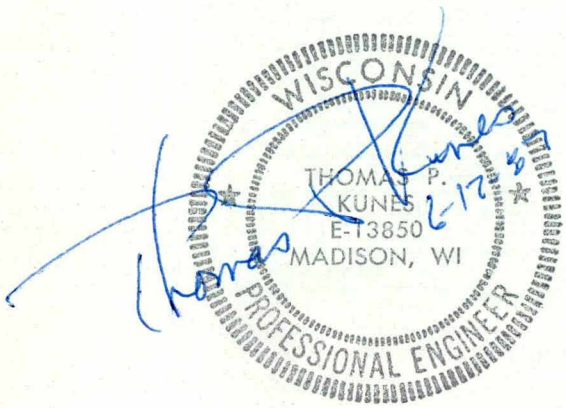
HYDROGEOLOGICAL INVESTIGATION
OF THE ALLUVIAL AQUIFER
BENEATH CITY WELL 6

WAUSAU, WISCONSIN

JUNE 1987



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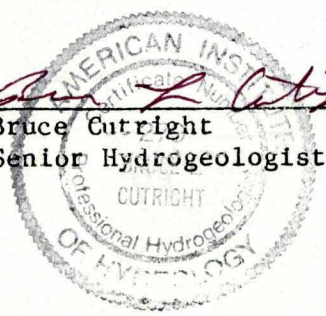

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WRITER'S DIRECT LINE
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June 18, 1987

Mr. Gary F. Kulibert
District Solid Waste Coordinator
Department of Natural Resources
North Central District Headquarters
Box 818
Rhinelander, Wisconsin 54501

Re: Wausau Water Supply Matter -- West-Side Report

Dear Gary:

Enclosed please find a copy of the joint City of Wausau-Marathon Electric study on the conditions existing on the west-side of the Wisconsin River. We have under separate cover forwarded copies of the report to the Environmental Protection Agency ("EPA").

In addition, the City and Marathon Electric have asked EPA to set up a meeting between their technical personnel and our consultants to discuss the upcoming remedial investigation/feasibility study. Given the work done to-date, we believe such discussions would assist EPA in developing a cost-effective study. If EPA agrees to discuss the matter and if representatives of the Department desire to attend such a meeting, please let us know so that we can coordinate schedules.

If you have any questions, please call either Jim Lonsdorf (715-842-1647) or me.

Very truly yours,

Mark A. Thimke

cc: Jim Lonsdorf
Dave Eisenreich

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1. INTRODUCTION

In March of 1982, the City of Wausau discovered the presence of trichloroethylene in one of its water supply wells. Subsequent investigations conducted by the U.S. Environmental Protection Agency, the Wisconsin Department of Natural Resources, and the Wisconsin Geological and Natural History Survey extended the known area of ground water contamination but did not definitively locate a source of contamination. The USEPA under the authority provided in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or "Superfund") has continued to seek potential sources. In early 1986 the City of Wausau, Marathon Electric Corporation, Wausau Chemical Corporation, AMOCO Corporation, and Wausau Energy Corporation were named as potentially responsible parties for the ground water contamination in the Wausau area by the USEPA. This group of 5 named PRPs were not able to reach an agreement with the USEPA to conduct a Remedial Investigation/Feasibility Study. When it became apparent that the 5 PRPs would not be able to cooperate with the USEPA, Marathon Electric Corporation and the City of Wausau agreed to work together outside of the normal Superfund process to address ground water contamination identified on the west side of the Wisconsin River.

Marathon Electric Corporation retained RMT, Inc., as their technical consultant. The City of Wausau retained Geraghty & Miller, Inc., as their technical consultant. RMT and Geraghty & Miller conducted investigations on the west side of the Wisconsin River beginning in August of 1986 and continuing to February of 1987. This report presents the findings and conclusions of that study.

1.1 Background

The City of Wausau municipal water supply is derived from six high-yield water supply wells located on both the east and west sides of the Wisconsin River. These production wells are responsible for the daily supply of (approximately) 4.3 million gallons of water required for the city residents and industries. Wells located on the west side of the Wisconsin River are City Wells 6, 7 and 9.

In March of 1982, trichloroethylene (TCE) was discovered in City Well 6, the southern most well of the 3 west side wells. Initially, the concentration of TCE was less than 100 ug/L. Concentrations gradually increased over time until February, 1984 when 200 ug/L was exceeded. The measured concentrations have remained in the range of 150 to 250 ug/L to the present. TCE has been the only compound conclusively detected in the well 6 water. Trace or unquantifiable detects of tetrachloroethylene (PCE) and dichloroethylene (DCE) have been reported in well 6, but not in any consistent pattern.

City Well 6 was taken off the city water supply line and has been pumped to waste at a rate of 1100 gpm since April 1986. Prior to April, well 6 was used periodically to mix with the other wells when supply demands required. Pumping of City Well 6 apparently limits contaminant movement toward City Wells 7 and 9, providing a hydraulic barrier between the source and the remaining west side water supply wells.

Several investigations have been conducted by the USEPA and the Wisconsin DNR in the vicinity of City Well 6 to determine the source of the TCE. As of the date of this report, they have not identified a specific source.

1.2 Purpose

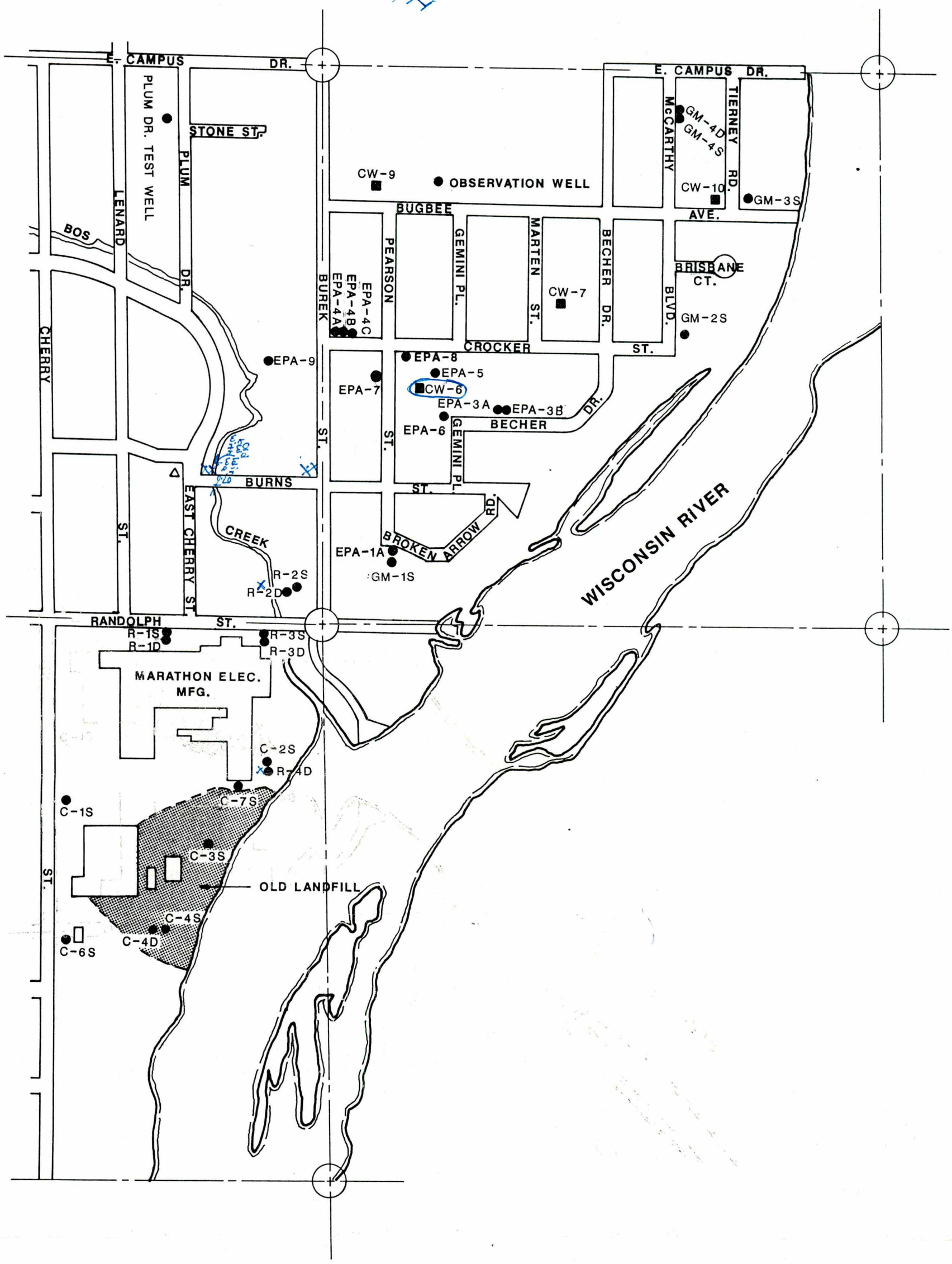
The goals of this investigation, jointly conducted on behalf of Marathon Electric and the City of Wausau by RMT, Inc., and Geraghty & Miller, Inc., were to define the ground water flow directions on the west side of the Wisconsin River to determine if the Marathon Electric/Old City Landfill property could be contributing contaminants to City Well 6. Secondly, the investigation was intended to add to the ground-water chemical data base by sampling of new wells and resampling of previously installed wells. This sampling provided consistent sampling methods for all wells in addition to the data collected in conjunction with hydraulic measurements to provide better evaluation of the distribution of contaminants and potential TCE migration pathways.

1.3 Scope

The tasks required to accomplish the above goals are listed below:

Objective 1 - Ground Water Flow Direction

Task 1 - Install deep and shallow wells on the Marathon Electric Property and around City Well 6. The new wells are designated by R- and GM- prefixes (Figure 1).



LEGEND

- ● EPA-1A EPA MONITORING WELL
- ● GM-1S GERAGHTY & MILLER MONITORING WELL
- ● R-1S RMT, INC. MONITORING WELL
- ■ CW-6 CITY OF WAUSAU WATER SUPPLY WELL
- ● C-4S CH_2M HILL MONITORING WELL

NORTH

0' 250' 500'

LOCATIONS OF WEST SIDE MONITORNG WELLS

RMT INC

Dwn. by:	JM
Date:	5/14/87
Proj.#	222.04

FIGURE 1

Task 2 - Collect ground-water level data from new and existing wells on the west side of the river which are screened at both shallow and deep depths. These water levels were recorded biweekly for six months.

Task 3 - Contour shallow and deep water level data to evaluate ground-water flow directions.

Task 4 - Conduct a pumping test on City Well 6 to determine aquifer properties and radius of influence of the pumping well.

Objective 2 - Additional Ground Water Chemical Data

Task 1 - Collect ground-water samples from City Well 6, in addition to monitoring wells in the well 6 vicinity and on the Marathon Electric Property.

Task 2 - Analyze the ground-water samples for the volatile organic compounds which have been previously detected in City Well 6, wells in the Old City Landfill, and wells on the Marathon Electric Property.

Task 3 - Analyze the ground-water samples from selected wells for major ions to verify flow directions by general water quality characteristics.

2. FINDINGS AND CONCLUSIONS

Geology

1. The study area is located in the Wisconsin River Valley. The near-river geology is dominated by thick sand and gravel deposits overlying Precambrian igneous and metamorphic bedrock.

2. The bedrock surface slopes sharply toward the river locally and toward the south regionally. Previous investigations suggest the presence of a bedrock ridge south of City Well 6, which may influence deep ground-water flow.

Hydrogeology

4. The sand and gravel of the aquifer are highly permeable and heterogeneous. The aquifer is unconfined with a saturated thickness of almost 120 feet near the Wisconsin River.

5. Ground water generally flows from the bedrock hills which border the valley toward the Wisconsin River. Locally, ground water flow is affected by river level fluctuations, bedrock topography, and pumping of the city wells.

6. Ground water under the southern part of the Marathon Electric/Old City Landfill property flows toward the Wisconsin River. Shallow ground-water flow discharges into the river.

7. Ground water under the northern part of the Marathon Electric/Old City Landfill property flows northeastward, toward the Wisconsin River, and under some conditions may flow to the north.

8. The radius of influence of City Well 6 extends at least as far south as Bos Creek. The shallow ground-water flow system appears to be influenced by Bos Creek, which may act as a recharge area during high creek levels and a discharge area during low levels.

9. The bedrock ridge south of City Well 6 may divert the flow of deep ground-water from the south toward the Wisconsin River. It is unknown to what extent deep ground water may flow over or around the ridge.

10. Pumping test results indicate that the aquifer responded as an unconfined aquifer with delayed yield. The following aquifer characteristics were computed:

Average Transmissivity - 315,000 gpd/ft to 370,000 gpd/ft

Storage Coefficient - 0.34 (Late), 0.05 (Early)

Average Hydraulic Conductivity - 2625 gpd/ft^2 to 3083 gpd/ft^2

WATER QUALITY

1. Trichloroethylene (TCE) is a common industrial solvent and waste product. TCE has been found in City Well 6 at concentrations ranging from approximately 100 ug/L to 200 ug/L.

2. Samples collected from monitoring wells EPA 4C and EPA 7, located northwest of City Well 6, detected 20 to 60 ug/L TCE, indicating there may be a source of TCE to the west of City Well 6.

3. Samples collected from monitoring wells R-4D and R-2D found concentrations of TCE ranging from 3,190 ug/L to 1,140 ug/L, indicating a possible source of TCE to the south of City Well 6.

4. Drinking water currently supplied to the City of Wausau residents is within applicable federal and state health-related standards and is tested on a regular basis so that adequate quality is maintained.

3. SUBSURFACE INVESTIGATION

3.1 Methods of Investigation

The subsurface investigation for the west side aquifer was prepared by RMT and Geraghty & Miller following a review of regional information and previous hydrogeologic studies. Directly related to the RMT/Geraghty & Miller investigation are two studies which were conducted by Roy F. Weston, Inc., and CH_2M Hill.

In 1985, Roy F. Weston, Inc., issued a report on behalf of the EPA which presented the results of their initial studies to locate the source of VOC's in City Wells 3 and 4 on the east side of the Wisconsin River and City Well 6 on the west side. Figure 1 illustrates the network of city wells and monitoring wells which are currently in place on the west side.

In 1986, CH2M Hill, Inc., completed an investigation of the Old City of Wausau Landfill located on the Marathon Electric Property for the Wisconsin DNR.

Based on these previous studies, the locations of new borings and wells were planned to further delineate ground-water flow directions, specifically near the Old City Landfill and Marathon Electric Property. Nine monitoring wells were installed under the supervision of RMT and Geraghty & Miller during August and September, 1986. Following completion of well installation, water level measurements continued to be collected from these wells in addition to the existing wells on a semi-monthly basis. An aquifer test was conducted by pumping City Well 6 at a constant rate for seven days to provide site-specific values for aquifer properties. One round of water quality samples was collected from the new monitoring wells in addition to selected existing monitoring wells, and analyzed for volatile organic compounds. Selected samples were also analyzed for inorganics and Hazardous Substances List parameters.

3.2 Site Setting

The Study Area is located in the northern portion of the City of Wausau, Marathon County, Wisconsin (Figure 1). Land use in the area is mostly residential near City Well 6, and mixed residential/industrial south of City Well 6.

The study area is bordered on the east by the Wisconsin River, and is bisected from northwest to southeast by Bos Creek. Land surface elevations range from approximately 1,225 feet (msl) near the western edge of the study area to 1,190 feet (msl) near the Wisconsin River. Wisconsin River water elevations are maintained by a dam at a fairly constant elevation of 1,187 to 1,188 feet (msl) operated by the Wisconsin Valley Improvement Corporation (S. Morgan Dec. 1986 personal communication).

3.3 Regional Hydrogeology

The major regional source of ground water for both private and municipal use is the Wausau Aquifer (Kendy, 1986). The Wausau Aquifer consists of glacio-fluvial sand and gravel outwash deposits which have filled buried bedrock valleys along the Wisconsin River, including the study area. These sand and gravel deposits are typically less than 1/2 mile wide. In some areas, the outwash deposits are over 150 feet thick. Wells in the unconfined Wausau Aquifer typically yield from 500 to 1,000 gpm, although the west side wells have been tested at greater than 3,000 gpm.

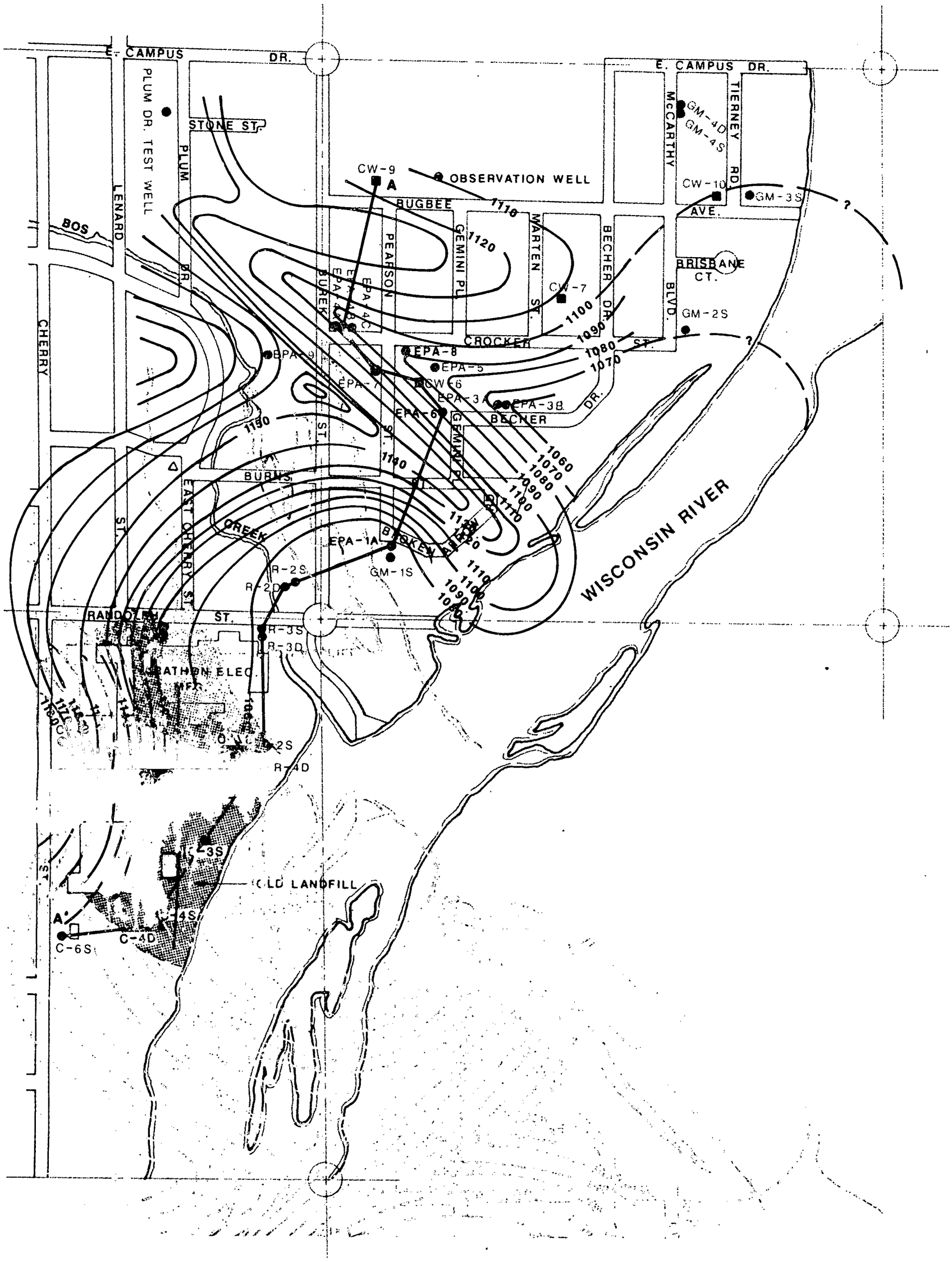
In upland areas away from the productive Wausau Aquifer, the crystalline bedrock yields a limited amount of water for domestic use. Although relatively impermeable, numerous near-surface fractures and weathered bedrock zones provide sufficient quantities of water for individual residential use. Generally, yields are less than 20 gpm in the bedrock aquifer, with yields in some areas less than 5 gpm (Kendy, 1986).

3.4 Site Geology

3.4.1 Bedrock

Bedrock in the study area has been extensively investigated by LaBerge and Myers (1983) to determine the potential for mineral exploration of the Precambrian rock. Two major lithologic units that are igneous in origin dominate the regional bedrock geology. Syenite, an igneous plutonic rock similar to granite but lighter in color, underlies the study area on the west side of the Wisconsin River. Bedrock on the east side of the river is predominantly rhyolite. The contact between these two lithologic bodies in the Wausau area is believed to be located beneath the Wisconsin River.

A seismic refraction study to determine the top of the bedrock surface was conducted by Roy F. Weston, Inc., in 1985. The Weston bedrock surface map has been combined with subsequent boring information to produce the bedrock surface map included as Figure 2. There is an apparent northwest to southeast-trending bedrock ridge located south of City Well 6 and north of Bos Creek.



LEGEND

- ● EPA-1A EPA MONITORING WELL
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- ● R-1S RMT, INC. MONITORING WELL
- ■ CW-6 CITY OF WAUSAU WATER SUPPLY WELL
- ● C-4S CH_2M HILL MONITORING WELL

A A' GEOLOGIC CROSS SECTION

APPROXIMATE BEDROCK SURFACE (COMBINES WESTON 1985 & UNPUB. DATA)

RMT INC.	Dwn. by: JM
	Date: 5/7/87
	Proj. #: 222.04

FIGURE 2

3.4.2 Unconsolidated Deposits

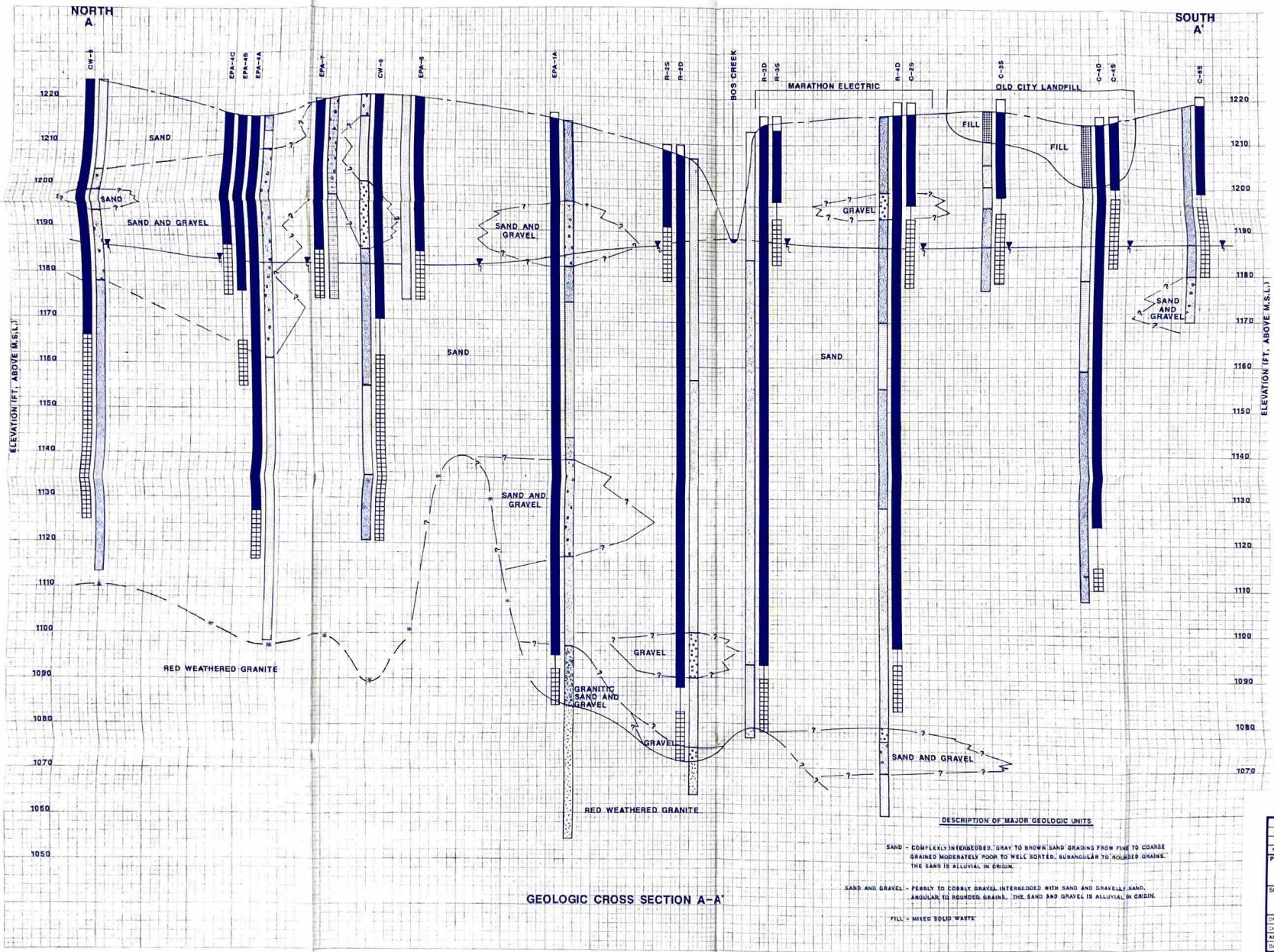
The study area is situated in an area of complex glacial outwash sand and gravel deposits. Figure 3 provides a north-to-south geologic cross-section through the study area. The location of the cross-section is shown on Figure 2. On the bedrock surface map, the bedrock has been defined as a lower boundary wherever boring information was available.

3.5 Site Hydrogeology

3.5.1 West Side Municipal Well Field

Water Supply Wells. City Well 6, located in the West Side Well Field on the corner of Pearson and Crocker Streets, was installed in 1951 by Layne-Northwest. The well was tested at 3,600 gpm, yielding a specific capacity of 130 gpm/ft. The well is 100 feet deep with a 24-inch bronze screen installed from 60-100 feet below land surface. The well, screened in sands, is considered the best producer of the city water supply wells, having both a high yield and a low iron and manganese content.

City Well 6 was taken off the city water supply line and has been pumped to waste at a rate of 1,100 gpm since April 1986. Prior to April, water from well 6 was periodically mixed with water from the other wells when demand required. Pumping of City Well 6 limits contaminant movement toward City Wells 7 and 9, and may provide an hydraulic barrier between the source of TCE and the remaining west side city water supply wells. Figure 4 shows the average monthly pumping for well 6 from 1977 to the present.



GEOLOGIC CROSS SECTION A-A'

LEGEND

- EXISTING GROUND SUFACE
- STRATIGRAPHIC BOUNDRY
- INFERRED STRATIGRAPHIC BOUNDARY
- WATER TABLE (NOVEMBER 26, 1986)
- BEDROCK DEPTH FROM WESTON, 1985
- WELL STICKUP ABOVE GROUND
- LOCATION OF WELL SEALS
- LOCATION OF WELL SCREEN
- MIXED SOLID WASTE
- FINE SAND, FINE SAND TRACE SILT, FINE SAND TRACE GRAVEL
- MEDIUM SAND, MEDIUM TO FINE SAND
- FINE TO COARSE SAND, MEDIUM TO COARSE SAND, FINE TO COARSE SAND, TRACE SILT, TRACE GRAVEL
- COARSE SAND
- SAND AND GRAVEL
- GRAVEL
- GRANITIC SAND AND GRAVEL
- GRANITE

DESCRIPTION OF MAJOR GEOLOGIC UNITS

SAND - COMPLEXLY INTERBEDDED, GRAY TO BROWN SAND GRADING FROM FINE TO COARSE GRAINED MODERATELY POOR TO WELL SORTED, SUBANGULAR TO ROUNDED GRAINS. THE SAND IS ALLUVIAL IN ORIGIN.

SAND AND GRAVEL - PEBBLY TO COBBLY GRAVEL INTERBEDDED WITH SAND AND GRAVELLY SAND, ANGULAR TO ROUNDED GRAINS. THE SAND AND GRAVEL IS ALLUVIAL IN ORIGIN.

FILL - MIXED SOLID WASTE

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJECT
FOLEY & LARDNER

SHEET TITLE
NORTH-SOUTH GEOLOGIC CROSS SECTION
WEST SIDE OF WISCONSIN RIVER
WAUSAU, WISCONSIN

DRAWN BY MCS	SCALE VERT 1"=10'	PROJ NO 222.04
CHECKED BY	HORIZ 1"=200'	DRWG NO
APPROVED BY	DATE PRINTED	SHEET OF
DATE 5-87		

RMT, INC.
Suite 104
404 South Washington Ave
Madison, WI 53703
Phone: 608/251-2734

FIGURE 3

PUMPING HISTORY OF CITY WELL 6

1977 to 1986

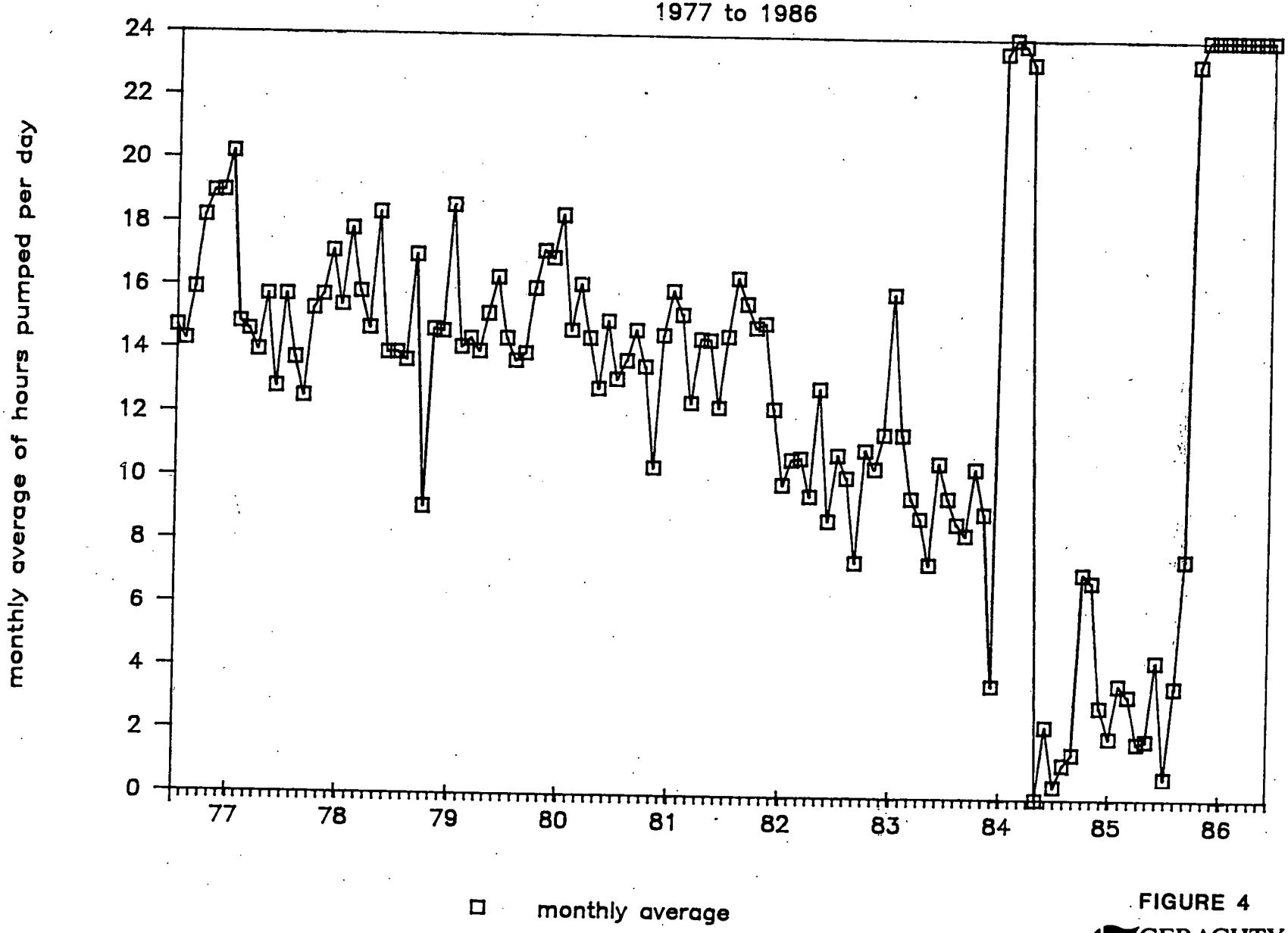


FIGURE 4

GERAGHTY & MILLER, INC.
Ground-Water Consultants

City Well 7, located between Bugbee Avenue and Crocker Street, was installed in 1951 by Layne-Northwest. The well was originally tested at 3,180 gpm, yielding a specific capacity of 127.5 gpm/ft. The total depth of the well is 100 feet below land surface with a 24-inch diameter bronze screen from 60 to 100 feet below land surface. The well is screened in sand, and presently pumps an average of 1,700 gpm when pumping alone (1,600 gpm when pumping in conjunction with well 9). No contamination has been detected in City Well 7. Figure 5 shows the average monthly pumping for well 7 from 1977 to the present.

City Well 9, located on the corner of Burek and Bugbee Avenue, was installed in 1963 by Miller Well and Pump Company. The well was tested at 1,200 gpm, and no specific capacity was reported. Information gathered during this investigation indicates that City Well 9 has a specific capacity of approximately 71 gpm/ft. The lower specific capacity at this well is a result of the higher bedrock surface and resultant thinner alluvial aquifer at this location. Total depth of the well is 100 feet below land surface with a 20-inch diameter stainless steel screen from 60 to 100 feet. The well is screened in medium to fine sand, and presently pumps an average of 850 gpm when pumping alone (750 gpm when pumping in conjunction with Well 7). No contamination has been detected in City Well 9. Average monthly use of well 9 from 1977 to the present is shown in Figure 6.

Pumping History. Historically, pumping schedules of the city wells are highly variable. The city wells are turned on and off according to changes in demand and to shift the pumping load from well to well. The recent

PUMPING HISTORY OF CITY WELL 7

1977 to 1986

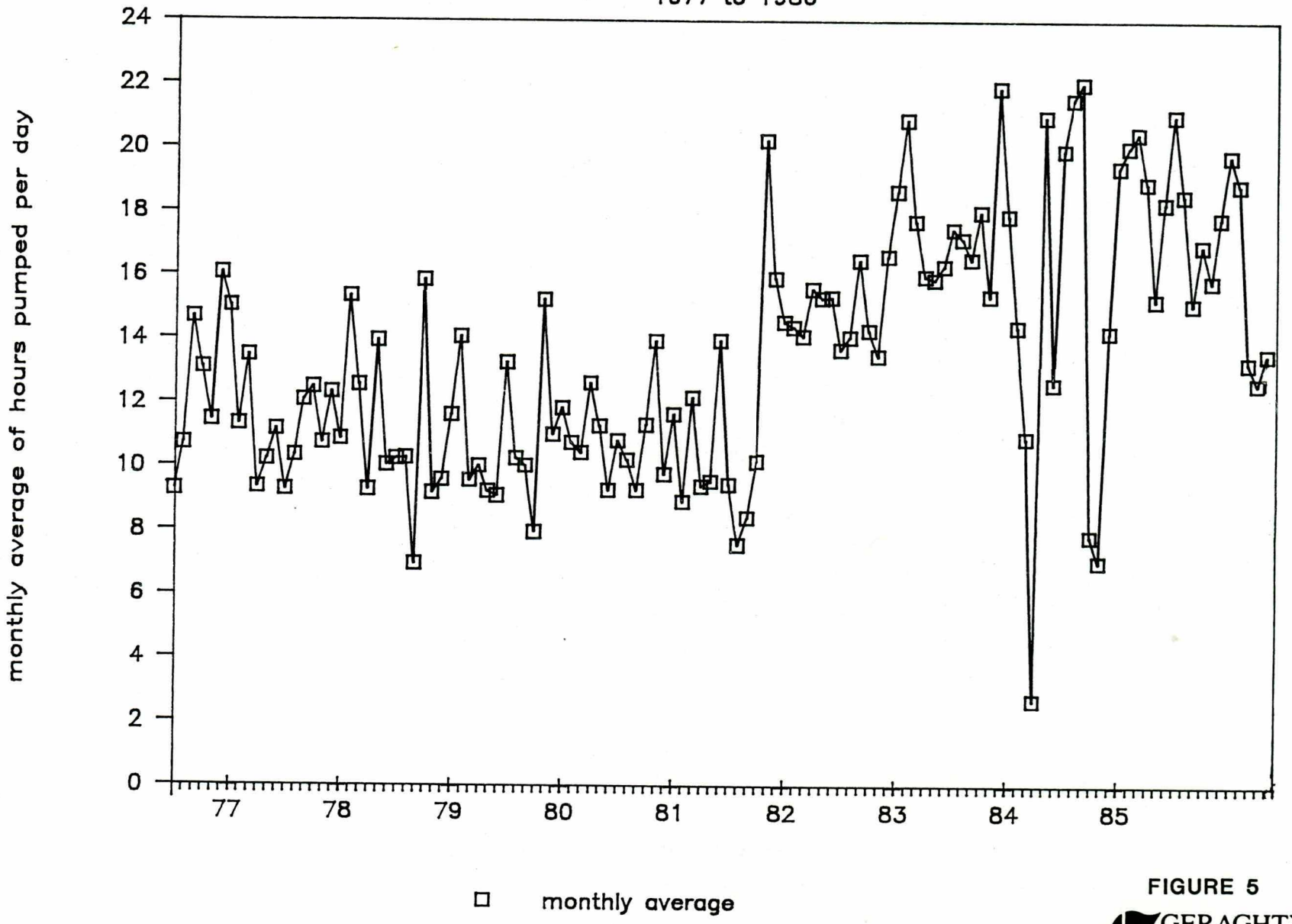


FIGURE 5

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PUMPING HISTORY OF CITY WELL 9

1977 to 1986

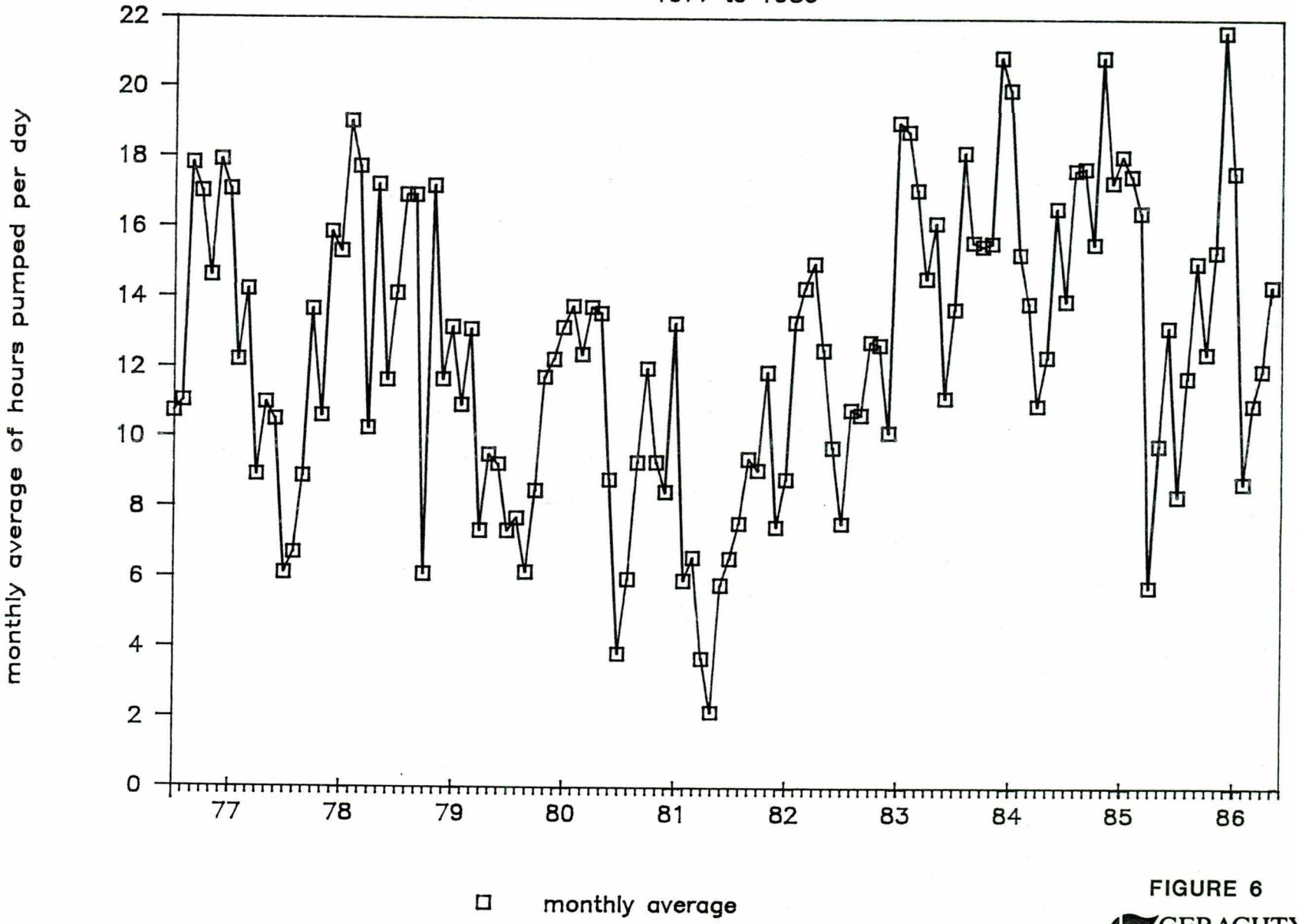


FIGURE 6

GERAGHTY & MILLER, INC.
Ground-Water Consultants

pumping history is summarized in Figures 4, 5, and 6, and is further defined below:

- During the winter months, wells 3 and 4 in the East Side Well Field commonly pump continuously, while wells 7 and 9 in the West Side Well Field run alternately. Well 8, on the east side near the Wausau Municipal Airport, is used only during times of high demand or periods when other wells must be shut down.

- During the summer months, pumping is heavier due to increased water demand, and all City wells are required to run almost continuously.

- The pumping rate of City Well 3 has had to be reduced over the last several years, from 1,250 gpm to the present pumping rate of 1,175 gpm. Wells 7 and 9 on the west side of the river have taken over the load well 3 is unable to carry. Well 6 was only used to meet maximum demands when necessary by mixing with clean water from the other wells.

because of increased head to stripper?

3.5.2 Ground-Water Elevations and Flow Directions

Ground-water elevations and subsequently derived flow directions were evaluated on the west side of the Wisconsin River by collecting water level measurements semi-monthly over a 6-month period of time (May 1986 to January 1987) from all the monitoring wells on the west side. A summary of the available well construction information for the monitoring wells on the west

side can be found in Table 3-1. Table 3-2 provides the water level measurements recorded from May 1986 through January 1987.

Water level conditions from two dates during the study program are presented in Figures 7 and 8 (May 22, 1987 and November 26, 1986, respectively). On the west side of the study area, natural ground-water gradients are somewhat steeper than the rest of the area, as ground-water levels are controlled by higher bedrock levels in addition to the nearby well field. As ground water reaches the deep alluvial deposits of the Wisconsin River Valley, natural gradients become somewhat flatter and more strongly affected by the level of the Wisconsin River, which is the natural discharge area for the regional ground-water flow system. This stretch of the Wisconsin River directly east of the study area is a reservoir and the elevation is usually maintained at 1,188 $\pm$ 0.5 feet msl by a dam south of the study area controlled by the Wisconsin Valley Improvement Corporation.

Pumping from the city well field affects ground-water flow directions in this area. The radius of influence and distribution of the cone of depression of the well field varies, depending upon the rate and duration of pumping in each water supply well.

No strong vertical gradients were observed in the aquifer during the study period. For this reason, it appears that ground-water flow is predominantly horizontal in this area.

