HYDROGEOLOGICAL INVESTIGATION OF THE ALLUVIAL AQUIFER BENEATH CITY WELL 6

WAUSAU, WISCONSIN

JUNE 1987



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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

TABLE OF CONTENTS

<u>Title</u>

Page

1.	INTRO	DDUCTION 1
	1.1	Background
	1.2	Purpose
	1.3	Scope 3
2.	FIND	INGS AND CONCLUSIONS 6
3.	SUBS	URFACE INVESTIGATION
	3.1	Method of Investigation 8
	3.2	Site Setting 10
	3.3	Regional Hydrogeology 10
	3.4	Site Geology 11
		3.4.1 Bedrock 11
		3.4.2 Unconsolidated Deposits 13
	3.5	Site Hydrogeology 13
		3.5.1 West Side Municipal Well Field 13
		3.5.2 Ground Water Elevations and Flow
		Directions 19
		3.5.3 Pump Test Results
	3.6	Ground Water Chemistry
		3.6.1 Chemistry of PCE and TCE 34
		3.6.2 Occurrence of Chloroethylenes in the
		Aquifer
		3.6.3 Potential Migration Pathways of TCE 49
4.	REFE	RENCES

<u>List of Tables</u>

Table	3-1	-	Summary of West Side Well Data, City of	
			Wausau, WI	21
Table	3-2		Time Series Water Level Measurements, West	
			Side Monitoring Wells, Wausau, WI	22
Table	3-3	-	Wisconsin River Elevations During Pump Test	30
Table	3-4	-	Weather Conditions During Pump Test	
			(December 6-13, 1986)	31
Table	3-5	-	Solubilities and Densities of Selected	
			Volatile Organic Compounds	37
Table	3-6	_	Results of Ground Water Analysis for VOC's	
			November 25, 1985	41
Table	3-7	-	Results of Ground Water Analysis for VOC's	
			January 6-7, 1986	42

TABLE OF CONTENTS (CONT'D)

List of Tables (Cont'd)

Table	3-8 -	Summary of Water Quality Results of Volatile	
		Organic Compounds (September 15-17, 1986)	45
Table	3-9 -	TCE Concentrations with Depth in R-4D and R-1D	
		(August 12-13, 1986)	48
Table	3-10-	Alkalinity Results for Ground Water Samples	
		in and Near the Old City Landfill	50

List of Figures

Figure 1 - Locations of West Side Monitoring Wells	4
Figure 2 - Approximate Bedrock Surface	12
Figure 3 - North-South Geologic Cross Section on West Side	
of Wisconsin River	14
Figure 4 - Pumping History of City Well 6	15
Figure 5 - Pumping History of City Well 7	17
Figure 6 - Pumping History of City Well 9	18 -
Figure 7 - Water Level Contours May 22, 1986	23
Figure 8 - Water Level Contours November 26, 1986	24
Figure 9 - Water Level Records in Selected Wells	
During Aquifer Test	27
Figure 10 - Biodegradation Pathways of Perchloroethylene	
and Trichloroethylene	35
Figure 11 - Marathon Electric/Old City Landfill Property 4	43
Figure 12 - TCE Concentrations in Cross Section	46
Figure 13 - Trilinear Diagram Showing Cation and Anion	
Compositions of Ground Water Samples	52

List of Appendices

Appendix A - Boring Logs Appendix B - Well Construction Diagrams Appendix C - VOC Depth Profiles at R-4D and R-1D Appendix D - Hazardous Substance List Analysis for Selected Wells Appendix E - Inorganic Data from West Side Wells Appendix F - Laboratory Sheets for VOC Data

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 <u>Scope</u>

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 GMprefixes (Figure 1).



LEGEND





0'

250' 500'





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.

Geology

- 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 groundwater 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 groundwater 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/ft² to 3083 gpd/ft²

WATER QUALITY

- 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 CH₂ M 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, CH2^M 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 <u>seven days</u> 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 <u>Site Setting</u>

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 <u>Regional Hydrogeology</u>

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.



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 crosssection 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

<u>Water Supply Wells</u>. 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.



PUMPING HISTORY OF CITY WELL 6 1977 to 1986 巾 0 - fination and fination and fination and fination min min

monthly average



monthly average of hours pumped per day

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.

<u>Pumping History</u>. 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



monthly average of hours pumped per day

PUMPING HISTORY OF CITY WELL 7

□ monthly average





□ monthly average

GERAGHTY & MILLER, INC. Ground-Water Consultants

monthly average of hours pumped per day

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.
- o 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 b 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.

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

		Top of	Ground		Bottom		Top of
	Well	Casing	Surface	Depth of	of Screen	Screen	Screen
	Designation	Elevation	Elevation	Well	Elevation	Length	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
	CW90BS	1,224.25	1,222.12				
	R1S	1,222.08	1,220.01	40.5	1,179.51	10.0	1,189.51
D	RlD	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
P	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
P	R4 D	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		1,187.82	NA	NA	NA	NA
	(Bos Creek)						

-- = Information not available

TABLE 3-2

TIME SERIES WATER LEVEL MEASUREMENTS WEST SIDE MONITORING WELLS (WAUSAU, WI)

					D			D				
Hall.	C 15	C 25	C 35	C 45	C 4D	C 65	C 75	EPA 1A	EPA 2A	EPA 3A	EPA 38	EPA 4A
		• ••		• ••			• ••	•••••				
22-May-86	27 10	31.77	32.12	29.43	28.94	33.85	33.44	29.73	17.16	32.96	38.11	31.80
29-Nay 00	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	21 73	31.92	37.81	29.34	28.95	34.04	33.59	29.88	17.88	38.19	38.38	32.42
26-100-86	28 20	31 74	32.74	29.09	28.81	33,92	33.49	29.95	18.24	38.38	38.56	32.70
10-1-1-26	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 - 101 - 85	28.25	31 60	32.61	29.11	28.69	33.72	33.28	28.77	17.43	37.28	37.49	30.61
07-100-86	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 85	31.74	32.67	29.26	28.78	33.95	33.45	29.62	17.17	38.16	38.35	31.59
04-Sen-86	24 59	31 79	32.76	29.27	28.83	34.01	33.49	29.52	17.31	38.18	38.32	31.80
18-500-86	29 01	31.52	32.45	28.91	28.55	33.75	33.19	29.38	17.21	37.89	38.09	31.53
02-001-86	25.57	30.49	31.55	28.09	27.61	32.74	32.18	21.75	16.55	35.88	36.05	30.19
16-0ct-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
••••••												
												D
	F01 40	ED4 40	604 E	E01 7	ED1 0	Dius	CH 6	CH 7	rw 9	CH 9 085	P15	R10
Well:	EPA 48	EPA 46	EFA J	EFK I	ELN 3	FINA		C A 1	64 3			
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22-May-86	32.25		30.00	30.33	17 72	23.17	44 00	55.00	53.00	40.30		
29-May-86	32.30		30.32	37.00	10 93	23.33 93 80	45.00	61 00	58.00	41 26		
12-JUN-86	32.83	32.00	30.30	31.30	10.63	23.00	43.00	60.00	58.00 58.00	32 74		
26-Jun-86	33.09	32.83	J0.//	37.03	10.32	24.22	44 00	00.00	58 00	41 26		
10-JUI-86	32.91	32.09	30.12	37.43	16.97	24.41	17 004	64 00	57 00	40.53		
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18-Seo-86						••						
02-Oct-85	20.83	21.32	26.03	27.13	30.57	28.09	23.58	26.22	27.75	28.04		
16-Oct-85	20.72	20.33	25.80	21.07	30.45	28.14	23.89	26.22	27.85	28.18		
30-Oct-85	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		25.08	28.34	30.10) 30.39		

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







S 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



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 ο 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 online. 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.
- o 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 (±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.

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TABLE 3-3 WISCONSIN RIVER ELEVATIONS DURING PUMP TEST

TABLE 3-4

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

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

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, 1Bull. 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/ft². These values are in agreement with those determined by Devaul and Green (1971, USGS) who indicated hydraulic conductivity of 1200 to 5600 gpd/ft².

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).

<u>Biodegradation</u>. 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



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.

<u>Water Solubility</u>. 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 $(H_2 0 = 1)$
Tetrachloroethylene	150	1.63
Trichloroethylene	1,000	1.46
trans 1,2-dichloroethylene	600	1.28
cis 1,2-dichloroethylene	800	1.26
l,l-dichloroethylene	2,250	1.22
vinyl chloride	9,150	0.91

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<u>Soil/Water Partitioning</u>. 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:

$$WC = \underline{SC} Eq. 1$$

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)

(CH₂M Hill, November 25, 1985)

	Detection Limit	<u>C-1S</u>	<u>C-2S</u>	<u>C-35</u>	<u>C-45</u>	<u>C-4D</u>	<u>C-65</u>	<u>c-7s</u>	Trip Blank	Field <u>Blank</u>
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							
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							
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							
Dichlorobromomethane	0.1	ND	ND							
Dibromochloromethane	0.1	ND	ND							

ND - Analyzed but not detected.

222.04 906:RPT:foley1223T

TABLE 3-7

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

(CH₂M Hill, JANUARY 6-7, 1986)

	Detection Limit	<u>C-15</u>	<u>C-2S</u>	<u>C-3S</u>	<u>C-4S</u>	<u>C-4D</u>	<u>C-65</u>	<u>C-7S</u>	Trip <u>Blank</u>	Field <u>Blank</u>
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
l,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						
l,l,l-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							
Dichlorobromomethane	0.1	ND	ND							
Dibromochloromethane	0.1	ND	ND							

ND - Analyzed but not detected.

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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 190M9/e Landfill, near the southeast corner of the assembly building (R-4D). It is also found to the northeast across Bos Creek (R-2D), at a concentration of 1140 in Table 3,190 ug/L. 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-lD 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 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)

	L Standards	etection <u>Limit*</u>	n <u>C-1S</u>	<u>C-2S</u>	<u>C-3S</u>	<u>C-4S</u>	<u>C4D</u>	<u>C-6S</u>	<u>C-7S</u>	<u>R-1S</u>	<u>R-1D</u>	<u>R-2S</u>	<u>R-2D</u>	<u>R-3S</u>	<u>R-3D</u>	<u>R-4D</u>	EPA-lA	EPA-3A	EPA-3B	EPA-4A	EPA-4C	EPA-5	EPA-7	EPA-9
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
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
1,2-Dichloroethylen	e 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
Carbon Tetrachloride	e 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
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
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
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
Toluene	2000.1	0.1	ND	5.0	0.1	·ND	0.2	ND	ND	ND	ND	ND	ND	ND	0.2	ND								
1,1,1-Trichloroetha	ne 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
Vinyl Chloride	1.02	2.0	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)

²Proposed 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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QM-15	<u>QM-2S</u>	<u>av-6</u>	<u>av-10</u>	LAB BLANK	FIELD • BLANK	TRIP BLANK
ND	ND	ND	ND	ND	ND	ND
ND	ND	226.	ND	ND	ND	ND
ND	ND	2.0	ND	ND	ND	ND
ND	ND	ND	ND	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	0.1	ND
ND	ND	ND	ND	0.2	0.2	ND
ND	ND	ND	ND	ND	ND	ND



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 semivolatiles, pesticides and PCBs. No compounds were detected above the

TABLE 3-9

TCE CONCENTRATIONS WITH DEPTH ' (AUGUST 1986)

Depth From Ground Surface (feet)	TCE (ug/L)
36	590
56	0.9
76	3.2
96	4.1
136	790
156	2.2
	8

MONITORING WELL R-4D

	MONITORIN	IG	WELL	R-1D
37				ND
57				ND
117				ND

22.04 906:RPT:foley1223T

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 CH₂M 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	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

Alkalinity (mg/L as CaCO₃)

taken from CH_2M Hill (1986)

22.04 906:RPT:foley1223T

(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



FIGURE 13

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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 ~ R-2D R-3D R-4D#6 #7 Wausau Test Well No. 9 #9 **1**S B-2S B-3S B-4S 4D B-6D B-7S WMW-1A WMW-3A WMW-3B WMW-4A WMW-4B WMW-4C ₩M₩-5 WMW-6 WMW-7 WMW-9 GM-1S GM-2S GM-3S

GM-4S

GM-4D

Same Same Same Same. CW-6 CW-7 CW-9 C-1S C-2S C-3S C-4S C-4D C-6S C-7S EPA-1A EPA-3A EPA-3B EPA-4A EPA-4B EPA-4C EPA-5 EPA-6 EPA-7 EPA-9 Same Same Same Same Same

		LOG OF	TEST BOR	ING	JOB NO.:222.04			
	RESIDUA	LS MANAGEM	ENT TECH	NOLOGY, INC.				
PRO.	JECT:	Foley & L	ardner		BORING NO.: R-1D			
	ATION:	<u>Wausau WI</u>			SUBFACE FLEW 1220.1			
LOG	GED BY:	T. E. Fox		SORFACE ELEV. 1220.				
DAT	E:	8/14/86		SHEET NO.: 1 of 4				
		SAMPLE			· · · · · · · · · · · · · · · · · · ·			
	Recover	y Moistur	e		VISUAL CLASSIFICATION			
No.	Туре	HN	U Depth		and Remarks			
			<u> </u>					
1	Jar	No	E	. Brown F-M G	ravel, Some F-C Sand,			
		Dete						
			· .	.				
2	Jar	0.	2 E	. Brown F-C S	and, Some F-M Gravel,			
				Little Silt				
3	Jar	0.	2					
			E					
			15					
4	Jar	0.	2 E					
			· =					
_			F					
5	Jar		E-					
_								
6	Jar	0.:	2 =		•.			
			— 30					
			E	Bross D.M.O				
7	Jar	0.4	4 <u> </u>	Brown F-M S	and, Little to Some Silt			
					·			
			- 35					
	H_C)					
8	Bag 2	nle	E					
	Sall		F					
			40	<u> </u>				
	GENER	AL NOTES		UAT.	ER LEVEL ORSERVATIONS			
STA	RT: $11:54$	AM 8/14	/86	WHILE DRILLI	NG: See Lori H. Field Note			
COM	PLETE:1:4	5 8/1	4/86	for Recover	y Data			
RIG	: IR TM 6	0		UPON COMPLET	ION:			
	W CHIEF: <u>L</u>	en J.	Tube	DEPTH OF WAT	KILLING:			
_ DVT	יייייי	"OD' Dun I	TUNE	DELTI UI WAL				

Induced H₂O From O' to 35'

F-204 (cont)	d.)—			LOG O	F TE	ST BOR	LNG		JOB	NO.: 222.	04	
	PRO	RESI IECT:	DUALS Fol	MANAG	EMEN Lard	T TECHI ner	NOLOGY,	BORING NO.: R-1D				
	LOCA	TION:	Wai	isau W	I				-		1220	14
	DRII LOGO	LED B SED BY	Y: <u>Ler</u> : T.F	<u>1 J.</u> E. Fox			- <u></u>		- 508	FACE ELEV.T	1220	.10
	DATH	:- <u></u>	8/1	4/86					SHE	ET NO.:	2 of	4
, i i i i i i i i i i i i i i i i i i i			SA	MPLE					VISUAL	CLASSIFICATI	[ON	
		Reco	very	Moist	ure				an	d Remarks		
·	No.	Туре			N	Depth				<u> </u>		
	9	Jar										•
-			-									
						45 E						
		-										
					-							
			ļ		ļ	<u> </u>						
	10	Tom			No	F	1					
	10	Jar		ע ו	elec	Ē						
						—						
		· · ·				<u> </u>						
						E			•			
									<u> </u>	· · · ·		
		_										
	10	Jar	· ·			F -	Brown :	Fine Sa	nd, Some	Silt		
	<u></u>					E					-	-
				<u> </u>		<u> </u>						
			ļ				1					
						E						
						E ₇₀						
				1	1		1					
	12	Jar		1								
		·:-	· · ·	·.								
			ļ		ļ	75	-			<u> </u>	-	•
						E		-	·	•		
			ļ	ľ		E						
				<u> </u>			-			• .		
		<u>↓</u>				- 80 -	4	•				
	13 -	Jar			L .	E			•	· _	. •	
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)												
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• . RMT, Inc. E-204 (cont'd)

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LOC 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.: 3 of 4

			SAHPLE	·			VISUAL CLASSIFICATION
No	. Type	Recovery	Hoisture	N		Depth	and Remarks
14	Jar			0.2	-		
15	Jar					105	. Rusty Brown at 105'-106'
						110	Brown E C Crewel Core D C C 1
16	Jar			No Detect		115	. Brown F-C Graver, 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		-	. Weathered Bedrock
19	Jar			No Detect		130	. Hard at 124'
					F	•	

F-203 (R2-31)		 .			
		RESTRIAT	LOG OF THE	EST BORD	ING	JOB NO.: 222.04
	PROJ	ECT:	Foley & I	Lardner		BORING NO.: R-1D
	LOCAT	TION:	Wausau WI	I		SURFACE FLEW . 1220.16
	LOGGE	ED BY:	T.E. Fox			
	DATE	:	8/14/86			SHEET NO.: 4 of 4
		SA	MPLF.		V	ISUAL CLASSIFICATION
, 1		Recovery	Moisture			and Remarks
	No. 7	Type	N	Depth		
				<u>-</u> .	. End of Dril	ling at 133'
				E	·····	
				E I		
			<u>├──</u>	135	Notes:	
				EI	HNU = VOC read	ings taken at 4:45 to 5:15 pm-
				E	8/14/86 of ja	rred samples. Upon collecting
ļ				Ę ↓	were jarred w	ith layer of Alum. foil under
				F-	lid. Jars we	re then shook and warmed with
	1			EI	penatrating p	robe thru Alum. foil (ppm.)
				E		
				Eſ	Samples	
				El		
				E	2° Sample"	is sample taken by Lori
			 	튼 ᅴ	Huntoon thru stainless bai	inner tube using a l" ler2/40 mil vials per sample
				EI		
	-			EI	Bag = 10# sam Cyclone separ	ple taken directly from ator - includes fines
				FI		
				E1	Jar = 86z wid taken with st	e mouth (specially cleaned) rainer at Cyclone discharge
					may not inclu	de all fines, as they may
	-			ΕI	have been was	hed thru strainer.
1				는 ᅴ		
	[E		
				F		
. I				Εſ		
				E I		
				E 1		
L T	k			·	••• • •	
	STAR	CENERAL T:	NOTES		WHILE DRILLING	C:
	CONPI	LETE:				
	RIG:	CHIEF	<u> </u>		UPON COMPLETIC TIME AFTER DR	M:
	DRILI	LING HETH	D::		DEPTH OF WATES	R:
					DEPTH OF CAVE	

	RESIDU	LOC JALS MAN	OF TEST BON AGEMENT TECH	JOB NO.: 222.04			
PR	JECT:	Foley &	Lardner	BORING NO.: R-2D			
LO	CATION:	Wausau,	WI				
	GED BY:	Len/Layı	ne Northwest		SURFACE ELEV.: 1207.69		
DA	re:	8/5/86		······································	SHEET NO.: 1 of 4		
		SAMPIF		1			
	Recove	ry Moi	sture	ן 	VISUAL CLASSIFICATION		
No	HNU No Type		HNU	and Remarks			
	+						
	Jar						
¹	Jar		- <u> </u> <u>E</u>	Dark brow	The brown F-C sand,		
			5_		some sill, trace to some gravel		
			- <u>E</u>				
2	Jar		.04				
			<u> </u>	-			
3	Jar						
4	Jar						
1							
	1 +						
			ΙE				
					-		
5	Tar						
<u>-</u> -	Jai		25 -	-			
6	Jar		ΙE				
<u> </u>							
· · ·	+						
7	Tar	·					
			E				
	┥───┤			4			
			I E				
<u> </u>	Jar						
			£40 .	4			
		l_		1			
	GEN	ERAL NO	TES	WATE	R LEVEL OBSERVATIONS		
ST	ART: 8/5	/86 4 H	<u>P.M.</u>	WHILE DRILLIN	G:		
	$\frac{\text{MPLETE: 8}}{100}$	/5/86 6:	30 P.M.	UPON COMPLETT	ON .		
	EW CHIEF	ilen lege	rano rski	TIME AFTER DR	ILLING: thru dual tube Well compl		
DR	ILLING M	ETHOD:DU	al tube	DEPTH OF WATE	R: <u>overnite 23.1 TOC</u>		
	Reverse	Air Rota	ry	DEPTH OF CAVE	-IN: <u>96.7 BGS 27 78 TOC</u>		

F-204 (2011	d.) LOG OF TEST BOR: RESIDUALS MANAGEMENT TECHN PROJECT: Foley & Lardner LOCATION: Wausau, WI DRILLED BY: Len/Layne Northwes LOGGED BY: TEF/SLM DATE: 8/5/86 SAMPLE	ING JOB NO.: 7222.04 NOLOGY, INC. BORING NO.: R-2D St SURFACE ELEV.: 1207.69 SHEET NO.: 2 of 4
_	Recovery Molsture	and Remarks
	9 Jar	
l	50 -	
	<u>10 Jar</u> 5555	. Brown F-M Sand
	60 -	at 56' - 57'
. ···	<u> </u>	
	<u>12 Jar</u> - 75	
)	13 Jar 85	

Inc. -204 (cont'd)

Pg. 3

LOC OF TEST BORING	JOB NO.: 222.04
RESIDUALS HANAGEMENT TECHNOLOGY, INC.	
PROJECT: Foley & Lardner	BORING NO.: R-2D
LOCATION: Wausau, WI	
DRILLED BY: Len/Layne Northwest	SURFACE ELEV.: 1207.69
LOCCED BY: TEF/SLM	
DATE: 8/5/86	SHEET NO.: 3 of 4



