

**Groundwater Monitoring and
Remedial Action-Interim Report
to DNR**

**STA-RITE Industries
Water Equipment Division
Delavan, Wisconsin**

April 1984

April 30, 1984

RECEIVED

SEP 13 1985

Sta-Rite Industries, Inc.
293 South Wright Street
Delavan, WI 53115

BUR. OF SOLID
WASTE MGT.

Attn: Mr. Dick LaChapell
Plant Manager

Re: Transmittal of Interim Report Concerning
Groundwater Monitoring and Remedial Actions
Donohue Project No. 12894.007

Dear Mr. LaChappell:

Attached is our Interim Report addressing information discussed with the Wisconsin Department of Natural Resources on March 27, 1984. The report transmits boring logs, well logs and monitoring data and describes additional site investigations and remedial actions to be completed by Sta-Rite at the Delavan facilities.

If you have any questions concerning the contents of this report, please contact this office.

Very truly yours,

DONOHUE & ASSOCIATES, INC.

Michael L. Crosser

Michael L. Crosser
Project Manager

MLC:mb

enc: Interim Report

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**GROUNDWATER MONITORING AND
REMEDIAL ACTIONS
INTERIM REPORT
STA-RITE INDUSTRIES
Delavan, Wisconsin**

April 1984

**DONOHUE & ASSOCIATES, INC.
Engineers/Architects
4738 North 40th Street
Sheboygan, WI 53081**

Project No. 12894.007

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- A Boring and Well Logs

CHAPTER 1

INTRODUCTION AND BACKGROUND

Since late 1982, investigations of chlorinated solvent contamination detected in City Well 4 in Delavan, Wisconsin have been underway. The Wisconsin Department of Natural Resources (DNR) suspected that the Sta-Rite Industries Water Equipment Division facilities, located approximately 1,000 feet east of City Well 4, was the source of the solvent contamination. The City retained Warzyn Engineering, Inc., to investigate. With the cooperation of Sta-Rite Industries, Warzyn Engineering obtained soil and groundwater samples on Sta-Rite property. The samples were obtained in areas of potential contamination as identified by Sta-Rite and in areas between the potentially contaminated areas and City Well 4. Warzyn issued a preliminary report of their findings on February 16, 1983, which indicated solvent-contaminated water at the groundwater surface near the southeast wall of Plant 1 and soil and near surface water contamination near the holding tank outside the north wall of Plant 2. Groundwater surface samples from wells between the identified contaminated areas and City Well 4 showed decreasing amounts of solvents as the distance from the identified contaminated area near Plants 1 and 2 increased. Wells near the Sta-Rite property line showed little or no contamination.

In January 1983, Sta-Rite retained Donohue to conduct further investigations. Donohue placed additional groundwater monitoring and sampling wells to obtain data covering greater areal and vertical distances and conducted a pump test to determine aquifer characteristics. The goals of the work were to determine whether the identified areas of contamination near Plants 1 and 2 could contribute to contamination of City Well 4 and to provide data for selecting remedial action if required. No definitive data collected during the investigation indicated a direct path of migration from the contaminated areas on Sta-Rite property to City Well 4. However, there was strong indication that solvents in the groundwater in the vicinity of Plant 1 were moving off-site to the northwest, the direction of groundwater flow. The data and results were reported in May, 1983. Following evaluation of the results reported in May, 1983, Sta-Rite authorized additional investigations to determine groundwater and contaminant movement in the area and authorized the removal of the sump tank and contaminated soils near Plant 2. The remedial actions were completed in December, 1983. The report discussing the remedial actions was issued in January, 1984.

Concurrent with the implementation of the Plant 2 remedial actions and with the assistance of Thomas A. Prickett, Donohue modeled the groundwater flow system. The results of the groundwater modeling were discussed in a report issued in December, 1983. The results of the groundwater modeling program indicated that contamination in the vicinity of the sump at Plant 2 could impact the water quality of City Well 4, especially when City Well 4 is pumped at high rates. Furthermore, the modeling indicated that following the remedial actions at the Plant 2 sump, the water quality at City Well 4 should gradually improve as a contaminant plume moves off to the northwest. Based on the results of the modeling program, the City of Delavan elected to shut down City Well 4 for several years to allow validation of the model. If the model is accurate, the groundwater system will clear and City Well 4 can be used without water treatment.

On March 9, 1984, the DNR sent a letter to Sta-Rite requesting that additional remedial action be conducted at Plant 2 and that additional investigations be conducted on Sta-Rite property and in the area of the contaminant plume that appears to be moving to the northwest from the Sta-Rite property. At that meeting, Sta-Rite agreed to conduct further site investigations and report the results of the site investigations by June 30, 1984. Sta-Rite also agreed to submit a report by April 30, 1984, addressing the following items:

1. Transmittal of boring and well logs and data.
2. Additional information concerning the direction of flow of the contaminant plume.
3. A proposal for additional remedial action at the Plant 2 sump.
4. A discussion of the appropriateness of further investigations under Plant 1.

This report addresses those points and also discusses the additional site investigations to be completed by June 30, 1984.

CHAPTER 2

BORING LOGS, WELL LOGS, AND DATA

Logs for the borings and wells installed by Donohue and Warzyn are presented in Appendix A. Table 1 presents a summary of the well depths from the ground surface and the elevations for the wells surveyed to date.

Table 2 presents a summary of the groundwater monitoring data taken from the monitoring wells. Table 3 presents a summary of soil analytical data for the borings. Discussions of the data had been presented in previous reports cited in the references and will not be repeated here.

The boring and well locations are shown on Figure 1. The boring and well labels have been changed from past reports for clarification. The legend is shown on Figure 1.

TABLE 1
BORING AND WELL INSTALLATION INFORMATION
STA-RITE INDUSTRIES
Delavan, Wisconsin

<u>Well Boring No.</u>	<u>Installed By</u>	<u>Date Installed</u>	<u>Total Depth Feet</u>	<u>Screened Interval Feet</u>	<u>Ground Elevation</u>	<u>Top of Pipe Elevation</u>	<u>Elevation of Screened Interval</u>
TB-1	Warzyn	12-14-82	10	-			
TB-2	Warzyn	12-14-82	15	-			
TB-3	Warzyn	12-14-82	10	-			
TB-4	Warzyn	12-14-82	10	-			
TB-5	Warzyn	12-14-82	10	-			
TB-7	Warzyn	12-14-82	10	-			
TB-8	Warzyn	12-14-82	10	-			
TB-9	Warzyn	12-14-82	10	-			
TW-1	Warzyn	12-9-82	44	24-44	939.2	942.39	915.2-895.2
TW-1A	Warzyn	12-10-82	85	75-85	939.4	942.60	864.4-854.4
TW-2	Warzyn	12-2-82	51	31-51	942.5	944.38	911.5-891.5
TW-2A	Warzyn	12-3-82	90	80-90	942.5	945.50	862.5-852.5
TW-3	Warzyn	12-8-82	48	28-48	943.5	946.67	915.5-895.5
TW-4	Warzyn	12-6-82	49	29-49	948.0	951.06	919.0-900.0
D-1	Donohue - Wis. Testing Lab.	2-15-83	50	30-50	948.8	952.52	919.8-899.8
D-2	Donohue - Wis. Testing Lab.	2-9-83	110	100-110	948.71	950.10	848.7-838.7
D-3	Donohue - Wis. Testing Lab.	2-17-83	50	30-50	947.4	950.50	847.4-837.4
D-4	Donohue - Wis. Testing Lab.	2-17-83	80	70-80	947.2	949.75	917.4-867.2
D-5	Donohue - Wis. Testing Lab.	2-22-83	50	30-50	944.0	946.45	914.0-894.0
D-6	Donohue - Wis. Testing Lab.	2-21-83	110	100-110	944.1	946.39	844.1-834.1
D-9	Donohue - Wis. Testing Lab.	2-23-83	50	30-50	935.3	936.96	905.3-885.3
D-10	Donohue - Wis. Testing Lab.	3-2-83	110	100-110	935.4	938.33	835.4-825.4
B-11	Donohue - Wis. Testing Lab.	6-28-83	35	-			
D-12	Donohue - Wis. Testing Lab.	6-30-83	36	26-36			
B-13	Donohue - Wis. Testing Lab.	7-1-83	35.5	-			
D-14	Donohue - Wis. Testing Lab.	7-12-83	35	25-35			
D-15	Donohue - Wis. Testing Lab.	7-7-83	38	28-38			
B-16	Donohue - Wis. Testing Lab.	7-8-83	32.5	-			
B-17	Donohue - Wis. Testing Lab.	7-11-83	27.5	-			
D-18	Donohue - Wis. Testing Lab.	10-10-83	37	34.5-37			
D-19	Donohue - Wis. Testing Lab.	10-10-93	29.5	19.5-29.5			

TABLE 2
GROUNDWATER QUALITY DATA
STA-RITE INDUSTRIES
Delavan, Wisconsin

Loc.	Date Sampled	Methylene chloride	1,1-Dichloroethylene	Trans 1,2-dichloroethylene	1,1,1-Trichloroethane	Trichloroethylene	Tetrachloroethylene	Toluene
-1	1-7-83				ND	7		
A	1-7-83	ND	ND	ND	ND	ND	ND	ND
	1-7-83	ND	ND	ND	ND	ND	ND	ND
A	1-7-83	ND	ND	ND	ND	ND	ND	ND
-3	1-7-83			7	8	81	7	
	1-7-83		250	<500	13,750	2,035		
	4-8-83	<1	<1	<1	<1	<1	<1	<1
2	4-8-83	<1	<1	<1	<1	<1	<1	2
3	4-8-83	<1	<1	<1	<1	<1	<1	<1
	4-8-83	<1	<1	<1	<1	<1	<1	<1
	4-8-83	<25	150	19	1,800	500	<1	<1
6	4-8-83	<1	<1	<1	<1	<1	<1	<1
	4-8-83	<1	<1	<1	10	2	<1	<1
	4-8-83	<1	<1	<1	<1	<1	<1	<1
	4-8-83	<1	<1	<1	3	3	<1	2
-1A	4-8-83	<1	<1	<1	<1	<1	<1	<1
	4-8-83	<1	<1	<1	<1	<1	<1	<1
A	4-8-83	<1	<1	<1	<1	<1	<1	<1
	4-8-83	<1	<1	<1	4	32	<1	<1
-4	4-8-83	<100	1,100	<100	12,500	3,400	<100	<100
	7-13-83	140	4,080		16,200	3,870		85
	7-13-83	860				110,000	1,830	85
	10-18-83	<1	<1	<1	6	7	1	<1
-1A	Not Sampled							
	10-18-83	<1	<1	<1	<1	<1	<1	<1
A	10-18-83	<1	<1	<1	<1	<1	<1	<1
-3	10-18-83	2	4	4	17	199	12	2
-4	Not Sampled							
	10-18-83	<1	<1	<1	<1	<1	<1	<1
	10-18-83	<1	<1	<1	<1	<1	<1	<1
	10-18-83	1	<1	<1	<1	<1	<1	<1
	10-18-83	<1	<1	<1	<1	<1	<1	<1
	10-18-83	<1	250	23	2,120	588	10	<1
	10-18-83	1	195	19	1,920	340	4	2
	10-18-83	<1	<1	<1	11	4	<1	<1
9	10-18-83	<1	<1	<1	<1	<1	<1	<1
	10-18-83	<1	<1	<1	<1	<1	<1	<1
	10-18-83	9	1,010	55	9,820	1,190	<1	<1
14	10-18-83	2	773	<1	7,640	954	5	<1
	10-18-83	1,180	8	10	26	17,400	2,950	11
	10-18-83	<1	<1	<1	<1	517	254	2
	10-18-83	<1	<1	2	<1	518	67	<1
-1	1-25-84	1	<1	<1	<1	<1	<1	<1
A	1-25-84	<1	<1	<1	<1	<1	<1	<1
	1-25-84	<1	<1	2	<1	6	<1	<1
A	1-25-84	<1	<1	<1	<1	20	<1	<1
-3	1-25-84	<1	5	5	38	500	27	<1
	1-25-84	5	2,330	57	20,400	5,360	<1	1
	1-25-84	**	**	**	**	**	**	**
	1-25-84	**	**	**	**	**	**	**
3	1-25-84	**	**	**	**	**	**	**

TABLE 2
(Continued)

<u>Well No.</u>	<u>Date Sampled</u>	<u>Methylene chloride</u>	<u>1,1-Dichloroethylene</u>	<u>Trans 1,2-dichloroethylene</u>	<u>1,1,1-Trichloroethane</u>	<u>Trichloroethylene</u>	<u>Tetrachloroethylene</u>	<u>Toluene</u>
D-4	1-25-84	**	**	**	**	**	**	**
D-5	1-25-84	<1	91	14	1,150	404	<1	1
D-6	1-25-84	<1	<1	<1	6	3	<1	<1
D-9	1-25-84	<1	<1	<1	<1	<1	<1	<1
D-10	1-25-84	<1	<1	<1	<1	<1	<1	<1
D-12	1-25-84	<50	1,570	100	18,300	3,600	<50	<50
D-14	1-25-84	<1	140	6	1,720	363	<1	<1
D-15	1-25-84	<50	<50	<50	<50	29,200	1,100	<50
D-18	1-25-84	2	1	1	6	2,290	150	<1
D-19	1-25-84	Dry						

Note: All analysis results are microgram/liter

*Warzyn Analysis

TABLE 3

SOIL SAMPLE ANALYTICAL DATA
 STA-RITE INDUSTRIES
 Delavan, Wisconsin

Boring No.	Date	Sample Depth Feet	Methylene chloride†	1,1-Dichloro- ethylen†	Trans 1,2- dichloroethylen†	1,1,1-Trichloro- ethan†	Trichloro- ethylene	Tetrachloro- ethylen†	Toluene†
TB-1	12-14-82	10				<500	600,000	13,800	
TB-2	12-14-82	15				<5,000	820,000	17,300	
TB-3		Not Analyzed Because No Solvent Odor							
TB-4	12-14-82	7.5				150	410	10	
TB-5	12-14-82	7.5				60	570	20	
TB-7	12-14-82	7.5				250	940	10	
TB-8	12-14-82	5.0				1,020	720	<10	
TB-9	12-14-82	5.0				310	1,290	<10	
B-11	6-27-83	12	12	4	42	29	1,000	3	4
B-11	6-27-83	32	2	12	5	118	148	<1	4
D-12	6-28-83	6.5	14	420	17	4,125	2,300	<1	9
D-12	6-28-83	18.5	5	95	<1	610	400	<1	4
D-12	6-28-83	32	<1	50	<1	295	80	<1	4
B-13	6-30-83	5.5	5	<1	11	<1	44	<1	<1
B-13	6-30-83	8.5	5	<1	<1	<1	5	2	2
B-13	6-30-83	17.5	17	3	<1	<1	73	30	15
B-13	6-30-83	34	<1	<1	<1	<1	<1	<1	<1
D-14	7-11-83	22.5	22	1	52	7	3	6	12
D-15	7-12-83	10					6	8	
B-16	7-8-83	12					29	5	
B-16	7-8-83	27					22	4	
B-17	7-11-83	9					36	13	
Sump	11-12-83	18					980,000	280,000	
Sump*	11-29-83	18				35	830	820	

†All values microgram per kilogram (ppb).

*Values after excavation open for one week. See Remedial Action Report - Plant 2 .

Figure 1

CHAPTER 3

FLOW DIRECTION OF GROUNDWATER AND CONTAMINANT PLUME

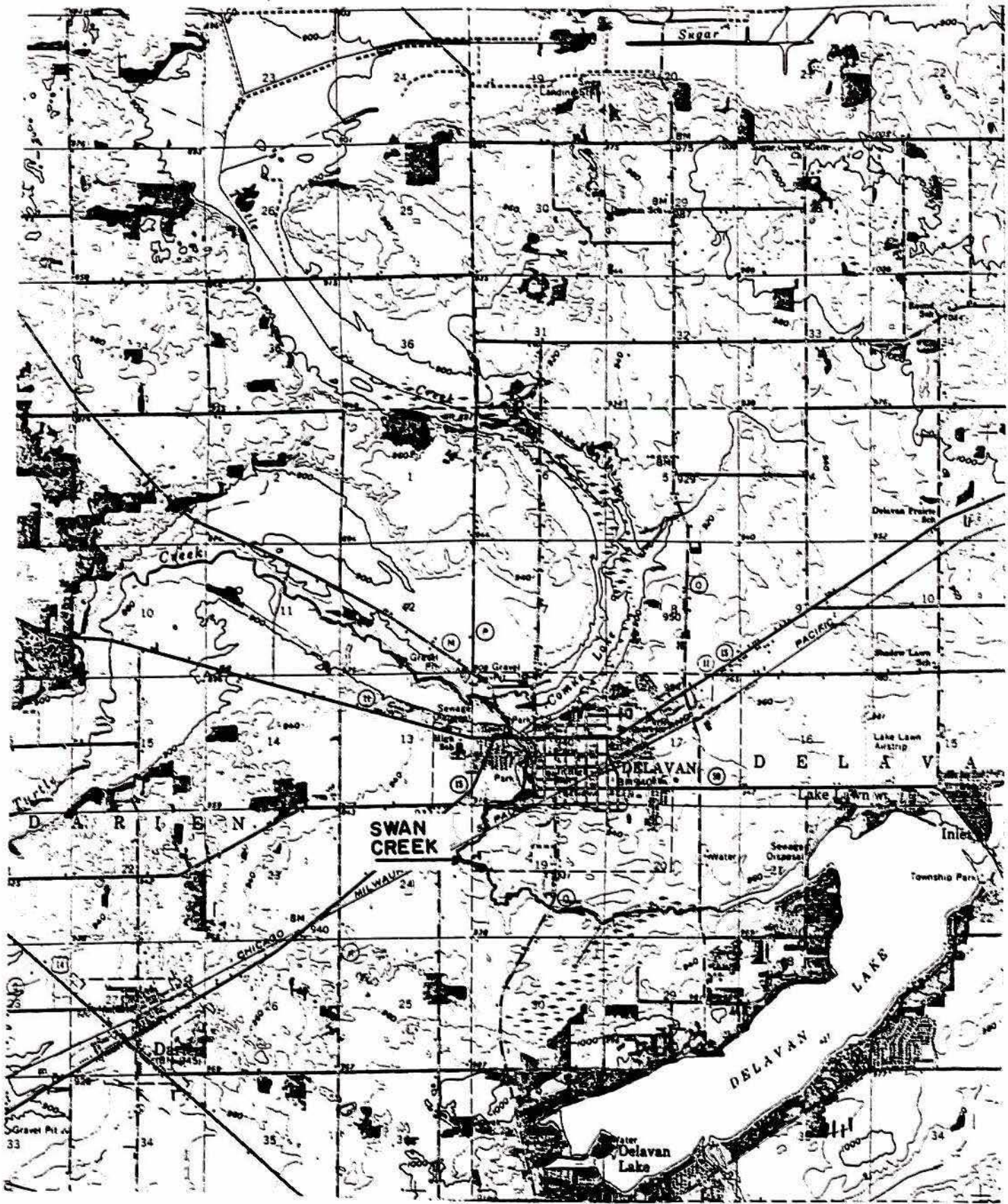
Previous analyses and modeling of contaminant movement from the Sta-Rite property indicates that the contaminant plume will have no effect on City Well 2. This is based on groundwater flow occurring to the west-northwest beneath the City of Delavan. The Department of Natural Resources (DNR) has raised questions that the plume will change direction from predominantly to the northwest to the southwest. The DNR suggested this could be caused by effects of pumping City Wells 2 and 3 and localized effects caused by southward flowing streams in the area. The DNR has also been concerned with verifying the plume downgradient of the contamination. This chapter discusses known groundwater flow conditions in the area and at site specific locations, including flow direction, recharge and discharge areas, seasonal variations in flow conditions, suspected vertical plume dispersion, and the effect of flow conditions on plume migration.