In general, water levels measured from the wells, in addition to results from the pumping test, indicate that Bos Creek is a general transition zone

TABLE 3-1
SUMMARY OF WEST SIDE WELL DATA, CITY OF WAUSAU, WI

	Well Designation	Top of Casing Elevation	Ground Surface Elevation	Depth of Well	Bottom of Screen Elevation	Screen Length	Top of Screen Elevation
	C-1S	1,223.69	1,220.98	29.9	1,191.08	15.0	1,206.08
	C-2S	1,219.20	1,216.24	37.9	1,178.34	15.0	1,193.34
	C-3S	1,220.17	1,217.41	38.9	1,178.51	15.0	1,193.51
	C-4S	1,216.80	1,214.26	32.2	1,182.06	15.0	1,197.06
D	C-4D	1,216.30	1,214.04	104.2	1,109.84	5.0	1,114.84
	C-6S	1,221.69	1,219.32	39.5	1,179.82	15.0	1,194.82
	C-7S	1,220.96	1,218.26	36.0	1,182.26	15.0	1,197.26
D	EPA1A	1,215.81	1,214.21	130.0	1,084.21	8.0	1,092.21
	EPA3A	1,223.26	1,221.11	140.0	1,081.11	10.0	1,091.11
	EPA3B	1,223.53	1,221.17	74.9	1,146.27	10.0	1,156.27
	EPA4A	1,215.24	1,215.59	100.0	1,115.59	10.0	1,125.59
	EPA4B	1,215.62	1,215.68	60.5	1,155.18	10.0	1,165.18
	EPA4C	1,215.34	1,215.69	40.0	1,175.69	10.0	1,185.69
	EPA5	1,219.22	1,219.28	45.0	1,174.28	10.0	1,184.28
	EPA6	--	1,218.93	45.0	1,174.00	10.0	1,184.00
	EPA7	1,219.00	1,219.06	45.0	1,174.06	10.0	1,184.06
	EPA9	1,201.92	1,201.99	--	--	--	--
	PLUM	1,215.85	1,213.73	--	--	--	--
	CW6	1,220.02	1,220.02	100.0	1,120.02	38.5	1,158.52
	CW7	1,223.63	1,223.63	100.0	1,123.63	39.0	1,162.63
	CW9	1,224.56	1,224.56	100.0	1,124.56	60.0	1,184.56
	CW9OBS	1,224.25	1,222.12	--	--	--	--
	R1S	1,222.08	1,220.01	40.5	1,179.51	10.0	1,189.51
D	R1D	1,222.34	1,220.16	121.0	1,099.16	10.0	1,109.16
	R2S	1,209.84	1,208.05	28.0	1,180.05	10.0	1,190.05
D	R2D	1,209.54	1,207.69	135.0	1,072.69	10.0	1,082.69
	R3S	1,215.27	1,212.79	32.0	1,180.79	10.0	1,190.79
	R3D	1,215.51	1,213.09	136.0	1,077.09	10.0	1,087.09
D	R4D	1,219.21	1,216.05	133.0	1,083.05	10.0	1,093.05
	GM1S	1,216.06	1,214.42	37.0	1,177.42	10.0	1,167.42
	GM2S	1,211.91	1,212.32	34.0	1,178.79	10.0	1,188.79
	GM3S	1,214.72	1,215.10	37.0	1,178.10	10.0	1,188.10
	GM4S	1,216.13	1,214.31	36.0	1,178.31	10.0	1,188.31
D	GM4D	1,216.46	1,214.52	145.0	1,069.52	10.0	1,079.52
	WHTW	1,199.52	--	--	--	--	--
	Test Well 10		1,215.05	--	--	--	--
	Staff Gauge (Bos Creek)		1,187.82	NA	NA	NA	NA

-- = Information not available NA - Not applicable

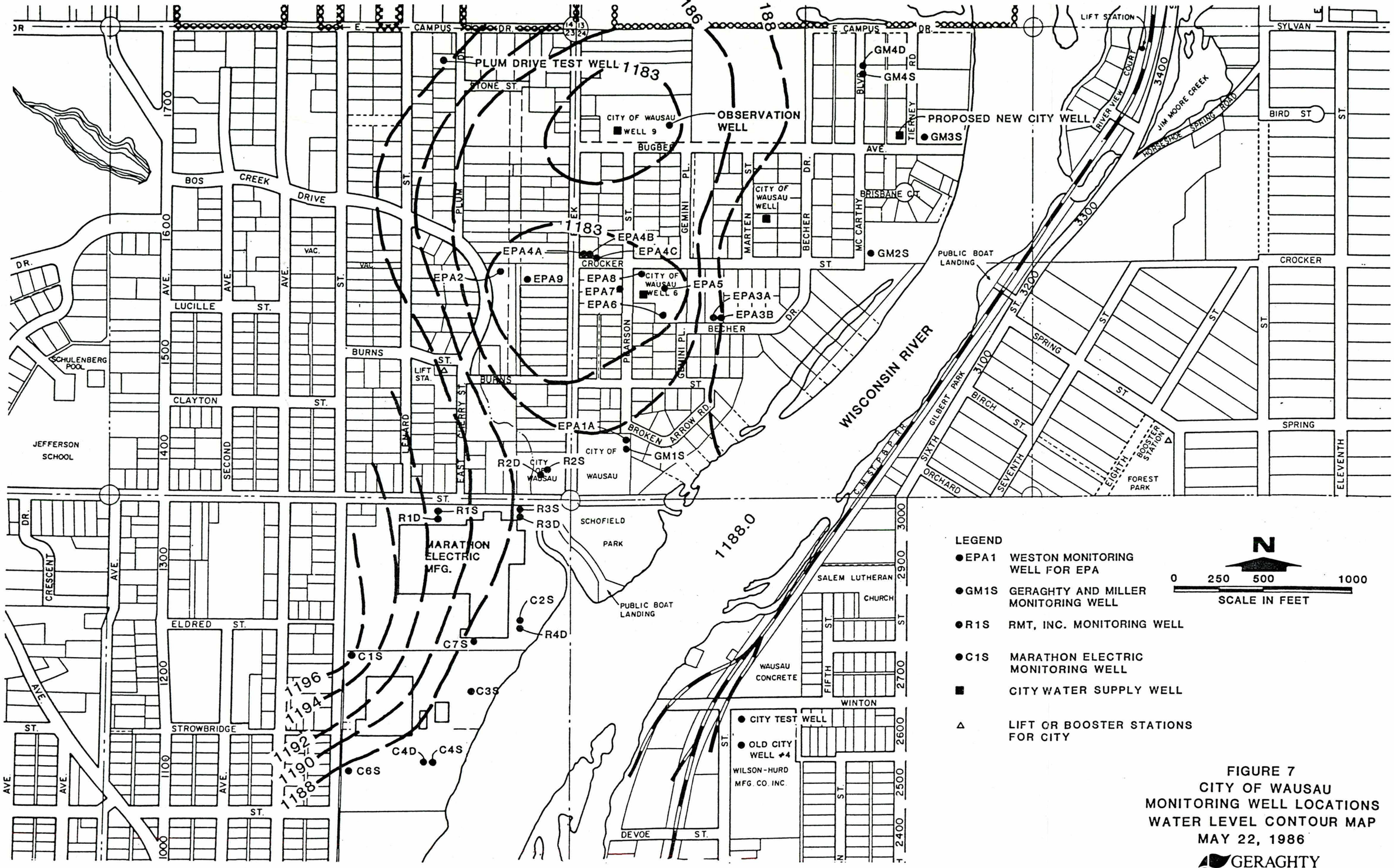
TABLE 3-2
TIME SERIES WATER LEVEL MEASUREMENTS
WEST SIDE MONITORING WELLS (WAUSAU, WI)

Well:	C 1S	C 2S	C 3S	C 4S	C 4D	C 6S	C 7S	EPA 1A	EPA 2A	EPA 3A	EPA 3B	EPA 4A
Date					D			D				
22-May-86	27.10	31.77	32.72	29.43	28.94	33.85	33.44	29.73	17.16	32.96	38.11	31.80
29-May-86	26.92	31.89	32.85	29.52	28.97	33.97	33.57	29.93	17.21	38.30	38.49	31.94
12-Jun-86	27.73	31.92	37.81	29.34	28.95	34.04	33.59	29.88	17.88	38.19	38.38	32.42
26-Jun-86	28.20	31.74	32.74	29.09	28.81	33.92	33.49	29.95	18.24	38.38	38.56	32.70
10-Jul-86	27.65	31.77	32.74	29.10	28.81	33.81	33.43	29.92	18.09	38.52	38.65	32.56
24-Jul-86	28.25	31.60	32.61	29.11	28.69	33.72	33.28	28.77	17.43	37.28	37.49	30.61
07-Aug-86	28.52	31.77	32.74	29.33	28.81	33.92	33.46	29.67	17.26	38.22	38.37	31.74
21-Aug-86	28.86	31.74	32.67	29.26	28.78	33.95	33.45	29.62	17.17	38.16	38.35	31.59
04-Sep-86	24.59	31.79	32.76	29.27	28.83	34.01	33.49	29.62	17.31	38.18	38.32	31.80
18-Sep-86	29.01	31.52	32.45	28.91	28.55	33.75	33.19	29.38	17.21	37.89	38.09	31.53
02-Oct-86	25.57	30.49	31.55	28.09	27.61	32.74	32.18	27.75	16.55	35.88	36.06	30.19
16-Oct-86	25.50	30.39	31.40	27.90	27.50	32.52	32.08	27.97	16.11	36.25	36.43	30.04
30-Oct-86	26.81	33.54	35.30	32.04	31.50	34.06	35.04	31.23	--	39.38	39.60	31.46
26-Nov-86	28.88	32.35	33.47	30.13	29.59	34.42	34.02	30.17	--	38.54	37.74	31.87
05-Jan-87	30.68	--	33.67	34.88	29.83	--	--	30.32	--	--	--	57.00

Well:	EPA 4B	EPA 4C	EPA 5	EPA 7	EPA 9	Plua	CW 6	CW 7	CW 9	CW 9 OBS	R1S	D R1D
Date												
22-May-86	32.25	--	36.06	36.93	--	23.17	42.00	33.00	59.00	40.50	--	--
29-May-86	32.36	--	36.32	37.06	17.73	23.33	44.00	65.00	57.00	40.48	--	--
12-Jun-86	32.83	32.60	36.50	37.36	18.23	23.80	45.00	64.00	58.00	41.26	--	--
26-Jun-86	33.09	32.85	36.71	37.63	18.52	24.22	43.00	64.00	58.00	32.74	--	--
10-Jul-86	32.97	32.69	36.72	37.49	18.37	24.41	44.00	65.00	58.00	41.26	--	--
24-Jul-86	31.01	30.75	33.89	33.87	16.89	24.55	17.00*	64.00	57.00	40.53	--	--
07-Aug-86	32.11	31.87	36.26	36.88	17.62	24.48	41.00	64.00	43.00*	40.70	--	--
21-Aug-86	31.98	31.67	36.12	36.75	17.52	24.45	42.00	68.00	42.00	40.20	--	--
04-Sep-86	32.20	31.95	36.24	36.94	17.70	24.66	44.00	68.00	43.00	40.17	--	--
18-Sep-86	31.92	31.67	35.90	36.60	17.48	24.74	42.00	68.00	41.00	39.85	--	--
02-Oct-86	30.54	30.32	33.79	34.76	16.23	24.37	41.00	36.00*	57.00	38.52	33.12	33.51
16-Oct-86	30.44	30.14	34.16	34.92	16.05	23.94	42.00	68.00	40.00	38.26	32.82	33.26
30-Oct-86	31.89	31.62	36.61	37.00	17.28	23.31	43.00	66.00	43.00	40.55	33.71	34.53
26-Nov-86	32.25	32.03	36.35	36.97	17.75	23.69	43.00	67.00	--	40.33	34.31	34.89
05-Jan-87	103.00	--	36.48	37.18	18.08	--	43.00	--	--	--	35.28	--

Well:	R2S	D R2D	R3S	R3D	D R4D	GM1S	GM2S	GM3S	GM4S	D GM4D
Date										
22-May-86	--	--	--	--	--	--	--	--	--	--
29-May-86	--	--	--	--	--	--	--	--	--	--
12-Jun-86	--	--	--	--	--	--	--	--	--	--
26-Jun-86	--	--	--	--	--	--	--	--	--	--
10-Jul-86	--	--	--	--	--	--	--	--	--	--
24-Jul-86	--	--	--	--	--	--	--	--	--	--
07-Aug-86	--	--	--	--	--	--	--	--	--	--
21-Aug-86	--	--	--	--	--	--	--	--	--	--
04-Sep-86	--	--	--	--	--	--	--	--	--	--
18-Sep-86	--	--	--	--	--	--	--	--	--	--
02-Oct-86	20.83	21.32	26.03	27.13	30.57	28.09	23.58	26.22	27.75	28.04
16-Oct-86	20.72	20.33	25.80	27.07	30.45	28.14	23.89	26.22	27.85	28.18
30-Oct-86	22.61	24.40	27.06	29.94	33.81	31.34	27.64	30.41	31.74	32.09
26-Nov-86	22.85	23.34	27.53	29.03	32.41	30.40	21.20	28.36	30.15	30.45
05-Jan-87	27.07	--	27.82	29.19	32.66	--	26.08	28.34	30.10	30.39

-- Water Levels Not Measured
* City Well 6 Not Pumping



LEGEND

- ●EPA1 WESTON MONITORING WELL FOR EPA
- ●GM1S GERAGHTY AND MILLER MONITORING WELL
- ●R1S RMT, INC. MONITORING WELL
- ●C1S MARATHON ELECTRIC MONITORING WELL
- ■ CITY WATER SUPPLY WELL
- △ LIFT OR BOOSTER STATIONS FOR CITY

N

0 250 500 1000

SCALE IN FEET

FIGURE 7
CITY OF WAUSAU
MONITORING WELL LOCATIONS
WATER LEVEL CONTOUR MAP
MAY 22, 1986

GERAGHTY & MILLER, INC.
Ground-Water Consultants

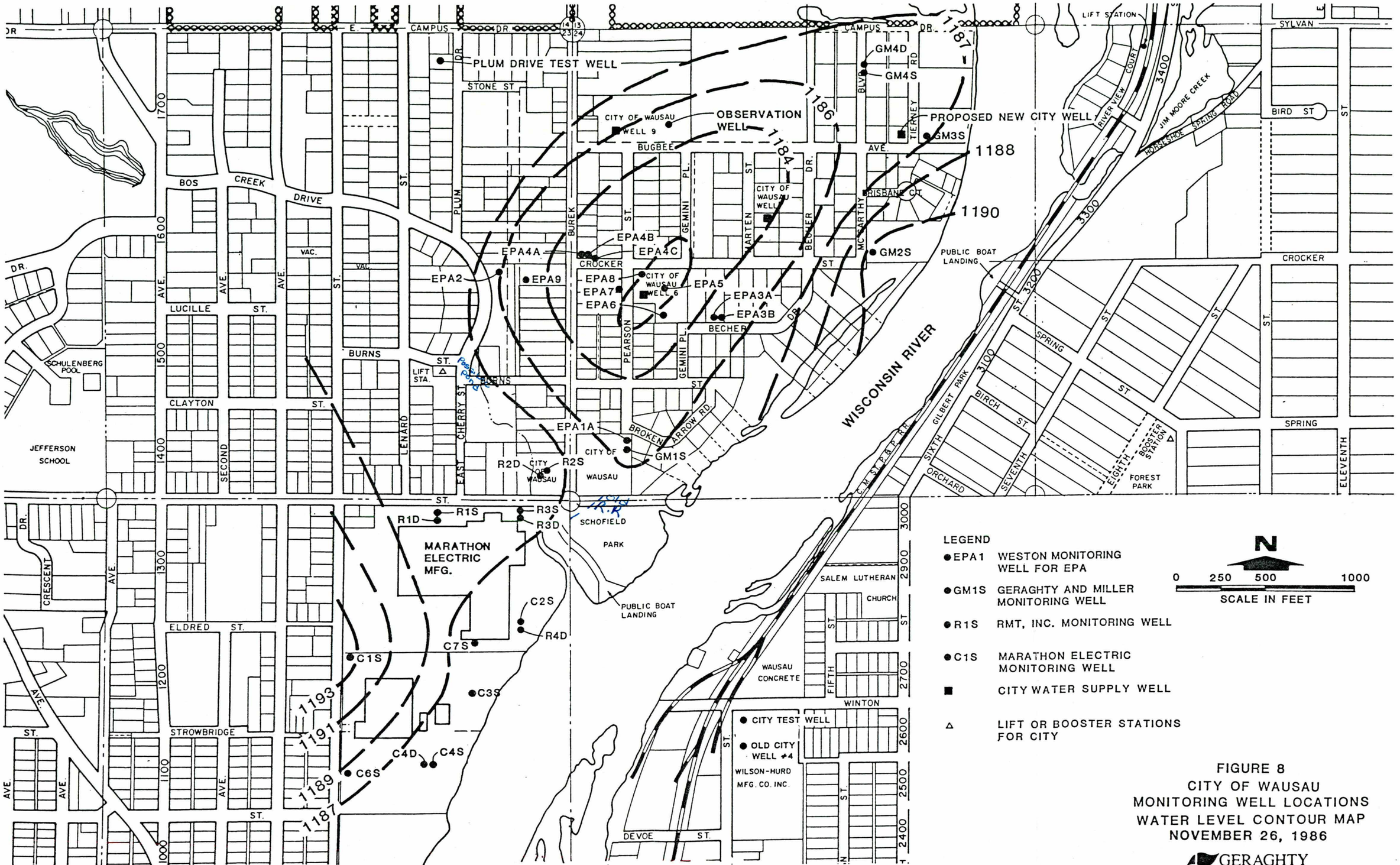


FIGURE 8
CITY OF WAUSAU
MONITORING WELL LOCATIONS
WATER LEVEL CONTOUR MAP
NOVEMBER 26, 1986

GERAGHTY & MILLER, INC.
Ground-Water Consultants

for ground-water flow directions. North of Bos Creek, it appears that ground-water flows to the north and east toward City Well 6. South of Bos Creek, it appears that ground water flows predominantly east and southeast toward the Wisconsin River. The extent that Bos Creek influences flow directions is believed to be dependent on water levels in the creek. During high creek stages, water may flow from the creek into the aquifer, and during low stages ground water may discharge into the creek. The effectiveness of the creek as a boundary was not evaluated.

Variations in the alluvial deposits may also control ground-water flow. The boring logs recorded during drilling indicate that the alluvial deposits vary from fine-sandy deposits to coarse-gravelly layers. Based on the boring logs, it appears there may also be some coarse layers at depth. While no continuous layers have been mapped, it is probable that gravelly lenses were deposited in the beds of the old stream channels, which would be expected to parallel the current Wisconsin River channel. If this is true, these coarse layers would result in a greater potential for contaminant migration along higher permeability zones created by these deposits. However, water level response data collected during the pump test from individual monitoring wells has not provided any clear hydraulic evidence that these channels exist.

Alternatively, the geophysical survey (Weston, 1985) indicated the presence of a bedrock ridge south of City Well 6. If this ridge is as extensive and as high as indicated in the survey, old river channels may not exist in this area. This bedrock ridge may influence deep ground- water flow and divert it toward the Wisconsin River discharge area. There is not

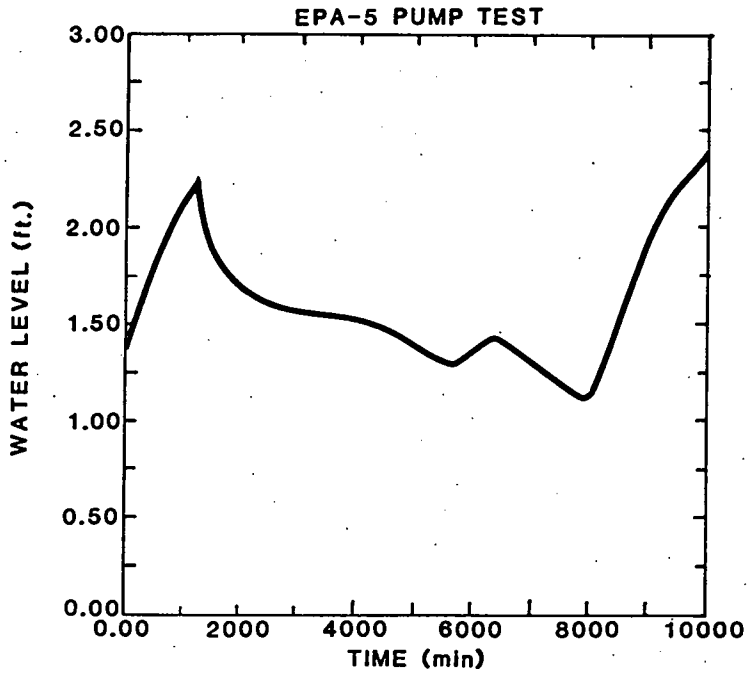
sufficient information at this time to determine the presence and degree of influence of the ridge.

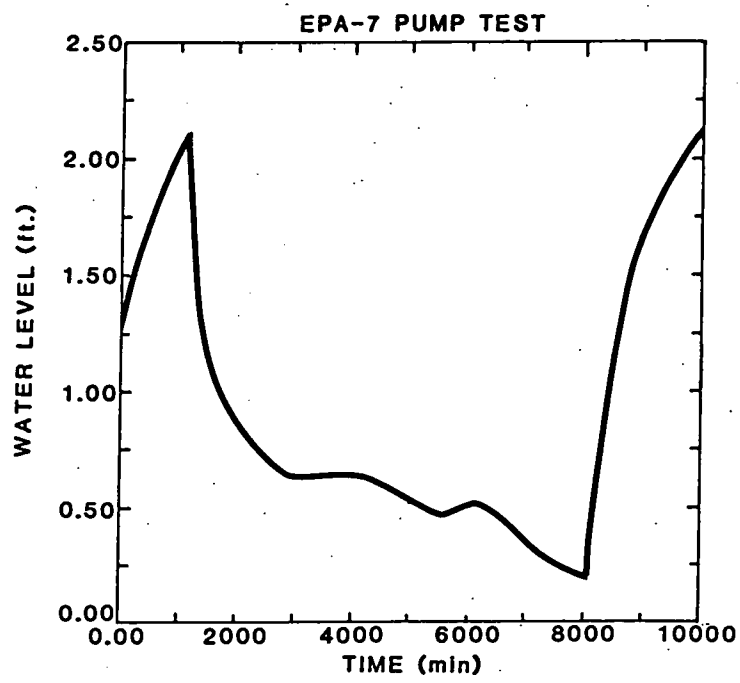
3.5.3 Pump Test Results

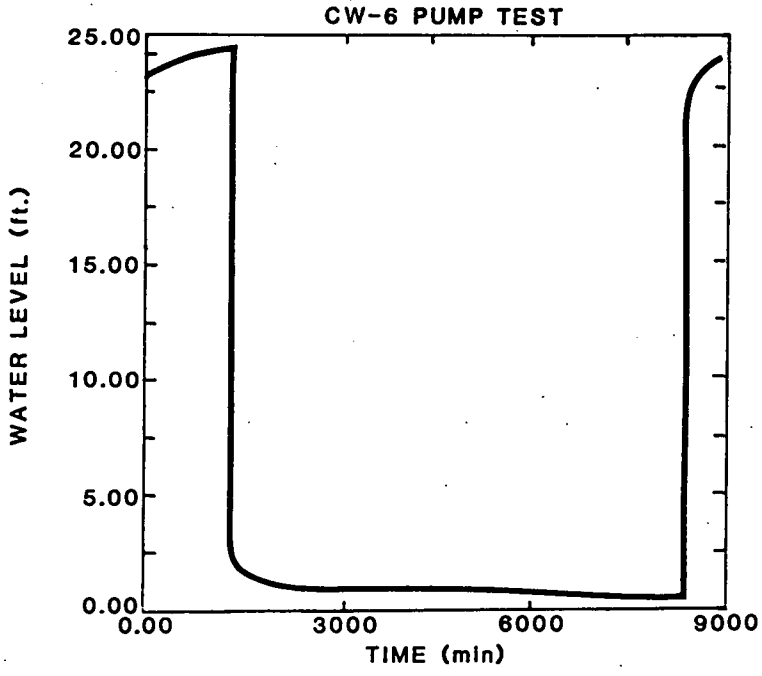
An aquifer test was conducted on the City of Wausau West Side Well Field from December 6-12, 1986. The purpose of this test was to define important aquifer characteristics which include hydraulic conductivity, transmissivity, and storage coefficient.

The test well, City Well 6, was pumped at a constant rate of 1,100 gpm throughout the seven (7) days of the test, at which time it was shut down and the recovery was monitored for 24 hours. Water levels were measured in the test well and nearby monitoring wells throughout the pump test. Water level measurements were collected by pressure transducers for the test well and those wells in the near vicinity, and by electrical measuring tapes and steel tapes for those wells at a greater distance from the test well. Figure 9 illustrates water levels recorded during the pump test at City Well 6 and two of the monitoring wells (EPA5 and EPA7).

There are a number of critical factors which could influence the pumping test and therefore were necessary to monitor. These include any pumping of nearby wells (other than the test well), changes in pumping rates of the wells, fluctuation in water levels of the nearby Wisconsin River, weather conditions (barometric pressure, temperature and precipitation), geological features (presence of a buried bedrock ridge), and anomalies in water level







NOTE:

City Well 6 turned on
at 1200 minutes,
pumping rate = 1100 GPM

City Wells 7 and 9 turned on
at 3600 minutes,
pumping rate CW7 = 1600 GPM
pumping rate CW9 = 750 GPM

City Well 6 turned off
at 8200 minutes

FIGURE 9
CITY OF WAUSAU
WATER LEVEL RECORDS
IN SELECTED WELLS
DURING AQUIFER TEST

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Ground-Water Consultants

readings (due to movement and interference with transducers or inaccuracies in water level measurement). These are further described below:

- Due to the city's water supply needs, the wells on the west side well field were shut down only 30 hours prior to the start of the pumping test. Full recovery of the water table had not occurred at the start of the test and a correction for the antecedent trend in the water levels was incorporated into the analyses. The City operated on system reserves during the first 1000 minutes of the test without utilizing wells 7 or 9. By Monday evening (the test began Saturday morning), the city's reservoirs of water began to be depleted and additional west side wells were required to come on-line. Prior to this time, only City Well 4 on the east side of the river was pumping. City Wells 3, 7 and 9 were turned on at 2:00 a.m. Tuesday, December 9, 1986 (3800 minutes after the start of the test), at rates of 1175 gpm, 1600 gpm, and 750 gpm, respectively. City Well 4 was shut off at this time, but was required to resume pumping at 7:00 a.m. Thursday, December 11, for two hours, due to an ongoing study conducted by the USEPA and Michigan Technological University.

- The elevations of the water levels in the Wisconsin River during the time the test was in progress were recorded by the Wisconsin Valley Improvement Corporation, at a water level recorder located inside the power house at the dam south of the study area. River levels showed a fairly consistent elevation of 1187.40 ($\pm$0.3) ft/msl during the test period. The water levels measured at the

Wisconsin River from December 5 through December 12 are listed in Table 3-3.

- Changes in weather conditions during the time the test was in progress were recorded by the Wausau Flight Service at the Wausau Municipal Airport. Barometric pressure showed a steady level of 30.00 ($\pm$0.50) mm Hg during the test period; therefore, no water level changes are likely to be affected by barometric pressure fluctuations. Temperatures during the test period fell from 30°F to 0° F, with only a slight warming from time to time. Precipitation was minimal during the pump test, as only two inches of snow (0.1 inch water level equivalent) accumulated during the seven days of the test. Barometric pressure measurements, temperature readings, and precipitation amounts for December 6 through December 12 are listed in Table 3-4.

Methods of Analysis. The physical setting for the West Side Well Field consists of a wedge-shaped aquifer thinning from east to west, bounded on the east by the Wisconsin River and to the west by the rising crystalline bedrock surface. North of the well field there is an area where gravel mining has removed from 25 to 35 feet of the aquifer material over an area of several tens of acres. South of the well field area, Bos Creek may act as a boundary near the surface or have no effect at all. The underlying bedrock has little primary permeability and is discounted as a source of water. The irregular bedrock surface controls the aquifer thickness and may control flow directions in the deeper portions of the aquifer. The aquifer is composed of unconsolidated sands and gravels with minor amounts of silt.

TABLE 3-3
WISCONSIN RIVER ELEVATIONS DURING PUMP TEST

December 5, 1986		December 6, 1986		December 7, 1986		December 8, 1986	
TIME	ELEVATION	TIME	ELEVATION	TIME	ELEVATION	TIME	ELEVATION
8:00	1187.47	1:00	1187.39	1:00	1187.50	1:00	1187.72
9:00	1187.49	2:00	-	2:00	-	2:00	-
10:00	1187.50	3:00	1187.37	3:00	1187.59	3:00	1187.48
11:00	1187.54	4:00	-	4:00	-	4:00	-
12:00	1187.61	5:00	1187.38	5:00	1187.66	5:00	1187.75
13:00	1187.66	6:00	1187.38	6:00	1187.69	6:00	1187.65
14:00	1187.57	7:00	1187.40	7:00	1187.45	7:00	1187.53
15:00	1187.38	8:00	1187.42	8:00	1187.40	8:00	1187.41
16:00	1187.38	9:00	1187.42	9:00	1187.46	9:00	1187.40
17:00	1187.00	10:00	1187.40	10:00	1187.55	10:00	1187.40
18:00	-	11:00	1187.38	11:00	1187.67	11:00	1187.39
19:00	1187.40	12:00	1187.48	12:00	1187.52	12:00	1187.40
20:00	-	13:00	1187.63	13:00	1187.42	13:00	1187.49
21:00	1187.38	14:00	1187.59	14:00	1187.38	14:00	1187.55
22:00	-	15:00	1187.59	15:00	1187.39	15:00	1187.53
23:00	1187.40	16:00	1187.65	16:00	1187.39	16:00	1187.51
24:00	-	17:00	1187.79	17:00	1187.40	17:00	1187.53
		18:00	-	18:00	-	18:00	-
		19:00	1187.92	19:00	1187.38	19:00	1187.59
		20:00	-	20:00	-	20:00	-
		21:00	1187.71	21:00	1187.39	21:00	1187.62
		22:00	-	22:00	-	22:00	-
		23:00	1187.37	23:00	1187.54	23:00	1187.61
		24:00	-	24:00	-	24:00	-

December 9, 1986		December 10, 1986		December 11, 1986		December 12, 1986	
TIME	ELEVATION	TIME	ELEVATION	TIME	ELEVATION	TIME	ELEVATION
1:00	1187.54	1:00	1187.57	1:00	1187.42	1:00	1187.46
2:00	-	2:00	-	2:00	-	2:00	-
3:00	1187.39	3:00	1187.40	3:00	1187.42	3:00	1187.47
4:00	-	4:00	-	4:00	-	4:00	-
5:00	1187.40	5:00	1187.38	5:00	1187.38	5:00	1187.46
6:00	1187.40	6:00	1187.40	6:00	1187.38	6:00	1187.44
7:00	1187.38	7:00	1187.43	7:00	1187.41	7:00	1187.41
8:00	1187.38	8:00	1187.48	8:00	1187.42		
9:00	1187.40	9:00	1187.55	9:00	1187.41		
10:00	1187.39	10:00	1187.69	10:00	1187.42		
11:00	1187.41	11:00	1187.61	11:00	1187.72		
12:00	1187.39	12:00	1187.57	12:00	1187.42		
13:00	1187.40	13:00	1187.47	13:00	1187.42		
14:00	1187.43	14:00	1187.39	14:00	1187.41		
15:00	1187.44	15:00	1187.39	15:00	1187.38		
16:00	1187.44	16:00	1187.39	16:00	1187.38		
17:00	1187.45	17:00	1187.40	17:00	1187.39		
18:00	-	18:00	-	18:00	-		
19:00	1187.38	19:00	1187.43	19:00	1187.40		
20:00	-	20:00	-	20:00	-		
21:00	1187.38	21:00	1187.43	21:00	1187.43		
22:00	-	22:00	-	22:00	-		
23:00	1187.39	23:00	1187.39	23:00	1187.46		
24:00	-	24:00	-	24:00	-		

TABLE 3-4

WEATHER CONDITIONS DURING PUMP TEST
(December 6 - 13, 1986)

	Barometric Pressure (Readings at Noon)	Temperature (Noon) Degrees F	Readings (Midnight) Degrees F	(Snow)	Precipitation (Water Equivalent)
December 6, 1986	30.34 mm Hg	30	22	trace	-
December 7, 1986	30.07 mm Hg	30	21	trace	-
December 8, 1986	30.05 mm Hg	26	25	1"	0.06"
December 10, 1986	29.85 mm Hg	21	2	trace	0.01"
December 11, 1986	30.02 mm Hg	6	9	none	-
December 11, 1986	29.63 mm Hg	21	5	1"	0.03
December 12, 1986	30.16 mm Hg	6	-5	none	-
December 13, 1986	30.46 mm Hg				

Inspection of the basic water level data collected during the aquifer test indicates the aquifer responded as an unconfined aquifer with delayed yield. The aquifer test data was analyzed using Boulton's method as well as approximations using the Theis and Jacob equations to determine the transmissivity, storage coefficient, and hydraulic conductivity. The methods of analyses are well described in "Analysis and Evaluation of Pumping Test Data" (G.P., and N.A. de Ridder, lBull. 11, ILRI, 1983). Appropriate corrections were made to reflect dewatering of the unconfined aquifer and antecedent trends in water levels prior to the test start.

The average transmissivity determined using the corrected drawdown and recovery data ranges from 315,000 to 370,000 gpd/ft. These values agree with those calculated by Devaul and Green (1971, USGS Water Resources of Wisconsin, Central Wisconsin Basin) who determined coefficient of transmissivity values of the outwash deposits in Marathon County ranging from 340,000 to 900,000 gpd/ft.

The calculated storage coefficients of 0.05 to 0.34 are within the range expected for the alluvial aquifer. Values calculated by Devaul and Green (1971, USGS) were determined to be 0.10 to 0.30.

Hydraulic conductivity is related to transmissivity by the following equation:

$K = T/b$

Where: K = hydraulic conductivity

T = transmissivity

b = saturated thickness of the aquifer

Based on an average saturated thickness of the alluvial aquifer of 120 feet, the values of hydraulic conductivity average between 2625 to 3083 gpd/ft^2. These values are in agreement with those determined by Devaul and Green (1971, USGS) who indicated hydraulic conductivity of 1200 to 5600 gpd/ft^2.

Hydraulic conductivities and transmissivities were also determined by Kendy (1986, Hydrogeology of the Wisconsin River Valley in Marathon County, Wisconsin; Master's Thesis, University of Wisconsin-Madison), using a computer program to estimate transmissivity and hydraulic conductivity from specific capacity data obtained from local well drillers. Using a storage coefficient of 0.1 based on pumping test results, calculations were made for all wells screened in sand and gravel, and the obtained geometric mean of hydraulic conductivity of 1.3×10^{-3} ft/sec was obtained. Kendy also utilized short term "slug tests" to determine the hydraulic conductivity at shallow monitoring wells in the area. A mean value of 4.9×10^{-4} ft/sec was obtained from 10 of the tests performed on the wells in sand and gravel. Values as low as 4×10^{-7} ft/sec were obtained for piezometers screened in clayey material within or beneath the outwash deposits.

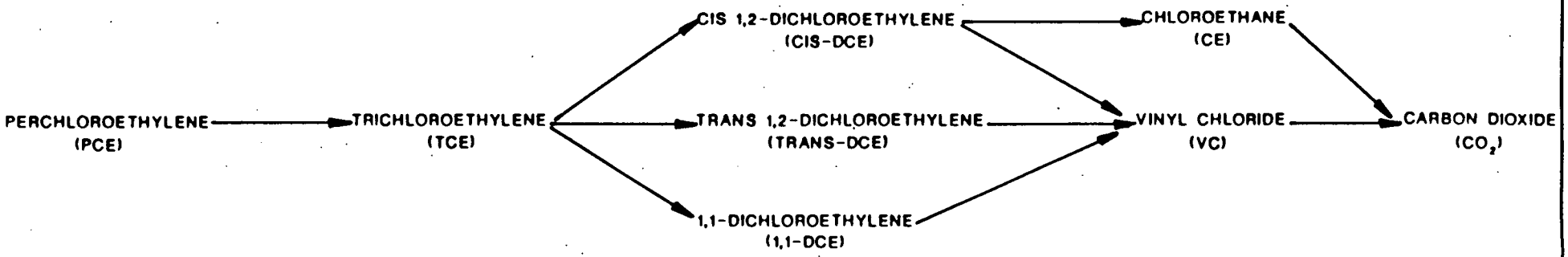
3.6 Ground Water Chemistry

3.6.1 Chemistry of PCE and TCE

Although a number of organic compounds were found in the aquifer, trichloroethylene is of primary interest due to its occurrence in City Well 6. The following discussion deals with biochemistry and physical chemistry of trichloroethylene and related compounds in ground water. (In the interest of brevity, certain abbreviations will be used throughout: Trichloroethylene will be shortened to TCE; Tetrachloroethylene or perchloroethylene will be abbreviated PCE; dichloroethylene will be abbreviated DCE; and volatile organic compounds will be shortened to VOCs).

Biodegradation. Biodegradation can change the concentrations of organic compounds in the saturated and unsaturated zones of subsurface environments. Of particular interest is the relationship between PCE and TCE. PCE can degrade to TCE, and subsequently to lower chlorinated organics. The various degradation pathways of PCE and TCE are shown in more detail in Figure 10. Degradation pathways shown are not reversible. Thus, TCE can originate from PCE, but PCE cannot be derived from TCE. The extent of biodegradation that occurs depends on the concentrations present, the concentrations of other compounds, exposure time to the biodegrading organisms and other hydrogeochemical factors. Therefore, it is not feasible to predict the rate of biodegradation at the Marathon Electric/Old City Landfill site. However, some information is available on the relative rates of biodegradation of the individual compounds. For instance, chloroethane is not usually found in ground-water samples, as it is rapidly degraded. On the other hand, trans

BIODEGRADATION PATHWAYS OF PERCHLOROETHYLENE AND TRICHLOROETHYLENE



RMT INC

Dwn. by.:	PPD
Date:	4 / 87
Proj. #:	222.04

FIGURE 10

1,2-dichloroethylene, cis 1,2-dichloroethylene and vinyl chloride degrade more slowly. These compounds are commonly found as breakdown products of PCE or TCE.

Water Solubility. Another consideration in the chemistry of these compounds is their water solubilities. All of the VOCs detected in this investigation are relatively soluble and mobile in ground water (Table 3-5).

At concentrations exceeding water solubility, these compounds (with the exception of vinyl chloride) sink in ground water due to their higher densities. This situation would occur when a large volume is spilled. For instance, a large spill of TCE could sink in the aquifer until reaching a less permeable layer such as bedrock. If the bedrock is sloped, the pooled TCE could flow downgradient and collect in depressions or pits. Over time, TCE would dissolve from the pool into the ground water.

TCE could also be preferentially transported in more permeable channels. These channels or zones may be present at or near the bedrock surface (this would be consistent with a braided formation of an old river bed). The existence of these channels would cause a complicated distribution of TCE. Evidence for this in the West Side Well Field may be found in observed concentrations of TCE at R-2D and R-3D. These wells are within 350 feet of each other, yet exhibit TCE concentrations which are different by 250 times. However, these differences could also be caused by different sources, or by ground-flow directions which cause an impact at one well but not at the other.

TABLE 3-5

SOLUBILITIES AND DENSITIES OF SELECTED
VOLATILE ORGANIC COMPOUNDS

Compound	Solubility (mg/L)	Density (H_2O = 1)
Tetrachloroethylene	150	1.63
Trichloroethylene	1,000	1.46
trans 1,2-dichloroethylene	600	1.28
cis 1,2-dichloroethylene	800	1.26
1,1-dichloroethylene	2,250	1.22
vinyl chloride	9,150	0.91

Soil/Water Partitioning. TCE tends to sorb or partition to solids which contain organic matter, such as soil. The amount of organic matter in soil decreases dramatically in the first few feet of depth; therefore, it is not practical to assign a single partition value to soil. However, for the purposes of calculation, a value of 0.5% would be reasonable for the sandy soil which is present at this site.

The resultant concentration of TCE in water, in equilibrium with TCE in the soil, can be estimated based on the relationship developed by Chiou et al. (1983). These researchers found a close correlation between the solubility of a given compound and its affinity for soil organic matter. This relationship reduces to:

$$WC = \frac{SC}{26.9\ (OMC)} \qquad \text{Eq. 1}$$

Where:

WC = soil water concentration in ug/L in equilibrium with soil organic matter.

SC = soil concentration in ug/kg in equilibrium with the water.

OMC = fractional organic matter content of soils.

For a soil concentration of 100 ug/kg (ppb), and assuming a soil organic matter consistent of 0.5% (0.005 fractional basis), the resultant water concentration of TCE in the soil is 750 ug/L (ppb).

Of the parameters in Equation 1, the most uncertainty lies in the estimate of the organic matter content of the soil. From Equation 1, it can be seen that the water concentration in the soil is inversely proportional to soil organic matter content. For instance, if the organic content estimate is 1%, then the water concentration in the soil is decreased by one-half, to 375 ug/L. The purpose of this calculation is to provide a point of reference for the observed TCE concentrations which are discussed in Section 3.6.2.

3.6.2 Occurrence of Chloroethylenes in the Aquifer

The ground-water investigation on the west side of the Wisconsin River was instigated by the discovery of TCE in City Well 6 in 1982. Although PCE and DCE were reported to have been detected (Weston, 1985), only values of TCE were reported, presumably because the other values were too low to be reliable.

Monitoring well installation and sampling was undertaken in the vicinity of City Well 6 on behalf of the USEPA by Weston from 1982-1984. Weston did not report any measurable values of VOCs in these monitoring wells. However, due to the use of an air-lift well sampling device during Weston's sampling procedures, it is possible that volatiles present in the ground water were lost by volatilization during the sampling.

In a separate investigation on behalf of the Wisconsin DNR, CH2M Hill installed and sampled seven wells on the Marathon Electric/Old City Landfill property from 1985-1986. The results of analyses of these wells, sampled for volatile organic compounds in 1985 and 1986, are summarized in Tables 3-6 and 3-7, respectively.

During the DNR's investigation, several VOC's were detected in ground water beneath the Marathon Electric/Old City Landfill property. TCE was detected at C-2S, near the southeast corner of the Marathon Electric assembly building and northeast of the landfill (see Figure 11), at a concentration of 1,060 ug/L measured on January 7, 1986. Lower levels of TCE (11-13 ug/L) were detected at C-7S, located a few feet due south of the east wing of the assembly building and north of the landfill. Within the landfill, TCE was measured in C-3S, C-4S and C-4D at concentrations ranging from 2 to 25 ug/L. Wells C-1S and C-6S, located upgradient of the landfill, contained no detectable concentrations of TCE.

Chloroform was measured at about 60 ug/L in the landfill from C-3S during both rounds of sampling by the DNR. Lower levels of chloroform were detected in both rounds at C-2S, C-7S and C-4D. DCE was found in the well nest at C-4 and also at C-2S. A portion of the DCE could be from the biodegradation of TCE in these same areas. Vinyl chloride was measured at C-4S during both rounds, in the southern edge of the landfill. 1,1,1-Trichloroethane was measured at 10-20 ug/L at C-7S during both rounds of sampling. The balance of the analytical results do not show a consistent pattern of occurrence for any VOC at levels well above the detection limits.

TABLE 3-6

RESULTS OF GROUND WATER ANALYSIS FOR VOC'S (ug/L)

(CH_2M Hill, November 25, 1985)

	Detection Limit	C-1S	C-2S	C-3S	C-4S	C-4D	C-6S	C-7S	Trip Blank	Field Blank
Per chloroethylene	0.1	ND	0.4	0.4	0.5	0.1	0.1	ND	ND	ND
Trichloroethylene	0.1	ND	280	6.9	2.0	19.7	ND	10.7	ND	ND
1,2-Dichloroethylene	0.3	ND	3.7	ND	9.3	1.4	ND	ND	ND	ND
Carbon Tetrachloride	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	0.1	ND	1.1	66	ND	1.4	ND	0.8	ND	ND
1,2-Dichloroethane	0.3	ND	ND	ND	0.4	ND	ND	ND	ND	ND
Dichloromethane	0.2	ND	0.5	0.4	0.6	0.4	1.6	1.2	0.6	0.8
Toluene	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.1	ND	ND	2.5	ND	0.3	ND	11.5	ND	ND
Vinyl Chloride	0.5	ND	ND	ND	2.2	ND	ND	ND	ND	ND
Ethyl Benzene	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorobromomethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND - Analyzed but not detected.

