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ERP

MONTGOMERY WATSON

May 23, 1997

Ms. Pamela A. Mylotta
Wisconsin Department of Natural Resources
4041 North Richards Street
P.O. Box 12436
Milwaukee, WI 53212

Re: Air Sparge/Soil Vapor Extraction Pilot Test and Off-Site Investigation Results
Wiscraft Facility
5316 West State Street
Milwaukee, Wisconsin

Dear Ms. Mylotta:

The purpose of this letter is to summarize the results of the recent air sparging (AS)/soil vapor extraction (SVE) pilot test, off-site investigation, and groundwater sampling activities for the above referenced site (Figure 1). The AS/SVE pilot test was conducted February 6, 1997 to assist in the evaluation of remedial technologies for the site. As part of the off-site investigation, Montgomery Watson installed three monitoring wells on the Steigerwald property, on February 3, 1997, to determine the extent of soil and groundwater contamination. During February and March 1997, groundwater samples were collected from the on-site and off-site monitoring wells to determine volatile organic compound (VOC) concentrations in the groundwater. The three new monitoring wells were sampled on February 19, 1997 and the existing site monitoring wells were sampled on March 12, 1997. Groundwater elevations were collected from all monitoring wells on April 9, 1997. Results and conclusions of the activities are summarized below.

PILOT TEST RESULTS

The AS/SVE pilot test was conducted to determine the feasibility and design requirements for implementing an AS/SVE system for groundwater and soil remediation at a site. Key parameters in assessing the feasibility of an AS/SVE system include evaluating the extent of oxygenation of the groundwater by AS, the response of the subsurface formation to applied vacuum by SVE, and if an AS/SVE system will meet the remedial objectives for the site. Site specific factors that could affect the remedial design include subsurface geologic material and stratigraphy, groundwater and soil vapor flow pathway variations, surface cover material, underground utility lines and structures, and air flow rate, pressure, and depth.

The existing recovery well, RW01, was used as the vapor extraction point for the SVE portion of the test. Depth to groundwater measured in RW01 on February 6, 1997 was 7.89 feet below ground surface. This allowed for approximately 4.2 feet of exposed screen in the vadose zone for extraction. The air sparge point (AS01) was installed to a total depth of 16 feet with a 3 foot screen. The AS point was placed approximately 13 feet from RW01 and in close proximity to

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other existing monitoring wells (MW07, MW10, and MW11) that were utilized as monitoring points during the pilot test to determine AS/SVE effectiveness (Figure 2).

The pilot test was conducted in three phases. During the first phase, SVE vacuum was applied to RW01 with a regenerative blower. Negative pressure was monitored in several monitoring wells (MW04, MW06, MW07, MW09, MW10, and MW11) at differing radial distances from RW01 (Figure 2). In the second phase, the SVE vacuum blower was switched off and air was introduced below the water table through AS01 by an air compressor. Groundwater elevations, dissolved oxygen (DO) concentrations, pressure, and temperature were monitored in the neighboring monitoring wells during this phase. During the third phase, SVE vacuum was applied to RW01 while air sparging in AS01 also occurred. Off-gas concentrations, groundwater elevations, DO concentrations, pressure, and temperature were monitored in the neighboring monitoring wells.

Phase I: Soil Vapor Extraction

The first phase of the AS/SVE field test consisted of operation of SVE only. Soil vapor extraction is a technology that extracts volatile contaminants from soils. Vacuum is applied to the soil formation in order to mobilize air within the vadose zone and volatilize contaminants present in the soil and transport the vapors through the extraction points to the discharge. The effectiveness of the technology is measured by determining the extent and magnitude of potential flow pathways of vapors in the subsurface, and by estimating the effective area (radius) of influence that can be expected from each vapor extraction point, or vent well. The amount of mass removal achieved is also of concern. This information is obtained by collecting vacuum data at surrounding wells and air samples from the SVE exhaust.

A regenerative vacuum blower connected to RW01 was used to extract soil vapor at a rate of approximately 105 standard cubic feet per minute (scfm) at a negative pressure of approximately 16 inches of water (in. H_2O). During the SVE test, vacuum (negative pressure) was monitored at the wells surrounding the vapor extraction point, using a magnehelic gauge, to determine the subsurface vacuum distribution. After approximately 1 hour, the formation stabilized and negative pressure was measured at monitoring wells MW07 at 1.2 in. H_2O, MW10 at 0.5 in. H_2O, and MW11 at 0.3 in. H_2O.

The experimental radius of influence was then determined by plotting the normalized vacuum data as a function of distance from the soil vapor extraction point (RW01) to the measured wells, and plotting a best-fit line (using regression analysis of the data). As described in the WDNR SVE design guidance document, the distance which corresponds to a percentage (1%) of the negative pressure at RW01 is used to arrive at the experimental radius of influence for a site in terms of vacuum. The experimental radius of influence at the Wiscraft Facility, based on 1% of source vacuum, is approximately 43 feet (Figure 3).

Off-gas concentrations from the SVE blower exhaust were monitored during this phase of the test. Organic vapor concentrations measured with the photoionization detector were approximately 3.5 ppm. An air sample was collected from the SVE exhaust and submitted for analysis of total volatile organic compounds (VOCs). The analytical results and emission

calculations for total VOCs and vinyl chloride are attached in Appendix A. The results of the sampling and PID readings indicate a mass removal of VOCs is occurring through the use of SVE. Concentrations of cis-1,2-dichloroethene (3 µg/L), trichloroethene (5 µg/L), and tetrachloroethene (22 µg/L) were detected. No detectable concentration of vinyl chloride (<1 µg/L) was detected. The calculated emission rates of total VOCs and vinyl chloride, based on the analytical results and SVE blower flow rate, are 0.012 lbs/hr and 3 lbs/yr, respectively.

Phase II: Groundwater Oxygenation (Air Sparging Only)

An air sparging test was conducted during the second phase of the pilot test. Air sparging is a process in which a gas containing oxygen (commonly air) is injected into groundwater through injection wells. As the injected air rises to the water table, it can strip VOCs from groundwater and the capillary fringe area. The process also increases dissolved oxygen concentrations in the groundwater and potentially enhances the biodegradation of contaminants that degrade aerobically. The effectiveness of air sparging is measured by monitoring the change in dissolved oxygen concentrations in surrounding monitoring wells and the effects (fluctuations) on the water table elevation.

Air was injected at a rate of 10 scfm at a pressure of 7.0 to 8.0 pounds per square inch (psi) into well AS01. Groundwater oxygenation was determined by monitoring dissolved oxygen concentrations and observing active aeration (bubbling) activity in the monitoring wells adjacent to AS01. Increases in dissolved oxygen were noticed in RW01 (7.5 ppm), MW07 (3 ppm), and as far away as MW10 (3.5 ppm), which is approximately twenty-five feet away from the AS well (Figure 4). Groundwater elevations were raised 2 to 2.5 feet in the neighboring monitoring wells (Figure 5). Visual observation of extreme bubbling in monitoring wells RW01 and MW07 was further evidence of oxygenation of groundwater. Active aeration of the groundwater was also observed in monitoring wells MW10 and MW11 during the pilot test.

Phase III: Combined Soil Vapor Extraction and Air Sparging

After operation of the air sparging test at AS01, as discussed above, the regenerative SVE vacuum blower was connected to RW01 and restarted to test the effect of soil vapor extraction and air sparging combined. In an engineered system, soil vapor extraction and air sparging are used simultaneously to strip VOCs from the soil and groundwater while providing oxygen to aid in aerobic degradation and remove contaminated soil vapors from the vadose zone.

An air sample was collected from the SVE exhaust and submitted for laboratory analysis of VOCs. The analytical results and emission calculations are attached in Appendix A. Concentrations of cis-1,2-dichloroethene (6 µg/L), trichloroethene (10 µg/L) and tetrachloroethene (55 µg/L) were detected. No detectable concentration of vinyl chloride (<1 µg/L) was detected. The analytical results collected from this sample while both AS and SVE were operating indicate a doubling of VOC mass removal compared to SVE technology alone. Emission calculations, based on the analytical results and SVE blower flow rate, indicate that SVE exhaust concentrations are well below the emission limits of 5.7 lbs/hr (0.024 lbs/hr) total VOCs and 300 lbs/yr (3 lbs/yr assuming detection limit concentrations) total vinyl chloride as dictated by Wisconsin Administrative Codes NR 419 and NR 445. Based on these analytical

results, no off-gas treatment will likely be required if an SVE system is installed. Total emission calculations for a full scale, operational system will be determined during the final design.

OFF-SITE INVESTIGATION RESULTS

On February 3, 1997, Montgomery Watson and its drilling subcontractor installed three monitoring wells on the eastern property line of the Steigerwald property. The three off-site wells (MW12, MW13, and MW14) were implemented to collect soil and groundwater samples to further define the extent of contamination. The monitoring well locations are shown on Figure 2.

Soil samples were collected at 2.5 ft intervals and visually classified in the field by Montgomery Watson's field technician in accordance with ASTM:D2488. Field observations of the samples, including color, moisture content, and unconfined compressive strength were recorded on the soil borings logs for each sample location. Sample lithology was recorded using the Unified Soil Classification System (USCS). The soils in the borings were similar to those encountered on the Wiscraft property. The soils consisted mainly of clay, silty fine sand, or silt fill to a depth of 2-5 ft overlying native brown fine to coarse sands to a depth of 2-12 ft. Beneath the sands, layers of brown lean clay, silt, and silty clay extended to depths of 10 to 15.5 ft.

Evidence of contamination (i.e., staining, odors, PID readings) was recorded on the soil boring logs included in Appendix B. Based on these observations, there is no evidence of soil contamination in the soils of any of the borings. For that reason, no soil samples were collected for subsequent laboratory analysis. This information, along with the hydraulic punch information collected during previous investigation activities, suggests that the soil contamination is limited to the Wiscraft property.

The off-site monitoring wells were installed to a depth of approximately 15.5 ft. The monitoring well construction logs and development forms are included in Appendix B. A summary of monitoring well information is included in Table 1. Prior to groundwater sampling, the monitoring wells were developed according to Chapter NR 141 Wisconsin Administrative Code (WAC).

On February 19, 1997, groundwater samples were collected from the three off-site monitoring wells (MW12, MW13, MW14) and submitted for laboratory analysis of VOCs by EPA Method 8021. The analytical results from the monitoring well sampling are summarized on Table 3 and are included in Appendix C. The groundwater analytical results for off-site monitoring well MW12 indicated concentrations of cis-1,2-dichloroethene of 92 µg/l, tetrachloroethene of 79 µg/l, trichloroethene of 29 µg/l, and vinyl chloride of 18 µg/l, which exceed NR 140 enforcement standards (ESs) and preventive action limits (PALs) for these compounds. Concentrations of tetrachloroethene (43 µg/L), trichloroethene (30 µg/L), and vinyl chloride (3 µg/L) in monitoring well MW13 also exceed NR 140 ESs and PALs. Only vinyl chloride (7 µg/L) was detected above the ESs in MW14.

Based on this information, the extent of groundwater contamination is from the Wiscraft property to the eastern edge of the Steigerwald property. The groundwater contamination may also extend further east to the adjacent property containing the Department of Public Works Forestry Bureau, believed to be owned by the City of Milwaukee.

MONITORING WELL ANALYTICAL RESULTS

Groundwater elevations were collected from all monitoring wells on April 9, 1997. A summary of water level elevations is included in Table 2 and a groundwater contour map is provided on Figure 7. Groundwater flow direction appears to be east-southeast onto the Steigerwald property.

Groundwater samples were collected from the on-site monitoring wells MW05, MW06, MW07, MW09, MW10, and MW11 on March 12, 1997. The samples were analyzed for VOCs by EPA Method 8021. Analytical results are summarized in Table 3 and are included in Appendix C. Increases in VOC concentrations in MW07, MW09, and MW10 indicate contamination from the source area is migrating to the east-southeast, with the natural gradient. The extent of off-site and on-site groundwater tetrachloroethene contamination is summarized on Figure 7, which provides a contour map of concentrations across the site.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the off-site investigation, soil contamination appears to be limited to near the source area, on the Wiscraft property. Groundwater contamination appears to extend off the Wiscraft property and onto the Steigerwald property. The groundwater contamination may potentially extend further to the east onto the Public Works Forestry Bureau property. In order to define the extent of impact, Montgomery Watson recommends the installation of monitoring wells on this property. The wells should be installed east of the Public Works Forestry building and south of the building along West State Street.

The results of the AS/SVE pilot test indicate that air sparging and soil vapor extraction are feasible technologies for soil and groundwater remediation at this site. SVE could be used for mass removal of the contaminants at the site, while AS provides stripping capability and aeration to the formation. These technologies will be incorporated into the final remedial design for the site.

Montgomery Watson is proceeding with the design of the remediation system for this site. The data collected to date will be used to formulate a conceptual design to be presented in a 30% design report. We will complete the conceptual design report and provide the document to WDNR for review. Based on comments, the detailed design will be completed. We anticipate installation of the system during the 1997 construction season.

If you have any questions regarding this information, please contact us at (414) 359-1144.

Sincerely,

MONTGOMERY WATSON

Chris R. Manz
Project Engineer

Kevin D. Shaver, CHMM
Supervising Environmental Scientist

Enclosures: Table 1 - Monitoring Well Information
Table 2 - Water Level Elevation Information
Table 3 - Summary of Groundwater Analytical Results - Monitoring Wells

Figure 1 - Site Location Map
Figure 2 - Site Plan with Sample Locations
Figure 3 - SVE Radius of Influence
Figure 4 - Pilot Test Dissolved Oxygen Concentrations vs. Time
Figure 5 - Pilot Test Water Level Elevations vs. Time
Figure 6 - Groundwater Contour Map - April 9, 1997
Figure 7 - Groundwater Tetrachloroethene Isoconcentration Map

Appendix A - SVE Emission Calculations and Analytical Results
Appendix B - Monitoring Well Boring Logs, Well Construction Logs, and Well Development Forms
Appendix C - Groundwater Analytical Results

cc: Mr. Jim McMillan - Wisconsin Department of Administration

CRM/HLS/KDS
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Table 1
Monitoring Well Information
Wiscraft Inc.
5316 West State Street
Milwaukee, Wisconsin

Well	Date Installed	Well Depth (ft)	Screen Length (ft)	Land Surface Elevation (ft)	Top of Casing Elevation (ft)	Top of Screen Elevation (ft)	Bottom of Screen Elevation (ft)
MW4	7/27/93	15.0	10.0	634.00	633.68	629.40	619.40
MW5	7/27/93	15.0	10.0	630.00	632.18	625.00	615.00
MW6	7/28/93	15.0	10.0	635.00	634.70	630.00	620.00
MW7	7/28/93	15.0	10.0	631.50	631.07	626.50	616.50
MW8	7/28/93	MW8 was abandoned on January 30, 1995 during soil excavtion.					
MW9	7/27/93	15.0	10.0	630.40	629.81	625.40	615.40
MW10	7/18/94	13.5	10.4	631.50	631.05	628.40	618.00
MW11	7/18/94	13.7	10.5	631.70	631.04	628.50	618.00
RW1	7/18/94	15.0	10.3	631.50	631.09	627.80	617.50
MW12	2/3/97	14.9	10.3	631.43	630.93	626.83	616.53
MW13	2/3/97	15.1	10.3	630.18	629.78	625.38	615.08
MW14	2/3/97	14.9	10.3	628.94	628.54	624.14	614.04

Notes:
1. Elevation reference to Mean Sea Level datum (MSL)
2. Well depths measured in feet below land surface.