F-203 (R2-8	1)				
	RESIDUAL PROJECT: FC LOCATION: NO	LOC OF TEST BOR S MANACEMENT TECH ley & Lardner	INC JOB NO.: 222.04 INOLOCY, INC. BORING NO.: R-2D		
	DRILLED BY: LOCCED BY: TE	Len/Layne Northw F/SLM	WestSURFACE ELEV.: 1207.69		
	DATE: 8/	5/86	SHEET NO.:4 of _4		
	Recovery	AMPLE Moisture	VISUAL CLASSIFICATION		
	No. Type	N Depth	and Remarks		
· ·	18 Jar	0.6	. Gravelly at 132' - 135'		
		140	. Weathered granite bedrock No samples recovered - air pushed cuttings into fractured formation		
			. Hard at 141 to 143		
		145	. End of drilling at 143'		
			. WL measured thru dual pipe (bottom @ - 143') @ 96.7' B.G.S. @ 7:30 A.M.		
		160	* <u>HNU Readings</u>		
		165	= 5.0 Stand By = 0.0 Ambient and background = 0.4-1.2 Reading in empty jar = 1.2		
	CENERAL START: COMPLETE: RIC: CREW CHIEF: DRILLING METHO	D:	WATER LEVEL OBSERVATIONS WHILE DRILLING: UPON COMPLETION: TIME AFTER DRILLING: DEPTH OF WATER: DEPTH OF CAVE-IN:		

- 204 (N2 0.	PROJ LOCA DRII LOGO DATI	RESIDUAL NECT: Fold ATION: Wa LED BY: I SED BY: T C: 8/1	LOG OF TH S MANAGEMEN by & Lardne usau, Wisc en J./ Lay Fox /86	EST BORI NT TECHN r onsin ne North	JOB NC.: 222.04 NOLOGY, INC. BORING NO.: thwest SURFACE ELEV.: SHEET NO.: 1 of		
	No	Recovery	Moisture	Depth	VISUAL CLASSIFICATION and Remarks		
]	Jar	9.5		. Brown Gray	F-M Sand, Some Silt	
	2	Jar	0.5		. Gray Brown M-C Sand an	_{Ci} lt F-C Sand, Trace- Little d Gravel, Trace Silt	
	3	Jar					
	4	Jar	Detect				
	5	Jar	No Detect				
	6	Jar			<u> </u>		
	7	Jar	No Detect		. Brown-Gray	Fine Sand	
	8	Jar					
	STA COM RIG CRE DRI	GENERA RT: 8/11/8 PLETE: 8/1 : IR TM W CHIEF: 1 LLING METI	L NOTES 6 10:45 1/86 11:5 60 en J. IOD: Dual T	5	WATER WHILE DRILLING UPON COMPLETIO TIME AFTER DRI DEPTH OF WATER	LEVEL OBSERVATIONS :	

-F-204 (cont'd.) RESIDUALS MANAGEMENT TECHNOLOGY, IN PROJECT: Foley & Lardner LOCATION: DBILLED PY: Long L (Longo Northwest)								JOB NO.: 222.04 BORING NO.: R-3D		
	DRI LOG DAT	LLED B GED BY E: 8/1	Y: <u>Le</u> : <u>T.</u> /86	n J./ Fox	Lay	ne Nort	hwest	SURFACE ELFV.: 1213.09 SHEET NO.: 2 of 4		
			SA	SIPICE	_					
		Reco	very	Moisture				VISUAL CLASSIFICATION		
	No.	No. Type			N	Depth		and Remarks		
	9	Bag					Grayish-Brown	Fine Sand		
		• ·					-			
	10	Jar -			-					
						- 50 -	Trace Fine Gr	avel at 50'-55'		
ι,			·	Dete	No	55 -				
		Jar		Dece	сь 					
								· ·		
								- -		
	12	Jar								
						<u>–</u> 70 –				
:						<u> </u>				
••	13	Jar								
						- 80 -	 -	· .		
	-									
						85		. ·		

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RMT, Inc. F-204 (cont'd)

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LOC OF TEST BORING Pg. 3 RESIDUALS HANAGEMENT TECHNOLOGY, INC. PROJECT: Foley & Lardner LOCATION: DRILLED BY: Len I /Layne Northwest LOGGED BY: T. Fox DATE: 8/11/86

JOB NO .: 222.04 BORING NO.: R-3D SHEET NO.: <u>3of 4</u>

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	- <u>1</u>	· · · · · · · · · · · · · · · · · · ·	VISUAL CLASSIFICATION				
No	. Type	Recovery	Hoisture	N	Depth	and Remarks	
14	Jar			No Detect	90	Brown-Gray Fine Sand	
15.	Jar						
					105		
16	Jar			No Detect			
17	Jar						
18 19	Jar Bag			No Detect		Yellowish Brown F-C Sand, Little to Some Silt, Little to Some Gravel	

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- F-203 (R2-8	13							
1 205 (12 5	, <u> </u>			LOC O	F TEST BOP	RINC JOB NO.: 222.04		04
-	PRO	JECT:	Foley	<u>Anaci</u>	IMENT TECH	INOLOGY, INC.	BORING NO .: R-	3D
	LOC	ATION:	Waus Y · Le	sau, WI	auno Nor	SURFACE FLEV 1213 09		
	LOC	GED BY	<u> </u>	Fox	ayne Nor			1213.09
	DAT	E:	8/	11/86			SHEET NO.:	<u>4 of 4</u>
-		Reco	SA very	MPLF. Moisti	ITe	VISUAL CLASSIFICATION		
	No.	No. Type			N Depth	4	and Remarks	
-	. 19	Jar			 E_`			
		Bāg			135			
	·					Driller indica	tes fractured bed	rock at
-					E	<u>135' to 137' -</u>	No Sample Returne	ed
1						Fud of Drillin	a at 1371	
							6 at 197	
					F			
-								·.
					<u> </u>			
•								
					E.			
					E			
8								
					155			
					E			
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					16Q_			
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					E			
					<u> </u>			[
-			1	<u>}_</u>				
	6717	T. CEI	NERAL	NOTES		WATER	LEVEL OBSERVATION	<u>s</u>
	COND	LETE:				WRILE DELLING	•	
	RIG:	CHIE	F :			UPON COMPLETIO	N:	
-	DRIL	LING H	KETHOD):		DEPTH OF WATER DEPTH OF CAVE-	: IN:	

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RMT, inc. F_{204} ($P_{2}-81$)	١					•						
r . :04				LOG OF	TE	ST BOR	JOB NO.: 222.04					
	PRO.	JECT:	DUALS Fol	MANAGE ey & La	MEN ardr	T TECH	BORING NO.: R-4D					
	LOCA	ATION:	<u>8'</u>	South c	of (2-25						
	LOG	GED BY	<u> </u>	<u>n J. /</u> E. Fox	r K	ne Nor	Invest bokrace Enver					
	DAT	E:	8/	12/86			SHEET NO.: 1 of 4					
		Reco	SA	MPLE	Te		VISUAL CLASSIFICATION					
	2)40m		O samples				and Remarks					
-		1900	thru			Deptn						
			Dual . Tube									
			1000									
	1	Jar										
				ļļ.			Brown F-M Sand, Little F-M Gravel,					
	 2	Inr					Trace-Little Silt					
•		Jai				-10 -						
		L				-						
	3	Jar				<u> </u>						
						<u> </u>						
	4	Jar					Brown F-C Gravel, Some Sand with Cobbles					
						20	· · ·					
-	- .	Jar			E	Very Dense Fine Sand, Some Silt						
				25	· · · · · · · · · · · · · · · · · · ·							
							Brown F-M Sand, Trace Silt,					
						<u> </u>	Trace Fine Gravel					
	6	Jar				E_{30}						
						F						
	7	Jar				Ē						
		001	<u>_</u>			 35						
			^H 2 ^O			E	Mostly Fine Sand at 35-40'					
			Sampl	e								
	8	Bag				<u> </u>						
l r						· ·						
	STA	$\operatorname{RT}: \frac{G}{G}$	$\frac{ENERAL}{8/12/2}$	86			WATER LEVEL OBSERVATIONS WHILE DRILLING: 31.25 with bit at 36'					
	COM	PLETE	: 9/13	/86		·····						
	RIG CRE	: 1R W CHI	<u>ТН 60</u> ЕГ: т	en I/Io	hr		UPON COMPLETION: TIME AFTER DRILLING:					
	DRI	LLING	METHO	Di: Dual	Tu	be						
Į	Rever	<u>cse Ai</u>	r Rot	ory			DEPIN OF CAVE-IN:					
	Intro	oduced	^{1 н} 2 ⁰	at 17'	to							

RESIDNALS MARAGEMENT TÉCHNOLOCY, INC. PROJECT: Elarine: DATE: SAMPLE DATE: SAMPLE DATE: SAMPLE VISUAL CLASSIFICATION ALT: SAMPLE VISUAL CLASSIFICATION ALT: SAMPLE VISUAL CLASSIFICATION and Remarks SAMPLE VISUAL CLASSIFICATION ALT: SAMPLE VISUAL CLASSIFICATION and Remarks No. Type N Depth Brown F-M Sand, Trace Silt 10 Jar 10 Jar 12 Jar	F-204_(cont	d.)	LO	G OF TEST B	ORING JOB NO.: 222.04					
Indication: 81 Source a Latinet. Supervision of C-25 DRILED N': Len J. / Lavne Northwest SURFACE ELFV.: DATE: 8/12/86 No. Type N Depth Recovery Molture SHET NO.: 2 of 4 SAMPLE VISUAL CLASSIFICATION and Remarks Brown F-M Sand, Trace Silt 9 Jar		RES PRO IFCT	SIDUALS MAI	NAGEMENT TE	CHNOLOGY, INC. BORING NO.: R-4D					
DRILLED BY: Len J. / Layne Northwest SURFACE ELFV.: 1216.05 LOCCED BY: $E. FOX SHET NO.: 2 of 4 SAMPLE VISUAL CLASSIFICATION and Remarks No. Type N Pepth and Remarks 9 Jar $	L	LOCATION	N: <u>8' Sout</u>	h of C-25						
NORL: 1.1.1.10X SHEFT NO.: 2 of 4 SAMPLE VISUAL CLASSIFICATION and Remarks No. Type N Depth 9 Jar 9 Jar 45 10 Jar 50 11 Jar 45 12 Jar 65 13 Jar 14 Jar 15 Jar 16 Jar 16 SHET NO.: 2 of 4 SHET NO.: 2 of 4 SHET NO.: 2 of 4		DRILLED	BY: Len J	. / Layne N	orthwest SURFACE ELEV.: 1216.05					
SAMPLE VISUAL CLASSIFICATION and Remarks No. Type N Depth and Remarks 9 Jar		DATE:	<u> </u>	86	SHEET NO.: 2 of 4					
Recovery Moisture and Remarks No. Type N Pepth and Remarks 9 Jar - - 9 Jar - - 10 Jar - - 11 Jar - - 12 Jar - - 13 Jar - - 14 Jar - - 15 Jar - - H20 - - - - - - - - 13 Jar - - - - - - - - - - - - -	I		SAMPL	5	VISUAL CLASSIFICATION					
No. Type N Nepth 9 Jar	ſ	Red	covery Mo	isture	and Remarks					
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	ł	No. Typ	e	N Dep						
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	1									
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					Brown F-M Sand, Trace Silt					
Brown F-C Sand, Trace Silt 10 Jar50 11 Jar55 H_20		9 Jar			·-					
Brown F-C Sand, Trace Silt 10 Jar50 11 Jar55 H_20 60 12 Jar66 13 Jar65 14 Jar75 15 Jar75 H_20										
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	-		•	E	Brown F-C Sand, Trace Silt Trace F Gravel					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				ΞĒ.						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	•			50						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	· · ·									
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	· .									
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		II Jar		55						
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			H ₂ O							
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			Sample							
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	2	12 Jar)					
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	•									
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					Brown F-M Sand, Trace Silt					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		13 Jar								
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$										
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	•									
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-	14 Jar								
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$										
$ \frac{15 \text{Jar}}{\text{H}_2^0} = \frac{16 \text{Jar}}{\text{Sample}} $	l									
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$										
$\frac{H_2O}{Sample}$: •	<u>15 Jar</u>		7	5 -					
<u>Sample</u> <u>16 Jar</u> <u>80 –</u>			но							
<u>16 Jar 80 –</u>	•-		2 Sample							
		16 Jar								
	-									
		-		E						
17 Tar	.	17 12-								
	r				5-					
	I .									

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•• : MT, Inc.

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F-204 (cont'd) LOC OF TEST BORING RESIDUALS HANAGEMENT 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

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	-1	1	SAHPLE	- <u></u>		+	VISUAL CLASSIFICATION					
No	. Type	Recovery	Hoisture	<u>N</u>		Depth	and Remarks					
18	Jar						Brown F-M Sand					
19	Jar		•		-							
20 [°]	Bag	H ₂ O Sample	· ·									
							Brown Fine Sand, Some Silt with Few Thin Layers of Fine to Medium Sand					
21	Tom											
21	Jar			·		=105	·.					
		r										
22	Jar											
						120						
23	Jar					125						
						-1,30						

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RMT, INC. F-203 (R2-8	1)				
	RESI	LOC OF TEST DUALS MANAGEMENT T	BORING JOB NO.: 222.04		
	LOCATION: DRILLED BY	Foley & Lard 8' South of 4: Len J. / Lav	C-25 Northwest SURFACE ELEV.: 1216.05		
	LOCCED BY: DATE:	T. E. Fox 8/12/86	SHEET NO.: 4 of 4		
		SAMPLE	VISUAL CLASSIFICATION		
	No. Type	N De	and Remarks		
	24 Bag		35		
	25 Jar	Sample	F-C Gravel; Some F-C Sand		
			Return H ₂ O turned brown at 138'		
ч.	26		Brown F-C Sand, Some Gravel,Trace of Some Silt		
			Possible Rock at 144.5' Hard Drilling at 144.5 to 147.5'		
			No Recovery at 144.5 to 156		
			Probable Fine Sand at 147.5 to 156 (came up drill tools)		
			End of Drilling at 156'		
			(no more drill rod left)		
	·····				
			д		
	START:	FRAL NOTES	WATER LEVEL OBSERVATIONS WHILE DRILLING:		
	COMPLETE: RIC: CREW CHIEF DRILLING M	: F.THOD :	UPON COMPLETION: TIME AFTER DRILLING: DEPTH OF WATER: DEPTH OF CAVE-IN:		
1					

#6 CITY WELLS, WAUSAU, WIS. BR 1871 800. 24, T. 29 H., R. 7 E. Near intersection of Crocker and Burak Sts. Layne-Marthwest Co., Contractors, 1951

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i, 1	10.]	L Elevation	a 12	18.25	Samples examined by T. T. Thwaites, Nos.	153758-1	53796
	ł	<u> </u>	5	u o. o.	Gravel, sandy, brown-gray		54" hole
		20-35	15	••••••	Scale, Coarse to Bouria, Drown-Bray to Bray		36" pipe cemented
			10	• • • • • •	Graver, Inte, samy		29.5 water
L I		35-50	15		Sand, medium to very coarse, gray		7 24" pipe
▋▎┸▏		50-55	5		No sample		
7 7		55 65	10	• • • • • •	Sand, medium to very coarse, gray		1. Screen
		65-85	20		Sand, medium to coarse, gray	0 0 0 0	48" grave
	100	85-100	15		Sand, medium to fine, gray	e et po u	le peck
•		· · · · · · · · · · · · ·	I	······	······································	<u>ن</u> ن	10.51

Jerry Donohus Engineering Co., Engineers

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

Ne. 2 900 ft. east of No. 1 Elevetion 1222

)	0-5 5-10 10-15 15-20 20-35	5 5 5 5 15	· · · · · · · · · · · · · · · · · · ·	Gravel, fine, sandy, light brown Sand, medium to very coarse, light brown mgy Gravel, fine, sandy, gray Sand, medium to very coarse, gray Gravel, fine to medium, sandy, gray	54 hole 36 pipe cemented
E I I	.	35-50	15		Sand, medium to very coarse, gray	24" pipe
T		50-85	35		Sand, medium to coarse, light gray	50 61 50 50 50 50 50 50 50 50 50 50 50 50 50
	100	85–10 0	15		Sand, medium to fine, light gram	00" pack

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

	<u></u>	·····	Wausau Test Well No. 9, Wausau, Wisconsin	RECEIVED
į	•	-	Miller Well & Pump Co., Driller - December, 1962 Sample Nos. 236210-236226 - Examined by M. E. Ostrom	NOV 1 5 1963
T.S.F.) / 1	0-5	5 Snd, bn, M, Srnd, Psrtg, C&VCsnd, gvl, St, fn s	nd SANITARY
-		5-10	5 Snd, bn, M, Srnd, Psrtg, C&VCsnd, st, fn snd	NGINEERIN'
		10-15	5 State Stat	
		10-20	5 980 Selfer avi mor brawh for Sang Parto VCAC M for s	nd I
			5 With Strick St	nd
D R I		30-45 45-50	15 Gvl. mot bn&wh. fn. Sang. VC. C. Mand. fn and. 5 Snd. 1t bn. M. Sang. Partg. Vst. fn and. Cand	rd_frags
P		50-55	15 [South Start She It bn M. Sang, Party C&fn and st	
T		55-60 60-70 70-75 75-80	5 States Snd, lt bn, M, Sang, Partg, VC&C, &tn and st States Snd, lt bn, M, Srnd, Fartg, C&fn and, at States Snd, lt bn, M, Srnd, Partg, gvl, C&fn and, at States Snd, lt bn, M, Srnd, Partg, gvl, C&fn and at States Snd, lt bn, M, Srnd, Fartg, VC, C&fn and at	
		8 0-90	10 Snd, 1t bn, M, Srnd, Gsrtg, C&fn snd, st	I GH Hole
		90-105	15 Snd, bn, M, Srnd, Førtg, C&fn snd, st	
	110	<u>90-105</u> 105-110	15 Snd, bn, M, Srnd, Førtg, C&fn snd, st 5 Snd, bn, fn, Sang, Førtg, SI, P, Mønd, mch st, g	vl 115

Formations: Drift

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1. Cou	nty_Aa	rathon				Town Village City]Wausau]Check one	and give bame	# 9
2. Loci	ation	Pearso	n & Eug	<u>bee</u>					
) .		N	ame of stre	et and num	iber of premia	e or Bection, 7	lown and Range number	•	• •
3. Owr	ner 🖪 or	Agent []	City of	Mausau	. partnership (
4. Mai	Addres	3			Complete ad	dress required			
5 Fro	m well to	nearest	: Buildin	· · · · · · · · · · · · · · · · · · ·	ft:sewer	ft: dr	ainft: septic	tankft	•
0. 110						·····			,
dry	well or f	ilter bed	f	t; abando	oned well	ft			
6. Wel	l is inten	ded to s	upply w	ater for:					
7. DR	ILLHOL	E:				10. FOI	RMATIONS:		
Dia. (in.)	From (IL)	To (IL)	Dia_ (in.)	From (ft.)	To (IL)		Kind	Fmm (iL)	То ([L)
48#	0	100				Sand	& Gravel	0	hO
						Sand	·),0	100
					ID BING -	Range	from Med. to F	ine	
8. CA	SING AI		er pipj				-++-1.0		
30m (IN.)	Steel	3/84 27		<u> </u>	58	- su	anacres.	coz.	
	C47	1 m-1			60				·
204	Steel	2. uar		0	00				
20"	Stainl	ess Sta	eel Scr	een 60	100				
.9. GR	OUT:								
)	Ki	sdb		From (fL)	To ([L)		<u> </u>		
Ceme	nt Slur	ry		θ	56				
Clay	Seal			56	58	Constru	ction of the well wa	as completed o	n:
11. 1	ÍISCELL	ANEOU	JS DATA	A:			January 22		19_63
Yield to	est:		Hrs. at		GPM.	The we	ll is terminated	24	inch
D 43				.	£1.	abov	e, below 📋 the peri	manent ground	surfac
Debty 1	rom sur	ace to v	valer-iev	ы. 1.		Was the	e well disinfected u	pon completion	1?
Water-	ievel whe	n pump	ز ing:	4	ft.		v	x NA	
Water	sample w	as sent i	to the st	ate labor	atory at:				· · · · ·
					10	Was the	e well sealed water	tight upon cor	npletior
	City	(on		- 18		Y	88 No	X
	<u> </u>	71	11 .			., 7			
Signatu	ire 72	<u>Illa</u>	Will	+Yu	ng Ce	là	x 155-Wa	usau, l	0.
-	R	egistered	Well Dri	ll er Ple	esse do not w	rite in space h	Complete Ma elow	il Address	
				-			10 ml 10 ml	10 m] 10 m]	10 u
Rec'd				No					
Ans'd						Gas-24 1	hT8		
Interne	i, tation					48 1	hr s.	,	
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/							117M		
						B. Coli			

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	CH2M				آ	ROJECT NUMBER		BORING NUMBE	R				
					·	L 20303. AO		15		SHEET / OF 2			
							SOIL	BORING	LO	G			
		Naus	hu. L	andfi									
	EVATION				·····	DRILLING CONTRACTOR	Twin	Cities Testi	na	· · · · · · · · · · · · · · · · · · ·			
DF	RILLING M	ETHOD A	ND EQU	IPMENT	Hollow ster	m. augers/CME-45							
- w.	ATER LEVE	EL AND D	ATE 22	2,5'	11/11/85	START 0900 11/11	LOGGER Johnson / MCCee						
		L	SAMPLE		STANDARD	SOIL DESC	RIPTION		COMMENTS				
ELEVATION	DEPTH Below Surface	INTERVAL FYPE AND NUMBER RECOVERY		TEST RESULTS 6"-6"-6" (N)	NAME. GRADATION PARTICLE SIZE DISTR MOISTURE CONTENT, I OR CONSISTENCY, S MINERALOGY, USCS (OR PLAS IBUTION. RELATIVE OIL STRL BROUP SYI	TICITY. COLOR. DENSITY JCTURE. MBOL	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION				
		0.0	5-1	18"	4-6-10 (16)					Background OVA reacting (.2 ppm)			
I		2.0 3.5	5-Z	1571	11-16-17 (33)	Sand, fine to med. gro dense	ined, bri	own, moist, 					
	5 -				-								
	-									-			
	- 01	9.5 11.0	5-3	10''	7-10-10 (20)	Sand, med. to coarse g moist, medium de	rained, l nsity Gf	- رمان 2)		. 2 OUA (background) _			
	-							-		· -			
	15 -	14,5 16,0	5-4	10"	8-13-16 (29)	As above with the c	e grave	 	i	,20VA (background) _			
	-							L L L		-			
	20 -	21.0	5 <i>-5</i>	17"	7-11-15 (26)	Sand, med. to cours medium (SP)	e, brow	n, moist		background OUA _			
	- - 25 -	23.5	5-6	<u>، بر</u>	25/1"	<u>Silty sand</u> , fine, gra (sm)	xy,tr.gr	evel, wet		Rough drilling at ≈235' Poos: bly coarse grovel			
								-		Water at 27.4' 10:00 After driving 5-7 water level at 20.5 bt 10:45			
	- 30	29,5 31.0	5-7	111	50/2"	Scenert page				-			