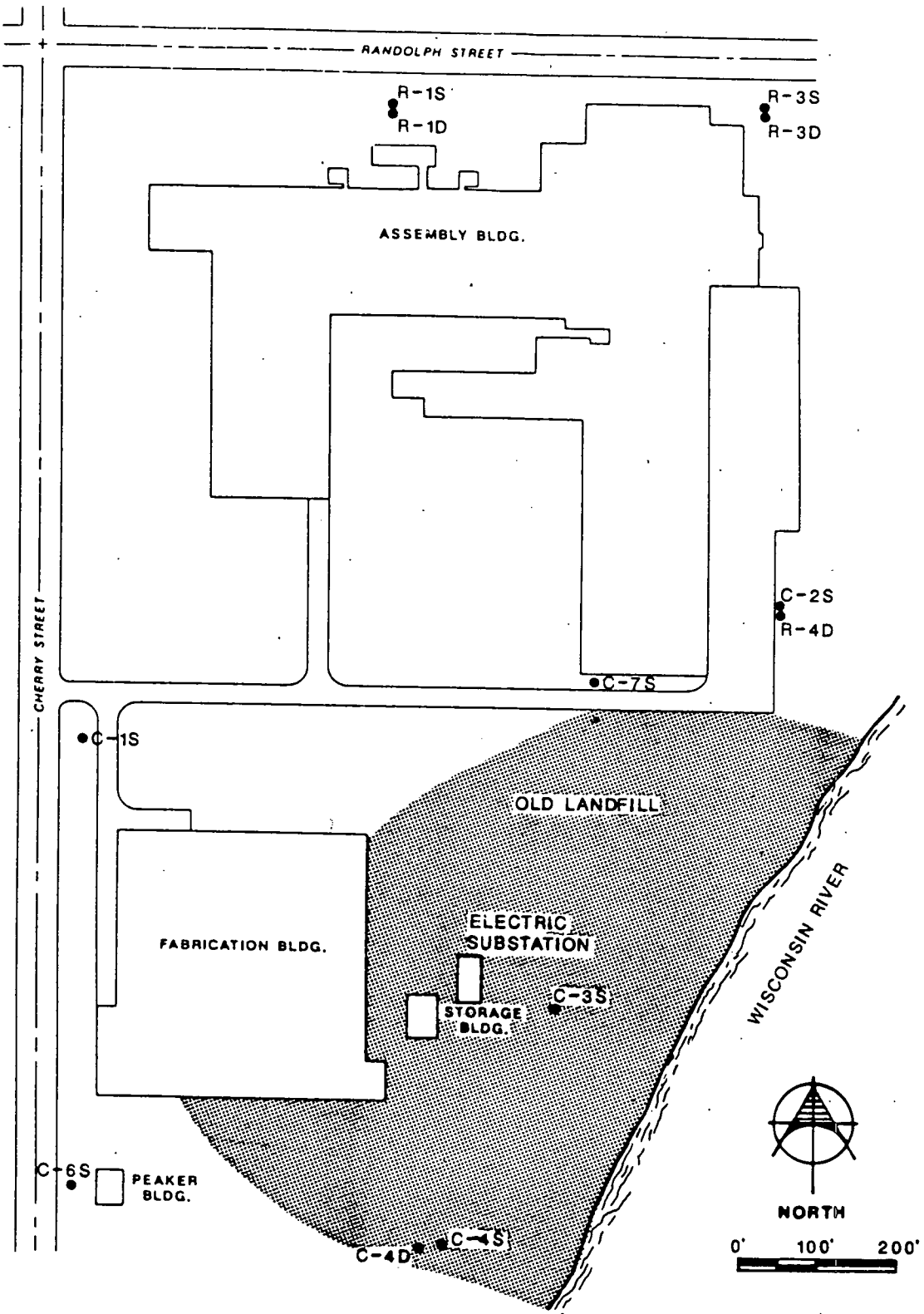
TABLE 3-7

RESULTS OF GROUND WATER ANALYSIS FOR VOC'S (ug/L)

(CH_2M Hill, JANUARY 6-7, 1986)

	Detection Limit	C-1S	C-2S	C-3S	C-4S	C-4D	C-6S	C-7S	Trip Blank	Field Blank
Per chloroethylene	0.1	ND	ND	0.3	1.1	ND	0.1	ND	ND	ND
Trichloroethylene	0.1	ND	1,060	5.0	2.6	24.6	ND	12.7	ND	ND
1,2-Dichloroethylene	0.3	ND	3.2	ND	11.4	2.5	ND	ND	ND	ND
Carbon Tetrachloride	0.1	ND	ND	98	ND	ND	ND	ND	ND	ND
Chloroform	0.1	ND	1.0	57.8	ND	1.1	0.1	0.9	ND	ND
1,2-Dichloroethane	0.3	ND	ND	ND	0.4	ND	ND	ND	ND	ND
Dichloromethane	0.2	ND	2.0	0.2	0.2	ND	ND	0.2	ND	0.4
Toluene	0.1	0.5	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.1	ND	2.0	ND	ND	0.1	ND	18.4	ND	ND
Vinyl Chloride	0.5	ND	ND	ND	3.5	ND	ND	ND	ND	ND
Ethyl Benzene	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorobromomethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND - Analyzed but not detected.



MARATHON ELECTRIC / OLD CITY LANDFILL PROPERTY

● LOCATIONS OF MONITORING WELLS

RMT NC

Dwn. by:	JM
Date:	5/7/87
Proj. #:	222.04

FIGURE 11

The VOC data from the sampling conducted by RMT and Geraghty & Miller are summarized in Table 3-8. Included in this table are data for monitoring wells north of the Old City Landfill (these results will be discussed later).

The occurrence of VOCs in the aquifer north of the landfill is localized in the deep ground water toward City Well 6. Trichloroethylene occurs at high concentrations near the bedrock surface northeast of the Old City Landfill, near the southeast corner of the assembly building (R-4D). 3190 ug/L It is also found to the northeast across Bos Creek (R-2D), at a concentration of 3,190 ug/L. 1140 in table However, TCE appears to occur at much lower concentrations of 4.4 ug/L at the northeast corner of the assembly building (R-3D), a location only 100 feet off a straight line drawn between R-4D and R-2D. TCE also occurs at low concentrations in EPA-4A (west-northwest of City Well 6). R-1D on the northern side of the Marathon Electric Property, and EPA-1A northeast of the property contained no detectable TCE.

In the shallow ground water, TCE was found in C-2S at concentrations ranging from 280 ug/l to 1,060 ug/l. C-2S 615 contains high concentrations of TCE in the shallow ground water. Concentrations ranging from about 20-60 ug/L were observed at R-2S and R-3S, and again west-northwest of City Well 6 at EPA-4C and EPA-7. Figure 12 illustrates the TCE concentrations in cross section. Areas of high TCE contamination (both shallow and deep) are dispersed, and the pattern may suggest more than one source. Potential paths of migration to explain this pattern will be discussed in the next section.

TABLE 3-8

SUMMARY OF WATER QUALITY RESULTS FOR VOLATILE ORGANIC COMPOUNDS (ug/L)
(SEPTEMBER 15-17, 1986)

	Standards	Detection Limit*	C-1S	C-2S	C-3S	C-4S	C-4D	C-6S	C-7S	R-1S	R-1D	R-2S	R-2D	R-3S	R-3D	R-4D	EPA-1A	EPA-3A	EPA-3B	EPA-4A	EPA-4C	EPA-5	EPA-7	EPA-9	GM-1S	GM-2S	CW-6	CW-10	LAB BLANK	FIELD BLANK	TRIP BLANK
Tetrachloroethylene	Zero[1]	0.1	ND	ND	0.3	5.8	ND	0.2	ND	ND	0.2	ND	ND	ND	ND	15.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethylene	5.0[2]	0.1	ND	615.	8.3	2.5	41.9	ND	10.5	0.1	ND	29.2	1140.	49.7	4.4	3190.	0.1	ND	ND	1.4	18.8	0.1	62.9	ND	ND	ND	226.	ND	ND	ND	ND
1,2-Dichloroethylene	70.0[1]	0.3	ND	10.0	ND	5.7	8.1	ND	ND	ND	ND	14.4	30.0	4.7	0.4	725.	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.0	ND	ND	ND	ND
Carbon Tetrachloride	5.0[2]	0.1	ND	ND	108.	ND	ND	ND	ND	ND	ND	ND	5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	NA	0.1	ND	ND	47.5	0.2	1.1	0.7	ND	ND	2.1	ND	ND	ND	0.9	ND	ND	ND	ND	ND	0.2	0.2	0.1	ND	0.3	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	5.0[2]	0.3	ND	ND	ND	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichloromethane	NA	0.2	ND	5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	2000.[1]	0.1	ND	5.0	0.1	ND	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.2	ND	ND	ND	ND	ND	ND	0.1	ND
1,1,1-Trichloroethane	200.[2]	0.1	ND	ND	ND	ND	0.1	ND	28.0	ND	ND	ND	ND	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.2	0.2	ND
Vinyl Chloride	1.0[2]	2.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

[1] Proposed Recommended Maximum Contaminant Level (federal)

[2] Proposed Maximum Contaminant Level (federal)

* - Detection limits were higher for CW-6, C-2S, R-2D and R-4D

ND - Analyzed but not detected

NA - Not Applicable

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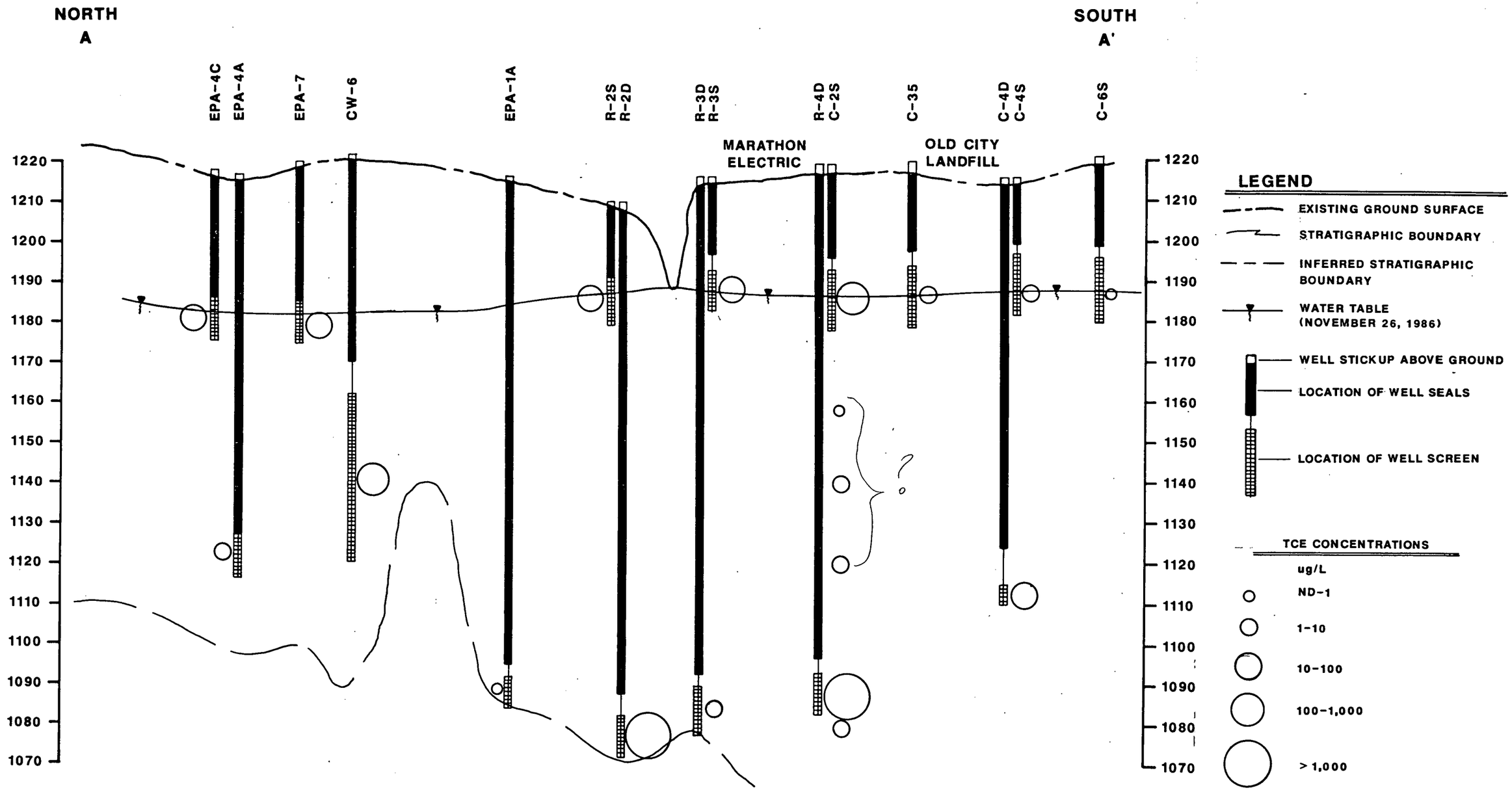


FIGURE 12

TCE CONCENTRATIONS IN CROSS SECTION A – A'

RMT INC

Dwn. by	EAP
Date:	5-13-87
Proj.#	222.04

DCE was observed in those monitoring wells which were found to contain TCE. In addition, PCE was measured in R-4D at 15 ug/L, in C-4S at 5.8 ug/L, and near the detection limit at C-2S, C-3S, and C-4D, C-6S, and R-1D. Carbon tetrachloride was found at concentrations ranging up to 110 ug/L in C-3S and at 5 ug/L in R-2D. Chloroform was found at 48-66 ug/L in C-3S, and also detected in 12 other monitoring wells at concentrations near the detection limits. Positive values for additional VOCs were measured at or near the detection limits.

The highest concentrations of TCE for both the shallow and deep ground water were observed in the wellnest northeast of the Old City Landfill (C-2S/R-4D). A more thorough investigation was conducted at this site. Water samples were collected during drilling, every 20 feet where possible, as the borehole was advanced for the deep well. A complete scan for VOC was conducted on these samples and a summary of the TCE results with depth are shown in Table 3-9. The full VOC results are included in Appendix C.

The depth profile at R-4D clearly shows TCE contamination at both the water table surface and at 136 feet below land surface. There is very little contamination detected between these depths or below 136 feet. A VOC depth profile was also conducted at R-1D, the monitoring well on the north side of the Marathon Electric assembly building. No detectable concentrations of VOCs were found at the three depths sampled (37, 57, and 117 feet).

Ground water samples from monitoring wells EPA-1A, R-2D, C-2S, R-4D, GM-4S and GM-4D were submitted for a hazardous substance list scan for semi-volatiles, pesticides and PCBs. No compounds were detected above the

TABLE 3-9

TCE CONCENTRATIONS WITH DEPTH
(AUGUST 1986)

MONITORING WELL R-4D

Depth From Ground Surface (feet)	TCE (ug/L)
36	590
56	0.9
76	3.2
96	4.1
136	790
156	2.2

MONITORING WELL R-1D

37	ND
57	ND
117	ND

detection limits in any of the samples. A complete listing of the results is provided in Appendix D.

3.6.3 Potential Migration Pathways of TCE

The patterns of occurrence of VOCs, particularly TCE, were described in Section 3.6.2. The following discussion presents possible interpretations for TCE source areas and potential migration pathways.

In Section 3.5.2, the shallow ground water flow directions on the southern part of the Marathon Electric/Old City Landfill property are shown to be to the east-southeast toward the Wisconsin River. The chemical data cannot confirm this direction is correct, but do show that shallow ground water is not flowing north or northeast in this area. The shallow ground water in the landfill is characterized by high alkalinity. Monitoring Well C-3S is in the landfill, and located due south of C-7S and southeast of C-2S. Both C-7S and C-2S are located outside the landfill. Neither of these wells shows a significant impact from the high alkalinity landfill leachate that is found in C-3S. Table 3-10 provides the alkalinity results from sampling done by CH_2M Hill in 1986.

It is more difficult to assess the direction of contaminant movement at depth. Sampling by RMT/Geraghty & Miller at R-4D showed no clear impact on alkalinity from the landfill (see data in Appendix E).

The TCE contamination found at depth is presently separated from the shallow contamination as seen in the concentration profile with depth at R-4D

TABLE 3-10

ALKALINITY RESULTS FOR GROUND WATER SAMPLES
IN AND NEAR THE OLD CITY LANDFILL

Well	Alkalinity (mg/L as $CaCO_3$) 11/25/85	1/6-7/86
C-1S	56	39
C-2S	34	38
C-3S	268	228
C-4S	66	58
C-4D	433	324
C-6S	66	50
C-7S	39	35

taken from CH_2M Hill (1986)

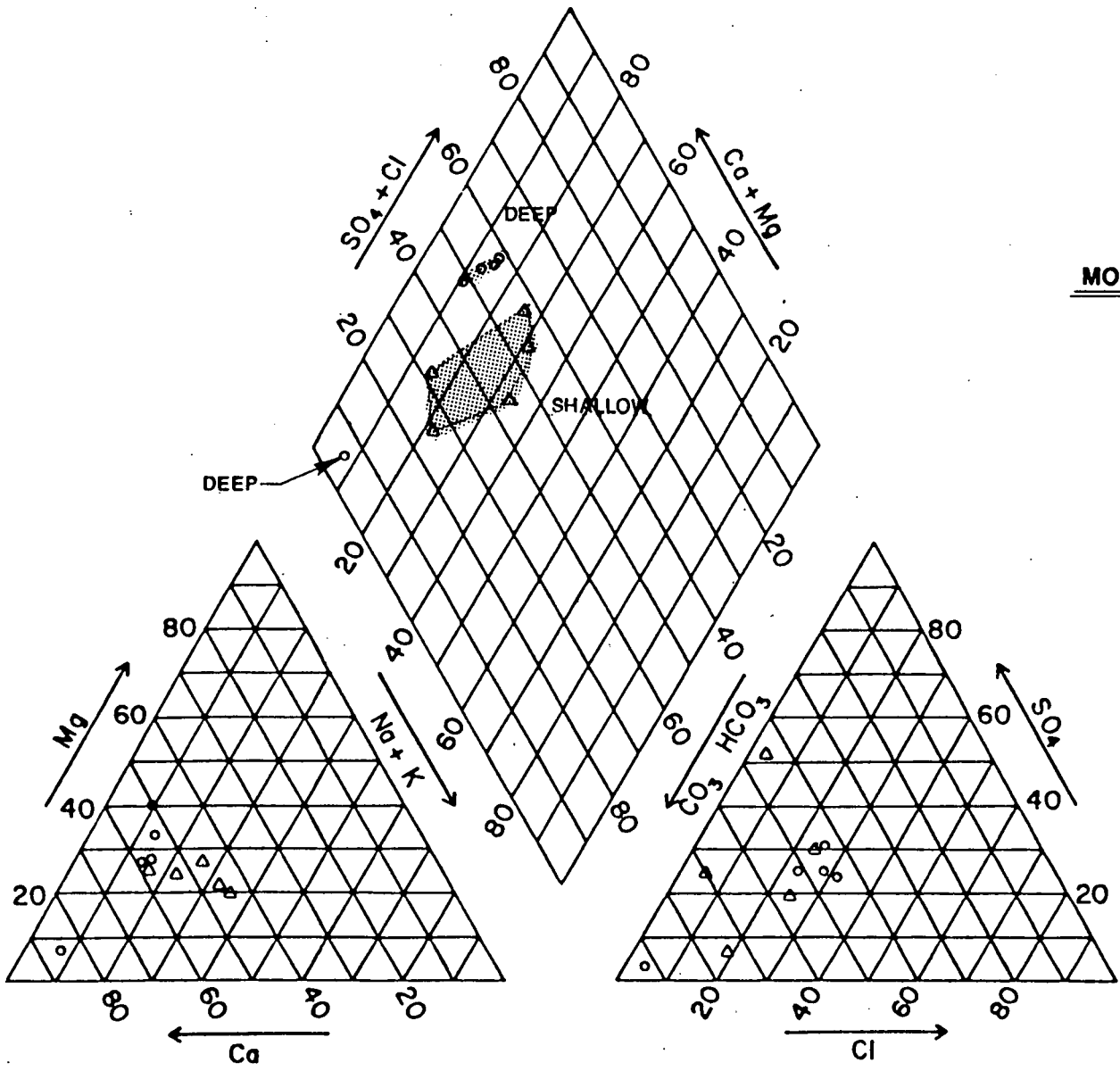
(see Table 3-7). However, in the past, surface spills may have accounted for the contamination which is now observed near the bedrock surface. In Section 3.5.2, it was shown that strong vertical gradients were not observed in the monitoring wells, and therefore, vertical flow is not postulated to link the deep and shallow contamination. In fact, the chemical composition of the ground water shows a differentiation of deep and shallow water.

A trilinear diagram is provided in Figure 13, and the differences in ground-water chemical composition are illustrated. Only those ground-water samples which exhibit cation/anion balance within $\pm$ 10% were included in the diagram. From this diagram, the shallow ground-water sample compositions are grouped separately from the deep ground-water samples, indicating that extensive vertical mixing is not occurring. The inorganic chemical analysis data used in the plots are included in Appendix E.

The outlying data point on the trilinear diagram represents EPA-1A. The ground water from this well had a field-measured pH value of 9.9. This pH value is very high, especially in comparison with the pH values for all other wells which were below 7.0. A high pH value is typically caused by the intrusion of cement-bentonite grout from the well annulus into the screened zone. This explanation is reasonable for EPA-1A, as the water is high in calcium carbonate which is indicative of cement, and not of the granitic formation.

It is possible that a large surface spill in the past could account for both the shallow and deep TCE contamination which is presently observed in the study area. TCE could sink through the alluvial aquifer and remain as a

TRILINEAR DIAGRAM SHOWING CATION AND ANION COMPOSITIONS OF GROUND WATER SAMPLES



MONITORING WELLS

△ – SHALLOW

○ – DEEP

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	Date: 5/7/87
	Proj. #: 222.04

FIGURE 13

pool on the bedrock surface, or could preferentially move through more permeable channels (as could be present in an old river valley). Alternatively, residual TCE in the unsaturated zone of an old spill site could cause a continuing source of contamination to the shallow ground water after each large rain event or water table fluctuation.

The above two scenarios are possible explanations for the observed vertical patterns of TCE distribution. In the earlier discussion, one or more sources were hypothesized to explain widely separated areas of shallow ground-water contamination. There is also a possibility that the intermittent pumping pattern at City Well 6, and the west well field in general (see Figure 4), has caused a complex distribution of TCE. The ground-water flow directions change depending on the operation of City Well 6 in conjunction with wells 7 and 9 . The resultant TCE distribution could appear to be coming from one or more sources.

The deep ground-water contamination does not correspond directly to the shallow areas. The most prominent example is at the well nest of R-3S/R-3D. R-3S contains 49.7 ug/L TCE, and R-3D contains 4.4 ug/L TCE. This pattern of occurrence may be derived when deep flow patterns are different from those near the water table surface. TCE may move in discrete channels at depth, which are not necessarily on the bedrock surface (see Table 3-10). Highly permeable zones or channels may exhibit the winding nature of an ancient stream valley. This would partially explain the large differences in TCE concentrations at wells which are close together, such as

R-3D and R-2D. If this situation is occurring, the tracking of the TCE plume becomes an extremely difficult task.

5. REFERENCES

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APPENDIX A

BORING LOGS

The monitoring well designation system has changed over the period during which several investigations have occurred in the area. Some of the logs included in this appendix are from previous reports by other agencies or their contractors. The following table is a cross index of well designations which shows the currently used well identification code in addition to the corresponding code used in the past. It also lists the wells in the same order as the boring logs appear in the appendix.

Cross Index of Well Designations

Well Identification Code Appearing on Log	Well Identification Code Appearing in This Report
R-1D	Same
R-2D	Same
R-3D	Same
R-4D	Same
#6	CW-6
#7	CW-7
Wausau Test Well No. 9	
#9	CW-9
1S	C-1S
B-2S	C-2S
B-3S	C-3S
B-4S	C-4S
4D	C-4D
B-6D	C-6S
B-7S	C-7S
WMW-1A	EPA-1A
WMW-3A	EPA-3A
WMW-3B	EPA-3B
WMW-4A	EPA-4A
WMW-4B	EPA-4B
WMW-4C	EPA-4C
WMW-5	EPA-5
WMW-6	EPA-6
WMW-7	EPA-7
WMW-9	EPA-9
GM-1S	Same
GM-2S	Same
GM-3S	Same
GM-4S	Same
GM-4D	Same

RMT, Inc.
F-204 (R2-81)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: Wausau WI
DRILLED BY: Len J
LOGGED BY: T. E. Fox
DATE: 8/14/86

JOB NO.: 222.04
BORING NO.: R-1D
SURFACE ELEV.: 1220.16
SHEET NO.: 1 of 4

SAMPLE No.	SAMPLE Type	SAMPLE Recovery	SAMPLE Moisture	HNU	Depth	VISUAL CLASSIFICATION and Remarks
1	Jar			No Detect	5	. Brown F-M Gravel, Some F-C Sand, Little Silt
2	Jar			0.2	10	. Brown F-C Sand, Some F-M Gravel, Little Silt
3	Jar			0.2	15	
4	Jar			0.2	20	
5	Jar				25	
6	Jar			0.2	30	
7	Jar			0.4	35	. Brown F-M Sand, Little to Some Silt
8	Bag	H_2O Sample			40	

GENERAL NOTES

START: 11:54 AM 8/14/86
COMPLETE: 1:45 8/14/86
RIG: IR TM 60
CREW CHIEF: Len J.
DRILLING METHOD: ~~Dual~~ Tube Reverse Air Rotory

WATER LEVEL OBSERVATIONS

WHILE DRILLING: See Lori H. Field Notes for Recovery Data
UPON COMPLETION:
TIME AFTER DRILLING:
DEPTH OF WATER:
DEPTH OF CAVE-IN:

Induced H_2O From 0' to 35'

F-204 (cont'd.)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: Wausau WI
DRILLED BY: Len J.
LOGGED BY: T.E. Fox
DATE: 8/14/86

JOB NO.: 222.04
BORING NO.: R-1D
SURFACE ELEV.: 1220.16
SHEET NO.: 2 of 4

SAMPLE No.	SAMPLE Type	Recovery	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
9	Jar				45	
					50	
10	Jar			No Detect	55	
					60	
10	Jar				65	Brown Fine Sand, Some Silt
					70	
12	Jar				75	
					80	
13	Jar				85	

RMT, Inc.
B-204 (cont'd)
Pg. 3

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: Wausau WI
DRILLED BY: Len J.
LOGGED BY: T.F. Fox
DATE: 8/14/86

JOB NO.: 222.04
BORING NO.: R-1D
SURFACE ELEV.: 1220.16
SHEET NO.: 3 of 4

SAMPLE No.	Type	Recovery	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
					90	
14	Jar			0.2	95	
					100	
15	Jar				105	. Rusty Brown at 105'-106' . Grayish Brown at 1-6'-110'
					110	
16	Jar			No Detect	115	. Brown F-C Gravel, Some F-C Sand
17	Jar			0.2	120	. Gray Fine Sand, Some Silt Appears to be Oxidizing to a Brownish Gray Upon Exposure to Air
18	Jar			0.6	125	. Weathered Bedrock
19	Jar			No Detect	130	. Hard at 124'

F-203 (R2-81)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: Wausau WI
DRILLED BY: Len J
LOGGED BY: T.E. Fox
DATE: 8/14/86

JOB NO.: 222.04
BORING NO.: R-1D
SURFACE ELEV.: 1220.16
SHEET NO.: 4 of 4

SAMPLE No.	SAMPLE Type	Recovery	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
						. End of Drilling at 133'
					135	

Notes:

HNU = VOC readings taken at 4:45 to 5:15 pm-8/14/86 of jarred samples. Upon collecting samples from cyclone separator samples were jarred with layer of Alum. foil under lid. Jars were then shook and warmed with sun when possible and measured by penatrating probe thru Alum. foil (ppm.)

Samples

"H_2O Sample" is sample taken by Lori Huntoon thru inner tube using a 1" stainless bailer.. .2/40 mil vials per sample

Bag = 10# sample taken directly from Cyclone separator - includes fines

Jar = 8oz wide mouth (specially cleaned) taken with strainer at Cyclone discharge may not include all fines, as they may have been washed thru strainer.

GENERAL NOTES

START:
COMPLETE:
RIG:
CREW CHIEF:
DRILLING METHOD:

WATER LEVEL OBSERVATIONS

WHILE DRILLING:
UPON COMPLETION:
TIME AFTER DRILLING:
DEPTH OF WATER:
DEPTH OF CAVE-IN:

RMT, Inc.
F-204 (R2-81)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: Wausau, WI
DRILLED BY: Len/Layne Northwest
LOGGED BY: TEF/SLM
DATE: 8/5/86

JOB NO.: 222.04
BORING NO.: R-2D
SURFACE ELEV.: 1207.69
SHEET NO.: 1 of 4

SAMPLE No.	SAMPLE Type	Recovery	Moisture	HNU	Depth	VISUAL CLASSIFICATION and Remarks
1	Jar					Dark brown to brown F-C sand, trace to some silt, trace to some gravel
					5	
2	Jar			.04		
					10	
3	Jar					
					15	
4	Jar					
					20	
5	Jar					
					25	
6	Jar					
					30	
7	Jar					
					35	
8	Jar			0.2		
					40	

GENERAL NOTES

START: 8/5/86 4 P.M.
COMPLETE: 8/5/86 6:30 P.M.
RIG: TH-60 Ingersoll Rand
CREW CHIEF: Len Jegerski
DRILLING METHOD: Dual tube Reverse Air Rotary

WATER LEVEL OBSERVATIONS

WHILE DRILLING:
UPON COMPLETION:
TIME AFTER DRILLING: thru dual tube well completion
DEPTH OF WATER: overnite 23.1 TOC
DEPTH OF CAVE-IN: 96.7 BGS 27.78 TOC

F-204 (cont'd.)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: Wausau, WI
DRILLED BY: Len/Layne Northwest
LOGGED BY: TEF/SLM
DATE: 8/5/86

JOB NO.: 222.04
BORING NO.: R-2D
SURFACE ELEV.: 1207.69
SHEET NO.: 2 of 4

SAMPLE No.	SAMPLE Type	Recovery	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
9	Jar				45	
					50	
10	Jar				55	Brown F-M Sand Coarser with gravel at 56' - 57'
					60	
11	Jar				65	
					70	
12	Jar				75	
					80	
13	Jar				85	

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: Wausau, WI
DRILLED BY: Len/Layne Northwest
LOGGED BY: TEF/SLM
DATE: 8/5/86

JOB NO.: 222.04
BORING NO.: R-2D
SURFACE ELEV.: 1207.69
SHEET NO.: 3 of 4

SAMPLE No.	Type	Recovery	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
					90	
14	Jar				95	
					100	. Brown fine sand, some gravel
15	Jar			0.6	105	
					110	Gravel with cobbles and boulders
16	Jar				115	. Brown fine sand, some silt, trace M-C sand
					120	
17	Jar				125	
					130	

RMT, INC.
F-203 (R2-81)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: Wausau, WI
DRILLED BY: Len/Layne Northwest
LOGGED BY: TEF/SLM
DATE: 8/5/86

JOB NO.: 222.04
BORING NO.: R-2D
SURFACE ELEV.: 1207.69
SHEET NO.: 4 of 4

SAMPLE No.	SAMPLE Type	Recovery	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
18	Jar			0.6	135	. Gravelly at 132' - 135'
					140	. Weathered granite bedrock No samples recovered - air pushed cuttings into fractured formation
					145	. Hard at 141 to 143
					150	. End of drilling at 143'
					155	
					160	. WL measured thru dual pipe (bottom @ - 143') @ 96.7' B.G.S. @ 7:30 A.M.
					165	* HNU Readings = 5.0 Stand By = 0.0 Ambient and background = 0.4-1.2 Reading in empty jar = 1.2

GENERAL NOTES

START:
COMPLETE:
RIG:
CREW CHIEF:
DRILLING METHOD:

WATER LEVEL OBSERVATIONS

WHILE DRILLING:
UPON COMPLETION:
TIME AFTER DRILLING:
DEPTH OF WATER:
DEPTH OF CAVE-IN:

RMT, Inc.
F-204 (R2-81)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: Wausau, Wisconsin
DRILLED BY: Len J./ Layne Northwest
LOGGED BY: T. Fox
DATE: 8/11/86

JOB NO.: 222.04
BORING NO.: R-3D
SURFACE ELEV.: 1213.09
SHEET NO.: 1 of 4

SAMPLE No.	SAMPLE Type	Recovery	Moisture	HNU	Depth	VISUAL CLASSIFICATION and Remarks
1	Jar			9.5		. Brown Gray F-M Sand, Some Silt
					5	
2	Jar			0.5		. Gray Brown F-C Sand, Trace ~~Little~~ Silt M-C Sand and Gravel, Trace Silt
					10	
3	Jar					
					15	
4	Jar			No Detect		
					20	
5	Jar			No Detect		
					25	
6	Jar					
					30	. Brown-Gray Fine Sand
7	Jar			No Detect		
					35	
8	Jar					
					40	

GENERAL NOTES
START: 8/11/86 10:45
COMPLETE: 8/11/86 11:55
RIG: IR TM 60
CREW CHIEF: Len J.
DRILLING METHOD: Dual Tube Reverse Air Rotary & H_2O

WATER LEVEL OBSERVATIONS
WHILE DRILLING:
UPON COMPLETION:
TIME AFTER DRILLING:
DEPTH OF WATER:
DEPTH OF CAVE-IN:

F-204 (cont'd.)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION:
DRILLED BY: Len J./ Layne Northwest
LOGGED BY: T. Fox
DATE: 8/11/86

JOB NO.: 222.04
BORING NO.: R-3D
SURFACE ELEV.: 1213.09
SHEET NO.: 2 of 4

SAMPLE No.	SAMPLE Type	Recovery	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
9	Bag					Grayish-Brown Fine Sand
					45	
10	Jar					
					50	Trace Fine Gravel at 50'-55'
					55	
11	Jar		No Detect			
					60	
					65	
12	Jar					
					70	
					75	
13	Jar					
					80	
					85	

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION:
DRILLED BY: Len J./Layne Northwest
LOGGED BY: T. Fox
DATE: 8/11/86

JOB NO.: 222.04
BORING NO.: R-3D
SURFACE ELEV.: 1213.09
SHEET NO.: 3of 4

SAMPLE No.	Type	Recovery	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
14	Jar			No Detect	90	Brown-Gray Fine Sand
					95	
15	Jar				100	
					105	
16	Jar			No Detect	110	
					115	
17	Jar				120	
					125	
18 19	Jar Bag			No Detect	130	Yellowish Brown F-C Sand, Little to Some Silt, Little to Some Gravel

R... INC.
F-203 (R2-81)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: Wausau, WI
DRILLED BY: Len J./ Layne Northwest
LOGGED BY: T. Fox
DATE: 8/11/86

JOB NO.: 222.04
BORING NO.: R-3D
SURFACE ELEV.: 1213.09
SHEET NO.: 4 of 4

SAMPLE						VISUAL CLASSIFICATION and Remarks
Recovery		Moisture				
No.	Type			N	Depth	
19	Jar Bag				135	
					140	Driller indicates fractured bed rock at 135' to 137' - No Sample Returned End of Drilling at 137'
					145	
					150	
					155	
					160	
					165	
					170	

GENERAL NOTES

START:
COMPLETE:
RIG:
CREW CHIEF:
DRILLING METHOD:

WATER LEVEL OBSERVATIONS

WHILE DRILLING:
UPON COMPLETION:
TIME AFTER DRILLING:
DEPTH OF WATER:
DEPTH OF CAVE-IN:

RMT, Inc.
F-204 (R2-81)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: 8' South of C-25
DRILLED BY: Len J. / Layne Northwest
LOGGED BY: T. E. Fox
DATE: 8/12/86

JOB NO.: 222.04
BORING NO.: R-4D
SURFACE ELEV.: 1216.05
SHEET NO.: 1 of 4

SAMPLE No.	Type	Recovery / Moisture 2)40ml H_2O samples w/bailer thru Dual Tube	N	Depth	VISUAL CLASSIFICATION and Remarks
					Brown F-M Sand, Little F-M Gravel, Trace-Little Silt
1	Jar			5	
2	Jar			10	
3	Jar			15	
4	Jar			20	Brown F-C Gravel, Some Sand with Cobbles
5	Jar			25	Very Dense Fine Sand, Some Silt
6	Jar			30	Brown F-M Sand, Trace Silt, Trace Fine Gravel
7	Jar			35	
		H_2O Sample			Mostly Fine Sand at 35-40'
8	Bag			40	

GENERAL NOTES
START: 8/12/86
COMPLETE: 9/13/86
RIG: 1R TH 60
CREW CHIEF: Len J/John J
DRILLING METHOD: Dual Tube Reverse Air Rotory

WATER LEVEL OBSERVATIONS
WHILE DRILLING: 31.25 with bit at 36'
UPON COMPLETION:
TIME AFTER DRILLING:
DEPTH OF WATER:
DEPTH OF CAVE-IN:

Introduced H_2O at 17' to

F-204_(cont'd.)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: 8' South of C-25
DRILLED BY: Len J. / Layne Northwest
LOGGED BY: T. E. Fox
DATE: 8/12/86

JOB NO.: 222.04
BORING NO.: R-4D
SURFACE ELEV.: 1216.05
SHEET NO.: 2 of 4

SAMPLE No.	SAMPLE Type	Recovery	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
						Brown F-M Sand, Trace Silt
9	Jar				45	
						Brown F-C Sand, Trace Silt Trace F Gravel
10	Jar				50	
11	Jar				55	
		H_2O Sample				
12	Jar				60	
						Brown F-M Sand, Trace Silt
13	Jar				65	
14	Jar				70	
15	Jar				75	
		H_2O Sample				
16	Jar				80	
17	Jar				85	

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: 8' South of C-25
DRILLED BY: Len J. / Layne Northwest
LOGGED BY: T. E. Fox
DATE: 8/12/86

JOB NO.: 222.04
BORING NO.: R-4D
SURFACE ELEV.: 1216.05
SHEET NO.: 3 of 4

SAMPLE No.	Type	Recovery	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
18	Jar				90	Brown F-M Sand
19	Jar				95	
20	Bag	H_2O Sample				Brown Fine Sand, Some Silt with Few Thin Layers of Fine to Medium Sand
21	Jar				100	
					105	
22	Jar				110	
					115	
23	Jar				120	
					125	
					130	

RMT, INC.
F-203 (R2-81)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: 8' South of C-25
DRILLED BY: Len J. / Layne Northwest
LOGGED BY: T. E. Fox
DATE: 8/12/86

JOB NO.: 222.04
BORING NO.: R-4D
SURFACE ELEV.: 1216.05
SHEET NO.: 4 of 4

SAMPLE No.	SAMPLE Type	Recovery	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
24	Bag				135	
25	Jar	H_2O Sample				F-C Gravel; Some F-C Sand
					140	Return H_2O turned brown at 138'
26						Brown F-C Sand, Some Gravel, Trace of Some Silt
					145	Possible Rock at 144.5' Hard Drilling at 144.5 to 147.5'
						No Recovery at 144.5 to 156
					150	Probable Fine Sand at 147.5 to 156 (came up drill tools)
					155	
						End of Drilling at 156' (no more drill rod left)
					160	
					165	
					170	

GENERAL NOTES

START:
COMPLETE:
RIG:
CREW CHIEF:
DRILLING METHOD:

WATER LEVEL OBSERVATIONS

WHILE DRILLING:
UPON COMPLETION:
TIME AFTER DRILLING:
DEPTH OF WATER:
DEPTH OF CAVE-IN:

#6

CITY WELLS, WAUSAU, WIS.
NW¼NW¼ sec. 24, T. 29 N., R. 7 E.
Near intersection of Crocker and Burek Sts.
Layne-Northwest Co., Contractors, 1951
Samples examined by F. T. Thwaites, Nos. 153758-153796

No. 1 Elevation 1218.25

DRIFT	0-5	5		Gravel, sandy, brown-gray
	5-20	15		Sand, coarse to medium, brown-gray to gray
	20-35	15		Gravel, fine, sandy
	35-50	15		Sand, medium to very coarse, gray
	50-55	5		No sample
	55-65	10		Sand, medium to very coarse, gray
	65-85	20		Sand, medium to coarse, gray
100	85-100	15		Sand, medium to fine, gray

54" hole
36" pipe cemented
29.5 water
24" pipe
50
61.5
Screen
48" gravel pack

Jerry Donohue Engineering Co., Engineers

Tested at 3600 g.p.m. specific capacity = 130 g.p.m./ft

#7

No. 2 900 ft. east of No. 1 Elevation 1222

DRIFT	0-5	5		Gravel, fine, sandy, light brown
	5-10	5		Sand, medium to very coarse, light brown-gy
	10-15	5		Gravel, fine, sandy, gray
	15-20	5		Sand, medium to very coarse, gray
	20-35	15		Gravel, fine to medium, sandy, gray
	35-50	15		Sand, medium to very coarse, gray
	50-85	35		Sand, medium to coarse, light gray
100	85-100	15		Sand, medium to fine, light gray

54" hole
36" pipe cemented
34 water
24" pipe
50
61
Screen
48" gravel pack

Tested at 3180 g.p.m. specific capacity = 127.5 g.p.m./ft.

Wausau Test Well No. 9, Wausau, Wisconsin
NW 1/4, NW 1/4, Sec. 24, R 7E, T 29N
Miller Well & Pump Co., Driller - December, 1962
Sample Nos. 236210-236226 - Examined by M. E. Ostrom

DRIFT	0- 5	5		Snd,bn,M,Srnd,Psrtg,C&VCsnd,gvl,St,fn snd	
	5-10	5		Snd,bn,M,Srnd,Psrtg,C&VCsnd,st,fn snd	
	10-15	5		Snd,mot bn&wh,C,Srnd,VC&Msnd,st,rk frags	
	15-20	5		Snd,mot bn&wh,C,Srnd,gvl,M&VCsnd,rk frags	
	20-25	5		gvl,mot bn&wh,fn,Sang,Psrtg,VC&C,M,fn snd	
	25-30	5		Snd,mot bn&wh,M,Srnd,Fsrtg,VC&Msnd,fn snd	
	30-45	15		Gvl,mot bn&wh,fn,Sang,VC,C,Msnd,fn snd,rd frags	33' WaterLvl.
	45-50	5		Snd,lt bn,M,Sang,Psrtg,Vst,fn snd,Csnd	
	50-55	5		Snd,lt bn,M,Sang,Psrtg,C&fn snd,st	
	55-60	5		Snd,lt bn,M,Sang,Psrtg,VC&C,&fn snd,st	
	60-70	10		Snd,lt bn,M,Srnd,Fsrtg,C&fn snd,st	
	70-75	5		Snd,lt bn,M,Srnd,Psrtg,gvl,C&fn snd,st	
	75-80	5		Snd,lt bn,M,Srnd,Fsrtg,VC,C&fn snd,st	
	80-90	10		Snd,lt bn,M,Srnd,Gsrtg,C&fn snd,st	6" Hole
	90-105	15		Snd,bn,M,Srnd,Fsrtg,C&fn snd,st	
110	105-110	5		Snd,bn,fn,Sang,Fsrtg,Sl,P,Msnd,mch st,gvl	115'

Formations: Drift

#9

1. County Marathon — Town ☐ Village ☐ City ☒ Wausau (Check one and give name)

2. Location Pearson & Bugbee
Name of street and number of premise or Section, Town and Range numbers

3. Owner ☒ or Agent ☐ City of Wausau
Name of individual, partnership or firm

4. Mail Address
Complete address required

5. From well to nearest: Building_____ft; sewer_____ft; drain_____ft; septic tank_____ft; dry well or filter bed_____ft; abandoned well_____ft.

6. Well is intended to supply water for:

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
48"	0	100			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
30"	Steel 3/8" Wall	0	58
20"	Steel ½" Wall Galv.	0	60
20"	Stainless Steel Screen	60	100

9. GROUT:

Kind	From (ft.)	To (ft.)
Cement Slurry	0	56
Clay Seal	56	58

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Sand & Gravel	0	40
Sand	40	100
Range from Med. to Fine		
See attached log		

Construction of the well was completed on:
January 22 19 63

The well is terminated 24 inches ☒ above, below ☐ the permanent ground surface.

Was the well disinfected upon completion?
Yes x No_____

Was the well sealed watertight upon completion?
Yes_____ No x

11. MISCELLANEOUS DATA:

Yield test: _____ Hrs. at _____ GPM.

Depth from surface to water-level: _____ ft.

Water-level when pumping: 34 ft.

Water sample was sent to the state laboratory at:
_____ City on _____ 19____

Signature Miller Well & Pump Co. — Registered Well Driller
Box 155 - Wausau, Wis. — Complete Mail Address

Please do not write in space below

Rec'd_____ No_____

Ans'd

Interpretation

	10 ml	10 ml	10 ml	10 ml	10 ml
Gas—24 hrs.					
48 hrs.					
Confirm					
B. Coli					

Examiner_____

CH2M HILL

PROJECT NUMBER	BORING NUMBER	
L 20303.A0	1S	SHEET 1 OF 2

SOIL BORING LOG

PROJECT Wausau Landfill LOCATION

ELEVATION DRILLING CONTRACTOR Twin Cities Testing

DRILLING METHOD AND EQUIPMENT Hollow stem augers / CME-45

WATER LEVEL AND DATE 22.5' 11/11/85 START 0900 11/11/85 FINISH 1015 11/11/85 LOGGER Johnson / McGee

ELEVATION / DEPTH BELOW SURFACE	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	0.0 – 1.5	S-1	18"	4-6-10 (16)			Background OVA reading (.2 ppm)
	2.0 – 3.5	S-2	15"	11-16-17 (33)	Sand, fine to med. grained, brown, moist, dense		
5	9.5						
10	11.0	S-3	10"	7-10-10 (20)	Sand, med. to coarse grained, brown, moist, medium density (SP)		.2 OVA (background)
	14.5						
15	16.0	S-4	10"	8-13-16 (29)	As above with trace gravel		.2 OVA (background)
	19.5						
20	21.0	S-5	17"	7-11-15 (26)	Sand, med. to coarse, brown, moist medium (SP)		background OVA
	23.5						Rough drilling at ≈23.5' Possibly coarse gravel
25	25.0	S-6	1"	25/1"	Silty sand, fine, gray, tr. gravel, wet (SM)		Water at 27.4' 10:00 After driving S-7 water level at 29.5' at 10:45
	29.5						
30	31.0	S-7	1"	50/2"	See next page		

REV 11/82 FORM D1586

CH2M HILL

PROJECT NUMBER	BORING NUMBER	
L20303.A0	.15	SHEET 2 OF 2

SOIL BORING LOG

PROJECT Wausau Landfill LOCATION

ELEVATION DRILLING CONTRACTOR Twin Cities Testing

DRILLING METHOD AND EQUIPMENT Hollow stem augers / CME-45

WATER LEVEL AND DATE START 11/11/85 FINISH 11/11/85 LOGGER Johnson

ELEVATION / DEPTH BELOW SURFACE	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	29.5	S-7	1"	50/2"	~~Silty sand~~, brown-gray, some gravel		
	31.0				34'		Auger refusal
35					Bottom of boring		

CH2M HILL

PROJECT NUMBER	BORING NUMBER	
L20303.A0	B-2S	SHEET 1 OF 2

SOIL BORING LOG

PROJECT Dundee LF - Lot 5 DNR LOCATION

ELEVATION DRILLING CONTRACTOR Twin City Testing

DRILLING METHOD AND EQUIPMENT CME 45 RIG 3¼" I.D. HSA (7½" O.D.) STD. "SPLIT SPOONS

WATER LEVEL AND DATE 27.7' 11/11/85 START 15:00 - 11/11/85 FINISH 11/11/85 LOGGER J.H. Johnson

ELEVATION / DEPTH BELOW SURFACE	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME. GRADATION OR PLASTICITY. PARTICLE SIZE DISTRIBUTION. COLOR. MOISTURE CONTENT. RELATIVE DENSITY OR CONSISTENCY. SOIL STRUCTURE. MINERALOGY. USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING. DRILLING RATE. DRILLING FLUID LOSS. TESTS AND INSTRUMENTATION
0	1.5	S-1	10"	2-2-3 (5)	FILL, SAND, DK. BROWN, TR. ORGANICS MOIST		OVA BACKGROUND ~3.5 ppm
	4.0						
5	5.5	S-2	12"	4-7-8 (15)	SAND, LT. BROWN, FINE, MOIST, (SP)		OVA READING BACKGROUND
	9.0						
10	10.5	S-3	8"	4-8-11 (19)	SAND, LT. BROWN, MED. TO CSE, MOIST, (SP)		OVA READING BACKGROUND
	14.0						
15	15.5	S-4	4"	4-8-13 (21)	SAND, LT. BROWN, MED. TO CSE, MOIST, ~20% F. GRAVEL (SP)		OVA READING BACKGROUND
	19.0						
20	20.5	S-5	7"	7-9-10 (19)	SAND, LT. BROWN, MED. TO CSE, MOIST (SP)		OVA READING BACKGROUND
	24.0						
25	25.5	S-6	7"	9-7-9 (16)	SAND, LT. BROWN, FINE TO MED, MOIST		OVA READING BACKGROUND
	29.0						OVA READING BACKGROUND WATER AT 27.8' at 15:52 WATER AT 27.7 at 16:00
30	30.5	S-7	6"	2-4-4 (8)			

REV 11/82 FORM D1586

CH2M HILL

PROJECT NUMBER	BORING NUMBER	SHEET 2 OF 2
	B-2S	

SOIL BORING LOG

PROJECT WAUSAU LF – DNR LOCATION

ELEVATION DRILLING CONTRACTOR TWIN CITY TESTING

DRILLING METHOD AND EQUIPMENT

WATER LEVEL AND DATE START FINISH LOGGER T.H. JOHNSON

ELEVATION / DEPTH BELOW SURFACE	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30							
	34.0						
	35.5	S-8	10"	3-4-6 (10)	SAND, LT. BRN, FINE, WET, (SP)		OVA READING BACKGROUND
35							
	39.0						
40	40.5		0"				NO RECOVERY
					Bottom of boring 40.5'		

REV 11/82 FORM D1586

CH2M HILL

PROJECT NUMBER	BORING NUMBER	SHEET / OF 2
L20303.A0	B-35	

SOIL BORING LOG

PROJECT [illegible] LOCATION

ELEVATION DRILLING CONTRACTOR Twin City Testing

DRILLING METHOD AND EQUIPMENT 7¼" O.D. Hollow stem augers CME-45

WATER LEVEL AND DATE 29.5' 11/12/85 START 1430-11/12 FINISH 1600 11/12/85 LOGGER [illegible]

ELEVATION / DEPTH BELOW SURFACE	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	0.0						
	1.5	S1	15"	3-3-4 (7)	FILL, BLACK, SAND, GRAVEL, SILT, SOME CINDERS, MOIST		OVA NOT WORKING PROPERLY - BATTERY LOW
	4.5						
5	5.0	S-2	8"	14-14-16 (30)	FILL, MOTTLED, BROWN AND GRAY, SAND, SOME COBBLES ~7'		
	9.5						
10	10.0	S-3	10"	15-13-32 (40)	SAND, LT. BROWN, MED. TO CSE., ~10% F. GRAVEL, MOIST, (SP)		ROUGH DRILLING AT ~10' B.G.S. POSSIBLY COARSE GRAVEL OR COBBLES
	14.5						
15	15.0	S-4	14"	5-8-10 18	SAND, LT. BROWN, FINE, MOIST (SP)		
20	19.5	S-5	5"	30-20/.2	SAND, LT. BROWN, MED. TO CSE, MOIST TO WET, (SP)		GRAVEL LODGED IN BOTTOM OF THE SPLIT SPOON
	21.0						
25	24.5	S-6	15"	4-5-6 (11)	SAND LT. BROWN, FINE TO MED, MOIST, (SP)		
	26.0						
	29.5						
30	31.0	S-7	8"	4-7-8 (15)	SAND, LT. BROWN, FINE TO MED. WET, SP		WATER AT 29.5' B.G.S. AT 15:46 hrs

REV 11/82 FORM D1586

CH2M HILL

PROJECT NUMBER	BORING NUMBER	SHEET
120303.A0	B-35	2 OF 2

SOIL BORING LOG

PROJECT Waseau LF - Wis. DNR LOCATION

ELEVATION DRILLING CONTRACTOR Twin City

DRILLING METHOD AND EQUIPMENT 3¼" I.D. / 7¼" O.D. HSA's; CME 45 RIG.

WATER LEVEL AND DATE START FINISH LOGGER T. H. Johnson

ELEVATION / DEPTH BELOW SURFACE	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30							
34.5							
35	34.5 - 36.0	S-8			SAND, LT. BROWN, FINE, WET		
36.0							
40					BOTTOM OF BOREHOLE @ 40'		COMPLETE DRILLING AT 1600 HRS

REV 11/82 FORM D1586

CH2M HILL

PROJECT NUMBER	BORING NUMBER	SHEET
L20303.A0	B-35	2 OF 2

SOIL BORING LOG

PROJECT Waseau LF - Wis. DNR LOCATION

ELEVATION DRILLING CONTRACTOR Twin City

DRILLING METHOD AND EQUIPMENT 3¼" I.D. / 7½" O.D. HSA's. CME 45 RIG.

WATER LEVEL AND DATE START FINISH LOGGER T. Li Johnson

ELEVATION / DEPTH BELOW SURFACE	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30							
34.5							
35	34.5 – 36.0	S-8			SAND, LT. BROWN, FINE, WET		
36.0							
40					BOTTOM OF BOREHOLE @ 40'		CONCRETE GROUTING AT 1600 HRS

CH2M HILL

PROJECT NUMBER	BORING NUMBER	SHEET
L20303.A0	B-4S	SHEET 1 OF 2

SOIL BORING LOG

PROJECT [illegible] LF - WDNR LOCATION

ELEVATION DRILLING CONTRACTOR TWIN CITY

DRILLING METHOD AND EQUIPMENT [illegible] RIG, 3¼" I.D. [illegible] HSA [illegible]

WATER LEVEL AND DATE 25' 11/13/85 START 0950-11/13 FINISH 11/13 LOGGER T. [illegible]

ELEVATION	DEPTH BELOW SURFACE	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	0	0.0–1.5	S-1	2"	3-4-5 (9)	FILL, SILTY SAND, GRAY, SOME CLAY, MOIST		OVA BACKGROUND ~3ppm
	5	4.5–6.0	S-2	5"	3-5-9 (14)	FILL, SAND, WOOD CHIPS, MOIST		PIECES OF PAPER & PLASTIC IN AUGER CUTTINGS
	10	9.5–11.0	S-3	2"	1-2-3 (5)	FILL, SAND, DK. GRAY, [illegible] SILT, CLAY, MOIST TO WET ~14'		OVA READING ~50ppm OFF AUGER CUTTINGS; 0ppm ON BACKFLUSH POSSIBLY METHANE
	15	14.5–16.0	S-4	10"	10-10-11 (21)	SAND, FINE, LT. BROWN, MOIST (SP)		
	20	19.5–21.0	S-5	12"	13-16-20 (36)	SAND, FINE TO MED., LT. BROWN, ~15% FINE GRAVEL, MOIST, (SP)		OVA READING ~4 to 5ppm (~1 to 2 ABOVE BACKGROUND) IN HSA & FROM SPLIT SPOON SAMPLE
	25	24.5–26.0	S-6	15"	8-8-13 (21)	SAND, FINE		WATER LEVEL AT 25' B.G.S. @ 10:50 HRS
	30	29.5–31.0	S-7	19"	18-19-21 (40)	SAND, FINE, LT. BROWN, WET (SP)		

CH2M HILL

PROJECT NUMBER	BORING NUMBER	SHEET
L20303.A0	B-45	2 OF 2

SOIL BORING LOG

PROJECT Wausau LF - WDNR LOCATION

ELEVATION DRILLING CONTRACTOR TWIN CITY

DRILLING METHOD AND EQUIPMENT

WATER LEVEL AND DATE START FINISH LOGGER T. H. Johnson

ELEVATION / DEPTH BELOW SURFACE	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30					SAND, FINE, LT. BROWN, WET, SP		
35					BOTTOM OF BORE-HOLE @ 35'		
40							

REV 11/82 FORM D1586

CH2M HILL

PROJECT NUMBER L20303.AO

BORING NUMBER 4D

SHEET 1 OF

SOIL BORING LOG

PROJECT City of Wausau Landfill LOCATION

ELEVATION DRILLING CONTRACTOR Twin Cities Testing

DRILLING METHOD AND EQUIPMENT Bentonite mud rotary / CME-55

WATER LEVEL AND DATE START [illegible] FINISH 14/10-11[illegible] LOGGER [illegible]

ELEVATION	DEPTH BELOW SURFACE	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
						See log of 4s for 0-35'		
	35	34–36.5	S-1	7"	3-4-6 (10)	Sand, f to m, moist, brown, tr gravel		
	40	39.5–41	S-2	9"	6-7-12 (19)	Sand, fine to coarse, tr. gr, moist, brown.		
	45	44.5–46	S-3	9"	6-9-12-14	as above		[illegible]
	50							
	55	54.5–56	S-4	10"	5-9-9-20	Sand, fine to med. grained moist, brown		
	60							

REV 11/82 FORM D1586

CH2M HILL

PROJECT NUMBER	BORING NUMBER	SHEET 2 OF 3
L20303.A0	4D	

SOIL BORING LOG

PROJECT City of Warsaw Landfill LOCATION

ELEVATION DRILLING CONTRACTOR Twin Cities Testing

DRILLING METHOD AND EQUIPMENT Mud rotary / CME-55

WATER LEVEL AND DATE START FINISH LOGGER SM McGee

ELEVATION / DEPTH BELOW SURFACE	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	64.5						
65	66	S-5	10"	6-13-11-9	Sand, fine to med, brown, wet		
70	74.5						Brake down drill string to remove pebble
75	76	S-6	15"	7-8-9-11	Sand, fine, brown, wet		
80	84.5						
85	86	S-7	14"	7-11-19-32	As above		

REV 11.

CH2M HILL

PROJECT NUMBER	BORING NUMBER	SHEET 3 OF 3
L20303.A0	HD	

SOIL BORING LOG

PROJECT City of Waukesha Landfill LOCATION

ELEVATION DRILLING CONTRACTOR Twin Cities Testing

DRILLING METHOD AND EQUIPMENT Mud rotary / CME-55

WATER LEVEL AND DATE START FINISH LOGGER SM McBee

ELEVATION / DEPTH BELOW SURFACE	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
95	94.5						
	96	S-8	15"	10-43-46-23	Sand, fine, moist, brown		
100							
105	104.5						
	106.4	S-9	10"	14-34-52-50/4	As above		
					Bottom of boring 106.4'		
110							

REV 11/82 FORM D1586

CH2M HILL

PROJECT NUMBER	BORING NUMBER	SHEET	OF
L20303.A0	B-6D	1	

SOIL BORING LOG

PROJECT City of Wausau Landfill LOCATION

ELEVATION DRILLING CONTRACTOR Twin Cities Testing

DRILLING METHOD AND EQUIPMENT Bentonite mud rotary / CME-55/75, 3 7/8" tricone

WATER LEVEL AND DATE START 11/11/85 FINISH LOGGER SMcBee

ELEVATION / DEPTH BELOW SURFACE	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Sand little if any gravel		Description from driller's comments Refer to log of B-6S Wyogel bentonite
10							
20							
30							
40					Cobbley sand and gravel		"boulder" 44' last ≈ 50% of drilling fluid
					Granite boulder or top of rock 47.5'		11/11/85
50					Bottom of boring 49.5'		11/12/85

This boring was drilled ≈5' from original location after tricone bit sheared off in hole at 55'.

REV 11/82 FORM D1586

CH2M HILL

PROJECT NUMBER	BORING NUMBER	SHEET / OF 2
L20303.AD	B-7S	

SOIL BORING LOG

PROJECT Wausau LF - WIS. DNR LOCATION

ELEVATION DRILLING CONTRACTOR Twin City Testing

DRILLING METHOD AND EQUIPMENT 3¼" I.D. HSA (7¼" O.D.), CME 45 RIG, STD SPLIT SPOONS

WATER LEVEL AND DATE 29.5' 11/12 START 0930 - 11/12 FINISH LOGGER J.H. Johnson

ELEVATION / DEPTH BELOW SURFACE	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME. GRADATION OR PLASTICITY. PARTICLE SIZE DISTRIBUTION. COLOR. MOISTURE CONTENT. RELATIVE DENSITY OR CONSISTENCY. SOIL STRUCTURE. MINERALOGY. USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING. DRILLING RATE. DRILLING FLUID LOSS. TESTS AND INSTRUMENTATION
0	0.0 – 1.5	S-1	12"	1-3-5 (8)	FILL, DK. GRAY TO BROWN, ORGANIC SILTY SAND ~2.0'		OVA BACKGROUND ~5 PPM
4.5							
5	6.0	S-2	10"	15-30-15/.2'	SAND, MED TO CSE, LT. BROWN, ~10% FINE GRAVEL, MOIST, (SP)		OVA READING ~5.5 PPM IN HSA
9.5							
10	11.0	S-3	12"	9-16-18 (34)	SAND, MED. TO CSE, LT. BROWN, ~10% FINE GRAVEL, (SP)		OVA READING BACKGROUND
14.5							OVA BACKGROUND UP TO ~5.5 PPM
15	16.0	S-4	9"	18-22-14 (36)	SAND, MED. TO CSE, LT. BROWN, ~30% FINE TO MED. GRAVEL, MOIST TO WET (AT BOTTOM) (SP)		OVA READING BACKGROUND
19.5							
20	21.0	S-5	10"	5-11-16 (27)	SAND, MED. TO CSE, LT. BROWN, MOIST, (SP)		OVA READING BACKGROUND
24.5							
25	26.0	S-6	8"	12-13-13 (26)	SAND, MED. TO CSE., LT BROWN, MOIST, (SP)		OVA READING UP TO 8 PPM IN HSA'S ~2 to 3 PPM above background
29.5							
30	31	S-7	6"	7-10-11 (21)	SAND, MED. TO CSE, LT. BROWN, WET (SP)		OVA READING BACKGROUND (~5.5 ppm)

REV 11/82 FORM D1586

CH2M HILL

PROJECT NUMBER	BORING NUMBER	SHEET 2 OF 2
L20303.A0	B-75	

SOIL BORING LOG

PROJECT Wausau Landfill LOCATION

ELEVATION DRILLING CONTRACTOR TWIN CITY TESTING

DRILLING METHOD AND EQUIPMENT

WATER LEVEL AND DATE START 0930 - 11/12 FINISH LOGGER T. J. JOHNSON

ELEVATION / DEPTH BELOW SURFACE	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30							WATER LEVEL AT 29.5 @ 10:53
	24.5						
35	26.0	S-8	8	4-7-8 (15)	SAND, FINE TO MED, LT. BROWN, WET (SP)		OVA READING BACKGROUND (5.5 PPM)
							DRILLED TO 40' W/D SPLIT SPOON SAMPLING. BECAME OF FLOWING SAND IN HSA'S - SET WELL TO 40' B.G.S.
40					BOTTOM OF BOREHOLE @ 40.0'		
45							

REV 11/82 FORM D1586

1985

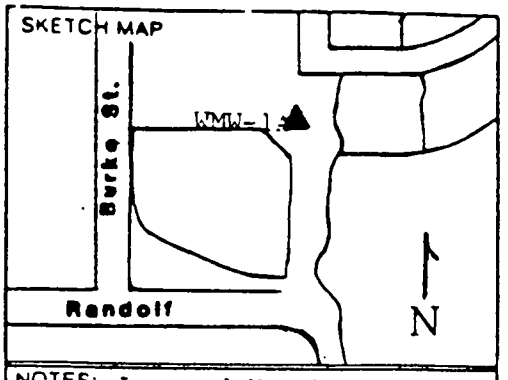
WESTON

DRILLING LOG

WELL NUMBER: WMW-1A
LOCATION: SW¼ Section 24, T29N, R7E.
SURFACE ELEVATION: 1214.15'
DRILLING COMPANY: Exploration Technology
DRILLER: Steve Wonn
LOG BY: David G. Pyles

OWNER: U.S. E.P.A.
ADDRESS: Schofield Park Wausau, Wisconsin
TOTAL DEPTH: 141.0'
WATER LEVEL: 1186.87'
DRILLING METHOD: Rotary
DATE DRILLED: 6-21-84
HELPER: Sven Lysloff
ToC 1215.92

SKETCH MAP



NOTES: Located Northeast of Baseball diamond in Schofield Park, Wausau Wisconsin

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					
			SS	8	Tan to buff, poorly sorted, sub-rounded quartz dominated sand.
					Fine to medium grain with less than 10% pebble fraction, and
5					trace silticlay.
					Reddish-brown, moderately sorted sub-angular to sub-rounded
					sand and gravel, medium to very coarse sand with rounded pebble
					fraction.
					Brown, poor to moderately sorted, subangular to sub-rounded,
10			SS	24	quarrz dominated sand. Fine to medium sand with a
					significant coarse fraction.
			SS	24	Brown to tan fine to medium grain sand, moderate to well sort,
					sub-rounded sand.
15					
			SS	49	Buff and Red-Brown, split - fraction, buff colored silt to
					fine sand well sorted, over very coarse sand and gravel,
20					angular to subangular, moderately sorted.

*ASTM D1586

DRILLING LOG

WELL NUMBER: WMW-1 A
OWNER: U.S. E.P.A.
LOCATION: SW¼ Section 24, T29N, R7E.
ADDRESS: Schofield Park Wausau, Wisconsin
TOTAL DEPTH: 141.0'
SURFACE ELEVATION: 1214.15'
WATER LEVEL: 1186.87'
DRILLING COMPANY: Exploration Technology
DRILLING METHOD: Rotary
DATE DRILLED: 6-21-84
DRILLER: Steve Wonn
HELPER: Sven Lysloff
LOG BY: David G. Pyles

SKETCH MAP

NOTES: Located Northeast of Baseball diamond in Schofield

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
20					
			SS	45	Reddish-brown, very coarse sand to fine gravel, sub-rounded to rounded, moderately sorted, trace of medium grain sand was
25					encountered at 24 feet.
			SS	47	Tan - Brown sand range from fine sand to gravel, poorly sorted sub-rounded sands. Gravel fraction maybe a result of annular-
30					cave-in.
			SS	29	Reddish - Brown, fine to medium grained, subangular to sub-
35					rounded, moderately sorted, sand. Small rounded pebble fraction, (less than 10%).
40					

*ASTM D1586

DRILLING LOG

WELL NUMBER: WMW-1A
LOCATION: SW¼ Section 24, T29N, R7E.
SURFACE ELEVATION: 1214.15'
DRILLING COMPANY: Exploration Technology
DRILLER: Steve Wonn
LOG BY: David G. Pyles

OWNER: U.S. E.P. A
ADDRESS: Schofield Park Wausau, Wisconsin
TOTAL DEPTH: 141.0'
WATER LEVEL: 11 86.87'
DRILLING METHOD: Rotary
DATE DRILLED: 6-21-84
HELPER: Sven Lysloff

SKETCH MAP

NOTES: Located Northeast of Baseball diamond in Schofield

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
40			SS	38	Tan to Brown medium grain sub-angular to sub-rounded, moderately sorted sand. Less than 10% sub-rounded to rounded pebble fraction and slight rock fragments - (Angular).
			SS	38	Same as above - (40.0 to 41.5 sample).
45					
50					
			SS	25	Tan, medium to very coarse, sub-angular to sub-rounded, moderately sorted sand. Pebble fraction is less than 5% and is rounded.
					Tan to brown medium sand to pebble - (fragmented rock). Sand
55			SS	50	fraction is well sorted sub-angular to sub-rounded with a trace of finer grain sand. Very coarse sand and pebble fraction is angular, and fragmented.
60					

*ASTM D1586

DRILLING LOG

JUN 2 6 1985

WELL NUMBER: WW-1A
LOCATION: SW¼ Section 24, T29N, R7E.
SURFACE ELEVATION: 1214.15'
DRILLING COMPANY: Exploration Technology
DRILLER: Steve Wonn
LOG BY: David G. Pyles

OWNER: U.S. E.P.A.
ADDRESS: Schofield Park Wausau, Wisconsin
TOTAL DEPTH: 141.0'
WATER LEVEL: 1186.87'
DRILLING METHOD: Rotary
DATE DRILLED: 6-21-84
HELPER: Sven Lysloff

SKETCH MAP

NOTES: Located Northeast of Baseball diamond in Schofield

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
60			SS	-	No sample recovered
65			SS	32	No sample recovered
70			SS	57	Tan to brown, medium grain sand, slight pebble fraction. Sand fraction is sub-angular to sub-rounded and moderately sorted. Slight pebble fraction of uniform size and consistantly rounded.
75					
80			SS	34	Reddish, black gravel, ranging form very coarse sand to gravel, sub-angular to sub-rounded, poorly sorted.

*ASTM D1586

DRILLING LOG

WELL NUMBER: WMW-1A
LOCATION: SW¼ Section 24, T29N, R7E
SURFACE ELEVATION: 1214.15'
DRILLING COMPANY: Exploration Technology
DRILLER: Steve Wonn
LOG BY: David G. Pyles
OWNER: U.S. E.P.A.
ADDRESS: Schofield Park Wausau, Wisconsin
TOTAL DEPTH: 141.0'
WATER LEVEL: 1186.87'
DRILLING METHOD:
DATE DRILLED: 6-21-84
HELPER: Sven Lysloff

SKETCH MAP

NOTES: Located Northeast of Baseball diamond in Schofield

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
80					
					Red - Black very coarse sand and gravel, same as 78.5 to 80
			SS	68	sample. Maybe annular - cave-in.
85					
			SS	66	Tan to reddish brown sand, range from fine sand to fine
90					gravel, poorly sorted, angular to subangular,
					Tan to Buff, coarse sand, range fine to very coarse sand,
			SS	146	trace gravel, moderately sorted, sub-rounded,
5					
					Tan to dark brown, fine sand and gravel approximately 50%-50%
			SS	30	moderately sorted fractions, subangular to rounded
100					

*ASTM D1586

DRILLING LOG

WELL NUMBER: WMW-1A
LOCATION: SW¼ Section 24, T29N, R7E
SURFACE ELEVATION: 1214.15'
DRILLING COMPANY: Exploration Technology
DRILLER: Steve Wonn
LOG BY: David G. Pyles

OWNER: U.S. E.P.A.
ADDRESS: Schofield Park Wausau, Wisconsin
TOTAL DEPTH: 141.0'
WATER LEVEL: 1186.87'
DRILLING METHOD: Rotary
DATE DRILLED: 6-21-84
HELPER: Sven Lysloff

SKETCH MAP

NOTES: Located Northeast of Baseball diamond in Schofield

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
100					
			SS	66	Same as 98.5 to 100 foot sample, coarse fraction believed to be annular cave-in.
105					
					Tan to dark brown subangular to subrounded well sorted sand.
			SS	81	Trace pebble fraction.
110					
			SS	80	No sample collected
115					
					Brown, very poorly sorted sand, grading with depth becoming fractured rock and grains subangular to sub-rounded. Quartz dominant mineral
			SS	69	
120					

*ASTM D1586

SHEET ___ OF ___

DRILLING LOG

WELL NUMBER MW-1A
LOCATION SW¼ Section 24, T29N, R7E
SURFACE ELEVATION 1214.15'
DRILLING COMPANY: Exploration Technology
DRILLER: Steve Wonn
LOG BY: David G. Pyles

OWNER: U.S. E.P.A.
ADDRESS: Schofield Park Wausau, Wisconsin
TOTAL DEPTH 141.0'
WATER LEVEL: 1186.87'
DRILLING METHOD: Rotary
DATE DRILLED: 6-21-84
HELPER: Sven Lysloff

SKETCH MAP

NOTES: Located Northeast of Baseball diamond in Schofield

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
120			SS	81	Brownish - red medium grain sand, gradational downward, to rock fragments, coarser sand fraction consistant subangular,
125					Brown to rusty red, brown sands are very coarse, subanglar and uniform. Sharp density and color contrast. Color indicitive
			SS	3501b 100+	of weathered granite, blow counts distinctly higher. Oxidized
130					fragmented weathered appearance
					Rusty - red fine to coarse grain weathered granite, wet to moist.
			SS	3501b 100+	
135					
			SS	3501E 115	Rusty red to burnt yellow, dense, consolidated, weathered granite, moist to dry. Bedrock texture and density.

*ASTM D1586

DRILLING LOG

JUN 26 1985

WELL NUMBER WMW-1A
LOCATION SW¼ Section 24, T29N, R7E
SURFACE ELEVATION 1214.15'
DRILLING COMPANY Exploration Technology
DRILLER Steve Wonn
LOG BY: David G. Pyles

OWNER: U.S. E.P.A
ADDRESS Schofield Park Wausau, Wisconsin
TOTAL DEPTH 141.0'
WATER LEVEL: 1186.87'
DRILLING METHOD Rotary
DATE DRILLED: 6-21-84
HELPER Sven Lysloff

SKETCH MAP

NOTES: Located Northeast of Baseball diamond in Schofield.

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
140					
			SS	350lb 48	Rusty red, weathered, highly consolidated granite, but compositionally not hard rock, damp to dry, extremely dense. Split-spoon would drive with 350 pound weight.
145					Drilled ahead to 159.5, No Sample was collected but rock was very hard and drilling was stopped due to the consolidated material. (Bedrock).

*ASTM D1586

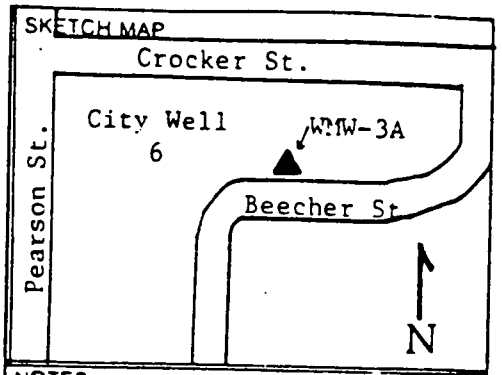
WESTON

DRILLING LOG

WELL NUMBER: WMW- 3A
LOCATION: Beecher Street, Wausau, Wi.
SURFACE ELEVATION: 1221.14
DRILLING COMPANY: Exploration Technology
DRILLER: Steve Wonn
LOG BY: D. G. Pyles

OWNER: U.S. EPA
ADDRESS: Clark Street, Chicago, Illinois
TOTAL DEPTH: 141.0'
WATER LEVEL: 1183.51
DRILLING METHOD: Rotary
DATE DRILLED: 9-25-84
HELPER:

SKETCH MAP



NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					
10					
		1	S.S.	27 33 39	Red-brown to black, moderately sorted sub-angular to sub-rounded quartz dominated granules with approximately 5% pebbles, 20% coarse sand and a trace of silt and clay.
20					
		2	S.S.	24 37 31	Red-brown, poorly sorted sub-rounded to rounded quartz dominated very coarse to coarse sand with less than 15% granules and approximately 10% silt and clay.
30					
		3	S.S.	17 22 19	Red-brown to black, very poorly sorted, angular to sub-rounded quartz dominated granules with approximately 20% pebbles, 30% sand, and 15% silt and clay.
40					

* A.S.T.M. D1586

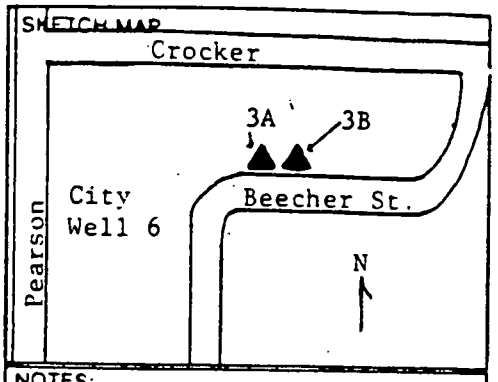
WESTERN

DRILLING LOG

WELL NUMBER: WMW-3A
LOCATION: Beecher Street, Wausau, Wisconsin
SURFACE ELEVATION: 1211.01'
DRILLING COMPANY: Exploration Technology
DRILLER: Steve Wonn
LOG BY: D. G. Pyles

OWNER: U.S. E.P.A.
ADDRESS: Clark Street, Chicago, Illinois
TOTAL DEPTH: 141.0'
WATER LEVEL: 1176.23'
DRILLING METHOD: Rotary
DATE DRILLED: 9/25/84
HELPER:

SKETCH MAP



NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
40					
		4	S.S	12 14 15	Brown, extremely well sorted, well-rounded quartz dominated sand with no particles greater than coarse sand size.
50					
		5	S.S.	13 23 24	Brown to black, moderately sorted, angular to sub-angular quartz dominated granules with approximately 15% pebbles and 10% silt and clay.
60					
		6	S.S.	18 12 12	Brown, extremely poorly sorted, angular to sub-rounded quartz dominated very coarse sand with approximately 1% pebbles, 20% granules and 30% silt and clay.
70					
		7	S.S.	12 9 9	Brown, moderately sorted, angular to sub-rounded quartz dominated medium to fine sand with inclusions of coarse sand. Approximately 35% silt and clay.
80					

* A.S.T.M. D1586

WESTERN

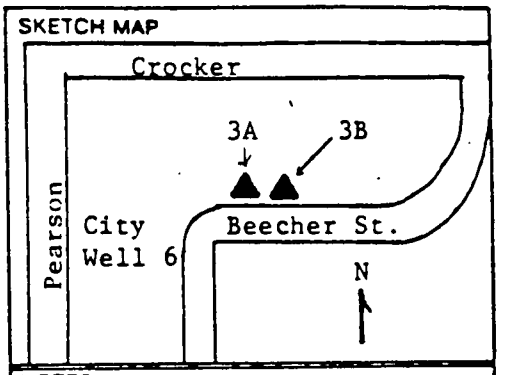
JUN 28 1985

DRILLING LOG

WELL NUMBER: WMW-3A
LOCATION: Beecher Street, Wausau, Wisconsin
SURFACE ELEVATION: 1211.01'
DRILLING COMPANY: Exploration Technology
DRILLER: Steve Wonn
LOG BY: D. G. Pyles

OWNER: U.S. E.P.A.
ADDRESS: Clark Street, Chicago, Illinois
TOTAL DEPTH: 141.0'
WATER LEVEL: 1176.23'
DRILLING METHOD: Rotary
DATE DRILLED: 9/25/84
HELPER:

SKETCH MAP



NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
80					
		8	S.S.	11 13 20	Light brown, poorly sorted, sub-angular to sub-rounded quartz dominated medium to fine sand with inclusions of pebbles, approximately 20% silt and clay.
90		9	S.S.	19 15 12	Medium brown, moderately to well sorted, sub-rounded to rounded quartz dominated medium to fine sand with inclusions of granules. Approximately 30% silt and clay.
100		10	S.S.	10 20 21	Brown, moderately sorted, sub-angular to sub-rounded quartz dominated fine sand with inclusions of pebbles (3%) and granules (2%). Silt and clay approximately 35%.
110		11	S.S.	31 60 --	Brown, moderately sorted, sub-rounded to rounded quartz dominated very fine sand with inclusions of pebbles (1%) and granules (2%). Silt and clay approximately 40%.
120					

* ASTM D1586

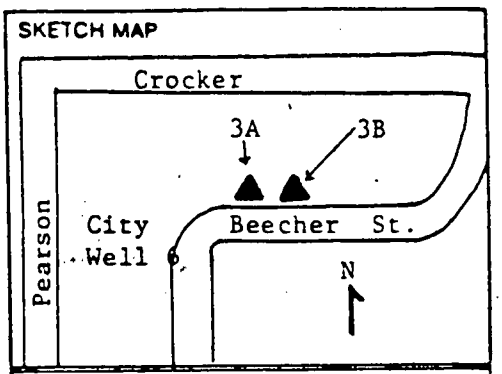
WESTON

DRILLING LOG

WELL NUMBER: WMW- 3A
LOCATION: Beecher Street
Wausau, Wisconsin
SURFACE ELEVATION: 1211.01'
DRILLING COMPANY: Exploration Technology
DRILLER: Steve Wonn
LOG BY: D. G. Pyles

OWNER: U.S. EPA
ADDRESS: Clark Street
Chicago, Illinois
TOTAL DEPTH 141.0'
WATER LEVEL: 1176.23'
DRILLING METHOD: Rotary
DATE DRILLED: 9/25/84
HELPER:

SKETCH MAP



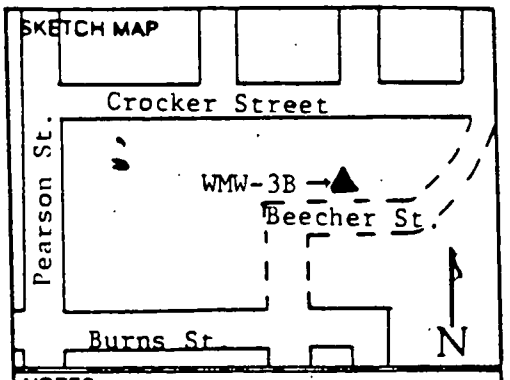
NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
120					
		12	S.S.	35 75 --	Brown, moderate to well sorted, angular to sub-rounded, quartz dominated very fine sand to silt with inclusions of pebbles (2%) and granules (1%). Clay percentage is 20%.
130					
		13	S.S.	43 100/ 10"	Brown, moderately sorted, sub-angular to sub-rounded quartz dominated medium sand with intermittant pebbles and some granules, some silt and clay.
140					
		14	S.S.	100/ 10"	Not able to recover.
		15	S.S.	100/ 10"	Not able to recover.
150					
160					

* ASTM D1586

DRILLING LOG

WELL NUMBER: WMW- 3B
OWNER: U.S. E.P.A.
LOCATION: Beecher Street, Wausau, Wisconsin
ADDRESS: Clark Street, Chicago, Illinois
TOTAL DEPTH: 75.0'
SURFACE ELEVATION: 1221.16
WATER LEVEL: 1183.79
DRILLING COMPANY: Exploration Technology
DRILLING METHOD: Rotary
DATE DRILLED: 9/22/84
DRILLER: Mark Prueher
HELPER:
LOG BY: Drill crew



NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					
		1			Brown, very coarse to fine sand with gravel.
10					
20					
30					
		2			Light brown, medium to fine sand, trace gravel, trace silt.
40					

*ASTM D1586

WASTEN

JUN 28 1985

DRILLING LOG

WELL NUMBER: WMW-3B
LOCATION: ~~Beecher Street~~ Wausau, Wisconsin
SURFACE ELEVATION: 1211.16'
DRILLING COMPANY: Exploration Technology
DRILLER: Mark Prueher
LOG BY: Drill Crew

OWNER: U.S. E.P.A.
ADDRESS: Clark Street, Chicago, Illinois
TOTAL DEPTH: 75.0'
WATER LEVEL: 1176.23'
DRILLING METHOD: Rotary
DATE DRILLED: 9/22/84
HELPER:

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
40		3			Light brown, medium to fine sand, trace gravel, trace silt.
50		4			Brown, very coarse to fine sand with gravel.
60		5			Light brown, medium to fine sand, trace gravel .
		6			Brown, very coarse to fine sand with gravel.
		7			Light brown, medium to fine sand, trace gravel.
70					
					End of boring 75'. Screen of 10' from 65' to 75'.
80					

* ASTM D1586

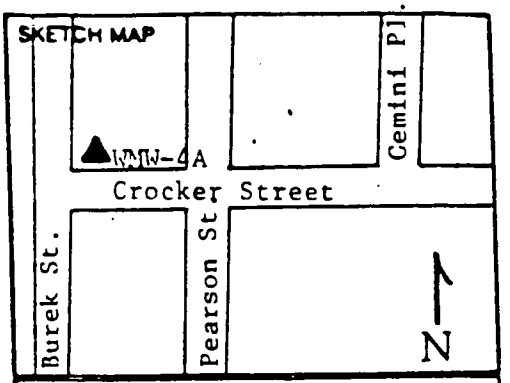
WESTON

1005'

DRILLING LOG

WELL NUMBER: WMW-4A
OWNER: U.S. EPA
LOCATION: Crocker & Burek St, Wausau, Wisconsin
ADDRESS: Clark Street, Chicago, Illinois
TOTAL DEPTH: 100'
SURFACE ELEVATION: 1215.63'
WATER LEVEL: 1185.71
DRILLING COMPANY: Exploration Technology
DRILLING METHOD: Rotary
DATE DRILLED: 9/26/84
DRILLER: Mark Prueher
HELPER: Drill crew
LOG BY:
ToC 1215.63

SKETCH MAP



NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		1			Black, medium to fine sand, trace of silt.
		2			Light brown, medium to fine sand with some gravel.
10		3			Light brown, coarse to fine sand with gravel.
20					
30					
40					

*ASTM D1586

WESTON

JUN 28 1985

DRILLING LOG

WELL NUMBER: WMW-4A
OWNER: U.S. EPA
LOCATION: Crocker & Burek St, Wausau, Wisconsin
ADDRESS: Clark Street, Chicago, Illinois
TOTAL DEPTH: 100'
SURFACE ELEVATION: 1215.63'
WATER LEVEL: 1185.71'
DRILLING COMPANY: Exploration Technology
DRILLING METHOD: Rotary
DATE DRILLED: 9/26/84
DRILLER: Mark Prueher
HELPER: Drill crew
LOG BY:

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
40					
50					
		4			Light brown, coarse to fine sand, trace gravel.
60					
70					
80					

*ASTM D1586

WESTON

1985

DRILLING LOG

WELL NUMBER: WMW-4A
OWNER: U.S. EPA
LOCATION: Crocker & Burek St, Wausau, Wisconsin
ADDRESS: Clark Street, Chicago, Illinois
TOTAL DEPTH: 100'
SURFACE ELEVATION: 1215.63'
WATER LEVEL: 1185.71'
DRILLING COMPANY: Exploration Technology
DRILLING METHOD: Rotary
DATE DRILLED: 9/26/84
DRILLER: Mark Prueher
HELPER:
LOG BY: Drill crew

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
		5			End of boring at 117', 10' screen from 90' to 100'.

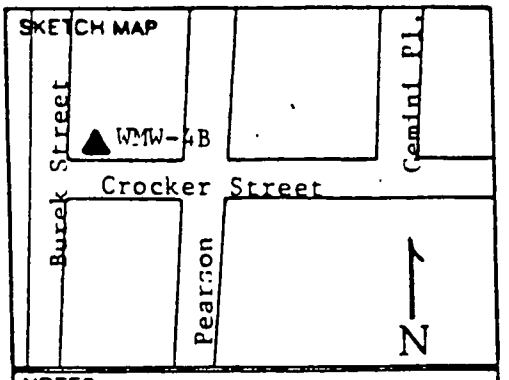
*ASTM D1586

JUN 2 1985

DRILLING LOG

WELL NUMBER: WMW- 4B
LOCATION: Crocker & Burek, Wausau, Wisconsin
SURFACE ELEVATION: 1215.53'
DRILLING COMPANY: Exploration Technology
DRILLER: Mark Prueher
LOG BY: Drill Crew

OWNER: U.S. EPA
ADDRESS: Clark Street, Chicago, Illinois
TOTAL DEPTH: 60.5'
WATER LEVEL: 1185.85'
DRILLING METHOD: Rotary
DATE DRILLED: 9/27/84
HELPER:
ToC 1215.53



NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					
		1			Brown, grades from fine to medium to coarse silty sand.
10					Considerable mud loss.
		2			Gravel
20					
		3			Coarser sand.
30					
40					

*ASTM D1586

WESTON

DRILLING LOG

WELL NUMBER: WMW-4B
OWNER: U.S. EPA
LOCATION: Crocker & Burek, Wausau, Wisconsin
ADDRESS: Clark Street, Chicago, Illinois
TOTAL DEPTH: 60.5'
SURFACE ELEVATION: 1215.53'
WATER LEVEL: 1185.85'
DRILLING COMPANY: Exploration Technology
DRILLING METHOD: Rotary
DATE DRILLED: 9/27/84
DRILLER: Mark Prueher
HELPER:
LOG BY: Drill crew

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
40					
		4			Brown, grades from fine to medium to coarse silty sand.
50					
					End of boring at 60.5'. 10' screen from 50' to 60'.
60					
70					
80					

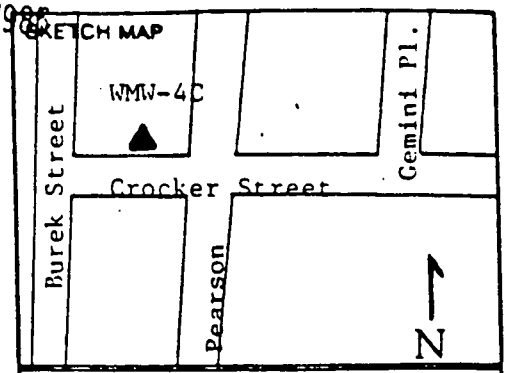
* ASTM D1586

JUN 2 3 1986

DRILLING LOG

WELL NUMBER: WMW-4C
OWNER: U.S. EPA
LOCATION: Crocker St. and Burek Street, Wausau, Wisconsin
ADDRESS: Clark Street, Chicago, Illinois
TOTAL DEPTH: 40'
SURFACE ELEVATION: 1215.50'
WATER LEVEL: 1186.50'
DRILLING COMPANY: Exploration Technology
DRILLING METHOD: Rotary
DATE DRILLED: 10/31/84
DRILLER: Bob Lavere
HELPER:
LOG BY: Drill crew
ToC 1215.50

SKETCH MAP



NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		1			Dark brown, coarse to fine sand with some silt and gravel (fill)(SP-SM)
		2			Brown, coarse to fine sand, trace silt, trace gravel. (SP).
10					
20					
30					
40					End of boring at 40'. 10' screen from 30' to 40'.

*ASTM D1586

SHEET 1 OF 1

JUN 2 3 1985

WESTERN

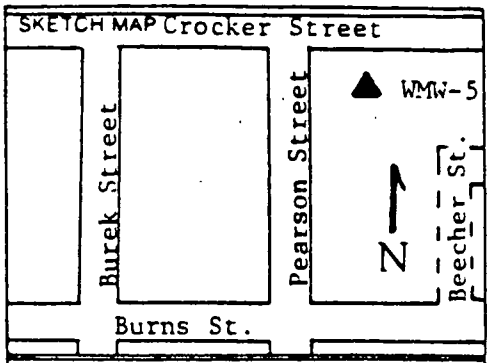
DRILLING LOG

WELL NUMBER: WMW-5
LOCATION: 150' east of CW-6, Wausau, Wisconsin
SURFACE ELEVATION: 1219.08'
DRILLING COMPANY: Exploration Technology
DRILLER: Mark Prueher
LOG BY: Drill crew

OWNER: U.S. EPA
ADDRESS: Clark Street, Chicago, Illinois
TOTAL DEPTH: 45'
WATER LEVEL: 1185.75'
DRILLING METHOD: Rotary
DATE DRILLED: 11/2/84

ToC 1219.08

SKETCH MAP



NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					.3' Topsoil.
		1			Light brown, coarse to fine sand with gravel, trace silt.
10					
20					
30					
40					

* ASTM D1586

WESTON

SKETCH MAP

DRILLING LOG

WELL NUMBER: WMW-5 OWNER: U.S. EPA

LOCATION: 150' east of CW-6, Wausau, Wisconsin ADDRESS: Clark Street, Chicago, Illinois

TOTAL DEPTH: 45'

SURFACE ELEVATION: 1219.08' WATER LEVEL: 1185.75'

DRILLING COMPANY: Exploration Technology DRILLING METHOD: Rotary DATE DRILLED: 11/2/84

DRILLER: Mark Prueher HELPER:

LOG BY: Drill crew

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
40					End of boring at 45'. 10' screen from 35 to 45'.

*ASTM D1586

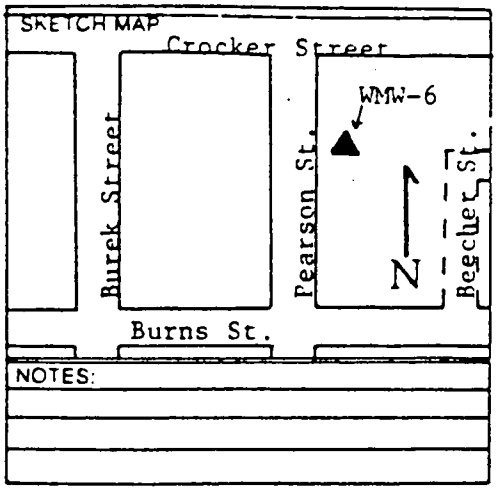
WESTERN

DRILLING LOG

WELL NUMBER: MW-6
OWNER: U.S.EPA
LOCATION: 140' Southwest of CW-6
ADDRESS: Clark Street Chicago, Illinois
Wausau, Wisconsin
TOTAL DEPTH: 45'
SURFACE ELEVATION: 1218.93'
WATER LEVEL: N/A
DRILLING COMPANY: Exploration Technology
DRILLING METHOD: Rotary
DATE DRILLED: 11/2/84
DRILLER: Mark Prueher
HELPER:
LOG BY: Drill crew

ToC 1218.93

SKETCH MAP



NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					.3' Topsoil
		1			Light brown, coarse to fine sand with trace gravel, trace silt.
10					
20					
30					
40					

*ASTM D1586

WESTON

JUN 2 6 1985

DRILLING LOG

WELL NUMBER: WMW-6

OWNER: U.S.EPA

LOCATION: 140' Sourhwest of CW-6

ADDRESS: Clark Street Chicago, Illinois

Wausau, Wisconsin

TOTAL DEPTH: 45'

SURFACE ELEVATION: 1218.93

WATER LEVEL: N/A

DRILLING COMPANY: Exploration Technology

DRILLING METHOD: Rotary

DATE DRILLED: 11/2/84

DRILLER: Mark Prueher

HELPER:

LOG BY: Drill crew

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
40					
					End of boring at 45'. 10' screen from 35' to 45'.
50					

*ASTM D1586

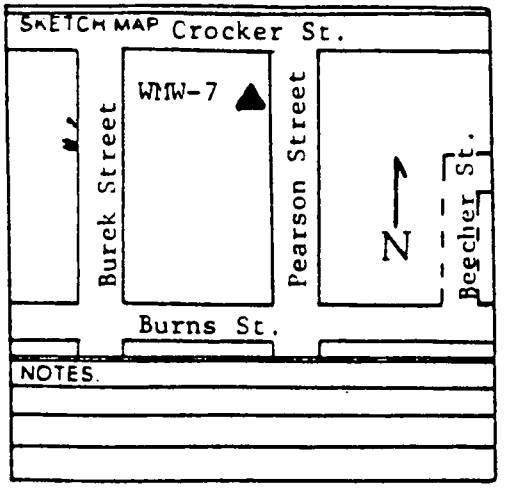
WESTON 1985

DRILLING LOG

WELL NUMBER: WMW-7
LOCATION
Wausau, Wisconsin
SURFACE ELEVATION: 1219.10'
DRILLING COMPANY: Exploration Technology
DRILLER: Bob Lavere
LOG BY: Drill crew

OWNER: U.S. EPA
ADDRESS: Clark Street
Chicago, Illinois
TOTAL DEPTH: 45.0'
WATER LEVEL: 1185.22'
DRILLING METHOD: Rotary
DATE DRILLED: 11/26/84
HELPER:

SKETCH MAP



NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					
					Brown, coarse to fine sand, trace silt with gravel and cobbles (SP).
10					
20					
					Brown, coarse to fine sand, trace silt (SP).
30					
40					

* ASTM D1586

WESTON

DRILLING LOG

WELL NUMBER: WMW-7
OWNER: U.S. EPA
LOCATION: Wausau, Wisconsin
ADDRESS: Clark Street, Chicago, Illinois
TOTAL DEPTH: 45.0'
SURFACE ELEVATION: 1219.10'
WATER LEVEL: 1185.22'
DRILLING COMPANY: Exploration Technology
DRILLING METHOD: Rotary
DATE DRILLED: 11/26/84
DRILLER: Bob Lavere
HELPER:
LOG BY: Drill crew

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
40					
					End of boring at 45.0'.
50					
60					
70					
80					

* ASTM D1586

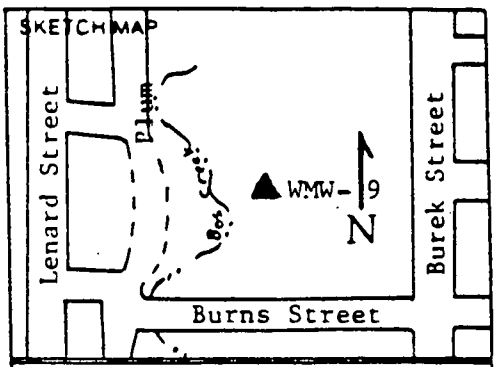
WESTON

JUN 28 1985

DRILLING LOG

WELL NUMBER: WMW-9
OWNER: U.S. EPA
LOCATION: Wausau, Wisconsin
ADDRESS: Clark Street, Chicago, Illinois
TOTAL DEPTH: 50.0'
SURFACE ELEVATION: 1201.99'
WATER LEVEL: 1186.19'
DRILLING COMPANY: Exploration Technology
DRILLING METHOD: Rotary
DATE DRILLED: 11/30/84
DRILLER: Bob Lavere
HELPER:
LOG BY: Drill crew

SKETCH MAP



NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					Topsoil
10					Brown, coarse to fine sand, trace silt with some gravel, occasional cobbles (SP).
30					Brown, coarse to fine sand, trace silt (SP).
40					

*ASTM D1586

WESTON

DRILLING LOG

385

WELL NUMBER: WMW-9 OWNER: U.S. EPA

LOCATION _____ ADDRESS: Clark Street
Chicago, Illinois

Wausau, Wisconsin TOTAL DEPTH 50.0'

SURFACE ELEVATION: 1201.98' WATER LEVEL: 1186.19'

DRILLING COMPANY: Exploration Technology DRILLING METHOD: Rotary DATE DRILLED: 11/30/84

DRILLER: Bob Lavere HELPER: _____

LOG BY: Drill crew

SKETCH MAP

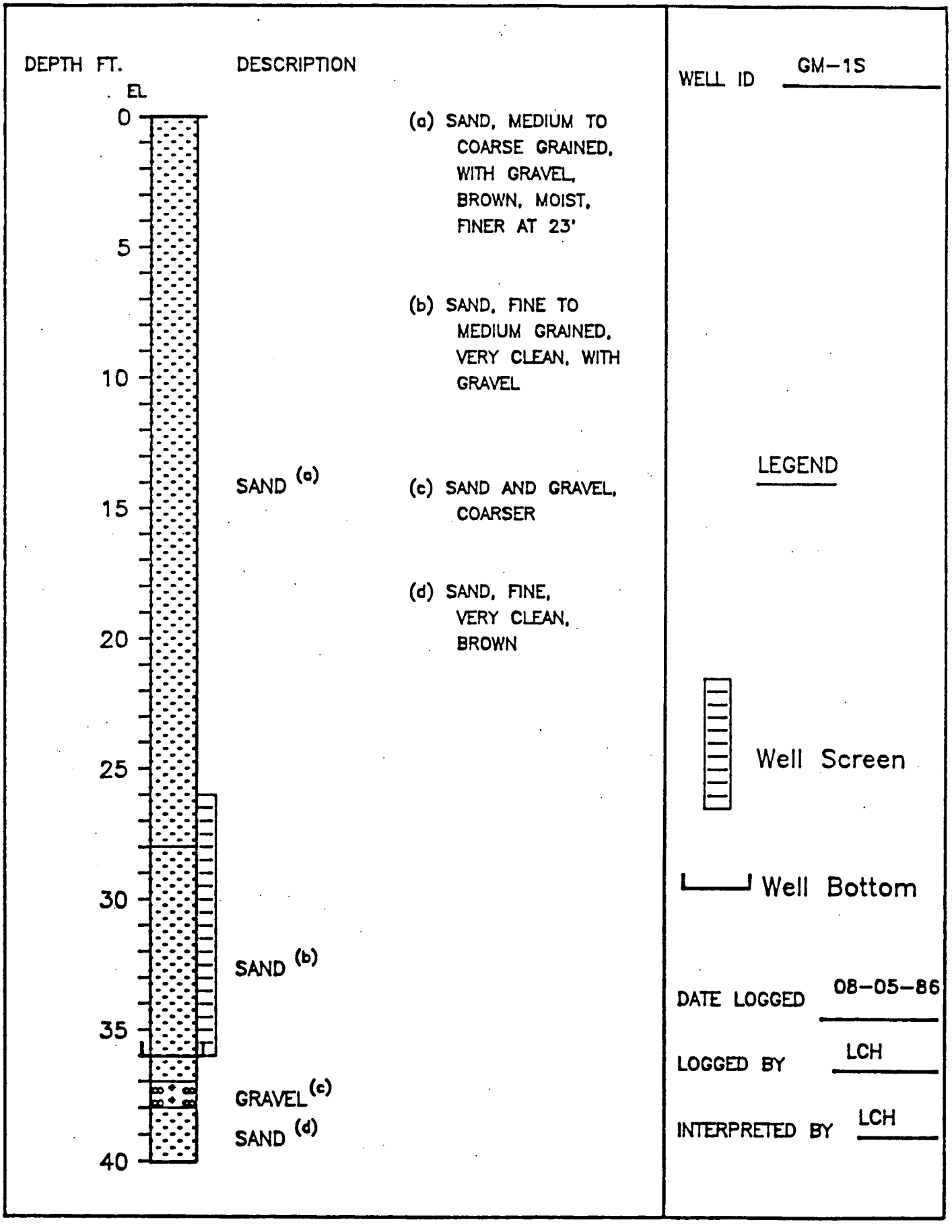
NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
40					
					Brown, coarse to fine sand, trace silt (SP).
50					End of boring at 50.0'
60					
70					
80					

*ASTM D1586

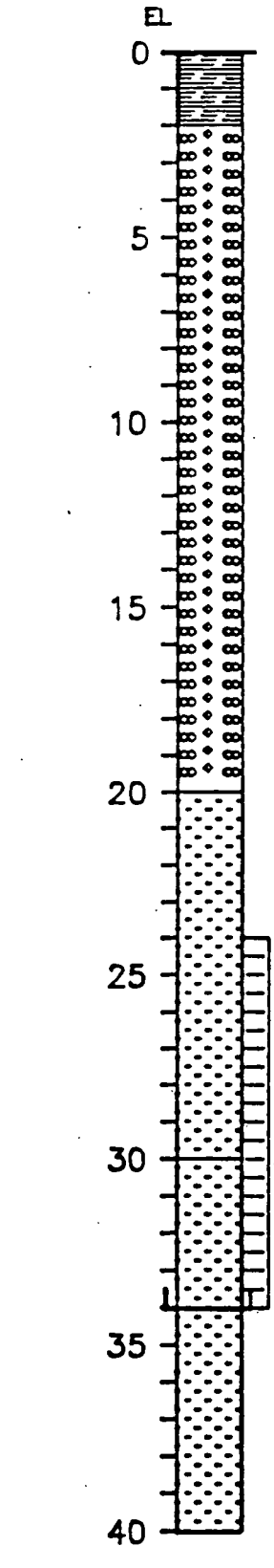
Geraghty & Miller, Inc.

WELL LOG



Geraghty & Miller, Inc.

WELL LOG



(a) TOPSOIL– SILTY SAND, FINE TO MEDIUM, WITH ORGANIC MATTER, DARK BROWN

(b) GRAVEL, COARSE TO MEDIUM, WITH MEDIUM TO COARSE GRAINED SAND, BROWN

(c) SAND AND GRAVEL, MEDIUM GRAINED, POORLY SORTED, WITH TAN FINE SAND AND ROCKS

(d) SAND AND GRAVEL, COARSE, WITH SUBROUNDED SAND AND PEBBLES

WELL ID GM–2S

LEGEND

Well Screen

Well Bottom

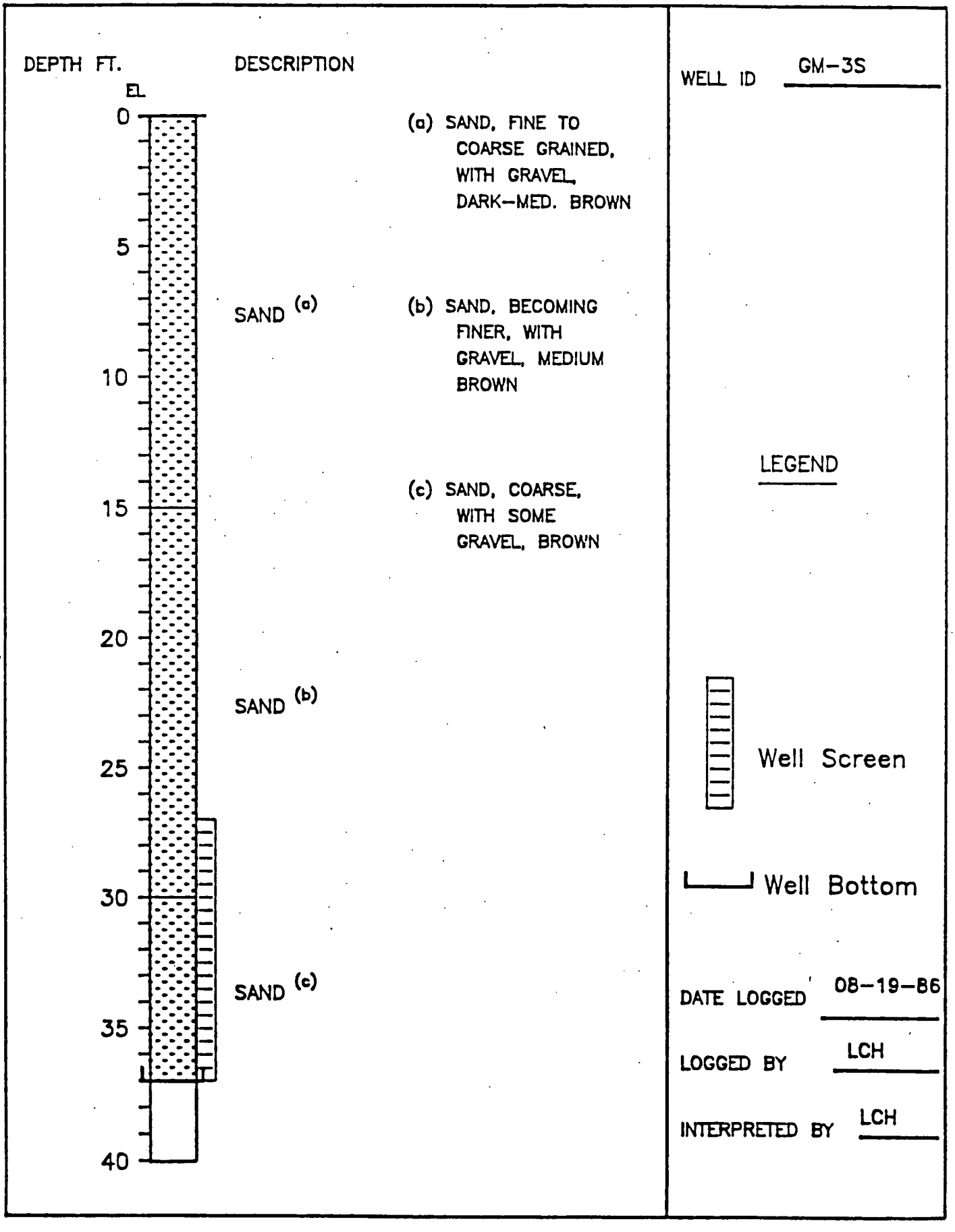
DATE LOGGED 08–18–86

LOGGED BY PH

INTERPRETED BY LCH

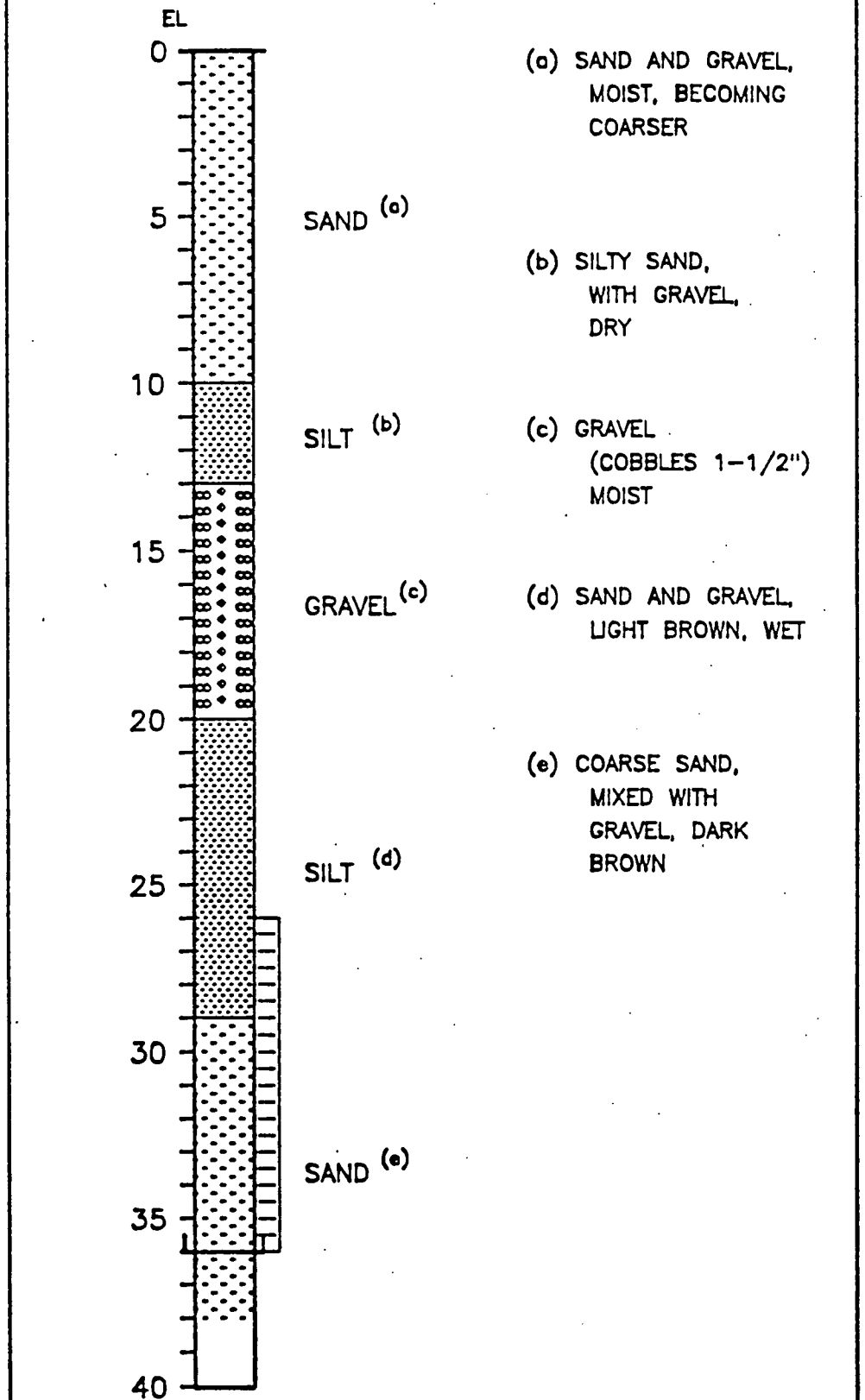
Geraghty & Miller, Inc.

WELL LOG



Geraghty & Miller, Inc.

WELL LOG



DESCRIPTION

(a) SAND AND GRAVEL, MOIST, BECOMING COARSER

(b) SILTY SAND, WITH GRAVEL, DRY

(c) GRAVEL (COBBLES 1-1/2") MOIST

(d) SAND AND GRAVEL, LIGHT BROWN, WET

(e) COARSE SAND, MIXED WITH GRAVEL, DARK BROWN

WELL ID GM-4S

LEGEND

Well Screen

Well Bottom

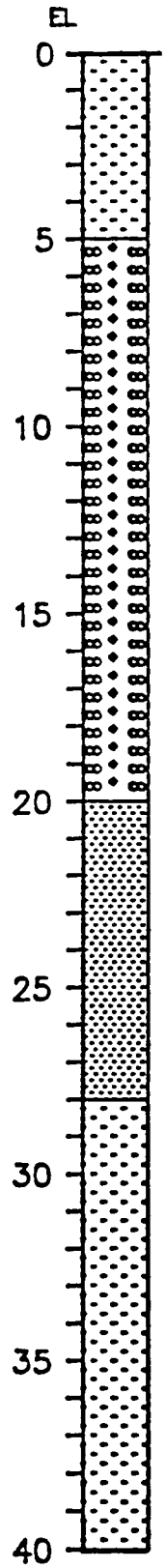
DATE LOGGED 08-21-86

LOGGED BY LCH

INTERPRETED BY LCH

Geraghty & Miller, Inc.

WELL LOG



DESCRIPTION

SAND [a]

(a) SAND, MEDIUM GRAINED, BROWN

GRAVEL [b]

(b) GRAVEL AND SAND, MEDIUM TO COARSE GRAINED SAND, COBBLES TO 1-1/2", BROWN

(c) SILT, VERY FINE, WITH SOME SMALL GRAVEL, VERY HARD, LT.BROWN

SILT [c]

(d) SAND, MEDIUM TO COARSE GRAINED, WITH TRACE OF GRAVEL, BROWN

SAND [d]

WELL ID GM-4D

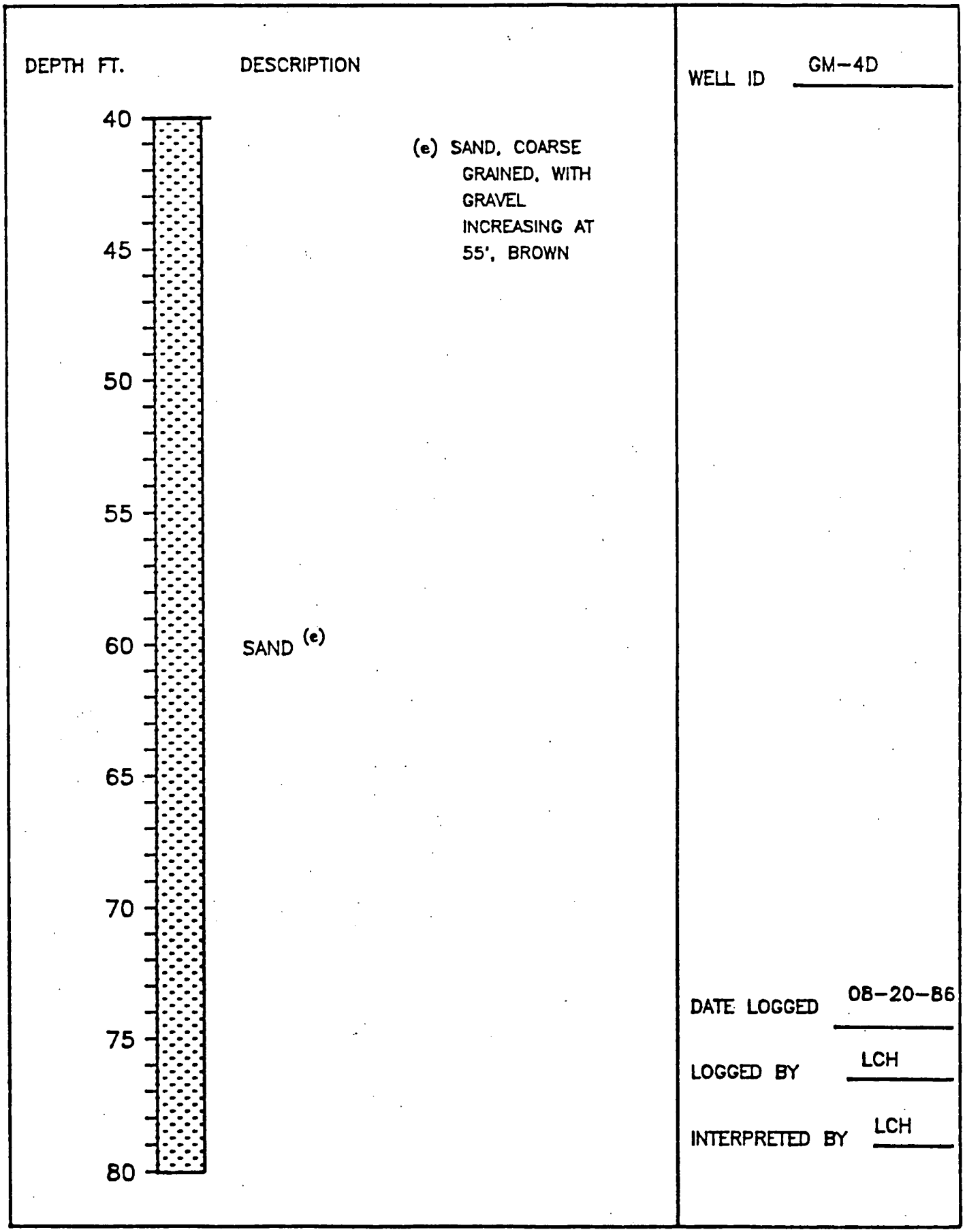
DATE LOGGED 08-20-86

LOGGED BY LCH

INTERPRETED BY LCH

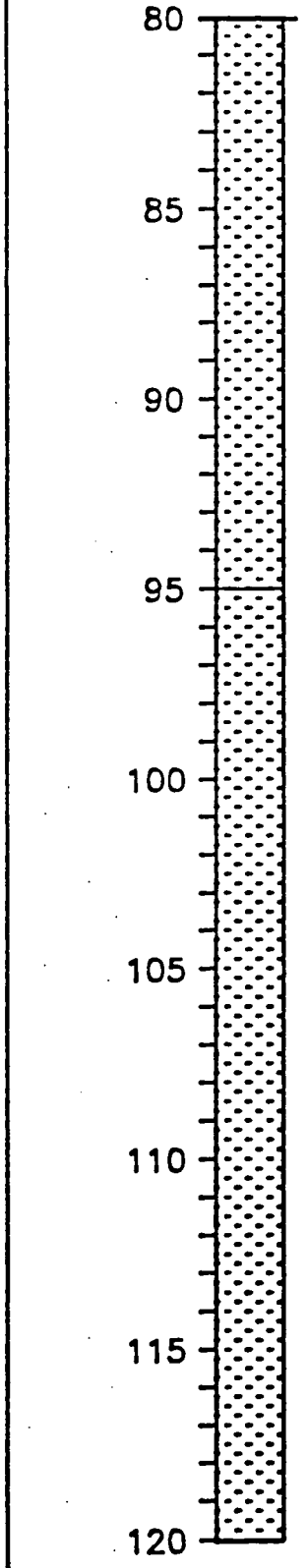
Geraghty & Miller, Inc.

WELL LOG



Geraghty & Miller, Inc.

WELL LOG



(e) SAND, COARSE GRAINED, WITH MUCH GRAVEL, BROWN

(f) SAND, VERY FINE TO MEDIUM GRAINED, NO GRAVEL, CAUSING BRIDGING OF TOOLS IN HOLE

WELL ID GM-4D

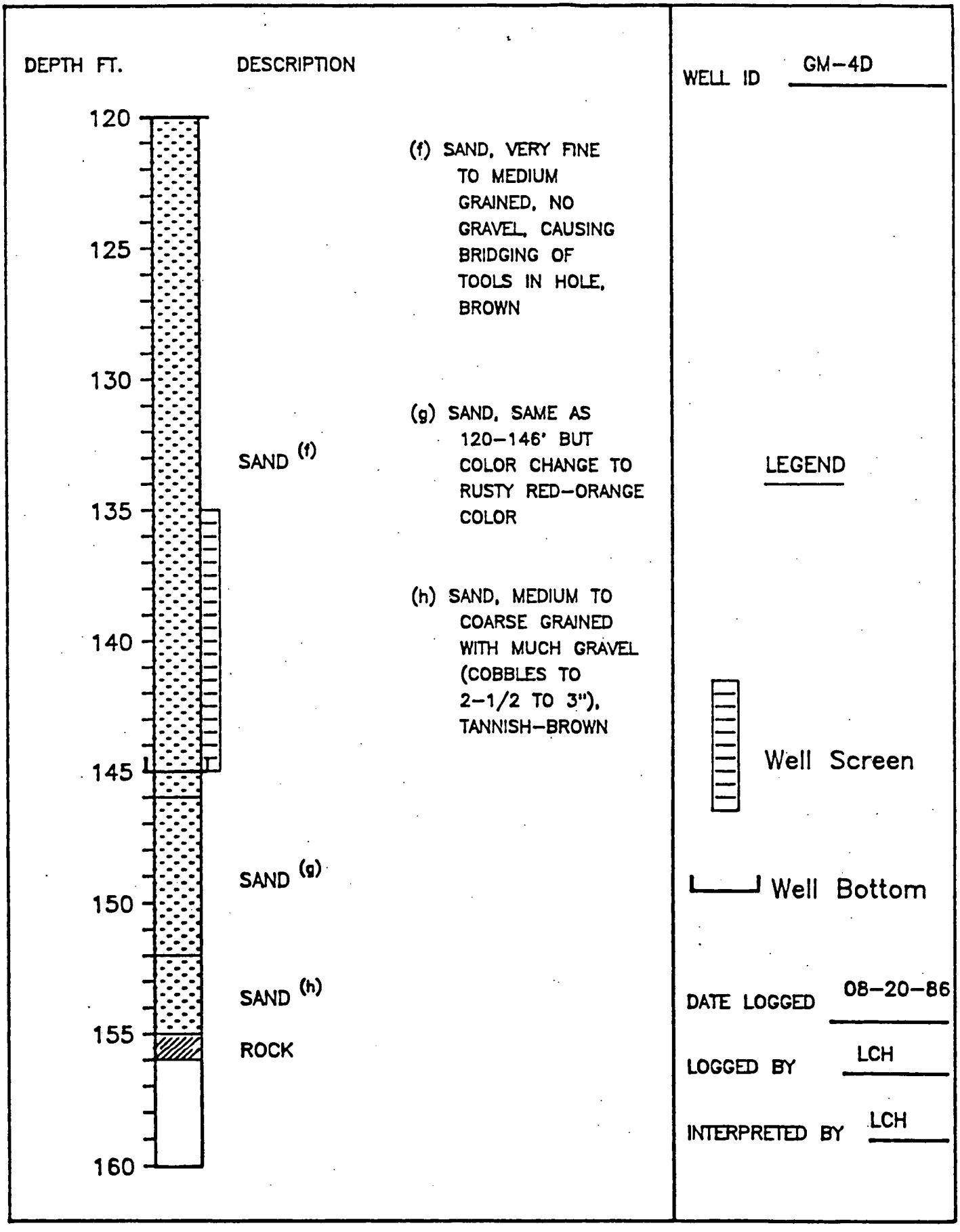
DATE LOGGED 08-20-86

LOGGED BY LCH

INTERPRETED BY LCH

Geraghty & Miller, Inc.

WELL LOG



APPENDIX B

WELL CONSTRUCTION DIAGRAMS

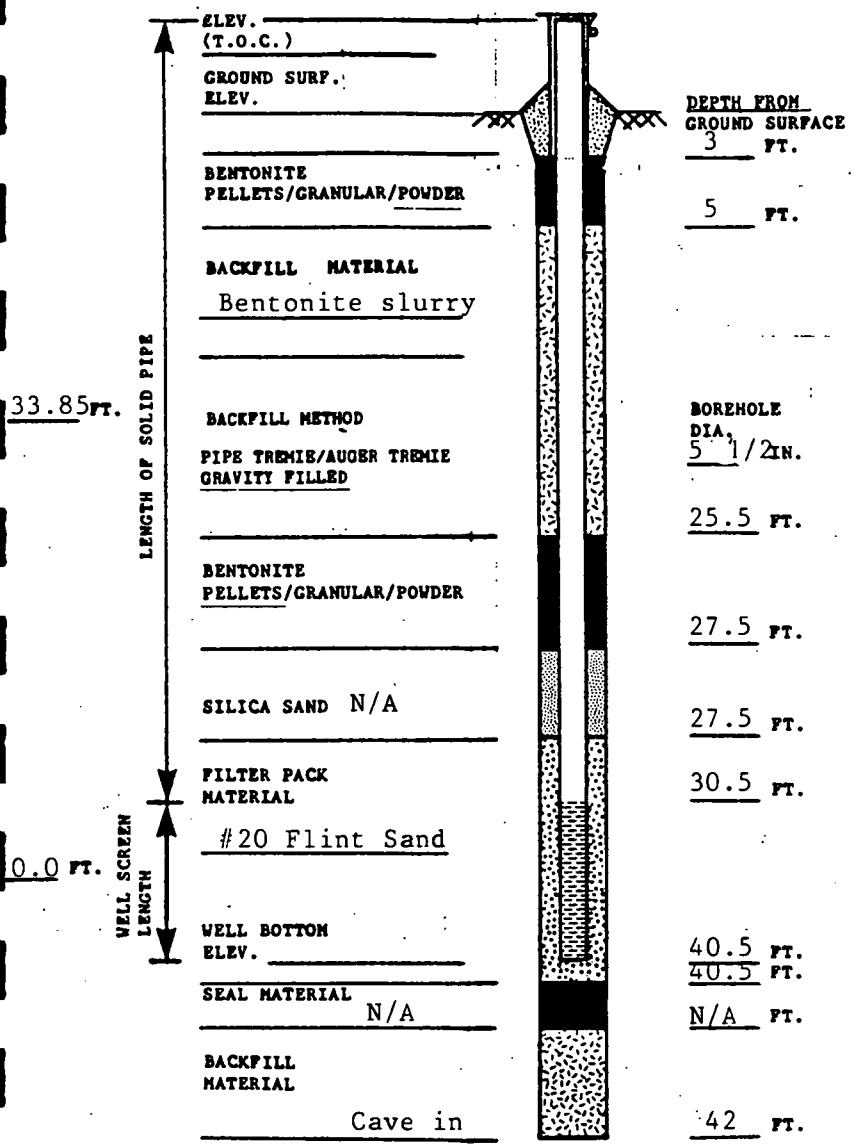
RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: Foley & Lardner NO. 222.04

WELL NO. R-1S

DATE INSTALLED 8/15/86



1) CASING DETAILS

A) TYPE OF PIPE:

PVC, STAINLESS, TEFLON, OTHER _____

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;

COUPLINGS, THREADED (W/TAPE?), OTHER w/ O rings

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:

PVC, STAINLESS, TEFLON, OTHER 6" Point

E) WELL SCREEN SLOT SIZE 0.010"

F) PIPE DIA: ID IN. 2.0 OD IN. 2.4

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. 4 IN.

2) WELL DEVELOPMENT 9/05/86

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER Air

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 20 minutes

C) APPROXIMATE WATER VOLUME: REMOVED -8 gallons

ADDED _____

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

_____ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 9/05/86 34.10' FT.

DATE/TIME _____ FT.

DATE/TIME _____ FT.

ADDITIONAL COMMENTS: _____

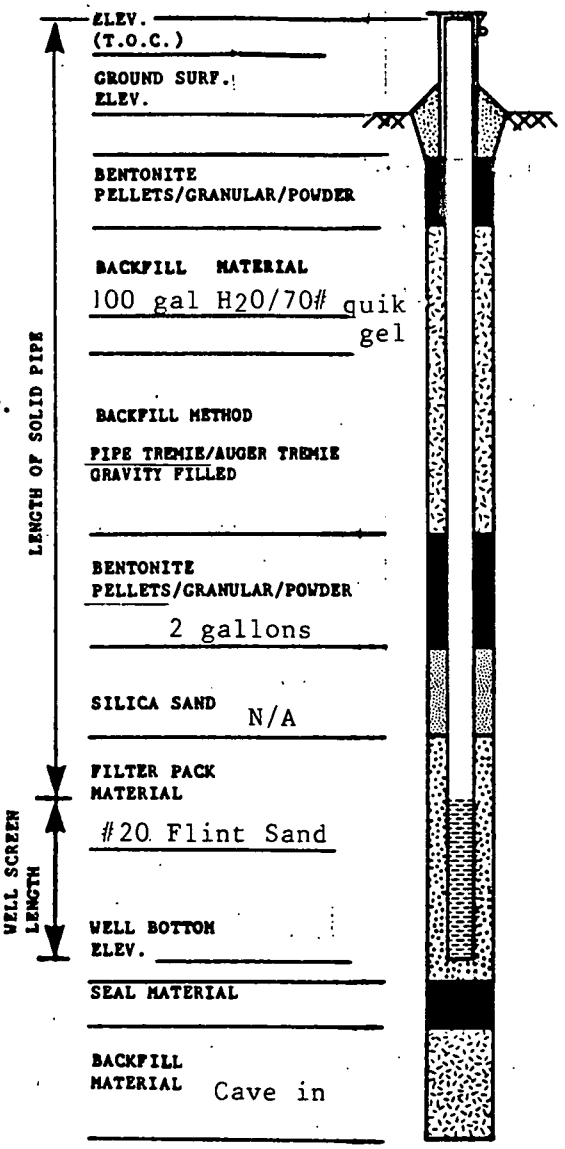
RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: Foley & Lardner NO. 222.04

WELL NO. R-1D

DATE INSTALLED 8/14/86



1) CASING DETAILS

A) TYPE OF PIPE:

PVC, STAINLESS, TEFLON, OTHER _____

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;

COUPLINGS, THREADED (W/TAPE?), OTHER w/ O rings

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:

PVC, STAINLESS, TEFLON, OTHER w/6" Point

E) WELL SCREEN SLOT SIZE 0.010"

F) PIPE DIA: ID IN. 2.0 OD IN. 2.4

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. 4 IN.

2) WELL DEVELOPMENT 9/05/86

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER Air

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 30 minutes

C) APPROXIMATE WATER VOLUME: REMOVED -300 gallons

ADDED _____

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?
slightly silty
CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

_____ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 8/15/86 A.M. 35.4 FT.

DATE/TIME 9/05/86 34.6 FT.

DATE/TIME _____ FT.

ADDITIONAL COMMENTS: _____

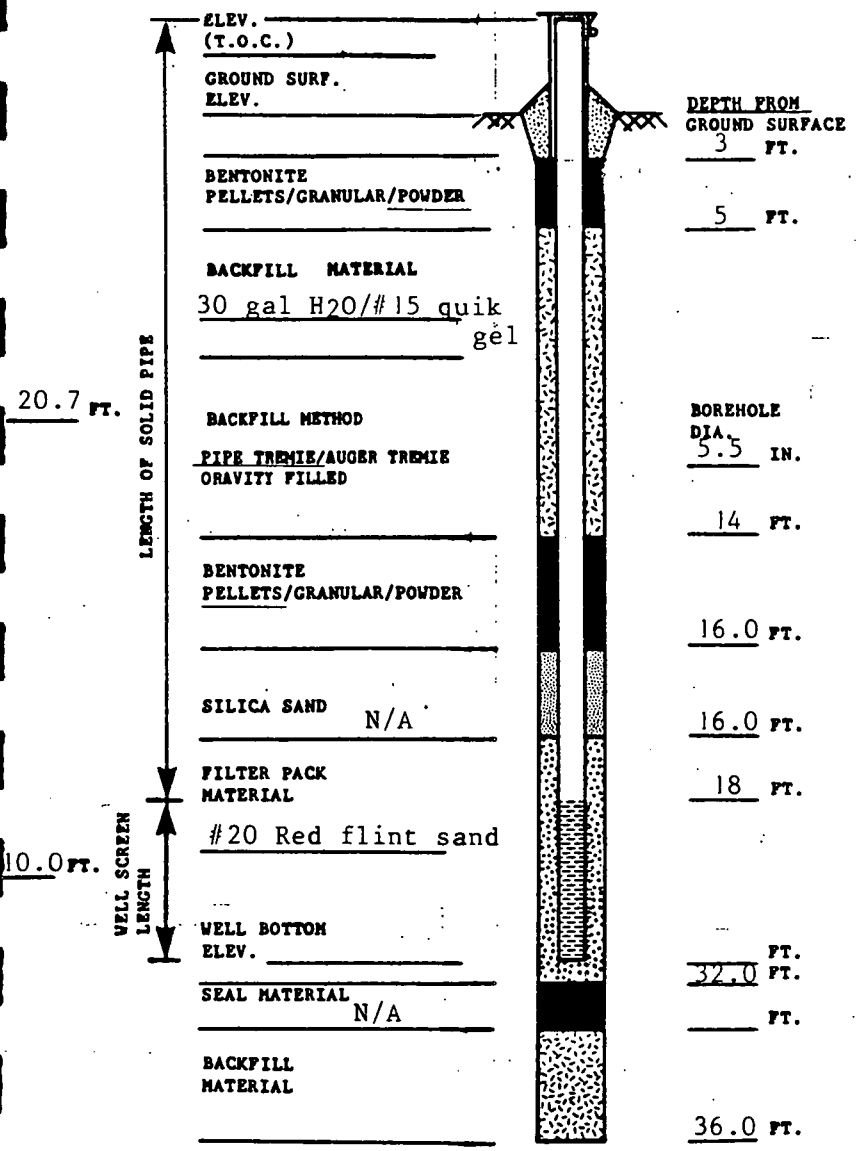
RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: Foley & Lardner NO. 222.04

WELL NO. R-2S

DATE INSTALLED 8/7/86



1) CASING DETAILS

A) TYPE OF PIPE:

PVC, STAINLESS, TEFLON, OTHER _____

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;

COUPLINGS, THREADED (W/TAPE?), OTHER w/ O rings

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:

PVC, STAINLESS, TEFLON, OTHER w/6" point

E) WELL SCREEN SLOT SIZE 0.010"

F) PIPE DIA: ID IN. 2.0 OD IN. 2.4

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. 4 IN.

2) WELL DEVELOPMENT 9/04/86

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER PVC Bailer & air

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 20 minutes + 1.5 hours

C) APPROXIMATE WATER VOLUME: REMOVED 7 gallons
ADDED 0 + 10 gallons

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

_____ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 8/7/86 22.18 FT.

DATE/TIME 8/12/86 22.40 FT.

DATE/TIME 9/4/86 22.4 FT.

ADDITIONAL COMMENTS: Measured inside well casing open to 30.7' B.T.O.C. (@ completion)
Bailer drops to 30.0' below T.O.C. - ok

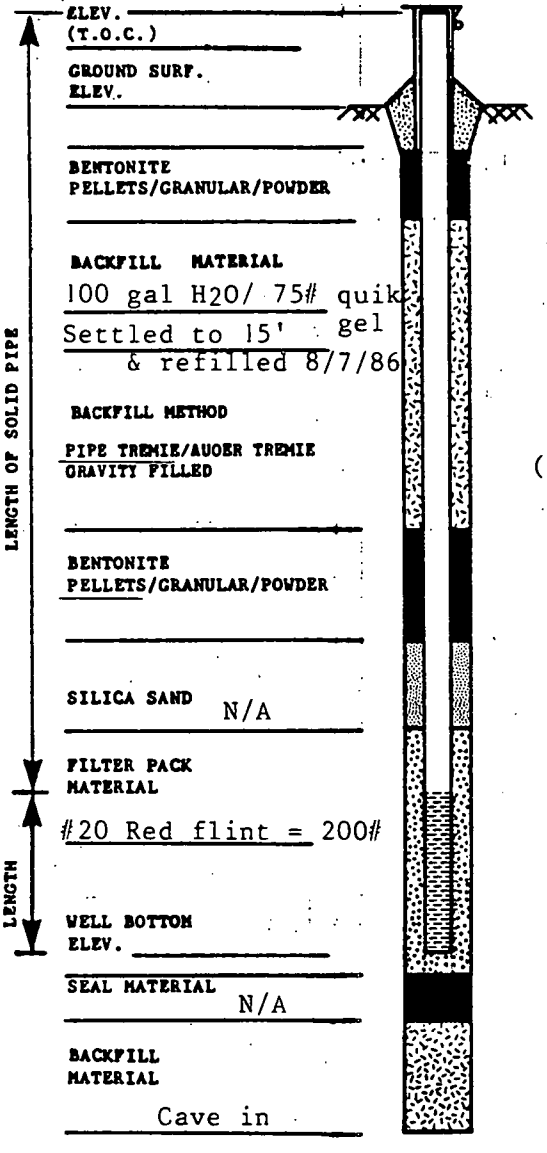
RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: Foley & Lardner NO. 222.04

WELL NO. R-2D

DATE INSTALLED 8/6/86



1) CASING DETAILS

A) TYPE OF PIPE:

PVC, STAINLESS, TEFLON, OTHER _____

PIPE SCHEDULE _____

B) TYPE OF PIPE JOINTS;

COUPLINGS, THREADED (W/TAPET), OTHER w/ O rings

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:

PVC, STAINLESS, TEFLON, OTHER w/6" point

E) WELL SCREEN SLOT SIZE 0.010

F) PIPE DIA: ID IN. 2.0 OD IN. 2.4

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO

PROTECTOR PIPE DIA. 4 IN.

2) WELL DEVELOPMENT 9/04/86

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER Air

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 30 minutes

C) APPROXIMATE WATER VOLUME: REMOVED ~300 gallons

ADDED _____

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

_____ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 8/6/86 96.7' BGS 7:30 AM thru dual FT.

DATE/TIME 8/6/86 1 PM 21.7' BGS thru over tube FT.

DATE/TIME 23.1 BTOC 8/6/86 5 PM @well shot FT.

22.78 BTOC 8/7/86 8 AM Complete

9/4/86 15:40 22.88'

ADDITIONAL COMMENTS: Well screen & pipe sealed in plastic prior to installation. After trimming & while removing overshot pipe, overshot & well pipe locked. Well was then pushed back to original depth. Bailer was sent down to 137' to confirm well pipe was in tact & open.

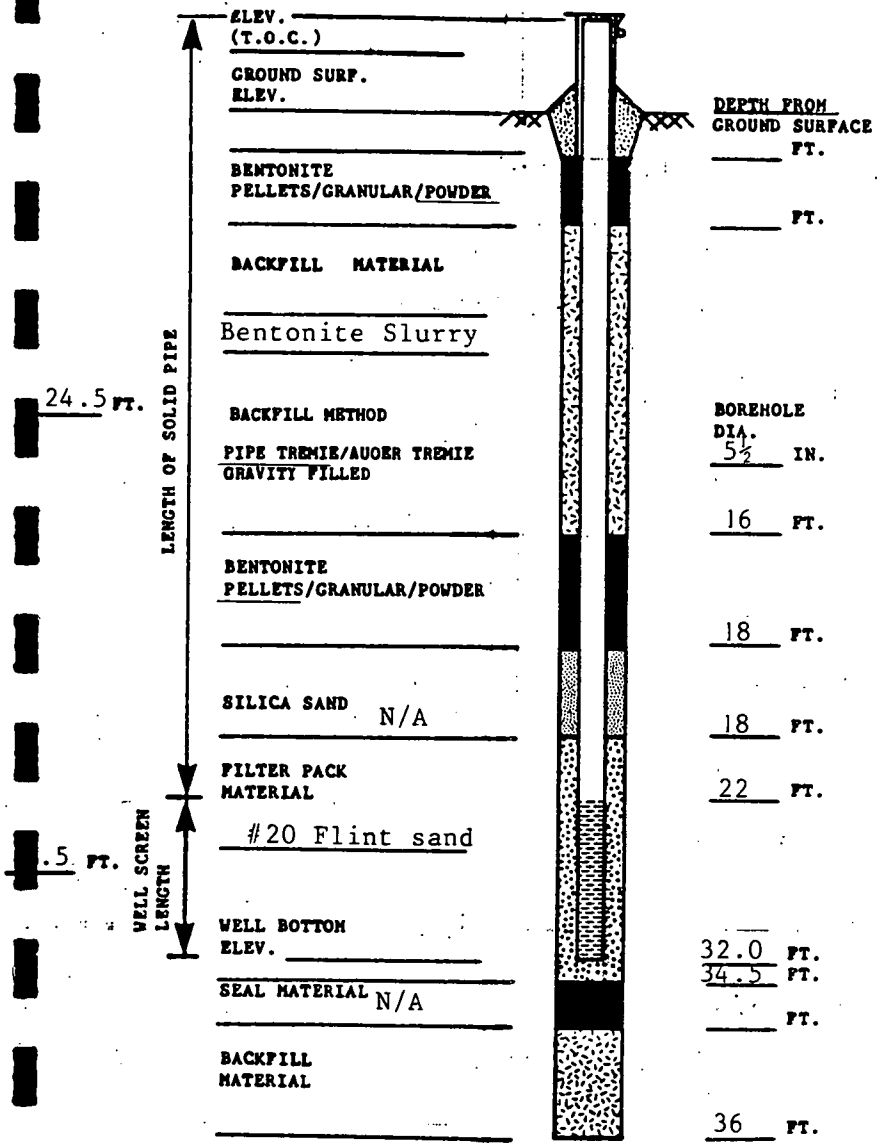
RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: Foley & Lardner NO. 222.04

WELL NO. R-3S

DATE INSTALLED 8/12/86



1) CASING DETAILS

A) TYPE OF PIPE:

PVC, STAINLESS, TEFLON, OTHER _____

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;

COUPLINGS, THREADED (W/TAPE?), OTHER w/ O rings

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:

PVC, STAINLESS, TEFLON, OTHER 6" unslotted point

E) WELL SCREEN SLOT SIZE 0.010"

F) PIPE DIA: ID IN. 2.0 OD IN. 2.4

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. 4 IN.

2) WELL DEVELOPMENT

9/04/86

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER Air

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 20 minutes

C) APPROXIMATE WATER VOLUME: REMOVED ~10 gallons

ADDED _____

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

_____ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 8/13/86 11:30 AM 24.70 FT.

DATE/TIME 9/04/86 18:00 27.21 FT.

DATE/TIME _____ FT.

ADDITIONAL COMMENTS: Pipe open to 33.35 below ground surface w/bailer - 8/13/86

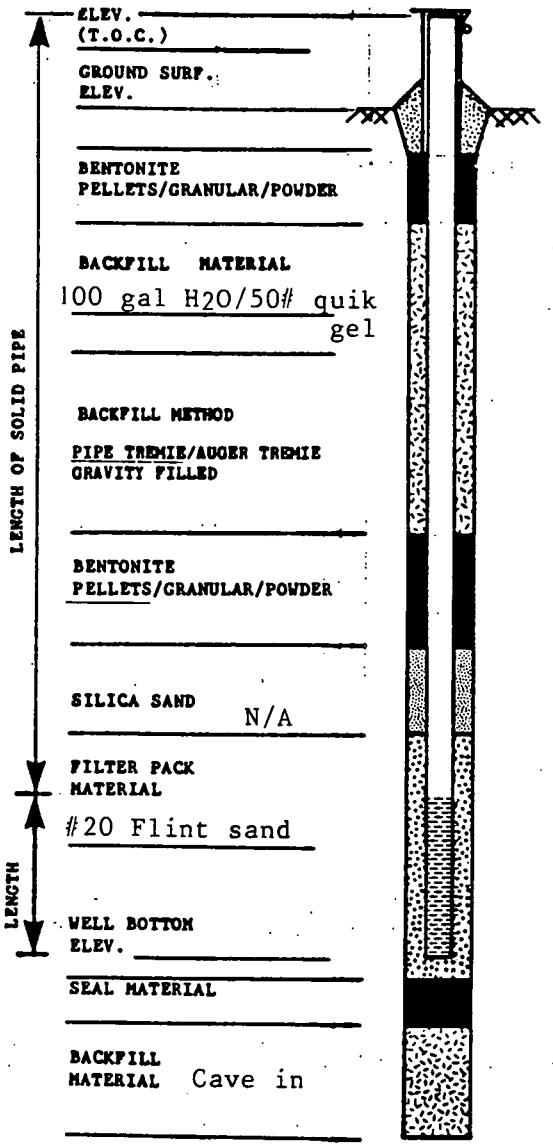
RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: Foley & Lardner NO. 222.04

WELL NO. R-3D

DATE INSTALLED 8/11/86



128.5 FT.

0.0 FT.

9.5' slotted

1) CASING DETAILS

A) TYPE OF PIPE:

PVC, STAINLESS, TEFLON, OTHER _____

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;

COUPLINGS, THREADED (W/TAPE?), OTHER w/ O rings

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:

PVC, STAINLESS, TEFLON, OTHER _____

E) WELL SCREEN SLOT SIZE 0.010"

F) PIPE DIA: ID IN. 2.0 OD IN. 2.4

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. 4 IN.

2) WELL DEVELOPMENT

A) METHOD 9/04/86

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER Air

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 30 minutes

C) APPROXIMATE WATER VOLUME: REMOVED -650 gallons

ADDED _____

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

_____ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 8/12/86 7:30 AM 24.5' BGS FT.

DATE/TIME 8/13/86 11:45 AM 26.2 BGS FT.

DATE/TIME 9/04/86 17:05 28.58 BTOC FT.

ADDITIONAL COMMENTS: Bailer goes down to 134.9' below ground surface - ok 8/13/86

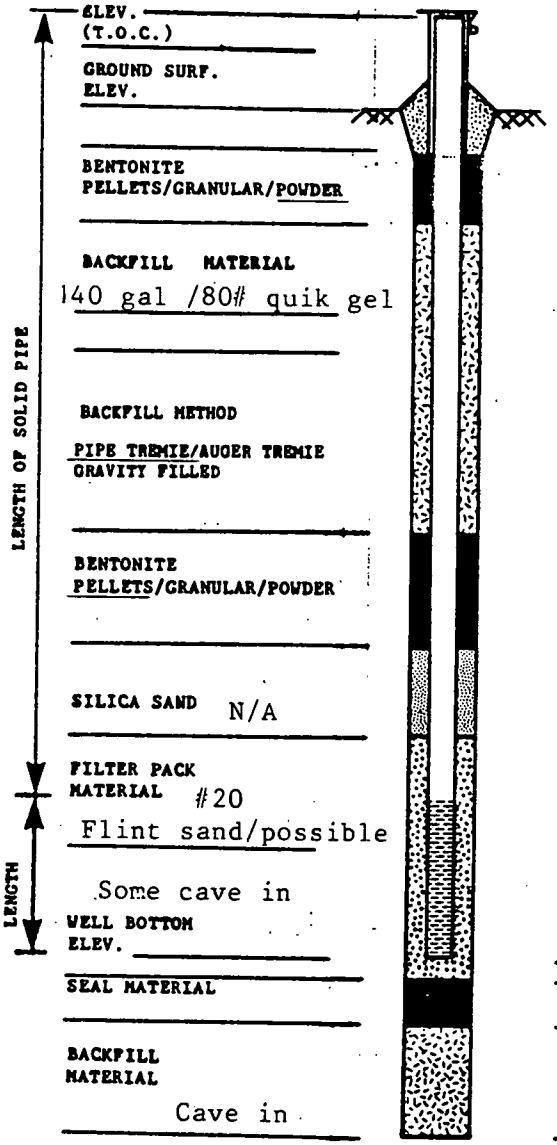
RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: Foley & Lardner NO. 222.04

WELL NO. R-4D

DATE INSTALLED 8/13/86



1) CASING DETAILS

A) TYPE OF PIPE:

PVC, STAINLESS, TEFLON, OTHER _____

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;

COUPLINGS, THREADED (W/TAPE?), OTHER w/ O rings

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:

PVC, STAINLESS, TEFLON, OTHER w/ 6' Point

E) WELL SCREEN SLOT SIZE 0.010"

F) PIPE DIA: ID IN. 2.0 OD IN. 2.4

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. ___ IN.

2) WELL DEVELOPMENT 9/04/86

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER Air

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 30 minutes

C) APPROXIMATE WATER VOLUME: REMOVED -750 gallons

ADDED _____

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

_____ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 8/14/86 8AM 31.78 FT.

DATE/TIME 9/4/86 18:40 31.87 FT.

DATE/TIME _____ FT.

ADDITIONAL COMMENTS: Total length of open pipe 135.1. Bailer drops to 132.0' below TOC - Well ok, but may have some sand sediment in bottom

CH2M HILL

FILE NO. _____

PAGE 1 OF 1

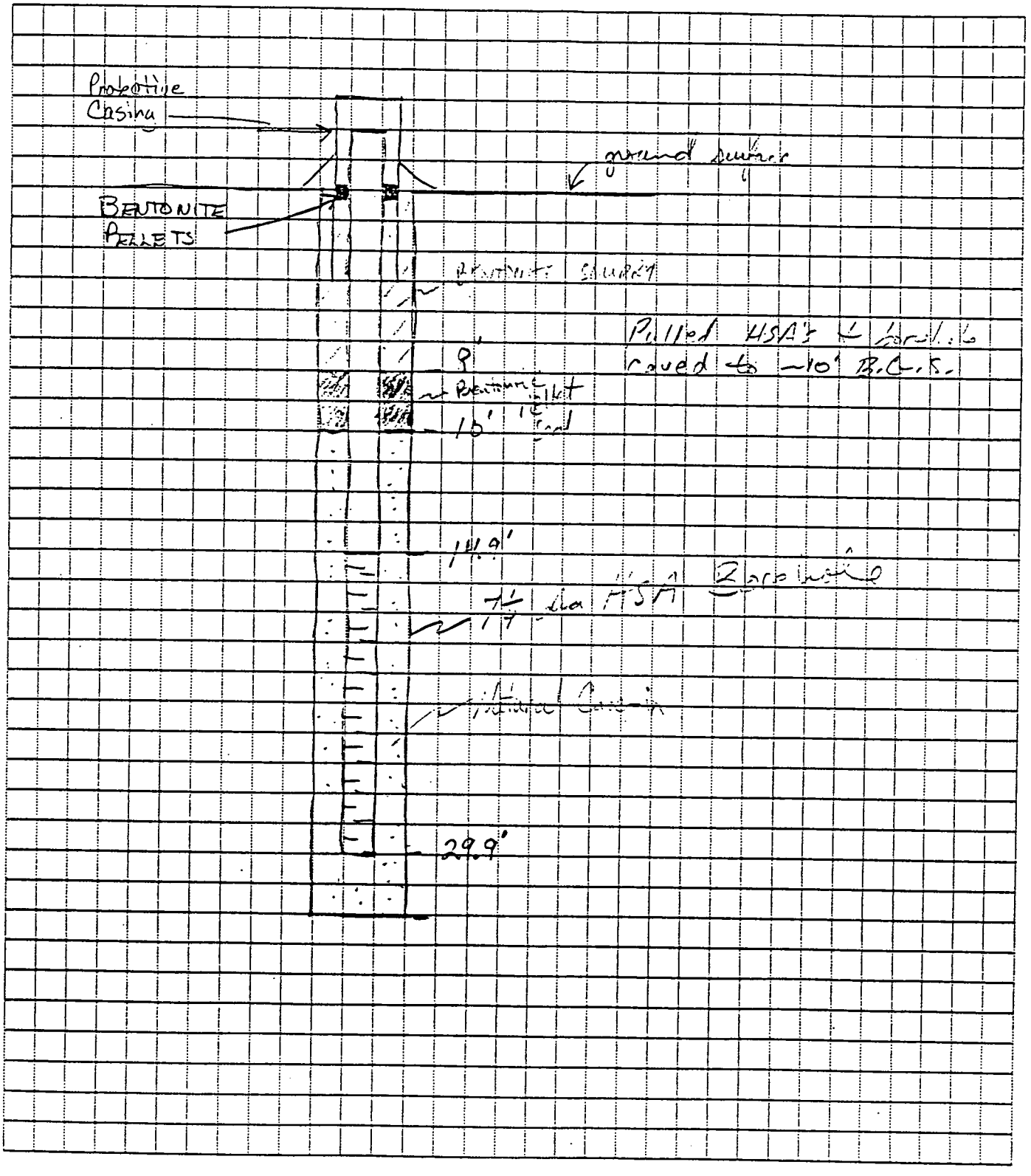
PIEZOMETER INSTALLATION SKETCH

PROJECT NAME Wausau — INSTALLED BY IHJ — DATE 11-11-95

PROJECT NO. L20303.A0 — CHECKED BY _____ — DATE _____

BORING NO. B-1S — COORDINATES _____

PIEZOMETER NO. B-1S



M05J12.R0119

CH2M HILL

FILE NO. _____

PAGE 1 OF 1

PIEZOMETER INSTALLATION SKETCH

PROJECT NAME Wausau LF

PROJECT NO. L20303.AD

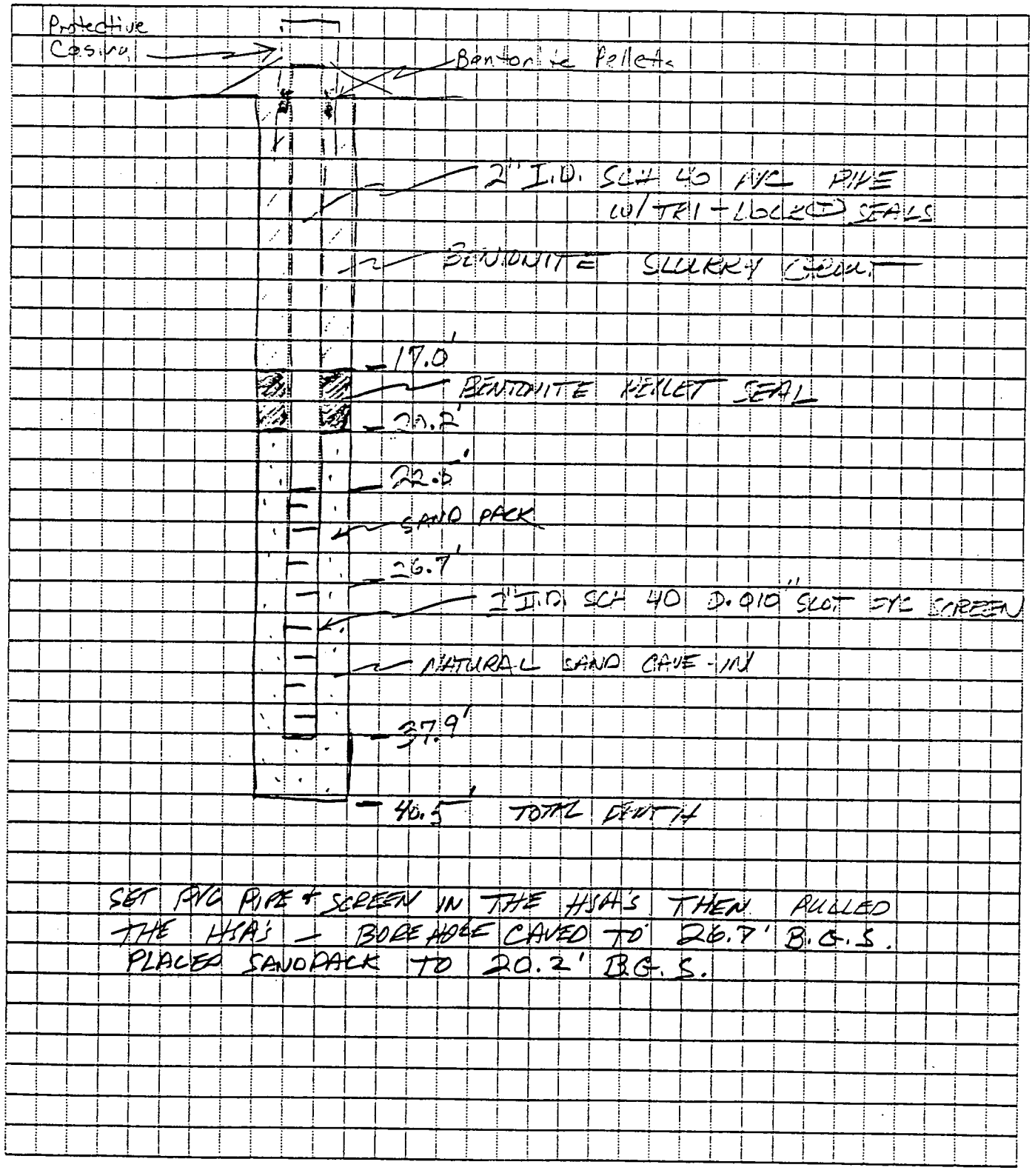
BORING NO. B-25

PIEZOMETER NO. B-25

INSTALLED BY I.H.J DATE 11/11/85

CHECKED BY _____ DATE _____

COORDINATES _____



SET PVC PIPE & SCREEN IN THE HSA'S THEN PULLED THE HSA'S - BOREHOLE CAVED TO 26.7' B.G.S. PLACED SANDPACK TO 20.2' B.G.S.

M05J12.R0119

CH2M HILL

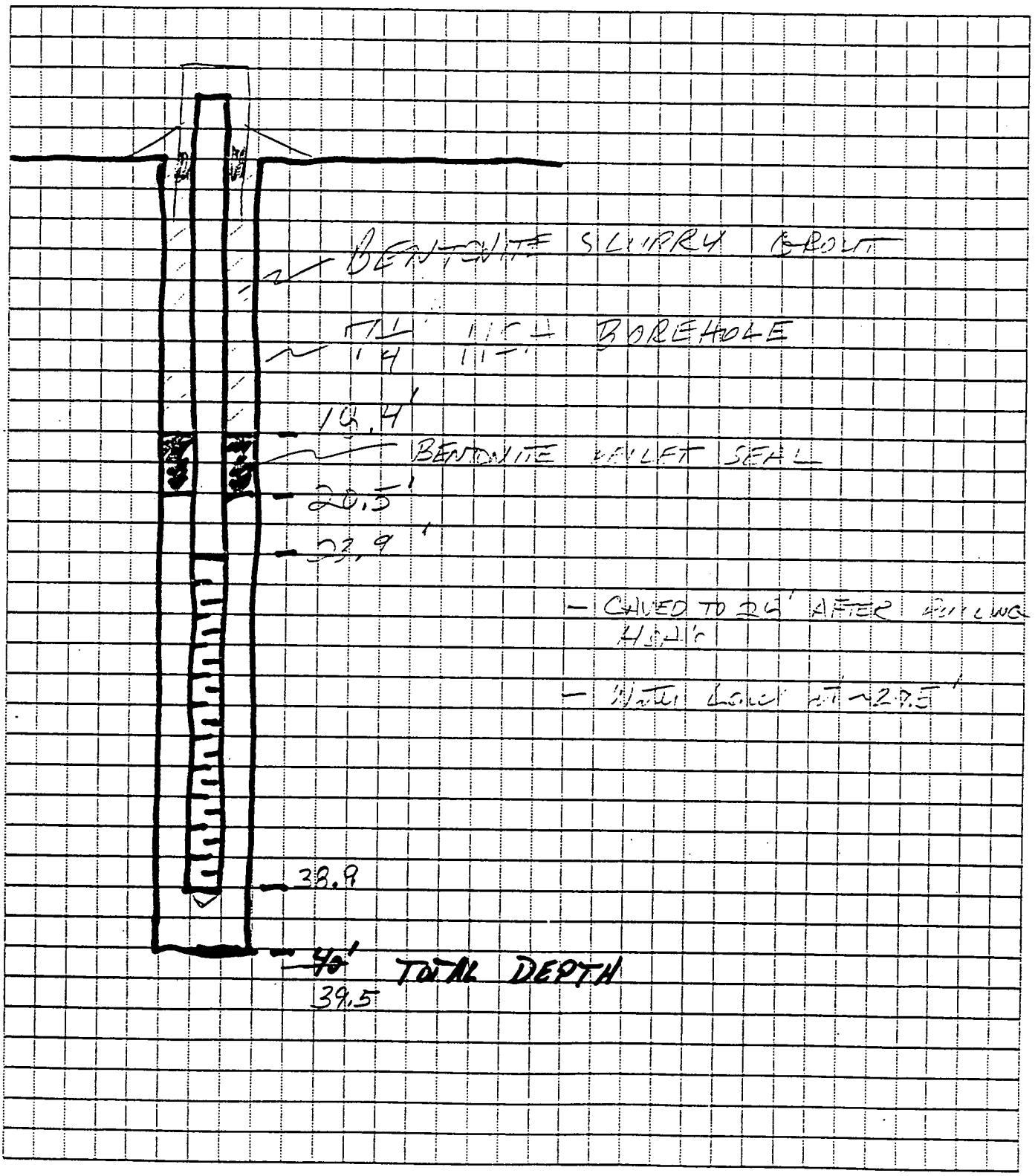
FILE NO. _____

PAGE 1 OF 1

PIEZOMETER INSTALLATION SKETCH

PROJECT NAME Wausau LF - WDNR
PROJECT NO: 20303.AO
BORING NO. B-3S
PIEZOMETER NO. B-3S

INSTALLED BY IHJ DATE 11/12/85
CHECKED BY _____ DATE _____
COORDINATES _____



M05J12.R0119

CH2M HILL

FILE NO. _____

PAGE 1 OF 1

PIEZOMETER INSTALLATION SKETCH

PROJECT NAME Wausau LF - WDNR

PROJECT NO. L20303.AO

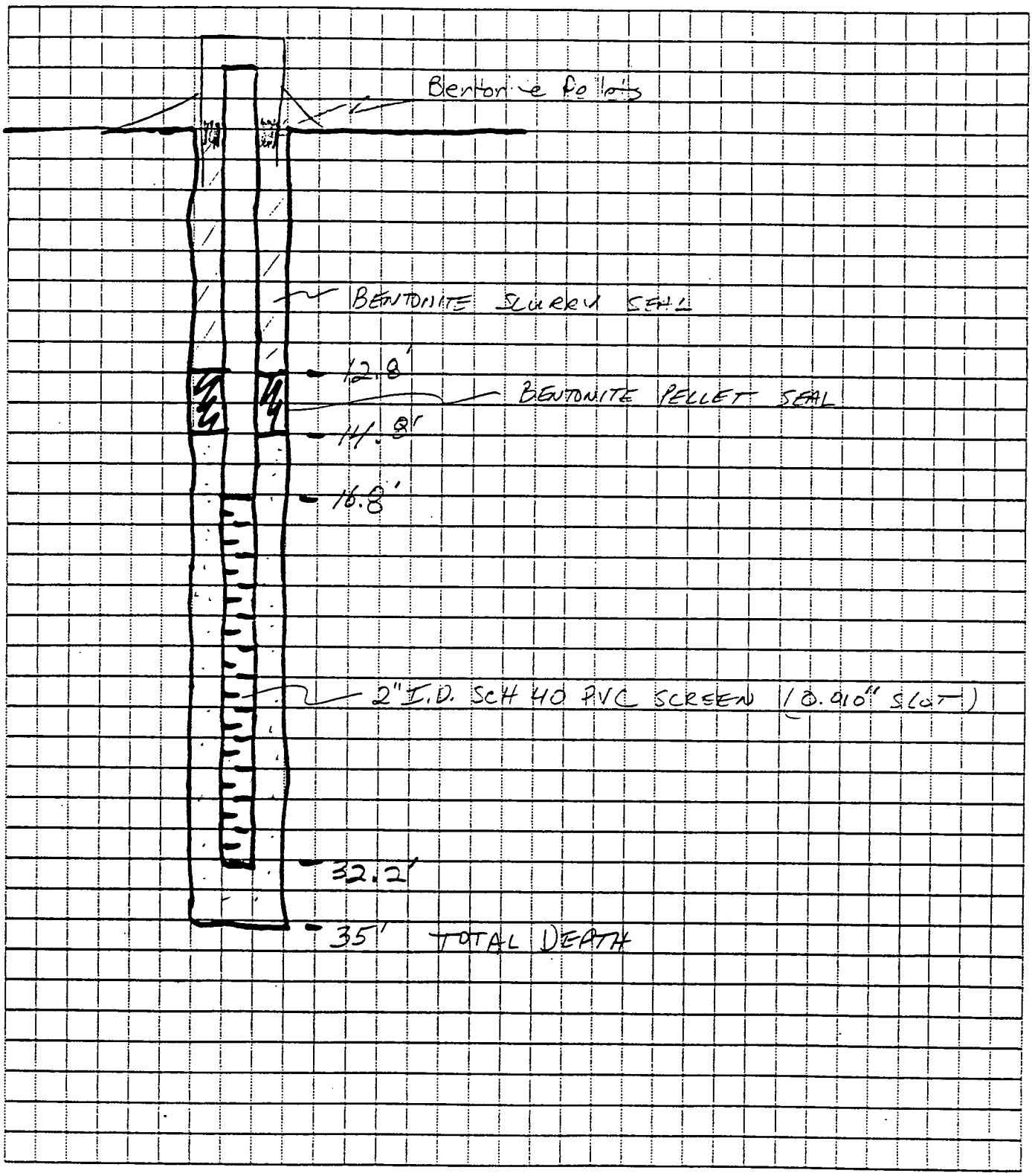
BORING NO. B-4S

PIEZOMETER NO. B-4S

INSTALLED BY I.H.Johnson DATE 11/13/85

CHECKED BY _____ DATE _____

COORDINATES _____



M05J12.R0119

CH2M HILL

FILE NO. _____

PAGE 1 OF 1

PIEZOMETER INSTALLATION SKETCH

PROJECT NAME City of Wausau Landfill

PROJECT NO. 120303.A5

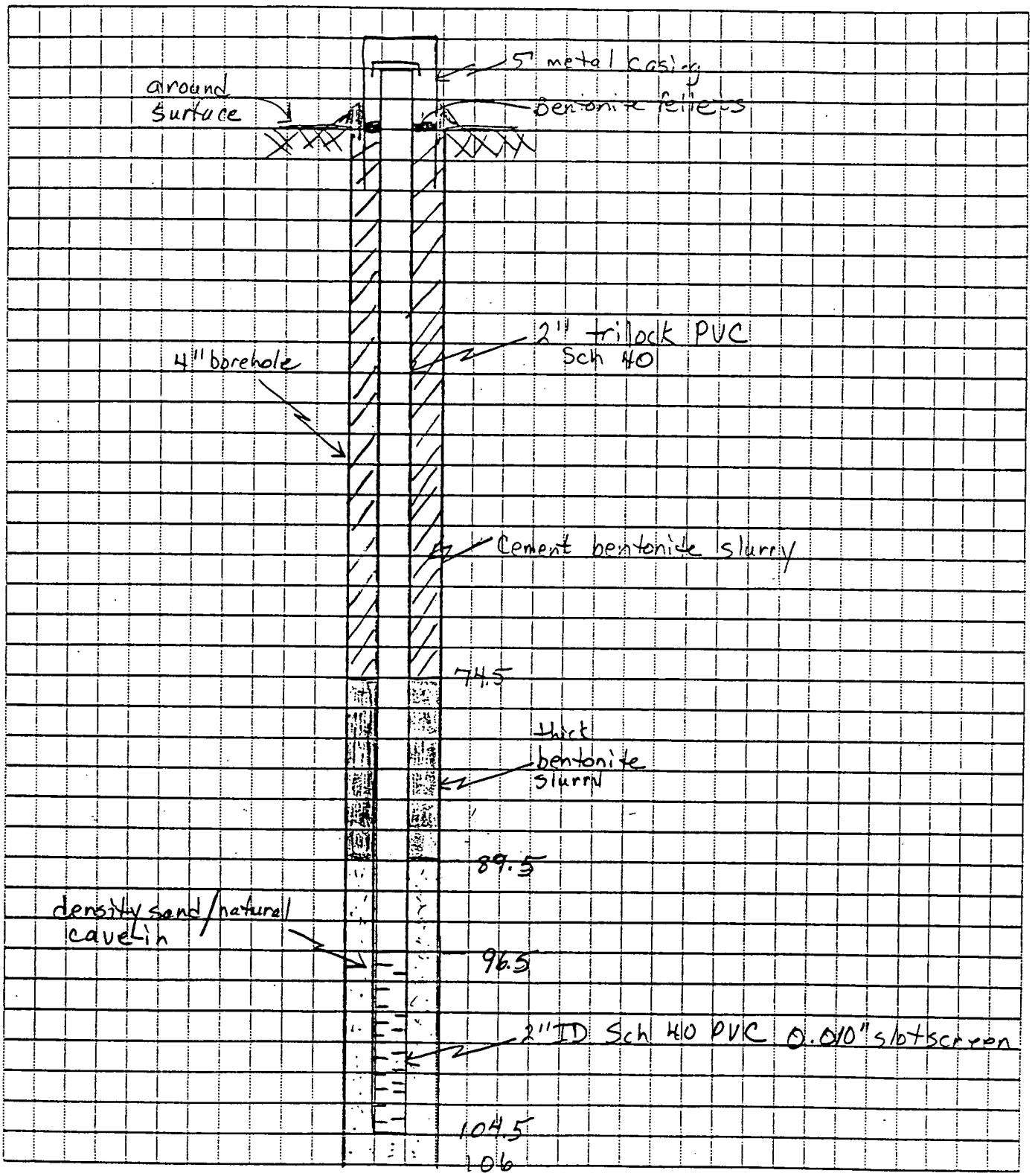
BORING NO. 4D

PIEZOMETER NO. _____

INSTALLED BY SM McGee DATE 11/15/85

CHECKED BY _____ DATE _____

COORDINATES _____



M05J12.R0119

CH2M HILL

FILE NO. _____

PAGE 1 OF 1

PIEZOMETER INSTALLATION SKETCH

PROJECT NAME Wausau LF - WDNR

PROJECT NO. L20303.A0

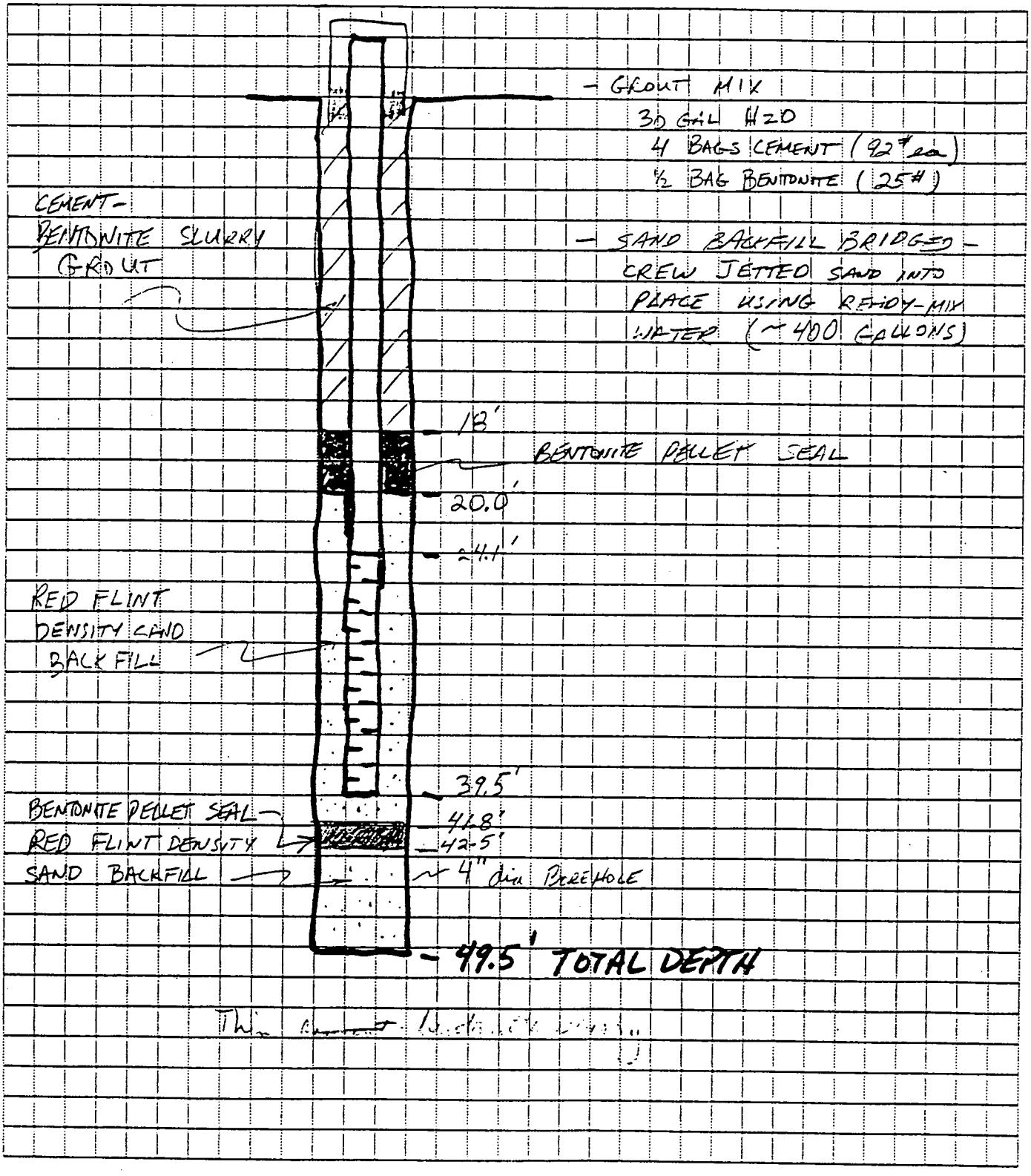
BORING NO. B-6

PIEZOMETER NO. B-6

INSTALLED BY I.H. Johnson DATE 11/13/85

CHECKED BY _____ DATE _____

COORDINATES _____



M05J12.R0119

CH2M HILL

FILE NO. _____

PAGE 1 OF 1

PIEZOMETER INSTALLATION SKETCH

PROJECT NAME Monroe LF - Wis. DNR

PROJECT NO. 120303.A0

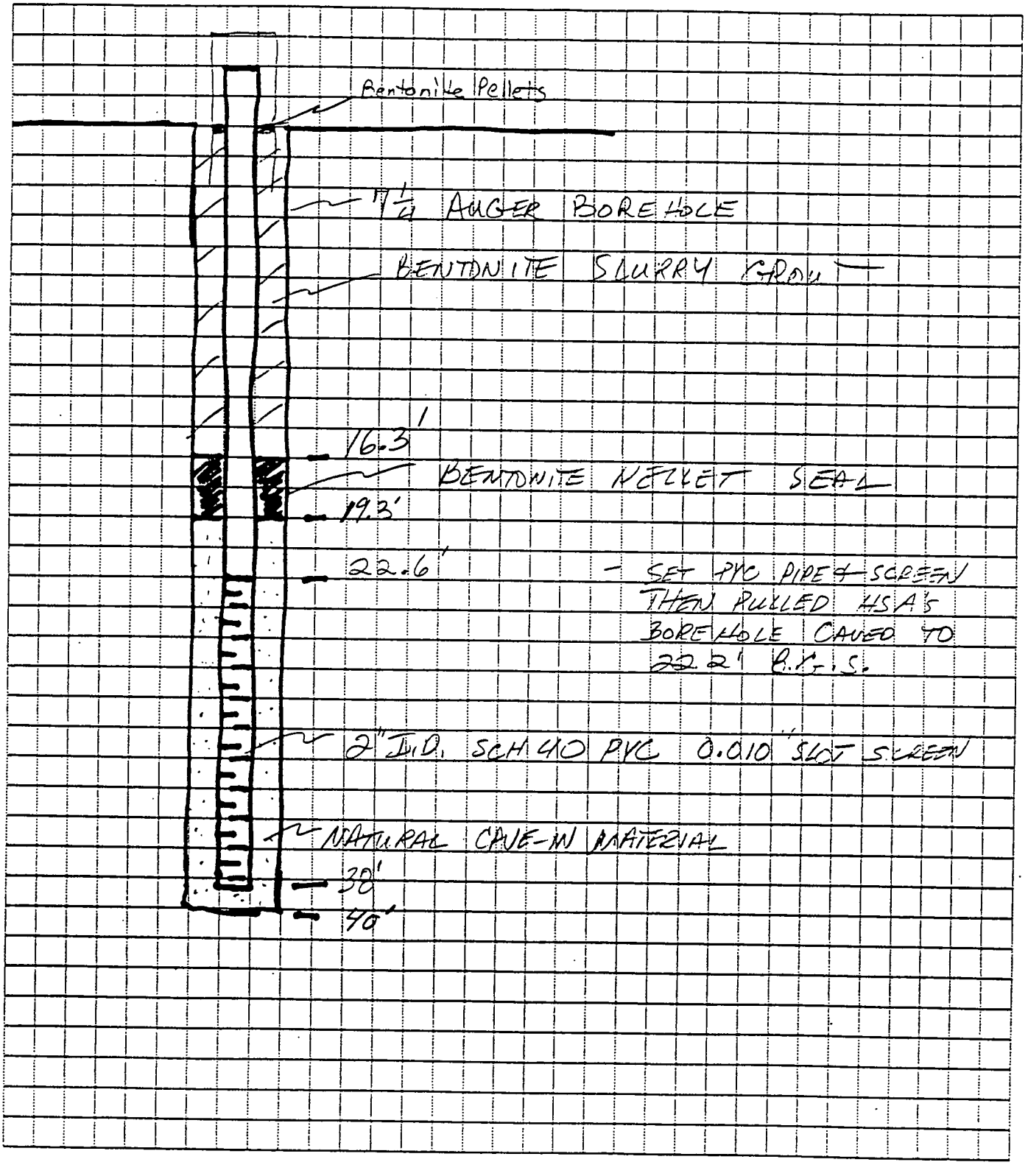
BORING NO. B-7S

PIEZOMETER NO. B-7S

INSTALLED BY IHJ DATE 11/12/85

CHECKED BY _____ DATE _____

COORDINATES _____



M05J12.R0119

JUN 26 1985

Well EPA Well #1 A

Well Construction Summary

Location or Coords: Wausau, Wisconsin
SW¼, NW¼, Section 24, T29N, R7E

Elevation: Ground Level 1213
Top of Casing 1215

Drilling Summary:

Total Depth 157.5' Below Land Surface
Borehole Diameter 3 7/8"

Driller Exploration Technology, Inc.
Steve Wonn & Sven Lysloff

Rig Central Mine Equipment, Model 55
Bit(s) Standard 3 7/8 inch "TRI-CONE"

Drilling Fluid Clear - not recirculated water
Surface Casing HW Flush Joint

Well Design:

Basis: Geologic Log X Geophysical Log ____
Casing String(s): C = Casing S = Screen

Casing: C1 124.0 To land surface with 1½ foot riser pipe
~~C2~~ 2" Galvanized case pipe

Screen: S1 8 Foot No. 60 Slot Johnson Galvanized, set at 122.0' to 130.0'
S2 ____

Centralizers Bentonite Pellets set to seal sand at 119.0'

Filter Material No. 30 Flint sand 157.5' to 119.0'
Cement + Bentonite-"grout" 3.76:1 Ratio cement to Bentonite, 119.0' to 10.0'
Other Pure cement mix from 10.0' to Land Surface + 1 foot slope mound to anchor protective cover pipe.

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling: Sampling and Cased	6-21-84	1310	7-4-84	1200
Geophys. Logging:	N/A	N/A	N/A	N/A
Casing: See Above Task				
Filter Placement:	7-6-84	0625	7-6-84	0800
Cementing:	7-6-84	0800	7-6-84	1600
Development:				
Other: Poured Cement and Set-Post to Guard the Well	7-6-84	1600	7-6-84	1700

Well Development:

The development was posponed to allow the grout seal to set-up.

Comments:

Elevations are only approximations and will be surveyed by the City of Wausau.

Back filled - (sand lifted) Boring to the selected interval where the sand point was located.

Location David G. Pyles-Roy F. Weston TAT
Personnel
Project

WESTON

JUN 20 1985

WELL DETAIL INFORMATION SHEET

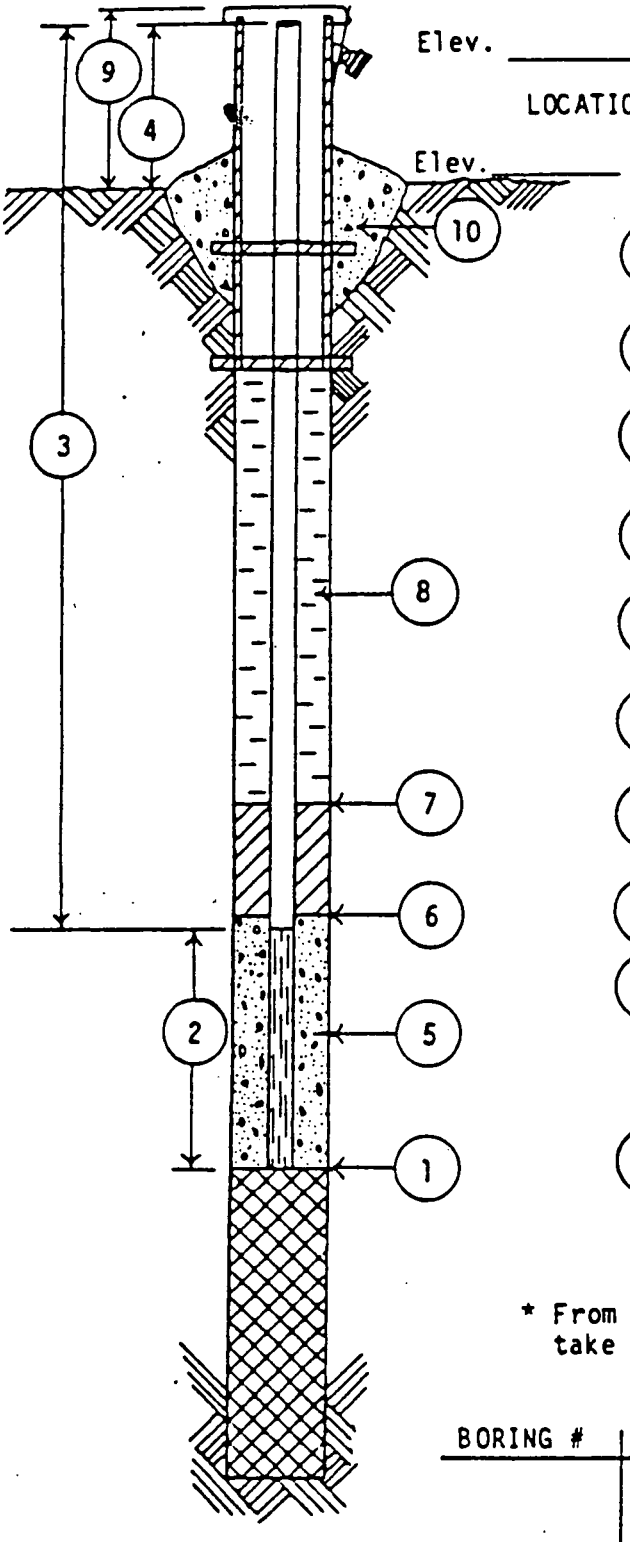
JOB NO. C 810234

BORING NO. WMW-3A

DATE 9/27/84

CHIEF SJW

LOCATION Wausau, Wisconsin



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

1. DEPTH TO BOTTOM OF BOREHOLE 140 FEET
2. LENGTH OF WELL POINT, (WELL SCREEN), OR SLOTTED PIPE 10 FEET
3. TOTAL LENGTH OF SOLID PIPE 132.5 FEET @ 2 IN. DIAMETER
4. HEIGHT OF WELL CASING ABOVE GROUND 2.5 FEET
5. TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE Sand
6. DEPTH OF LOWER OR BOTTOM SEAL 105 FEET
7. DEPTH OF UPPER OR TOP SEAL 103 FEET
8. TYPE OF BACKFILL Cement-Bentonite Grout
9. PROTECTIVE CASING (YES) NO
   HEIGHT ABOVE GROUND 2.5'
   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

JUL [illegible] 1985

JOB NO. C 810324

BORING NO. WMW-3B

DATE 9/22/84

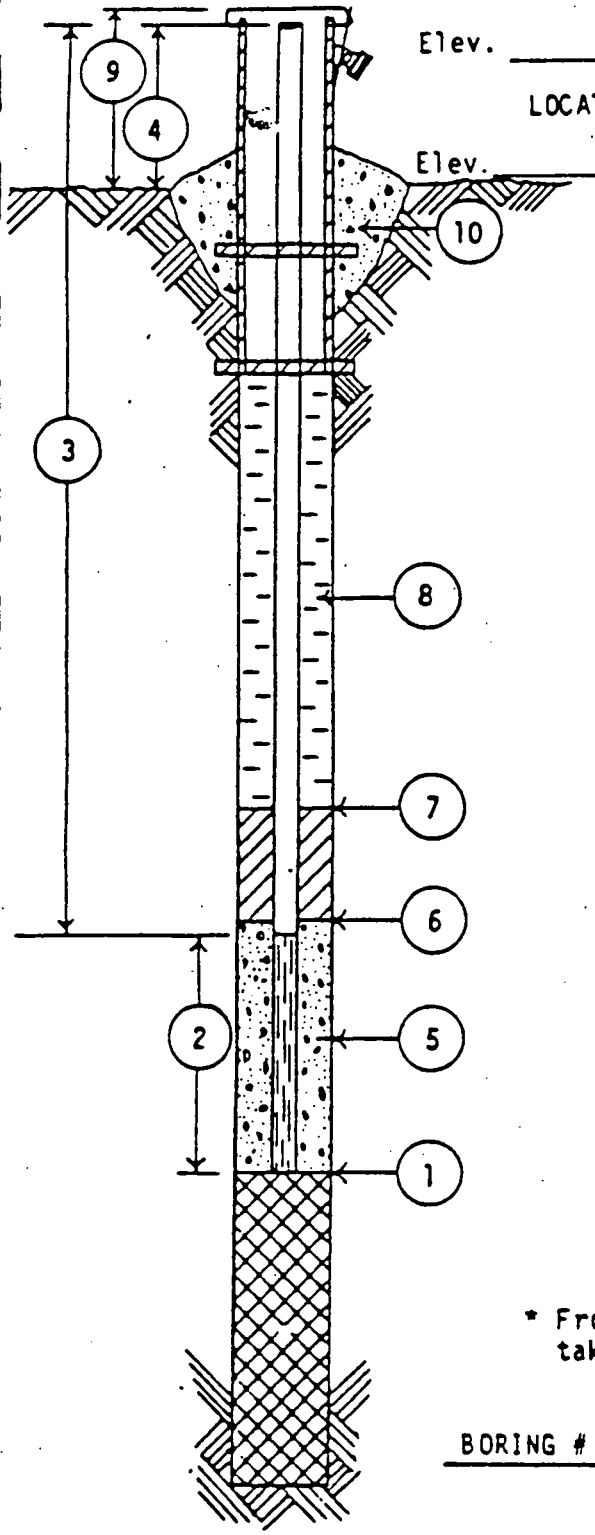
CHIEF MP

Elev. _____

LOCATION Wausau

Elev. _____

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



1. DEPTH TO BOTTOM OF BOREHOLE 75 FEET
2. LENGTH OF WELL POINT, (WELL SCREEN,) OR SLOTTED PIPE 10 FEET
3. TOTAL LENGTH OF SOLID PIPE 67.5 FEET @ 2 IN. DIAMETER
4. HEIGHT OF WELL CASING ABOVE GROUND 2.5 FEET
5. TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE Filter Sand
6. DEPTH OF LOWER OR BOTTOM SEAL 63 FEET
7. DEPTH OF UPPER OR TOP SEAL 61 FEET
8. TYPE OF BACKFILL Grout
9. PROTECTIVE CASING (YES) NO
   HEIGHT ABOVE GROUND 2.6'
   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

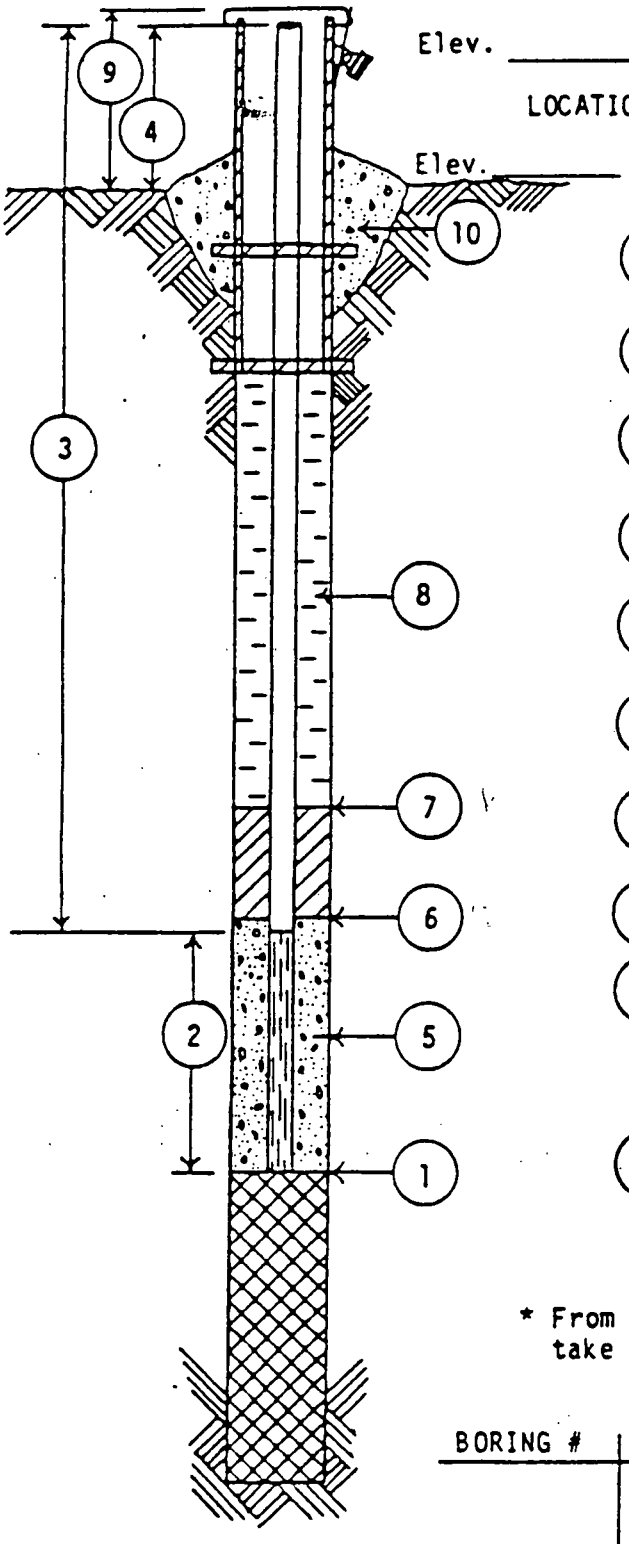
JOB NO. C 810324

BORING NO. WMW-4A

DATE 9/27/84

CHIEF MP

LOCATION Wausau, Wisconsin



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

(1) DEPTH TO BOTTOM OF BOREHOLE 100 FEET

(2) LENGTH OF WELL POINT, WELL SCREEN, OR SLOTTED PIPE 10 FEET

(3) TOTAL LENGTH OF SOLID PIPE 90 FEET @ 2 IN. DIAMETER

(4) HEIGHT OF WELL CASING ABOVE GROUND 0.0 FEET

(5) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE Filter Sand

(6) DEPTH OF LOWER OR BOTTOM SEAL 88 FEET

(7) DEPTH OF UPPER OR TOP SEAL 36 FEET

(8) TYPE OF BACKFILL Grout

(9) PROTECTIVE CASING (YES) NO

HEIGHT ABOVE GROUND 0.0

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 810234

BORING NO. MW-4B

DATE 9/28/84

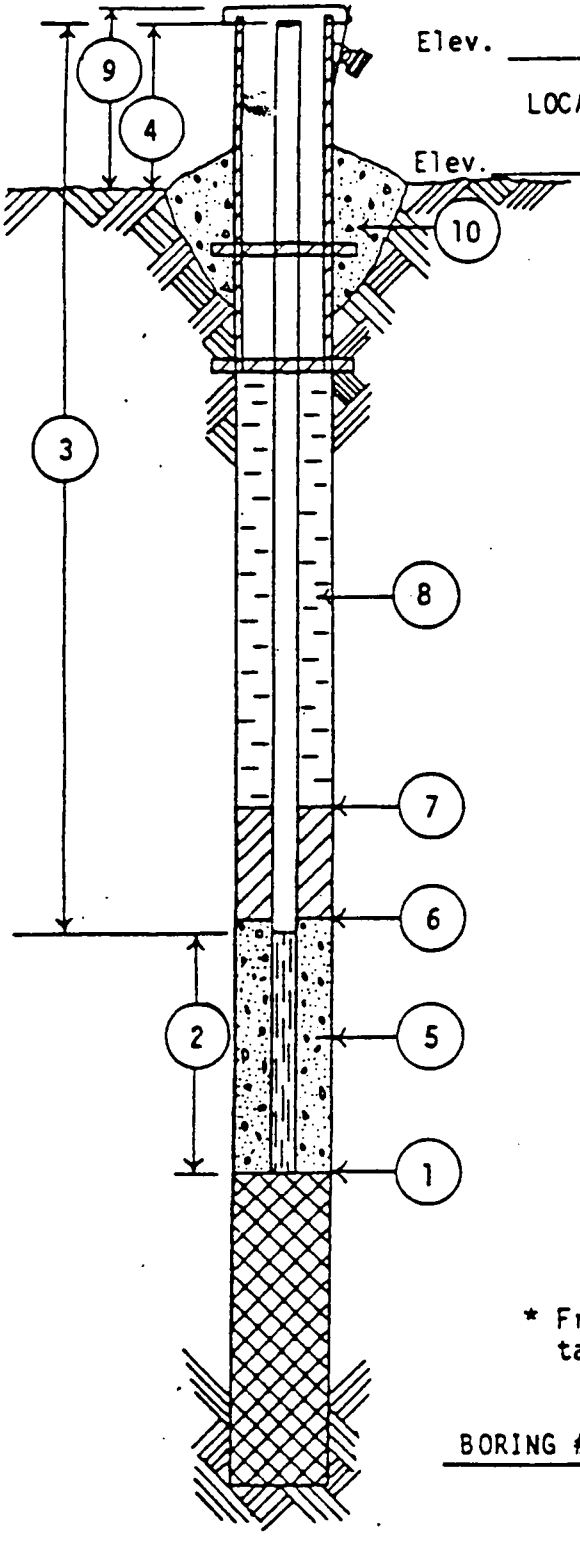
CHIEF SJW

Elev. _____

LOCATION Wausau

Elev. _____

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



1. DEPTH TO BOTTOM OF BOREHOLE 60.5 FEET
2. LENGTH OF WELL POINT, (WELL SCREEN,) OR SLOTTED PIPE 10 FEET
3. TOTAL LENGTH OF SOLID PIPE 50.5 FEET @ 2 IN. DIAMETER
4. HEIGHT OF WELL CASING ABOVE GROUND -.5 FEET
5. TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE Sand
6. DEPTH OF LOWER OR BOTTOM SEAL 39 FEET
7. DEPTH OF UPPER OR TOP SEAL 37 FEET
8. TYPE OF BACKFILL Cement-Bentonite Grout
9. PROTECTIVE CASING (YES) NO
   HEIGHT ABOVE GROUND 0'
   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 1985

JOB NO. C 810324

BORING NO. WMW-4C

DATE 10/31/84

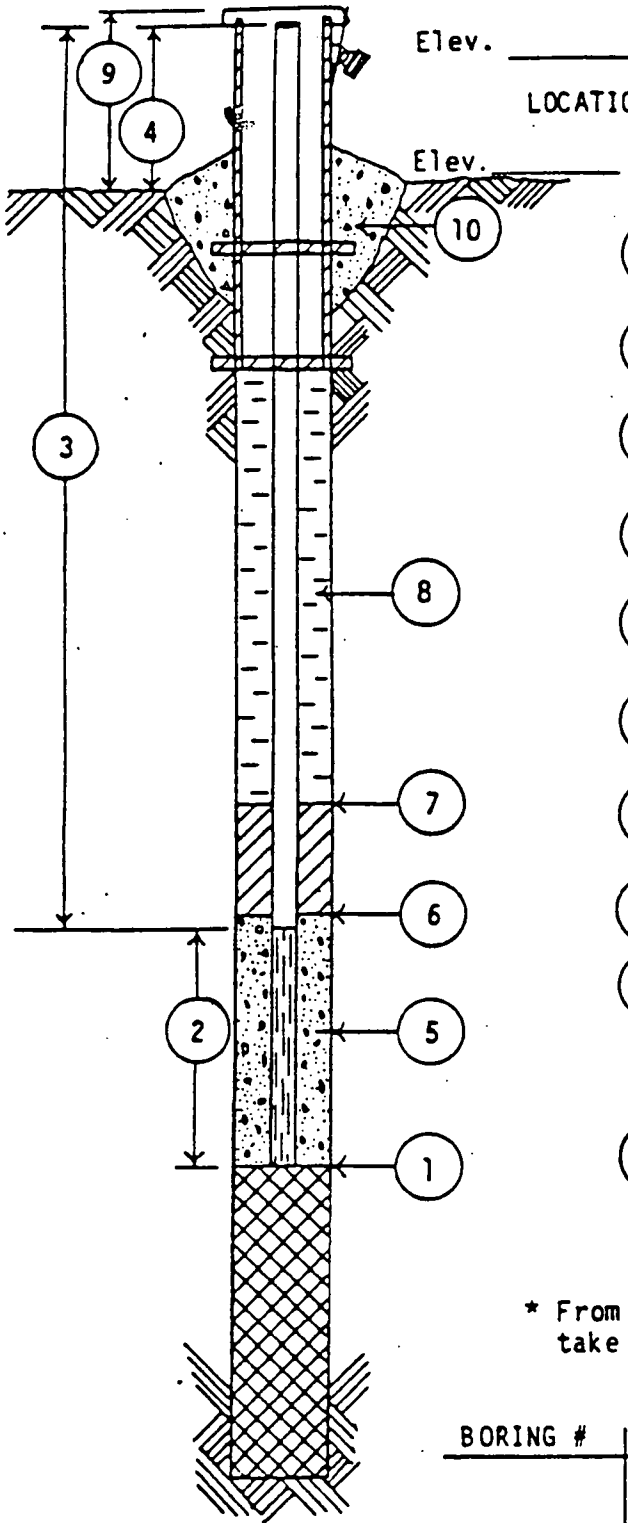
CHIEF RL

Elev. _____

LOCATION Wausau, Wisconsin

Elev. _____

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



(1) DEPTH TO BOTTOM OF BOREHOLE
40 FEET

(2) LENGTH OF WELL POINT, (WELL SCREEN,) OR SLOTTED PIPE 10 FEET

(3) TOTAL LENGTH OF SOLID PIPE 30 FEET @ 2 IN. DIAMETER

(4) HEIGHT OF WELL CASING ABOVE GROUND
0.1 FEET

(5) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE _____

(6) DEPTH OF LOWER OR BOTTOM SEAL
29 FEET

(7) DEPTH OF UPPER OR TOP SEAL
1 FEET

(8) TYPE OF BACKFILL Cement & Bentonite Slurry

(9) PROTECTIVE CASING (YES) NO

HEIGHT ABOVE GROUND GS

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 810324

BORING NO. [illegible]-5

DATE 11/2/84

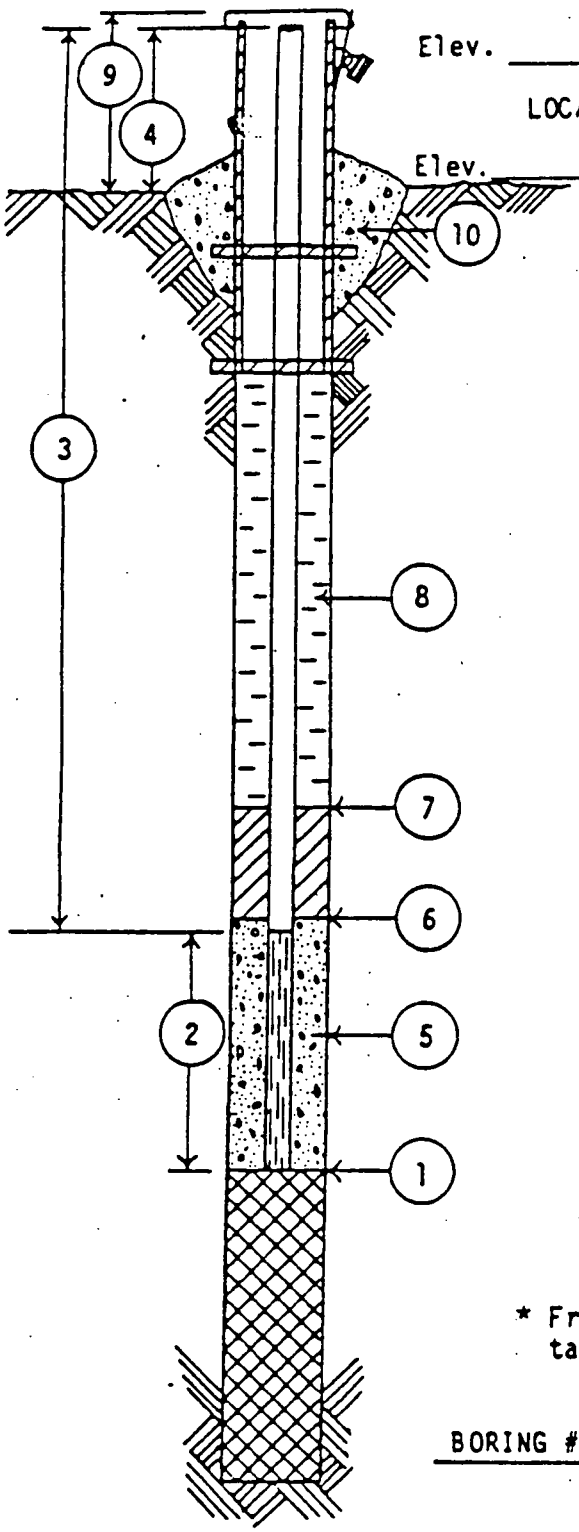
CHIEF MP

Elev. _____

LOCATION Wausau, Wisconsin

Elev. _____

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



1. DEPTH TO BOTTOM OF BOREHOLE 45 FEET
2. LENGTH OF WELL POINT, WELL SCREEN, OR SLOTTED PIPE 10 FEET
3. TOTAL LENGTH OF SOLID PIPE 35 FEET @ 2 IN. DIAMETER
4. HEIGHT OF WELL CASING ABOVE GROUND 0.1 FEET
5. TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE _____
6. DEPTH OF LOWER OR BOTTOM SEAL 34 FEET
7. DEPTH OF UPPER OR TOP SEAL 1 FEET
8. TYPE OF BACKFILL Cement & Bentonite Slurry
9. PROTECTIVE CASING (YES) NO
   HEIGHT ABOVE GROUND -
   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 810324

BORING NO. MW-6

DATE 11/2/84

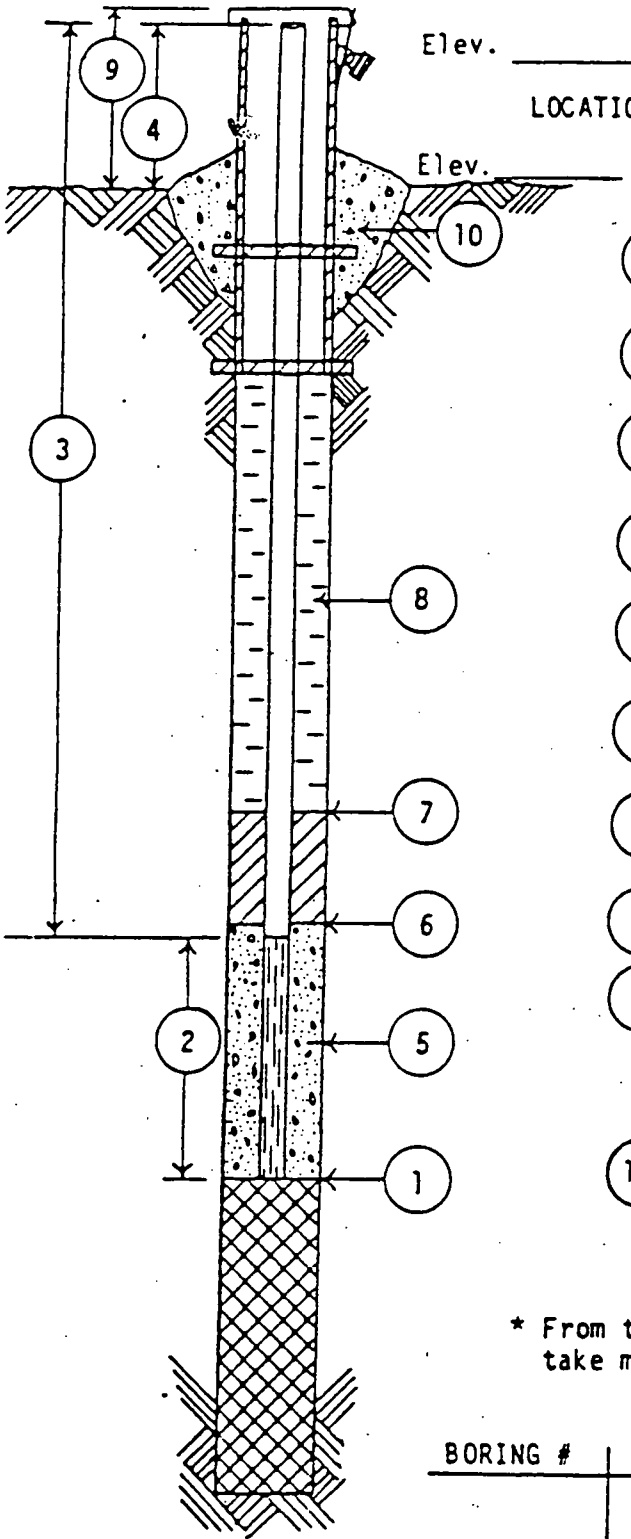
CHIEF MP

Elev. _____

LOCATION Wausau, Wisconsin

Elev. _____

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



1. DEPTH TO BOTTOM OF BOREHOLE 45 FEET
2. LENGTH OF WELL POINT, (WELL SCREEN), OR SLOTTED PIPE 0 FEET
3. TOTAL LENGTH OF SOLID PIPE 35 FEET @ 2 IN. DIAMETER
4. HEIGHT OF WELL CASING ABOVE GROUND 0.1 FEET
5. TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE _____
6. DEPTH OF LOWER OR BOTTOM SEAL 34 FEET
7. DEPTH OF UPPER OR TOP SEAL 1 FEET
8. TYPE OF BACKFILL Cement & Bentonite Slurry
9. PROTECTIVE CASING (YES) NO
   HEIGHT ABOVE GROUND -
   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

JUN 28 1985

ROY F WESTON INC
WESTON
ENVIRONMENTAL CONSULTANTS-DESIGNERS

JOB NO. C 810324

BORING NO. WMW-7

DATE 11/26/84

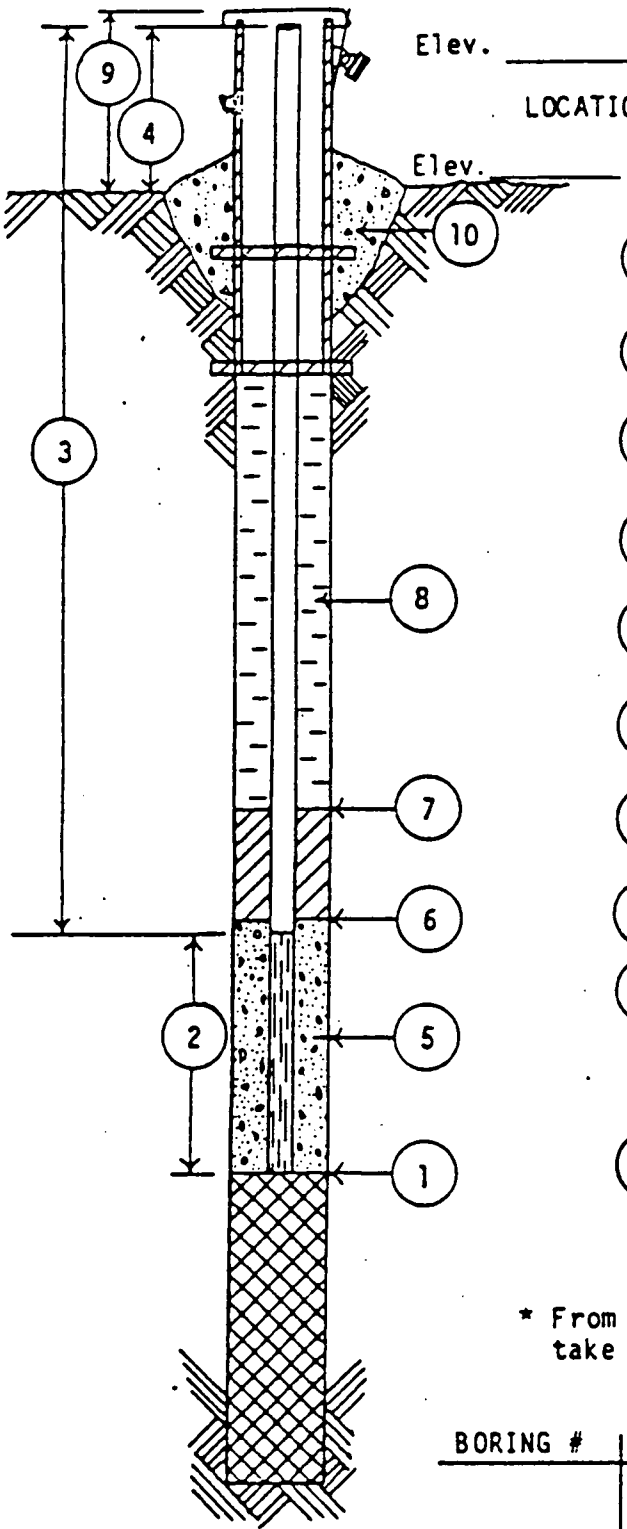
CHIEF RL

Elev. _____

LOCATION Wausau, Wisconsin, Foy F. Weston, EPA

Elev. _____

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



(1) DEPTH TO BOTTOM OF BOREHOLE
45 FEET

(2) LENGTH OF WELL POINT, WELL SCREEN, OR SLOTTED PIPE 10 FEET

(3) TOTAL LENGTH OF SOLID PIPE 35 FEET @ 2 IN. DIAMETER

(4) HEIGHT OF WELL CASING ABOVE GROUND
0.1 FEET

(5) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE _____

(6) DEPTH OF LOWER OR BOTTOM SEAL
34 FEET

(7) DEPTH OF UPPER OR TOP SEAL
1 FEET

(8) TYPE OF BACKFILL Cement & Bentonite Slurry

(9) PROTECTIVE CASING (YES) NO

HEIGHT ABOVE GROUND GS

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

[PJS-7-45]

OCT - 3 1985

WELL DETAIL INFORMATION SHEET

ROY F. WESTON INC
WESTON
ENVIRONMENTAL CONSULTANTS-DESIGNERS

JOB NO. C 810324

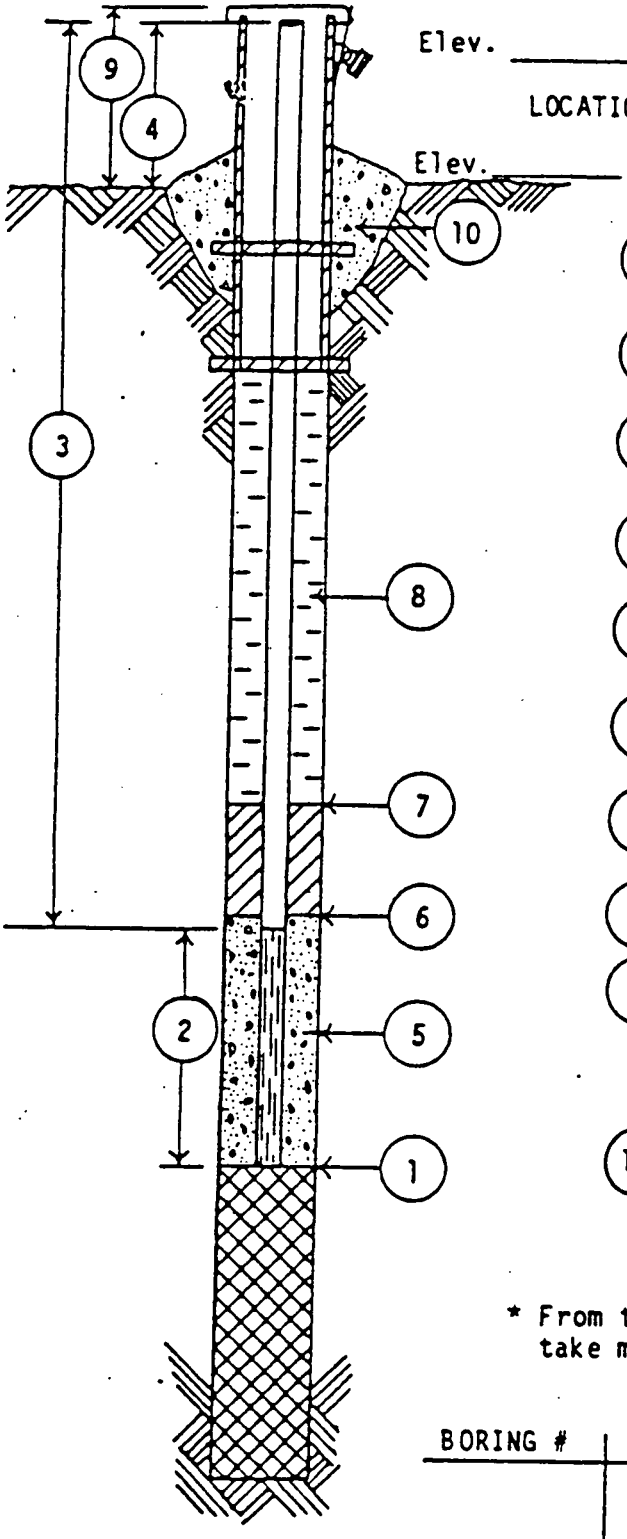
BORING NO. [illegible] WMW-9

DATE 11/30/84

CHIEF MP

LOCATION Wausau, Wisconsin; Roy F. Weston, EPA

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



(1) DEPTH TO BOTTOM OF BOREHOLE 50 FEET

(2) LENGTH OF WELL POINT, (WELL SCREEN), OR SLOTTED PIPE 15 FEET

(3) TOTAL LENGTH OF SOLID PIPE 35.0 FEET @ 2 IN. DIAMETER

(4) HEIGHT OF WELL CASING ABOVE GROUND -0.1 FEET

(5) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE -

(6) DEPTH OF LOWER OR BOTTOM SEAL 39 FEET

(7) DEPTH OF UPPER OR TOP SEAL 1 FEET

(8) TYPE OF BACKFILL Cement & Bentonite Slurry

(9) PROTECTIVE CASING (YES) NO

HEIGHT ABOVE GROUND GS

LOCKING CAP YES (NO)

(10) CONCRETE CAP (YES) NO

WATER LEVEL CHECKS

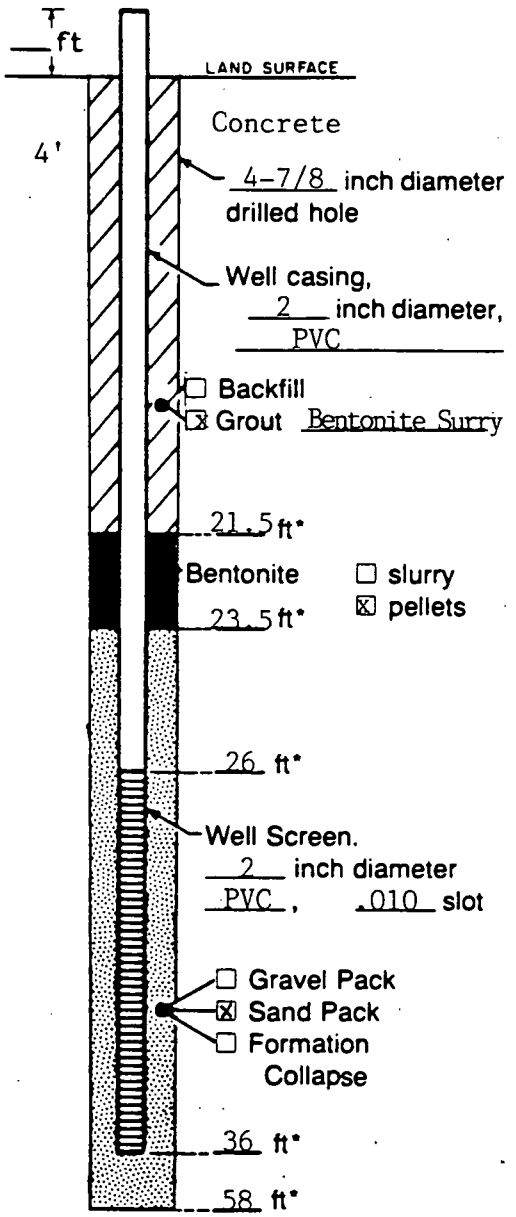
* From top of casing, if protective casing higher take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS

[PJS-7-45]

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project E1127CW1 Well GM1S

Town/City Wausau

County Marathon State WI

Permit No. _____

Land-Surface Elevation

and Datum _____ feet ☐ surveyed

_____ ☐ estimated

Installation Dates(s) 8/6/86

Drilling Method Dual-Tube

Drilling Contractor Layne N.W.

Drilling Fluid Raw water & Air

Development Techniques(s) and Date(s)

9/4/86 airlift

Fluid Loss During Drilling _____ gallons

Water Removed During Development 5 gallons

Static Depth to Water 29.93' feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration 20 minutes hours

Yield _____ gpm Date 9/04/86

Specific Capacity _____ gpm/ft

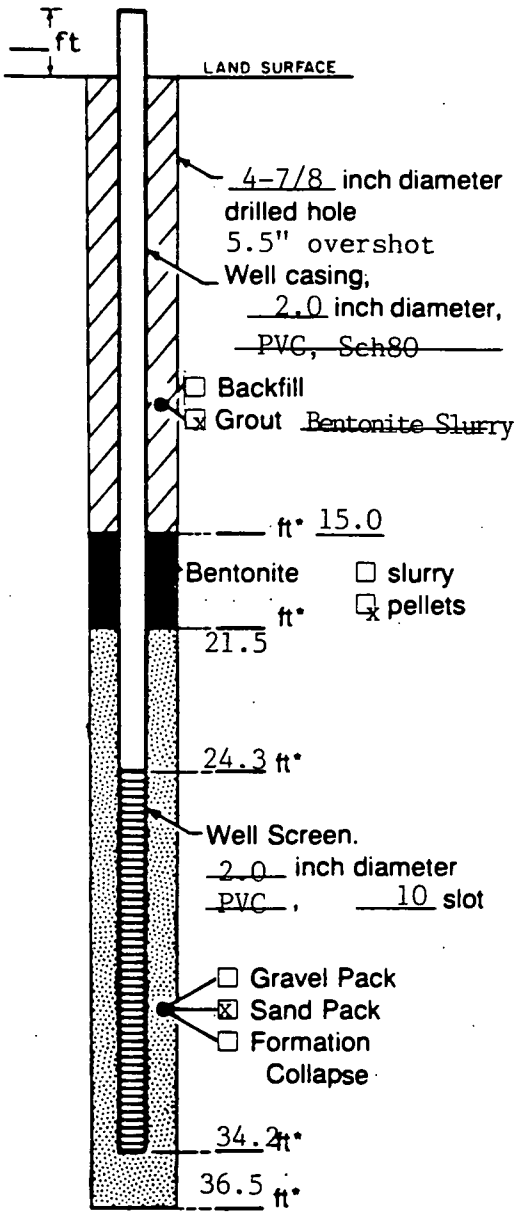
Well Purpose Monitor G.W. Quality

Remarks 8/6 15:35 WL = 27.75' BLS

Prepared by L.C. Huntoon

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Wausau E1127CW1 Well GM-2S

Town/City Wausau

County _____ State _____

Permit No. _____

Land-Surface Elevation

and Datum _____ feet ☐ surveyed

_____ ☐ estimated

Installation Dates(s) 8/19/86 7:50 a.m.-8:50 a.m.

Drilling Method Double Tube

Drilling Contractor Layne N.W.

