12/85

STS Consultants Ltd.
Consulting Engineers

Interim Report

Groundwater Extraction Program
Wausau, Wisconsin

Wausau Chemical Corporation

Wausau, Wisconsin

Report

STS Consultants Ltd.
Consulting Engineers

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

December 17, 1985

Department of Natural Resources
P.O. Box 310
Antigo, Wisconsin 54409

Attention: Mr. Jack Saltes

STS Job 12776-B

RE: Wausau Chemical Corporation Groundwater Extraction Program

Gentlemen:

On behalf of Charne, Glassner, Tehan, Clancy and Taitelman, legal council to Wausau Chemical, we are submitting an interim report concerning the above referenced project. Five copies of the report are enclosed.

If you have any questions concerning this report, please feel free to contact us at your convenience.

Yours very truly,

STS CONSULTANTS LTD.

Mark D. Millsop

Mark D. Millsop
Environmental Geologist

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

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Report

Project

GROUNDWATER EXTRACTION PROGRAM - INTERIM REPORT

WAUSAU CHEMICAL CORPORATION
WAUSAU, WISCONSIN

Client

WAUSAU CHEMICAL COMPANY
P.O. BOX 953
WAUSAU, WISCONSIN 54401

Project # 12776-B

Date December, 1985

STS Consultants Ltd.
Consulting Engineers

540 Lambeau Street
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INTRODUCTION

The purpose of this report is to describe the soils and the extraction well installations at Wausau Chemical Corporation and to evaluate the effectiveness of the groundwater extraction program to date. This report includes soil boring logs, well installation diagrams and water quality data.

The Wausau Chemical Corporation is located on the east bank of the Wisconsin River at 2001 River Drive which is in the NW 1/4 of the NW 1/4 of Section 25, T29N, R7E of the City of Wausau, Marathon County, Wisconsin. For historical information concerning the tetrachloroethylene (perchloroethylene) spill at the site, please refer to the STS report dated April 3, 1985.

PROCEDURES

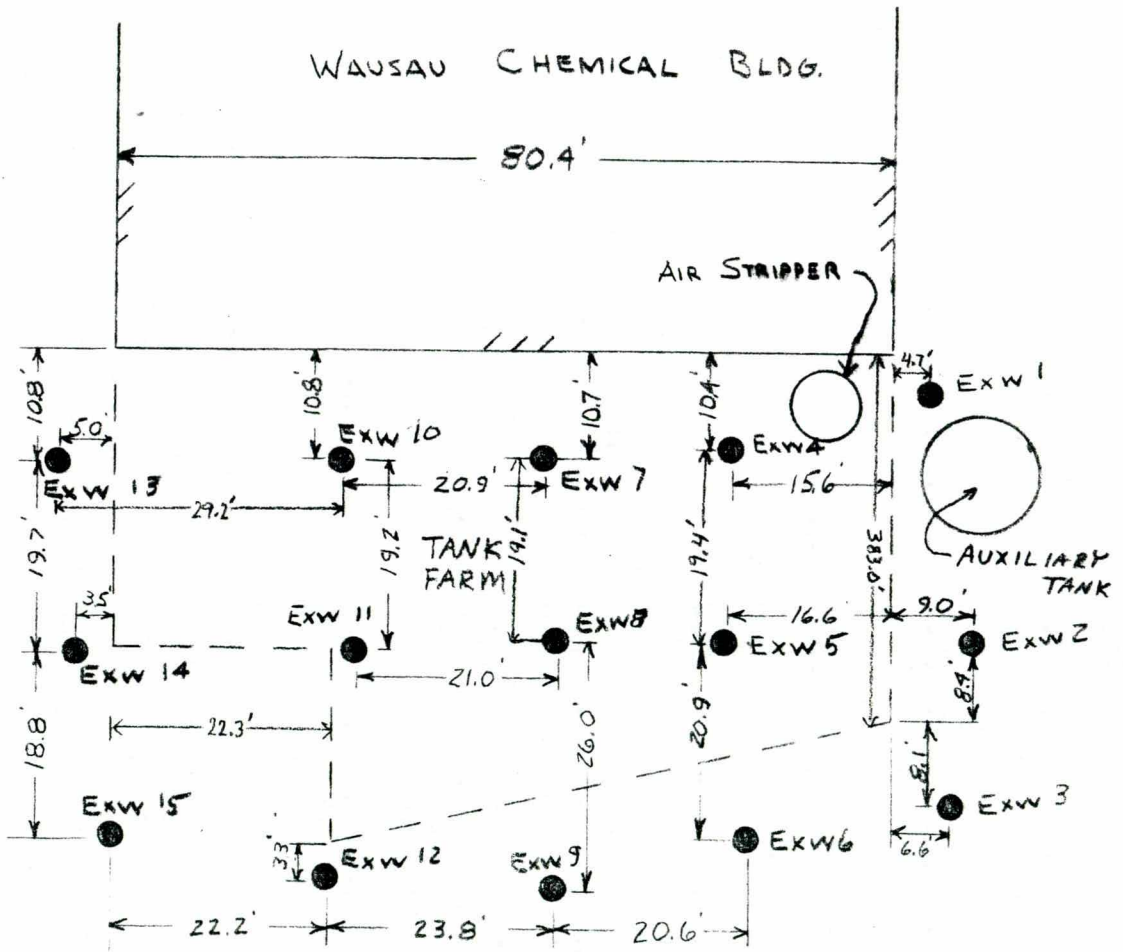
Soil Borings and Well Installations

The new field exploration completed for this report consisted of 15 soil borings (B-1 to B-15) and groundwater extraction well installations in October, 1985, on or near the old tank farm at Wausau Chemical (Figure 1). All of the borings were drilled to a depth of 26.5 feet with the exception of B-7 which was drilled to a depth of 27.5 feet. The boring surface elevations and well elevations were surveyed with respect to Wausau City Datum, and are shown on the Soil Boring Logs and Well Installation Diagrams.

The soil borings were drilled to their respective depths with a truck-mounted CME rotary drilling rig. Solid-stem augers were used to advance the boreholes. The first 10 feet in each of the soil borings was not sampled. Below the 10 foot level, representative samples of the soils in the boreholes were obtained at 5 foot intervals by means of split-barrel sampling procedures in general accordance with ASTM Specification D 1586-67, "Standard Method for Penetration Tests and Split-Barrel Sampling of Soils". A brief description of this sampling procedure is included in Appendix A.

Groundwater extraction wells were installed in each of the soil borings. In order to install the extraction wells, a 6 inch steel casing was driven into the ground and then a roller bit and revert drilling mud were utilized. The wells were installed per the design specifications outlined in STS's October 10, 1985 letter to the Department of Natural Resources. Generally, the wells consist of 4 inch ID Schedule 40 threaded PVC pipe with a 10 foot long 0.15 inch slotted PVC well screen. The well screens are wrapped with a polypropylene filter (Poly-filter GB) with opening size #40 from Carthage Mills, Inc. Below the well screen is a 3 foot

FIGURE 1



EXTRACTION WELLS,

WAUSAU CHEMICAL FACILITY

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GREEN BAY, WIS. 54303

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solid PVC pipe which was installed to provide the minimum inlet head pressure needed for the submersible pumps.

The annulus around each of the well screens was backfilled with pea gravel. On-site sand was placed above the pea gravel and a bentonite powder seal was placed near the ground surface. After installation, the wells were developed by pumping and bailing. Well installation diagrams are included in Appendix A.

Soil Classification

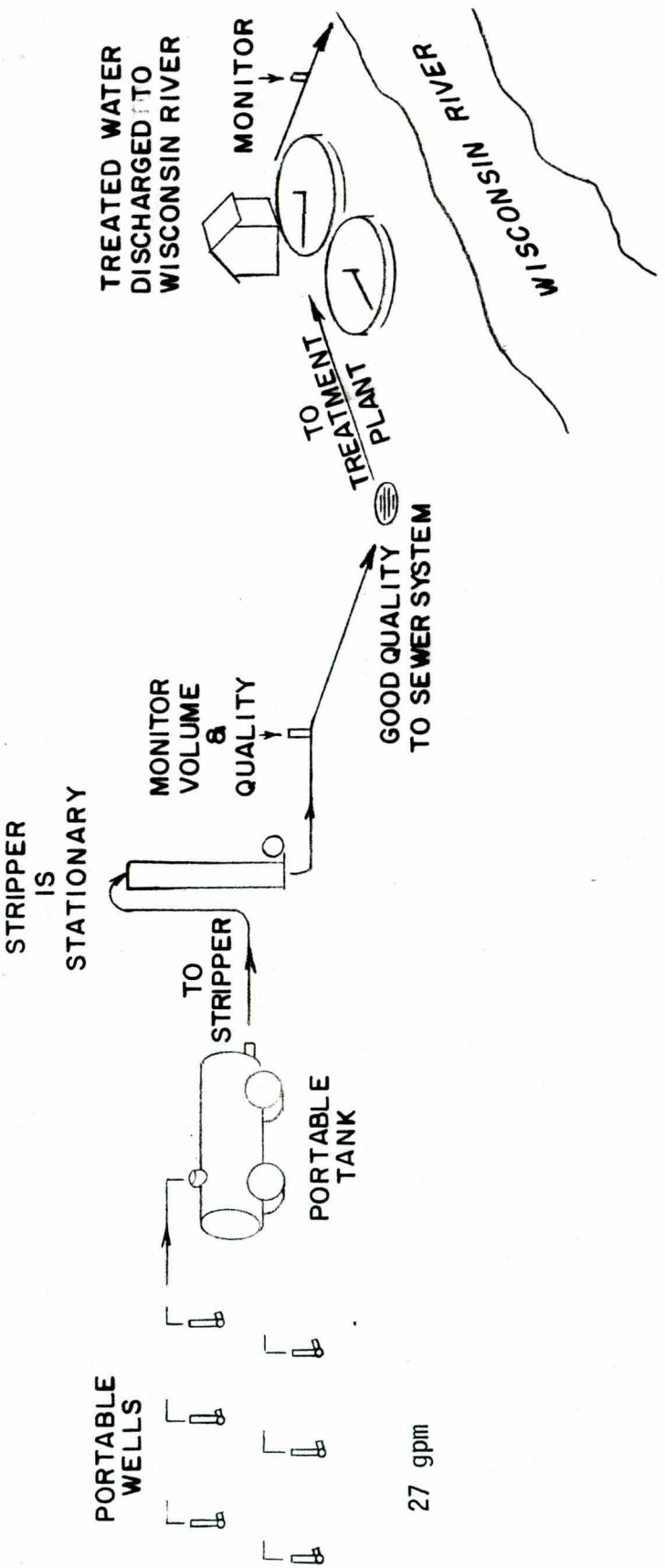
Each of the soil samples recovered from the boreholes was examined by an experienced Soils Engineer to determine the major and minor soil components, degree of saturation, and any conspicuous lenses and seams. Then the soils were classified according to the Unified Soil Classification System. The capitalized symbol in parenthesis on the boring logs is the appropriate group symbol according to this classification scheme. A chart describing the Unified Soil Classification System is included in Appendix A.

Upon completion of the classification, the Engineer grouped the soil samples by type as shown on the Soil Boring Logs in Appendix A. Please note that the strata contact lines represent approximate boundaries between soil types, whereas changes in the soil types in situ may be gradual in both the horizontal and vertical directions.

Groundwater Extraction, Treatment and Monitoring

The groundwater extraction and treatment system was installed per the recommendations in STS's April 4, 1985 report. Generally, the system consists of 6 submersible pumps installed in a cluster of 6 wells, an auxiliary tank, and an airstripper (Figure 2).

FIGURE 2



EXTRACTION AND TREATMENT OF
TETRACHLOROETHYLENE
WAUSAU, WISCONSIN

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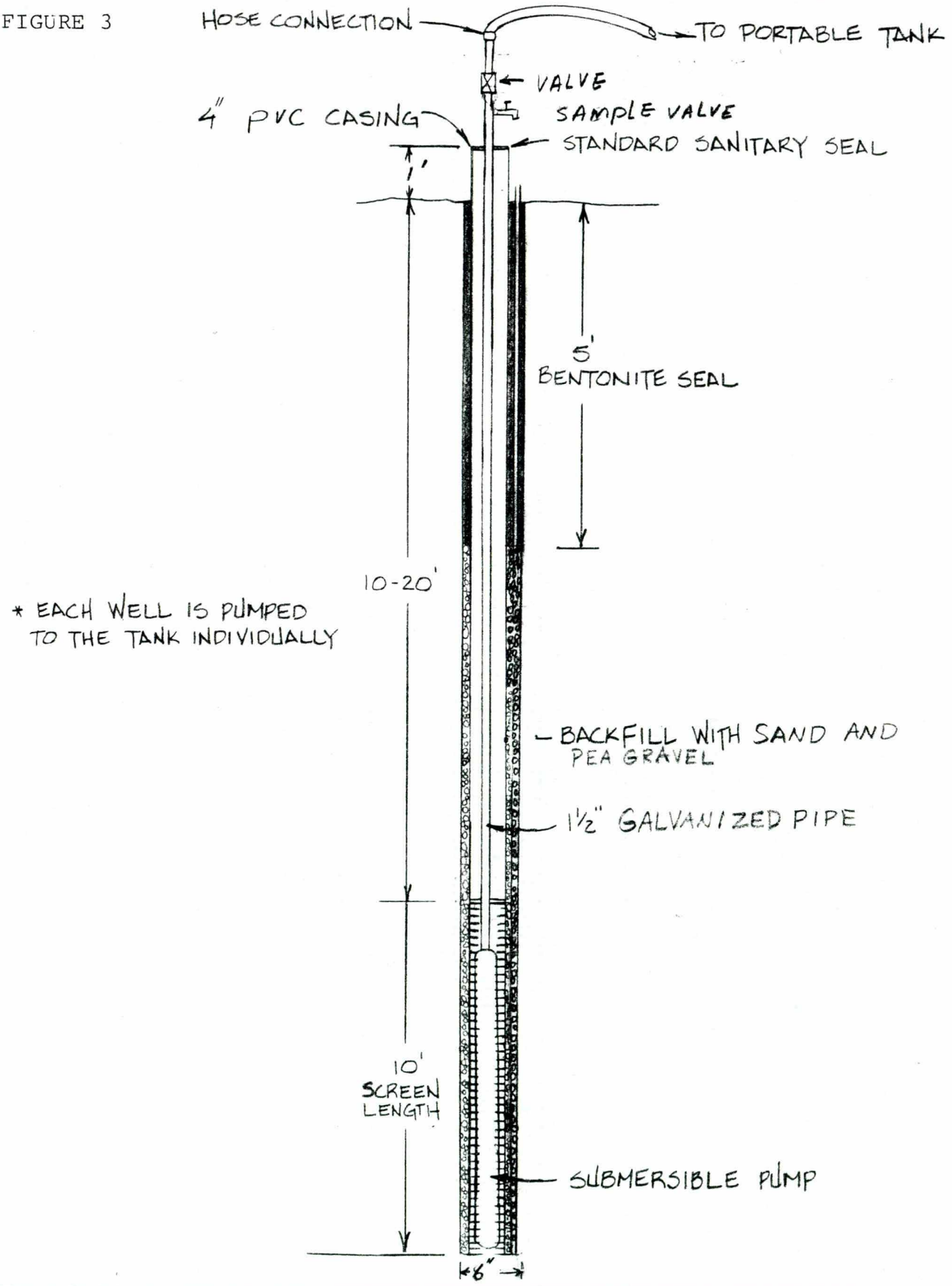
One-horsepower submersible pumps, with an estimated average pumping rate of 25 to 27 gpm, were installed in extraction wells 10, 11, 12, 13, 14 and 15 in mid-October, 1985. The pumps are connected to a galvanized steel pipe which is connected to a rubber hose at the top of the well (Figure 3). The extracted water is pumped through hoses to an auxiliary tank which is fitted with a 3-horsepower centrifugal pump. Then the water is pumped from the tank to the airstripper at a rate of approximately 145 gpm. After the water is treated for volatile organic compound removal in the airstripper, the water is discharged to the Wausau City Sewer. Any residual contamination remaining treated at the Wausau wastewater treatment plant in the activated treatment phase. influent~ effluent?

During the extraction program, periodic water analyses were performed. The water samples were obtained from the specially installed sample valves on the wells. These samples were analyzed by Zimpro Laboratory. When stable water quality is observed, extraction in a well cluster is terminated and the pumps are moved to a new well cluster. In addition, pumping rates, pumping duration and water levels are measured regularly.

The monitoring program also was undertaken to determine the contaminant level for the influent and effluent from the airstripper. The data obtained from that monitoring allowed calculation of the airstripper efficiency and, furthermore, it enabled discharge requirements to be evaluated. Thus, pumping rates could be adjusted as needed.

FIGURE 3



WELL INSTALLATION DIAGRAM

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JJT	6-18-85	½"=1'-0"	12776A

RESULTS

Soils Exploration

Fill was encountered near the surface in the borings; however, it can extend to a depth of 18 feet. The fill consists of medium dense to very dense sand with gravel. It is underlain by a fine to coarse sand with gravel extending to the termination depth of the borings. This strata's relative density ranged from very loose to dense. Soil Boring Logs are included in Appendix A.

Extraction Program

A generalized historical summary of the extraction and airstripping system is presented in Table 1. Thus far, there have been various minor problems described in Table 1. The first cluster of wells that was pumped included extraction wells 10, 11, 12, 13, 14 and 15. They were pumped until November 15 when the pumps were removed from wells 13, 14 and 15, and those three pumps were installed in wells 7, 8 and 9. Thus, the second cluster of wells consists of extraction wells 7, 8, 9, 10, 11 and 12. Due to unfavorable weather conditions and the Thanksgiving holiday in late November, well cluster 2 was not pumped during that period. However, pumping commmenced once again recently.