KDS/CRM/TJM/KDS
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TABLE 2
Water Level Elevation Information
Wiscraft Inc.
5316 West State Street
Milwaukee, Wisconsin

	MW4	MW5	MW6	MW7	MW8 *	MW9	MW10	MW11	RW01	MW12	MW13	MW14
Top of Casing (TOC) Elevation (ft)	633.68	632.18	634.70	631.07	632.60	629.81	631.05	631.04	631.09	630.93	629.78	628.54
Ground Surface (GS) Elevation (ft)	634.0	630.0	635.0	631.5	633.0	630.4	631.5	631.7	631.5	631.43	630.18	628.54
					Depth of Water Below Top of Casing, in Feet							
Date												
8/3/93	7.86	8.93	9.10	7.51	7.03	4.40	---	---	---	---	---	---
10/13/93	8.42	9.11	9.49	6.02	---	4.78	---	---	---	---	---	---
7/18/94	8.26	9.25	10.14	5.89	8.64	4.65	---	---	---	---	---	---
7/19/94	---	9.25	10.14	5.99	---	4.76	5.96	5.93	5.93	---	---	---
1/30/95	---	---	---	---	P-7.94, W-8.91	---	---	---	---	---	---	---
2/28/95	9.12	9.83	10.08	6.63	---	5.36	6.62	6.58	6.66	---	---	---
3/6/96	---	9.26	---	5.98	---	4.70	6.00	5.94	---	---	---	---
4/22/96	8.16	9.02	---	5.73	---	4.51	5.73	5.66	5.74	---	---	---
2/6/97	9.92	---	8.86	7.44	---	6.42	7.48	7.40	7.48	---	---	---
2/19/97	9.70	9.53	10.82	7.29	---	6.23	7.33	7.24	7.31	7.16	9.18	8.09
3/12/97	9.47	8.56	10.64	7.14	---	6.12	7.17	7.08	---	---	---	---
4/9/97	9.56	9.21	10.64	7.17	---	6.13	7.21	7.11	7.19	7.10	9.24	8.07
					Water Level Elevation, in Feet Above Sea Level							
Date												
8/3/93	625.82	623.25	625.60	623.56	625.57	625.41	---	---	625.41	---	---	---
10/13/93	625.26	623.07	625.21	625.05	---	625.03	---	---	625.03	---	---	---
7/18/94	625.42	622.93	624.56	625.18	623.96	625.16	---	---	---	---	---	---
7/19/94	---	622.93	624.56	625.08	---	625.05	625.09	625.11	625.16	---	---	---
1/30/95	---	---	---	---	624.47	---	---	---	---	---	---	---
2/28/95	624.56	622.35	624.62	624.44	---	624.45	624.43	624.46	624.43	---	---	---
3/6/96	---	622.92	---	625.09	---	625.11	625.05	625.10	---	---	---	---
4/22/96	625.52	623.16	---	625.34	---	625.30	625.32	625.38	625.35	---	---	---
2/6/97	623.76	---	625.84	623.63	---	623.39	623.57	623.64	623.61	---	---	---
2/19/97	623.98	622.65	623.88	623.78	---	623.58	623.72	623.80	623.78	623.77	620.60	620.45
3/12/97	624.21	623.62	624.06	623.93	---	623.69	623.88	623.96	---	---	---	---
4/9/97	624.12	622.97	624.06	623.90	---	623.68	623.84	623.93	623.90	623.83	620.54	620.47

NOTES:

1. Monitoring well elevations established by National Survey and Engineering, Milwaukee, Wisconsin.
2. Corrected water level elevation for MW8 on January 30, 1995 was calculated by multiplying the measured product thickness by the estimated specific gravity of the product (0.80) and adding this factor to the measured water level elevations.
3. * MW8 was abandoned on January 30, 1995.

GRM/CRM/KDS

J:\1272\019\01\TABLE.XLS\Water level

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TABLE 3
Summary of Groundwater Analytical Results - Monitoring Wells
Wiscraft Inc.
5316 West State Street
Milwaukee, Wisconsin

Date Sampled	Benzene	Chloroform	1,1-DCA	1,1-DCE	cis-DCE	trans-DCE	Ethyl benzene	Methylene chloride	Tetrachloro-ethene	TCA	Trichloro-ethene	Toluene	Vinyl chloride	Xylenes
MW 4														
8/9/93	ND	ND	ND	ND	ND	ND	ND	ND	18	3.6	ND	ND	ND	ND
3/12/97	ND	ND	ND	ND	ND	ND	ND	ND	14	ND	ND	ND	ND	ND
MW 5														
8/9/93	ND	ND	ND	ND	18	ND	ND	ND	260	ND	75	ND	ND	ND
3/6/96	ND	ND	ND	ND	10	1.2	ND	ND	110	ND	20	ND	ND	ND
3/12/97	ND	ND	ND	ND	2	ND	ND	ND	21	ND	2	ND	ND	ND
MW 6														
8/10/93	ND	ND	ND	ND	1.4	ND	ND	ND	2.1	ND	1.5	4	ND	2.1
3/12/97	ND	ND	ND	ND	ND	ND	3	ND	ND	ND	ND	ND	ND	ND
MW 7														
8/9/93	ND	ND	ND	ND	86	ND	ND	ND	750	14	110	ND	ND	ND
3/6/96	ND	ND	ND	ND	410	ND	ND	ND	680	ND	280	ND	130	ND
3/12/97	ND	ND	6	1	3700	27	ND	ND	3500	22	1600	ND	4	ND
MW 8*														
8/10/93	200	ND	ND	180	70,000	340	ND	ND	34,000	ND	34,000	780	1,200	ND
7/19/94	250	ND	ND	ND	160,000	1,400	ND	ND	33,000	ND	67,000	1,000	820	520
MW 9														
8/9/93	ND	ND	ND	ND	88	ND	ND	ND	700	ND	250	ND	ND	ND
3/6/96	ND	ND	ND	ND	120	ND	ND	ND	450	ND	120	ND	48	ND
3/12/97	ND	ND	ND	ND	150	ND	ND	ND	570	ND	190	ND	ND	ND
MW 10														
3/21/95	ND	ND	19	0.5	NA	ND	ND	ND	80	22	31	ND	ND	ND
3/6/96	ND	3.2	18	ND	50	1.6	ND	ND	44	25	18	ND	ND	ND
3/12/97	2	ND	17	2	1800	20	ND	ND	1100	34	940	ND	2	ND
MW 11														
3/21/95	ND	4.6	52	0.8	NA	1.3	ND	0.9	25	74	2	ND	ND	ND
3/6/96	ND	4.1	26	ND	22	1.2	ND	ND	18	30	2.1	ND	ND	ND
3/12/97	ND	2	25	ND	22	1	ND	ND	16	27	2	ND	ND	ND
MW 12														
2/19/97	ND	ND	7	ND	92	1	ND	ND	79	2	29	ND	18	ND
MW 13														
2/19/97	ND	ND	2	ND	59	ND	ND	ND	43	4	30	ND	3	ND
MW 14														
2/19/97	ND	ND	ND	ND	51	ND	ND	ND	4	ND	7	ND	ND	ND
RW 1														
7/20/94	ND	ND	8.7	1.6	550	3.8	ND	ND	1,200	16	160	ND	18	ND
PAL (4)	0.5	0.6	85	0.7	7.0	20	140	15	0.5	40	0.5	68.6	0.02	124
ES (4)	5	6	850	7.0	70	100	700	150	5.0	200	5.0	343	0.2	620

NOTES:

1. "ND" Designates analyte not detected above laboratory quantitation limit.
2. "NA" Designates analyte was not analyzed.
3. Only the analytes detected are listed.
4. Preventive Action Limits (PAL) and Enforcement Standards (ES) published in Wisconsin Administrative Code Chapter NR 140.
5. Results from RW1 on July 20, 1994 were collected 8 hours into a pump test.
6. MW8 was abandoned on January 30, 1995.

Abbreviations:

1,1-DCA= 1,1-Dichloroethane
1,1-DCE = 1,1-Dichloroethene
cis-DCE = cis-1,2-Dichloroethene
trans-DCE = trans-1,2-Dichloroethene
TCA = 1,1,1-Trichloroethane
TCE = Tetrachloroethene

550 = ES Exceedance
1200 = PAL Exceedance

HLS/CRM/KDS
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R21E

T7N

north

0 2000 4000

SCALE IN FEET

QUADRANGLE LOCATION

NOTES

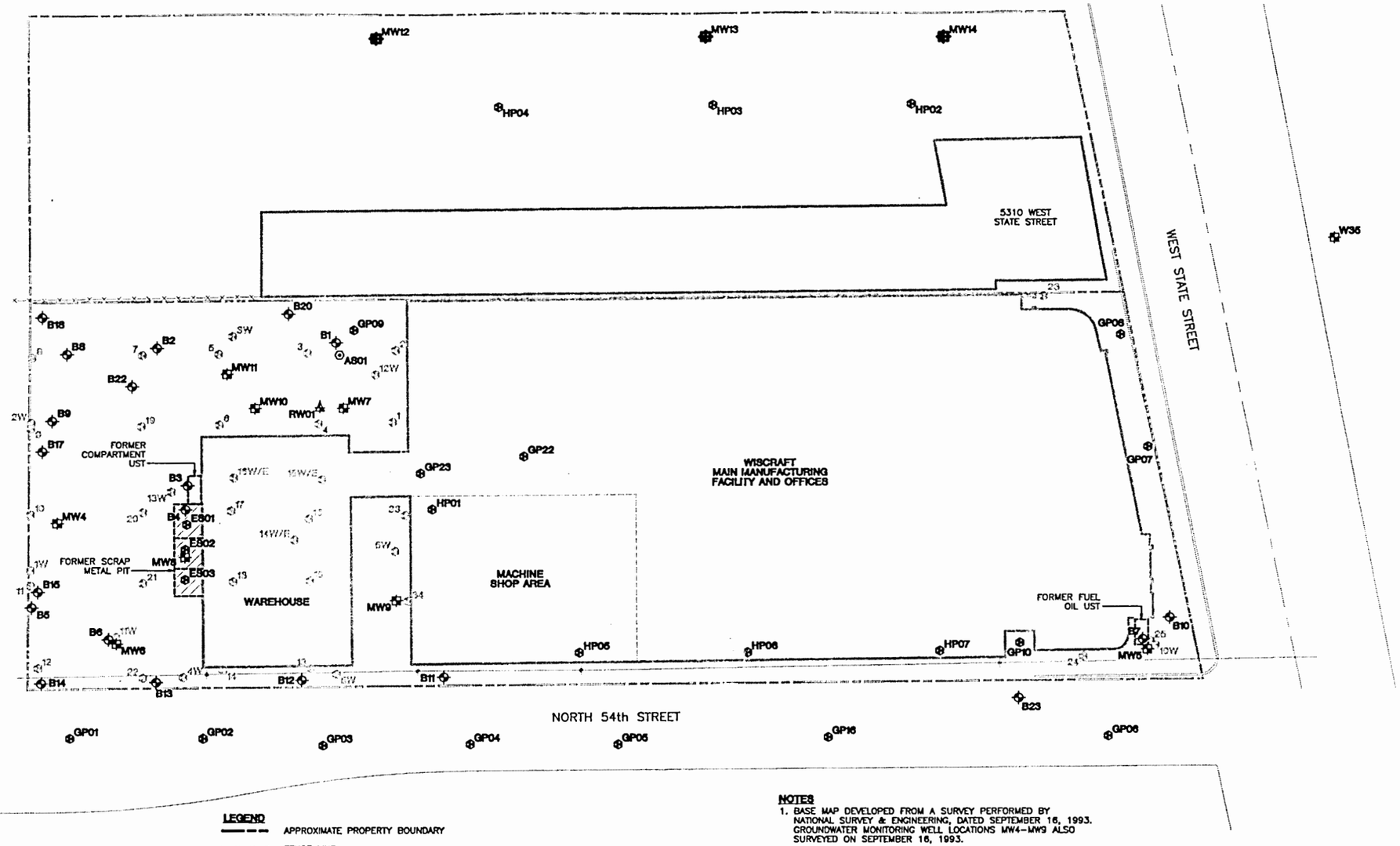
1. BASE MAP DEVELOPED FROM THE MILWAUKEE, WISCONSIN 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP, DATED 1958, PHOTOREVISED 1971.

FIGURE 1

Developed By KDS	Drawn By CCM	**SITE LOCATION MAP**	Drawing Number 1272019 01090011 A1
Approved By	Date 7-11-95	CONCEPTUAL DESIGN STATE OF WISCONSIN 5316 WEST STATE STREET MILWAUKEE, WISCONSIN	MONTGOMERY WATSON
Reference			
Revisions			

QUALITY CONTROL | Graphic Standards CCM 4-30-97 | Lead Professional | Technical Review KDS 5-1-97 | Project Manager | Management Review | Other

This document has been developed for a specific application and may not be used without the written approval of Montgomery Watson.