Drilling Fluid Water & Air

Development Techniques(s) and Date(s)

9/4/86 Airlift

Fluid Loss During Drilling _____ gallons

Water Removed During Development 20 gallons

Static Depth to Water 26.5 ft/8/19/86 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration 20 minutes hours

Yield _____ gpm Date 9/4/86

Specific Capacity _____ gpm/ft

Well Purpose Monitor G.W. Quality

Remarks 9/4 water level = 25.69' BCS

Prepared by Phil Harry/ L.C. Huntoon

APPENDIX C

VOC DEPTH PROFILES AT R-4D AND R-1D (AUGUST 12-14, 1986)

APPENDIX C

VOC DEPTH PROFILES AT R-4D AND R-1D
AUGUST 12-14, 1986

	Detection Limit	R-4D(36)	R-4D(56)	R-4D(76)	R-4D(96)	R-4D(136)
Benzene	0.2	X	X	X	X	X
Bromoform	0.5	X	X	X	X	X
Bromomethane	1.0	X	X	X	X	X
Carbon Tetrachloride	0.1	X	X	X	X	X
Chlorobenzene	0.1	X	X	X	X	X
Chloroethane	1.0	X	X	X	X	X
2-Chloroethylvinyl Ether	2.0	X	X	X	X	X
Chloroform	0.1	1.8	X	0.4	0.6	X
Chloromethane	6.0	X	X	X	X	X
Dibromochloromethane	0.1	X	X	X	X	X
1,2-Dichlorobenzene	0.3	X	X	X	X	X
1,3-Dichlorobenzene	0.3	X	X	X	X	X
1,4-Dichlorobenzene	0.3	X	X	X	X	X
Dichlorobromomethane	0.1	X	X	X	X	X
1,1-Dichloroethane	0.1	X	X	X	X	X
1,2-Dichloroethane	0.3	X	X	X	X	X
1,1-Dichloroethylene	1.0	X	X	X	X	X
1,2-Dichloroethylene	0.3	13.9	X	X	X	345.
Dichloromethane	0.2	X	X	X	X	X
1,2-Dichloropropane	0.5	X	X	X	X	X
cis-1,3-Dichloropropene	0.3	X	X	X	X	X
trans-1,3-Dichloropropene	1.0	X	X	X	X	X
Ethylbenzene	0.2	X	X	X	X	X
1,1,2,2-Tetrachloroethane	0.1	X	X	X	X	X
Tetrachloroethylene	0.1	0.7	X	X	X	7.5
Toluene	0.1	X	X	X	X	X
1,1,1-Trichloroethane	0.1	2.9	X	X	X	X
1,1,2-Trichloroethane	0.1	X	X	X	X	X
Trichloroethylene	0.1	590.	0.9	3.2	4.1	790.
Vinyl Chloride	2.0	X	X	X	X	X
Trichlorofluoromethane	0.2	X	X	X	X	X
Dichlorodifluoromethane	2.0	X	X	X	X	X

X Analyzed But Not Detected

	Detection Limit	R-4D(156)	R-1D(37)	R-1D(57)	R-1D(117)
Benzene	0.2	X	X	X	X
Bromoform	0.5	X	X	X	X
Bromomethane	1.0	X	X	X	X
Carbon Tetrachloride	0.1	X	X	X	X
Chlorobenzene	0.1	X	X	X	X
Chloroethane	1.0	X	X	X	X
2-Chloroethylvinyl Ether	2.0	X	X	X	X
Chloroform	0.1	X	X	X	0.2
Chloromethane	6.0	X	X	X	X
Dibromochloromethane	0.1	X	X	X	X
1,2-Dichlorobenzene	0.3	X	X	X	X
1,3-Dichlorobenzene	0.3	X	X	X	X
1,4-Dichlorobenzene	0.3	X	X	X	X
Dichlorobromomethane	0.1	X	X	X	X
1,1-Dichloroethane	0.1	X	X	X	X
1,2-Dichloroethane	0.3	X	X	X	X
1,1-Dichloroethylene	1.0	X	X	X	X
1,2-Dichloroethylene	0.3	0.5	X	X	X
Dichloromethane	0.2	X	X	X	X
1,2-Dichloropropane	0.5	X	X	X	X
cis-1,3-Dichloropropene	0.3	X	X	X	X
trans-1,3-Dichloropropene	1.0	X	X	X	X
Ethylbenzene	0.2	X	X	X	X
1,1,2,2-Tetrachloroethane	0.1	X	X	X	X
Tetrachloroethylene	0.1	X	X	X	0.6
Toluene	0.1	X	X	X	0.2
1,1,1-Trichloroethane	0.1	X	X	X	X
1,1,2-Trichloroethane	0.1	X	X	X	X
Trichloroethylene	0.1	2.2	X	X	X
Vinyl Chloride	2.0	X	X	X	X
Trichlorofluoromethane	0.2	X	X	X	X
Dichlorodifluoromethane	2.0	X	X	X	X

APPENDIX D

HAZARDOUS SUBSTANCE LIST ANALYSIS FOR SELECTED WELLS

HAZLETON LABORATORIES AMERICA, INC.
Chemical & BioMedical Sciences Division
3301 KINSMAN BLVD. • P.O. BOX 7545 • MADISON, WISCONSIN 53707 • PHONE (608) 241-4471 • TLX 703958 HAZRAL MDS UD

REPORT OF ANALYSIS

SAMPLE NUMBER: 60904286
DATE ENTERED: 09/19/86
REPORT PRINTED: 09/30/86

BARR CHRISTEL
RESIDUALS MANAGEMENT TECHNOLOGY, INC.
1486 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

GROUND WATER: 19760; W-1D
PROJECT NO. 222.04

PURCHASE ORDER NUMBER: 12745

ACID FRACTION
(SEE B/N FRACTION - SEMIVOLATILE COMPOUND LIST)

BASE/NEUTRAL FRACTION

SEMIVOLATILE COMPOUNDS

COMPOUND NAME	MCG/L
PHENOL	LESS THAN 10
BIS(-2-CHLORDETHYL)ETHER	LESS THAN 10
2-CHLOROPHENOL	LESS THAN 10
1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
BENZYL ALCOHOL	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10
2-METHYLPHENOL	LESS THAN 10
BIS(2-CHLOROISOPROPYL)ETHER	LESS THAN 10
4-METHYLPHENOL	LESS THAN 10
N-NITROSO-DI-N-PROPYLAMINE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
NITROBENZENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
BENZOIC ACID	LESS THAN 50
BIS(2-CHLOROETHOXY)METHANE	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
4-CHLOROANILINE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
4-CHLORO-3-METHYLPHENOL	LESS THAN 10
2-METHYLNAPHTHALENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10
2,4,5-TRICHLOROPHENOL	LESS THAN 50
2-CHLORONAPHTHALENE	LESS THAN 10

SAMPLE NUMBER: 60904286 PAGE 2

GROUND WATER: 19760; W-1D
PROJECT NO. 222.04

BASE/NEUTRAL FRACTION (CONTINUED)

2-NITROANILINE	LESS THAN 50
DIMETHYL PHTHALATE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
3-NITROANILINE	LESS THAN 50
ACENAPHTHENE	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 50
4-NITROPHENOL	LESS THAN 50
DIBENZOFURAN	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DIETHYLPHTHALATE	2 J
4-CHLOROPHENYL-PHENYLETHER	LESS THAN 10
FLUORENE	LESS THAN 10
4-NITROANILINE	LESS THAN 50
4,6-DINITRO-2-METHYLPHENOL	LESS THAN 50
N-NITROSODIPHENYLAMINE*(1)	LESS THAN 10
4-BROMOPHENYL-PHENYLETHER	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 50
PHENANTHRENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
DI-N-BUTYLPHTHALATE	LESS THAN 10
FLUORANTHENE	LESS THAN 10
PYRENE	LESS THAN 10
BUTYLBENZYLPHTHALATE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 20
BENZO(A)ANTHRACENE	LESS THAN 10
BIS(2-ETHYLHEXYL)PHTHALATE	3 J
CHRYSENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
BENZO(B)FLUORANTHENE	LESS THAN 10
BENZO(K)FLUORANTHENE	LESS THAN 10
BENZO(A)PYRENE	LESS THAN 10
INDENO(1,2,3-CD)PYRENE	LESS THAN 10
DIBENZO(A,H)ANTHRACENE	LESS THAN 10
BENZO(G,H,I)PERYLENE	LESS THAN 10

J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.05
BETA-BHC	LESS THAN 0.05
DELTA-BHC	LESS THAN 0.05
GAMMA-BHC (LINDANE)	LESS THAN 0.05

HAZLETON LABORATORIES AMERICA, INC. Chemical & BioMedical Sciences Division
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SAMPLE NUMBER: 60904286

GROUND WATER: 19760; W-1D
PROJECT NO. 227.04

PESTICIDE/PCB FRACTION (CONTINUED)

HEPTACHLOR	LESS THAN 0.05
ALDRIN	LESS THAN 0.05
HEPTACHLOR EPOXIDE	LESS THAN 0.05
ENDOSULFAN I	LESS THAN 0.05
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10
METHOXYCHLOR	LESS THAN 0.50
ENDRIN KETONE	LESS THAN 0.10
CHLORDANE	LESS THAN 0.50
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.50
PCB-1221	LESS THAN 0.50
PCB-1232	LESS THAN 0.50
PCB-1242	LESS THAN 0.50
PCB-1248	LESS THAN 0.50
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0

METHOD REFERENCES

ACID FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

BASE/NEUTRAL FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
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SAMPLE NUMBER: 60904286

GROUND WATER: 19760; W-1D
PROJECT NO. 222.04

METHOD REFERENCES (CONTINUED)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

HAZLETON LABORATORIES AMERICA, INC. Chemical & BioMedical Sciences Division
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REPORT OF ANALYSIS

SAMPLE NUMBER: 60904282
DATE ENTERED: 09/19/86
REPORT PRINTED: 09/30/86

BARR CHRISTEL
RESIDUALS MANAGEMENT TECHNOLOGY, INC.
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

GROUND WATER: 19761; R-2D
PROJECT NO. 222.04

PURCHASE ORDER NUMBER: 12745

ACID FRACTION
(SEE B/N FRACTION - SEMIVOLATILE COMPOUND LIST)

BASE/NEUTRAL FRACTION

SEMIVOLATILE COMPOUNDS

COMPOUND NAME	MCG/L
PHENOL	LESS THAN 10
BIS(-2-CHLOROETHYL)ETHER	LESS THAN 10
2-CHLOROPHENOL	LESS THAN 10
1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
BENZYL ALCOHOL	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10
2-METHYLPHENOL	LESS THAN 10
BIS(2-CHLOROISOPROPYL)ETHER	LESS THAN 10
4-METHYLPHENOL	LESS THAN 10
N-NITROSO-DI-N-PROPYLAMINE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
NITROBENZENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
BENZOIC ACID	LESS THAN 50
BIS(2-CHLOROETHOXY)METHANE	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
4-CHLOROANILINE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
4-CHLORO-3-METHYLPHENOL	LESS THAN 10
2-METHYLNAPHTHALENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10
2,4,5-TRICHLOROPHENOL	LESS THAN 50
2-CHLORONAPHTHALENE	LESS THAN 10

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SAMPLE NUMBER: 60904287

GROUND WATER: 19761; R-2D
PROJECT NO. 222.04

BASE/NEUTRAL FRACTION (CONTINUED)

2-NITROANILINE	LESS THAN 50
DIMETHYL PHTHALATE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
3-NITROANILINE	LESS THAN 50
ACENAPHTHENE	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 50
4-NITROPHENOL	LESS THAN 50
DIBENZOFURAN	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DIETHYLPHTHALATE	1 J
4-CHLOROPHENYL-PHENYLETHER	LESS THAN 10
FLUORENE	LESS THAN 10
4-NITROANILINE	LESS THAN 50
4,6-DINITRO-2-METHYLPHENOL	LESS THAN 50
N-NITROSODIPHENYLAMINE*(1)	LESS THAN 10
4-BROMOPHENYL-PHENYLETHER	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 50
PHENANTHRENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
DI-N-BUTYLPHTHALATE	2 J
FLUORANTHENE	LESS THAN 10
PYRENE	LESS THAN 10
BUTYLBENZYLPHTHALATE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 20
BENZO(A)ANTHRACENE	LESS THAN 10
BIS(2-ETHYLHEXYL)PHTHALATE	2 J
CHRYSENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
BENZO(B)FLUORANTHENE	LESS THAN 10
BENZO(K)FLUORANTHENE	LESS THAN 10
BENZO(A)PYRENE	LESS THAN 10
INDENO(1,2,3-CD)PYRENE	LESS THAN 10
DIBENZO(A,H)ANTHRACENE	LESS THAN 10
BENZO(G,H,I)PERYLENE	LESS THAN 10

1' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

PESTICIDE/PCB FRACTION

COMPOUND NAME	UG/L
ALPHA-BHC	LESS THAN 0.05
BETA-BHC	LESS THAN 0.05
DELTA-BHC	LESS THAN 0.05
GAMMA-BHC (LINDANE)	LESS THAN 0.05

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SAMPLE NUMBER: 60904287

GROUND WATER: 19761; R-2D
PROJECT NO. 222.04

PESTICIDE/PCB FRACTION (CONTINUED)

HEPTACHLOR	LESS THAN 0.05
ALDRIN	LESS THAN 0.05
HEPTACHLOR EPOXIDE	LESS THAN 0.05
ENDOSULFAN I	LESS THAN 0.05
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10
METHOXYCHLOR	LESS THAN 0.50
ENDRIN KETONE	LESS THAN 0.10
CHLORDANE	LESS THAN 0.50
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.50
PCB-1221	LESS THAN 0.50
PCB-1232	LESS THAN 0.50
PCB-1242	LESS THAN 0.50
PCB-1248	LESS THAN 0.50
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0

METHOD REFERENCES

ACID FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

BASE/NEUTRAL FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
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SAMPLE NUMBER: 60904287

GROUND WATER: 19761; R-2D
PROJECT NO. 222.04

METHOD REFERENCES (CONTINUED)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
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HAZLETON LABORATORIES AMERICA, INC. Chemical & BioMedical Sciences Division
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REPORT OF ANALYSIS

SAMPLE NUMBER: A09042R8
DATE ENTERED: 09/19/86
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HARR CHRISTEL
RESIDUALS MANAGEMENT TECHNOLOGY, INC.
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

GROUND WATER: 19762; C-2S
PROJECT NO. 222.04

PURCHASE ORDER NUMBER: 12745

ACID FRACTION
(SEE B/N FRACTION - SEMIVOLATILE COMPOUND LIST)

BASE/NEUTRAL FRACTION

SEMIVOLATILE COMPOUNDS

COMPOUND NAME	MCG/L
PHENOL	LESS THAN 10
BIS(-2-CHLOROETHYL)ETHER	LESS THAN 10
2-CHLOROPHENOL	LESS THAN 10
1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
BENZYL ALCOHOL	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10
2-METHYLPHENOL	LESS THAN 10
BIS(2-CHLOROISOPROPYL)ETHER	LESS THAN 10
4-METHYL PHENOL	LESS THAN 10
N-NITROSO-DI-N-PROPYLAMINE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
NITROBENZENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
2,4-DIMETHYL PHENOL	LESS THAN 10
BENZOIC ACID	LESS THAN 50
BIS(2-CHLOROETHOXY)METHANE	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
4-CHLOROANILINE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
4-CHLORO-3-METHYL PHENOL	LESS THAN 10
2-METHYLNAPHTHALENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10
2,4,5-TRICHLOROPHENOL	LESS THAN 50
2-CHLORONAPHTHALENE	LESS THAN 10

SAMPLE NUMBER: 60904288

GROUND WATER: 19762; C-2S
PROJECT NO. 222.04

BASE/NEUTRAL FRACTION (CONTINUED)

2-NITROANILINE	LESS THAN 50
DIMETHYL PHTHALATE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
3-NITROANILINE	LESS THAN 50
ACENAPHTHENE	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 50
4-NITROPHENOL	LESS THAN 50
DIBENZOFURAN	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
4-CHLOROPHENYL-PHENYLETHER	LESS THAN 10
FLUORENE	LESS THAN 10
4-NITROANILINE	LESS THAN 50
4,6-DINITRO-2-METHYLPHENOL	LESS THAN 50
N-NITROSODIPHENYLAMINE*(1)	LESS THAN 10
4-BROMOPHENYL-PHENYLETHER	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 50
PHENANTHRENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
DI-N-BUTYLPHTHALATE	1 J
FLUORANTHENE	LESS THAN 10
PYRENE	LESS THAN 10
BUTYLBENZYLPHTHALATE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 20
BENZO(A)ANTHRACENE	LESS THAN 10
BIS(2-ETHYLHEXYL)PHTHALATE	3 J
CHRYSENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
BENZO(B)FLUORANTHENE	LESS THAN 10
BENZO(K)FLUORANTHENE	LESS THAN 10
BENZO(A)PYRENE	LESS THAN 10
INDENO(1,2,3-CD)PYRENE	LESS THAN 10
DIBENZO(A,H)ANTHRACENE	LESS THAN 10
BENZO(G,H,I)PERYLENE	LESS THAN 10

J INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.05
BETA-BHC	LESS THAN 0.05
DELTA-BHC	LESS THAN 0.05
GAMMA-BHC (LINDANE)	LESS THAN 0.05

HAZLETON LABORATORIES AMERICA, INC. Chemical & BioMedical Sciences Division
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SAMPLE NUMBER: 60904288

GROUND WATER: 19762; C-2S
PROJECT NO. 222.04

PESTICIDE/PCB FRACTION (CONTINUED)

HEPTACHLOR	LESS THAN 0.05
ALDRIN	LESS THAN 0.05
HEPTACHLOR EPOXIDE	LESS THAN 0.05
ENDOSULFAN I	LESS THAN 0.05
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10
METHOXYCHLOR	LESS THAN 0.50
ENDRIN KETONE	LESS THAN 0.10
CHLORDANE	LESS THAN 0.50
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.50
PCB-1221	LESS THAN 0.50
PCB-1232	LESS THAN 0.50
PCB-1242	LESS THAN 0.50
PCB-1248	LESS THAN 0.50
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0

METHOD REFERENCES

ACID FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

BASE/NEUTRAL FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

SAMPLE NUMBER: 60904288

GROUND WATER: 19762; C-2S
PROJECT NO. 222.04

METHOD REFERENCES (CONTINUED)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

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Chemical & BioMedical Sciences Division
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REPORT OF ANALYSIS

SAMPLE NUMBER: 609042BV

DATE ENTERED: 09/19/86

REPORT PRINTED: 09/30/86

[illegible] CHRISTEL
[illegible]SIDUALS MANAGEMENT TECHNOLOGY, INC.
1406 EAST WASHINGTON AVENUE
SUITE 124
[illegible]DISON, WI 53703

[illegible]OUND WATER: 19763; R-4D
[illegible]JECT NO. 229.04

[illegible]RCHASE ORDER NUMBER: 12745

ACID FRACTION
(SEE B/N FRACTION - SEMIVOLATILE COMPOUND LIST)

BASE/NEUTRAL FRACTION

SEMIVOLATILE COMPOUNDS

COMPOUND NAME	MCG/L
PHENOL	LESS THAN 10
BIS(-2-CHLOROETHYL)ETHER	LESS THAN 10
2-CHLOROPHENOL	LESS THAN 10
1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
BENZYL ALCOHOL	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10
2-METHYLPHENOL	LESS THAN 10
BIS(2-CHLOROISOPROPYL)ETHER	LESS THAN 10
4-METHYLPHENOL	LESS THAN 10
N-NITROSO-DI-N-PROPYLAMINE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
NITROBENZENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
2,4-DIMETHYL PHENOL	LESS THAN 10
BENZOIC ACID	LESS THAN 50
BIS(2-CHLOROETHOXY)METHANE	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
4-CHLOROANILINE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
4-CHLORO-3-METHYLPHENOL	LESS THAN 10
2-METHYLNAPHTHALENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10
2,4,5-TRICHLOROPHENOL	LESS THAN 50
2-CHLORONAPHTHALENE	LESS THAN 10

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SAMPLE NUMBER: 60904289

GROUND WATER: 19763; R-4D
PROJECT NO. 222.04

BASE/NEUTRAL FRACTION (CONTINUED)

2-NITROANILINE	LESS THAN 50
DIMETHYL PHTHALATE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
3-NITROANILINE	LESS THAN 50
ACENAPHTHENE	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 50
4-NITROPHENOL	LESS THAN 50
DIBENZOFURAN	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
4-CHLOROPHENYL-PHENYLETHER	LESS THAN 10
FLUORENE	LESS THAN 10
4-NITROANILINE	LESS THAN 50
4,6-DINITRO-2-METHYLPHENOL	LESS THAN 50
N-NITROSODIPHENYLAMINE*(1)	LESS THAN 10
4-BROMOPHENYL-PHENYLETHER	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 50
PHENANTHRENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
DI-N-BUTYL PHTHALATE	1 J
FLUORANTHENE	LESS THAN 10
PYRENE	LESS THAN 10
BUTYLBENZYL PHTHALATE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 20
BENZO(A)ANTHRACENE	LESS THAN 10
BIS(2-ETHYLHEXYL)PHTHALATE	LESS THAN 10
CHRYSENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
BENZO(B)FLUORANTHENE	LESS THAN 10
BENZO(K)FLUORANTHENE	LESS THAN 10
BENZO(A)PYRENE	LESS THAN 10
INDENO(1,2,3-CD)PYRENE	LESS THAN 10
DIBENZO(A,H)ANTHRACENE	LESS THAN 10
BENZO(G,H,I)PERYLENE	LESS THAN 10

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

PESTICIDE/PCB FRACTION

COMPOUND NAME	UG/L
ALPHA-BHC	LESS THAN 0.05
BETA-BHC	LESS THAN 0.05
DELTA-BHC	LESS THAN 0.05
GAMMA-BHC (LINDANE)	LESS THAN 0.05

SAMPLE NUMBER: 60904289

GROUND WATER: 19763; R-4D
PROJECT NO. 222.04

PESTICIDE/PCB FRACTION	(CONTINUED)
HEPTACHLOR	LESS THAN 0.05
ALDRIN	LESS THAN 0.05
HEPTACHLOR EPOXIDE	LESS THAN 0.05
ENDOSULFAN I	LESS THAN 0.05
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10
METHOXYCHLOR	LESS THAN 0.50
ENDRIN KETONE	LESS THAN 0.10
CHLORDANE	LESS THAN 0.50
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.50
PCB-1221	LESS THAN 0.50
PCB-1232	LESS THAN 0.50
PCB-1242	LESS THAN 0.50
PCB-1248	LESS THAN 0.50
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0

METHOD REFERENCES

ACID FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43416, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

BASE/NEUTRAL FRACTION
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U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43416, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

SAMPLE NUMBER: 60904289

GROUND WATER: 19763; R-4D
PROJECT NO. 229.04

METHOD REFERENCES (CONTINUED)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

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REPORT OF ANALYSIS

SAMPLE NUMBER: 611904291
DATE ENTERED: 09/19/86
REPORT PRINTED: 09/30/86

ERR CHRISTEL
RESIDUALS MANAGEMENT TECHNOLOGY, INC.
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

GROUND WATER: 19764; FIELD BLK
PROJECT NO. 222.04

PURCHASE ORDER NUMBER: 12745

ACID FRACTION
(SEE B/N FRACTION - SEMIVOLATILE COMPOUND LIST)

BASE/NEUTRAL FRACTION

SEMIVOLATILE COMPOUNDS

COMPOUND NAME	UG/L
PHENOL	LESS THAN 10
BIS(-2-CHLOROETHYL)ETHER	LESS THAN 10
2-CHLOROPHENOL	LESS THAN 10
1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
BENZYL ALCOHOL	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10
2-METHYLPHENOL	LESS THAN 10
BIS(2-CHLOROISOPROPYL)ETHER	LESS THAN 10
4-METHYLPHENOL	LESS THAN 10
N-NITROSO-DI-N-PROPYLAMINE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
NITROBENZENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
BENZOIC ACID	LESS THAN 50
BIS(2-CHLOROETHOXY)METHANE	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
4-CHLOROANILINE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
4-CHLORO-3-METHYLPHENOL	LESS THAN 10
2-METHYLNAPHTHALENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10
2,4,5-TRICHLOROPHENOL	LESS THAN 50
2-CHLORONAPHTHALENE	LESS THAN 10

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SAMPLE NUMBER: 60904290

GROUND WATER: 19764; FIELD BLK
PROJECT NO. 229.04

BASE/NEUTRAL FRACTION (CONTINUED)

2-NITROANILINE	LESS THAN 50
DIMETHYL PHTHALATE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
3-NITROANILINE	LESS THAN 50
ACENAPHTHENE	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 50
4-NITROPHENOL	LESS THAN 50
DIBENZOFURAN	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DIETHYL PHTHALATE	1 J
4-CHLOROPHENYL-PHENYLETHER	LESS THAN 10
FLUORENE	LESS THAN 10
4-NITROANILINE	LESS THAN 50
4,6-DINITRO-2-METHYLPHENOL	LESS THAN 50
N-NITROSODIPHENYLAMINE*(1)	LESS THAN 10
4-BROMOPHENYL-PHENYLETHER	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 50
PHENANTHRENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
DI-N-BUTYLPHTHALATE	1 J
FLUORANTHENE	LESS THAN 10
PYRENE	LESS THAN 10
BUTYLBENZYLPHTHALATE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 20
BENZO(A)ANTHRACENE	LESS THAN 10
BIS(2-ETHYLHEXYL)PHTHALATE	2 J
CHRYSENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
BENZO(B)FLUORANTHENE	LESS THAN 10
BENZO(K)FLUORANTHENE	LESS THAN 10
BENZO(A)PYRENE	LESS THAN 10
INDENO(1,2,3-CD)PYRENE	LESS THAN 10
DIBENZO(A,H)ANTHRACENE	LESS THAN 10
BENZO(G,H,I)PERYLENE	LESS THAN 10

1) INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

PESTICIDE/PCB FRACTION

COMPOUND NAME	UG/L
ALPHA-BHC	LESS THAN 0.05
BETA-BHC	LESS THAN 0.05
DELTA-BHC	LESS THAN 0.05
GAMMA-BHC (LINDANE)	LESS THAN 0.05

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SAMPLE NUMBER: 60904290

GROUND WATER: 19764; FIELD BLK
PROJECT NO. 222.04

PESTICIDE/PCB FRACTION (CONTINUED)

HEPTACHLOR	LESS THAN 0.05
ALDRIN	LESS THAN 0.05
HEPTACHLOR EPOXIDE	LESS THAN 0.05
ENDOSULFAN I	LESS THAN 0.05
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10
METHOXYCHLOR	LESS THAN 0.50
ENDRIN KETONE	LESS THAN 0.10
CHLORDANE	LESS THAN 0.50
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.50
PCB-1221	LESS THAN 0.50
PCB-1232	LESS THAN 0.50
PCB-1242	LESS THAN 0.50
PCB-1248	LESS THAN 0.50
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0

METHOD REFERENCES

ACID FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
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BASE/NEUTRAL FRACTION
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U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

SAMPLE NUMBER: 60904290

GROUND WATER: 19764; FIELD BLK
PROJECT NO. 222.04

METHOD REFERENCES (CONTINUED)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

HAZLETON LABORATORIES AMERICA, INC.
Chemical & BioMedical Sciences Division
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REPORT OF ANALYSIS

SAMPLE NUMBER: 611904291
DATE ENTERED: 09/19/86
REPORT PRINTED: 09/30/86

ROBB CHRISTEL
RESIDUALS MANAGEMENT TECHNOLOGY, INC.
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

GROUND WATER: 19765; TRIP BLK
PROJECT NO. 222.04

PURCHASE ORDER NUMBER: 12745

ACID FRACTION
(SEE B/N FRACTION - SEMIVOLATILE COMPOUND LIST)

BASE/NEUTRAL FRACTION

SEMIVOLATILE COMPOUNDS

COMPOUND NAME	UG/L
PHENOL	LESS THAN 10
BIS(-2-CHLOROETHYL)ETHER	LESS THAN 10
2-CHLOROPHENOL	LESS THAN 10
1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
BENZYL ALCOHOL	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10
2-METHYLPHENOL	LESS THAN 10
BIS(2-CHLOROISOPROPYL)ETHER	LESS THAN 10
4-METHYLPHENOL	LESS THAN 10
N-NITROSO-DI-N-PROPYLAMINE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
NITROBENZENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
BENZOIC ACID	LESS THAN 50
BIS(2-CHLOROETHOXY)METHANE	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
4-CHLOROANILINE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
4-CHLORO-3-METHYLPHENOL	LESS THAN 10
2-METHYLNAPHTHALENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10
2,4,5-TRICHLOROPHENOL	LESS THAN 50
2-CHLORONAPHTHALENE	LESS THAN 10

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SAMPLE NUMBER: 60904291

GROUND WATER: 19765; TRIP BLK
PROJECT NO. 222.04

BASE/NEUTRAL FRACTION (CONTINUED)

2-NITROANILINE	LESS THAN 50
DIMETHYL PHTHALATE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
3-NITROANILINE	LESS THAN 50
ACENAPHTHENE	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 50
4-NITROPHENOL	LESS THAN 50
DIBENZOFURAN	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
4-CHLOROPHENYL-PHENYLETHER	LESS THAN 10
FLUORENE	LESS THAN 10
4-NITROANILINE	LESS THAN 50
4,6-DINITRO-2-METHYLPHENOL	LESS THAN 50
N-NITROSODIPHENYLAMINE*(1)	LESS THAN 10
4-BROMOPHENYL-PHENYLETHER	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 50
PHENANTHRENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
DI-N-BUTYL PHTHALATE	1 J
FLUORANTHENE	LESS THAN 10
PYRENE	LESS THAN 10
BUTYLBENZYLPHTHALATE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 20
BENZO(A)ANTHRACENE	LESS THAN 10
BIS(2-ETHYLHEXYL)PHTHALATE	LESS THAN 10
CHRYSENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
BENZO(B)FLUORANTHENE	LESS THAN 10
BENZO(K)FLUORANTHENE	LESS THAN 10
BENZO(A)PYRENE	LESS THAN 10
INDENO(1,2,3-CD)PYRENE	LESS THAN 10
DIBENZO(A,H)ANTHRACENE	LESS THAN 10
BENZO(G,H,I)PERYLENE	LESS THAN 10

1' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

STICIDE/PCB FRACTION

COMPOUND NAME	UG/L
ALPHA-BHC	LESS THAN 0.05
BETA-BHC	LESS THAN 0.05
DELTA-BHC	LESS THAN 0.05
GAMMA-BHC (LINDANE)	LESS THAN 0.05

HAZLETON LABORATORIES AMERICA, INC. Chemical & BioMedical Sciences Division
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SAMPLE NUMBER: 60914291

GROUND WATER: 19765; TRIP BLK
PROJECT NO. 229.04

PESTICIDE/PCB FRACTION (CONTINUED)

HEPTACHLOR	LESS THAN 0.05
ALDRIN	LESS THAN 0.05
HEPTACHLOR EPOXIDE	LESS THAN 0.05
ENDOSULFAN I	LESS THAN 0.05
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10
METHOXYCHLOR	LESS THAN 0.50
ENDRIN KETONE	LESS THAN 0.10
CHLORDANE	LESS THAN 0.50
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.50
PCB-1221	LESS THAN 0.50
PCB-1232	LESS THAN 0.50
PCB-1242	LESS THAN 0.50
PCB-1248	LESS THAN 0.50
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0

METHOD REFERENCES

ACID FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

BASE/NEUTRAL FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
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SAMPLE NUMBER: 60904291

GROUND WATER: 19765; TRIP BLK
PROJECT NO. 222.04

METHOD REFERENCES (CONTINUED)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
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TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

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TABULAR LISTING OF REPORTS ENCLOSED

PRINTED ON: 10/24/86

GERAGHTY AND MILLER

PURCHASE ORDER NUMBER: PROJ. NO. E1042WA1

SAMPLE NUMBER	SAMPLE DESCRIPTION	DATE RECEIVED	PARAMETERS REQUESTED
61000308	GROUNDWATER: GM4S; 9/24/86	10/01/86	HSL SEMI-VOLATILES; PESTICIDE/PCB'S
61000309	GROUNDWATER: GM4D; 9/24/86	10/01/86	HSL SEMI-VOLATILES; PESTICIDE/PCB'S

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REPORT OF ANALYSIS

LORIN HUNTOON
GERAGHTY AND MILLER
312 EAST MICHIGAN STREET
SUITE 200
MILWAUKEE, WI 53202

SAMPLE NUMBER: 61000308
DATE ENTERED: 10/01/86
REPORT PRINTED: 10/24/86

GROUNDWATER: GM4S; 9/24/86

PURCHASE ORDER NUMBER: PROJ. NO. E1042WA1

ACID FRACTION
(SEE B/N FRACTION - SEMIVOLATILE COMPOUND LIST)

BASE/NEUTRAL FRACTION

SEMIVOLATILE COMPOUNDS

COMPOUND NAME	MCG/L
PHENOL	LESS THAN 10
BIS(-2-CHLOROETHYL)ETHER	LESS THAN 10
2-CHLOROPHENOL	LESS THAN 10
1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
BENZYL ALCOHOL	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10
2-METHYLPHENOL	LESS THAN 10
BIS(2-CHLOROISOPROPYL)ETHER	LESS THAN 10
4-METHYLPHENOL	LESS THAN 10
N-NITROSO-DI-N-PROPYLAMINE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
NITROBENZENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
BENZOIC ACID	LESS THAN 50
BIS(2-CHLOROETHOXY)METHANE	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
4-CHLOROANILINE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
4-CHLORO-3-METHYLPHENOL	LESS THAN 10
2-METHYLNAPHTHALENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10
2,4,5-TRICHLOROPHENOL	LESS THAN 50
2-CHLORONAPHTHALENE	LESS THAN 10

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SAMPLE NUMBER: 61000308

GROUNDWATER: GM4S; 9/24/86

BASE/NEUTRAL FRACTION (CONTINUED)

2-NITROANILINE	LESS THAN 50
DIMETHYL PHTHALATE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
3-NITROANILINE	LESS THAN 50
ACENAPHTHENE	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 50
4-NITROPHENOL	LESS THAN 50
DIBENZOFURAN	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DIETHYLPHTHALATE	LESS THAN 10
4-CHLOROPHENYL-PHENYLETHER	LESS THAN 10
FLUORENE	LESS THAN 10
4-NITROANILINE	LESS THAN 50
4,6-DINITRO-2-METHYLPHENOL	LESS THAN 50
N-NITROSODIPHENYLAMINE*(1)	LESS THAN 10
4-BROMOPHENYL-PHENYLETHER	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 50
PHENANTHRENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
DI-N-BUTYLPHTHALATE	1 J
FLUORANTHENE	LESS THAN 10
PYRENE	LESS THAN 10
BUTYLBENZYLPHTHALATE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 20
BENZO(A)ANTHRACENE	LESS THAN 10
BIS(2-ETHYLHEXYL)PHTHALATE	2 J
CHRYSENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
BENZO(B)FLUORANTHENE	LESS THAN 10
BENZO(K)FLUORANTHENE	LESS THAN 10
BENZO(A)PYRENE	LESS THAN 10
INDENO(1,2,3-CD)PYRENE	LESS THAN 10
DIBENZO(A,H)ANTHRACENE	LESS THAN 10
BENZO(G,H,I)PERYLENE	LESS THAN 10

*(1) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.05
BETA-BHC	LESS THAN 0.05

SAMPLE NUMBER: 61000308 PAGE 3

GROUNDWATER: GM4S; 9/24/86

PESTICIDE/PCB FRACTION (CONTINUED)

DELTA-BHC	LESS THAN 0.05
GAMMA-BHC (LINDANE)	LESS THAN 0.05
HEPTACHLOR	LESS THAN 0.05
ALDRIN	LESS THAN 0.05
HEPTACHLOR EPOXIDE	LESS THAN 0.05
ENDOSULFAN I	LESS THAN 0.05
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10
METHOXYCHLOR	LESS THAN 0.50
ENDRIN KETONE	LESS THAN 0.10
CHLORDANE	LESS THAN 0.50
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.50
PCB-1221	LESS THAN 0.50
PCB-1232	LESS THAN 0.50
PCB-1242	LESS THAN 0.50
PCB-1248	LESS THAN 0.50
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0

METHOD REFERENCES

ACID FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
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SAMPLE NUMBER: 61000308 PAGE 4

GROUNDWATER: GM4S; 9/24/86

METHOD REFERENCES (CONTINUED)

BASE/NEUTRAL FRACTION
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REPORT OF ANALYSIS

LORIN HUNTOON
GERAGHTY AND MILLER
312 EAST MICHIGAN STREET
SUITE 200
MILWAUKEE, WI 53202

SAMPLE NUMBER: 61000309
DATE ENTERED: 10/01/86
REPORT PRINTED: 10/24/86

GROUNDWATER: GM4D; 9/24/86

PURCHASE ORDER NUMBER: PROJ. NO. E1042WA1

ACID FRACTION
(SEE B/N FRACTION - SEMIVOLATILE COMPOUND LIST)

BASE/NEUTRAL FRACTION

SEMIVOLATILE COMPOUNDS

COMPOUND NAME	MCG/L
PHENOL	LESS THAN 10
BIS(-2-CHLOROETHYL)ETHER	LESS THAN 10
2-CHLOROPHENOL	LESS THAN 10
1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
BENZYL ALCOHOL	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10
2-METHYLPHENOL	LESS THAN 10
BIS(2-CHLOROISOPROPYL)ETHER	LESS THAN 10
4-METHYLPHENOL	LESS THAN 10
N-NITROSO-DI-N-PROPYLAMINE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
NITROBENZENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
BENZOIC ACID	LESS THAN 50
BIS(2-CHLOROETHOXY)METHANE	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
4-CHLOROANILINE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
4-CHLORO-3-METHYLPHENOL	LESS THAN 10
2-METHYLNAPHTHALENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10
2,4,5-TRICHLOROPHENOL	LESS THAN 50
2-CHLORONAPHTHALENE	LESS THAN 10

SAMPLE NUMBER: 61000309

GROUNDWATER: GM4D; 9/24/86

BASE/NEUTRAL FRACTION (CONTINUED)

2-NITROANILINE	LESS THAN 50
DIMETHYL PHTHALATE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
3-NITROANILINE	LESS THAN 50
ACENAPHTHENE	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 50
4-NITROPHENOL	LESS THAN 50
DIBENZOFURAN	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DIETHYLPHTHALATE	LESS THAN 10
4-CHLOROPHENYL-PHENYLETHER	LESS THAN 10
FLUORENE	LESS THAN 10
4-NITROANILINE	LESS THAN 50
4,6-DINITRO-2-METHYLPHENOL	LESS THAN 50
N-NITROSODIPHENYLAMINE*(1)	LESS THAN 10
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PYRENE	LESS THAN 10
BUTYLBENZYLPHTHALATE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 20
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BIS(2-ETHYLHEXYL)PHTHALATE	6 J
CHRYSENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
BENZO(B)FLUORANTHENE	LESS THAN 10
BENZO(K)FLUORANTHENE	LESS THAN 10
BENZO(A)PYRENE	LESS THAN 10
INDENO(1,2,3-CD)PYRENE	LESS THAN 10
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PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.05
BETA-BHC	LESS THAN 0.05

SAMPLE NUMBER: 61000309 PAGE 3

GROUNDWATER: GM4D; 9/24/86

PESTICIDE/PCB FRACTION (CONTINUED)

DELTA-BHC	LESS THAN 0.05
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PCB-1016	LESS THAN 0.50
PCB-1221	LESS THAN 0.50
PCB-1232	LESS THAN 0.50
PCB-1242	LESS THAN 0.50
PCB-1248	LESS THAN 0.50
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0

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SAMPLE NUMBER: 61000309 PAGE 4

GROUNDWATER: GM4D; 9/24/86

METHOD REFERENCES (CONTINUED)

BASE/NEUTRAL FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
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PESTICIDE/PCB FRACTION
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TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

APPENDIX E

INORGANIC DATA FROM WEST SIDE WELLS (WAUSAU, WI)

APPENDIX E

INORGANIC CHEMICAL DATA FROM
WEST SIDE WELLS (WAUSAU, WI)

	Detection Limit	GM-1S 9/15/86	C-2S 9/15/86	C-4S 9/17/86	C-4D 9/17/86	C-4SP 9/17/86	W-1D 9/15/86	R-2D 9/15/86	R-4D 9/15/86	C-1S 9/15/86	R-1S 9/15/86	R-1D 9/15/86	R-2S 9/15/86	R-3S 9/15/86	R-3D 9/15/86	Blank 9/15/86	Trip Blank
T. Alkalinity mg/l $CaCO_3$	20.	32.	X	211.	56.	--	120.	61.	38.	35.	44.	43.	83.	65.	47.	X	X
Cl, mg/l	0.1	1.9	27.7	18.8	21.0	--	5.1	20.4	28.7	35.4	18.3	21.6	15.6	21.1	21.1	X	X
SO_4, mg/l	0.5	10.8	17.1	242.	35.4	--	3.4	30.9	29.0	17.4	29.0	23.9	7.2	20.8	25.0	X	X
$NO_3 + NO_2$, mg/l as N	0.5	3.4	5.1	13.8	9.10	--	X	X	1.8	3.3	2.8	8.3	X	0.6	6.0	X	X
Ca, mg/l	0.008	12.2	28.8	99.2	41.0	--	43.5	29.3	28.1	36.5	23.1	33.4	23.9	23.6	30.2	0.063	0.038
Fe, mg/l	0.004	0.032	X	0.006	X	0.053	0.054	0.007	0.022	0.013	0.023	0.008	0.047	0.199	0.015	X	X
K, mg/l	1.5	2.6	X	12.1	2.3	--	3.5	X	3.5	4.7	6.4	X	6.1	6.0	3.5	3.0	X
Mg, mg/l	0.026	2.98	6.88	34.2	10.8	--	2.29	12.8	14.5	5.11	7.06	10.1	7.04	6.65	12.2	X	X
Na, mg/l	0.027	2.83	17.8	61.9	11.9	--	3.51	8.68	12.8	40.9	16.6	10.9	8.72	18.4	8.32	0.35	0.36
Pb, mg/l	0.005	--	--	0.025	--	0.024	--										

X = Analyzed but not detected

222.04 906:RPT:foley1223A

APPENDIX F

LABORATORY SHEETS FOR VOC DATA

ZIMPRO INC.
ENVIRONMENTAL & ENERGY SYSTEMS

October 15, 1986

RMT, Inc.
Suite 124
1406 East Washington Ave.
Madison, WI 53703

Attn: Tom Stotzenberg

Re: Project No. 222.04 PO #12748

Attached are the results for the water samples submitted September 17, 1986. Also attached is the chain of custody record and Zimpro's sample check-in form.

The VOC analysis was done using EPA Method 601 with PID (10.2 eV) and Hall detectors in series (Tables 1-8). The cis and trans-1,2-dichloroethylene are not separated by this analysis and are calculated based on a trans-1,2-dichloroethylene standard. Dilutions were necessary for some of the samples. Those samples appear on separate tables with detection limits reflecting the dilutions.

Inorganic results are included in Tables 9 through 11. Total alkalinity was done according to EPA 310.1. Chloride, nitrate + nitrite and sulfate were done by ion chromatography (EPA 300.0). Metals, except lead, were done by ICP emission spectroscopy (EPA 200.7). Lead was analyzed by furnace AA (EPA 239.2) per your request.

If you have any questions, please call.

Sincerely,

ZIMPRO INC.

Mary C. Christie Heuser

Mary C. Christie Heuser
Instrumentation Chemist

MCCH/ls

MILITARY ROAD
ROTHSCHILD, WISCONSIN 54474
TELEPHONE (715) 359-7211 TELEX 29-0495

ZIMPRO
ENVIRONMENTAL & ENERGY SYSTEMS

Table 1

RMT
VOC Analysis (ug/l)

	Detection Limit	W-9I 9-16-86	M-10 9-15-86	GM-1S 9-16-86	GM-2S 9-15-86	C-3S 9-17-86
Carbon Tetrachloride	0.1	X	X	X	X	108.
Chloroform	0.1	X	X	0.3	X	47.5
1,2-Dichloroethane	0.3	X	X	X	X	X
1,2-Dichloroethylene	0.3	X	X	X	X	X
Dichloromethane	0.2	X	X	X	X	X
Tetrachloroethylene	0.1	X	X	X	X	0.3
Toluene	0.1	X	X	X	X	0.1
1,1,1-Trichloroethane	0.1	X	X	X	X	X
Trichloroethylene	0.1	X	X	X	X	8.3
Vinyl Chloride	2.0	X	X	X	X	X
Analytical No.		21944	21946	21947	21950	21954

X = Analyzed but not detected

ZIMPRO
ENVIRONMENTAL & ENERGY SYSTEMS

Table 2

RMT
VOC Analysis (ug/l)

	Detection Limit	C-4S 9-17-86	C-4D 9-17-86	C-6S 9-17-86	C-7S 9-17-86	W-5S 9-17-86
Carbon Tetrachloride	Ø.1	X	X	X	X	X
Chloroform	Ø.1	Ø.2	1.1	Ø.7	X	Ø.2
1,2-Dichloroethane	Ø.3	Ø.3	X	X	X	X
1,2-Dichloroethylene	Ø.3	5.7	8.1	X	X	X
Dichloromethane	Ø.2	X	X	X	X	X
Tetrachloroethylene	Ø.1	5.8	X	Ø.2	X	X
Toluene	Ø.1	X	Ø.2	X	X	X
1,1,1-Trichloroethane	Ø.1	X	Ø.1	X	28.Ø	X
Trichloroethylene	Ø.1	2.5	41.9	X	1Ø.5	Ø.1
Vinyl Chloride	2.Ø	X	X	X	X	X
Analytical No.		21955	21958	21961	21962	21963

X = Analyzed but not detected

ZIMPRO
ENVIRONMENTAL & ENERGY SYSTEMS

Table 3

RMT
VOC Analysis (ug/l)

	Detection Limit	DUP 1 9-15-86	W-1D 9-16-86	C-1S 9-17-86	R-1S 9-16-86	R-1D 9-16-86
Carbon Tetrachloride	0.1	X	X	X	X	X
Chloroform	0.1	X	X	X	X	2.1
1,2-Dichloroethane	0.3	X	X	X	X	X
1,2-Dichloroethylene	0.3	X	X	X	X	X
Dichloromethane	0.2	X	X	X	X	X
Tetrachloroethylene	0.1	X	X	X	X	0.2
Toluene	0.1	X	X	X	X	X
1,1,1-Trichloroethane	0.1	X	X	X	X	X
Trichloroethylene	0.1	X	0.1	X	0.1	X
Vinyl Chloride	2.0	X	X	X	X	X
Analytical No.		21965	21967	21976	21979	21982

X = Analyzed but not detected

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Table 4

RMT
VOC Analysis (ug/l)

	Detection Limit	R-2S 9-16-86	R-3S 9-16-86	R-3D 9-16-86	W-3I 9-15-86	W-3D 9-15-86
Carbon Tetrachloride	0.1	X	X	X	X	X
Chloroform	0.1	X	X	0.9	X	X
1,2-Dichloroethane	0.3	X	X	X	X	X
1,2-Dichloroethylene	0.3	14.4	4.7	0.4	X	X
Dichloromethane	0.2	X	X	X	X	X
Tetrachloroethylene	0.1	X	X	X	X	X
Toluene	0.1	X	X	X	X	X
1,1,1-Trichloroethane	0.1	X	X	0.1	X	X
Trichloroethylene	0.1	29.2	49.7	4.4	X	X
Vinyl Chloride	2.0	X	X	X	X	X
Analytical No.		21985	21988	21991	21994	21995

X = Analyzed but not detected

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Table 5

RMT
VOC Analysis (ug/l)

	Detection Limit	W-4S 9-15-86	W-4D 9-15-86	W-7S 9-15-86	Blk 9-16-86	Field Blank 9-17-86	Trip Blank
Carbon Tetrachloride	0.1	X	X	X	X	X	X
Chloroform	0.1	0.2	X	0.1	X	X	X
1,2-Dichloroethane	0.3	X	X	X	X	X	X
1,2-Dichloroethylene	0.3	X	X	X	X	X	X
Dichloromethane	0.2	X	X	X	X	X	X
Tetrachloroethylene	0.1	X	X	X	X	X	X
Toluene	0.1	X	X	0.2	X	0.1	X
1,1,1-Trichloroethane	0.1	X	X	X	0.2	0.2	X
Trichloroethylene	0.1	18.8	1.4	62.9	X	X	X
Vinyl Chloride	2.0	X	X	X	X	X	X
Analytical No.		21996	21997	21998	21999	22003	22004

X = Analyzed but not detected

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Table 6

RMT
VOC Analysis (ug/l)

	Detectopm Limit	M-6 9-16-86
Carbon Tetrachloride	Ø.5	X
Chloroform	Ø.5	X
1,2-Dichloroethane	1.5	X
1,2-Dichloroethylene	1.5	2.Ø
Dichloromethane	1.Ø	X
Tetrachloroethylene	Ø.5	X
Toluene	Ø.5	X
1,1,1-Trichloroethane	Ø.5	X
Trichloroethylene	Ø.5	226.
Vinyl Chloride	1Ø.Ø	X
Analytical No.		21945

X = Analyzed but not detected

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Table 7

RMT
VOC Analysis (ug/l)

	Detectopm Limit	C-2S 9-17-86
Carbon Tetrachloride	2.5	X
Chloroform	2.5	X
1,2-Dichloroethane	7.5	X
1,2-Dichloroethylene	7.5	10.0
Dichloromethane	5.0	5.0
Tetrachloroethylene	5.0	X
Toluene	2.5	5.0
1,1,1-Trichloroethane	2.5	X
Trichloroethylene	2.5	615.
Vinyl Chloride	50.0	X
Analytical No.		21951

X = Analyzed but not detected

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Table 8

RMT
VOC Analysis (ug/l) — What of?

	Detection Limit	DUP 2 9-17-86	R-2D 9-16-86	R-4D 9-17-86
Carbon Tetrachloride	5.0	X	5.0	X
Chloroform	5.0	X	X	X
1,2-Dichloroethane	15.0	X	X	X
1,2-Dichloroethylene	15.0	705.	30.0	725.
Dichloromethane	10.0	X	X	X
Tetrachloroethylene	5.0	10.0	X	15.0
Toluene	5.0	X	X	X
1,1,1-Trichloroethane	5.0	X	X	X
Trichloroethylene	5.0	2,835.	1,135.	3,185.
Vinyl Chloride	100.	X	X	X
Analytical No.		21966	21970	21976

X = Analyzed but not detected