

DEPARTMENT OF NATURAL RESOURCES
NORTH CENTRAL DISTRICT

FROM: DALE T. URSO

No. 7/31/84
Date: 7/31/84

J. Brasch
H. Berndt

H. Pelzer
T. Bashaw

B. Dobbins

L. Maltbey

R. Martini

C. Weister

E. Kreul

T. Blake

J. Sullivan

G. Hansen

W. Jaeger

R. Young

J. Neis

C. Besadny-ADMIN/5

B. Braun-ADMIN/5

J. Hagman-OPA/5

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L. Wible-ADMIN/5

L. Lueschow-ADMIN/5

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R. Becker

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M. DeBrock

Follow through
For your approval
What about this?
Note and return
For your comments
Information only

G. Kulibert
C. Fitzgerald

Refer to

COMMENTS:

See Me
Answer
Answer for
signature
Prepare rough draft
Investigate and report
For your recommendations
Due date

*Note the drop in water level
in MW1 when #5 municipal
well is running full flow.
Also notice levels of TCE in well
3B.*

CHARNE, GLASSNER, TEHAN, CLANCY & TAITELMAN
S. C.
ATTORNEYS AT LAW

IRVIN B. CHARNE
WILLIAM E. GLASSNER, JR.
ROBERT E. TEHAN, JR.
LAWRENCE CLANCY
DONALD S. TAITELMAN
WILLIAM E. MCCARTY
RONALD S. JACOBS
BRENDAN M. COMER
MICHAEL C. RUNDE
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F. THOMAS OLSON
RAYMOND R. KRUEGER
ROBERT B. CORRIS
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ARTHUR J. HARRINGTON
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BARBARA J. BECKER
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GREGORY C. BURCE
JOHN M. VAN LIESHOUT
ADRIAN N. COHEN
CHARLES S. LEWIS
THOMAS P. McELIGOTT
MICHAEL A. LEVEY
E. ANN KERNS

July 27, 1984

FIRST BANK BUILDING
SUITE 800
211 WEST WISCONSIN AVENUE
MILWAUKEE, WISCONSIN 53203-2377

TELEPHONE (414) 273-2000

OF COUNSEL
HENRY S. REUSS

Mr. Charles Weister
North Central District Headquarters
Department of Natural Resources
P. O. Box 818
Rhineland, Wisconsin 54501

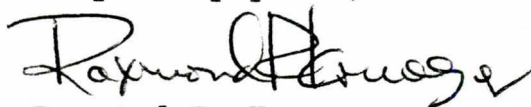
Re: Wausau Chemical Corporation
Wausau, Wisconsin

Dear Mr. Weister:

Enclosed you will find the preliminary study report prepared by STS Consultants, Ltd. in accordance with the plan of study agreed to at the February 24, 1984, meeting of representatives of DNR, STS Consultants, Ltd. and the company. This information is being provided to the DNR in connection with the notification given DNR by the company of the December 19, 1983, sudden and accidental release of tetrachloroethylene (perchloroethylene). In providing this information, neither the company nor its legal counsel intend to waive the protections afforded by the work product doctrine as it may apply to STS Consultants, Ltd.

If you should have any questions with regard to the foregoing, please feel free to call or write the undersigned.

Very truly yours,


Raymond R. Krueger

RRK/jmr/lis
Enclosure
cc: Wausau Chemical Corporation

RECEIVED
Wis. Dept. of Natural Resources

JUL 27 1984

N. C. Dist. Hdqrs.
RHINELAND, WI

Client

CHARNE, GLASSNER, TEHAN, CLANCY & TAITELMAN
211 WEST WISCONSIN AVENUE
MILWAUKEE, WISCONSIN 53203

Project

SUBSURFACE EXPLORATION AND TESTING PROGRAM
EVALUATE GROUND WATER QUALITY
WAUSAU CHEMICAL FACILITIES
WAUSAU, WISCONSIN

STS JOB 12776

JULY 25, 1984



STS Consultants Ltd.
Green Bay, Wisconsin



STS Consultants Ltd.
Consulting Engineers

540 Lambeau
Green Bay, Wisconsin 54303
(414) 494-9656

July 25, 1984

Charne, Glassner, Tehan, Clancy & Taitelman
211 West Wisconsin Avenue
Milwaukee, Wisconsin 53203

Attention: Attorney Raymond R. Krueger

STS Job 12776

RE: Preliminary Subsurface Exploration and Testing Program to Evaluate
Ground Water Quality at the Wausau Chemical Facilities in Wausau,
Wisconsin.

Gentlemen:

We are pleased to submit the preliminary study report plan for the above referenced site. This work was verbally authorized by you on July 24, 1984. Work was conducted as generally described in our December 13 Plan of Study. Modifications to the study are discussed in the attached report. As approved by the Department of Natural Resources, no chemical analysis of soils or sediments was conducted.

Ten copies of the report are enclosed for distribution.

INTRODUCTION

The attached report fulfills the Plan of Study requirements described in our December 13, 1983 proposal. This proposal was responded to in a January 19, 1984 letter from the Wisconsin Department of Natural Resources.

The proposed plan of study and DNR response letter were discussed in a February 24, 1984 meeting with Wausau Chemical, Wisconsin Department of Natural Resources and STS representatives. All representatives mutually agreed that the STS December 13 Plan of Study should be modified as follows:

1. No soil analysis should be conducted.
2. Sediment analysis should be postponed.
3. The number of wells and depth of wells were mutually acceptable.
4. Several water level measurements in the observation wells should be taken.
5. 10-foot well screens for the shallow wells are adequate.

The Department of Natural Resources agreed to these changes in its March 10, 1984 letter by Ed Kreul.

The purpose of the proposed study was to address DNR concerns relating to reported concentrations of volatile organics in Wausau city pumping wells No. 3 and No. 4 and an accidental release of tetrachloroethylene (perchloroethylene) during routine operations which occurred on December 19, 1984 during extremely cold weather. It was reported that 800 to 900 gallons of commercial grade product were lost. The immediate response of the Wausau Chemical personnel recovered most of the product in snow and surface soils. Wausau Chemical subsequently initiated a cleanup program to excavate the remaining contaminated soils above the water table within the tank farm area and arranged to dispose of these soils at a secure landfill. DNR personnel observed and reviewed the cleanup operations. The cleanup work was described in the May 4, 1984 report

from Wausau Chemical to the DNR. The bulk storage facility is currently dismantled.

FIELD PROCEDURES

The field exploration program consisted of three boring locations denoted as B-1, 2, and 3. A PVC well was also installed in 1975. These locations are shown on the attached Soil Boring and Monitoring Well Location Diagram. The well elevations were surveyed and are referenced to Wausau City Datum.

The soil borings were conducted with a truck-mounted Mobile B-61 rotary drilling rig. Soil Borings 1 and 2 were advanced to 24.5 and 25.5 feet, respectively below the ground surface. Boring B-3 was advanced considerably deeper to bedrock to 163 feet. Shallower auger borings were also conducted at the B-3 location. Soil boring B-3A was conducted to 65 feet and B-3B was conducted to 25.5 feet. Boring B-3A was not sampled since similar conditions were encountered at B-3.

The sandy soils were sampled in general accordance with ASTM Specification D 1586, "Standard Method for Penetration Test and Split-Barrel Sampling of Soils". Briefly, this sampling procedure involved driving a 2-inch OD standard sampler 18 inches with a 140 pound weight freefalling a distance of 30 inches. The number of blows required to drive the sampler the final 12 inches was recorded as the standard "N" penetration. This "N" value is a preliminary estimate of the density of the soils. After

driving the sampler was returned to the surface and opened. The length of sample and recovery was measured and the soil was preliminarily classified according to type by a Soils Technician. A representative portion of each sample was then sealed in a glass jar, labeled and returned to our laboratory for further examination and testing.

Detailed soil conditions and drilling procedures are described on the attached soil boring logs. Generally borings were advanced using solid-stem auger. Where necessary the holes were cased to prevent caving.

Observation wells were installed in each of the soil borings as described in the attached field well installation diagram. These installations essentially consist of 2 inch diameter Schedule 40 steam-cleaned galvanized pipe and well screen. The wells were developed after installation by pumping 200 to 300 gallons from the well at rates ranging from 5 to 10 gallons per minute. Each of the wells was purged until the discharge water was clear.

Upon completion of the wells frequent water level measurements were taken and compared to the operation of pumping wells No. 3 and No. 4, and the river elevation. These water levels are briefly summarized in the attached Water Level Summary. A general rise in all water levels was observed on April 28 through May 2, the results of approximately 2 to 2 1/2 inches of precipitation.

Ground water samples were collected for chemical analyses on May 16 and May 30, 1984. Samples were collected following EPA sampling protocol after first bailing 10 gallons from wells B-1, B-2, and B-3B, 20 gallons from 3-A, and 40 gallons from 3. Samples were immediately shipped to the Zimpro Analytic Laboratory and analyzed using EPA Method 601 for volatile organics. The purge and trap technique was used for concentrating while photo ionization (10.2eV) and Hall detectors in series were used for quantitation. Field blanks 1 and 2 for each analysis represent the organic free water used to clean up and prepare the bailer-type sampler between wells. Detailed test results and detection limits for each of the parameters are included in the attached Zimpro May 25 and June 8 reports.

LABORATORY PROCEDURES

The penetration samples were visually examined by a Geotechnical Engineer to estimate the distribution of grain-sizes, plasticity, organic content, moisture condition, color, presence of lenses and seams and geologic origin. The soils were classified according to type using the Unified Soil Classification System. The classification symbols are indicated on the attached soil boring logs. Selected samples were tested for grain-size distribution in general accordance with ASTM D 421 and D 422. The distribution curves for these samples are attached.

CONCLUSIONS AND RECOMMENDATIONS

Based upon the volatile organic analysis, it appears that the B-1, B-2, B-3B and the PVC wells installed in the upper portion of the aquifer have greater volatile organic concentrations. The highest concentrations were observed at well B-3B. The higher concentration of volatile organics was noticeably absent at the PVC well (MW-8 on Wausau Treatment Plant property). The volatile organics were barely detectable at well B-3 (163 feet) and B-3A (65 feet). Based on these observations, it appears that the volatile organics are confined to a limited area on Wausau chemical property in the upper portion of the aquifer. No

Where high concentrations of volatile organics were observed, concentrations may be limited by the solubility of the volatile organics in the water. We expect that this may be the case of well B-3B.