LEGEND

———	APPROXIMATE PROPERTY BOUNDARY
x—x—x—x	FENCE LINE
⊕	UTILITY POLE
MW4	GROUNDWATER MONITORING WELL LOCATION AND NUMBER
2	SOIL GAS SURVEY LOCATION AND NUMBER
15E	SOIL GAS/HYDRAULIC PROBE – SOIL SAMPLE LOCATION AND NUMBER
3W	SOIL GAS/HYDRAULIC PROBE – GROUNDWATER SAMPLE LOCATION AND NUMBER
B2	SOIL BORING LOCATION AND NUMBER
GP01	GEOPROBE SAMPLING LOCATION AND NUMBER
RW01	GROUNDWATER RECOVERY WELL LOCATION AND NUMBER
ES01	APPROXIMATE EXCAVATION SOIL SAMPLE LOCATION AND NUMBER
AS01	AIR SPARGING POINT LOCATION AND NUMBER
HP01	HYDRAULIC PROBE SAMPLING LOCATION AND NUMBER
//////	AREA OF SOIL EXCAVATION
MW12	PROPOSED GROUNDWATER MONITORING WELL LOCATION AND NUMBER

NOTES

1. BASE MAP DEVELOPED FROM A SURVEY PERFORMED BY NATIONAL SURVEY & ENGINEERING, DATED SEPTEMBER 16, 1993. GROUNDWATER MONITORING WELL LOCATIONS MW4–MW9 ALSO SURVEYED ON SEPTEMBER 16, 1993.
2. SOIL GAS SURVEY/HYDRAULIC PROBE SAMPLING POINTS BASED ON FIELD OBSERVATIONS BY TARGET ENVIRONMENTAL SERVICES ON JUNE 22–24, 1993.
3. SOIL BORINGS B1–B10 PERFORMED JUNE 30 AND JULY 1 AND 6, 1992. LOCATIONS ARE BASED ON FIELD OBSERVATIONS BY WARZYN INC.
4. MONITORING WELLS MW4–MW9 INSTALLED JULY 27 AND 28, 1993, MONITORING WELLS MW10 AND MW11 AND RECOVERY WELL RW01 WERE INSTALLED JULY 19, 1994.
5. GEOPROBE BORING COMPLETED OCTOBER 17–20, 1994. LOCATIONS ARE BASED ON FIELD OBSERVATIONS BY MONTGOMERY WATSON AMERICAS, INC.
6. LOCATIONS OF MW10, MW11 AND RW01 ARE BASED ON SURVEYED OBSERVATIONS BY MONTGOMERY WATSON AMERICAS, INC. ON FEBRUARY 28, 1995.
7. SOIL BORINGS B11–B15, B17, B18, B20, B22, B23 PERFORMED APRIL 23–25, 1996. LOCATIONS ARE BASED ON FIELD OBSERVATIONS BY MONTGOMERY WATSON.
8. AIR SPARGING POINT AS01 INSTALLED ON APRIL 25, 1996. LOCATION IS BASED ON FIELD OBSERVATION BY MONTGOMERY WATSON.
9. HYDRAULIC PROBE BORINGS HP01–HP07 COMPLETED APRIL 22 AND MAY 1, 1996. LOCATIONS BASED ON FIELD OBSERVATIONS BY MONTGOMERY WATSON.
10. AREA OF SOIL EXCAVATION BASED ON FIELD OBSERVATION BY MONTGOMERY WATSON AMERICAS, INC. ON JANUARY 31, 1995.
11. EXCAVATION SOIL SAMPLES COLLECTED BY MONTGOMERY WATSON AMERICAS, INC. ON JANUARY 31, 1995.
12. GEOPROBE IS A REGISTERED TRADEMARK OF KEJR ENGINEERING, INC.

north

0 20 40

SCALE IN FEET

FIGURE 2

Release	Issuance/Revisions	Date	By	Approvd.
1	ADD PROPOSED MONITORING WELLS	1-8-97	CRM	

Developed By
Approved By
Reference
Consultants

Drawn By CCM
Date 9-25-96

SITE PLAN WITH SAMPLE LOCATIONS

CONCEPTUAL DESIGN
STATE OF WISCONSIN
5316 WEST STATE STREET
MILWAUKEE, WISCONSIN

Printed

Sheet Number

Drawing Number
1272019
01090011 D10

MONTGOMERY WATSON

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QUALITY CONTROL
Graphic Standards CCM 7-15-96
Last Published
Issued Date
Project Manager JCK 8-15-96
Designed Date
Chkr.

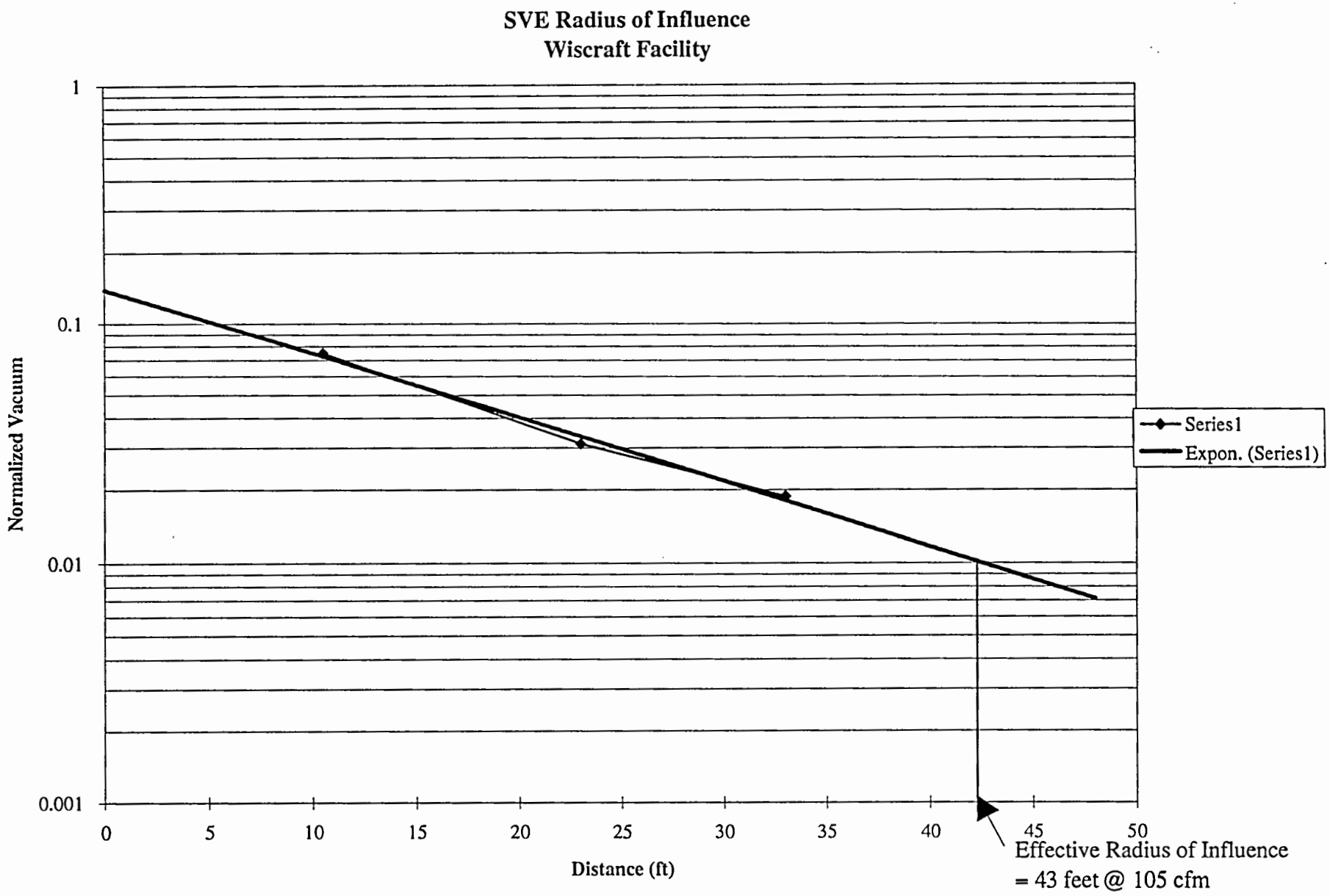

SVE Radius of Influence
Wiscraft Facility
Normalized Vacuum
1
0.1
0.01
0.001
0
5
10
15
20
25
30
35
40
45
50
Distance (ft)
Series1
Expon. (Series1)
Effective Radius of Influence
= 43 feet @ 105 cfm

Figure 3

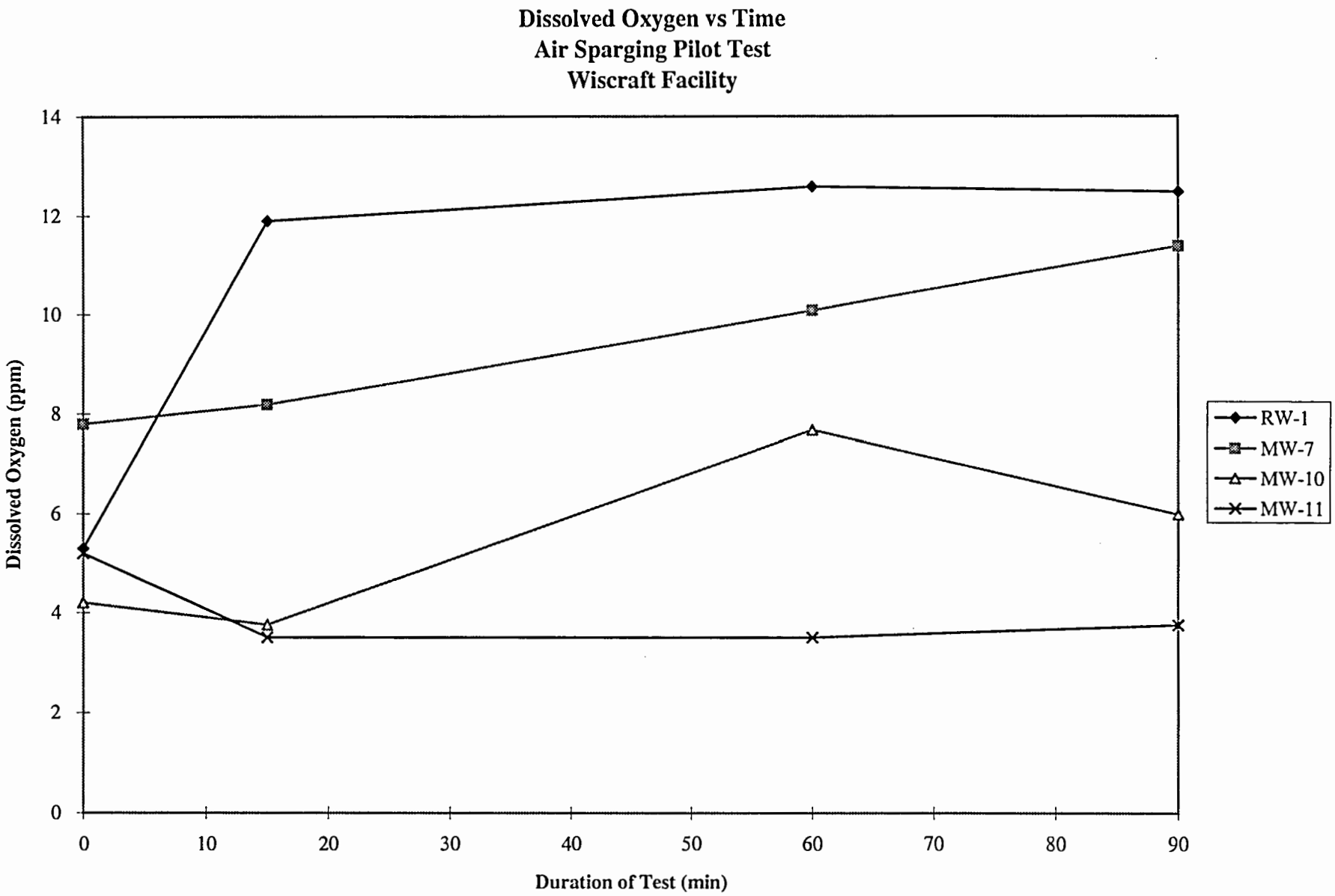

Dissolved Oxygen vs Time
Air Sparging Pilot Test
Wiscraft Facility
Dissolved Oxygen (ppm)
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
90
Duration of Test (min)
RW-1
MW-7
MW-10
MW-11