Efficiency - Prior to commencement of the Extraction Program, samples were gathered from extraction wells 5, 7, 10 and 15. Perchloroethylene concentrations for those wells are presented in Table 2. Perchloroethylene concentrations from samples gathered from wells 7, 10 and 15 on November 8 showed a marked decrease in measured concentration. Furthermore,

STS Job 12776-B

TABLE 1

GENERALIZED EXTRACTION AND AIRSTRIPPER HISTORY

Date	Activity
Oct. 11	Stripper installation started
Oct. 23	Attempted start-up. Blower would not stay on. Determined that motor/blower combination designed incorrectly. Blower people were to install new blower Monday, October 28, but didn't come in until October 30.
Oct. 30	Started to run but breakers would not stay on.
Oct. 31	Rewired - ran about three hours - mechanical operation checked out OK.
Nov. 1	Ran approximately four hours
Nov. 2	Ran approximately four and one-half hours
Nov. 3	Ran approximately five hours
Nov. 4 Nov. 5	Ran approximately a 4-hour morning - started again at 4 p.m. and ran all night and all day until 8 a.m., November 6.
Nov. 7 Nov. 8-9	Started Wells 10 and 11 only at 2 p.m. and ran until system failed Friday night or Saturday morning due to snow storm. Everything froze up solid.
Nov. 12	Thawed system out and restarted 4:30 p.m.
Nov. 13	Ran Wells 10 and 11 only all day until 2 p.m., November 14.
Nov. 14	Discussed water meter not working.
Nov. 15	Changed pumps from Wells 13, 14 and 15 to 7, 8 and 9. Ran #11 for two hours only to get water level readings.
Nov. 19	Could not start up. Lines were frozen.
Nov. 20	Pulled pumps to remove check valves and thaw out lines. Installed heating tape on tank line valve and meter.
Nov. 21	Started Wells 7, 8, 9 at 4 p.m. Ran until 4 p.m., November 22. Shut down to take out water meter (not working again - new meter).
Nov. 25	Meter repaired. Thanksgiving week - did not attempt to run due to cold and manpower shortage.

TABLE 2

MEASURED PERCHLOROETHYLENE CONCENTRATIONS (PPM)

Sampling Date	Extraction Well 5	7	10	11	15	Stripper Influent	Stripper Effluent	Stripper Efficiency
10-3-85			144.0					
10-11-85	145.0	50.2			8.0			
10-30-85[1]						4.6	0.3	93.5%
11-4-85[2]						2.9	0.5	82.7%
11-8-85[3]		11.0	5.6		0.1	6.2	0.6	90.3%
11-14-85[4]			6.9	9.4		8.2[5]	1.0	87.8%
11-22-85[6]						5.8	0.7	87.9%
12-5-85[7]	40.0	3.1	6.0		1.2			

[1] = Samples taken after 2 hours of pumping wells 12, 13, 14 and 15

[2] = Samples taken after 2 hours of pumping wells 11, 12, 13, 14, and 15

[3] = Samples taken after 2 hours of pumping wells 10, 11, 13, 14 and 15

[4] = Samples taken after 46 hours of pumping wells 10 and 11

[5] = Concentration not measured; value obtained by averaging concentrations measured in wells 10 and 11

[6] = Samples taken after 16 hours of pumping wells 7, 8 and 9

[7] = Samples taken after 2-1/2 hours pumping wells 7 and 10.

samples gathered from those wells on December 5, 1985 show further decrease in concentration.

Airstripper influent and effluent samples were gathered on five occasions from late October to late November for perchloroethylene analysis. The influent concentrations ranged form 2.9 to 8.2 ppm, whereas effluent concentrations ranged from 0.3 to 1.0 ppm (Table 2). Airstripper efficiency calculated from the influent and effluent concentrations ranged from 82.7% to 93.5% and averaged 88.4%. Thus, an average of 88.4% of the perchloroethylene that is introduced into the airstripper is removed. The airstripper efficiency can be affected by many parameters such as influent concentration, temperature and humidity. More data is needed before trends or relationships between efficiency and associated parameters can be evaluated. However, at this point, it appears as if the airstripper is doing a more than adequate job. Efficiency may decrease with colder temperatures.

Air Emissions - Perchloroethylene emissions from the airstripper were calculated for the five dates that influent and effluent perchloroethylene concentrations were measured (Table 3). Perchloroethylene emission values in pounds per hour were obtained by multiplying 145 gallons per minute (auxiliary tank centrifugal pump pumping capacity) times 60 minutes times the measured influent perchloroethylene concentration in parts per million times 8.33 pounds per gallon times the calculated airstripper efficiency for that date. Perchloroethylene emissions ranged from 0.174 to 0.522 pounds per hour and averaged 0.357 pounds per hour. All of these values are much less than the maximum allowable perchloroethylene emission of 3 pounds per hour.

TABLE 3

PERCHLOROETHYLENE EMISSIONS FROM AIRSTRIPPER

Date	Actual Pounds/hour	Estimated Pounds/day
10-30-85	0.312	0.624
11-4-85	0.174	2.088
11-8-85	0.406	uncalculable *
11-14-85	0.522	7.308
11-22-85	0.369	5.904

* Variable pumping schedule; cannot calculate emission value from known data

Daily perchloroethylene emission was calculated by multiplying the pounds per hour value for that date by the amount of time the respective wells were pumped. These values are shown in Table 2 and they range from 0.624 to 7.308 pounds per day. These values and the average estimated pounds per day emission of 3.981 are much less than the maximum allowable limit of 15 pounds per day.

The extraction and airstripping system has been very successful in meeting the emissions requirements to date. It appears that the system could be pumped 24 hours per day without exceeding the daily 15 pounds per day limit. Water quality and pumping data on which all of the above calculations are based are included in Appendix B.

Pumping Test - On November, 8, 1985, a pumping test was conducted in well 11 to determine the radius of influence of the extraction wells. After steady state conditions were obtained, pumping wells 10 and 11 were shut off at 10:51 a.m. The wells recharged for approximately 1 hour before pump 11 was started again at 12:04 p.m. The pumping test results are presented in Table 4. Please refer to Figure 1 for the locations of the monitored wells.

Generally, the data show that after pumping well 11 had started, pumping well 10 was affected, pumping well 8 was affected very little, and pumping wells 5 and 2 were unaffected. A possible explanation for the increase in water levels after 39 minutes is gravity drainage in the water table aquifer. That is, after drawdown, the water in the unsaturated zone drained due to gravity and caused the water level to rise. The important aspect of the pumping test is that only wells 10 and 8 were affected by the pumping of well 11. Thus, we can assume that there is a well developed overlap in the cone of depressions between the extraction wells when pumping but yet the radius of influence is not so

TABLE 4

PUMPING TEST WATER LEVEL SUMMARY, NOVEMBER 8, 1985

Time (min.)	Well 11		Well 10		Well 8		Well 5		Well 2	
	Water Level	Elevation	Water Level	Elevation	Water Level	Elevation	Water Level	Elevation	Water Level	Elevation
0[1]	20.8	1182.7	17.70	1185.4						
11	18.33	1185.17	17.5	1185.6						
16	18.1	1185.4	17.42	1185.68						
25	18.0	1185.5	17.42	1185.68						
38	17.96	1185.54	17.37	1185.73	16.25	1185.55	17.5	1185.7	13.9	1185.6
63	17.75	1185.75	17.25	1185.85	16.1	1185.7	17.4	1185.8	13.8	1185.7
0[2]										
6	21.17	1182.33	17.37	1185.73	16.17	1185.63	17.58	1185.62	14.0	1185.5
11	21.25	1182.25	17.5	1185.60	16.42	1185.38	17.5	1185.7	13.92	1185.58
20	21.33	1182.17	17.54	1185.56						
39	21.42	1182.08	17.29	1185.81	16.33	1185.47	17.58	1185.62	13.83	1185.67

[1] = After steady state conditions were obtained, pumps 10 and 11 were shut off at 10:51 a.m.

[2] = Pump 11 was started at 12:04 p.m.

Note: Water levels are measured in feet below top of casing and elevations are feet above mean sea level.

great that any of the wells should be eliminated. Water level data sheets for the pumping test and other water level measurements taken throughout October and November are included in Appendix B.

CONCLUSIONS AND RECOMMENDATIONS

The startup performance record for the extraction and treatment system at Wausau Chemical is quite good. Operations really have only been troubled by normal startup and freezing weather. The extraction and treatment system was not planned to operate in freezing weather. To date, approximately 800,000 gallons of water of have been collected and treated. The quality has been improved approximately 90% at pumping wells (7, 8, 9, 10, 11, 12, 13, 14 and 15). At unpumped wells within the radius of influence of these wells improvement is on the order of 70%. These conclusions are born out by test results tabulated below.

Perchloroethlyene Analysis

Well #	Startup Quality (ppm)	December 8 Quality (ppm)	Percent Cleanup
5	145.0	40.0	72%
7	50.2	3.1	94%
10	144.0	6.0	96%
15	8.0	1.25	84%

Air Stripper Efficiency

Based upon tested influent and effluent water quality to the air stripper, it appears that 88% perchloroethlyene is removed on the average. From the data, it appears that cold temperatures will lower the efficiency.

Air Emissions

Based on influent and effluent concentration to the stripper, it appears that the emissions are in compliance with a maximum of 3 pounds per hour, 15 pounds per day standards. The

maximum recorded air discharge was 0.5 pounds per hour perchloroethlyene. For total volatile organic carbon compounds we expect that the above discharge values would increase approximately 20% to 30%.

Based on the above information, it appears that no exceedances of the air emissions standard have occurred.

Pumping Field Influence

Based upon water levels recorded on November 8 during pumping of Well 11, specific capacities on the order of 10 gallons per minute per foot of drawdown were obtained. This pumping test also indicated that the radius of influence of a single pumping well may be on the order 20 to 40 feet. Based on this data, overlapping cones of depression occurred during simultaneous pumping of the well cluster.

Recommendations

The extraction and treatment design was not developed to operate in freezing conditions. Based upon this condition and the upcoming winter weather, we recommend that operations be postponed until spring. Any prolonged warm periods may allow startup providing the system can be reactivated without great difficulty. We recommend that check valves in each of the wells be removed to reduce freezing problems. However, check valve removal may cause reverse rotation of the motor windings which is discouraged by most manufacturers.

Periodic pumping of sand was observed during startup pumping of most wells. We recommend that the sand level in the auxiliary tank be monitored periodically so that sand levels do not rise above the auxiliary tank outlet.

During the initial operation, all wells were operated simultaneously with switching controlled by the lowest yield well. During the later stages of extraction from a given cluster, we recommend that each well be independently switched by the automatic flow control.

Considering the higher concentrations of perchloroethlyene encountered during startup for the program, we recommend that pumping activities be restricted to 12 hours per day until the concentration of influent water can be lowered to a suitable level allowing 24 hour operations. We recommend that the monitoring program be revised to collect the following data.

1. Influent and effluent samples should be taken simultaneously a few hours after startup of each well cluster and daily thereafter. Chemical analyses will be used to calculate the stripper efficiency and to determine compliance with air discharge limitations. The results of later stages of cluster pumping also will be used to determine whether or not pumps can be moved to the next cluster based on stabilization of the effluent water quality.
2. To determine when pumps may be moved to a new cluster, we suggest that all individual wells be sampled before moving the pumps to identify stabilization water quality in the individual well.
3. Monitoring well B-3B should be sampled when the well cluster includes any of extraction wells 1, 2, 3, 4, 5, or 6 which will be within the zone of influence of the B-3B monitoring well.
4. When higher concentrations are encountered in the stripper effluent, we suggest weekly sampling of the Wausau wastewater treatment plant effluent. The effluent sample should be obtained in conjunction with high flow and high concentrations of the effluent from the stripper.

5. Groundwater elevations should be measured in all extraction and monitoring wells in the vicinity of the tank farm on a semi-weekly basis during pumping.

GENERAL QUALIFICATIONS

The analysis and recommendations submitted in this report are based on data obtained by Wausau Chemical. Our interpretation and recommendations are limited to the available data.

APPENDICES

APPENDIX A

1. Procedures Regarding Field Logs, Laboratory Data Sheets and Samples
2. Penetration Testing Procedure
3. General Notes
4. Unified Soil Classification System Chart
5. Soil Boring Logs
6. Extraction Well Installation Diagrams

APPENDIX B

1. Chronological Water Quality, Water Level and Pumping Data

PROCEDURES REGARDING FIELD LOGS, LABORATORY DATA SHEETS AND SAMPLES

In the process of obtaining and testing samples and preparing the report, procedures are followed that represent reasonable and accepted practice in the field of soil and foundation engineering.

Specifically, field logs are prepared during performance of the drilling and sampling operations which are intended to portray essentially field occurrences, sampling locations and other information.

Samples obtained in the field are frequently subjected to additional testing and reclassification in the laboratory by more experienced soils engineers, and differences between the field logs and the final logs exist.

The Engineer preparing the report reviews the field and laboratory logs, classifications and test data, and in his judgement in interpreting this data, may make further changes.

Samples taken in the field, some of which are later subjected to laboratory tests, are retained in our laboratory for sixty (60) days and are then destroyed unless special disposition is requested by our client. Samples retained over a long period of time, even in sealed jars, are subject to moisture loss which changes the apparent strength of cohesive soil, generally increasing the strength from what was originally encountered in the field. Since they are no longer representative of the moisture conditions initially encountered, an inspection of these samples could recognize this factor.

It is common practice in the soil and foundation engineering profession that field logs and laboratory test data sheets not be included in engineering reports, because they do not represent the engineer's final opinion as to the appropriate descriptions for conditions encountered in the exploration and testing work. On the other hand, we are aware that perhaps certain contractors and subcontractors submitting bids or proposals on work might have an interest in studying these documents before submitting a bid or proposal. For this reason, the field logs will be retained in our office for inspection by all contractors submitting a bid or proposal. We would welcome the opportunity to explain any changes that have and typically are made in the preparation of our final reports, to the contractor or sub-contractors, before the firm submits its bid or proposal, and to describe how the information was obtained to the extent the contractor or subcontractor wishes. Results of laboratory tests are generally shown on the boring logs or are described in the text of the report, as appropriate.

PENETRATION TESTING PROCEDURE

The penetration testing procedure essentially followed ASTM Specification D 1586-67, "Standard Method for Penetration Tests and Split-Barrel Sampling of Soils". Briefly, the sampling procedure involved driving a 2-inch OD standard sampler 18 inches with a 140-pound hammer freefalling a distance of 30 inches. The number of blows required to drive the sampler the final foot was recorded as the Standard "N" Penetration. This N-value is used by Soils Engineers to estimate the strength and compressibility of the soil. After driving, the sampler was returned to the surface and opened. The length of sample (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.

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS	:	Split Spoon – 1 3/8" I.D., 2" O.D., unless otherwise noted	OS	:	Osterberg Sampler – 3" Shelby Tube
ST	:	Shelby Tube – 2" O.D., unless otherwise noted	HS	:	Hollow Stem Auger
PA	:	Power Auger	WS	:	Wash Sample
DB	:	Diamond Bit – NX: BX: AX	FT	:	Fish Tail
AS	:	Auger Sample	RB	:	Rock Bit
JS	:	Jar Sample	BS	:	Bulk Sample
VS	:	Vane Shear	PM	:	Pressuremeter test - in situ

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 of ground water elevations must be sought.

GRADATION DESCRIPTION & TERMINOLOGY:

Coarse Grained or Granular Soils have more than 50% of their dry weight retained on a #200 sieve; they are described as: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are described as: clays or clayey silts if they are cohesive, and silts if they are non-cohesive. In addition to gradation, granular soils are defined on the basis of their relative in-place density and fine grained soils on the basis of their strength or consistency, and their plasticity.

Major Component Of Sample	Size Range	Descriptive Term(s) (Of Components Also Present in Sample)	Percent of Dry Weight
Boulders	Over 8 in. (200mm)	Trace	1 – 9
Cobbles	8 in. to 3 in. (200mm to 75mm)	Little	10 – 19
Gravel	3 in. to #4 sieve (75mm to 2mm)	Some	20 – 34
Sand	#4 to #200 sieve (2mm to .074mm)	And	35 – 50
Silt	Passing #200 sieve (0.074mm to 0.005mm)		
Clay	Smaller than 0.005mm		

CONSISTENCY OF COHESIVE SOILS:

Unconfined Comp. Strength, Qu, tsf	Consistency
< 0.25	Very Soft
0.25 – 0.49	Soft
0.50 – 0.99	Medium (Firm)
1.00 – 1.99	Stiff
2.00 – 3.99	Very Stiff
4.00 – 8.00	Hard
>8.00	Very Hard

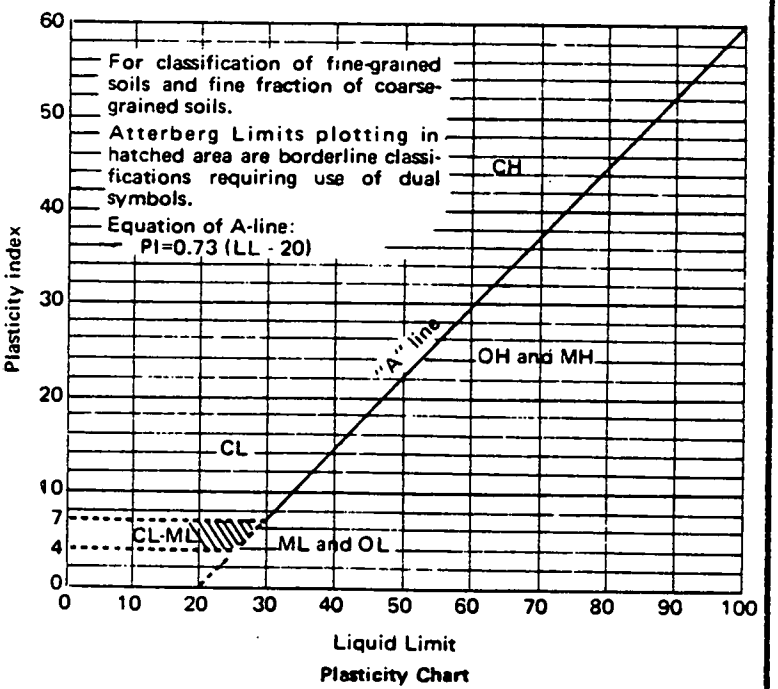
RELATIVE DENSITY OF GRANULAR SOILS:

N – Blows/ft.	Relative Density
0 – 3	Very Loose
4 – 9	Loose
10 – 29	Medium Dense
30 – 49	Dense
50 – 80	Very Dense
80+	Extremely Dense

UNIFIED SOIL CLASSIFICATION SYSTEM

Major divisions			Group symbols		Typical names	Laboratory classification criteria
Coarse-grained soils (More than half of material is *larger* than No. 200 sieve size)	Gravels (More than half of coarse fraction larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	$C_u=\frac{D_{60}}{D_{10}}$ greater than 4; $C_c=\frac{(D_{30})^2}{D_{10}XD_{60}}$ between 1 and 3
			GP		Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW
		Gravels with fines (Appreciable amount of fines)	GM	d	Silty gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4 — Above "A" line with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols
				u		
			GC		Clayey gravels, gravel-sand-clay mixtures	Atterberg limits above "A" line with P.I. greater than 7
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_u=\frac{D_{60}}{D_{10}}$ greater than 6; $C_c=\frac{(D_{30})^2}{D_{10}XD_{60}}$ between 1 and 3
			SP		Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirement for SW
		Sands with fines (Appreciable amount of fines)	SM	d	Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4 — Limits plotting in hatched zone with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols.
				u		
			SC		Clayey sands, sand-clay mixtures	Atterberg limits above "A" line with P.I. greater than 7
Fine-grained soils (More than half of material is *smaller* than No. 200 sieve)	Silts and clays (Liquid limit less than 50)		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL		Organic silts and organic silty clays of low plasticity	
	Silts and clays (Liquid limit greater than 50)		MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	
			CH		Inorganic clays of high plasticity, fat clays	
			OH		Organic clays of medium to high plasticity, organic silts	
	Highly organic soils		Pt		Peat and other highly organic soils	

Determine percentages of sand and gravel from grain-size curve.
Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:
Less than 5 per cent . . . . . GW, GP, SW, SP
More than 12 per cent . . . . . GM, GC, SM, SC
5 to 12 per cent . . . . . *Borderline* cases requiring dual symbols



Plasticity Chart

STS Consultants Ltd.