The general water table map of the area indicates flow to the northwest from Delavan Lake to Comus Lake (Borman, 1976). A groundwater divide exists to the southeast of the site between Delavan Lake and Lake Geneva; this results in Delavan Lake acting as a recharge area for flow to the northwest. The presence of this recharge area is substantiated in Borman, where it is noted that there was a 40-foot drop in water levels between the shallow and deep water table aquifer wells.

Groundwater flows away from Delavan Lake to the northwest and west and is discharged to Comus Lake and Turtle Creek. Comus Lake is known to be a discharge area for groundwater flow because of the upward gradients found within the aquifer in the lake area. These upward gradients result in numerous springs and artesian wells near the lake. Most of the shoreline of Comus Lake remains a groundwater discharge area throughout the entire year. Springs along the eastern shoreline remain flowing continuously (Smith, 1984; Thresher & Son, 1978). During high runoff periods, Comus Lake may become a flow-through lake resulting in discharge out of the lake along the southwest shore (Thresher & Son, 1978) near the dam and probably as a function of the dam.

Surface water flows from Delavan Lake northwestward through Swan Creek which discharges into Turtle Creek west of Comus Lake. Turtle Creek flows northwest out of Comus Lake and then westward out of Walworth County (Figure 2). Turtle Creek acts as a groundwater discharge area for water flowing from the north, east, and south. It is the main discharge area for the southwestern portion of the County. Since Comus Lake and Turtle Creek are the major discharge areas in this portion of the County, little or no groundwater underflow would be expected to occur beneath these areas. However, in the lower portions of the sand aquifer there will be some leakage of groundwater from the water table aquifer into the underlying bedrock aquifers because of head differences between the two systems.

Site specific groundwater levels measured in the vicinity of Sta-Rite and at the Mobil Oil bulk plant on Ann Street in the City of Delavan, substantiate



Donohue

April 1984
12894.

**Topographic Map of Delavan Area
Showing Stream Flow Directions and
Major Surface Water Features**



FIGURE 2

that groundwater flows to the northwest (Warzyn, 1984). Water table maps constructed from additional monitoring in 1983 and 1984 at Sta-Rite, are shown on Figures 3 through 6 and indicate flow to the northwest. Although there may be local "wobbles" in the groundwater contours, we would not expect large variations in the direction of flow since streams in the area flow to the north and northwest and groundwater flow would be to the discharge points of Lake Comus and Turtle Creek.

Groundwater flow beneath the suspected area of contamination occurs in the intermediate portion of the flow path system. This means that groundwater flow is predominantly horizontal. Nested wells on-site indicate small vertical upward and downward gradients which vary with time. Consistent vertical downward gradients only occur when City Well 4 is pumping. It is known that the contaminants tend to stay at the water table surface. This, coupled with the fact that flow is predominantly horizontal, indicates that dispersion would be the main cause of contaminants occurring in the deeper portion of the aquifer. Water quality testing at the deep nested wells substantiate that the majority of contamination occurs at the water table surface. Therefore, suspected contamination would be discharged to Comus Lake and Turtle Creek since it occurs at the water table and this groundwater is discharged at the springs. No discharge of contaminants to the bedrock system is expected to occur for this same reason.

These discussions indicate that contaminants would move off-site to the northwest, remain in the upper portion of the aquifer, and discharge to Comus Lake. Flow would not be expected to reverse itself and move southwestward towards City Well 2 nor travel as underflow to city wells to the west of Comus Lake. The modeling indicates that high pumping rates would be required at City Well 3 to pull contaminants into the well. Since City Well 2 is a small capacity well, pumping rates would not be high enough to draw contaminants in that direction.

The City discourages private wells for potable water in the city limits when a connection can be made to the city system. However, two wells were located between Sta-Rite and Comus Lake. A well used for swimming pool water is located on Estate Lane. This is directly downgradient from the suspected contamination. Water samples from this well were analyzed several times in 1983 for volatile organics. All results were below detection. In April 1984, a second well was located near the 3rd Street extension at Comus Lake. We are investigating well construction information for this well. We recommend semi-annual monitoring of these wells in lieu of installing additional monitoring wells.

Little underflow would occur beneath Comus Lake, and Comus Lake has been tested for the presence of contaminants with a negative result. Two samples were collected from Comus Lake on June 6, 1983, and analyzed for trichloroethylene and 1,1,1 trichloroethane. There was no solvent detected in either sample. The detection limit was 1 microgram per liter. One sample was collected 20 feet from shore on the east side of the lake near the northwest corner of the Ned Hollister Wetlands Conservancy. The second sample was collected at the lake outfall immediately upstream of the dam. Furthermore, Sta-Rite has implemented remedial action and additional investigations to further address the source of contamination. Therefore, Sta-Rite believes it is not necessary to implement an extensive groundwater monitoring program to define the exact plume boundaries.

Figure 3

Figure 4

Figure 5

Figure 6

CHAPTER 4

PLANT 2 REMEDIAL ACTION

ACTIONS COMPLETED

Remedial action at the sump near Plant 2, consisting of removal of the sump and contaminated soils to a depth of 20 feet was completed in December, 1984. The results of the remedial action program were reported in the report entitled, "Remedial Action at Plant 2 Sump, Sta-Rite Industries, Delavan Operations," January, 1984. The report indicates that a relatively small amount of solvent remains in the unsaturated soils between the depth of excavation (20 feet) and the top of the groundwater table (25 feet). In addition, the contamination already in the groundwater in the vicinity of the sump was not removed. At a review meeting with the DNR on March 27, 1984, Sta-Rite agreed to address further remedial action at the sump. The following discussion presents the approach to the additional remedial action.

ADDITIONAL REMEDIAL ACTION PROCEDURES

Additional excavation of contaminated soils in the vicinity of the Plant 2 Sump is not practical because the excavation will put the foundation for Plant 2 in jeopardy unless costly reinforcing measures are taken. Furthermore, additional excavation of the soils will do nothing to remove the contamination already in the groundwater. As an alternative to further excavation, we propose to install a flushing system in the vicinity of the sump and a groundwater extraction well to remove contaminated groundwater and provide water for the flushing system. To allow flushing of the contaminants from the unsaturated soils beneath the tank, a two-foot wide trench, two feet deep will be excavated around the perimeter of the new tank. The trench will be filled with stone. Water from the extraction well will be pumped to the flushing trench through a spray nozzle to provide aeration to remove a portion of the contaminants from the water.

Because it is possible that a groundwater mound will be created beneath the flushing trench and tank, precautions must be taken to ensure that the empty sump tank will not float; therefore, 2.5 feet of water will be pumped into the tank to provide sufficient weight. The remaining volume of the tank will be available to drain flammable solvents from the floor of Plant 2 in case of emergency.

The rate of flushing will be adjusted manually to ensure that the area does not flood. Flushing will continue until the water in Well D15 is adequately reduced in contamination. The extraction well will be drilled during the first week of May, 1984.

Installation of the pump, stone trench, and spray system will be completed by June 30, 1984. Temporary piping will be installed initially because it is likely that the soil extraction will be complete by winter. At our anticipated flushing rate of 30 gpm, approximately 1,500 bed volumes of water can be eluted by winter. Because the solubility of chlorinated solvents in water exceeds 150 mg/l, and because the soils contain little organic matter, the partition coefficient favors the extraction. We expect that the extraction will be nearly

complete after fewer than 100 bed volumes. The final extractions will be completed using city water because water free of solvent will be required to provide adequate driving force (concentration differential) to remove final traces of solvent. We will determine the approximate total amount of water required to flush the soils by obtaining a sample of contaminated soil from another area on-site or by preparing a synthetically contaminated soil if we find no further on-site contamination. We will extract the contaminated soil to determine the amount of water required to remove the solvents.

The groundwater extraction well will be located approximately 300 feet northwest of the sump near existing Donohue Wells D18 and D19. This placement of the extraction well will allow extraction of contamination downstream of the Plant 2 sump, as well as solvent in the immediate vicinity of the sump. The well will be 8 inches in diameter and will have a total depth of 50 feet. The screen will be 20 feet long and begin at the groundwater table surface.

A pump test will be run on the extraction well to allow calculation of parameters for designing additional extraction wells for the boundary extraction system discussed later in this report.

CHAPTER 5

REMEDIAL INVESTIGATION OF POTENTIAL CONTAMINANTS UNDER PLANT NO. 1

Based on information collected from site investigations and interviews of plant employees, we cannot exclude the possibility that there are pockets of contamination in the soils under Plant 1. Plant 1 was constructed in phases over a period of years with the last major expansion completed in 1974. There is a possibility that disposal of trichloroethylene occurred somewhere under the 1974 addition prior to its construction. We are confident that no 1,1,1-trichloroethane was disposed in this area because the plant did not use 1,1,1-trichloroethane as a degreasing solvent prior to the expansion.

Two general approaches are available for determining the importance of any contamination of soils under Plant 1. The first approach is direct and involves obtaining samples of soils beneath the building addition and analyzing the samples for the volatile solvents. This approach would require extensive concrete boring and soil sampling and would be disruptive to the production operations. If the extent of contamination could be found, remedial action efforts would be significant. They would include relocation of production equipment, saw cutting concrete, concrete demolition and removal, soil excavation of a portion of the contaminated soils, backfilling and installation of a system of drains for flushing the remainder of the contaminated soils, and replacement of the concrete floor. Direct investigation and remedial action beneath Plant 1 would be a significant economic burden to Sta-Rite. The area of interest contains the motor assembly room which has a controlled environment to eliminate dust contamination. This production operation cannot be moved elsewhere on-site or transferred to other production facilities without substantial facilities renovation and loss of product production. The plant would have to stop production resulting in hundreds of thousands of dollars in lost sales and potential loss of market share. A temporary plant closing would affect not only company performance, but also employment in the community.

To minimize these adverse impacts, Sta-Rite will use an indirect method to evaluate the potential contamination beneath Plant 1.

Four borings have already been drilled inside the Plant 1 building. One of the borings has been converted to a groundwater monitoring well (D12). The well indicates that the groundwater is contaminated and that the ratio of 1,1,1-trichloroethane to trichloroethylene is approximately 4:1, approximately the same ratio found in the Warzyn monitoring well (TW4) located just south of the Plant 1 building and the Donohue monitoring well located just west of the Plant 1 building (D14).

Because 1,1,1-trichloroethane was not used prior to the 1974 building addition, we can estimate the importance of any past disposal practices under the addition without doing further exploratory work beneath the existing building. As part of the field investigations, we propose to install two groundwater monitoring wells along the northwest wall of Plant 1. In addition, if soils analysis shows solvent contamination east of the chip storage area, we will install groundwater monitoring wells just northwest of the suspected outside

soil contamination east of the chip storage area. Based on the ratio of solvents found in the monitoring wells near the chip storage area, under Plant 1 and west and northwest of Plant 1 and based on the relative concentrations of the solvents with distance from the outside source, we will be able to estimate the importance of any contamination under Plant 1. Examples of hypothetical findings are discussed below to describe the approach.

1. The monitoring wells located near the area east of the chip storage area will show solvent contaminated groundwater and the solvents in the groundwater will be in the same ratio as the solvents in the groundwater monitoring wells located under and immediately south and west of Plant 1. The new monitoring wells located northwest of Plant 1 will be less contaminated but the solvent ratio will be the same. These results would suggest that the primary source of contamination is located outside of Plant 1 and we would recommend no further investigations directly under Plant 1 until the effect of site clean-up of the outside sources is complete and the effects of the clean-up evaluated. We would suggest installing perimeter extraction wells to intercept the contaminants.
2. The wells to be installed immediately north and west of north Plant 1 show contamination however, the contamination is primarily trichloroethylene with only small amounts of 1,1,1-trichloroethane. The wells east of the chip storage area show the same ratio of solvents as D12, D14, and TW4. This information would lead us to conclude that there is a source of contamination under Plant 1. The concentrations in the wells would indicate whether further work under Plant 1 is warranted and if it would be necessary for the company to develop a plan for addressing this contamination such as boundary interception wells is satisfactory.

Other possibilities exist. These will be discussed and evaluated after the data are collected. The monitoring wells will be installed during the first two weeks of May. Well development, sampling, analysis, and data evaluation will be completed by June 30, 1984.

CHAPTER 6

INVESTIGATION OF THE AREA EAST OF THE CHIP STORAGE AREA

There is a possibility that spent solvents were discharged in an area east of the existing chip storage facility. We propose to determine the significance of contamination, if any, in this area using a backhoe to excavate pits to obtain samples for analysis and, if solvent contamination is found, by installing groundwater monitoring wells to determine the impact on groundwater in the immediate vicinity.

BACKHOE TEST PITS

Test pits will be excavated with a backhoe throughout the area of suspected contamination. The test pits will be dug to a depth of approximately 12 feet and samples will be collected every three feet of depth. The samples will be analyzed by headspace analysis using VOA and HNU field organic analyzers. The field analysis will provide data concerning the number of solvent compounds present and the relative concentration of solvents in each sample. A limited number of samples will be further analyzed by laboratory gas chromatography to allow calculation of absolute concentrations. The pits will be excavated on a grid pattern to identify the limits of contamination.

During the excavation we will collect a sample of soil that is contaminated with solvents, compact the soil into a column and run laboratory extraction studies with water to determine the volume of water required to flush the soils.

GROUNDWATER MONITORING WELLS

If soil contamination is found, groundwater monitoring wells will be placed west and north of the potential site of contamination to determine the impact on groundwater quality. At one location a well nest will be installed to determine the depth of contamination in the aquifer. The groundwater monitoring wells will be drilled approximately 20 feet downgradient from the suspected source of contamination. The soils from one of the wells will be sampled every 2.5 feet and analyzed for the volatile solvents. These wells will be drilled through bituminous pavement.

Field analysis of the core sample from one well will confirm the presence or absence of contaminants under the pavement. We expect the soils beneath the pavement will not be contaminated.

As discussed earlier, two groundwater monitoring wells will be placed north and west of Plant 1 to estimate the significance of any contamination of soils beneath Plant 1.

We expect this investigation will be completed by June 30, 1984.

CHAPTER 7

BOUNDARY EXTRACTION WELLS

Plant boundary extraction wells, in addition to the well proposed in Chapter 4, might be required to intercept contaminants flowing off-site to the northwest. To design the extraction program, the following information is required.

1. Aquifer characteristics at the plant downgradient boundary.
2. The depth of contamination in the aquifer.
3. The linear boundary limits of the aquifer contamination.

The required information will be obtained as part of the plan of study outlined in Chapters 3, 4, and 5. The aquifer characteristics will be determined by running a pump test on the extraction well to be used for the Plant 2 sump area remedial actions. The depth of contamination will be determined by sampling the well nest installed east of Wright Street between well D5 and D14.

The southern boundary of contamination can be defined with existing monitoring wells and the northeast boundary will be determined by the two additional wells to be installed along the northwest wall of Plant 1. Specific recommendations concerning alternative remedial actions will be included in the June 30, 1984, submittal to the DNR.

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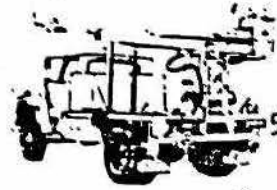
APPENDIX A
BORING AND WELL LOGS

LOG OF BORING
WISCONSIN TESTING LABORATORIES



PROJECT: Test Borings and Well Installation	JOB NO.: S-8315
CLIENT: Donohue & Associates, Inc.	BORING NO.: D-2
LOCATION: Sta-Rite Industries, Delavan, Wisconsin	GROUND ELEVATION:
BORING STARTED: 2/7/83	GROUND WATER: During xx AT DRILLING 60'
BORING COMPLETED: 2/8/83	At Completion xxxx HOURS AFTER DRILLING _____
TOTAL DEPTH BORING: 110'	HOURS AFTER DRILLING

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF.	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
8" Hollow stem augers to 25 ft., 4 1/2" tricone roller bit and wash boring with bentonite for remainder of boring.				0		BLACK CLAYEY TOPSOIL moist.					
	1	3/3/3		5		MEDIUM STIFF BROWN AND GRAY MOTTLED VERY SILTY CLAY moist. (CL)					NOTE: Suspended drilling at 40 ft. on 2/7/83. Next morning hole caved in at 30 ft. depth. Lost 50 gal. slurry. Then mixed heavy slurry and continued with drilling.
	2	3/4/6		10		LOOSE TO MEDIUM DENSE BROWN SILTY FINE TO COARSE SAND moist to very moist, trace to little clay, little fine to coarse gravel. (SM)					
	3	7/8/13		15							
	4	6/8/8		20							
5	40/10/29		25		See Next Page.					NOTE: Switched to wash drilling with bentonite and 4 1/2" roller bit at 25 ft. depth.	



DRILLING AND SAMPLING INFORMATION:

BORING LOGGED BY H. Steinruck CHECKED BY Soils Engineer CLASSIFICATION SYSTEM WTL

METHOD OF DRILLING Truck Mounted Drill MACHINE MODEL CME 55, Unit 11

PENETRATION TESTS: 2" O.D. x 1-3/8" I.D. SPLIT SPOON SAMPLER
DRIVEN 12" WITH 140# PIN GUIDED WEIGHT FREE FALLING 30".
NUMBER OF BLOWS REQUIRED SHOWN ON REPORT.

SPLIT SPOON

TUBE SAMPLE

AUGER SAMPLE

WASH SAMPLE

LOG OF BORING

PROJECT: Test Borings and Well Installation	JOB NO.: S-8315
CLIENT: Donohue & Associates, Inc.	D-2
LOCATION: Sta-Rite Industries, Delavan, Wisconsin	BORING NO.: _____
	GROUND ELEVATION: _____

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. T.S.F.	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
				25		DENSE TO VERY DENSE BROWN FINE TO COARSE SAND AND GRAVEL moist to very moist, some small cobbles. (SW-GW)					
	6	28/23/ 27		30							
				35							
	7	15/14/ 25		40							
				45							
	8	20/26/ 30		50							
				55							
	9	17/19/ 31		60							
				65							
	10	39/61/ 77		70							
				75							
	11	30/43/ 76		80							
				85							
	12	40/45/ 52		90							
				95							
				100							

NOTE: At 59 ft. depth, lost little slurry (3 to 5 gallons).

See Next Page.