C	H2M HILL				[L 20303.AO	BORING NUME	ER	SHEET 2 OF 2				
						Ş	SOIL BORIN	g lo	G				
ELE			ND FOLL	andfi	Hallow 24	DRILLING CONTRACTOR IW'N CHes Teching							
WA	TER LEVE				<u></u>	START1\/11/8	<u> </u>	11/85	LOGGER Johnson				
			SAMPLE		STANDARD PENETRATION	SOIL DESCRI	IPTION		COMMENTS				
ELEVATION	DEPTH BELOW SURFACE	INTERVAL	TYPE AND NUMBER	RECOVERY	RESULTS 6"-6"-6" (N)	NAME. GRADATION C PARTICLE SIZE DISTRI MOISTURE CONTENT RI OR CONSISTENCY, SC MINERALOGY, USCS GR	DR PLASTICITY BUTION COLOR ELATIVE DENSITY DIL STRUCTURE ROUP SYMBOL	SYMBOLIC LOG	DEPTH OF CASING. DRILLING RATE. DRILLING FLUID LOSS. TESTS AND INSTRUMENTATION				
	-	29.5	5-7	1''	50/2"	Silty sand, brown-gr	ay, some gravel						
	-	31.0]					
	-							_					
	4					2 the of here	34'	4	Auger refusal				
	35 -					Dottom of Doring		4					
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	H2M					L20303.AD	BORING NUMBE	. R						
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PA	OJECT _	. In	SAU	LF -	- Luis C	DIJR LOCATION								
EL	EVATION				CHE H	DRILLING CONTRACTOR	100 144 T	<u>, 11 a.</u>	VEDIC SEADLE					
	ATER I EVI	ETHOD A	ND EQL	лрмент 7,7	11/11/85	START 15:00 - 11/11/9	<u>-10.</u> 111/85	Toporo I.H. Tolescow						
			SAMPLE		STANDARD	SOIL DESCRIPTIO	ON		COMMENTS					
, z					RESULTS	NAME. GRADATION OR F	PLASTICITY.	υ	DEPTH OF CASING.					
ELEVATIO	DEPTH BELOW SURFACE	INTERVA	TYPE ANI NUMBER	RECOVEF	6"-6"-6" (N)	PARTICLE SIZE DISTRIBUT MOISTURE CONTENT, RELAT OR CONSISTENCY, SOIL S MINERALOGY, USCS GROU	ION, COLOR. TIVEDENSITY STRUCTURE. P SYMBOL	LOG	DRILLING RATE. DRILLING FLUID LOSS. TESTS AND INSTRUMENTATION					
		<u>- 1.5</u> 5-1 /0"		2-2-3	FILL, SAND, DK. ENOUN,	- C. Or Graves		OVA BACKGEOUND						
				- (3)	M			~3.5pm						
]	-					
ļ		4.0		ļ		- SAND IT REGIMAL E.	WE MOIST -							
	5.	65	5-2	12"	(4-7-0)	150	··		OVA REPOINT BACKGESUND					
		100					-		_					
1		ļ.							_					
		4					-		_					
I		7.0				SAND LT. BROWN M	ED. TO LSE, _		DYA REHOING SHIKEROUND					
	10-	10.5	5-3	8	4-8-11	HOUT (CD)	_							
	ļ [′] .	ļ				- pioisi, (21-)	-							
		4					_		-					
1							_							
	-	14.0				- SAND LT. ECOLUM MED.	TO LSE,	4	CVA READING BACKGE					
	15-	155	5-4	4"	(4-8-13)	MOIST, ~20% F.G.	HAVEL (SP) _							
	-						_		_					
	-						_		_					
•	-						· -		-					
	-	17.0			7 7 10	SAND AT BOAUL MED -								
	20-	7.2 5	5-5	7"	(1-9-10)	MOIST (2)			CVA READING BACKGECOND					
	-						-	:	_					
	-	•					-		-					
	-						-		-					
	-	24.0				CHUD IT. BROWL FINE TO	MED MOIST -		OVA READING RALLES					
	25-	25.5	5-6	7"	1-7-9	<u><u>Sino</u>, cirilou k, i i i</u>	-		CACE FOIND					
	-			·		+	-							
	-						L.							
	-						_		OVA READING STERSTANDIG					
	-					+-	-		LATER AT 27.8 at 15:52					
	30 -	२ ल	5-7	6"	2-1-4				WATER AT 27.1 at 16:00					

C	H2M HILL			·	ſ	ROJECT NUMBER BORING NUM	BER S	SHEET 2 OF 2
						SOIL BORIN	G LO	G
R	OJECT _	JAU	SALL	2F -	UNR	LOCATION	· · · · · · ·	
ELI	EVATION			<u> </u>		DRILLING CONTRACTOR TWIN CIT	YTE	STING
DR	ILLING ME		ND EQU	IPMENT		START CINICI		TH TOHION
					STANDARD			
z					PENETRATION TEST	NAME GRADATION OR PLASTICITY	 	DEPTH OF CASING
ELEVATIO	DEPTH Below Surface	NTERVA	IYPE ANI	RECOVER	6"-6"-6" (N)	PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLI	DRILLING RATE. DRILLING FLUID LOSS. TESTS AND INSTRUMENTATION
-	30				-			
	-						-	
5	-						-	-
	-	34.0		_		CUD IS BRIL FINE WIT (D)	-	-
	- 	25 5	5-8	10"	3-4-6	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	-	CVA REFUNCT
	35 -	2.7		10	(/0)			
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	-	39.0						
	40 -	425		0				NO RELOVERY
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li	H2M					PROJECT NUMBER	BORING NUMB	R	
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2	RUJECT					LO			
		N			244400	DRILLING CONTRACTOR	I'm Att, The	times,	
		METHOD	AND E	QUIPMEN		Tollow Sem, auders	2112-25	ر. 	
vv					1112703	START 14130 - 1112 F	INISH 1600	1/12/8	LOGGER _ T. 4 . Jol
_			SAMP	LE	PENETRATIO	N SOIL DESCRIPTION			COMMENTS
- Nor	ш Ц	F I	CZ G	RY	RESULTS	NAME. GRADATION OR PL	ASTICITY.		DEPTH OF CASING
N.	PTH WO	ERV	ABF MBF		6"-6"-6"	MOISTURE CONTENT, RELATIV	N. COLOR. EDENSITY	100	DRILLING RATE.
ELE	DEI	IN I	TYP	REC		OR CONSISTENCY, SOIL STR MINERALOGY, USCS GROUP S		YME 0G	TESTS AND
_	0	0.0			1 3-3-4			<u> </u>	
		- 1.5	5.1	15	(7)'	TILL, SLACK, SAND	, GRAVEL, -		OVA NOT WORKING
						- SILT, SOME CINCERS	, MONT		PROPERLY - EATERS
		-					-		2000 -
							-		-
	-	7-45				FILL MATIER PR	-		-
	3	-1	Co	c''	14-14-16	, There , BROWN	CRAY UM		
		- 5.2	<u>P</u> -	0	(30)	SAND, SOME CONVERS	۲ ک		
		-					~7']	i	-
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		125				SAND IT PROVIDE NOTE			
	10 -	-{	C-3	10"	15-13-22				
		11.0			(40)	~ 10% F. Cravel Mo	(Sr)		· -
							4		Fourier DEligit
]					F		
		1					4		Salle LY COMPSE
	•	11.5							GRAVEL OR COBRIES
	15-	4	Cill		5-8-10	CI. BEDUN, FINE,	10121		• 1
	-	1.2	/ ^د ر	14		(SP)	-		· · · · -
			•				4	·	
	-	1.							
	-					•	-		
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	20-	19.5	. <	- "	20-22/	SAND, LT. BROWN, MED.	TO CIE,		GATIVEL LOCCED IN -
		210	د-ر	5	<i>70⁻²⁰/.</i> 2	MOIST TO WET (SP)	-		BOTTOM OF THE
	-	-21.0					+		SPLIT STOSK .
	-						· -		
	· -								1
	_						1		-
	-	2115				CAND LT. BROWN, FINE TO	MED,		-
	25	21 .	5-6	15	4-2-6	in , , , , , , , , , , , , , , , , , , ,	· 4		
	+	19.0		12	('')	MOISI, (21)			
	4				•				· 1
1	_						1		+
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.	, 1·	29.5			4-7-8	STAL, LT. R. COMP. F. U.S.		-	WATER MY INST BUT I
L	<u> </u>	21.0	5-7	8	(15)	WET.SP	_		47 15:46 has

	H2M					PROJECT NUMBER L20303 . AO	BORING NUMB	ER S	SHEET 2 OF 2			
Ŀ]	· . ·				SO	L BORING	GLO	G			
	OJECT	Nom	riv L	F-	WIR DNI	۹						
EL	EVATION				211 7	DRILLING CONTRACTOR TWIN CITY						
	ILLING M		ND EQU	JIPMENT	<u></u>	5. (72, 5.0.) HSA'S, 31	-, 					
			SAMPLE		STANDARD		FINISH					
NO	щ	1	9	RY	TEST	NAME. GRADATION OR PL	ASTICITY,	 U				
ELEVAT	DEPTH BELOW SURFAC	INTERV	TYPE AN NUMBEF	RECOVE	6"-6"-6" (N)	PARTICLE SIZE DISTRIBUTIC MOISTURE CONTENT, RELATI OR CONSISTENCY, SOIL ST MINERALOGY, USCS GROUP	DN. COLOR. VEDENSITY IRUCTURE, SYMBOL	LOG SYMBOLI	DRILLING RATE. DRILLING FLUID LOSS. TESTS AND INSTRUMENTATION			
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	-	345		÷		SAND LT. BEDUIL FIN	IE, 12 ET	4				
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	CH2M		-			PROJECT NUMBER	BORING NUMBE	R	SHEET 2 OF 2			
۱ ۲						SOI	L BORING	LO	G			
	ROJECT	Nom	en L	F -	WIL DN	R						
E	LEVATION					DBILLING CONTRACTOR TWIN CITY						
, c			AND EQU	JIPMEN	T_ 2,1/2] .	0.172" 0.0.1 HSA'S. CM	IF LIS RIG	,				
v	VATER LEV	EL AND C				START FINISH			LOGGER T. LI. Juminent			
			SAMPLE	E	STANDARD PENETRATIO	SOIL DESCRIPTION	l <u> </u>		COMMENTS			
EL EVATION	DEPTH DEPTH BELOW SURFACE	INTERVAL	TYPE AND NUMBER	весочени	TEST RESULTS 6"-6"-6" (N)	NAME, GRADATION OR PL/ PARTICLE SIZE DISTRIBUTION MOISTURE CONTENT, RELATIV OR CONSISTENCY, SOIL STI MINERALOGY, USCS GROUP S	ASTICITY, N. COLOR, E DENSITY RUCTURE, SYMBOL	LOG SYMBOLIC	DEPTH OF CASING. DRILLING RATE. DRILLING FLUID LOSS. TESTS AND INSTRUMENTATION			
_	30.											
	35 -	34.5	3-3			<u>Ernu</u> , IT. HERMIN, FINA	= = =, ::-,=7 = = =		-			
	40 <u>-</u>					BOTTOM OF BORE-OLE	F 40'		SWARETE DRILLING AT 1600-25			
				•			- - - -					
			:									

					PI	ROJECT NUMBER	BORING NUMBER	1			
	HILL			•		120303.AD	1. B-45		SHEET / OF		
]					SOIL	BORING	LOC	à l		
		1.200	with 1	F -	WONR				· · ·		
ELE		- 7000.				DRILLING CONTRACTOR TUNIN GTY					
	ILLING ME	THOD AI		PMENT	Oper US	KIG- 340 I.D. 1-4		·- ··			
WA			ATE 25	• n/i	3/85	START 0950-11:13 F		11/13	// [_ر , - ـ ر , - ـ _ , / ـ _ ,] LOGGER		
1 1	_	:	SAMPLE	· · ·	STANDARD	SOIL DESCRIPTION			COMMENTS		
ELEVATION	DEPTH BELOW SURFACE	INTERVAL	TYPE AND NUMBER	РЕСОVЕРУ	TEST RESULTS 6"-6"-6" (N)	NAME, GRADATION OR PLA PARTICLE SIZE DISTRIBUTION MOISTURE CONTENT, RELATIV OR CONSISTENCY, SOIL STR MINERALOGY, USCS GROUP S	ASTICITY. N. COLOR. EDENSITY RUCTURE. SYMBOL	SYMBOLIC LOG	DEPTH OF CASING. DRILLING RATE. DRILLING FLUID LOSS. TESTS AND INSTRUMENTATION		
	<u>ن</u>	ن. ت	1	01	3-4-5	FILL SILTY STUD, GRI	AY, JONE		OVA BACKGROUND		
	-	1.5	5-1	ð	(9)	CLAN MOIST	′ –		~ 3ppm		
		4.5 6.0 7.5 11.0	5-3	5" 2"	3-5-9 (14) 1-2-3 (5)	FILL, SAND, LISTO MOIST FILL, SAND, TX. JAKAY, SILT, LLAY, MOIST 7	CHIPS, 		Marcs of March + Rimetic IN MUSER CUTTINGS -		
	- - - -	11.5	5-4	10"	10-10-11 (21)	SAND, FINE, LT. BROWN (SP)	1, MOIST -		OFF PUBER CATING: Oppm ON BACKFLUSH POSSIBLY METHANE		
	20-	19.5	5-5	12"	(36)	SAND, FINE TO MED., LT. ~15 % FINE GRAVEL, N	: BROWN, MOIST, (SP) -		OVA READING ~4 to 5 ppm (~1 to 2 ABOVE BACKEGROUNO) - IN HSA & FROM SPLIT SPOON SAMPLE		
	25-	24.5 26.0	5-6	15"	8-8-13 (21)	SAND, FINE	- - - -		WATER LEVEL AT 25' B.G.S. @ 10:50 HRS		
	20-	24.5	5-7	19"	13-19-21	SAND, FILE, LT. BROWN (SP)	U, WET		REV 11/82 FORM D1586		

ELE DRI		INA	nsan	LF	- WE	DNR LOC			·····
UHI					······································	DRILLING CONTRACTOR	UN CITY		
WA'				IPMENT	· · · · · · · · · · · · · · · · · · ·	START			T- 4 71 10
٢		SAMPLE		STANDARD	SOIL DESCRIPTION				
ELEVATION	DEPTH Below Surface	INTERVAL	TYPE AND NUMBER	RECOVERY	TEST RESULTS 6"-6"-6" (N)	NAME. GRADATION OR PLA PARTICLE SIZE DISTRIBUTION MOISTURE CONTENT. RELATIVE OR CONSISTENCY. SOIL STF MINERALOGY. USCS GROUP S	ASTICITY. N. COLOR. EDENSITY RUCTURE. YMBOL	SYMBOLIC LOG	DEPTH OF CASING. DRILLING RATE. DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	30					STAND FINE, LT. BROWN,	2007,312		
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	J					SOIL BORIN	GLO	G
	OJECT		of 1	<u>שמור לי</u> עראיי איי	Bermri	DRILLING CONTRACTOR LOCATION DRILLING CONTRACTOR	L'ra	
WA						START FINISH	11/14 74	LOGGER SAL MERSO
N			SAMPLE		PENETRATION		-	COMMENTS
ELEVATIC	DEPTH BELOW SURFACE	INTERVAL	TYPE AND NUMBER	RECOVER	6"-6"-6" (N)	PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	LOG SYMBOLIC	DEPTH OF CASING. DRILLING RATE. DRILLING FLUID LOSS. TESTS AND INSTRUMENTATION
	-					Seelog of 4s for 0-35'	_	
	-						-	
	-	İ				· ·	4	
	35-	34	<u> </u>	71	3-4-6	Sand, flom, moist, brown		
	_	36.5	5-1		(10)	tr gravel	4	
	-					• •	-	
		305]	
	40 -	<u>ы</u>	5-2	qu	6-7-12	Sand, fine to coarse, tr.gr,]	
	; - 4	-11 				pround j prown	4	
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	-	44.5				· · · · · · · · · · · · · · · · · · ·		
	45-	NIC	5-3	<u>م</u> "	6-9-12-4	25 above		والمناجرين المعاجرونة
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	4					-		
	55	54.5			<u> - 9,0,20</u>	Sand fine to a all 1		
		56	5-4	10''	5 - 1-9:40	moist, brown		-
	-					-		
	+							
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	H2M HILL				F	ROJECT NUMBER L20303, AO	BORING NUMBER	8	SHEET 3 OF 3		
]					SO	IL BORING	LOC	3		
Part of the second s	OJECT	CIKI	المجر ال	ببەلد	5112 hi	<u></u>					
EL	EVATION	, 		<u>.</u> .		DRILLING CONTRACTOR Cities Testing					
DR	ILLING ME	THOD A	ND EQU	IPMENT	Nind rot	1:11 CME-55					
WA	TER LEVE	L AND D	ATE		CTANDARD.	START	FINISH		LOGGER SM M Bee		
			SAMPLE	: 1 -	PENETRATION	SOIL DESCRIPTIO)N	ļ	COMMENTS		
ELEVATION	DEPTH BELOW SURFACE	INTERVAL	TYPE AND NUMBER	RECOVERY	RESULTS 6"-6"-6" (N)	NAME, GRADATION OR P PARTICLE SIZE DISTRIBUTIO MOISTURE CONTENT, RELATI OR CONSISTENCY, SOIL S MINERALOGY, USCS GROUP	LASTICITY. ON. COLOR. IVEDENSITY TRUCTURE. ? SYMBOL	SYMBOLIC LOG	DEPTH OF CASING. DRILLING RATE. DRILLING FLUID LOSS. TESTS AND INSTRUMENTATION		
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	95-	1 11 2	- 11	יי א	10-13-16-23	Sond, fine, moist, brow	un			_	
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-	-					•	_]	
	105-	104.5			14-34-52-59.4	Hs above					
-	-	usz A	5-9	10″							
	_					Bottom of boring	106.4']	
∎ '											
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ः) टर्म	EVATION			Jaus	u Lundh []		Win Cities T	atin a	
DR	ILLING ME		AND EQI	JIPMEN	Benton'i	- mud rotory / CME	-55/75	37/87 +	cone
WA I	TER LEVE		DATE			START 11/11/85	FINISH		LOGGER SMCBee
			SAMPL	E	STANDARD	SOIL DESCRIPT	NON		COMMENTS
ELEVATION	DEPTH BELOW SURFACE	INTERVAL	TYPE AND NUMBER	RECOVERY	6"-6"-6" (N)	NAME. GRADATION OR PARTICLE SIZE DISTRIBU MOISTURE CONTENT. REL OR CONSISTENCY. SOIL MINERALOGY. USCS GRO	PLASTICITY, TION. COLOR, ATIVE DENSITY STRUCTURE, UP SYMBOL	SYMBOLIC	DEPTH OF CASING. DRILLING RATE. DRILLING FLUID LOSS TESTS AND INSTRUMENT&TION
	4					Sand little if any	grauel		Description trom
	_							-	driller's comments
	_							1	Reter to log of B-65
								1	Wyoqel bentonite
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					-	Cobbley sand and a saus			boulder!
						gibve	ſ	-1	
						-	•	-	
	J							1	44' last ≈ 50%
]						#1	اتح ا	or an ling fluid
	ລ]	·				promite boulder or top	ot rock		11/11/85
	ך <i>م</i> ر					Bottom of boring	49.5	51-	11/12/85
1								-	
		-	This	borint	, was dril	led 25 from origin	al locatio.	n to file	trippne hit
	7		sheet	red	ott in ho	le at 55!	_		

