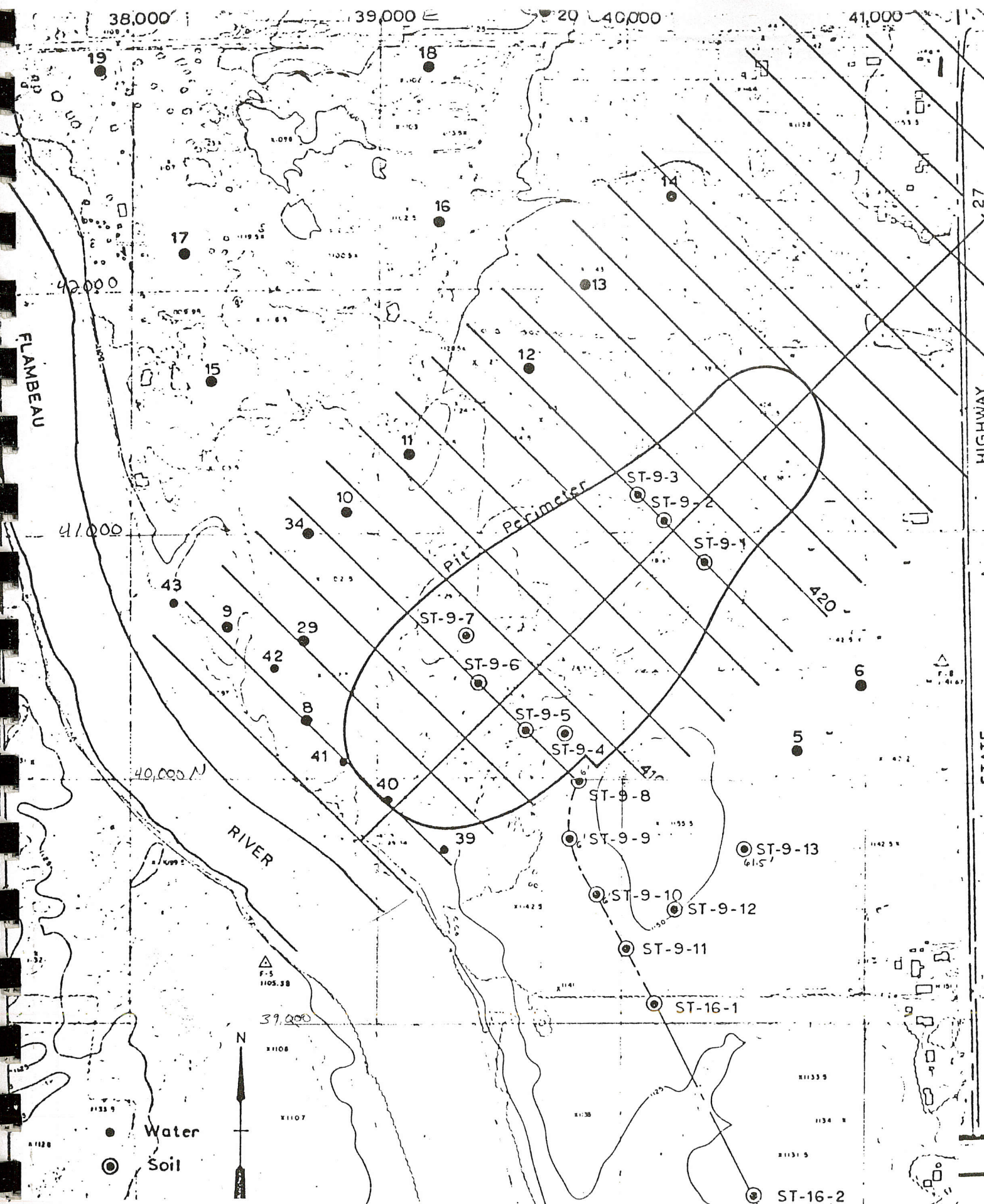


APPENDIX 3.5-B

Geologic Logs and Soil Test Data for Borings Completed by STS
Consultants, Ltd., 1972 through 1975

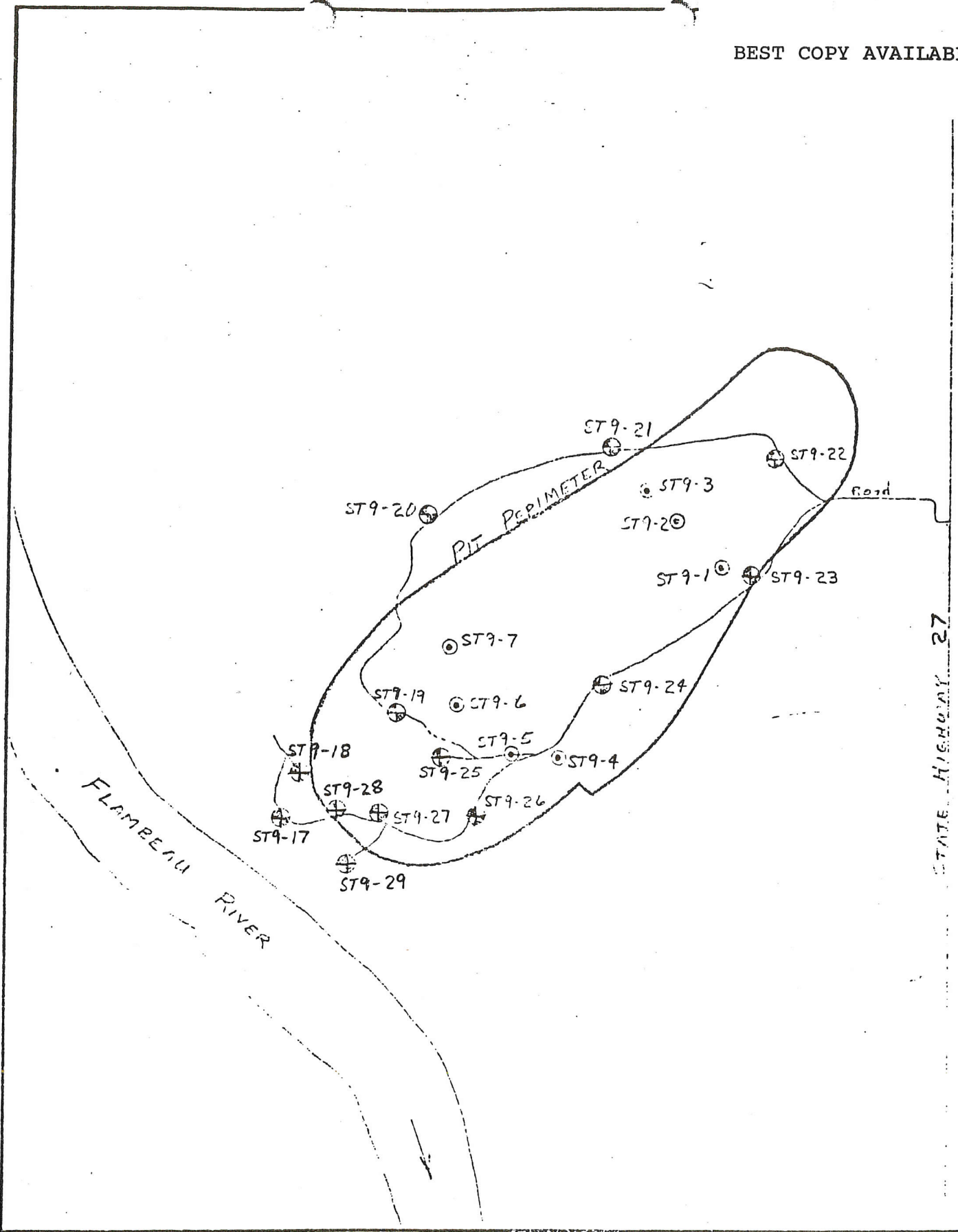


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LOCATIONS
Section 9
Grant Township, Rusk Co., Wis.

3.5-B-1 SCALE 1" = 500' DATE Oct. 1972

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SOIL BORING LOCATION DIAGRAM
 PROPOSED MINE DEVELOPMENT
 LADYSMITH, WISCONSIN



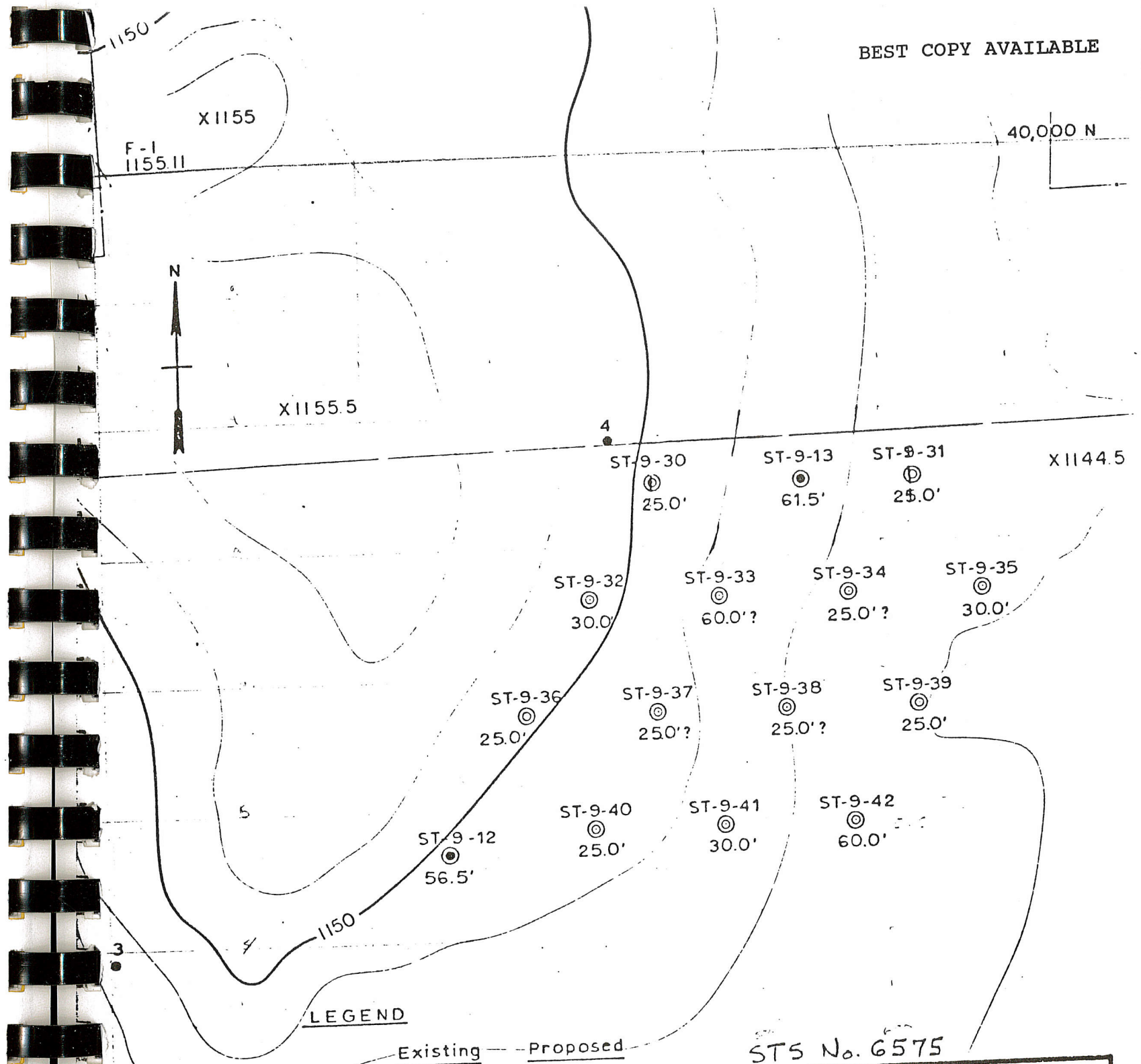
SOIL TESTING SERVICES
 OF WISCONSIN, INC.

540 LAMBEAU ST. GREEN BAY, WISCONSIN 54303

4970A P.M. 7/11/75 11:50 AM

3.5-B-2

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LEGEND

Existing — Proposed

Number.....	ST-9-13	30'	ST-9-30
Soil test hole location.....	⊙		⊙
Depth.....	61.5'		25.0'
Water well location & No.....	3		

STS No. 6575

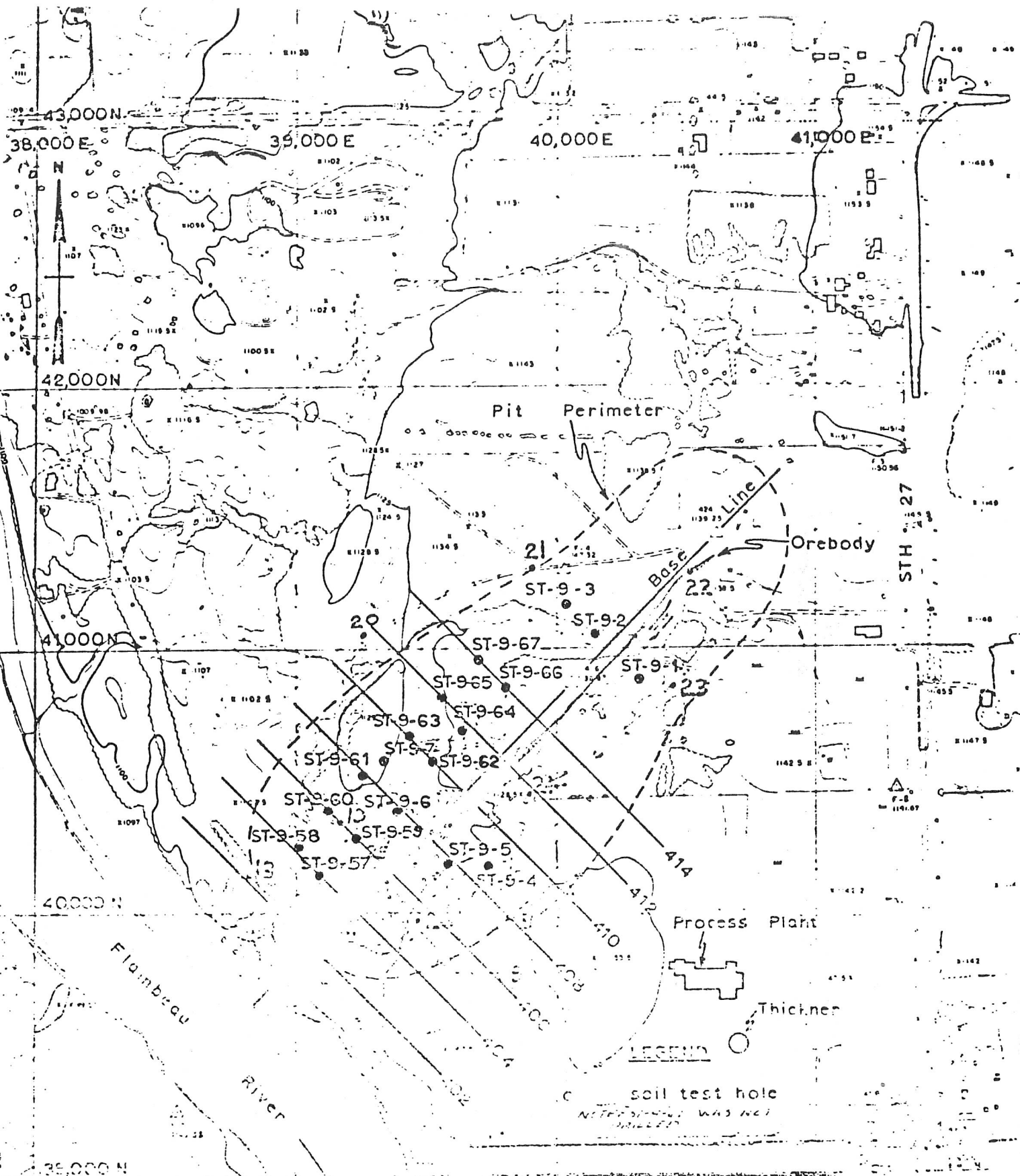
FLAMBEAU MINING CORP.

SOIL TEST HOLE
 LOCATION MAP
 FLAMBEAU DEVELOPMENT

SCALE: 1" = 100'
 DRAWN BY: GLB

DATE Mar. 1975
 MAP NO.

3.5-B-3



FLAMBEAU MINING CORP.

**SOIL TEST HOLE LOCATIONS
OPEN PIT AREA**
(with relation to process plant location)

SCALE: 1" = 500' DATE: Jan. 1972
 DESIGNED BY: G.L.G. DRAWN BY: G.L.G.
 2.5-R-4

GENERAL NOTES

1950 Chicago Building Code Soil Classifications are Used Except Where Noted

DRILLING & SAMPLING SYMBOLS

- SS : Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted
- ST : Shelby Tube - 2" O.D., except where noted
- PA : Power Auger Sample
- DB : Diamond Bit - NX: BX: AX:
- CB : Carbide Bit - NX: BX: AX:
- OS : Osterberg Sampler - 3" Shelby Tube
- HS : Housel Sampler
- WS : Wash Sample
- FT : Fish Tail
- RB : Rock Bit
- WO : Wash Out

Standard "N" Penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch OD split spoon, except where noted.

WATER LEVEL MEASUREMENT SYMBOLS

- WL : Water Level
- WCI : Wet Cave In
- DCI : Dry Cave In
- WS : While Sampling
- WD : While Drilling
- BCR : Before Casing Removal
- ACR : After Casing Removal
- AB : After Boring

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable ground water levels. In impervious soils, the accurate determination of ground water elevations is not possible in even several days observation, and additional evidence on ground water elevations must be sought.

CLASSIFICATION

COHESIONLESS SOILS

- "Trace" : 1% to 10%
 - "Trace to some" : 10% to 20%
 - "Some" : 20% to 35%
 - "And" : 35% to 50%
 - Loose : 0 to 9 Blows
 - Medium Dense : 10 to 29 Blows
 - Dense : 30 to 59 Blows
 - Very Dense : ≥ 60 Blows
- } or equivalent

COHESIVE SOILS

If clay content is sufficient so that clay dominates soil properties, then clay becomes the principle noun with the other major soil constituent as modifier; i.e., silty clay. Other minor soil constituents may be added according to classification breakdown for cohesionless soils; i.e., silty clay, trace to some sand, trace gravel.

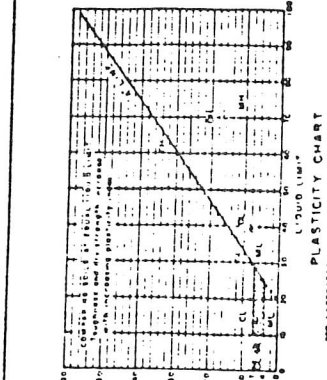
- Soft : 0.00 — 0.59 tons/ft²
- Stiff : 0.60 — 0.99 tons/ft²
- Tough : 1.00 — 1.99 tons/ft²
- Very tough : 2.00 — 3.99 tons/ft²
- Hard : ≥ 4.00 tons/ft²

GENERAL NOTES



SOIL TESTING SERVICES OF WISCONSIN, INC.

UNIFIED SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION			
GROUP SYMBOLS	TYPICAL NAMES	INFORMATION REQUIRED FOR DESCRIBING SOILS	LABORATORY CLASSIFICATION CRITERIA
GW	Well graded gravels, gravel-sand mixtures, little or no fines	On typical name, indicate approximate percentages of sand and gravel, size, shape, surface condition, and the nature of the coarse grains, including any special information and symbol in parentheses	$C_u = \frac{D_{60}}{D_{30}}$ Greater than 4 $C_c = \frac{(D_{30})^2}{D_{60} D_{10}}$ Between one and 3
GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	For undisturbed soils add information on stratification, degree of compaction, cementation, moisture conditions and drainage characteristics	Not meeting all gradation requirements for SW
GM	Silty gravels, poorly graded gravel-sand-silt mixtures	EXAMPLE: Silty sand, slightly, about 10% sand, rounded and subangular, maximum size of coarse grain color in wet condition, dry, light or dark brown, well connected and moist in place, silty sand, (SM)	Above 3" line with PI between 4 and 7 or PI less than 4 or PI greater than 7
GC	Clayey gravels, poorly graded gravel-sand-clay mixtures		Above 3" line with PI between 4 and 7 or PI less than 4 or PI greater than 7
SW	Well graded sands, gravelly sands, little or no fines		Not meeting all gradation requirements for SW
SP	Poorly graded sands, gravelly sands, little or no fines		Above 3" line with PI between 4 and 7 or PI less than 4 or PI greater than 7
SM	Silty sand, poorly graded sand-silt mixtures		Not meeting all gradation requirements for SW
SC	Clayey sand, poorly graded sand-clay mixtures		Above 3" line with PI between 4 and 7 or PI less than 4 or PI greater than 7
ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity		Not meeting all gradation requirements for SW
CL	Inorganic clays of low to medium plasticity, gravelly clay, sandy clay, silty clay, lean clay		Above 3" line with PI between 4 and 7 or PI less than 4 or PI greater than 7
OL	Organic silts and organic silt clays of low plasticity		Not meeting all gradation requirements for SW
MH	Inorganic silts, micaceous or dishonorable fine sandy or silty silt, plastic silt		Above 3" line with PI between 4 and 7 or PI less than 4 or PI greater than 7
CH	Inorganic clays of high plasticity, fat clays		Not meeting all gradation requirements for SW
OH	Organic clays of medium to high plasticity		Above 3" line with PI between 4 and 7 or PI less than 4 or PI greater than 7
PS	Peat and other highly organic soils		Not meeting all gradation requirements for SW



TOUGHNESS (Consistency near plastic limit)
After removing particles larger than No. 40 sieve size, a specimen of soil about 1/2 inch cubic in size is molded to the consistency of putty. If no dry particles are visible on the surface, the specimen should be spread out in a thin layer and allowed to dry for 24 hours. The specimen is then rolled into a thread about 1/8 inch in diameter. The toughness is the number of revolutions of the rolling wheel required to break the thread. The toughness is reported as a percentage of the toughness of a standard soil of known plasticity.

DRY STRENGTH (Crushing characteristics)
After removing particles larger than No. 40 sieve size, moist soil is rolled into a ball of the consistency of putty, adding water if necessary. Allow the soil to dry completely by oven, sun, or other means. The dry strength is the maximum load in pounds that can be applied to the ball by a standard testing machine. The dry strength is reported as a percentage of the dry strength of a standard soil of known plasticity.

FIELD IDENTIFICATION PROCEDURES FOR FINE GRAINED SOILS OR FRACTIONS
These procedures are to be performed on the moist No. 40 sieve residue. For field classification purposes, screening is not intended, simply remove by hand the coarse particles that interfere with the test.

AGENCY (Reaction to shaking)
After removing particles larger than No. 40 sieve size, proceed as per above. If the soil is a silty or clayey silt, it will be found that the soil is very soft and will break up easily. If the soil is a silty or clayey sand, it will be found that the soil is firm and will not break up easily. If the soil is a silty or clayey clay, it will be found that the soil is very firm and will not break up easily.

D-3
Soil classification chart

LOG OF BORING NO. ST 9-1			
OWNER		ARCHITECT-ENGINEER	
Great Lakes Exploration Company		PROJECT NAME	
Ladysmith, Wisconsin		Proposed Copper Mine Development	
DEPTH	ELEVATION	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
SAMPLE NO.	TYPE SAMPLE	UNIT WEIGHT (pcf)	PLASTIC LIMIT %
SAMPLE NO.	REMARKS	WATER CONTENT %	LIQUID LIMIT %
STANDARD 1" PENETRATION (BLOWS/FT.)			
1	SS	Surface Elevation 1127.2 Silty very fine wilty and sandy top soil (OL)	
2	SS	Silty fine sand-trace gravel-brown (SM)	
3	SS	Silty fine medium sand-trace to some gravel-brown (SM)	
4	SS	Fine coarse sand-some fine coarse subangular gravel-trace silt-brown (SM)	
5	SS	Silty fine sand-trace to some gravel-brown-slightly cemented (SM)	
6	SS	Fine-medium sand-some fine coarse gravel-trace silt and coarse sand-brown (SW)	
7	RB		
8	RB	Poorly cemented sandstone	
9	SS	Saprolite-gray to rusty brown to orangish brown-silt-trace clay and angular rock fragments (ML)	
10	SS		
11	SS		
12	SS		
13	SS		
14	SS		
15	SS	Saprolite-reddish brown trace light brown-hit darker purple at 65'-silt trace clay and angular rock fragments-more rock fragments starting at 67.5'	
16	SS		
17	SS		
18	SS		
19	SS	End of Boring 50' of 4" Casing 30' of 5" Casing	

WATER LEVEL OBSERVATIONS		SOIL TESTING SERVICES		BORING STARTED 9 13 72	
W.L. 4.5	W.A. W.D.	OF WIS. INC.		BORING COMPLETED 9 17 72	
W.L. 16.2	B.C.R. 17	GREEN BAY WISCONSIN		DRAWN 4.H.	
		540 LAMARU STREET		APPROVED 10.1	
				JOB # 4070	
				SHEET	

SOIL TESTING SERVICES, OF WIS., INC.

PERMEABILITY TEST

Constant Head

Sample ST 9-1 Sample 9, 10 & 11 Combined

Soil Description Saprolite-gray to rusty brown and orangish brown silt-trace clay and rock fragments (ML)

Mark No.

Compacted Dry Density = 105.8 PCF

Water Content = 14.6% Liquid Limit = 28.4%
Plastic Limit = Non-Plastic

% Compaction = 94.8% of ASTM D698-70

Sample Diameter = 3.0 inch

Sample Height = 6.0 inch

Run No.	Head, inches	Duration, seconds	Permeability cm/sec	Remarks
1	194.6	69,300	1.0×10^{-6}	
2	333	13,200	1.0×10^{-6}	
3	333	8,700	1.2×10^{-6}	
			Avg. = 1.1×10^{-6}	

Project No. _____
STS b No. 4970
Date 10-4-72
Report No. _____

SOIL TESTING SERVICES OF WISCONSIN, INC.

540 LAMBEAU ST., GREEN BAY, WIS. 54303

PHONE (414) 494-9656

Date 10-3-72

Job No. 4970

COMPACTION CONTROL REPORT

1. Laboratory Compaction Test Data

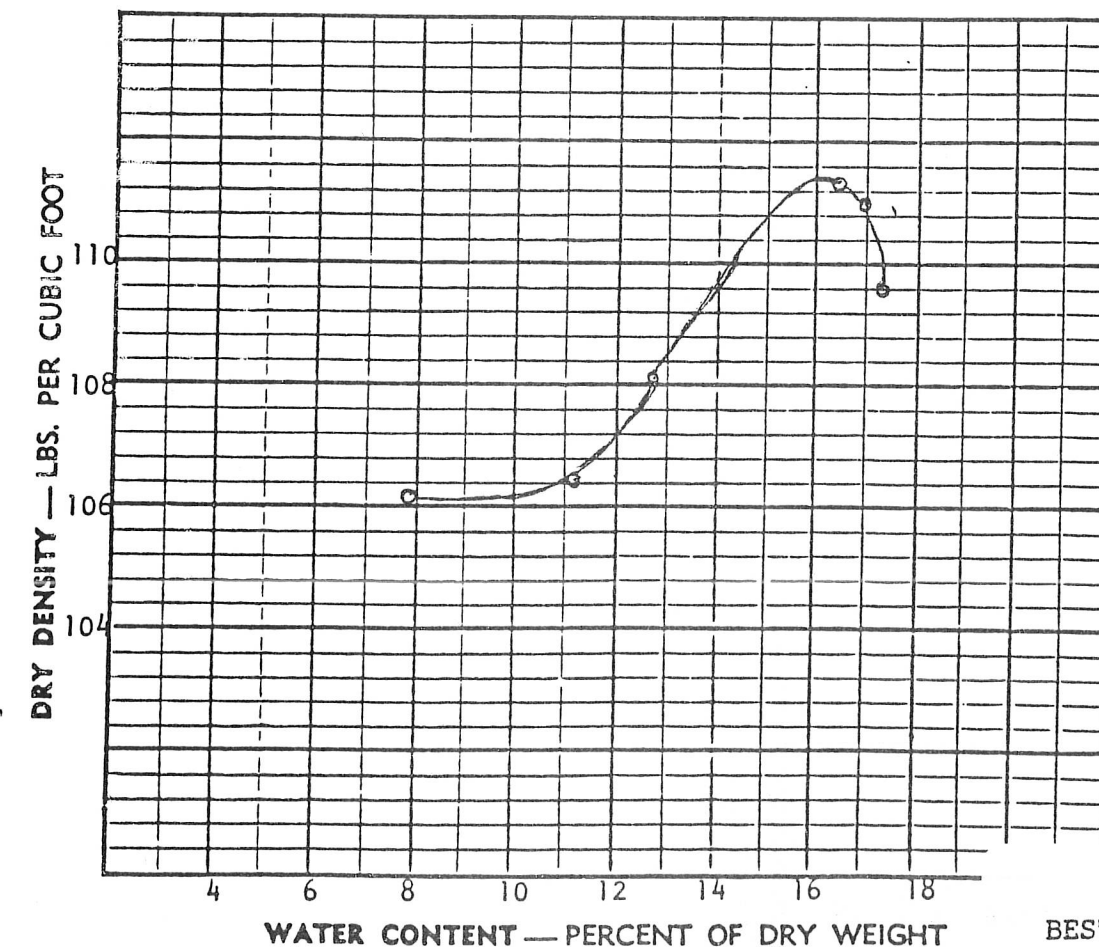
A. Description of Soil: Saprolite-Gray to rusty brown and orangish brown silt (sericite) trace clay and angular rock fragments

Material Mark _____ Classification ML AASHO BPR
Source of Material Boring ST 9-1 Samples 9, 10 and 11 combined

Natural Water Content 13.1-16.1% Natural Dry Density _____ PCF Specific Gravity _____
Liquid Limit 28.4 % Plastic Limit Non-plastic % Plasticity Index _____

B. Test Procedure Used: ASTM D-698-70 Method C

C. Test Results: Optimum Water Content 16.0 %
Maximum Dry Density 111.4 PCF (at a Wet Density of _____ PCF)



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3.5-B-9

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3.5-B-8

SOIL TESTING SERVICES, OF WIS., INC.

PERMEABILITY TEST

Constant Head

Project No. LV1

Job No. 4970

Date 10-24-72

Report No. _____

Sample Boring ST 9-2 Combined Samples 14,15,16,17 & 18 65' to 77'

Soil Description Saprolite-gray and white with rusty brown streaks-silt with angular rock fragments-talcy feel (sericite) ML

Mark No. _____

Compacted Dry Density = 128.9 PCF

% Compaction = 95.8%

Sample Diameter = 3 1/16 inch

Sample Height = 6.0 inch

Run No.	Head, inches	Duration, seconds	Permeability cm ² /sec	Remarks
---------	--------------	-------------------	-----------------------------------	---------

1	56	30,600	4.4×10^{-6}	
2	56	60,600	5.5×10^{-6}	
3	56	75,600	5.4×10^{-6}	

Avg. = 5.0×10^{-6}

OWNER Great Lakes Exploration Company		ARCHITECT-ENGINEER		
SITE Ladysmith, Wisconsin		PROJECT NAME Propped Copper Mine Development		
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	DESCRIPTION OF MATERIAL	UNCOMPACTED COMPRESSIVE STRENGTH (TUNB/FT.) 10 20 30 40 50
				STANDARD "H" PENETRATION (BLOWS/FT.)
1	SS		Subsidiary (Silty) and sandy	
2	SS		Fine coarse sand-some fine medium gravel-trace silt-medium dark brown (SW)	
3	SS		Silty fine sand-trace to some fine-coarse gravel-brown (SM) lenses of fine medium sand	
4	SS		Fine sand-trace to some silt-trace gravel-brown (SP-SM)	
5	SS			
6	SS		Fine sand-trace silt-brown-moist to wet (SP)	
7	SS			
8	SS		Fine sand-trace to some silt-brown (SM)	
9	SS		Silty very fine sand-brown (SM)	
10	SS			
11	WS		Fine coarse sand-some fine medium gravel-trace silt-dark brown to rusty brown-wet (SW)	
12	WS			
13	WS		<i>Sandstone</i>	
14	SS			
15	SS		Saprolite-gray and white with rusty brown streaks only to 65'-talcy feel-silt with fine coarse angular rock fragments rock fragments platy at 75'	
16	SS			
17	SS			
18	PS		Gray and white highly weathered schist	
19	DR		End of Boring 65' of 5" Casing	

Date _____

Job No. 4970

COMPACTION CONTROL REPORT

1. Laboratory Compaction Test Data

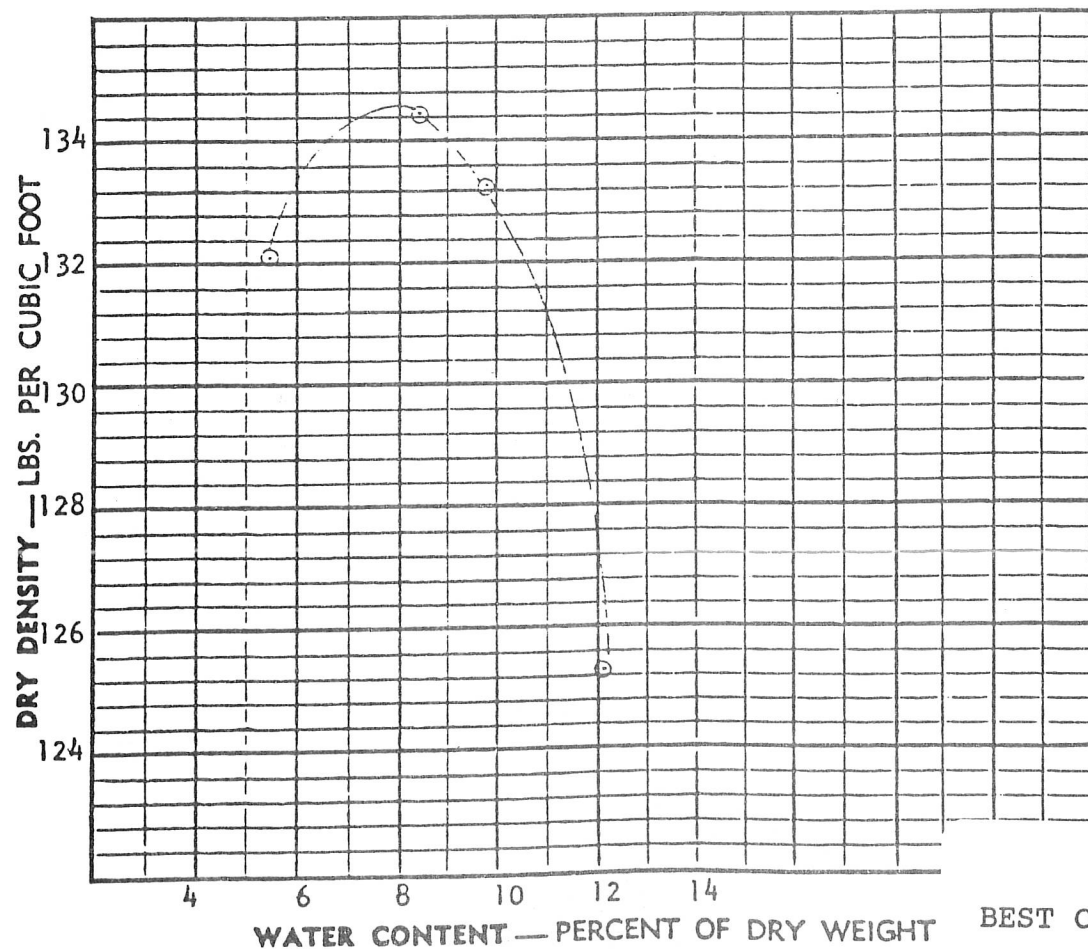
A. Description of Soil: Saprolite-gray and white with rusty brown streaks-silt with angular rock fragments-talcy feel (sericite)

Material Mark Boring ST 9-2 Classification ML AASHO BPR
 Source of Material Boring ST 9-2 Combined samples 14, 15, 16, 17, and 18.65' - 77'

Natural Water Content 8.2-10.4 % Natural Dry Density _____ PCF Specific Gravity _____
 Liquid Limit _____ % Plastic Limit _____ % Plasticity Index _____

B. Test Procedure Used: ASTM D-698-70 Method A

C. Test Results: Optimum Water Content 8.0 %
 Maximum Dry Density 134.6 PCF (at a Wet Density of _____ PCF)



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LOG OF BORING NO. <u>ST 9-3</u>		ARCHITECT-ENGINEER					
OWNER <u>Great Lakes Exploration Company</u>		PROJECT NAME <u>Proposed Copper Mine Development</u>					
SITE <u>Ladysmith, Wisconsin</u>		UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²					
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	DESCRIPTION OF MATERIAL	PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %	STANDARD "N" PENETRATION (BLOWS/FT.)
			SURFACE ELEVATION <u>1136.5</u>				
1	SS		Fine sand and silt-brown (SH-ML)				
2	SS						
3	SS						
4	SS		Silty fine-medium sand-trace to some fine coarse gravel-trace clay-brown-trace rusty brown to 16' - dense slightly cemented (SH)				
5	SS						
6	SS						
7	SS		Fine-coarse sand-some fine-coarse gravel-trace silt-rusty brown to brown (SW) 1 1/2" very fine sandy silt seams @ 36'				
8	SS						
9	SS						
10	SS		Silty fine-medium sand-trace to some gravel-reddish brown-dense-slightly cemented (SH)				
11	SS						
12	SS		Poorly cemented light brown sandstone				
13	SS		Saprolite-rusty brown-trace orange brown and brown silty fine-coarse angular sand and fragments (angular rock)				
14	SS		Saprolite-gray and white-trace orange brown-talcy feel-silt with fine-coarse angular rock fragments				
15	SS		Saprolite-orange brown-trace light brown silt with angular rock fragments				
16	SS		Saprolite-gray and white-trace orange brown-talcy feel-silt with angular rock fragments				
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PERMEABILITY TEST

Constant Head

Project No. _____
 STS No. 4970

Date 10-21-72

Report No. _____

Sample Boring ST 9-3 Combined Samples 14,15,16, & 18 65' to 75' -

Soil Description Saprolite-gray and white traces orange brown-silt with fine to coarse angular rock fragments

Mark No. _____

Compacted Dry Density = 110.7 PCF

% Compaction = 88.5%

Sample Diameter = 3 1/6 inch

Sample Height = 6.0 inch

Run No.	Head, inches	Duration, seconds	Permeability cm^2/sec	Remarks
1	56	79,200	6.7×10^{-6}	
2	56	76,200	6.8×10^{-6}	
3	56	36,000	5.8×10^{-6}	
4	56	69,000	6.3×10^{-6}	
5	56	71,700	6.2×10^{-6}	
			Avg = 6.4×10^{-6}	

Date 10-21-72

Job No. 4970

COMPACTION CONTROL REPORT

1. Laboratory Compaction Test Data

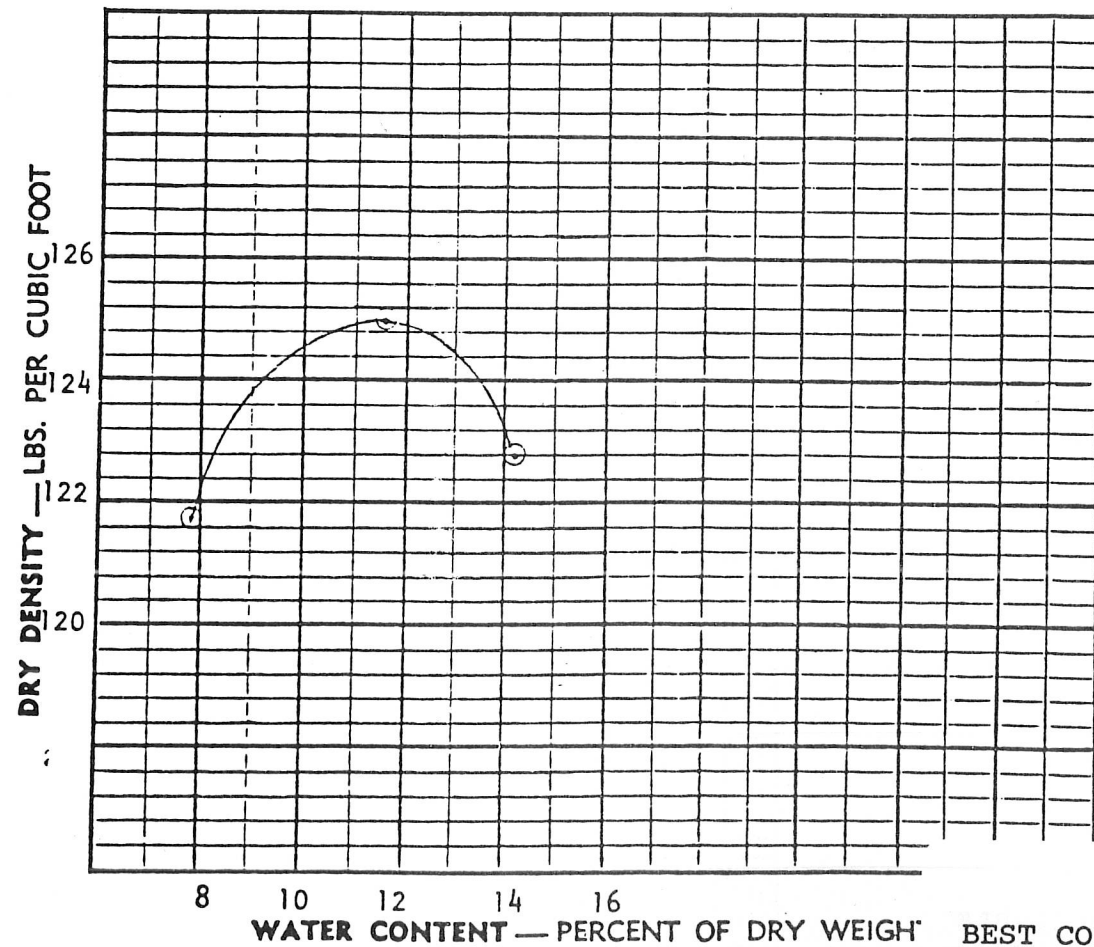
A. Description of Soil: Saprolite-gray and white trace orange brown silt with angular rock fragments

Material Mark ML Classification _____ AASHO BPR
 Source of Material Boring St 9-3 Combined samples 14, 15, 16, 18 65' to 75'

Natural Water Content 7.9 % Natural Dry Density _____ PCF Specific Gravity _____
 Liquid Limit _____ % Plastic Limit _____ % Plasticity Index _____

B. Test Procedure Used: ASTM D-698-70 Method "C"

C. Test Results: Optimum Water Content 11.5 %
 Maximum Dry Density 125.0 PCF (at a Wet Density of _____ PCF)



OWNER Great Lakes Exploration Company				ARCHITECT-ENGINEER			
SITE Ladysmith, Wisconsin				PROJECT NAME Proposed Copper Mine Development			
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH (TUN/FT ²)			
				1	2	3	4
				PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %			
				STANDARD 1/4" PENETRATION (BLOWS/FT)			
			SURFACE ELEVATION 1126.1				
			Dark brown sandy loam (OL)				
	1	SS	Silty fine sand-brown-wet (SH)				
	2	SS					
	3	SS	Fine coarse sand-trace gravel and cobbles-brown (SW)				
	4	SS	Silty fine medium sand-trace to some gravel-slightly reddish brown-slightly cemented hardpan-very dense (SM)				
	5	SS					
	6	SS	Fine medium sand-trace gravel and silt-brown and yellowish brown (SP)				
	7	SS					
	8	RB	Saprolite-greenish gray-silt-trace clay and angular rock fragments (ML)				
	9	SS					
	10	SS					
	11	SS	Saprolite-gray to dark gray and light brown-silt-trace to some angular sand and rock fragments (ML)				
			hard drilling from 42.5 to 43'				
			End of Boring				
			30' of 4" Casing				

PERMEABILITY TEST
 Constant Head
 Sample Boring ST9-4 Combined sample 7,9,10, & 11 32' to 43'
 Soil Description Saprolite-greenish gray-silt trace clay and angular rock fragments (ML)
 Liquid limit = 25.1%
 Plastic limit 20.8%

Mark No.
 Compacted Dry Density = 115.8 PCF
 Compaction = 95.4%
 Sample Diameter = 3 1/16 inch Sample Height = 6.0 inch

Run No.	Head inches	Duration seconds	Permeability cm/sec	Remarks
1	173	63,300	1.0 x 10 ⁻⁶	
2	118	20,400	1.1 x 10 ⁻⁶	
3	173	12,900	1.2 x 10 ⁻⁶	
4	35	54,600	1.1 x 10 ⁻⁶	
5	118	82,800	7.2 x 10 ⁻⁷	
			Avg. = 1.1 x 10 ⁻⁶	

WATER LEVEL OBSERVATIONS		SOIL TESTING SERVICES OF WIS. INC. GREEN BAY, WISCONSIN 540 LAMARU STREET	BORING STARTED	
W.L. 5'-6"	W.S. 0'-0"		BORING COMPLETED	
W.L. 7'	W.S. 0'-0"		APPROVED	
W.L. WET CAMP IN G.S. AGR		DRAWN BY: [Signature] APPROVED BY: [Signature]		

Date _____

Job No. 4970

COMPACTION CONTROL REPORT

1. Laboratory Compaction Test Data

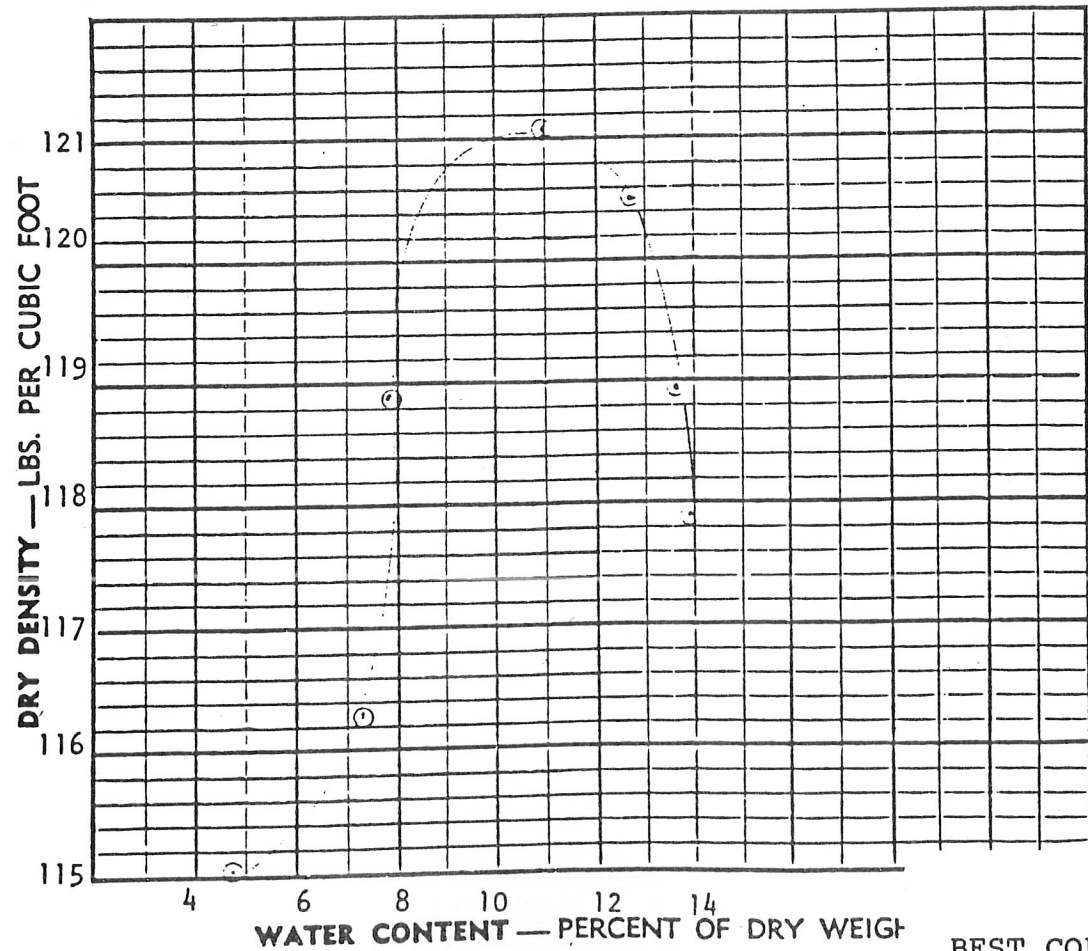
A. Description of Soil: Saprolite - greenish gray-silt-trace clay & angular rock fragments

Material Mark _____ Classification ML AASHO BPR
 Source of Material ST 9-4 S 7, 9, 10, 11 32' to 43'

Natural Water Content _____ % Natural Dry Density _____ PCF Specific Gravity _____
 Liquid Limit 25.1 % Plastic Limit 20.8 % Plasticity Index 4.3

B. Test Procedure Used: ASTM D-698-70 Method C

C. Test Results: Optimum Water Content 10.5 %
 Maximum Dry Density 121.2 PCF (at a Wet Density of _____ PCF)



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LOG		BORING NO. <u>ST 9-5</u>					
OWNER Great Lakes Exploration Company		ARCHITECT-ENGINEER					
SITE Ladysmith, Wisconsin		PROJECT NAME Proposed Copper Mine Development					
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH (TONS/FT.²)	PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %
					STANDARD "N" PENETRATION (BLOWS/FT.)		
SURFACE ELEVATION <u>1124.1</u>							
1	SS		Black sandy topsoil (CL)				
2	SS		Silty fine-medium sand-trace gravel and clay-brown (SH)				
3	SS		Silty fine-medium sand-trace to some gravel-brown-dense-slightly cemented (SH)				
4	SS						
5	SS						
6	SS		Poorly cemented sandstone				
7	SS		Saprolite-brown and gray to grayish brown-silt with angular rock fragments		247%	341%	
8	SS		Saprolite-gray-talcaceous silt with angular rock fragments				
9	SS		Saprolite-brown and gray-silt with angular rock fragments				
10	SS						
11	SS						
12	SS						
13	SS						
14	SS						
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17	SS						
18	SS						
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204	SS						
205	SS						
206	SS	</					

PERMEABILITY TEST

Constant Head

Sample Boring ST9-5 Combined samples 7, 8, 9, 12 & 13 31' to 41'

Soil Description Saprolite - brown and gray-silt with angular rock fragments (ML)

Mark No.

Compacted Dry Density = 103.9 PCF

Compaction = 94.1%

Sample Diameter = 3 1/16 inch

Sample Height = 6.0 inch

Run No.	Head, inches	Duration, seconds	Permeability cm/sec	Remarks
1	22.5	4140	6.4×10^{-5}	
2	22.5	11,700	5.9×10^{-5}	
3	22.5	4,680	6.1×10^{-5}	
			Avg. = 6.1×10^{-5}	

ST Job No. 4970

Date 10-26-72

Report No.

SOIL TESTING SERVICES OF WISCONSIN, INC.

540 LAMBEAU ST., GREEN BAY, WIS. 54303

PHONE (414) 494-9656

Date 10-31-72

Job No. 4970

COMPACTION CONTROL REPORT

1. Laboratory Compaction Test Data

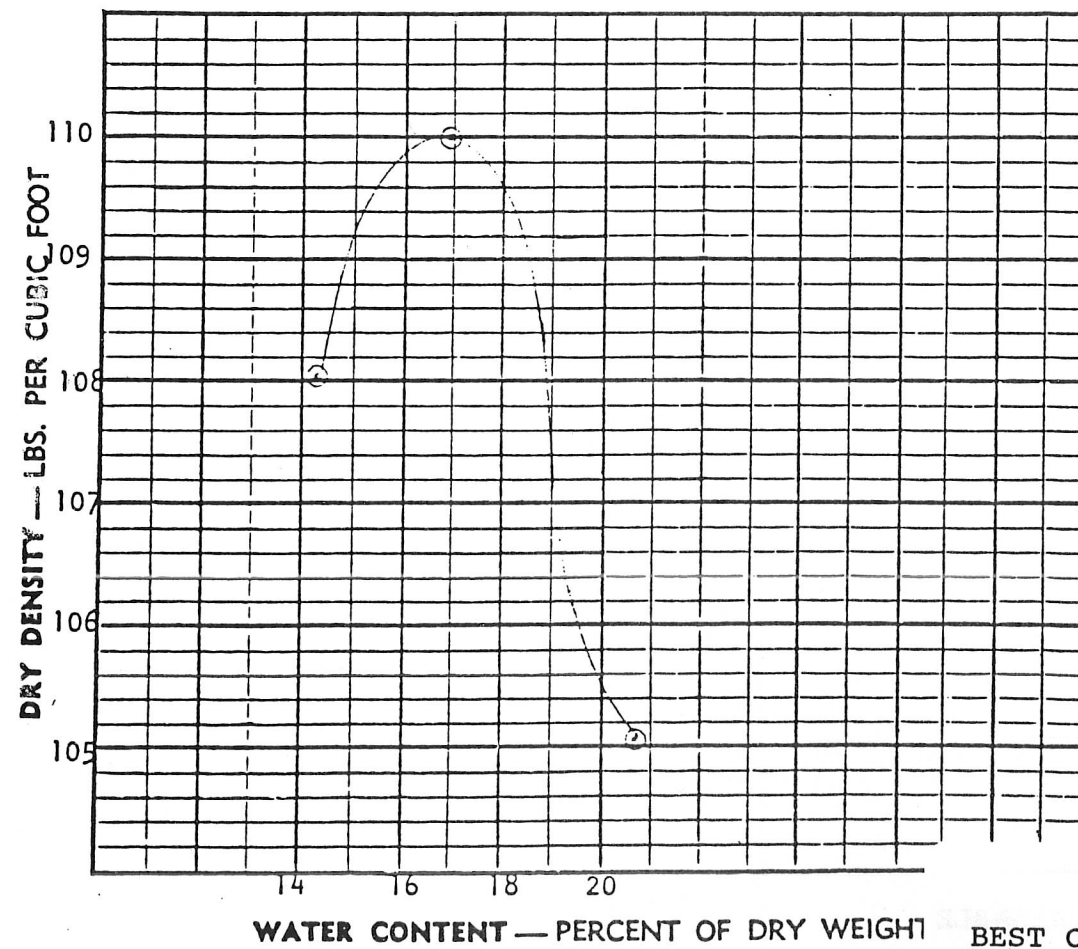
A. Description of Soil: Saprolite-brown and gray-silt with angular rock fragments (ML)

Material Mark _____ Classification ML AASHO BPR
Source of Material ST9-5 Sample 7, 8, 9, 12 & 13 31' to 41'

Natural Water Content _____ % Natural Dry Density _____ PCF Specific Gravity _____
Liquid Limit 34.1 % Plastic Limit 24.7 % Plasticity Index 9.4

B. Test Procedure Used: ASTM D 698-70

C. Test Results: Optimum Water Content 16.8 %
Maximum Dry Density 110.0 PCF (at a Wet Density of _____ PCF)



LOG		BORING NO. ST 9-6		
OWNER Great Lakes Exploration Company		ARCHITECT-ENGINEER		
SITE Ladysmith, Wisconsin		PROJECT NAME Proposed Copper Mine Development		
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE BY REC'D	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2
				PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % STANDARD "H" PENETRATION (BLOWS/FT.)
			SURFACE ELEVATION 1113.6	
1	SS		Silty fine sand-dark rusty brown-wet (SM)	
5	WS		Fine coarse sand-some fine medium gravel-trace silt-brown-wet (SW)	30 1/2"
10	WS		Fine medium sand-trace silt-brown (SP)	50 1/4"
15	SS		White and light brown poorly cemented sandstone	
20	WS			
25				
26.5	SS		Saprolite-orange brown trace light brown and dark gray fine sand and silt-some angular rock fragments	
30	SS		Saprolite-reddish brown with white seams-clayey silt some platy rock fragments and sandstone pieces	11.2% X - Δ 26.2%
35	DB		Harder rock-dark purple with yellow brown schist	
35	SS		Saprolite-reddish brown trace light brown clayey silt some fine coarse angular rock fragments (CL-ML)	15.6% X - Δ 19.2%
40	DB		Dark purple trace yellow brown and brown highly weathered schist-platy structure near vertical	
			End of Boring 30' of 5" Casing	

LOG OF BORING NO. ST 9-7		10		
OWNER Green Lakes Exploration Company		ARCHITECT-ENGINEER		
SITE Ladysmith, Wisconsin		PROJECT NAME Proposed Copper Mine Development		
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE BY REC'D	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2
				PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % STANDARD "H" PENETRATION (BLOWS/FT.)
			SURFACE ELEVATION 1117.1	
1	SS		Silty fine sand-brown (SM)	
2	SS		Fine medium sand-trace to some gravel and silt-brown (SM)	24 1/2"
3	SS		White and light brown poorly cemented sandstone	
4	SS			
5	SS		Fine coarse sand-trace to some fine medium gravel-trace silt-brown-wet (SW)	55"
6	SS		Fine coarse sand and fine coarse subangular gravel-trace silt-brown (SU-SW)	62"
7	SS		Light brown poorly cemented sandstone	
8	RB			
9	SS		Saprolite-white to greenish gray and pink-clayey silt-trace angular rock fragments (CL-ML)	
11	SS			
12	SS		Saprolite-light reddish brown to reddish brown-silty clay-trace sand and angular rock fragments (CH)	
13	SS			
14	SS		Saprolite-light reddish brown to reddish brown-silty clay-trace sand and angular rock fragments (CH)	
15	SS			
16	SS		Saprolite-light reddish brown to reddish brown-silty clay-trace sand and angular rock fragments (CH)	
17	SS			
18	SS		Saprolite-light reddish brown to reddish brown-silty clay-trace sand and angular rock fragments (CH)	
19	SS			
20	ST		End of Boring 49' of 4" Casing	104

PERMEABILITY TEST

Constant Head

ST Job No. 4970

Date 9-28-72

Report No. _____

SOIL TESTING SERVICES OF WISCONSIN, INC.

540 LAMBEAU ST., GREEN BAY, WIS. 54303

PHONE (414) 494-9656

Sample ST 9-7 Samples 12B, 15, 18 & 19 Combined

Soil Description Saprolite - light reddish brown silty clay-trace sand size and angular rock fragments (CH)

Mark No. _____

Compacted Dry Density = 119.8 PCF Water Content = 24.9% Liquid Limit = 56.0%
 Plastic Limit = 30.4%

% Compaction = 98% of ASTM D698-70

Sample Diameter = 3.0 inch Sample Height = 6.0 inch

Date 9-27-72

Job No. 4970

COMPACTION CONTROL REPORT

I. Laboratory Compaction Test Data

A. Description of Soil: Saprolite - light reddish brown silty clay-trace sand size and angular rock fragments

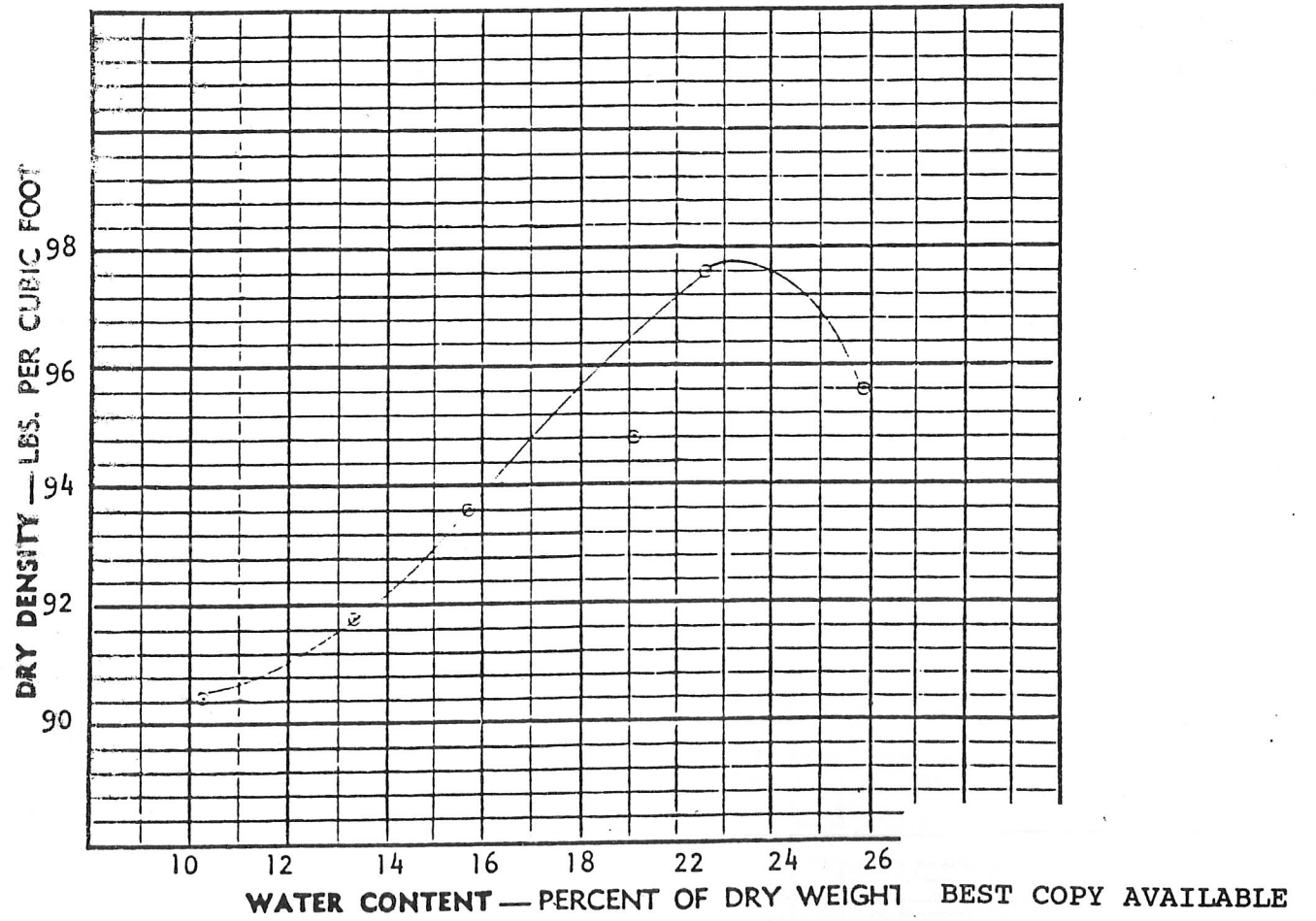
Material Mark _____ Classification CH AASHO BPR
 Source of Material Boring ST 9-7 Samples 12B, 15, 18 & 19 combined

Natural Water Content 33.1-25.1% Natural Dry Density _____ PCF Specific Gravity _____
 Liquid Limit 56.0 % Plastic Limit 30.4 % Plasticity Index 25.6

B. Test Procedure Used: ASTM D-698-70 Method C

C. Test Results: Optimum Water Content 23.1 %
 Maximum Dry Density 97.8 PCF (at a Wet Density of _____ PCF)

Run No.	Head, inches	Duration, seconds	Permeability cm/sec	Remarks
1	328	67,500	2.4×10^{-8}	
2	328	36,000	2.5×10^{-8}	
3	328	72,000	2.6×10^{-8}	Sample swelled about 1/2" at top after test
			Avg. = 2.5×10^{-8}	



LOG OF BORING NO. ST 9-8

OWNER Great Lakes Exploration Company				ARCHITECT-ENGIN. .R						
SITE Ladysmith, Wisconsin				PROJECT NAME Proposed Haul Road ST-9-8						
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2				
						PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %	STANDARD "N" PENETRATION (BLOWS/FT.)	
				SURFACE ELEVATION ↓		10	20	30	40	50
1	AS			Black silty topsoil (OL)						
2	AS			Silty fine sand-trace clay-brown-sample 3 wet (SM)						
5	3	AS								
6				End of Boring						

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WATER LEVEL OBSERVATIONS	
W.L.	W.S. OR W.D.
W.L.	B.C.R. A.C.R.
W.L.	4.9' AB

SOIL TESTING SERVICES OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	10-25-72
BORING COMPLETED	10-25-72
RIG BOMB.	FOREMAN TM
DRAWN HH	APPROVED WMP
JOB # 4970	SHEET

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. ST 9

OWNER Great Lakes Exploration Company				ARCHITECT-ENGINEER						
SITE Ladysmith, Wisconsin				PROJECT NAME Proposed Haul Road ST-9-9						
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2				
						PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %	STANDARD "N" PENETRATION (BLOWS/FT.)	
				SURFACE ELEVATION ↓		10	20	30	40	50
1	AS			Dark brown sandy topsoil (OL-SM)						
2	AS			Silty very fine sand-brown-wet (SM)						
5	3	AS		Silty fine sand-trace clay-brown (SM-SC)						
6.0				End of Boring						

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WATER LEVEL OBSERVATIONS	
W.L.	W.S. OR W.D.
W.L.	B.C.R. A.C.R.
W.L.	5.0' AB

SOIL TESTING SERVICES OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	10-25-72
BORING COMPLETED	10-25-72
RIG BOMB.	FOREMAN TM
DRAWN HH	APPROVED WMP
JOB # 4970	SHEET

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BS-81471

BS-81471

LOG OF BORING NO. ST-10

OWNER Great Lakes Exploration Company				ARCHITECT-ENGINEER						
SITE Ladysmith, Wisconsin				PROJECT NAME Proposed Haul Road <u>ST-9-10</u>						
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2				
						PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %	STANDARD "N" PENETRATION (BLOWS/FT.)	
				SURFACE ELEVATION ↓		10	20	30	40	50
	1	AS		Black silty topsoil (OL)						
	2	AS		Silty very fine sand-brown (SM)						
	3	AS		Silty fine sand-trace clay-brown (SM-SC)						
	4	AS		Silty fine sand-brown-wet (SM)						
				End of Boring						

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WATER LEVEL OBSERVATIONS	
W.L.	W.S. OR W.D.
W.L.	B.C.R. A.C.R.
W.L.	4.2' AB

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	10-25-72
BORING COMPLETED	10-25-72
RIG Bomb.	FOREMAN TM
DRAWN HH	APPROVED WMP
JOB # 4970	SHEET

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. ST-11

OWNER Great Lakes Exploration Company				ARCHITECT-ENGINEER						
SITE Ladysmith, Wisconsin				PROJECT NAME Proposed Haul Road <u>ST-9-11</u>						
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2				
						PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %	STANDARD "N" PENETRATION (BLOWS/FT.)	
				SURFACE ELEVATION ↓		10	20	30	40	50
	1	AS		Dark brown sandy topsoil (OL)						
	2	AS		Silty fine sand-brown (SM)						
	3	AS		Clayey fine sand-brown-wet (SC)						
				End of Boring						

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WATER LEVEL OBSERVATIONS	
W.L.	W.S. OR W.D.
W.L.	B.C.R. A.C.R.
W.L.	5.5' AB

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	10-25-72
BORING COMPLETED	10-25-72
RIG Bomb.	FOREMAN TM
DRAWN HH	APPROVED WMP
JOB # 4970	SHEET

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. ST-9-12 11

OWNER Great Lakes Exploration Company		ARCHITECT-ENGINEER	
SITE Ladysmith, Wisconsin		PROJECT NAME Proposed Copper Mine Development	
DEPTH ELEVATION	SAMPLE NO. TYPE SAMPLE SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % STANDARD "N" PENETRATION (BLOWS/FT.)
1	ST	Dark brown silty and sandy topsoil (OL)	84
2	ST	Silt and very fine sand brown to rusty brown (SM)	125
3	SS	Silty and clayey fine sand brown (SC)	
4	SS	Fine-medium sand-trace gravel and silt-brown-dense-moist to wet (SP)	
5	SS	Fine sand-trace to some silt-brown-dense (SH)	
6	SS	Silty and sandy clay-trace gravel-brown trace gray and rusty brown-hard (CL)	
7	SS	Silty clay-mottled dark brown and light brown-hard (CL)	120
8	SS	Silty and clayey sand-trace gravel-dark-rusty brown (SC)	114
9	ST	Silty and sandy clay-trace gravel-brown (CL)	116
10	SS	Silty and clayey sand-trace gravel-brown-very dense (SC)	
11	SS	Poorly cemented sandstone	
12	SS	Saprolite-white and gray with reddish brown streaks-silt with angular rock fragments-talcly feel (ML)	
13	SS		
14	SS		
15	SS		

End of Boring
20' NX Casing

*calibrated Penetrometer

WATER LEVEL OBSERVATIONS	
W.L. 4'-5.5'	W.S. OR W.D.
W.L. 15' B.C.R.	7' A.C.R.
W.L.	

SOIL TESTING SERVICES	
OF WIS., INC.	
ROUTE NO. 7—BAETEN ROAD	
GREEN BAY, WISCONSIN	

BORING STARTED	10-5-72
BORING COMPLETED	10-5-72
RIG	V-15 FOREMAN RR
DRAWN	RM APPROVED WHP
JOB #	4970 SHEET

The stratification lines represent the approximate boundary between soil types and the transition may be gradual

LOG OF BORING NO. ST 9-13 12

OWNER Great Lakes Exploration Company		ARCHITECT-ENGINEER	
SITE Ladysmith, Wisconsin		PROJECT NAME Proposed Copper Mine Development	
DEPTH ELEVATION	SAMPLE NO. TYPE SAMPLE SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % STANDARD "N" PENETRATION (BLOWS/FT.)
1A	SS	Dark brown silty and sandy topsoil (OL)	
2	SS	Silty very fine sand-brown trace rusty brown (SM-ML)	
3	SS	Silty fine sand-trace gravel-brown-wet (SM)	
4	SS	Fine-coarse sand-trace to some gravel-trace silt-brown (SI)	
5	SS	Clayey sand-trace gravel-brown-dense (SC)	
6	SS	Silty and sandy clay-trace gravel-brown (CL)	
7	SS	Silty clay-trace sand and gravel-gray to rusty brown-very tough (CL)	107
8	SS	Silty fine-coarse sand-trace clay and rock fragments rusty brown (SC)	
9	ST	Silty fine-medium sand-trace gravel-rusty brown (SH)	
10	SS	Silty very fine sand-brown and gray-very dense (SM)	
11	SS	Fine-medium sand-trace to some fine medium gravel-trace silt-brown-wet-dense (SP)	
12	SS	Fine-coarse sand-some fine coarse gravel-trace silt-grayish brown-wet-dense (SW)	
13	SS	Saprolite-white and greenish gray silt	
14	SS		
15	SS		

End of Boring
60' NX Casing

*Calibrated Penetrometer

WATER LEVEL OBSERVATIONS	
W.L.	W.S. OR W.D.
W.L. 17.8' B.C.R.	16' A.C.R.
W.L.	

SOIL TESTING SERVICES	
OF WIS., INC.	
ROUTE NO. 7—BAETEN ROAD	
GREEN BAY, WISCONSIN	

BORING STARTED	10-5-72
BORING COMPLETED	10-5-72
RIG	V-15 FOREMAN RR
DRAWN	RM APPROVED WHP
JOB #	4970 SHEET

The stratification lines represent the approximate boundary between soil types and the transition may be gradual

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LOG OF BORING NO. ST9 - 17A

OWNER: Bear Creek Mining Company
 ARCHITECT-EI: NEER
 SITE: Ladysmith, Wisconsin
 PROJECT NAME: Proposed Mine Development

17A

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2				
						PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %	STANDARD "N" PENETRATION (BLOWS/FT.)	
				SURFACE ELEVATION → 1100						
				No samples						
20	1	SS		Silty fine coarse sand-trace to some fine medium gravel-trace clay-trace decomposed gravel pieces at 30 feet-brown to rusty brown (SW)						
25	2	SS								
30	3	SS		Fine coarse sand-trace to some fine medium gravel-trace silt-brown (SW)						
35	4	SS								
40	5	SS								
41.5				End of Boring	40" NX Casing	20" of NX Casing left in hole				

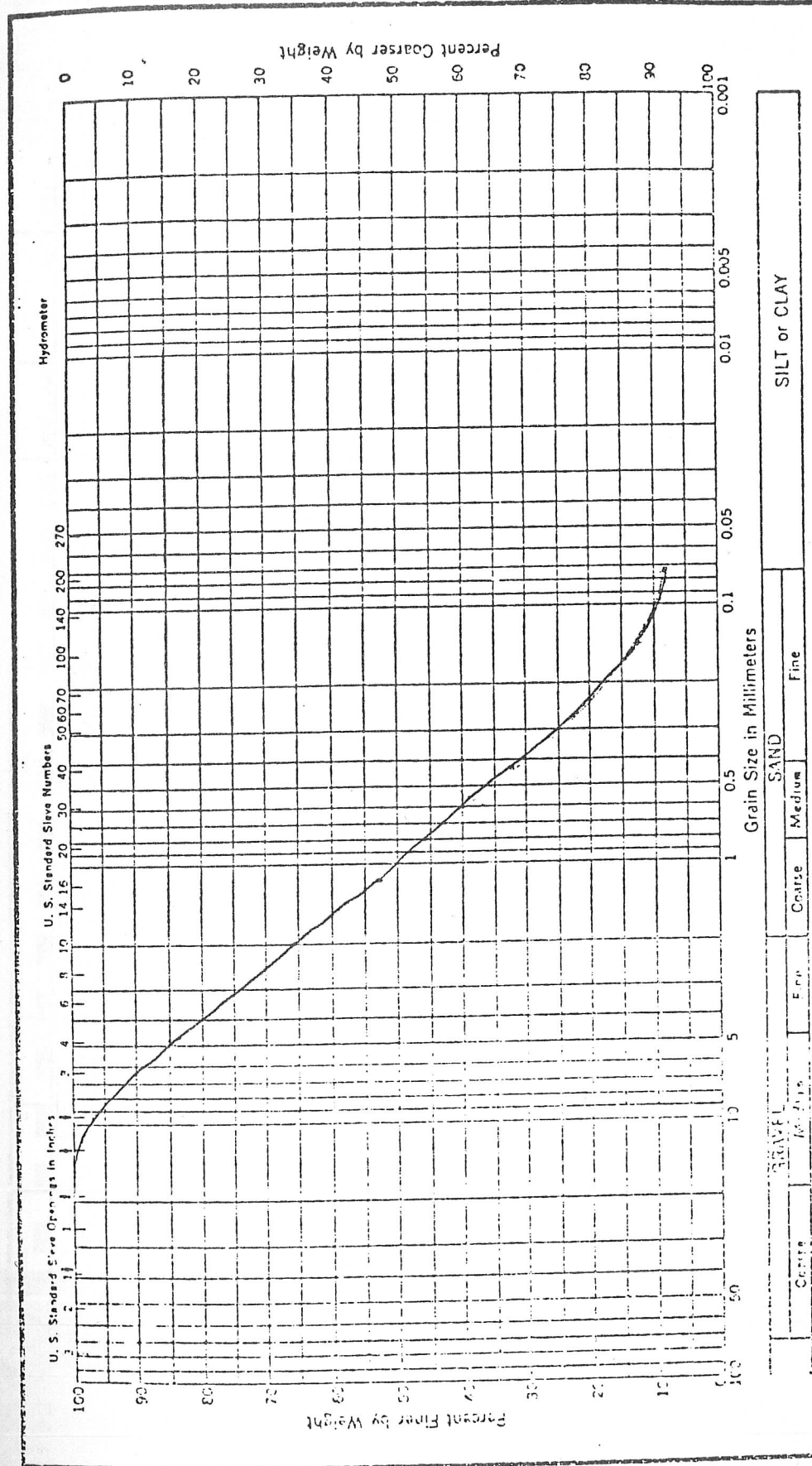
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WATER LEVEL OBSERVATIONS	
W.L.	W.S. OR W.D.
W.L. 11.6' P.C.R.	A.C.P.
W.L.	

SOIL TESTING SERVICES OF WIS., INC.
 540 LAMBEAU STREET
 GREEN BAY, WIS. 54303

BORING STARTED	6-22-73
BORING COMPLETED	6-22-73
RIG	22
FOREMAN	JG
DRAWN	APPROVED WMP
JOB #	4970 A
	SHEET

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.



Boring ST9 - 17A	
Sample 4 35'-36.5'	
Sample Tested = 132.2 gr.	
CLASSIFICATION	Fine-coarse sand - some fine medium gravel - trace silt (SW)
% S - S - S + S	15 - 77 - 8 (FWD 12/88)
DRAWN	APPROVED
DATE	JOB NO.

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LOG OF BORING NO. ST9-18

OWNER: Bear Creek Mining Company
 ARCHITECT-ENGINEER: [Blank]
 SITE: Ladysmith, Wisconsin
 PROJECT NAME: Proposed Mine Development

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2					
						PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %	STANDARD "N" PENETRATION (BLOWS/FT.)		
X				SURFACE ELEVATION → 1102							
5	1	SS		Silty fine sand-some fine coarse gravel-trace coarse sand-dark reddish brown (SM)							
10	2	SS		Fine coarse sand-some fine coarse angular to rounded gravel-trace to some silt (SW-SM)							
15	3	SS		Saprolite-light gray trace brown and yellow brown silt (ML) with layers of clayey silt (CL-ML)							
19.5	4	SS									
				End of Boring							
				18' NX Casing							
				10' NX Casing left in hole							
				1 1/2" Ø PVC installed to 13.0'							

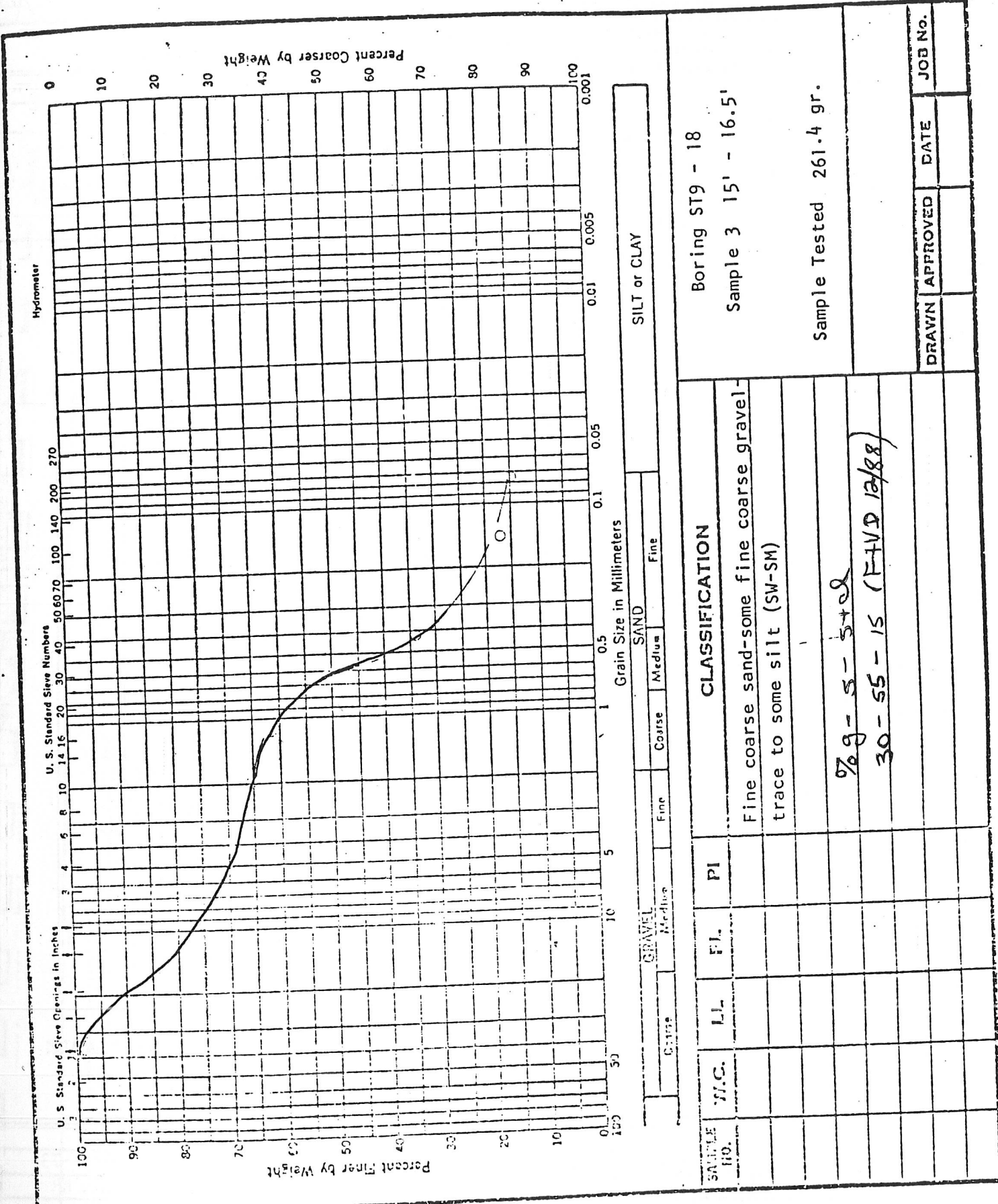
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WATER LEVEL OBSERVATIONS	
W.L.	W.S. OR W.D.
W.L. 4.4'	D.C.R. A.C.R.
W.L.	

SOIL TESTING SERVICES OF WIS., INC.
 540 LAMBEAU STREET
 GREEN BAY, WIS. 54303

BORING STARTED	6-21-73
BORING COMPLETED	6-21-73
DIG 22	FOREMAN JG
DRAWN	APPROVED WMP
JOB # 4970 A	SHEET

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.



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LOG OF BORING NO. ST9-19A

OWNER: Bear Creek Mining Company
 ARCHITECT-ENGINEER: 19A
 SITE: Ladysmith, Wisconsin
 PROJECT NAME: Proposed Mine Development

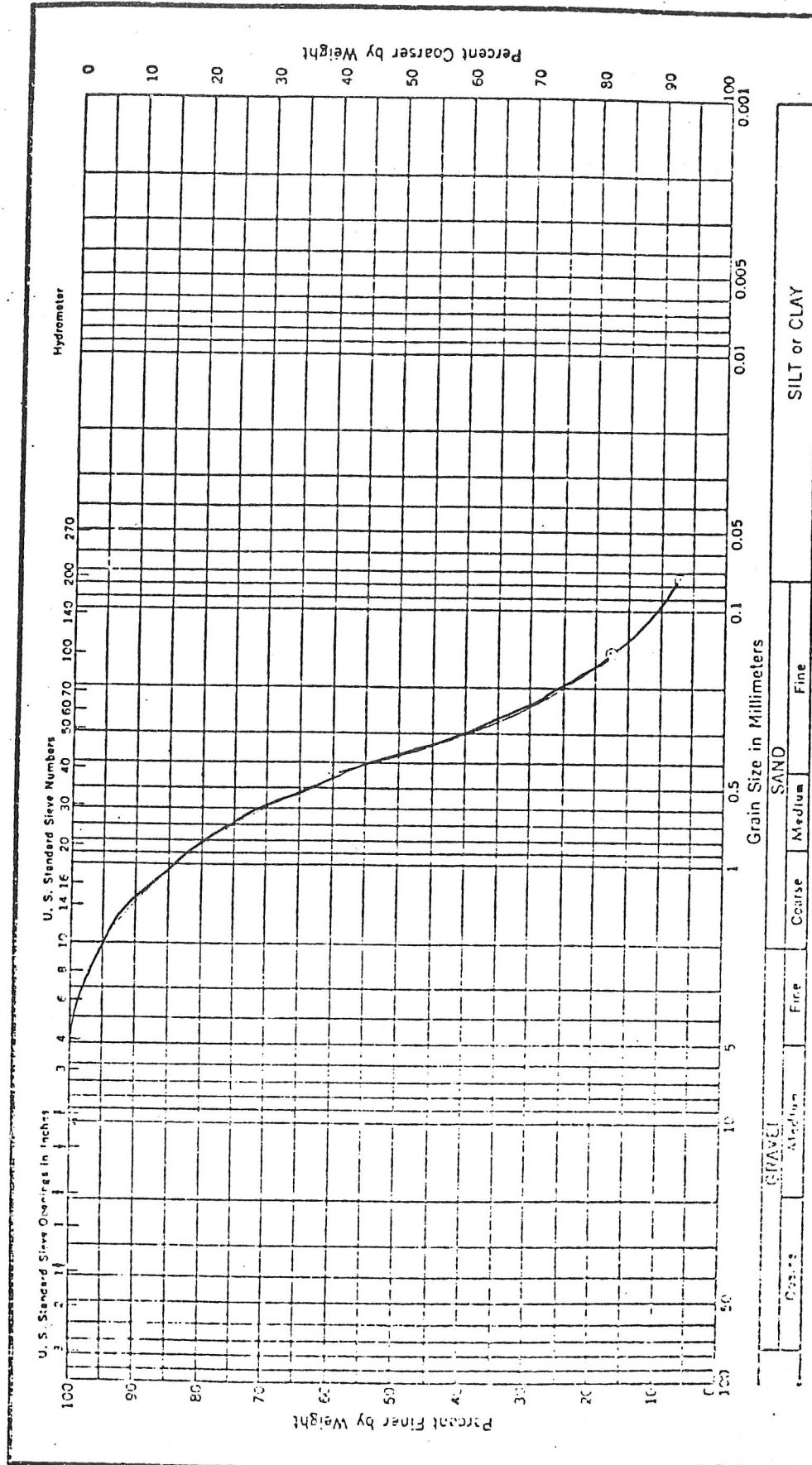
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2		
						PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %
				SURFACE ELEVATION 1120				
20				No samples-cobbles noted from 4' to 14'-boulders from 14' to 20'				
25.0	1	SS		Fine coarse subangular to rounded gravel-some fine coarse sand-trace silt-wet-dark gray brown to gray brown (GW)				
	2	SS						
				End of Boring 23.5' 4" Casing 19' of 1 1/2" Ø PVC placed in bore hole (Had to drill out 20' of PVC in order to install well)				

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WATER LEVEL OBSERVATIONS	
W.L.	W.S. OR W.D.
W.L. 10'	B.C.R. A.C.R.
W.L. 10' AB	

SOIL TESTING SERVICES OF WIS., INC.
 540 LAMBEAU STREET
 GREEN BAY, WIS. 54303

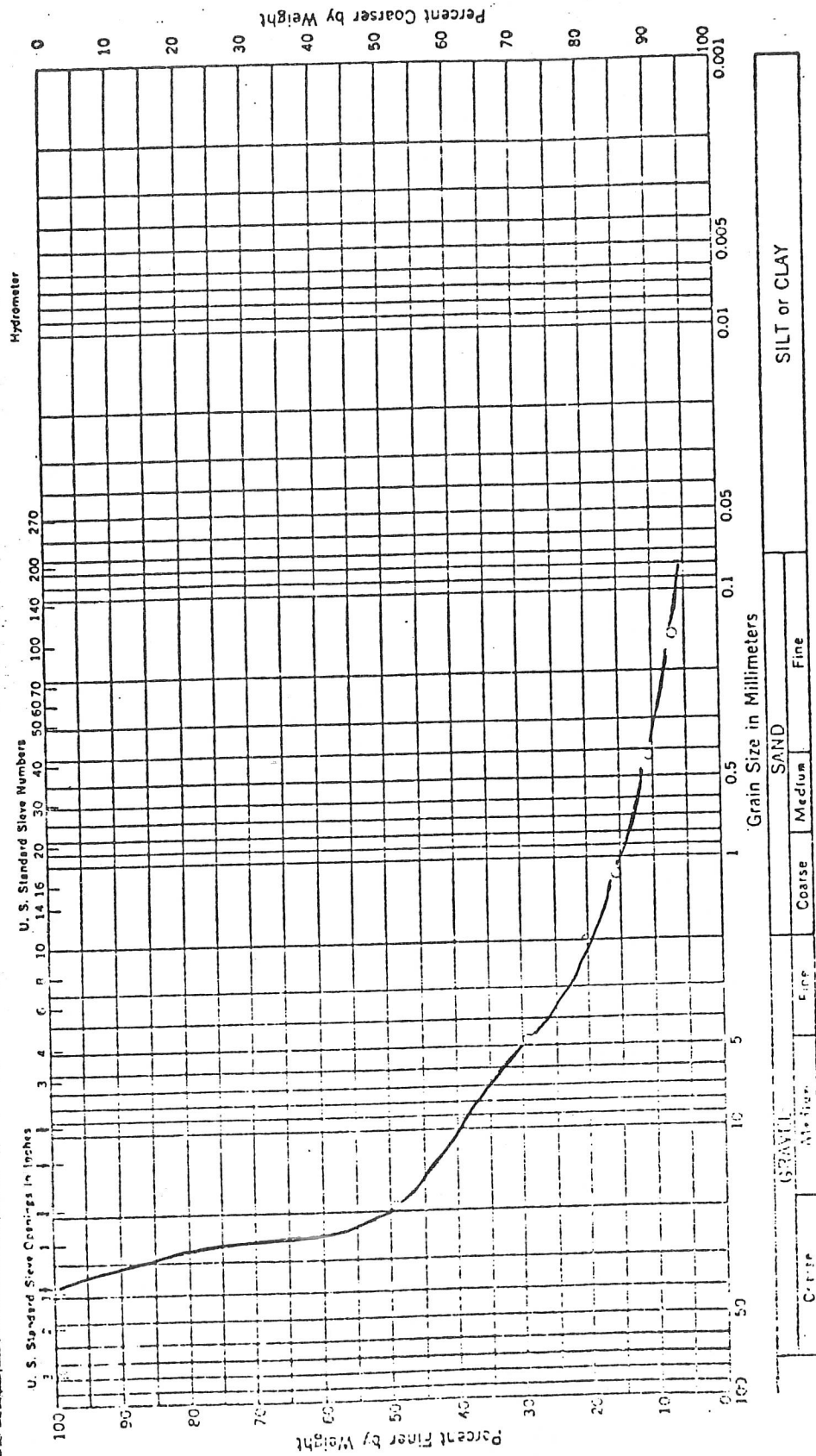
BORING STARTED 6-14-73
 BORING COMPLETED 6-14-73
 DRG W-15
 DRAWN APPROVED WMP
 JOB # 4970 A SHEET



Boring ST9-19		Sample 68 28 to 28.5'		Sample Tested= 237.0 gr.	
CLASSIFICATION					
Fine coarse sand-trace silt-sandstone (SP-SM)					
20-5 - sand					
0-93-7 (F+V) 12/88					
FILE NO.	DATE	APPROVED	DATE	APPROVED	JOB NO.

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The stratification lines represent the approximate boundary between soil types and the transition may be gradual.



SOIL OR CLAY	SILT or CLAY	
BORING NO.	Boring ST9 - 19A	
SAMPLE NO.	Sample 1 21' - 22.2'	
WEIGHT	Sample Tested 692.7 gr.	
CLASSIFICATION	Fine coarse angular gravel-some sand-trace silt (GW) <i>89-5-5 dot</i> <i>72-22-6 (F+V) 12/88</i>	
W.C.		
L.L.		
P.L.		
P.I.		
GRAVEL	Coarse	Medium
SAND	Coarse	Fine

DRAWN	APPROVED	DATE	JOB NO.
-------	----------	------	---------

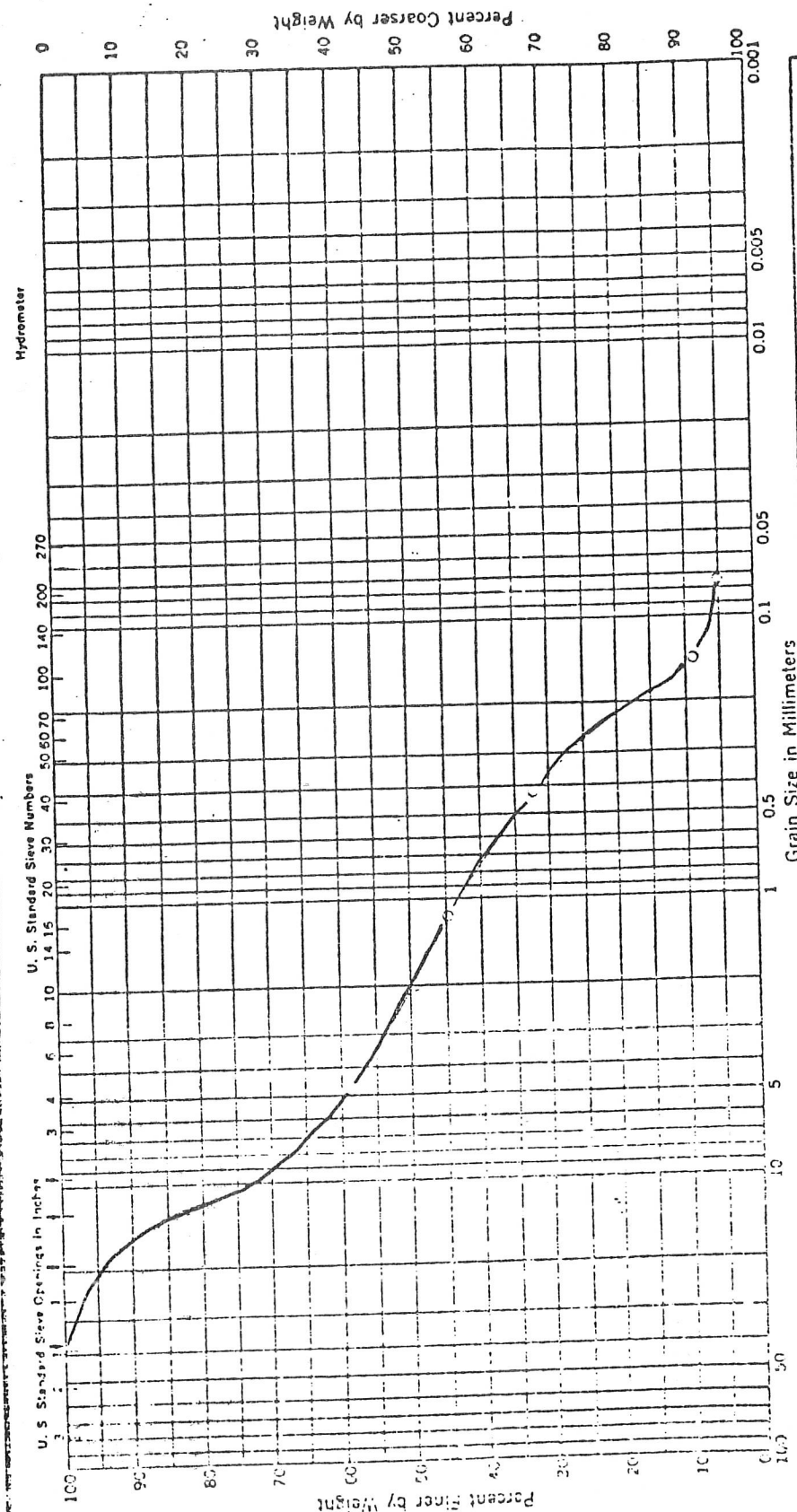
LOG OF BORING NO. ST9 - 20

OWNER	Bear Creek Mining Company	ARCHITECT-ENGINEER	
SITE	Ladysmith, Wisconsin	PROJECT NAME	Proposed Mine Development
DEPTH	ELEVATION	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2
			PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
			STANDARD "N" PENETRATION (BLOWS/FT.)
		SURFACE ELEVATION +1115	10 20 30 40 50
1	SS	Fine medium sand-trace gravel and silt-brown-wet (SW)	43
2	SS	Fine coarse sand-some fine coarse rounded to sub-angular gravel-trace silt-brown and gray brown (SW)	75
3	SS	Silty fine coarse sand-trace to some gravel-trace clay-reddish brown (SM-SC)	38
4	SS	(SM)	23
5	SS	Fine coarse sand and fine coarse sub-angular to rounded gravel-trace silt-brown-wet (SW-GW)	131
6	SS	Light brown poorly cemented coarse grained sandstone	36
7	SS	Saprolite-white to orangish brown silt (ML)	41
End of Boring 30' 4" Casing ⊗ - 140 lbs.-30" drop on 2" O.D. Split Spoon ⊗ - 380 lbs.-28" drop on 3" O.D. Split Spoon			

WATER LEVEL OBSERVATIONS		SOIL TESTING SERVICES		BORING STARTED 6-18-73	
W.L.	3.5'	W.S.	OK OK	BORING COMPLETED	6-18-73
W.L.	B.C.R.	A.C.R.	OF WIS., INC.	RIG	W-15
W.L.			ROUTE NO. 7—BAEYEN ROAD	FOREMAN	RR
			GREEN BAY, WISCONSIN	DRAWN	APPROVED
					VMP

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SILT or CLAY
SAND
Medium
Coarse
Fine
Medium
Coarse
Fine

Boring ST9 - 20
Sample 5-25' - 26.2'
Sample Tested 621.6 gr.

CLASSIFICATION
Fine coarse sand and fine coarse gravel - trace silt (SW-GW) (SW-SM)
Well graded sand w/ silt and gravel
90g - S - sand
41-54-5 (FWD 12/88)

U.C.	PI	PL	LL

DRAWN	APPROVED	DATE	JOB NO.

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LOG OF BORING NO. ST9 - 20A

OWNER Bear Creek Mining Company		ARCHITECT-ENGINEER		
SITE Ladysmith, Wisconsin		PROJECT NAME Proposed Mine Development		
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² 1 2 3 4 5 PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % STANDARD "N" PENETRATION (BLOWS/FT.) 10 20 30 40 50
X			SURFACE ELEVATION → +1115	
			No Samples	
25	1	SS	Silty fine medium sand-trace to some fine coarse gravel-trace clay-reddish brown (SM)	
	2	SS	Fine coarse sand-trace to some fine medium gravel-trace silt-brown-wet (SW)	
30		RB	Sandstone (no samples)	
34.5			End of Boring 30' 4" Casing Installed 1 1/2" Ø PVC to 31'	

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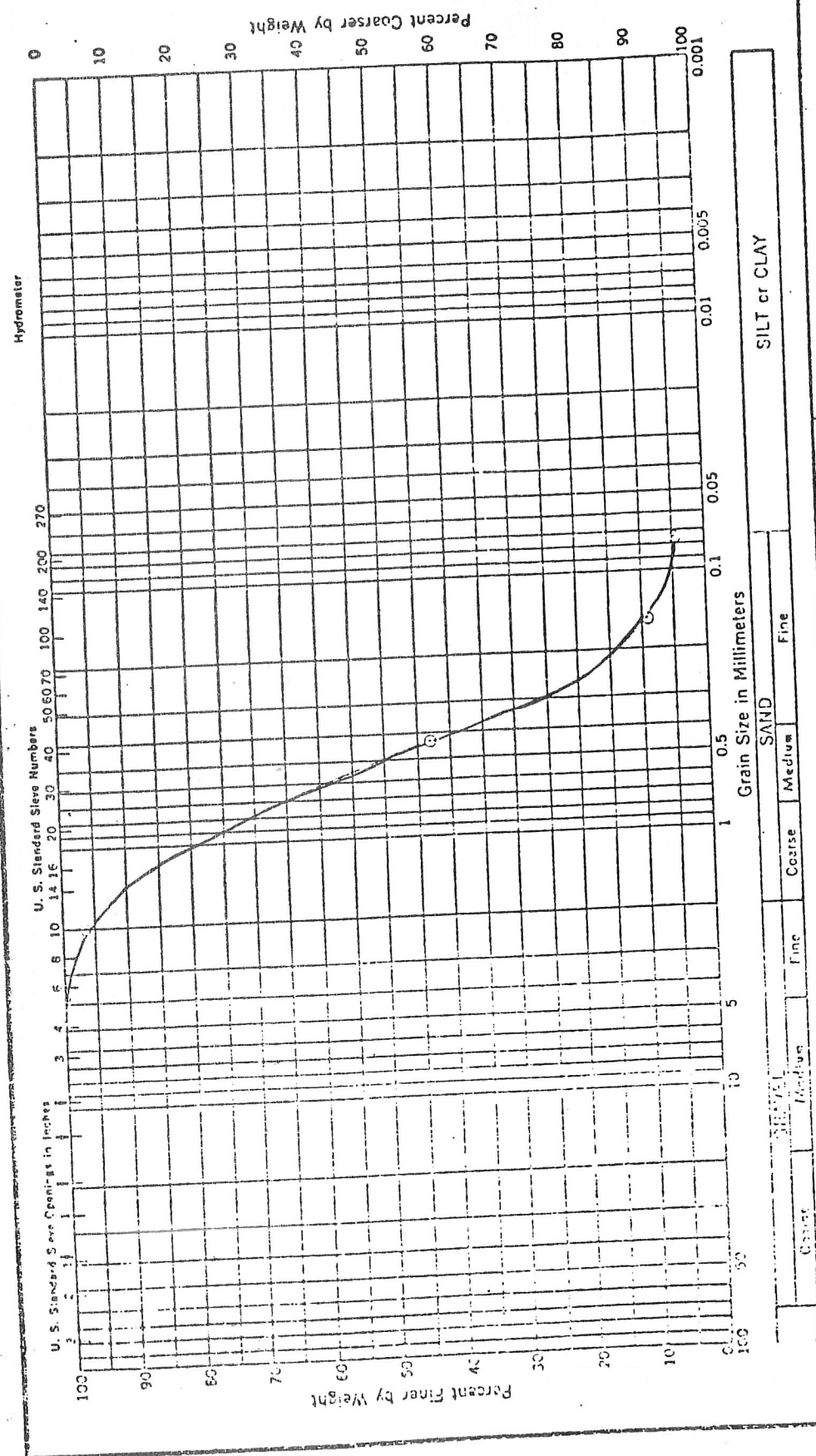
WATER LEVEL OBSERVATIONS	
W.L. 3'	W.D.
W.L. 3'	R.C.P. F.C.P.
W.L.	

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	6-19-73
BORING COMPLETED	6-19-73
FIG W-15	FOREMAN RR
DRAWN	APPROVED VMP
JOB # 4970 A	SHEET

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

OWNER Bear Creek Mining Company		ARCHITECT-ENGINEER 22A	
SITE Ladysmith, Wisconsin		PROJECT NAME Proposed Mine Development	
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	DESCRIPTION OF MATERIAL
			PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % STANDARD "N" PENETRATION (BLOWS/FT.)
			SURFACE ELEVATION → +1139
5			No samples
10			
15			
16.5	1	SS	Fine coarse sand-some fine medium gravel-trace silt-dark gray brown-wet (SW)
			End of Boring 10' NX Casing Left 10' NX Casing in borehole & 1 1/2" Ø PVC to 14'



Boring ST9-22	
Sample 9 45'-46.5'	
Sample Tested = 749.0 gr.	
CLASSIFICATION	Fine-coarse sand-trace silt-sandstone
U.C.	
LL	
PL	
PI	
70g - 5 - SAND (SP) 0 - 96 - 4 (FTVD 12/88)	
DRAWN	APPROVED
DATE	JOB NO.

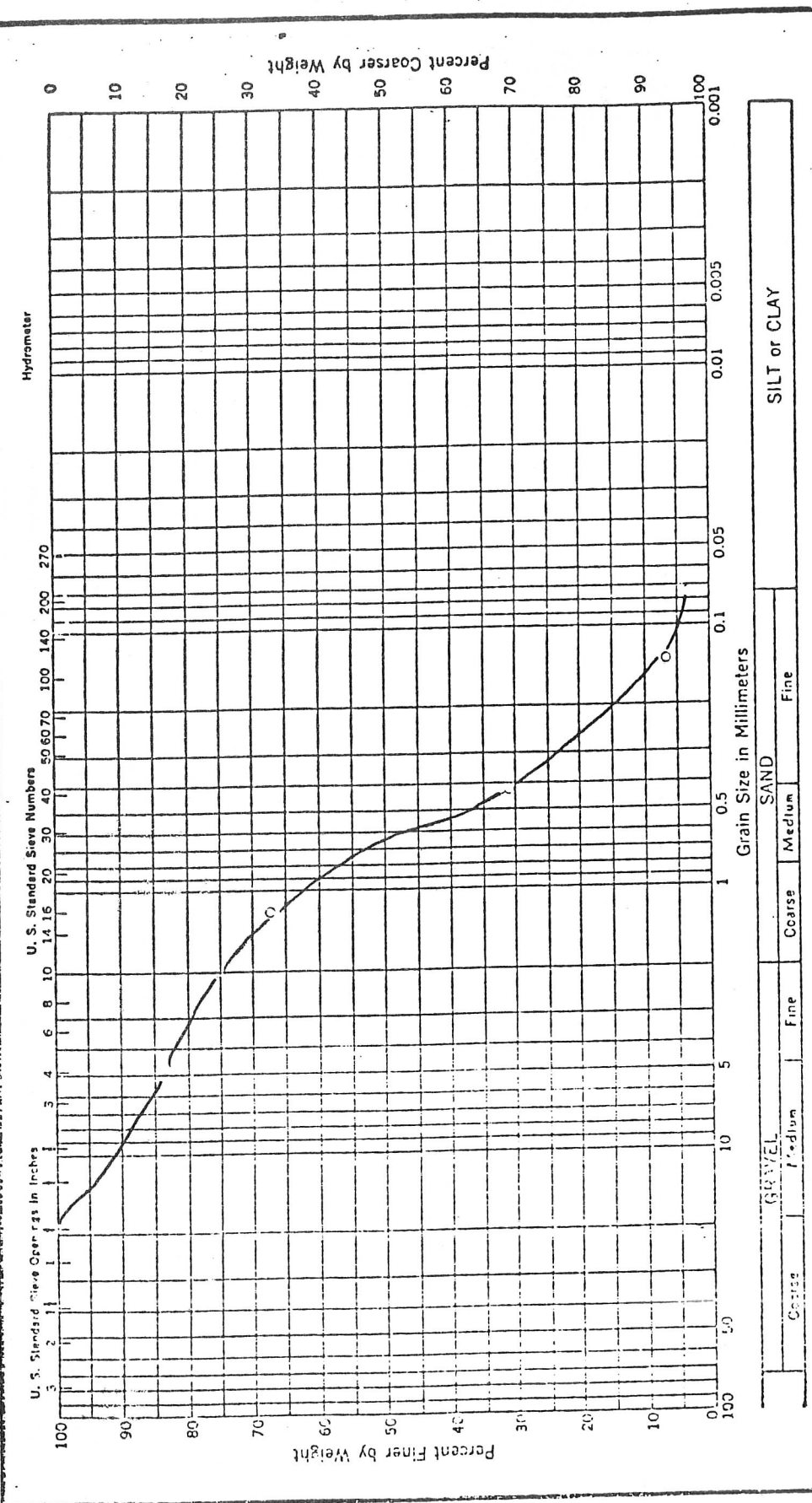
WATER LEVEL OBSERVATIONS	
W.L.	12' WEXX W.D.
W.L.	P.C.R. A.C.R.
W.L.	

SOIL TESTING SERVICES
 OF WIS., INC.
 540 LAMBEAU STREET
 GREEN BAY, WIS. 54303

BORING STARTED	6-27-73
BORING COMPLETED	6-27-73
FIG. W-15	FOREMAN RR
DRAWN	APPROVED WMP
JOB # 4970 A	SHEET

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The stratification lines represent the approximate boundary between soil types and the transition may be gradual.
 3.5-B-49

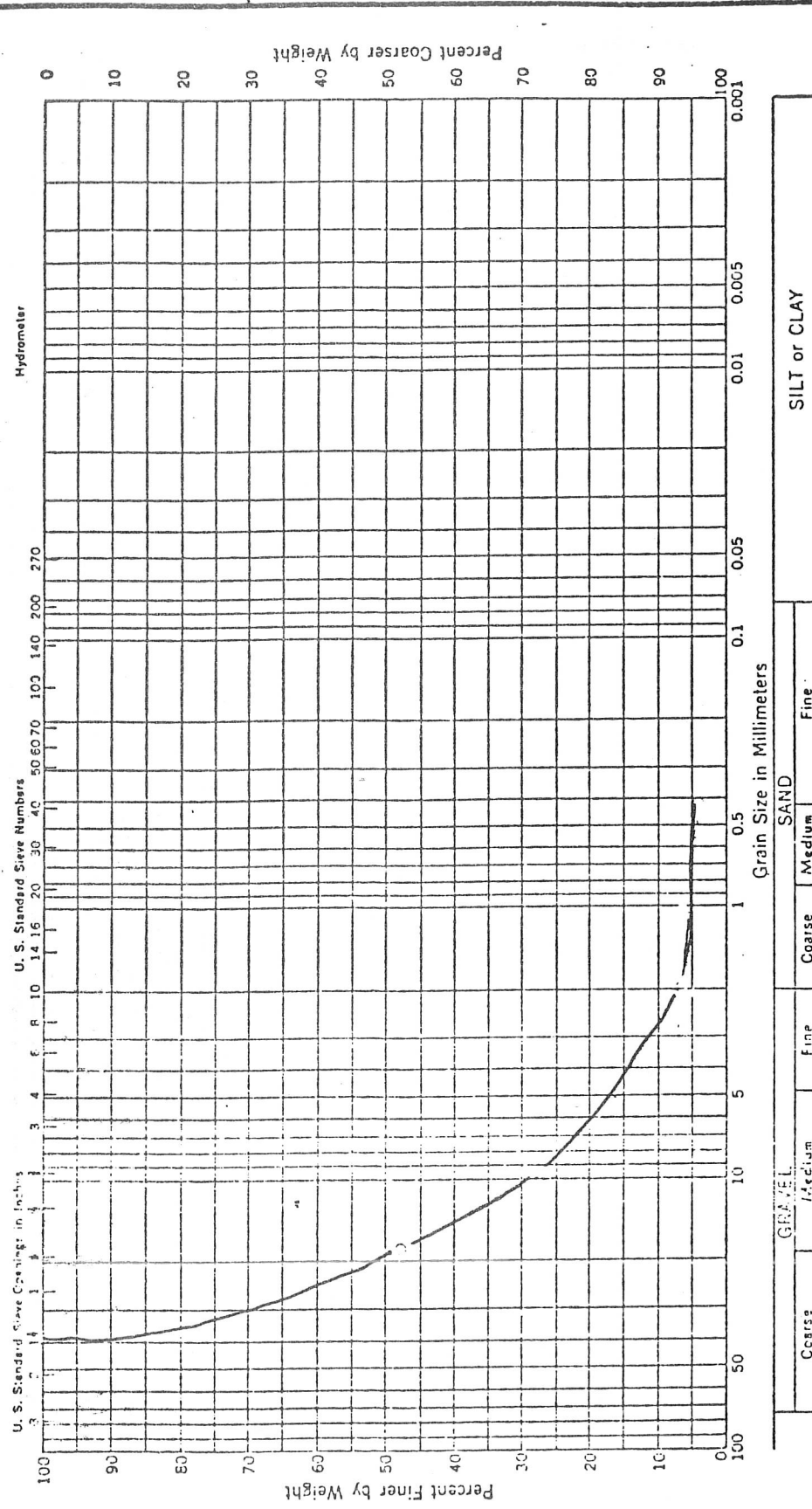


Boring ST9 - 22A	
Sample 1 15'-16.5'	
Sample Tested 160.7 gr.	
CLASSIFICATION	
Sample No.	Fine coarse sand-some fine medium gravel-trace silt (SW)
U.C.	
LL	
FL	
FI	
90g - S - SAND 14-87-3 (FTVD 12/88)	
DRAWN	APPROVED
DATE	JOB NO.

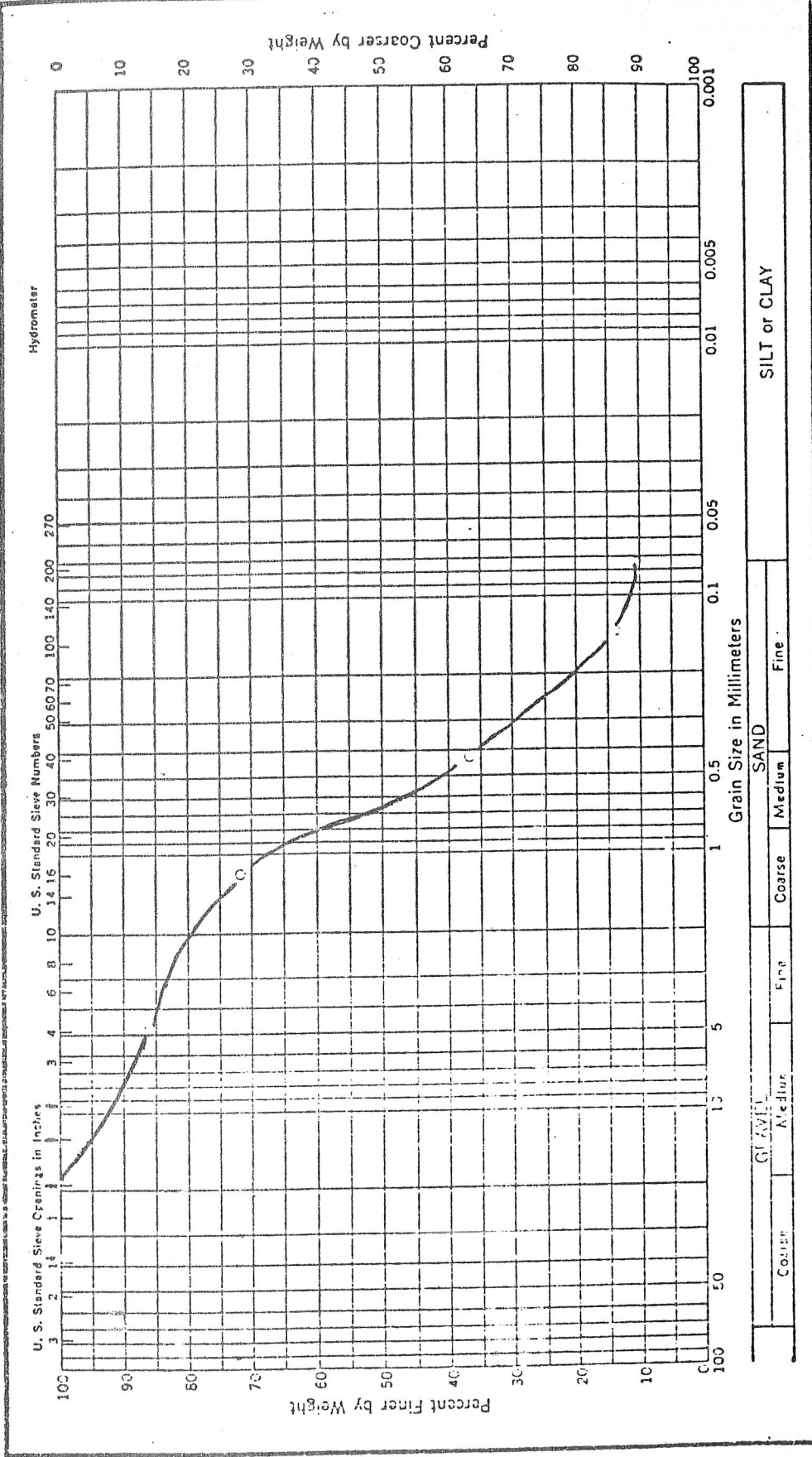
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LOG OF BORING NO. ST9 - 23		OWNER	ARCHITECT-ENGINEER
SITE		Bear Creek Mining Company	Proposed Mine Development
Ladysmith, Wisconsin		PROJECT NAME	
DEPTH	ELEVATION	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH (LB/SQ FT)
1	SS	Silty fine medium sand-trace to some gravel-dark reddish brown (SH) could not auger deeper than 14'	PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % STANDARD "N" PENETRATION (BLOWS/FT)
2	SS		40 lbs. - 30" drop on 3" O.D. Split Spoon 80 lbs. - 28" drop on 3" O.D. Split Spoon
3	SS	Silty fine coarse sand-trace to some gravel-reddish brown (SH) cobbles from 16' to 17'	
4	SS	Fine medium sand-trace fine medium gravel, coarse sand, and silt-brown-wet (SP)	
5	SS	Fine coarse sand-trace fine medium gravel and silt-brown (SW)	
6	SS	Silty fine sand-brown (SH) seams of fine coarse sand	
7	SS		
8	WS	Brown and yellow to rusty brown poorly cemented fine to coarse grained sandstone-40 to 50% water loss while drilling (SP)	
9	SS	Saprolite-gray brown-trace white silt with quartz fragments-silty (FL)	
WATER LEVEL OBSERVATIONS		OGIL TESTING SERVICES	
W.L.	W.S. W.D.	OF WIS., INC.	
W.L.	O.C.R.	BORING COMPLETED	
W.L. Dry to 14' while augering		DATE	

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SAMPLE NO.		CLASSIFICATION	Boring ST9 - 23A
W.C.		Fine coarse gravel-trace sand (GP)	Sample 2 25'-26.5'
LL		<i>99-5-sand</i>	Sample Tested 305.2 gr.
FI		<i>83-12-5 (FTVD 12/88)</i>	
FL			
PI			

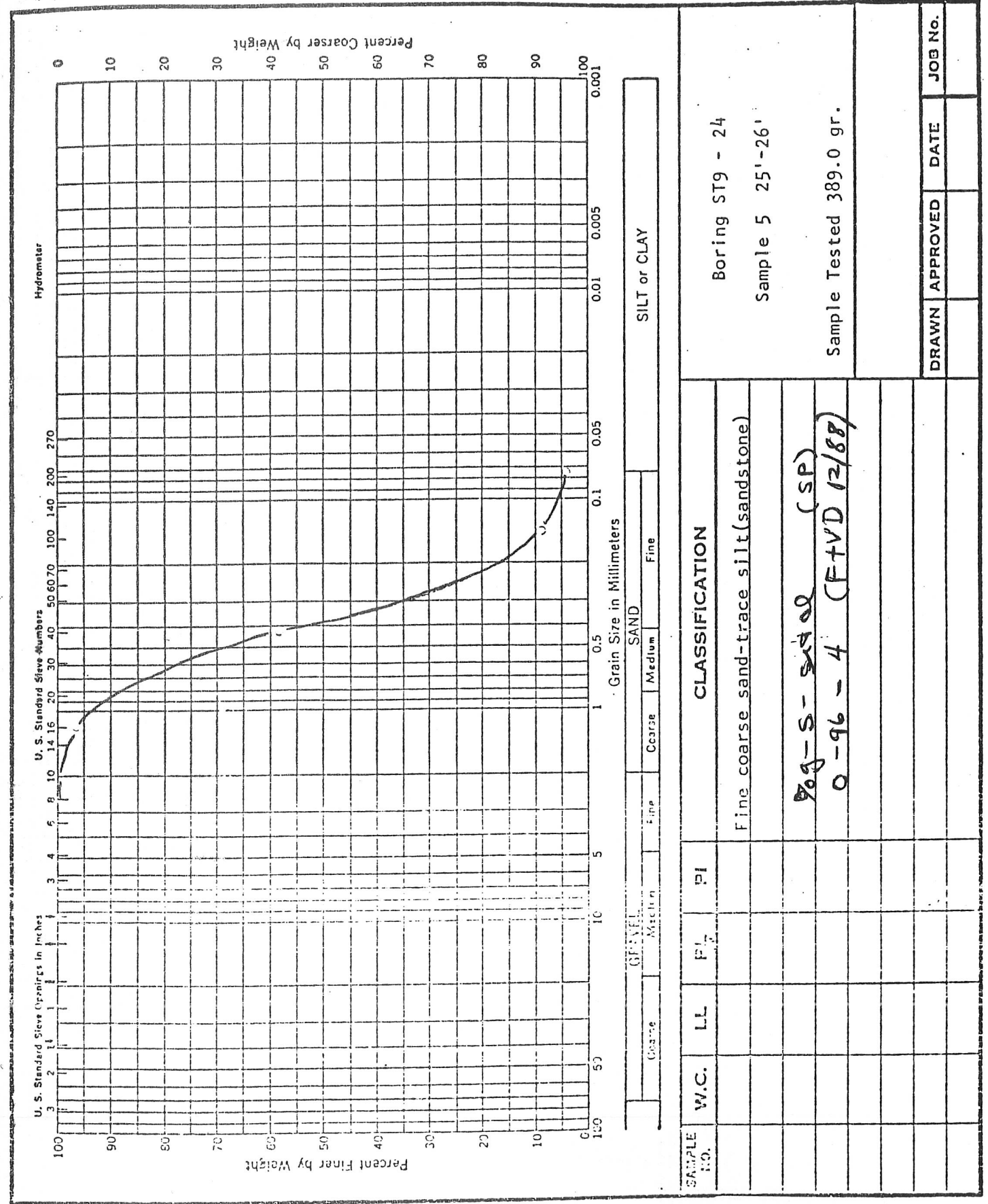


SAMPLE NO.		CLASSIFICATION	Boring ST9 - 23A
W.C.		Fine coarse sand-some fine medium gravel-trace silt (SW)	Sample 2A - 25'-26.5'
LL			Sample Tested 291.0 gr.
FI			
FL			
PI			

99-5-sand
15-74-11 (FTVD 12/88)

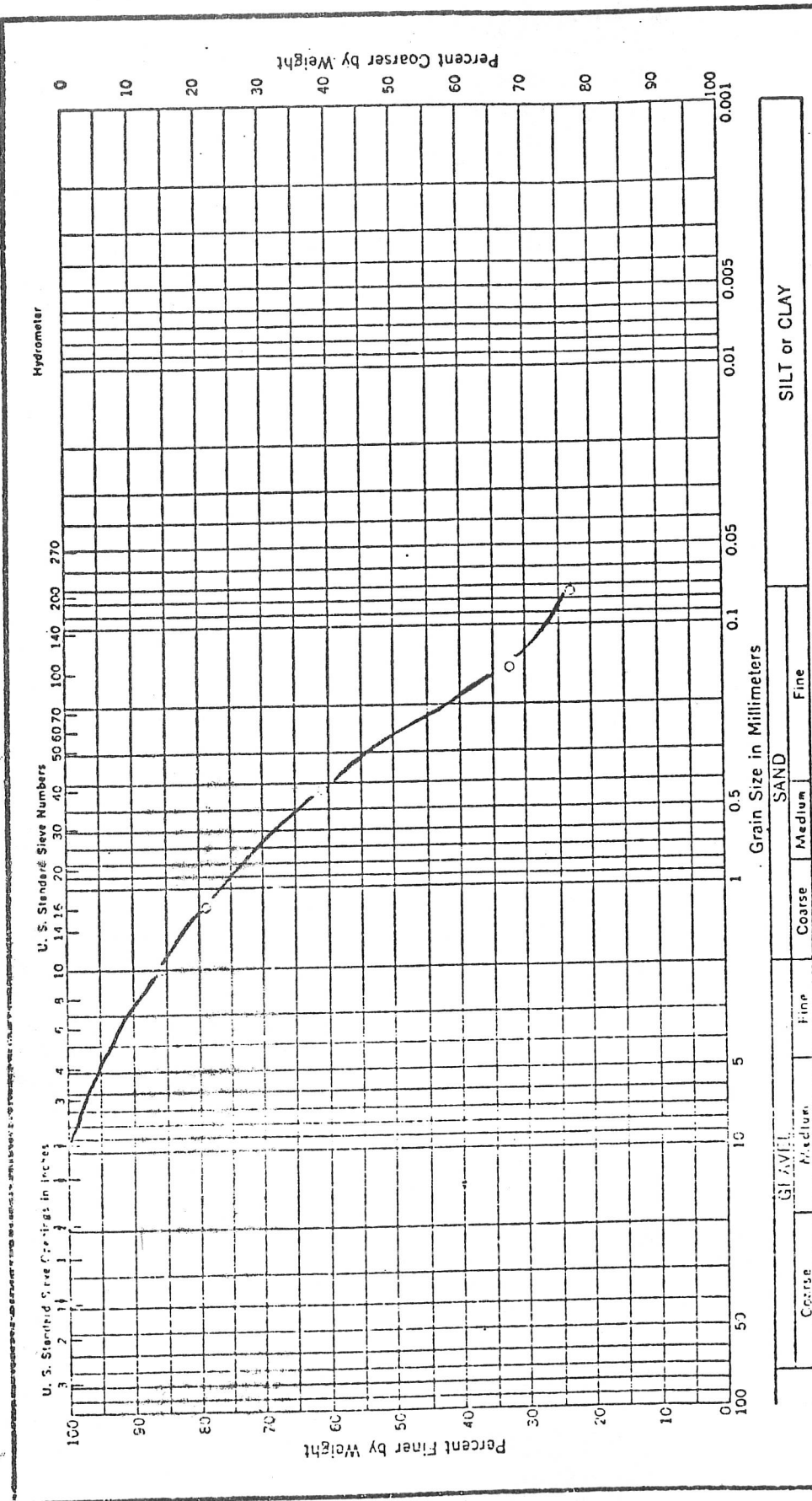
LOG OF BORING NO. ST9 - 24

OWNER Bear Creek Mining Company		ARCHITECT-ENGINEER	
SITE Ladysmith, Wisconsin		PROJECT NAME Proposed Mine Development	
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL
			UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % STANDARD "N" PENETRATION (BLOWS/FT.)
			SURFACE ELEVATION +1128
5	1	SS	Very fine sandy silt-trace clay-mottled gray and rusty brown (ML) 40 lbs.-30" drop on 3" O.D. Spl t Spoon 80 lbs.-28" drop on 3" O.D. Spl t Spoon
10	2	SS	Fine coarse sand-trace to some gravel and silt-brown-wet (SM) 31
15	3	SS	Silty fine coarse sand-trace gravel and clay-reddish brown-dense (SM) 43
20	4	SS	33
25	5	SS	69
30	6	SS	White changing to yellowish brown at 27.5' poorly cemented fine to coarse grained sandstone-occasional gray seam near 30 feet 45 1/2"
35	7	SS	50 1/2"
40	8	SS	End of Boring 30" 4" Casing left 3' 1 1/2" PVC in hole 25"

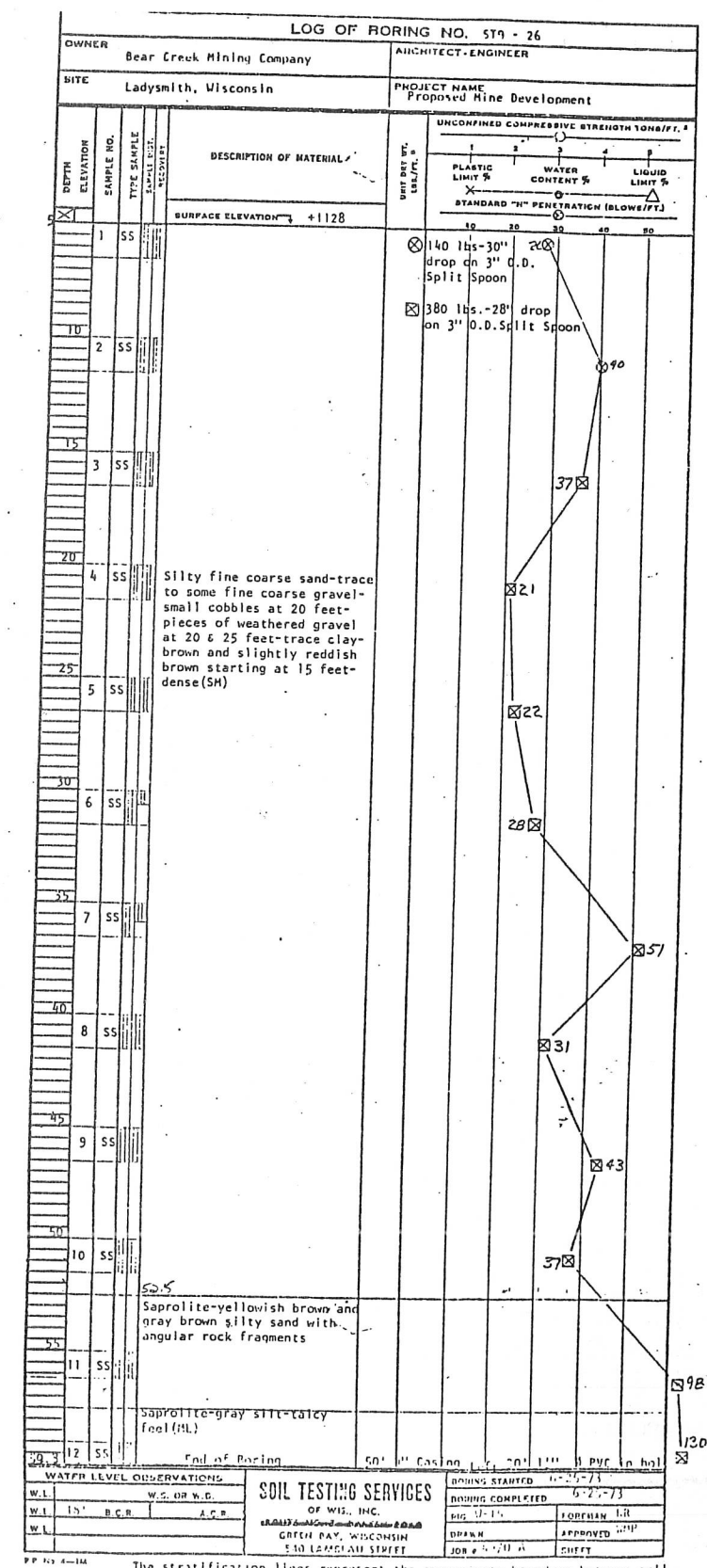


SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION
					90g-S-5400 (SP) 0-96-4 (F+VD 12/88)
					Boring ST9 - 24 Sample 5 25'-26' Sample Tested 389.0 gr.
DRAWN	APPROVED	DATE	JOB No.		

WATER LEVEL OBSERVATIONS		SOIL TESTING SERVICES	
W.L.	W.S. OR W.D.	BORING STARTED	6-24-73
W.L.	13' B.C.R.	A.C.R.	6-24-73
W.L.		RIG	FOREMAN RR
		DRAWN	APPROVED WHP

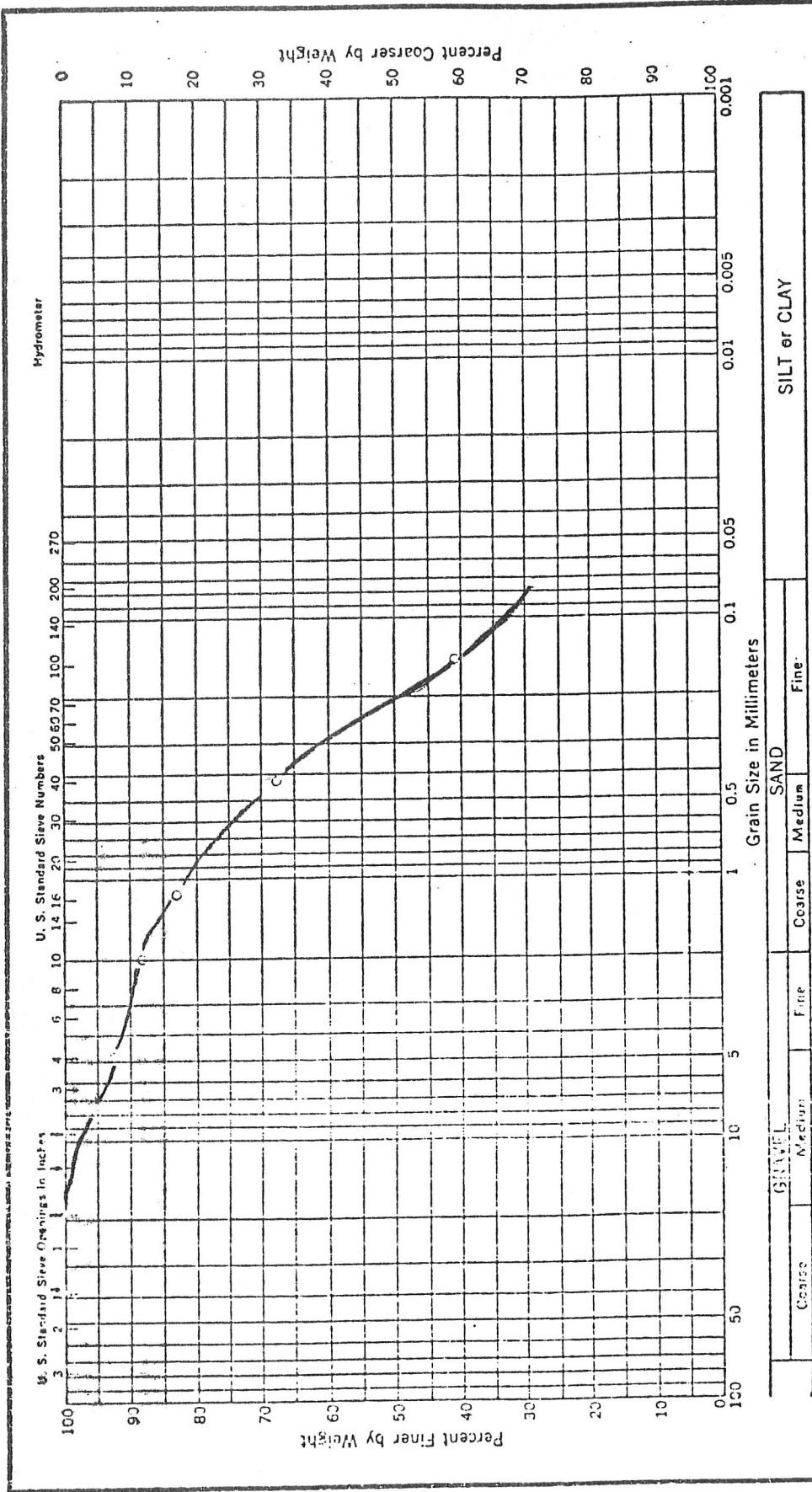


Boring ST9 - 25	
Sample 3 15'-16'	
Sample Tested 233.0 gr.	
CLASSIFICATION	
W.C.	PI
LL	FL
FL	PI
Silty fine coarse sand-trace to some gravel (SM)	
70g - 5 - 51408	
5 - 72 - 23 (F+VD 12/88)	
DRAWN	APPROVED
DATE	JOB No.



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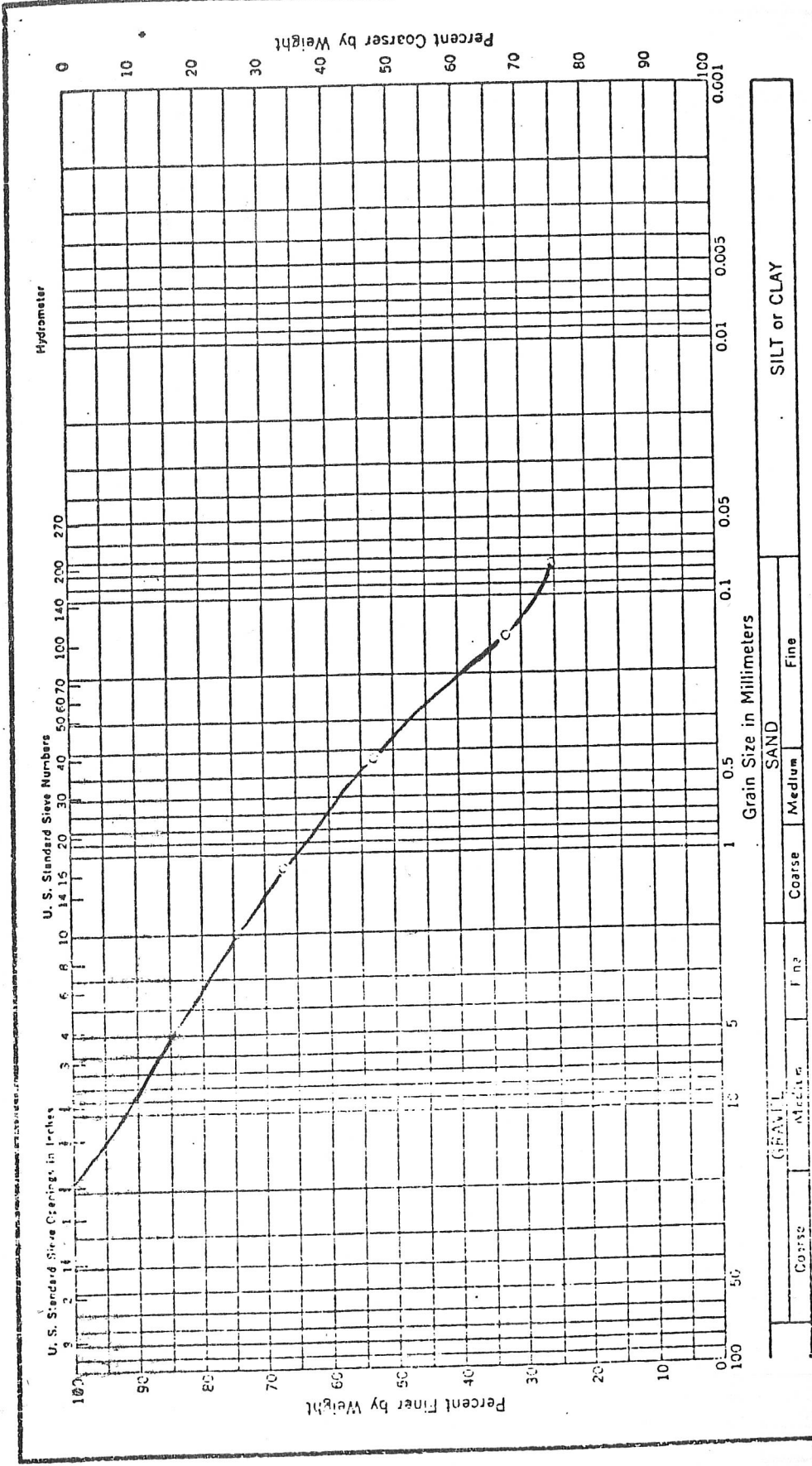
Boring ST9 - 26
Sample 6 30'-31.5'
Sample Tested 200.0 gr.

CLASSIFICATION
Silty fine coarse sand-trace to some gravel (SM)
7-64-29 (F+VD 12/88)

GRAVEL: Coarse, Medium, Fine
SAND: Coarse, Medium, Fine
SILT or CLAY

SAMPLE NO.	V.C.	LL	FL	PI

DRAWN	APPROVED	DATE	JOB No.



Boring ST9 26
Sample 7 35'-36.5'
Sample Tested 209.4 gr.

CLASSIFICATION
Silty fine coarse sand-some fine medium gravel (SM)
7-64-21 (F+VD 12/88)

GRAVEL: Coarse, Medium, Fine
SAND: Coarse, Medium, Fine
SILT or CLAY

SAMPLE NO.	V.C.	LL	FL	PI

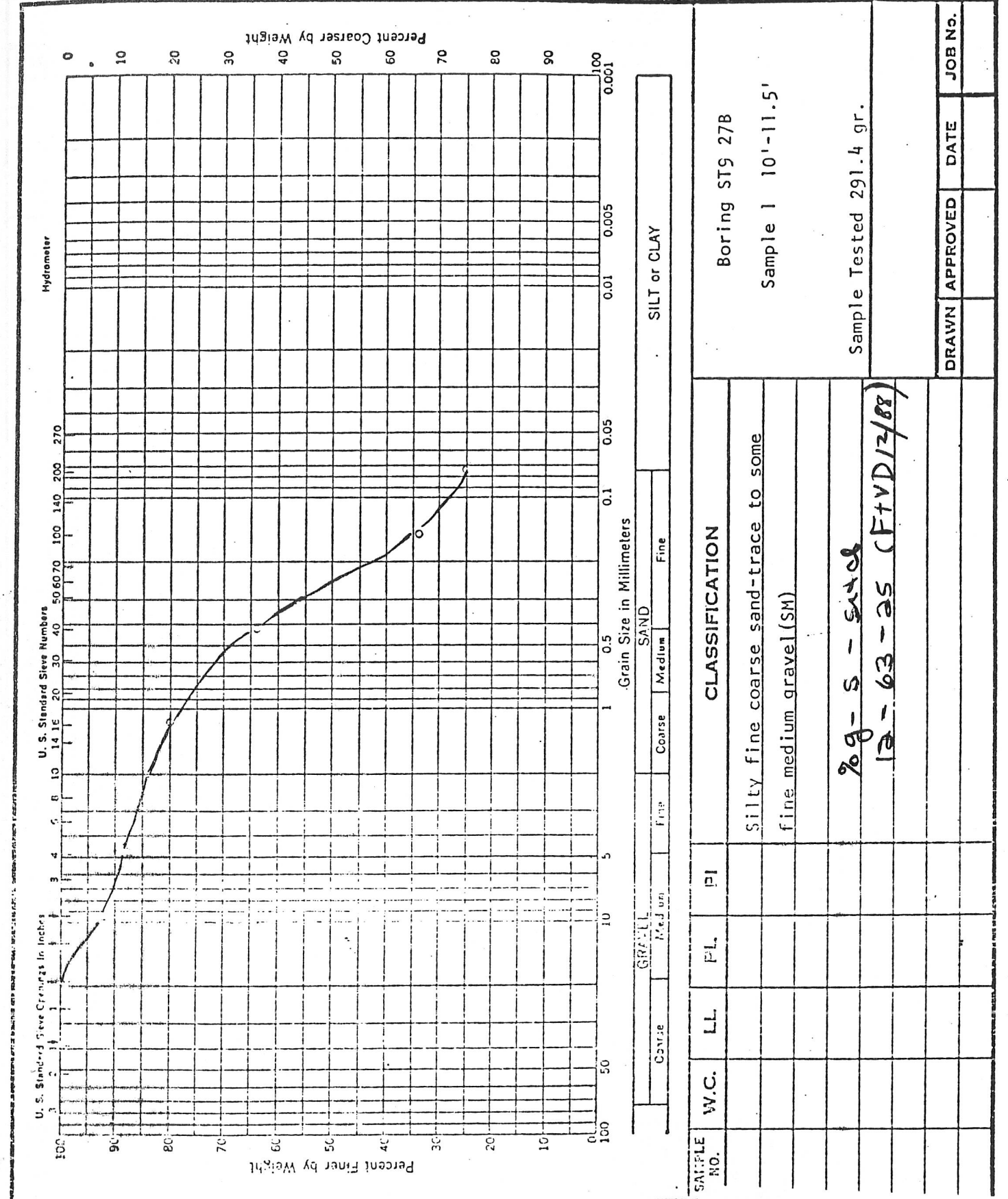
DRAWN	APPROVED	DATE	JOB No.

LOG OF BORING NO. 19 - 27B				
OWNER Bear Creek Mining Company		ARCHITECT-ENGINEER 27B		
SITE Ladysmith, Wisconsin		PROJECT NAME Proposed Mine Development		
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2 PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % STANDARD "N" PENETRATION (BLOWS/FT.)
SURFACE ELEVATION +1112				
5			Fine coarse sand-some fine coarse angular and sub-angular gravel-brown(SW) hit many boulders between 5' and 12' had to offset 2 times to get past 10'	
10	1	SS	Silty fine coarse sand-trace to some fine medium gravel-trace clay-reddish brown(SM)	24
15				
19	2 2A	SS SS	Saprolite-yellow brown, brown, and white silt(ML)	24
End of Boring 17.5' NX Casing Left 8' of NX Casing in hole left 1 1/2" Ø PVC to 11'				

WATER LEVEL OBSERVATIONS	
W.L.	W.S. OR W.D.
W.L.	2' B.C.P. A.C.P.
W.L.	

SOIL TESTING SERVICES OF WIS., INC. 540 LAMDEAU STREET GREEN BAY, WIS. 54303		BORING STARTED 6-23-73	BORING COMPLETED 6-23-73
		FIG W-15	FOREMAN RR
		DRAWN	APPROVED WMP
		JOB # 4970 A	SHEET

The stratification lines represent the approximate bound-
between soil types and the transition may be gradual.



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LOG OF BORING NO. 28 - 20

OWNER Bear Creek Mining Company		ARCHITECT-ENGINEER 28								
SITE Ladysmith, Wisconsin		PROJECT NAME Proposed Mine Development								
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2				
						PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %	STANDARD "N" PENETRATION (BLOWS/FT.)	
X				SURFACE ELEVATION → +1104		10	20	30	40	50
5				No samples-very hard drilling- 5' NX casing broke off at 10 feet						
10										
				End of Boring						

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WATER LEVEL OBSERVATIONS		SOIL TESTING SERVICES		BORING STARTED 6-23-73	
W.L.	W.S. OR W.D.	OF WIS., INC.		BORING COMPLETED 6-23-73	
W.L.	B.C.R.	540 LAMBEAU STREET		REQ 22	FOREMAN JG
W.L.	A.C.R.	GREEN BAY, WIS. 54303		DRAWN	APPROVED WHP
				JOB # 4970 A	SHEET

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.
3.5-B-66

BB-S-91471

LOG OF BORING NO. 28A - 28A

OWNER Bear Creek Mining Company		ARCHITECT-ENGINEER 28A								
SITE Ladysmith, Wisconsin		PROJECT NAME Proposed Mine Development								
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2				
						PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %	STANDARD "N" PENETRATION (BLOWS/FT.)	
X				SURFACE ELEVATION → 40' SE of 9-28		10	20	30	40	50
5				No samples-very hard drilling- sandstone at 15.7'-bottom 5' of NX casing broke off						
10										
15										
16.3				End of Boring						

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WATER LEVEL OBSERVATIONS		SOIL TESTING SERVICES		BORING STARTED 6-23-73	
W.L.	W.S. OR W.D.	OF WIS., INC.		BORING COMPLETED 6-23-73	
W.L.	B.C.R.	540 LAMBEAU STREET		REQ 22	FOREMAN JG
W.L.	A.C.R.	GREEN BAY, WIS. 54303		DRAWN	APPROVED WHP
				JOB # 4970 A	SHEET

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.
3.5-B-67

BB-S-91471

LOG OF BORING NO. 19- 28B

OWNER: Bear Creek Mining Company
 ARCHITECT-ENGINEER: [Blank]
 SITE: Ladysmith, Wisconsin
 PROJECT NAME: Proposed Mine Development

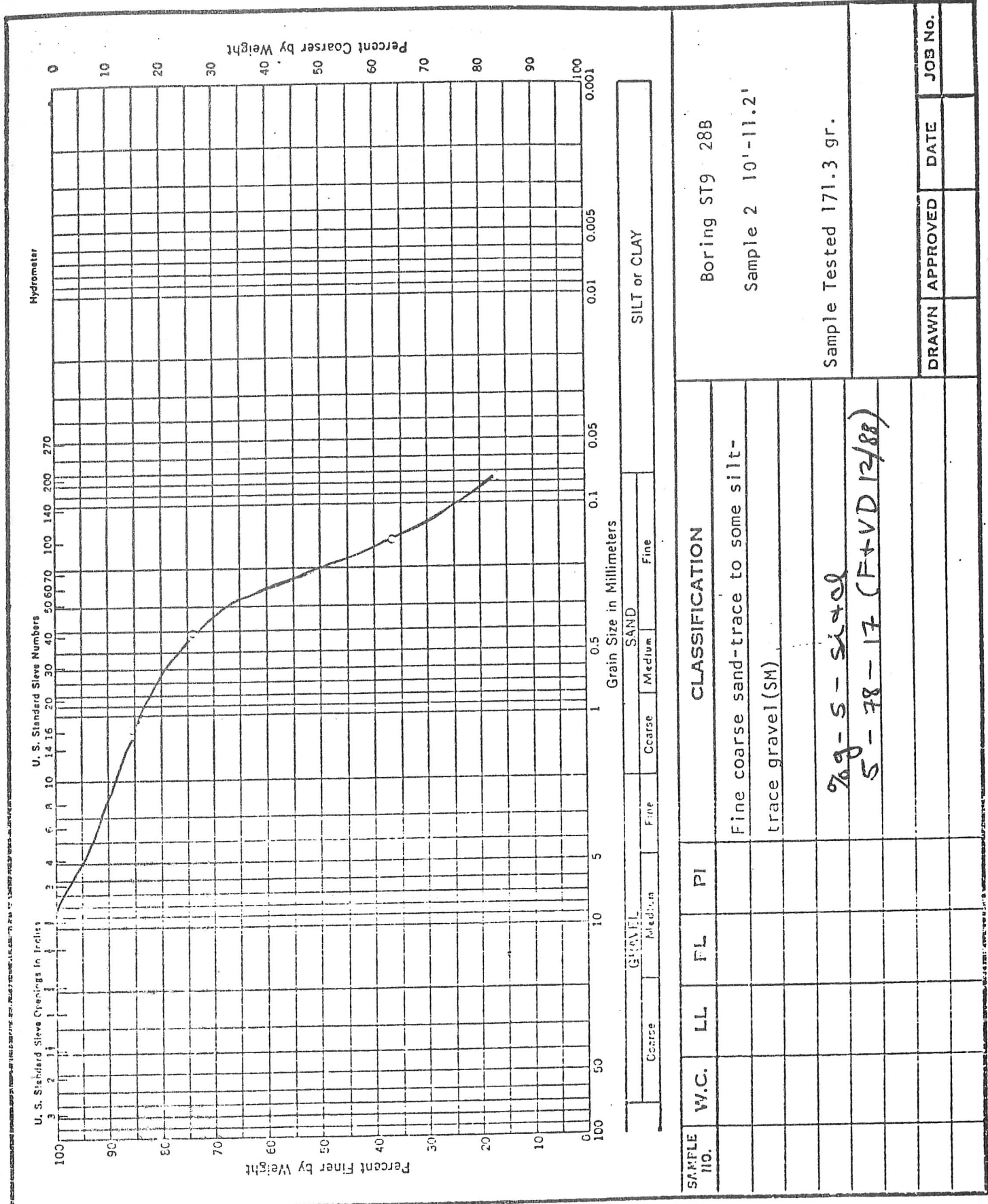
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2				
						1	2	3	4	5
						PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % STANDARD "N" PENETRATION (BLOWS/FT.)				
				SURFACE ELEVATION ↓		10	20	30	40	50
5	1	SS		Fine coarse sand-trace to some silt-trace gravel-dark reddish brown to brown (SM)						
10	2	SS								
13.5				Saprolite-reddish purple clay with sand and angular rock fragments						
15	3	SS								
16.5										
				End of Boring						
				15' NX Casing						
				Left 5' of NX Casing in hole						
				Left 1 1/2" Ø PVC to 9'						

⊗ 54

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WATER LEVEL OBSERVATIONS		SOIL TESTING SERVICES OF WIS., INC. 540 LANDEAU STREET GREEN BAY, WIS. 54303	BORING STARTED 6-23-73	
W.L.	W.S. OR W.D.		BORING COMPLETED 6-23-73	
W.L. 4'	P.C.R.		NO. 22	FOREMAN JG
W.L.	A.C.R.	DRAWN	APPROVED WMP	
		LOG # 4970 A	SHEET	

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.



Boring ST9 28B
 Sample 2 10'-11.2'
 Sample Tested 171.3 gr.

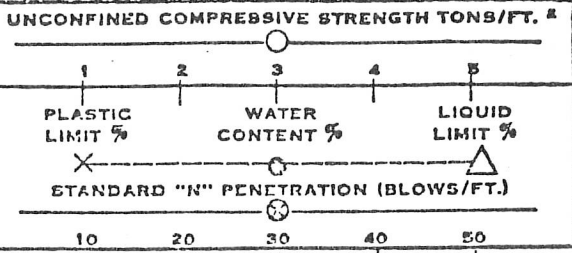
DRAWN APPROVED DATE JOB No.

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LOG OF BORING NO. 29 - 29

OWNER Bear Creek Mining Company	ARCHITECT-ENGINEER 29
SITE Ladysmith, Wisconsin	PROJECT NAME Proposed Mine Development

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2				
						1 PLASTIC LIMIT %	2 WATER CONTENT %	3 STANDARD "N" PENETRATION (BLOWS/FT.)	4 LIQUID LIMIT %	5
X				SURFACE ELEVATION → +1101						
5	1	SS		Silty fine coarse sand-trace to some fine medium gravel-reddish brown(SM) large boulders to 5'-had to offset 3 times to get past 5 feet			⊗33			
10	2	SS		Saprolite-white and brown silt(ML)			⊗24			
11.5	2A	SS								
				End of Boring 10' NX Casing 1 1/2" Ø PVC installed to 9' pea gravel from 11.5' to 5' bentonite from 5' to 2' sand and gravel 2 feet to ground surface-left 5' NX casing in hole						



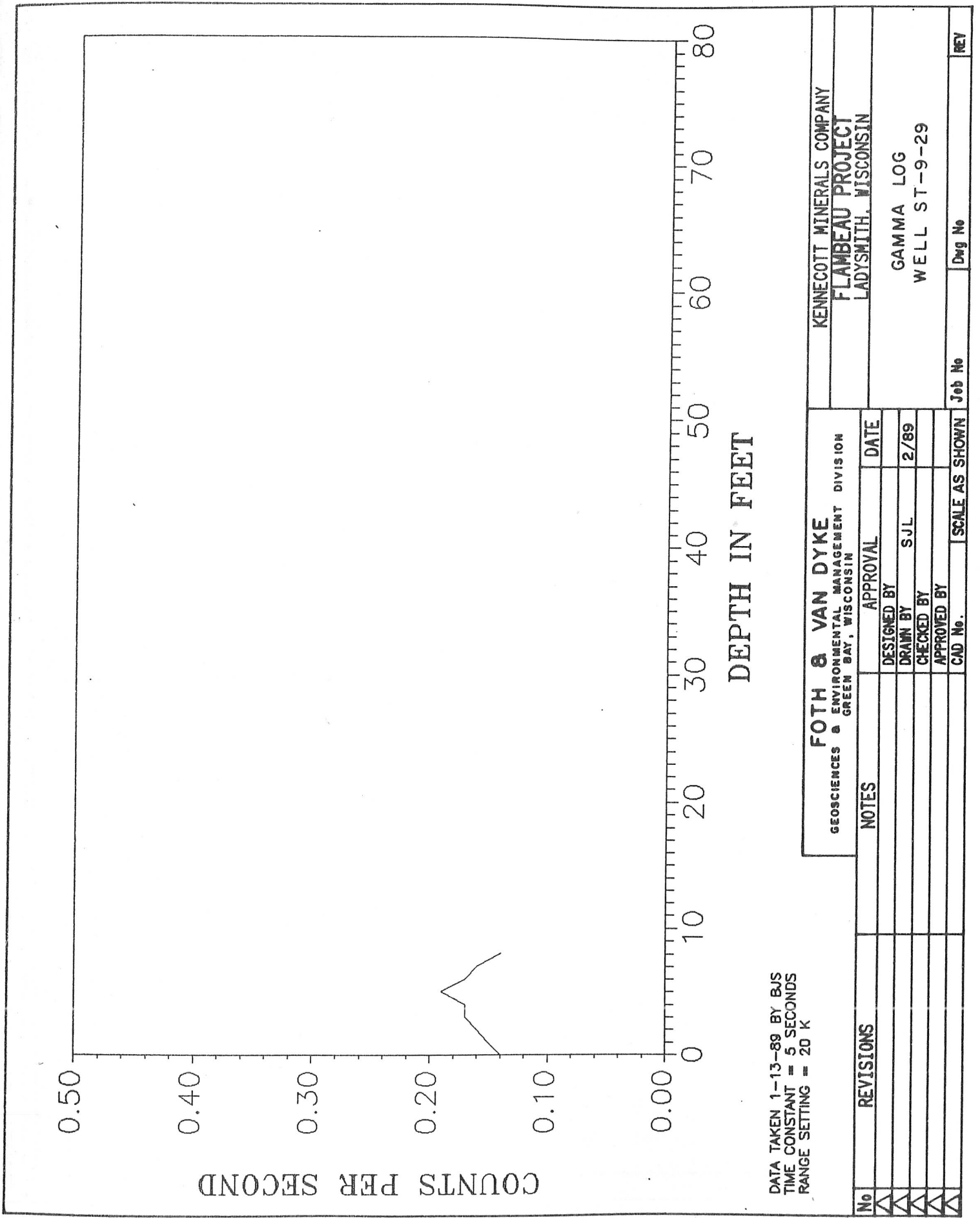
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WATER LEVEL OBSERVATIONS	
W.L.	W.S. OR W.D.
W.L. 4.5' B.C.P.	A.C.P.
W.L.	

SOIL TESTING SERVICES
 GEOTECHNICAL CONSULTING
 OF WIS., INC.
 540 LAMBEAU STREET
 GREEN BAY, WIS. 54303

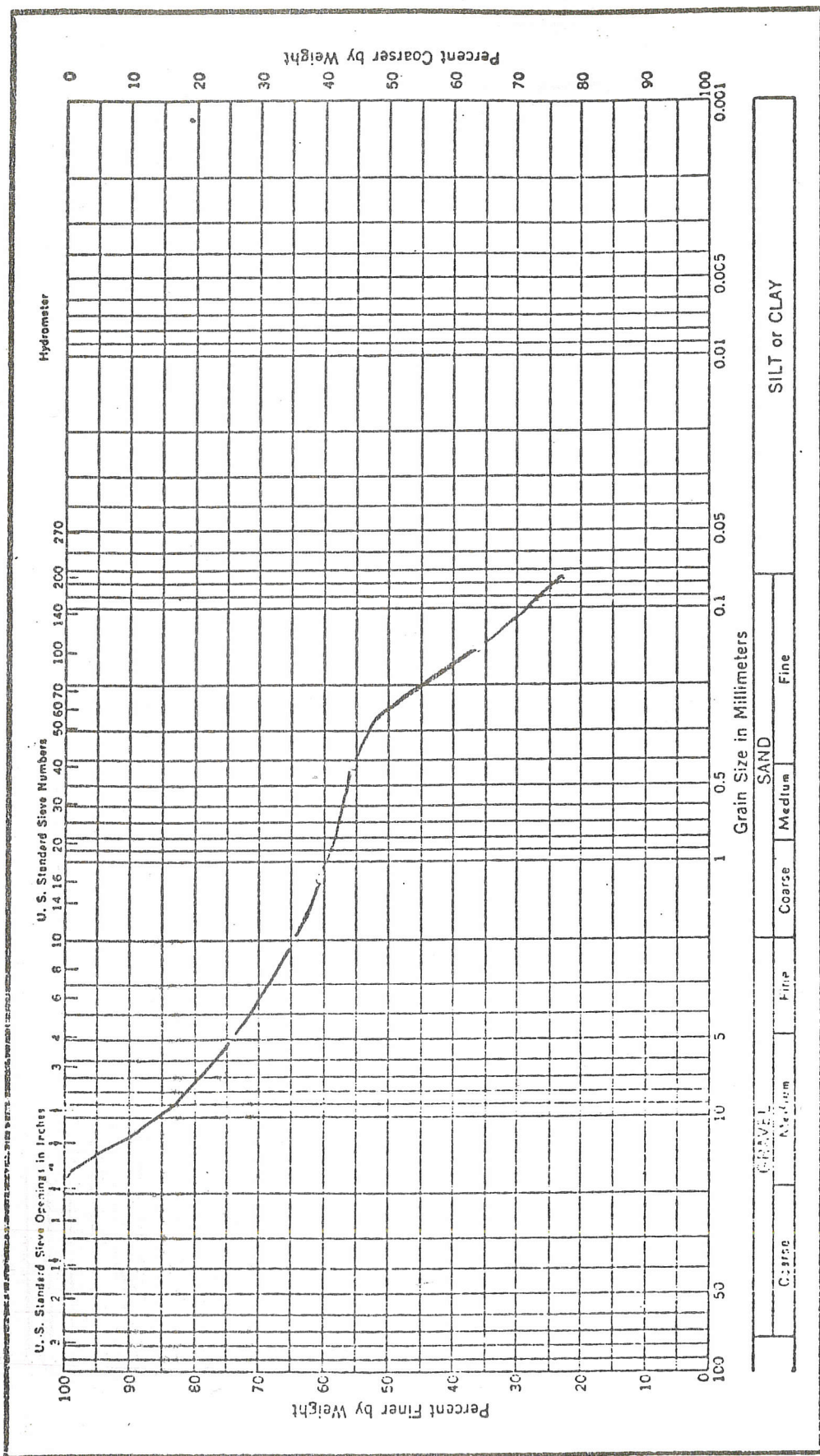
BORING STARTED	6-23-73
BORING COMPLETED	6-23-73
RIG	M-15
FORAMAN	RR
DRAWN	APPROVED WMP
JOB #	4970 A
SHEET	

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

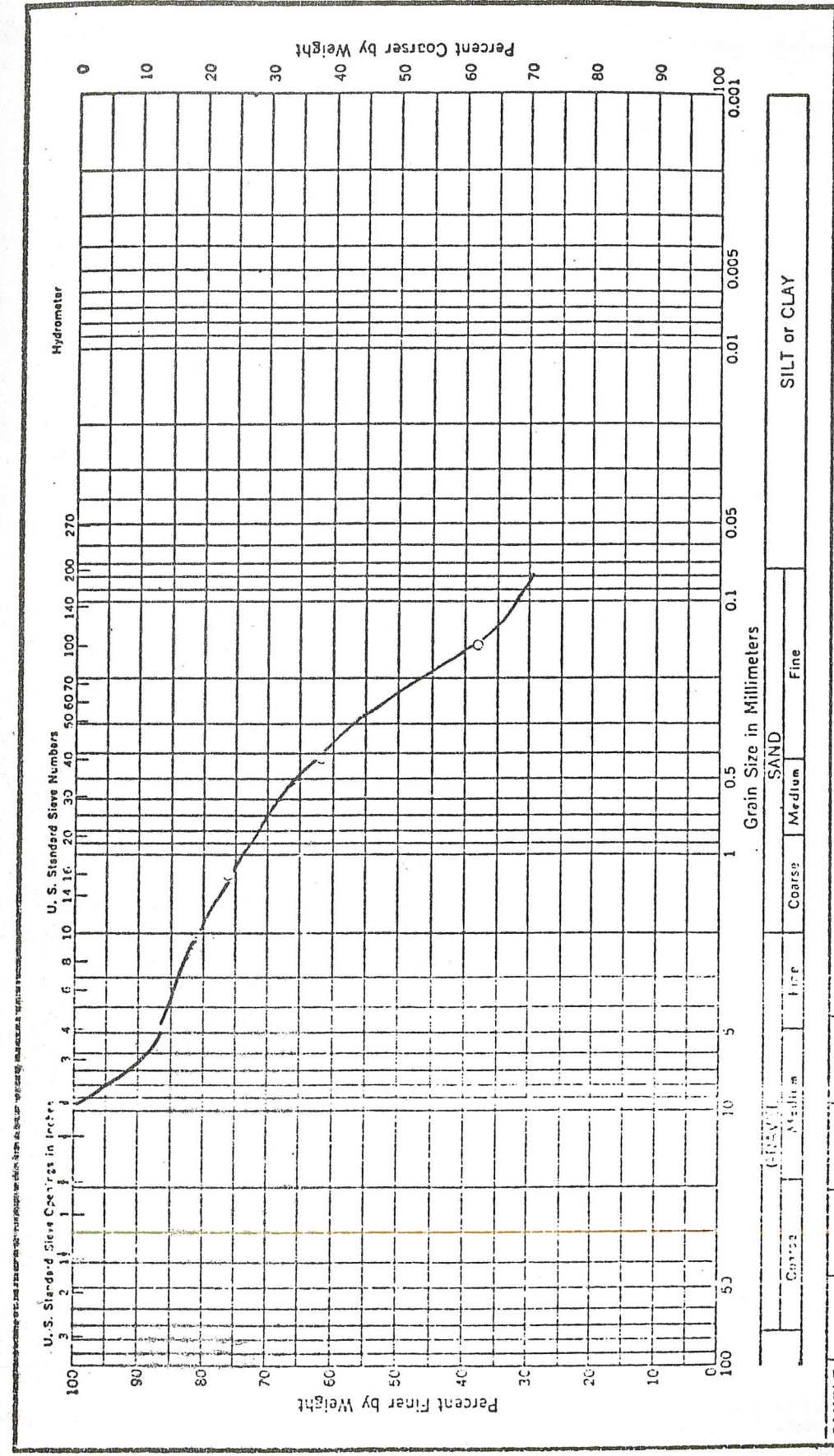


KENNECOTT MINERALS COMPANY	
FLAMBEAU PROJECT	
LADYSMITH, WISCONSIN	
GAMMA LOG	
WELL ST-9-29	
Job No	
Dwg No	
REV	
FOTH & VAN DYKE	
GEOSCIENCES & ENVIRONMENTAL MANAGEMENT DIVISION	
GREEN BAY, WISCONSIN	
APPROVAL	DATE
DESIGNED BY	2/89
DRAWN BY	SJL
CHECKED BY	
APPROVED BY	
CAD No.	SCALE AS SHOWN
No	REVISIONS
△	
△	
△	
△	

88 S-81471



SAMPLE NO.	W.C.	LL	PL	PI	CLASSIFICATION	Boring ST9 29 Sample 1 5'-6.5'	DRAWN	APPROVED	DATE	JOB NO.



SAMPLE NO.	W.C.	LL	FL	PI	CLASSIFICATION	Boring ST9 29 Sample 2 10'-10.5'	DRAWN	APPROVED	DATE	JOB NO.

LOG OF BORING NO. ST-9-30

OWNER Flambeau Mining Corporation				ARCHITECT-ENGINEER						
SITE Flambeau Mine Ladysmith, Wisconsin				PROJECT NAME Proposed Ore Process Plant						
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	RECOVERY	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2					
					PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %	STANDARD "N" PENETRATION (BLOWS/FT.)		
				SURFACE ELEVATION 1149.6						
				Dark brown silty topsoil-(OL) frozen						
1	SS			Brown very fine sandy silt, trace fine roots, trace clay, with thin seams of brown clayey silt (CL-ML) loose to medium dense-damp-(ML)						
2	SS			Brown clayey sandy silt-medium dense-damp-(ML-CL)						
3	SS			Brown fine to coarse sand, trace to some fine to medium gravel, trace silt-dense-damp (SW)						
4	SS			Brown fine to medium sand, trace silt-dense-damp-(SM)						
5	SS			Brown silty very fine to fine sand, with some fine to coarse angular gravel (possible decomposed cobbles)-very dense-saturated-(SM-ML)						
6	SS			Dark red brown silt, some fine sand, trace fine gravel, with occasional very thin (1/16") seams of red clay-very dense-saturated-(ML)						
7	SS			Dark red brown silt, some fine sand, trace fine gravel, with occasional very thin (1/16") seams of red clay-very dense-saturated-(ML)						
8	SS			End of Boring						
				Auger boring full depth No casing or wash water used						

ST-9-30

9 3/4
Borehole

7 1/8
Borehole

7 0
Borehole

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WATER LEVEL OBSERVATIONS		SOIL TESTING SERVICES OF WIS., INC. GREEN BAY, WISCONSIN 540 LAMBEAU ST	BORING STARTED	4-1-75
W.L. 15'-16.5'	W.S. P.M.W.D.		BORING COMPLETED	4-1-75
W.L. B.C.R.	A.C.R.		RIG W-22	FOREMAN CF
W.L. 14.5' AR			DRAWN JK	APPROVED WCK
12.7' 3 Days AB			JOB # 6575	SHEET

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. ST-9-31

OWNER Flambeau Mining Corporation				ARCHITECT-ENGINEER						
SITE Flambeau Mine Ladysmith, Wisconsin				PROJECT NAME Proposed Ore Process Plant						
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	RECOVERY	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2					
					PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %	STANDARD "N" PENETRATION (BLOWS/FT.)		
				SURFACE ELEVATION 1143.8						
				Dark brown silty topsoil-(OL)						
				See Note "A"						
1	SS			Brown sandy silt, trace clay-very tough-moist-(ML)						
2	SS			Brown silty fine sand and silty fine to coarse sand, trace to some fine to coarse gravel, with 1/2" seams of dark red brown silty clay-(CL)-very dense-damp-(SM)						
3	SS			Brown silty fine sand, trace fine gravel-dense-saturated-(SM-ML)						
4	SS			Brown silty clayey fine to medium sand, trace fine gravel tough to hard-(SC)						
5	SS			Mottled brown clayey silt, trace fine sand-tough-(CL-ML)						
6	SS			End of Boring						
7	SS			Auger boring full depth No casing or wash water used						
8	SS			Note A: Mottled yellow brown, brown, and gray silt, trace fine sand and clay with thin seams of yellow brown fine sand-(SP)-very tough-(ML)						

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WATER LEVEL OBSERVATIONS		SOIL TESTING SERVICES OF WIS., INC. GREEN BAY, WISCONSIN 540 LAMBEAU ST	BORING STARTED	4-1-75
W.L. 14'	W.S. P.M.W.D.		BORING COMPLETED	4-2-75
W.L. B.C.R.	A.C.R.		RIG W-22	FOREMAN CF
W.L. 14.3' AB			DRAWN JK	APPROVED WCK
14.5' 1 Day AB			JOB # 6575	SHEET

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. ST-9-32

OWNER				ARCHITECT-ENGINEER			
Flambeau Mining Corporation				PROJECT NAME			
SITE				Proposed Ore Process Plant			
Flambeau Mine				UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²			
Ladysmith, Wisconsin							
DEPTH	ELEVATION	SAMPLE NO.	TYPE SAMPLE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³	STANDARD "N" PENETRATION (BLOWS/FT.)
	1149.6				SURFACE ELEVATION		
1		SS			Dark brown silty topsoil-(OL)		5
2		SS			Mottled brown silty very fine sand-medium dense-dry-(SM-ML)		12
3		SS			Mottled yellow red brown and gray brown sandy clayey silt-very tough-(ML-CL)		15
4		SS			Brown sandy silt, trace fine gravel-very tough-moist-(ML)		11
5		SS					35
6		SS					36
7		SS			Brown fine to medium sand, trace silt and fine gravel-dense to medium dense-damp, changing to wet at 15'-(SP)		28
8		SS					20
9		SS			Brown silty sandy clay, trace to some fine to medium gravel-very tough-saturated-(CL-SC)		7
10		SS			Mottled brown, gray, and yellow brown silty clay, trace sand-hard-(CL-ML)		13
End of Boring							Calibrated Penetrometer
Auger boring to 15 feet							
Wash boring below 15 feet							
25 feet of NX casing							

ST-9-32

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WATER LEVEL OBSERVATIONS			SOIL TESTING SERVICES		BORING STARTED	
W.L. 14'	W.S. 88.8 XXX		OF WIS., INC.		3-19-75	
W.L. 6.5' B.C.R.	7.4' A.C.R.		GREEN BAY, WISCONSIN		BORING COMPLETED	
W.L.			540 LAMBEAU ST.		3-19-75	
			DRAWN JK		FOREMAN FV	
			JOB # 6575		APPROVED WCK	
			SHEET			

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. ST-9-33				ARCHITECT-ENGINEER			
OWNER				PROJECT NAME			
Flambeau Mining Corporation				Proposed Ore Process Plant			
SITE				UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²			
Flambeau Mine							
Ladysmith, Wisconsin				STANDARD "N" PENETRATION (BLOWS/FT.)			
DEPTH	ELEVATION	SAMPLE NO.	TYPE SAMPLE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³	STANDARD "N" PENETRATION (BLOWS/FT.)
	1146.7				SURFACE ELEVATION		
1		SS			Dark brown silty topsoil-(OL)		5
2		SS			Mottled brown silty very fine sand-medium dense-dry-(SM-ML)		12
3		SS			Brown fine to medium sand, trace fine to medium gravel, trace silt-dense-damp-(SP)		23
4		SS			Brown silty very fine sand, trace fine gravel-dense-damp-(SM-ML)		41
5		SS			Brown silty fine to medium sand, trace fine gravel-dense-wet-(SM)		44
6		SS			Dark red brown sandy silt, trace clay and fine to medium gravel-dense-saturated-(ML)		31
7		SS			Brown silty fine to coarse sand, trace fine gravel, with seams of red-brown fine gravel-dense-saturated-(SH)		43
8		SS			Brown silty clayey fine to medium sand, trace fine to medium gravel, with thin seams of brown silt-fine sand-medium dense-saturated-(SC)		37
9		SS			Brown fine sand, trace to some silt, trace fine gravel-dense-saturated-(SM-SC)		30
10		SS			Brown silty clayey sand with brown of gray silty fine to coarse sand-dense-saturated-(SC)		36
11		SS			Dark red brown silty clayey sand, trace fine gravel-hard-saturated-(SC-CL)		41
12		SS					30
13		SS			Yellow brown silt, trace clay sand and fine gravel-dense to very dense-saturated-(ML)		50
14		SS					64
15		SS			Mottled brown and yellow red silty sandy clay, some fine to medium gravel-hard-saturated-(CL-SC)		30
16		SS			Yellow red sandy silt, trace to some fine to medium gravel, trace clay-very dense-saturated-(ML)		30
17		SS			Yellow red silty fine sand, trace fine gravel-dense-wet-(SM)		63
18		SS			Sepiolite-yellowish white and gray-silt with angular gravel fragments-talc-very dense-(ML)		41
19		SS					61
End of Boring							Calibrated Penetrometer
27.5' of 4 inch casing used							
60' of Revert used							
Auger boring to 20 feet							
Wash boring below 20 feet							

ST-9-33

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LOG OF BORING NO. ST-9-36

OWNER Flambeau Mining Corporation		ARCHITECT-ENGINEER		
SITE Flambeau Mine Ladysmith, Wisconsin		PROJECT NAME Proposed Ore Process Plant		
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²
				PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % STANDARD "N" PENETRATION (BLOWS/FT.)
			SURFACE ELEVATION 1150.6	
1	SS		Dark brown silty topsoil-(OL) trace Dark brown fine sandy silt, trace fine roots-loose-moist-(ML)	28
2	SS		Mottled brown, yellow red, and gray fine sandy silt-medium dense to dense-damp-(ML)	26
3	SS			33
4	SS		Brown fine to coarse sand, trace to some fine to coarse gravel, trace silt-dense-damp-(SW)	41
5	SS			50
6	SS		Brown fine to medium sand, trace silt-dense to loose- wet-(SP)	30
7	SS			30
8	SS		Brown silty sandy clay, trace fine to medium gravel-hard- (CL)	35
End of Boring Auger boring full depth No casing or wash water used Cobbles and coarse gravel noted throughout boring				

ST-9-36

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WATER LEVEL OBSERVATIONS		BORING STARTED 4-3-75	
W.L. 15'-16.5'	W.S. DNKXD.	BORING COMPLETED 4-3-75	
W.L. B.C.R.	A.C.R.	RIG W-22	FOREMAN CF
W.L. WCI 14.2' AB		DRAWN JK	APPROVED WCK
		JOB # 6575	SHEET

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE 150, GREEN BAY, WISCONSIN
540 LAMBEAU ST.

The stratification lines represent the approximate bound-
ary between soil types and the transition may be gradual.

LOG OF BORING NO. ST-9-37

OWNER Flambeau Mining Corporation		ARCHITECT-ENGINEER		
SITE Flambeau Mine Ladysmith Wisconsin		PROJECT NAME Proposed Ore Process Plant		
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²
				PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % STANDARD "N" PENETRATION (BLOWS/FT.)
			SURFACE ELEVATION 1147.2	
1	SS		Dark brown silty topsoil-(OL) See Note "A"	28
2	SS		Brown sandy silt, trace fine to some fine sand, trace clay- medium dense-damp-(ML)	24
3	SS		Brown fine sand, trace silt, with lenses of brown silty fine sand medium dense-damp-(SP)	22
4	SS		Brown fine to coarse sand, trace silt and fine gravel-dense- wet-(SW)	38
5	SS		Brown silty very fine sand- very dense-saturated-(SM-ML)	66
6	SS		Dark brown silty very fine sand, trace fine to medium gravel-very dense-saturated-(SM)	21 1/2 SAMPLING
7	SS		Brown fine sand trace to some fine to medium gravel, trace silt- dense to medium dense-wet-(SP)	43
8	SS			27
End of Boring Auger boring full depth No casing or wash water used Cobbles and coarse gravel noted throughout boring				
Note A: Mottled gray, brown, and yellow brown silt, trace to some fine sand, trace clay-medium dense-damp-(ML)				

ST-9-37

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WATER LEVEL OBSERVATIONS		BORING STARTED 4-3-75	
W.L. 15'-16.5'	W.S. DNKXD.	BORING COMPLETED 4-3-75	
W.L. B.C.R.	A.C.R.	RIG W-22	FOREMAN CF
W.L. WCI 16.3' AB		DRAWN JK	APPROVED WCK
WCI 21' AB		JOB # 6575	SHEET
WCI 13.3' 4 Hrs. AR		The stratification lines represent the approximate bound- ary between soil types and the transition may be gradual.	

SOIL TESTING SERVICES
OF WIS., INC.
GREEN BAY, WISCONSIN
540 LAMBEAU ST.

LOG OF BORING NO. ST-9-38

OWNER Flambeau Mining Co. ation		ARCHITECT-ENGINEER					
SITE Flambeau Mine Ladysmith, Wisconsin		PROJECT NAME Proposed Ore Process Plant					
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²			
				PLASTIC LIMIT %			
				WATER CONTENT %			
				LIQUID LIMIT %			
				STANDARD "N" PENETRATION (BLOWS/FT.)			
				UNIT DRY WT. LBS./FT. ³			
				SURFACE ELEVATION → 1144.5			
				1	SS	Dark brown silty topsoil-(OL-frozen)	32
				2	SS	Mottled brown sandy silt-medium dense-damp-(SM-ML)	27
3	SS	Brown sandy silt, trace clay-hard-damp-(ML)	35				
4	SS	Brown silty very fine sand with seams of brown fine to coarse sand, trace fine gravel-(SP) medium dense-damp-(SM-ML)	51				
5	SS	Brown sandy silt, trace fine gravel, with seams of brown fine to coarse sand-(SW) dense-damp-(ML)	56				
10	5	SS	Red brown sandy silt, trace clay and fine to medium gravel-dense-damp-(ML)	42			
15	6	SS	Brown silty clayey sand, trace fine gravel-medium dense-saturated-(SC-CL)	27			
20	7	SS	Mottled brown and yellow brown silty clay, trace fine sand-very tough-(CL-ML)	29			
25	8	SS	End of Boring	25			
26.5	Auger boring full depth No casing or wash water used Cobbles and coarse gravel noted throughout boring			*Calibrated Penetrometer			

ST-9-38

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WATER LEVEL OBSERVATIONS	
W.L. 15'-16.5'	W.S. OR W.P. XX
W.L. B.C.R.	A.C.R.
W.L. 15.3' AB	
14.6' Few Hours AB	

SOIL TESTING SERVICES
OF WIS., INC.
GREEN BAY, WISCONSIN
540 LAMBEAU ST

BORING STARTED	4-13-75
BORING COMPLETED	4-13-75
RIG	W-22
FOREMAN	CF
DRAWN	JK
APPROVED	WCK
JOB #	6575
SHEET	

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. ST-9-39

OWNER Flambeau Mining Corporation		ARCHITECT-ENGINEER					
SITE Flambeau Mine Ladysmith, Wisconsin		PROJECT NAME Proposed Ore Process Plant					
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²			
				PLASTIC LIMIT %			
				WATER CONTENT %			
				LIQUID LIMIT %			
				STANDARD "N" PENETRATION (BLOWS/FT.)			
				UNIT DRY WT. LBS./FT. ³			
				SURFACE ELEVATION → 1141.9			
				1	SS	Black silty topsoil-(OL-frozen)	36
				2	SS	Mottled yellow brown and gray silt, trace fine sand and clay-very tough-damp-(ML)	17
3	SS	Mottled gray and dark brown sandy silt-very tough-damp-(ML)	38				
4	SS	Brown silty fine to medium sand, trace to some fine to medium gravel-dense-moist-(SM)	48				
5	SS	Brown and red brown silty clayey sand, trace to some fine to medium gravel-medium dense to dense-wet at 15'-(SC-CL)	20				
6	SS	Brown silty fine to coarse sand, trace to some fine to medium gravel-loose-wet-(SM)	30				
7	SS	End of Boring	9				
26.5	Auger boring full depth-no casing or wash water used			*Calibrated Penetrometer			

ST-9-39

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WATER LEVEL OBSERVATIONS	
W.L. 15'-16.5'	W.S. OR W.P. XX
W.L. B.C.R.	A.C.R.
W.L. 14.5' AB	
9.5' 1 Day AB	

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	4-2-75
BORING COMPLETED	4-2-75
RIG	W-22
FOREMAN	CF
DRAWN	WW
APPROVED	WCK
JOB #	6575
SHEET	

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. ST-9-41

OWNER Flambeau Mining Corporation		ARCHITECT-ENGINEER		
SITE Flambeau Mine Ladysmith, Wisconsin		PROJECT NAME Proposed Ore Process Plant		
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²
				UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²
				PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % STANDARD "N" PENETRATION (BLOWS/FT.)
			SURFACE ELEVATION → 1148.4	
1	SS		Dark brown silty topsoil-(OL) frozen	
2	SS		Mottled brown silt, trace fine sand and clay, with thin seams of brown fine sand-(SP) medium dense-damp-(ML)	
3	SS		Brown silty clayey sand, trace to some fine to medium gravel-dense-damp-(SC-CL)	
4	SS		Brown fine to coarse sand, trace to some fine to medium gravel, trace silt-dense-damp-(SW)	
5	SS		Brown silty very fine sand-very dense-moist-(SM-ML)	
6	SS		Brown fine to medium sand, trace silt and fine gravel-dense-wet-(SP)	
7	SS		Brown silty clayey sand, trace fine gravel-very dense-saturated-(SC)	
8	SS		End of Boring Auger boring full depth-no casing or wash water used-cobbles and coarse gravel noted through boring	

BORING STARTED	4-2-75
BORING COMPLETED	4-2-75
RIG	W-22
FOREMAN	CF
DRAWN	WW
APPROVED	WCK
JOB #	6575
SHEET	

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

The stratification lines represent the approximate boundary between soil types and the transition may be gradual

LOG OF BORING NO. ST-9-41

OWNER Flambeau Mining Corporation		ARCHITECT-ENGINEER		
SITE Flambeau Mine Ladysmith, Wisconsin		PROJECT NAME Proposed Ore Process Plant		
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²
				UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²
				PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % STANDARD "N" PENETRATION (BLOWS/FT.)
			SURFACE ELEVATION → 1145.5	
1A	SS		Dark brown silty topsoil-(OL)	
2	SS		Yellow brown sandy clayey silt-very tough-(ML-CL)	
3	SS		Brown very fine sandy silt, trace fine gravel-medium dense-damp-(ML)	
4	SS		Brown silty fine sand, trace fine gravel-medium dense-damp-(SM) cobble at 6 feet	
5	SS			
6	SS			
7	SS		Brown silty very fine sand to sandy silt, trace to some fine to coarse gravel-medium dense-(SM-ML)	
8	SS			
9	SS		Mottled yellow gray and gray silty clay, trace fine sand-hard-(CL-ML)	
10	SS		Dark red brown and red gray silty clay trace fine sand and fine gravel-very tough-(CL-ML)	
			End of Boring 25' of NX Casing used Auger boring to 7 feet Wash boring below 7 feet	*Calibrated Penetrometer

WATER LEVEL OBSERVATIONS	
W.L.	15-16.5' W.S. XXXXX
W.L.	6.7' B.C.R. 7.1' A.C.R.
W.L.	Dry to 6' WD with auger

SOIL TESTING SERVICES
OF WIS., INC.
GREEN BAY, WISCONSIN
540 LAMBEAU ST

BORING STARTED	3-19-75
BORING COMPLETED	3-19-75
RIG	8
FOREMAN	EV
DRAWN	WW
APPROVED	WCK
JOB #	6575
SHEET	

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.
3.5-B-85

LOG OF BORING NO. ST-9-42		OWNER	ARCHITECT-ENGINEER
Flambeau Mining Corporation		Flambeau Mining Company	
Ladysmith, Wisconsin		PROJECT NAME	Proposed Ore Process Plant
UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²			
DEPTH ELEVATION	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNITS
0	0	SURFACE ELEVATION 1111	
1	55	Dark brown silty loam (ML)	
2	55	Brown sandy silt, trace fine medium dense-sand (ML)	
3	55	Mottled brown and yellow brown clayey silt, trace fine sand, with thin seams of brown fine sand (SP) very tough (ML-LL)	
4	55	Brown fine sandy silt, trace to coarse gravel-very dense-moist (ML)	
5	55	Brown fine sand, trace to some silt, trace to some fine to coarse gravel-very dense to dense-sand-changing to wet at 10' (SP-SM)	
6	55		
7	55	Brown silty clayey fine to coarse sand, trace to some fine to coarse gravel-dense-saturated (SC-CL)	
8	55	Brown sandy silt, trace fine gravel-dense to very dense-moist (ML)	
9	55		
10	55	Brown silty clayey fine to coarse sand, trace fine gravel-dense to loose-saturated (SC-CL)	
11	55		
12	55		
13	55	Gray brown silty clay, trace fine sand-hard (CL)	
14	55	Dark yellow brown (mottled) silty clay, trace to some fine gravel, trace silt-hard (CL)	
15	55	Stratum of cobbles and boulders, in probable sand matrix-could not sample-rock bit	
16	55	Dark gray brown silty very fine sand, trace to some fine to coarse gravel-dense to very dense-saturated (SM-ML)	
17	55		
18	55	Gray brown fine to coarse sand, trace to some fine to coarse gravel, trace silt-very dense-saturated (SM)	
19	55	End of Boring 20' of 4" casing used 60' of drilling mud used (4-vert) Auger boring to 17.5 feet Wash boring below 17.5 feet	

ST-9-42

ST-9

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LOG OF BORING NO. ST-9-57		OWNER	ARCHITECT-ENGINEER
Flambeau Mining Company		Flambeau Mining Company	
Ladysmith, Wisconsin		PROJECT NAME	Proposed Mine Development
UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²			
DEPTH ELEVATION	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNITS
0	0	SURFACE ELEVATION 1111	
1	55	Silty SAND (SM), non to slightly plastic, trace roots in upper foot, dark reddish brown, wet, waterbearing, loose to dense, outwash	
2	55		
3	55	Slightly silty fine to coarse SAND (SW-SM), some gravel, yellowish red, waterbearing, dense, outwash	
4	55	Silty very fine SAND (SM), nonplastic, red, waterbearing, dense, outwash	
5	55		
6	55	Sandy GRAVEL (GW), trace silt, some cobbles and boulders, weak red, water bearing, very dense, outwash	
7	55		
8	55		
9	55		
10	55	Sandstone, quartz grains in layers ranging from silt size to medium sand size, white mottled pink to light gray, weakly cemented, waterbearing	
11	55		
12	55		
13	55		
14	55		
15	55		
16	55	SAPROLITE, SILT (ML), light gray mottled reddish yellow, pearly lustre, moist, very dense	
17	55		
18	55		
19	55		
20	55		
21	55		
22	55		
23	55		
24	55		
25	55		
26	55		
27	55		
28	55		
29	55		
30	55		
31	55		
32	55		
33	55		
34	55		
35	55		
36	55		
37	55		
38	55		
39	55		
40	55		
41	55		
42	55		
43	55		
44	55		
45	55	End of Boring Boring advanced to 6 feet by power auger, to 23' by 4" casing, Revert and cutting bits, to 43' by Revert and cutting bits.	

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WATER LEVEL OBSERVATIONS		SOIL TESTING SERVICES		BORING STARTED	
WL	2.5' WD	OF WIS., INC.		Oct. 23, 1975	
WL	BCR	540 LAMBEAU STREET		BORING COMPLETED	
WL	ACR	GREEN BAY, WIS. 54303		Oct. 27, 1975	
		DRAWN KO		FOREMAN EV	
		JOB = 6971		APPROVED BMT	
				SHEET 1 of 1	

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. ST-9-58
ARCHITECT-ENGINEER

ST-9-58

OWNER Flambeau Mining Company		PROJECT NAME Proposed Mine Development							
SITE Ladysmith, Wisconsin		ARCHITECT-ENGINEER ST-9-58							
DEPTH ELEVATION	SAMPLE NO	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²	UNIT DRY WT. LBS./FT. 3	PLASTICITY INDEX		
							PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %
				SURFACE ELEVATION 1110.9					
1	SS			Silty SAND(SM), non to slightly plastic, trace to some gravel, red, wet, medium dense, outwash					
2	SS			Silty sandy GRAVEL (GM), nonplastic, red, waterbearing, till					
3	SS			Silty very fine SAND (SM), nonplastic, red, waterbearing, outwash					
4	SS			Sandy GRAVEL (GP), dark reddish gray, waterbearing, outwash					
5	SS			SANDSTONE, quartz grains ranging in size from uniformly fine at the 11-foot depth to fine to coarse at the 20 and 25-foot depths, light pink to light gray, weakly cemented, waterbearing					
6	SS								
7	SS								
8	SS								
9	SS								
10	SS								
11	ST			SAPROLITE, slightly clayey silt (ML), slightly plastic, laminated structure at vertical or near vertical orientation; reddish yellow and yellow brown to 35 feet, silvery gray and dark gray below 35 feet; pearly lustre, moist, very dense RQD from 35.3 to 38.3' = 55% RAD from 40.3 to 47.3' = 46%					
12	ST								

⊗ (Represents blows/ft. with 300-lb. hammer dropping 28" on a 3" O. D. spoon)

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WATER LEVEL OBSERVATIONS		SOIL TESTING SERVICES	
WL 2.7' WS	BCR	ACR	OF WIS., INC.
WL Cave-in at 3' while augering			540 LAMBEAU STREET GREEN BAY, WIS. 54303
BORING STARTED Oct 22, 1975		BORINGS COMPLETED Oct 23, 1975	
RIG #8		FOREMAN EV	
DRAWN KO		APPROVED BMT	
JOB = 6971		SHEET 1 of 1	

OWNER Flambeau Mining Company		ARCHITECT-ENGINEER ST-9-59						
SITE Ladysmith, Wisconsin		PROJECT NAME Proposed Mine Development						
DEPTH ELEVATION	SAMPLE NO	TYPE SAMPLE	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²	UNIT DRY WT. LBS./FT. 3	PLASTICITY INDEX		
						PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %
			SURFACE ELEVATION 1113					
1	SS		Silty fine SAND(SM), nonplastic, trace roots, yellowish red, moist to wet, loose to medium dense, outwash					
2	SS							
3	SS							
4	SS		Slightly silty SAND(SV-SM), some gravel, reddish brown, wet to waterbearing, very dense, outwash					
5	SS							
6	SS		Silty SAND(SM), nonplastic, some gravel, reddish brown, waterbearing, very dense, till					
7	SS		Sandy GRAVEL (Gv), trace silt, weak red, waterbearing, very dense, outwash					
8	SS		SAPROLITE, sandy silt (ML) with zone of silty sand from 27 to 29' nonplastic; pearly white stained reddish yellow, reddish yellow from 27 to 31 feet; talcy texture wet to moist, very dense					
9	SS							
10	SS							
11	SS							
12	SS		SAPROLITE, sandy silt with zone of silty sand from 45 to 46', nonplastic, weak red marbled white and reddish yellow, wet to moist, very dense					
13	SS							
14	SS							
15	SS							
16	SS							
17	SS							
18	SS							
19	SS							
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98	SS							
99	SS							
100	SS							

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LOG OF BORING NO. ST-9-60

OWNER Flambeau Mining Company		ARCHITECT-ENGINEER								
SITE Ladysmith, Wisconsin		PROJECT NAME Proposed Mine Development								
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2				
						1	2	3	4	5
						PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % X-----●-----▲ STANDARD "N" PENETRATION (BLOWS/FT.)				
						10	20	30	40	50
				SURFACE ELEVATION → 1120						
	1	SS		Silty SAND(SM), non to slightly plastic, trace gravel, trace roots, dark brown, wet, loose, outwash						
	2	SS		Medium SAND(SP), trace gravel, yellowish red, moist, medium dense, outwash						
	3	SS		Medium to coarse SAND(SP), some gravel, yellowish red to reddish brown to weak red, moist to waterbearing, very dense, outwash						
	4	SS								
	5	SS								
	6	SS		Slightly silty Sandy GRAVEL (GW-GM), weak red, waterbearing, very dense, till * 1' layer of cobbles and boulders at 17' depth						
	7	SS		Fine SAND (SP), trace to some gravel, reddish brown, waterbearing, very dense, outwash						
	8	SS		SANDSTONE, quartz grains ranging in size from fine to coarse at 25' to fine at 35', light gray stained reddish yellow, very weakly cemented, waterbearing						
	9	SS								
	10	SS								
	11	ST		SAPROLITE, slightly clayey silt(ML), slightly plastic, laminated structure at near vertical orientation; pearly white and yellow changing to dark gray and yellowish brown with depth; moist, very dense						
	12	ST								
	13	ST								
	14	ST		Continued on next sheet						

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WATER LEVEL OBSERVATIONS	
W.L.	ACR
W.L.	BCR
W.L.	ACR

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	Oct. 30, 1975
BORING COMPLETED	Oct. 30, 1975
RIG #8	FOREMAN EV
DRAWN KO	APPROVED BMT
JOB # 6971	SHEET 1 of 2

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

OWNER Flambeau Mining Company	ARCHITECT-ENGINEER
SITE Ladysmith, Wisconsin	PROJECT NAME Proposed Mine Development

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2				
						1	2	3	4	5
						PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % X-----●-----▲ STANDARD "N" PENETRATION (BLOWS/FT.)				
						10	20	30	40	50
				SURFACE ELEVATION → 1120						
				Continued from previous sheet						
	15	SS		SAPROLITE, silt(ML), nonplastic, laminated structure at near vertical orientation, pearly light gray and gray changing to silvery gray and pinkish gray at depth, moist, very dense RQD from 52-1/2 to 53-1/2'=71%						
	16	SS								
	17	SS								
	18	SS								
	19	SS								
	20	SS								
	21	SS								
	22	SS								
	23	SS								
	24	SS								
	25	SS								
	26	SS								
	27	SS								
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	100	SS								

WATER LEVEL OBSERVATIONS	
W.L.	ACR
W.L.	BCR
W.L.	ACR

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	Oct. 30, 1975
BORING COMPLETED	Oct. 30, 1975
RIG #8	FOREMAN EV
DRAWN KO	APPROVED BMT
JOB # 6971	SHEET

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

OWNER Flambeau Mining Company		ARCHITECT-ENGINEER ST-9-63								
SITE Ladysmith, Wisconsin		PROJECT NAME Proposed Mine Development								
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2				
						1	2	3	4	5
				SURFACE ELEVATION → 1116.8						
	1	SS		Slightly silty very fine SAND(SP-SM), yellowish red, moist, medium dense, outwash						
	2	SS		Gray fine to medium SAND(SP), some gravel, yellowish red, moist, very dense, outwash						
	3	SS								
	4	SS		Slightly silty gravelly fine to medium SAND(SW-SM), yellowish red, moist to wet, very dense to dense, till						
	5	SS								
	6	SS		Sandstone, quartz grains, mostly fine-grained but some layers fine to medium grained, a few seams of sandy silt and sandy clayey silt, white to light gray, waterbearing, uncemented to weakly cemented.						
	7	SS								
	8	SS								
	9	SS								
	10	SS								
	11	SS		SAPROLITE, slightly clayey silt (ML), cobbles and pebbles of igneous origin at 53' depth, slightly plastic, laminated structure at near vertical orientation, taicy texture, silvery gray and dark gray, moist, very dense						
	12	SS								
	13	ST								
	14	ST		Continued on next sheet						

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Unit 5 FWD 2/88

WATER LEVEL OBSERVATIONS		SOIL TESTING SERVICES OF WIS., INC. 540 LAMBEAU STREET GREEN BAY, WIS. 54303	BORING STARTED	Oct. 21, 1975
WL			BORING COMPLETED	Oct. 22, 1975
WL	B.C.R.		RIG #8	FOREMAN EV
WL	A.C.R.		DRAWN KO	APPROVED BMT
			JOB # 6971	SHEET 1 of 2

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

OWNER Flambeau Mining Company		ARCHITECT-ENGINEER ST-9-63 (cont.)								
SITE Ladysmith, Wisconsin		PROJECT NAME Proposed Mine Development								
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2				
						1	2	3	4	5
				SURFACE ELEVATION → 1116.8						
	15	ST			122					0*
	16	ST		SAPROLITE, slightly clayey silt (ML), cobbles and pebbles of igneous origin at 53' depth, slightly plastic, laminated structure at near vertical orientation, taicy texture, silvery gray and dark gray, moist, very dense						4.5+
	17	ST								
	18	ST		End of Boring						
				Boring advanced to 6' by power auger, to 17' by 4" casing, roller bit and Revert, to 58' by roller bit and Revert						

Unit 5 FWD 2/88

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WATER LEVEL OBSERVATIONS		SOIL TESTING SERVICES OF WIS., INC. 540 LAMBEAU STREET GREEN BAY, WIS. 54303	BORING STARTED	Oct. 21, 1975
W.L.			BORING COMPLETED	Oct. 22, 1975
W.L.	B.C.R.		RIG #8	FOREMAN EV
W.L.	A.C.R.		DRAWN KO	APPROVED BMT
			JOB # 6971	SHEET 2 of 2

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. ST-9-64

OWNER Flambeau Mining Company		ARCHITECT-ENGINEER ST-9-64	
SITE Ladysmith, Wisconsin		PROJECT NAME Proposed Mine Development	
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	DESCRIPTION OF MATERIAL
1126.3			SURFACE ELEVATION 1126.3
1	SS		Silty SAND(SM), nonplastic, trace roots, yellowish red, moist, loose, outwash
2	SS		Very fine sandy SILT(ML), nonplastic, lens of slightly organic silt, seam slightly silty fine sand, reddish brown, moist, medium dense, outwash
5	3	SS	Silty sandy GRAVEL (GW-GM), nonplastic, reddish brown, moist, very dense, till
4	SS		Fine and fine to medium SAND(SP), trace gravel, reddish brown, moist, outwash
10			
15	5	SS	
20			Silty fine SAND (SM), non to slightly plastic, trace gravel, reddish brown, wet, very dense to dense, till (Two attempts made to recover sample at 15'-16' depth)
25	6	SS	
30			Sandstone, quartz grains, layers ranging in grain size from very fine sand to silt size at 25' to medium to coarse sand-size at 35', white and light gray, laminated with pale yellow at 25', pale brown at 40', waterbearing, weakly cemented
35	7	SS	
40			SAPROLITE, silt(ML), nonplastic, laminated structure at near vertical orientation, gray and light gray, pearly lustre and talcy texture, moist, very dense
45	8	SS	
45.4			Continued on next sheet

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WATER LEVEL OBSERVATIONS	
W.L.	4.9' WD
W.L.	B.C.R. A.C.R.
W.L.	

SOIL TESTING SERVICES OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS 54303

BORING STARTED	Nov. 4, 1975
BORING COMPLETED	Nov. 4, 1975
RIG #8	FOREMAN EV
DRAWN KO	APPROVED BMT
JOB # 6071	SHEET 1 of 2

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. ST-9-64 (continued)

OWNER Flambeau Mining Company		ARCHITECT-ENGINEER ST-9-64 cont.	
SITE Ladysmith, Wisconsin		PROJECT NAME Proposed Mine Development	
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	DESCRIPTION OF MATERIAL
1126.3			SURFACE ELEVATION 1126.3
45.4			Continued from previous sheet
50	13	SS	
50	14	SS	
55	15	SS	SAPROLITE, silt(ML), nonplastic, laminated structure at near vertical orientation, gray and light gray, pearly lustre and talcy texture, moist, very dense
55.3	16	SS	
			End of Boring
			Boring advanced to 10' by power auger, to 11' by 4" casing, cutting bit and Revert, to 55.3' by cutting bit and Revert

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WATER LEVEL OBSERVATIONS	
W.L.	4.9' WD
W.L.	B.C.R. A.C.R.
W.L.	

SOIL TESTING SERVICES OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	Nov. 4, 1975
BORING COMPLETED	Nov. 4, 1975
RIG #8	FOREMAN EV
DRAWN KO	APPROVED BMT
JOB # 6971	SHEET 2 of 2

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

OWNER Flambeau Mining Company		PROJECT NAME Proposed Mine Development					
SITE Ladysmith, Wisconsin		ARCHITECT-ENGINEER ST-9-65					
DEPTH ELEVATION	SAMPLE NO. TYPE SAMPLE	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS. FT. ²				
			1	2	3	4	5
SURFACE ELEVATION 1142			STANDARD "N" PENETRATION (BLOWS/FT.)				
			10	20	30	40	50
1	SS	St topsoil underlain by 4" of silty clay. Slightly nonplastic, yellowish red, moist, loose to medium dense, outwash					
2	SS						
3	SS	Slightly silty fine to coarse SAND (SW-SM), some gravel, yellowish red, dry, very dense, outwash					
4	SS	Fine to medium SAND (SP), a few lenses of silt, yellowish red, slightly moist, dense, outwash					
5	SS	Slightly silty fine to coarse SAND (SW-SM), some gravel, yellowish red, wet, very dense, till					
6	SS						
7	SS	Sandstone, quartz grains, mostly fine-grained with a layer of silt-size grains at 20' and medium sand-size grains at 30', white mottled gray and pink, weakly cemented					
8	SS						
9	SS						
10	SS						
11	SS						
12	SS						
13	SS						
14	SS						
15	SS	SAPROLITE, slightly clayey silt (ML), slightly plastic, laminated structure at near vertical, color from yellowish brown, reddish brown, reddish yellow and olive brown, tacky texture, moist, very dense					
16	SS						
17	SS						
18	SS						
19	SS						
20	SS						
21	SS						
22	SS						
23	SS						
24	SS						
25	SS						
26	SS						
27	SS						
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50	SS						

OWNER Flambeau Mining Company		PROJECT NAME Proposed Mine Development					
SITE Ladysmith, Wisconsin		ARCHITECT-ENGINEER ST-9-66					
DEPTH ELEVATION	SAMPLE NO. TYPE SAMPLE	DESCRIPTION OF MATERIAL	UNCONFINED COMPRESSIVE STRENGTH TONS. FT. ²				
			1	2	3	4	5
SURFACE ELEVATION 1144			STANDARD "N" PENETRATION (BLOWS/FT.)				
			10	20	30	40	50
1	SS						
2	SS	Silty very fine SAND (SM), nonplastic, yellowish red, moist, loose to medium dense, outwash					
3	SS						
4	SS	Silty fine SAND (SM), nonplastic, trace gravel, moist, medium dense, outwash					
5	SS						
6	SS	Fine to medium SAND (SP), trace gravel, yellowish red to reddish brown, moist, medium dense to dense, outwash					
7	SS						
8	SS	Silty fine SAND (SM), nonplastic, trace gravel, red, moist, dense to very dense, till					
9	SS						
10	SS						
11	SS	Sandstone, quartz grains in sizes ranging from silt-size to medium sand-size, white mottled dark gray and reddish yellow, weakly cemented					

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LOG OF BORING NO. ST-9-66 (continued)

OWNER: Flambeau Mining Company
 ARCHITECT-ENGINEER: ST-9-66 cont.
 SITE: Ladysmith, Wisconsin
 PROJECT NAME: Proposed Mine Development

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 3				
						1	2	3	4	5
				SURFACE ELEVATION → 1144						
				Continued from previous sheet						
45.2				Sandstone, quartz grains in sizes ranging from silt-size to medium sand-size, white mottled dark gray and reddish yellow weakly cemented						
50	13	SS								
	14	SS								
	15	SS								
55	Run #1	DB BX								
60	Run #2	DB BX		SAPROLITE, slightly clayey silt (ML), slightly plastic, foliated in near vertical orientation, light gray and white marbled red and yellow, pearly lustre, moist, very dense	118					
	16	ST			119					
65	17	ST								
	18	ST								
	Run #3	DB BX		SAPROLITE, silt (ML), laminated structure at near vertical orientation, light gray mottled red, moist, very dense						
68.3	19	SS								
				End of Boring Boring advanced to 10' by power auger, to 30' by 4' casing, cutting bit and Revert, to 55' by NX casing, cutting bit and Revert, to 68.3' by diamond bit, cutting bit and Revert						

WATER LEVEL OBSERVATIONS

W.L.	5 3' WS
W.L.	B.C.R. A.C.R.
W.L.	

SOIL TESTING SERVICES OF WIS., INC.
 540 LAMBEAU STREET
 GREEN BAY, WIS. 54303

BORING STARTED Oct. 15, 1975
 BORING COMPLETED Oct. 20, 1975
 RIG #8 FOREMAN EV
 DRAWN KO APPROVED BMT
 JOB # 6971 SHEET 2 of 2

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. ST-9-67

OWNER: Flambeau Mining Company
 ARCHITECT-ENGINEER: ST-9-67
 SITE: Ladysmith, Wisconsin
 PROJECT NAME: Proposed Mine Development

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 3				
						1	2	3	4	5
				SURFACE ELEVATION → 1135						
	1	SS		Silty very fine SAND (SM), nonplastic, reddish brown to yellowish brown, moist, loose to medium dense, outwash						
	2	SS								
5	3	SS		Silty fine to coarse SAND (SM), nonplastic, some gravel, reddish brown, slightly moist, very dense, till						
	4	SS		Fine to coarse SAND (SP), some gravel, reddish brown, slightly moist, outwash						
10	5	SS		Slightly silty very fine SAND (SP-SM), reddish brown, moist, medium dense, outwash						
15	6	SS		Silty fine SAND (SM), trace gravel, lenses of SAND, reddish brown, wet, medium dense, till						
20	7	SS		Slightly silty fine SAND (SP-SM) and silty SAND (SM), some gravel, reddish brown to red, wet, very dense, till						
25	8	SS								
30	9	SS								
35	10	SS								
	Run #1	DB BX								
	Run #2	DB BX								
40	Run #3	DB BX		Sandstone; quartz grains; mostly silt-sized particles from 32 to 38.6' with a trace of clay. Mostly fine to medium sand-sized grains from 38.6 to 49.9' except for some seams and layers of silt-sized grains; upper 6.6' light gray with streaks of yellowish red and dark brown, lower 11.2' is light gray banded with yellow, black, and reddish yellow; waterbearing; weakly cemented						
45										
46.1										

WATER LEVEL OBSERVATIONS

W.L.	
W.L.	
W.L.	

SOIL TESTING SERVICES OF WIS., INC.
 540 LAMBEAU STREET
 GREEN BAY, WIS. 54303

BORING STARTED Oct. 16, 1975
 BORING COMPLETED Oct. 20, 1975
 RIG #8 FOREMAN EV
 DRAWN KO APPROVED BMT
 JOB # 6971 SHEET 1 of 2

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO ST-9- (cont'd)

OWNER Flambeau Mining Company	ARCHITECT-ENGINEER ST-9-67 cont
SITE Ladysmith, Wisconsin	PROJECT NAME Proposed Mine Development

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2							
							1	2	3	4	5			
46.1					SURFACE ELEVATION → 1135									
					Continued from previous sheet									
	Run DB #4 NX				Sandstone (continued)									
50	Run DB #5 NX				SAPROLITE, clayey silt (ML), plastic, laminated structure at near vertical orientation; yellowish red and red, silvery gray and yellowish red below 55'; talcy texture, moist, very dense									
55	12 ST				RQD from 46.1 to 51.1' = 0% RQD from 51.1 to 51.9' = 78%	110							○*	4.5+
	13 ST					130							○*	4.5+
60	14 ST													
	15 ST				SAPROLITE, slightly clayey silt (ML), slightly plastic, laminated structure with near vertical orientation, silvery gray and dark gray, moist, very dense									
	16 SS													
	17 SS													
65	Run DB #6 NX				RQD from 62-1/2 to 67-1/2 = 63%									
67.5					End of Boring									
70					Boring advanced to 10' by power auger, to 15' by 4" casing, cutting bit and Revert, to 35.7' by cutting bit and Revert to 51.9' by diamond bit and Revert to 62.5' by cutting bit and Revert, to 67.5' by diamond bit and Revert									

WATER LEVEL OBSERVATIONS		
W.L.		
W.L.	B.C.R.	A.C.R.
W.L.		

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	Oct. 16, 1975
BORING COMPLETED	Oct. 20, 1975
RIG	8
FOREMAN	EV
DRAWN	KO
APPROVED	BMT
JOB #	6971
SHEET	2 of 2

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.