LOG OF BORING

PROJECT: Test Borings and Well Installation	JOB NO.: S-83:5
CLIENT: Donohue & Associates, Inc.	BORING NO.: D-2
LOCATION: Sta-Rite Industries, Delavan, Wisconsin	GROUND ELEVATION:

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. LSE	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
				60		VERY DENSE BROWN FINE TO COARSE SAND wet to saturated, trace to little fine to coarse gravel, few thin seams of sandy clay. (SP-SW)					
	13	46	65/ 72	65							
	14	34	46/ 62	70							
	15	38	47/ 50	75							
	16	41	53/ 63	80							
	17	39	55/ 51	85							
	18	36	49/ 60	90							
	19	43	46/ 48	95							

LOG OF BORING

PROJECT: Test Borings and Well Installation	JOB NO.: S-9315
CLIENT: Donohue & Associates, Inc.	D-2
LOCATION: Sta-Rite Industries, Delavan, Wisconsin	BORING NO.: _____
	GROUND ELEVATION: _____

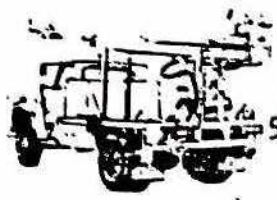
DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION	
							P.S.F. Qu	% Mc	P.C.F. Dd	% S		
				95		VERY DENSE BROWN FINE TO COARSE SAND wet to saturated, trace to little fine to coarse gravel, few thin seams of sandy clay. (SP-SW)						
	20	50/52/ 50		100	[Sample]							
	21	48/53/ 58		105	[Sample]							
	22	50/61/ 64		110		END OF BORING						

LOG OF BORING
WISCONSIN TESTING LABORATORIES



PROJECT: <u>Test Borings and Well Installation</u>	JOB NO.: <u>S-8315</u>
CLIENT: <u>Donohue & Associates, Inc.</u>	BORING NO.: <u>D-4</u>
LOCATION: <u>Sta-Rite Industries, Delavan, Wisconsin</u>	GROUND ELEVATION: _____
BORING STARTED: <u>2/16/83</u>	GROUND WATER: During <input checked="" type="checkbox"/> DRILLING <u>39'</u>
BORING COMPLETED: <u>2/17/83</u>	At Completion _____ HOURS AFTER DRILLING _____
TOTAL DEPTH BORING: <u>80'</u>	_____ HOURS AFTER DRILLING _____

DRILLING DATA: BIT SIZE, TYPE, - LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
8" Hollow stem augers to 55 ft., 4 1/2" tricone roller bit and wash boring with bentonite for remainder of boring.				0-		BLACK CLAYEY TOPSOIL moist.					
	1	7/10/13		5-		MEDIUM DENSE TO DENSE BROWN SILTY FINE TO COARSE SAND moist, trace to little clay, some fine to coarse gravel, few small cobbles. (SM)					
	2	13/14/17		10-							
	3	12/15/19		15-							
	4	21/24/30		20-							
	5	20/30/36		25-							



DRILLING AND SAMPLING INFORMATION:

BORING LOGGED BY: H. Steinruck **CHECKED BY:** Soils Engineer **CLASSIFICATION SYSTEM:** WTL

METHOD OF DRILLING: Truck Mounted Drill **MACHINE MODEL:** CME 55, Unit 11

PENETRATION TESTS: 2" O.D. x 1-3/8" I.D. SPLIT SPOON SAMPLER DRIVEN 12" WITH 140# PIN GUIDED WEIGHT FREE FALLING 30". NUMBER OF BLOWS REQUIRED SHOWN ON REPORT.

SPLIT SPOON
 TUBE SAMPLE

AUGER SAMPLE
 WASH SAMPLE

LOG OF BORING

PROJECT: Test Borings and Well Installation	JOB NO.: S-8315
CLIENT: Donohue & Associates, Inc.	D-4
LOCATION: Sta-Rite Industries, Delavan, Wisconsin	BORING NO.: _____
	GROUND ELEVATION: _____

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
				25		<p>MEDIUM DENSE TO DENSE BROWN SILTY FINE TO COARSE SAND moist, trace to little clay, some fine to coarse gravel, few small cobbles. (SM)</p> <p>MEDIUM DENSE BROWN SILTY FINE TO COARSE SAND wet, little fine to coarse gravel. (SM)</p> <p>MEDIUM DENSE BROWN FINE TO COARSE SAND wet to saturated, some fine to coarse gravel, trace silt. (SP-SW)</p>					
	6	11/13/ 16		30							
	7	12/13/ 14		35							
	8	9/11/6		40							
	9	9/5/12		45							
	10	7/8/10		50							
	11	9/2/ 14		55							
	12	10/13/ 18		60							

NOTE: At 55 ft. depth, switched over to wash boring with tricone roller bit and bentonite.

LOG OF BORING

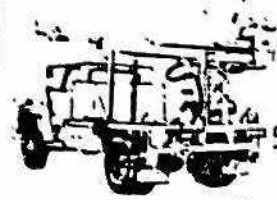
PROJECT: Test Borings and Well Installation	JOB NO.: S-8315
CLIENT: Donohue & Associates, Inc.	D-4
LOCATION: Sta-Rite Industries, Delavan, Wisconsin	BORING NO.: _____
	GROUND ELEVATION: _____

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSE	FT. DEPTH	SAMPLE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
				60		MEDIUM DENSE BROWN FINE TO COARSE SAND wet to saturated, some fine to coarse gravel, trace silt. (SP-SW)					
	13	56	77/ 102	65	■	VERY DENSE BROWN FINE TO MEDIUM SAND very moist, trace silt, little fine to coarse gravel. (SP-SW)					
	14	100 3"		70	■						
	15	100 4"		75	■						
	16	35	50/ 63	80	■	VERY DENSE BROWN FINE TO COARSE SAND saturated, little fine to medium gravel. (SW)					
						END OF BORING					
				85							
				90							
				95							

LOG OF BORING
WISCONSIN TESTING LABORATORIES

PROJECT: <u>Test Borings and Well Installation</u>	JOB NO.: <u>S-8315</u>
CLIENT: <u>Donohue & Associates, Inc.</u>	BORING NO.: <u>D-6</u>
LOCATION: <u>Sta-Rite Industries, Delavan, Wisconsin</u>	GROUND ELEVATION: _____
BORING STARTED: <u>2/18/83</u>	GROUND WATER: During <input checked="" type="checkbox"/> DRILLING <u>27'</u>
BORING COMPLETED: <u>2/21/83</u>	At Completion _____ HOURS AFTER DRILLING _____
TOTAL DEPTH BORING: <u>110'</u>	_____ HOURS AFTER DRILLING _____

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
8" Hollow stem augers to 55 ft., 4 1/4" tricone roller bit and wash boring with bentonite for remainder of boring.				0-		BLACK CLAYEY TOPSOIL moist.					
	1	4/5/5		5-		MEDIUM STIFF BROWN SILTY CLAY moist, trace fine to coarse sand, trace fine gravel. (CL)					
	2	5/7/12		10-		MEDIUM DENSE BROWN CLAYEY SILTY FINE TO COARSE SAND moist, little fine to coarse gravel. (SM)					
	3	12/29/40		15-		VERY DENSE BROWN FINE TO COARSE SAND AND GRAVEL moist. (SW-GW)					
	4	16/38/30		20-							
	5	20/60/94		25-							



DRILLING AND SAMPLING INFORMATION:

BORING LOGGED BY H. Steinruck CHECKED BY Soils Engineer CLASSIFICATION SYSTEM WTL

METHOD OF DRILLING Truck Mounted Drill MACHINE MODEL CME 55, Unit 11

PENETRATION TESTS: 2" O.D. x 1-3/8" I.D. SPLIT SPOON SAMPLER
DRIVEN 12" WITH 140# PIN GUIDED WEIGHT FREE FALLING 30".
NUMBER OF BLOWS REQUIRED SHOWN ON REPORT.

SPLIT SPOON SAMPLE
 TUBE SAMPLE
 AUGER SAMPLE
 WASH SAMPLE

LOG OF BORING

PROJECT: <u>Test Borings and Well Installation</u>	JOB NO.: <u>S-8315</u>
CLIENT: <u>Donohue & Associates, Inc.</u>	BORING NO.: <u>D-6</u>
LOCATION: <u>Sta-Rite Industries, Delavan, Wisconsin</u>	GROUND ELEVATION: _____

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. T.S.F.	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F Dd	% S	
				25-		VERY DENSE BROWN FINE TO COARSE SAND AND GRAVEL moist. (SW-GW)					
	6	15/24/ 29		30-	■	DENSE TO FIRM BROWN FINE TO COARSE SAND saturated, some fine to coarse gravel. (SP-SW)					
	7	8/7/6		35-	■						
	8	7/7/8		40-	■						
	9	6/8/9		45-	■						
	10	7/9/12		50-	■						
	11	8/ 1/ 14		55-	■						
	12	6/9/14		60-	■	VERY STIFF BROWN VERY SANDY CLAY moist, little fine to medium gravel. (CL)					

LOG OF BORING

PROJECT: <u>Test Borings and Well Installation</u>	JOB NO.: <u>S-8315</u>
CLIENT: <u>Donohue & Associates, Inc.</u>	BORING NO.: <u>D-6</u>
LOCATION: <u>Sta-Rite Industries, Delavan, Wisconsin</u>	GROUND ELEVATION: _____

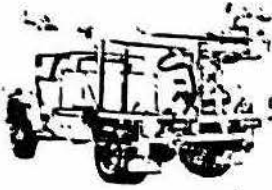
DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION	
							P.S.F. Qu	% Mc	P.C.F. Dd	% S		
				95		VERY DENSE BROWN FINE TO COARSE SAND saturated, some fine to coarse gravel. (SP-SW)						
	20	60/61/ 67		100	■							
	21	52/60/ 71		105	■							
	22	48/60/ 73		110	■	END OF BORING						

WISCONSIN TESTING LABORATORIES



PROJECT: <u>Test Borings and Well Installation</u>	JOB NO.: <u>S-8315</u>
CLIENT: <u>Donohue & Associates, Inc.</u>	BORING NO.: <u>D-10</u>
LOCATION: <u>Sta-Rite Industries, Delavan, Wisconsin</u>	GROUND ELEVATION: _____
BORING STARTED: <u>2/24/83</u>	GROUND WATER: <u>During XX DRILLING 22'</u>
BORING COMPLETED: <u>3/2/83</u>	At Completion <u>XXXX AFTER DRILLING _____</u>
TOTAL DEPTH BORING: <u>110'</u>	HOURS AFTER DRILLING _____

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
8" Hollow stem augers to 55 ft., 4 1/2" tricone roller bit and wash boring with bentonite for remainder of boring.	1	3/4/5		0		MEDIUM STIFF BLACK CLAYEY TOPSOIL moist. (OL)					
				5		MEDIUM STIFF BROWN SILTY CLAY moist, trace fine to coarse sand. (CL)					
				10		FIRM BROWN SILTY FINE TO COARSE SAND moist, little fine to coarse gravel, trace clay. (SM)					
				15							
				20							
	5	10/14/16		25		DENSE TO VERY DENSE BROWN FINE TO COARSE SAND saturated, some fine to coarse gravel, trace silt. (SP-SW)					

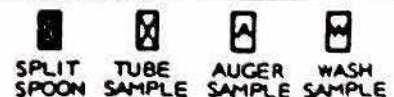


DRILLING AND SAMPLING INFORMATION:

BORING LOGGED BY H. Steinruck CHECKED BY Soils Engineer CLASSIFICATION SYSTEM WTL

METHOD OF DRILLING Truck Mounted Drill MACHINE MODEL CME 55, Unit 11

PENETRATION TESTS: 2" O.D. x 1-3/8" I.D. SPLIT SPOON SAMPLER
DRIVEN 12" WITH 140# PIN GUIDED WEIGHT FREE FALLING 30".
NUMBER OF BLOWS REQUIRED SHOWN ON REPORT.



LOG OF BORING

PROJECT: Test Borings and Well Installation	JOB NO.: S-8315
CLIENT: Donohue & Associates, Inc.	BORING NO.: D-10
LOCATION: Sta-Rite Industries, Delavan, Wisconsin	GROUND ELEVATION:

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE- TRATE	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
				25-		DENSE TO VERY DENSE BROWN FINE TO COARSE SAND saturated, some fine to coarse gravel, trace silt. (SP-SW)					
	6	13/15/18		30-							
	7	17/19/23		35-							
	8	20/26/29		40-							
	9	27/35/40		45-		VERY DENSE BROWN CLAYEY SILTY FINE TO COARSE SAND saturated, some fine to coarse gravel. (SM-SC)					
	10	23/31/39		50-							
	11	30/38/47		55-		VERY DENSE BROWN FINE TO MEDIUM SAND saturated, trace coarse sand, trace fine to medium gravel. (SP)					
	12	34/37/48		60-							

NOTE: Few thin to medium seams of silty sandy clay around the 50 ft. depth level.

LOG OF BORING

PROJECT: Test Borings and Well Installation	JOB NO.: 5-8315
CLIENT: Donohue & Associates, Inc.	BORING NO.: D-10
LOCATION: Sta-Rite Industries, Delavan, Wisconsin	GROUND ELEVATION:

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. T.S.F.	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
				60		VERY DENSE BROWN FINE TO MEDIUM SAND saturated, trace coarse sand, trace fine to medium gravel. (SP)					
	13	31/33/50		65							
	14	33/40/46		70							
	15	26/31/34		75		VERY DENSE BROWN FINE TO COARSE SAND saturated, trace silt, little fine to coarse gravel. (SP-SW)					
	16	30/24/39		80							
	17	31/33/34		85							
	18	25/31/30		90							
	19	26/30/37		95		VERY DENSE BROWN FINE TO COARSE SAND saturated, little fine to coarse gravel. (SP-SW)					

LOG OF BORING

PROJECT: Test Borings and Well Installation	JOB NO.: S-8315
CLIENT: Donohue & Associates, Inc.	BORING NO.: D-10
LOCATION: Sta-Rite Industries, Delavan, Wisconsin	GROUND ELEVATION:

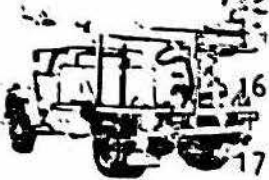
DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION	
							P.S.F. Qu	% Mc	P.C.F. Dd	% S		
				95		VERY DENSE BROWN FINE TO COARSE SAND saturated, little fine to coarse gravel. (SP-SW)						
	20	28/38/ 41		100	■							
	21	23/32/ 33		105	■							
	22	30/34/ 39		110	■	END OF BORING						

LOG OF BORING
WISCONSIN TESTING LABORATORIES



PROJECT: Soil Sampling	JOB NO.: S-8364
CLIENT: Donohue & Associates, Inc.	BORING NO.: B-11
LOCATION: Sta-Rite Industries, Delavan, WI	GROUND ELEVATION:
BORING STARTED: 6/27/83	GROUND WATER: During ^{XX} AT DRILLING 30'
BORING COMPLETED: 6/28/83	HOURS AFTER DRILLING:
TOTAL DEPTH BORING: 35'	HOURS AFTER DRILLING:

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
				0-		GRAY CONCRETE FLOOR.					
9 In. hollow stem auger casing used with carbide toothed finger bit for entire depth of boring.	1			—		BROWN, DARK BROWN AND GRAY SILTY FINE TO COARSE SAND AND GRAVEL moist, little sandy clay, trace wood, trace of clayey topsoil (possible fill).	NOTE: Floor opened by diamond coring.				
	2			—							
	3			—							
	4			5-							
	5			—							
	6			—		BROWN SILTY FINE TO COARSE SAND AND GRAVEL moist to very moist, trace large gravel, few seams of silty sandy clay.	NOTE: Drove large gravel for Sample 6.				
	7			10-							
	8			—							
	9			—							
	10			—							
	11			15-							
	12			—							
	13			—							
	14			20-							
	15			—							
	16			—							
	17			25-							



DRILLING AND SAMPLING INFORMATION:

BORING LOGGED BY H. Steinruck CHECKED BY Soils Engineer CLASSIFICATION SYSTEM WTL

METHOD OF DRILLING Hollow Stem Augers, Truck Mounted Drill, MACHINE MODEL CME 55, Unit 12

Disconnect Tower

PENETRATION TESTS: 2" O.D. x 1-3/8" I.D. SPLIT SPOON SAMPLER
 DRIVEN 12" WITH 140# PIN GUIDED WEIGHT FREE FALLING 30".
 NUMBER OF BLOWS REQUIRED SHOWN ON REPORT.

SPLIT SPOON
 TUBE SAMPLE
 AUGER SAMPLE
 WASH SAMPLE

LOG OF BORING

PROJECT: Soil Sampling	JOB NO.: S-8364
CLIENT: Donohue & Associates, Inc.	BORING NO.: B-1
LOCATION: Sta-Rite Industries, Delavan, WI	GROUND ELEVATION:

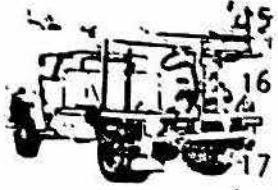
DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. T.S.F.	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
	18			25		BROWN SILTY FINE TO COARSE SAND AND GRAVEL moist to very moist, trace large gravel, few seams of silty sandy clay.	NOTE: Blows around 100/2 in. in the 25 ft. to 30 ft. zone.				
	19										
	20					GRAY CEMENTED SAND moist, some fine to coarse gravel.					
	21			30		GRAY FINE TO COARSE SAND AND FINE TO LARGE GRAVEL saturated.					
	22										
	23										
	24			35		END OF BORING					
				40							
				45							
				50							
				55							
				60							

LOG OF BORING
WISCONSIN TESTING LABORATORIES

5-1

PROJECT: Soil Sampling and Well Installation	JOB NO.: S-8364
CLIENT: Donohue & Associates, Inc.	BORING NO.: D-12
LOCATION: Sta-Rite Industries, Delavan, WI	GROUND ELEVATION:
BORING STARTED: 6/28/83	GROUND WATER: During XX DRILLING 31'
BORING COMPLETED: 6/29/83	HOURS AFTER DRILLING:
TOTAL DEPTH BORING: 36-1/2'	HOURS AFTER DRILLING:

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
				0-		GRAY CONCRETE FLOOR.					
9 in. hollow stem auger casing used with carbide toothed finger bit for entire depth of boring.	1			—		DARK BROWN FINE TO COARSE SAND AND GRAVEL FILL moist, trace silt, some concrete slabs.	NOTE: Floor opened by diamond coring.				
	2			—							
	3			—							
	4			5-		BROWN SILTY FINE TO COARSE SAND AND GRAVEL moist, trace of clayey topsoil in Samples 2 and 3 (possibly natural).	NOTE: Hit concrete at 1.5 ft. depth. Approximately 4 to 6 in. thick.				
	5			—							
	6			—							
	7			10-							
	8			—							
	9			—							
	10			15-		BROWN FINE TO COARSE SAND moist to very moist, trace silt, some fine to coarse gravel, few thin seams of clay.					
	11			—							
	12			—							
	13			—							
	14			20-							
	15			—							
	16			—							
	17			25-							



DRILLING AND SAMPLING INFORMATION:

BORING LOGGED BY H. Steinruck CHECKED BY Soils Engineer CLASSIFICATION SYSTEM WTL
 METHOD OF DRILLING Hollow Stem Augers, Truck Mounted Drill,
Disconnect Tower MACHINE MODEL CME 55, Unit 12

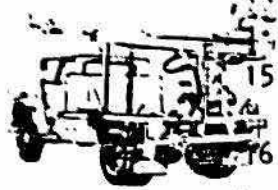
PENETRATION TESTS: 2" O.D. x 1-3/8" I.D. SPLIT SPOON SAMPLER
 DRIVEN 12" WITH 140# PIN GUIDED WEIGHT FREE FALLING 30".
 NUMBER OF BLOWS REQUIRED SHOWN ON REPORT.