	H2M				Γ	PROJECT NUMBER	BORING NUM	BER S	
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¥ <u>с</u> _́А Б		War	ence	LF.	-WIS.	DNR	LOCATION	Tert	
DR	ILLING ME	ETHOD A			_3¼''I	DRILLING CONTRACTOR _ .D. HSA (74" 0.0), CME 45	RIG.	TD (PUT SPONS
w A		L AND D		9.5'	11/12	START (0930 - 11)	12 FINISH		LOGGER _ T.H. JOHASON
			SAMPLE		STANDARD PENETRATION	SOIL DESCRI	PTION		COMMENTS
ELEVATION	DEPTH BELOW SURFACE	INTERVAL	TYPE AND NUMBER	RECOVERY	TEST <u>RESULTS</u> 6"-6"-6" (N)	NAME, GRADATION O PARTICLE SIZE DISTRIB MOISTURE CONTENT, RE OR CONSISTENCY, SO MINERALOGY, USCS GR	R PLASTICITY. UTION. COLOR. LATIVE DENSITY IL STRUCTURE. OUP SYMBOL	SYMBOLIC LOG	DEPTH OF CASING. DRILLING RATE. DRILLING FLUID LOSS. TESTS AND INSTRUMENTATION
	0	0.0	5-1	12"	(-3-5)	FILL, DK. GRAY TO	BROWN,		OVA BALKGEISSIND
	-					ORCHINIC SILTY S.	~7.0'].,	
	- - - -	4.5 6.0	5-2	/3"	15-30-15/.2	<u>5400</u> , MED TO CSE, ~10% FINE GRAVE	СТ. Вешин, -, моізт, (SP)		ONA REMOINE -5.5 RAM - IN HSA -
	/0	7.5	5-3	1,2"	9-16-18 (34)	5000, MED. TO CSE, ~10% FINE GRAVED	(T. 13Rocin, . (SP)		OVA ZEADING BECKGELUND
	/5-	14.5 16.0	5.4	9"	18-22-14 (36)	SAND, MED. TO CSE, -30% FINE TO ME. MOIST TO LUETI (SP)	נד, באיניטאר, ס. פריטוניט בגו אינד אינד אינד		OVA KELIJUNG
	- 20- -	1.5 21.0	5-5	10"	5-11-16 (27)	SANO, MED. TO LSE MOIST, (SP)	-, LT. BROWN,	-	OVA REHDING BACK GROUND
5	- 25- -	<u>24.5</u> 26.0	5-6	B ⁱⁱ	(26)	<u>SAND, MEH.</u> TO OSE., MOIST (SP)	LT Blown,		OVA READING UP TO BPPM IN HAY -2 to 3 ppm above back round
	_و'ر _	27	5-7	ĉ	7-10-11	54NO, NOD. TOCSE, 57 10	- The Child LUET		СИЧ - Сенчоние Внекоклению (~ 5,5 грам)

	H2M	•			ſ		BORING NUME	ER	
						<u> 20303.40</u>			
	•							G LO	G
A مربع المحالي br>المحالي المحالي	OJECT _	War	500	Lanc	<u>LA 11</u>		LOCATION		
EL DR	EVATION				·	DRILLING CONTRACTOR	Chi Chi		
WA		L AND C	ATE			START 0930 - 11/12	FINISH		LOGGER
z			SAMPLE		STANDARD PENETRATION TEST	SOIL DESCRIPT	10N		COMMENTS
ELEVATIO	DEPTH BELOW SURFACE	INTERVAL	TYPE AND NUMBER	RECOVERY	RESULTS 6"-6"-6" (N)	NAME. GRADATION OR PARTICLE SIZE DISTRIBUT MOISTURE CONTENT RELA OR CONSISTENCY, SOIL MINERALOGY, USCS GROL	PLASTICITY, TION, COLOR, TIVE DENSITY STRUCTURE, JP SYMBOL	SYMBOLIC LDG	DEPTH OF CASING. DRILLING RATE. DRILLING FLUID LOSS. TESTS AND INSTRUMENTATION
	, o -							-	WATER LEVEL AT 27.5 at 10:53
	- 35 - -	26.0	5-8	8	4-7-8 (15)	SHTUD, FINE TO NED, WET (SP)	LT. Biswel,	-	DUA ROTOING BACKGROUNSD (5.5mm)
	40					BOTTOM OF BOREH	01EP 40.0'		W/S SILL F SPON SHARPLING RECHNISE OF FLOWING SHAP IN HSA'S - SET WELL TO 40'B.S.S.
	- - - - - -						-		
	- - - - -						- -		
							-		

REV 11/82 FORM D1586



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	DRILLING LOG		
	WELL NUMBER: WMW-1A LOCATION SW32 Section 24, T29N, R7	OWNER: U.S. E.P.A.         ADDRESS: Schofield Park         E.       Wausau, Wisconsin         TOTAL DEPTH       141.0'         15'       1180.87'	
8	DRILLING Exploration COMPANY: Teche logy DRILLER Steve Wonn LOG BY: David G. Pyl	DRILLING DATE DRILLED: 6-21-84 METHOD: Rotary DRILLED: 6-21-84 HELPER: Sven Lysloff	NOTES: Located Northeast of Baseball diamond in Schofield
20	DEPTH MEETI Calence COC HUNDER Calence CLUP.E	DESCRIPTION / SU UPLE COLOR, TEXTL	DIL CLASSIFICATION JRE, STRUCTURES)
25	<u>SS</u> 45	Reddish-brown, very coarse sand to rounded, moderately sorted, trace encountered at 24 feet.	o fine gravel, sub-rounded to of medium grain sand was
30_	SS 47	Tan - Brown sand range from fine s sub-rounded sands. Gravel fractic cave-in.	and to gravel, poorly sorted on maybe a result of annular-
35_	<u>SS</u> 29	Reddish - Brown, fine to medium gr rounded, moderately sorted, sand. fraction, (less - than - 10%)	ained, subangular to sub- Small rounded pebble
40	AS1 M U1566		SHEETOF

	SKETCH MAP
DRILLING LOG	
WELL NUMBER WMM LOCATION SWY Section 24, T29N, H SURFACE ELEVATION: 12	-1A OVNER: U.S. E.P. A ADDRESS Schofield Park 7E. Wausau, Wisconsin TOTAL DEPTH 141.0' 14.15' WATER LEVEL: 11 86.87'
DRILLING Exploration COMPANY Technik' ogy DRILLER Steve Wonn	DRILLING DATE METHOD: Rotary DRILLED 6-21-84 MELPER: Sven Lysloff HELPER: Sven Lysloff NOTES: Located Northeast of Baseball diamond in Schofield
LOG BY: David G. Py	es
40 DEPTH PEET CRAPHE COL HUUSE	MPE DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
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	
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	moderately sorted sand Pebble fraction is loss than 5% and
	is rounded.
	Tan to brown medium sand to pebble - (fragmented rock). Sand
55 50 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.
* A 5 1 M D158	

		SKETCH MAR
	DRILLINGLOG	JUN 28 1985
	WHW-1	A OWNER U.S. E.P.A.
	LOCATION SWE Section 24, T29N, R	ADDRESS <u>Schoffeld Park</u> 7E Wausau, Wisconsin
•		TOTAL DEPTH
	SURFACE ELEVATION 121	A.15 WATER LEVEL: 1100.07
_	COMPANY: Technology	METHOD Rotary DRILLED: 6-21-84 NOTES: Located Northeast of
	DRILLER <u>Steve wonn</u>	Baseball diamond in Schofield
	LOG BY: David G. Py	les
	REPTH MEETINGS WUNDE	DESCRIPTION / SOIL CLASSIFICATION
60		
5		No sample recovered
		· · · · · · · · · · · · · · · · · · ·
	· ·	
55_	SS 32	No sample recovered
	+	
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70 -	┽┝╴╺╢┝╼╾┼╌╌┼╼╾╴	
	SS 57	Tan to brown, medium grain sand, slight pebble fraction,
•		Sand fraction is sub-angular to sub-rounded and moderately
	<b>↑</b>	sorted. Slight mebble fraction of uniform size and
	·↓	
75 _		consistantly rounded.
l		
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	↓ _ ↓	
	SS 34	Reddish, black gravel, ranging form very coarse sand to gravel
•		
80		sub-angular to sub-rounded, poorly sorted.

	SKEICH MAP
DFILLING LOG	· · · · · · · · · · · · · · · · · · ·
WELL MUMBER WMW-1 A	OWNER: U.S. E.P.A.
Section 24 T29N R	ADDRESS Schofield Park
	TOTAL DEPTH 141.0'
SURI ACE ELEVATION:	214.15' WATER LEVEL: 1186.87'
DRUING Exploratio	n DRILLING DATE
DRILLER Steve Wonn	HELPER: Sven Lysloff NOTES: Located Northeast of
LOG BY David G. P	vles
ten no wet	at the
DEPTH ME CANPAK LUNDLE NUTLE	DESCRIPTION / SOIL CLASSIFICATION
	Red - Black very coarse sand and gravel one and 78 for an
	and graver, same as 70.5 to 80
SS 68	sampie. Maybe annular - cave-in.
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<b>↓ </b>	
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<u> </u>	Tan to reddish brown sand, range from fine sand to fine
	gravel, poorly sorted, angular to subangular.
<b>╡</b> ┠╸╺┤ <u></u> ╎╼╾┼╼╼┼╌╍╴	Tan to Buff coarse cand more film to
┽┠╸╺┨ <del>┝┈╶╿</del> ───	
SS 146	trace gravel, moderately sorted, sub-rounded,
<b>┦╴</b> ╶╎├──┼──┼───	
┽╎╸╶ <del>╎┝╼╍╎╸┈╎╸</del>	
╂┠╸╺ <b>┨┝</b> ──┼──┼──┥	
	Tan to dark brown, fine sand and group!
cc 30	graver approximately 50%-50%
	moderately sorted fractions, subangular to rounded
<b>*</b> - <b>-</b>	

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				SKETCH MAP
	SURFACE ELEVATION 1 DRILLING EXPlanatio	1 _A R7E 214.15'	OWNER: U.S. E.P.A. ADDRESS <u>Schofield Park</u> Wausau, <u>Wisconsin</u> TOTAL DEPTH 141.0' WATER LEVEL: 1186.87	
	DRILLER: Steve Wonn	METH	DD <u>Rotary</u> DRILLED <u>6-21-84</u> HELPER <u>Sven Lysloff</u>	NUTES: Located Northeast of Baseball diamond do Sal finance
-	LOG BY: David G. P	yles		
100_	DEPTH PEET 1000 HUM	E TYPE BLOWS	DESCRIPTION / S (COLOR, TEXT)	OIL CLASSIFICATION JRE, STRUCTURES)
	┫┝╴┛┠╼╌┼╾			
	SS 66	Same be and	as 98.5 to 100 foot sample, c	carse fraction believed to
(				
		Tan to	dark brown subangular to sub	prounded well sorted sand.
1 ¹⁰ -		Trace	pebble fraction.	
		No_sam	ole collected	
115				
		Brown		
		fractur	ed rock and grains subangular	to sub-rounded. Quartz
	SS 69	dominan	<u></u>	
	· A 5 1 W U1586	ال		

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	ちちちちちちち	SKEICH MAP
DRILLING LOG		
WELL NUMBER <u>UMU-1A</u> LOCATION <u>SW4</u> Section 24, T29N, R7E	OWNER: U.S. E.P.A. ADDRESS <u>Schofield Park</u> <u>Wausau</u> , <u>Wisconsin</u>	
SURFACE ELEVATION 1214.15 DRILLING Exploration DI COMPANY: Technology M	WATER LEVEL: 1186.87'	
DRILLER <u>Steve Wonn</u> LOG BY: <u>David G. Pyles</u>	HELPER Sven Lysloff	NOIES. Located Northeast of Baseball_diamond_in_Schofie
	7. 7	
DEPTH MELTINGE UPLE WONE THE	DESCRIPTION / S (COLOR, TEXT)	OIL CLASSIFICATION JRE, STRUCTURES)
<u>SS81</u>	mish - red medium grain sand,	gradational_downward, to rock
	ments, coarser sand fraction co	onsistant_subangular,
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4		
Brow	n to rusty red, brown sands are	very coarse, subanglar
and	uniform. Sharp density and col	or contrast. Color indiciti
SS 35016 SS 100+ of w	eathered granite, blow counts d	istinctly higher. Oxidized
frag	mented weathered appearance	
	· · · · · · · · · · · · · · · · · · ·	
Rust	y - red fine to coarse grain we	athered granite, wet to moist
3501B SS 100+		
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4  ■     − -   − −   − − −   − − −		
<b>┥│╸╺</b> <mark>┟╴<b>┽</b> ─<b>┥┤</b> ──</mark>		
BSOIR Rust	<u>red to burnt yellow, dense, co</u>	nsolidated, weathered granite
SS 115 nois	to dry. Bedrock texture and	density.

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		University fragment
	DRILLING LOG	JUN 2 = 1985
_	ALL NUMBER	A OWNER U.S. E.P.A
	Section 24, T29N	<u>ADDRESS Scholleid Park</u> <u>R7E</u> Wausau, Wisconsin
-		TOTAL DEPTH 141.0'
	SURFACE ELEVATION 1214 Exploratio	-15 WATER LEVEL:
	COMPANY: Technology	DATE DATE DATE DATE DATE DATE DATE DATE
	DRILLER <u>Dueve</u> woni	HELPER Sven Lysloff Baseball diamond in School
	LOG BY: David G. Py	/les
	DEPTH PEELOU UPLE WUNDER	DESCRIPTION / SOIL CLASSIFICATION
140 -		(COLOR, TEXTURE, STRUCTURES)
_		
	3501	
	S <u>48</u>	Rusty red, weathered, highly consolidated granite
		but compositionally not hard rock, damp to dry, ev-
: <b>* * 5</b> -	╾┽┝╸╶┫╎╌┄┽╌╌╌┦	tremely dense. Split-spoon would drive with 350
		pound weight.
-		
	╉┝╸╺╢──┼──┤	Driffed anead to 159.5, No Sample was collected but
	╉┝╸╶╢╼╌┼╼╌┥	rock was very hard and drilling was stopped due to the
	<b>┥</b> ┝╸╺ <u></u> ╎╾╺┽━╍┥	consolidated material. (Bedrock).
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l		1.12 51 51			
1		JUN 2 8 1085	SKETCH MAP		
		0011 2 8 1905			
	DRILLING LOG				
i i	WELL NUMBER: WMN-3B	OWNER: U.S. E.P.A.			
•	LOCATION: <u>Beacher Stre</u> Wausau, Wisconsin	Chicago, Illinois			
		TOTAL DEPTH 75.0			
	SURFACE ELEVATION: 121.	WATER LEVEL: 1176.23			
	DRILLING Technology	DRILLING ROTARY DATE 9/22/84	NOTES		
	DRILLER: Mark Prueher	HELPER:			
	Drill Crew				
1	E T ME	DESCRIPTION /			
	REPART PER LOS UP LIVE T	COLOR, TEXT	URE, STRUCTURES)		
40 -		<u></u>			
•	3	Light brown, medium to fine san	d, trace gravel, trace silt.		
	+				
			· · · · · · · · · · · · · · · · · · ·		
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50	╺┫╸┫╾┽╾┽╾┥				
	4	Brown, very coarse to fine sand	with gravel.		
8	┥┝╴┥┝╌┽╾┼╼┥				
· ·					
			· · · ·		
•	┥┝╴┥┝╼╌┽╼╌┥				
60		Light brown, medium to fine sar	id, trace graver .		
			•		
	╉┝╴╺╢╌╌┼╌╴┼╌╍┥	a second to fine sand	with gravel.		
		Brown, very coarse to The com			
		light brown medium to fine say	nd, trace gravel.		
	$\downarrow$ $\downarrow$ $\downarrow$ $\downarrow$ $\uparrow$ $\downarrow$	Light otom, menne			
70					
<b>- 70</b>					
	┥┝╴┥┝──┼──┼				
		End of boring 75'. Screen of 10	)' from 65' to 75'.		
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80	مسیلی است است السی السب ا		SHEET OF		
				Ling Kenny	SKETCH MAP
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DRILL	ING LC	<u>o</u> G		().	
		WMW-4	A	U.S. EPA	
LOCAT		rocker	& Burek	Staddress: Clark Street	Crocker Street
Wa	usau.	Wisco	nsin	<u>Chicago, Illinois</u>	
			1215.63		
DRILLI	NG T	plonat	ion DF	ILLING BOL THE 9/26/84	N Bea
COMP	ANY: 10	rk Pru	eher ME	THOD:DRILLED:	NOTES:
DHILL	Dr	ill cr	rew	ToC 1215.63	· · · · · · · · · · · · · · · · · · ·
LOGE	IY:			-	
	•		67	7.7	
	Ar are 1		AND THE REAL	DESCRIPTION	SOIL CLASSIFICATION
	CR NT	erer er	W BLUE	COLOR, TE	(TURE, STRUCTURES)
			В	ack, medium to fine sand, tr	ace of silt.
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1				bt brown medium to fine sar	d with some gravel.
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	3		Li	tht brown, coarse to fine sar	nd with gravel.
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	SKETCH MAP
DRILLING LOG	JUN 2 8 1985
WNW-4A	U.S. EPA
WELL NUMBER:	OWNER:
Wausau, Wisconsi	n Chicago, Illinois
	TOTAL DEPTH 100'
SURFACE ELEVATION:	WATER LEVEL:
COMPANY: Technology	METHOD: Rotary DRILLED: 9/26/84 NOTES:
DRILLER: Mark Fruene	MELPER:
LOG BY:	
THE REF. ELOS WINDER	DESCRIPTION / SOIL CLASSIFICATION
Conserved Strate Strate	(COLOR, TEXTURE, STRUCTURES)
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	Light brown, coarse to fine sand, trace gravel.
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DRILLING	GLOG		iver	•
	WMW-4A	U	.S. EPA	·
WELL NUM	BER:	OWNER:	lark Street	-
LOCATION Waus	Bu. Wisconsin	Chicag	o, Illinois	
		TOTAL DEPTH	100'	
SURFACE	ELEVATION: 1215	.63' WATER LEVEL	. 1185.71!	
DRILLING	Exploration	DRILLING BOLATY	DATE 9/26/8	4
COMPANY	Mark Prueher	METHOD:	DRILLED:	NOTES:
UNILLEN.	Drill crew			
LOG BY: _				
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Star Provide	A LOW AND	ST L WO	COLOR. TE	XTURE STRUCTURES)
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		End of border	at 117' 10' c	creen from $90^{1}$ to $100^{1}$
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	Vire Jeni	SKETCH MAP
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DRILLING LOG		
WELL NUMBER: MMN-48	OWNER: U.S. EPA	_
LOCATION: Crocker & Bure	ADDRESS: Clark Street	
<u>Wausau</u> , Wisconsin	TOTAL DEPTH 60.5'	-
SURFACE ELEVATION: 1215.	3' WATER LEVEL 1185.85'	
Expression DRILLING Technology	DRILLING BOLATY DATE 9/27/	84
DRILLER: Mark Prueher	METHOD:DRILLED:	NOTES:
LOG BY:		
	7.7	
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Con gui gui gui	(COLOR, 1	IEA IUME, SINULIUMES)
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	Brown, grades from fine to me	dium to coarse silty sand.
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	End of boring at 60.5'. 10'	screen from 50' to 60'.
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DRILLING LOG WELL NUMBER: WMV-4C LOCATION: Crocker_St and Burek_Streer Wausau, Wisconsin SURFACE ELEVATION: 1215. SURFACE ELEVATION: 1215. DRILLING COMPANY: Technology DRILLER: Bob Lavere Drill crew LOG BY:	U.S. EPA         OWNER:       U.S. EPA         ADDRESS:       Clark Street         Chicago       Illinois         TOTAL DEPTH       40'         SO'       WATER LEVEL:         DRILLING       DATE         METHOD:       Rotary         DRILLED:       10/31/84         MELPER:       ToC 1215.50         DESCRIPTION/SOIL CLASSIFICATION	
	(COLOR, TEXTURE, STRUCTURES)	11)(57.
	Brown, coarse to fine sand, trace silt, trace gravel. (SP).	.1) (SP- SM)
	End of boring at 40'. 10' screen from 30' to 40'.	]



	W. SPEN	SKETCH MAP
DRILLING LOG		
WMW-5	OWNER U.S. EPA	
LOCATION 150' east of	ADDRESS <u>Clark Street</u>	
Wausau_Wisconsin	Chicago, Illinois TOTAL DEPTH45'	
SURFACE ELEVATION 1219.0	18 WATER LEVEL: 1185.75	-
DRILLING Exploration D COMPANY: TechnologyM	RILLING DATE ETHOD: <u>Rotary</u> DRILLED: <u>11/2/1</u>	84
DRILLER: <u>Mark Prueher</u>		
LOG BY:		· · · · · · · · · · · · · · · · · · ·
	7:7	
DEPTH REE. LOS WALL AWALE AWALE	DESCRIPTIC	DN/SOIL CLASSIFICATION
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	d_of_boring_at_45'. 10' so	creen from 35 to 45'.
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		CTEDIETI	SKETCH MAP
	LOG	н. Ал	
	WMW-6	U.S.EPA	
LOCATION	R:	OWNER: ADD <u>BESS: Clark Street</u>	_
of CW-6	) 	TOTAL DEPTH (5'	
SURFACE EL	EVATEDN:	3 WATER LEVEL: N/A	
DRILLING ES	cploration DF	RILLING DATE	/84.
DRILLER: Ma	ark Prueher	HELPER:	
LOG BY:	cill crew		
		· · · · · · · · · · · · · · · · · · ·	L
TEPTH IFEETI	LOS NUMBER TYPE	DESCRIPTI	ON / SOIL CLASSIFICATION
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		<u> </u>	
	End	of boring at 45'. 10' so	reen from 35' to 45'.
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		Jau	sa	u,	Wise	ons	in		TOTA	L DEPT	'н <u>50</u>	.0'								
	SUF	RFA(	CE I	ELEV Ex		N: rati	201.9 on ,	<u>8'</u>	WATE	ER LEVI	EL:	<u>1186</u>	<u>.19'</u>							
1			NY:	Te	chno	<u>200</u>	<u>v</u> N	AETHO		tary		DRILLE	ED: 11/	<u>30/8</u> 4	NOTE	S:				
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WELL LOG



WELL LOG



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#### APPENDIX B

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#### WELL CONSTRUCTION DIAGRAMS

		PLC	DJECT NAME: Foley & Lardner NO. 222.04
Well Discret		VEI	LL NO. <u>R-1S</u>
<b>F-17</b> (8 11-85)	•	<b>DA1</b>	TE INSTALLED 8/15/86
	ELEV.	1	) CASING DETAILS A) TYPE OF PIPE: <u>PVC</u> , STAINLESS, TEPLON, OTHER
	BENTONITE PELLETS/GRANULAR/POWDER	5 PT.	PIPE SCHEDULE <u>40</u> B) TYPE OF PIPE JOINTS; COUPLINGS, <u>THREADED</u> (W/TAPE?), OTHER <u>w/ 0 ring</u> s
	BACKFILL MATERIAL Bentonite slurry	·	C) WAS SOLVENT USED? YES OR NO. D) TYPE OF WELL SCREEN:
<u>33.85</u> rr. fg	BACKFILL METHOD BC	$\frac{1}{2} / 2 \ln t$	PVC, STAINLESS, TEFLON, OTHER <u>6" Point</u> E) WELL SCREEN SLOT SIZE <u>0.010"</u> F) PIPE DIA: ID IN. 2.0 OD IN. 2.4
LENGTH OF	GRAVITY FILLED	5.5 pt.	G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO PROTECTOR PIPE DIA. 4 IN.
	BENTONITE PELLETS/GRANULAR/POWDER	7.5 pt.	A) METHOD BAILING, PUMPING, SURGING, COMPRESSED AIR
	SILICA SAND N/A	7.5 <b>PT.</b>	OTHER <u>Air</u> (NOTE ADDITIONAL COMMENTS BELOW)
0.0 rt. 5 E	#20 Flint Sand	<u></u> <b>PT.</b>	B) TIME SPENT FOR DEVELOPMENT? <u>20 minutes</u> C) Approximate water volume: Removed <u>-8 gallons</u> Added
	VELL BOTTOM ELEV 4 SEAL MATERIAL	0.5 PT. 0.5 PT.	D) WATER CLARITY BEFORE DEVELOPMENT? CLEAR, TURBID, OPAQUE
	N/A N BACKFILL MATERIAL	<u>/A</u> <b>FT.</b>	E) WATER CLARITT AFTER DEVELOPMENT? <u>CLEAR</u> , SLIGHTLY TURBID, TURBID, OPAQUE F) ODOR? YES OR <u>NO</u>
	Cave in Mixe	<u>42</u> FT. 3	A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?
I			B) OTHER MEASUREMENTS (T.O.C.): DATE/TIME 9/05/86 34.10'

DATE/TIME _ PT. ADDITIONAL COMMENTS: . . . . . • • • . <u>, .</u> . . ۰. . ... . . . **-** . .

DATE/TIME

PT.

1 Diagram 7 (R 11-85)		·		DATE I	NSTALLS	m 8/14/86			-
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<b>▲</b>	ELEV			·					
	ELEV. (T.O.C.)			1) (	ASTNO	DETATIS			
		TB		., .	) TYP	PERILS			
1	GROUND SURF.				., PVC	-	TERION OTHER		
1	/xx	<b>1</b>	GROUND SURFACE	e	<u></u>	DIRE SCHEDE	12 40	· · · · · · · · · · · · · · · · · · ·	
	BENTONITE	601	/1.	. ,	() <b>т</b> үр	PE OF PIPE 10			_
	PELLETS/GRANULAR/POWDER		PT.	-	., COI	IPLINGS THEF	ADED (U/TADE?) OTHE	ww/0 rin	ae
	BACKFILL HATERIAL					COLUBRE HER	NULL (W/INFER), UINE		<u> </u>
	100 gal H20/70# guik				.) WAS	D OF UPIN CO	DI TES OR <u>RU</u>		
a l	gel				,, IIF		REERI	" Point	
. 8					<u> </u>	L, STAINLESS,	TEPLON, OTHER $\underline{W/0}$		_
SOLI	BACKFILL METHOD		DIA.		C) WEL	LL SCREEN SLO	T SIZE 0.010		
0	PIPE TREMIE/AUGER TREMIE GRAVITY FILLED		<u> </u>	F	') PIF	PE DIA: ID I	N. <u>2.0</u> OD IN. <u>2</u>		
ENCTH			105 PT.	, C	S) INS Pro	STALLED PROTE	CTOR PIPE W/LOCK? <u>Y</u> IA. <u>4</u> IN.	es or no	
	BENTONITE			2) W	IELL DE	evelophent	9/05/86		
	2 gallons		108 ==		) Het	CHOD	· ·		
			<u> </u>		BAI	ILING, PUMPIN	G, SURGING, COMPRESS	ED AIR	
	SILICA SAND N/A		108		OTH	er <u>Air</u>			<b></b>
	N/A	2 2	<u>108</u> PT.		(NC	DTE ADDITIONA	L COMMENTS BELOW).		
1	FILTER PACK . Material		<u>111</u> <b>рт.</b>	B	) TIM	E SPENT FOR	DEVELOPMENT? 30 mi	nutes	_
	#20 Flint Sand		:	c	:) APP	ROXIMATE WAT	ER VOLUME: REMOVED	- <u>300 gall</u>	ons
₹	· · · · · · · · · · · · · · · · · · ·						ADDED		_
	VELL BOTTON			D	) WAT	TER CLARITY B	BFORE DEVELOPMENT?		_
T	ELEV.		121 PT.		CLE	LAR, TURBID,	OPAQUE		
	SEAL MATERIAL		TT.	z	:) WAT	TER CLARITY A	FTER DEVELOPMENT?		
	BACKETTI				CLE	slightl AR, SLIGHTLY	y silty TURBID, TURBID, OPA	QUE	
•	MATERIAL Cave in			P	·) 000	' )R7 YES OR N	0	•	
			<u>133</u> <b>PT</b> .	- א וו	ATTR I	EVEL SIDNARY	<u> </u>		
,				37 .	1 100	TH PRON TOR			
							or Casing Arien Deve	LUPHERII	
						FT. OR D	RY .		
				B	) OTH	IER MEASUREME	NTS (T.O.C.):		,
					DAT	ETINE 8/1	5/80 A.M.	35.4	<u>4</u> PT.
					DAT	TE/TIME 9/0	5/86	34.0	<u>6</u> PT.
				·	DAT				PT.
	ADDITIONAL COMMENTS:	·· ·· ·	·			······································		·	
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		PROJECT BAHEI	Foley & Lardner no. 222.04
Magnes		WELL NO.	R-2S
(1 11-85)		DATE INSTALLED	8/7/86
	- £LEV	1) CASING 1	DETAILS
A A	(T.O.C.)	A) TYP	E OF PIPE:
	GROUND SURF. ELEV. DEPTH FR	DM PVC	STAINLESS, TEPLON, OTHER
	CROUND S	URFACE F.	PIPE SCHEDULE 40
	BENTONITE PELLETS/GRANULAR/POVDER	B) TYP	E OF PIPE JOINTS;
1	· · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · ·  · · · · · · · · · · · · · · · · · · · · · · · ·	r. cou	PLINGS, THREADED (W/TAPE?), OTHER w/ O ring
	BACKFILL NATERIAL	C) WAS	SOLVENT USED? YES OR NO
	<u>30 gal H20/#15 quik</u>	D) TYP	E OF WELL SCREEN:
2 d I d	gei a	PVC	, STAINLESS, TEFLON, OTHER W/6" point
7 m. 8	BACKETUL METHOD BOREHOLI	E) WELI	L SCREEN SLOT SIZE 0.010"
	DIA.	N. F) PIP	E DIA: ID IN. 2.0 OD IN. 2.4
5 2	ORAVITY FILLED	C) INS	TALLED PROTECTOR PIPE V/LOCK? YES OR NO
	§ <u>14</u> 1	T. PROI	TECTOR PIPE DIA. 4 IN.
-	BENTONITE PELLETS/GRANILAR/POWDER	2) WELL DE	9/04/86
	16.0 x	A) METI T.	HOD
		BAI	LING, PUMPING, SURGING, COMPRESSED AIR
	SILICA SAND N/A	OTH	ER PVC Bailer & air
		(10)	TE ADDITIONAL COMMENTS BELOW)
+	HATERIAL 18 1	T. B) TINI	E SPENT FOR DEVELOPMENT? 20 minutes + 1.
	#20 Red flint sand	C) APPI	ROXIMATE WATER VOLUME: REMOVED 7 gallons
			ADDED $0^+$ 10 gails
	WELL BOTTOM	D) WATI	ER CLARITY BEFORE DEVELOPMENT?
-L	<u>22.0</u>	T. CLEA	AR, TURBID, OPAQUE
	SEAL PATERIAL N/A	T. E) WATI	ER CLARITY AFTER DEVELOPMENT?
· ·	BACKFILL	CLE	AR, SLIGHTLY TURBID, TURBID, OPAQUE
	HATERIAL 7377-5	F) ODOR	R7 YES OR NO
	<u>36.0</u>	T. 3) WATER LI	EVEL SUMMARY
		A) DEP	TH FROM TOP OF CASING AFTER DEVELOPMENT?
		<u> </u>	FT. OR DRY
		B) OTH	ER MEASUREMENTS (T.O.C.):
		DAT	E/TIME 8/7/86 22.18
		DAT	E/TIME 8/12/86 22.40
		DAT	E/TIME 9/4/86 22.4
			· · · · · · · · · · · · · · · · · · ·
	ADDITIONAL COMMENTS: Measured inside wel	casing open	to 30.7' B.T.O.C. (@ completion)
	Bailer drops to 30.0	)' below T.O.C	. – ok
	· · · · · · · · · · · · · · · · · · ·	•• .	

, Foley & Lardner 100. 222.04
R-2D
B/6/86
DETAILS
PE OF PIPE:
C, STAINLESS, TEFLON, OTHER
PE OF PIPE JOINTS;
UPLINGS, THREADED (W/TAPET), OTHER W/ O ring
S SOLVENT USED? YES OR NO
PE OF WELL SCREEN:
C, STAINLESS, TEPLON, OTHER $w/6"$ point
LL SCREEN SLOT SIZE 0.010
PE DIA: ID IN. 2.0 OD IN. 2.4
STALLED PROTECTOR PIPE W/LOCK? YES OR NO Notector Pipe dia. <u>4</u> in.
evelopment 9/04/86
THOD
ILING, PUMPING, SURGING, COMPRESSED AIR
HERAir
OTE ADDITIONAL COMMENTS BELOW)
HE SPENT FOR DEVELOPMENT? 30 minutes
PROXIMATE WATER VOLUME: REHOVED - 300 gallo
ADDED
TER CLARITY BEFORE DEVELOPMENT?
EAR, <u>TURBID,</u> OPAQUE
TER CLARITY AFTER DEVELOPMENT?
FAR. SLIGHTLY TURBID. TURBID. OPAQUE
PTH FROM TOP OF CASING AFTER DEVELOPMENT?
PT. OR DRY
HER MEASUREMENTS (T.O.C.): 8/6/86
TE/TIME 96.7 BGS 7:30 AM thru dual
TE/TIME 21.7' BGS 8/6/86 thru over
TE/TIME         23.1         BTOC         8/6/86         5         PM         @well           22.78         BTOC         8/7/86         8         AM         Comp           0/6/86         15:40         22         88         Set         Set
stic prior to installation.
vershot & well pipe locked.
ailer was sent down to 137' to
1

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R	MT
¥e11	Diagram
F-17	(2 11-85)

PROJECT NAME:	<u>Foley &amp; Lardner</u>	WO.	222.04	_
WELL NO.	<u>R-3S</u>			
, DATE INSTALLED	8/12/86			•

1) CASING DETAILS ELEV. (T.O.C.) A.) TYPE OF PIPE: GROUND SURF. ELEV. DEPTH PROM GROUND SURFACE PVC, STAINLESS, TEPLON, OTHER 700 PIPE SCHEDULE 40 FT. BENTONITE B) TYPE OF PIPE JOINTS: PELLETS/GRANULAR/POWDER PT. COUPLINGS, THREADED (W/TAPE?), OTHERW/ 0 rings BACKFILL MATERIAL C) WAS SOLVENT USED? YES OR NO D) TYPE OF WELL SCREEN: Bentonite Slurry PIPE PVC, STAINLESS, TEPLON, OTHER _6" unslotted SOLID point 4.5 m. BOREHOLE E) WELL SCREEN SLOT SIZE 0.010" BACKFILL METHOD DIA. PIPE TREMIE/AUOER TREMIE F) PIPE DIA: ID IN. 2.0 OD IN. 2.4 IN. 5 GRAVITY FILLED LENGTH C) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO 16 **_ PT.** PROTECTOR PIPE DIA. 4 IN. BENTONITE 2) WELL DEVELOPMENT PELLETS/GRANULAR/POWDER 9/04/86 A) HETHOD . <u>18</u> **PT**. BAILING, PUMPING, SURGING, COMPRESSED AIR SILICA SAND N/A OTHER Air <u>18</u> PT. (NOTE ADDITIONAL COMMENTS BELOW) FILTER PACK 22 PT. B) TIME SPENT FOR DEVELOPMENT? 20 minutes MATERIAL SCREEN #20 Flint sand C) APPROXIMATE WATER VOLUME: REHOVED -10 gallons ADDED D) WATER CLARITY BEFORE DEVELOPMENT? WELL BOTTOM .0_ PT. ELEV. CLEAR, TURBID, OPAQUE SEAL MATERIAL N/A PT. E) WATER CLARITY AFTER DEVELOPMENT? PT. BACKFILL CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE MATERIAL P) ODOR7 YES OR NO <u>36</u> **рт**. 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 <u>27.21</u> PT. DATE/TIME PT . ADDITIONAL COMMENTS: Pipe open to 33.35 below ground surface w/bailer - 8/13/86 . · . ~

agras 11-85)			WELL NO.	R-3D
11-85)	•			
			DATE INSTALLED	8/11/86
<del></del>	- SLEV.		1) CASING D	PETAILS
A	(T.O.C.)		A) TYPE	OF PIPE:
	GROUND SURF.	DEPTH PROM	PVC,	STAINLESS, TEFLON, OTHER
		CROUND SURFACE	2	PIPE SCHEDULE 40
	BENTONITE PELLETS/GRANULAR/POWDER		B) TYPE	OF PIPE JOINTS;
	2 S	PT.	COUP	LINCS, THREADED (W/TAPE?), OTHER w/ 0 rings
	100 gal H20/50# quik		C) WAS	SOLVENT USED? YES OR NO
	gel	· ·	D) TYPE	OF WELL SCREEN:
		;	PVC,	STAINLESS, TEFLON, OTHER
	BACKFILL METHOD	BOREHOLE DIA.	E) WELL	SCREEN SLOT SIZE 0.010"
5	PIPE TREMIE/AUGER TREMIE	<u>52</u> IN.	P) PIPE	DIA: ID IN. 2.0 OD IN. 2.4
		<u>120</u> <b>гт.</b>	G) INST. Prote	ALLED PROTECTOR PIPE W/LOCK? YES OR NO BCTOR PIPE DIA. 4 IN.
	BENTONITE PELLETS/GRANULAR/POWDER	•	2) WELL DEVI	ELOPHENT
		122 FT.	A) METHO	op 9/04/86
			BAIL:	ING, PUMPING, SURGING, COMPRESSED AIR
	SILICA SAND N/A	<u>122</u> <b>FT.</b>	OTHEI	Air
1	FILTER PACK		(NOT)	2 ADDITIONAL COMMENTS BELOW)
•	HATERIAL	<u>120</u> <b>PT.</b>	B) TIME	SPENT FOR DEVELOPHENT? 30 minutes
	"20 Flint sand	:	C) APPRO	ADDED
	WELL BOTTON	·····	D) WATER	CLARITY BEFORE DEVELOPMENT?
	ELEV	136 PT. 136 PT.	CLEAR	, TURBID, OPAQUE
	SEAL MATERIAL	PT.	E) WATER	CLARITY AFTER DEVELOPHENT?
	BACKFILL		CLEAR	. SLICHTLY TURBID, TURBID, OPAQUE
	HATERIAL Cave in 13475	120	F) ODOR?	YES OR NO
	E2783	<u>    130    </u> <b>FT</b> .	3) WATER LEV	'EL SUMMARY
			A) DEPTH	FROM TOP OF CASING AFTER DEVELOPMENT?
				FT. OR DRY
			B) OTHER	MEASUREMENTS (T.O.C.):
		•	DATE/	TINE 8/12/86 7:30 AM 24.5' BGS F
			DATE/	TIME 8/13/86 11:45 AM 26.2 BGS
			DATE/	TINE 9/04/86 17:05 28.58 BTOCP
	ADDITIONAL COMMENTS: Bailer goes	down to 134.9	)' below gr	<u>cound_surface - ok 8/13/86</u>
	····			· · · · · · · · · · · · · · · · · · ·
		· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·

RMI		
ell Diagram -17 (l 11-85)		

Well F-17

1.11.126

T		K		1) C/	ASING DETAILS
T	GROUND SURF.			Α.	) TYPE OF PIPE:
	ELEV.		DEPTH FROM		PVC, STAINLESS, TEPLON, OTHER
	BENTONITE		<u>3</u> <b>FT</b> .		PIPE SCHEDULE 40
	PELLETS/GRANULAR/POWDER		5	B	) TYPE OF PIPE JOINTS;
		<u>.</u>	FT.		COUPLINGS, THREADED (W/TAPE?), OTHER W/ O rin
	140 gal /80# quik gel			C)	) WAS SOLVENT USED? YES OR <u>NO</u>
•	to gar / oow quik ger		<u></u>	D)	) TYPE OF WELL SCREEN;
			•		PVC, STAINLESS, TEPLON, OTHER w/ 6' Point
BACKI	PILL HETHOD		BOREHOLE	E)	WELL SCREEN SLOT SIZE 0.010"
PIP GRA	E TREMIE/AUGER TREMIE		<u>57</u> IN.	F)	) PIPE DIA: ID IN. 2.0 OD IN. 2.4
			<u>117</u> <b>PT</b> .	G)	) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO Protector Pipe Dia IR.
ļ	BENTONITE PELLETS/GRANULAR/POUTPP			2) VE	CLL DEVELOPMENT 9/04/86
	<u>DDDTD</u> , GRANDLAR, FORDER		119 -	(۸	METHOD
			<u></u> =		BAILING, PUMPING, SURGING, COMPRESSED AIR
SILI	CA SAND N/A				OTHER Air
			9_ PT.		(NOTE ADDITIONAL COMMENTS BELOW)
MATE	RIAL #20		123 PT.	B)	TIME SPENT FOR DEVELOPMENT? 30 minutes
<u>F1</u>	int sand/possible		:	c)	APPROXIMATE WATER VOLUME: REMOVED -750 gallo
.S	ome cave in				ADDED
VE	LL BOTTON			D)	WATER CLARITY BEFORE DEVELOPMENT?
SPAI			<u> 33</u> PT. <u> 33</u> PT.		CLEAR, TURBID, OPAQUE
			FT.	E)	WATER CLARITY AFTER DEVELOPMENT?
B/	ACKPILL	5 5 5			CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE
64m	Cave in		154	P)	ODOR7 YES OR NO
		<b>1</b>	<u>    130    </u> <b>FT.</b>	3) WAT	PER 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
					DATE/TIME 9/4/86 18:40 31.87
					DATE/TIME
	· ·				
	ADDITIONAL COMMENTS: Total ler	igth o	f_open_pipe	135.	1. Bailer drops to 132.0' below TOC
_	Well ok,	but ma	ay have some	sand	d sediment in bottom

ROJE	CT N	AME		Wa	4.50	<u>.</u>								IN	STA	ALL	ED	BY		57,	7 لم	/			DA	TE.	//	-!/-
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CH2M
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FILE NO. _____ PAGE ____ OF ____

# PIEZOMETER INSTALLATION SKETCH

PROJECT NO:	/ 20303,AO			
BORING NO.	3-75			_ DATE
PIEZOMETER N	$\frac{12-75}{12-75}$		COORDINATES	
TIEZOMETEN N	0			
	<u> </u>	<u>Rentonite Pelle</u>	etts	
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M05J12.R0119

			JUN 28 MOU Constru	1985	Well_EPA	<u>be 12-11</u>	<b>A</b>
			Location or Coords: <u>Wausau</u> , <u>Wisconsin</u>	Elevation: Ground	Level	1213	
			SWE, NUL, Section 24, T29N, R7E	Top of	Casing	1215	
	_20 +		Drilling Summary:	Construction	Time Log:		
TAT	- Second		Total Depth 157.5' Below Land Surface		Start	Fir	hish
ston	1992	- Sherr	Borehole Diameter <u>3 7/8''</u>	Task	Date Time	Date	Time
W F. We	40	ans the second	Driller Exploration Technology, Inc. Steve Wonn & Sven Lysloff	and Cased	6 <u>-21-84_131</u>	_0 7 <u>-4-84</u> 	_1200
ld <b>ma</b> . Pyles-Roy	60	-Jihosiy Assardu	Rig <u>Central Mine Equipment</u> Model 55 Bit(s) <u>Standard 3 7/8 inch"TRI-CONE"</u>	Geophys.Logging: Casing: S <u>ee Above Task</u>	N/A	/A	<u>₩/</u> A_
<b>.</b>			Drilling Fluid Clear - not recirculated			-	
David			water Surface Casing <u>HW</u> Flush Joint Well Design:	Filter Placement: Cementing:	7 <u>-6-84</u> 062 7-6-840800	2 7 <u>-6-8</u> 4 7 <u>-6-84</u>	<u>0800</u> 1600
ocation _			Basis: Geologic Log X Geophysical Log Casing String(s): C = Casing S = Screen	Development: Other: Poured Cement	7 <u>-6-84</u> <u>1600</u>		1.700
	100			a <u>nd Set-Post</u> t <u>o Guard the W</u> e	<u> </u>	-	
	120			Well Develop The developmen the grout seal	ment: ment: nt was pospe l to set-up	oned to	allow
a			Casing: Ci 124.0 10 Iand Sufface with <u>1¹/₂ foot riser pipe</u> <u>2^{''} Calvanized case pipe</u> Sat 8 Foot No. 60 Slot Johnson			·	
2	140		Galvanized, set at 122.0'           S2         to 130.0'	Comments: Elevations are	only approx	imation	 s
	160		Centralizers Bentonite Pellets set to	and will be su of Wausan	rveved by 1	he Citv	
	180		Filter Material No. 30 Flint sand 157.5' to 119.0' Cement + Bentonite-"grout" 3.76:1 Ratio cement to Bentonite, 119.0'rol0.0 Other Pure cement mix from 10.0' to Land Surface + 1 foot slope mound to anchor protective cover pipe.	Back filled - the selected i 'sand point was	(sand lifte nterval whe located.	ed) Bori	
-							
	- 200				Ϋ́,	LEN	



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## WELL DETAIL INFORMATION SHEET



	JOB NOC 810324
	BORING NO. WMW-4A
	DATE9/27/84
<u></u>	CHIEFMP
LOCATION	Wausau, Wisconsin
to 1	be from ground surface unless otherwise dicated.
	DEPTH TO BOTTOM OF BOREHOLE
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
5	TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE
6	DEPTH OF LOWER OR BOTTOM SEAL
7	DEPTH OF UPPER OR TOP SEAL
8	TYPE OF BACKFILL Grout
9	PROTECTIVE CASING YES NO
$\smile$	HEIGHT ABOVE GROUND 0.0
	LOCKING CAP YES NO
	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. MIL-5
DATE 11/2/84
Elev 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 <u>45</u> FEET
2 LENGTH OF WELL POINT, WELL SCREEN, OR <u>SLOTTED PIPE</u> D FEET
3 $         -$
$\begin{bmatrix} - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - & - \\ - $
5 TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE
6 DEPTH OF LOWER OR BOTTOM SEAL
7 DEPTH OF UPPER OR TOP SEAL
<b>8</b> TYPE OF BACKFILL <u>Cement &amp; Bentonite</u> Slurr
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 <u>protective</u> casing.
BORING #   DATE   TIME   DEPTH TO WATER   REMARKS



Juk -	
WELL DETAIL INFORMATION SHEET C 810324	
	-
BORING NO. WMW-7	•
DATE 11/26/84	-
CHIEF RL	•
LOCATION Wausau, Wisconsin, Foy F. Weston, EPA	r
to be from ground surface unless otherwise	l
T DEPTH TO BOTTOM OF BOREHOLE <u>45</u> FEET	
2 LENGTH OF WELL POINT, WELL SCREEN,	
OR <u>SLOTTED PIPE</u> 10 <u>FEET</u>	
3 TOTAL LENGTH OF SOLID PIPE 35 FEET @ 2 IN. DIAMETER	
4 HEIGHT OF WELL CASING ABOVE GROUND	
-1 $-1$ $-1$ $-1$ $-1$ $-1$ $-1$ $-1$	
-     -     -     5     TYPE OF FILTER MATERIAL AROUND WELL       POINT OR SLOTTED PIPE     -     -     -	
6 DEPTH OF LOWER OR BOTTOM SEAL	
- $        -$	
6 (8) TYPE OF BACKFILL Cement & Bentonite Slu	rry
9 PROTECTIVE CASING YES NO	
2 HEIGHT ABOVE GROUND GS	
LOCKING CAP YES NO	
10 CONCRETE CAP YES NO	
WATER LEVEL CHECKS	
<pre>* From top of casing, if protective casing higher take measurement from top of protective casing.</pre>	
BORING # DATE TIME DEPTH TO WATER REMARKS	

[PJS-7-45]

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WELL DETAI	L INFORMATION SHEET
	JOB NOC 810324
	BORING NO
	DATE11/30/84
Elev	CHIEFMP
LOCATION	Wausau, Wisconsin; Roy F. Weston, EPA All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.
	DEPTH TO BOTTOM OF BOREHOLE
	LENGTH OF WELL POINT, WELL SCREEN, OR SLOTTED PIPE 15 FEET
	TOTAL LENGTH OF SOLID PIPE 35.0 FEET @ _2 IN. DIAMETER
	HEIGHT OF WELL CASING ABOVE GROUND
	) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE
	DEPTH OF LOWER OR BOTTOM SEAL
	DEPTH OF UPPER OR TOP SEAL
	) TYPE OF BACKFILL <u>Cement &amp; B</u> entonite Slurry
9	PROTECTIVE CASING YES NO
	HEIGHT ABOVE GROUND
	LOCKING CAP YES NO
	) CONCRETE CAP ( YES NO
	WATER LEVEL CHECKS
* From to take me	p of casing, if protective casing higher asurement from top of <u>protective</u> casing.
BORING # 1 1	DATE I TIME I DEPTH TO WATER I REMARKS

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[PJS-7-45]



# WELL CONSTRUCTION LOG

ProjectE1127CW1	Well <u>GM1s</u>
Town/City <u>Wausau</u>	
County Marathon	StateWI
Permit No	
Land-Surface Elevation	
and Datum feet	surveyed
meter,	estimated
Installation Dates(s) 8/6/86	
Drilling Method	
Drilling Contractor Layne N.W.	
Drilling Fluid <u>Raw water &amp; Air</u>	
ry Development Techniques(s) and Date(s)	
ets9/4/86 airlift	·
Fluid Loss During Drilling	gallons
Water Removed During Development	5gallons
Static Depth to Water29.93'	feet below M.P.
er slot Pumping Depth to Water	feet below M.P.
Pumping Duration <u>20 minutes</u> hou	ırs
Yield gpm	Date <u>9/04/86</u>
Specific Capacity	gpm/ft
Well Purpose Monitor G.W. Qualit	ty
<b>Remarks</b> $\frac{8}{6}$ 15:35 WL = 27.3	75' BLS
e	
Prenared by L.C. Huntoon	
	Project _E1127CW1 Town/City _Wausau County _Marathon Permit No Land-Surface Elevation and Datum feet feet Installation Dates(s) _8/6/86 Drilling Method _Dual_Tube Drilling Contractor _Layne N.W. Drilling Fluid _Raw water & Air  y Development Techniques(s) and Date(s)  get Fluid Loss During Drilling Fluid Loss During Drilling Fluid Loss During Development Static Depth to Water Pumping Duration _20_minuteshou Yield gpm Specific Capacity Well Purpose _Monitor G.W. Quality Remarks 8/6 _15:35 _WL = _27  Pumping Duration for Huntoon



# WELL CONSTRUCTION LOG

		Project <u>Wausau E1127CW1</u> Well <u>GM-2S</u>	
	LAND SURFACE	Town/City Wausau	
		County State	
	/ 7/8 inch diamator	Permit No	
	drilled hole	Land-Surface Elevation	
	5.5" overshot	and Datum feet	
	Well casing; 2.0 inch diameter	estimated	
	PVC, Sch80	Installation Dates(s) 8/19/86 7:50 a.m8:50 a.m.	
	Backfill	Drilling Method Double Tube	
	Grout Bentonite Slurry	Drilling Contractor Layne N.W.	
	Ŋ	Drilling Fluid <u>Water &amp; Air</u>	
	ft* <u>15.0</u>		
	Bentonite	Development Techniques(s) and Date(s)	
	ft•	9/4/86 Airlift	
	21.5		
	2 <u>4.3</u> <del>ft</del> *	Fluid Loss During Drillinggall	ons
		Water Removed During Development 20 gall	ons
	Well Screen.	Static Depth to Water 26.5 ft/8/19/86 feet below M	1.P.
	PVC 10 slot	Pumping Depth to Water feet below M	1.P.
		Pumping Duration 20 minutes hours	
	Gravel Pack	Yield gpm Date	<u>ب</u>
	Sand Pack	Specific Capacity gpm/ft	
		Well Purpose Monitor G.W. Quality	
		· · · · · · · · · · · · · · · · · · ·	
	<u>34.</u> 2t*		
	<u>36.5</u> ft*	Remarks $9/4$ water level = 25.69' BCS	
5			
Meas	suring Point is Top of		
Well	Casing Unless Otherwise		
Noted	d.		
*Dep	th Below	· · · · · · · · · · · · · · · · · · ·	
Lan	d Surface		
		Prepared by Phil Harry/ L.C. Huntoon	

APPENDIX C

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

## APPENDIX C

. 3

## 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	Ø.2	х	х	X	х	X
Bromoform	Ø.5	X	Х	х	X	X
Bromomethane	1.0	х	Χ.	X	x	X
Carbon Tetrachloride	Ø.1	x	х	X	х	Х
Chlorobenzene	Ø.1	х	X	х	х	Х
Chloroethane	1.0	х	X	Х	х	х
2-Chloroethylvinyl Ether	2.0	х	X	Х	х	Х
Chloroform	Ø.1	1.8	Х	0.4	0.6	х
Chloromethane	6.0	х	X	Χ.	х	х
Dibromochloromethane	0.1	х	х	х	х	х
1,2-Dichlorobenzene	Ø.3	х	X ,	х	x	X
1,3-Dichlorobenzene	Ø.3	х	х	X	х	x
1.4-Dichlorobenzene	Ø.3	x	x	x	x	X
Dichlorobromomethane	Ø.1	X	. X	x	x	x
1.1-Dichloroethane	Ø.1	X	X	x	x	x
1.2-Dichloroethane	Ø.3	x	x	x	X	x
1.1-Dichloroethylene	1.0	x	x	x	x	x
1.2-Dichloroethylene	Ø.3	13.9	x	X ·	x	345.
Dichloromethane	Ø.2	x	x	x	x	X
1.2-Dichloropropane	Ø.5	x	x	x	x	x
cis-1.3-Dichloropropene	Ø.3	x ·	x	x	x	x
trans-1.3-Dichloropropene	1.0	x	x	x	x	x
Ethylbenzene	g.2	x	x	x	x	x
1.1.2.2-Tetrachloroethane	Ø.1	x	x	x	x x	x
Tetrachloroethylene	<i>a</i> 1	ด้ว	x	Ŷ	X	7.5
Toluene	a 1	Y	x	x	x	Y .
1.1.1-Trichloroethane	a 1	2.9	X	x	x	Y
1 1 2-Trichloroethane	a 1	¥	× ×	X X	Y Y	X Y
Trichloroothylono	a 1	500	â	ົ້າ	้	790
Vinyl Chloride	2 0	y .	v v	3.2 V	7.1 V	750. · V
Tright antonae	2.0U Q 2	A Y	Ŷ	A Y	A Y	A Y
Dighlorodifluoromethese	2.4	v v	N V	A V	A V	A V
Dichtoronituoromethane	2.0	~	~	~	Λ.	Λ

X Analyzed But Not Detected

	Detection				
	<u>Limit</u>	R-4D(156)	R-1D(37)	R-1D(57)	R-1D(117)
D					
Benzene	0.2	X	X	х	х
Bromolorm	0.5	X	x	X	х
Bromometnane	1.0	X	х	X	х
Carbon Tetrachloride	0.1	X	х	х	x
Chloropenzene	Ø.1	x	X	х	X
Chloroethane	1.0	Х	х	Х	х
2-Chloroethylvinyl Ether	2.0	X	х	X	X
Chloroform	Ø.1	X	х	х	0.2
Chloromethane	6.0	X	. X	.Χ.	х
Dibromochloromethane	Ø.1	X	х	х	x
1,2-Dichlorobenzene	Ø.3	х	х	х	X
1,3-Dichlorobenzene	Ø.3	X	x	х	х
1,4-Dichlorobenzene	Ø.3	X	х	х	X
Dichlorobromomethane	Ø.1	X	x	х	x
1,1-Dichloroethane	Ø.1	X	x	x	x
1,2-Dichloroethane	Ø.3	x	х	х	x
1,1-Dichloroethylene	1.0	X	x	x	x
1,2-Dichloroethylene	Ø.3	Ø.5	х	X	x
Dichloromethane	0.2	х	X	x	x
1,2-Dichloropropane	0.5	х	X	x	x
cis-1,3-Dichloropropene	Ø.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	х	x	x	Y
Tetrachloroethylene	· Ø.1	x	x	x	ดโด
Toluene	0.1	x	x	x	a 2
1,1,1-Trichloroethane	Ø.1	x	x	X	¥.2 Y
1,1,2-Trichloroethane	Ø.1	x	x	Y	Y Y
Trichloroethylene	Ø.1	2.2	x	x	Y
Vinyl Chloride	2.0	X	x	x	A Y
Trichlorofluoromethane	0.2	x	x	Ŷ	A Y
Dichlorodifluoromethane	2.0	x	X	X	x

.

APPENDIX D

# HAZARDOUS SUBSTANCE LIST ANALYSIS FOR SELECTED WELLS



3301 KINSMAN BLVD. . P.O. BOX 7545 . MADISON, WISCONSIN 53707 . PHONE (608) 241-4471 . TLX 703956 HAZRAL MDS UD

REPORT OF ANALYSIS

FIGER CHRISTEL REALDUALS MANAGEMENT TECHNOLOGY, INC. 1416 FAST WASHINGTON AVENUE SUITE 124 MEDISON, W1 53203

GREAND WATER: 19760; W-1D PEDJECT NO. 222.04

## PURCHASE ORDER NUMBER: 12745

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

P SE/NEUTRAL FRACTION

SEMIUOLATILE COMPOUNDS

COMPUTIND NAME	MCG/L		
PHENOI	LESS	THAN	1 0
BIS(-2-CHLORDETHYL)ETHER	LESS	THAN	10
	LESS	THAN	10
	LESS	THAN	10
	LESS	THAN	10
BENZYL ALCOHOL	LESS	THAN	10
	LESS	THAN	10
	LESS	THAN	10
BIS(2-CHLOR(ISOPROPYL)ETHER	I.ESS	THAN	10
4-METHYL PHENDL	LESS	THAN	10
N-NITROSO-DI-N-PROPYLAMINE	LESS	THAN	10
HEXACHI ORDETHANE	LESS	THAN	10
NITRUBENZENE	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-CHLORDETHOXY)METHANE	LESS	THAN	10
2.4-DICHLOROPHENOL	ILESS	THAN	10
1.2.4-TRICHLOROBENZENE	LESS	THÀN	10
NAPHTHALENE	LESS	THAN	1 ព
4-CHLORDAN IL INE	LESS	THAN	10
HEXACHLOROBUTADIENE	L.ESS	THAN	] ()
4-CHLORD-3-METHYLPHENDL	LESS	THAN	10
2-METHYL NAPHTHALENE	LESS	THAN	10
HEXACHI, DRIDCYCL DPENTADIENE	LESS	THAN	10
2.4.6-TRICHLOROPHENOL	LESS	THAN	10
2,4,5-TRICHLORDPHENDL	LESS	THAN	50
2-CHLORONAPHTHALENE	LESS	THAN	1 (1

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

3301 KINSMAN BLVD. • P.O. BOX 7545 • MADISON, WISCONSIN 53707 • PHONE (608) 241-4471 • TLX 703956 HAZRAL MDS UD

MPLE NUMBER: 60904286

GREWIND WATER: 19760; W-1D PENJECT ND. 222.04

#### HASE/NEUTRAL FRACTION

(CONTINUED)

	2-NITROANILINE	LESS	THAN	50
	DIMETHYL PHTHALATE	IESS	THAN	10
	ACENAPHTHYLENE	LESS	THAN	10
	3-NITERIANILINE	LESS	THAN	51
	ACENAPHTHENE	LESS	THAN	10
	2,4-DINITROPHENOL	LESS	THAN	50
	4-NITROPHENDI	LESS	THAN	50
	DIBENZOFURAN	LESS	THAN.	10
	2,4-DINITROTOLUENE	LESS	THAN	10
	2,6-DINITROTOLUENE	I_ESS	THAN	10
ł	DÍETHYLPHTHALATE	2 J		
	4-CHUOROPHENYL-PHENYLETHER	LESS	THAN	10
-	ELUDRENE	LESS	THAN	10
•	4-NITREANILINE	I.ESS	THAN	50
	4,6-DINITRO-2-METHYLPHENDL	LESS	THAN	50
	N-NITROSODIPHENYLAMINE*(1)	L.ESS	THAN	10 -
_	4-RROMOPHENYL-PHENYLETHER	LESS	THAN	10
	HEXACHLARABENZENE	I. ESS	THAN	10
	PENTACHLOROPHENOL	LESS	THAN	50
	PHENANTHRENE	LESS	THAN	10
	ANTHRACENE	LESS	THAN	10
	DI-N-BUTYLPHTHALATE	I.ESS	THAN	10
	FLUORANTHENE	LESS	THAN	10
	PYRFNE		THAN	10
	BUTYLBENZYLPHTHALATE	LESS	THAN	10
	3,3'-DICHLOROBENZIDINE	1.ESS	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
	BENZD(B)FLUORANTHENE	LESS	THAN	10
	BENZO(K)FLUGRANTHENE	LESS	THAN	10
•	BENZO(A)PYRENE	LESS	THAN	10
	INDEND(1,2,3-CD)PYRENE	LESS	THAN	10
	D(BENZD(A,H)ANTHRACENE	LESS	THAN	10
	BENZO(G,H,1)PERYLENE	LESS	THAN	10

11 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 ZERD.

#### STICIDE/PCB FRACTION

COMPOUND NAME AI PHA-BHC BETA-BHC DFI.TA-BHC GAMMA-BHC (LINDANE) MCG/L LESS THAN 0.05 LESS THAN 0.05 LESS THAN 0.05 LESS THAN 0.05

3

PARE

3301 KINSMAN BLVD. . P.O. BOX 7545 . MADISON, WISCONSIN 53707 . PHONE (608) 241-4471 . TLX 703956 HAZRAL MDS UD

(CONTINUED)

PLE NUMBER: 60904286

GROUND WATER: 19760; W-1D PEDJECT ND. 222.04

PESTICIDE/PCB FRACTION

LESS THAN 0.05 HEPTACHLOR LESS THAN 0.05 AL DRIN LESS THAN 0.05 HEPTACHLOR EPOXIDE LESS THAN 0.05 ENDOSULFAN I LESS THAN 0.10 DIFLDRIN 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 0.50 METHOXYCHI. OR LESS THAN 0.10 ENDRIN KETONE . IESS THAN 0.50 CHLORDANE LESS THAN 1.0 TIDXAPHENE LESS THAN 0.50 PCB-1016 LESS THAN 0.50 PCB-1221 LESS THAN 0.50 PCB-1232 LESS THAN 0.50 PICB-1242 LESS THAN 0.50 PCB-1248 LESS THAN 1.0 PCB-1254 LESS THAN 1.0 PCB-1260

### THOD REFERENCES

ACID FRACTION THODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA BLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED **NCTOBER 1984)** S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, TINBER 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) ASE/NETITRAL FRACTION METHODS FOR ORBANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA BUIGATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (ŘEÚJSFD TOBER 1984) U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, DCTOBER 26, 1984) EST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

3301 KINSMAN BLVD. . P.O. BOX 7545 . MADISON, WISCONSIN 53707 . PHONE (608) 241-4471 . TLX 703956 HAZRAL MDS UD

SEPLE NUMBER: 60904286

GREWIND WATER: 19760; W-1D PREJECT NO. 222.04

METHOD REFERENCES (CONTINUED)

PESTICIDE/POB FRACTION METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PERLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OF DBER 1984)

U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OFTOBER 26, 1984) TEST METHODS FOR EVALUATING SOULD WASTE, EPA PUBLICATION NO. SW-846, SECOND

EDITION, METHOD SUBD, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PARE 4

**Chemical & BioMedical Sciences Division** 

3301 KINSMAN BLVD. . P.O. BOX 7545 . MADISON, WISCONSIN 53707 . PHONE (608) 241-4471 . TLX 703956 HAZRAL MDS UD

REPORT OF ANALYSIS

BARA CHRISTEL RESIDUALS MANAGEMENT TECHNOLOGY, INC. 1406 FAST WASHINGTON AVENUE SHITE 124 MEDISON, WI 53703

ZLETON

CONTRACTOR: 19761; R-2D

PURCHASE ORDER NUMBER: 12745

A ID FRACTION (SEE B/N FRACTION - SEMIVOLATILE COMPOUND LIST)

SEVNELITRAL FRACTION

SEMIVOLATILE COMPOUNDS

MCG/L COMPTIIND NAME LESS THAN 10 PHENNL LESS THAN 10 BIS(-2-CHLOROETHYL)ETHER LESS THAN 10 2-CHL FIROPHENOL LESS THAN 10 1,3-DICHLORUBENZENE LESS THAN 1( 1,4-DICHLOROBENZENE LESS THAN 10 BENZYL ALCOHOL LESS THAN 10 1,2-DICHLORDBENZENE LESS THAN 10 2-METHYLPHENOL LESS THAN 10 BIS(2-CHLOROISOPROPYL)ETHER LESS THAN 10 4-METHYL PHENOL LESS THAN 11 N-NITROSO-DI-N-PROPYLAMINE LESS THAN 10 HEXACHI DROFTHANE LESS THAN 10 NITROBENZENE LESS THAN 10 ISOPHORONE LESS THAN 10 2-NITROPHENOL LESS THAN 10 2,4-DIMETHYLPHENDL LESS THAN 50 BENZOIC ACID LESS THAN 10 BIS(2-CHLORDETHOXY) METHANE LESS THAN 10 2,4-DICHLOROPHENOL LESS THAN 10 1,2,4-TRICHLOROBENZENE LESS THAN 10 NAPHTHAL FNE LESS THAN 10 4-CHLORDANIL INE LESS THAN 10 HEXACHI ORDBLITADIENE LESS THAN 10 4-CHUNRN-3-METHYLPHENOL LESS THAN 10 2-METHYLNAPHTHALENE LESS THAN 10 HEXACHLOROCYCLOPENTADIENE LESS THAN 10 2,4,6-TRICHLOROPHENOL LESS THAN 50 2,4,5-TRICHLOROPHENOL LESS THAN 10 2-CHI ORONAPHTHALENE

SAMPLE NUMBER: 60904282 DATE ENTERED: 09/19/86

REPORT PRINTED: 09/30/86

ZLETON - LABORATORIES AMERICA, INC.