OWNER: Wausau Chemical Corporation	LOG OF BORING NUMBER: B-1
PROJECT NAME: Extraction Program at Wausau Chemical	ARCHITECT—ENGINEER

SITE LOCATION: Wausau, Wisconsin

SURFACE ELEVATION 1196.50

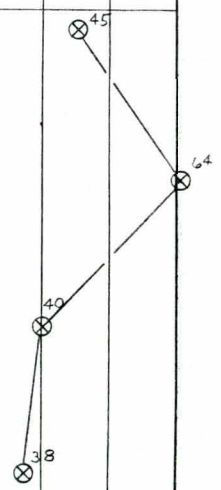
DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³
5					No sampling	
10						
15	1	SS			Brown medium to coarse sand (SP) with gravel - trace of silt (approximately 1 to 3%) - dense to very dense	
20	2	SS				
25	3	SS				
26.5	4	SS			End of Boring Boring advanced using solid-stem auger To install 4" well, 6" hole was drilled by pounding in 24' long 6" casing and using roller bit and mixed Revert	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² — 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

10 20 30 40 50

STANDARD PENETRATION BLOWS / FT. — 10 20 30 40 50



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

WL 1.0-11.5' WS	BORING STARTED 10-15-85	STS OFFICE 540 Lambeau Green Bay WI 54303	
WL BCR ACR	BORING COMPLETED 10-15-85	DRAWN BY JJT	SHEET NO. 1 OF 1
WL	RIG CME 45 FOREMAN JW	APP'D BY MG	STS JOB NO. 12776-B

BL:3-1183

STS Consultants Ltd.

OWNER: Wausau Chemical Corporation	LOG OF BORING NUMBER: B-2
PROJECT NAME: Extraction Program at Wausau Chemical	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 / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % / STANDARD PENETRATION BLOWS / FT.
					SURFACE ELEVATION 1196.6		
					No sampling		
5							
10							
	1	SS			Brown silty fine to coarse sand (SM) with gravel - moist - medium dense		29
15							
	2	SS			Brown medium to coarse sand (SP) with gravel - moist - dense		34
20							
	3	SS					36
25							
26.5	4	SS					41
					End of Boring Boring advanced using solid-stem auger To install 4" well, 6" hole was drilled by pounding in 24' long 6" casing and using roller bit and mixed Revert		

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

WL 10-11.5' WS	BORING STARTED 10-14-85	STS OFFICE 540 Lambeau Green Bay WI 54303	
WL BCR ACR	BORING COMPLETED 10-15-85	DRAWN BY JJT	SHEET NO. 1 OF 1
WL	RIG CME 45 FOREMAN JW	APP'D BY MG	STS JOB NO. 12776-B

BL:3-1183

STS Consultants Ltd.

OWNER: Wausau Chemical Corporation	LOG OF BORING NUMBER: B-3
PROJECT NAME: Extraction Program at Wausau Chemical	ARCHITECT—ENGINEER

SITE LOCATION: Wausau, Wisconsin

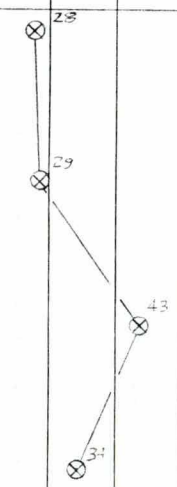
SURFACE ELEVATION: 1196.9

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³
5					No sampling	
10						
15	1	SS			Brown medium to coarse sand (SP) with gravel - moist - medium dense to dense	
20	2	SS				
25	3	SS				
26.5	4	SS				
					End of Boring Boring advanced using solid-stem auger To install 4" well, 6" hole was drilled by pounding in 24' long, 6" casing and using roller bit and mixed Revert	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS / FT. (10 20 30 40 50)



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

WL 10-15' WD	BORING STARTED 10-14-85	STS OFFICE 540 Lambeau Green Bay WI 54303	
WL BCR ACR	BORING COMPLETED 10-14-85	DRAWN BY JJT	SHEET NO. 1 OF 1
WL	RIG CME 45 FOREMAN JW	APP'D BY MG	STS JOB NO. 12776-B

BL:3-1183

STS Consultants Ltd.

OWNER: Wausau Chemical Corporation	LOG OF BORING NUMBER: B-4
PROJECT NAME: Extraction Program at Wausau Chemical	ARCHITECT—ENGINEER

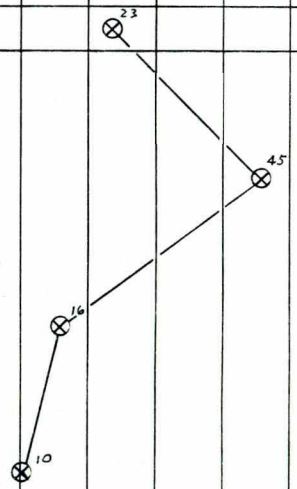
SITE LOCATION: Wausau, Wisconsin

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³
					SURFACE ELEVATION 1199.8	
5					No sampling	
10	1	SS			Fill: grayish brown silty fine to coarse sand (SM) - some gravel - moist - medium dense	
15	2	SS			Brown medium to coarse sand (SP) and gravel - moist - medium dense to dense	
20	3	SS				
25						
26.5	4	SS				
					End of Boring Boring advanced using solid-stem auger To install 4" well, 6" hole was drilled by pounding in 26' long, 6" casing and using roller bit and mixed Revert	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS / FT. (10 20 30 40 50)



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

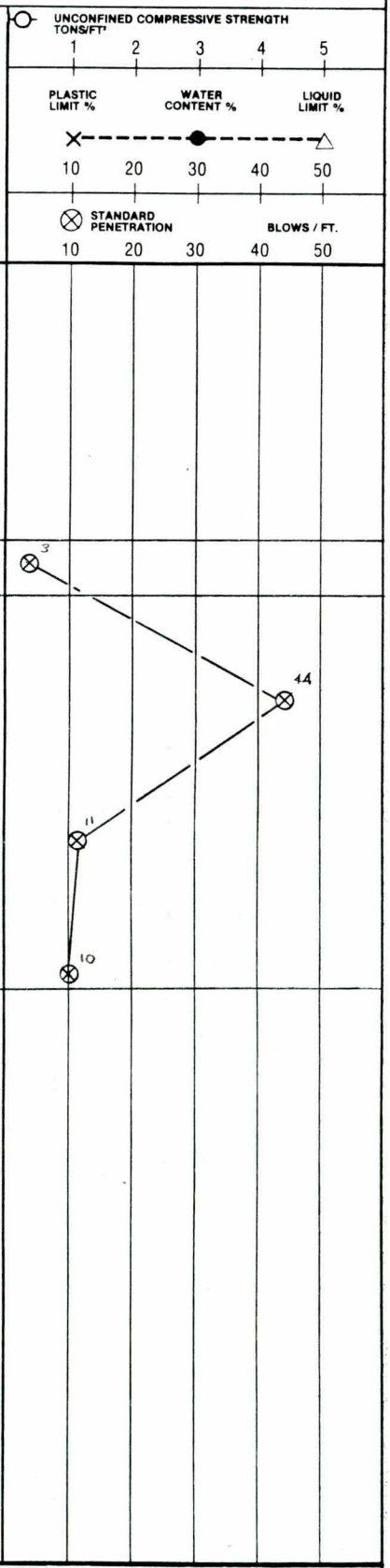
WL 10-15' WD	BORING STARTED 10-8-85	STS OFFICE 540 Lambeau Green Bay WI 54303	
WL BCR ACR	BORING COMPLETED 10-8-85	DRAWN BY JJT	SHEET NO. 1 OF 1
WL	RIG CME 45 FOREMAN JW	APP'D BY MG	STS JOB NO. 12776-B

BL:3-1183

STS Consultants Ltd.

OWNER: Wausau Chemical Corporation	LOG OF BORING NUMBER: B-5
PROJECT NAME: Extraction Program at Wausau Chemical	ARCHITECT—ENGINEER
SITE LOCATION: Wausau, Wisconsin	

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³
					SURFACE ELEVATION 1199.8	
5					No sampling	
10	1	SS			Fill: brown fine to coarse sand (SP) - some gravel - moist - loose	
15	2	SS			Brown medium to coarse sand (SP) with gravel - moist - medium dense to dense	
20	3	SS				
25						
26.5	4	SS			End of Boring Boring advanced using solid-stem auger To install 4" well, 6" hole was drilled by pounding in 26' long, 6" casing and using roller bit and mixed Revert	



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

WL 10-15' WD	BORING STARTED 10-8-85	STS OFFICE 540 Lambeau Green Bay WI 54303	
WL BCR ACR	BORING COMPLETED 10-9-85	DRAWN BY JJT	SHEET NO. 1 OF 1
WL	RIG CME 45 FOREMAN JW	APP'D BY MG	STS JOB NO. 12776-B

BL:3-1183

STS Consultants Ltd.

OWNER: Wausau Chemical Corporation	LOG OF BORING NUMBER: B-6
PROJECT NAME: Extraction Program at Wausau Chemical	ARCHITECT—ENGINEER

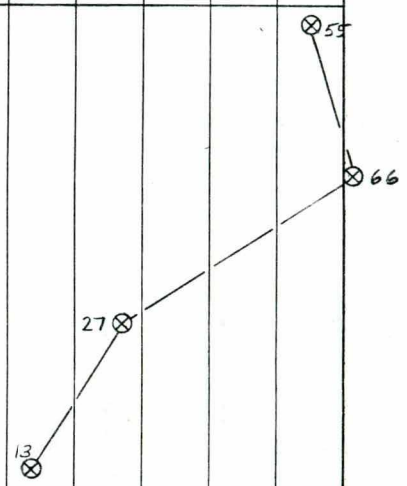
SITE LOCATION: Wausau, Wisconsin

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³
					SURFACE ELEVATION 1196.50	
5					No sampling	
10						
15	1	SS			Brown fine to coarse sand (SP) with gravel - moist - medium dense to very dense	
20	2	SS				
25	3	SS				
26.5	4	SS			End of Boring Boring advanced using solid-stem auger To install 4" well, 6" hole was drilled by pounding in 24' long, 6" casing and using roller bit and mixed Revert	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS / FT. (10 20 30 40 50)



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

WL 10-15' WS	BORING STARTED 10-14-85	STS OFFICE 540 Lambeau Green Bay WI 54303	
WL BCR ACR	BORING COMPLETED 10-14-85	DRAWN BY JJT	SHEET NO. 1 OF 1
WL	RIG CME 45 FOREMAN JW	APP'D BY MG	STS JOB NO. 12776-B

BL:3-1183

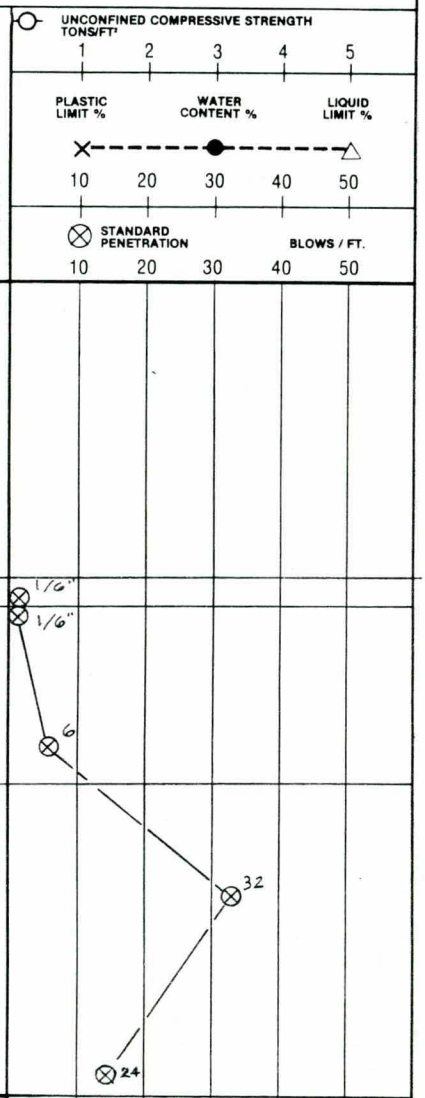
STS Consultants Ltd.

OWNER: Wausau Chemical Corporation	LOG OF BORING NUMBER: B-7
PROJECT NAME: Extraction Program at Wausau Chemical	ARCHITECT—ENGINEER

SITE LOCATION: Wausau, Wisconsin

SURFACE ELEVATION 1199.60

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³
5					No sampling	
10	1	SS			Fill: grayish brown silty fine sand (SM) - trace gravel - moist - very loose	
	1A	SS				
15	2	SS			Fill: brown fine to medium sand (SM-SP) - little gravel - trace silt - loose	
20	3	SS			Brown medium to coarse sand (SP) and gravel - moist - medium dense to dense	
25						
27.5	4	SS				
					End of Boring Boring advanced using solid-stem auger To install 4" well, 6" hole was drilled by pounding in 26' long, 6" casing and using roller bit and mixed Revert	



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

WL 10-15' WS	BORING STARTED 10-3-85	STS OFFICE 540 Lambeau Green Bay WI 54303	
WL BCR ACR	BORING COMPLETED 10-8-85	DRAWN BY JJT	SHEET NO. 1 OF 1
WL	RIG CME 45 FOREMAN JW	APP'D BY MG	STS JOB NO. 12776-B

BL:3-1183

STS Consultants Ltd.

OWNER: Wausau Chemical Corporation	LOG OF BORING NUMBER: B-8
PROJECT NAME: Extraction Program at Wausau Chemical	ARCHITECT—ENGINEER

SITE LOCATION: Wausau, Wisconsin

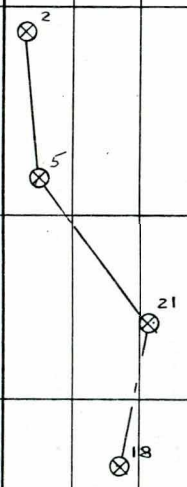
SURFACE ELEVATION 1199.5

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³
5					No sampling	
10						
15	1	SS			Fill: grayish brown silty fine sand (SM) - trace gravel - moist - very loose to loose	
	2	SS				
20					Brown silty fine to coarse sand (SM) and gravel - moist - medium dense	
	3	SS				
25					Brown medium to coarse sand (SP) and gravel - moist - medium dense	
26.5	4	SS				
					End of Boring Boring advanced using solid-stem auger To install 4" well, 6" hole was drilled by pounding in 26' long, 6" casing and using roller bit and mixed Revert	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS / FT. (10 20 30 40 50)



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

WL 10-15' WD	BORING STARTED 10-10-85	STS OFFICE 540 Lambeau Green Bay WI 54303	
WL BCR ACR	BORING COMPLETED 10-10-85	DRAWN BY JJT	SHEET NO. 1 OF 1
WL	RIG CME 45 FOREMAN JW	APP'D BY MG	STS JOB NO. 12776-B

BL:3-1183

STS Consultants Ltd.

OWNER: Wausau Chemical Corporation	LOG OF BORING NUMBER: B-9
PROJECT NAME: Extraction Program at Wausau Chemical	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 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS / FT. (10 20 30 40 50)
SURFACE ELEVATION 1196.2							
5					No sampling		
10							
15	1	SS			Brown medium to coarse sand (SP) and gravel - trace silt (approximately 1 to 3%) - moist		
	2	SS					
20	3	SS					
25							
26.5	4	SS					
					End of Boring Boring advanced using solid-stem auger To install 4" well, 6" hole was drilled by pounding in 24' long, 6" casing and using roller bit and mixed Revert		

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

WL 10-15' WD	BORING STARTED 10-13-85	STS OFFICE 540 Lambeau Green Bay WI 54303	
WL BCR ACR	BORING COMPLETED 10-13-85	DRAWN BY JJT	SHEET NO. 1 OF 1
WL	RIG CME 45 FOREMAN JW	APP'D BY MG	STS JOB NO. 12776-B

BL:3-1183

STS Consultants Ltd.

OWNER: Wausau Chemical Corporation	LOG OF BORING NUMBER: B-10
PROJECT NAME: Extraction Program at Wausau Chemical	ARCHITECT—ENGINEER

SITE LOCATION: Wausau, Wisconsin

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³
					SURFACE ELEVATION 1199.8	
5					No sampling	
10	1	SS			Fill: brown fine to coarse sand (SP) - some gravel - little dark brown buried topsoil - moist - loose	
15	2	SS			Fill: brown fine to coarse sand (SP) and gravel - moist - very dense	
	3	SS				
20	4	SS			Brown medium to coarse sand (SP) some gravel - moist - dense	
25						
26.5	5	SS				
					End of Boring Boring advanced using solid-stem auger To install 4" well, 6" hole was drilled by pounding in 26' long, 6" casing and using roller bit and mixed Revert	

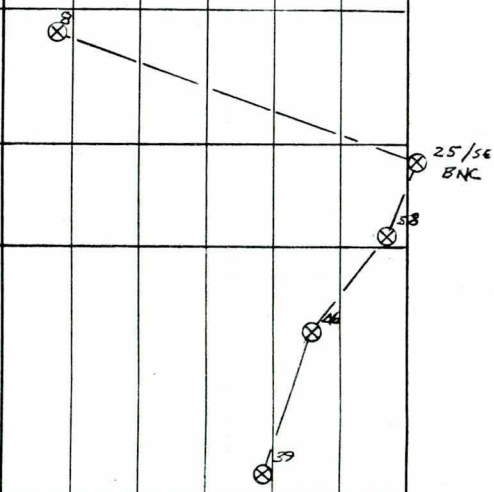
UNCONFINED COMPRESSIVE STRENGTH TONS/FT² — 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

10 20 30 40 50

STANDARD PENETRATION BLOWS / FT.

10 20 30 40 50



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

WL 10-15' WD	BORING STARTED 10-2-85	STS OFFICE 540 Lambeau Green Bay WI 54303	
WL BCR ACR	BORING COMPLETED 10-2-85	DRAWN BY JJT	SHEET NO. 1 OF 1
WL	RIG CME 45 FOREMAN JW	APP'D BY MG	STS JOB NO. 12776-B

BL:3-1183

STS Consultants Ltd.

OWNER: Wausau Chemical Corporation	LOG OF BORING NUMBER: B-11
PROJECT NAME: Extraction Program at Wausau Chemical	ARCHITECT—ENGINEER

SITE LOCATION: Wausau, Wisconsin

SURFACE ELEVATION: 1200.1

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 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS / FT. (10 20 30 40 50)
5					No sampling		
10	1	SS			Fill: brown silty fine sand (SM) - trace roots - trace gravel - moist - loose		5
15	2	SS			Brown fine to coarse sand (SP) and gravel - trace silt (approximately 1 to 3%) - moist - very loose to medium dense		2
20	3	SS					22
25							
26.5	4	SS					17
					End of Boring Boring advanced using solid-stem auger To install 4" well, 6" hole was drilled by pounding in 26' long, 6" casing and using roller bit and mixed Revert		

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

WL	BORING STARTED 10-12-85	STS OFFICE 540 Lambeau Green Bay WI 54303	
WL BCR ACR	BORING COMPLETED 10-13-85	DRAWN BY JJT	SHEET NO. 1 OF 1
WL	RIG CME 45 FOREMAN JW	APP'D BY MG	STS JOB NO. 12776-B

BL:3-1183

STS Consultants Ltd.

OWNER: Wausau Chemical Corporation	LOG OF BORING NUMBER: B-12
PROJECT NAME: Extraction Program at Wausau Chemical	ARCHITECT—ENGINEER

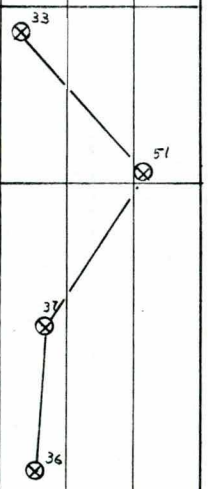
SITE LOCATION: Wausau, Wisconsin

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³
					SURFACE ELEVATION 1196.5	
5					No sampling	
10						
15	1	SS			Fill: brown silty fine to medium sand (SM) and gravel - trace topsoil - moist - medium dense	
	2	SS				
20					Brown medium to coarse sand (SP) and gravel - moist - dense to very dense	
	3	SS				
25						
26.5	4	SS				
					End of Boring Boring advanced using solid-stem auger To install 4" well, 6" hole was drilled by pounding in 24' long, 6" casing and using roller bit and mixed Revert	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS / FT. (10 20 30 40 50)



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

WL 10-15' WS	BORING STARTED 10-13-85	STS OFFICE 540 Lambeau Green Bay WI 54303	
WL BCR ACR	BORING COMPLETED 10-13-85	DRAWN BY JJT	SHEET NO. 1 OF 1
WL	RIG CME 45 FOREMAN JW	APP'D BY MG	STS JOB NO. 12776-B

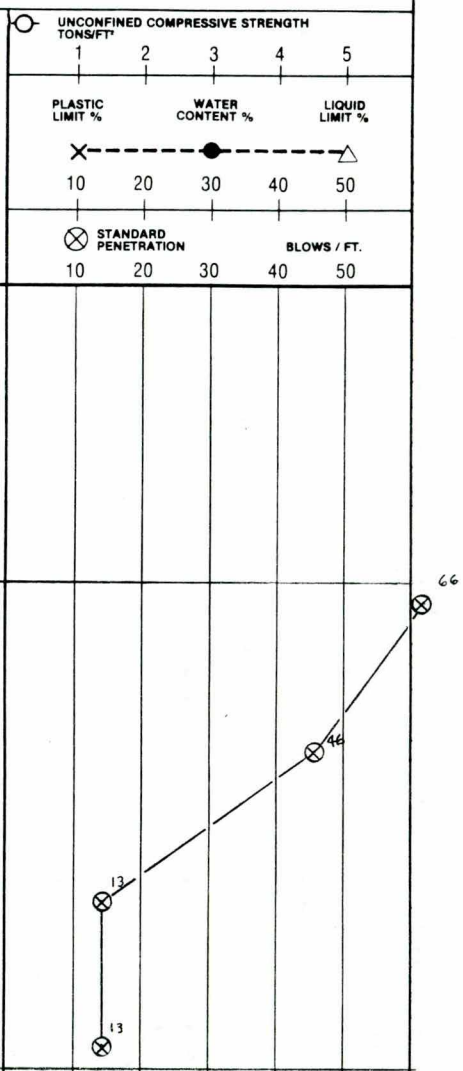
BL:3-1183

STS Consultants Ltd.	OWNER Wausau Chemical Corporation	LOG OF BORING NUMBER B-13
	PROJECT NAME Extraction Program at Wausau Chemical	ARCHITECT—ENGINEER

SITE LOCATION

Wausau, Wisconsin

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³
					SURFACE ELEVATION 1196.6	
5					No sampling	
10						
15	1	SS			Brown medium to coarse sand (SP) and gravel - moist - medium dense to very dense	
	2	SS				
20	3	SS				
25						
26.5	4	SS			End of Boring Boring advanced using solid-stem auger To install 4" well, 6" hole was drilled by pounding in 25' long, 6" casing and using roller bit and mixed Revert	



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

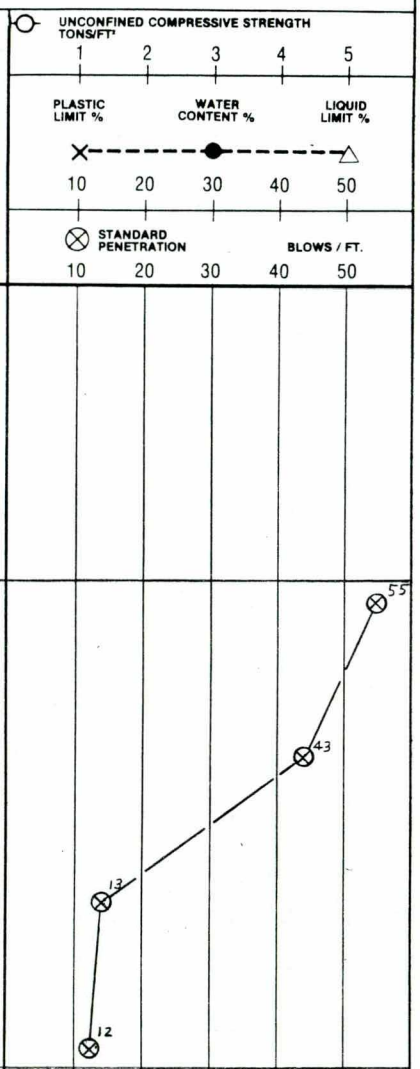
WL 10-15' WD	BORING STARTED 10-10-85	STS OFFICE 540 Lambeau Green Bay WI 54303	
WL BCR ACR	BORING COMPLETED 10-10-85	DRAWN BY JJT	SHEET NO. 1 OF 1
WL	RIG CME 45 FOREMAN JW	APP'D BY MG	STS JOB NO. 12776-B

BL:3-1183

STS Consultants Ltd.

OWNER: Wausau Chemical Corporation	LOG OF BORING NUMBER: B-14
PROJECT NAME: Extraction Program at Wausau Chemical	ARCHITECT—ENGINEER
SITE LOCATION: Wausau, Wisconsin	

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³
					SURFACE ELEVATION 1196.3	
					No sampling	
5						
10						
	1	SS			Brown medium to coarse sand (SP) and gravel - moist - medium dense to very dense	
15						
	2	SS				
20						
	3	SS				
25						
26.5	4	SS				
					End of Boring Boring advanced using solid-stem auger To install 4" well, 6" hole was drilled by pounding in 8' long, 6" casing and using roller bit and mixed Revert	



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

WL	BORING STARTED 10-10-85	STS OFFICE 540 Lambeau Green Bay WI 54303	
WL BCR ACR	BORING COMPLETED 10-10-85	DRAWN BY JJT	SHEET NO. 1 OF 1
WL	RIG CME 45 FOREMAN JW	APP'D BY MG	STS JOB NO. 12776-B

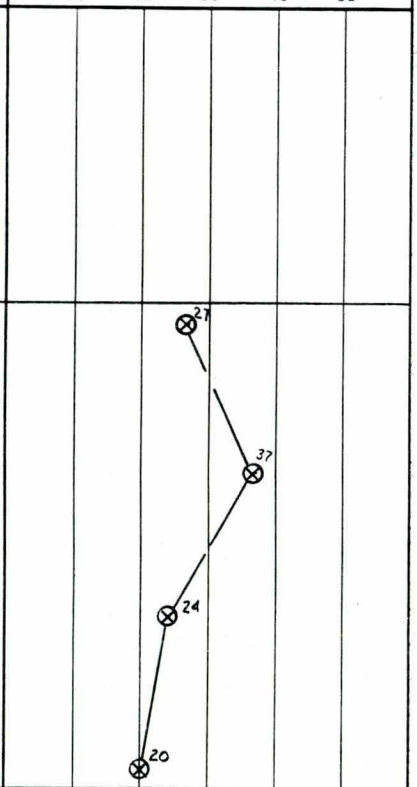
BL:3-1183

STS Consultants Ltd.

OWNER: Wausau Chemical Corporation	LOG OF BORING NUMBER: B-15
PROJECT NAME: Extraction Program at Wausau Chemical	ARCHITECT—ENGINEER

SITE LOCATION: Wausau, Wisconsin

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³
					SURFACE ELEVATION 1196.2	
5					No sampling	
10						
15	1	SS			Brown silty fine to coarse sand (SP) and gravel - trace silt (approximately 1 to 3%) - moist - medium dense to dense	
20	2	SS				
25	3	SS				
26.5	4	SS			End of Boring Boring advanced using solid-stem auger To install 4" well, 6" hole was drilled by pounding in 5' long, 6" casing and using roller bit and mixed Revert	



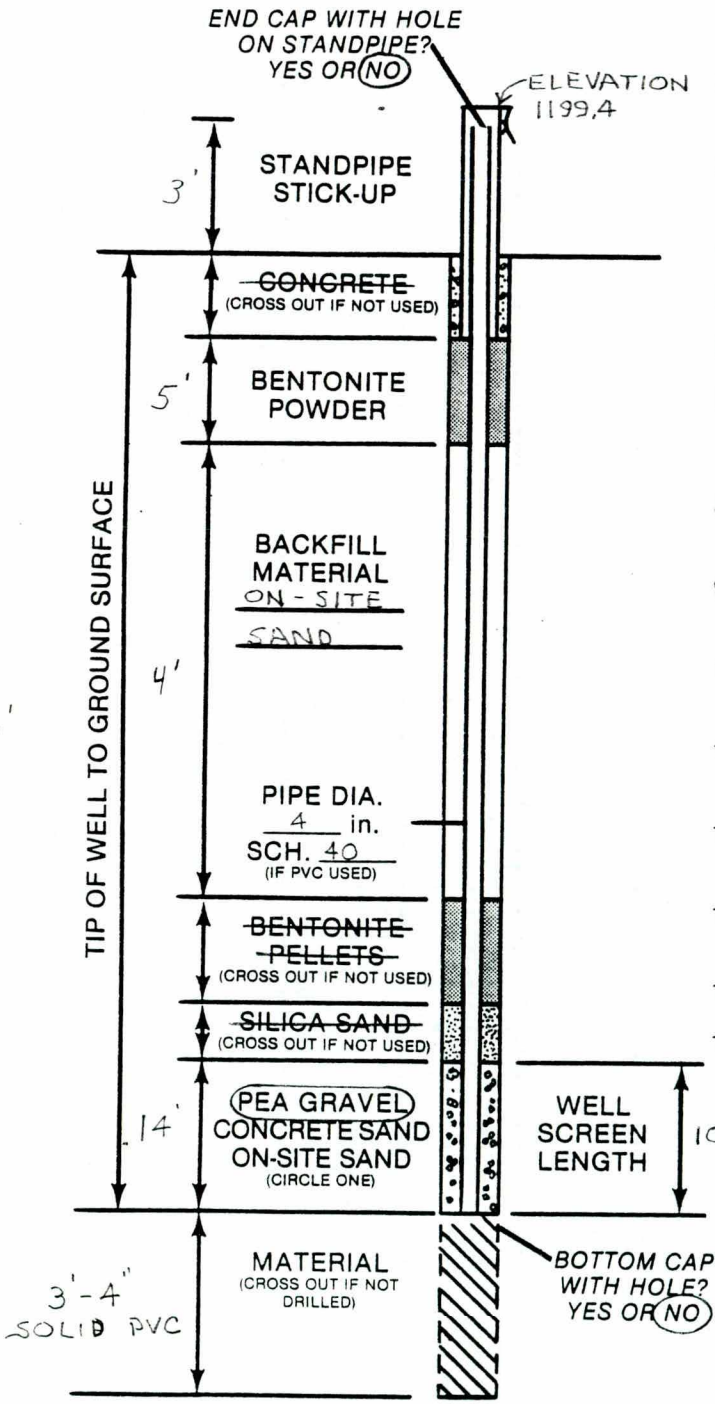
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL 10-15' WD	BORING STARTED 10-11-85	STS OFFICE 540 Lambeau Green Bay WI 54303	
WL BCR ACR	BORING COMPLETED 10-11-85	DRAWN BY JJT	SHEET NO. 1 OF 1
WL	RIG CME 45 FOREMAN JW	APP'D BY MG	STS JOB NO. 12776-B

BL:3-1183

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 0.15"

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 _____

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?
13 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. 1 DATE INSTALLED 10-15-95 DRILL RIG CME 45

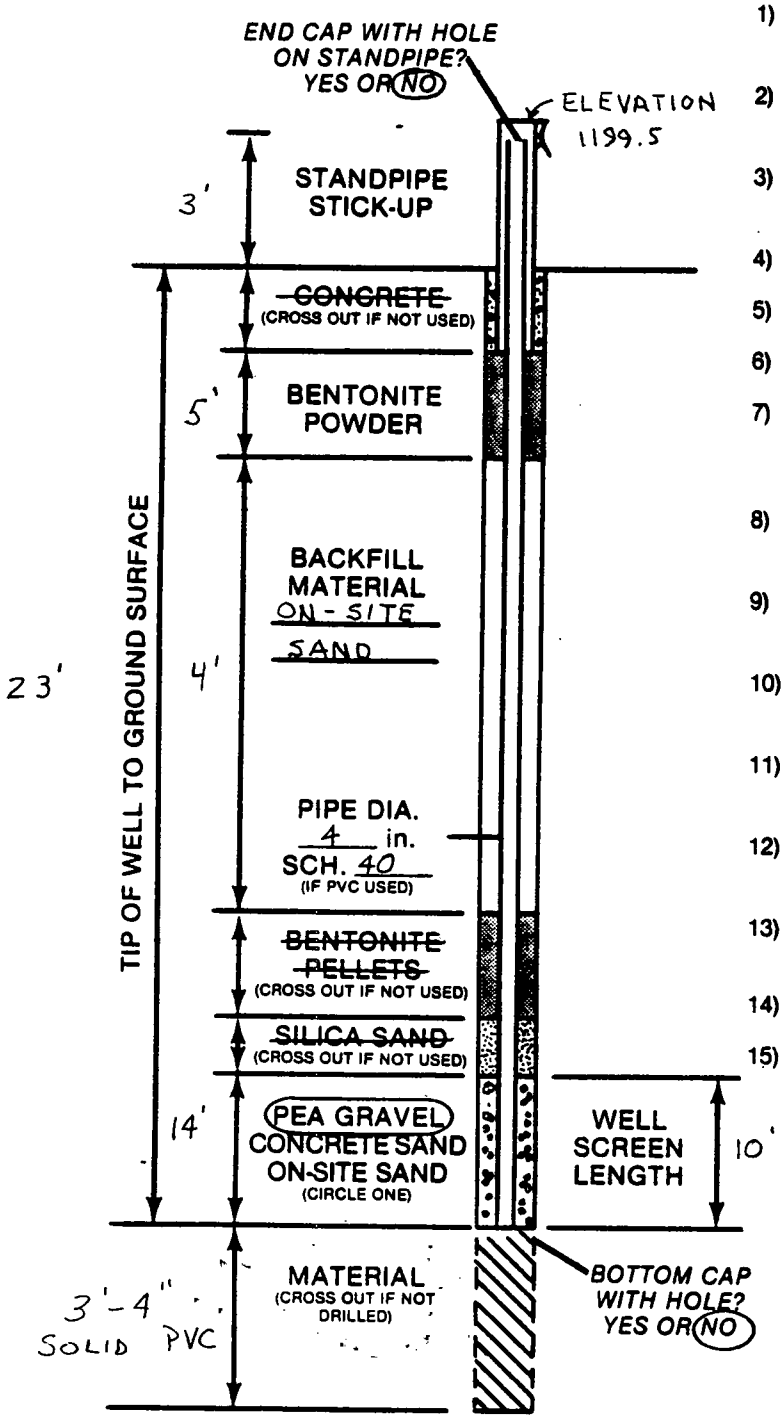
DRILLER JOHN WRIGHT DRILL CREW DAVID WONCH

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12770-B

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 0.15"

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 _____

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?
13 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. 2 DATE INSTALLED 10-15-85 DRILL RIG CME 45

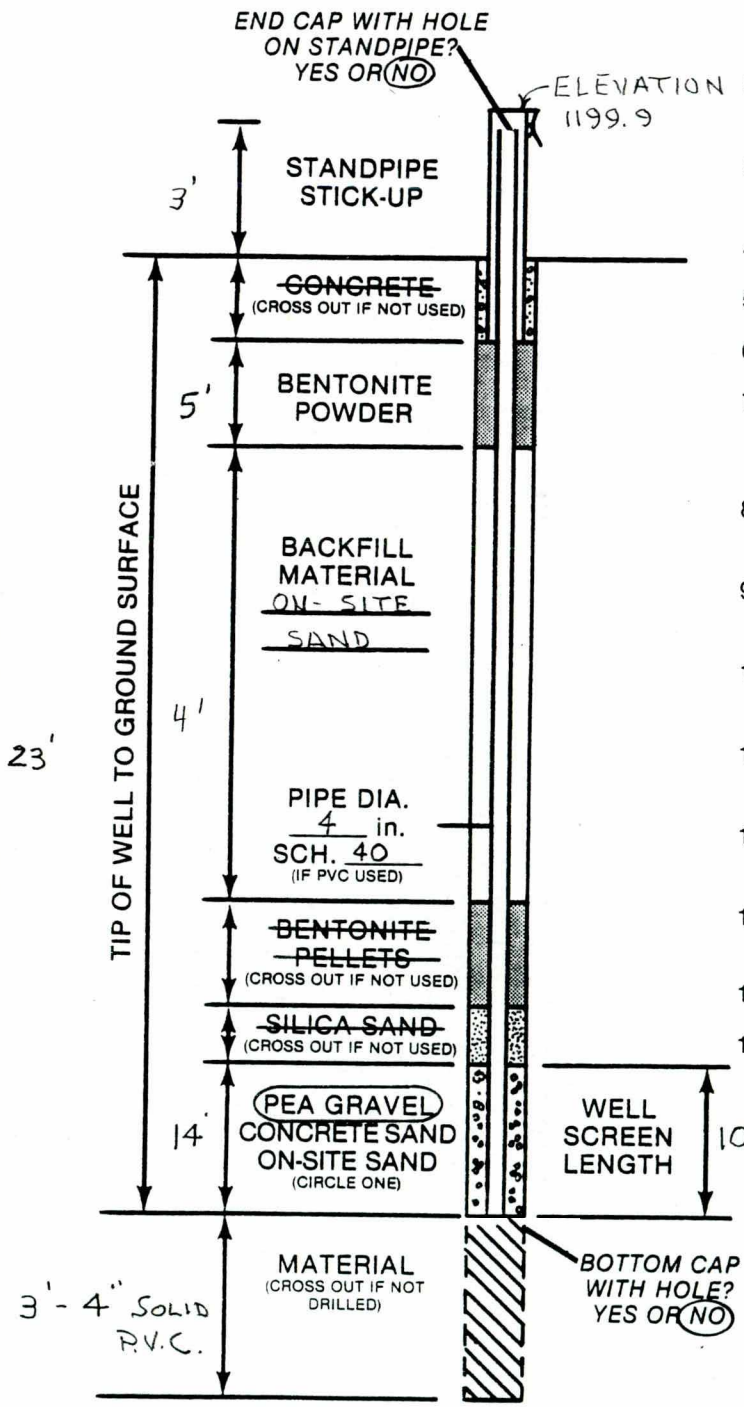
DRILLER JOHN WRIGHT DRILL CREW DAVID WONCH

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12776-B

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 .15

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 _____

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?
13 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. 3 DATE INSTALLED 10-14-85 DRILL RIG CME 45

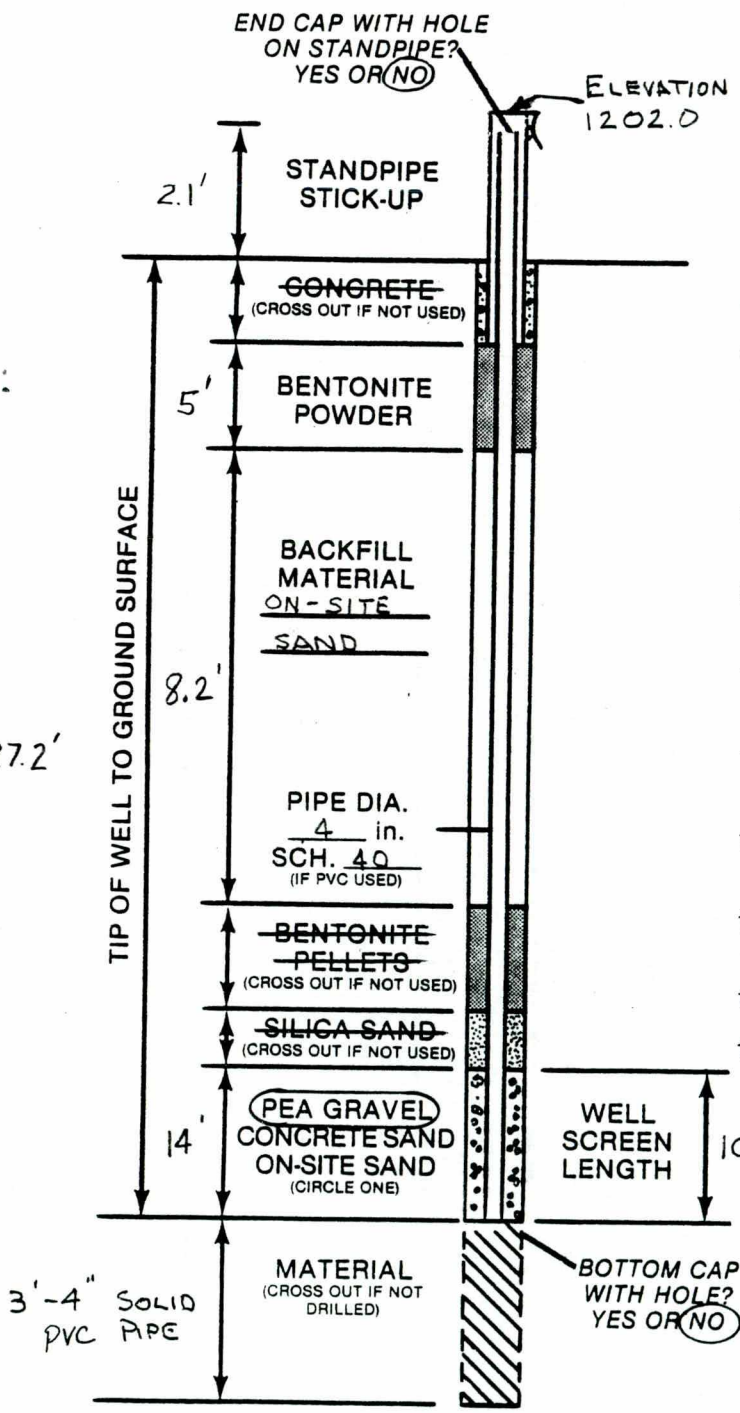
DRILLER JOHN WRIGHT DRILL CREW DAVID WONCH

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12776-B

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 .15

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 _____

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?
15.2 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. 4 DATE INSTALLED 10-9-85 DRILL RIG CME 45

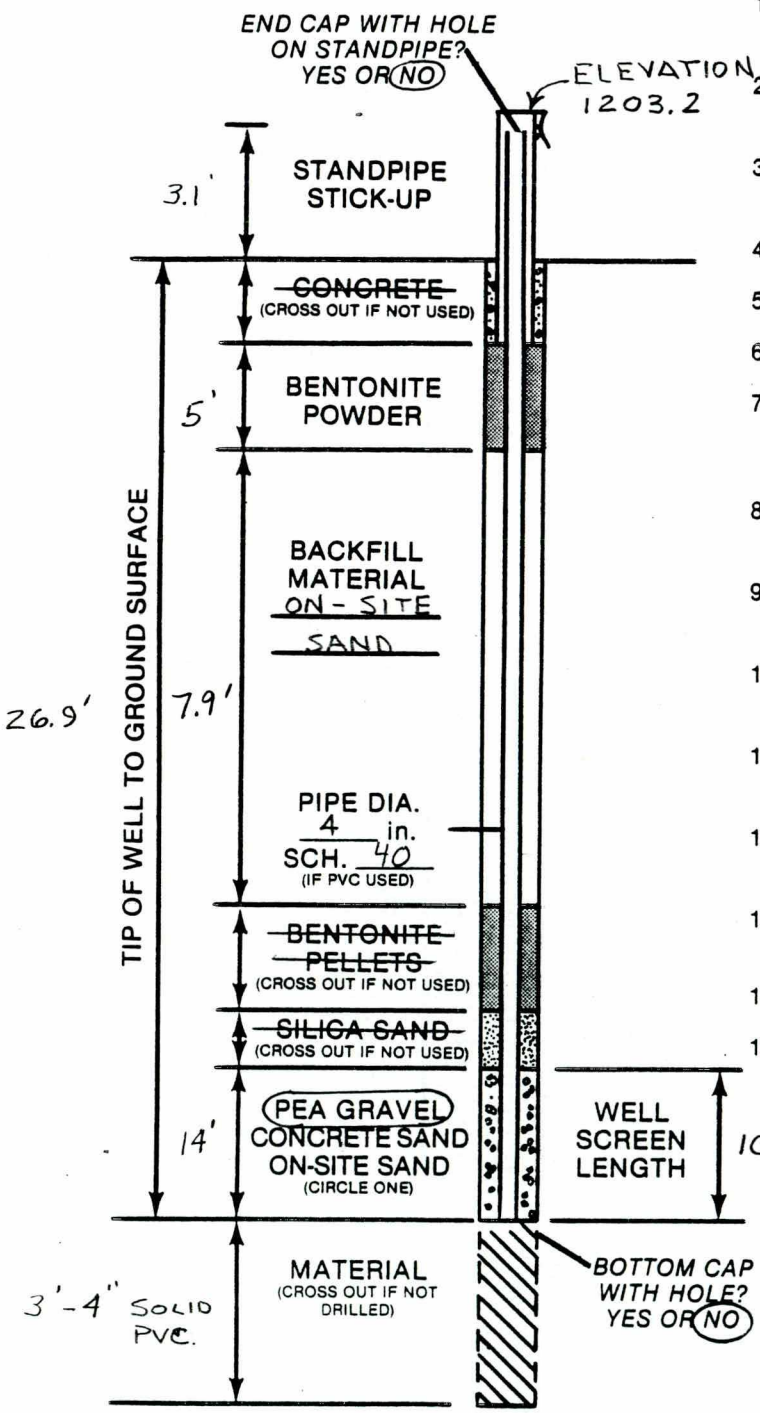
DRILLER JOHN WRIGHT DRILL CREW DAVID WONCH

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12776-B

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 .15

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 _____

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?
16.3 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. 5 DATE INSTALLED 10-9-85 DRILL RIG CME 45

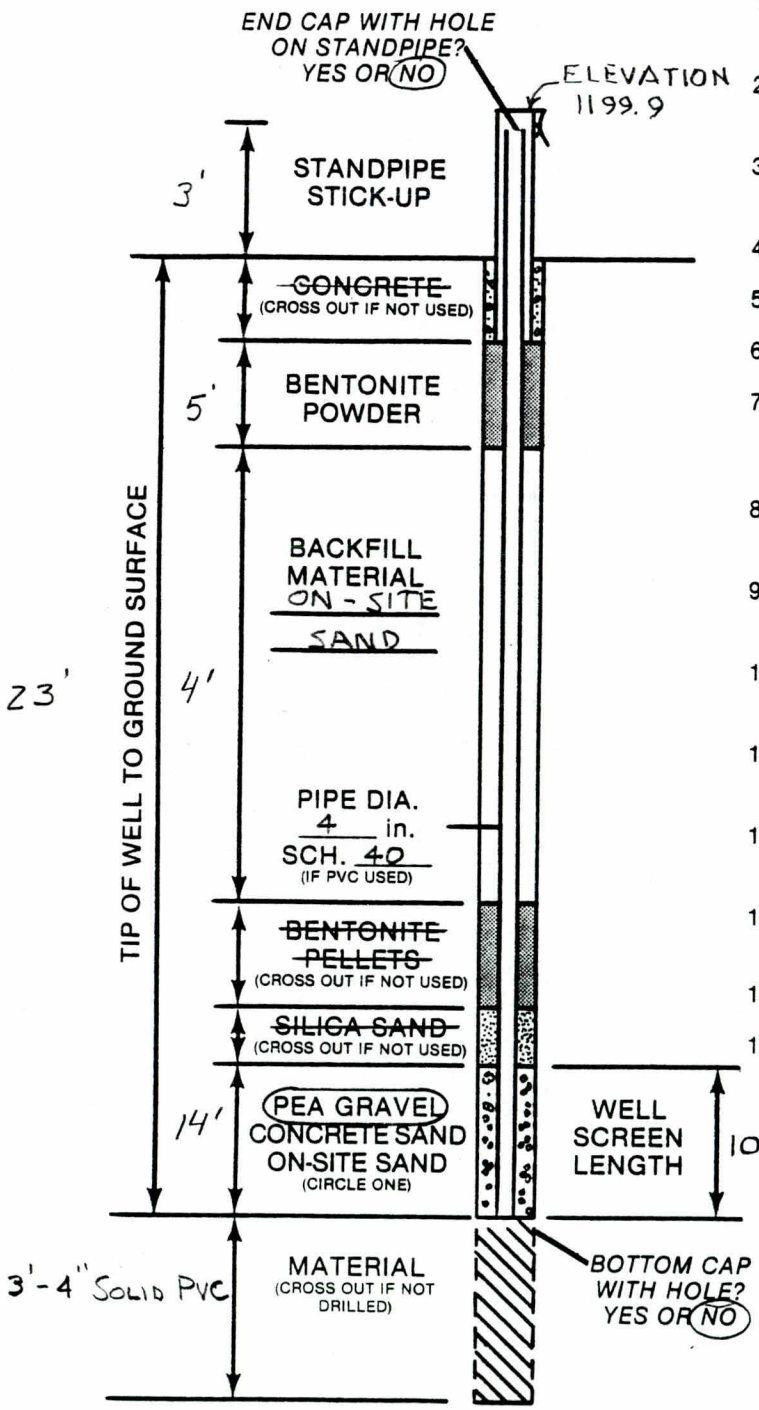
DRILLER JOHN WRIGHT DRILL CREW DAVID WONCH

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12776-B

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 .15

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 _____

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?
13' 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. 6 DATE INSTALLED 10-14-85 DRILL RIG CME 45

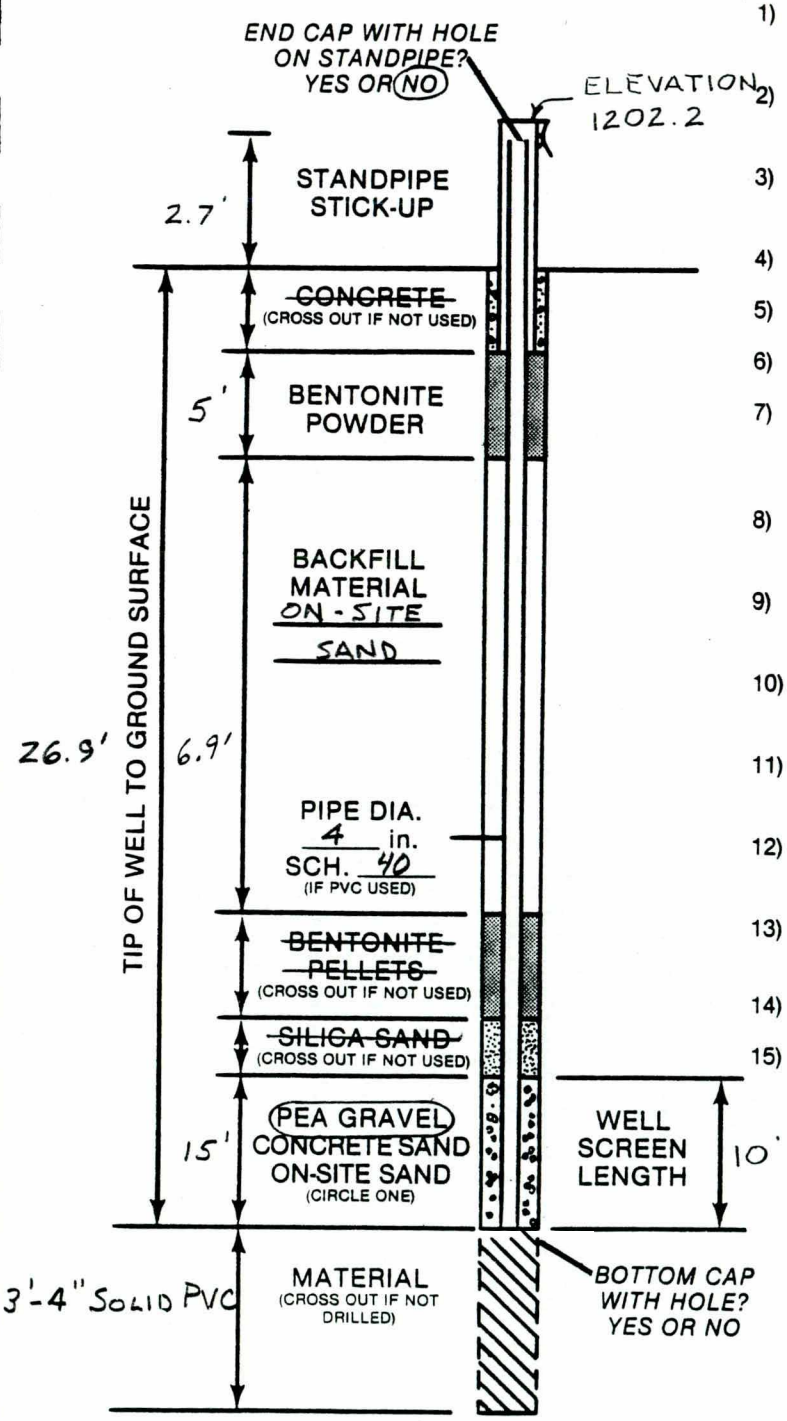
DRILLER JOHN WRIGHT DRILL CREW DAVID WONCH

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12766-B

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 .15

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 _____

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?
15.4 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. 7 DATE INSTALLED 10-8-85 DRILL RIG CME 45

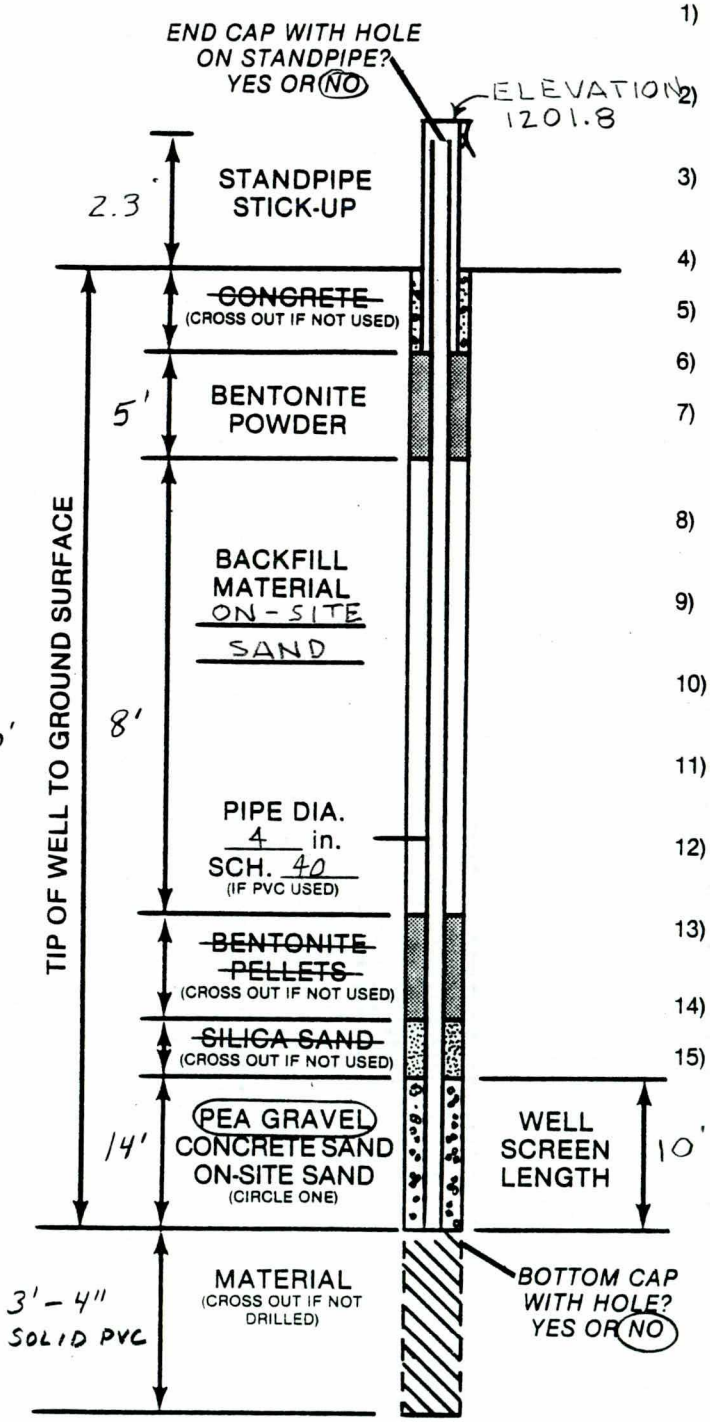
DRILLER JOHN WRIGHT DRILL CREW DAVID WONCH

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12776-B

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 .15

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 _____

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?
15.0' 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. 8 DATE INSTALLED 10-10-85 DRILL RIG CME 45

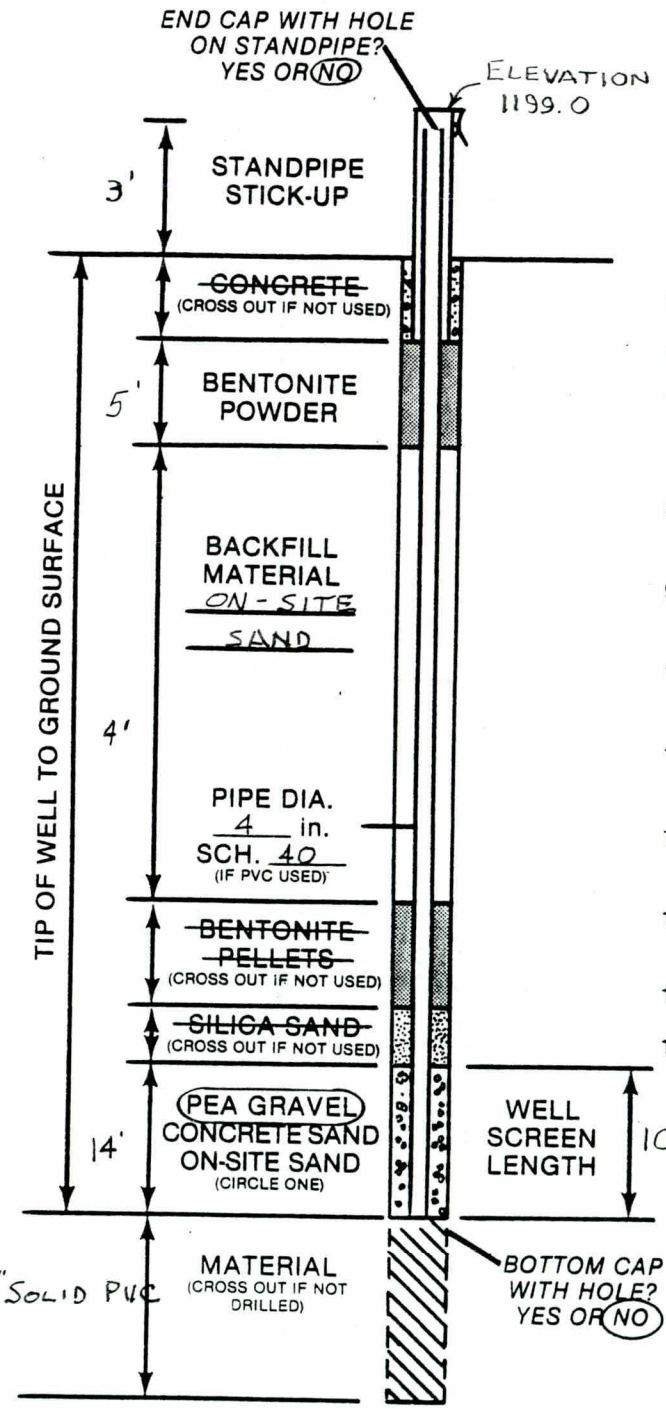
DRILLER JOHN WRIGHT DRILL CREW DAVID WONCH

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12776-B

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 .15

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 _____

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?
12.6' 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. 9 DATE INSTALLED 10-13-85 DRILL RIG CME 45

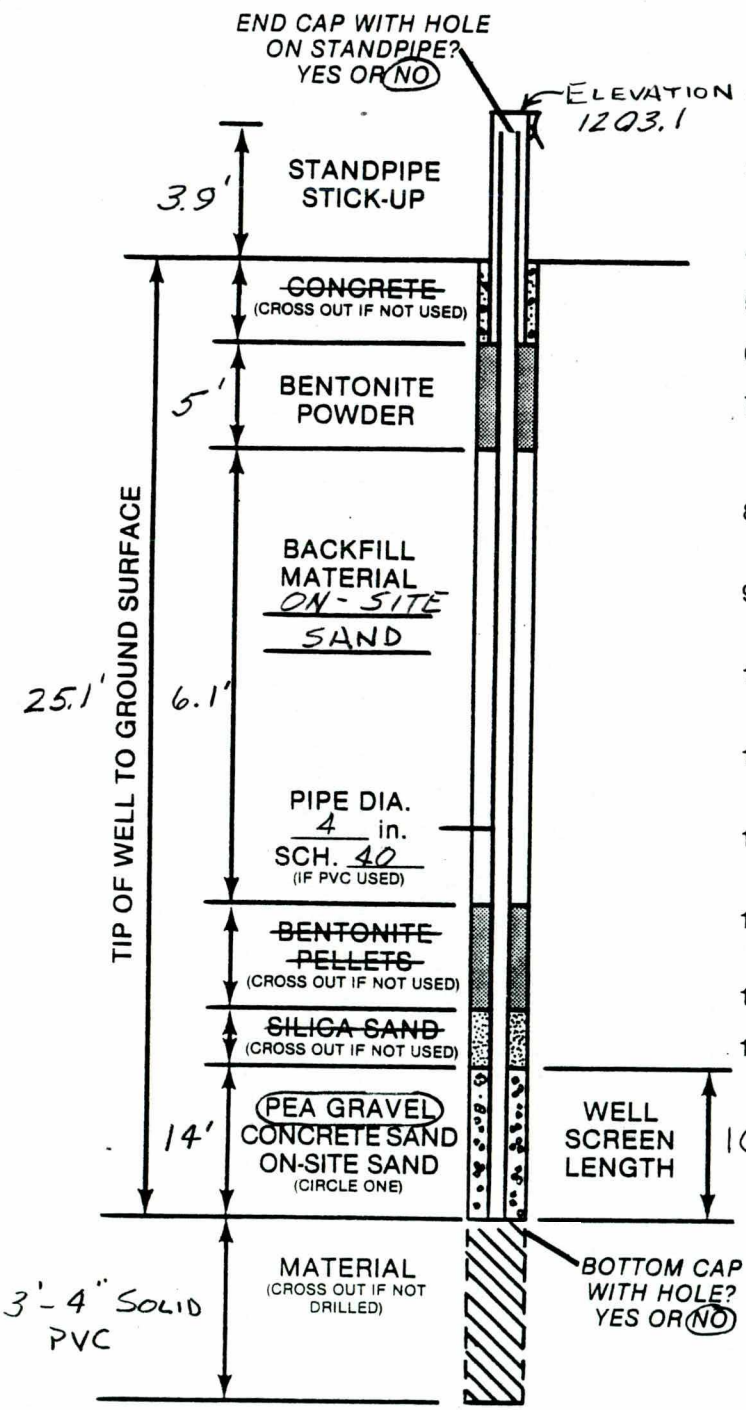
DRILLER JOHN WRIGHT DRILL CREW DAVID WONCH

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12776-B

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 .15

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 _____

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. 10 A DATE INSTALLED 10-11-85 DRILL RIG CME 45

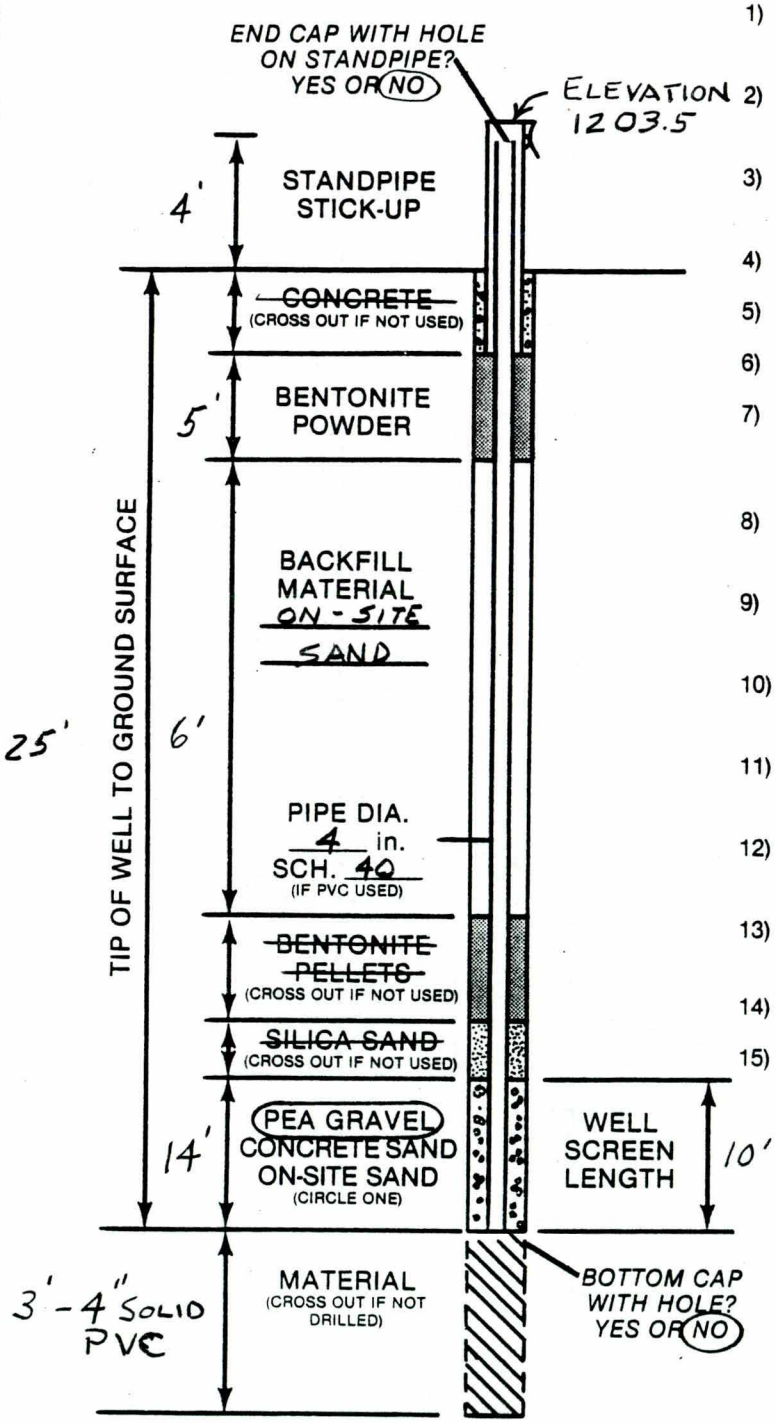
DRILLER JOHN WRIGHT DRILL CREW DAVID WONCH

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12776-B

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 .15

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 _____

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?
17.5 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. 11 DATE INSTALLED 10-13-85 DRILL RIG CME 45

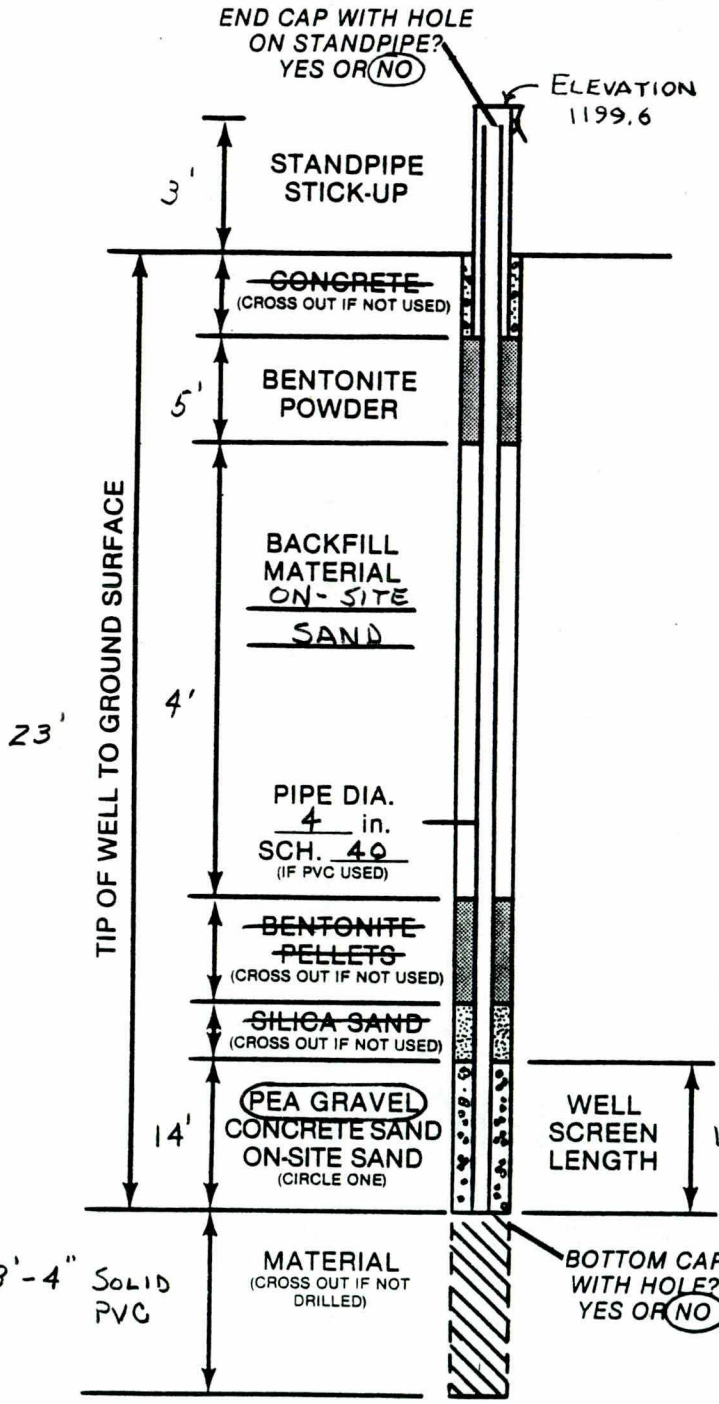
DRILLER JOHN WRIGHT DRILL CREW DAVID WONCH

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12776-B

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 .15

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 _____

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?
13' 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. 12 DATE INSTALLED 10-13-85 DRILL RIG CME 45

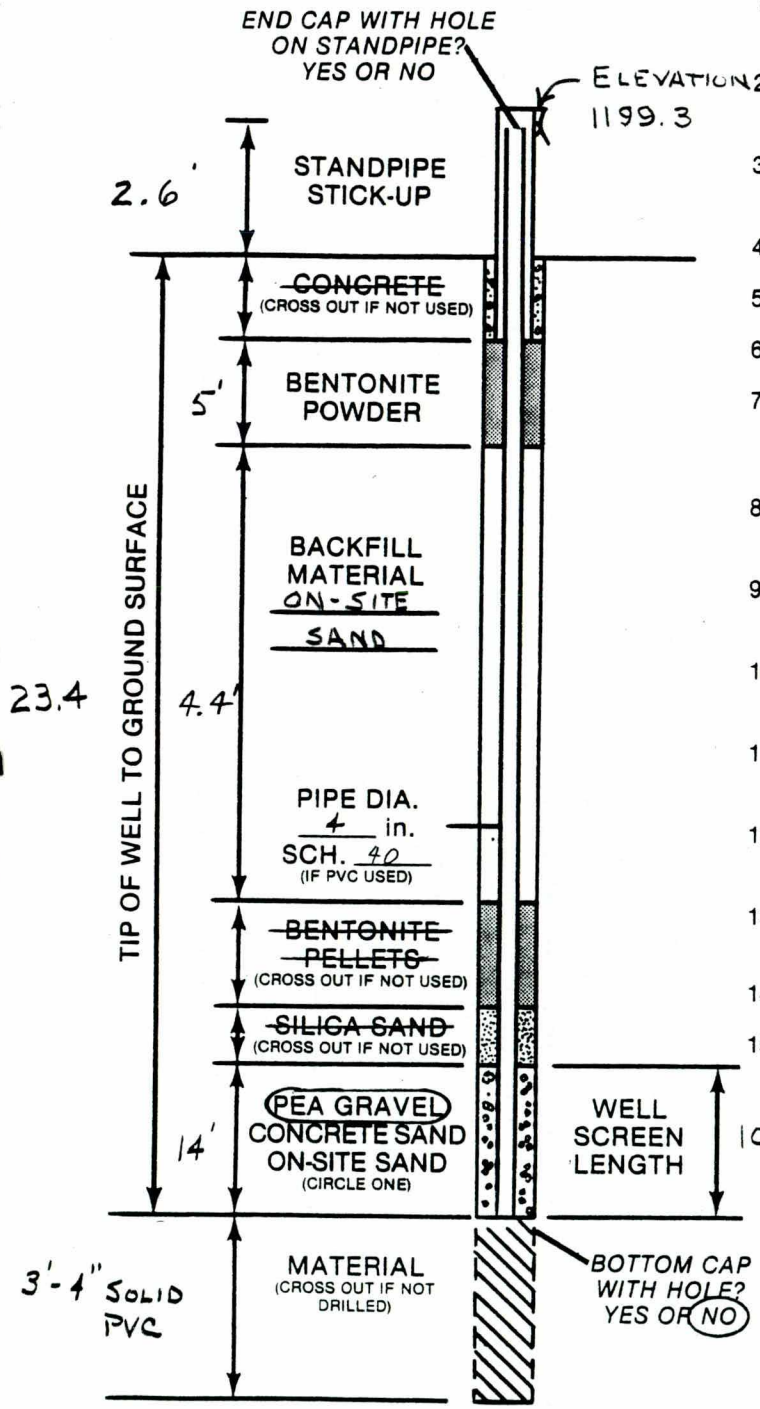
DRILLER JOHN WRIGHT DRILL CREW DAVID WONCH

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12776-B

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 .15

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 _____

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?
12.6 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. 13 DATE INSTALLED 10-10-85 DRILL RIG CME 45

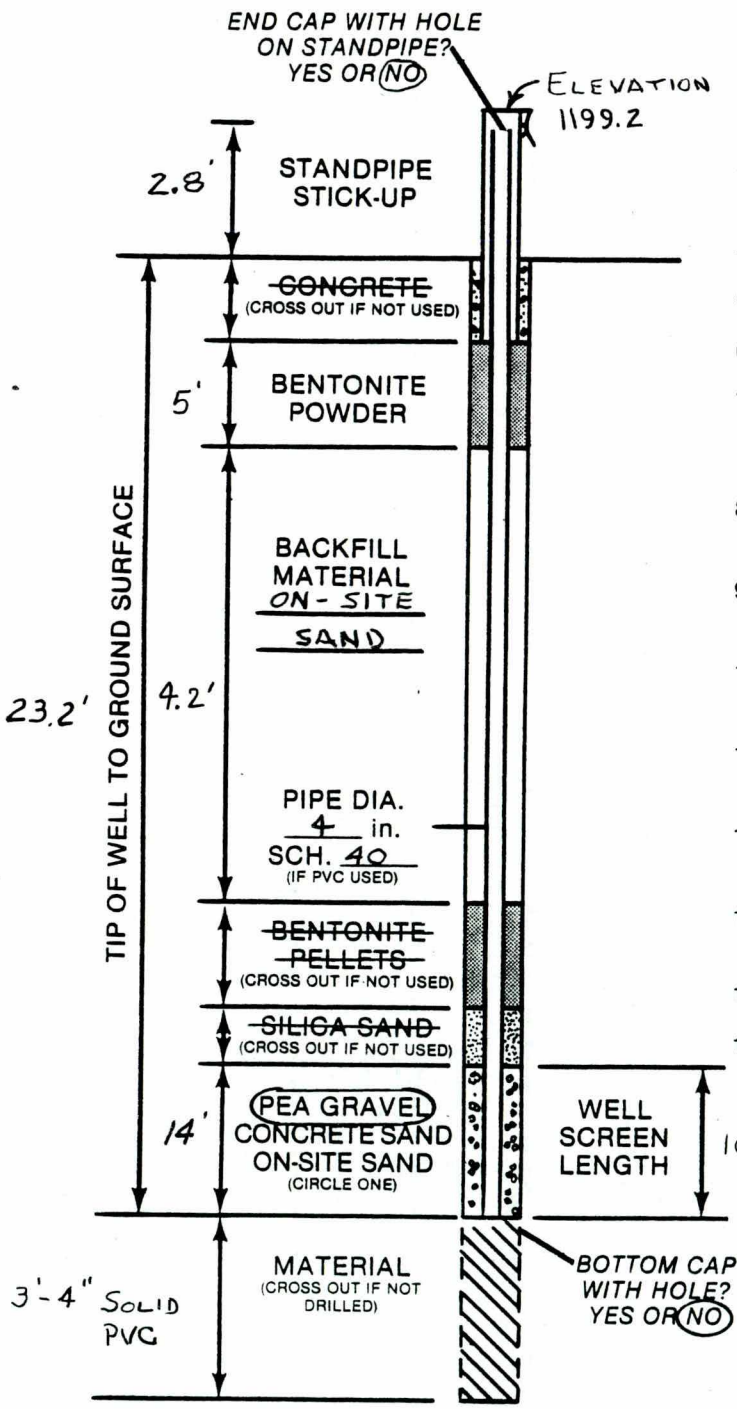
DRILLER JOHN WRIGHT DRILL CREW DAVID WONCH

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12776-B

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 .15

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 _____

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?
12.3 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. 14 DATE INSTALLED 10-10-85 DRILL RIG CME 45

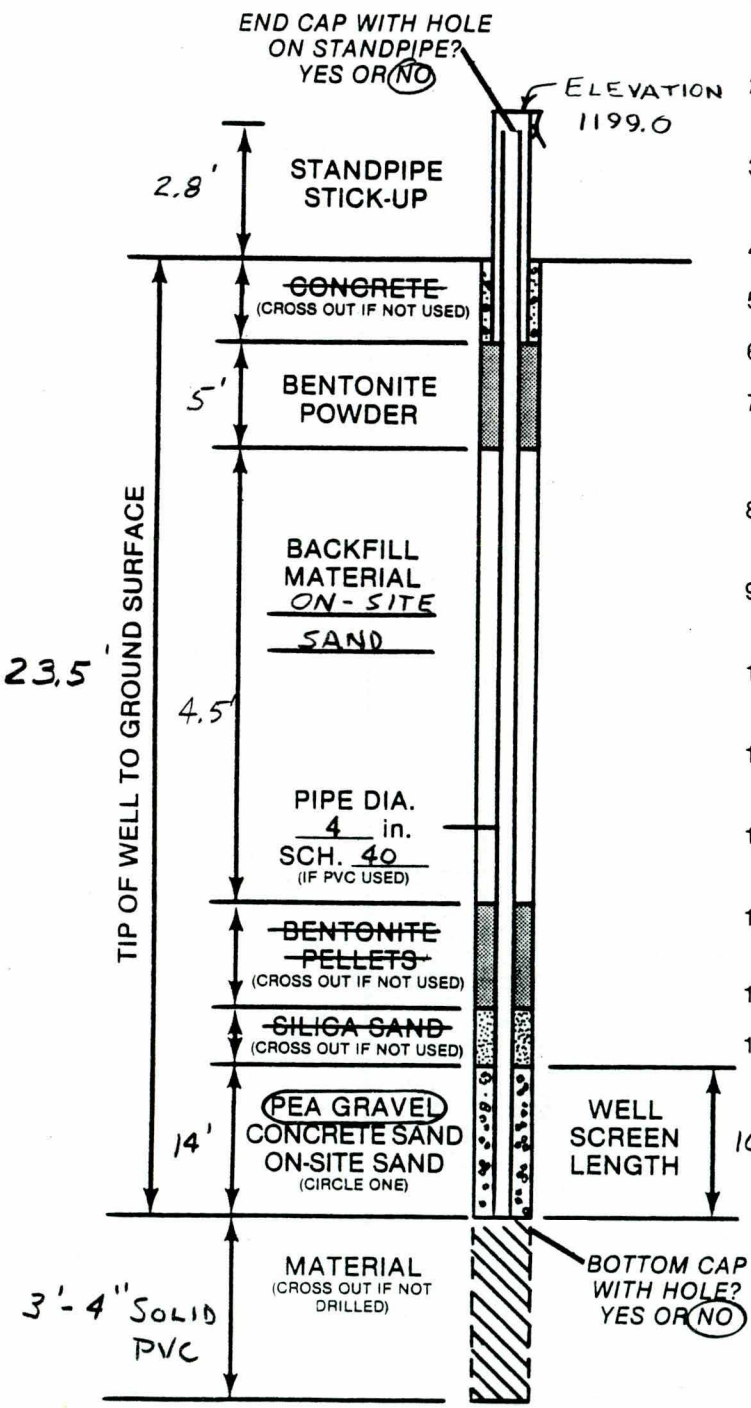
DRILLER JOHN WRIGHT DRILL CREW DAVID WONCH

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 17226-B

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 .15

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 _____

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?
12.2 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. 15 DATE INSTALLED 10-11-85 DRILL RIG CME 45

DRILLER JOHN WRIGHT DRILL CREW DAVID WONCH

JOB/CLIENT WAUSAU CHEMICAL STS JOB No. 12776-B

FW: 1-983

ZIMPRO
A SUBSIDIARY OF STERLING DRUG INC.
POLLUTION CONTROL SYSTEMS

November 4, 1985

Mr. Jim Cherwinka
Wausau Chemical Corp.
P.O. Box 953
Wausau, WI 54401

Dear Mr. Cherwinka:

The composite well and stripper effluent samples taken October 30, 1985 were analyzed according to EPA Method 601. The results are listed below.

	Wells ~~D-2~~ 12-15 Composite	Stripper Effluent
Perc (mg/l)	4.6	0.3
Analytical No.	14614	14615

If you have any questions, please call.

Sincerely,

ZIMPRO INC.

Mary C. Christie Heuser

Mary C. Christie Heuser
Instrumentation Chemist

MCCH/ls

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

MILITARY ROAD
ROTHSCHILD, WISCONSIN 54474

Table , Wasau Chemical - Extraction Program TS [redacted] # [redacted]

Date: 10-30-85 Date: 10-31-85

Time (Hour)

Cluster: Pumps ON	2	4	6	8	10	12	14	16	18	20	22	24	2	4	6	8	10	12	14	16	18	20	22	24
				←12→																				
				←13→																				
				←14→																				
				←15→																				
Total Pump rate, G.P.M. ①				108																				
Total Disch. * 10^6 G.																								
Perc % Inlet				4.6 ④																				
Perc % outlet				.3																				
% Ren.				93																				
total % Inlet ③																								
total % outlet																								
% Ren.																								
Contaminant Emitted (LB/H)				.38																				

① pump rate estimated 27 G.P.M./pump

② using initial concentration

③ Estimated based on 60% Perc

④ using Final Concentration

* All Compounds measured in the lab.

** measured from Flow meter

[redacted] STS Job # 12776-B [redacted]

	Time:				Time:				Time:				Time:				
	W.L.	T. F.C.	B. F.C.	ON/off	W.L.	T. F.C.	B. F.C.	ON/off	W.L.	T. F.C.	B. F.C.	ON/off	W.L.	T. F.C.	B. F.C.	ON/off	Comment - Tech. Na-
10	16' 10½"																
11	17' 4½"			OFF													
12	13' 7"																
13	13' 7"																
14	13' 0"																
15	12' 11"																
EXIT																	5 shows pumping were done on 11-2-85 and 11-3-85 and 3.5 hours on 11-4-85
EXW		Flow meter Reading				Flow meter Reading				Flow meter Reading				Flow meter Reading			All the OFF pumps were done manually to match the centrifugal pump & submercible pump.

T.F.C: Top float cont
set at
[illegible] float cont

Table , Wasau Chemical - Extraction Program [redacted] TS [redacted] # [redacted]6

Date: 11-2-85 | Date: 11-3-85

Time (Hour)

2 4 6 8 10 12 14 16 18 20 22 24 2 4 6 8 10 12 14 16 18 20 22 24

Cluster: Pumps ON

10 →
12 →
13 →
14 →
15 →

10 →
12 →
13 →
14 →
15 →

Total Pump rate, G.P.M. ①

135 →

135 →

total Disch. * 10^6 G.

Perc % (PPm) Inlet | outlet | % Ren.

total % ③ (PPm) Inlet | outlet | % Ren.

12.2 +

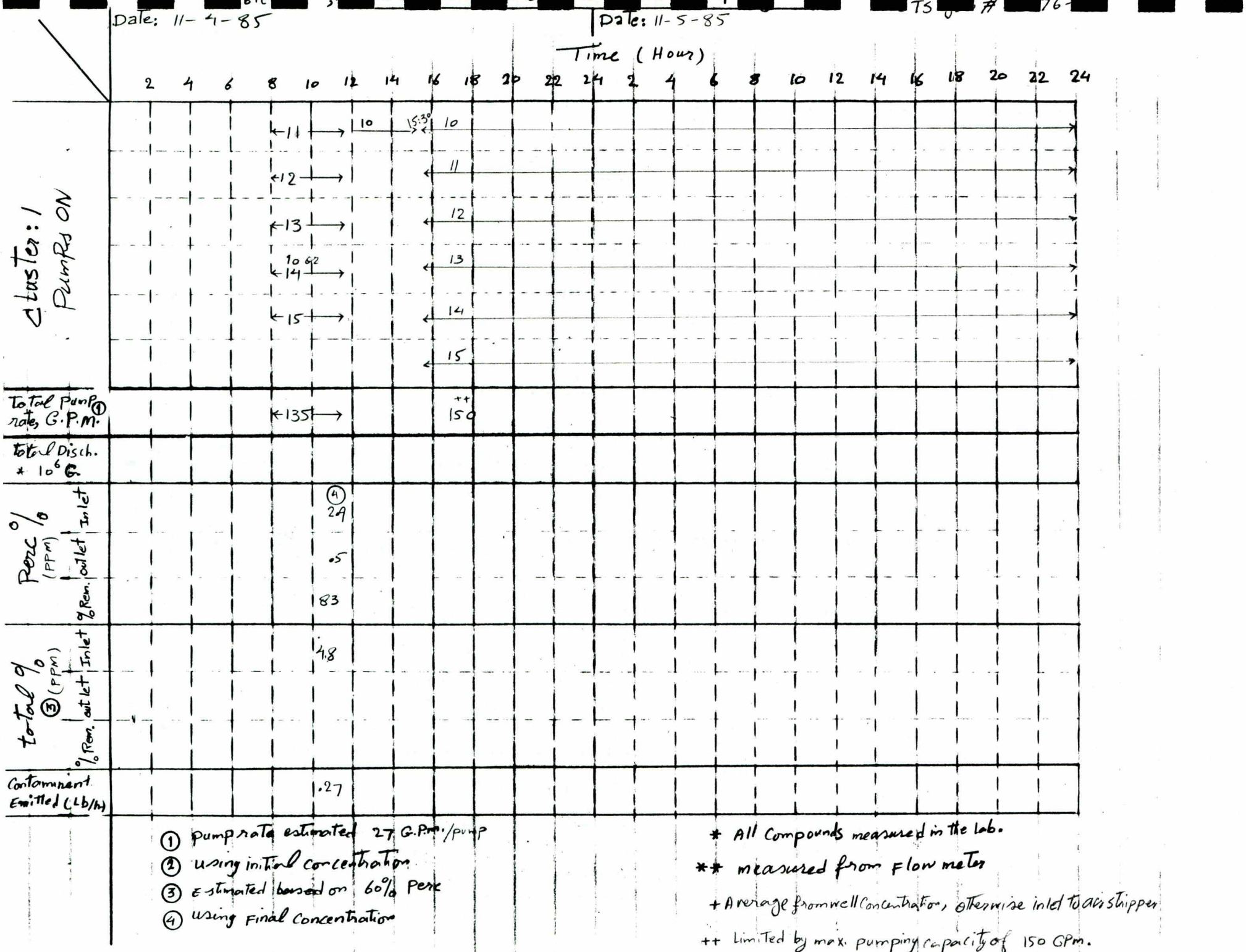
Contaminent Emitted (Lb/H)

2.85

① pump rate estimated 27 G.P.M./pump
② using initial concentration
③ Estimated based on 60% Perc
④ using Final Concentration

* All Compounds measured in the lab.
** measured from Flow meter
+ Average from well Concentration, otherwise inlet to air stripper

[redacted]ble, Wasau Chemical - Extraction Program [redacted] TS [redacted] # [redacted]76[redacted]



(1) pump rate estimated 27 G.P.M./pump
(2) using initial concentration
(3) Estimated based on 60% Perk
(4) using Final Concentration

* All Compounds measured in the lab.
** measured from Flow meter
\+ Average from well Concentration, otherwise inlet to air stripper
++ Limited by max. pumping capacity of 150 GPM.

[redacted] T[redacted] system on 8:15 a.m. W[redacted] program at [redacted] chemical fac[redacted] [redacted] [redacted] Date: [redacted] 4 '85

STS Job # 12776-B

Well	Time: 8:00 a.m. W.L.	T.F.C.	B.F.C.	ON/OFF	Time: 9:00 W.L.	T.F.C.	B.F.C.	ON/OFF	Time: 10:00 am AR W.L.	T.F.C.	B.F.C.	ON/OFF	Time: 11.00 AM AR W.L.	T.F.C.	B.F.C.	ON/OFF	Comment - Tech. Name
10	16' 6"	20' 8"		OFF	22' 8"			ON	18' 1"			OFF	23			ON	
11	17' 0"	20' 6"		OFF	20' 6"			ON	20' 10"			ON	20' 0"			ON	
12	13' 1½"	15' 8"		OFF	15' 8"			ON	16"			ON	15' 10"			ON	
13	12' 9"	13' 5"		OFF	13' 5"	(16' 5"	ON)	10 min OFF	15' 3"			ON	15' 0"			ON	Sample taken at 12:00 noon
14	13' 7"	13' [illegible]"		OFF	13' 1"			OFF	17'			ON	14' 0			ON	
15	13' 6"	12' 8"		OFF	12' 8"			ON	16' 2"			ON	15' 3"			ON	In 2.9 ppm per

EXW

Out 0.5 ppm

Flow meter Reading

Flow meter Reading

Flow meter Reading

Flow meter Reading

Levels on Non-working wells

Well	Level
8	#8 15' 4"
7	#7 16' 0
9	#9 13' 0
6	#6 14' 0
5	#5 17' 0
4	#4 16' 0
3	#3 13' 6
2	#2 13' 6"
1	#1 17' 7"

Turn on at 8. Am
Turn off at 1

T.F.C: Top Float Cont[illegible]
set at
[illegible]

[redacted] Treatment [redacted] at [redacted] chemical facility [redacted] WI [redacted] Te: [redacted]-[redacted]

STS Job # 12776-B

	Time: 1:00 PM				Time: 2:00 AR				Time:				Time:				
	W.L.	T. F.C.	B. F.C.	ON/OFF	W.L.	T. F.C.	B. F.C.	ON/OFF	W.L.	T. F.C.	B. F.C.	ON/OFF	W.L.	T. F.C.	B. F.C.	ON/OFF	Comments - Tech. Name
10	22' 0"	22' 0"		ON	22' 0"			ON									
11	20' 0"			ON	17' 8"			OFF									
12	13' [illegible]"			ON	13' [illegible]" 0			OFF									
13	15' 2"			ON	16' 0"			ON									
14	13' 3"			ON	5' 2"			ON									
15	13' 5"			ON	[illegible]	13' 3"		OFF	[illegible]								
		Flow meter Reading				Flow meter Reading				Flow meter Reading				Flow meter Reading			

8:00 AM ON

11:30 PM OFF

3:30 PM ON

↓

Continue to wash until Wed 11-6-85 8:00 AM

T.F.C: Top Float Cor set at

- - - Bottom Float Cor-

[redacted] Date: 11-5-85

STS Job # 12776-B

	Time: 8:00 a.m. AR				Time: 10:00 AM AR				Time: 11:00 AM AR				Time: 12:00 AR				
	W.L.	T. F.C.	B. F.C.	ON/OFF	W.L.	T. F.C.	B. F.C.	ON/OFF	W.L.	T. F.C.	B. F.C.	ON/OFF	W.L.	T. F.C.	B. F.C.	ON/OFF	Comment - Tech. Nar
10	22' 3"			ON	17'2"			OFF	22' 0"			ON	22' 6"			ON	
11	21' 4"			ON	20' 8"			OFF	20' 0'			ON	21' 0"			ON	
12	[illegible]' 7"			ON	16' 0"			ON	16' 4"			ON	16' 5"			ON	
13	18' 8"			ON	16' 0"			ON	15' 5"			ON	16' 0"			ON	
14	18' 0"			ON	16' 0'			ON	16' 0			ON	15' 6"			ON	Composite input sample
15	17' 0"			ON	15' 0'			ON	15' 0'			ON	15' 6"			ON	@ 3.9 gpm

EXW

	W.L.	Flow meter Reading	W.L.	Flow meter Reading	W.L.	Flow meter Reading	W.L.	Flow meter Reading
9	14' 0"							
8	16' 8"							
	16' 4"							
6	17' 6"							
5	17' 0"							
4	17' 0"							
3	14' 0"							
2	14' 0"							
	13'							

Composite input sample @ 3.9 gpm [illegible] taken at 8:30 a.m.

Continuously working on 11-5-85 until 8:00 AM of 11-6-85

T.F.C: Top Float Con. set at
B.F.C: Bottom Float Control

STS Job # 12776-B

Date: 11-5-80

	Time: 1200 hr				Time:				Time:				Time:				
	W.L.	T. F.C.	B. F.C.	ON/off	W.L.	T. F.C.	B. F.C.	ON/off	W.L.	T. F.C.	B. F.C.	ON/off	W.L.	T. F.C.	B. F.C.	ON/off	Comment - Tech. Nar
10	25' 4"			ON													
11	20' 5"			ON													
12	16' 5"			ON													
13	13' 10"			OFF													
14	13' 7			OFF													
15	13' 4"			OFF													
		Flow meter Reading				Flow meter Reading				Flow meter Reading				Flow meter Reading			

EXW

EXW

T.F.C: Top Float Cont
set at

Table , Wasau Chemical - Extraction Program

TS [redacted] # [redacted] 76

Date: 11-6-85 Date: 11-7-85

Time (Hour)

	2	4	6	8	10	12	14	16	18	20	22	24	2	4	6	8	10	12	14	16	18	20	22	24
Extractor: / Pump Rd ON																								
10	→	→	→	→															→	→	→	→	→	→
11	→	→	→	→															→	→	→	→	→	→
12	→	→	→	→																				
13	→	→	→	→																				
14	→	→	→	→																				
15	→	→	→	→																				
Total Pump rate, G.P.M. ①	150 ++																							
Total Disch. * 10^6 G.																								
Perc % (PPm) Inlet				3.9																				
Perc % (PPm) outlet																								
% Ren.																								
total % ③ (PPm) Inlet																								
total % ③ (PPm) outlet																								
% Ren.																								
Contaminant Emitted (Lb/Hr)																								

① pump rate estimated 2[illegible] G.P.M./pump
② using initial concentration
③ Estimated based on 60% Perc
④ using Final Concentration

* All Compounds measured in the Lab.
** measured from Flow meter
+ Average from well Concentration, otherwise inlet to air stripper
++ Limited by max. pumping capacity of 150 GPm.

[redacted] STS Job # 12776-B Date: 11-6-85

	Time: 8:30 a.m. W.L.	T. F.C.	B. F.C.	ON/Off	Time: 2:50 PM W.L.	T. F.C.	B. F.C.	ON/Off	Time: W.L.	T. F.C.	B. F.C.	ON/Off	Time: W.L.	T. F.C.	B. F.C.	ON/Off	Comment - Tech. Name
13	13 8			Off	18 7			ON									
14	13 6				16 0												
15	13 3				17 9												3.7 ppm
12	13 11				16 7												Sample 10:00
11	17 10				21 11"												Composite
10	17 4				34 5"												
9	13 4	Flow meter Reading			13 8	Flow meter Reading				Flow meter Reading				Flow meter Reading			Another sample from Wall #10 only 13.1 ppm
8	16 0				16' 3"												
7	16 7				16' 7"												
6	14 2				14 2												
5	17 5				17' 6"												
4	16 3				16' 4"												
3	14 1				14 2												
2	13 5				13 9												
1	13				13												

T.F.C: Top Float Cor set at

STS Job # 12776-B

Date: 11-7-85

	Time: 8:00 a.m. W.L.	T. F.C.	B. F.C.	ON/OFF	Time: W.L.	T. F.C.	B. F.C.	ON/OFF	Time: W.L.	T. F.C.	B. F.C.	ON/OFF	Time: W.L.	T. F.C.	B. F.C.	ON/OFF	Comment - Tech. Name
13	13 5			all off													
14	13 4																
15	13 2																
12	13 9																
11	17 8																
10	17 3																
9	13 4	Flow meter Reading			Flow meter Reading				Flow meter Reading				Flow meter Reading				
8	16 0																
7	16 5																
6	14 1																
5	17 4																
4	16 2																
3	14 1																
2	15 8																
1	13 7																

EXW

EXW

Pumps off since 3:00 pm 11-6-85

Total well #10 & 11 only at 9:00 am

T.F.C: Top Float Control set at - F.C. - Bottom Float Control

Zimpro Results
by Telephone

Samples of 11-8-85:

Compound	PPB Influent	Effluent
Perchloroethylene	6220	.646

Well # (Perc only)	
7	11,000
10	5550
15	120

Table: [redacted] Thermal [redacted] Extraction Program

STS Job # 12776-B

Date: 11-8-85 | Date: 11-9-85

Time (Hour)

2 4 6 8 10 12 14 16 18 20 22 24 2 4 6 8 10 12 14 16 18 20 22 24

Cluster: 1

Pumps ON

10 → 10 → 10 → shut off due to snow drift

11 → 11 → 11 → shut off due to snow drift

13 →

14 →

15 →

Total Pump rate, G.P.M. ①			
Total Disch. * 10^6 G.			
Perc % (PPM) Inlet	5.55	well 10	
Perc % (PPM) outlet	11.	well 7	
Perc % Rem.	0.12	well 15	
total % ③ (PPM) Inlet	*④ 14.14		
total % ③ (PPM) outlet	* 1.098		
total % Rem.	92		
Contaminant Emitted (Lb/hr)	.97		

① Pump rate estimated 27 G.P.M./pump

② Using initial Concentration

③ Estimated based on 60% Perc

④ Using Final Concentration

* All Compounds measured in the lab.

** measured from Flow meter

+ Average from well Concentration, otherwise, inlet To Airstripper

++ Limited by max. pumping capacity of 150 GPM

Table: [redacted] Extraction program

STS Job # 12776-B

Date: 11-10-85 | Date: 11-11-85

Time (Hour)

2 4 6 8 10 12 14 16 18 20 22 24 2 4 6 8 10 12 14 16 18 20 22 24

Cluster: 1
Pumps ON

System was off Due to Snow Drifting

Total Pump rate, G.P.M. ①	
total Disch. * 10^6 G.	
Benz % (PPM) Inlet	
Benz % (PPM) outlet	
% Rem.	
total % ③ (PPM) Inlet	
total % ③ (PPM) outlet	
% Rem.	
Contaminent Emitted (Lb/hr)	

① pump rate estimated 27 G.P.M./pump
② using initial concentration
③ Estimated based on 60% Perc
④ using Final Concentration

* All Compounds measured in the lab.
** measured from Flow meter
+ Average from well Concentration, otherwise, inlet to Air stripper
++ Limited by max. pumping capacity of 150 GPM

Table: [redacted] Vapor Extraction Program

STS Job # 12776-B

Date: 11-12-85 | Date: 11-13-85

Time (Hour)

2 4 6 8 10 12 14 16 18 20 22 24 2 4 6 8 10 12 14 16 18 20 22 24

Cluster: 1 Pumps ON

10

11

Total Pump rate, G.P.M. ①	
Total Disch. * 10^6 G.	
Benz % (PPm) Inlet	
Benz % (PPm) outlet	
% Ren.	
total % ③ (PPm) Inlet	
total % ③ (PPm) outlet	
% Ren.	
Contaminant Emitted (Lb/hr)	

① pump rate estimated 27 G.P.M./pump

② using initial concentration

③ Estimated based on 60% Perk

④ using Final Concentration

* All Compounds measured in the lab

** measured from Flow meter

+ Average from well concentration, otherwise, inlet to Airstripper

++ Limited by max. pumping capacity of 150 GPM

Sample taken 1:15 pm 11-14-85

Well #:	Perc
#10	6950
#11	9400
#10 + #11 Composite effluent	1040

[redacted] Table: [redacted], W[redacted]au[redacted]her[redacted]al [redacted] E[redacted]x[redacted]c[redacted]t[redacted] pr[redacted]gram [redacted]

STS Job # 12776-B

Date: 11-14-85 | Date: 11-15-85

Time (Hour)

2 4 6 8 10 12 14 16 18 20 22 24 2 4 6 8 10 12 14 16 18 20 22 24

Cluster: 1

Pumps ON

10 →

11 →

Total Pump rate, G.P.M. ①	
Total Disch. * 10^6 G.	
Benz % (PPM) Inlet / outlet / % Rem.	
total % ③ (PPM) Inlet / outlet / % Rem.	
Contaminant Emitted (Lb/h)	

① pump rate estimated 27 G.P.M./pump

② using initial concentration

③ estimated based on 60% Perk

④ using Final Concentration

* All Compounds measured in the lab.

** measured from Flow meter

+ Average from well Concentration, otherwise, inlet to Airstripper

++ limited by max. pumping capacity of 150 GPM

STS Job # 12776-B

Date: 11-15-85

Analyst Rosenbaum

Comments: Tech. Rep. -

	Time: 10:30				Time: 1:35 p.m. Start #11 only 1:05 p.m.				Time: 2:05 p.m. 2:35 p.m.				Time: 3:05 p.m. 3:35 p.m.			
	W.L.	T. F.C.	B. F.C.	ON/OFF	W.L.	T. F.C.	B. F.C.	ON/OFF	W.L.	T. F.C.	B. F.C.	ON/OFF	W.L.	T. F.C.	B. F.C.	ON/OFF
10	~~10' 3"~~	System off														
11	17' 4"				20' 0"	1:35 pm			#11	20' 5"		20' 10"		20' 9"		20' 10"
12	13' 4"															
13	13' 4"															
14	13' 0"															
15	12' 7"															
9	12' 6"	Flow meter Reading			Flow meter Reading				Flow meter Reading				Flow meter Reading			
8	16' 0"															
7	16' 0"															
6	14' 0"															
5	17' 0"															
4	16' 0"															
3	13' 6"															
2	13' 0"															
1	13' 4"															

ORP
11-16-85
11-17-85
11-18-85

11-19-85
Start pumps
10, 11 at 10:35
7, 8, 9 at 11:30.

T.F.C: Top Float Control set at

Title: Wasau Chemical Extraction Program

Date: 11-21-85 | Date: 11-22-85 | STS Job # 12776-B

Time (Hours)

2 4 6 8 10 12 14 16 18 20 22 24 | 2 4 6 8 10 12 14 16 18 20 22 24

Cluster: 1 Pumps ON

Wells 7, 8, 9

Sample Taken (Composite)

Wells 7-12

Shut down to remove water meter, meter not working. Water pumped on this sheet not registered.

Total Pump Rate G.P.M. ①

Total Disch. ± 10^6 Gal

Perc % (ppm) Inlet | Outlet | % Removal

Total Q ② (Ft³) Inlet | Outlet | % Perc

Contaminant Emitted (LBS/Hr)

— Composite Sample (Wells 7, 8, 9) taken 8:15 a.m. 11-22-85

	Perc
Influent	5800
Effluent	700

① pump rate estimated 27 GPM/pump
② using initial concentration
③ estimated based on 60% Perc
④ using final concentration

* All compounds measured in the Lab
** measured from Flow meter
+ Average from well concentration, otherwise, inlet to Airstripper
++ Limited by max pumping capacity of 150 GPM

Title: Wasau chemical - Extraction program

Date: 12-5-85

Date:

SIS Job # 12[illegible]-B

Time (Hours)

2 4 6 8 10 12 14 16 18 20 22 24 2 4 6 8 10 12 14 16 18 20 22 24

WENS #7 & 10

Shut down after 2 hrs Exit lines frozen. Sample taken at 10:30 a.m

Cluster: 1
Pumps ON

Well #	Perc
5	40100
7	3100
10	6000
13	4540
14	315
15	1250

Total Pump ① G.P.M.

Total Disch. 10^6 G

Perc % (PPM) Inlet / Outlet / % Rem.

Total % ③ (PPM) Inlet / Outlet / % Rem.

Total Contaminant Mass (LBS)

① pump rate estimated 27 GPM/pump
② using initial concentration
③ estimated based on 60% Perc
④ using final concentration

* All Compounds measured from flow meter
** measured from flow meter
+ Average from well concentration, otherwise, inlet to Air Stripper
++ Limited by max pumping capacity of 150 GPM