WISCONSIN TESTING LABORATORIES

PROJECT: Soil Sampling	JOB NO.: S-8364
CLIENT: Donohue & Associates, Inc.	BORING NO.: B-13
LOCATION: Sta-Rite Industries, Delavan, WI	GROUND ELEVATION:
BORING STARTED: 6/30/83	GROUND WATER: During AT DRILLING 29 1/2'
BORING COMPLETED: 7/1/83	HOURS AFTER DRILLING:
TOTAL DEPTH BORING: 35-1/2'	HOURS AFTER DRILLING:

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
				0-		GRAY CONCRETE FLOOR.					
9 in. hollow stem auger casing used with carbide toothed finger bit for entire depth of boring.	1					BROWN FINE TO COARSE SAND FILL moist, some fine to large gravel.	NOTE: Floor opened by diamond coring				
	2										
	3					DARK BROWN TO BROWN SANDY SILTY CLAY moist, trace hair roots.					
	4					BROWN FINE TO COARSE SAND AND FINE TO LARGE GRAVEL moist.					
	5										
	6					BLACK TO DARK BROWN CLAYEY TOPSOIL moist.					
	7				10-	BROWN FINE TO COARSE SAND AND FINE TO LARGE GRAVEL moist, trace silt.					
	8										
	9										
	10										
	11										
	12										
	13										
	14						BROWN TO GRAY FINE TO COARSE SAND AND FINE TO LARGE GRAVEL moist, some cobbles.	NOTE: Very dense and difficult drilling below 21 ft. depth.			
15											
16											
				25-							



DRILLING AND SAMPLING INFORMATION:

BORING LOGGED BY H. Steinruck CHECKED BY Soils Engineer CLASSIFICATION SYSTEM WTL
 METHOD OF DRILLING Hollow Stem Augers, Truck Mounted Drill,
Disconnect Tower MACHINE MODEL CME 55, Unit 12

PENETRATION TESTS: 2" O.D. x 1-3/8" I.D. SPLIT SPOON SAMPLER
 DRIVEN 12" WITH 140# PIN GUIDED WEIGHT FREE FALLING 30".
 NUMBER OF BLOWS REQUIRED SHOWN ON REPORT.



LOG OF BORING

PROJECT: Soil Sampling and Well Installation CLIENT: Donohue & Associates, Inc. LOCATION: Sta-Rite Industries, Delavan, WI	JOB NO.: S-8364 BORING NO.: D-12 GROUND ELEVATION:
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DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENET. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
				25		BROWN FINE TO COARSE SAND moist to very moist, trace silt, some fine to coarse gravel, few thin seams of clay.					
	18			—							
	19			—							
				30		GRAY FINE TO COARSE SAND AND FINE TO LARGE GRAVEL saturated.					
	20			—							
	21			—							
				35		END OF BORING					
	22			—							
	23			—							
				40							
	24			—							
				45							
				50							
				55							
				60							

LOG OF BORING

PROJECT: Soil Sampling	JOB NO.: S-8364
CLIENT: Donohye & Associate, Inc.	BORING NO.: B-13
LOCATION: Sta-Rite Industries, Delavan, WI	GROUND ELEVATION:

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION	
							P.S.F. Qu	% Mc	P.C.F. Dd	% S		
	17			25		BROWN TO GRAY FINE TO COARSE SAND AND FINE TO LARGE GRAVEL moist, some cobbles.						
	18			—								
	19			—								
	20			30		BROWN FINE TO COARSE SAND AND FINE TO LARGE GRAVEL saturated.						
	21			—								
	22			—								
	23			—								
				35		END OF BORING						
				—								
				—								
				40								
				—								
				—								
				45								
				—								
				—								
				50								
				—								
				—								
				55								
				—								
				—								
				60								

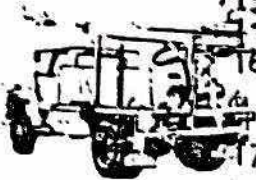
LOG OF BORING

WISCONSIN TESTING LABORATORIES



PROJECT: Soil Sampling and Well Installation	JOB NO.: S-8364
CLIENT: Donohue & Associates, Inc.	BORING NO.: D-14
LOCATION: Sta-Rite Industries, Delavan, WI	GROUND ELEVATION:
BORING STARTED: 7/11/83	GROUND WATER: During XX DRILLING 30'
BORING COMPLETED: 7/12/83	12 HOURS AFTER DRILLING 30'
TOTAL DEPTH BORING: 36'	HOURS AFTER DRILLING

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Od	% S	
9 in. hollow stem auger casing used with carbide toothed finger bit for entire depth of boring.	1			0-		BLACK TO DARK BROWN CLAYEY TOPSOIL moist, some fine gravel (possible fill).					
	2			—							
	3			—							
	4			5-		DARK BROWN TO DARK GRAY SILTY CLAY moist, little fine to medium sand.					
	5			—							
	6			—		BROWN CLAYEY TO SILTY FINE TO COARSE SAND moist, some fine to large gravel.					
	7			—							
	8			10-							
	9			—							
	10			—							
	11			15-							
	12			—							
	13			—							
	14			20-		BROWN FINE TO COARSE SAND AND FINE TO LARGE GRAVEL moist.					
	15			—							
	16			—							
	17			25-							



DRILLING AND SAMPLING INFORMATION:

BORING LOGGED BY H. Steinruck CHECKED BY Soils Engineer CLASSIFICATION SYSTEM WTL

METHOD OF DRILLING Hollow Stem Augers, Truck Mounted Drill MACHINE MODEL CME 55, Unit 12

PENETRATION TESTS: 2" O.D. x 1-3/8" I.D. SPLIT SPOON SAMPLER
DRIVEN 12" WITH 140# PIN GUIDED WEIGHT FREE FALLING 30".
NUMBER OF BLOWS REQUIRED SHOWN ON REPORT.

SPLIT SPOON
 TUBE SAMPLE
 AUGER SAMPLE
 WASH SAMPLE

LOG OF BORING

PROJECT: Soil Sampling and Well Installation	JOB NO.: S-8364
CLIENT: Donohue & Associates, Inc.	BORING NO.: D74
LOCATION: Sta-Rite Industries, Delavan, WI	GROUND ELEVATION:

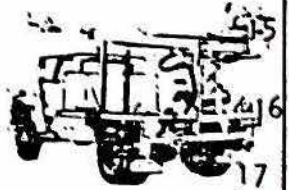
DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F Dd	% S	
				25		BROWN FINE TO COARSE SAND AND FINE TO LARGE GRAVEL moist.					
	18			—							
	19			—							
	20			—							
				30		BROWN FINE TO COARSE SAND saturated, some fine to coarse gravel.					
	21			—							
	22			—							
	23			—							
	24			35		END OF BORING					
				—							
				40							
				—							
				45							
				—							
				50							
				—							
				55							
				—							
				60							

LOG OF BORING
WISCONSIN TESTING LABORATORIES



PROJECT: Soil Sampling and Well Installation	JOB NO.: S-8364
CLIENT: Donohue & Associates, Inc.	BORING NO.: D-15
LOCATION: Sta-Rite Industries, Delavan, WI	GROUND ELEVATION:
BORING STARTED: 7/7/73	GROUND WATER: During AT DRILLING 32 1/2'
BORING COMPLETED: 7/7/83	At Completion HOURS AFTER DRILLING 27'
TOTAL DEPTH BORING: 38'	HOURS AFTER DRILLING

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF.	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
				0-		BLACK ASPHALT SURFACE.					
9 in. hollow stem auger casing used with carbide toothed finger bit for entire depth of boring.	1			1-		BROWN FINE TO COARSE SAND AND GRAVEL moist, few seams of sandy clay.					
	2			2-							
	3			3-							
	4			4-							
	5			5-							
	6			6-							
	7			7-							
	8			10-		BROWN CLAYEY TO SILTY FINE TO COARSE SAND moist, little fine to coarse gravel.					
	9			9-							
	10			10-							
	11			11-							
	12			12-							
	13			13-							
	14			20-							
	15			25-		BROWN VERY SANDY CLAY TO CLAYEY FINE TO COARSE SAND very moist, some fine to coarse gravel.					
	16			16-							
	17			17-							



DRILLING AND SAMPLING INFORMATION:

BORING LOGGED BY: H. Steinruck **CHECKED BY:** Soils Engineer **CLASSIFICATION SYSTEM:** WTL

METHOD OF DRILLING: Hollow Stem Augers, Truck Mounted Drill **MACHINE MODEL:** CME 55, Unit 12

PENETRATION TESTS: 2" O.D. x 1-3/8" I.D. SPLIT SPOON SAMPLER
 DRIVEN 12" WITH 140# PIN GUIDED WEIGHT FREE FALLING 30".
 NUMBER OF BLOWS REQUIRED SHOWN ON REPORT.

SPLIT SPOON SAMPLE

TUBE SAMPLE

AUGER SAMPLE

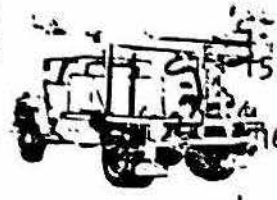
WASH SAMPLE

LOG OF BORING
WISCONSIN TESTING LABORATORIES



PROJECT: Soil Sampling	JOB NO.: S-8364
CLIENT: Donohue & Associates, Inc.	BORING NO.: B-16
LOCATION: Sta-Rite Industries, Delavan, WI	GROUND ELEVATION:
BORING STARTED: 7/7/83	GROUND WATER: During AT DRILLING 25'
BORING COMPLETED: 7/8/83	At Completion XXXX AFTER DRILLING 25'*
TOTAL DEPTH BORING: 32-1/2'	HOURS AFTER DRILLING

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	*Caved to 25-1/2' SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
				0-		BLACK ASPHALT SURFACE.					
9 In. hollow stem auger casing used with carbide toothed finger bit for entire depth of boring.	1			—		BROWN CLAYEY TO SILTY FINE TO COARSE SAND moist, some fine to large gravel.					
	2			—							
	3			—							
	4			—							
	5			—							
	6			—							
	7			—							
	8			—							
	9			—							
	10			—							
	11			—							
	12			—							
	13			—							
	14			—							
	15			—		BROWN SILTY CLAYEY SAND TO VERY SANDY CLAY very moist, some fine to coarse gravel.					
	16			—		See Next Page.					



DRILLING AND SAMPLING INFORMATION:

BORING LOGGED BY: H. Steinruck **CHECKED BY:** Soils Engineer **CLASSIFICATION SYSTEM:** WTL

METHOD OF DRILLING: Hollow Stem Augers, Truck Mounted Drill **MACHINE MODEL:** CME 55, Unit 12

PENETRATION TESTS: 2" O.D. x 1-3/8" I.D. SPLIT SPOON SAMPLER
DRIVEN 12" WITH 140# PIN GUIDED WEIGHT FREE FALLING 30".
NUMBER OF BLOWS REQUIRED SHOWN ON REPORT.

SPLIT
SPOON

TUBE
SAMPLE

AUGER
SAMPLE

WASH
SAMPLE

LOG OF BORING

PROJECT: <u>Soil Sampling</u>	JOB NO.: <u>S-8364</u>
CLIENT: <u>Donohue & Associate, Inc.</u>	BORING NO. B <u>16</u>
LOCATION: <u>Sta-Rite Industries, Delavan, WI</u>	GROUND ELEVATION: _____

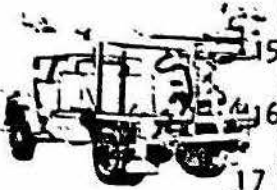
DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
	17			25		BROWN VERY SANDY CLAY TO CLAYEY FINE TO COARSE SAND wet, some fine to coarse gravel.					
	18			—							
	19			—							
	20			30							
	21			—							
						END OF BORING					
				35							
				—							
				40							
				—							
				45							
				—							
				50							
				—							
				55							
				—							
				60							

WISCONSIN TESTING LABORATORIES

21

PROJECT: Soil Sampling	JOB NO.: S-8364
CLIENT: Donohue & Associates, Inc.	BORING NO.: B-17
LOCATION: Sta-Rite Industries, Delavan, WI	GROUND ELEVATION:
BORING STARTED: 7/8/83	GROUND WATER: During <input checked="" type="checkbox"/> DRILLING 22'
BORING COMPLETED: 7/11/83	HOURS AFTER DRILLING:
TOTAL DEPTH BORING: 27-1/2'	HOURS AFTER DRILLING:

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
				0-		BLACK ASPHALT SURFACE.					
9 in. hollow stem auger casing used with carbide toothed finger bit for entire depth of boring.	1			1-		BROWN FINE TO COARSE SAND AND GRAVEL moist.					
	2			2-							
	3			3-		BROWN CLAYEY FINE TO COARSE SAND AND GRAVEL moist.					
	4			4-							
	5			5-							
	6			6-							
	7			7-	10-						
	8			8-							
	9			9-		BROWN FINE TO COARSE SAND very moist to moist, little clay, little fine to coarse gravel.					
	10			10-							
	11			11-							
	12			12-							
	13			13-	20-		BROWN FINE TO COARSE SAND very moist to wet, little fine to medium gravel.				
	14			14-							
	15			15-							
	16			16-							
	17			17-	25-						



DRILLING AND SAMPLING INFORMATION:

BORING LOGGED BY H. Steinruck CHECKED BY Soils Engineer CLASSIFICATION SYSTEM WTL

METHOD OF DRILLING Hollow Stem Augers, Truck Mounted Drill MACHINE MODEL CME 55, Unit 12

PENETRATION TESTS: 2" O.D. x 1-3/8" I.D. SPLIT SPOON SAMPLER
DRIVEN 12" WITH 140# PIN GUIDED WEIGHT FREE FALLING 30".
NUMBER OF BLOWS REQUIRED SHOWN ON REPORT.

SPLIT SPOON
 TUBE SAMPLE
 AUGER SAMPLE
 WASH SAMPLE

LOG OF BORING

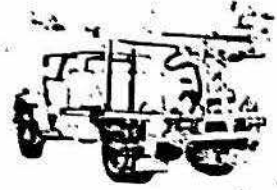
PROJECT:	Soil Sampling	JOB NO.:	S-8364
CLIENT:	Donohue & Associates, Inc.	BORING NO	B-17
LOCATION:	Sta-Rite Industries, Delavan, WI	GROUND ELEVATION:	

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Od	% S	
	18			25		BROWN FINE TO COARSE SAND very moist to wet, little fine to medium gravel.					
						END OF BORING					
				30							
				35							
				40							
				45							
				50							
				55							
				60							

WISCONSIN TESTING LABORATORIES

PROJECT: <u>Additional Well and Piezometer Installations</u>	JOB NO.: <u>S-83112</u>
CLIENT: <u>Donohue and Associates, Inc.</u>	BORING NO.: <u>D-18</u>
LOCATION: <u>Sta-Rite Industries, Delavan, Wisconsin</u>	GROUND ELEVATION: _____
BORING STARTED: <u>10-10-83</u>	GROUND WATER: During <input checked="" type="checkbox"/> DRILLING <u>24 1/2'</u>
BORING COMPLETED: <u>10-10-83</u>	At completion <input checked="" type="checkbox"/> NO AFTER DRILLING <u>27'</u>
TOTAL DEPTH BORING: <u>37 ft.</u>	HOURS AFTER DRILLING

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
8 3/4" Hollow stem auger casing with carbide toothed finger bit for entire depth of boring.				0-		BLACK CLAYEY TOPSOIL moist. (10") BROWN SILTY CLAY moist, trace of fine to medium gravel.					
				5-		BROWN CLAYEY FINE TO COARSE SAND AND GRAVEL moist, some small cobbles.					
				10-							
				15-							
				20-							
				25-			BROWN FINE TO COARSE SAND satur- ated, little fine to medium gravel.				



DRILLING AND SAMPLING INFORMATION:

BORING LOGGED BY H. Steinruck CHECKED BY Soils Engineer CLASSIFICATION SYSTEM WTL

METHOD OF DRILLING Flight auger truck mounted drill rig MACHINE MODEL CME 55, Unit 11

PENETRATION TESTS: 2" O.D. x 1-3/8" I.D. SPLIT SPOON SAMPLER
 DRIVEN 12" WITH 140# PIN GUIDED WEIGHT FREE FALLING 30".
 NUMBER OF BLOWS REQUIRED SHOWN ON REPORT.

SPLIT
SPOON

TUBE
SAMPLE

AUGER
SAMPLE

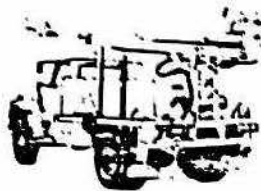
WASH
SAMPLE

WISCONSIN TESTING LABORATORIES

PROJECT: Additional Well and Piezometer Installations JOB NO.: S-83112
 CLIENT: Donohue and Associates, Inc. BORING NO.: D-19
 LOCATION: Sta-Rite Industries, Delavan, Wisconsin GROUND ELEVATION: _____

BORING STARTED 10-10-83 GROUND WATER: During ~~AT~~ DRILLING 24 1/2'
 BORING COMPLETED 10-10-83 At completion ~~XXXX~~ AFTER DRILLING 24 1/2'
 TOTAL DEPTH BORING 29 1/2 ft. HOURS AFTER DRILLING _____

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSF	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Q _u	% M _c	P.C.F. D _d	% S	
8 3/4" Hollow stem auger casing with carbide toothed finger bit for entire depth of boring.				0-		BLACK CLAYEY TOPSOIL moist, (10") BROWN SILTY CLAY moist, trace of fine to medium gravel.					
				5-		BROWN CLAYEY FINE TO COARSE SAND AND GRAVEL moist, some small cobbles.					
				10-							
				15-							
				20-							
			25-			BROWN FINE TO COARSE SAND, satur- ated, little fine to medium gravel.					



DRILLING AND SAMPLING INFORMATION:

BORING LOGGED BY H. Steinruck CHECKED BY Soils Engineer CLASSIFICATION SYSTEM WTL

METHOD OF DRILLING Flight auger truck mounted drill rig MACHINE MODEL CME 55, Unit 11

PENETRATION TESTS: 2" O.D. x 1-3/8" I.D. SPLIT SPOON SAMPLER
 DRIVEN 12" WITH 140# PIN GUIDED WEIGHT FREE FALLING 30".
 NUMBER OF BLOWS REQUIRED SHOWN ON REPORT.



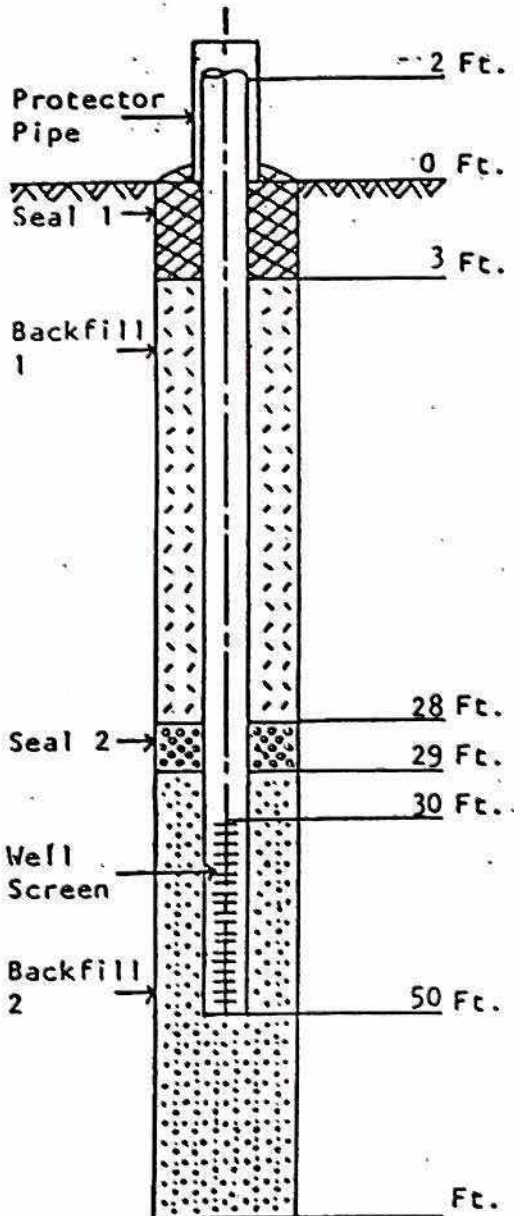
LOG OF BORING

PROJECT: <u>Additional Well and Piezometer Installations</u> CLIENT: <u>Donohue and Associates, Inc.</u> LOCATION: <u>Sta-Rite Industries, Delavan, Wisconsin</u>	JOB NO.: <u>S-83112</u> BORING NO.: <u>D-19</u> GROUND ELEVATION: _____
--	--

DRILLING DATA: BIT SIZE, TYPE, LOSS OR GAIN OF WATER, CASING SIZE, ETC.	SAMPLE NO.	NUMBER BLOWS	POCKET PENE. TSE	FT. DEPTH	SAMPLE TYPE	SOIL CLASSIFICATION	LABORATORY RESULTS				ELEVATION
							P.S.F. Qu	% Mc	P.C.F. Dd	% S	
8 3/4" Hollow stem auger casing with carbide toothed finger bit for entire depth of boring.				25		BROWN FINE TO COARSE SAND, sat- urated, little fine to medium gravel.					
				30		END OF BORING					
				35							
				40							
				45							
				50							
				55							
				60							

WISCONSIN TESTING LABORATORIES

WELL DIAGRAM



Boring No: (Well) D-1

Date Installed 2/15/83

Seal Material

Seal 1 Concrete mixed with Bentonite

Seal 2 Bentonite Pellets

Backfill Material

Backfill 1 Grout - 2 to 1 Cement/
Bentonite Powder

Backfill 2 Washed Torpedo Sand

Auger Hole Diameter 8 In.