3301 KINSMAN BLVD. . P.O. BOX 7545 . MADISON, WISCONSIN 53707 . PHONE (608) 241-4471 . TLX 703956 HAZRAL MDS UD

### SUPLE NUMBER: 60904287

GROWND WATER: 19761; R-2D PEDJECT NO. 222.04

### HASE/NEUTRAL FRACTION

2-NITROANILINE DIMETHYL PHTHALATE ACENAPHTHYLENE 3-NITROANJI INE ACENAPHTHENE 2,4-DINITROPHENOL 4-NITROPHENOL DIRENZOFURAN 2,4-DINITRATOLUENE 2,6-DINITROTOLUENE DIFTHYI PHTHALATE 4-CHLOROPHENYL-PHENYLETHER FI HORFNE 4-NITRIANII INE 4,6-DINITRO-2-METHYLPHENOL N-NITROSODIPHENYLAMINE*(1) 4-BROMOPHENYL-PHENYLETHER HEXACHLOROBENZENE PENTACHI OROPHENOL PHENANTHRENE ANTHRALENE DI-N-BLITYL PHTHAL ATE FILLIORANTHENE -PYRFNE BUTYLBENZYLPHTHALATE 3,3'-DICHLOROPENZIDINE BENZD (A) ANTHRADENE BIS(2-ETHYLHEXYL)PHTHALATE CHRYSENE DI-N-NCTYL PHTHALATE BENZO (B) FLUORANTHENE RENZO(K)FLUORANTHENE BENZO(A)PYRENE INDEND(1,2,3-CD)PYRENE DIBENZO(A, H)ANTHRACENE BENZO(G,H, D)PERYLENE

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 ZERD.

#### TICIDE/PCB FRACTION

COMPOUND NAME AL PHA-BHC BETA-BHC DFL TA-BHC GAMMA-BHC (LINDANE) MCR/L LESS THAN 0.05 LESS THAN 0.05 LESS THAN 0.05 LESS THAN 0.05

LESS THAN 10

LESS THAN 10

PAGE 2

(CONTINUED) LESS THAN 50 IESS THAN 10 LESS THAN 10 LESS THAN 50 LESS THAN 10 LESS THAN 50 LESS THAN 50 LESS THAN 10 LESS THAN 10 LESS THAN 10 1 J LESS THAN 11 LESS THAN 10 LESS THAN 50 LESS THAN 50 LESS THAN 10 LESS THAN 10 LESS THAN 10 LESS THAN 50 LESS THAN 10 LESS THAN 10 2 J LESS THAN 10 LESS THAN 10 LESS THAN 10 LESS THAN 20 LESS THAN 10 2 J LESS THAN 10 LESS THAN 10 LESS THAN 10 LESS THAN 11 LESS THAN 10 LESS THAN 1

3

PARE

3301 KINSMAN BLVD. . P.O. BOX 7545 . MADISON, WISCONSIN 53707 . PHONE (608) 241-4471 . TLX 703958 HAZRAL MDS UD

SEPLE NUMBER: 60904287

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

PESTICIDE/PCB FRACTION

(CONTINUED)

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

#### FTHOD REFERENCES

ACID FRACTION FTHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WARTEWATER, EPA UBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED **OCTOBER 1984)** L.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, CTOBER 26, 1984) FST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984) HASE/NEUTRAL FRACTION METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA FUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (ŘEVISED TOBER 1984) . EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-4340A; OCTOBER 26, 1984) TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND DITION, METHOD 8270, U.S. FPA, WASHINGTON, DC (REVISED APRIL 1984)



3301 KINSMAN BLVD. . P.O. BOX 7545 . MADISON, WISCONSIN 53707 . PHONE (608) 241-4471 . TLX 703956 HAZRAL MDS UD

SAMPLE NUMBER: 60904287

RECEIVED WATER: 19761; R-2D PREDECT NO. 222.04

METHOD REFERENCES (CONTINUED)

ETON

FUSTICIDE/POB FRACTION METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA FUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, DH (REVISED FUBER 1984)

UTS. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)

TIST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PARE

Chemical & BloMedical Sciences Division

3301 KINSMAN BLVD. • P.O. BOX 7545 • MADISON, WISCONSIN 53707 • PHONE (608) 241-4471 • TLX 703956 HAZRAL MDS UD

#### REPORT OF ANALYSIS

HARR CHRISTEL REDIDUALS MANAGEMENT TECHNOLOGY, INC. 1406 FAST WASHINGTON AVENUE SHITE 124 MODISON, WI 53203

GENHIND WATER: 19762; C-25 PLAJECT NO. 227.04

# PURCHASE ORDER NUMBER: 12745

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

FESEZNEUTRAL FRACTION

SEMIUDI ATTLE COMPOUNDS

•			
COMPOUND NAME	MCG/L	-	
PHENOL	LESS	THAN	1 fi
	LESS	THAN	10
	I ESS	THAN	10
	LESS	THAN	10
	LESS	THAN	10
BENZYL ALCOHOL	LESS	THAN	10
1 2-DICHLOROBENZENE	LESS	THAN	10
2-METHYL PHENOL	LESS	THAN	10
BIS(2-CHLURD)SOPRUPYL)ETHER	LESS	THAN	10
4-METHYL PHENOL	LESS	THAN	10
N-NITROSO-DI-N-PROPYLAMINE	I. ESS	THAN	11
HEXACHLIDROF THANE	LESS	THAN	10
NITROBENZENE	LESS	THAN	10
I SUPHORINE	LESS	THAN	10
	LESS	THAN	10
	LESS	THAN	10
PENZDIC ACID	LESS	THAN	5(1
RIS(2-CHLORDETHOXY)METHANE	LESS	THAN	10
2.4-DICHLOROPHENOL	I ESS	THAN	ງດ
1.2.4-TRICHLINROBENZENE	LESS	THAN	10
NAPHTHALENE	LESS	THAN	1 fi
4-ICHLOROAN ULINE	LESS	THAN	10
HEXACHLOROBUTADIENE	LESS	THAN	<u> </u>
4-CHLORO-3-METHYLPHENDL	LESS	THAN	10
2-METHYLNAPHTHALFNE	I.ESS	THAN	10
HEXACHI DROCYCLOPENTADIENE	LESS	THAN	10
2.4.6-TRICHLOROPHENOL	I ESS	THAN	1 ()
2.4.5-TRICHLOROPHENOL	LESS	THAN	51)
	I.ESS	THAN	1 ()

SAMPLE	NUMPER:	60904288
DATE	ENTERED	09/19/86
REFORT	PRINTED:	09/30/86

3301 KINSMAN BLVD. . P.O. BOX 7545 . MADISON, WISCONSIN 53707 . PHONE (608) 241-4471 . TLX 703956 HAZRAL MDS UD

SAPPLE NUMBER: 60904288

GROUND WATER: 19762; C-25 DECT NO. 222.04 Pi

BASE/NEUTRAL FRACTION

2-NITROANILINF DIMFTHYL PHTHALATE ACENAPHTHYLENE 3-NITROANILINE ACENAPHTHENE 2,4-DINITROPHENOL 4-NITROPHENOL DIBENZOFURAN 2,4-DINITROTOLUENE 2,6-DINITROTOLUENE DIFTHY PHTHALATE 4-CHL OROPHENYL-PHENYLETHER **FUNDRENE** 4-NITROANILINE 4,6-DINITRO-2-METHYLPHENDL N-NITROSODIPHENYLAMINE*(1) 4-BROMOPHENYL-PHENYLETHER HEXACHLOROBENZENE PENTACHI DROPHENDL. PHENANTHRENE ANTHRACENE DI-N-BUTYLPHTHALATE FI LIDRANTHENE. PYRENE BUTYLBENZYLPHTHALATE 3,3'-DICHLORDBENZIDINE BENZO (A) ANTHRACENE BIS(2-ETHYLHEXYL)PHTHALATE CHRYSENF DI-N-NCTYL PHTHALATE BENZO(B)FLUORANTHENE RENZO(K)FLUORANTHENE BENZO(A)PYRENE INDEND(1,2,3-CD)PYRENE LESS THAN 1 LESS THAN 10 DIRENZO(A, H)ANTHRACENE LESS THAN 10 BENZO(G,H,J)PERYLENE

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 ZERD.

#### TICIDE/PCB FRACTION

MCGZL COMPOUND NAME LESS THAN 0.05 ai pha-bhc LESS THAN 0.05 RETA-RHC LESS THAN 0.05 DEL TA-RHD IESS THAN 0.05 GAMMA-RHC (LINDANE)

(CONTINUED)

LES	55	THAN	50
I F	SS	THAN	10
LES	55	HAHT	10
1 F	SS	THAN	50
LE	SS	THAN	10
1 E	SS	THAN	50
L.E.	SS	THAN	50
. L.E	SS	THAN	10
L.E.	55	THAN	10
LE	SS	THAN	11
LE	<u>55</u>	THAN	10
1.E	SS	THAN	10
LE	SS	THAN	10
1 E	SS	THAN	51
LE	SS	THAN	50
1. E	SS	THAN	1 ()
LE	55	THAN	10
1 E	SS	THAN	10
LE	SS	THAN	50
1E	SS	THAN	1 fi
LE	SS	THAN	10
1	J		
LE	SS	THAN	10
I E	SS	THAN	1.0
L.E	SS	THAN	10
L.E	ISS	THAN	<b>2</b> fi
LE	<u>SS</u>	THAN	10
3	J		
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l. E	SS	THAN	1 (
LE	ISS	THAN	10
i. E	SS	THAN	10
1F	SS	THAN	10
		TUAN	1 0

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# SA PLE NUMBER: 60904288

GREWIND WATER: 19762; C-25 PFEJECT NO. 227.04

## PESTICIDE/PCB FRACTION

(CONTINUED)

			-	
		LESS	THAN	0.05
		LESS	THAN	0.05
	UCOTACHLOR FROXIDE	LESS	THAN	0.115
		I.ESS	THAN	0.05
		LESS	THAN	0.10
		I.ESS	THAN	0.11
_	4,4 -DUE	LESS	THAN	0.10
		LESS	THAN	0.10
	FNUUSULFAN II	LESS	THAN	0.10
		I ESS	THAN	0.11
	ENDUSILEAN SULEHTE	LESS	THAN	0.10
	4,4'-1001	I ESS	THAN	0.50
		LESS	THAN	0.11
-	ENDRIN KEILINE	LESS	THAN	0.50
		LESS	THAN	1.0
		1 ESS	THAN	0.51
	P[B-1116	LESS	THAN	0.50
	PLH-1271	LESS	THAN	0.50
	PCB-1232	LESS	THAN	0.51
	PDH-1247	LESS	THAN	0.50
	PCB-1748	LESS	THAN	1.0
	PCH-1274	LESS	THAN	1.1
	PCB-1260			_ `

#### THOD REFERENCES

ACID FRACTION THODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA BLICATION ND. 600/4-82-057, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED 00108FR 1984) S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43404, DTOBER 26, 1984) TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND DITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984) BASEZNELITRAL FRACTION METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA UBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, DH (REVISED TOBER 1984) D.S. EPA METHOD 625 (FEDERAL REGISTER, VOLLIME 49, NO. 209, PG. 43385-43406, CTOBER 26, 1984) EST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND FDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)



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SEIPLE NUMBER: 60904288

GROUND WATER: 19762; C-25 PHIDECT NO. 222.04

METHOD REFERENCES (CONTINUED)

PESTICIDE/POB FRACTION METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PERLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OFTOBER 1984)

U.S. EPA METHOD 608 (FEDERAL REGISTER, UNLUME 49, NO. 209, PG. 43321-43336, DETOBER 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)

Chemical & BioMedical Sciences Division

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REPORT OF ANALYSIS

HERE CHRISTEL REGIONALS MANAGEMENT TECHNOLOGY, INC. 1406 EAST WASHINGTON AVENUE SHITE 124 MODISON, WI 53703

DUND WATER: 19763; R-4D DJECT NO. 222.04

TRCHASE ORDER NUMBER: 12745

ACTO FRACTION (SFE B/N FRACTION - SEMIVOLATILE COMPOUND LIST)

ASEZNELITRAL FRACTION

SEMIVOLATILE COMPOUNDS

MCG/L COMPOUND NAME LESS THAN 10 PHENOL LESS THAN 10 BIS(-2-CHLORDETHYL)ETHER LESS THAN 11 2-CHL CIROPHENOL LESS THAN 10 1,3-DICHLORDBENZENE LESS THAN 11 1,4-DICHLORDBENZENE LESS THAN 10 BENZYL ALCOHOL LESS THAN 10 1,2-DICHLORDBENZENE LESS THAN 10 2-METHYLPHENOL LESS THAN 10 BIS(2-CHLOROISOPROPYL)ETHER LESS THAN 10 4-METHYL PHENDL LESS THAN 11 N-NITROSO-DI-N-PROPYLAMINE LESS THAN 10 HEXACHI DROETHANE LESS THAN 10 NITROBENZENE LESS THAN 10 ISUPHORONE. LESS THAN 10 2-NITROPHENOL LESS THAN 10 2,4-DIMETHYL PHENDL LESS THAN 50 RENZOIC ACID LESS THAN 10 BIS(2-CHLORDETHOXY)METHANE LESS THAN 10 2,4-DICHLOROPHENOL LESS THAN 10 1,2,4-TRICHLORDBENZENE LESS THAN 10 NAPHTHALENE LESS THAN 10 4-CHLORDAN IL INE LESS THAN 10 HEXACHLORDBUTAD1ENE LESS THAN 10 4-CHLORD-3-METHYLPHENDL LESS THAN 10 2-METHYL NAPHTHALENE LESS THAN 10 HEXACHLOROCYCLOPENTADIENE LESS THAN 10 2,4,6-TRICHLOROPHENOL LESS THAN 50 2,4,5-TRICHLORNPHENDL LESS THAN 10 2-CHLORONAPHTHALENE

SAMPLE NUMBER: 60904287 DATE ENTERED: 09719786 REPORT PRINTED: 09730786



PAGE 2

PLE NUMBER: 61914289 S

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

BASE/NEUTRAL FRACTION

2-NITROANTLINE DIMETHYL PHTHALATE ACENAPHTHYLENE 3-NITROANIL INE ALFNAPHTHENF 2,4-DINITROPHENOL 4-NT TRIPPHENDL D 1 BENZOFURAN 2,4-DINITROTOLUENE 2,6-DINITROTOLUENE DIFTHY PHTHALATE 4-CHUOROPHENYL-PHENYLETHER FLUORFNE 4-NITR(IANILINE 4,6-DINITRO-2-METHYLPHENOL N-NITROSODIPHENYLAMINE*(1) 4-BROMUPHENYL-PHENYLETHER HEXACHLORGBENZENE PENTACHI OROPHENOL PHENANTHRENE ANTHRACENE DI-N-BUTYL PHTHALATE FLUORANTHENE PYRFNE BUTYLBENZYL PHTHALATE 3,3'-DICHLORDBENZIDINE BENZO (A) ANTHRACENE BIS(2-ETHYLHEXYL)PHTHALATE CHRYSENE DI-N-DCTYL PHTHALATE BENZO(B)FLUDRANTHENE BENZO(K)FLUORANTHENE BENZO (A) PYRENE INDEND(1,2,3-CD)PYRENE DIBENZO(A,H)ANTHRACENE BENZO(G,H,I)PERYLENE

(CONTINUED)

LESS THAN 50
LESS THAN 10
LESS THAN 10
LESS THAN 50
LESS THAN 10
LESS THAN 50
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LESS THAN 10
LESS THAN 10
LESS THAN 10

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 AL PHA-BHC BETA-BHC DFL TA-BHC GAMMA-BHC (LINDANE) MCGZL LESS THAN 0.05 LESS THAN 0.05 LESS THAN 0.05 LESS THAN 0.05

. 1

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PAGE 3

SPEPLE NUMBER: 60904289

GROUND WATER: 19763; R-4D PF**E**JECT NO. 222-04

## PESTICIDE/PCB FRACTION

(CONTINUED)

		LESS THAN 0.05
	HEPTACHLOR	LESS THAN 0.05
-	ALDRIN	IESS THAN 0.05
_	HEPTACHLOR EPOXIDE	
	ENDOSULEAN I	
	DIFLORIN	
	4 4' - DDE	LESS THAN 0.10
-		LESS THAN U.IU
		LESS THAN 0.10
		LESS THAN 0.10
		LESS THAN 0.10
	ENDUSULIAN SULPAIL	LESS THAN 0.10
	4,4!-001	LESS THAN 0.50
-	METHOXYCHI UR	LESS THAN 0.10
	ENDRIN KETUNE	LESS THAN 0.51
	CHLORDANE	LESS THAN 1.0
	TITXAPHENE	LESS THAN 0.50
	PCB-1016	1 ESS THAN 0.51
	PCB-1221	LESS THAN 0.51
	PCB-1232	LEAS THAN 0 50
-	PCB-1242	
	PCB-1248	LESS THAN U.90
	PCB-1254	LESS THAN 1.0
	DCD_1260	LESS THAN 1.1

#### THOD REFERENCES

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

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PARF 4

PLE NUMBER: 60904289 SA

GROUND WATER: 19763; R-4D PREJECT NO. 227-04

# METHOD REFERENCES (CONTINUED)

PESTICIDE/PCB FRACTION METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WARTEWATER, EPA PERLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REUISED U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43391-43336,

TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD BUBD, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

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REPORT OF ANALYSIS

RERA CHRISTEL SIDUALS MANAGEMENT TECHNOLOGY, INC. R 1406 FAST WASHINGTON AVENUE SHITE 124 DISON, WI 53283

NUND WATER: 19764; FIELD BLK F DIECT NO. 222.04

PURCHASE ORDER NUMBER: 12745

ATID FRACTION (SEE BAN FRACTION - SEMIVOLATILE COMPOUND LIST)

SEZNELITRAL FRACTION

SEMIVOLATILE COMPOUNDS

MCG/I COMPTILIND NAME IFSS THAN 11 PHENOL LESS THAN 10 BIS(-2-CHLORDETHYL)ETHER LESS THAN 11 2-CHUDROPHENOL LESS THAN 10 1,3-DICHLORDBENZENE LESS THAN 10 1,4-DICHLORDBENZENE LESS THAN 10 BENZYI ALCOHOL LESS THAN 10 1,2-DICHLORDBENZENE LESS THAN 10 2-METHYL PHENOL. LESS THAN 10 BIS(2-CHLOROISOPROPYL)ETHER LESS THAN 10 4-METHYLPHENOL LESS THAN 10 N-NITROSO-DI-N-PROPYLAMINE LESS THAN 10 HEXACHI ORDETHANE LESS THAN 10 NTTRUBENZENE LESS THAN 10 I SUPHORONE LESS THAN 10 2-NITROPHENOL LESS THAN 10 2,4-DIMETHYLPHENOL LESS THAN 50 BENZOIC ACID LESS THAN 10 BIS(2-CHLOROETHOXY)METHANE LESS THAN 11 2,4-DICHLOROPHENOL LESS THAN 10 1,2,4-TRICHLOROBENZENE IESS THAN 10 NAPHTHAI ENE LESS THAN 10 4-CHLORDANILINE IESS THAN 10 HEXACHLOROBUTADIENE LESS THAN 10 4-CHLORD-3-METHYLPHENOL I FSS THAN 10 2-METHYL NAPHTHAL FNE LESS THAN 10 HEXACHLOROCYCLOPENTADIENE LESS THAN 10 2,4,6-TRICHLOROPHENOL LESS THAN 50 2,4,5-TRICHLOROPHENOL LESS THAN 10 2-CHLORONAPHTHALENE

SAMPLE NUMBER: 60904290 DATE ENTERED: 09/19/86

REPORT PRINTED: 09/30/86

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SA PLE NUMBER: 60904290

RELIND WATER: 19764; FIELD BLK Print nn. 229.04

HASE/NELITRAL FRACTION

(CONTINUED)

· · · · · ·	LESS THAN 50
2-NITROANIL INE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
	LESS THAN 51
3-NITRANILINE	LESS THAN 10
ACENAPHTHENE	LESS THAN 50
2,4-DINITROPHENOL	LESS THAN 50
4-NTTRIPHENNI.	LESS THAN 11
DIRENZOFURAN	IESS THAN 10
2,4-DIN(TROTOLUENE	ESS THAN 10
2,6-DINITROTOLIIFNE	1 7
DIFTHY PHTHALATE	LES THAN 10
4-CHLOROPHENYL-PHENYLETHER	LESS THAN 10
FLUORFNE	1000 THAN 50
4-NITRANILINE	1 55 THAN 50
4,6-DINITRO-2-METHYLPHENOL	LEDD THAN 10
N-NITROSODIPHENYLAMINE*(1)	LEOS THON 10
4-BROMOPHENYL_PHENYLETHER	LESS THAN 10
HEXACHLOROBENZENE	
PENTACHI.OROPHENOL	LESS THAN 10
PHENANTHRENE	LESS THAN 10
ANTHRAILENE	LESS (MAIN 10
DI-N-BUTYLPHTHALATE	1 J
FLUDRANTHENE	
PYRENE	
BUTYL BENZYL PHTHAL ATE	LESS THAN TO
3 3 -DICHI OROBENZIDINE	IFSS THAN 20
BENZO(A)ANTHRACENE	LESS THAN IN
BIS(2-ETHYLHEXYL)PHTHALATE	2 J
	LESS THAN 10
DI-N-OCTYL PHTHALATE	IFSS THAN 1
BENZO(B)FLUORANTHENE	LESS THAN 10
PENZO(K) FLUORANTHENE	LESS THAN 11
RENZO(A) PYRENE	LESS THAN 10
INDEND(1.2.3-CD)PYRENE	IESS THAN 10
DIBENZILLA HIANTHRACENE	LESS THAN 10
BENZO(G.H.I)PERYLENE	IFSS THAN 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

COMPOUNDNAMEMCG/LAL PHA-BHCLESS THAN 0.05BETA-BHCLESS THAN 0.05DFL TA-BHCLESS THAN 0.05GAMMA-BHC (LINDANE)LESS THAN 0.05

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PAGE

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PLE NUMBER: 60904290

RRAIND WATER: 19764; FIELD BLK PELIERT ND. 222.04

PESTICIDE/PCB FRACTION

(CONTINUED)