Figure 4

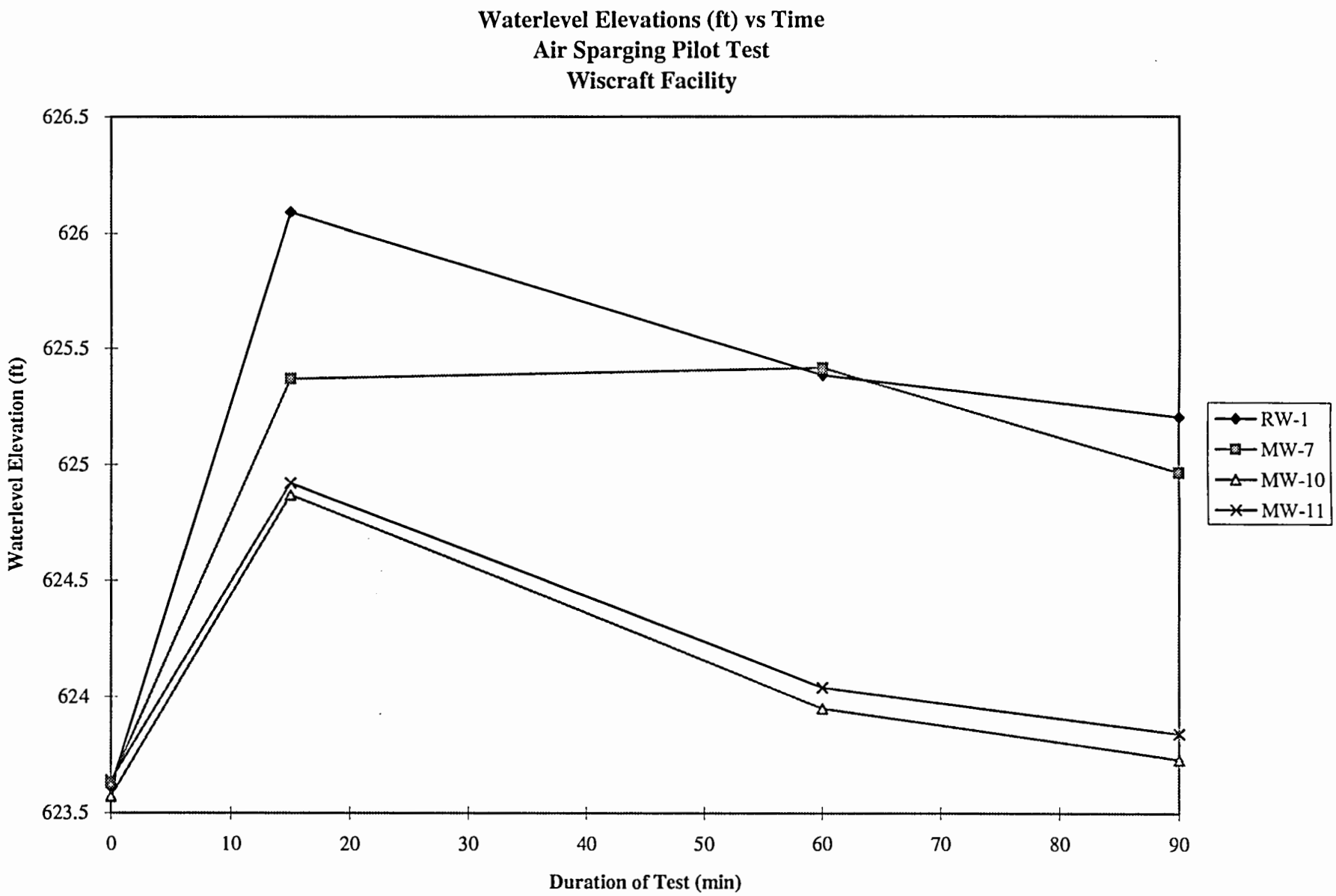
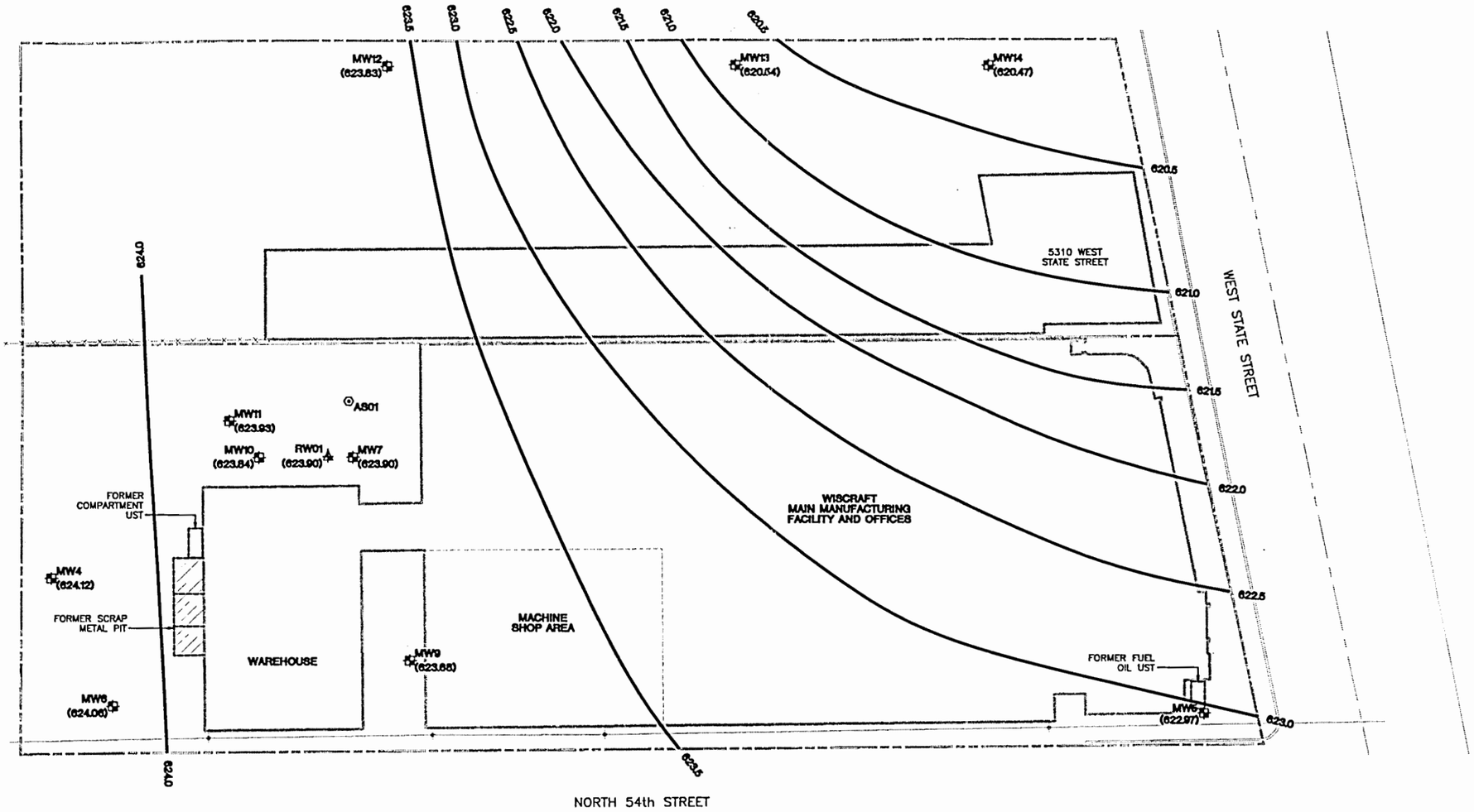

Waterlevel Elevations (ft) vs Time
Air Sparging Pilot Test
Wiscraft Facility
626.5
626
625.5
625
624.5
624
623.5
Waterlevel Elevation (ft)
0
10
20
30
40
50
60
70
80
90
Duration of Test (min)
RW-1
MW-7
MW-10
MW-11

Figure 5



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- FENCE LINE
- UTILITY POLE
- MW4 — GROUNDWATER MONITORING WELL LOCATION AND NUMBER
- RW01 — GROUNDWATER RECOVERY WELL LOCATION AND NUMBER
- AS01 — AIR SPARGING POINT LOCATION AND NUMBER
- AREA OF SOIL EXCAVATION
- (623.90) — GROUNDWATER ELEVATION (IN FEET ABOVE MSL)
- 621.0 — GROUNDWATER CONTOUR (INTERVAL IS 0.5 ft.)

NOTES

1. BASE MAP DEVELOPED FROM A SURVEY PERFORMED BY NATIONAL SURVEY & ENGINEERING, DATED SEPTEMBER 16, 1993. GROUNDWATER MONITORING WELL LOCATIONS MW4–MW9 ALSO SURVEYED ON SEPTEMBER 16, 1993.
2. MONITORING WELLS MW4–MW9 INSTALLED JULY 27 AND 28, 1993, MONITORING WELLS MW10 AND MW11 AND RECOVERY WELL RW01 WERE INSTALLED JULY 19, 1994.
3. LOCATIONS OF MW10, MW11 AND RW01 ARE BASED ON SURVEYED OBSERVATIONS BY MONTGOMERY WATSON AMERICAS, INC. ON FEBRUARY 28, 1995.
4. AIR SPARGING POINT AS01 INSTALLED ON APRIL 25, 1996. LOCATION IS BASED ON FIELD OBSERVATION BY MONTGOMERY WATSON.
5. AREA OF SOIL EXCAVATION BASED ON FIELD OBSERVATION BY MONTGOMERY WATSON AMERICAS, INC. ON JANUARY 31, 1995.
6. MONITORING WELLS MW12–MW14 WERE INSTALLED ON FEBRUARY 3, 1997.
7. GROUNDWATER CONTOURS BASED ON WATER LEVEL ELEVATION DATA COLLECTED ON APRIL 9, 1997.

north

0 20 40

SCALE IN FEET

FIGURE 6

GROUNDWATER CONTOUR MAP (APRIL 9, 1997)

CONCEPTUAL DESIGN
STATE OF WISCONSIN
5316 WEST STATE STREET
MILWAUKEE, WISCONSIN

Drawn By CCM
Date 5-2-97
Developed By
Approved By
Reference
Consultants

Issuance/Revisions | Date | By | Apprvd.

Release

Printed

Sheet Number

Drawing Number
1272019
010900011 D11

MONTGOMERY WATSON

Quality Control: Meets Standards CCM 3-20-97 | Technical Review Project Manager KCS 3-17-97 | Management Review Other

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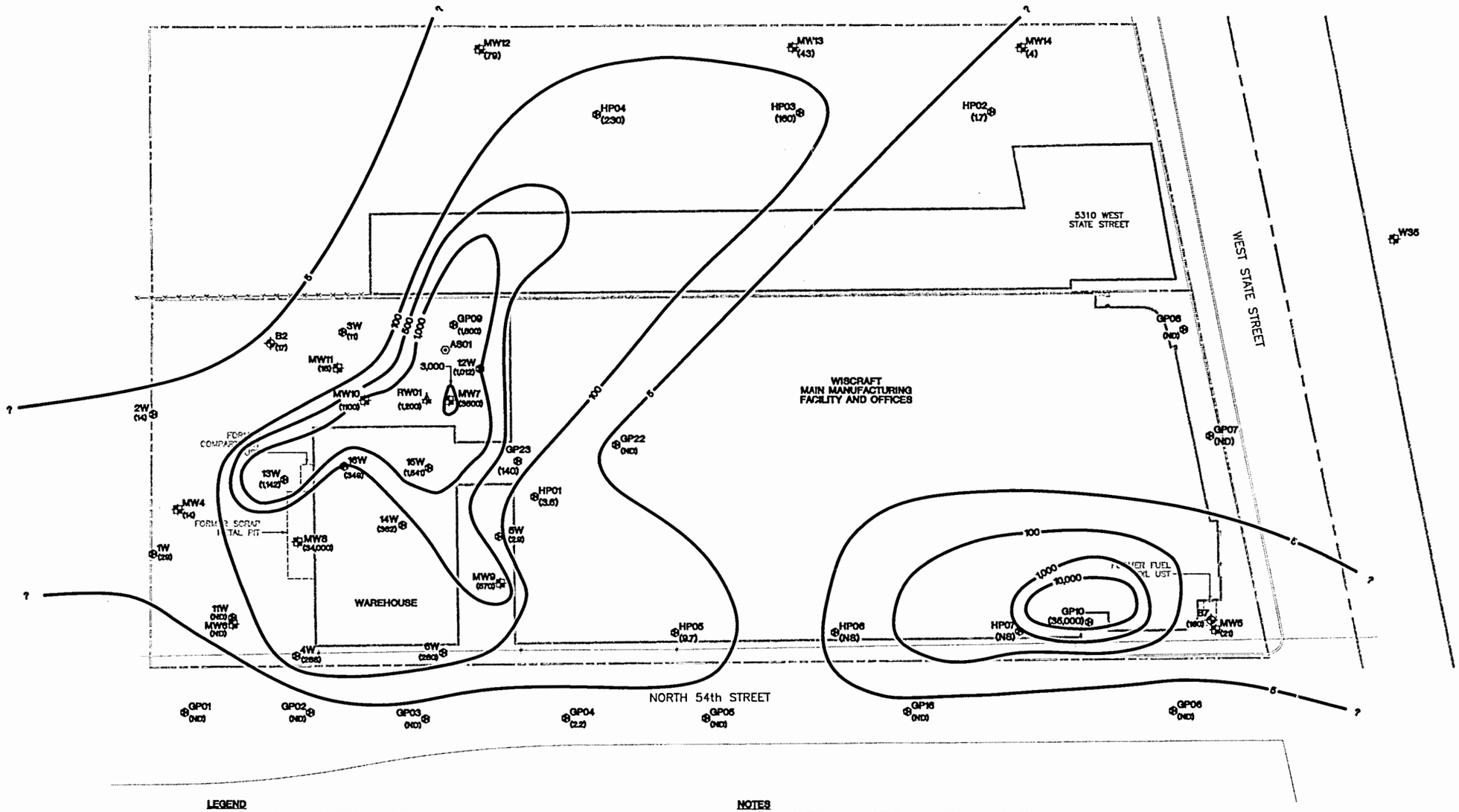

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- FENCE LINE
- UTILITY POLE
- RW01 — GROUNDWATER RECOVERY WELL LOCATION AND NUMBER
- MW4 — GROUNDWATER MONITORING WELL LOCATION AND NUMBER
- SW — SOIL SURVEY/HYDRAULIC PROBE – GROUNDWATER SAMPLE LOCATION AND NUMBER
- B2 — APPROXIMATE TEMPORARY WELL LOCATION AND NUMBER
- (280) — TETRACHLOROETHENE CONCENTRATION, in ug/L
- (NS) — NO SAMPLE
- 1000 — GROUNDWATER TETRACHLOROETHENE ISOCONCENTRATION (ug/L)
- GP01 — GEOPROBE SAMPLING LOCATION AND NUMBER
- HP01 — HYDRAULIC PROBE BORING LOCATION AND NUMBER
- AS01 — AIR SPARGING POINT LOCATION AND NUMBER

NOTES

1. TETRACHLOROETHENE CONCENTRATIONS ARE FROM GROUNDWATER SAMPLES COLLECTED ON JUNE 21–24, 1993 USING THE HYDRAULIC PROBE DURING A SOIL GAS SURVEY, ON AUGUST 9–10, 1993 FROM THE GROUNDWATER MONITORING WELLS (MW8) AND ON JULY 1, 1992 FROM TEMPORARY WELLS INSTALLED IN THE SOIL BORINGS, AND ON OCTOBER 17–19, 1994 FROM THE GEOPROBE SAMPLING.
2. TETRACHLOROETHENE CONCENTRATION FROM RW01 IS FROM GROUNDWATER SAMPLES COLLECTED ON JULY 20, 1994 DURING THE EIGHTH HOUR OF A PUMP TEST.
3. TETRACHLOROETHENE CONCENTRATIONS FROM MW4–MW7, AND MW9–MW11 ARE FROM GROUNDWATER SAMPLES COLLECTED ON MARCH 12, 1997.
4. TETRACHLOROETHENE CONCENTRATIONS FROM MW12, MW13 AND MW14 ARE FROM GROUNDWATER SAMPLES COLLECTED ON FEBRUARY 19, 1997.

north

0 20 40

SCALE IN FEET

FIGURE 7

Drawn By CCM
Date 5-2-97
Developed By CCM
Approved By
Reference
Consultants

Issuance/Revisions | Date | By | Apprvd. | Releases

GROUNDWATER TETRACHLOROETHENE ISOCONCENTRATION MAP

CONCEPTUAL DESIGN
STATE OF WISCONSIN
5316 WEST STATE STREET
MILWAUKEE, WISCONSIN

Printed

Sheet Number

Drawing Number
1272019
01090011 D12

MONTGOMERY WATSON

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QUALITY CONTROL | Engineer Reviewer CCM 3-26-97 | Technical Review | Management Review
Lead Professional CCM 4-8-97 | Project Manager | Director

A

SVE Emission Calculations and Analytical Data

VINYL CHLORIDE AND TOTAL VOC AIR EMISSION CALCULATIONS
SOIL VAPOR EXTRACTION PILOT TEST
Wiscraft Facility
Milwaukee, Wisconsin
Wisconsin Department of Administration

Done by: GRM
Checked by: CRM

Objective: Convert vinyl chloride and total VOC exhaust concentrations to removal rates; lbs/day and lbs/hr by using the following equation:

$$E = \frac{(g/m^3)\ (ft^3/min)\ (1440\ min/d)}{(454\ g/lb)\ (35.31\ ft^3/m^3)}$$

where:
E = Emission rate (lbs/day)
g/m^3 = Vinyl chloride or total VOC concentration
cfm = cubic feet per minute of air flow

Assumptions:
1. Calculations based on exhaust air analytical results collected on February 6, 1997, with only the SVE blower operating.
2. Air flow rate based on pitot tube readings taken on site given site specific conditions.

Flow Rate: For this application, Q = 105 cfm

Estimated Vinyl chloride Emission:

Result: Vinyl chloride concentration (g/m^3)= 0.001

$$E = \frac{0.0010 * 105 * 1440}{454 * 35.31}$$

= 0.009 lbs/day = 0.00039 lbs/hr
= 3.4 lb/yr

WDNR NR 445 limit for vinyl chloride is 300 lbs/yr.

Estimated total VOC Emission:

Result: VOC concentration (g/m^3)= 0.03

$$E = \frac{0.030 * 105 * 1440}{454 * 35.31}$$

= 0.2830 lbs/day = 0.0118 lbs/hr

WDNR NR 419 limit for total VOC emissions is 5.7 lbs/hr.

GRM/HLS/CRM
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1272019.01090011

VINYL CHLORIDE AND TOTAL VOC AIR EMISSION CALCULATIONS
AIR SPARGING/SOIL VAPOR EXTRACTION PILOT TEST
Wiscraft Facility
Milwaukee, Wisconsin
Wisconsin Department of Administration

Done by: GRM
Checked by: CRM

Objective: Convert vinyl chloride and total VOC exhaust concentrations to removal rates; lbs/day and lbs/hr by using the following equation:

$$E = \frac{(g/m^3)}{(454\ g/lb)} \quad \frac{(ft^3/min)}{} \quad \frac{(1440\ min/d)}{(35.31\ ft^3/m^3)}$$

where:
E = Emission rate (lbs/day)
g/m^3 = Vinyl chloride or total VOC concentration
cfm = cubic feet per minute of air flow

Assumptions:
1. Calculations based on exhaust air analytical results collected on February 6, 1997, with the AS compressor & SVE blower operating.
2. Air flow rate based on pitot tube readings taken on site given site specific conditions.

Flow Rate: For this application, Q = 90 cfm

Estimated Vinyl chloride Emission:

Result: Vinyl chloride concentration (g/m^3)= 0.001

$$E = \frac{0.0010 * 90 * 1440}{454 * 35.31}$$

= 0.008 lbs/day = **0.00034** lbs/hr
= **3.0** lb/yr

WDNR NR 445 limit for vinyl chloride is 300 lbs/yr.

Estimated total VOC Emission:

Result: VOC concentration (g/m^3)= 0.071

$$E = \frac{0.071 * 90 * 1440}{454 * 35.31}$$

= 0.5740 lbs/day = **0.0239** lbs/hr

WDNR NR 419 limit for total VOC emissions is 5.7 lbs/hr.

GRM/HLS/CRM
J:\1272\019\01\0011\EMIS.xls-AS&SVE
1272019.01090011

IEA
An Aquarion Company

126 West Center Court
Schaumburg, Illinois 60195

Phone 1-800-933-2580
Fax 847-705-1567

RECEIVED
FEB 18 1997
MW - MILW.

February 12, 1997

Montgomery Watson
Kevin Shaver
11925 W. Lake Park Dr.
Suite 200
Milwaukee, WI 53224

Dear Kevin Shaver:

Please find enclosed the analytical results of the samples received at our laboratory on February 07, 1997. This report contains sections addressing the following information at a minimum:

- -Definitions
- -Analytical Methodology
- -State certifications
- -Analytical Results
- -Chain-of-custody (if applicable)

IEA Project#: L72970352	Client Project: 1272019
	Purchase Order#:
IEA Quote#:	Site:

Copies of this analytical report and supporting data are maintained in our files for three years; samples are retained for two weeks unless special arrangements have been made. Unless specifically indicated, all analytical testing was performed at this laboratory and no portion of the testing was subcontracted.

We appreciate your selection of our services and welcome any questions or suggestions you may have relative to this report. Please contact Jim Dowse at (800) 933-2580 for any additional information. Thank you for utilizing our services, we hope you will consider us for your future analytical needs.

have reviewed and approved the enclosed data for final release.

Sincerely

Larry D. Lewis
Director of Operations
IEA-Illinois Laboratory

IEA
An Aquarion Company

Definitions of Data Qualifiers

Organic Analysis

B - This analyte was detected in the method blank associated with this sample. The concentration reported in the method blank is suspected to contribute to the reported concentration of the analyte in the sample.

E - The concentration reported for this compound exceeds the calibration range of the instrument.

H - This sample had one or more surrogate recoveries above the acceptance criteria due to coelution with a nontarget compound.

J - The reported concentration for this compound is an estimated value. When associated with tentatively identified compounds (TICs), the result is quantitated based on a response factor of 1. When the flag is associated with a calibrated target compound, the compound has been positively identified and the reported concentration is above the method detection limit (MDL), but below the practical quantitation limit (PQL).

L - This sample had one or more surrogate recoveries below the acceptance criteria due to matrix effects. This effect was confirmed through a second analysis of the sample.

LI - The recovery of the internal standard corresponding to this compound did not meet the acceptance criteria due to matrix effects. This effect was confirmed through a second analysis of the sample.

T1 - The chromatographic profile of this sample does not match that of a gasoline standard. Another unidentifiable petroleum product is present in this sample. Quantitation is based on a gasoline standard calibration.

T2 - The chromatographic profile of this sample does not match that of a diesel fuel standard. Another petroleum product is present in this sample. Quantitation is based on a diesel fuel standard calibration.

U - This compound was not detected in the sample above the PQL.

UD - This compound was not detected above the elevated PQL in this diluted analysis.

Inorganic Analysis

E - The reported value was estimated due to the presence of interference.

M - Duplicate injection precision was not met.

N - Spiked sample recovery was not within control limits.

S - The reported value was determined by the Method of Standard Additions(MSA).

W - Post digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance.

* - Duplicate analysis was not within control limits.

+ - Correlation Coefficient for the MSA is less than 0.995.

IEA
An Aquarion Company

Sample Summary

IEA-Illinois

Laboratory ID	Client ID
L72970352-001	AS/SVE
L72970352-002	SVE ONLY

IEA
An Aquarion Company

Client Name: Montgomery Watson
IEA Project #: L72970352
Client Project ID: 1272019

PROJECT NARRATIVE

GC Volatiles Analysis--Air Analysis

Samples were analyzed using modified method 8021. 5mls of air is taken from the tedlar bag using a gas-tight syringe, and injected into an air-tight purging vessel that contains 2ml of water with surrogate. This vessel is then purged with the volatile constituents collected on the sorbent trap. The trap is then heated and desorbed onto the chromatographic column. Compounds are separated and detected using a photoionization and electrolytic conductivity detectors in series. Quantitation is performed using five point calibration curves generated from purged water standards. The surrogate recovery is calculated to determine if the purge vessel was leak free. Results reflect the amount, in µg/L, of constituents in the raw air sample.

IEA
An Aquarion Company

Client: Montgomery Watson
IEA Job#: L72970352
Project ID: 1272019
Matrix: Water
Method: 8021A
Wisconsin Cert. #: 999756670

Halogenated & Aromatic Volatile Compound List
GC Volatiles Analysis
µg/L

Analyte / Lab ID						PQL
Dilution Factor	1	1				
Method Blank	VS020797	VS020797				
Client ID	AS/SVE	SVE ONLY				
Lab ID	001	002				
Dichlorodifluoromethane	U	U				1
Chloromethane	U	U				1
Vinyl Chloride	U	U				1
Bromomethane	U	U				1
Chloroethane	U	U				1
Trichlorofluoromethane	U	U				1
1,1-Dichloroethene	U	U				1
Methylene Chloride	U	U				1
MTBE	U	U				1
trans-1,2-Dichloroethene	U	U				1
Isopropyl Ether	U	U				1
1,1-Dichloroethane	U	U				1
2,2-Dichloropropane	U	U				1
cis-1,2-Dichloroethene	6	3				1
Chloroform	U	U				1
Bromochloromethane	U	U				1
1,1,1-Trichloroethane	U	U				1
1,1-Dichloropropene	U	U				1
Carbon Tetrachloride	U	U				1
1,2-Dichloroethane	U	U				1
Benzene	U	U				1
Trichloroethene	10	5				1
1,2-Dichloropropane	U	U				1
Bromodichloromethane	U	U				1
Dibromomethane	U	U				1
cis-1,3-Dichloropropene	U	U				1
Toluene	U	U				1
trans-1,3-Dichloropropene	U	U				1
1,1,2-Trichloroethane	U	U				1
1,3-Dichloropropane	U	U				1
Tetrachloroethene	55	22				1
Dibromochloromethane	U	U				1
1,2-Dibromoethane	U	U				1
Chlorobenzene	U	U				1
1,1,1,2-Tetrachloroethane	U	U				1
Ethylbenzene	U	U				1
m&p-Xylene	U	U				2
o-Xylene	U	U				1
Styrene	U	U				1

IEA
An Aquarion Company

Client: Montgomery Watson
IEA Job#: L72970352
Project ID: 1272019
Matrix: Water
Method: 8021A
Wisconsin Cert. #: 999756670

Halogenated & Aromatic Volatile Compound List
GC Volatiles Analysis
µg/L

Dilution Factor	1	1				PQL
Method Blank	VS020797	VS020797				
Client ID	AS/SVE	SVE ONLY				
Analyte / Lab ID	001	002				
Isopropylbenzene	U	U				1
Bromoform	U	U				1
1,1,2,2-Tetrachloroethane	U	U				1
1,2,3-Trichloropropane	U	U				1
n-Propylbenzene	U	U				1
Bromobenzene	U	U				1
1,3,5-Trimethylbenzene	U	U				1
2-Chlorotoluene	U	U				1
4-Chlorotoluene	U	U				1
tert-Butylbenzene	U	U				1
1,2,4-Trimethylbenzene	U	U				1
sec-Butylbenzene	U	U				1
-Isopropyltoluene	U	U				1
1,3-Dichlorobenzene	U	U				1
1,4-Dichlorobenzene	U	U				1
n-Butylbenzene	U	U				1
1,2-Dichlorobenzene	U	U				1
1,2-Dibromo-3-Chloropropane	U	U				1
1,2,4-Trichlorobenzene	U	U				1
Hexachlorobutadiene	U	U				1
Naphthalene	U	U				1
1,2,3-Trichlorobenzene	U	U				1
Date Sampled	2/6/97	2/6/97				
Date Analyzed	2/8/97	2/8/97				

PQL = Practical Quantitation Limit
To obtain the sample-specific quantitation limit, multiply the PQL by the Dilution Factor.

MONTGOMERY WATSON

CHAIN OF CUSTODY RECORD

SPECIAL INSTRUCTIONS:
- [ ] PECFA
- [ ] WI LUST
- [ ] ACT 307
- [ ] REPORT DRY WT
- [x] OTHER:

TURNAROUND
- [x] 2 WEEKS (standard)
- [ ] 1 WEEK
- [ ] 3 DAYS
- [ ] 1 DAY

PROJECT NAME: Niscraft, Inc
PROJECT #: 1272019.
CITY: Milwaukee,
STATE: WI
SAMPLER(S): Chris Manz

COLLECTION DATE	COLLECTION TIME	GRAB / COMP	SAMPLE ID	NO. OF CONTAINERS	VOCs (8021)							REMARKS	LAB USE ONLY MATRIX	LAB USE ONLY LAB NO.
2/6/97	4:00	Grab	AS/SVE	1	✓									
2/6/97	5:00	Grab	SVE Only	1	✓									

SPECIAL INSTRUCTIONS:
Send results to Chris Manz at MW-Milw.

TAMPER EVIDENT SEAL INTACT? ___YES ___NO ___NOT PRESENT
SEAL NO.: _____
SAMPLES RECEIVED ON ICE? ___YES ___NO TEMP: _____°C

PROJ. MGR.: Kevin Shaver

	SIGNATURE	DATE	TIME		SIGNATURE	DATE	TIME
RELINQUISHED BY:	Chris Manz	2/7/97	8:00	RECEIVED BY:	R. Vanesse	2/7/97	1100 A/12
RELINQUISHED BY				RECEIVED BY:			
RELINQUISHED BY:				RECEIVED BY:			
RELINQUISHED BY				RECEIVED FOR LABORATORY BY:	Vince Vu	2/7/97	1300

C-O-C No. 015584

NAME OF COURIER: _____
AIRBILL NUMBER: _____

B

MONITORING WELL BORING LOGS, WELL CONSTRUCTION SUMMARIES, AND WELL DEVELOPMENT FORMS

State of Wisconsin
Department of Natural Resources

Route To:
- ☐ Solid Waste
- ☐ Emergency Response
- ☐ Wastewater
- ☐ Haz. Waste
- ☐ Underground Tanks
- ☐ Water Resources
- ☐ Other _____

SOIL BORING LOG INFORMATION

Form 4400-122 7-91

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
* WISCRAFT, INC.		MW12

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
J&J SOIL TESTING LTD. M. WIEBELHAUS	2-3-97	2-3-97	4¼ IN. HSA

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW12	_____ Feet MSL	_____ Feet MSL	8.5 inches

Boring Location
State Plane _____ N, _____ E S/C/N | Lat ___ ___ ___
NE 1/4 of NW 1/4 of Section 26, T 7 N, R 21 (E)/W | Long ___ ___ ___

Local Grid Location (if applicable)
_____ Feet ☐N ☐S _____ Feet ☐E ☐W

County	DNR County Code	Civil Town/City/or Village
MILWAUKEE	41	MILWAUKEE

Sample Number	Length Recovered (in.)	Blow Counts	Depth in Ft	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/Comments
1	19	6 4 5 5		STIFF, DARK BROWN LEAN CLAY, LITTLE TO SOME FINE TO COARSE SAND AND GRAVEL	FILL			0.0	9	F/M				
				LOOSE, DARK BROWN SILTY FINE SAND	FILL									
2	16	3 7 16 20	5	VERY DARK BROWN SILT (BURIED TOPSOIL)	ML			0.0	23	M				
3	17	14 13 8 9		MEDIUM DENSE, YELLOWISH BROWN FINE TO MEDIUM SAND, SOME SILT, SOME FINE TO COARSE ROUNDED GRAVEL	SM			0.0	21	M/W				
4	19	10 12 8 9	10	MEDIUM DENSE, GRAYISH BROWN FINE TO COARSE SAND	SP			0.0	20	W				
5	20	9 12 12 14		HARD, DARK GRAYISH BROWN LEAN CLAY, SOME FINE TO COARSE SAND AND GRAVEL	CL			0.0	24	W				
				MEDIUM DENSE, DARK GRAYISH BROWN FINE SAND, SOME SILT	SM									
6	23	12 18 24 29	15	INTERBEDDED LAYERS OF STIFF TO HARD CLAY AND SILT	CL/ML			0.0	42	W				
				END OF BORING AT 15.5 FT MW12 INSTALLED AT 14.9 FT										

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

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Terry J. March | Firm: MONTGOMERY WATSON

This form is authorized by Chapters 144.147 and 162, Wis. Stats. Completion of this report is mandatory. Penalties: Forfeit not less than $10 nor more than $5,000 for each violation. Fined not less than $10 or more than $100 or imprisoned not less than 30 days, or both for each violation. Each day of continued violation is a separate offense, pursuant to ss 144.99 and 162.06, Wis. Stats.

MONTGOMERY WATSON

FLUSH MOUNT MONITORING WELL CONSTRUCTION SUMMARY

1272019.0109.0011
JOB NO.

Facility/Project Name: WISCRAFT, INC.	Local Grid Location of Well: ☐ N. ft. ☐ S. ft. ☐ E. ☐ W.	Well Name: MW12
Type of Well: Water Table Observation Well ☒ Piezometer ☐	Grid Origin Location: Lat. ____ Long. ____ or St. Plane ft. N, ft. E.	Date Well Installed: 2-3-97
	Section Location of Waste/Source ☐ E. ☐ W.	Well Installed By: (Person's Name and Firm)
Distance Well Is From Waste/Source Boundary ft.	Location of Well Relative to Waste/Source: ☐ Upgradient ☐ Sidegradient ☒ Downgradient ☐ Not Known	(Geologist) T. MARCH - MONTGOMERY WATSON (Driller) M. WIEBELHAUS - J+J SOIL TESTING

Watertight Cover elevation ____ ft. MSL

Well casing top elevation ____ ft. MSL

Ground surface elevation ____ ft. MSL

Surface Seal, bottom ____ ft. MSL or 1.0 ft.

USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☐ MH ☐ CL ☒ CH ☐
Bedrock ☐

Sieve analysis attached? ☐ Yes ☒ No

Drilling method used: Rotary ☐ Hollow Stem Auger ☒ Other ☐

Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒

Drilling additives used? ☐ Yes ☒ No

Describe ____

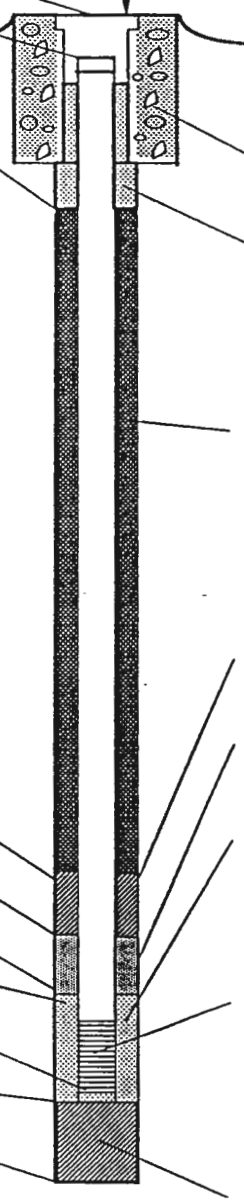
Source of water: N/A

	ELEVATION	DEPTH
Bentonite seal, top	____ ft. MSL or	1.5 ft.
Fine sand, top	____ ft. MSL or	3.5 ft.
Filter pack, top	____ ft. MSL or	4.0 ft.
Screen joint, top	____ ft. MSL or	4.6 ft.
Well bottom	____ ft. MSL or	14.9 ft.
Filter pack, bottom	____ ft. MSL or	15.5 ft.
Borehole, bottom	____ ft. MSL or	15.5 ft.

Borehole, diameter 8.5 in.

O.D. well casing 2.38 in.

I.D. well casing 2.05 in.



Bolt down water tight cover:
Inside Diameter: 6 (in.) Length 12 (in.)

Water tight well cap? Yes ☒ No ☐
Lock? Yes ☒ No ☐

Surficial Seal: Concrete ☒ Bentonite ☐

Sand Drainage? Yes ☒ No ☐

Material between well casing and protective pipe:
Bentonite ☐
Annular space seal ☐
Other ☒ FILTER SAND

Annular space seal: Granular Bentonite ☐
____ Lbs/gal mud weight... Bentonite-sand slurry ☐
____ Lbs/gal mud weight..... Bentonite slurry ☐
____ % Bentonite..... Bentonite-cement grout ☐
____ cu ft volume added for any of the above

How installed: Tremie ☐ Tremie pumped ☐ Gravity ☐

Bentonite seal: Bentonite granules ☒ Bentonite pellets ☐ Other ☐
☐ 1/4 in. ☐ 3/8 in. ☐ 1/2 in.

Fine sand material: Manufacturer, product name & mesh size
AMERICAN MATERIALS, RED FLINT, #45-55
Volume added 0.2 cu ft

Filter pack material: Manufacturer, product name & mesh size
AMERICAN MATERIALS, RED FLINT, #30
Volume added 2.0 cu ft

Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐

Screen material: PVC SCHEDULE 40

Screen type: Factory cut ☒ Continuous slot ☐ Other ☐

Manufacturer TIMCO

Slot size: .010 in.

Slotted length: 9.7 ft.

Backfill material (below filter pack): None ☒ Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowlege.

Signature Terry J March

Firm Montgomery Watson

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: WISCRAFT, INC
Location: STATE ST. - MILWAUKEE, WI
Developed By: T. MARCH
Well No.: MW12
Project No.: 1272019.0109.0011
Checked By:

1. Can this well be purged dry? ☒ Yes ☐ No
2. Well development method

surged with bailer and bailed	☒
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	☐
pumped slowly	☐
Other	☐

3. Time spent developing well ____ min.
4. Total well depth (TOC) (From well construction summary) 14.4 ft.
   Measured well depth (Before) 13.9 ft.
   Measured well depth (After) 14.4 ft.
5. Inside diameter of well 2.05 in.
6. Volume of water in filter pack and well casing 6.9 gal.
7. Volume of water removed from well 10.0 gal.
   Relative recovery rate ____ ft. per ____ min.
8. Volume of water added (if any) ____ gal.
9. Source of water added N/A

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 6.98 ft.	7.16 ft.
Date:	b. 2/4/97 (mm dd yy)	2/19/97 (mm dd yy)
Time:	c. 10:00 ☒ a.m. ☐ p.m.	9:30 ☒ a.m. ☐ p.m.
11 Sediment in well bottom:	6.0 inches	0.0 inches
12 Water Observations:	Clear ☐ Turbid ☒ (Describe)	Clear ☐ Turbid ☒ (Describe)
Color	DARK BROWN	GRAYISH BROWN
Odor	NONE	NONE
Turbidity	VERY	MODERATE
HNu	ND	ND

Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = 5.6
Well casing Vol. (gallons) $0.16r^2 l$ = 1.3
Saturated length of sand pack (ft.) (ls) 7.4
Length of water column (ft.) (l) 7.4
R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

	(BEFORE)	(AFTER)
13 Total suspended solids (500 ml Unfiltered)	____ mg/l	____ mg/l
14. COD (250 ml Unfiltered Sulfuric)	____ mg/l	____ mg/l

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb.	Comment

State of Wisconsin
Department of Natural Resources

Route To:
- ☐ Solid Waste
- ☐ Emergency Response
- ☐ Wastewater
- ☐ Haz. Waste
- ☐ Underground Tanks
- ☐ Water Resources
- ☐ Other _____

SOIL BORING LOG INFORMATION

Form 4400-122 7-91

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
* WISCRAFT, INC.		MW13

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
J & J SOIL TESTING LTD. M. WIEBELHAUS	2-3-97	2-3-97.	4¼ IN. HSA

DNR Facility Well No.	Wi Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW13	_____ Feet MSL	_____ Feet MSL	8.5 inches

Boring Location
State Plane _____ N, _____ E S/C/N | Lat ___ ___ ___
NE 1/4 of NW 1/4 of Section 26, T 7 N, R 21 (E)/W | Long ___ ___ ___

Local Grid Location (if applicable)
☐ N _____ Feet ☐ S ☐ E _____ Feet ☐ W

County	DNR County Code	Civil Town/City/or Village
MILWAUKEE	41	MILWAUKEE

Sample Number	Length Recovered (in.)	Blow Counts	Depth in Ft	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/Comments
				GRAVEL AND CRUSHED ASPHALT	FILL									
				DARK BROWN CLAY	FILL									
1	23	20 18 13 10		VERY DARK BROWN SILT, LITTLE FINE SAND (BURIED TOPSOIL)	ML			0.0	31	F/M				
2	15	11 10 12 15	5	MEDIUM DENSE, DARK YELLOWISH BROWN, FINE TO COARSE SAND, SOME SILT, SOME FINE TO COARSE GRAVEL	SM			0.0	22	M				
3	20	18 22 21 20		DENSE, YELLOWISH BROWN, FINE TO COARSE SAND, SOME FINE TO COARSE ROUNDED GRAVEL, LITTLE TO SOME SILT	SM			0.0	43	M				
4	16	8 9 10 10	10	MEDIUM DENSE TO DENSE, YELLOWISH BROWN FINE TO COARSE SAND AND GRAVEL, SOME SILT	SM/GM			0.0	19	W				
5	21	23 20 16 25						0.0	36	W				
6	22	17 21 18 24		HARD, DARK GRAYISH BROWN, LEAN CLAY, LITTLE TO SOME FINE TO COARSE SAND, LITTLE FINE TO COARSE GRAVEL	CL									
			15	STIFF, DARK GRAYISH BROWN SILT LITTLE FINE SAND	ML			0.0	39	W				
				END OF BORING AT 15.5 FT MW13 INSTALLED AT 15.1 FT										

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

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Terry J. March | Firm: MONTGOMERY WATSON

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MONTGOMERY WATSON

FLUSH MOUNT MONITORING WELL CONSTRUCTION SUMMARY

1272019.0109.0011
JOB NO.

Facility/Project Name	Local Grid Location of Well	Well Name
WISCRAFT, INC.	☐ N. ft. ☐ S. ft. ☐ E. ☐ W.	MW13
Type of Well: Water Table Observation Well ☒ Piezometer ☐	Grid Origin Location: Lat. ____ Long. ____ or St. Plane ft. N, ft. E.	Date Well Installed: 2-3-97
	Section Location of Waste/Source ☐ E. ☐ W.	Well Installed By: (Person's Name and Firm)
Distance Well Is From Waste/Source Boundary ft.	Location of Well Relative to Waste/Source: ☐ Upgradient ☐ Sidegradient ☒ Downgradient ☐ Not Known	(Geologist) T. MARCH - MONTGOMERY WATSON (Driller) M. WIEBELHAUS - J&J SOIL TESTING

Watertight Cover elevation ____ ft. MSL

Well casing top elevation ____ ft. MSL

Ground surface elevation ____ ft. MSL

Surface Seal, bottom ____ ft. MSL or 1.0 ft.

USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☐ MH ☐ CL ☒ CH ☐
Bedrock ☐

Sieve analysis attached? ☐ Yes ☒ No

Drilling method used: Rotary ☐ Hollow Stem Auger ☒ Other ☐

Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒

Drilling additives used? ☐ Yes ☒ No

Describe ____

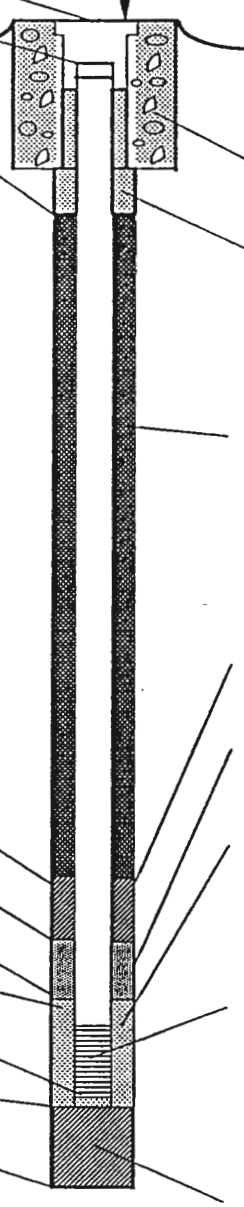
Source of water: N/A

	ELEVATION	DEPTH
Bentonite seal, top	____ ft. MSL or	1.5 ft.
Fine sand, top	____ ft. MSL or	3.5 ft.
Filter pack, top	____ ft. MSL or	4.0 ft.
Screen joint, top	____ ft. MSL or	4.8 ft.
Well bottom	____ ft. MSL or	15.1 ft.
Filter pack, bottom	____ ft. MSL or	15.5 ft.
Borehole, bottom	____ ft. MSL or	15.5 ft.

Borehole, diameter 8.5 in.

O.D. well casing 2.38 in.

I.D. well casing 2.05 in.



Bolt down water tight cover:
Inside Diameter: 6 (in.) Length 12 (in.)

Water tight well cap? Yes ☒ No ☐
Lock? Yes ☒ No ☐

Surficial Seal: Concrete ☒ Bentonite ☐

Sand Drainage? Yes ☒ No ☐

Material between well casing and protective pipe: Bentonite ☐ Annular space seal ☐ Other ☒ FILTER SAND

Annular space seal: Granular Bentonite ☐
____ Lbs/gal mud weight... Bentonite-sand slurry ☐
____ Lbs/gal mud weight..... Bentonite slurry ☐
____ % Bentonite..... Bentonite-cement grout ☐
____ cu ft volume added for any of the above

How installed: Tremie ☐ Tremie pumped ☐ Gravity ☐

Bentonite seal: Bentonite granules ☒ Bentonite pellets ☐ Other ☐
☐ 1/4 in. ☐ 3/8 in. ☐ 1/2 in.

Fine sand material: Manufacturer, product name & mesh size
AMERICAN MATERIALS, RED FLINT, #45-55
Volume added ____ cu ft

Filter pack material: Manufacturer, product name & mesh size
AMERICAN MATERIALS, RED FLINT, #30
Volume added ____ cu ft

Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐

Screen material: PVC SCHEDULE 40

Screen type: Factory cut ☒ Continuous slot ☐ Other ☐

Manufacturer TIMCO

Slot size: .010 in.

Slotted length: 9.7 ft.

Backfill material (below filter pack): None ☒ Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowlege.

Signature Terry J March

Firm Montgomery Watson

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MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: WISCRAFT, INC — Well No. MW13
Location: STATE ST. - MILWAUKEE, WI — Project No. 1272019.0109.0011
Developed By: T. MARCH — Checked By:

1. Can this well be purged dry? ☐ Yes ☒ No
2. Well development method
   - surged with bailer and bailed ☐
   - surged with bailer and pumped ☒
   - surged with block and bailed ☐
   - surged with block and pumped ☐
   - surged with block, bailed and pumped ☐
   - compressed air ☐
   - bailed only ☐
   - pumped only ☐
   - pumped slowly ☐
   - Other _____ ☐
3. Time spent developing well: 90 min.
4. Total well depth (TOC) (From well construction summary): 14.7 ft.
   Measured well depth (Before): 14.7 ft.
   Measured well depth (After): 14.7 ft.
5. Inside diameter of well: 2.05 in.
6. Volume of water in filter pack and well casing: 5.0 gal.
7. Volume of water removed from well: 50.0 gal.
   Relative recovery rate _____ ft. per. _____ min.
8. Volume of water added (if any): — gal.
9. Source of water added: N/A

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 9.25 ft.	9.30 ft.
Date:	b. 2/4/97 (mm dd yy)	2/4/97 (mm dd yy)
Time:	c. 9 : 40 ☒ a.m. ☐ p.m.	11 : 45 ☒ a.m. ☐ p.m.
11 Sediment in well bottom:	0.0 inches	0.0 inches
12 Water Observations:	Clear ☐ Turbid ☒ (Describe)	Clear ☐ Turbid ☒ (Describe)
Color	DARK BROWN	DARK BROWN
Odor	NONE	NONE
Turbidity	VERY	VERY SLIGHT
HNu	ND	ND

Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = 4.1

Well casing Vol. (gallons) $0.16r^2 l$ = 0.9

Saturated length of sand pack (ft.) (ls) 5.5

Length of water column (ft.) (l) 5.5

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

	(BEFORE)	(AFTER)
13 Total suspended solids (500 ml Unfiltered)	mg/l	mg/l
14. COD (250 ml Unfiltered Sulfuric)	mg/l	mg/l

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb..	Comment

State of Wisconsin
Department of Natural Resources

Route To:
- ☐ Solid Waste
- ☐ Emergency Response
- ☐ Wastewater
- ☐ Haz. Waste
- ☐ Underground Tanks
- ☐ Water Resources
- ☐ Other _____

SOIL BORING LOG INFORMATION

Form 4400-122 7-91

Page 1 of 1

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
* WISCRAFT, INC.		MW 14

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
J & J SOIL TESTING LTD. M. WIEBELHAUS	2-3-97	2-3-97	4¼ IN. HSA

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW14	_____ Feet MSL	_____ Feet MSL	8.5 inches

Boring Location
State Plane _____ N, _____ E S/C/N | Lat ___ ___ ___
NE 1/4 of NW 1/4 of Section 26, T 7 N, R 21 (E)/W | Long ___ ___ ___

Local Grid Location (if applicable)
_____ Feet ☐N ☐S _____ Feet ☐E ☐W

County	DNR County Code	Civil Town/City/or Village
MILWAUKEE	41	MILWAUKEE

Sample Number	Length Recovered (In.)	Blow Counts	Depth In Ft	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
				ASPHALT PAVEMENT AND GRAVEL	FILL									
				DARK BROWN LEAN CLAY	FILL									
1	23	25 24 16 12		DENSE TO VERY DENSE, DARK YELLOWISH BROWN, FINE TO COARSE SAND, LITTLE TO SOME SILT, LITTLE TO SOME FINE TO COARSE GRAVEL	SM			0.0	40	F/M				
2	14	10 31 48 10%	5					0.0	79	M				
3	22	23 25 20 21						0.0	45	M				
4	16	8 7 7 7	10	MEDIUM DENSE, DARK YELLOWISH BROWN, FINE TO COARSE SAND AND GRAVEL, LITTLE TO SOME SILT	SM/GM			0.0	14	W				
5	19	6 8 11 13		HARD, DARK GRAYISH BROWN LEAN CLAY, SOME FINE TO COARSE SAND, LITTLE FINE TO COARSE GRAVEL	CL			0.0	19	W				
6	22	7 8 11 14	15	STIFF, DARK GRAYISH BROWN SILT	ML			0.0	19	W				
				END OF BORING AT 15.5 FT MW14 INSTALLED AT 14.9 FT										

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

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Terry J. March | Firm: MONTGOMERY WATSON

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WDNR 8/91

MONTGOMERY WATSON

FLUSH MOUNT MONITORING WELL CONSTRUCTION SUMMARY

1272019.0109.0011
JOB NO.

Facility/Project Name	Local Grid Location of Well	Well Name
WISCRAFT, INC.	☐ N. ft. ☐ S. ft. ☐ E. ☐ W.	MW14
Type of Well: Water Table Observation Well ☒ Piezometer ☐	Grid Origin Location: Lat. ____ Long. ____ or St. Plane ft. N, ft. E.	Date Well Installed: 2-3-97
	Section Location of Waste/Source ☐ E. ☐ W.	Well Installed By: (Person's Name and Firm)
Distance Well Is From Waste/Source Boundary ft.	Location of Well Relative to Waste/Source: ☐ Upgradient ☐ Sidegradient ☒ Downgradient ☐ Not Known	(Geologist) T. MARCH - MONTGOMERY WATSON (Driller) M. WIEBELHAUS - J+J SOIL TESTING

Watertight Cover elevation ____ ft. MSL

Well casing top elevation ____ ft. MSL

Ground surface elevation ____ ft. MSL

Surface Seal, bottom ____ ft. MSL or 1.0 ft.

USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☐ MH ☐ CL ☒ CH ☐
Bedrock ☐

Sieve analysis attached? ☐ Yes ☒ No

Drilling method used: Rotary ☐ Hollow Stem Auger ☒ Other ☐

Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒

Drilling additives used? ☐ Yes ☒ No

Describe ____

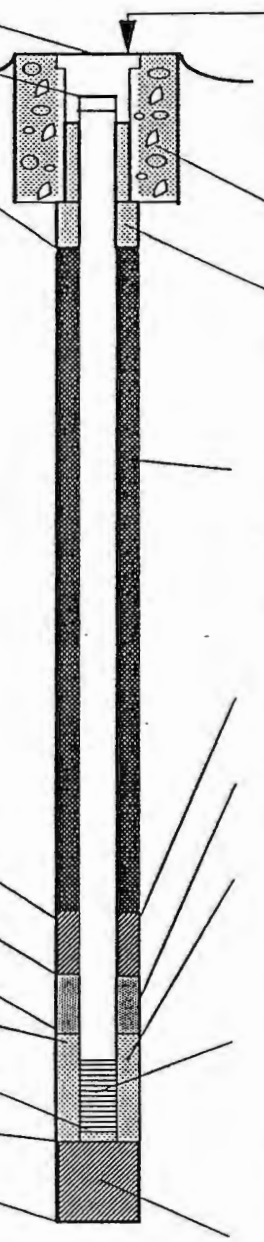
Source of water: N/A

	ELEVATION	DEPTH
Bentonite seal, top	____ ft. MSL or	1.5 ft.
Fine sand, top	____ ft. MSL or	3.5 ft.
Filter pack, top	____ ft. MSL or	4.0 ft.
Screen joint, top	____ ft. MSL or	4.8 ft.
Well bottom	____ ft. MSL or	14.9 ft.
Filter pack, bottom	____ ft. MSL or	15.5 ft.
Borehole, bottom	____ ft. MSL or	15.5 ft.

Borehole, diameter 8.5 in.

O.D. well casing 2.38 in.

I.D. well casing 2.05 in.



Bolt down water tight cover:
Inside Diameter: 6 (in.) Length 12 (in.)

Water tight well cap? Yes ☒ No ☐
Lock? Yes ☒ No ☐

Surficial Seal: Concrete ☒ Bentonite ☐

Sand Drainage? Yes ☒ No ☐

Material between well casing and protective pipe: Bentonite ☐ Annular space seal ☐ Other ☒ FILTER SAND

Annular space seal: Granular Bentonite ☐
____ Lbs/gal mud weight... Bentonite-sand slurry ☐
____ Lbs/gal mud weight..... Bentonite slurry ☐
____ % Bentonite..... Bentonite-cement grout ☐
____ cu ft volume added for any of the above

How installed: Tremie ☐ Tremie pumped ☐ Gravity ☐

Bentonite seal: Bentonite granules ☒ Bentonite pellets ☐ Other ☐
☐ 1/4 in. ☐ 3/8 in. ☐ 1/2 in.

Fine sand material: Manufacturer, product name & mesh size
AMERICAN MATERIALS, RED FLINT, 45-55
Volume added ____ cu ft

Filter pack material: Manufacturer, product name & mesh size
AMERICAN MATERIALS, RED FLINT, #30
Volume added ____ cu ft

Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐

Screen material: PVC SCHEDULE 40

Screen type: Factory cut ☒ Continuous slot ☐ Other ☐

Manufacturer TIMCO

Slot size: .010 in.

Slotted length: 9.7 ft.

Backfill material (below filter pack): None ☒ Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowlege.

Signature: Terry J March

Firm: Montgomery Watson

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: WISCRAFT, INC
Location: STATE ST. - MILWAUKEE, WI
Developed By: T. MARCH
Well No.: MW14
Project No.: 1272019.0109.0011
Checked By:

1. Can this well be purged dry? ☒ Yes ☐ No
2. Well development method

surged with bailer and bailed	☒
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	☐
pumped slowly	☐
Other _____	☐

3. Time spent developing well: 30 min.
4. Total well depth (TOC) (From well construction summary): 14.5 ft.
   Measured well depth (Before): 14.4 ft.
   Measured well depth (After): 14.5 ft.
5. Inside diameter of well: 2.05 in.
6. Volume of water in filter pack and well casing: 5.8 gal.
7. Volume of water removed from well: 3.0 gal.
   Relative recovery rate _____ ft. per _____ min.
8. Volume of water added (if any): — gal.
9. Source of water added: N/A

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 8.24 ft.	8.09 ft.
Date:	b. 2/4/97 (mm dd yy)	2/19/97 (mm dd yy)
Time:	c. 9:30 ☒ a.m. ☐ p.m.	9:20 ☒ a.m. ☐ p.m.
11 Sediment in well bottom:	1.0 inches	0.0 inches
12 Water Observations:	Clear ☐ Turbid ☒ (Describe)	Clear ☐ Turbid ☒ (Describe)
Color	DARK YELLOW BROWN	DARK YELLOW BROWN
Odor	NONE	NONE
Turbidity	VERY	VERY
HNu	ND	ND

Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = 4.7

Well casing Vol. (gallons) $0.16r^2 l$ = 1.1

Saturated length of sand pack (ft.) (ls) 6.3

Length of water column (ft.) (l) 6.3

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg/l (AFTER)

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb.	Comment

IEA
An Aquarion Company

126 West Center Court
Schaumburg, Illinois 60195

Phone 1-800-933-2580
Fax 847-705-1567

February 25, 1997

P# 1272019.0109.0011
File Code 4127.0011

Montgomery Watson
Kevin Shaver
11925 W. Lake Park Dr.
Suite 200
Milwaukee, WI 53224

Dear Kevin Shaver:

Please find enclosed the analytical results of the samples received at our laboratory on February 20, 1997. This report contains sections addressing the following information at a minimum:

- -Definitions
- -Analytical Methodology
- -State certifications
- -Analytical Results
- -Chain-of-custody (if applicable)

IEA Project#:	L72970485	Client Project:	1272019.0109.0011
		Purchase Order#:	
IEA Quote#:		Site:	WISCRAFT

Copies of this analytical report and supporting data are maintained in our files for three years; samples are retained for two weeks unless special arrangements have been made. Unless specifically indicated, all analytical testing was performed at this laboratory and no portion of the testing was subcontracted.

We appreciate your selection of our services and welcome any questions or suggestions you may have relative to this report. Please contact Jim Dowse at (800) 933-2580 for any additional information. Thank you for utilizing our services, we hope you will consider us for your future analytical needs.

have reviewed and approved the enclosed data for final release.

Sincerely

Jim Dowse for

Larry D. Lewis
Director of Operations
IEA-Illinois Laboratory

IEA
An Aquarion Company

Definitions of Data Qualifiers

Organic Analysis

B - This analyte was detected in the method blank associated with this sample. The concentration reported in the method blank is suspected to contribute to the reported concentration of the analyte in the sample.

E - The concentration reported for this compound exceeds the calibration range of the instrument.

H - This sample had one or more surrogate recoveries above the acceptance criteria due to coelution with a nontarget compound.

J - The reported concentration for this compound is an estimated value. When associated with tentatively identified compounds (TICs), the result is quantitated based on a response factor of 1. When the flag is associated with a calibrated target compound, the compound has been positively identified and the reported concentration is above the method detection limit (MDL), but below the practical quantitation limit (PQL).

L - This sample had one or more surrogate recoveries below the acceptance criteria due to matrix effects. This effect was confirmed through a second analysis of the sample.

LI - The recovery of the internal standard corresponding to this compound did not meet the acceptance criteria due to matrix effects. This effect was confirmed through a second analysis of the sample.

T1 - The chromatographic profile of this sample does not match that of a gasoline standard. Another unidentifiable petroleum product is present in this sample. Quantitation is based on a gasoline standard calibration.

T2 - The chromatographic profile of this sample does not match that of a diesel fuel standard. Another petroleum product is present in this sample. Quantitation is based on a diesel fuel standard calibration.

U - This compound was not detected in the sample above the PQL.

UD - This compound was not detected above the elevated PQL in this diluted analysis.

Inorganic Analysis

E - The reported value was estimated due to the presence of interference.

M - Duplicate injection precision was not met.

N - Spiked sample recovery was not within control limits.

S - The reported value was determined by the Method of Standard Additions(MSA).

W - Post digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance.

* - Duplicate analysis was not within control limits.

+ - Correlation Coefficient for the MSA is less than 0.995.

IEA
An Aquarion Company

Sample Summary

IEA-Illinois

Laboratory ID	Client ID
L72970485-001	MW12
L72970485-002	MW13
L72970485-003	MW14
L72970485-004	TRIP BLANK

IEA
An Aquarion Company

Client: Montgomery Watson
IEA Job#: L72970485
Project ID: 1272019.0109.0011
Matrix: Water
Method: 8021A

Halogenated & Aromatic Volatile Compounds
GC Volatiles Analysis
µg/L

Analyte / Lab ID	001	002	003	004		PQL
Dilution Factor	1	1	1	1		
Method Blank	VS022197	VS022197	VS022197	VS022197		
Client ID	MW12	MW13	MW14	TRIP BLANK		
Benzene	U	U	U	U		1
Ethylbenzene	U	U	U	U		1
Toluene	U	U	U	U		1
Total Xylenes	U	U	U	U		3
Bromodichloromethane	U	U	U	U		1
Bromoform	U	U	U	U		1
Bromomethane	U	U	U	U		1
Carbon Tetrachloride	U	U	U	U		1
Chlorobenzene	U	U	U	U		1
Chloroethane	U	U	U	U		1
Chloroform	U	U	U	U		1
Chloromethane	U	U	U	U		1
Dibromochloromethane	U	U	U	U		1
1,2-Dichlorobenzene	U	U	U	U		1
1,3-Dichlorobenzene	U	U	U	U		1
1,4-Dichlorobenzene	U	U	U	U		1
1,1-Dichloroethane	7	2	U	U		1
1,2-Dichloroethane	U	U	U	U		1
1,1-Dichloroethene	U	U	U	U		1
cis-1,2-Dichloroethene	92	59	51	U		1
trans-1,2-Dichloroethene	1	U	U	U		1
1,2-Dichloropropane	U	U	U	U		1
cis-1,3-Dichloropropene	U	U	U	U		1
trans-1,3-Dichloropropene	U	U	U	U		1
Methylene Chloride	U	U	U	U		1
1,1,2,2-Tetrachloroethane	U	U	U	U		1
Tetrachloroethene	79	43	4	U		1
1,1,1-Trichloroethane	2	4	U	U		1
1,1,2-Trichloroethane	U	U	U	U		1
Trichloroethene	29	30	7	U		1
Trichlorofluoromethane	U	U	U	U		1
Vinyl Chloride	18	3	U	U		1
Date Sampled	2/19/97	2/19/97	2/19/97	2/19/97		
Date Analyzed	2/21/97	2/21/97	2/21/97	2/21/97		

PQL = Practical Quantitation Limit
To obtain the sample-specific quantitation limit, multiply the PQL by the Dilution Factor.

IEA
An Aquarion Company

126 WEST CENTER COURT
SCHAUMBURG, ILLINOIS 60195
PH # 708-705-0740
FAX # 708-705-1567

CHAIN OF CUSTODY RECORD

NO. 2845

Page 1 of 1

REGULATORY CLASSIFICATION - PLEASE SPECIFY

☐ NPDES ☐ DRINKING WATER ☐ RCRA ☐ OTHER _____

COMPANY	CONTACT PERSON	PROJECT I.D.	PHONE #	FAX #	P.O. #
MONTGOMERY WATSON - MILW.	KEVIN SHAVER	WISCRAFT 1272019.0109.0011	414-359-1144	414-359-1145	

ADDRESS	CITY	STATE	ZIP
1925 WEST LAKE PARK DRIVE - SUITE 200	MILWAUKEE	WI	53224

DELIVERABLES
☒ Routine
☐ Rush (Specify)
☐ Special Request (attach specifics)

DATE	TIME	SAMPLE I.D.	MATRIX	# OF CONTAINERS	PRESERVED Y/N	VOC (8010/8020)	(COMMENTS)
2-19-97	1125	MW12	GW	2	Y HCl	X	
↓	1115	MW13	↓	↓	↓	↓	
↓	1140	MW14	↓	↓	↓	↓	
↓	0800	TRIP BLANK	↓	1	↓	↓	

RELINQUISHED BY (SIGNATURE)	DATE / TIME	RECEIVED BY	DATE / TIME
Terry J. March	2-20-97/0900	K. Lawson	2/20/97 9:45 AM

RELINQUISHED BY (SIGNATURE)	DATE / TIME	RECEIVED FOR LAB BY	DATE / TIME
		[illegible]	2/20/97 1700

REMARKS ON SAMPLE RECEIPT
☐ BOTTLE INTACT ☐ CUSTODY SEALS
☐ PRESERVED ☐ SEALS INTACT
☒ CHILLED ☐ SEE REMARKS

IEA QUOTE NO.

IEA USE ONLY

C

GROUNDWATER ANALYTICAL RESULTS

IEA
An Aquarion Company

126 West Center Court
Schaumburg, Illinois 60195

Phone 1-800-933-2580
Fax 847-705-1567

RECEIVED
MAR 31 1997
MW - MILW.

March 26, 1997

Montgomery Watson
evin Shaver
1925 W. Lake Park Dr.
Suite 200
Milwaukee, WI 53224

P# 1272019.0109.0011
File Code 6/3.7

ear Kevin Shaver:

Please find enclosed the analytical results of the samples received at our laboratory on March 14, 1997. This report contains sections addressing the following information at a minimum:

- -Definitions
- -Analytical Methodology
- -State certifications
- -Analytical Results
- -Chain-of-custody (if applicable)

IEA Project#: L72970773	Client Project:	1272019.0109.0011
	Purchase Order#:	
IEA Quote#:	Site:	WISCRAFT

Copies of this analytical report and supporting data are maintained in our files for three years; samples are retained for two weeks unless pecial arrangements have been made. Unless specifically indicated, all nalytical testing was performed at this laboratory and no portion of the testing was subcontracted.

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I have reviewed and approved the enclosed data for final release.

incerely

arry D. Lewis
Director of Operations
IEA-Illinois Laboratory

IEA
An Aquarion Company

126 West Center Court
Schaumburg, Illinois 60195

Phone 1·800·933·2580
Fax 847·705·1567

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* - Duplicate analysis was not within control limits.

+ - Correlation Coefficient for the MSA is less than 0.995.

Sample Summary

IEA-Illinois

Laboratory ID	Client ID
L72970773-001	MW05
L72970773-002	MW06
L72970773-003	MW07
L72970773-004	MW09
L72970773-005	MW10
L72970773-006	MW11
L72970773-007	MW11 DUPLICATE
L72970773-008	MW04
L72970773-009	FIELD BLANK
L72970773-010	TRIP BLANK

Client:	Montgomery Watson
IEA Job#:	L72970773
Project ID:	1272019.0109.0011
Site:	WISCRAFT
Matrix:	Water
Method:	8021A

Halogenated & Aromatic Volatile Compounds
GC Volatiles Analysis
µg/L

Analyte / Lab ID						PQL
Dilution Factor	1	1	1	10	1	
Method Blank	VS031797	VS031797	VS031797	VS031897	VS031897	
Client ID	MW05	MW06	MW07	MW09	MW10	
Lab ID	001	002	003	004	005	
Benzene	U	U	U	UD	2	1
Ethylbenzene	U	3	U	UD	U	1
Toluene	U	U	U	UD	U	1
Total Xylenes	U	U	U	UD	U	3
Bromodichloromethane	U	U	U	UD	U	1
Bromoform	U	U	U	UD	U	1
Bromomethane	U	U	U	UD	U	1
Carbon Tetrachloride	U	U	U	UD	U	1
Chlorobenzene	U	U	U	UD	U	1
Chloroethane	U	U	U	UD	U	1
Chloroform	U	U	U	UD	U	1
Chloromethane	U	U	U	UD	U	1
Dibromochloromethane	U	U	U	UD	U	1
1,2-Dichlorobenzene	U	U	U	UD	U	1
1,3-Dichlorobenzene	U	U	U	UD	U	1
1,4-Dichlorobenzene	U	U	U	UD	U	1
1,1-Dichloroethane	U	U	6	UD	17	1
1,2-Dichloroethane	U	U	U	UD	U	1
1,1-Dichloroethene	U	U	1	UD	2	1
cis-1,2-Dichloroethene	2	U	3700 (*)	150	1800 (**)	1
trans-1,2-Dichloroethene	U	U	27	UD	20	1
1,2-Dichloropropane	U	U	U	UD	U	1
cis-1,3-Dichloropropene	U	U	U	UD	U	1
trans-1,3-Dichloropropene	U	U	U	UD	U	1
Methylene Chloride	U	U	U	UD	U	1
1,1,2,2-Tetrachloroethane	U	U	U	UD	U	1
Tetrachloroethene	21	U	3500 (*)	570	1100 (**)	1
1,1,1-Trichloroethane	U	U	22	UD	34	1
1,1,2-Trichloroethane	U	U	U	UD	U	1
Trichloroethene	2	U	1600 (*)	190	940 (**)	1
Trichlorofluoromethane	U	U	U	UD	U	1
Vinyl Chloride	U	U	4	UD	2	1
Date Sampled	3/12/97	3/12/97	3/12/97	3/12/97	3/12/97	
Date Analyzed	3/17/97	3/17/97	3/17/97	3/18/97	3/18/97	

PQL = Practical Quantitation Limit
To obtain the sample-specific quantitation limit, multiply the PQL by the Dilution Factor.
(*)--This compound was analyzed at a 1:50 dilution on 3/18/97.
(**)--This compound was analyzed at a 1:25 dilution on 3/18/97.

Client:	Montgomery Watson
IEA Job#:	L72970773
Project ID:	1272019.0109.0011
Site:	WISCRAFT
Matrix:	Water
Method:	8021A

Halogenated & Aromatic Volatile Compounds
GC Volatiles Analysis
µg/L

Analyte / Lab ID						PQL
Dilution Factor	1	1	1	1	1	
Method Blank	VS031897	VS031897	VS031897	VS031897	VS031997	
Client ID	MW11	MW11 DUPLICATE	MW04	FIELD BLANK	TRIP BLANK	
Lab ID	006	007	008	009	010	
Benzene	U	U	U	U	U	1
Ethylbenzene	U	U	U	U	U	1
Toluene	U	U	U	U	2	1
Total Xylenes	U	U	U	U	U	3
Bromodichloromethane	U	U	U	U	U	1
Bromoform	U	U	U	U	U	1
Bromomethane	U	U	U	U	U	1
Carbon Tetrachloride	U	U	U	U	U	1
Chlorobenzene	U	U	U	U	U	1
Chloroethane	U	U	U	U	U	1
Chloroform	2	1	U	U	U	1
Chloromethane	U	U	U	U	1	1
Dibromochloromethane	U	U	U	U	U	1
1,2-Dichlorobenzene	U	U	U	U	U	1
1,3-Dichlorobenzene	U	U	U	U	U	1
1,4-Dichlorobenzene	U	U	U	U	U	1
1,1-Dichloroethane	25	22	U	U	U	1
1,2-Dichloroethane	U	U	U	U	U	1
1,1-Dichloroethene	U	U	U	U	U	1
cis-1,2-Dichloroethene	22	19	U	U	U	1
trans-1,2-Dichloroethene	1	U	U	U	U	1
1,2-Dichloropropane	U	U	U	U	U	1
cis-1,3-Dichloropropene	U	U	U	U	U	1
trans-1,3-Dichloropropene	U	U	U	U	U	1
Methylene Chloride	U	U	U	U	U	1
1,1,2,2-Tetrachloroethane	U	U	U	U	U	1
Tetrachloroethene	16	14	14	U	U	1
1,1,1-Trichloroethane	27	23	U	U	U	1
1,1,2-Trichloroethane	U	U	U	U	U	1
Trichloroethene	2	1	U	U	U	1
Trichlorofluoromethane	U	U	U	U	U	1
Vinyl Chloride	U	U	U	U	U	1
Date Sampled	3/12/97	3/12/97	3/12/97	3/12/97	3/12/97	
Date Analyzed	3/18/97	3/18/97	3/19/97	3/19/97	3/20/97	

PQL = Practical Quantitation Limit
To obtain the sample-specific quantitation limit, multiply the PQL by the Dilution Factor.

Method 8021

Matrix Spike/Matrix Spike Duplicate

Matrix: Water

Date Analyzed: 3/20/97
IEA Sample ID: L72970755-001

Compound	Spike Added (µg/L)	Sample Concentration (µg/L)	Matrix Spike Concentration (µg/L)	% Recovery
1,1-Dichloroethene	50	<1	53	106%
Trichloroethene	50	<1	53	106%
Benzene	50	<1	53	106%
Toluene	50	<1	51	102%
Chlorobenzene	50	<1	52	104%

Compound	Spike Added (µg/L)	Matrix Spike Dup Concentration (µg/L)	% Recovery	% Difference
1,1-Dichloroethene	50	55	110%	4%
Trichloroethene	50	46	92%	14%
Benzene	50	53	106%	0%
Toluene	50	52	104%	2%
Chlorobenzene	50	51	102%	2%

% Recovery Limits: 70-130%
% Difference Limits: +/- 20 %

IEA
An Aquarion Company

126 WEST CENTER COURT
SCHAUMBURG, ILLINOIS 60195
PH # 708-705-0740
FAX # 708-705-1567

CHAIN OF CUSTODY RECORD

NO. 5473

Page 1 of 1

REGULATORY CLASSIFICATION - PLEASE SPECIFY

☐ NPDES ☐ DRINKING WATER ☐ RCRA ☐ OTHER

COMPANY	CONTACT PERSON	PROJECT I.D.	PHONE #	FAX #	P.O. #
MONTGOMERY WATSON	KEVIN SHAVER	1272019.0109.0011	414-359-1144	414-359-1145	

ADDRESS	CITY	STATE	ZIP
11925 WEST LAKE PARK DRIVE – SUITE 200	MILWAUKEE	WI	53224

DELIVERABLES: ☑ Routine ☐ Rush (Specify) ☐ Special Request (attach specifics)

DATE	TIME	SAMPLE I.D.	MATRIX	# OF CONTAINERS	PRESERVED Y/N	VOC (8010/8020)	(COMMENTS)
3-12-97	1140	MW05	GW	2	Y HCl	X	
	1345	MW06					OILY ODOR
	1325	MW07					SLIGHT SOLVENT ODOR
	1200	MW09					
	1310	MW10					SLIGHT SOLVENT ODOR
	1255	MW11					
	1255	MW11 DUPLICATE					
	1225	MW04					
	1400	FIELD BLANK					
	1100	TRIP BLANK		1			

RELINQUISHED BY (SIGNATURE)	DATE / TIME	RECEIVED BY	DATE / TIME
Terry J. Marck	3-14-97/0900	R. Hawkins	3/14/97 900 AM

RELINQUISHED BY (SIGNATURE)	DATE / TIME	RECEIVED FOR LAB BY	DATE / TIME
		Vince Vugar	3/14/97 1400

REMARKS ON SAMPLE RECEIPT

☐ BOTTLE INTACT ☐ CUSTODY SEALS
☐ PRESERVED ☐ SEALS INTACT
☑ CHILLED ☐ SEE REMARKS

IEA QUOTE NO.

IEA USE ONLY