Well Material PVC, Sch. 40, FJT

Total Length of Well 52 Ft.

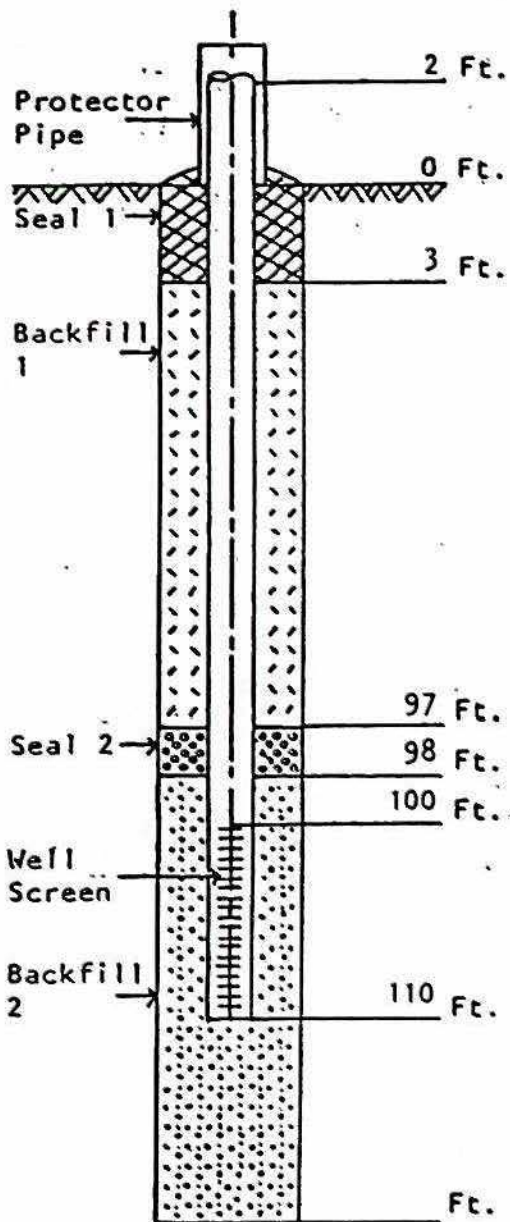
Well I.D. 2 In.

Well Point Slot Size 0.006 In.

Comments Started this boring on 2/9/83. Used hollow stem augers to 25' depth, then used 4 1/2" roller bit to 40' depth, but could not keep hole open even with a very thick Bentonite slurry. Pulled off until we had more hollow stem augers (2/15/83). Finished hole and set well.

WISCONSIN TESTING LABORATORIES

WELL DIAGRAM



Boring No. (Well) D-2

Date Installed 2/9/83

Seal Material

Seal 1 Concrete

Seal 2 Bentonite Pellets

Backfill Material

Backfill 1 Grout composed of 2 parts cement and 1 part bentonite powder

Backfill 2 Washed Sand

Approx Hole Diameter 4 1/2 to 8 In.

Well Material PVC Sch. 40, FJT

Total Length of Well 112 Ft.

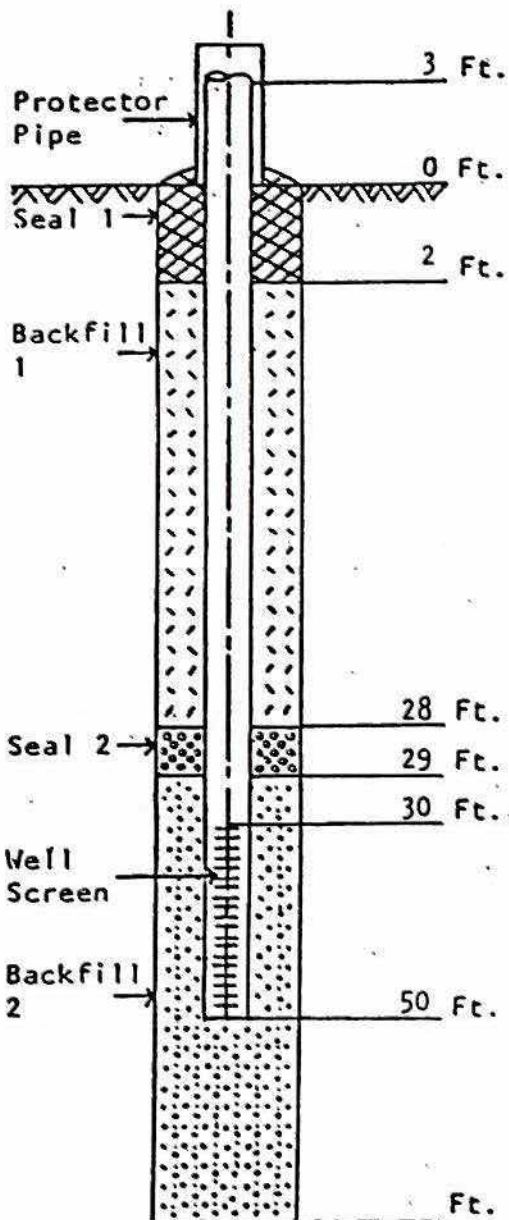
Well I.D. 2 In.

Well Point Slot Size 0.006 In.

Comments _____

WISCONSIN TESTING LABORATORIES

WELL DIAGRAM



D-3

Boring No. (Well) _____

Date Installed 2/17/83

Seal Material

Seal 1 Concrete

Seal 2 Bentonite Pellets

Backfill Material

2 to 1 Grout - Cement/Bentonite

Backfill 1 Powder

Backfill 2 Washed Sand

Auger Hole Diameter 8 In.

Well Material PVC, Sch. 40, FJT

Total Length of Well 53 Ft.

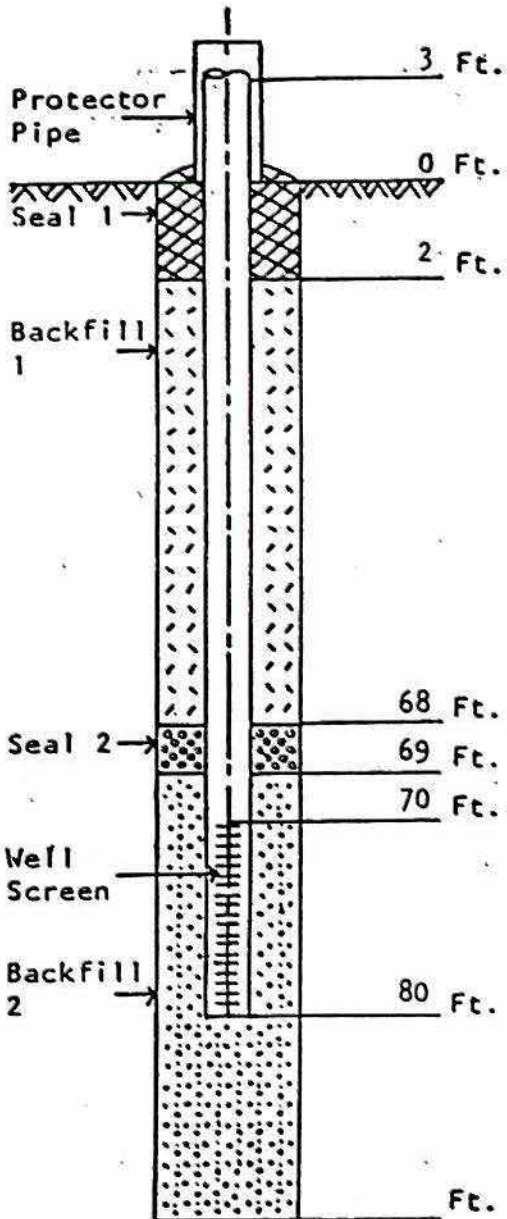
Well I.D. 2 In.

Well Point Slot Size 0.006 In.

Comments _____

WISCONSIN TESTING LABORATORIES

WELL DIAGRAM



Boring No. (Well) D-4

Date Installed 2/17/83

Seal Material

Seal 1 Concrete

Seal 2 Bentonite Pellets

Backfill Material

Backfill 1 2 to 1 Grout - Cement/Bentonite Powder

Backfill 2 Washed Sand

Auger Hole Diameter 4 1/2 to 8 In.

Well Material PVC, Sch. 40, FJT

Total Length of Well 83 Ft.

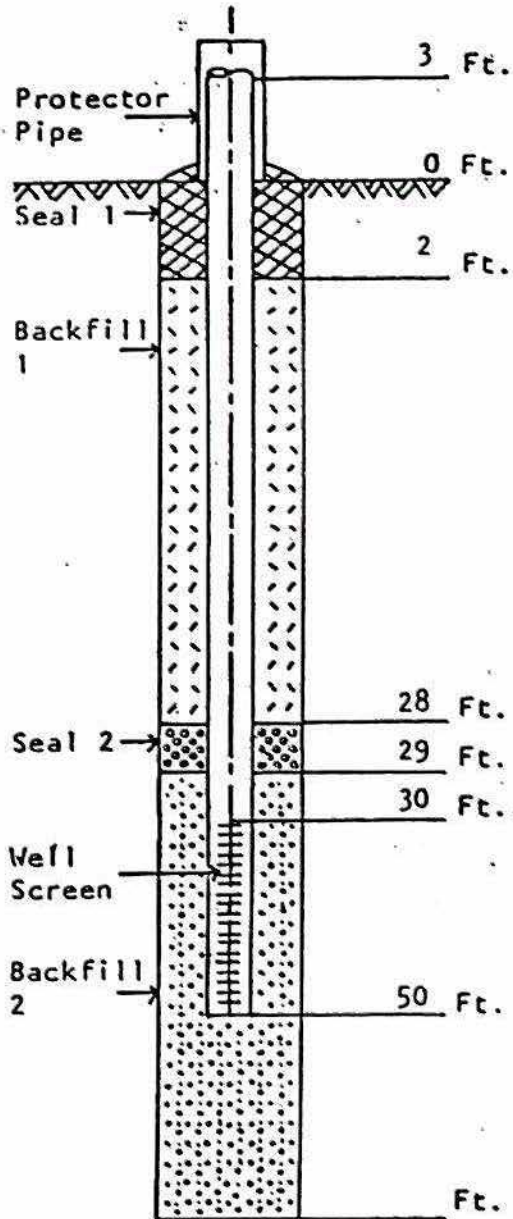
Well I.D. 2 In.

Well Point Slot Size 0.006 In.

Comments _____

WISCONSIN TESTING LABORATORIES

WELL DIAGRAM



Boring No. (Well) D-5

Date Installed 2/22/83

Seal Material

Seal 1 Concrete

Seal 2 Bentonite Pellets

Backfill Material

Backfill 1 2/1 Grout - Cement/Bentonite

Backfill 2 Washed Sand

Auger Hole Diameter 8 In.

Well Material PVC, Sch. 40, FJT

Total Length of Well 53 Ft.

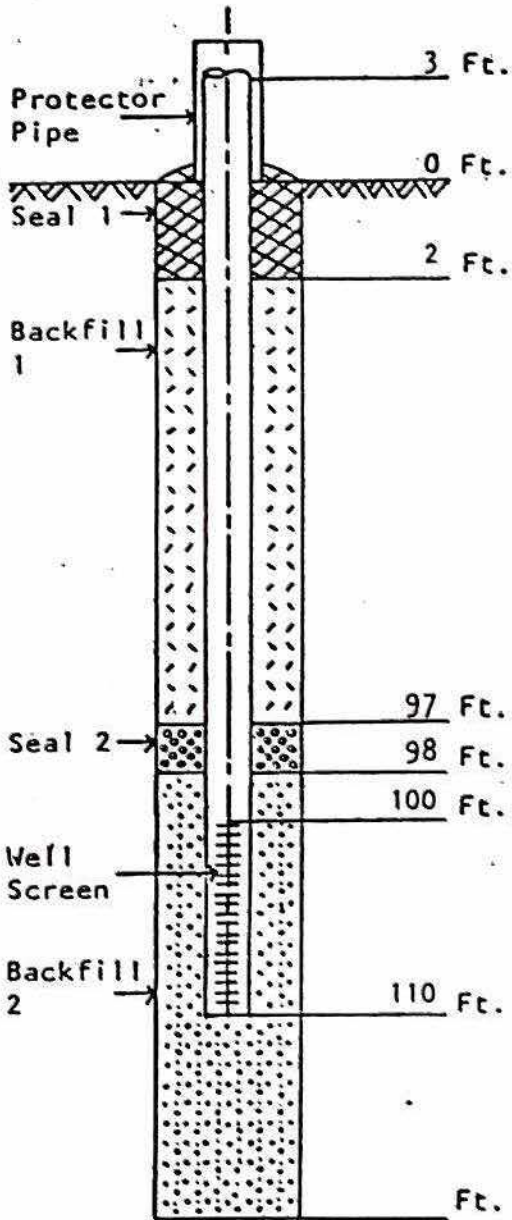
Well I.D. 2 In.

Well Point Slot Size 0.006 In.

Comments While retracting augers to above screen, I believe some large gravels
may have fallen in against screen portion of PVC.

WISCONSIN TESTING LABORATORIES

WELL DIAGRAM



Boring No. (Well) D-6

Date Installed 2/21/83

Seal Material

Seal 1 Concrete

Seal 2 Bentonite Pellets

Backfill Material

Backfill 1 Grout 2/1, Cement/Bentonite Powder

Backfill 2 Washed Sand

Well Hole Diameter 4½ to 8 In.

Well Material PVC, Sch. 40, FJT

Total Length of Well 113 Ft.

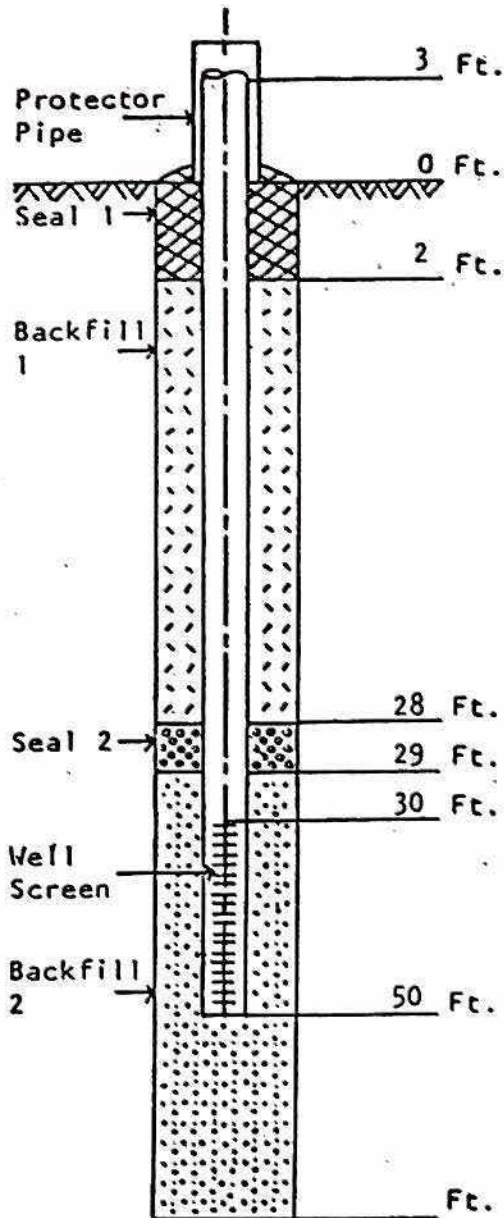
Well I.D. 2 In.

Well Point Slot Size 0.006 In.

Comments _____

WISCONSIN TESTING LABORATORIES

WELL DIAGRAM



Boring No. (Well) D-9

Date Installed 2/23/83

Seal Material

Seal 1 Concrete

Seal 2 Bentonite Pellets

Backfill Material

Backfill 1 Grout - Cement/Bentonite (2 to 1)

Backfill 2 Washed Sand

Auger Hole Diameter 8 In.

Well Material PVC, Sch. 40, FJT

Total Length of Well 53 Ft.

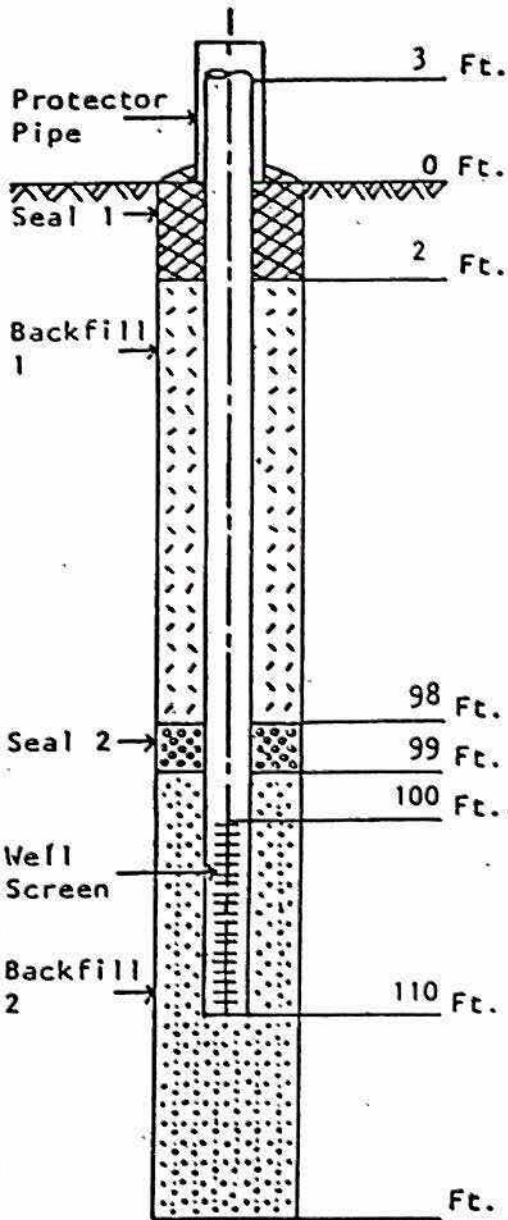
Well I.D. 2 In.

Well Point Slot Size 0.006 In.