	LESS THAN 0.05
HEPTACHLOR	LESS THAN 0.15
ALDRIN	
HEPTACHLOR EPOXIDE	
ENDOSILEAN I	1F55 THON 0 10
DIFLORIN	
4_4'-DDE	1155 THAN 0.10
E ENDRIN	LESS THEN U.L.
ENDRISHLEAN II	LESS THAN U.II
	LESS THAN 0.10
ENDOSULEAN SULEATE	LESS THAN 0.11
	LESS THAN 0.10
	LESS THAN 0.51
	LESS THAN 0.10
	LESS THAN 0.50
	LESS THAN 1.0
	LESS THAN 0.50
PCB-1016	LESS THAN 0.58
PICR-1221	LESS THAN 0.51
PCB-1232	LESS THAN 0.50
PCR-1242	LESS THAN 0.50
PCB-1248	LCCS THON 1.0
PI:8-1254	$L_{L,AA}$ (LECE THAN 1. (
PCB-1260	1833 1088 1 P

#### FTHOD REFERENCES

BCID FRACTION
FTHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA
FTHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA
FUBLICATION ND. 600/4-82-057, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
S. EPA METHOD 625 (FEDERAL REGISTER, UGLUME 49, NO. 209, PG. 43385-43406, SECOND
FEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION ND. SW-846, SECOND
FDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)
BASEZNEUTRAL FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA
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METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA
METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, NOTOBER 26, 1984)
METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND FOITION, METHOD 8270, U.S. FPA, WASHINGTON, DC (REVISED APRIL 1984)


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MPLE NUMBER: 60904290

GROUND WATER: 19764; FIELD BLK Reduient NO. 272.04

METHOD REFERENCES (CONTINUED)

PESTICIDE/POB FRACTION METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PEBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED DITOBER 1984)

U.S. EPA METHOD 608 (FEDERAL REGISTER, UDLIME 49, NO. 209, PG. 43321-43336, DETOBER 26, 1984)

EST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND FOITION, METHOD BOBD, U.S. FPA, WASHINGTON, DC (REVISED APRIL 1984)

PAGE 4

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REPORT OF ANALYSIS

RERE CHRISTEL REALDHALS MANAGEMENT TECHNOLOGY, INC. 1406 FAST WASHINGTON AVENUE SHITE 124 MEDISON, WI 53203

COUND WATER: 19765; TRIP BLK PEDJECT NO. 222.04

PURCHASE ORDER NUMBER: 12745

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

F SEZNEUTRAL FRACTION

SEMIUNLATILE COMPOUNDS

	•
COMPOUND NAME	MCG/L
PHENOI	IFSS THAN 14
BUS(-2-CHUDRDETHYL)ETHER	LESS THAN 10
	IESS THAN 10
	LESS THAN 10
1 A-DICHLORGBENZENE	IFSS THAN 10
	LESS THAN 10
	IFSS THAN 10
	LESS THAN 10
BIS(2-CHI ORDISCIPROPYL)ETHER	LESS THAN 11
	LESS THAN 10
	IFSS THAN )(
	LESS THAN 10
NITROBENZENE	LESS THAN 10
tenpunpink	LESS THAN 10
	1 ESS 1 HAN 10
	LESS THAN 10
	IFSS THAN 50
	LESS THAN 10
	LESS THAN 10
1 2 4-TRICHLOROBENZENE	LESS THAN 10
	IESS THAN 10
	LESS THAN 10
	IFSS THAN 11
	LESS THAN 10
	LESS THAN 10
	LESS THAN 10
	LESS THAN 11
	LESS THAN 50
	LESS THAN 10

SAMPLE	NUMBER	6119114291
DATE E	INTERED:	09719786
REPORT F	PRINTED	09/30/86

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SETPLE NUMBER: 60904291

GROUND WATER: 19765; TRIP BLK PUNJECT ND. 222.04

BASEZNELITRAL FRACTION

(CONTINUED)

2-NITROANIL INF	LESS THAN 50
	(ESS THAN 1)
ALENAPHTHYLENE	LESS THAN 10
3-NITROANILINE	LESS THAN 50
ACENAPHTHENE	LESS THAN 10
2 4-DINITROPHENOL	LESS THAN 50
4-NITROPHENOL	LESS THAN 50
DIBENZOFURAN	IFSS THAN 10
2.4-DINITRITOLUENE	LESS THAN 10
2 6-DINITROTOLUENE	LESS THAN 10
DIETHYLPHTHALATE	LESS THAN 10
4-CHI OROPHENYL-PHENYLETHER	LESS THAN 10
FLUORENE	LESS THAN 10
	LESS THAN 50
4 6-DINITRO-2-METHYLPHENOL	LESS THAN 50
N_NITROSODIPHENYLAMINE*(1)	LESS THAN 10
4-BROMOPHENYL-PHENYLETHER	LESS THAN 10
HEXAL'HI ORLIBENZENE	LESS THAN 10
	LESS THAN 50
PHENANTHRENE	LESS THAN 10
ANTHRALIENE	LESS THAN 10
DI-N-BUTYL PHTHALATE	1 3
FLUDRANTHENE	LESS THAN 10
PYRENE	LESS THAN 10
BUTYLBENZYLPHTHALATE	LESS THAN 10
3.3'-DICHLOROBENZIDINE	LESS THAN 20
BENZD(A)ANTHRACENE	LESS THAN 10
BIS(2-ETHYLHEXYL)PHTHALATE	IFSS THAN 10
CHRYSENE	LESS THAN 10
DI-N-DCTYL PHTHALATE	LESS THAN 10
BENZO(B)FLUORANTHENE	LESS THAN 10
BENZO(K)FLUORANTHENE	IFSS THAN 10
BENZO(A)PYRENE	LESS THAN 10
INDEND(1,2,3-CD)PYRENE	IESS THAN 10
DIBENZO(Á, H)ANTHRACENE	LESS THAN 10
BENZO(G,H, I)PERYLENE	IESS THAN 11

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 ZERD.

STICIDE/PCB FRACTION

COMPOLINO NAME AL PHA-BHC HETA-RHC DEL TA-BHC GAMMA-RHC (LINDANE)

MICIG/L LESS THAN 0.05 LESS THAN 0.05 LESS THAN 0.05 LESS THAN 0.05 PARE

2

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PAGE

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BUTPLE NUMBER: 60904291

REDIND WATER: 19765; TRIP BLK Penject ND, 222.04

PESTICIDE/PCB FRACTION

(CONTINUED)

HEPTACHLOR	LESS	THAN	<b>n.</b> 05
ALDRIN	I ESS	THAN	0.05
HEPTACHURR FPOXIDE	LESS	THAN	0.05
ENDOSULEAN 1	I.ESS	THAN	0.05
DIFLORIN	LESS	THAN	0.10
	LESS	THAN	0.10
	LESS	THAN	0.10
ENDOSH FON II	I ESS	THAN	0.10
	LESS	THAN	0.10
ENDOSULEAN SULFATE	LESS	THAN	0.10
	LESS	THAN	0.10
	LESS	THAN	0.50
	LESS	THAN	0.11
	1 FSS	THAN	0.50
	LESS	THAN	1.0
	LFSS	THAN	0.50
FLD-1910	LESS	THAN	0.50
DCD 1939	I FSS	THAN	0.50
	LESS	THAN	0.51
FINT-1444 DCD 1970	LESS	THAN	0.50
	LESS	THAN	1.0
	LESS	THAN	1.0
r PUB-1760			

#### THOD REFERENCES

ALID FRACTION THODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA HBLICATION NO. KAAZ4-82-757, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984) S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, TUBER 26, 1984) TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. 54-846, SECOND EDITION, METHOD 8270, U.S. FPA, WASHINGTON, DC (REVISED APRIL 1984) BASEZNELITRAL FRANTION METHODS FOR ORBANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WAS TEWATER, EPA BEILGATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (ŘEVISED (TOBER 1984) U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, CTORFR 26, 1984) EST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND FOITION, METHOD 8220, H.S. FPA, WASHINGTON, DC (REVISED APRIL 1984)



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SPERIE NUMBER: 60904291

PAGE 4

GROUND WATER: 19765; TRIP BLK PHEJECT NO. 227.04

# 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 (REVISE) OFTOBER 1984)

U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OFTOBER 26, 1984)

TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED AFRIL 1984) HALLELUN LABORATORIES AMERICA, INC.

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TABULAR LISTING OF REPORTS ENCLOSED

PAGE: 1

GERAGHTY AND MILLER

PRINTED DN: 10/24/86

PURCHASE ORDER NUMBER: PROJ. NO. E1042WA1

STPLE DATE   N IBER SAMPLE DESCRIPTION   61 0308 GROUNDWATER: GM4S; 9/24/86   61 10/01/86 HSL SEMI-VOLATILES; PESTICIDE/PCB'S   61 0309 GROUNDWATER: GM4D; 9/24/86   10/01/86 HSL SEMI-VOLATILES; PESTICIDE/PCB'S   10/01/86 HSL SEMI-VOLATILES; PESTICIDE/PCB'S	
61 0308 GROUNDWATER: GM4S; 9/24/86 61 000309 GROUNDWATER: GM4D; 9/24/86 10/01/86 HSL SEMI-VOLATILES; PESTICIDE/PCB'S 10/01/86 HSL SEMI-VOLATILES; PESTICIDE/PCB'S	
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REPORT OF ANALYSIS

LORIN HUNTOON GERAGHTY AND MILLER 3 EAST MICHIGAN STREET SUITE 200 MILWAUKEE, WI 53202

GROUNDWATER: GM4S; 9/24/86

PURCHASE ORDER NUMBER: PROJ. NO. E1042WA1

A D FRACTION

SEE B/N FRACTION - SEMIVOLATILE COMPOUND LIST)

BE/NEUTRAL FRACTION

.

SEMIVOLATILE COMPOUNDS

Ľ	LUMPUUNU NAME	I FSS	THAN	10
	PHENUL	1 555	THAN	10
1		1 555	THAN	10
		1 595	THAN	10
-	1,3-DICHLURUBENZENE		THAN	10
	1,4-DILHLURUBENZENE	LESS	THAN	10
	BENZYL ALLUHUL	I ESS	THAN	10
l	1,2-DILHLURUBENZENE	I FSS	THAN	10
_		LESS	THAN	10
	A METUNI DUENOL	LESS	THAN	10
	A NITROCO DI N RECEVI AMINE	LESS	THAN	10
		I ESS	THAN	10
t		LEGG	THAN	10
	NI I RUBENZENE	LESS	THAN	10
-		LESS	THAN	10
			THAN	10
	2,4-DIMETHILMENUL		THAN	50
	BENZUIL ALIU	LESS	THAN	10
		LESS	THAN	10
	2,4-DICHLURUPHENUL	LESS	THAN	10
	1,2,4-TRICHLURUBENZENE	LESS	THAN	10
		LESS	THAN	10
			THAN	10
		LESS	THAN	10
			THAN	10
			THAN	10
			THAN	10
ŀ	2,4,6-IRICHLURUPHENUL			50
	2,4,5-TRICHLOROPHENUL	LESS	TUAN	20
	2-CHLORONAPHTHALENE	LESS	IHHN	τU

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

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SF TLE NUMBER: 61000308

GADUNDWATER: GM45; 9/24/86

BE NEUTRAL FRACTION

(CONTINUED)

_	2-NITRDANILINE	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
φ.	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
	BÉNZO(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
l	BENZO(A)PYRENE	LESS	THAN	10
	INDEND(1,2,3-CD)PYRENE	LESS	THAN	10
	DIBENZO(A,H)ANTHRACENE	LESS	THAN	10
	BENZO(G,H,I)PERYLENE	LESS	THAN	10

) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

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 ALPHA-BHC BETA-BHC <u>MCG/L</u> LESS THAN 0.05 LESS THAN 0.05 PAGE 2

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SE TLE NUMBER: 61000308

DUNDWATER: GM4S; 9/24/86

#### STICIDE/PCB FRACTION

(CONT	INUED)
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	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	THẠN	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	0.90
I	PCB-1232	LESS	THAN	0.50
-	PCB-1242	LESS	THAN	0.50
	PCB-1248	LESS	THAN	0.90
	PCB-1254	LESS	THAN	1.0
	PCB-1260	LESS	THAN	Ι.υ

# HETHOD REFERENCES

FRACTION

MUTHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED GETOBER 1984)

US. 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 EVITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

21 L

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SE 'LE NUMBER: 61000308

GUNDWATER: GM4S; 9/24/86

#### 1ETHOD REFERENCES (CONTINUED)

BEE/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 DTOBER 1984) JUS. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, DCTOBER 26, 1984) TOT METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND E ITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984) POSTICIDE/PCB FRACTION METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA POBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED

DCTOBER 1984) JES. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, DETOBER 26, 1984)

TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND TITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

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REPORT OF ANALYSIS

LORIN HUNTOON GERAGHTY AND MILLER 12 EAST MICHIGAN STREET SUITE 200 MILWAUKEE, WI 53202

GROUNDWATER: GM4D; 9/24/86

PURCHASE ORDER NUMBER: PROJ. NO. E1042WA1

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

SE/NEUTRAL FRACTION

SEMIVOLATILE COMPOUNDS

•			
COMPOUND NAME	MCG/L	<b>1</b>	
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-CHLORDISOPROPYL)ETHER	LESS	THAN	10
4-METHYLPHENOL	LESS	THAN	10
N-NITROSO-DI-N-PROPYLAMINE	LESS	THAN	10
HEXACHLORDETHANE	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-CHLORDANILINE	LESS	THAN	10
	LESS	THAN	10
4-CHLORO-3-METHYLPHENOL	LESS	THAN	10
2-METHYLNAPHTHALENE	LESS	THAN	10
HEXACHLOROCYCLOPENTADIENE	LESS	THAN	10
	LESS	THAN	10
	LESS	THAN	50
	LESS	THAN	10
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SAMPLE	E NUMBER:	61000309
DATE	ENTERED	10/01/86
REPORT	PRINTED:	10/24/86

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LE NUMBER: 61000309

GROUNDWATER: GM4D; 9/24/86

#### d SE/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	
HEXACHLORDBENZENE	LESS	THAN	10	
PENTACHLOROPHENOL	LESS	THAN	50	
PHENANTHRENE	LESS	THAN	10 -	
ANTHRACENE	LESS	THAN	10	
DI-N-BUTYLPHTHALATE	LESS	THAN	10	
FLUDRANTHENE	LESS	THAN	10	
PYRENE	LESS	THAN	10	
BUTYLBENZYLPHTHALATE	LESS	THAN	10	
3,3'-DICHLOROBENZIDINE	LESS	THAN	20.	
BÉNZO(A)ANTHRACENE	LESS	THAN	10	
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	
INDEND(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.

INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE 131 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 ALPHA-BHC BETA-BHC

MCG/L LESS THAN 0.05 LESS THAN 0.05

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SF `LE NUMBER: 61000309

DUNDWATER: GM4D; 9/24/86

### STICIDE/PCB FRACTION

(CONTINUED)

#### ETHOD REFERENCES

CID FRACTION ETHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCINNATI, OH (REVISED CTOBER 1984)

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 DITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

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SANTLE NUMBER: 61000309

SRUNDWATER: GM4D; 9/24/86

#### 1ETHOD REFERENCES (CONTINUED)

BA E/NEUTRAL FRACTION 1ETHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED DCEDBER 1984) J. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406,

CTOBER 26, 1984)

ENT METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND DEFION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PESTICIDE/PCB FRACTION

1E HODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION ND. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED CTOBER 1984)

J. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, CHDBER 26, 1984)

TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDNTION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PAGE

#### 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 CaC0 ₃	20.	32.	x	211.	56.		120.	61.	38.	35.	44.	43.	83.	65.	47.	<b>X</b> .	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/1	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/1 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	<b>X</b> ,
K, mg/1	1.5	2.6	Χ.	12.1	2.3		3.5	x	3.5	4.7	6.4	<b>X</b> :.	6.1	6.0	3.5	3.0	. <b>X</b>
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/1	0.005			0.025		0.024						ı	1				

X = Analyzed but not detected

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222.04 906:RPT:foley1223A

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### APPENDIX F

# LABORATORY SHEETS FOR VOC DATA



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 Heused

Mary C. Christie Heuser Instrumentation Chemist

MCCH/ls

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



. ·	v	RMT X Analysis	s (ug/l)			
	Detection	W-91 9-16-86	M-10 9-15-86	GM-15 9-16-86	GM-2S 9-15-86	C-3S 9-17-86
Carbon Tetrachloride	Ø.1	x	x	, <b>x</b>	x	108.
chloroform	Ø.1	x	x	0.3	x	47.5
1.2-Dichloroethane	Ø.3	x	x	x	x	X
1,2-Dichloroethylene	Ø.3	x	x	· <b>X</b>	, <b>X</b>	x
r,z=bicniethane	Ø.2	x	x	x	X	х
Tetrachloroethylene	Ø.1	x	x	x	x	Ø.3
	Ø.1	x	x	x	, <b>x</b>	Ø.1
1 1 1 - mrichloroethane	Ø.1	X	x	x	<b>X</b> .	. <b>X</b>
		x	x	x	x	8.3
Trichloroechylene	ο. <u>τ</u> 5 α	x	×	x	x	x
Analytical No.	2 • U	21944	21946	21947	21950	21954

# X = Analyzed but not detected

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RMT VOC Analysis (ug/l)

	Detection Limit	C-45 9-17-86	C-4D 9-17-86	C-65 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
nichloromethane	Ø.2	x	x	x	x	x
Tetrachloroethylene	Ø.1	5.8	x	Ø.2	x	x
	Ø.1	x	Ø.2	x	x	x
1 1 1-mrichloroethane	Ø.1	×	Ø.1	x	28.0	x
T,T,T=TTCHTOLOCCHENT	Ø.1	2.5	41.9	x	10.5	Ø.1
Trichioroeulyiene	2.0	x	x	x	x	x
Analytical No.		21955	21958	21961	21962	21963



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## Table 3

RMT VOC Analysis (ug/1)

	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	Ø.1	x	x	x	X	x
Chloroform	Ø.1	X	· <b>X</b>	x	x	2.1
1 2-pichloroethane	Ø.3	x	x	x	x	x
1,2-Dichloroethylene	Ø.3	x	x	x	x	x
nichloromethane	ø.2	x	· <b>x</b>	x	x	X
metrachloroethylene	Ø.1	x	x	x	x	Ø.2
moluene	Ø.1	x	X	x	x	x
1 1 1_mrichloroethane	Ø.1	x	x	x	x	x
T,T,T=TTTetttolocent	Ø.1	x	Ø.1	x	Ø.1	x
Trichloroediyrene	2.0	X	×	x	x	x
Analytical No.		21965	21967	21976	21979	21982



RMT VOC Analysis (ug/l)

	Detection Limit	R-2S 9-16-86	R-35 9-16-86	R-3D 9-16-86	W-31 9-15-86	W-3D 9-15-86
Carbon Tetrachloride	Ø.1	x	x	x	x	x
Chloroform	ø.1	x	x	Ø.9	x	x
1,2-Dichloroethane	Ø.3	×	x	<b>X</b> :	- X	x
1,2-Dichloroethylene	Ø.3	14.4	4.7	Ø.4	x	x
Dichloromethane	Ø.2	x	x	x	x	×
Tetrachloroethylene	Ø.1	X	X	x	x	x
Toluene	Ø.1	X	x	x	x	x
1,1,1-Trichloroethane	Ø.1	x	x	Ø.1	x	x
Trichloroethylene	Ø.1	29.2	49.7	4.4	x	x
Vinyl Chloride	2.0	x	×	x	X	x
Analytical No.		21985	21988	· 21991	21994	21995



RMT VOC Analysis (ug/l)

	Detection Limit	W-45 9-15-86	W-4D 9-15-86	W-75 9-15-86	Blk 9-16-86	Field Blank 9-17-86	Trip Blank
Carbon Tetrachloride	Ø.1	x	x	x	x	X	<b>X</b> .
Chloroform	Ø.1	Ø.2	x	Ø.1	· <b>X</b>	x	x
1,2-Dichloroethane	Ø.3	x	x	x	x	x	x
1,2-Dichloroethylene	Ø.3	x	x	x	x	x	x
Dichloromethane	Ø.2	x	x	x	x	´ X	x
Tetrachloroethylene	.0.1	x	x	x	x	x	X
Toluene	Ø.1	x	x	Ø.2	x	Ø.1	x
1,1,1-Trichloroethane	Ø.1	x	x	x	Ø.2	Ø.2	x
Trichlorœthylene	Ø.1	18.8	1.4	62.9	x	X	. <b>X</b>
Vinyl Chloride	2.0	x	x	x	x	x	X
Analytical No.		21996	21997	21998	21999	22003	22004



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RMT VOC Analysis (ug/l)

	Detectopm Limit	M-6 9-16-86
Carbon Tetrachloride	Ø.5	x
Chloroform	Ø.5	<b>X</b>
1,2-Dichloroethane	1.5	x
1,2-Dichloroethylene	1.5	2.0
Dichloromethane	1.0	x
Tetrachloroethylene	0.5	x
Toluene	Ø.5	x
1,1,1-Trichloroethane	Ø.5	x
Trichloroethylene	Ø.5	226.
Vinvl Chloride	10.0	x
Analytical No.		21945



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

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X = Analyzed but not detected

ENVIRONMENTAL & ENERGY SYSTEMS



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		2	0			
	V	RMT C Analysis	s (ug/1)	-What o		
	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	х		
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	х		
1,1,1-Trichloroethane	5.0	x	x	x		
Trichloroethylene	5.0	2,835.	1,135.	3,185.		
Vinyl Chloride	100.	<b>X</b>	x	x		
Analytical No.		21966	<b>21</b> 97Ø	21976		