Based on the foregoing, we recommend that a ground water extraction program be implemented to extract water from the upper portion of the aquifer as noted above and appropriately treat the water. This program should be implemented as soon as possible and focused on the area near well B-3B in the upper portion of the aquifer.

GENERAL QUALIFICATIONS

The conclusions and recommendations submitted in this report are based on data obtained from three new soil borings and six observation wells. Chemistry variations may occur between the wells, the nature and extent of which may not become evident until extraction proceeds or additional well sampling is conducted. If variations are noted, our firm should be informed. It may be necessary to make additional observations and tests to determine the characteristics of the variations and make a re-evaluation of the recommendations in this report.

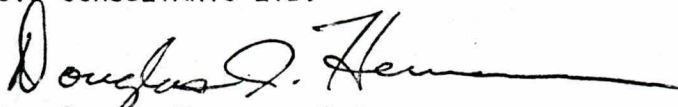
Water level readings have been made in the wells at the times and the conditions stated in the report. This data has been reviewed, and interpreted. However, it must be noted that the period of observation was relatively short and that seasonal and annual fluctuations of the ground water level and chemistry will likely occur.

This report is based upon the December 13 Plan of Study and amendments. It was necessary to make a number of assumptions regarding the proposed locations and water chemistry interpretations. It is recommended that we be provided an opportunity to briefly review any additional studies conducted by the Wisconsin Department of Natural Resources or the USEPA, as these results may allow further refinement of the conclusions and recommendations in this report.

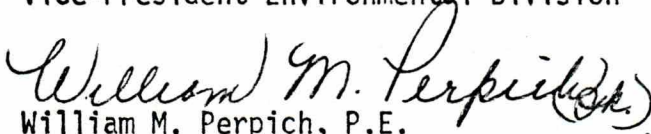
We appreciate the opportunity to be of service to you on this project.
If you have any questions or comments regarding this report, please
contact us at your convenience.

Yours very truly,

STS CONSULTANTS LTD.



Douglas J. Hermann, P.E.
Vice-President Environmental Division



William M. Perpich, P.E.
Regional Vice-President

DJH/pk

Enclosures:

Boring Logs 1, 2, 3, 3-A, 3-B and PVC
Soil Boring and Monitoring Well Location Diagram
Gradation Curves (3)
Field Well Installation Diagrams B-1, B-2, B-3, B-3A, B-3B and PVC Well
Ground Water Level Data Summary
May 25 and June 8, Zimpro Test Results



STS Consultants Ltd.

OWNER

Wausau Chemical

PROJECT NAME

Tetrachloroethylene Spill

LOG OF BORING NUMBER

1

ARCHITECT—ENGINEER

SITE LOCATION

Wausau, Wisconsin

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT²		
						1	2	3
X				SURFACE ELEVATION 1194.2				
	1	AS		Fill - dark brown fine to coarse silty sand (SM) - with some gravel - with a trace of fiber - moist medium dense				
	2	SS						
5	3	SS						
	4	SS		Brown fine to coarse sand (SP-SW) - moist - dense to very dense				
	5	SS						
10	6	SS						
15	7	SS						
				Brown fine to medium sand (SP) - with some fine to medium gravel from 20 to 22 feet - wet - medium dense				
20	8	SS						
24.5	9	SS						
				End of Boring Boring advanced with solid-stem auger to 24.5 feet 23 feet of casing used 2" diameter galvanized observation well installed at 23' with protector pipe and lock. TGAL = 1197.03				

PLASTIC LIMIT %	WATER CONTENT %		LIQUID LIMIT %	
X	●		△	
10	20	30	40	50
⊗	STANDARD PENETRATION		BLOWS / FT.	
10	20	30	40	50

11	19	39	67
12	10	19	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN SITU. THE TRANSITION MAY BE GRADUAL.

WL 13.3' WS and WD	BORING STARTED 3-30-84	STS OFFICE Green Bay
WL 13.3' BCR ARC	BORING COMPLETED 3-30-84	DRAWN BY SHEET NO. 1 OF 1
WL	RIG FOREMAN EVH	APP'D BY CJK STS JOB NO. 12776



STS Consultants Ltd.

OWNER

Wausau Chemical

LOG OF BORING NUMBER

2

PROJECT NAME

Tetrachloroethylene Spill

ARCHITECT—ENGINEER

SITE LOCATION

Wausau, Wisconsin

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²					PLASTIC LIMIT %					WATER CONTENT %					LIQUID LIMIT %					STANDARD PENETRATION BLOWS / FT.				
						1	2	3	4	5	10	20	30	40	50	10	20	30	40	50	10	20	30	40	50	10	20	30	40	50
×				SURFACE ELEVATION 1195.8																										
	1	AS		Topsoil - brown organic sandy silt (SM) - with some clay																										
	2	SS		Brown fine to coarse sand and fine to medium gravel (SM) - with a trace of silt - moist - dense to very dense																										
5	3	SS																												
	4	SS																												
	5	SS																												
10	6	SS																												
				Brown fine to medium sand (SP) - with some fine gravel - wet - dense to medium dense																										
15	7	SS																												
20	8	SS																												
25				End of Boring Boring advanced with solid-stem auger to 25.5 feet 24 feet of HW casing used 2" diameter galvanized observation well installed at 24' with protector pipe and lock. TGAL = 1197.94																										
25.5																														

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL 19.4' WS and WD	BORING STARTED 3-30-84	STS OFFICE Green Bay
WL BCR 14.5' ARC	BORING COMPLETED 3-30-84	DRAWN BY SHEET NO. 1 OF 1
WL	RIG FOREMAN EVH	APP'D BY CJG STS JOB NO. 12776



STS Consultants Ltd.

OWNER
Wausau Chemical

PROJECT NAME

Tetrachloroethylene Spill

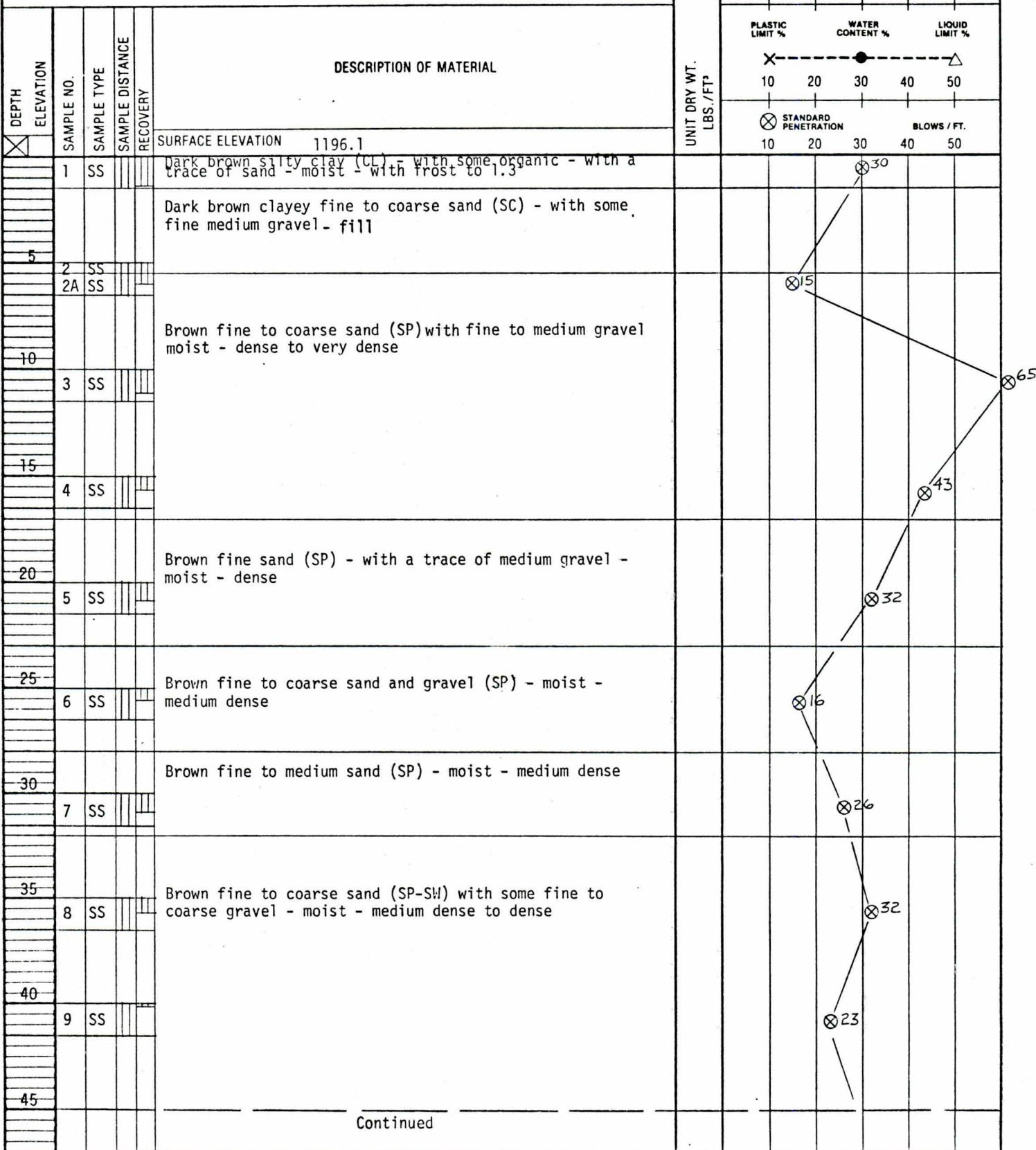
LOG OF BORING NUMBER

3

ARCHITECT—ENGINEER

SITE LOCATION

Wausau, Wisconsin



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL		BORING STARTED		3-27-84	STS OFFICE		Green Bay			
WL	BCR	ARC	BORING COMPLETED		3-29-84	DRAWN BY		SHEET NO. 1 OF 4		
WL			RIG Mobile B-61 FOREMAN		EVH	APP'D BY		CJG	STS JOB NO.	12776



STS Consultants Ltd.

OWNER

Wausau Chemical

PROJECT NAME

Tetrachloroethylene Spill

LOG OF BORING NUMBER

3 (continued)

ARCHITECT—ENGINEER

SITE LOCATION

Wausau, Wisconsin

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²					PLASTIC LIMIT %					WATER CONTENT %					LIQUID LIMIT %					STANDARD PENETRATION BLOWS / FT.				
						1	2	3	4	5	10	20	30	40	50	10	20	30	40	50	10	20	30	40	50	10	20	30	40	50
45	10	SS		Continued																										
50	11	SS		Brown fine to medium sand (SP) - with a trace of fine gravel - moist to wet - medium dense to dense																										
55	12	SS																												
60	13	SS		Brown fine to coarse sand and gravel (SP-SW) - wet - medium dense																										
65	14	SS																												
70	15	SS		Brown fine to medium sand (SP)-wet - with a trace of gravel - wet - dense to very dense																										
75	16	SS																												
80	17	SS																												
85				Continued																										

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL 15' WS	BORING STARTED 3-27-84	STS OFFICE Green Bay
WL BCR ARC	BORING COMPLETED 3-29-84	DRAWN BY SHEET NO. 2 OF 4
WL	RIGMobile B-61 FOREMAN EVH	APP'D BY CJC STS JOB NO. 12776



STS Consultants Ltd.

OWNER
Wausau ChemicalLOG OF BORING NUMBER
3 (continued)PROJECT NAME
Tetrachloroethylene Spill

ARCHITECT—ENGINEER

SITE LOCATION

Wausau, Wisconsin

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²					PLASTIC LIMIT %					WATER CONTENT %					LIQUID LIMIT %					STANDARD PENETRATION BLOWS / FT.				
						1	2	3	4	5	10	20	30	40	50	10	20	30	40	50	10	20	30	40	50	10	20	30	40	50
85	18	SS		Continued																										
90	19	SS		Brown fine to medium sand (SP) - wet - with a trace of gravel - wet - dense to very dense																										
95	20	SS																												
100	21	SS																												
105	22	SS		Brown fine to coarse sand (SP) - with some fine to medium gravel - wet - dense to extremely dense																										
110	23	SS																												
115	24	SS																												
120	25	SS																												
125				Continued																										

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL	15' WS	BORING STARTED		3-27-84	STS OFFICE		Green Bay		
WL	BCR	ARC	BORING COMPLETED		3-29-84	DRAWN BY		SHEET NO. 3 OF 4	
WL			RIG	Mobile B-61	FOREMAN	EVH	APP'D BY	CJG	STS JOB NO. 12776



STS Consultants Ltd.

OWNER

Wausau Chemical

PROJECT NAME

Tetrachloroethylene Spill

LOG OF BORING NUMBER

3 (continued)

ARCHITECT—ENGINEER

SITE LOCATION

Wausau, Wisconsin

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. ³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²					PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %
						1	2	3	4	5			
125	26	SS											
130	27	SS											
135				Reddish brown silty fine to coarse sand (SP-SM) with some fine to coarse gravel - wet - extremely dense									
140	28	SS											
145													
150	29	SS		Brown silty fine to medium sand (SP-SM) - wet - extremely dense									
155													
160	30	SS		Brown silty fine to coarse sand (SM) - with a trace of medium gravel - moist - extremely dense									
163				End of Boring Boring advanced with solid-stem auger to 163.0 feet 10 feet of 6" casing used - 130' of HW casing used 2" diameter galvanized observation well installed at 161' with protector pipe and lock. TGAL = 1198.16									

37/6"
86/6"
BNCG.

177/6"

200/4"

140

167/6"

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL	15' WS		BORING STARTED		3-27-84	STS OFFICE		Green Bay			
WL	BCR	ARC	BORING COMPLETED		3-29-84	DRAWN BY		SHEET NO. 4	OF 4		
WL			RIGMobile B-61		FOREMAN	EVH	APP'D BY		CJG	STS JOB NO.	12776



STS Consultants Ltd.

OWNER

Wausau Chemical

LOG OF BORING NUMBER

B-3B

PROJECT NAME

Tetrachloroethylene Spill

ARCHITECT—ENGINEER

SITE LOCATION

Wausau, Wisconsin

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²		
							1	2	3
					SURFACE ELEVATION 1195.9				
	1	SS			Fill - brown fine to coarse silty sand (SM) - with some fine to coarse gravel - with pieces of concrete - with a trace of black silty clay - moist - medium dense to loose				
	2	SS							
5	3	SS							
	4	SS							
	5	SS			Brown fine to coarse sand (SP) - with some fine to medium gravel - moist to wet - dense to medium dense				
10	6	SS							
	7	SS							
15	8	SS							
20	9	SS			End of Boring Boring advanced with solid-stem auger to 25.5 feet 24 feet of HW casing used 2" diameter galvanized observation well installed at 24' with protector pipe and lock. TGAL = 1197.94 B-3A TGAL = 1197.81				
25 25.5									

PLASTIC LIMIT %	WATER CONTENT %		LIQUID LIMIT %	
X	●	△		
10	20	30	40	50
⊗ STANDARD PENETRATION	BLOWS / FT.			
10	20	30	40	50

DEPTH (FEET)	UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)
0	21
1	7
2	4
3	5
4	37
5	39
6	40
7	17
8	7
9	7
10	7
15	7
20	7
25	7
25.5	7

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

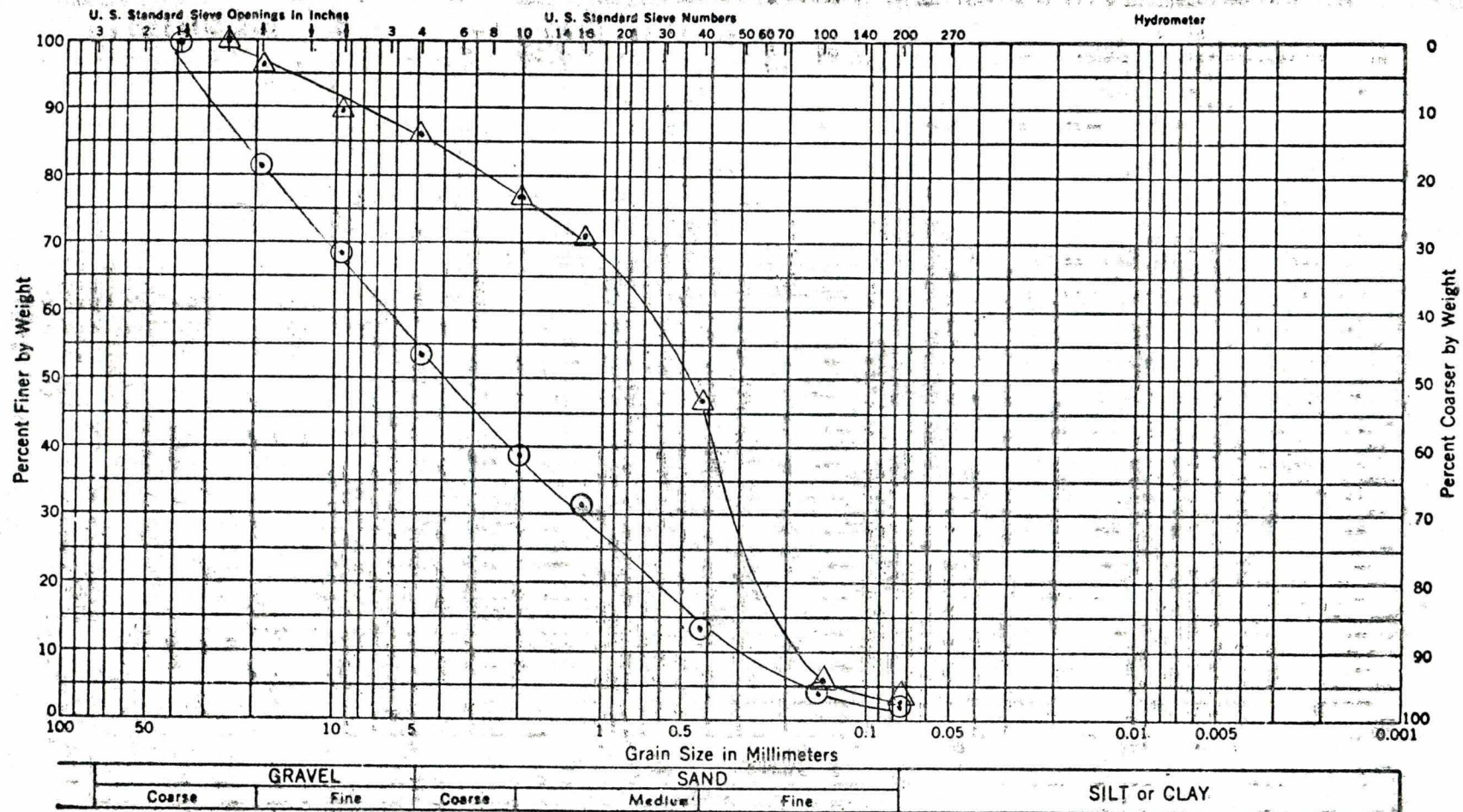
WL	15' WS and WD	BORING STARTED	4-2-84	STS OFFICE	Green Bay			
WL	BCR	ARC	BORING COMPLETED	4-2-84	DRAWN BY	SHEET NO. 1 OF 1		
WL			RIG Mobile B-61 FOREMAN	EVH	APP'D BY	CJG	STS JOB NO.	12776

LOG OF BORING NO. 1 (PVC)

OWNER Wausau Chemical				ARCHITECT-ENGINEER				
SITE Wausau, Wisconsin				PROJECT NAME Well Point Installation				
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.)		
						10	20	30
	1	SS		SURFACE ELEVATION → Top 2011				
	1A	SS		Fine to coarse sand, trace to some gravel-dark brown-loose to medium dense-(SW)		13		
	2	SS						
	3	SS						
	4	SS						
				Fine to coarse sand and gravel- dark brown-moist-loose-(SW-GW)		6		
	5	SS						
				Fine to coarse sand, trace to some medium gravel-dark brown-moist to wet-very dense (SW-GP)				72
	6	SS						
	7	SS		Fine to coarse sand-brown- moist to wet-dense to medium dense-(SW)			33	
	8	SS				14		
				Medium to coarse sand, trace gravel-moist to wet black and brown-medium dense-(SP)				
	9	SS				16		
				End of Boring 25 feet of NX casing				

WATER LEVEL OBSERVATIONS				SOIL TESTING SERVICES		BORING STARTED 7-14-75	
W.L.	13.5'	W.X.R.R. W.D.		OF WIS., INC.		BORING COMPLETED 7-14-75	
W.L.	12.0'	B.C.R.	A.C.R.	GREEN BAY, WISCONSIN		RIG 22	FOREMAN CF
W.L.	12.0'	in wellpoint after installation		540 LAMBEAU ST.		DRAWN RV	APPROVED DBE
						JOB # W-6795	SHEET

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

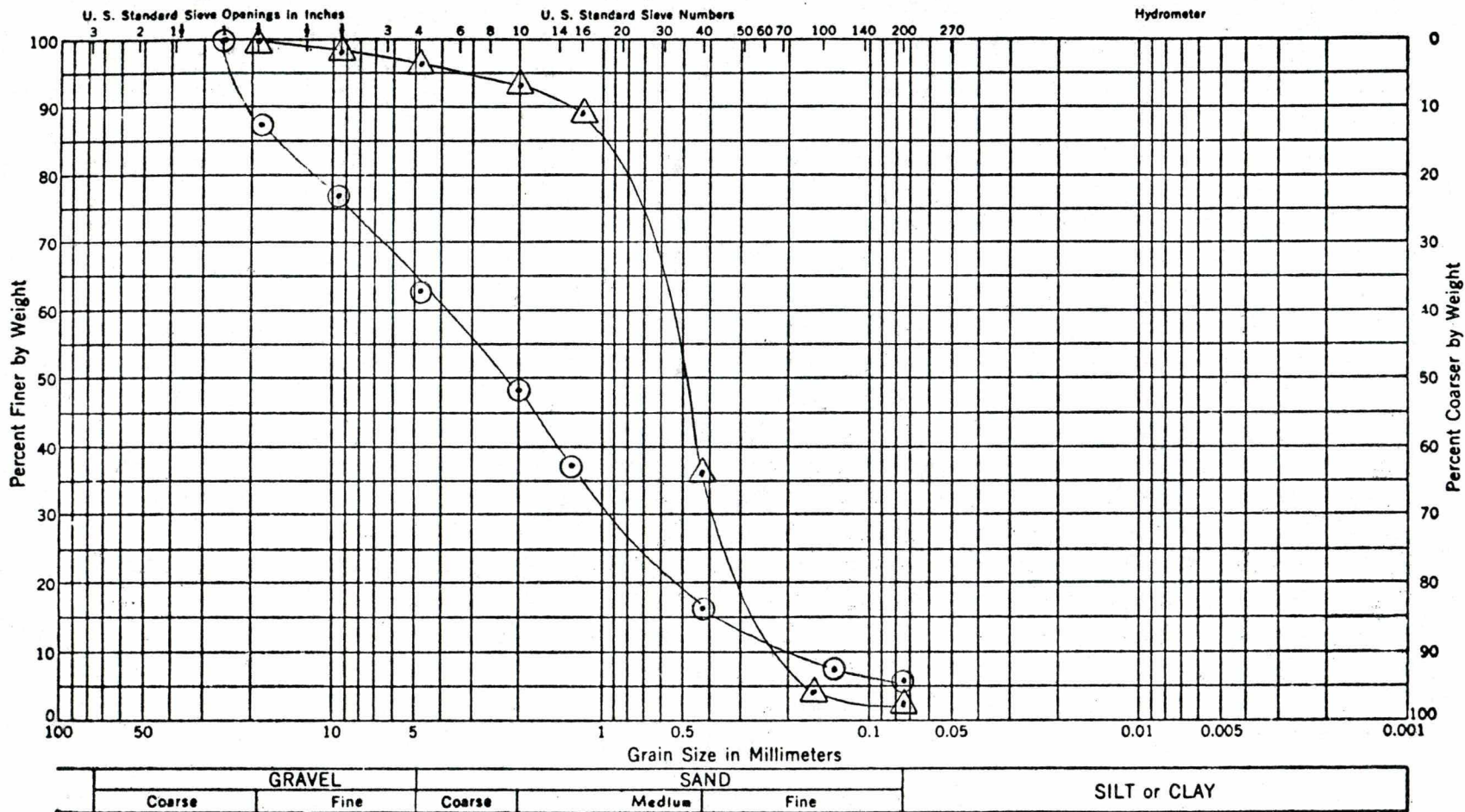


BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION
B-T	S-3	4-5.5'	⊙	.3	1.3	6.1	20.3	.92	Sp-SW
B-1	S-9	23-24.5'	△	.18	.31	.69	3.8	.77	SP

GRAIN SIZE ANALYSIS
WAUSAU CHEMICAL CORPORATION
WAUSAU, WISCONSIN

STS CONSULTANTS LTD.

DRAWN	APPROVED	DATE	JOB No.
SMD	DJH	4-19-84	12776

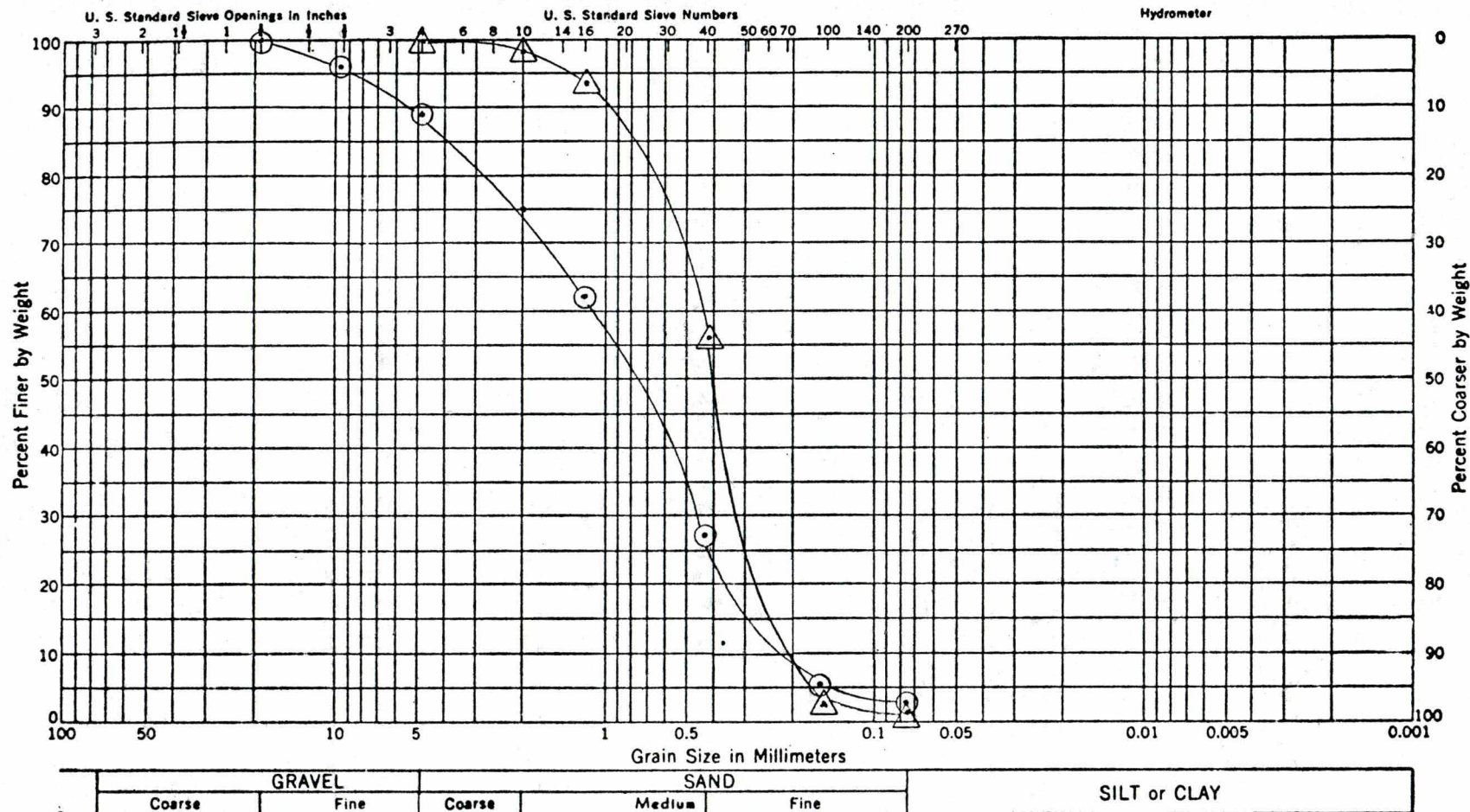


BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION
B-2	S-6	10-11.5'	○	.2	1	3.9	19.5	1.3	SW
B-2	S-7	15-16.5'	△	.24	.39	.55	2.3	1.2	SP

GRAIN SIZE ANALYSIS
WAUSAU CHEMICAL CORPORATION
WAUSAU, WISCONSIN

STS CONSULTANTS LTD.

DRAWN	APPROVED	DATE	JOB No.
SMD	DJH	4-19-84	12776

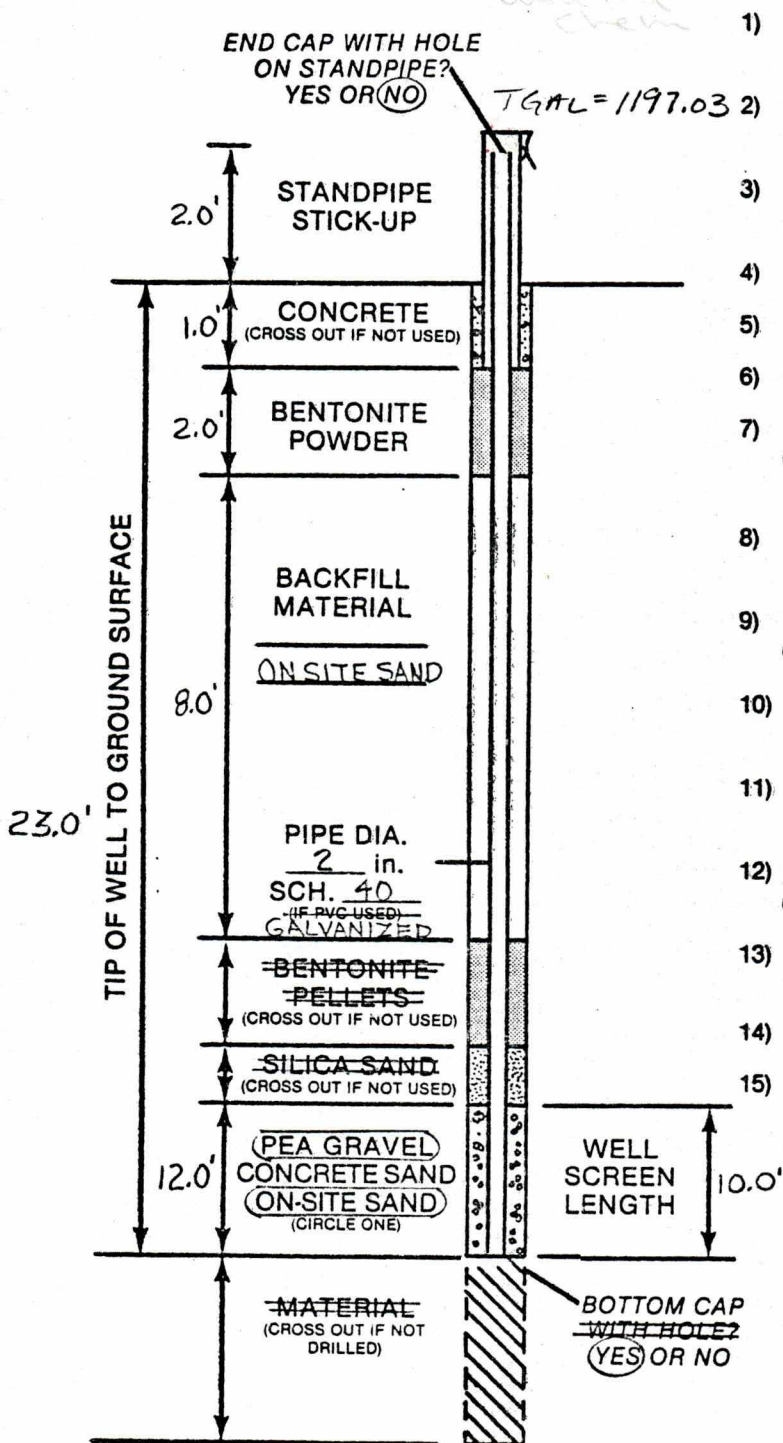


BORING	SAMPLE	DEPTH	SYMBOL	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	CLASSIFICATION	GRAIN SIZE ANALYSIS WAUSAU CHEMICAL CORPORATION WAUSAU, WISCONSIN			
B-3	S-6	25-26.5'	—○—	.21	.44	1.2	5.7	.77	SP				
B-3	S-25	20-21.5'	—△—	.21	.32	.33	1.6	1.5	SP	STS CONSULTANTS LTD.			
										DRAWN APPROVED DATE JOB No.			
										SMD	DJH	4-19-84	12776



STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



- 1) TYPE OF PIPE?
PVC, GALVANIZED, STAINLESS, OTHER _____
- 2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, THREADED, OTHER _____
- 3) TYPE OF WELL SCREEN
PVC, GALVANIZED, STAINLESS, OTHER _____
- 4) SCREEN SIZE _____ .020
- 5) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
- 6) WAS SOLVENT USED? YES OR NO
- 7) WAS DRILLING MUD USED? NO
SOLID AUGER, HOLLOW STEM AUGER,
WATER, REVERT, BENTONITE
- 8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR NO
- 9) HOW WAS WELL DEVELOPED?
BAILING, PUMPING, SURGING, COMPRESSED AIR
- 10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., 30 min., OTHER 20 MIN
- 11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 200 GAL
10 GPM
- 12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, OPAQUE
- 13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, TURBID, OPAQUE
- 14) DID THE WATER SMELL? YES OR NO
- 15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
15.3 Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. B-1 DATE INSTALLED 3-30-84 DRILL RIG DR-2

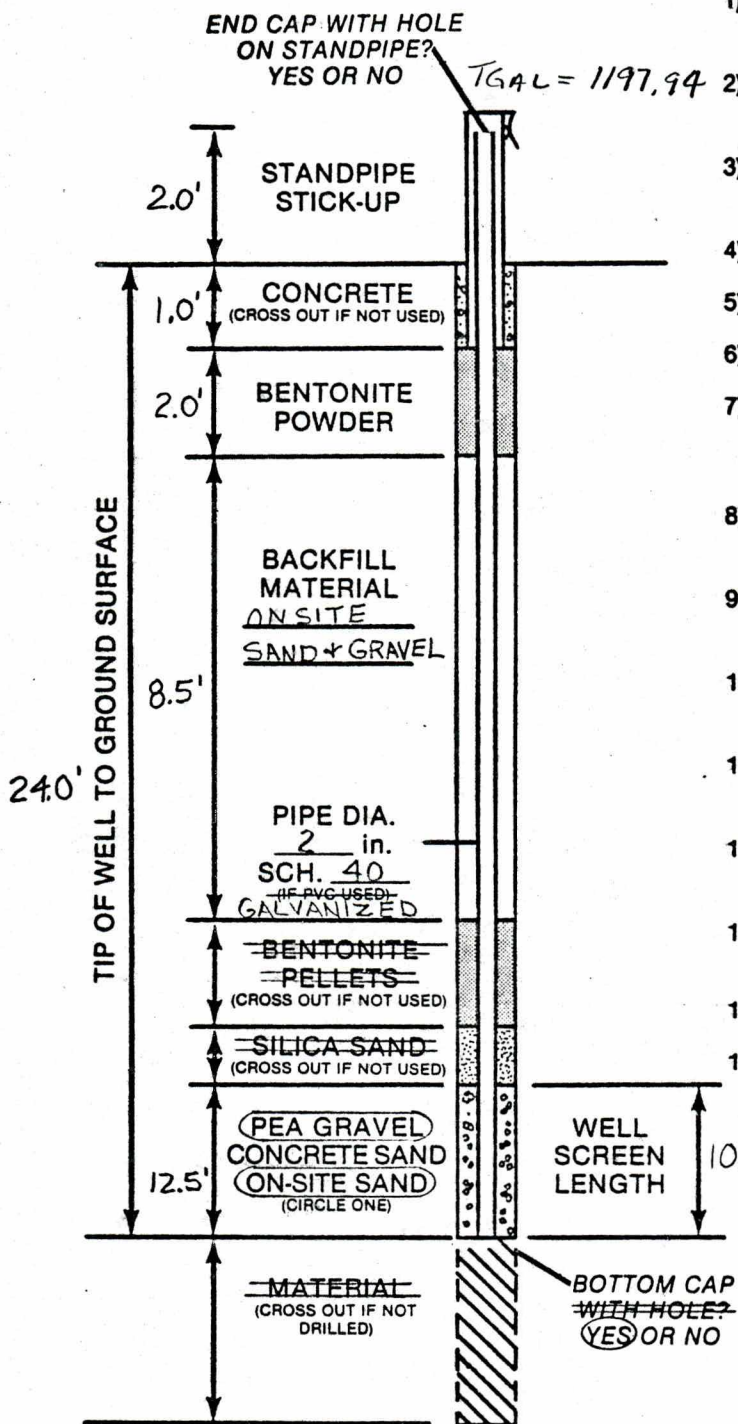
DRILLER EVH DRILL CREW WRZ

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12776



STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



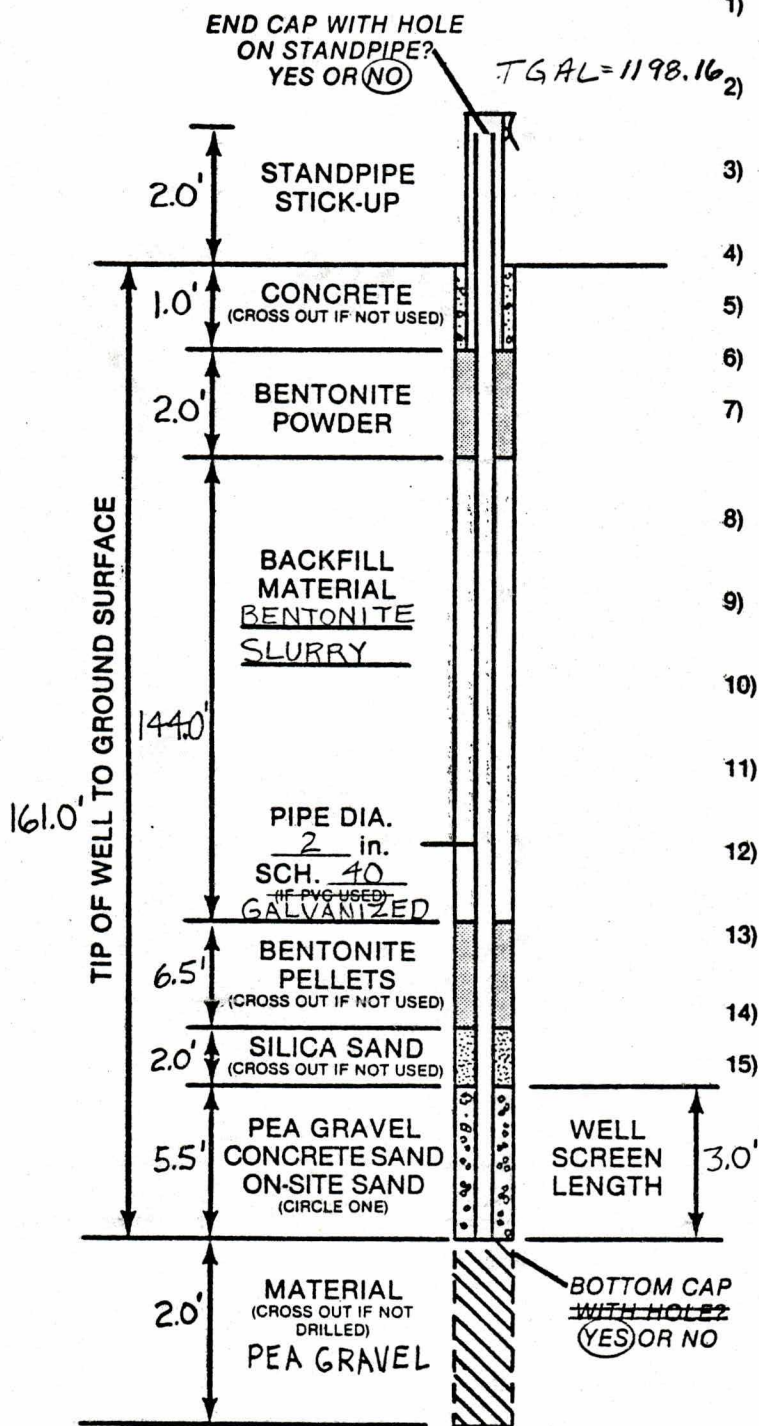
- 1) TYPE OF PIPE?
PVC, GALVANIZED, STAINLESS, OTHER _____
- 2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, THREADED, OTHER _____
- 3) TYPE OF WELL SCREEN
PVC, GALVANIZED, STAINLESS, OTHER _____
- 4) SCREEN SIZE .020
- 5) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
- 6) WAS SOLVENT USED? YES OR NO
- 7) WAS DRILLING MUD USED? NO
SOLID AUGER, HOLLOW STEM AUGER,
WATER, REVERT, BENTONITE
- 8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR NO
- 9) HOW WAS WELL DEVELOPED?
BAILING, PUMPING, SURGING, COMPRESSED AIR
- 10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., 30 min., OTHER 20 MIN
- 11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 200 GAL
10 G PM
- 12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, OPAQUE
- 13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, TURBID, OPAQUE
- 14) DID THE WATER SMELL? YES OR NO
- 15) WATER LEVEL SUMMARY
 - 1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
16.4 Ft. or DRY
 - 2) OTHER MEASUREMENTS:
DATE _____, _____ Ft. FROM T, ST. PIPE
DATE _____, _____ Ft. FROM T, ST. PIPE
DATE _____, _____ Ft. FROM T, ST. PIPE
DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. B-2 DATE INSTALLED 3-30-84 DRILL RIG DR-2
 DRILLER EVH DRILL CREW WRZ
 JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12776
 FW: 1-983



STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



- 1) TYPE OF PIPE?
PVC, GALVANIZED, STAINLESS, OTHER _____
- 2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, THREADED, OTHER _____
- 3) TYPE OF WELL SCREEN
PVC, GALVANIZED, STAINLESS, OTHER _____
- 4) SCREEN SIZE .020
- 5) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
- 6) WAS SOLVENT USED? YES OR NO
- 7) WAS DRILLING MUD USED?
SOLID AUGER, HOLLOW STEM AUGER,
WATER, REVERT, BENTONITE
- 8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR NO
- 9) HOW WAS WELL DEVELOPED?
BAILING, PUMPING, SURGING, COMPRESSED AIR
- 10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., 30 min., OTHER 60 MIN
- 11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 300 GAL.
5 GPM
- 12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, OPAQUE
- 13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, TURBID, OPAQUE
- 14) DID THE WATER SMELL? YES OR NO
- 15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
_____ Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. B-3 DATE INSTALLED 3-29-84-3-30-84 DRILL RIG DR-2

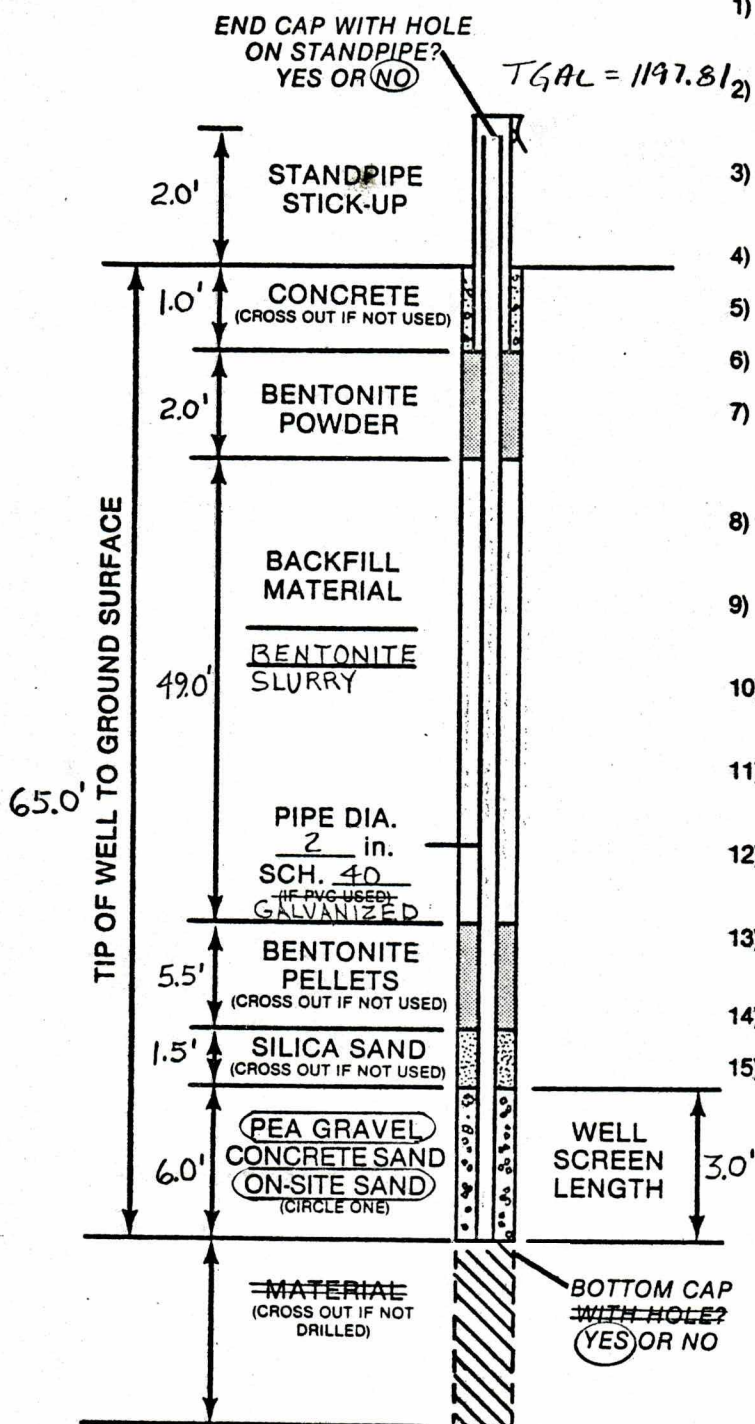
DRILLER EVH DRILL CREW WRZ

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12776



STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



- 1) TYPE OF PIPE?
PVC, GALVANIZED, STAINLESS, OTHER _____
- 2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, THREADED, OTHER _____
- 3) TYPE OF WELL SCREEN
PVC, GALVANIZED, STAINLESS, OTHER _____
- 4) SCREEN SIZE .020
- 5) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
- 6) WAS SOLVENT USED? YES OR NO
- 7) WAS DRILLING MUD USED?
SOLID AUGER, HOLLOW STEM AUGER,
WATER, REVERT, BENTONITE
- 8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR NO
- 9) HOW WAS WELL DEVELOPED?
BAILING, PUMPING, SURGING, COMPRESSED AIR
- 10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., 30 min., OTHER _____
- 11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 200 GAL
8 GPM
- 12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, OPAQUE
- 13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, TURBID, OPAQUE
- 14) DID THE WATER SMELL? YES OR NO
- 15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
_____ Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. B-3A DATE INSTALLED 4-2-84 DRILL RIG DR-2

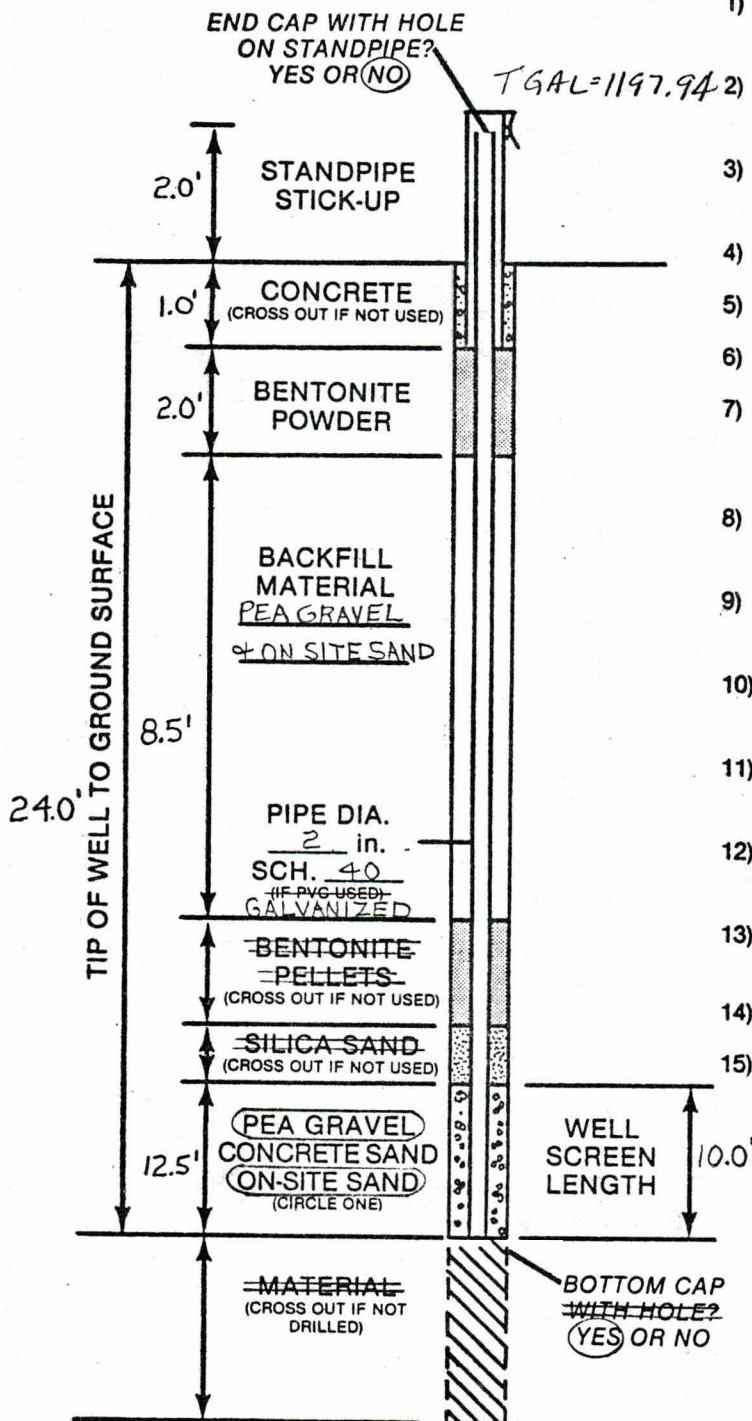
DRILLER EVH DRILL CREW WRZ

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12776



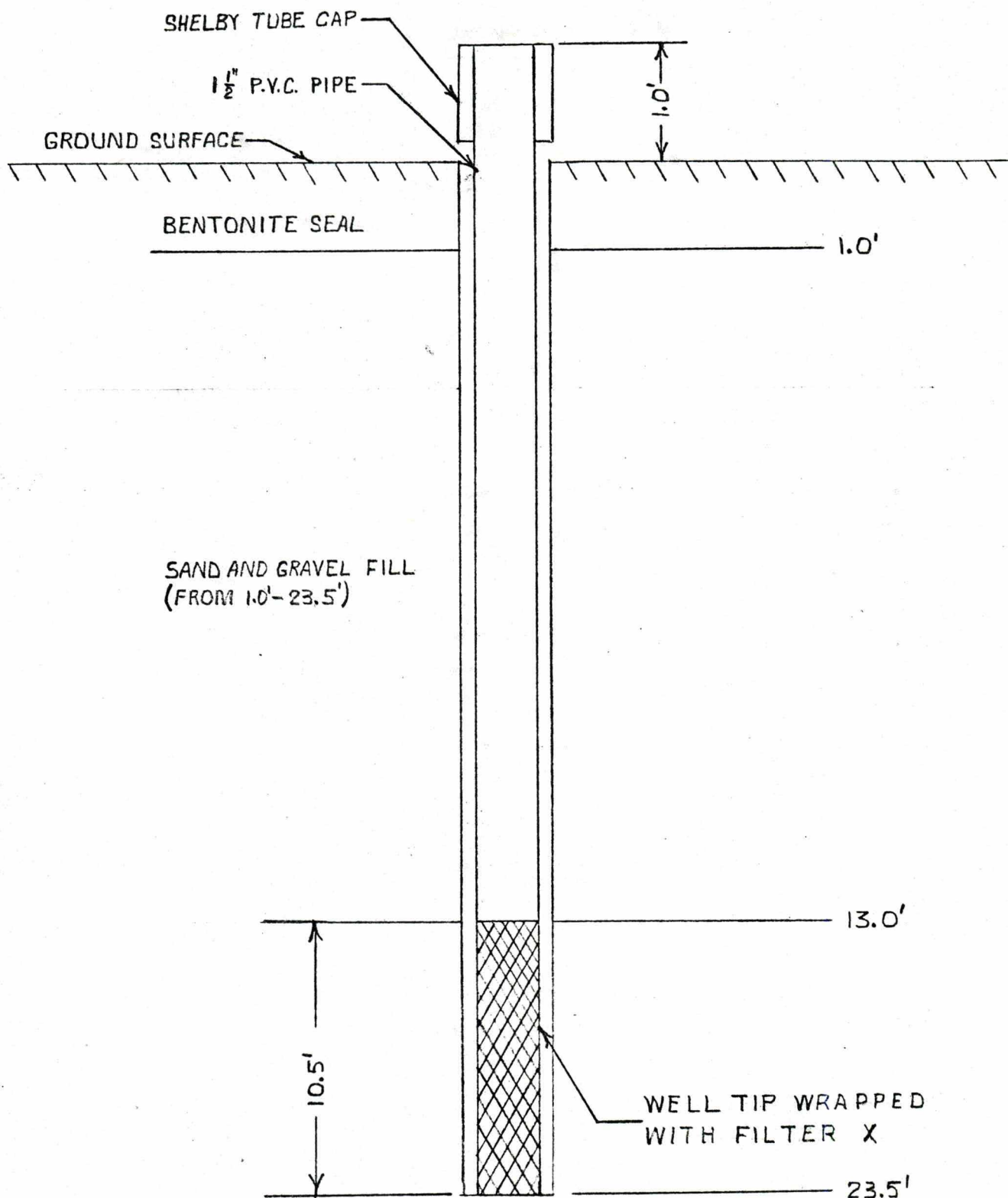
STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM

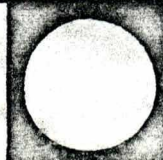


- 1) TYPE OF PIPE?
PVC, GALVANIZED, STAINLESS, OTHER _____
- 2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, THREADED, OTHER _____
- 3) TYPE OF WELL SCREEN
PVC, GALVANIZED, STAINLESS, OTHER _____
- 4) SCREEN SIZE .020
- 5) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
- 6) WAS SOLVENT USED? YES OR NO
- 7) WAS DRILLING MUD USED? NO
SOLID AUGER, HOLLOW STEM AUGER,
WATER, REVERT, BENTONITE
- 8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR NO
- 9) HOW WAS WELL DEVELOPED?
BAILING, PUMPING, SURGING, COMPRESSED AIR
- 10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., 30 min., OTHER _____
- 11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 200 GAL.
106 PM
- 12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, OPAQUE
- 13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, TURBID, OPAQUE
- 14) DID THE WATER SMELL? YES OR NO
- 15) WATER LEVEL SUMMARY
 - 1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
16.0 Ft. or DRY
 - 2) OTHER MEASUREMENTS:
DATE _____, _____ Ft. FROM T, ST. PIPE
DATE _____, _____ Ft. FROM T, ST. PIPE
DATE _____, _____ Ft. FROM T, ST. PIPE
DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. B-3B DATE INSTALLED 4-3-84 DRILL RIG DR-2
 DRILLER EVH DRILL CREW WRZ
 JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12776
 FW: 1-983



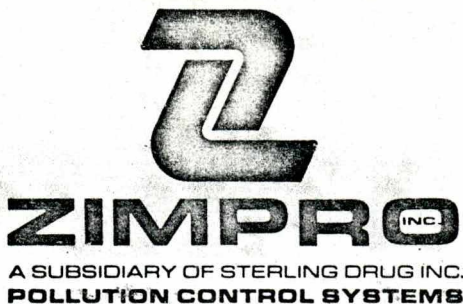
WELL POINT INSTALLATION DIAGRAM
WAUSAU CHEMICAL
WAUSAU, WISCONSIN



SOIL TESTING SERVICES
OF WISCONSIN, INC.

GREEN BAY, WISCONSIN 54301

R.P.V. 7-2577 NO SCALE W6795



May 25, 1984

STS Consultants Ltd.
540 Lambeau
Green Bay, WI 54303

Attn: Doug Hermann

Re: Wausau Chemical Well Water Profile

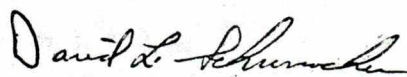
The water samples collected at the Wausau Chemical site on May 16, 1984 were analyzed using EPA Method 601 for volatile organics. The purge and trap technique was used for concentrating while photoionization (10.2 eV) and Hall detectors in series were used for quantitation. Detection limits are given in the left column.

The field blank samples contained traces of tetrachloroethylene. One of the blanks also contained a trace of toluene. Sample B-3B contained very high concentrations of volatile organics.

If you have any questions concerning these results, please feel free to call.

Sincerely,

ZIMPRO INC.


David L. Schumacher
Instrumentation Chemist

DLS/ljs

cc: J.W. Barr
J.R. Salkowski

Enclosure



June 8, 1984

STS Consultants Ltd.
540 Lambeau
Green Bay, WI 54303

Attn: Doug Hermann

Re: Wausau Chemical Well Water Profile

The water samples collected at the Wausau Chemical site on May 31, 1984 were analyzed using EPA Method 601 for volatile organics. The purge and trap technique was used for concentrating while photoionization (10.2 eV) and Hall detectors in series were used for quantitation. Detection limits are given in the left column.

Analysis of the field blanks revealed traces of a few volatile organics. A sample of organic free water collected at our facility also revealed traces of volatile organics. Apparently, there is some low level contamination occurring in the laboratory and efforts are being taken to solve this matter. The level of contamination is so low, however, that it has no significant effect on your results.

If you have any questions concerning these results, please feel free to call.

Sincerely,

ZIMPRO INC.


David L. Schumacher
Instrumentation Chemist

DLS/ljs

cc: J.W. Barr
J.R. Salkowski

Enclosure

May 16, 1984
Wausau Chemical

	Detection Limit	Field Blank #1	Field Blank #2	24.5'	25.5'	163'		25.5'	25'
				B-1	B-2	B-3	B-3A	B-3B	PVC Well
Acrolein	40	X	X	X	X	X	X	X	X
Benzene	0.1	X	X	X	0.3	X	X	45	X
Bromoform	0.5	X	X	X	X	X	X	X	X
Bromomethane	1.0	X	X	X	X	X	X	X	X
Carbon Tetrachloride	0.1	X	X	X	X	X	X	X	X
Chlorobenzene	0.1	X	X	X	X	X	X	X	X
Chloroethane	1.0	X	X	X	X	X	X	X	X
1-Chloroethylvinyl Ether	2.0	X	X	X	X	X	X	X	X
Chloroform	0.1	X	X	X	X	X	X	X	0.3
Chloromethane	6.0	X	X	X	X	X	X	X	X
1-Bromochloromethane	0.1	X	X	X	X	X	X	X	X
1,1-Dichlorobromomethane	0.1	X	X	X	X	X	X	X	X
1,1-Dichloroethane	0.1	X	X	X	0.4	X	X	12	X
1,2-Dichloroethane	0.3	X	X	X	X	X	X	X	X
1,1-Dichloroethylene	0.5	X	X	X	0.5	X	X	3.5	X
1,2-Dichloroethylene	0.3	X	X	17	16	1.5	X	630	1.0
1,1-Dichloromethane	0.5	X	X	X	X	X	X	X	X
1,2-Dichloropropane	0.5	X	X	X	X	X	X	X	X
trans-1,3-Dichloropropene	0.3	X	X	X	X	X	X	X	X
trans-1,3-Dichloropropene	1.0	X	X	X	X	X	X	X	X
Ethylbenzene	0.2	X	X	3.5	0.9	X	X	2000	6.7
1,1,2,2-Tetrachloroethane	0.1	X	X	X	X	X	X	X	X
1,1,2,2-Tetrachloroethylene	0.1	1.7	0.3	180	490	1.2	1.2	3200	32
Toluene	0.1	0.7	X	1.9	0.7	X	X	2600	5.6
1,1,1-Trichloroethane	0.1	X	X	10	1.7	X	X	30	0.2
1,1,2-Trichloroethane	0.1	X	X	X	X	X	X	X	X
Trichloroethylene	0.1	X	X	26	49	2.8	X	2600	7.7
Vinyl Chloride	0.1	X	X	X	6.7	X	X	1.1	X
<u>Other Volatile Organics</u>									
Methyl ethyl Ketone	2.0	X	X	X	X	X	X	15	X
Tetrahydrofuran	5.0	X	X	X	X	X	X	X	X
p-Xylene	0.5	X	X	4.4	2.2	X	X	8800	31
m,p-Xylene (as o-xylene)	0.5	X	X	2.3	1.4	X	X	5300	19
Analytical No.		4059	4059	4060	4061	4062	4063	4064	4065

= Not detected

NOTE: Field Blank #1 & #2 were taken from organic-freewater used to final rinse the bailer between samplings.

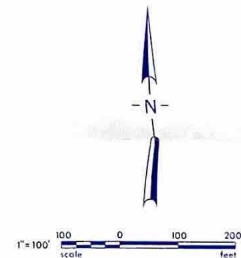
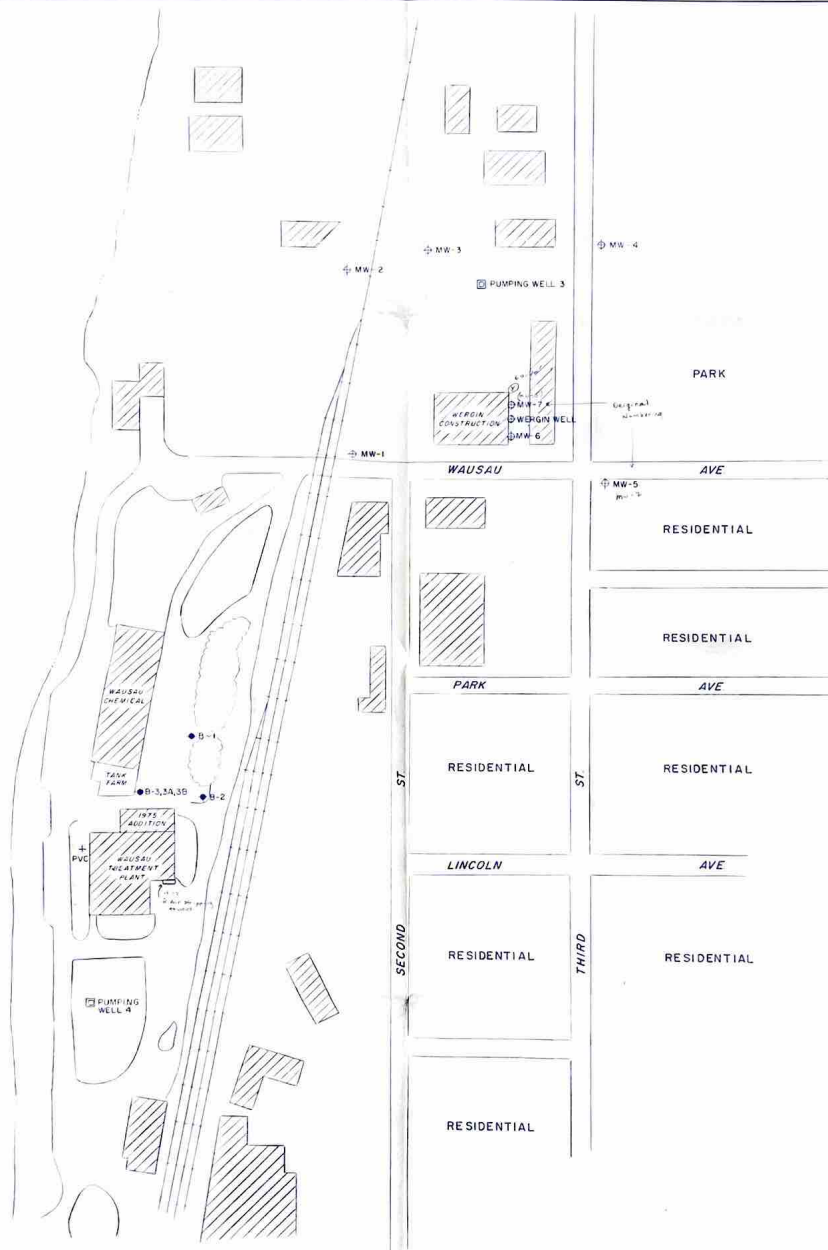
Wausau Chemical

May 31, 1984

	Detection Limit	Field Blank #1	Field Blank #2	B-1	B-2	B-3	B-3A	B-3B	PVC Well
Acrolein	40	X	X	X	X	X	X	X	X
Benzene	0.1	X	X	X	X	X	X	40	X
Bromoform	0.5	X	X	X	X	X	X	X	X
Bromomethane	1.0	X	X	X	X	X	X	X	X
Carbon Tetrachloride	0.1	X	X	X	X	X	X	X	X
Chlorobenzene	0.1	X	X	X	X	X	X	X	X
Chloroethane	1.0	X	X	X	X	X	X	X	X
2-Chloroethylvinyl Ether	2.0	X	X	X	X	X	X	X	X
Chloroform	0.1	X	0.5	X	X	X	X	X	0.3
Chloromethane	6.0	X	X	X	X	X	X	X	X
Dibromochloromethane	0.1	X	X	X	X	X	X	X	X
Dichlorobromomethane	0.1	X	X	X	X	X	X	X	X
1,1-Dichloroethane	0.1	X	X	1.0	X	X	X	X	X
1,2-Dichloroethane	0.3	X	X	X	X	X	X	X	X
1,1-Dichloroethylene	0.5	X	X	X	0.5	X	X	3.1	X
1,2-Dichloroethylene	0.3	X	X	78	11	1.7	X	680	X
Dichloromethane	0.5	X	X	1.3	X	X	X	X	X
1,2-Dichloropropane	0.5	X	X	X	X	X	X	X	X
cis-1,3-Dichloropropene	0.3	X	X	X	X	X	X	X	X
trans-1,2-Dichloropropene	1.0	X	X	X	X	X	X	X	X
Ethylbenzene	0.2	X	X	3.5	2.3	1.4	X	660	1.7
1,1,2,2-Tetrachloroethane	0.1	X	X	X	X	X	X	X	X
Tetrachloroethylene	0.1	0.2	0.3	310	210	2.1	0.4	4300	31
Toluene	0.1	X	X	3.3	1.4	0.7	X	800	0.8
1,1,1-Trichloroethane	0.1	X	X	17	1.6	X	X	20	0.2
1,1,2-Trichloroethane	0.1	X	X	X	X	X	X	X	X
Trichloroethylene	0.1	X	0.1	140	50	3.7	0.1	4800	5.4
Vinyl Chloride	0.1	X	X	X	3.9	X	X	0.5	X
<u>Other Volatile Organics</u>									
Methyl Ethyl Ketone	2.0	X	X	X	X	X	X	X	X
Tetrahydrofuran	5.0	X	X	X	X	X	X	X	X
m-xylene	0.5	X	X	18	7.4	3.2	2.5	3020	5.4
o & p xylene (as o-xylene)	0.5	X	X	11	5.0	2.1	X	2150	2.7
Analytical No.		4465	4466	4467	4468	4469	4470	4471	4472

X = not detected

WISCONSIN RIVER
NORMAL POOL
1188



LEGEND

- + SOIL BORING AND PVC MONITORING WELL BY WAUSAU CHEM (JULY 1975)
- ⊕ SOIL BORING AND MONITORING WELL BY CITY OF WAUSAU
- ◆ SOIL BORING AND MONITORING WELL BY WAUSAU CHEM
- ▨ INDUSTRIAL BUILDING

TAKEN FROM CITY OF WAUSAU
ORTHOPHOTOGRAPHIC MAPS 90 AND 100
PHOTOGRAPHED APRIL 26, 1974



STS Consultants Ltd.
540 Lambeau St. Green Bay, Wisconsin
ph 414-494-9656

SCALE: 1"=100'	DATE: 7-25-88	DRAWN BY: J. J. T.	APPROVED BY:
REVISION:	BY:	DESCRIPTION:	
PROJECT: WAUSAU CHEMICAL CORPORATION			
SHEET: SOIL BORING AND MONITORING LOCATION			
TOTAL SHEETS: 12776			