Comments _____

WISCONSIN TESTING LABORATORIES

WELL DIAGRAM



Boring No. (Well) D-10

Date Installed 3/2/83

Seal Material

Seal 1 Concrete

Seal 2 Bentonite Pellets

Backfill Material

Backfill 1 Grout 2 to 1 - Cement/Bentonite

Backfill 2 Washed Sand

~~Auger~~ Hole Diameter 4½ to 8 In.

Well Material PVC, Sch. 40, FJT

Total Length of Well 113 Ft.

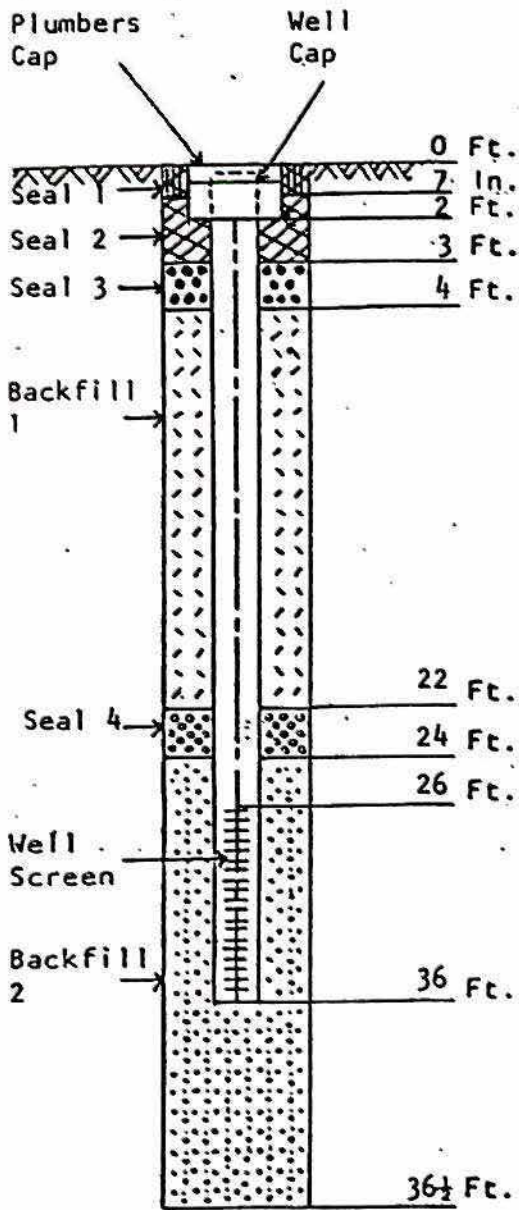
Well I.D. 2 In.

Well Point Slot Size 0.006 In.

Comments _____

WISCONSIN TESTING LABORATORIES

WELL DIAGRAM



Boring No. (Well) - D-12

Date Installed 6/30/83

Seal Material

- Seal 1 Quick-Set Concrete
- Seal 2 1 to 1 Paste - Cement/Bentonite Powder
- Seal 3 Bentonite Pellets
- Seal 4 Bentonite Pellets

Backfill Material

Backfill 1 Cutting (Sand and Gravel)

Backfill 2 Saturated Sand and Gravel

From Hole

Auger Hole Diameter 9 In.

Well Material PVC Sch. 40, FJT

Total Length of Well 36 Ft.

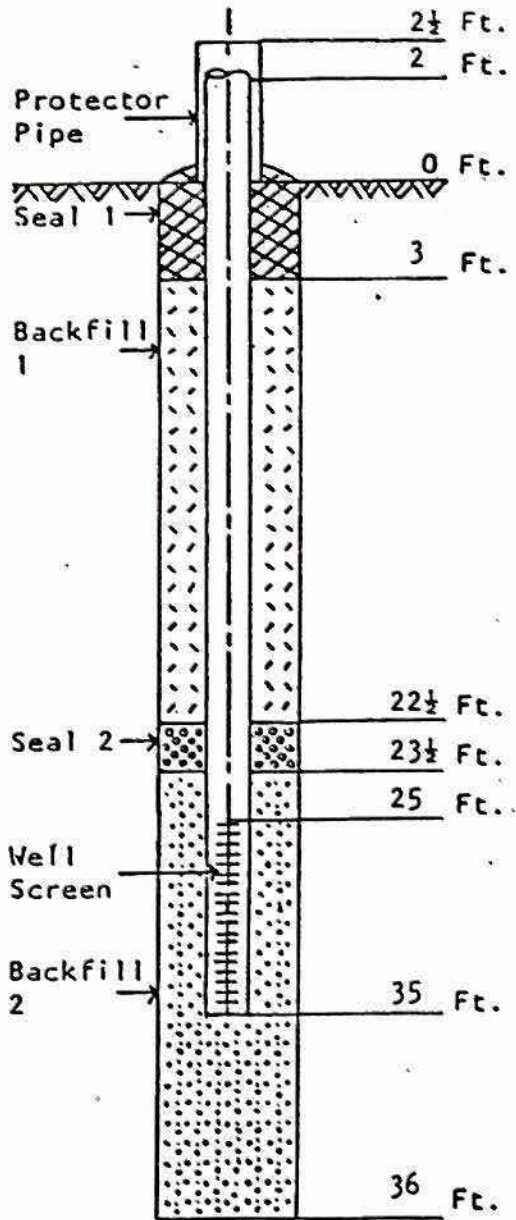
Well I.D. 2 In.

Well Point Slot Size 0.010 In.

Comments _____

WISCONSIN TESTING LABORATORIES

WELL DIAGRAM



Boring No. (Well) D-14

Date Installed 7/12/83

Seal Material

Seal 1 Cement-Bentonite Paste

Seal 2 Bentonite Pellets

Backfill Material

Backfill 1 Cuttings

Backfill 2 Washed Sand

Auger Hole Diameter 9 In.

Well Material PVC Sch. 40, FJT

Total Length of Well 37 Ft.

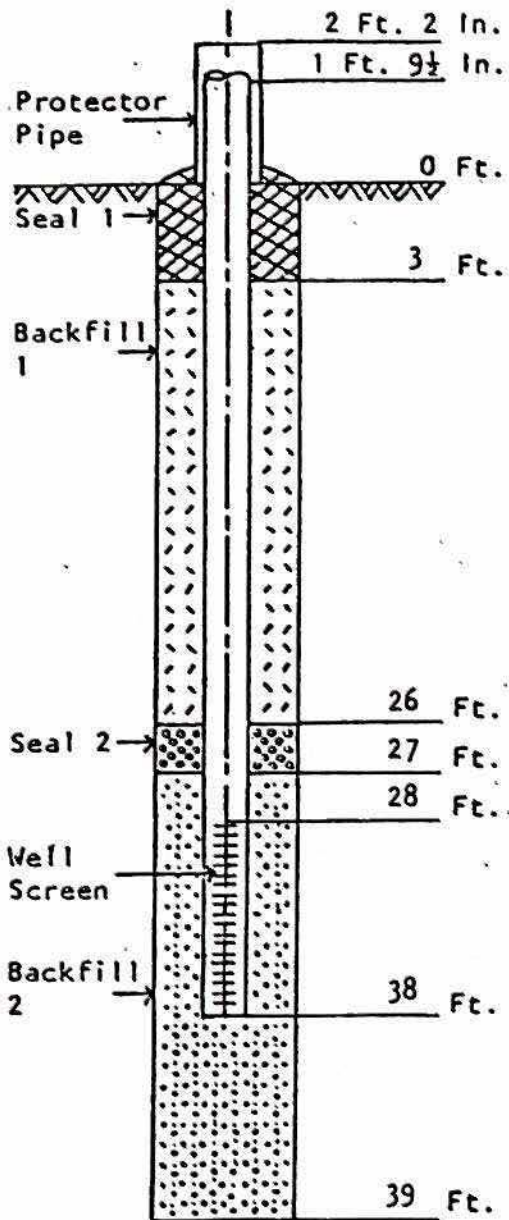
Well I.O. 2 In.

Well Point Slot Size 0.010 In.

Comments _____

WISCONSIN TESTING LABORATORIES

WELL DIAGRAM



Boring No. (Well) D-15

Date Installed 7/7/83

Seal Material

Seal 1 Concrete

Seal 2 Bentonite Pellets

Backfill Material

Backfill 1 Cuttings

Backfill 2 Washed Sand

Auger Hole Diameter 9 In.

Well Material PVC Sch. 40, FJT

Total Length of Well 39.8 Ft.

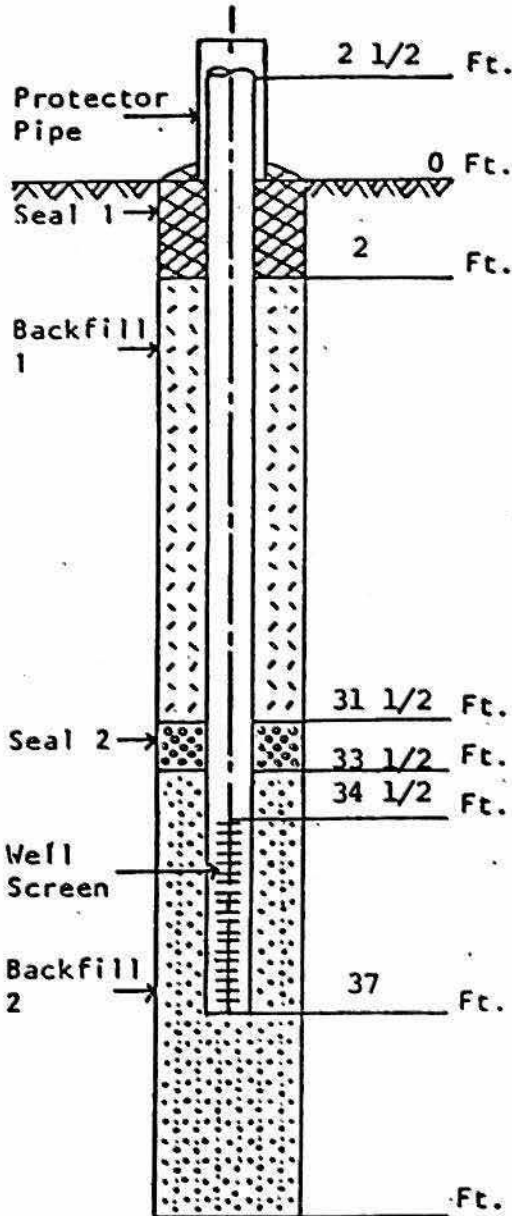
Well I.D. 2 In.

Well Point Slot Size 0.010 In.

Comments _____

WISCONSIN TESTING LABORATORIES

WELL DIAGRAM



Boring No. (Well) D-18

Date Installed 10-10-83

Seal Material

Seal 1 Concrete

Seal 2 Bentonite Pellets

Backfill Material

Backfill 1 Cement-Bentonite Grout (10:1)

Backfill 2 Sand

Auger Hole Diameter 3 3/4 In.

Well Material PVC Sch. 40, FTT

Total Length of Well 39 1/2 Ft.

Well I.D. 2 In.

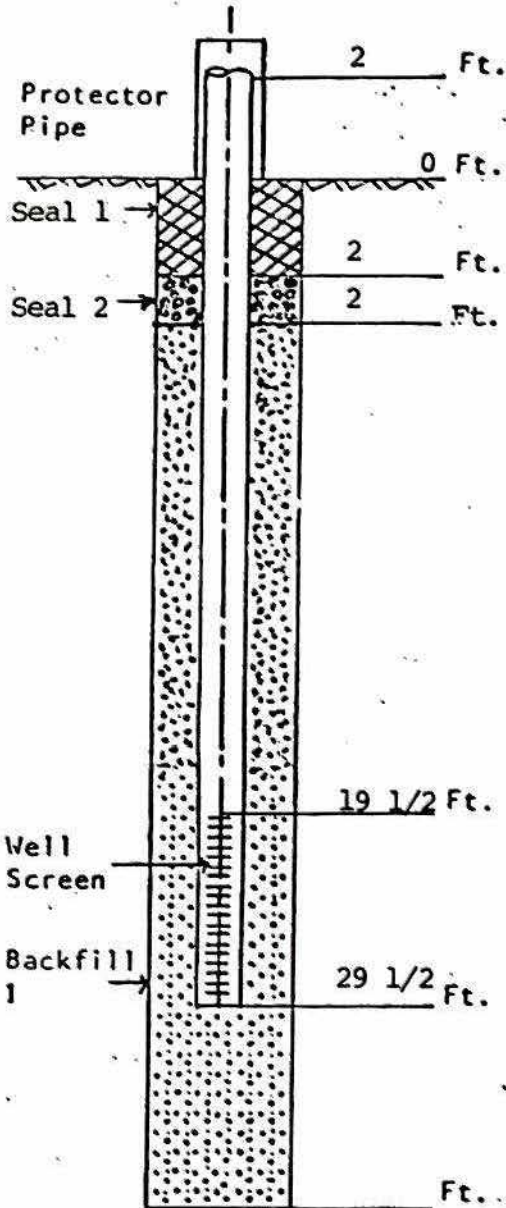
Well Point Slot Size 0.01 In.

Comments Water at 27 ft. depth in well after surging with nitrogen for
15 min. at 160 PSI.

Note: No locks were installed on wells by client as of 6:30 P.M., 10-10-83

WISCONSIN TESTING LABORATORIES

WELL DIAGRAM



Boring No. (Well) D-19

Date Installed 10-10-83

Seal Material

Seal 1 Concrete

Seal 2 Bentonite Pellets

Backfill Material

Backfill 1 Sand

Auger Hole Diameter 8 3/4 In.

Well Material PVC Sch. 40, FJT

Total Length of Well 31 1/2 Ft.

Well I.D. 2 In.

Well Point Slot Size 0.01 In.

Comments Water in well at 24 1/2 ft. depth

Well was surged with nitrogen

WARZYN



ENGINEERING INC

LOG OF TEST BORING

Project Hydrogeologic Investigation
Location Delavan, Wisconsin

Boring No. TW-1
Surface Elevation 939.30
Job No. C 10771
Sheet 1 of 1

1409 EMIL STREET • P.O. BOX 9538, MADISON, WIS. 53715 • TEL. (608) 257-4848

Table with columns: SAMPLE (Recovery, Moisture, No., Type, Depth), VISUAL CLASSIFICATION and Remarks (See TW-1A for Soil Classification, End Boring at 45'), SOIL PROPERTIES (Gc, W, LL, PL, D)

WATER LEVEL OBSERVATIONS

While Drilling
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave In

GENERAL NOTES

Start 12/8/82 Complete 12/8/82
Crew Chief NG/S Rig 55-1
Drilling Method RB w/Bentonite DM

WARZYN**ENGINEERING INC****LOG OF TEST BORING**
 Project Hydrogeologic Investigation
 Location Delavan, Wisconsin

 Boring No. TW-1A
 Surface Elevation 939.50
 Job No. C 10771
 Sheet 1 of 2

1409 EMIL STREET • P.O. BOX 9636, MADISON, WIS. 53716 • TEL. (608) 257-4848

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Type	Recovery ↓	Moisture ↓	N	Depth		q _c	W	LL	PL	D
						Brown Clayey SILT					
1	SS	1.0	M	4	5	Brown Silty CLAY, Trace to Some Fine to Coarse Sand, Trace Fine Gravel (ML-CL)					
2	SS	.75	M	21	10	Brown Silty Fine to Medium SAND, Some Fine Gravel (SM)					
3	SS	1.5	M	27	15						
4	SS	1.0	M	60	20						
5	SS	1.0	W	77	25	Gray, Fine to Coarse SAND and Fine to Coarse GRAVEL, Trace to Little Silt (SW-SM)					
6	SS	1.0	W	83	30						
7	SS	1.5	W	53	35						
8	SS	1.0	W	58	40						
					45	Brown SAND and SILT, Little Fine Gravel, Little Clay (SI)					

(Continued)

WARZYN**ENGINEERING INC****LOG OF TEST BORING**

Project Hydrogeologic Investigation

Location Delavan, Wisconsin

Boring No. IW-1A

Surface Elevation 939.50

Job No. C 10771

Sheet 2 of 2

1409 EMIL STREET • P.O. BOX 9538, MADISON, WIS. 53715 • TEL. (608) 287-4848

SAMPLE**VISUAL CLASSIFICATION
and Remarks****SOIL PROPERTIES**

No.	Type	Recovery		Moisture		Depth
		↓	↓	N		
9	SS	1.5	M	56		50
10	SS	1.0	W	71		60
11	SS	.75	W	96		70
12	SS	1.0	W	71		80
13	SS	1.0	W	65		85

Brown SAND and SILT, Little
Fine Gravel, Little Clay (SM)Brown to Gray Fine to Coarse
SAND, Little Fine Gravel,
Little Silt (SW-SM)

End Boring at 85'

WATER LEVEL OBSERVATIONS**GENERAL NOTES**

While Drilling _____

Upon Completion of Drilling _____

Time After Drilling _____

Depth to Water _____

Depth to Cave In _____

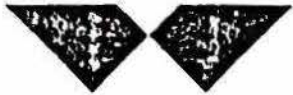
Start 12/9/82 Complete 12/9/82

Crew Chief WG/SW Rig 55-1

Drilling Method _____

RB w/Bentonite DM

WARZYN



ENGINEERING INC

LOG OF TEST BORING

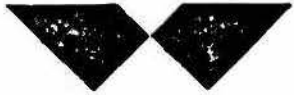
Project Hydrogeologic Investigation
 Location Delavan, Wisconsin

Boring No. TW-2
 Surface Elevation 942.60
 Job No. C.10771
 Sheet i of 2

1409 EMIL STREET • P.O. BOX 9838, MADISON, WIS. 53715 • TEL. (608) 257-4848

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Type	Recovery ↓	Moisture ↓	N	Depth		q _c	W	LL	PL	D
1	SS	1.0	M	8		Brown Clayey SILT (ML)					
2	SS	1.5	M	9	5						
3	SS	1.5	M	32	10	Brown Silty Fine to Medium SAND, Some Fine Gravel (SM)					
4	SS	X	M	60	15		7/8"				
5	SS	1.5	W	52	20						
6	SS	.5	W	60	25						
7	SS	.5	W	70	30	Brown Fine GRAVEL, Little to Some Coarse Sand (GP)					
8	SS	1.5	W	100	35	Brown Fine to Coarse SAND and Fine to Coarse Gravel, Trace to Little Silt (SW-SM)					
9	SS	1.0	W	60	40	Gray, Fine to Coarse SAND and Fine to Coarse GRAVEL, Trace to Little Silt (SW-SM)					
					45	Brown to Gray Fine to Coarse SAND, Little Fine Gravel, Little Silt (SW-SM)					

(Continued)

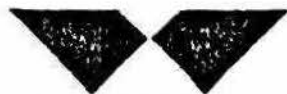
WARZYN**ENGINEERING INC****LOG OF TEST BORING**
 Project Hydrogeologic Investigation
 Location Delavan, Wisconsin

 Boring No. TW-2
 Surface Elevation 942.60
 Job No. C. 10771
 Sheet 2 of 2

1408 EMIL STREET • P.O. BOX 9538, MADISON, WIS. 53715 • TEL. (608) 257-4848

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Type	Recovery	Moisture		Depth		G _s	W	LL	PL	D
		↓	↓	N							
						Brown to Gray Fine to Coarse SAND, Little Fine Gravel, Little Silt (SW-SM)					
10	SS	1.5	W	56	50						
						End Boring at 50'					
					55						
					60						
					65						
					70						
					75						
					80						
					85						

