.1	31.	1.74	245.	35.	0.64	6.7	4.47	0.203
95% confidence limits	± 0.5	± 14.	± 0.03	± 21.	± 16.	± 0.04	± 0.6	± 0.12	± 0.014

Constituent	Mo µg/g	Na ₂ O wt %	Ni µg/g	Sb µg/g	Sr µg/g	Ti wt %
Mean	2.5	1.47	86.	0.7	49.	0.29
95% confidence limits	± 2.5	± 0.10	± 28.	± 1.0	± 11.	± 0.07

INFORMATIONAL VALUES

Constituent	Bi µg/g	Cd µg/g	Hg µg/g	La µg/g	P ₂ O ₅ wt %	Pb µg/g	Se µg/g	Te µg/g	Zr µg/g
Mean	1.6	0.8	0.01	19.	0.06	2.	1.3	2.7	18.
95% confidence limits	± 2.6	± 1.0	± 0.07	± 6.	± 0.12	± 3.	± 0.9	± 0.9	± 9.
No. of sets	3	4	2	2	3	3	3	3	3
No. of results	15	20	10	11	15	15	15	15	13

3.5-32-28

** TOTAL PAGE.011 **

**Lakefield Research ABA Data and Bulk Chemical Composition of the Waste Rock
Composites, the Master Ore Composite and the Tailings**

This page not used.

LAKEFIELD RESEARCH

A Division of Falconbridge Limited

P.O. Box 4300, 185 Concession St., Lakefield, Ontario, K0L 2H0

Phone : 705-652-2000 FAX : 705-652-6365

Crandon Mining Company

7 N. Brown St., 3rd Flr.

Rhineland, WI, 54501-3161 - U.S.A.

Attn : K. W. Collison

Fax : (715)365-1457

Lakefield, November 23, 1994

Date Rec. : October 28, 1994

LR. Ref. : NOV9000.C94

Reference : 93C049

Project : LR9447754

CERTIFICATE OF ANALYSIS

Element	MASTER COMPOSITES			
	SL	RL	UML	LML
Au [g/t]	< 0.02	< 0.02	< 0.02	< 0.02
Ag [g/t]	< 0.5	< 0.5	< 0.5	2.0
Hg [%]	< 0.00003	< 0.00003	< 0.00003	< 0.00003
C(t) [%]	0.08	0.33	0.53	0.44
S [%]	0.01	< 0.01	0.04	0.22
Al [%]	6.36	6.80	7.10	6.83
Sb [%]	0.002	0.002	0.003	0.003
As203 [%]	0.008	< 0.005	< 0.005	0.008
Ba [%]	0.039	0.034	0.036	0.029
Be [%]	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Bi [%]	< 0.005	< 0.005	< 0.005	< 0.005
Cd [%]	0.0005	0.0007	0.0006	0.0008
Ca [%]	0.11	0.77	1.34	0.99
Cr [%]	0.0007	0.0011	0.0012	0.0009
Co [%]	0.0021	0.0019	0.0025	0.0028
Cu [%]	0.086	0.021	0.024	0.033
Fe [%]	4.60	6.21	6.59	7.04
Ga [%]	0.0014	0.0014	0.0015	0.0013
Ge [%]	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Pb [%]	0.014	0.015	0.026	0.018
Mg [%]	2.12	3.60	3.21	2.87
Mn [%]	0.063	0.14	0.13	0.13
Mo [%]	< 0.002	< 0.002	< 0.002	< 0.002
Ni [%]	0.0006	0.0015	0.0010	0.0010
K [%]	1.79	1.24	1.14	1.19
Se [%]	< 0.0003	< 0.0003	< 0.0003	< 0.0003
Si [%]	31.1	28.5	28.5	27.3
Na [%]	0.11	0.51	0.69	0.73
Te [%]	< 0.0003	< 0.0003	< 0.0003	< 0.0003
Tl [%]	< 0.001	< 0.001	< 0.001	< 0.001
Sn [%]	< 0.001	< 0.001	0.006	< 0.001
Ti [%]	0.056	0.038	0.069	0.062
Zn [%]	0.024	0.019	0.019	0.036
U [%]	< 0.001	< 0.001	< 0.001	< 0.001

Detection limit for Ge is elevated due to sample matrix.



J. R. Johnston

A MEMBER OF IAETL CANADA

Accredited by CAEAL for specific tests registered with the Association

LAKEFIELD RESEARCH

A Division of Falconbridge Limited

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FAX : 705-652-6365

Crandon Mining Company

7 N. Brown St., 3rd Flr.

Rhineland, WI, 54501-3161 - U.S.A.

Lakefield, November 23, 1994

Date Rec. : October 28, 1994

LR. Ref. : NOV9000.C94

Reference : 93C049

Project : LR9447754

Attn : K. W. Collison

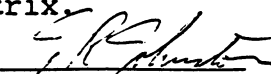
Fax : (715)365-1457

CERTIFICATE OF ANALYSIS

HIGH SULFUR COMPOSITES

Element	SLX	RLX	UMLX	LMLX
Au [g/t]	< 0.02	< 0.02	< 0.02	0.59
Ag [g/t]	< 0.5	< 0.5	0.5	12.4
Hg [%]	0.00007	< 0.00003	0.00007	0.00023
C(t) [%]	0.24	0.05	0.16	0.38
S [%]	3.93	3.33	4.44	4.44
Al [%]	6.43	6.56	6.68	6.35
Sb [%]	0.002	0.002	0.002	0.006
As203 [%]	0.008	0.008	0.006	0.025
Ba [%]	0.023	0.027	0.033	0.026
Be [%]	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Bi [%]	< 0.005	< 0.005	< 0.005	< 0.005
Cd [%]	0.0009	0.0007	0.0007	0.0019
Ca [%]	0.38	0.17	0.36	0.66
Cr [%]	0.0009	0.0010	0.0009	0.0009
Co [%]	0.0013	0.0016	0.0019	0.0025
Cu [%]	0.016	0.049	0.0056	0.049
Fe [%]	5.49	5.61	6.55	7.83
Ga [%]	0.0013	0.0013	0.0015	0.0012
Ge [%]	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Pb [%]	0.016	0.022	0.016	0.048
Mg [%]	2.98	2.25	2.64	1.98
Mn [%]	0.071	0.039	0.048	0.064
Mo [%]	< 0.002	< 0.002	< 0.002	< 0.002
Ni [%]	< 0.0005	< 0.0005	0.0018	0.0008
K [%]	1.80	1.63	1.84	2.12
Se [%]	0.0004	0.0005	< 0.0003	< 0.0003
Si [%]	30.3	31.3	28.6	28.0
Na [%]	0.12	0.28	0.30	0.35
Te [%]	< 0.0003	< 0.0003	< 0.0003	< 0.0003
Tl [%]	< 0.001	< 0.001	< 0.001	< 0.001
Sn [%]	< 0.001	0.002	< 0.001	0.006
Ti [%]	0.046	0.044	0.065	0.054
Zn [%]	0.13	0.020	0.018	0.42
U [%]	< 0.001	< 0.001	< 0.001	< 0.001

Detection limit for Ge is elevated due to sample matrix.


J. R. Johnston

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Crandon Mining Company

7 N. Brown St., 3rd Flr.

Rhineland, WI, 54501-3161 - U.S.A.

Attn : K. W. Collison

Fax : (715)365-1457

Lakefield, March 16, 1995

Date Rec. : September 19, 1994

LR. Ref. : MAR9899.C95

Reference : 4492

Project : 9447204

CERTIFICATE OF ANALYSIS

Revised Certificate Sep7480.C94

Element	CMC-WC-009 Fine	CMC-WC-010 Crs.	Master Comp.
Au [g/t]	0.77	1.01	3.61
Ag [g/t]	26.7	15.8	38.1
Hg [%]	0.00013	0.00019	0.00073
C(t) [%]	0.58	0.44	0.38
S [%]	17.6	29.7	29.1
Al [%]	4.88	1.84	2.01
Sb [%]	0.0064	0.0070	0.0085
As [%]	0.23	0.26	0.27
Ba [%]	0.006	0.005	0.006
Be [%]	< 0.005	< 0.005	< 0.005
Bi [%]	0.002	< 0.002	0.002
Cd [%]	0.004	0.002	0.026
Ca [%]	0.86	0.56	0.41
Cr [%]	0.021	0.003	0.007
Co [%]	0.0055	0.0079	0.0067
Cu [%]	0.14	0.05	0.33
Fe [%]	17.7	26.8	23.2
Ga [%]	0.0021	0.0013	0.0015
Ge [%]	< 0.0001	< 0.0001	< 0.0001
Pb [%]	0.63	0.29	1.12
Mg [%]	2.05	1.12	1.12
Mn [%]	0.067	0.052	0.046
Mo [%]	< 0.002	< 0.002	< 0.002
Ni [%]	0.004	< 0.002	0.010
K [%]	1.31	0.39	0.44
Se [%]	0.0030	0.0038	0.0042
Si [%]	18.0	15.0	12.8
Na [%]	0.27	0.080	0.18
Te [%]	< 0.0003	< 0.0003	< 0.0003
Tl [%]	0.002	0.001	0.001
Sn [%]	0.0028	0.0022	0.0023
Ti [%]	0.17	0.12	0.10
U [%]	< 0.002	< 0.002	< 0.002
Zn [%]	1.12	0.60	9.66



Roch Marion

LAKEFIELD RESEARCH

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FAX : 705-852-8265

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7 N. Brown St., 3rd Flr.
Rhinelander, WI, 54501-3161 - U.S.A.

Attn : K. W. Collison
Fax : (715)365-1457

Lakefield, November 11, 1994

Date Rec. : November 1, 1994

LR. Ref. : NOV7581.C94

Reference : 93C049

Project : 9447754

CERTIFICATE OF ANALYSIS

MODIFIED EPA ABA

No.	Sample ID	Constant ---	M HCL	HCL added mL	NaOH added mL	HCL (mL) consumed	NP *	MPA *	CWMP *	NP/MPA *	S %	S- %	Paste pH units
1	SL	0.9950	0.5193	40	40.20	0.00	0.0	4.4	-4.40	0.00	0.14	0.13	8.72
2	DUP SL	0.9834	0.5193	80	81.35	0.00	0.0	4.4	-4.40	0.00	0.14	0.13	--
3	RL	0.9950	0.5193	40	37.95	2.2	29	1.6	27.40	18	0.05	0.05	9.09
4	DUP RL	0.9834	0.5193	80	78.90	2.4	31	1.6	29.40	19	0.05	0.05	--
5	LML	0.9950	0.5193	40	36.40	3.8	49	3.1	45.90	16	0.10	0.10	9.09
6	DUP LML	0.9834	0.5193	80	77.65	3.6	47	3.1	43.90	15	0.10	0.10	--
7	LML	0.9950	0.5193	40	36.55	3.6	47	11	36.00	4.3	0.34	0.27	8.82
8	DUP LML	0.9834	0.5193	80	77.80	3.5	45	11	34.00	4.1	0.34	0.27	--
9	SLX	0.9950	0.5193	40	39.30	0.90	12	123	-111.00	0.10	3.95	3.57	8.09
10	DUP SLX	0.9834	0.5193	80	80.50	0.84	11	123	-112.00	0.09	3.95	3.57	--
11	RLX	0.9950	0.5193	40	40.20	0.00	0.0	102	-102.00	0.00	3.26	3.20	8.00
12	DUP RLX	0.9834	0.5193	80	81.35	0.00	0.0	102	-102.00	0.00	3.26	3.20	--

LAKEFIELD RESEARCH

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NOV7581.C94

No.	Sample ID	Constant ---	N NCL	NCL added mL	NaOH added mL	NCL (mL) consumed	NP *	NPA *	CNNP *	NP/NPA *	S %	S- %	Paste pH units
13	UMLX	0.9950	0.5193	40	39.60	0.60	7.8	140	-132.20	0.06	4.49	3.78	7.86
14	DUP UMLX	0.9834	0.5193	80	80.90	0.44	5.7	140	-134.30	0.04	4.49	3.78	--
15	LMLX	0.9950	0.5193	40	38.40	1.8	23	130	-107.00	0.18	4.15	3.53	5.84
16	DUP LMLX	0.9834	0.5193	80	79.80	1.5	19	130	-111.00	0.15	4.15	3.53	--

Constant (C) = (mL acid in blank) / (mL base in blank)
mL acid consumed = (mL acid added) - (mL base added x C)

*NP(Neutralization Potential)

= (mL acid consumed) x (25) x (N of acid)

*MPA(Maximum Potential Acidity)

= % Sulphur x 31.25

*CNNP(Common Net Neutralization Potential)

= NP-MPA

*Results expresses as tonnes CaCO3 eq/1000 tonnes material


for Dave Hevenor

A MEMBER OF IAETL CANADA

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3.5-32-35

Revisions to Lakefield Research Sample ID Nos.

Lakefield Research Data

#9 H21: 1127-1128
#38 H98: 884-885
#64 H154: 1681-1682
#89 H160: 2481-2482

Core Intervals Described and Sampled

should read H21: 1527-1528
should read H98: 844-845
should read H155: 1661-1662
should read H160: 2421-2422

These revisions are required to correct the mislabeling of the collected samples submitted for analysis. The correct intervals in all cases are those shown in the WRC data included in Appendix 1.9.

LAKEFIELD RESEARCH

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7 N. Brown St., 3rd Flr.
Rhineland, WI, 54501-3161 - U.S.A.

Attn : K. W. Collison
F : (715)365-1457

Lakefield, August 30, 1994

Date Rec. : August 30, 1994
LR. Ref. : JUN7302.C94
Reference : ---
Project : 9446241

CERTIFICATE OF ANALYSIS

3.5-32-350

No.	Sample ID	C	N HCL	HCL added mL	NaOH added mL	HCL (mL) consumed	NP *	MPA *	CNNP *	NP/MPA	S %	S= %	Paste pH units
1	H6 775-776	1.0499	0.0934	40	21.25	17.69	41.3	4.06	37.2	10.2	0.13	0.12	8.77
2	H9 139-140	1.0499	0.0934	40	37.10	1.049	2.449	53.4	-50.95	0.05	1.71	1.71	8.27
3	H9 159-160	1.0499	0.0934	40	37.25	0.8912	2.081	281.3	-279.21	0.01	9.11	9.11	6.77
4	H9 339-340	1.0499	0.0934	40	36.40	1.784	4.166	0.63	3.54	6.61	0.02	0.02	8.69
5	H9 380-381	0.9627	0.5119	40	40.30	1.203	15.4	0.31	15.1	49.7	0.01	0.01	8.50
6	H16 2325-2326	0.9270	0.5099	40	38.60	4.218	53.8	0.94	52.9	57.2	0.03	0.02	9.09
7	H20 707-708	1.0499	0.0934	40	19.70	19.32	45.1	101.3	-56.20	0.45	3.24	2.73	8.19
8	H21 1122-1123	1.0499	0.0934	40	28.60	9.973	23.3	87.5	-64.20	0.27	2.80	2.44	8.69
9	H21 1127-1128	0.9270	0.5099	40	29.20	12.93	164.8	0.31	164.5	531.6	0.01	0.01	9.10
10	H21 1647-1648	1.0499	0.0934	40	28.00	10.60	24.8	11.3	13.5	2.19	0.36	0.36	8.81
11	H21 1754-1755	0.9270	0.5099	40	28.05	14.00	178.5	169.7	8.80	1.05	5.43	5.37	8.93
12	H23 974-975	1.0499	0.0934	40	32.90	5.458	12.7	10.0	2.70	1.27	0.32	0.32	8.75
13	H23 1456-1457	0.9270	0.5099	40	36.15	6.489	82.7	3.13	79.6	26.4	0.10	0.10	8.63
14	H231492.5-1495.5	1.0499	0.0934	40	25.50	13.23	30.9	1012.5	-981.60	0.03	33.3	33.3	7.05
15	H24 1028-1029	1.0499	0.0934	40	35.35	2.886	6.739	3.13	3.61	2.15	0.10	0.10	8.79

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JUN7302.C94

No.	Sample ID	C	N HCL	HCL added mL	NaOH added mL	HCL (mL) consumed	NP *	MPA *	CNNP *	NP/MPA	S %	S= %	Paste pH units
16	H24 1132-1133	1.0499	0.0934	40	32.60	5.773	13.5	0.94	12.6	14.4	0.03	0.03	8.79
17	H35 2315-2316	0.9270	0.5099	40	34.20	8.297	105.8	2.50	103.3	42.3	0.08	0.08	8.74
18	H35 2373-2373.5	0.9319	0.5099	80	73.70	11.32	144.3	956.3	-812.00	0.15	29.7	29.7	8.83
19	H37 2184-2185	0.9270	0.5099	40	38.30	4.496	57.3	5.94	51.4	9.65	0.19	0.19	8.88
20	H42 2235-2236	0.9270	0.5099	40	37.30	5.423	69.1	41.6	27.5	1.66	1.33	0.94	8.98
21	H44 329-330	1.0499	0.0934	40	36.55	1.626	3.797	1.56	2.24	2.43	0.05	0.04	8.79
22	H44 555-556	1.0499	0.0934	40	37.05	1.101	2.571	0.63	1.94	4.08	0.02	0.02	8.88
23	H44 883-884	1.0499	0.0934	40	31.10	7.348	17.2	0.63	16.6	27.3	0.02	0.02	8.82
24	H45 1767-1768	1.0499	0.0934	40	33.85	4.461	10.4	1.25	9.15	8.32	0.04	0.04	9.22
25	H46 1834-1835	0.9270	0.5099	40	39.30	3.569	45.5	0.63	44.9	72.2	0.02	0.02	9.47
26	H46 2009-2010	0.9319	0.5099	80	76.60	8.616	109.8	25.0	84.8	4.39	0.80	0.80	9.07
27	H46 2295-2296	0.9270	0.5099	40	35.95	6.674	85.1	63.8	21.3	1.33	2.04	2.04	8.78
28	H68 1971-1972	1.0499	0.0934	40	27.50	11.13	26.0	0.94	25.1	27.7	0.03	0.03	8.82
29	H73 1549-1550	1.0499	0.0934	40	31.15	7.296	17.0	21.9	-4.90	0.78	0.70	0.70	8.72
30	H73 1581.5-1582	1.0499	0.0934	40	18.30	20.79	48.5	156.9	-108.40	0.31	5.10	5.10	8.28
31	H74 352-353	1.0499	0.0934	40	36.50	1.679	3.920	0.63	3.29	6.22	0.02	0.01	8.51
32	H74 570-571	1.0499	0.0934	40	36.20	1.994	4.656	0.00	4.66	15.0	< 0.01	< 0.01	8.97
33	H85 836-837	0.9270	0.5099	40	17.85	23.45	298.9	4.38	294.5	68.2	0.14	0.14	8.38
34	H91 949-950	1.0485	0.0934	40	34.38	3.953	9.230	115.9	-106.67	0.08	3.79	3.79	7.19
35	H92 725-726	1.0485	0.0934	40	36.41	1.824	4.259	90.3	-86.04	0.05	2.95	2.95	6.38
36	H92 734-735	1.0485	0.0934	40	34.58	3.743	8.740	1.25	7.49	6.99	0.04	0.03	8.12
37	H98 556-557	1.0485	0.0934	40	36.05	2.202	5.142	0.63	4.51	8.16	0.02	0.02	8.49
38	H98 884-885	1.0485	0.0934	40	34.74	3.575	8.348	0.31	8.04	26.9	0.01	0.01	8.59

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JUN7302.C94

3.5-32-358

No.	Sample ID	C	N HCL	HCL added mL	NaOH added mL	HCL (mL) consumed	NP *	MPA *	CNNP *	NP/MPA	S %	S= %	Paste pH units
39	H98 1304-1305	1.0485	0.0934	40	18.40	20.71	48.4	12.2	36.2	3.97	0.39	0.37	8.73
40	H128 2112-2113	0.9324	0.5099	40	38.45	4.149	52.9	70.6	-17.70	0.75	2.26	2.26	8.33
41	H128 2312-2312.5	1.0485	0.0934	40	35.20	3.093	7.222	350.0	-342.77	0.02	11.2	10.4	7.19
42	H131 579-579.5	0.9324	0.5099	40	34.50	7.832	99.8	55.6	44.2	1.79	1.78	1.40	8.53
43	H131 1168-1169	1.0485	0.0934	40	30.94	7.559	17.7	0.31	17.4	57.1	0.01	0.01	8.72
44	H131 1207-1208	0.9270	0.5099	40	40.60	2.364	30.1	197.5	-167.40	0.15	6.32	6.32	8.32
45	H131 1234-1235	1.0485	0.0934	40	34.03	4.320	10.1	109.4	-99.30	0.09	3.50	3.27	7.82
46	H131 1302-1303	0.9270	0.5099	40	42.10	0.9733	12.4	6.88	5.52	1.80	0.22	0.22	8.73
47	H131 1346-1347	0.9270	0.5099	40	41.95	1.112	14.2	47.2	-33.00	0.30	1.51	1.35	8.88
48	H131 1469-1470	0.9270	0.5099	40	38.80	4.032	51.4	18.8	32.6	2.73	0.60	0.60	8.26
49	H132 1133-1133.5	0.9270	0.5099	40	39.90	3.013	38.4	337.5	-299.10	0.11	10.8	10.8	7.32
50	H132 1139-1140	0.9270	0.5099	40	38.95	3.893	49.6	18.4	31.2	2.70	0.61	0.61	7.62
51	H133 1224-1225	0.9270	0.5099	40	38.61	4.209	53.7	5.31	48.4	10.1	0.17	0.16	8.19
52	H133 1297.5-1298	0.9324	0.5099	40	39.80	2.890	36.8	187.2	-150.40	0.20	5.99	5.69	7.61
53	H138 1797-1798	1.0485	0.0934	40	32.45	5.976	14.0	7.50	6.50	1.87	0.24	0.14	7.77
54	H140 2361-2369	0.9324	0.5099	40	40.20	2.518	32.1	14.7	17.4	2.18	0.47	0.43	8.64
55	H142 714-715	1.0485	0.0934	40	36.89	1.321	3.085	0.31	2.78	9.95	0.01	0.01	8.54
56	H142 791-793	1.0485	0.0934	40	34.63	3.690	8.616	123.1	-114.48	0.07	3.94	3.94	7.70
57	H143 748-749	1.0485	0.0934	40	35.42	2.862	6.683	38.4	-31.71	0.17	1.23	1.23	8.25
58	H143 1110-1111	0.9324	0.5099	40	42.45	0.4196	5.349	222.8	-217.45	0.02	7.13	6.96	7.26
59	H143 1128.5-1129	0.9270	0.5099	40	41.60	1.437	18.3	224.4	-206.10	0.08	7.18	7.18	7.67
60	H144 722-723	0.9259	0.5099	80	66.20	18.71	238.5	9.06	229.4	26.3	0.32	0.31	8.12
61	H149 1119-1120	0.9270	0.5099	40	42.10	0.9733	12.4	0.94	11.5	13.2	0.03	0.03	8.78

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JUN7302.C94

No.	Sample ID	C	N HCL	HCL added mL	NaOH added mL	HCL (mL) consumed	NP *	MPA *	CNNP *	NP/MPA	S %	S= %	Paste pH units
62	H149 1641-1642	0.9324	0.5099	40	38.70	3.916	49.9	2.81	47.1	17.8	0.09	0.09	8.80
63	H154 1595-1596	0.9270	0.5099	40	37.55	5.191	66.2	10.0	56.2	6.62	0.32	0.32	9.06
64	H154 1681-1682	1.0485	0.0934	40	29.70	8.860	20.7	283.1	-262.40	0.07	9.06	9.06	7.67
65	H155 130-131	1.0485	0.0934	40	35.05	3.250	7.589	0.63	6.96	12.0	0.02	0.02	8.45
66	H155 305-306	1.0485	0.0934	40	35.35	2.936	6.856	1.88	4.98	3.65	0.06	0.06	8.34
67	H155 349-350	1.0485	0.0934	40	37.10	1.101	2.571	39.7	-37.12	0.06	1.27	1.21	6.85
68	H155 492-493	1.0490	0.0934	40	36.50	1.711	3.995	0.31	4.00	12.9	0.01	0.01	7.96
69	H155 627-628	1.0490	0.0934	40	36.35	1.869	4.364	0.31	4.05	14.1	0.01	0.01	7.73
70	H155 756-757	1.0490	0.0934	40	36.07	2.163	5.051	0.31	4.74	16.3	0.01	0.01	8.13
71	H155 893-894	1.0490	0.0934	40	31.31	7.156	16.7	6.88	9.82	2.43	0.22	0.22	8.04
72	H155 1053-1054	1.0490	0.0934	40	35.10	3.180	7.425	0.31	7.12	24.0	0.01	0.01	8.78
73	H155 1194-1195	1.0490	0.0934	40	31.00	7.481	17.5	0.31	17.2	56.5	0.01	0.01	8.18
74	H155 1274-1275	0.9281	0.5099	40	41.05	1.901	24.2	15.3	8.90	1.58	0.49	0.49	8.44
75	H155 1342-1342	0.9281	0.5099	40	41.80	1.205	15.4	0.94	14.5	16.4	0.03	0.02	8.51
76	H155 1509-1510	0.9281	0.5099	40	40.10	2.783	35.5	0.63	34.9	56.3	0.02	0.02	9.24
77	H155 1549-1550	0.9335	0.5099	80	76.70	8.401	107.1	164.1	-57.00	0.65	5.25	5.25	8.03
78	H155 1582-1583	0.9281	0.5099	40	36.05	6.542	83.4	30.3	53.1	2.75	0.97	0.97	8.45
79	H155 1661-1662	0.9335	0.5099	80	75.60	9.427	120.2	160.0	-39.80	0.75	5.12	4.91	8.08
80	H155 1808-1809	0.9335	0.5099	80	78.00	7.187	91.6	0.63	91.0	145.4	0.02	0.02	9.21
81	H155 1962-1963	0.9335	0.5099	80	79.25	6.020	76.7	54.7	22.0	1.40	1.75	1.75	8.32
82	H155 2089-2090	1.0490	0.0934	40	31.40	7.061	16.5	2.19	14.3	7.53	0.07	0.07	9.02
83	H155 2241-2242	0.9281	0.5099	40	36.90	5.753	73.3	1.25	72.1	58.6	0.04	0.04	8.80
84	H155 2248-2249	1.0490	0.0934	40	26.20	12.52	29.2	0.63	28.6	46.3	0.02	0.02	9.02

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JUN7302.C94

3.5-32-35F

No.	Sample ID	C	N HCL	HCL added mL	NaOH added mL	HCL (mL) consumed	NP *	MPA *	CNNP *	NP/MPA	S %	S= %	Paste pH units
85	H159 1767-1768	0.9335	0.5099	80	76.70	8.401	107.1	9.69	97.4	11.1	0.31	0.31	9.10
86	H159 1917-1918	0.9335	0.5099	80	79.95	5.367	68.4	1031.3	-962.90	0.07	34.1	33.9	7.90
87	H160 2020-2021	0.9281	0.5099	40	34.85	7.656	97.6	0.94	96.7	103.8	0.03	0.03	8.81
88	H160 2434-2435	0.9281	0.5099	40	38.15	4.593	58.5	32.2	26.3	1.82	1.03	1.00	8.42
89	H160 2481-2482	1.0490	0.0934	40	24.50	14.30	33.4	35.6	-2.20	0.94	1.14	1.14	9.19
90	H163 1782-1783	0.9281	0.5099	40	39.65	3.201	40.8	0.63	40.2	64.8	0.02	0.02	8.56
91	H163 1835-1836	0.9335	0.5099	80	77.85	7.327	93.4	54.4	39.0	1.72	1.74	1.57	8.71
92	H163 1874-1875	0.9335	0.5099	80	76.10	8.961	114.2	1.25	113.0	91.4	0.04	0.03	8.83
93	H165 2289-2290	0.9281	0.5099	40	36.90	5.753	73.3	12.2	61.1	6.01	0.39	0.37	8.85
94	H172 1093-1094	1.0490	0.0934	40	36.56	1.649	3.850	0.31	3.54	12.4	0.01	0.01	8.97
95	H176 926-927	0.9335	0.5099	80	80.85	4.527	57.7	116.6	-58.90	0.49	3.73	3.65	7.83
96	H242 615-616	0.9281	0.5099	40	40.40	2.505	31.9	81.9	-50.00	0.39	2.62	2.62	7.89
97	H248 910-911	1.0490	0.0934	40	36.62	1.586	3.703	148.4	-144.69	0.02	4.75	4.49	7.23
98	H249 1996.5-1997	0.9281	0.5099	40	42.65	0.4165	5.309	478.1	-472.79	0.01	15.3	15.3	5.09
99	H251 1142-1142.5	1.0490	0.0934	40	32.02	6.411	15.0	259.4	-244.40	0.06	8.30	8.19	7.88
100	H269 896-897	1.0540	0.0934	40	32.65	5.587	13.0	24.1	-11.10	0.54	0.79	0.79	8.11
101	H270 2082-2083	1.0540	0.0934	40	33.65	4.533	10.6	1.56	9.04	6.79	0.05	0.04	9.00
102	H271 2209-2210	1.0540	0.0934	40	19.95	18.97	44.3	5.00	39.3	8.86	0.16	0.16	9.19
-- duplicates --													
103	H21 1647-1648	1.0499	0.0934	40	28.00	10.60	24.8	11.3	13.5	2.19	0.36	0.36	8.81
104	H37 2184-2185	0.9281	0.5099	40	38.05	4.686	59.7	6.88	52.8	8.68	0.22	0.19	8.88
105	H73 1549-1550	1.0499	0.0934	40	31.20	7.243	16.9	20.9	-4.00	0.81	0.67	0.67	8.72
106	H98 1304-1305	1.0485	0.0934	40	19.50	19.55	45.6	11.6	34.0	3.93	0.37	0.37	8.73
107	H132 1133-1133.5	0.9270	0.5099	40	39.75	3.152	40.2	331.3	-291.10	0.12	10.6	10.6	7.32

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JUN7302.C94

No.	Sample ID	C	N HCL	HCL added mL	NaOH added mL	HCL (mL) consumed	NP *	MPA *	CNNP *	NP/MPA	S %	S= %	Paste pH units
108	H143 1128.5-1129	0.9270	0.5099	40	41.60	1.437	18.3	225.9	-207.60	0.08	7.12	7.12	7.67
109	H155 627-628	1.0490	0.0934	40	36.32	1.900	4.437	0.31	4.44	14.3	0.01	0.01	7.73
110	H155 1661-1662	0.9335	0.5099	80	74.60	10.36	132.1	154.7	-22.60	0.85	4.95	4.95	8.08
111	H160 2481-2482	1.0490	0.0934	40	24.20	14.61	34.1	36.3	-2.20	0.94	1.16	1.16	9.19
112	H251 1142-1142.5	1.0490	0.0934	40	31.10	7.376	17.2	258.4	-241.20	0.07	8.27	7.87	7.88

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3.5-32-35g

Constant (C) = (mL acid in blank) / (mL base in blank)
mL acid consumed = (mL acid added) - (mL base added x C)

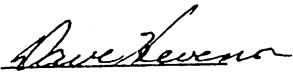
*NP(Neutralization Potential)
= (mL acid consumed) x (25) x (N of acid)
* A(Maximum Potential Acidity)
= % Sulphur x 31.25
*CNNP(Common Net Neutralization Potential)
= NP-MPA

*Results expresses as tonnes CaCO₃ eq/1000 tonnes material

* Samples H23 1492.5-1493 and H23 1495-1495.5 were combined. The assay reported is the composite of these two samples

For samples with S values of <0.01 a value of 0.01 were used in the NP/MPA calculation

3.5-32-35h


Dave Hevenor

A MEMBER OF IAETL CANADA

Accredited by CAEAL for specific tests registered with the Association

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Lakefield, September 7, 1995

Crandon Mining Company

7 N. Brown St., 3rd Flr.

Rhineland, WI, 54501-3161 - U.S.A.

Attn : K. W. Collison

Fax : (715)365-1457

Date Rec. : September 1, 1995

LR. Ref. : SEP9002.R95

Reference : PO#95-0017

Project : LR

CERTIFICATE OF ANALYSIS

3.5-32-35i

No.	Sample ID	Constant	N HCL added HCL	NaOH added mL	HCL (mL) consumed	NP *	MPA *	CNNP *	NP/MPA *	S %	S= %	Paste pH units	
1	Analysis Date	05.09.95	02.09.95	02.09.95	05.09.95	05.09.95	05.09.95	05.09.95	05.09.95	03.09.95	03.09.95	30995	
2	Analysis Time	16:32	09:12	09:12	16:32	12:35	12:35	15:22	16:31	16:31	12:45	15:29	700
7	DDH 44 538-540	1.000	0.4980	40	39.90	0.1	1	< 0.3	1	3.3	< 0.01	< 0.01	8.48
9	DDH 44 548-550	1.000	0.4980	40	39.80	0.2	3	< 0.3	3	10.0	< 0.01	< 0.01	8.52
11	DDH 44 557-559	1.000	0.4980	40	39.90	0.1	1	< 0.3	1	3.3	< 0.01	< 0.01	8.69
13	DDH 44 566-568	1.000	0.4980	40	39.7	0.3	4	< 0.3	4	13	< 0.01	< 0.01	8.75
15	DDH 44 575-577	1.000	0.4980	40	39.80	0.2	3	< 0.3	3	10.0	< 0.01	< 0.01	8.85
19	DDH 92 313-315	1.000	0.4980	40	39.75	0.3	4	2.8	1	1.4	0.09	0.06	8.38
21	DDH 92 322-324	1.000	0.4980	40	39.90	0.1	1	0.3	1	3.3	0.01	< 0.01	8.81
23	DDH 92 332-334	1.000	0.4980	40	39.80	0.2	3	0.3	3	10.0	0.01	< 0.01	8.36
25	DDH-23 1041-1043	1.000	0.4980	40	38.70	1.3	16	1.6	14	10	0.05	0.05	8.45
27	DDH-23 1050-1052	1.000	0.4980	40	37.60	2.4	30	7.5	23	4.0	0.24	0.24	8.65
33	DDH-23 1059-1061	1.000	0.4980	40	38.05	2.0	25	0.9	24	28	0.03	0.02	8.58
35	DDH-23 1068-1070	1.000	0.4980	40	39.05	1.0	12	0.3	12	40	0.01	< 0.01	8.71
37	DDH-23 1077-1079	1.000	0.4980	40	39.20	0.8	10	1.9	8	5.3	0.06	0.04	8.80
39	DDH-44 754-756	1.000	0.4980	40	39.60	0.4	5	0.6	4	8.3	0.02	< 0.01	8.38
41	DDH-44 764-766	1.000	0.4980	40	39.55	0.5	6	0.3	6	20	0.01	< 0.01	7.76
45	DDH-44 774-776	1.000	0.4980	40	39.85	0.2	3	0.3	3	10.0	0.01	< 0.01	8.24
47	DDH-160 1975-1977	1.000	0.4980	40	39.30	0.7	9	0.3	9	30	0.01	< 0.01	9.03

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SEP9002.R95

3.5-32-351

No.	Sample ID	Constant	N HCL added HCL	ml	NaOH added mL	HCL (mL) consumed	NP *	MPA *	CNNP *	NP/MPA *	S %	S= %	Paste pH units
49	DDH-160 1985-1987	1.000	0.4980	40	38.60	1.4	17	0.6	16	28	0.02	0.01	9.09
51	DDH-160 1994-1996	1.000	0.4980	40	37.60	2.4	30	0.3	30	100	0.01	0.01	9.19
53	DDH-172 1504-1506	1.000	0.4980	40	39.65	0.4	5	< 0.3	5	17	< 0.01	< 0.01	9.09
59	DDH-172 1513-1515	1.000	0.4980	40	39.35	0.7	9	< 0.3	9	30	< 0.01	< 0.01	9.18
61	DDH-172 1522-1524	1.000	0.4980	40	38.05	2.0	25	< 0.3	25	83	< 0.01	< 0.01	9.13
63	DDH-46 2028-2030	1.000	0.4980	40	36.95	3.1	39	< 0.3	39	130	< 0.01	< 0.01	9.20
65	DDH-46 2037-2039	1.000	0.4980	40	36.00	4.0	50	< 0.3	50	167	< 0.01	< 0.01	9.34
67	DDH-46 2046-2048	1.000	0.4980	40	36.95	3.1	39	1.9	37	21	0.06	0.03	9.24
69	DDH-46 2055-2057	0.9901	0.4980	80	67.75	12.9	161	0.6	160	268	0.02	< 0.01	8.72
73	73-DDH 1372-1374	0.9950	0.4980	40	37.60	2.6	32	2.5	30	13	0.08	0.08	9.16
75	73-DDH 1381-1383	0.9950	0.4980	40	38.45	1.7	21	< 0.3	21	70	< 0.01	< 0.01	9.24
77	73-DDH 1390-1392	0.9901	0.4980	80	69.80	10.9	136	0.9	135	151	0.03	0.02	9.00
79	DDH-131 1163-1165	1.000	0.4980	40	38.70	1.3	16	< 0.3	16	53	< 0.01	< 0.01	9.23
81	DDH-131 1171-1173	1.008	0.4980	40	38.95	0.7	9	5.9	3	1.5	0.19	0.14	8.91
87	DDH-131 1180-1182	1.008	0.4980	40	34.90	4.8	60	5.3	55	11	0.17	0.14	8.62
89	DDH-16 2079-2099	1.008	0.4980	40	32.30	7.4	92	0.3	92	307	0.01	< 0.01	8.90
91	DDH-16 3007-3009	1.008	0.4980	40	35.00	4.7	59	0.9	58	66	0.03	0.03	8.89
93	DDH-16 3017-3019	0.9950	0.4980	40	36.75	3.4	42	0.3	42	140	0.01	0.01	8.88
95	DDH 45 2067-2069	0.9950	0.4980	40	34.30	5.9	73	1.9	71	38	0.06	0.06	8.79
99	DDH 45 2077-2079	0.9950	0.4980	40	38.75	1.4	17	1.6	15	11	0.05	0.05	9.08
101	DDH 45 2086-2088	0.9950	0.4980	40	37.80	2.4	30	0.9	29	33	0.03	0.03	8.74
103	DDH 45 2098-2100	0.9950	0.4980	40	37.85	2.3	29	1.3	28	22	0.04	0.03	8.69
105	DDH-68 1880-1882	0.9950	0.4980	40	37.7	2.5	31	0.3	31	103	0.01	0.01	8.83
107	DDH-68 1889-1891	1.000	0.4980	40	37.90	2.1	26	< 0.3	26	87	< 0.01	< 0.01	8.85
113	DDH-68 1898-1900	0.9986	0.4980	40	36.30	3.8	47	0.6	46	78	0.02	< 0.01	9.25
115	DDH-176 993-995	0.9986	0.4980	40	38.20	1.9	24	2.8	21	8.6	0.09	0.07	8.25
117	DDH-176 1002-1004	1.005	0.4980	40	39.80	0.0	0	7.5	-7	0	0.24	0.16	7.16
119	DDH-176 1010-1012	1.005	0.4980	40	39.80	0.0	0	10.6	-10	0	0.34	0.25	7.07
121	DDH-176 1019-1021	0.9950	0.4980	40	39.85	0.4	5	4.7	0	1.1	0.15	0.09	8.52
125	DDH-9 SL 362-385	0.9950	0.4980	40	39.80	0.4	5	< 0.3	5	17	< 0.01	< 0.01	8.69

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SEP9002.R95

No.	Sample ID	Constant	N HCL added HCL	NaOH HCL (mL) mL added mL consumed	NP *	MPA *	CNNP *	NP/MPA *	S %	S= %	Paste pH units
127	DDH-23 SL 523-552	0.9950	0.4980	40 38.50 1.7	21	0.3	21	70	0.01	< 0.01	7.77
129	DDH-44 SL 160-192	0.9988	0.4980	80 79.50 0.6	7	0.6	6	12	0.02	< 0.01	8.69
131	DDH-44 SL 536-575	0.9950	0.4980	40 39.90 0.3	4	< 0.3	4	13	< 0.01	< 0.01	8.60
133	DDH-91 SL 247-274	0.9950	0.4980	40 39.90 0.3	4	0.3	4	13	0.01	< 0.01	8.46
139	DDH-91 SL 397-447	1.000	0.4980	40 39.10 0.9	11	10.6	0	1.0	0.34	0.20	8.93
141	DDH-92 SL 311-338	1.000	0.4980	40 39.40 0.6	7	1.3	6	5.4	0.04	0.03	8.32
143	DDH-144 SL 662-688	1.000	0.4980	40 39.70 0.3	4	1.3	3	3.1	0.04	< 0.01	8.20
145	DDH-9 RL 592-642	1.000	0.4980	40 39.30 0.7	9	3.4	6	2.6	0.11	0.08	8.11
147	DDH-15 RL 2079-2111	0.9986	0.4980	40 38.40 1.7	21	< 0.3	21	70	< 0.01	< 0.01	8.81
151	DDH-16 RL 2344-2376	1.008	0.4980	40 35.50 4.2	52	< 0.3	52	173	< 0.01	< 0.01	8.09
153	DDH-21 RL 932-985	0.9950	0.4980	40 39.40 0.8	10	< 0.3	10	33	< 0.01	< 0.01	8.37
155	DDH-21 RL 1216-1272	1.000	0.4980	40 36.40 3.6	45	1.9	43	24	0.06	0.02	8.42
157	DDH-23 RL 1042-1082	0.9950	0.4980	40 38.80 1.4	17	2.2	15	7.7	0.07	0.07	8.19
159	DDH-23 RL 1177-1230	1.008	0.4980	40 39.30 0.4	5	< 0.3	5	17	< 0.01	< 0.01	8.59
165	DDH-24 RL 1126-1161	1.008	0.4980	40 38.75 0.9	11	0.9	10	12	0.03	0.03	8.25
167	DDH-44 RL 667-694	1.008	0.4980	40 39.45 0.2	3	< 0.3	3	10.0	< 0.01	< 0.01	8.88
169	DDH-44 RL 752-779	0.9950	0.4980	40 39.60 0.6	7	< 0.3	7	23	< 0.01	< 0.01	8.49
171	DDH-46 RL 1823-1859	0.9988	0.4980	80 76.40 3.7	46	< 0.3	46	153	< 0.01	< 0.01	9.40
173	DDH-91 RL 583-621	1.008	0.4980	40 39.35 0.3	4	2.2	2	1.8	0.07	0.07	8.25
177	DDH-160 RL 1783-1808	1.008	0.4980	40 36.95 2.8	35	1.3	34	27	0.04	< 0.01	8.80
179	DDH-160 RL 1971-1997	0.9986	0.4980	40 37.25 2.8	35	0.6	34	58	0.02	< 0.01	9.02
181	DDH-163 RL 1721-1747	1.008	0.4980	40 37.15 2.6	32	< 0.3	32	107	< 0.01	< 0.01	9.25
183	DDH-163 RL 1804-1829	0.9950	0.4980	40 35.80 4.4	55	4.1	51	13	0.13	0.07	9.36
185	DDH-172 RL 1298-1315	0.9969	0.4980	80 78.90 1.3	16	0.9	15	18	0.03	< 0.01	8.81
191	DDH-172 RL 1500-1526	1.008	0.4980	40 39.30 0.4	5	< 0.3	5	17	< 0.01	< 0.01	9.32
193	DDH-16 UML 2378-2406	0.9950	0.4980	40 34.70 5.5	68	< 0.3	68	227	< 0.01	< 0.01	8.92
195	DDH-44 UML 955-980	1.028	0.4980	40 39.40 -0.5	-6	< 0.3	-6	-20	< 0.01	< 0.01	8.70
197	DDH-46 UML 1944-1984	0.9986	0.4980	40 32.60 7.4	92	3.8	88	24	0.12	0.10	9.55
199	DDH-46 UML 2026-2060	0.9986	0.4980	40 34.45 5.6	70	0.3	70	233	0.01	< 0.01	8.77
203	DDH-73 UML 1370-1395	0.9986	0.4980	40 29.15 10.9	136	1.9	134	72	0.06	0.06	8.90

3.5-32-35K

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SEP9002.R95

3.5-32-351

No.	Sample ID	Constant	N HCL added HCL	added mL	NaOH HCL (mL) added mL consumed	NP *	MPA *	CNNP *	NP/MPA *	S %	S= %	Paste pH units	
205	DDH-92 UML 564-573	0.9986	0.4980	40	39.25	0.8	10	< 0.3	10	33	< 0.01	< 0.01	8.71
207	DDH-92 UML 575-589	0.9986	0.4980	40	38.70	1.4	17	< 0.3	17	57	< 0.01	< 0.01	8.41
209	DDH-131 UML 1161-1185	1.005	0.4980	40	37.80	2.0	25	0.9	24	28	0.03	0.03	8.54
211	DDH-131 UML 1161-1186	0.9986	0.4980	40	35.95	4.1	51	0.9	50	57	0.03	< 0.01	8.82
213	DDH-140 UML 2841-2868	0.9988	0.4980	80	79.80	0.3	4	1.9	2	2.1	0.06	< 0.01	8.83
219	DDH-149 UML 1442-1477	1.005	0.4980	40	38.60	1.2	15	< 0.3	15	50	< 0.01	< 0.01	8.93
221	DDH-154 UML 1444-1470	0.9986	0.4980	40	29.95	10.1	126	12.2	114	10	0.39	0.20	9.00
223	DDH-160 UML 2220-2245	0.9986	0.4980	40	36.70	3.4	42	2.5	40	17	0.08	0.08	9.25
225	DDH-163 UML 2371-2396	0.9950	0.4980	40	34.40	5.8	72	2.2	70	33	0.07	0.06	9.40
227	DDH-163 UML 2560-2585	0.9950	0.4980	40	37.70	2.5	31	0.6	30	52	0.02	0.02	9.05
231	DDH-6 LML 865-900	1.005	0.4980	40	39.20	0.6	7	142.2	-135	0.1	4.55	3.79	8.00
233	DDH-9 LML 802-861	1.000	0.4980	40	37.20	2.8	35	147.2	-112	0.2	4.71	4.22	7.84
235	DDH-15 LML 2475-2515	1.028	0.4980	40	34.55	4.5	56	6.3	50	8.9	0.20	0.16	9.08
237	DDH-16 LML 2995-3026	1.028	0.4980	40	34.20	4.8	60	10.6	49	5.7	0.34	0.33	8.87
239	DDH-21 LML 1627-1657	1.000	0.4980	40	38.60	1.4	17	1.3	16	13	0.04	0.03	8.99
245	DDH-42 LML 2234-2271	1.028	0.4980	40	34.40	4.6	57	5.0	52	11	0.16	0.16	8.72
247	DDH-45 LML 2065-2100	1.028	0.4980	40	37.30	1.7	21	0.9	20	23	0.03	0.03	8.63
249	DDH-46 LML 2238-2273	0.9986	0.4980	40	34.30	5.7	71	3.1	68	23	0.10	0.07	8.67
251	DDH-68 LML 1878-1903	1.005	0.4980	40	36.80	3.0	37	0.3	37	123	0.01	< 0.01	8.65
253	DDH-85 LML 964-1004	1.028	0.4980	40	35.00	4.0	50	37.5	13	1.3	1.20	0.93	8.49
257	DDH-139 LML 2933-2960	1.005	0.4980	40	34.40	5.4	67	0.3	67	223	0.01	< 0.01	8.66
259	DDH-154 LML 1500-1526	0.9986	0.4980	40	37.75	2.3	29	0.9	28	32	0.03	0.02	8.88
261	DDH-159 LML 1813-1838	1.008	0.4980	40	35.30	4.4	55	5.3	50	10	0.17	0.12	8.67
263	DDH-163 LML 2850-2921B	0.9950	0.4980	40	30.80	9.4	117	27.5	90	4.3	0.88	0.88	9.02
265	DDH-165 LML 2227-2250	1.028	0.4980	40	37.60	1.3	16	0.6	15	27	0.02	0.02	8.74
271	DDH-176 LML 986-1021	1.000	0.4980	40	39.70	0.3	4	< 0.3	4	13	< 0.01	< 0.01	7.49
273	DDH-270 LML 2047-2073	0.9950	0.4980	40	39.25	0.9	11	< 0.3	11	37	< 0.01	< 0.01	8.22
275	CMC-FT	1.0000	0.4980	40	37.25	2.8	35	946.9	-911	< 1	30.3	24.0	6.61
277	CMC-CT	1.0000	0.4980	40	37.75	2.3	29	925.0	-896	< 1	29.6	28.2	5.59

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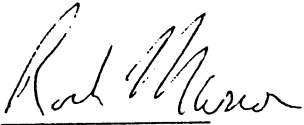
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SEP9002.R95

No. Sample ID	Constant	N HCL added HCL	NaOH HCL (mL) added mL consumed	NP *	MPA *	CNNP *	NP/MPA *	S %	S= Paste pH % units

Constant (C) = (mL acid in blank) / (mL base in blank)
mL acid consumed = (mL acid added) - (mL base added x C)

- *NP(Neutralization Potential)
= (mL acid consumed) x (25) x (N of acid)
- *MPA(Maximum Potential Acidity)
= % Sulphur x 31.25
- *CNNP(Common Net Neutralization Potential)
= NP-MPA
- *Results expresses as tonnes CaCO3 eq/1000 tonnes material


Roch Marion

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3.5-32-35m

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Phone : 705-652-2038 - FAX : 705-652-6441

Crandon Mining Company

7 N. Brown St., 3rd Flr.

Rhineland, WI, 54501-3161 - U.S.A.

Attn : K. W. Collison

Fax : (715)365-1457

Lakefield, September 8, 1995

Date Rec. : September 1, 1995

LR. Ref. : SEP9001.R95

Reference : PO#95-0017

Project : LR

CERTIFICATE OF ANALYSIS

No.	Sample ID	Al g/t	As g/t	Ba g/t	Be g/t	Ca g/t	Cd g/t	Co g/t	Cr g/t	Cu g/t	Fe g/t	Mg g/t	Mn g/t	Mo g/t
1	DDH 44 538-540	58600	< 50	383	< 0.5	956	4.0	19	24	37	33100	12400	381	< 5.0
2	DDH 44 548-550	58700	< 50	381	< 0.5	928	4.0	12	11	28	36300	13600	397	< 5.0
3	DDH 44 557-559	59300	< 50	361	< 0.5	1440	3.4	11	14	26	36400	18000	457	< 5.0
4	DDH 44 566-568	68200	< 50	433	< 0.5	685	3.4	8.0	< 2.0	8.5	34700	18100	472	< 5.0
5	DDH 44 575-577	65200	< 50	404	< 0.5	548	3.4	11	< 2.0	13	32900	18800	458	< 5.0
6	DDH 92 313-315	65000	66	458	< 0.5	854	4.0	16	14	1180	35300	17700	534	< 5.0
7	DDH 92 322-324	65000	< 50	462	< 0.5	828	3.4	8.1	< 2.0	31	33400	17200	513	< 5.0

No.	Sample ID	Na g/t	Ni g/t	P g/t	Pb g/t	Sb g/t	Se g/t	Te g/t	Zn g/t	K g/t	As g/t	Se g/t	Sb g/t	Hg g/t	CO2 %
1	DDH 44 538-540	1350	28	155	20	< 10	< 5.0	< 10	144	21100	43.6	< 5.0	< 5.0	< 0.3	< 0.05
2	DDH 44 548-550	1370	30	96	24	< 10	< 5.0	< 10	136	20400	21.0	< 5.0	< 5.0	< 0.3	< 0.05
3	DDH 44 557-559	1290	29	68	25	< 10	< 5.0	< 10	149	19600	8.3	< 5.0	< 5.0	< 0.3	< 0.05
4	DDH 44 566-568	1420	< 2.0	176	25	< 10	< 5.0	< 10	88	23800	6.0	< 5.0	< 5.0	< 0.3	< 0.05
5	DDH 44 575-577	1210	7.8	97	27	< 10	< 5.0	< 10	101	22600	13.5	< 5.0	< 5.0	< 0.3	< 0.05
6	DDH 92 313-315	1340	46	163	29	< 10	< 5.0	< 10	125	22000	65.6	< 5.0	< 5.0	< 0.3	0.07
7	DDH 92 322-324	1330	20	157	29	< 10	< 5.0	< 10	62	22800	5.9	< 5.0	< 5.0	< 0.3	0.15

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SEP9001.R95

No.	Sample ID	Al g/t	As g/t	Ba g/t	Be g/t	Ca g/t	Cd g/t	Co g/t	Cr g/t	Cu g/t	Fe g/t	Hg g/t	Mn g/t	Mo g/t
8	DDH 92 332-334	77900	< 50	368	< 0.5	578	11	16	58	174	77800	27500	888	< 5.0
9	DDH-23 1041-1043	99700	< 50	471	0.8	1510	14	39	8.2	849	104000	34000	2270	< 5.0
10	DDH-23 1050-1052	106000	< 50	533	0.7	2430	48	51	35	124	108000	34900	2500	< 5.0
11	DDH-23 1059-1061	98100	< 50	745	1.0	3360	15	40	2.1	191	92400	32500	2350	< 5.0
12	DDH-23 1068-1070	78700	< 50	392	< 0.5	2020	15	38	32	72	104000	42400	2260	< 5.0
13	DDH-23 1077-1079	57300	< 50	272	< 0.5	1660	9.4	24	2.1	553	65000	27800	1240	< 5.0
14	DDH-44 754-756	71200	< 50	482	< 0.5	1380	5.6	15	9.7	11	38100	21200	480	< 5.0
15	DDH-44 764-766	67100	< 50	252	0.7	1910	7.4	15	39	72	46100	20200	478	< 5.0
16	DDH-44 774-776	68700	< 50	540	0.7	1370	4.5	15	< 2.0	12	38100	10700	288	< 5.0
17	DDH-160 1975-1977	85000	< 50	358	0.8	1840	11	33	< 2.0	116	72900	58700	804	< 5.0
18	DDH-160 1985-1987	85800	< 50	468	< 0.5	3270	9.0	30	47	124	73800	53500	909	< 5.0
19	DDH-160 1994-1996	93500	< 50	434	0.7	5460	9.6	26	< 2.0	16	60200	40900	738	< 5.0

No.	Sample ID	Na g/t	Ni g/t	P g/t	Pb g/t	Sb g/t	Se g/t	Te g/t	Zn g/t	K g/t	As g/t	Se g/t	Sb g/t	Hg g/t	CO2 %
8	DDH 92 332-334	1210	10	137	32	< 10	< 5.0	< 10	129	20500	8.7	< 5.0	< 5.0	< 0.3	0.18
9	DDH-23 1041-1043	3170	25	230	46	< 10	< 5.0	< 10	425	31600	< 5.0	< 5.0	< 5.0	< 0.3	0.15
10	DDH-23 1050-1052	16900	44	205	48	< 10	< 5.0	< 10	7390	22000	38.8	< 5.0	< 5.0	0.5	0.40
11	DDH-23 1059-1061	8210	40	238	44	< 10	< 5.0	< 10	550	29900	12.3	< 5.0	< 5.0	< 0.3	0.40
12	DDH-23 1068-1070	904	19	616	33	< 10	< 5.0	< 10	280	10400	9.9	< 5.0	< 5.0	< 0.3	0.18
13	DDH-23 1077-1079	985	< 2.0	420	30	< 10	< 5.0	< 10	366	9840	5.2	< 5.0	< 5.0	< 0.3	< 0.05
14	DDH-44 754-756	1460	5.1	516	26	< 10	< 5.0	< 10	78	24700	9.4	< 5.0	< 5.0	< 0.3	0.11
15	DDH-44 764-766	1160	31	456	25	< 10	< 5.0	< 10	353	23200	11.0	< 5.0	< 5.0	< 0.3	0.07
16	DDH-44 774-776	2010	< 2.0	487	28	< 10	< 5.0	< 10	68	27300	33.4	< 5.0	< 5.0	< 0.3	0.11
17	DDH-160 1975-1977	1100	10	444	35	< 10	< 5.0	< 10	94	12400	< 5.0	< 5.0	< 5.0	< 0.3	0.15
18	DDH-160 1985-1987	1190	29	646	34	< 10	< 5.0	< 10	109	15100	< 5.0	< 5.0	< 5.0	< 0.3	0.07
19	DDH-160 1994-1996	21800	< 2.0	460	39	< 10	< 5.0	< 10	168	12300	6.5	< 5.0	< 5.0	< 0.3	0.33

3.5-32-350

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SEP9001.R95

3.5-32-35p

No.	Sample ID	Al g/t	As g/t	Ba g/t	Be g/t	Ca g/t	Cd g/t	Co g/t	Cr g/t	Cu g/t	Fe g/t	Mg g/t	Mn g/t	Mo g/t
20	DDH-172 1504-1506	70000	< 50	469	< 0.5	1620	3.9	11	103	16	29500	26200	490	< 5.0
21	DDH-172 1513-1515	68900	< 50	509	< 0.5	2590	3.4	9.3	8.3	21	24800	25000	561	< 5.0
22	DDH-172 1522-1524	68700	< 50	529	< 0.5	4670	1.1	8.4	3.5	17	20100	19200	601	< 5.0
23	DDH-46 2028-2030	64400	< 50	207	< 0.5	10600	7.3	19	87	17	62700	41300	1450	67
24	DDH-46 2037-2039	69500	< 50	289	< 0.5	17400	5.7	14	< 2.0	49	42000	22800	1190	< 5.0
25	DDH-46 2046-2048	71100	< 50	396	< 0.5	10000	8.0	29	< 2.0	130	63900	33400	1090	< 5.0
26	DDH-46 2055-2057	81200	< 50	148	< 0.5	57700	10	41	8.2	126	79100	31100	1290	< 5.0
27	73-DDH 1372-1374	61300	< 50	450	< 0.5	7630	5.7	13	14	941	49400	16500	1430	< 5.0
28	73-DDH 1381-1383	67700	< 50	547	< 0.5	5050	6.8	13	2.5	28	47100	19000	964	< 5.0
29	73-DDH 1390-1392	64200	< 50	49	< 0.5	40700	8.4	27	< 2.0	66	58000	22400	1330	< 5.0
30	DDH-131 1163-1165	66300	< 50	545	< 0.5	4170	8.4	22	< 2.0	22	59300	22400	1050	< 5.0
31	DDH-131 1171-1173	94500	< 50	552	0.5	2610	13	35	34	11	95900	33500	1590	< 5.0

No.	Sample ID	Na g/t	Ni g/t	P g/t	Pb g/t	Sb g/t	Se g/t	Te g/t	Zn g/t	K g/t	As g/t	Se g/t	Sb g/t	Hg g/t	CO2 %
20	DDH-172 1504-1506	1590	50	524	25	< 10	< 5.0	< 10	85	19300	< 5.0	< 5.0	< 5.0	< 0.3	< 0.05
21	DDH-172 1513-1515	1500	14	464	29	< 10	< 5.0	< 10	87	22200	< 5.0	< 5.0	< 5.0	< 0.3	< 0.05
22	DDH-172 1522-1524	2900	13	436	25	< 10	< 5.0	< 10	71	23500	< 5.0	< 5.0	< 5.0	< 0.3	0.26
23	DDH-46 2028-2030	2360	24	762	31	< 10	< 5.0	< 10	110	9000	< 5.0	< 5.0	< 5.0	< 0.3	1.03
24	DDH-46 2037-2039	16900	< 2.0	820	27	< 10	< 5.0	< 10	68	12000	< 5.0	< 5.0	< 5.0	< 0.3	1.54
25	DDH-46 2046-2048	7940	54	623	27	< 10	< 5.0	< 10	90	12100	< 5.0	< 5.0	< 5.0	< 0.3	0.70
26	DDH-46 2055-2057	20300	66	795	35	< 10	< 5.0	< 10	92	5740	< 5.0	< 5.0	< 5.0	< 0.3	6.31
27	73-DDH 1372-1374	1910	30	608	27	< 10	< 5.0	< 10	74	18600	< 5.0	< 5.0	< 5.0	< 0.3	1.03
28	73-DDH 1381-1383	1700	18	650	24	< 10	< 5.0	< 10	72	20900	< 5.0	< 5.0	< 5.0	< 0.3	0.51
29	73-DDH 1390-1392	26900	28	342	25	< 10	< 5.0	< 10	86	2880	5.4	< 5.0	< 5.0	< 0.3	5.40
30	DDH-131 1163-1165	1480	2.8	789	24	< 10	< 5.0	< 10	119	18200	< 5.0	< 5.0	< 5.0	< 0.3	0.22
31	DDH-131 1171-1173	8650	70	504	37	< 10	< 5.0	< 10	172	20800	< 5.0	< 5.0	< 5.0	< 0.3	0.11

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No.	Sample ID	Al g/t	As g/t	Ba g/t	Be g/t	Ca g/t	Cd g/t	Co g/t	Cr g/t	Cu g/t	Fe g/t	Mg g/t	Mn g/t	Mo g/t
32	DDH-131 1180-1182	80600	< 50	444	0.5	12100	15	41	17	40	98600	42000	2140	< 5.0
33	DDH-16 2079-2099	77400	< 50	250	< 0.5	13900	11	31	22	8.5	79800	33600	1810	< 5.0
34	DDH-16 3007-3009	72500	< 50	209	< 0.5	10800	9.1	24	64	62	76200	28600	1680	< 5.0
35	DDH-16 3017-3019	73100	< 50	209	< 0.5	10600	8.9	21	27	47	66100	18300	1240	< 5.0
36	DDH 45 2067-2069	59400	< 50	160	< 0.5	14000	11	21	7.2	59	68200	21100	1970	< 5.0
37	DDH 45 2077-2079	62600	< 50	171	< 0.5	4910	12	25	4.3	308	80500	20900	1190	< 5.0
38	DDH 45 2086-2088	58000	< 50	127	< 0.5	4650	12	24	< 2.0	110	80300	19200	1140	< 5.0
39	DDH 45 2098-2100	57900	< 50	196	< 0.5	5860	13	26	< 2.0	58	81500	19600	1300	< 5.0
40	DDH-68 1880-1882	52900	< 50	171	< 0.5	6180	9.2	20	32	66	67400	17700	1280	< 5.0
41	DDH-68 1889-1891	61200	< 50	175	< 0.5	6910	10	19	< 2.0	9.8	66500	17800	1130	< 5.0
42	DDH-68 1898-1900	64000	< 50	220	< 0.5	5240	11	21	46	13	75500	19000	1160	< 5.0
43	DDH-176 993-995	61900	< 50	232	0.8	1660	9.0	16	27	13	45300	23900	220	< 5.0

No.	Sample ID	Na g/t	Ni g/t	P g/t	Pb g/t	Sb g/t	Se g/t	Te g/t	Zn g/t	K g/t	As g/t	Se g/t	Sb g/t	Hg g/t	CO2 %
32	DDH-131 1180-1182	1890	50	475	38	< 10	< 5.0	< 10	198	15700	7.2	< 5.0	< 5.0	< 0.3	2.13
33	DDH-16 2079-2099	9190	< 2.0	884	31	< 10	< 5.0	< 10	134	12000	< 5.0	< 5.0	< 5.0	< 0.3	2.50
34	DDH-16 3007-3009	11900	21	1100	32	< 10	< 5.0	< 10	151	9430	8.9	< 5.0	< 5.0	< 0.3	1.54
35	DDH-16 3017-3019	18000	20	1500	32	< 10	< 5.0	< 10	161	11600	5.0	< 5.0	< 5.0	< 0.3	1.36
36	DDH 45 2067-2069	12000	16	1040	29	< 10	< 5.0	< 10	349	8200	< 5.0	< 5.0	< 5.0	< 0.3	2.57
37	DDH 45 2077-2079	9570	12	1170	28	< 10	< 5.0	< 10	222	6720	< 5.0	< 5.0	< 5.0	< 0.3	0.29
38	DDH 45 2086-2088	8710	< 2.0	1040	23	< 10	< 5.0	< 10	285	5160	< 5.0	< 5.0	< 5.0	< 0.3	0.22
39	DDH 45 2098-2100	6970	< 2.0	1180	25	< 10	< 5.0	< 10	258	6190	5.8	< 5.0	< 5.0	< 0.3	0.55
40	DDH-68 1880-1882	8570	2.7	1040	23	< 10	< 5.0	< 10	138	5920	< 5.0	< 5.0	< 5.0	< 0.3	1.10
41	DDH-68 1889-1891	13900	< 2.0	1260	25	< 10	< 5.0	< 10	148	6600	5.9	< 5.0	< 5.0	< 0.3	0.92
42	DDH-68 1898-1900	9740	< 2.0	1340	29	< 10	< 5.0	< 10	180	11500	15.7	< 5.0	< 5.0	< 0.3	3.19
43	DDH-176 993-995	1550	4.3	755	37	< 10	< 5.0	< 10	1030	15100	8.3	< 5.0	< 5.0	< 0.3	< 0.05

3.5-32-35g

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SEP9001.R95

No.	Sample ID	Al g/t	As g/t	Ba g/t	Be g/t	Ca g/t	Cd g/t	Co g/t	Cr g/t	Cu g/t	Fe g/t	Mg g/t	Mn g/t	Mo g/t
44	DDH-176 1002-1004	82200	< 50	442	1.3	544	4.0	7.4	23	73	23500	13300	74	< 5.0
45	DDH-176 1010-1012	62000	< 50	313	1.0	601	4.5	9.4	15	11	26500	10800	143	< 5.0
46	DDH-176 1019-1021	71100	< 50	219	0.7	2020	7.3	15	13	9.3	47000	24500	208	< 5.0
47	DDH-9 SL 362-385	64400	< 50	368	< 0.5	618	8.6	12	29	13	46000	21100	649	< 5.0
48	DDH-23 SL 523-552	59000	< 50	337	0.6	1910	7.6	13	< 2.0	11	44000	19000	787	< 5.0
49	DDH-44 SL 160-192	62300	< 50	373	0.5	366	6.3	8.0	42	353	39600	20400	394	< 5.0
50	DDH-44 SL 536-575	59300	< 50	388	0.6	618	6.4	15	48	27	31600	14300	374	< 5.0
51	DDH-91 SL 247-274	60300	< 50	253	0.5	482	12	18	3.1	2695	60900	20300	798	< 5.0
52	DDH-91 SL 397-447	67100	< 50	323	0.7	1350	9.9	15	< 2.0	131	59700	25500	928	< 5.0
53	DDH-92 SL 311-338	59100	< 50	382	0.6	535	6.3	13	18	458	38400	17300	526	< 5.0
54	DDH-144 SL 662-688	57300	< 50	243	< 0.5	565	9.2	17	9.5	351	59000	22600	1030	< 5.0
55	DDH-9 RL 592-642	71200	< 50	331	0.6	1680	9.2	19	3.4	35	54500	32200	679	< 5.0

No.	Sample ID	Na g/t	Ni g/t	P g/t	Pb g/t	Sb g/t	Se g/t	Te g/t	Zn g/t	K g/t	As g/t	Se g/t	Sb g/t	Hg g/t	CO2 %
44	DDH-176 1002-1004	2690	< 2.0	118	52	< 10	< 5.0	< 10	159	32600	15.3	< 5.0	< 5.0	< 0.3	< 0.05
45	DDH-176 1010-1012	2110	< 2.0	199	31	< 10	< 5.0	< 10	998	22900	5.3	< 5.0	< 5.0	< 0.3	0.22
46	DDH-176 1019-1021	2120	< 2.0	907	30	< 10	< 5.0	< 10	509	19500	19.0	< 5.0	< 5.0	< 0.3	0.11
47	DDH-9 SL 362-385	1530	13	145	26	< 10	< 5.0	< 10	137	19100	6.6	< 5.0	< 5.0	< 0.3	< 0.05
48	DDH-23 SL 523-552	1130	< 2.0	214	25	< 10	< 5.0	< 10	131	17700	< 5.0	< 5.0	< 5.0	< 0.3	0.18
49	DDH-44 SL 160-192	1200	12	100	23	< 10	< 5.0	< 10	152	20600	23.3	< 5.0	< 5.0	< 0.3	< 0.05
50	DDH-44 SL 536-575	1450	27	159	21	< 10	< 5.0	< 10	107	22200	11.5	< 5.0	< 5.0	< 0.3	< 0.05
51	DDH-91 SL 247-274	1100	6.0	78	22	< 10	< 5.0	< 10	230	15700	< 5.0	< 5.0	< 5.0	< 0.3	< 0.05
52	DDH-91 SL 397-447	1210	< 2.0	418	28	< 10	< 5.0	< 10	132	17200	12.3	< 5.0	< 5.0	< 0.3	< 0.05
53	DDH-92 SL 311-338	1270	6.8	137	26	< 10	< 5.0	< 10	75	20300	16.1	< 5.0	< 5.0	< 0.3	< 0.05
54	DDH-144 SL 662-688	1040	5.4	144	25	< 10	< 5.0	< 10	169	13900	7.8	< 5.0	< 5.0	< 0.3	< 0.05
55	DDH-9 RL 592-642	1220	4.0	632	29	< 10	< 5.0	< 10	185	18500	< 5.0	< 5.0	< 5.0	< 0.3	< 0.05

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No.	Sample ID	Al g/t	As g/t	Ba g/t	Be g/t	Ca g/t	Cd g/t	Co g/t	Cr g/t	Cu g/t	Fe g/t	Hg g/t	Mn g/t	Mo g/t
56	DDH-15 RL 2079-2111	75200	< 50	281	0.6	4620	9.8	23	28	24	54100	48100	1180	< 5.0
57	DDH-16 RL 2344-2376	75900	< 50	310	0.6	13900	15	30	11	14	94800	29200	1310	< 5.0
58	DDH-21 RL 932-985	68300	< 50	435	0.7	2070	6.8	13	12	28	41400	22800	779	< 5.0
59	DDH-21 RL 1216-1272	75300	< 50	211	0.8	4790	10	26	5.2	60	72900	53800	1120	< 5.0
60	DDH-23 RL 1042-1082	81200	< 50	466	0.7	2460	17	32	< 2.0	318	82700	32400	1880	< 5.0
61	DDH-23 RL 1177-1230	75200	< 50	208	0.5	1400	11	23	24	39	75700	46600	1230	< 5.0
62	DDH-24 RL 1126-1161	71800	< 50	626	0.5	2340	9.2	18	45	224	52700	16700	951	< 5.0
63	DDH-44 RL 667-694	65600	< 50	367	< 0.5	1210	7.4	12	< 2.0	6.2	51200	25700	640	< 5.0
64	DDH-44 RL 752-779	67300	< 50	391	< 0.5	1400	6.8	15	261	24	46300	21700	522	< 5.0
65	DDH-46 RL 1823-1859	68100	< 50	221	< 0.5	14700	5.7	15	108	9.1	38700	22100	1130	< 5.0
66	DDH-91 RL 583-621	79100	< 50	366	0.5	1950	11	16	116	3004	75200	26900	961	< 5.0
67	DDH-160 RL 1783-1808	75000	< 50	191	< 0.5	6230	16	39	525	55	102000	53800	1690	< 5.0

No.	Sample ID	Na g/t	Ni g/t	P g/t	Pb g/t	Sb g/t	Se g/t	Te g/t	Zn g/t	K g/t	As g/t	Se g/t	Sb g/t	Hg g/t	CO2 %
56	DDH-15 RL 2079-2111	7870	27	366	31	< 10	< 5.0	< 10	166	12700	< 5.0	< 5.0	< 5.0	< 0.3	0.22
57	DDH-16 RL 2344-2376	10300	< 2.0	672	28	< 10	< 5.0	< 10	76	9900	< 5.0	< 5.0	< 5.0	< 0.3	2.64
58	DDH-21 RL 932-985	1460	3.7	466	25	< 10	< 5.0	< 10	69	23400	< 5.0	< 5.0	< 5.0	< 0.3	0.22
59	DDH-21 RL 1216-1272	1060	< 2.0	677	33	< 10	< 5.0	< 10	102	11100	6.9	< 5.0	< 5.0	< 0.3	0.73
60	DDH-23 RL 1042-1082	5680	< 2.0	405	36	< 10	< 5.0	< 10	1340	20000	11.6	< 5.0	< 5.0	< 0.3	0.15
61	DDH-23 RL 1177-1230	1170	4.0	438	31	< 10	< 5.0	< 10	253	12000	< 5.0	< 5.0	< 5.0	< 0.3	< 0.05
62	DDH-24 RL 1126-1161	1460	13	508	30	< 10	< 5.0	< 10	161	25500	< 5.0	< 5.0	< 5.0	< 0.3	0.11
63	DDH-44 RL 667-694	1290	< 2.0	452	26	< 10	< 5.0	< 10	109	18500	< 5.0	< 5.0	< 5.0	< 0.3	< 0.05
64	DDH-44 RL 752-779	1470	< 2.0	467	24	< 10	< 5.0	< 10	124	22000	8.7	< 5.0	< 5.0	< 0.3	< 0.05
65	DDH-46 RL 1823-1859	21200	< 2.0	411	25	< 10	< 5.0	< 10	96	12300	< 5.0	< 5.0	< 5.0	< 0.3	1.69
66	DDH-91 RL 583-621	1250	< 2.0	656	34	< 10	< 5.0	< 10	142	18900	< 5.0	< 5.0	< 5.0	< 0.3	< 0.05
67	DDH-160 RL 1783-1808	940	< 2.0	693	32	< 10	< 5.0	< 10	112	6940	< 5.0	< 5.0	< 5.0	< 0.3	0.77

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No.	Sample ID	Al g/t	As g/t	Ba g/t	Be g/t	Ca g/t	Cd g/t	Co g/t	Cr g/t	Cu g/t	Fe g/t	Mg g/t	Mn g/t	Mo g/t
68	DDH-160 RL 1971-1997	81900	< 50	357	0.6	5500	9.1	28	184	45	63100	47600	866	< 5.0
69	DDH-163 RL 1721-1747	60900	< 50	391	< 0.5	10300	4.6	12	570	16	41000	18100	1160	< 5.0
70	DDH-163 RL 1804-1829	72800	< 50	359	< 0.5	16400	8.0	24	119	66	57000	25100	1960	< 5.0
71	DDH-172 RL 1298-1315	74800	< 50	224	< 0.5	2700	12	23	61	163	73800	49000	1770	< 5.0
72	DDH-172 RL 1500-1526	68700	< 50	513	0.5	2660	4.6	11	304	19	28200	24200	564	< 5.0
73	DDH-16 UML 2378-2406	68500	< 50	474	< 0.5	8460	10	28	164	20	81400	22300	1200	< 5.0
74	DDH-44 UML 955-980	71600	< 50	301	< 0.5	1460	10	20	129	16	69000	32500	771	< 5.0
75	DDH-46 UML 1944-1984	75900	< 50	422	0.5	15100	4.0	12	202	10	38400	10500	855	< 5.0
76	DDH-46 UML 2026-2060	69300	< 50	243	< 0.5	23300	6.9	22	88	44	58600	31200	1200	< 5.0
77	DDH-73 UML 1370-1395	65200	< 50	322	< 0.5	26800	6.9	19	123	404	51900	21400	1450	< 5.0
78	DDH-92 UML 564-573	90500	< 50	369	0.8	1090	9.7	19	33	8.3	78300	40000	1220	< 5.0
79	DDH-92 UML 575-589	47000	< 50	101	0.7	951	6.9	14	96	7.8	50800	23900	786	< 5.0

No.	Sample ID	Na g/t	Ni g/t	P g/t	Pb g/t	Sb g/t	Se g/t	Te g/t	Zn g/t	K g/t	As g/t	Se g/t	Sb g/t	Hg g/t	CO2 %
68	DDH-160 RL 1971-1997	12000	< 2.0	556	36	< 10	< 5.0	< 10	114	11600	< 5.0	< 5.0	< 5.0	< 0.3	0.55
69	DDH-163 RL 1721-1747	11700	< 2.0	447	25	< 10	< 5.0	< 10	108	15900	< 5.0	< 5.0	< 5.0	< 0.3	0.77
70	DDH-163 RL 1804-1829	19100	< 2.0	511	34	< 10	< 5.0	< 10	171	10300	< 5.0	< 5.0	< 5.0	< 0.3	2.72
71	DDH-172 RL 1298-1315	1030	< 2.0	565	31	< 10	< 5.0	< 10	505	12100	< 5.0	< 5.0	< 5.0	< 0.3	0.18
72	DDH-172 RL 1500-1526	1790	< 2.0	497	26	< 10	< 5.0	< 10	75	24300	< 5.0	< 5.0	< 5.0	< 0.3	< 0.05
73	DDH-16 UML 2378-2406	1640	< 2.0	634	28	< 10	< 5.0	< 10	92	14700	< 5.0	< 5.0	< 5.0	< 0.3	1.14
74	DDH-44 UML 955-980	1240	< 2.0	526	30	< 10	< 5.0	< 10	183	15200	< 5.0	< 5.0	< 5.0	< 0.3	< 0.05
75	DDH-46 UML 1944-1984	34700	< 2.0	472	29	< 10	< 5.0	< 10	90	10300	< 5.0	< 5.0	< 5.0	< 0.3	1.32
76	DDH-46 UML 2026-2060	12300	< 2.0	743	28	< 10	< 5.0	< 10	80	9940	< 5.0	< 5.0	< 5.0	< 0.3	3.78
77	DDH-73 UML 1370-1395	13300	< 2.0	524	26	< 10	< 5.0	< 10	82	14800	< 5.0	< 5.0	< 5.0	< 0.3	2.57
78	DDH-92 UML 564-573	1380	< 2.0	296	36	< 10	< 5.0	< 10	193	19300	< 5.0	< 5.0	< 5.0	< 0.3	< 0.05
79	DDH-92 UML 575-589	920	< 2.0	191	23	< 10	< 5.0	< 10	120	5110	5.7	< 5.0	< 5.0	< 0.3	0.11

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No.	Sample ID	Al g/t	As g/t	Ba g/t	Be g/t	Ca g/t	Cd g/t	Co g/t	Cr g/t	Cu g/t	Fe g/t	Mg g/t	Mn g/t	Mo g/t
80	DDH-131 UML 1161-1185	71000	< 50	408	0.9	7920	10	29	20	27	76200	32500	1430	< 5.0
81	DDH-140 UML 2841-2868	75100	< 50	370	0.6	18000	7.4	23	< 2.0	32	61700	18500	1090	< 5.0
82	DDH-149 UML 1442-1477	68200	< 50	113	0.6	2980	9.7	20	8.2	33	64600	61300	992	< 5.0
83	DDH-154 UML 1444-1470	68400	< 50	233	< 0.5	19200	8.0	22	< 2.0	105	56800	33200	1200	< 5.0
84	DDH-160 UML 2220-2245	70900	< 50	270	< 0.5	8790	6.9	16	6.7	589	55300	24500	679	< 5.0
85	DDH-163 UML 2371-2396	65500	< 50	146	< 0.5	23500	5.7	23	25	873	57400	18200	870	< 5.0
86	DDH-163 UML 2560-2585	56900	< 50	396	< 0.5	3240	6.3	21	< 2.0	70	59100	20800	746	< 5.0
87	DDH-6 LML 865-900	73400	< 50	196	0.6	2340	12	24	7.4	38	69200	50100	312	< 5.0
88	DDH-9 LML 802-861	45800	730	296	0.9	3120	10	8.0	< 2.0	88	52500	12500	135	< 5.0
89	DDH-15 LML 2475-2515	74000	< 50	249	2.4	13600	11	30	< 2.0	88	69400	27500	1200	< 5.0
90	DDH-16 LML 2995-3026	71100	< 50	152	< 0.5	12800	11	25	< 2.0	212	77600	29200	1410	< 5.0
91	DDH-21 LML 1627-1657	74700	< 50	249	< 0.5	4700	10	24	< 2.0	208	68000	44700	1120	< 5.0

No.	Sample ID	Na g/t	Ni g/t	P g/t	Pb g/t	Sb g/t	Se g/t	Te g/t	Zn g/t	K g/t	As g/t	Se g/t	Sb g/t	Hg g/t	CO2 %
80	DDH-131 UML 1161-1185	2190	19	538	29	< 10	< 5.0	< 10	155	13700	< 5.0	< 5.0	< 5.0	< 0.3	1.10
81	DDH-140 UML 2841-2868	24000	< 2.0	856	33	< 10	< 5.0	< 10	126	6170	< 5.0	< 5.0	< 5.0	< 0.3	2.61
82	DDH-149 UML 1442-1477	810	21	630	29	< 10	< 5.0	< 10	113	5030	< 5.0	< 5.0	< 5.0	< 0.3	0.22
83	DDH-154 UML 1444-1470	10800	3.8	507	57	< 10	< 5.0	< 10	177	12500	< 5.0	< 5.0	< 5.0	< 0.3	5.03
84	DDH-160 UML 2220-2245	14000	11	688	31	< 10	< 5.0	< 10	94	8910	< 5.0	< 5.0	< 5.0	< 0.3	0.81
85	DDH-163 UML 2371-2396	19800	29	657	25	< 10	< 5.0	< 10	74	3440	< 5.0	< 5.0	< 5.0	< 0.3	2.17
86	DDH-163 UML 2560-2585	950	8.1	516	27	< 10	< 5.0	< 10	121	10300	< 5.0	< 5.0	< 5.0	< 0.3	0.33
87	DDH-6 LML 865-900	1410	11	875	42	< 10	< 5.0	< 10	897	12500	34.3	< 5.0	< 5.0	0.4	0.07
88	DDH-9 LML 802-861	1060	< 2.0	114	303	25	< 5.0	< 10	2410	18900	729	< 5.0	23	1.8	0.48
89	DDH-15 LML 2475-2515	11600	< 2.0	605	39	< 10	< 5.0	< 10	196	11300	11.3	< 5.0	< 5.0	< 0.3	2.83
90	DDH-16 LML 2995-3026	11100	< 2.0	1050	28	< 10	< 5.0	< 10	193	8110	5.5	< 5.0	< 5.0	< 0.3	2.02
91	DDH-21 LML 1627-1657	1070	11	911	30	< 10	< 5.0	< 10	137	10900	< 5.0	< 5.0	< 5.0	< 0.3	0.40

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No.	Sample ID	Al g/t	As g/t	Ba g/t	Be g/t	Ca g/t	Cd g/t	Co g/t	Cr g/t	Cu g/t	Fe g/t	Mg g/t	Mn g/t	Mo g/t
92	DDH-42 LML 2234-2271	70000	< 50	217	< 0.5	16100	9.7	21	< 2.0	20	71300	25800	1370	< 5.0
93	DDH-45 LML 2065-2100	56000	< 50	136	< 0.5	6210	9.7	25	138	81	74900	19600	1220	< 5.0
94	DDH-46 LML 2238-2273	73500	< 50	295	< 0.5	20500	9.1	27	69	51	67300	19100	1020	< 5.0
95	DDH-68 LML 1878-1903	62300	< 50	178	< 0.5	7550	9.0	20	93	33	71000	19300	1160	< 5.0
96	DDH-85 LML 964-1004	69800	72	329	0.9	10700	6.3	15	73	18	43600	24700	552	< 5.0
97	DDH-139 LML 2933-2960	77300	< 50	233	< 0.5	16000	9.6	23	60	36	72400	35800	1400	< 5.0
98	DDH-154 LML 1500-1526	70300	< 50	192	1.8	4140	11	25	19	87	69200	43700	1210	< 5.0
99	DDH-159 LML 1813-1838	75900	< 50	374	1.4	10100	6.2	21	< 2.0	30	41900	13900	1080	< 5.0
100	DDH-163 LML 2850-2921B	78000	< 50	336	0.9	17900	6.8	22	< 2.0	57	45900	45200	1020	< 5.0
101	DDH-165 LML 2227-2250	71300	< 50	196	0.6	5990	14	30	62	21	86600	39800	1300	< 5.0
102	DDH-176 LML 986-1021	76200	< 50	295	1.6	1110	11	16	43	55	45200	21500	199	< 5.0
103	DDH-270 LML 2047-2073	79700	< 50	577	0.7	4310	3.9	15	14	11	25100	9860	309	< 5.0

No.	Sample ID	Na g/t	Ni g/t	P g/t	Pb g/t	Sb g/t	Se g/t	Te g/t	Zn g/t	K g/t	As g/t	Se g/t	Sb g/t	Hg g/t	CO2 %
92	DDH-42 LML 2234-2271	11500	< 2.0	1140	27	< 10	< 5.0	< 10	173	7810	11.2	< 5.0	< 5.0	< 0.3	1.65
93	DDH-45 LML 2065-2100	8900	25	993	27	< 10	< 5.0	< 10	248	5410	< 5.0	< 5.0	< 5.0	< 0.3	0.48
94	DDH-46 LML 2238-2273	17800	14	628	29	< 10	< 5.0	< 10	90	7870	< 5.0	< 5.0	< 5.0	< 0.3	3.19
95	DDH-68 LML 1878-1903	9830	< 2.0	1100	29	< 10	< 5.0	< 10	160	6630	6.5	< 5.0	< 5.0	< 0.3	1.54
96	DDH-85 LML 964-1004	3530	7.1	406	29	< 10	< 5.0	< 10	331	21600	72.1	< 5.0	< 5.0	< 0.3	2.28
97	DDH-139 LML 2933-2960	13800	9.6	1060	32	< 10	< 5.0	< 10	131	12000	< 5.0	< 5.0	< 5.0	< 0.3	1.87
98	DDH-154 LML 1500-1526	960	10	634	29	< 10	< 5.0	< 10	196	8830	< 5.0	< 5.0	< 5.0	< 0.3	0.40
99	DDH-159 LML 1813-1838	12000	< 2.0	632	30	< 10	< 5.0	< 10	103	16500	35.3	< 5.0	< 5.0	< 0.3	2.42
100	DDH-163 LML 2850-2921B	2540	4.6	353	32	< 10	< 5.0	< 10	160	19900	37.5	< 5.0	< 5.0	< 0.3	< 0.05
101	DDH-165 LML 2227-2250	1490	17	670	30	< 10	< 5.0	< 10	219	8000	5.1	< 5.0	< 5.0	< 0.3	0.77
102	DDH-176 LML 986-1021	2080	26	322	49	< 10	< 5.0	< 10	1610	21900	28.5	< 5.0	< 5.0	< 0.3	0.18
103	DDH-270 LML 2047-2073	2840	2.3	1510	27	< 10	< 5.0	< 10	69	25100	6.9	< 5.0	< 5.0	< 0.3	3.27

LAKEFIELD RESEARCH

A Division of Falconbridge Limited
P.O. Box 4300, 185 Concession St., Lakefield, Ontario, K0L 2H0
Phone : 705-652-2038 - FAX : 705-652-6441

SEP9001.R95

No.	Sample ID	Al	As	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	Mg	Mn	Mo
		g/t	g/t	g/t	g/t	g/t	g/t	g/t	g/t	g/t	g/t	g/t	g/t	g/t
119	CMC-FT	17200	3110	37	< 0.5	6600	52	86	< 2.0	523 274000	10500	518	< 5.0	
121	CMC-CT	17900	3088	38	< 0.5	6620	51	83	< 2.0	489 267000	10800	523	< 5.0	

No.	Sample ID	Na	Ni	P	Pb	Sb	Se	Te	Zn	K	As	Se	Sb	Hg	CO2
		g/t	g/t	g/t	g/t	g/t	g/t	g/t	g/t	g/t	g/t	g/t	g/t	g/t	%
119	CMC-FT	848	< 2.0	123	886	< 10	< 20	< 10	6210	4250	3000	18.9	23	2.7	1.76
121	CMC-CT	907	< 2.0	117	845	< 10	< 20	< 10	5450	4500	2680	52.4	25	2.3	1.58



Roch Marion

3.5-32-35w

Chemex Labs ABA Data.



Chemex Labs, Inc.

Analytical Chemists * Geochemists * Registered Assayers

994 Glendale Ave., Unit 3, Sparks
Nevada, U.S.A. 89431
PHONE: 702-356-5395 FAX: 702-355-0179

To: CRANDON MINING COMPANY

7 H BROWN ST.
RIMMELANDER, WISCONSIN
54501-1457

Project:

Comments: ATTN: KEN BLACK

Page Number : 1
Total Pages : 1
Certificate Date : 02-OCT-95
Invoice No. : 10528949
P.O. Number :
Account : MZX

CERTIFICATE OF ANALYSIS

A9528949

SAMPLE	PREP CODE		PASTE pH	S % * Sulfate	S % *** Sulfide	S % Total	CO2 % Inorg	Mod. Ma Acid **	Mod Neu Potent.	Net Neu Poten**	Ratio NP/MPA	
CMC-CT	268	220	6.3	0.29	28.44	28.4	1.0	889	21	-868	1.00	
CMC-FT	268	220	6.3	0.05	30.04	31.1	1.3	939	26	-913	1.00	
FILE MAIN <u>EMJ</u> Sub <u>WS</u> Sub <u>DA</u> Keywords _____ _____												

NOTE: * HYDROCHLORIC ACID SOLUBLE SULFATE

NOTE: ** UNITS = KILOGRAMS CaCO3 EQUIVALENT PER METRIC TONNE (Kg/MT)

NOTE: *** NITRIC ACID SOLUBLE SULFIDE

CERTIFICATION: John Bickler

3.5-32-36b

**Appendix 3.5-32 Table 1. Bulk Chemical Data Conversions and
Calculations for the Waste Rock Composites**

Appendix 3.5-32 Table 1

Bulk Chemical Data Conversions and Calculations for the Waste Rock Composites

Reported concentrations have been converted to mg/kg, and the mass of each parameter has been calculated.

Skunk Lake Master Composite

Parameter	Reported Concentration (%, g/t)	Converted Concentration (mg/kg)	Calculated Mass (kg)
Aluminum	6.36 %	63,600	5,370
Antimony	0.002 %	20	1.7
Arsenic	0.008 % (As ₂ O ₃)	61 (As)	5.2
Barium	0.039 %	390	33
Cadmium	0.0005 %	5.0	0.42
Calcium	0.11 %	1,100	93
Carbon (total)	0.08 %	800	68
Chromium	0.0007 %	7.0	0.59
Cobalt	0.0021 %	21	1.8
Copper	0.086 %	860	73
Gallium	0.0014 %	14	1.2
Iron	4.60 %	46,000	3,900
Lead	0.014 %	140	12
Magnesium	2.12 %	21,200	1,790
Manganese	0.063 %	630	54
Mercury	<0.00003 %	<0.3	<0.03
Nickel	0.0006 %	6.0	0.51
Potassium	1.79 %	17,900	1,510
Selenium	<0.0003 %	<3	<0.3
Silicon	31.1 %	311,000	26,200
Silver	<0.5 g/t	<0.01	<5E-4

Appendix 3.5-32 Table 1, continued

Parameter	Reported Concentration (%, g/t)	Converted Concentration (mg/kg)	Calculated Mass (kg)
Sodium	0.11 %	1,100	93
Sulfur (total)	0.01 %	100	8.4
Tin	<0.001 %	<10	<0.8
Titanium	0.056 %	560	47
Zinc	0.024 %	240	20

Rice Lake Master Composite

Parameter	Reported Concentration (%, g/t)	Converted Concentration (mg/kg)	Calculated Mass (kg)
Aluminum	6.80 %	68,000	8,600
Antimony	0.002 %	20	2.5
Arsenic	<0.005 % (As ₂ O ₃)	<40 (As)	<5
Barium	0.034 %	340	43
Cadmium	0.0007 %	7.0	0.88
Calcium	0.77 %	7,700	970
Carbon (total)	0.33 %	3,300	420
Chromium	0.0011 %	11	1.4
Cobalt	0.0019 %	19	2.4
Copper	0.021 %	210	27
Gallium	0.0014 %	14	1.8
Iron	6.21 %	62,100	7,850
Lead	0.015 %	150	19
Magnesium	3.60 %	36,000	4,550
Manganese	0.14 %	1,400	180
Mercury	<0.00003 %	<0.3	<0.04
Nickel	0.0015 %	15	1.9
Potassium	1.24 %	12,400	1,570
Selenium	<0.0003 %	<3	<0.4
Silicon	28.5 %	285,000	36,000
Silver	<0.5 g/t	<0.01	<7E-4
Sodium	0.51 %	5,100	640
Sulfur (total)	<0.01 %	<100	<13
Tin	<0.001 %	<10	<1.3
Titanium	0.038 %	380	48
Zinc	0.019 %	190	24

Upper Mole Lake Master Composite

Parameter	Reported Concentration (%, g/t)	Converted Concentration (mg/kg)	Calculated Mass (kg)
Aluminum	7.10 %	71,000.00	9,400
Antimony	0.003 %	30	4.0
Arsenic	<0.005 % (As ₂ O ₃)	<40 (As)	<5
Barium	0.036 %	360	48
Cadmium	0.0006 %	6.0	0.80
Calcium	1.34 %	13,400	1,780
Carbon (total)	0.53 %	5,300	700
Chromium	0.0012 %	12	1.6
Cobalt	0.0025 %	25	3.3
Copper	0.024 %	240	32
Gallium	0.0015 %	15	2.0
Iron	6.59 %	65,900	8,760
Lead	0.026 %	260	35
Magnesium	3.21 %	32,100	4,270
Manganese	0.13 %	1,300	170
Mercury	<0.00003 %	<0.3	<0.04
Nickel	0.0010 %	10	1.3
Potassium	1.14 %	11,400	1,520
Selenium	<0.0003 %	<3	<0.4
Silicon	28.5 %	285,000	37,900
Silver	<0.5 g/t	<0.01	<7E-4
Sodium	0.69 %	6,900	920
Sulfur (total)	0.04 %	400	53
Tin	0.006 %	60	8.0
Titanium	0.069 %	690	92
Zinc	0.019 %	190	25

Lower Mole Lake Master Composite

Parameter	Reported Concentration (%, g/t)	Converted Concentration (mg/kg)	Calculated Mass (kg)
Aluminum	6.83 %	68,300	5,300
Antimony	0.003 %	30	2.3
Arsenic	0.008 % (As ₂ O ₃)	61 (As)	4.7
Barium	0.029 %	290	23
Cadmium	0.0008 %	8.0	0.62
Calcium	0.99 %	9,900	770
Carbon (total)	0.44 %	4,400	340
Chromium	0.0009 %	9.0	0.70
Cobalt	0.0028 %	28	2.2
Copper	0.033 %	330	26
Gallium	0.0013 %	13	1.0
Iron	7.04 %	70,400	5,460
Lead	0.018 %	180	14
Magnesium	2.87 %	28,700	2,230
Manganese	0.13 %	1,300	100
Mercury	<0.00003 %	<0.3	<0.02
Nickel	0.0010 %	10	0.78
Potassium	1.19 %	11,900	923
Selenium	<0.0003 %	<3	<0.2
Silicon	27.3 %	273,000	21,200
Silver	2.0 g/t	0.045	0.0017
Sodium	0.73 %	7,300	570
Sulfur (total)	0.22 %	2,200	170
Tin	<0.001 %	<10	<0.78
Titanium	0.062 %	620	48
Zinc	0.036 %	360	28

Skunk Lake High Sulfur Composite

Parameter	Reported Concentration (%, g/t)	Converted Concentration (mg/kg)	Calculated Mass (kg)
Aluminum	6.43 %	64,300	4,730
Antimony	0.002 %	20	1.5
Arsenic	0.008 % (As_2O_3)	61 (As)	4.5
Barium	0.023 %	230	17
Cadmium	0.0009 %	9.0	0.66
Calcium	0.38 %	3,800	280
Carbon (total)	0.24 %	2,400	180
Chromium	0.0009 %	9.0	0.66
Cobalt	0.0013 %	13	0.96
Copper	0.016 %	160	12
Gallium	0.0013 %	13	0.96
Iron	5.49 %	54,900	4,040
Lead	0.016 %	160	12
Magnesium	2.98 %	29,800	2,190
Manganese	0.071 %	710	52
Mercury	0.00007 %	0.70	0.052
Nickel	<0.0005 %	<5	<0.4
Potassium	1.80 %	18,000	1,320
Selenium	0.0004 %	4.0	0.29
Silicon	30.3 %	303,000	22,300
Silver	<0.5 g/t	<0.01	<4E-4
Sodium	0.12 %	1,200	88
Sulfur (total)	3.93 %	39,300	2,890
Tin	<0.001 %	<10	<0.74
Titanium	0.046 %	460	34
Zinc	0.13 %	1,300	96

Rice Lake High Sulfur Composite

Parameter	Reported Concentration (%, g/t)	Converted Concentration (mg/kg)	Calculated Mass (kg)
Aluminum	6.56 %	65,600	5,310
Antimony	0.002 %	20	1.6
Arsenic	0.008 % (As ₂ O ₃)	61 (As)	4.9
Barium	0.027 %	270	22
Cadmium	0.0007 %	7.0	0.57
Calcium	0.17 %	1,700	140
Carbon (total)	0.05 %	500	40
Chromium	0.0010 %	10	0.81
Cobalt	0.0016 %	16	1.3
Copper	0.049 %	490	40
Gallium	0.0013 %	13	1.0
Iron	5.61 %	56,100	4,540
Lead	0.022 %	220	18
Magnesium	2.25 %	22,500	1,820
Manganese	0.039 %	390	32
Mercury	<0.00003 %	<0.3	<0.02
Nickel	<0.0005 %	<5	<0.4
Potassium	1.63 %	16,300	1,320
Selenium	0.0005 %	5.0	0.4
Silicon	31.3 %	313,000	25,400
Silver	<0.5 g/t	<0.01	<4E-4
Sodium	0.28 %	2,800	230
Sulfur (total)	3.33 %	33,300	2,700
Tin	0.002 %	20	1.6
Titanium	0.044 %	440	36
Zinc	0.020 %	200	16

Upper Mole Lake High Sulfur Composite

Parameter	Reported Concentration (%, g/t)	Converted Concentration (mg/kg)	Calculated Mass (kg)
Aluminum	6.68 %	66,800	5,210
Antimony	0.002 %	20	1.6
Arsenic	0.006 % (As_2O_3)	46 (As)	3.6
Barium	0.033 %	330	26
Cadmium	0.0007 %	7.0	0.55
Calcium	0.36 %	3,600	280
Carbon (total)	0.16 %	1,600	120
Chromium	0.0009 %	9.0	0.70
Cobalt	0.0019 %	19	1.5
Copper	0.0056 %	56	4.4
Gallium	0.0015 %	15	1.2
Iron	6.55 %	65,500	5,110
Lead	0.016 %	160	12
Magnesium	2.64 %	26,400	2,060
Manganese	0.048 %	480	37
Mercury	0.00007 %	0.70	0.05
Nickel	0.0018 %	18	1.4
Potassium	1.84 %	18,400	1,440
Selenium	<0.0003 %	<3	<0.23
Silicon	28.6 %	286,000	22,300
Silver	0.5 g/t	0.01	4.3E-4
Sodium	0.30 %	3,000	234
Sulfur (total)	4.44 %	44,400	3,460
Tin	<0.001 %	<10	<0.8
Titanium	0.065 %	650	51
Zinc	0.018 %	180	14

Lower Mole Lake High Sulfur Composite

Parameter	Reported Concentration (%, g/t)	Converted Concentration (mg/kg)	Calculated Mass (kg)
Aluminum	6.35 %	63,500	4,710
Antimony	0.006 %	60	4.5
Arsenic	0.025 % (As_2O_3)	190 (As)	14
Barium	0.026 %	260	19
Cadmium	0.0019 %	19	1.4
Calcium	0.66 %	6,600	490
Carbon (total)	0.38 %	3,800	280
Chromium	0.0009 %	9.0	0.67
Cobalt	0.0025 %	25	1.9
Copper	0.049 %	490	36
Gallium	0.0012 %	12	0.89
Iron	7.83 %	78,300	5,810
Lead	0.048 %	480	36
Magnesium	1.98 %	19,800	1,470
Manganese	0.064 %	640	47
Mercury	0.00023 %	2.3	0.17
Nickel	0.0008 %	8.0	0.59
Potassium	2.12 %	21,200	1,570
Selenium	<0.0003 %	<3	<0.2
Silicon	28.0 %	280,000	20,800
Silver	12.4 g/t	0.281	0.0102
Sodium	0.35 %	3,500	260
Sulfur (total)	4.44 %	44,400	3,290
Tin	0.006 %	60	4.5
Titanium	0.054 %	540	40
Zinc	0.42 %	4,200	310

Appendix 3.5-32 Table 1, continued

1. The waste rock composites were also analyzed for the parameters listed below, none of which were detected.

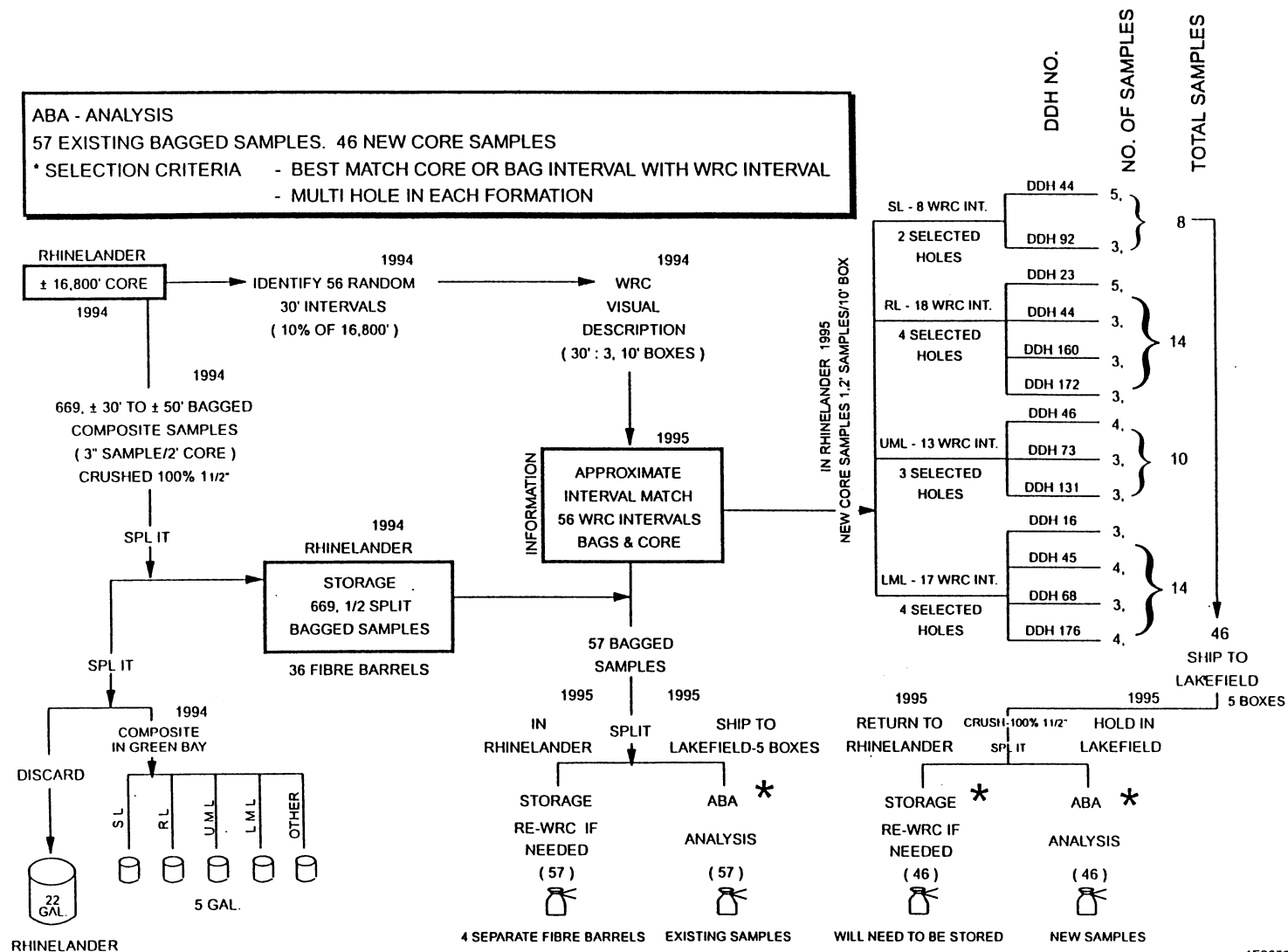
Parameter	Detection Limit
Beryllium	0.0001 %
Bismuth	0.005 %
Germanium	0.0005 %
Molybdenum	0.002 %
Tellurium	0.0003 %
Thallium	0.001 %
Uranium	0.001%

2. Gold was detected in the Lower Mole Lake High Sulfur waste rock composite (0.59g/t). The concentration of gold was below the detection limit (0.02g/t) in the other waste rock composites.

Prepared by: JET
Checked by: DJL

**Appendix 3.5-32 Figure 1.
Waste Characterization Flow Sheet.**





1F267091

Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	JKS1	DATE: JULY '97
APPROVED BY:	JET	DATE: JULY '97
APPROVED BY:	JWS	DATE: JULY '97


Crandon Mining Company
**APPENDIX 3.5-32
 FIGURE 1**
WASTE CHARACTERIZATION FLOW SHEET

Scale:	NONE	Date:	JULY 1997
Prepared By:	Foth & Van Dyke	By:	JRB2

**Appendix 3.5-32 Table 2. Bulk Chemical Data Conversions and
Calculations for the Master Ore Composite and Tailings**

Appendix 3.5-32 Table 2

Bulk Chemical Data Converstions and Calculations for the Master Ore Composite and Tailings

Master Ore Composite

Parameter	Reported Concentration (%, g/t)	Converted Concentration (mg/kg)
Aluminum	2.01 %	20,100
Antimony	0.0085 %	85
Arsenic	0.27 %	2,700
Barium	0.006 %	60
Cadmium	0.026 %	260
Calcium	0.41 %	4,100
Carbon (total)	0.38 %	3,800
Chromium	0.007 %	70
Cobalt	0.0067 %	67
Copper	0.33 %	3,300
Gallium	0.0016 %	16
Gold	3.61 g/t	3.98
Iron	23.2 %	232,000
Lead	1.12 %	11,200
Magnesium	1.12 %	11,200
Manganese	0.046 %	460
Mercury	0.00073 %	7.0
Nickel	0.010 %	100
Potassium	0.44 %	4,400
Selenium	0.0042 %	42
Silicon	12.8 %	128,000
Silver	38.1 g/t	42.0
Sodium	0.18 %	1,800
Sulfur (total)	29.1 %	291,000
Thallium	0.001 %	10
Tin	0.0023 %	23
Titanium	0.10 %	1,000
Zinc	9.66 %	96,600

Fine Tailings Composite

Parameter	Reported Concentration (%, g/t)	Converted Concentration (mg/kg)	Recovered from Bench Test (mg/kg M. Ore)
Aluminum	4.88 %	48,800	16,300
Antimony	0.0064 %	64	21
Arsenic	0.23 %	2,300	770
Barium	0.006 %	60	20
Cadmium	0.004 %	40	10
Calcium	0.86 %	8,600	2,900
Carbon (total)	0.58 %	5,800	1,900
Chromium	0.021 %	210	70
Cobalt	0.0055 %	55	18
Copper	0.14 %	1,400	470
Gallium	0.0021 %	21	7.0
Gold	0.77 g/t	0.85	0.28
Iron	17.7 %	177,000	59,100
Lead	0.63 %	6,300	2,100
Magnesium	2.05 %	20,500	6,840
Manganese	0.067 %	670	220
Mercury	0.00013 %	1.0	0.33
Nickel	0.004 %	40	10
Potassium	1.31 %	13,100	4,370
Selenium	0.0030 %	30	10
Silicon	18.0 %	180,000	60,100
Silver	26.7 g/t	29.4	9.81
Sodium	0.27 %	2,700	900
Sulfur (total)	17.6 %	176,000	58,700
Thallium	0.002 %	20	7
Tin	0.0028 %	28	9.4
Titanium	0.17 %	1,700	570
Zinc	1.12 %	11,200	3,740

Coarse Tailings Composite

Parameter	Reported Concentration (%, g/t)	Converted Concentration (mg/kg)	Recovered from Bench Test (mg/kg M. Ore)
Aluminum	1.84 %	18,400	9,210
Antimony	0.0070 %	70	35
Arsenic	0.26 %	2,600	1,300
Barium	0.005 %	50	30
Cadmium	0.002 %	20	10
Calcium	0.56 %	5,600	2,800
Carbon (total)	0.44 %	4,400	2,200
Chromium	0.003 %	30	20
Cobalt	0.0079 %	79	39
Copper	0.05 %	500	300
Gallium	0.0013 %	13	6.5
Gold	1.01 g/t	1.11	0.556
Iron	26.8 %	268,000	134,000
Lead	0.29 %	2,900	1,500
Magnesium	1.12 %	11,200	5,610
Manganese	0.052 %	520	260
Mercury	0.00019 %	2.0	1.0
Nickel	<0.002 %	<20	<10
Potassium	0.39 %	3,900	2,000
Selenium	0.0038 %	38	19
Silicon	15.0 %	150,000	75,100
Silver	15.8 g/t	17.4	8.71
Sodium	0.080 %	800	400
Sulfur (total)	29.7 %	297,000	149,000
Thallium	0.001 %	10	5
Tin	0.0022 %	22	11
Titanium	0.12 %	1,200	600
Zinc	0.60 %	6,000	3,000

Prepared by: JET
Checked by: DJL

Composition of the Residual Process Water

State Laboratory of Hygiene
University of Wisconsin Center for Health Sciences
465 Henry Mall, Madison, WI 53706
R.H. Laessig, Ph.D., Director S.L. Inhorn, M.D., Medical Director

Environmental Science Section (608) 262-3453 DNR LAB ID 113133790
Inorganic chemistry (#1 of 21 on 10/18/94, unseen)

Id: Point/Well/... Field #: Route: SW70
Collection Date: 06/16/94 Time: 16:50 County: 21 (Forest)
From: CRANDON MINING COMPANY LAKEFIELD RESEARCH ONTARIO CANADA
Description: RECYCLE MILL TEST WATER - CYCLE 30
To: LARRY LYNCH Type: Compliance
DNR Source: Effluent
MADISON

Account number: EA008 Collected by: MARKART
Enforcement
Date Received: 06/20/94 Labslip #: IE030659 Reported: 10/17/94

ALUMINUM, ICP	1400.	UG/L
ANTIMONY, ICP	<100.	UG/L
ARSENIC, ICP	ND (LOD=100 UG/L)	
BISMUTH, ICP	ND (LOD=100. UG/L)	
CADMIUM, AA FURNACE	<0.2	UG/L
CHROMIUM, AA FURNACE	56.	UG/L
COBALT, ICP	41.	UG/L
detected between 10 (LOD) and 43 (LOQ) UG/L		
DIGEST 730.1, LIQUIDS, EPTOX, ICP EXCEPT AS, AG, SE	DIG MET	
DIGESTION 740.1, LIQUIDS, FOR FURNACE	DIG MET	
DIGESTION 760.1, ALL LIQUIDS & EPTOX FOR AS AND SE	DIG MET	
BARIUM, ICP	19.6	UG/L
BERYLLIUM, ICP	0.6	UG/L
detected between 0.3 (LOD) and 1.0 (LOQ) UG/L		
CALCIUM, ICP	299.	MG/L
COPPER, ICP	63.	UG/L
IRON, ICP	0.41	MG/L
MAGNESIUM, ICP	0.15	MG/L
MANGANESE, ICP	4.6	UG/L
NICKEL, ICP	6.	UG/L
detected between 6. (LOD) and 18. (LOQ) UG/L		
SODIUM, ICP	30.0	MG/L
ZINC, ICP	445.	UG/L
HARDNESS, CALCULATION METHOD	750.	MG/L
LEAD, AA FURNACE	270.	UG/L
MOLYBDENUM, ICP	ND (LOD=40 UG/L)	
PH, LAB	**	SU #1
analysis rejected		
POTASSIUM, ICP	10.3	MG/L

State Laboratory of Hygiene
University of Wisconsin Center for Health Sciences
465 Henry Mall, Madison, WI 53706
R.H. Laessig, Ph.D., Director S.L. Inhorn, M.D., Medical Director

Environmental Science Section (608) 262-3458 DNR LAB ID 113133790
... continuing Labslip # IE030659

SELENIUM, ICP	287.0	UG/L
SILVER, AA FURNACE	*3.27	UG/L #2
analysis rejected		
THALLIUM, AA FURNACE	<3.	UG/L
TIN, ICP	ND (LOD=100 UG/L)	
TITANIUM, ICP	ND (LOD=3 UG/L)	
TEMPERATURE	ICED	C

--- Footnotes ---

Remark #1: NO BOTTLE RECEIVED

Remark #2: CONTROL FAILURE, INSUFFICIENT SAMPLE TO RESET

Appendix 3.5-32 Table 3.
Explanation of ABA Units Used in the Text and Appendix Tables, and a Comparison
of these Terms with those Used by Lakefield Research and Chemex Labs.

Appendix 3.5-32 Table 3

Explanation of ABA Units Used in the Text and Appendix Tables, and a Comparison of These Terms With Those Used by Lakefield Research and Chemex Labs

Text and Appendix Tables	Lakefield Research	Chemex Labs
S (total sulfur content)	S	S (total)
S ²⁻ (sulfide sulfur content)	S ⁻	S (sulfide)
CO ₂ (carbon dioxide content)	not used	CO ₂ (inorg.)
NP (total neutralization potential)	NP	not used
NP-CO ₂ (neutralization potential due to carbonate minerals)	not used	Mod Neu Potent.
AP (total acid production potential)	MPA (maximum potential acidity)	not used
SAP (acid production potential due to sulfide mineral content)	not used	Mod. Ma Acid
Net NP (net neutralization potential) (Net NP = NP - AP)	CNNP (common net neutralization potential)	Net Neu Potent (equal to NP-CO ₂ minus SAP)

Prepared by: JET
Checked by: RTJ

3.5-32-54b

WRC Evaluation Data.

TABLE 5.1

Rock Classification of Geochemical and Physical Parameters for ARD Evaluations
(after Brodie et al., 1991)

FACTOR	HIGHEST CHEMICAL ACTIVITY = 5	4	INTERMEDIATE CHEMICAL ACTIVITY = 3	2	LOWEST CHEMICAL ACTIVITY = 1	RELATIVE WEIGHT	HIGHEST ARD POTENTIAL	LOWEST ARD POTENTIAL
Sulphide Type	highly reactive; e.g. framboidal or fine grained (<5 microns) pyrrhotite		moderate reactivity; e.g. coarse grained (5 - 100 microns) pyrrhotite, or fine grained pyrite, or equal amounts of 1 and 5		low reactivity eg. pyrite, massive crystals (>100 microns)	6	30	6
Proportion Sulphide Surface Area Exposure	localized (zones) of concentration exposed on fracture surfaces; e.g. >50% of sulphides in stringers or veins		>20% of sulphides in zones, stringers or veins with some preferential exposure on fracture 5		individual small crystals uniformly distributed throughout rock host material	5	25	5
Alkali Type	highly reactive eg. CaCO ₃		moderate reactivity		slightly reactive	-4	-4	-20
Proportion Alkali Surface Area Exposure	individual small crystals uniformly distributed throughout rock host material, or >50% alkali in bedding, fractures or veins which tends to become exposed in handling		>20% of alkali in bedding or veins with some preferential exposure on fractures		localized (zones) of concentration exposed on fracture surfaces; e.g. >50% of alkali in bedding, fractures or veins which tends not to become exposed in handling	-3	-3	-15
Grain Size	>20% fines; e.g. >20% sand size or finer		5% sand size or finer,		little fines; <1% sand size or finer	2	10	2
Weathering/ Slaking	highly slaking; >20% of rock mass degrades to sand size or finer		slightly slaking; >2% of rock mass degrades to sand size or finer		non-slaking and durable rock;	2	10	2
						Total	68	-20

NOTES:

- The rating scale along the horizontal axis varies from 1 "lowest" referring to the combination of characteristics resulting in the lowest (if any) rate and production of acidic drainage, to 5 "highest" referring to the combination of characteristics resulting in the highest rate and production of acidic drainage.
- The cumulative weighted point rating for the sample is plotted on the NP:AP graph defining boundaries of rock types for ARD prediction. Possible totals range from -20, consisting of massive pyrite crystals in a disseminated highly reactive base concentrated on exposed fractures with little fines and not slaking, to 68 rock consisting of highly reactive pyrrhotite, highly concentrated on exposed fractures and stringers in a low reactive base which is disseminated within the host rock with much fines and a high slaking potential.
- Grain size estimates in sulphide type factor from Dophell 1989.

Rock Classification for ARD Evaluations

DDH: 163

Int: 1791-1821

(RL)

Factor

Relative
Rating

ARD
Weight

Potential

Sulfide type

1 X 6 = 6

Sulfide surface
area exposed

1 X 5 = 5

Alkali type

4 X -4 = -16

Alkali surface
area exposed

4 X -3 = -12

Grain size

1 X 2 = 2

Weathering/
slaking

1 X 2 = 2

Total -13

DDH: 9

Int: 590-620

(RL)

Factor

Relative
Rating

ARD
Weight

Potential

Sulfide type

1 X 6 = 6

Sulfide surface
area exposed

1 X 5 = 5

Alkali type

1 X -4 = -4

Alkali surface
area exposed

1 X -3 = -3

Grain size

1 X 2 = 2

Weathering/
slaking

2 X 2 = 4

Total 10

DDH: 91

Int: 583-613

(RL)

Factor

Relative
Rating

ARD
Weight

Potential

Sulfide type

1 X 6 = 6

Sulfide surface
area exposed

1 X 5 = 5

Alkali type

1 X -4 = -4

Alkali surface
area exposed

1 X -3 = -3

Grain size

1 X 2 = 2

Weathering/
slaking

2 X 2 = 4

Total 10

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Radm 9/20/94

Rock Classification for ARD Evaluations

DDH: 23

Int: 1051-1081

RL

Factor

Relative
Rating

ARD
Weight

Potential

Sulfide type

1 X 6 = 6

Sulfide surface
area exposed

1 X 5 = 5

Alkali type

1 X -4 = -4

Alkali surface
area exposed

1 X -3 = -3

Grain size

1 X 2 = 2

Weathering/
slaking

1 X 2 = 2

Total 8

DDH: 23

Int: 1201-1231

Factor

Relative
Rating

ARD
Weight

Potential

Sulfide type

1 X 6 = 6

Sulfide surface
area exposed

1 X 5 = 5

Alkali type

1 X -4 = -4

Alkali surface
area exposed

1 X -3 = -3

Grain size

1 X 2 = 2

Weathering/
slaking

1 X 2 = 2

Total 8

DDH: 15

Int: 2072-2102

Factor

Relative
Rating

ARD
Weight

Potential

Sulfide type

1 X 6 = 6

Sulfide surface
area exposed

1 X 5 = 5

Alkali type

1 X -4 = -4

Alkali surface
area exposed

1 X -3 = -3

Grain size

1 X 2 = 2

Weathering/
slaking

1 X 2 = 2

Total 8

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Rock Classification for ARD Evaluations

DDH: 160
Int: 1789-1819

(RL)

Factor	Relative Rating		ARD Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	<u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	<u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	<u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	<u>-3</u>
Grain size	<u>1</u>	X	<u>2</u>	<u>2</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	<u>2</u>
Total				<u>8</u>

DDH: 160
Int: 1969-1999

(RL)

Factor	Relative Rating		ARD Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	<u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	<u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	<u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	<u>-3</u>
Grain size	<u>1</u>	X	<u>2</u>	<u>2</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	<u>2</u>
Total				<u>8</u>

DDH: 16
Int: 2330-2360

(RL)

Factor	Relative Rating		ARD Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	<u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	<u>5</u>
Alkali type	<u>5</u>	X	<u>-4</u>	<u>-20</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	<u>-12</u>
Grain size	<u>1</u>	X	<u>2</u>	<u>2</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	<u>2</u>
Total				<u>-17</u>

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Rock Classification for ARD Evaluations

DDH: <u>21</u>	Factor	Relative Rating	ARD Weight	Potential
Int: <u>960-990</u>	Sulfide type	<u>1</u>	X <u>6</u>	= <u>+6</u>
(RL)	Sulfide surface area exposed	<u>1</u>	X <u>5</u>	= <u>+5</u>
	Alkali type	<u>1</u>	X <u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>1</u>	X <u>-3</u>	= <u>-3</u>
	Grain size	<u>1</u>	X <u>2</u>	= <u>+2</u>
	Weathering/slaking	<u>1</u>	X <u>2</u>	= <u>+2</u>
			Total	<u>8</u>

DDH: <u>21</u>	Factor	Relative Rating	ARD Weight	Potential
Int: <u>1260-1290</u>	Sulfide type	<u>1</u>	X <u>6</u>	= <u>+6</u>
(RL)	Sulfide surface area exposed	<u>1</u>	X <u>5</u>	= <u>+5</u>
	Alkali type	<u>1</u>	X <u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>1</u>	X <u>-3</u>	= <u>-3</u>
	Grain size	<u>1</u>	X <u>2</u>	= <u>+2</u>
	Weathering/slaking	<u>1</u>	X <u>2</u>	= <u>+2</u>
			Total	<u>8</u>

DDH: <u>44</u>	Factor	Relative Rating	ARD Weight	Potential
Int: <u>661-691</u>	Sulfide type	<u>1</u>	X <u>6</u>	= <u>+6</u>
(RL)	Sulfide surface area exposed	<u>1</u>	X <u>5</u>	= <u>+5</u>
	Alkali type	<u>1</u>	X <u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>1</u>	X <u>-3</u>	= <u>-3</u>
	Grain size	<u>1</u>	X <u>2</u>	= <u>+2</u>
	Weathering/slaking	<u>2</u>	X <u>2</u>	= <u>4</u>
			Total	<u>10</u>

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KSDM 9/20/94

Rock Classification for ARD Evaluations

DDH: <u>44</u>	Factor	Relative Rating	ARD Weight	Potential
Int: <u>751-781</u>	Sulfide type	<u>1</u>	X <u>6</u> =	<u>6</u>
<u>RL</u>	Sulfide surface area exposed	<u>1</u>	X <u>5</u> =	<u>5</u>
	Alkali type	<u>1</u>	X <u>-4</u> =	<u>-4</u>
	Alkali surface area exposed	<u>1</u>	X <u>-3</u> =	<u>-3</u>
	Grain size	<u>1</u>	X <u>2</u> =	<u>2</u>
	Weathering/slaking	<u>2</u>	X <u>2</u> =	<u>4</u>
			Total	<u>10</u>

DDH: <u>172</u>	Factor	Relative Rating	ARD Weight	Potential
Int: <u>1285-1315</u>	Sulfide type	<u>1</u>	X <u>6</u> =	<u>6</u>
<u>RL</u>	Sulfide surface area exposed	<u>1</u>	X <u>5</u> =	<u>5</u>
	Alkali type	<u>1</u>	X <u>-4</u> =	<u>-4</u>
	Alkali surface area exposed	<u>1</u>	X <u>-3</u> =	<u>-3</u>
	Grain size	<u>1</u>	X <u>2</u> =	<u>2</u>
	Weathering/slaking	<u>1</u>	X <u>2</u> =	<u>2</u>
			Total	<u>8</u>

DDH: <u>172</u>	Factor	Relative Rating	ARD Weight	Potential
Int: <u>1500-1518</u>	Sulfide type	<u>1</u>	X <u>6</u> =	<u>6</u>
<u>RL</u>	Sulfide surface area exposed	<u>1</u>	X <u>5</u> =	<u>5</u>
	Alkali type	<u>1</u>	X <u>-4</u> =	<u>-4</u>
	Alkali surface area exposed	<u>1</u>	X <u>-3</u> =	<u>-3</u>
	Grain size	<u>1</u>	X <u>2</u> =	<u>2</u>
	Weathering/slaking	<u>1</u>	X <u>2</u> =	<u>2</u>
			Total	<u>8</u>

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1/2/11 9/20/94

Rock Classification for ARD Evaluations

DDH: 144

Int: 672-702

[SL]

Factor

Relative Rating

ARD Weight

Potential

Sulfide type
Sulfide surface area exposed
Alkali type
Alkali surface area exposed
Grain size
Weathering/slaking

<u>1</u>	X	<u>6</u>	=	<u>6</u>
<u>1</u>	X	<u>5</u>	=	<u>5</u>
<u>1</u>	X	<u>-4</u>	=	<u>-4</u>
<u>1</u>	X	<u>-3</u>	=	<u>-3</u>
<u>1</u>	X	<u>2</u>	=	<u>2</u>
<u>1</u>	X	<u>2</u>	=	<u>2</u>

Total 8

DDH: 24

Int: 1141-1171

[RL]

Factor

Relative Rating

ARD Weight

Potential

Sulfide type
Sulfide surface area exposed
Alkali type
Alkali surface area exposed
Grain size
Weathering/slaking

<u>1</u>	X	<u>6</u>	=	<u>6</u>
<u>1</u>	X	<u>5</u>	=	<u>5</u>
<u>1</u>	X	<u>-4</u>	=	<u>-4</u>
<u>1</u>	X	<u>-3</u>	=	<u>-3</u>
<u>1</u>	X	<u>2</u>	=	<u>2</u>
<u>1</u>	X	<u>2</u>	=	<u>2</u>

Total 8

DDH: 163

Int: 1731-1761

[RL]

Factor

Relative Rating

ARD Weight

Potential

Sulfide type
Sulfide surface area exposed
Alkali type
Alkali surface area exposed
Grain size
Weathering/slaking

<u>1</u>	X	<u>6</u>	=	<u>6</u>
<u>1</u>	X	<u>5</u>	=	<u>5</u>
<u>3</u>	X	<u>-4</u>	=	<u>-12</u>
<u>3</u>	X	<u>-3</u>	=	<u>-9</u>
<u>1</u>	X	<u>2</u>	=	<u>2</u>
<u>1</u>	X	<u>2</u>	=	<u>2</u>

Total -6

092094 SET

9/20/94

Rock Classification for ARD Evaluations

DDH: 91
Int: 253-283

Total

(SL)

Factor	Relative Rating		ARD Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	<u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	<u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	<u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	<u>-3</u>
Grain size	<u>1</u>	X	<u>2</u>	<u>2</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	<u>2</u>
Total				<u>13</u>

DDH: 9
Int: 350-380

(SL)

Factor	Relative Rating		ARD Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	<u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	<u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	<u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	<u>-3</u>
Grain size	<u>1</u>	X	<u>2</u>	<u>2</u>
Weathering/slaking	<u>2</u>	X	<u>2</u>	<u>4</u>
Total				<u>10</u>

DDH: 91
Int: 403-433

(SL)

Factor	Relative Rating		ARD Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	<u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	<u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	<u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	<u>-3</u>
Grain size	<u>1</u>	X	<u>2</u>	<u>2</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	<u>2</u>
Total				<u>8</u>

092094 JET
DEM 9/20/94

Rock Classification for ARD Evaluations

DDH: ~~82~~ 92

Int: 321-351

TOTAL

Summary

(SL)

Factor	Relative Rating		ARD Weight	Potential
Sulfide type	1	X	6	6
Sulfide surface area exposed	1	X	5	5
Alkali type	1	X	-4	-4
Alkali surface area exposed	1	X	-3	-3
Grain size	1	X	2	2
Weathering/slaking	2.2	X	2	4.4
Total				10.4

DDH: 92

Int: 321-331

"Fresh"

40%

Factor	Relative Rating		ARD Weight	Potential
Sulfide type	1	X	6	6
Sulfide surface area exposed	1	X	5	5
Alkali type	1	X	-4	-4
Alkali surface area exposed	1	X	-3	-3
Grain size	1	X	2	2
Weathering/slaking	1	X	2	2
Total				8

DDH: 92

Int: 331-351

"Weathered"

60%

Factor	Relative Rating		ARD Weight	Potential
Sulfide type	1	X	6	6
Sulfide surface area exposed	1	X	5	5
Alkali type	1	X	-4	-4
Alkali surface area exposed	1	X	-3	-3
Grain size	1	X	2	2
Weathering/slaking	3	X	2	6
Total				12

$$\begin{array}{r} 3 \times 6 = 1.8 \\ 1 \times 4 = 0.4 \\ \hline 2.2 \end{array}$$

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MDM 9/20/91 3.5-32-64

Rock Classification for ARD Evaluations

DDH: 23

Int: 511-541

Total

(SL)

Factor

Relative
Rating

ARD
Weight

Potential

Sulfide type

1 X 6 = 6

Sulfide surface
area exposed

1 X 5 = 5

Alkali type

1 X -4 = -4

Alkali surface
area exposed

1 X -3 = -3

Grain size

1 X 2 = 2

Weathering/
slaking

1 X 2 = 2

Total 8

DDH: 44

Int: 151-181

Total

(SL)

Factor

Relative
Rating

ARD
Weight

Potential

Sulfide type

1 X 6 = 6

Sulfide surface
area exposed

2 X 5 = 10

Alkali type

1 X -4 = -4

Alkali surface
area exposed

1 X -3 = -3

Grain size

1 X 2 = 2

Weathering/
slaking

2 X 2 = 4

Total 15

DDH: 44

Int: 541-571

Total

(SL)

Factor

Relative
Rating

ARD
Weight

Potential

Sulfide type

1 X 6 = 6

Sulfide surface
area exposed

1 X 5 = 5

Alkali type

1 X -4 = -4

Alkali surface
area exposed

1 X -3 = -3

Grain size

1 X 2 = 2

Weathering/
slaking

2 X 2 = 4

Total 10

092094 JET

ADN 9/20/94

3.5-32-65

Rock Classification for ARD Evaluations

DDH: <u>46</u>	Factor	Relative Rating	ARD Weight	Potential
Int: <u>1814-1844</u>	Sulfide type	<u>1</u>	X <u>6</u>	= <u>6</u>
<u>RL</u>	Sulfide surface area exposed	<u>1</u>	X <u>5</u>	= <u>5</u>
	Alkali type	<u>1</u>	X <u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>1</u>	X <u>-3</u>	= <u>-3</u>
	Grain size	<u>1</u>	X <u>2</u>	= <u>2</u>
	Weathering/slaking	<u>1</u>	X <u>2</u>	= <u>2</u>
			Total	<u>8</u>

DDH: <u>163</u>	Factor	Relative Rating	ARD Weight	Potential
Int: <u>2361-2391</u>	Sulfide type	<u>1</u>	X <u>6</u>	= <u>6</u>
<u>UML</u>	Sulfide surface area exposed	<u>1</u>	X <u>5</u>	= <u>5</u>
	Alkali type	<u>4</u>	X <u>-4</u>	= <u>-16</u>
	Alkali surface area exposed	<u>4</u>	X <u>-3</u>	= <u>-12</u>
	Grain size	<u>1</u>	X <u>2</u>	= <u>2</u>
	Weathering/slaking	<u>1</u>	X <u>2</u>	= <u>2</u>
			Total	<u>-13</u>

DDH: <u>163</u>	Factor	Relative Rating	ARD Weight	Potential
Int: <u>2571-2601</u>	Sulfide type	<u>1</u>	X <u>6</u>	= <u>6</u>
<u>UML</u>	Sulfide surface area exposed	<u>2</u>	X <u>5</u>	= <u>10</u>
	Alkali type	<u>1</u>	X <u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>1</u>	X <u>-3</u>	= <u>-3</u>
	Grain size	<u>1</u>	X <u>2</u>	= <u>2</u>
	Weathering/slaking	<u>1</u>	X <u>2</u>	= <u>2</u>
			Total	<u>13</u>

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Rock Classification for ARD Evaluations

DDH: 131

Int: 1159-1189

(UML)

Factor	Relative Rating		ARD Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>32</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>1</u>	X	<u>2</u>	= <u>2</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total				= <u>10 10</u>

DDH: 46

Int: 1934-1964

(UML)

Factor	Relative Rating		ARD Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>1</u>	X	<u>2</u>	= <u>2</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total				= <u>13</u>

DDH: 46

Int: 2024-2054

(UML)

Factor	Relative Rating		ARD Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>3</u>	X	<u>-4</u>	= <u>-12</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>1</u>	X	<u>2</u>	= <u>2</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total				= <u>-9</u>

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Rock Classification for ARD Evaluations

DDH: 92

Int: 561-591

UML

Factor

Relative Rating

ARD Weight

Potential

Sulfide type

1 X 6 = 6

Sulfide surface area exposed

1 X 5 = 5

Alkali type

1 X -4 = -4

Alkali surface area exposed

1 X -3 = -3

Grain size

1 X 2 = 2

Weathering/slaking

2 X 2 = 4

Total 10

DDH: 154

Int: 1429-1459

UML

Factor

Relative Rating

ARD Weight

Potential

Sulfide type

1 X 6 = 6

Sulfide surface area exposed

1 X 5 = 5

Alkali type

1 X -4 = -4

Alkali surface area exposed

1 X -3 = -3

Grain size

1 X 2 = 2

Weathering/slaking

1 X 2 = 2

Total 8

DDH: 73

Int: 1369-1399

UML

Factor

Relative Rating

ARD Weight

Potential

Sulfide type

1 X 6 = 6

Sulfide surface area exposed

3 X 5 = 15

Alkali type

3 X -4 = -12

Alkali surface area exposed

2 X -3 = -6

Grain size

1 X 2 = 2

Weathering/slaking

1 X 2 = 2

Total 7

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Rock Classification for ARD Evaluations

DDH: <u>140</u>	Factor	Relative Rating		ARD Weight	Potential
Int: <u>2842-2872</u>	Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
<u>UML</u>	Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
	Grain size	<u>1</u>	X	<u>2</u>	= <u>2</u>
	Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
				Total	<u>8</u>

DDH: <u>149</u>	Factor	Relative Rating		ARD Weight	Potential
Int: <u>1460-1490</u>	Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
<u>UML</u>	Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
	Grain size	<u>1</u>	X	<u>2</u>	= <u>2</u>
	Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
				Total	<u>8</u>

DDH: <u>140</u>	Factor	Relative Rating		ARD Weight	Potential
Int: <u>2209-2239</u>	Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
<u>UML</u>	Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
	Alkali type	<u>5</u>	X	<u>-4</u>	= <u>-20</u>
	Alkali surface area exposed	<u>5</u>	X	<u>-3</u>	= <u>-15</u>
	Grain size	<u>1</u>	X	<u>2</u>	= <u>2</u>
	Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
				Total	<u>-20</u>

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Rock Classification for ARD Evaluations

DDH: <u>44</u>	Factor	Relative Rating		ARD Weight	Potential
Int: <u>961-991</u>	Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
<u>UML</u>	Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
	Grain size	<u>1</u>	X	<u>2</u>	= <u>2</u>
	Weathering/slaking	<u>3</u>	X	<u>2</u>	= <u>6</u>
				Total	<u>12</u>

DDH: <u>16</u>	Factor	Relative Rating		ARD Weight	Potential
Int: <u>2360-2390</u>	Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
<u>UML</u>	Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
	Grain size	<u>1</u>	X	<u>2</u>	= <u>2</u>
	Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
				Total	<u>8</u>

DDH: <u>163</u>	Factor	Relative Rating		ARD Weight	Potential
Int: <u>2891-2921</u>	Sulfide type	<u>3</u>	X	<u>6</u>	= <u>18</u>
<u>LML</u>	Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
	Grain size	<u>1</u>	X	<u>2</u>	= <u>2</u>
	Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
				Total	<u>30</u>

Rock Classification for ARD Evaluations

DDH: <u>139</u>	<u>Factor</u>	<u>Relative Rating</u>		<u>ARD Weight</u>	<u>Potential</u>
Int: <u>2945-2975</u>	Sulfide type	<u>1</u>	X	<u>6</u>	<u>6</u>
<u>LML</u>	Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	<u>5</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	<u>-4</u>
	Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	<u>-3</u>
	Grain size	<u>1</u>	X	<u>2</u>	<u>2</u>
	Weathering/slaking	<u>1</u>	X	<u>2</u>	<u>2</u>
				Total	<u>8</u>

DDH: <u>68</u>	<u>Factor</u>	<u>Relative Rating</u>		<u>ARD Weight</u>	<u>Potential</u>
Int: <u>1876-1906</u>	Sulfide type	<u>1</u>	X	<u>6</u>	<u>6</u>
<u>LML</u>	Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	<u>5</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	<u>-4</u>
	Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	<u>-3</u>
	Grain size	<u>1</u>	X	<u>2</u>	<u>2</u>
	Weathering/slaking	<u>1</u>	X	<u>2</u>	<u>2</u>
				Total	<u>8</u>

DDH: <u>159</u>	<u>Factor</u>	<u>Relative Rating</u>		<u>ARD Weight</u>	<u>Potential</u>
Int: <u>1802-1832</u>	Sulfide type	<u>1</u>	X	<u>6</u>	<u>6</u>
<u>LML</u>	Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	<u>5</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	<u>-4</u>
	Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	<u>-3</u>
	Grain size	<u>1</u>	X	<u>2</u>	<u>2</u>
	Weathering/slaking	<u>1</u>	X	<u>2</u>	<u>2</u>
				Total	<u>8</u>

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Rock Classification for ARD Evaluations

DDH: <u>85</u>	<u>Factor</u>	<u>Relative Rating</u>		<u>ARD Weight</u>	<u>Potential</u>
Int: <u>989-1019</u>	Sulfide type	<u>1</u>	X	<u>6</u>	<u>6</u>
<u>LML</u>	Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	<u>5</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	<u>-4</u>
	Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	<u>-3</u>
	Grain size	<u>1</u>	X	<u>2</u>	<u>2</u>
	Weathering/slaking	<u>2</u>	X	<u>2</u>	<u>4</u>
				Total	<u>10</u>

DDH: <u>6</u>	<u>Factor</u>	<u>Relative Rating</u>		<u>ARD Weight</u>	<u>Potential</u>
Int: <u>841-871</u>	Sulfide type	<u>2</u>	X	<u>6</u>	<u>12</u>
<u>LML</u>	Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	<u>15</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	<u>-4</u>
	Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	<u>-3</u>
	Grain size	<u>1</u>	X	<u>2</u>	<u>2</u>
	Weathering/slaking	<u>1</u>	X	<u>2</u>	<u>2</u>
				Total	<u>24</u>

DDH: <u>16</u>	<u>Factor</u>	<u>Relative Rating</u>		<u>ARD Weight</u>	<u>Potential</u>
Int: <u>29963026</u>	Sulfide type	<u>2</u>	X	<u>6</u>	<u>12</u>
<u>LML</u>	Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	<u>15</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	<u>-4</u>
	Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	<u>-3</u>
	Grain size	<u>1</u>	X	<u>2</u>	<u>2</u>
	Weathering/slaking	<u>1</u>	X	<u>2</u>	<u>2</u>
				Total	<u>24</u>

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Rock Classification for ARD Evaluations

DDH: <u>46</u>	Factor	Relative Rating	ARD Weight	Potential
Int: <u>2233-2263</u>	Sulfide type	<u>1</u>	X <u>6</u>	= <u>6</u>
<u>LML</u>	Sulfide surface area exposed	<u>3</u>	X <u>5</u>	= <u>15</u>
	Alkali type	<u>2</u>	X <u>-4</u>	= <u>-8</u>
	Alkali surface area exposed	<u>3</u>	X <u>-3</u>	= <u>-9</u>
	Grain size	<u>1</u>	X <u>2</u>	= <u>2</u>
	Weathering/slaking	<u>1</u>	X <u>2</u>	= <u>2</u>
			Total	<u>8</u>

DDH: <u>9</u>	Factor	Relative Rating	ARD Weight	Potential
Int: <u>831-861</u>	Sulfide type	<u>4</u>	X <u>6</u>	= <u>24</u>
<u>LML</u>	Sulfide surface area exposed	<u>4</u>	X <u>5</u>	= <u>20</u>
	Alkali type	<u>1</u>	X <u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>1</u>	X <u>-3</u>	= <u>-3</u>
	Grain size	<u>1</u>	X <u>2</u>	= <u>2</u>
	Weathering/slaking	<u>2</u>	X <u>2</u>	= <u>4</u>
			Total	<u>43</u>

DDH: <u>154</u>	Factor	Relative Rating	ARD Weight	Potential
Int: <u>1509-1539</u>	Sulfide type	<u>2</u>	X <u>6</u>	= <u>12</u>
<u>LML</u>	Sulfide surface area exposed	<u>3</u>	X <u>5</u>	= <u>15</u>
	Alkali type	<u>2</u>	X <u>-4</u>	= <u>-8</u>
	Alkali surface area exposed	<u>3</u>	X <u>-3</u>	= <u>-9</u>
	Grain size	<u>1</u>	X <u>2</u>	= <u>2</u>
	Weathering/slaking	<u>1</u>	X <u>2</u>	= <u>2</u>
			Total	<u>14</u>

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Rock Classification for ARD Evaluations

DDH: <u>15</u>	Factor	Relative Rating		ARD Weight	Potential
Int: <u>2474-2504</u>	Sulfide type	<u>2</u>	X	<u>6</u>	= <u>12</u>
<u>LML</u>	Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
	Grain size	<u>1</u>	X	<u>2</u>	= <u>2</u>
	Weathering/slaking	<u>3</u>	X	<u>2</u>	= <u>2</u>
				Total	<u>19</u>

DDH: <u>174</u>	Factor	Relative Rating		ARD Weight	Potential
Int: <u>991-1021</u>	Sulfide type	<u>2</u>	X	<u>6</u>	= <u>12</u>
<u>LML</u>	Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
	Grain size	<u>1</u>	X	<u>2</u>	= <u>2</u>
	Weathering/slaking	<u>3</u>	X	<u>2</u>	= <u>6</u>
				Total	<u>28</u>

DDH: <u>21</u>	Factor	Relative Rating		ARD Weight	Potential
Int: <u>1646-1676</u>	Sulfide type	<u>2</u>	X	<u>6</u>	= <u>12</u>
<u>LML</u>	Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
	Grain size	<u>1</u>	X	<u>2</u>	= <u>2</u>
	Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
				Total	<u>19</u>

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Rock Classification for ARD Evaluations

DDH: 165

Int: 2231-2261

LML

Factor	Relative Rating		ARD Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	<u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	<u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	<u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	<u>-3</u>
Grain size	<u>1</u>	X	<u>2</u>	<u>2</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	<u>2</u>
Total				<u>18</u>

DDH: 42

Int: 2262-2292

LML

Factor	Relative Rating		ARD Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	<u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	<u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	<u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	<u>-3</u>
Grain size	<u>1</u>	X	<u>2</u>	<u>2</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	<u>2</u>
Total				<u>8</u>

DDH: 45

Int: 2062-2092

LML

Factor	Relative Rating		ARD Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	<u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	<u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	<u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	<u>-9</u>
Grain size	<u>1</u>	X	<u>2</u>	<u>2</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	<u>2</u>
Total				<u>12</u>

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Rock Classification for ARD Evaluations

DDH: 270

Int: 2059-2089

LML

Factor

Relative
Rating

ARD
Weight

Potential

Sulfide type

1

X

6

=

6

Sulfide surface
area exposed

1

X

5

=

5

Alkali type

1

X

-4

=

-4

Alkali surface
area exposed

1

X

-3

=

-3

Grain size

1

X

2

=

2

Weathering/
slaking

1

X

2

=

2

Total

8

DDH:

Int:

Factor

Relative
Rating

ARD
Weight

Potential

Sulfide type

X

6

=

Sulfide surface
area exposed

X

5

=

Alkali type

X

-4

=

Alkali surface
area exposed

X

-3

=

Grain size

X

2

=

Weathering/
slaking

X

2

=

Total

DDH:

Int:

Factor

Relative
Rating

ARD
Weight

Potential

Sulfide type

X

6

=

Sulfide surface
area exposed

X

5

=

Alkali type

X

-4

=

Alkali surface
area exposed

X

-3

=

Grain size

X

2

=

Weathering/
slaking

X

2

=

Total

Waste Rock Classification (WRC) Evaluations

DDH: 155 Main int.: 125-150 Eval. int.: 130-131

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 25%

(SL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>2</u>	X	<u>2</u>	= <u>4</u>
Total =				<u>12</u>

DDH: 155 Main int. 280-308 Eval. int. 305-306

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 15%

(SL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>2</u>	X	<u>2</u>	= <u>4</u>
Total =				<u>12</u>

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Waste Rock Classification (WRC) Evaluations

DDH: 155 Main int.: 335-350 Eval. int.: 349-350

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 40%

(SL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>10</u>

DDH: 155 Main int. 490-510 Eval. int. 492-493

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 50%

(SL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>10</u>

DS2
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 155 Main int.: 615-635 Eval. int.: 627-628

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 25%

(SL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>10</u>

DDH: 155 Main int. 735-760 Eval. int. 756-757

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 20%

(SL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>10</u>

822
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 155 Main int.: 890-915 Eval. int.: 893-894

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 25%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>10</u>

DDH: 155 Main int. 1040-1060 Eval. int. 1053-1054

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 25%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>10</u>

827
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 155 Main int.: 1185-1210 Eval. int.: 1194-1195

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 50%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>10</u>

DDH: 155 Main int. 1340-1360 Eval. int. 1342-1343

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 50%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>10</u>

82
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 155 Main int.: 1490-1510 Eval. int.: 1509-1510

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 40%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>10</u>

DDH: 155 Main int. 1640-1675 Eval. int. 1661-1662

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 15%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>20</u>

823
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 155 Main int.: 1790-1810 Eval. int.: 1808-1809

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 25%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>4</u>

DDH: 155 Main int. 1940-1960 Eval. int. 1962-1963

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 25%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>14</u>

723
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 155 Main int.: 2080-2105 Eval. int.: 2089-2090

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 60%

RL

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>10</u>

DDH: 155 Main int. 2240-2260 Eval. int. 2241-2242

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 60%

RL

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>3</u>	X	<u>-4</u>	= <u>-12</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>4</u>

827
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 155 Main int.: 2240-2260 Eval. int.: 2248-2249

Est. sulfide content in eval. int. High

Est. % of main int. accounted for by eval. int. 40%

(RL)

Factor	Relative Rating	WRC Weight	Potential
Sulfide type	<u>1</u>	X <u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X <u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X <u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X <u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X <u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X <u>2</u>	= <u>2</u>
Total =			<u>10</u>

DDH: 155 Main int. Eval. int. 1274-1275

Est. sulfide content in eval. int.

Est. % of main int. accounted for by eval. int.

(RL)

Requested by
WDNR

Factor	Relative Rating	WRC Weight	Potential
Sulfide type	<u>1</u>	X <u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X <u>5</u>	= <u>10</u>
Alkali type	<u>2</u>	X <u>-4</u>	= <u>-8</u>
Alkali surface area exposed	<u>2</u>	X <u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X <u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X <u>2</u>	= <u>2</u>
Total =			<u>8</u>

52
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 155 Main int.: _____ Eval. int.: 1549-1550

Est. sulfide content in eval. int.

Est. % of main int. accounted for by eval. int.

(RL)

Requested by
WDNR

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>3</u>	X	<u>-4</u>	= <u>-12</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>6</u>

DDH: 155 Main int. _____ Eval. int. 1582-1583

Est. sulfide content in eval. int.

Est. % of main int. accounted for by eval. int.

(RL)

Requested by
WDNR

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>3</u>	X	<u>-4</u>	= <u>-12</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>6</u>

82
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 44 Main int.: 310-340 Eval. int.: 329-330

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 35%

(SL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>14</u>

DDH: 44 Main int. 530-560 Eval. int. 555-556

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 30%

(SL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>12</u>

827
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 44 Main int.: 869-890 Eval. int.: 883-884

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 20%

ML

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>16</u>

DDH: 74 Main int. 330-360 Eval. int. 352-353

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 20%

SL

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>2</u>	X	<u>2</u>	= <u>4</u>
Total =				<u>14</u>

827
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 74 Main int.: 560-590 Eval. int.: 570-571

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 50%

RL

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>9</u>

DDH: 242 Main int. 605-635 Eval. int. 615-616

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 10%

ML

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>12</u>

023
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 98 Main int.: 525-560 Eval. int.: 556-557

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 25%

(SL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>12</u>

DDH: 21 Main int. 1120-1150 Eval. int. 1122-1123

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 5%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>17</u>

827
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 21 Main int.: 1520-1550 Eval. int.: 1527-1528

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 20%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>6</u>

DDH: 160 Main int. 2000-2030 Eval. int. 2020-2021

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 10%

(RL)

Alternate eval.
int. suggested
by WDR

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>16</u>

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06/94

Waste Rock Classification (WRC) Evaluations

DDH: 160 Main int.: 2420-2450 Eval. int.: 2421-2422

Est. sulfide content in eval. int. Average
 Est. % of main int. accounted for by eval. int. 85%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>17</u>

DDH: 160 Main int. 2420-2450 Eval. int. 2434-2435

Est. sulfide content in eval. int. Highest
 Est. % of main int. accounted for by eval. int. 15%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>17</u>

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06/94

Waste Rock Classification (WRC) Evaluations

DDH: 6 Main int.: 740-780 Eval. int.: 775-776

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 20%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>14</u>

DDH: 133 Main int. 1050-1240 Eval. int. 1224-1225

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 30%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>12</u>

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Waste Rock Classification (WRC) Evaluations

DDH: 138 Main int.: 1770-1820 Eval. int.: 1797-1798

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 5%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>12</u>

DDH: 37 Main int. 2160-2200 Eval. int. 2184-2185

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 20%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>10</u>

DES
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 85 Main int.: 800-840 Eval. int.: 836-837

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 35%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>14</u>

DDH: 269 Main int. 865-940 Eval. int. 896-897

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 20%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>16</u>

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06/94

Waste Rock Classification (WRC) Evaluations

DDH: 165 Main int.: 2240-2290 Eval. int.: 2289-2290

Est. sulfide content in eval. int. Highest
 Est. % of main int. accounted for by eval. int. 10%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>14</u>

DDH: 42 Main int. 2210-2250 Eval. int. 2235-2236

Est. sulfide content in eval. int. Highest
 Est. % of main int. accounted for by eval. int. 20%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>12</u>

827
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 128 Main int.: 2100-2130 Eval. int.: 2112-2113

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 8%

ML

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>16</u>

DDH: 35 Main int. 2270-2350 Eval. int. 2315-2316

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 5%

ML

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>12</u>

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Waste Rock Classification (WRC) Evaluations

DDH: 68 Main int.: 1930-2020 Eval. int.: 1971-1972

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 60%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>14</u>

DDH: 271 Main int. 2195-2250 Eval. int. 2209-2210

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 20%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>14</u>

for
06/14

Waste Rock Classification (WRC) Evaluations

DDH: 270 Main int.: 2070-2165 Eval. int.: 2082-2083

Est. sulfide content in eval. int. Average
 Est. % of main int. accounted for by eval. int. 100%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>12</u>

DDH: 159 Main int. 1750-1900 Eval. int. 1767-1768

Est. sulfide content in eval. int. Highest
 Est. % of main int. accounted for by eval. int. 25%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>11</u>

82
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 45 Main int.: 1730-1770 Eval. int.: 1767-1768

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 20%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>11</u>

DDH: 21 Main int. 1620-1670 Eval. int. 1647-1648

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 15%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>14</u>

827
0494

Waste Rock Classification (WRC) Evaluations

DDH: 16 Main int.: 2300-2380 Eval. int.: 2325-2326

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 60%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>10</u>

DDH: 176 Main int. 880-950 Eval. int. 926-927

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 100%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>17</u>

82)
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 142 Main int.: 700-800 Eval. int.: 714-715

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 50%

(SL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>1</u>
Total =				<u>10</u>

DDH: 142 Main int. 700-800 Eval. int. 791-793

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 5%

(SL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>5</u>	X	<u>5</u>	= <u>25</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>30</u>

82
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 144 Main int.: 660-750 Eval. int.: 722-723

Est. sulfide content in eval. int. High

Est. % of main int. accounted for by eval. int. 10%

(SL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>3</u>	X	<u>-4</u>	= <u>-12</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>-4</u>

DDH: 149 Main int. 1100-1150 Eval. int. 1119-1120

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 65%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>14</u>

723
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 149 Main int.: 1620-1670 Eval. int.: 1641-1642

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 2%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>6</u>

DDH: 132 Main int. 1130-1180 Eval. int. 1139-1140

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 75%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>14</u>

fw
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 132 Main int.: 1130-1180 Eval. int.: 1133-1133.5

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. <1%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>17</u>

DDH: 23 Main int. 1500-1600 Eval. int. 1549-1550

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 20%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>16</u>

JE
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 23 Main int.: 930-1050 Eval. int.: 974-975

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 1-2%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>20</u>

DDH: 172 Main int. 1070-1100 Eval. int. 1093-1094

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 100%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>19</u>

82
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 91 Main int.: 949-981 Eval. int.: 949-950

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 15%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>2</u>	X	<u>-4</u>	= <u>-8</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>10</u>

DDH: 20 Main int. 700-750 Eval. int. 707-708

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 10%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>14</u>

82
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 73 Main int.: 1500-1600 Eval. int.: 1549-1550

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 4%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>16</u>

DDH: 140 Main int. 2300-2500 Eval. int. 2361-2369

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 5%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>22</u>

827
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 154 Main int.: 1590-1650 Eval. int.: 1595-1596

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 10%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>11</u>

DDH: 92 Main int. 700-780 Eval. int. 734-735

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. <1%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>14</u>

92
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 92 Main int.: 700-780 Eval. int.: 725-726

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 50%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>16</u>

DDH: 24 Main int. 940-1170 Eval. int. 1028-1029

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. <1%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>6</u>

ED
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 24 Main int.: 940-1170 Eval. int.: 1132-1133

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 75%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>14</u>

DDH: 143 Main int. 700-770 Eval. int. 748-749

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 15%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>14</u>

827
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 143 Main int.: 1070-1120 Eval. int.: 1110-1111

Est. sulfide content in eval. int. Highest
 Est. % of main int. accounted for by eval. int. 2%

(ML)	Factor	Relative		WRC	Potential
		Rating		Weight	
	Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
	Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
	Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
	Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
				Total =	<u>16</u>

DDH: 46 Main int. 1800-1980 Eval. int. 1834-1835

Est. sulfide content in eval. int. Average
 Est. % of main int. accounted for by eval. int. 60%

(RL)	Factor	Relative		WRC	Potential
		Rating		Weight	
	Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
	Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
	Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
	Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
				Total =	<u>9</u>

52
02/94

Waste Rock Classification (WRC) Evaluations

DDH: 46 Main int.: 1800-2000⁺ Eval. int.: 2009-2010

Est. sulfide content in eval. int. Highest
 Est. % of main int. accounted for by eval. int. 1%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>16</u>

DDH: 46 Main int. 2200-2320 Eval. int. 2295-2296

Est. sulfide content in eval. int. Highest
 Est. % of main int. accounted for by eval. int. 3%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>11</u>

823
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 9 Main int.: 139-190 Eval. int.: 139-140

Est. sulfide content in eval. int. Average
 Est. % of main int. accounted for by eval. int. 50%

(SL)	Factor	Relative Rating		WRC Weight	Potential
	Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
	Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
	Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
	Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
				Total =	<u>14</u>

DDH: 9 Main int. 139-190 Eval. int. 159-160

Est. sulfide content in eval. int. Highest
 Est. % of main int. accounted for by eval. int. 15%

(SL)	Factor	Relative Rating		WRC Weight	Potential
	Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
	Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
	Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
	Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
	Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
	Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
				Total =	<u>16</u>

6/94

Waste Rock Classification (WRC) Evaluations

DDH: 9 Main int.: 300-400 Eval. int.: 339-340

Est. sulfide content in eval. int. High

Est. % of main int. accounted for by eval. int. 20%

(SL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>6</u>

DDH: 9 Main int. 300-400 Eval. int. 380-381

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 80%

(SL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>12</u>

SL
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 131 Main int.: 1160-1221 Eval. int.: 1207-1208

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 5%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>14</u>

DDH: 131 Main int. 1160-1221 Eval. int. 1168-1169

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 95%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>12</u>

92
806/94

Waste Rock Classification (WRC) Evaluations

DDH: 131 Main int.: 1221-1316 Eval. int.: 1234-1235

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 1%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>19</u>

DDH: 131 Main int. 1221-1316 Eval. int. 1302-1303

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 59%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>7</u>

827
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 131 Main int.: 1316-1410 Eval. int.: 1346-1347

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 4 %

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>19</u>

DDH: 131 Main int. 1410-1503 Eval. int. 1469-1470

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 100 %

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>9</u>

827
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 163 Main int.: 1750-1950 Eval. int.: 1782-1783

Est. sulfide content in eval. int. Average

Est. % of main int. accounted for by eval. int. 100%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>7</u>

DDH: 163 Main int. 1750-1950 Eval. int. 1835-1836

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. <1%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>14</u>

82
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 163 Main int.: 1750-1950 Eval. int.: 1874-1875

Est. sulfide content in eval. int. Average (2nd sample)

Est. % of main int. accounted for by eval. int. 100%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>6</u>

DDH: 98 Main int. 1280-1330 Eval. int. 1304-1305

Est. sulfide content in eval. int. High

Est. % of main int. accounted for by eval. int. 10%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>4</u>	X	<u>-3</u>	= <u>-12</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>16</u>

827
04/94

Waste Rock Classification (WRC) Evaluations

DDH: 23 Main int.: 1400-1460 Eval. int.: 1456-1457

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 20%

(ML)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>2</u>	X	<u>5</u>	= <u>10</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>12</u>

DDH: 98 Main int. 820-850 Eval. int. 844-845

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 50%

(RL)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>3</u>	X	<u>-3</u>	= <u>-9</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>14</u>

82)
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 21 Main int.: 1753-1756 Eval. int.: 1754-1755

Est. sulfide content in eval. int.

Est. % of main int. accounted for by eval. int.

(CR)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>3</u>	X	<u>-4</u>	= <u>-12</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>9</u>

DDH: 23 Main int. 1492-1496 Eval. int. 1492.5-1493.5

Est. sulfide content in eval. int.

Est. % of main int. accounted for by eval. int.

(CR)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>25</u>

827
80494

Waste Rock Classification (WRC) Evaluations

DDH: 35 Main int.: 2374-2376 Eval. int.: 2375-2375.5

Est. sulfide content in eval. int.

Est. % of main int. accounted for by eval. int.

(CR)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>25</u>

DDH: 73 Main int. 1580-1583 Eval. int. 1581.5-1582

Est. sulfide content in eval. int.

Est. % of main int. accounted for by eval. int.

(CR)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>17</u>

DEJ
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 128 Main int.: 2311-2313 Eval. int.: 2312-2312.5

Est. sulfide content in eval. int.

Est. % of main int. accounted for by eval. int.

(CR)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>5</u>	X	<u>5</u>	= <u>25</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>30</u>

DDH: 133 Main int. 1297-1299 Eval. int. 1297.5-1298

Est. sulfide content in eval. int.

Est. % of main int. accounted for by eval. int.

(CR)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>2</u>	X	<u>-4</u>	= <u>-8</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>18</u>

JE
06/24

Waste Rock Classification (WRC) Evaluations

DDH: 143 Main int.: 1127-1130 Eval. int.: 1128.5-1129

Est. sulfide content in eval. int.

Est. % of main int. accounted for by eval. int.

CR

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>3</u>	X	<u>2</u>	= <u>6</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>27</u>

DDH: 159 Main int. 1916-1919 Eval. int. 1917-1918

Est. sulfide content in eval. int.

Est. % of main int. accounted for by eval. int.

CR

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>5</u>	X	<u>5</u>	= <u>25</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>3</u>	X	<u>2</u>	= <u>6</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>32</u>

JEJ
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 248 Main int.: 909-912 Eval. int.: 910-911

Est. sulfide content in eval. int.

Est. % of main int. accounted for by eval. int.

(CR)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>3</u>	X	<u>2</u>	= <u>6</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>19</u>

DDH: 249 Main int. 1995-1998 Eval. int. 1996.5-1997

Est. sulfide content in eval. int.

Est. % of main int. accounted for by eval. int.

(CR)

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>3</u>	X	<u>2</u>	= <u>6</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>27</u>

82
06/94

Waste Rock Classification (WRC) Evaluations

DDH: 251 Main int.: 1141-1143 Eval. int.: 1142-1142.5

Est. sulfide content in eval. int. _____

Est. % of main int. accounted for by eval. int. _____

CR

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>4</u>	X	<u>5</u>	= <u>20</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>2</u>	X	<u>-3</u>	= <u>-6</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>22</u>

DDH: 131 Main int. _____ Eval. int. 579-579.5

Est. sulfide content in eval. int. _____

Est. % of main int. accounted for by eval. int. _____

Misc. Sample

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>1</u>	X	<u>5</u>	= <u>5</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>10</u>

Waste Rock Classification (WRC) Evaluations

DDH: 155 Main int.: 1640-1675 Eval. int.: 1661-1662

Est. sulfide content in eval. int. Highest

Est. % of main int. accounted for by eval. int. 15

RL

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	<u>1</u>	X	<u>6</u>	= <u>6</u>
Sulfide surface area exposed	<u>3</u>	X	<u>5</u>	= <u>15</u>
Alkali type	<u>1</u>	X	<u>-4</u>	= <u>-4</u>
Alkali surface area exposed	<u>1</u>	X	<u>-3</u>	= <u>-3</u>
Grain size	<u>2</u>	X	<u>2</u>	= <u>4</u>
Weathering/slaking	<u>1</u>	X	<u>2</u>	= <u>2</u>
Total =				<u>20</u>

DDH: _____ Main int. _____ Eval. int. _____

Est. sulfide content in eval. int. _____

Est. % of main int. accounted for by eval. int. _____

Factor	Relative Rating		WRC Weight	Potential
Sulfide type	_____	X	<u>6</u>	= _____
Sulfide surface area exposed	_____	X	<u>5</u>	= _____
Alkali type	_____	X	<u>-4</u>	= _____
Alkali surface area exposed	_____	X	<u>-3</u>	= _____
Grain size	_____	X	<u>2</u>	= _____
Weathering/slaking	_____	X	<u>2</u>	= _____
Total =				_____

Appendix 3.5-32 Table 4.
Summary of the 1994 ABA Determinations and WRC Values
for the Initial Waste Rock Investigation.

Appendix 3.5-32 Table 4a

Skunk Lake Formation Summary of the 1994 ABA Determinations and WRC Values for the Initial Waste Rock Investigation

Main Interval	ABA/WRC Evaluated Interval	S %	S ² %	NP kg/tonne	AP kg/tonne	Net NP kg/tonne	$\frac{NP}{AP}$	WRC Value*
DDH 9 139-190	DDH 9 139-140	1.71	1.71	2.4	53.4	-51	0.04	14
DDH 9 139-190	DDH 9 159-160	9.11	9.11	2.1	281	-279	0.01	16
DDH 9 300-400	DDH 9 339-340	0.02	0.02	4.2	0.6	3.6	7.0	6
DDH 9 300-400	DDH 9 380-381	0.01	0.01	15.4	0.3	15.1	51.3	12
DDH 44 310-340	DDH 44 329-330	0.05	0.04	3.8	1.6	2.2	2.4	14
DDH 44 530-560	DDH 44 555-556	0.02	0.02	2.6	0.6	2.0	4.3	12
DDH 74 330-360	DDH 74 352-353	0.02	0.01	3.9	0.6	3.3	6.5	14
DDH 98 525-560	DDH 98 556-557	0.02	0.02	5.1	0.6	4.5	8.5	12
DDH 142 700-800	DDH 142 714-715	0.01	0.01	3.1	0.3	2.8	10.3	10
DDH 142 700-800	DDH 142 791-793	3.94	3.94	8.6	123	-114	0.1	30
DDH 144 660-750	DDH 144 722-723	0.32	0.31	238	9.1	229	26.2	-4
DDH 155 125-150	DDH 155 130-131	0.02	0.02	7.6	0.6	7.0	12.7	12
DDH 155 280-308	DDH 155 305-306	0.06	0.06	6.8	1.9	4.9	3.6	12
DDH 155 335-350	DDH 155 349-350	1.27	1.21	2.6	39.7	-37.1	0.1	10
DDH 155 490-510	DDH 155 492-493	0.01	0.01	4.0	0.3	3.7	13.3	10
DDH 155 615-635	DDH 155 627-628	0.01	0.01	4.4	0.3	4.1	14.7	10
DDH 155 735-760	DDH 155 756-757	0.01	0.01	5.0	0.3	4.7	16.7	10

*Refer to Table 3.5-20 of the May 22, 1995, Crandon Project EIR for interpretation of WRC values.

Appendix 3.5-32 Table 4b

Rice Lake Formation Summary of the 1994 ABA Determinations and WRC Values for the Initial Waste Rock Investigation

Main Interval	ABA/WRC Evaluated Interval	S %	S ² %	NP kg/tonne	AP kg/tonne	Net NP kg/tonne	NP AP	WRC Value*
DDH 16 2300-2380	DDH 16 2325-2326	0.03	0.02	53.8	0.9	52.9	59.8	10
DDH 21 1120-1150	DDH 21 1122-1123	2.80	2.44	23.3	87.5	-64.2	0.3	17
DDH 23 930-1050	DDH 23 974-975	0.32	0.32	12.7	10.0	2.7	1.3	20
DDH 24 940-1170	DDH 24 1028-1029	0.10	0.10	6.7	3.1	3.6	2.2	6
DDH 24 940-1170	DDH 24 1132-1133	0.03	0.03	13.5	0.9	12.6	15.0	14
DDH 46 1800-1980	DDH 46 1834-1835	0.02	0.02	45.5	0.6	44.9	75.8	9
DDH 74 560-590	DDH 74 570-571	<0.01	<0.01	4.6	0.3	4.3	15.3	9
DDH 98 820-850	DDH 98 844-845	0.01	0.01	8.3	0.3	8.0	27.7	14
DDH 140 2300-2500	DDH 140 2361-2369	0.47	0.43	32.1	14.7	17.4	2.2	22
DDH 143 700-770	DDH 143 748-749	1.23	1.23	6.7	38.4	-31.7	0.2	14
DDH 149 1100-1150	DDH 149 1119-1120	0.03	0.03	12.4	0.9	11.5	13.8	14
DDH 155 890-915	DDH 155 893-894	0.22	0.22	16.7	6.9	9.8	2.4	10
DDH 155 1040-1060	DDH 155 1053-1054	0.01	0.01	7.4	0.3	7.1	24.7	10
DDH 155 1185-1210	DDH 155 1194-1195	0.01	0.01	17.5	0.3	17.2	58.3	10
Requested by WDNR ¹	DDH 155 1274-1275	0.49	0.49	24.2	15.3	8.9	1.6	8
DDH 155 1340-1360	DDH 155 1342-1343	0.03	0.02	15.4	0.9	14.5	17.1	10
DDH 155 1490-1510	DDH 155 1509-1510	0.02	0.02	35.5	0.6	34.9	59.2	10

Appendix 3.5-32 Table 4b (Continued)

Main Interval	ABA/WRC Evaluated Interval	S %	S ² %	NP kg/tonne	AP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	WRC Value*
Requested by WDNR ¹	DDH 155 1549-1550	5.25	5.25	107	164	-57.0	0.7	6
Requested by WDNR ¹	DDH 155 1582-1583	0.97	0.97	83.4	30.3	53.1	2.8	6
DDH 155 1640-1675	DDH 155 1661-1662	5.12	4.91	120	160	-40.0	0.8	20
DDH 155 1790-1810	DDH 155 1808-1809	0.02	0.02	91.6	0.6	91.0	153	4
DDH 155 1940-1960	DDH 155 1962-1963	1.75	1.75	76.7	54.7	22.0	1.4	14
DDH 155 2080-2105	DDH 155 2089-2090	0.07	0.07	16.5	2.2	14.3	7.5	10
DDH 155 2240-2260	DDH 155 2241-2242	0.04	0.04	73.3	1.2	72.1	61.1	4
DDH 155 2240-2260	DDH 155 2248-2249	0.02	0.02	29.2	0.6	28.6	48.7	10
DDH 160 2000-2030	DDH 160 2020-2021	0.03	0.03	97.6	0.9	96.7	108	16
DDH 163 1750-1950 ²	DDH 163 1782-1783	0.02	0.02	40.8	0.6	40.2	68.0	7
DDH 163 1750-1950	DDH 163 1835-1836	1.74	1.57	93.4	54.4	39.0	1.7	14
DDH 163 1750-1950 ²	DDH 163 1874-1875	0.04	0.03	114	1.2	113	95.0	6
DDH 172 1070-1100	DDH 172 1093-1094	0.01	0.01	3.8	0.3	3.5	12.7	19
DDH 155 1640-1675	DDH 155 1661-1662	9.06	9.06	20.7	283	-262	0.07	20

*Refer to Table 3.5-20 of the May 22, 1995, Crandon Project EIR for interpretation of WRC values.

¹Samples collected outside the interval evaluated by request of WDNR.

²Two separate "average" samples were collected from the same main interval.

Appendix 3.5-32 Table 4c

Mole Lake Formation Summary of the 1994 ABA Determinations and WRC Values for the Initial Waste Rock Investigation

Main Interval	ABA/WRC Evaluated Interval	S %	S ² %	NP kg/tonne	AP kg/tonne	Net NP kg/tonne	NP AP	WRC Value*
DDH 6 740-780	DDH 6 775-776	0.13	0.12	41.3	4.1	37.2	10.1	14
DDH 20 700-750	DDH 20 707-708	3.24	2.73	45.1	101	-55.9	0.4	14
DDH 21 1520-1550	DDH 21 1527-1528	0.01	0.01	165	0.3	165	550	6
DDH 21 1620-1670	DDH 21 1647-1648	0.36	0.36	24.8	11.3	13.5	2.2	14
DDH 23 1400-1460	DDH 23 1456-1457	0.10	0.10	82.7	3.1	79.6	26.7	16
DDH 23 1500-1600	DDH 23 1549-1550	--	--	--	--	--	--	12
DDH 35 2270-2350	DDH 35 2315-2316	0.08	0.08	106	2.5	104	42.4	12
DDH 37 2160-2200	DDH 37 2184-2185	0.19	0.19	57.3	5.9	51.4	9.7	10
DDH 42 2210-2250	DDH 42 2235-2236	1.33	0.94	69.1	41.6	27.5	1.7	12
DDH 44 869-890	DDH 44 883-884	0.02	0.02	17.2	0.6	16.6	28.7	16
DDH 45 1730-1770	DDH 45 1767-1768	0.04	0.04	10.4	1.2	9.2	8.7	11
DDH 46 1800-2000	DDH 46 2009-2010	0.80	0.80	110	25.0	85.0	4.4	16
DDH 46 2200-2320	DDH 46 2295-2296	2.04	2.04	85.1	63.8	21.3	1.3	11
DDH 68 1930-2020	DDH 68 1971-1972	0.03	0.03	26.0	0.9	25.1	28.9	14
DDH 73 1500-1600	DDH 73 1549-1550	0.70	0.70	17.0	21.9	-4.9	0.8	16
DDH 85 800-840	DDH 85 836-837	0.14	0.14	299	4.4	295	68.0	14
DDH 91 949-981	DDH 91 949-950	3.79	3.79	9.2	116	-107	0.1	10
DDH 92 700-780	DDH 92 725-726	2.95	2.95	4.2	90.3	-86.1	0.05	16

Appendix 3.5-32 Table 4c (Continued)

Main Interval	ABA/WRC Evaluated Interval	S %	S ² %	NP kg/tonne	AP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	WRC Value*
DDH 92 700-780	DDH 92 734-735	0.04	0.03	8.7	1.2	7.5	7.3	14
DDH 98 1280-1330	DDH 98 1304-1305	0.39	0.37	48.4	12.2	36.2	4.0	16
DDH 128 2100-2130	DDH 128 2112-2113	2.26	2.26	52.9	70.6	-17.7	0.7	16
DDH 131 1160-1221	DDH 131 1168-1169	0.01	0.01	17.7	0.3	17.4	59.0	12
DDH 131 1160-1221	DDH 131 1207-1208	6.32	6.32	30.1	198	-168	0.2	14
DDH 131 1221-1316	DDH 131 1234-1235	3.50	3.27	10.1	109	-98.9	0.1	19
DDH 131 1221-1316	DDH 131 1302-1303	0.22	0.22	12.4	6.9	5.5	1.8	7
DDH 131 1316-1410	DDH 131 1346-1347	1.51	1.35	14.2	47.2	-33.0	0.3	19
DDH 131 1410-1503	DDH 131 1469-1470	0.60	0.60	51.4	18.8	32.6	2.7	9
DDH 132 1130-1180	DDH 132 1133-1113.5	10.8	10.8	38.4	338	-300	0.1	17
DDH 132 1130-1180	DDH 132 1139-1140	0.61	0.61	49.6	18.4	31.2	2.7	14
DDH 133 1050-1240	DDH 133 1224-1225	0.17	0.16	53.7	5.3	48.4	10.1	12
DDH 138 1770-1820	DDH 138 1797-1798	0.24	0.14	14.0	7.5	6.5	1.9	12
DDH 143 1070-1120	DDH 143 1110-1111	7.13	6.96	5.3	223	-218	0.02	16
DDH 149 1620-1670	DDH 149 1641-1642	0.09	0.09	49.9	2.8	47.1	17.8	6
DDH 154 1590-1650	DDH 154 1595-1596	0.32	0.32	66.2	10.0	56.2	6.6	11
DDH 159 1750-1900	DDH 159 1767-1768	0.31	0.31	107	9.7	97.3	11.0	11
DDH 160 2420-2450	DDH 160 2421-2422	1.14	1.14	33.4	35.6	-2.2	0.9	17
DDH 160 2420-2450	DDH 160 2434-2435	1.03	1.00	58.5	32.2	26.3	1.82	17
DDH 165 2240-2290	DDH 165 2289-2290	0.39	0.37	73.3	12.2	61.1	6.01	14

Appendix 3.5-32 Table 4c (Continued)

Main Interval	ABA/WRC Evaluated Interval	S %	S ² %	NP kg/tonne	AP kg/tonne	Net NP kg/tonne	$\frac{NP}{AP}$	WRC Value*
DDH 176 880-950	DDH 176 926-927	3.73	3.65	57.7	117	-59.3	0.49	17
DDH 242 605-635	DDH 242 615-616	2.62	2.62	31.9	81.9	-50.0	0.39	12
DDH 269 865-940	DDH 269 896-897	0.79	0.79	13.0	24.1	-11.1	0.54	16
DDH 270 2070-2165	DDH 270 2082-2083	0.05	0.04	10.6	1.6	9.0	6.63	12
DDH 271 2195-2250	DDH 271 2209-2210	0.16	0.16	44.3	5.0	39.3	8.86	14

*Refer to Table 3.5-20 of the May 22, 1995, Crandon Project EIR for interpretation of WRC values.

Appendix 3.5-32 Tables 5-8.

1995 ABA Determinations of the Randomly Selected Waste Rock Cores, Calculated Statistical Parameters, and Comparisons with the Master Waste Rock Composites.

Appendix 3.5-32 Table 5.
Skunk Lake Formation 1995 ABA Determinations.

Appendix 3.5-32 Table 5a

ABA Determinations of the Randomly Selected Skunk Lake Formation Cores, Calculated Statistical Parameters, and a Comparison With the ABA Determinations of the Skunk Lake Master Composite

Skunk Lake Core	S %	S ² %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 9 362-385	<0.01	<0.01	<0.05	5	1	0.3	0.3	4.7	17	17	3.3	8.69
DDH 23 523-552	0.01	<0.01	0.18	21	4	0.3	0.3	20.7	70	70	13	7.77
DDH 44 160-192	0.02	<0.01	<0.05	7	1	0.6	0.3	6.4	12	23	3.3	8.69
DDH 44 536-575	<0.01	<0.01	<0.05	4	1	0.3	0.3	3.7	13	13	3.3	8.60
DDH 91 247-274	0.01	<0.01	<0.05	4	1	0.3	0.3	3.7	13	13	3.3	8.46
DDH 91 397-447	0.34	0.20	<0.05	11	1	10.6	6.3	0.4	1.0	1.8	0.2	8.93
DDH 92 311-338	0.04	0.03	<0.05	7	1	1.3	0.9	5.7	5.4	7.8	1.1	8.32
DDH 144 662-688	0.04	<0.01	<0.05	4	1	1.3	0.3	2.7	3.1	13	3.3	8.20
Range	<0.01-0.34	<0.01-0.20	<0.05-0.18	4-21	1-4	0.3-10.6	0.3-6.3	0.4-20.7	1.0-70	1.8-70	0.2-13	7.77-8.93
X (n = 8)	0.06	0.04	0.07	8	1	2	1	6.0	17	20	3.8	8.5
σ	0.11	0.07	0.05	6	1	4	2	6.2	22	21	3.9	0.4
Master Composite	0.14	0.13	NA	0	NC	4.4	4.1	-4.4	0	0	NC	8.7

Note: Detection limit values were used in calculations for measured values which were less than the detection limit.

NA = not analyzed

NC = not calculated

Appendix 3.5-32 Table 5b

Determination of ABA Variability Within the Randomly Selected Skunk Lake Formation Core DDH 44: 536-575, Calculated Statistical Parameters, and a Comparison With the ABA Determinations of DDH 44: 536-575

Skunk Lake Core	S %	S ² %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 44 538-540	<0.01	<0.01	<0.05	1	1	0.3	0.3	0.7	3.3	3.3	3.3	8.48
DDH 44 548-550	<0.01	<0.01	<0.05	3	1	0.3	0.3	2.7	10	10	3.3	8.52
DDH 44 557-559	<0.01	<0.01	<0.05	1	1	0.3	0.3	0.7	3.3	3.3	3.3	8.69
DDH 44 566-568	<0.01	<0.01	<0.05	4	1	0.3	0.3	3.7	13	13	3.3	8.75
DDH 44 575-577	<0.01	<0.01	<0.05	3	1	0.3	0.3	2.7	10	10	3.3	8.85
Range				1-4				0.7-3.7	3.3-13	3.3-13		8.48-8.85
X (n = 5)	<0.01	<0.01	<0.05	2.4	1	0.3	0.3	2.1	8	8	3.3	8.7
σ				1.3				1.3	4	4		0.2
DDH 44 536-575	<0.01	<0.01	<0.05	4	1	0.3	0.3	3.7	13	13	3.3	8.6

Note: Detection limit values were used in calculations for measured values which were less than the detection limit.

Appendix 3.5-32 Table 5c

Determination of ABA Variability Within the Randomly Selected Skunk Lake Formation Core DDH 92: 311-338, Calculated Statistical Parameters, and a Comparison With the ABA Determinations of DDH 92: 311-338

Skunk Lake Core	S %	S ₂ %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 92 313-315	0.09	0.06	0.07	4	2	2.8	1.9	1.2	1.4	2.1	1	8.38
DDH 92 322-324	0.01	<0.01	0.15	1	3	0.3	0.3	0.7	3.3	3.3	10	8.81
DDH 92 332-334	0.01	<0.01	0.18	3	4	0.3	0.3	2.7	10	10	13	8.36
Range	0.01-0.09	<0.01-0.06	0.07-0.18	1-4	2-4	0.3-2.8	0.3-1.9	0.7-2.7	1.4-10	2.1-10	1-13	8.36-8.81
X (n = 3)	0.04	0.03	0.13	3	3	1.1	0.8	1.5	4.9	5.1	8	8.5
σ	0.05	0.03	0.06	2	1	1.4	0.9	1.0	4.5	4.3	6	0.2
DDH 92 311-338	0.04	0.03	<0.05	7	1	1.3	0.9	5.7	5.4	7.8	1.1	8.3

Note: Detection limit values were used in calculations for measured values which were less than the detection limit.

3.5-32-140

Appendix 3.5-32 Table 6.
Rice Lake Formation 1995 ABA Determinations.

Appendix 3.5-32 Table 6a

ABA Determinations of the Randomly Selected Rice Lake Formation Cores, Calculated Statistical Parameters, and a Comparison With the ABA Determinations of the Rice Lake Master Composite

Rice Lake Core	S %	S ² %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 92 592-642	0.11	0.08	<0.05	9	1	3.4	2.5	5.6	2.6	3.6	0.4	8.11
DDH 15 2079-2111	<0.01	<0.01	0.22	21	5	0.3	0.3	20.7	70	70	17	8.81
DDH 16 2344-2376	<0.01	<0.01	2.64	52	60	0.3	0.3	51.7	173	173	200	8.09
DDH 21 932-985	<0.01	<0.01	0.22	10	5	0.3	0.3	9.7	33	33	17	8.37
DDH 21 1216-1272	0.06	0.02	0.73	45	17	1.9	0.6	43.1	24	75	28	8.42
DDH 23 1042-1082	0.07	0.07	0.15	17	3	2.2	2.2	14.8	7.7	7.7	1.4	8.19
DDH 23 1177-1230	<0.01	<0.01	<0.05	5	1	0.3	0.3	4.7	17	17	3.3	8.59
DDH 24 1126-1161	0.03	0.03	0.11	11	3	0.9	0.9	10.1	12	12	3.3	8.25
DDH 44 667-694	<0.01	<0.01	<0.05	3	1	0.3	0.3	2.7	10	10	3.3	8.88
DDH 44 752-779	<0.01	<0.01	<0.05	7	1	0.3	0.3	6.7	23	23	3.3	8.49
DDH 46 1823-1859	<0.01	<0.01	1.69	46	38	0.3	0.3	45.7	153	153	127	9.40
DDH 91 583-621	0.07	0.07	<0.05	4	1	2.2	2.2	1.8	1.8	1.8	0.4	8.25

3.5-32-142

Appendix 3.5-32 Table 6a (Continued)

Rice Lake Core	S %	S ² %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	NP AP	NP SAP	NP-CO ₂ SAP	Paste pH
DDH 160 1783-1808	0.04	<0.01	0.77	35	18	1.3	0.3	33.7	27	117	60	8.80
DDH 160 1971-1997	0.02	<0.01	0.55	35	13	0.6	0.3	34.4	58	117	43	9.02
DDH 163 1721-1747	<0.01	<0.01	0.77	32	18	0.3	0.3	31.7	107	107	60	9.25
DDH 163 1804-1829	0.13	0.07	2.72	55	62	4.1	2.2	50.9	13	25	28	9.36
DDH 172 1298-1315	0.03	<0.01	0.18	16	4	0.9	0.3	15.1	18	53	13	8.81
DDH 172 1500-1526	<0.01	<0.01	<0.05	5	1	0.3	0.3	4.7	17	17	3.3	9.32
Range	<0.01-0.13	<0.01-0.08	<0.05-2.72	3-55	1-62	0.3-4.1	0.3-2.5	1.8-51.7	1.8-173	1.8-173	0.4-200	8.09-9.40
X (n = 18)	0.04	0.03	0.61	23	14	1.1	0.8	22	43	56	34	8.7
σ	0.04	0.03	0.86	18	20	1.2	0.8	18	51	55	52	0.4
Master Composite	0.05	0.05	NA	30	NC	1.6	1.6	28.4	19	19	NC	9.1

Note: Detection limit values were used in calculations for measured values which were less than the detection limit.

NA = not analyzed

NC = not calculated

Appendix 3.5-32 Table 6b

Determination of ABA Variability Within the Randomly Selected Rice Lake Formation Core DDH 23: 1042-1082, Calculated Statistical Parameters, and a Comparison With the ABA Determinations of DDH 23: 1042-1082

Rice Lake Core	S %	S ² %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 23 1041-1043	0.05	0.05	0.15	16	3	1.6	1.6	14.4	10	10	1.9	8.45
DDH 23 1050-1052	0.24	0.24	0.40	30	9	7.5	7.5	22.5	4.0	4.0	1.2	8.65
DDH 23 1059-1061	0.03	0.02	0.40	25	9	0.9	0.6	24.1	28	42	15	8.58
DDH 23 1068-1070	0.01	<0.01	0.18	12	4	0.3	0.3	11.7	40	40	13	8.71
DDH 23 1077-1079	0.06	0.04	<0.05	10	1	1.9	1.2	8.1	5.3	8.3	0.8	8.80
Range	0.01-0.24	<0.01-0.24	<0.05-0.40	10-30	1-9	0.3-7.5	0.3-7.5	8.1-24.1	4.0-40	4.0-42	0.8-15	8.45-8.80
X (n = 5)	0.08	0.07	0.24	19	5	2.4	2.2	16	17	21	6.4	8.6
σ	0.09	0.1	0.16	8.6	4	2.9	3.0	6.9	16	18	7.0	0.1
DDH 23 1042-1082	0.07	0.07	0.15	17	3	2.2	2.2	14.8	7.7	7.7	1.4	8.2

Note: Detection limit values were used in calculations for measured values which were less than the detection limit.

3.5-32-144

Appendix 3.5-32 Table 6c

Determination of ABA Variability Within the Randomly Selected Rice Lake Formation Core DDH 44: 752-779, Calculated Statistical Parameters, and a Comparison With the ABA Determinations of DDH 44: 752-779

Rice Lake Core	S %	S ² %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 44 754-756	0.02	<0.01	0.11	5	3	0.6	0.3	4.4	8.3	17	10	8.38
DDH 44 764-766	0.01	<0.01	0.07	6	2	0.3	0.3	5.7	20	20	6.7	7.76
DDH 44 774-776	0.01	<0.01	0.11	3	3	0.3	0.3	2.7	10	10	10	8.24
Range	0.01-0.02		0.07-0.11	3-6	2-3	0.3-0.6		2.7-5.7	8.3-20	10-20	6.7-10	7.76-8.38
X (n = 3)	0.01	<0.01	0.10	5	3	0.4	0.3	4.3	13	16	8.9	8.1
σ	0.01		0.02	2	1	0.2		1.5	6.3	5.1	1.9	0.3
DDH 44 752-779	<0.01	<0.01	<0.05	7	1	0.3	0.3	6.7	23	23	3.3	8.5

Note: Detection limit values were used in calculations for measured values which were less than the detection limit.

3.5-32-145

Appendix 3.5-32 Table 6d

Determination of ABA Variability Within the Randomly Selected Rice Lake Formation Core DDH 160: 1971-1997, Calculated Statistical Parameters, and a Comparison With the ABA Determinations of DDH 160: 1971-1997

Rice Lake Core	S %	S ² %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 160 1975-1977	0.01	<0.01	0.15	9	3	0.3	0.3	8.7	30	30	10	9.03
DDH 160 1985-1987	0.02	0.01	0.07	17	2	0.6	0.3	16.4	28	57	6.7	9.09
DDH 160 1994-1996	0.01	0.01	0.33	30	8	0.3	0.3	29.7	100	100	27	9.19
Range	0.01-0.02	<0.01-0.01	0.07-0.33	9-30	2-8	0.3-0.6		8.7-29.7	28-100	30-100	6.7-27	9.03-9.19
X (n = 3)	0.01	0.01	0.18	19	4	0.4	0.3	18	53	62	15	9.1
σ	0.01	0.01	0.13	11	3	0.2		11	41	35	11	0.1
DDH 160 1971-1997	0.02	<0.01	0.55	35	13	0.6	0.3	34.4	58	117	43	9.0

Note: Detection limit values were used in calculations for measured values which were less than the detection limit.

3.5-32-146

Appendix 3.5-32 Table 6e

Determination of ABA Variability Within the Randomly Selected Rice Lake Formation Core DDH 172: 1500-1526, Calculated Statistical Parameters, and a Comparison With the ABA Determinations of DDH 172: 1500-1526

Rice Lake Core	S %	S ² %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 172 1504-1506	<0.01	<0.01	<0.05	5	1	0.3	0.3	4.7	17	17	3.3	9.09
DDH 172 1513-1515	<0.01	<0.01	<0.05	9	1	0.3	0.3	8.7	30	30	3.3	9.18
DDH 172 1522-1524	<0.01	<0.01	0.26	25	1	0.3	0.3	24.7	83	83	3.3	9.13
Range			<0.05-0.26	5-25				4.7-24.7	17-83	17-83		9.09-9.18
X (n = 3)	<0.01	<0.01	0.12	13	1	0.3	0.3	13	43	43	3.3	9.1
σ			0.12	11				11	35	35		0.1
DDH 172 1500-1526	<0.01	<0.01	<0.05	5	1	0.3	0.3	4.7	17	17	3.3	9.3

Note: Detection limit values were used in calculations for measured values which were less than the detection limit.

Appendix 3.5-32 Table 7.
Upper Mole Lake Formation 1995 ABA Determinations

Appendix 3.5-32 Table 7a

ABA Determinations of the Randomly Selected Upper Mole Lake Formation Cores, Calculated Statistical Parameters, and a Comparison With the ABA Determinations of the Upper Mole Lake Master Composite

Upper Mole Lake Core	S %	S ² %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 16 2378-2406	<0.01	<0.01	1.14	68	26	0.3	0.3	67.7	227	227	87	8.92
DDH 44 955-980	<0.01	<0.01	<0.05	0	1	0.3	0.3	-6.3	0	0	3.3	8.70
DDH 46 1944-1984	0.12	0.10	1.32	92	30	3.8	3.1	88.2	24	30	9.7	9.55
DDH 46 2026-2060	0.01	<0.01	3.78	70	86	0.3	0.3	69.7	233	233	287	8.77
DDH 73 1370-1395	0.06	0.06	2.57	136	58	1.9	1.9	134.1	72	72	30	8.90
DDH 92 564-589	<0.01 ^a	<0.01 ^a	0.08 ^a	14 ^a	2 ^a	0.3 ^a	0.3 ^a	13.7 ^a	47 ^a	47 ^a	6.7 ^a	8.56 ^a
DDH 131 1161-1185	0.03 ^b	0.02 ^b	1.10 ^c	38 ^b	25 ^c	0.9 ^b	0.6 ^b	37.1 ^b	42 ^b	63 ^b	42 ^b	8.68 ^b
DDH 140 2841-2868	0.06	<0.01	2.61	4	59	1.9	0.3	2.1	2.1	13	197	8.83
DDH 149 1442-1477	<0.01	<0.01	0.22	15	5	0.3	0.3	14.7	50	50	17	8.93
DDH 154 1444-1470	0.39	0.20	5.03	126	114	12.2	6.3	113.8	10	20	18	9.00
DDH 160 2220-2245	0.08	0.08	0.81	42	18	2.5	2.5	39.5	17	17	7.2	9.25
DDH 163 2371-2396	0.07	0.06	2.17	72	49	2.2	1.9	69.8	33	38	26	9.40

3.5-32-149

Appendix 3.5-32 Table 7a (Continued)

Upper Mole Lake Core	S %	S ²⁻ %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 163 2560-2585	0.02	0.02	0.33	31	8	0.6	0.6	30.4	52	52	13	9.05
Range	<0.01-0.39	<0.01-0.20	<0.05-5.03	-6 to 136	1-114	0.3-12.2	0.3-6.3	-6.3 to 134.1	0 to 233	0 to 233	3.3-287	8.56- 9.55
X (n = 13)	0.07	0.05	1.63	54	37	2.1	1.4	52	62	66	57	9.0
σ	0.10	0.06	1.53	45	35	3.2	1.8	43	74	76	87	0.3
Master Composite	0.10	0.10	NA	48	NC	3.1	3.1	44.9	15	15	NC	9.1

^aAverage values for DDH 92:564-573 and DDH 92:575-589

^bAverage values for DDH 131:1161-1185 and DDH 131:1161-1186

^cValues for DDH 131:1161-1185

Note: Detection limit values were used in calculations for measured values which were less than the detection limit.

NA = not analyzed

NC = not calculated

3.5-32-150

Appendix 3.5-32 Table 7b

Determination of ABA Variability Within the Randomly Selected Upper Mole Lake Formation Core DDH 46: 2026-2060, Calculated Statistical Parameters, and a Comparison With the ABA Determinations of DDH 46: 2026-2060

Upper Mole Lake Core	S %	S ² %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 46 2028-2030	<0.01	<0.01	1.03	39	23	0.3	0.3	38.7	130	130	77	9.20
DDH 46 2037-2039	<0.01	<0.01	1.54	50	35	0.3	0.3	49.7	167	167	117	9.34
DDH 46 2046-2048	0.06	0.03	0.70	39	16	1.9	0.9	37.1	20	43	18	9.24
DDH 46 2055-2057	0.02	<0.01	6.31	161	144	0.6	0.3	160.4	268	537	480	8.72
Range	<0.01-0.06	<0.01-0.03	0.70-6.31	39-161	16-144	0.3-1.9	0.3-0.9	37.1- 160.4	20-268	43-537	18-480	8.72-9.34
X (n = 4)	0.02	0.02	2.40	72	54	0.8	0.4	71	146	219	173	9.1
σ	0.02	0.01	2.63	59	60	0.8	0.3	60	102	218	209	0.3
DDH 46 2026-2060	0.01	<0.01	3.78	70	86	0.3	0.3	69.7	233	233	287	8.8

Note: Detection limit values were used in calculations for measured values which were less than the detection limit.

Appendix 3.5-32 Table 7c

Determination of ABA Variability Within the Randomly Selected Upper Mole Lake Formation Core DDH 73: 1370-1395, Calculated Statistical Parameters, and a Comparison With the ABA Determinations of DDH 73: 1370-1395

Upper Mole Lake Core	S %	S ² %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 73 1372-1374	0.08	0.08	1.03	32	23	2.5	2.5	29.5	13	13	9.2	9.16
DDH 73 1381-1383	<0.01	<0.01	0.51	21	12	0.3	0.3	20.7	70	70	40	9.24
DDH 73 1390-1392	0.03	0.02	5.40	136	123	0.9	0.6	135.1	151	227	205	9.00
Range	<0.01-0.08	<0.01-0.08	0.51-5.40	21-136	12-123	0.3-2.5	0.3-2.5	20.7-135.1	13-151	13-227	9.2-205	9.00-9.24
X (n = 3)	0.04	0.04	2.31	63	53	1.2	1.1	62	78	103	85	9.1
σ	0.04	0.04	2.69	63	61	1.1	1.2	64	69	111	105	0.1
DDH 73 1370-1395	0.06	0.06	2.57	136	58	1.9	1.9	134.1	72	72	30	8.9

Note: Detection limit values were used in calculations for measured values which were less than the detection limit.

Appendix 3.5-32 Table 7d

Determination of ABA Variability Within the Randomly Selected Upper Mole Lake Formation Core DDH 131: 1161-1185, Calculated Statistical Parameters, and a Comparison With the ABA Determinations of DDH 131: 1161-1185

Upper Mole Lake Core	S %	S ² %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 131 1163-1165	<0.01	<0.01	0.22	16	5	0.3	0.3	15.7	53	53	17	9.23
DDH 131 1171-1173	0.19	0.14	0.11	9	3	5.9	4.4	3.1	1.5	2.0	0.68	8.91
DDH 131 1180-1182	0.17	0.14	2.13	60	48	5.3	4.4	54.7	11	14	11	8.62
Range	<0.01-0.19	<0.01-0.14	0.11-2.13	9-60	3-48	0.3-5.9	0.3-4.4	3.1-54.7	1.5-53	2.0-53	0.68-17	8.62-9.23
X (n = 3)	0.12	0.10	0.82	28	19	3.8	3.0	24	22	23	9.6	8.9
σ	0.10	0.08	1.14	28	25	3.1	2.4	27	27	27	8.2	0.3
DDH 131 1161-1185	0.03	0.02	1.10	38	25	0.9	0.6	37.1	42	63	42	8.7

Note: Detection limit values were used in calculations for measured values which were less than the detection limit.

3.5-32-153

Appendix 3.5-32 Table 8.
Lower Mole Lake Formation 1995 ABA Determinations

Appendix 3.5-32 Table 8a

ABA Determinations of the Randomly Selected Lower Mole Lake Formation Cores, Calculated Statistical Parameters, and a Comparison With the ABA Determinations of the Lower Mole Lake Master Composite

Lower Mole Lake Core	S %	S ² %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 6 865-900	4.55	3.79	0.07	7	2	142.2	118.4	-135.2	0.05	0.06	0.02	8.00
DDH 9 802-861	4.71	4.22	0.48	35	11	147.2	131.9	-112.2	0.24	0.27	0.08	7.84
DDH 15 2475-2515	0.20	0.16	2.83	56	64	6.3	5.0	49.7	8.9	11	13	9.08
DDH 16 2995-3026	0.34	0.33	2.02	60	46	10.6	10.3	49.4	5.7	5.8	4.5	8.87
DDH 21 1627-1657	0.04	0.03	0.40	17	9	1.3	0.9	15.7	13	19	10	8.99
DDH 42 2234-2271	0.16	0.16	1.65	57	38	5.0	5.0	52.0	11	11	7.6	8.72
DDH 45 2065-2100	0.03	0.03	0.48	21	11	0.9	0.9	20.1	23	23	12	8.63
DDH 46 2238-2273	0.10	0.07	3.19	71	73	3.1	2.2	67.9	23	32	33	8.67
DDH 68 1878-1903	0.01	<0.01	1.54	37	35	0.3	0.3	36.7	123	123	117	8.65
DDH 85 964-1004	1.20	0.93	2.28	50	52	37.5	29.1	12.5	1.3	1.7	1.8	8.49
DDH 139 2933-2960	0.01	<0.01	1.87	67	43	0.3	0.3	66.7	223	223	143	8.66
DDH 154 1500-1526	0.03	0.02	0.40	29	9	0.9	0.6	28.1	32	48	15	8.88

3.5-32-155

Appendix 3.5-32 Table 8a (Continued)

Lower Mole Lake Core	S %	S ²⁻ %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	NP AP	NP SAP	NP-CO ₂ SAP	Paste pH
DDH 159 1813-1838	0.17	0.12	2.42	55	55	5.3	3.7	49.7	10	15	15	8.67
DDH 163 2850-2921	0.88	0.88	<0.05	117	1	27.5	27.5	89.5	4.2	4.2	0.04	9.02
DDH 165 2227-2250	0.02	0.02	0.77	16	18	0.6	0.6	15.4	27	27	30	8.74
DDH 176 986-1021	<0.01	<0.01	0.18	4	4	0.3	0.3	3.7	13	13	13	7.49
DDH 270 2047-2073	<0.01	<0.01	3.27	11	74	0.3	0.3	10.7	37	37	247	8.22
Range	<0.01-4.71	<0.01-4.22	<0.05-3.27	4-117	1-74	0.3-147.2	0.3-131.9	-135.2 to 89.5	0.05-223	0.06-223	0.02-247	7.49-9.08
X (n = 17)	0.73	0.64	1.41	42	32	23	20	19	33	35	39	8.6
σ	1.50	1.30	1.13	29	26	47	41	59	57	56	67	0.4
Master Composite	0.34	0.27	NA	46	NC	11	8	35	4.2	5.8	NC	8.8

Note: Detection limit values were used in calculations for measured values which were less than the detection limit.

NA = not analyzed

NC = not calculated

Appendix 3.5-32 Table 8b

Determination of ABA Variability Within the Randomly Selected Lower Mole Lake Formation Core DDH 16: 2995-3026, Calculated Statistical Parameters, and a Comparison With the ABA Determinations of DDH 16: 2995-3026

Lower Mole Lake Core	S %	S ² %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 16 2079-2099	0.01	<0.01	2.50	92	57	0.3	0.3	91.7	307	307	190	8.90
DDH 16 3007-3009	0.03	0.03	1.54	59	35	0.9	0.9	58.1	66	66	39	8.89
DDH 16 3017-3019	0.01	0.01	1.36	42	31	0.3	0.3	41.7	140	140	103	8.88
Range	0.01-0.03	<0.01-0.03	1.36-2.50	42-92	31-57	0.3-0.9	0.3-0.9	41.7-91.7	66-307	66-307	39-190	8.88-8.90
X (n = 3)	0.02	0.02	1.80	64	41	0.5	0.5	64	171	171	111	8.9
σ	0.01	0.01	0.61	25	14	0.3	0.3	25	123	123	76	0.01
DDH 16 2995-3026	0.34	0.33	2.02	60	46	10.6	10.3	49.4	5.7	5.8	4.5	8.9

Note: Detection limit values were used in calculations for measured values which were less than the detection limit.

3.5-32-157

Appendix 3.5-32 Table 8c

Determination of ABA Variability Within the Randomly Selected Lower Mole Lake Formation Core DDH 45: 065-2100, Calculated Statistical Parameters, and a Comparison With the ABA Determinations of DDH 45: 2065-2100

Lower Mole Lake Core	S %	S ² %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 45 2067-2069	0.06	0.06	2.57	73	58	1.9	1.9	71.1	38	38	30	8.79
DDH 45 2077-2079	0.05	0.05	0.29	17	7	1.6	1.6	15.4	11	11	4.4	9.08
DDH 45 2086-2088	0.03	0.03	0.22	30	5	0.9	0.9	29.1	33	33	5.6	8.74
DDH 45 2098-2100	0.04	0.03	0.55	29	13	1.3	0.9	27.7	22	32	14	8.69
Range	0.03-0.06	0.03-0.06	0.22-2.57	17-73	5-58	0.9-1.9	0.9-1.9	15.4-71.1	11-38	11-38	4.4-30	8.69-9.08
X (n = 4)	0.04	0.04	0.91	37	21	1.4	1.3	36	26	28	14	8.8
σ	0.01	0.02	1.12	25	25	0.4	0.5	24	12	12	12	0.2
DDH 45 2065-2100	0.03	0.03	0.48	21	11	0.9	0.9	20.1	23	23	12	8.6

Note: Detection limit values were used in calculations for measured values which were less than the detection limit.

Appendix 3.5-32 Table 8d

Determination of ABA Variability Within the Randomly Selected Lower Mole Lake Formation Core DDH 68: 1878-1903, Calculated Statistical Parameters, and a Comparison With the ABA Determinations of DDH 68: 1878-1903

Lower Mole Lake Core	S %	S ² %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 68 1880-1882	0.01	0.01	1.10	31	25	0.3	0.3	30.7	103	103	83	8.83
DDH 68 1889-1891	<0.01	<0.01	0.92	26	21	0.3	0.3	25.7	87	87	70	8.85
DDH 68 1898-1900	0.02	<0.01	3.19	47	73	0.6	0.3	46.4	78	157	243	9.25
Range	<0.01-0.02	<0.01-0.01	0.92-3.19	26-47	21-73	0.3-0.6		25.7-46.4	78-103	87-157	70-243	8.83-9.25
X (n = 3)	0.01	0.01	1.74	35	40	0.4	0.3	34	89	116	132	9.0
σ	0.01		1.26	11	29	0.2		11	13	37	96	0.2
DDH 68 1878-1903	0.01	<0.01	1.54	37	35	0.3	0.3	36.7	123	123	117	8.6

Note: Detection limit values were used in calculations for measured values which were less than the detection limit.

3.5-32-159

Appendix 3.5-32 Table 8e

Determination of ABA Variability Within the Randomly Selected Lower Mole Lake Formation Core DDH 176: 986-1021, Calculated Statistical Parameters, and a Comparison With the ABA Determinations of DDH 176: 986-1021

Lower Mole Lake Core	S %	S ² %	CO ₂ %	NP kg/tonne	NP-CO ₂ kg/tonne	AP kg/tonne	SAP kg/tonne	Net NP kg/tonne	<u>NP</u> AP	<u>NP</u> SAP	<u>NP-CO₂</u> SAP	Paste pH
DDH 176 993-995	0.09	0.07	<0.05	24	1	2.8	2.2	21.2	8.6	11	0.4	8.25
DDH 176 1002-1004	0.24	0.16	<0.05	0	1	7.5	5.0	-7.5	0	0	0.2	7.16
DDH 176 1010-1012	0.34	0.25	0.22	0	5	10.6	7.8	-10.6	0	0	0.6	7.07
DDH 176 1019-1021	0.15	0.09	0.11	5	3	4.7	2.8	0.3	1.1	1.8	1.1	8.52
Range	0.09-0.34	0.07-0.25	<0.05-0.22	0-24	1-5	2.8-10.6	2.2-7.8	-10.6 to 21.2	0-8.6	0-11	0.2-1.1	7.07-8.52
X (n = 4)	0.21	0.14	0.11	7.2	2	6.4	4.4	0.8	2.4	3.2	0.6	7.8
σ	0.11	0.08	0.08	11	2	3.4	2.5	14	4.1	5.3	0.4	0.7
DDH 176 986-1021	<0.01	<0.01	0.18	4	4	0.3	0.3	3.7	13	13	13	7.5

Note: Detection limit values were used in calculations for measured values which were less than the detection limit.

**Notes Regarding the May 8, 1996 Visitation to the CMC Core Storage Facility in
Rhineland, Wisconsin and the Results of the Scintillometer Evaluations of Ore and
Waste Rock.**

Crandon Mining Company

May 9, 1996

Mr. Mark Meyers
U.S. Army Corps of Engineers
St. Paul District
190 5th Street East
St. Paul, MN 55101

Mr. Dan Cozza
U.S. Environmental Protection Agency
77 West Jackson Street
T17J
Chicago, IL 60604

Dear Mr. Meyers and Mr. Cozza:

Enclosed is the agenda and a list of participants involved in the May 8th, 1996 visit to Crandon Mining Company's core warehouse in Rhinelander, WI. In addition the participants requested copies of a number of articles which have been forwarded with this letter.

Yours truly,



K. Black
Sr. Environmental Engineer

cc. as per attached list

FILE MAIN GEO
Sub AS
Sub _____
Keywords _____

c:	Ron Spry	U.S. Fish and Wildlife Service
	Greg Bunker	Stockbridge Munsee Community
	Ken Markart	WDNR/Rhineland
	John Koss	Menominee Indian Tribe of Wisconsin
	John Griffin	Sokaogon Chippewa Community
	Chris Carlson	WDNR/Madison
	Bill Tans	WDNR/Madison

CANDON WAREHOUSE
(655 WASHINGTON)

MAY 8, 1996

PLEASE SIGN IN

NAME	REPRESENTING	PHONE No.
Terry Jorgenson	Curps of Eng	612-290-5598
Mark Meyers	COE	612-290-5648
Ron SPRY	USFWS	414-465-7440
George Howlett	Menominee Tribe	715 799 3179
BARRY Young	St. Charles Mnsrce	(715) 793-4362
Don de Blasio	USEPA	312/886 4360
GREG Bunker	S/M Tribe	715 793 4363
Allen Melcer	USEPA	312 886-1498
Jean Chruscicki	"	312 353 1435
Art Tipton	"	312 886-6193
NATHAN WISER	"	312 353-9564
Roman Ferdinand	Solomon Chippewa	715-478-7611
Dan Cozza	U. S. EPA	312-886-7252
Ken Markant	WDNR/Rhinelander	715-365-8959
John Koss	MITW	(715) 799-4937
JOHN GRIFFIN	SOKRAGON	715 478 7606
A. J. ERICKSON JR	ETML	713-978-5450
RICHARD COTE	Rio Alcon	814-874-2672

CRANDON MINE
Core Shed Visit Agenda
Wednesday, 8 May 1996

10:00 AM	Meet at the Rhinelander WalMart (on Business Hwy 8)
10:10-10:30 AM	Proceed to Core shed and Intro by CMC Representative(s)
10:30-12:30	Examination of Core
12:30-01:15 PM	Lunch (location to be determined)
01:15-04:00 PM	Continue examining core
04:00-04:30 PM	Wrap-up core examination/ Discussion

Summary of Core Warehouse Visit of May 8, 1996
Meeting Notes

Opening Comments:

- a. Introduction of CMC Personnel (R. Cote, J. Erickson and K. Black)
- b. Purpose of the meeting was to respond to the COE letter in which a some interested parties expressed concern about radioactivity in the waste/ore and soils at the Crandon Project.

Review of prior Studies - K.Black

1. Radiological Test Program by Hazelton Environmental Sciences and Camp Dresser McKee -1981 (document in the Appendix of EIR)
 - program designed to identify and quantify the level of radioactivity.
 - parameters measured included gross alpha, beta, Radium 226, Total U, Total thorium and gamma radiation.
2. made available copies of the most recent response from WGNHS - April 17, 1996.
3. Waste characterization studies

Comparative Analysis of Uranium in waste rock, ore and soils - A.J. Erickson

Reference spreadsheet

Conclusion: No significant amounts of uranium or radioactivity was found in the core or soils.

Review/Results

- Core warehouse housed all the core from the Crandon Project with the except of those samples that have been used for various test programs. Chain of custody forms are available for these samples.

Cont'd (Radioactivity Review at Core Warehouse in Rhinelander on May 8, 1996)

- CMC indicated that it had a calibrated Ludlum 19 Survey Meter - serial number 15289, calibrated 12/20/95 - a scaler unit which read at 0 - 5000 microR/hr(uR/hr).

- Menominee tribe also had a scaler unit that measured gamma/beta in milliR/hr (mR/hr). The unit was a Victoreen Instrument Model 6N calibrated in August, 1991.

- Two holes were pulled; 270 and 143. (AJE made it clear that CMC were available to pull and core that requested)

- Hole 143 Ore section - HW - F/W +/- 1180 -1400 argillite at bottom of hole; no reading above background; hole selected by J.Griffin. No full length of core pulled for review.

- Hole 270 Ore section - HW - F/W +/- 2171 -2357. Black argillite; no reading above background; hole available and typical. AJE explained the earlier interpretation of black shale that had been quoted in the literature.

- Hole 270 - Waste Characterization 2047 -2073 LML and hole 21 - 1627- 1657 LML; no sulfides or radioactivity detected.

- Background radioactivity was 5-7 uR/hr on this scaler unit.

Uranium ore from Highland - 100 uR/hr

Red Granite - 10

Ore (incl. waste) - 6-8

Brick 6-8

Rock samples (Rhinelander) 6-8

(This measuring equipment was selected to show a relative comparison between nature rock, Wausau red granites, and the material found at Crandon.)

- Asbestos forms may also be an issue that is raised in the future. Prior studies in which 58 thin sections were analyzed; no asbestos was found.

Concluding Comments by CMC

Is there radioactivity in the nature environment -- YES. Is the radioactivity at the Crandon Project different from background -- NO.

Other:

EPA reviewed borehole samples from the TMA area.

J. Koss of MITW asked to look at saprolite. Hole 102 was selected by Koss and pulled by CMC. Interval 219- 286. Clay -weak rock which will form part of the CP.

Meeting Adjourned at approximately 3 PM

*K. Bladt
Nov 13/96*

Rock Classification for ARD Evaluations

DDH: 270

Int: 2059-2089

LML

Factor

Relative
Rating

ARD
Weight

Potential

Sulfide type

X

6

=

6

Sulfide surface
area exposed

X

5

=

5

Alkali type

X

-4

=

-4

Alkali surface
area exposed

X

-3

=

-3

Grain size

X

2

=

2

Weathering/
slaking

X

2

=

2

Total

8

DDH:

Int:

Factor

Relative
Rating

ARD
Weight

Potential

Sulfide type

X

6

=

Sulfide surface
area exposed

X

5

=

Alkali type

X

-4

=

Alkali surface
area exposed

X

-3

=

Grain size

X

2

=

Weathering/
slaking

X

2

=

Total

DDH:

Int:

Factor

Relative
Rating

ARD
Weight

Potential

Sulfide type

X

6

=

Sulfide surface
area exposed

X

5

=

Alkali type

X

-4

=

Alkali surface
area exposed

X

-3

=

Grain size

X

2

=

Weathering/
slaking

X

2

=

Total

092194 561

76