WATER LEVEL OBSERVATIONS
 While Drilling _____
 Upon Completion of Drilling _____
 Time After Drilling _____
 Depth to Water _____
 Depth to Cave In _____
GENERAL NOTES
 Start 11/29/82 Complete 11/29/82
 Crew Chief JWG/SW 55-1
 Drilling Method RB w/Bentonite DM

WARZYN**ENGINEERING INC****LOG OF TEST BORING**

Project Hydrogeologic Investigation

Location Delavan, Wisconsin

 Boring No. TW-2A
 Surface Elevation 942.50
 Job No. C 10771
 Sheet 1 of 1

1409 EMIL STREET • P.O. BOX 9538, MADISON, WIS. 53715 • TEL. (608) 257-4848

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Type	Recovery ↓	Moisture ↓	M	Depth		q _s	W	LL	PL	D
					55	See Boring TW-2 for Soil Classification to 50' Brown to Gray Fine to Coarse SAND, Little Fine Gravel, Little Silt (SW-SM)					
11	SS	.3	W	60	58"						
					65						
					70						
12	SS	.25	W	60	77"						
13	SS	.3	W	60	79"						
					80						
					85						
14	SS	.2	W	60	88"						
					90						

End Boring at 90'

WATER LEVEL OBSERVATIONS
 While Drilling _____
 Upon Completion of Drilling _____
 Time After Drilling _____
 Depth to Water _____
 Depth to Cave In _____
GENERAL NOTES
 Start 12/1/82 Complete 12/1/82
 Crew Chief WG/S/Rig 55-1
 Drilling Method _____
 RB w/Bentonite DM

WARZYN



ENGINEERING INC

LOG OF TEST BORING

Project Hydrogeologic Investigation
 Location Delavan, Wisconsin

Boring No. TW-3
 Surface Elevation 943.70
 Job No. C 10771
 Sheet 1 of 2

1409 EMIL STREET • P.O. BOX 9538, MADISON, WIS. 53716 • TEL. (608) 257-4848

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Type	Recovery ↓	Moisture ↓	N	Depth		φ	W	LL	PL	D
1	SS	1.0	M	-		TOPSOIL					
2	SS	.5	M	4	5	Brown Silty FINE to Medium SAND, Some FINE Gravel (SM)					
3	SS	1.5	M	30	10	Brown Silty CLAY, Trace to Some FINE to Coarse Sand, Trace FINE Gravel (ML-CL)					
4	SS	1.0	M	30	15	Brown Silty FINE to Medium SAND, Some FINE Gravel (SM)					
5	SS	1.5	M	32	20						
6	SS	1.5	M	31	25						
7	SS	1.5	M	37	30						
8	SS	.5	W	60 96"	35	Brown FINE GRAVEL, Little to Some Coarse Sand (GP)					
9	SS	1.0	W	78	40	Gray FINE to Coarse SAND and FINE to Coarse GRAVEL, Trace to Little Silt (SW-SM)					
					45						

(Continued)

WARZYN**ENGINEERING INC****LOG OF TEST BORING**Project Hydrogeologic InvestigationLocation Delavan, Wisconsin
 Boring No. TW-3
 Surface Elevation _____
 Job No. C.10/71
 Sheet 2 of 2

1409 EMIL STREET • P.O. BOX 9536, MADISON, WIS. 53715 • TEL. (608) 257-4848

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
Recovery		Moisture		N	Depth		q _s	W	LL	PL	D
No.	Type	↓	↓								
						Gray, Fine to Coarse SAND and Fine to Coarse GRAVEL, Trace to Little Silt (SW-SM)					
10	SS	1.0	W	61	50						
						End Boring at 50'					
					55						
					60						
					65						
					70						
					75						
					80						
					85						

WATER LEVEL OBSERVATIONS
 While Drilling _____
 Upon Completion of Drilling _____
 Time After Drilling _____
 Depth to Water _____
 Depth to Cave In _____
GENERAL NOTES
 Start 12/7/82 Complete 12/7/82
 Crew Chief JWG/SWG 55-1...
 Drilling Method RB w/Bentonite DM

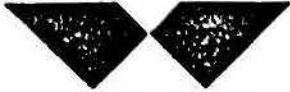
WARZYN**ENGINEERING INC****LOG OF TEST BORING**
 Project Hydrogeologic Investigation
 Location Delavan, Wisconsin

 Boring No. TW-4
 Surface Elevation 948.00
 Job No. C. 10771
 Sheet 1 of 2

1409 EMIL STREET • P.O. BOX 9536, MADISON, WIS. 53715 • TEL. (608) 257-4848

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
Recovery		Moisture		N	Depth		G _s	W	LL	PL	D
No.	Type	↓	↓								
1	SS	1.0	M	4		TOPSOIL (FILL)					
2	SS	1.5	M	4	5	Brown Silty CLAY					
3	SS	1.5	W	-		Brown Silty Fine to Medium SAND, Some Fine Gravel (SM)					
4	SS	1.5	M	24	10						
5	SS	1.5	M	47	15	More Gravel at 14.5'					
6	SS	1.0	M	28	20						
7	SS	1.0	M	57	25	Gray, Fine to Coarse SAND and Fine to Coarse GRAVEL, Trace to Little Silt (SW-SM)					
8	SS	1	W	50 77"	30						
9	SS	1	W	50 78"	35	Brown Fine GRAVEL, Little to Some Coarse Sand (GP)					
10	SS	1.0	W	37	40	Gray, Fine to Coarse SAND and Fine to Coarse GRAVEL, Trace to Little Silt (SW-SM)					
11	SS				45						

(Continued)

WARZYN**ENGINEERING INC****LOG OF TEST BORING**
 Project ... Hydrogeologic Investigation ...
 Location ... Delavan, Wisconsin ...

 Boring No. ... 1W-4 ...
 Surface Elevation ...
 Job No. ... C 10771 ...
 Sheet ... 2 ... of ... 2 ...

1408 EMIL STREET • P.O. BOX 9538, MADISON, WIS. 53718 • TEL. (608) 257-4848

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES					
Recovery		Moisture		N	Depth		q _c	W	LL	PL	D	
No.	Type	↓	↓									
						Gray, Fine to Coarse SAND and Fine to Coarse GRAVEL, Trace to Little Silt (SW-SM)						
11	SS	X	W	30	50							
						End Boring at 50'						
					55							
					60							
					65							
					70							
					75							
					80							
					85							

WATER LEVEL OBSERVATIONS
 While Drilling _____
 Upon Completion of Drilling _____
 Time After Drilling _____
 Depth to Water _____
 Depth to Cave In _____
GENERAL NOTES
 Start 12/6/82 Complete 12/6/82
 Crew Chief JWG/SW Rig 55-1
 Drilling Method _____
 RB w/Bentonite DM _____

WARZYN



ENGINEERING INC

LOG OF TEST BORING

Project Hydrogeologic Investigation
 Location Delavan, Wisconsin

Boring No. B-1
 Surface Elevation 944.1
 Job No. C 10/71
 Sheet 1 of 1

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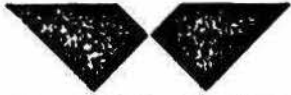
SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Type	Recovery ↓	Moisture ↓	N	Depth		q _c	W	LL	PL	D
						TOPSOIL					
1	SS	1.0	M	14		Brown Silty Fine to Medium SAND, Some Fine Gravel (SM) Saturated @ 5.0' (Odor) Strong Layer of Silty Clay Water after 7.5 Sample Water at 5.8' Odor Strong					
2	SS	1.0	W	3	5						
3	SS	1.0	W	2							
4	SS	-	W	1	10						
						End Boring at 10'					
					15						
					20						
					25						
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS

Time Drilling _____
 Upon Completion of Drilling _____
 Time After Drilling _____
 Depth to Water _____
 Depth to Cave In _____

GENERAL NOTES

Start 12/14/82 Complete 12/14/82
 Crew Chief JWG/CT Rig 55-1
 Drilling Method FA 0-10'

WARZYN**ENGINEERING INC****LOG OF TEST BORING**
 Project Hydrogeologic Investigation
 Location Delavan, Wisconsin

 Boring No. B-2
 Surface Elevation 944.43
 Job No. C 10771
 Sheet 1 of 1

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SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Type	Recovery ↓	Moisture ↓	N	Depth		q _s	W	LL	PL	D
1	SS	1.0	M	8		Brown Silty Fine to Medium SAND, Some Fine Gravel (SM) High Moisture, Also High Odor at 2.0' Strong Odor Odor Odor					
2	SS	1.5	M	5	5						
3	SS	1.0	M	21							
4	SS	1.0	M	18	10						
5	SS	1.5	M	33	15						
						End Boring at 15'					
					20						
					25						
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS**GENERAL NOTES**
 While Drilling _____
 Upon Completion of Drilling _____
 Time After Drilling 1/2 hour _____
 Depth to Water _____
 Depth to Cave In 15.0' _____

 Start 12/14/82 Complete 12/14/82
 Crew Chief JWG/CRig 55-1
 Drilling Method FA 0-15'

WARZYN**ENGINEERING INC****LOG OF TEST BORING**

Hydrogeologic Investigation

Project

Location Delavan, Wisconsin

B-5

Boring No.

Surface Elevation 946.3Job No. C 10771

Sheet of

1409 EMIL STREET • P.O. BOX 9538, MADISON, WIS. 53715 • TEL. (608) 257-4848

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Type	Recovery		Moisture			Depth	q _c	W	LL	PL
		↓	↓	M	N						
						1' GRAVEL, PEBBLES, SILT					
1	SS	1.0	M	9		Brown Clayey SILT					
2	SS	1.0	M	7	5	*					
3	SS	1.0	W	7		Brown Silty Fine to Medium SAND, Some Fine Gravel (SM)					
4	SS	1.5	W	14	10	Wet Not Saturated					
						End Boring at 10'					
					15	* Brown Sandy Silty CLAY, Occasional Gravel					
					20						
					25						
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS

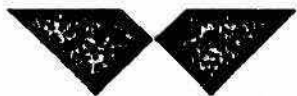
While Drilling _____

Upon Completion of Drilling _____

Time After Drilling 1/2 hour _____

Depth to Water _____

Depth to Cave In 10.0'M _____**GENERAL NOTES**Start 12/13/82 Complete 12/13/82Crew Chief WG/CT Rig 55-1Drilling Method FA 0-10'

WARZYN**ENGINEERING INC****LOG OF TEST BORING**
 Project Hydrogeologic Investigation
 Location Delavan, Wisconsin

 Boring No. B-7
 Surface Elevation 945.3
 Job No. C 10771
 Sheet 1 of 1

1409 EMIL STREET • P.O. BOX 9536, MADISON, WIS. 53715 • TEL. (608) 257-4648

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
Recovery		Moisture		N	Depth		q _s	W	LL	PL	D
No.	Type	↓	↓								
1	SS	1.5	M	11	5	6" Crushed ROCK					
2	SS	1.5	M	12		Brown Clayey SILT					
3	SS	1.5	W	13	10	Brown Silty Fine to Medium SAND, Some Fine Gravel (SM)					
4	SS	1.5	M	13		End Boring at 10'					
					15						
					20						
					25						
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS
 While Drilling _____
 Upon Completion of Drilling _____
 Time After Drilling 1/2 hour _____
 Depth to Water _____
 Depth to Cave In 10.0' Moist _____
GENERAL NOTES
 Start 12/13/82 Complete 12/13/82
 Crew Chief WVG/CT Rig 55-1
 Drilling Method FA 0-10'

WARZYN



ENGINEERING INC

LOG OF TEST BORING

Project Hydrogeologic Investigation
 Location Delavan, Wisconsin

Boring No. B-8
 Surface Elevation 945.5
 Job No. C 10771
 Sheet of

1409 EMIL STREET • P.O. BOX 9536, MADISON, WIS. 53715 • TEL. (608) 257-4648

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Type	Recovery ↓	Moisture ↓	N	Depth		q _s	W	LL	PL	D
1	SS	1.5	M	9	5 10 15 20 25 30 35 40	2" BLACKTOP					
						* Brown Silty CLAY High Moisture at 4'					
2	SS	1.5	M	5		Trace Sand, Occasional Gravel					
3	SS	1.5	M	12		Brown Silty Fine to Medium SAND, Some Fine Gravel (SM)					
4	SS	1.5	M	17	End Boring at 10'						
						*3"± GRAVEL Dark Brown Clayey Silt					

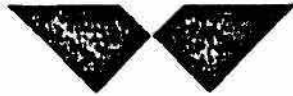
WATER LEVEL OBSERVATIONS

While Drilling _____
 Upon Completion of Drilling _____
 Time After Drilling $\frac{1}{2}$ hour _____
 Depth to Water _____
 Depth to Cave In 10.0' Moist _____

GENERAL NOTES

Start 12/13/82 Complete 12/13/82
 Crew Chief VG/CRig 55-1
 Drilling Method FA 0-10'

WARZYN



ENGINEERING INC

LOG OF TEST BORING

Project Hydrogeologic Investigation

Location Delavan, Wisconsin

Boring No. B-9

Surface Elevation 945.8

Job No. C 10771

Sheet 1 of 1

1409 EMIL STREET • P.O. BOX 9538, MADISON, WIS. 53715 • TEL. (608) 257-4848

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Type	Recovery ↓	Moisture ↓	N	Depth		q _s	W	LL	PL	D
1	SS	1.0	M	15	5	2" BLACKTOP 6"± GRAVEL Brown Clayey Silt					
2	SS	1.5	M	13							
3	SS	1.0	W	7	10	Brown Silty Fine to Medium SAND, Some Fine Gravel (SM)					
4	SS	1.5	W	14							
						End Boring at 10'					
					15						
					20						
					25						
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS

GENERAL NOTES

While Drilling _____
 Upon Completion of Drilling _____
 Time After Drilling 1/2 hour _____
 Depth to Water _____
 Depth to Cave In 10.0' Moist _____

Start 12/13/82 Complete 12/13/82
 Crew Chief WG/CRig 55-1
 Drilling Method FA 0-10'

APPENDIX D
WELL DETAILS
WARZYN WELLS

WELL DETAIL INFORMATION SHEET

JOB NO. C 10771

BORING NO. TW-1

DATE 12/9/82

CHIEF JWG/SW

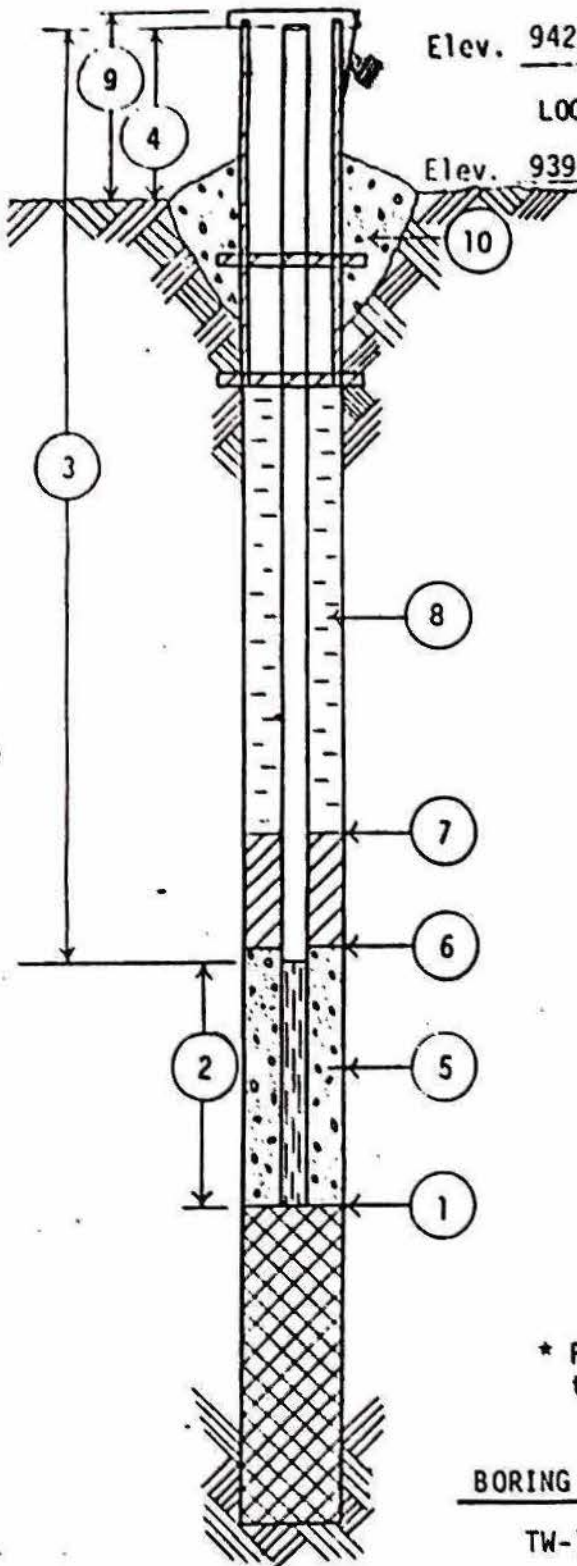
Elev. 942.39

LOCATION

Hydrogeologic Investigation Delavan, Wisconsin

Elev. 939.30

All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.



- ① DEPTH TO BOTTOM OF BOREHOLE
44 FEET
- ② LENGTH OF WELL POINT, WELL SCREEN, OR SLOTTED PIPE 19.2 FEET
- ③ TOTAL LENGTH OF SOLID PIPE 27.9 FEET @ 2 IN. DIAMETER
- ④ HEIGHT OF WELL CASING ABOVE GROUND 3.09 FEET
- ⑤ TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE Flint
- ⑥ DEPTH OF LOWER OR BOTTOM SEAL 3.0 FEET
- ⑦ DEPTH OF UPPER OR TOP SEAL 0.0 FEET
- ⑧ TYPE OF BACKFILL Flint
- ⑨ PROTECTIVE CASING YES NO
HEIGHT ABOVE GROUND 3.10
LOCKING CAP YES NO
- ⑩ CONCRETE CAP YES NO

WATER LEVEL CHECKS

* From top of casing, if protective casing higher take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS
TW-1	12/10/82	AM	20.7'	From Top

WELL DETAIL INFORMATION SHEET

JOB NO. C 10771

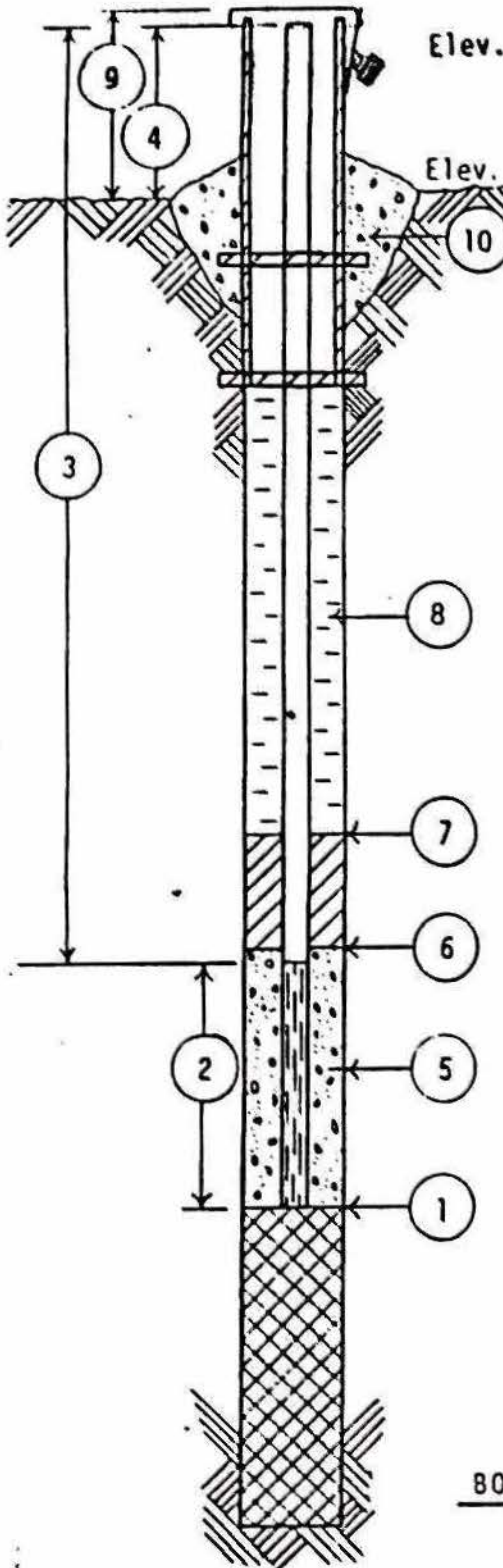
BORING NO. TW-1A

DATE 12/10/82

Elev. 943.22 CHIEF JWG/SW

LOCATION Hydrogeologic Investigation Delavan, Wisconsin

Elev. 939.50 All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.



- ① DEPTH TO BOTTOM OF BOREHOLE
85 FEET
- ② LENGTH OF WELL POINT, WELL SCREEN,
OR SLOTTED PIPE 9.6 FEET
- ③ TOTAL LENGTH OF SOLID PIPE 73.5
FEET @ 2 IN. DIAMETER
- ④ HEIGHT OF WELL CASING ABOVE GROUND
3.1 FEET
- ⑤ TYPE OF FILTER MATERIAL AROUND WELL
POINT OR SLOTTED PIPE Flint
- ⑥ DEPTH OF LOWER OR BOTTOM SEAL
73 FEET
- ⑦ DEPTH OF UPPER OR TOP SEAL
67 FEET
- ⑧ TYPE OF BACKFILL Flint Pellets
- ⑨ PROTECTIVE CASING YES NO
HEIGHT ABOVE GROUND 3.72
LOCKING CAP YES NO
- ⑩ CONCRETE CAP YES NO

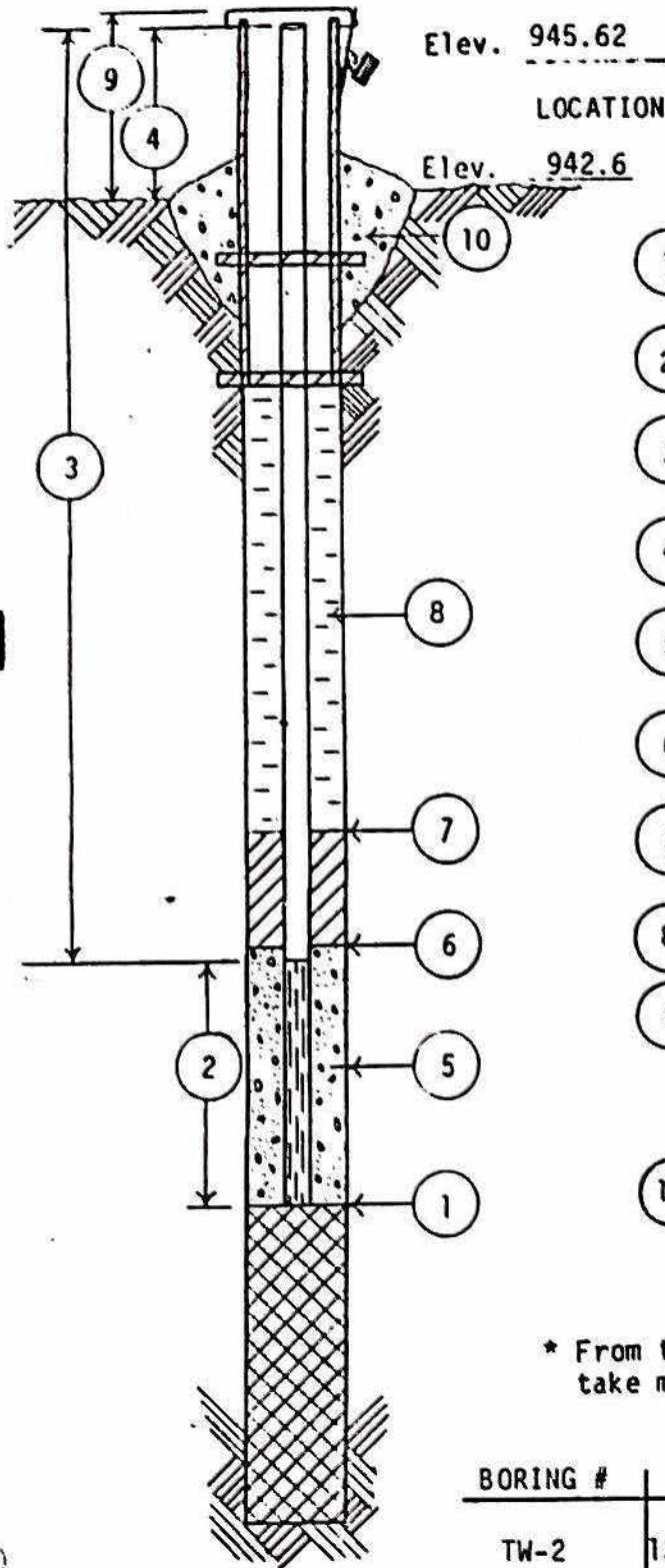
WATER LEVEL CHECKS

* From top of casing, if protective casing higher take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS

WELL DETAIL INFORMATION SHEET

JOB NO. C 10771
 BORING NO. TW-2
 DATE 12/2/82
 CHIEF JWG



LOCATION Hydrogeologic Investigation Delavan, Wisconsin
 Elevation: 945.62
 Elevation: 942.6
 All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.

- 1 DEPTH TO BOTTOM OF BOREHOLE
51 FEET
- 2 LENGTH OF WELL POINT, WELL SCREEN, OR SLOTTED PIPE 19.0 FEET
- 3 TOTAL LENGTH OF SOLID PIPE 33.8 FEET @ 2 IN. DIAMETER
- 4 HEIGHT OF WELL CASING ABOVE GROUND 1.8 FEET
- 5 TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE Flint
- 6 DEPTH OF LOWER OR BOTTOM SEAL 3.0 FEET
- 7 DEPTH OF UPPER OR TOP SEAL 0.0 FEET
- 8 TYPE OF BACKFILL Flint
- 9 PROTECTIVE CASING YES NO
HEIGHT ABOVE GROUND 3.02
LOCKING CAP YES NO
- 10 CONCRETE CAP YES NO

WATER LEVEL CHECKS

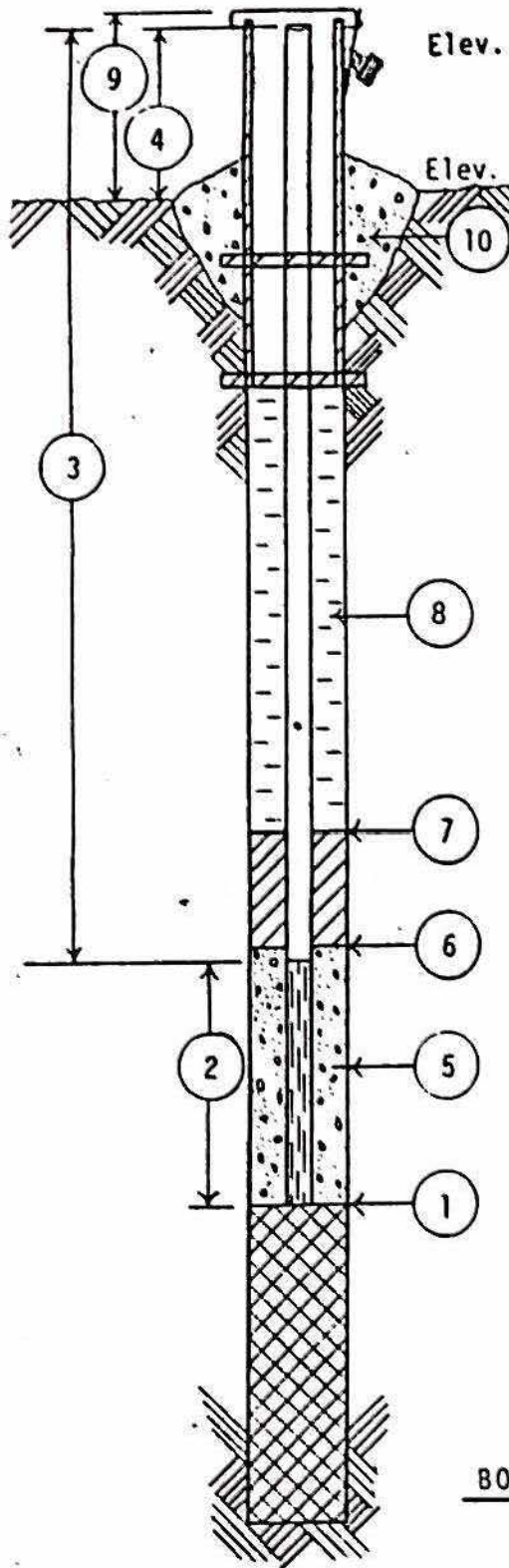
* From top of casing, if protective casing higher take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS
TW-2	12/10/82	AM	29.3'	From Top

WELL DETAIL INFORMATION SHEET

JOB NO. C 10771
 BORING NO. TW-2A
 DATE 12/3/82
 ELEV. 945.50 CHIEF JWG

LOCATION Hydrogeologic Investigation; Delavan, Wisconsin
 ALL depth measurements of well detail assumed to be from ground surface unless otherwise indicated.



- 1 DEPTH TO BOTTOM OF BOREHOLE
90.0 FEET
- 2 LENGTH OF WELL POINT, WELL SCREEN, OR SLOTTED PIPE 9.6 FEET
- 3 TOTAL LENGTH OF SOLID PIPE 80.4 FEET @ 2 IN. DIAMETER
- 4 HEIGHT OF WELL CASING ABOVE GROUND
3.0 FEET
- 5 TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE Flint
- 6 DEPTH OF LOWER OR BOTTOM SEAL
78.0 FEET
- 7 DEPTH OF UPPER OR TOP SEAL
73.0 FEET
- 8 TYPE OF BACKFILL Flint/Bentonite
- 9 PROTECTIVE CASING YES NO
HEIGHT ABOVE GROUND 3.05
LOCKING CAP YES NO
- 10 CONCRETE CAP YES NO

WATER LEVEL CHECKS

* From top of casing, if protective casing higher take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS
TW-2A	12/10/82	AM	28.9'	From Top

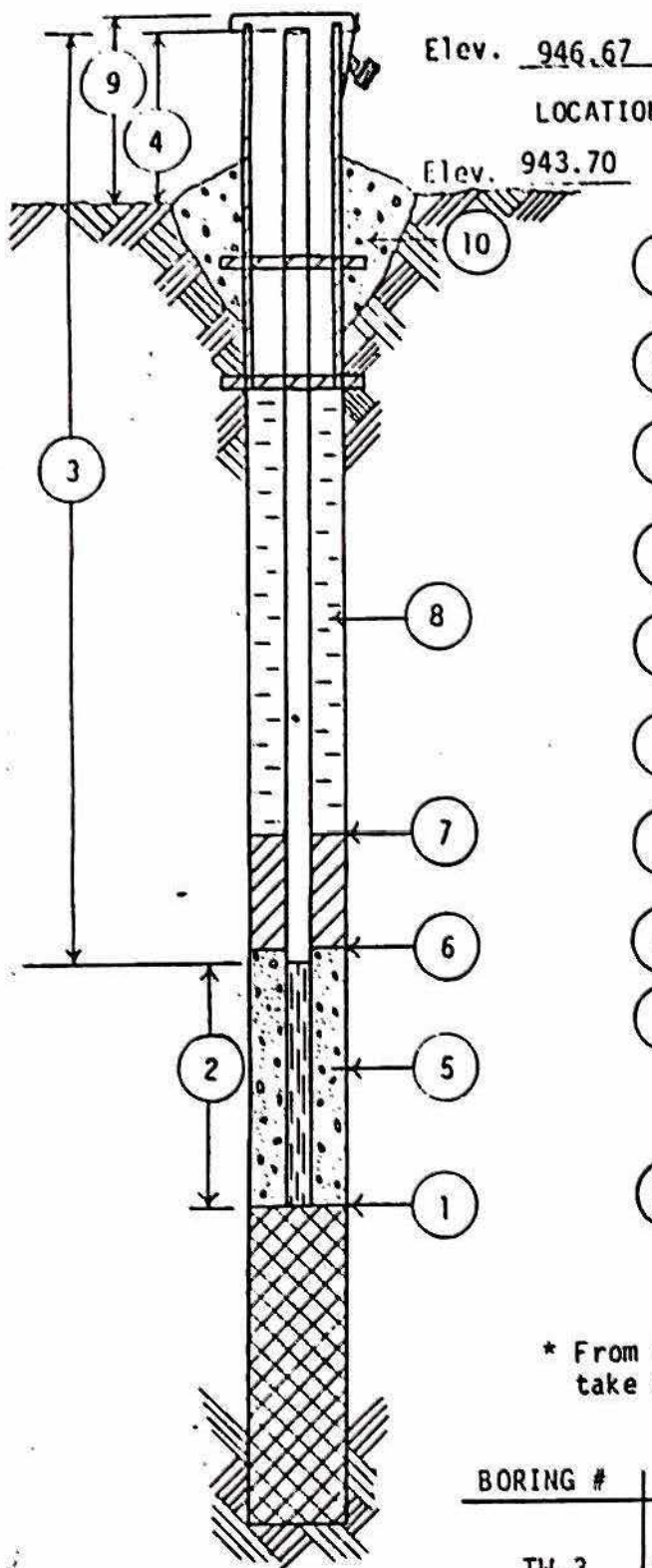
WELL DETAIL INFORMATION SHEET

JOB NO. C 10771
 BORING NO. TW-3
 DATE 12/8/82

Elev. 946.67 CHIEF JWG, SW

LOCATION Hydrogeologic Investigation; Delavan, Wisconsin

ALL depth measurements of well detail assumed to be from ground surface unless otherwise indicated.



- ① DEPTH TO BOTTOM OF BOREHOLE
48.2 FEET
- ② LENGTH OF WELL POINT, WELL SCREEN, OR SLOTTED PIPE 19.2 FEET
- ③ TOTAL LENGTH OF SOLID PIPE 32.0 FEET @ 2 IN. DIAMETER
- ④ HEIGHT OF WELL CASING ABOVE GROUND 3.0 FEET
- ⑤ TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE Flint
- ⑥ DEPTH OF LOWER OR BOTTOM SEAL 3.0 FEET
- ⑦ DEPTH OF UPPER OR TOP SEAL 0.0 FEET
- ⑧ TYPE OF BACKFILL Flint
- ⑨ PROTECTIVE CASING YES NO
HEIGHT ABOVE GROUND 2.97
- LOCKING CAP YES NO
- ⑩ CONCRETE CAP YES NO

WATER LEVEL CHECKS

* From top of casing, if protective casing higher take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS
TW-3	12/10/82	AM	28.0	From Top

WELL DETAIL INFORMATION SHEET

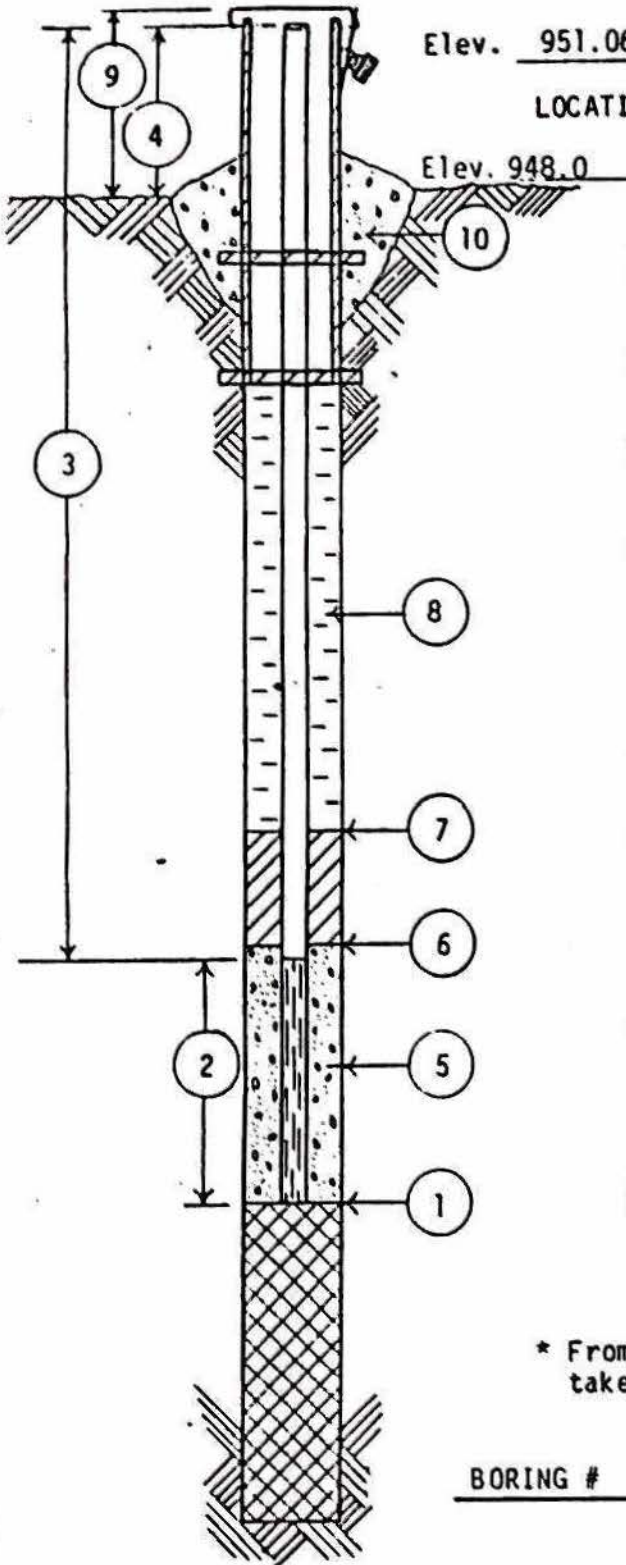
JOB NO. C 10771

BORING NO. TW-4

DATE 12/6/82

Elev. 951.06 CHIEF JWG/SW

LOCATION Hydrogeologic Investigation; Delavan, Wisconsin
 All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.



- ① DEPTH TO BOTTOM OF BOREHOLE 49.5 FEET
- ② LENGTH OF WELL POINT, WELL SCREEN, OR SLOTTED PIPE 19.2 FEET
- ③ TOTAL LENGTH OF SOLID PIPE 33.4 FEET @ 2 IN. DIAMETER
- ④ HEIGHT OF WELL CASING ABOVE GROUND 3.1 FEET
- ⑤ TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE Flint
- ⑥ DEPTH OF LOWER OR BOTTOM SEAL 3.0 FEET
- ⑦ DEPTH OF UPPER OR TOP SEAL 0.0 FEET
- ⑧ TYPE OF BACKFILL Flint
- ⑨ PROTECTIVE CASING YES NO
 HEIGHT ABOVE GROUND 3.09
 LOCKING CAP YES NO
- ⑩ CONCRETE CAP YES NO

WATER LEVEL CHECKS

* From top of casing, if protective casing higher take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS