COOK COMPOSITES AND POLYMERS

• *Imagination* • *Innovation*

CERTIFIED

P 520 692 480

MAIL

February 6, 1997

Mr. Tim Mulholland
Wisconsin Department of Natural Resources
Bureau of Solid Waste Management
P.O. Box 7921
101 South Webster Street
Madison, WI 53707-7921

246004330
HW/GWM

RE: Cook Composites and Polymers Co. - Saukville, WI
1996 Annual Groundwater Results

Dear Tim:

Enclosed are two copies of the 1996 Annual Groundwater Report for our Cook Composites and Polymers Co.'s (CCP's) Saukville, WI facility. The report presents a summary of the analytical data collected during the four quarterly sampling events conducted at CCP during 1996 and also provides an evaluation of water level and groundwater quality trends at the site. The data indicate the remedial systems currently operating at CCP are continuing to effectively prevent groundwater contamination from migrating off-site. Volatile organic compound (VOC) concentration trends over the past years also suggest that the contamination is diminishing near the site boundaries and is being removed via the extraction wells and collection systems.

If you have any questions regarding the annual report, please feel free to contace me at (816) 391-6025.

Sincerely,
Cook Composites and Polymers Co.

Craig R. Bostwick

Craig R. Bostwick
Director Environmental-Regulatory-Safety

Enclosures

cc: Ms. Laura Lodisio - USEPA (2 copies)
Mr. Franklin Shultz - WDNR SE District (2 copies)
Mr. Christopher Lear - Village of Saukville (1 copy)
Mr. Gary Masse - CCP Saukville (1 copy)

CCP

P.O. Box 419389 Kansas City, MO 64141-6389
(816) 391-6000 Fax: (816) 391-6337

246004330 HW/GWM

1996 ANNUAL REPORT

PREPARED FOR
COOK COMPOSITES AND POLYMERS
SAUKVILLE, WISCONSIN

PREPARED BY
RMT, INC.
MADISON, WISCONSIN

JANUARY 1997

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EXECUTIVE SUMMARY

Temporal trends in groundwater chemistry show that levels of volatile organic compounds (VOCs) persist in groundwater in the glacial deposits and shallow dolomite at concentrations on the order of tens of thousands of µg/L. The persistent high levels of VOCs in groundwater suggest that light nonaqueous phase liquids (LNAPLS[1]) are present in the glacial deposits and shallow subsurface. The residual sources of contamination continue to leach VOCs into groundwater in the glacial deposits and in the shallow dolomite. However, VOC concentrations in the deep aquifer have decreased by two orders of magnitude since the groundwater extraction system was brought on-line 8 years ago, and continue to remain very low to nondetectable.

The groundwater extraction system minimizes vertical (downward) migration of contaminants from the glacial drift and shallow dolomite to the deep dolomite because continuous groundwater extraction has created dewatered zones in the glacial drift and shallow dolomite beneath the CCP property. Even though elevated concentrations of VOCs persist in groundwater beneath the facility, off-site migration of contaminants continues to be effectively controlled by the groundwater recovery systems in the glacial drift, shallow dolomite, and deep dolomite aquifer.

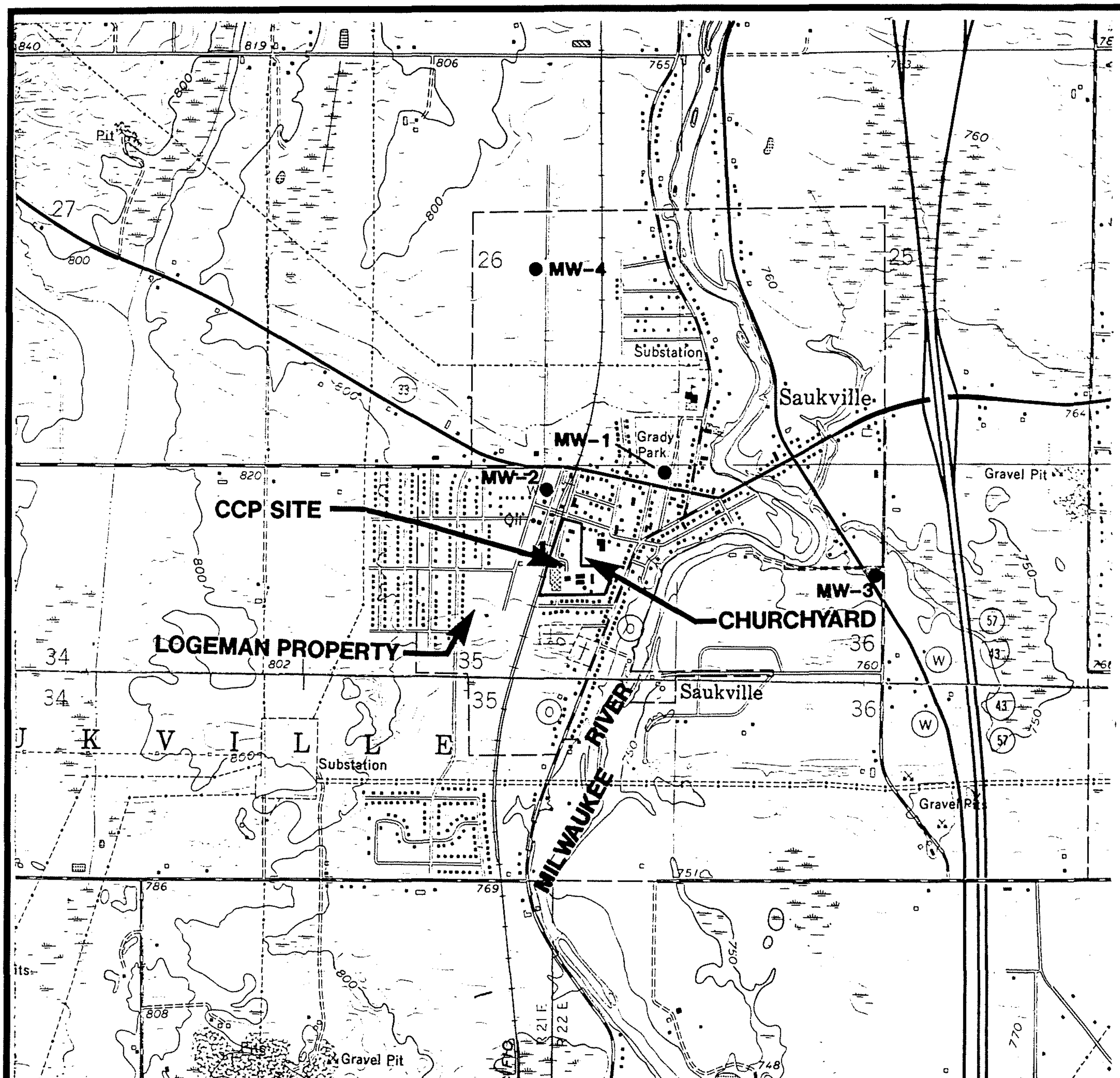
1 LNAPLS are liquids that have a density less than water and that are immiscible in water, i.e., petroleum products.

Section 1
INTRODUCTION

CCP operates a plant in Saukville, Wisconsin, where alkyd, polyester, and urethane resins are manufactured (Figure 1). Prior to 1991, the plant was owned and operated by Freeman Chemical Corporation.

In compliance with the 1987 Corrective Action Order on Consent (CAO) V-W-88-R-002, Freeman Chemical Corporation undertook interim corrective measures for groundwater contamination at their Saukville facility. The interim measures included the installation of a groundwater remediation system and the development of a groundwater monitoring program. The groundwater recovery system is discussed in detail in the RCRA Facility Investigation (RFI) report (RMT, 1995a). The groundwater monitoring program requires four rounds of groundwater sampling per year. In 1996, CCP conducted the sampling and analysis of groundwater in January (winter), April (spring), July (summer), and October (fall). The Wisconsin Department of Natural Resources (WDNR) requirement to include analysis for parameters detected during Appendix IX monitoring conducted as part of the RFI (WDNR, 1994), was completed during the annual sampling round in July.

RMT, Inc. (RMT), in Madison, Wisconsin, conducted the groundwater sampling for the 1996 quarterly monitoring events. The groundwater samples were analyzed at RMT, Inc., Laboratories in Madison, Wisconsin, for the winter round, and were analyzed by EnChem Laboratories, of Madison and Green Bay, Wisconsin, for the spring, summer and fall rounds. The field data and the results of the chemical analyses of groundwater were compiled by RMT, and were submitted in quarterly reports by CCP to the USEPA Region V and the WDNR. Volatile organic compound (VOC) exceedances of Wisconsin Administrative Code NR 140 Preventive Action Limits (PALs) or Enforcement Standards (ESs) were reported quarterly by CCP in accordance with NR 508. This report was prepared to summarize the results of groundwater monitoring over the last year.



STATE LOCATION

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0 2000 4000

SITE LOCATION, MUNICIPAL WELLS, AND OFF SITE AREAS OF CONCERN

COOK COMPOSITES AND POLYMERS SAUKVILLE, WISCONSIN

SOURCE: BASE MAP FROM PORT WASHINGTON WEST AND CEDARBURG, WISCONSIN USGS QUADRANGLES.

RMT INC.

DWN. BY:	DSS
APPROVED BY:	COB
DATE:	JANUARY 1997
PROJ. #	3333.02
FILE #	33330201.DWG

FIGURE 1.

PLOT DATA
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Plot Date: Thursday, December 5, 1996
Plot Time: 08:08.3131 AM
Attached Xref's: No xref's Attached.

Section 2

PURPOSE AND SCOPE

This document presents a summary of the data collected during the four quarterly groundwater sampling events that were conducted at CCP in 1996, and provides an evaluation of water level and groundwater quality trends at the site. Since the water quality data have been submitted to the USEPA and the WDNR in the quarterly reports, they will not be reproduced in this document.

The scope of this report includes the following:

- A summary of water levels that were measured in on-site monitoring wells in 1996, and potentiometric surface maps of the glacial drift and shallow dolomite hydrogeologic units
- An evaluation of groundwater flow directions in the glacial drift and shallow dolomite hydrogeologic units, and the effects of groundwater extraction on these patterns of groundwater flow
- A summary of the site groundwater monitoring program and the quarterly total VOC concentrations by well
- Isoconcentration maps for total VOCs in groundwater in the glacial drift and shallow dolomite wells
- Time-concentration plots of total VOCs in groundwater in selected wells
- An evaluation of the trends in groundwater quality for each monitoring well group for 1996
- An evaluation of the effectiveness of plume containment by on-site groundwater extraction, based on groundwater flow and quality data

Section 3
SITE HYDROGEOLOGY

3.1 Description of Hydrogeologic Units

The subsurface geology at the site has been divided into three hydrogeologic units. These include the glacial drift (unconsolidated deposits), shallow dolomite (Silurian dolomite to 100 feet below grade), and the deep dolomite (Silurian dolomite from 100 to 700 feet below grade). Descriptions of these hydrogeologic units are outlined below.

Glacial Drift

The glacial drift hydrogeologic unit consists of a complex succession of fill and glaciolacustrine deposits that is underlain by till. The lake deposits and other materials have been extensively used as fill on-site. Both the till and glaciolacustrine deposits are considered to be part of a partially confining hydrostratigraphic unit (RMT, 1995a).

The total thickness of the unconsolidated deposits (glacial drift) typically varies between 10 and 30 feet beneath the site area, but is generally on the order of 10 feet at the CCP facility. Glaciolacustrine deposits are up to 20 feet thick on the western side of the site, and consist of interbedded sand, silt, and clay that is soft to medium hard, gray, and plastic to slightly plastic. Between 5 and 25 feet of till are present beneath the eastern side of the site. The till is composed of interbedded silty sand to sandy gravel that ranges from loose to very dense, and is brown to gray in color and typically well-graded (RMT, 1995a).

The stratigraphic order of the deposits from the ground surface downward is typically sand and silt overlying a laterally continuous layer of laminated silt and clay (glaciolacustrine deposits) above dense clay (glacial till). A thin layer of sand and gravel (glacial outwash) lies between this till unit and bedrock.

Shallow Dolomite

The glacial deposits are unconformably underlain by fractured, massive to thinly bedded Silurian dolomite, with a total thickness of approximately 700 feet in the site area, which includes the deep dolomite aquifer.

The uppermost 100 feet of the Silurian dolomite in the Saukville area tends to have a lower permeability than the underlying deep dolomite aquifer. Occasionally, transmissive zones are encountered in the shallow dolomite, such as at well W-24A, which extracts groundwater at 40 gallons per minute, and yet shows little drawdown (RMT, 1995a).

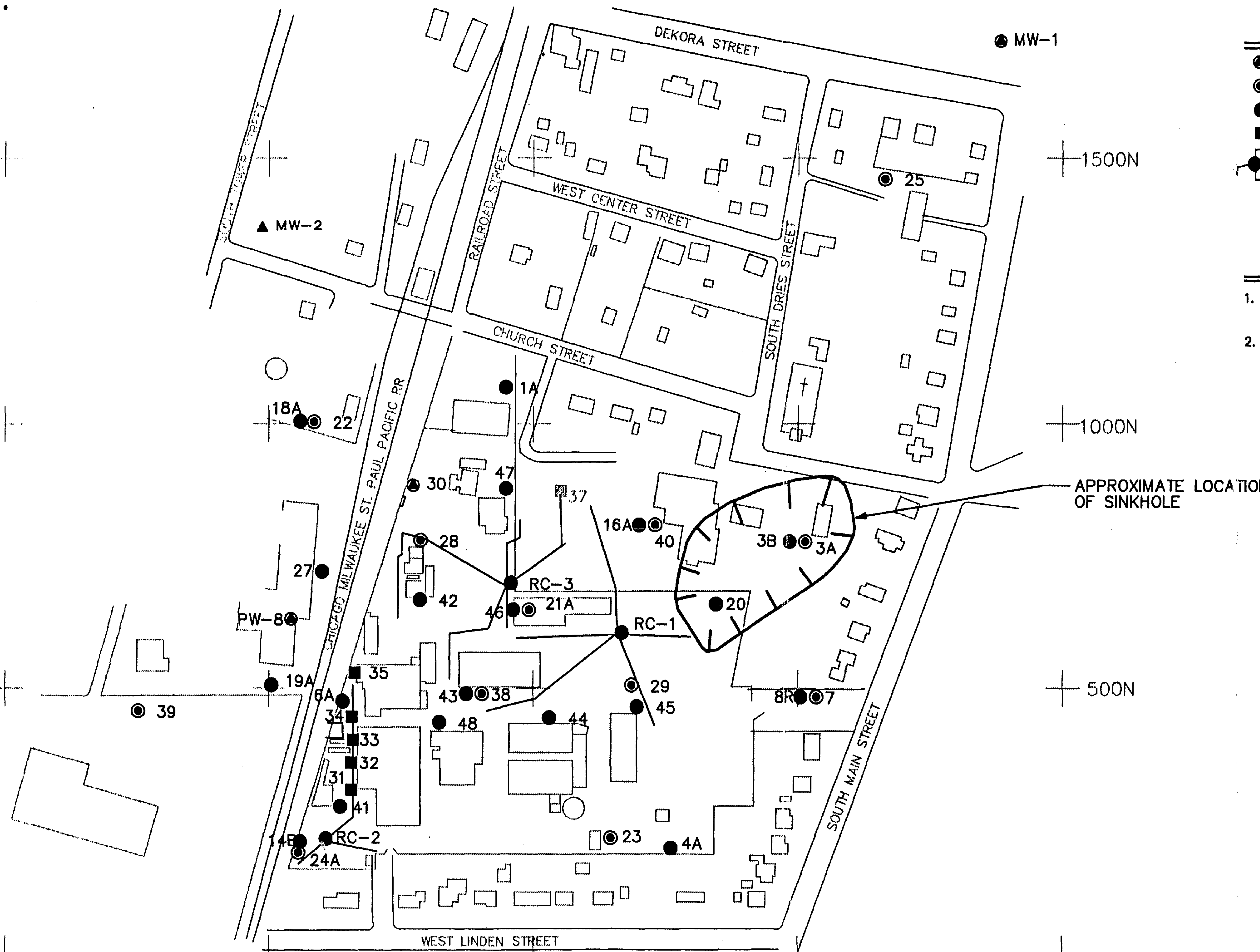
Deep Dolomite

The deep dolomite aquifer is defined as the Silurian dolomite from 100 feet to 700 feet below grade. The dominant lithology in the deep dolomite aquifer in the Saukville area is the Racine Formation. Municipal wells in the study area are typically cased to approximately 100 feet below grade, and are completed in the Silurian dolomite to depths in the range of 450 to 550 feet below grade. Groundwater flow within the Silurian dolomite appears to be fracture-controlled beneath the study area (RMT, 1995a).

Several solution features have been identified in the dolomite on-site. A sinkole that is filled with glacial deposits that extend to a depth of approximately 200 feet below grade was encountered on the eastern edge of the CCP site (Figure 2) during the installation of wells W-3A, W-3B and W-20. The areal extent of the sinkhole was further delineated based on a seismic refraction survey performed by Minnesota Geophysical Associates (MGA, 1989). Further evidence of karstic features includes solution-enlarged joints in the dolomite observed during the borehole video logging of W-30. These observations, coupled with the hydraulic response of the aquifer during aquifer tests in Saukville, suggest that groundwater flow in the Silurian dolomite is fracture controlled in the study area (RMT, 1995a).

3.2 Groundwater Levels and Flow Patterns in 1996

Groundwater levels in site monitoring wells were measured prior to purging during quarterly sampling events. Table 1 presents a summary of water levels for each quarter, and Figure 2 shows the locations of site monitoring wells. The water level data for 1996 were used to construct quarterly water table maps for the glacial drift unit, and quarterly potentiometric surface maps for the shallow dolomite unit (Appendix A).



LEGEND

- DEEP DOLOMITE WELL
- SHALLOW DOLOMITE WELL
- GLACIAL OVERBURDEN WELL
- GLACIAL OVERBURDEN WITHDRAWAL WELL
- RANNEY COLLECTOR

NOTES

1. BASE MAP WAS DEVELOPED FROM HATCHER-SAYRE, INC., 1992.
2. W-37 WAS ABANDONED AUGUST 2, 1996.

MONITORING WELL LOCATION MAP
COOK COMPOSITES AND POLYMERS
SAUKVILLE, WISCONSIN

RMT INC.

DWN. BY:	JRW
APPROVED BY:	COB
DATE:	JANUARY 1997
PROJ. #	3333.02
FILE #	33330211.DWG

FIGURE 2

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Plot Time: 1:05.3392 PM
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TABLE 1
COOK COMPOSITES AND POLYMERS
SUMMARY OF WATER LEVELS, 1996 (FEET, MSL)

GEOLOGIC UNIT	SAMPLE ID	01/96	04/96	07/96	09/96
Glacial	W-01A	757.14	757.61	762.11	758.16
Glacial	W-03B	732.98	733.42	739.24	733.13
Glacial	W-04A	746.57	752.34	756.13	745.65
Glacial	W-06A	764.83	766.23	766.09	764.45
Glacial	W-08R	745.6	746.75	751.89	745.59
Glacial	W-14B	764.12	765.46	766.05	762.44
Glacial	W-16A	755.33	752.85	762.22	752.95
Glacial	W-18A	766.17	769.36	770.31	767.24
Glacial	W-19A	763.92	766.37	768.19	764.6
Glacial	W-20	728.23	728.31	734.48	727.97
Glacial	W-27	766.91	768.01	768.63	767.21
Glacial	W-37	758.75	759.52	761.17	NM
Glacial	W-41	758.62	759.7	762.73	757.98
Glacial	W-42	754.41	755.8	759.06	754.84
Glacial	W-43	757.67	761.96	760.42	758.4
Glacial	W-44	754.95	754.98	757.47	756.13
Glacial	W-45	<752.27	<752.27	757.47	756.13
Glacial	W-46	760.19	762.33	<752.27	<752.27
Glacial	W-47	758.84	759.74	759.6	758.72
Glacial	W-48	762.21	763.2	763.46	761.23
Shallow Dolomite	W-03A	732.23	732.72	738.6	732.32
Shallow Dolomite	W-07	743.32	744.97	750.26	742.47
Shallow Dolomite	W-21A	703.43	710.04	707.62	702.51
Shallow Dolomite	W-22	729.27	729.38	732.01	728.52
Shallow Dolomite	W-23	737.97	738.4	743.78	737.32
Shallow Dolomite	W-24A	755.64	758.77	762.11	757.31
Shallow Dolomite	W-25	745.3	745.84	751.7	745.06
Shallow Dolomite	W-28	732.39	731.13	722.16	714.91
Shallow Dolomite	W-29	723.02	718.46	735.86	727.12
Shallow Dolomite	W-38	748.11	748.75	751.92	748.04
Shallow Dolomite	W-39	756.73	757.72	760.57	756
Shallow Dolomite	W-40	736.93	737.34	742.47	738.4
Deep Dolomite	MW-01	486	486	571	481
Deep Dolomite	MW-02	NM	NM	604.03	NM
Deep Dolomite	MW-03	471	461	586	461
Deep Dolomite	MW-04	658	663	663	659
Deep Dolomite	PW-08	730.83	735.99	737.18	733.69
Deep Dolomite	W-30	665.34	667.66	660.73	679.24

DW = DRY WELL
NM = NOT MEASURED

The Glacial Drift Hydrogeologic Unit

The water table occurs in the glacial drift unit, as shown on Figures 3a through 3d (Appendix A). The depth to the water table at the site is approximately 10 feet below grade. Water table elevations appear to be higher in the spring due to enhanced recharge resulting from snowmelt and rainfall. Well W-20 is completed as a piezometer within the glacial drift present in the sinkhole in the northeastern portion of the site (Figure 2), and the hydraulic head within this well is representative of groundwater flow in the shallow dolomite unit. Therefore, water levels from well W-20 were not used to construct the water table maps on Figures 3a through 3d, but have been used to construct the potentiometric surface maps for the shallow dolomite unit (Figures 4a through 4d).

The water table beneath the CCP facility generally slopes downgradient to the east, toward the Milwaukee River with a hydraulic gradient of 0.02 ft/ft. However, on-site shallow groundwater flow is deflected toward the Ranney collectors, and toward extraction wells (Table 2) through the on-site groundwater recovery system. The pumps in the extraction wells and Ranney collector sumps are operated by floats, so that they do not run constantly. Table 2 outlines the pump running times for the extraction wells and Ranney collectors.

Hydrographs of representative water table wells (W-18A, W-46, and W-47) for the period from 1985 to the present are shown on Figure 4. Water levels in upgradient well W-18A are similar to water levels in on-site wells W-46 and W-47 in 1985, prior to activation of the on-site groundwater recovery system. After pumping began in 1987, the water levels in wells W-46 and W-47 decreased and then stabilized at a level approximately 2 to 6 feet lower than the pre-pumping level. On the other hand, for upgradient well W-18A, water levels have increased approximately 5 feet since 1985. The decreasing trend in water levels in the on-site wells, coupled with the increasing trend in water levels in the upgradient well, indicates that on-site groundwater extraction is dewatering the on-site glacial deposits. Based on the available data, the shallow groundwater extraction system is controlling off-site migration of groundwater in the glacial drift.

WATER LEVELS OVER TIME

Monitoring Wells in Glacial Deposits

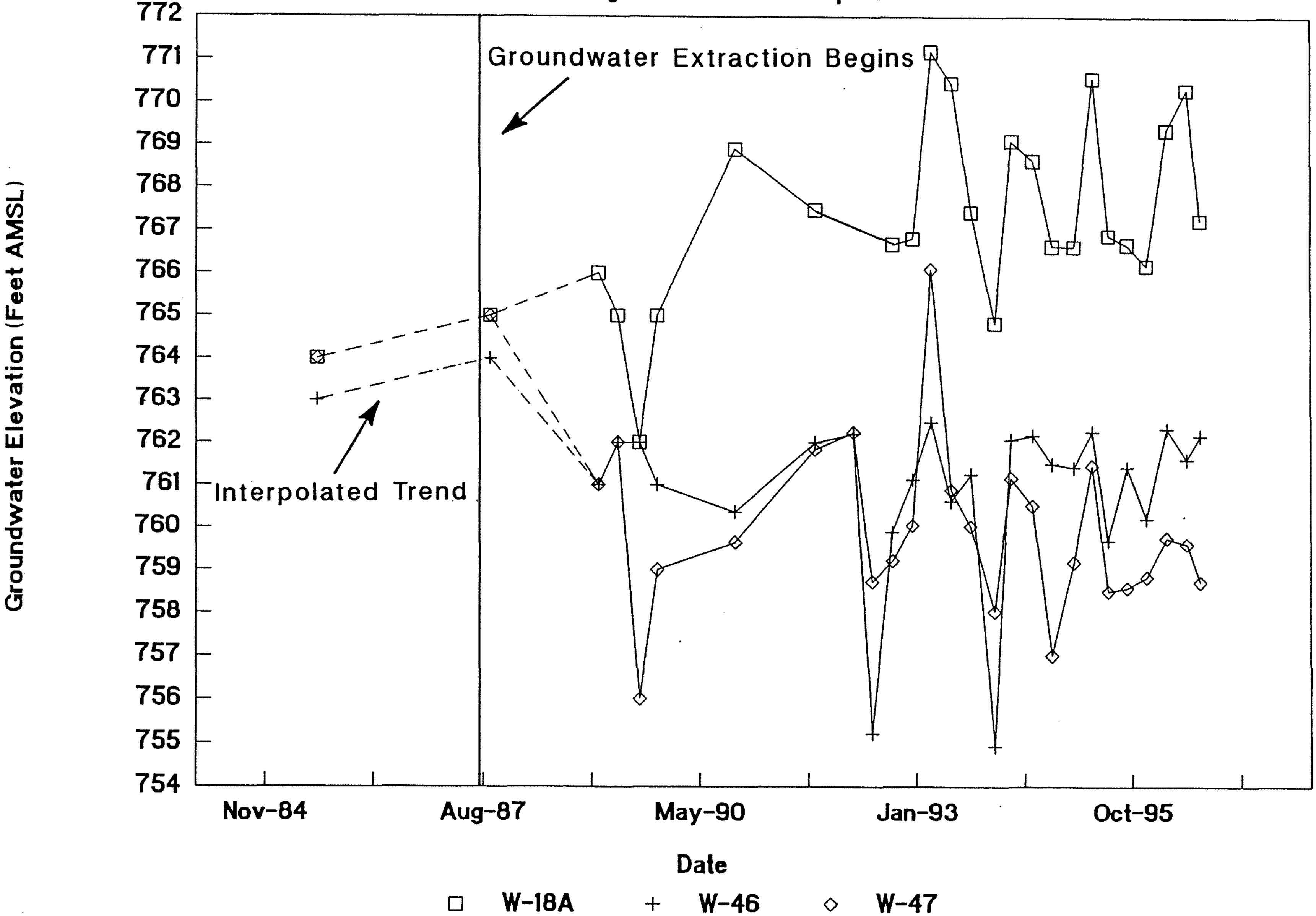

Figure 4

A vertically downward hydraulic gradient continues to be present between the glacial drift and the shallow dolomite. The magnitude of the downward gradients was on the order of 0.08 ft/ft (downward, at wells W-14B/W-24A) to 0.59 ft/ft (downward, at wells W-16A/W-40) (Appendix B).

The Shallow Dolomite Hydrogeologic Unit

The potentiometric surface in the shallow dolomite unit for the winter, spring, summer, and fall quarters of 1996 is shown on Figures 5a, 5b, 5c, and 5d (Appendix A). All of the piezometers except PW-8 (which is constructed to receive water only from the deep dolomite) have been included in the potentiometric map. W-30, which is opened to both the shallow and deep dolomite, has been included in the potentiometric maps for shallow dolomite. Pumping from W-30 has created a large cone of depression in the shallow dolomite.

Hydrographs for wells W-18 and W-22 for the period from 1985 to the present are shown on Figure 6. Prior to the activation of the on-site groundwater extraction system in 1987, water levels in the shallow dolomite wells were such that the dolomite was saturated. Water levels in the shallow dolomite have dropped approximately 35 feet in some areas since the groundwater extraction system was activated. The drop has resulted in partial dewatering of the shallow dolomite. The dewatered rock is an elliptical zone, the long axis of which strikes northwest, and the center of which is near well W-30, approximately parallel to the direction of regional jointing within the Silurian dolomite as discussed in the RFI (RMT, 1995a). Groundwater flow within the shallow dolomite appears to be convergent on extraction wells W-21A and W-30 (Table 2). Convergent groundwater flow is one line of evidence that the groundwater extraction system is controlling groundwater flow beneath the site and thus controlling off-site migration of contaminated groundwater within the shallow dolomite.

The Deep Dolomite Hydrogeologic Unit

Based on the results of groundwater modeling conducted during the RCRA Facility Investigation (RFI), groundwater flow in the deep dolomite aquifer in the Saukville area is toward the on-site

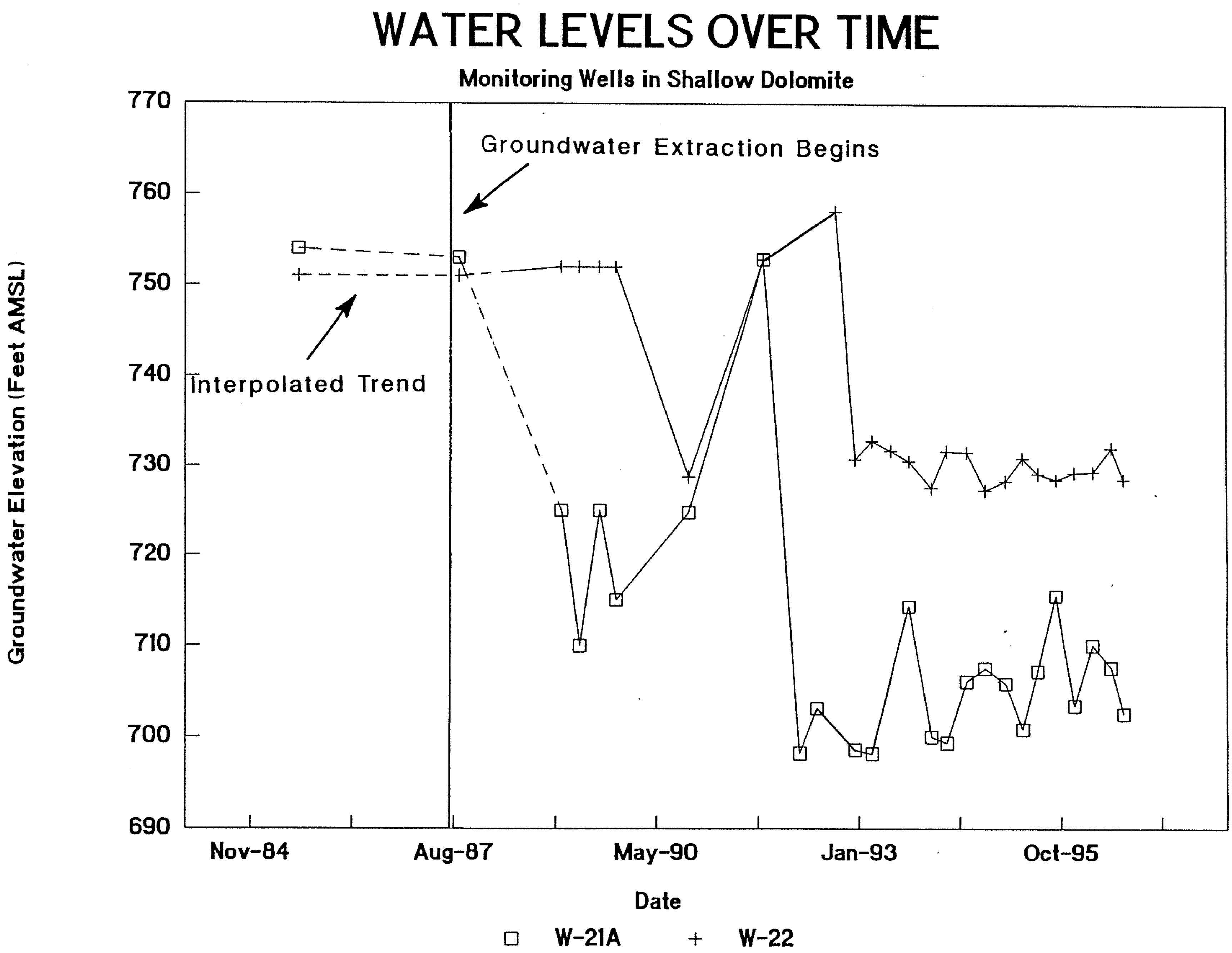
WATER LEVELS OVER TIME
Monitoring Wells in Shallow Dolomite
Groundwater Extraction Begins
Interpolated Trend
Groundwater Elevation (Feet AMSL)
770
760
750
740
730
720
710
700
690
Nov-84
Aug-87
May-90
Jan-93
Oct-95
Date
W-21A
W-22

Figure 6

TABLE 2

SUMMARY OF WELL RUNNING TIMES (1996)

Hydrogeologic Unit	Well I.D.	Monthly Running Time (hours) Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Total (hours)	Comments
Glacial drift	W-31	0.0	0.0	0.0	0.3	0.5	2.7	0.8	0.0	0.0	0.3	0.0	0.1	4.7	Dewatering of glacial drift due to pumping at RC-2 has affected groundwater elevation
	W-32	0.0	0.0	6.3	10.5	2.6	6.5	0.5	0.0	0.0	0.0	0.0	0.4	26.8	Dewatering of glacial drift due to pumping at RC-2 has affected groundwater elevation
	W-33	8.8	11.2	14.3	20.1	8.2	14.3	11.4	7.2	4.6	8.5	10.0	10.6	129.2	Dewatering of glacial drift due to pumping at RC-2 has affected groundwater elevation
	W-34	832.7	669.1	671.8	822.2	672.6	671.2	609.3	120.0	235.5	260.0	258.4	287.3	6110.1	Continued pumping assists in controlling off-site migration of contaminants within the glacial drift
	W-35	1.6	1.8	1.8	2.2	1.9	2.2	2.3	1.8	1.4	1.9	1.5	1.5	21.9	Continued pumping assists in controlling off-site migration of contaminants within the glacial drift
	W-37	2.5	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	2.8	W-37 was abandoned in August 1996 and replaced by a Ranney collector trench extension of RC-3
	RC-1	25.6	324.6	616.0	739.9	673.8	669.7	840.5	630.5	675.9	818.4	654.8	741.2	7410.9	Pumping has created some dewatering of the glacial drift during the summer quarter
	RC-2	770.9	656.5	671.7	839.0	672.7	670.7	840.7	666.7	675.8	815.9	610.7	710.7	8602.0	Pumping has created some dewatering of the glacial drift during the winter and fall quarters
	RC-3	17.5	28.5	21.8	92.7	87.1	315.1	72.9	21.8	0.0	21.6	14.1	14.7	707.8	Pumping has only shown some dewatering during the spring, summer, and fall quarters.
Shallow dolomite	W-21A	64.7	53.3	64.0	81.7	81.7	136.0	489.8	134.6	90.2	74.9	128.0	151.6	1550.5	Pumping is contributing to the creation of a large dewatered zone within the dolomite
	W-24A	53.7	7.0	10.7	9.5	7.8	5.4	8.9	5.1	5.7	7.3	6.5	6.9	134.5	Continued pumping assists in controlling flow of contaminants within the dolomite
	W-28	154.4	430.7	364.5	0.0	7.6	9.3	67.5	41.0	8.3	0.0	25.8	47.6	1156.7	Continued pumping assists in controlling flow of contaminants within the dolomite
	W-29	93.9	37.1	34.2	37.3	0.1	4.7	44.1	35.2	34.4	43.7	34.3	38.6	437.6	Continued pumping assists in controlling flow of contaminants within the dolomite

Notes: The pumping wells at CCP are on automatic switches which turn the pumps on when the water in the wells reaches a specified level. The pumps are inspected daily, including weekends, to insure proper operation.

Differences in pumping times for the Ranney Collectors are due to differences in the type and size of the pumps servicing each Ranney Collector.

well (W-30) and toward the active Saukville municipal wells (MW-1, MW-3, and MW-4). Only one on-site data point is available to document flow directions within the deep dolomite aquifer, and that is pumping well W-30. Therefore, on-site data are inadequate to prepare potentiometric surface maps for the deep dolomite aquifer. Vertical groundwater flow at the site has a strong downward component from the glacial deposits and the shallow dolomite toward the deep dolomite aquifer. Horizontal groundwater flow beneath the CCP facility, within the deep dolomite aquifer, is convergent on well W-30 (RMT, 1995a).

Section 4
GROUNDWATER MONITORING PROGRAM

4.1 Program Description

The groundwater monitoring program at the CCP Saukville site includes 44 monitoring points composed of 20 glacial drift wells, 12 shallow dolomite wells, 6 deep dolomite wells, 3 Ranney collectors (essentially French drains), and 3 publicly owned treatment works (POTW) sampling points. The monitoring points are grouped according to four sampling objectives: receptor, perimeter, remediation progress, and groundwater elevation monitoring. The organization of wells by monitoring objective is presented in Table 3.

Receptor points include four municipal water supply wells (MW-1 through MW-4); POTW influent, effluent, and sludge monitoring points; and the Ranney collectors (RC-1, RC-2, and RC-3). The Ranney collectors are monitored because they discharge to the sanitary sewer and yield a portion of the data needed to estimate VOC extraction rates in groundwater. Perimeter points are monitoring wells on- and off-site that are located at or beyond the edge of the VOC plume. These wells provide the necessary information to define the lateral extent of the plume. Remediation progress points are monitoring wells that are located within the VOC plume. These wells provide information concerning the effectiveness of the on-site remedial systems. Groundwater elevation monitoring wells are located both on- and off-site and provide data on groundwater flow patterns and the effectiveness of on-site pumping wells.

Each of these well groupings is further subdivided into glacial drift, shallow dolomite, and deep dolomite hydrogeologic units. This subdivision allows for a more effective evaluation of on-site groundwater flow and quality trends.

4.2 Changes in the Monitoring Network

Between July 27, 1996, and August 2, 1996, contaminated soil, located in the Churchyard (Figure 1) adjacent to the eastern side of the CCP property, was excavated and removed as part of off-site remediation efforts (RMT, 1996a). During these remediation activities, the electrical and water transfer lines for well W-37 were damaged. In consultation with the WDNR, a decision was made to abandon well W-37 and replace it with a new Ranney collection trench extended to

TABLE 3

SUMMARY OF 1996 GROUNDWATER SAMPLING PROGRAM
COOK COMPOSITES AND POLYMERS

Monitoring Objective/ Well Group	Unit Monitored	Sampling Point	Sampling Frequency and EPA Method Number		
			Quarterly	Semiannually[1]	Annually[2]
Receptor	Glacial drift	RC-1	8021		
		RC-2	8021		
		RC-3	8021		
	Deep dolomite	MW-1	8021		
		MW-2[3]			8021
		MW-3	8021		
		MW-4	8021		
	POTW	POTW-I	8021		
		POTW-E	8021		
		POTW-S	8021		
Perimeter	Glacial drift	W-01A		8021	
		W-03B		8021	
		W-04A		8021	
		W-08R		8021	
		W-20		8021	
		W-27		8021	
	Shallow dolomite	W-03A		8021	
		W-07		8021	
		W-22		8021	
		W-23		8021	
		W-25[4]		8021	
	Deep dolomite	PW-08		8021	
Remediation progress	Glacial drift	W-06A			8021, 8270, 7060, 6010
		W-19A			8021
		W-37[5]			8021
		W-41			8021
		W-42			8021

TABLE 3 (CONTINUED)

SUMMARY OF 1996 GROUNDWATER SAMPLING PROGRAM
COOK COMPOSITES AND POLYMERS

Monitoring Objective/ Well Group	Unit Monitored	Sampling Point	Sampling Frequency and EPA Method Number		
			Quarterly	Semiannually[1]	Annually[2]
		W-43			8021, 8270, 7060, 6010
		W-47			8021, 8270, 7060, 6010, 8080
	Shallow dolomite	W-21A			8021, 8270, 7060, 6010
		W-24A			8021, 8270, 7060, 6010
		W-28			8021, 8270, 7060, 6010
		W-29			8021, 8270, 7060, 6010
		W-38			8021
	Deep dolomite	W-30			8021, 8270, 7060, 6010
Groundwater elevation monitoring	Glacial drift	W-14B	Quarterly water level measurements only		
		W-16A	Quarterly water level measurements only		
		W-18A	Quarterly water level measurements only		
		W-44	Quarterly water level measurements only		
		W-45	Quarterly water level measurements only		
		W-46	Quarterly water level measurements only		
		W-48	Quarterly water level measurements only		
	Shallow dolomite	W-39	Quarterly water level measurements only		
		W-40	Quarterly water level measurements only		

NOTES:

1 Semiannual samples were collected in April and October.
2 Annual samples were collected in July.
3 MW-2 is only monitored annually because it is not used for water supply purposes.
4 W-25 is located off-site and was damaged in November 1996 by construction activities.
5 W-37 was abandoned in August 1996 during the soil remediation program.

the former W-37 location (Figure 2). The Ranney collector trench will effectively provide the same plume containment as W-37 formerly did. Because of this, W-37 is no longer included in the groundwater monitoring network for the site.

Section 5
GROUNDWATER QUALITY

5.1 Background

Table 3 presents the sampling schedule that was developed for 1996 groundwater monitoring, along with the analytical method used each quarter. The methods and associated parameters are listed in Table 4. The Ranney collectors and the remediation progress wells are only analyzed for the volatile aromatic compounds listed under Method 8021. The winter, spring, and fall quarter samples, including monitoring wells, municipal wells, and POTW sample points, were analyzed for the full VOC list. In addition, selected wells were analyzed during the annual monitoring round (summer) for parameters detected during the Appendix IX monitoring conducted during the RFI (Table 3).

5.2 Total VOC Data

The tabulated results of VOC concentrations in each well and the supporting laboratory data sheets were presented in the four quarterly reports (RMT, 1996b, 1996c, 1996d, and 1996e). Tables 5, 6, and 7 present a summary of total VOC concentrations in each well for the four quarters. The wells are organized by monitoring objective and hydrogeologic unit as described in Section 4 and Table 3. Figure 2 shows the locations of the monitoring wells. The lateral distribution of VOCs in the glacial drift unit and in the shallow dolomite unit for the year is depicted on two composite isoconcentration maps. Composite maps for 1996 were constructed using VOC concentration data from all four quarterly sampling rounds. The isoconcentration maps are included on Figures 7 and 8 of Appendix C.

VOC Patterns in the Glacial Drift Unit

The extent of VOC contamination in the glacial drift unit for 1996 is shown on Figure 7 of Appendix C. As noted in Section 3, well W-20 is completed in the glacial drift within the sinkhole and is more representative of water quality in the shallow dolomite aquifer. Isoconcentration contours in the glacial drift unit (Figure 7) do not include VOC detections in the Ranney collectors because these are composite groundwater samples that were collected from broad areas of the site through radial collection lines.

TABLE 4

SUMMARY OF ANALYTES AND METHODS
COOK COMPOSITES & POLYMERS

Volatile Organic Compounds by Method 8021		
Chloroethane	1,1,2,2-Tetrachloroethane	
Chloromethane	1,2-Dichloropropane	
Bromomethane	trans-1,2-Dichloropropene	
Vinyl chloride	Trichloroethene	
Methylene chloride	Dibromochloromethane	
Acetone	1,1,2-Trichloroethane	
Carbon disulfide	Benzene[1]	
1,1-Dichloroethene	cis-1,3-Dichloropropene	
1,1-Dichloroethane	Bromoform	
1,2-Dichloroethene (total)	2-Hexanone	
Chloroform	4-Methyl-2-Pentanone	
1,2-Dichloroethane	Tetrachloroethene	
2-Butanone	Toluene[1]	
1,1,1-Trichloroethane	Chlorobenzene[1]	
Carbon tetrachloride	Ethylbenzene[1]	
Vinyl acetate	Styrene	
Bromodichloromethane	Xylenes (total)[1]	
	1,4-Dichlorobenzene[1]	
	1,3-Dichlorobenzene[1]	
	1,2-Dichlorobenzene[1]	

Semivolatile Organic Compounds by Method 8270	Polychlorinated Biphenyls (PCBs) by Method 8080[2,3]	Metals by Methods 7060, 6010[1]
1,4-Dioxane	Aroclor 1016	Arsenic
2,4-Dimethylphenol	Aroclor 1221	Barium
2-Methylnaphthalene	Aroclor 1232	
2-Methylphenol	Aroclor 1242	
4-Methylphenol	Aroclor 1248	
Acetophenone	Aroclor 1254	
Bis(2-ethylhexyl)phthalate	Aroclor 1260	
Naphthalene		
Phenanthrene		
Phenol		

NOTES:
1 Volatile aromatic compounds.
2 Analyzed annually for wells W-06A, W-43, W-47, W-21A, W-24A, W-28, W-29, and W-30.
3 Only well W-47 is analyzed for PCBs.

TABLE 5
TOTAL VOCS DETECTED 1996, RECEPTOR GROUP

GLACIAL UNIT

SAMPLE ID	01/96		04/96		07/96		09/96	
RC-1	345.7	UG/L			34190	UG/L	271	UG/L
RC-2	340	UG/L	7382	UG/L	32260	UG/L	14900	UG/L
RC-3	5390	UG/L			20810	UG/L	16500	UG/L

DEEP DOLOMITE UNIT AND POTW

SAMPLE ID	01/96		04/96		07/96		10/96	
MW-01	ND	UG/L	ND	UG/L	ND	UG/L	ND	UG/L
MW-02					ND	UG/L		
MW-03	ND	UG/L	ND	UG/L	ND	UG/L	ND	UG/L
MW-04	ND	UG/L	ND	UG/L	ND	UG/L	ND	UG/L
MW-04 DUP	ND	UG/L	ND	UG/L	ND	UG/L	ND	UG/L
POTW-E	ND	UG/L	ND	UG/L	ND	UG/L	ND	UG/L
POTW-I	59	UG/L	225	UG/L	83.4	UG/L	245.5	UG/L
POTW-S	275	UG/L	120	UG/L	74.4	UG/L	213.2	UG/L

1. Ranney collectors RC-1, RC-2, and RC-3 are shallow groundwater drains sampled at the manhole, prior to discharge to the POTW. Wells MW-01, MW-02, MW-03, and MW-04 are screened in the deep dolomite. Well MW-02 is only sampled in July. Monitoring points POTW-E, POTW-I, and POTW-S are sampled at the wastewater treatment facility.

2. Blank entries indicate that a sample was not collected at the monitoring point during the quarter, typically because the well was dry.

3. Refer to summary tables in the quarterly reports (RMT, Inc., 1996a,b,c,d) for specific analytes detected. Typical VOC detections included benzene, toluene, ethylbenzene, xylenes, and acetone.

4. Total VOCs were calculated by summing all measured and estimated values, except those qualified with a "U", which are considered undetected because of associated blank contamination.

ND = None detected.

TABLE 6
TOTAL VOCS DETECTED 1996, PERIMETER GROUP

GLACIAL UNIT

SAMPLE ID	04/96		10/96	
W-01A	ND	UG/L	ND	UG/L
W-03B	ND	UG/L	ND	UG/L
W-03B DUP	ND	UG/L	ND	UG/L
W-04A	ND	UG/L	ND	UG/L
W-08R	ND	UG/L		
W-20	1.8	UG/L	49.6	UG/L
W-27	99.7	UG/L	142.5	UG/L

SHALLOW DOLOMITE UNIT

SAMPLE ID	04/96		10/96	
PW-08	ND	UG/L	ND	UG/L
W-03A	ND	UG/L	ND	UG/L
W-07	ND	UG/L	ND	UG/L
W-22	ND	UG/L	1.2	UG/L
W-23	13.5	UG/L	83.9	UG/L
W-23 DUP	23.2	UG/L	45.4	UG/L
W-25			ND	UG/L

1. Well PW-08 is a deep dolomite well.

2. Blank entries indicate that a sample was not collected at the monitoring point during that quarter, typically because the well was dry.

3. Refer to summary tables in the quarterly reports (RMT, Inc., 1996a,b,c,d) for specific analytes detected. Typical VOC detections included 1,2-dichloroethene, trichloroethene, benzene, toluene, ethylbenzene, and xylenes.

4. Total VOCs were calculated by summing all measured and estimated values, except those qualified with a "U", which are considered undetected because of associated blank contamination.

ND = None detected.

TABLE 7
TOTAL VOCS DETECTED 1996, REMEDIATION PROGRESS GROUP

GLACIAL UNIT

SAMPLE ID	07/96	
W-06A	150960	UG/L
W-19A	129	UG/L
W-19A DUP	86	UG/L
W-37	140360	UG/L
W-41	588	UG/L
W-42	28500	UG/L
W-43	15780	UG/L
W-47	124760	UG/L

SHALLOW DOLOMITE UNIT

SAMPLE ID	07/96	
W-21A	29900	UG/L
W-24A	2	UG/L
W-28	109	UG/L
W-29	929.6	UG/L
W-30	11.1	UG/L
W-38	4298.8	UG/L
W-38 DUP	2354.4	UG/L

1. Well W-30 is a deep dolomite well.

2. Refer to summary tables in the quarterly reports (RMT, Inc., 1996a,b,c,d) for specific analytes detected. Typical VOC detections included benzene, toluene, ethylbenzene, and xylenes.

3. Total VOCs were calculated by summing all measured and estimated values, except those qualified with a "U", which are considered undetected because of associated blank contamination.

ND = None detected.

The pattern of VOC concentrations in groundwater during 1996 (Figure 7) was similar to that observed in 1995 and in previous years (RMT, 1995a; RMT, 1994; and Hatcher-Sayre, Inc., 1992). Three major VOC plumes are apparent in groundwater in the glacial drift unit (Figure 7 of Appendix C). The first plume, which is located in the northern portion of the site, is centered at the former hazardous waste incinerator/former urethane laboratory area, with total VOC concentrations greater than 100,000 µg/L, and extends off-site to the east under the churchyard. Affected groundwater in this area is controlled by Ranney collectors RC-1 and RC-3. The second plume, which is located in the southwestern portion of the site, is centered in the area of the former dry well. Groundwater flow in this area is influenced by RC-2. Total VOC concentrations in this area range from over 500 µg/L to over 100,000 µg/L. The third prominent plume is centered around W-43, with a total VOC concentration of greater than 15,000 µg/L. This plume appears to originate in the vicinity of the former tank farm area and is effectively captured by the collection lines of RC-1. The water table maps (Figures 3a through 3d) and the isoconcentration glacial drift map (Figure 7 of Appendix C) indicate that the off-site migration of impacted groundwater is being controlled by on-site pumping.

VOC Patterns in the Shallow Dolomite Unit

Total VOC concentrations in groundwater in the shallow dolomite unit for 1996 are shown on Figure 8 of Appendix C. The concentrations and distribution of VOCs in groundwater are similar to those documented in 1995 (RMT, 1995b).

The concentrations of detected VOCs in the shallow dolomite are highest near the center of the site (well W-21A), and decrease with distance in all directions to levels generally below 10 µg/L at the perimeter of the site. Coupled with the convergent groundwater flow toward the shallow dolomite and deep dolomite extraction wells, (Figures 5a, 5b, 5c, and 5d), this indicates that off-site migration of impacted groundwater is being controlled by on-site pumping.

5.3 Appendix IX Results

In accordance with the WDNR requirement (WDNR, 1994), eight remedial progress wells were analyzed during the annual sampling round (summer) for the non-VOC Appendix IX parameters detected during the October 1994 sampling round and during the January 1995 confirmatory round (Table 8). Each of these wells is located near the center of the groundwater contamination.

Table 8
SUMMARY OF APPENDIX IX PARAMETERS DETECTED
CCP - SAUKVILLE

PARAMETERS (ug/L)	DATE	WELL								NR140	
		W-06A	W-21A	W-24A	W-28	W-29	W-30	W-43	W-47	PAL	ES
SVOCs											
1,4-Dioxane	Oct-94	710E	1200D	210	530D	ND	20	ND	380D	NS	NS
	Jan-95	620	960	460	610	ND	24	ND	2000E	NS	NS
	Jul-95	350	1000	260	660	120	19Q	ND	710	NS	NS
	Jul-96	870Q	1100Q	250D	900D	170	44	ND	4700	NS	NS
2,4-Dimethylphenol	Oct-94	120	10	ND	ND	ND	ND	ND	71	NS	NS
	Jan-95	210	36Q	ND	ND	ND	ND	ND	210	NS	NS
	Jul-95	100Q	18Q	ND	ND	5Q	ND	62	340	NS	NS
	Jul-96	170Q	90Q	ND	1Q	26	ND	93Q	320Q	NS	NS
2-Methylphenol	Oct-94	32	5Q	ND	ND	ND	ND	ND	14	NS	NS
	Jan-95	51Q	ND	ND	ND	ND	ND	ND	27Q	NS	NS
	Jul-95	22Q	ND	ND	ND	ND	ND	ND	45Q	NS	NS
3-Methylphenol	Oct-94	170	ND	ND	ND	ND	ND	ND	ND	NS	NS
4-Methylphenol	Oct-94	112	10	ND	ND	ND	ND	ND	51	NS	NS
	Jan-95	180	ND	ND	ND	ND	ND	ND	130	NS	NS
	Jul-95	89Q	ND	ND	ND	ND	ND	ND	120	NS	NS
Acetophenone	Oct-94	56	ND	ND	ND	ND	ND	ND	ND	NS	NS
-	Jan-95	78Q	ND	ND	ND	ND	ND	9600	ND	NS	NS
	Apr-95	ND	ND	ND	ND	ND	ND	23	ND	NS	NS
	Jul-95	49Q	ND	ND	ND	2Q	ND	280	120Q	NS	NS
	Jul-96	130QB	ND	ND	ND	ND	ND	ND	250QB	NS	NS
Napthalene	Oct-94	10	ND	ND	ND	ND	ND	ND	**34**	8	40
	Jan-95	**15Q**	ND	ND	ND	ND	ND	**1200Q**	**17Q**	8	40
	Jul-95	ND	**27Q**	ND	ND	2Q	ND	**43Q**	**30Q**	8	40
	Jul-96	**31**	**28Q**	ND	ND	0.4Q	ND	**75Q**	**90Q**	8	40
Phenol	Oct-94	70	ND	ND	ND	ND	ND	ND	70	1200	6000
	Jan-95	110	ND	ND	ND	ND	ND	ND	190	1200	6000
	Jul-95	61Q	ND	ND	ND	ND	ND	30Q	110	1200	6000
	Jul-96	ND	ND	ND	ND	31	ND	ND	180Q	1200	6000
1,2 Dichlorobenzene	Oct-94	ND	8Q	ND	ND	ND	ND	ND	ND	60	600
Butylbenzylphthalate	Oct-94	ND	ND	ND	ND	2Q	ND	ND	ND	NS	NS
2-Methylnaphthalene	Oct-94	ND	ND	ND	ND	ND	ND	ND	12	NS	NS
	Jan-95	ND	ND	ND	ND	ND	ND	4500	ND	NS	NS
	Apr-95	NA	NA	NA	NA	NA	NA	6Q	NA	NS	NS
	Jul-95	ND	ND	ND	ND	ND	ND	120	ND	NS	NS
	Jul-96	ND	ND	ND	ND	ND	ND	200Q	ND	NS	NS

Table 8 (continued)
SUMMARY OF APPENDIX IX PARAMETERS DETECTED
CCP - SAUKVILLE

PARAMETERS (ug/L)	DATE	WELL								NR140	
		W-06A	W-21A	W-24A	W-28	W-29	W-30	W-43	W-47	PAL	ES
SVOCs											
Acenaphthene	Jan-95	ND	ND	ND	ND	ND	ND	280Q	ND	NS	NS
Dibenzofuran	Jan-95	ND	ND	ND	ND	ND	ND	370Q	ND	NS	NS
Fluorene	Jan-95	ND	ND	ND	ND	ND	ND	590Q	ND	80	400
N-Nitrosodiphenylamine	Jan-95	ND	ND	ND	ND	ND	ND	1100Q	ND	NS	NS
Phenanthrene	Oct-94	ND	ND	ND	ND	ND	ND	ND	3Q	NS	NS
	Jan-95	ND	ND	ND	ND	ND	ND	1200Q	ND	NS	NS
	Apr-95	NA	NA	NA	NA	NA	NA	4Q	NA	NS	NS
	Jul-95	ND	ND	ND	ND	ND	ND	33Q	ND	NS	NS
	Jul-96	ND	ND	ND	ND	ND	ND	48Q	ND	NS	NS
Bis (2-ethylhexyl) phthalate	Oct-94	ND	ND	ND	ND	ND	ND	ND	25	0.6	6
	Jan-95	ND	ND	ND	ND	ND	ND	ND	54	0.6	6
	Jul-96	ND	ND	ND	ND	3Q	ND	ND	ND	0.6	6
PCBs											
Aroclor-1242	Oct-94	ND	ND	ND	ND	ND	ND	ND	25	0.003	0.03
	Jul-96	NA	NA	NA	NA	NA	NA	NA	38	0.003	0.03
Aroclor-1248	Jan-95	ND	ND	ND	ND	ND	ND	ND	27	0.003	0.03
	Jul-95	NA	NA	NA	NA	NA	NA	NA	7.0	0.003	0.03
METALS											
Arsenic	Oct-94	47	28	3	5.4	5.4	ND	ND	7.6	5	50
	Jan-95	28	30	ND	ND	16	ND	ND	ND	5	50
	Jul-95	45	29	ND	ND	ND	ND	25	4.8	5	50
	Jul-96	29	20	ND	ND	4.4	ND	30	8.0	5	50
Barium	Oct-94	66	130	85	130	170	76	ND	150	400	2000
	Jan-95	68	130	74	ND	140	70	490	260	400	2000
	Jul-95	ND	140	83	160	160	73	120	130	400	2000
	Jul-96	ND	170	88	160	200	91	150	110	400	2000
Zinc	Oct-94	ND	ND	ND	270	ND	ND	ND	ND	2500	5000

NS=No standard.
ND=Not detected.
NA=Not analyzed.
Shaded values indicate NR 140 PAL or ES exceedance.

<u>LABORATORY QUALIFIERS</u>:
B=Analyte present in the method blank.
D=Analyte from a diluted analysis.
E=Analyte concentration exceeds calibration range.
J=When specific QC criteria are outside the established control limits, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
Q=Qualitative mass spectral evidence of analyte present; concentration is less than the reporting limit.

Prepared by: Cindy Miller, QC'd by: COB & CLS

Non-VOC parameters detected included 1,4-dioxane, 2,4-dimethylphenol, acetophenone, naphthalene, phenol, 2-methylnaphthalene, phenanthrene, bis(2-ethylhexyl)phthalate (BEHP), aroclor-1242, arsenic, and barium. The source of these constituents is not known. The metals detected may be related to naturally occurring elements. Aroclor 1242, Napthalene, BEHP, and arsenic were reported at concentrations above their respective NR 140 Preventive Action Limits (PALs) or Enforcement Standards (ESs).

Napthalene was reported at wells W-6A and W-21A at concentrations above the PAL, and has been reported above the PAL at these wells in the past. Napthalene appears to be related to past activities at the CCP site.

BEHP was reported in well W-29 at a concentration above the ES. However, BEHP is a common laboratory contaminant, and the concentration reported was below the laboratory reporting limit. Therefore, it is likely that BEHP is not actually present at well W-29.

Arsenic was present at wells W-6A, W-21A, W-43 and at W-47 at concentrations above the PAL. Arsenic has been detected at these wells in the past. Arsenic is a naturally occurring element, and is not known to be connected to the past activities at the CCP site. The presence of arsenic in these wells may be due to the presence of naturally occurring concentrations.

Aroclor-1242 was found in well W-47 at a concentration exceeding the ES. Aroclor 1242 or 1248 have been reported at this well above the ES since 1994 (Table 8) when analysis for Aroclors was initiated as part of the RFI (RMT, 1995a). PCBs are not known to be a part of the contamination related to the activities at the CCP site. The source of these Aroclors is unknown.

5.4 VOC Trends by Monitoring Objective

This section describes trends in total VOC concentrations for each of the monitoring objectives. Total VOC concentrations in groundwater versus time plots for individual wells are presented in Appendix D. The discussion that follows is organized by monitoring objective (receptor, perimeter, remediation progress) and, for each monitoring objective, by the hydrogeologic unit (glacial drift, shallow dolomite, deep dolomite). The total VOC data shown prior to 1992 were obtained from Hatcher-Sayre, Inc.

Receptor Monitoring

Ranney Collectors and POTW

Total VOCs were monitored in the shallow groundwater that was discharged from the Ranney collectors (RC-1, RC-2, and RC-3) and in the influent, effluent, and sludge samples that were collected at the POTW. These analyses were performed to monitor the levels of chemical compounds leaving the CCP site and being processed at the POTW. The total VOCs detected in 1996 are shown in Table 5. The total VOC concentrations in the Ranney collector discharges are variable, but overall, they exhibit a decreasing trend from over 100,000 µg/L in 1987 to levels in the tens of thousands or less in 1996. Total VOC concentrations in RC-1, RC-2, and RC-3 have generally decreased over the years. Total VOC concentrations in groundwater monitoring wells in glacial drift source areas near the three major VOC plumes have remained relatively steady over the same period. The decrease in total VOCs being recovered at the site is likely due to partial dewatering of the glacial drift in the area of the Ranney collectors.

Ranney collector discharge is mixed with wastewater from diverse sources upon arrival at the POTW, which explains the variability in POTW influent (POTW-I) VOC concentrations (Table 5). No VOCs were detected in the discharge effluent (POTW-E). This indicates that the discharge from CCP does not adversely affect the permit requirements for the POTW. Total VOC concentrations in the POTW sludge (POTW-S) varied from 74 µg/L to over 275 µg/L in 1996.

Municipal Wells (Deep Dolomite Wells)

No VOC concentrations were reported in the municipal wells (MW-1 through MW-4) during 1996, indicating that the Village water supply wells continue to be unaffected by the CCP site. In addition, the groundwater flow modeling performed during the RFI (RMT, 1995a) showed that the zone of contribution for well MW-4 does not extend to the CCP facility, so it is very unlikely that groundwater affected by the CCP facility could reach MW-4.

Perimeter Monitoring

Glacial Drift Wells

VOC concentrations in the perimeter wells screened in the glacial drift in 1996 were typically low (< 10 µg/L) or nondetected with the exception of the concentrations at upgradient well W-27 (Table 6). These concentrations are consistent with those of the past 3 years.

As in 1995, well W-27 exhibited exceedances of the Wisconsin Administrative Code NR 140 Enforcement Standard (ES) for trichloroethene, and exceedances of the Preventive Action Limit (PAL) for 1,2-dichloroethene. Well W-27 has consistently shown concentrations of chlorinated VOCs since 1988. W-27 is hydraulically upgradient of the CCP facility. Detections of chlorinated hydrocarbons in wells upgradient of the CCP are likely due to TCE sludge disposal activities at the former Northern Signal, which previously operated a facility just west (upgradient) of the CCP property (RMT, 1995a).

Dolomite Wells

Perimeter wells screened in the dolomite generally showed low or nondetectable levels for total VOCs (Table 6). Exceptions include wells W-22, W-23, and W-25, which contained total VOCs ranging from 1.2 to 83.9 µg/L. As in 1995, well W-22 had one PAL exceedance for 1,2-dichloroethane. Well W-23 contained chloromethane and vinyl chloride at levels exceeding its ES and also contained benzene at levels exceeding its PAL. There were no NR 140 exceedances noted in W-25.

Remediation Progress Monitoring

Glacial Drift Wells

The remediation progress wells in the glacial drift unit are only sampled annually. In general, VOC levels were consistent with historical ranges. Total VOC concentrations in remediation progress wells continue to remain in the range of tens of thousands to hundreds of thousands of µg/L (Table 7). The persistently high levels of VOCs in groundwater suggest that non-aqueous phase liquids (NAPLs) are present in the glacial deposits and shallow subsurface. The residual sources of contamination continue to leach VOCs into groundwater in the glacial deposits and into the shallow dolomite.

Total VOC concentrations appear to have stabilized in wells W-06A, W-37, and W-41, and may be stabilizing in W-47. VOC concentrations for W-19A dropped to below the detection level in 1994, and were detected at less than 10 µg/L in 1995, and were up to 129 µg/L in 1996. VOC concentrations in W-42 showed an increase during 1996. VOC concentrations in W-43 tend to be quite variable.

Several remediation progress wells screened in the glacial drift contained VOCs in excess of NR 140 ESs. These wells include W-06A, W-37, W-42, W-43, and W-47, which contained benzene, toluene, ethylbenzene, and xylenes (BTEX) above their respective ESs. Well W-41 contained xylene at a concentration above the PAL. The presence of BTEX compounds in groundwater is consistent with past site activities. Wells W-43 and W-47 had ES exceedences for naphthalene, and well W-6A had a PAL exceedence for naphthalene.

Chlorinated compounds have consistently been detected in well W-19A in past years, and occasionally have been detected in wells W-42 and W-6A. All of these remediation progress wells are located on the western side or just west (upgradient) of the site. As stated above, the presence of chlorinated compounds appears to be associated with sludge disposal practices at Northern Signal, formerly located upgradient (west) of the CCP site.

Dolomite Wells

VOC levels in remediation progress wells screened in the dolomite generally displayed concentrations within ranges established over the past 3 years—generally in the tens of thousands of µg/L range (Table 7). As with the remediation progress wells within the glacial drift, persistent high levels of VOCs in groundwater suggest that NAPLs are present in the glacial deposits and shallow dolomite. The residual sources of contamination continue to leach VOCs into groundwater present in the shallow dolomite.

W-21A shows little change in concentration over the last several years. Decreasing trends have been noted in wells W-29, W-30, and W-38. VOC concentrations in well W-28 have fluctuated between approximately 50,000 and 130,000 µg/L since the end of 1994. VOC concentrations in well W-24A have fluctuated from below the detection limit to several tens of thousands since 1990, and have shown a decreasing trend since 1994.

Several wells contained VOCs at concentrations exceeding either their ESs or PALs. The exceedances were for one or more of the BTEX compounds in wells W-21A, W-28, W-29, W-30 and W-38. These wells are located near the center of the site or just to the west of center. Acetone was also detected above the PAL at W-29. Remediation progress well W-29 (located near the center of the site) also contained vinyl chloride in excess of the ES.

Section 6
PLUME CONTAINMENT

The discussion in this section combines groundwater flow and quality trends from the receptor, perimeter, and remediation progress wells in the glacial drift and dolomite, to present an evaluation of the effectiveness of the plume containment in the remedial system at the Saukville site.

6.1 The Glacial Drift Unit

Portions of the glacial deposits in the area of the Ranney collectors (located near the sites of greatest contamination) appear to be dewatered. This, along with the generally low to non-detectable concentrations within the perimeter wells (Figure 7), indicates that off-site migration of contaminated groundwater within the glacial drift unit is being effectively controlled.

6.2 The Shallow Dolomite Unit

Over the past 3 years, VOC concentrations in the shallow dolomite have remained stable at levels near thousands to tens of thousands of µg/L in the remediation progress wells. Perimeter wells in this unit generally contained low (less than 10 µg/L) to nondetectable levels of VOCs, with the exception of W-27, which is located hydraulically upgradient of the CCP site. The remediation system has dewatered an elliptical zone within the shallow dolomite as documented in the RFI (RMT, 1995a). Dewatering portions of the glacial till and shallow dolomite due to groundwater extraction at the site has important implications for the efficiency of the groundwater extraction system at the site. Dewatering in these areas has decoupled groundwater flow from the till to the dolomite, thereby reducing the amount of contaminants that can migrate into the dolomite from the till. Based on the inward gradients toward recovery wells W-21A and W-30, and the lack of VOC detections and decreasing VOC concentration trends in the perimeter monitoring wells, migration of the contaminant plume in the shallow dolomite is being effectively controlled.

6.3 The Deep Dolomite Unit

VOC concentrations in the deep dolomite receptor and remediation progress wells (e.g., MW-1, MW-2, MW-3, MW-4) are below detection limits. VOC concentrations at PW-08 (located upgradient of the CCP site) have not been detected since 1994. VOC concentrations at W-30 have decreased by approximately two orders of magnitude since 1989. In addition, groundwater flow beneath the CCP facility is horizontally convergent on well W-30, as shown in the RFI (RMT, 1995a). Convergent flow toward the recovery wells, coupled with decreasing VOC concentrations in the extracted groundwater, demonstrates that off-site migration of groundwater within the deep dolomite aquifer is being effectively controlled by groundwater pumping.

6.4 Hydraulic Communication Between the Aquifers

Groundwater elevation data, along with chemical results, indicate that downward seepage is occurring from source areas in the glacial drift into the shallow dolomite through fractures in the upper portion of the bedrock. However, groundwater extraction has created dewatered zones within the glacial drift and shallow dolomite, thus reducing the potential for vertical migration of contaminants from the glacial drift to the shallow dolomite.

Section 7

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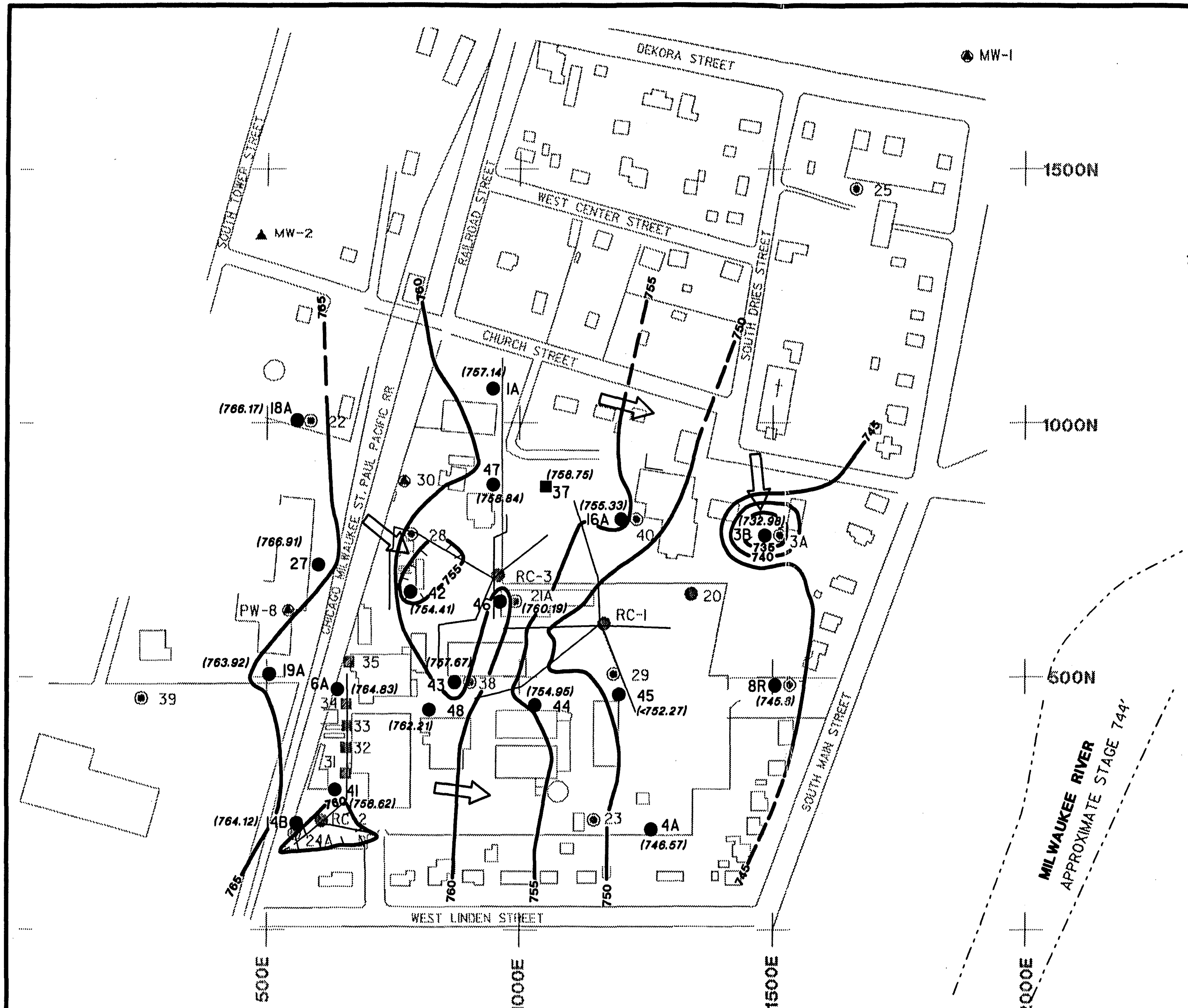
RMT, Inc. 1996d. 1996 Summer quarter groundwater results. Prepared for: Cook Composites and Polymers Co. September 1996.

RMT, Inc. 1996e. 1996 Fall quarter groundwater results. Prepared for: Cook Composites and Polymers Co. November 1996.

WDNR. 1994. Letter from Ms. Barbara J. Zellmer, Chief of the Hazardous Waste Management Section of the Bureau of Solid Waste Management at the Wisconsin Department of Natural Resources to Mr. Craig Bostwick, Corporate Manager, Environmental & Safety at Cook Composites and Polymers, September 24, 1994.

APPENDIX A

WATER TABLE AND POTENTIOMETRIC SURFACE MAPS



LEGEND

- DEEP DOLOMITE WELL
- SHALLOW DOLOMITE WELL
- GLACIAL OVERBURDEN WELL
- GLACIAL OVERBURDEN WITHDRAWAL WELL
- RANNEY COLLECTOR
- (755.33) WATER TABLE ELEVATION (JANUARY 1996)
- 750 WATER TABLE CONTOUR (5-foot INTERVAL)
- GROUNDWATER FLOW DIRECTION

NOTES

1. BASE MAP WAS DEVELOPED FROM HATCHER-SAYRE, INC., 1992.
2. ELEVATIONS EXPRESSED IN FEET ABOVE MEAN SEA LEVEL.
3. RANNEY COLLECTOR CONSTRUCTION DATA USED TO DEVELOP THIS MAP IS APPROXIMATE.

N

0 200 400

SCALE: 1"=200'

WATER TABLE MAP
GLACIAL DRIFT - WINTER 1996
COOK COMPOSITES AND POLYMERS
SAUKVILLE, WISCONSIN

RMT INC.

Dwn. By:	JRW
Approved By:	COB
Date:	JANUARY 1997
Proj. #:	3333.02
File #:	33330201.DGN

FIGURE 3A

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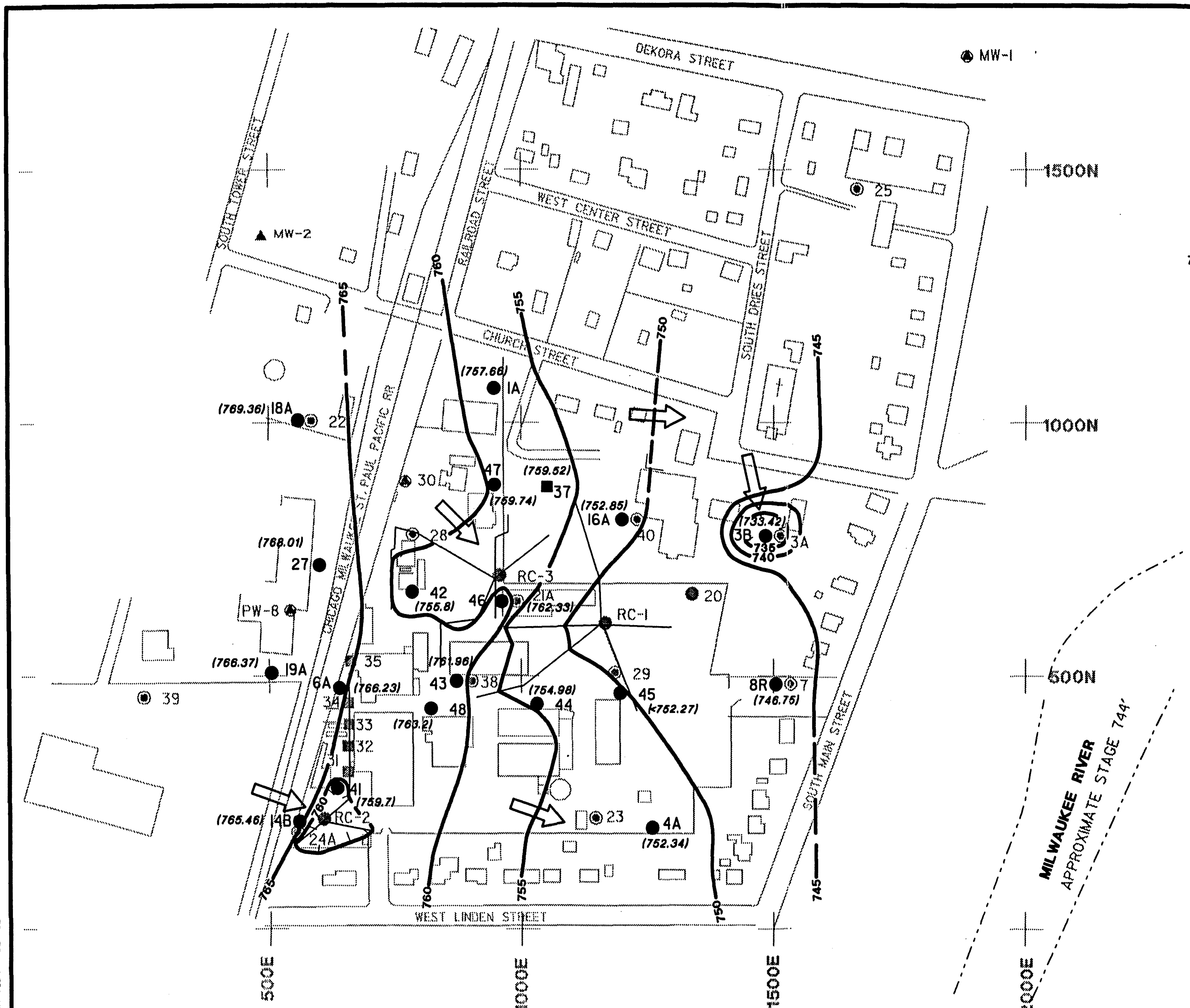

LEGEND

- DEEP DOLOMITE WELL
- SHALLOW DOLOMITE WELL
- GLACIAL OVERBURDEN WELL
- GLACIAL OVERBURDEN WITHDRAWAL WELL
- RANNEY COLLECTOR
- (752.85) WATER TABLE ELEVATION (APRIL 1996)
- 750 WATER TABLE CONTOUR (5-foot INTERVAL)
- GROUNDWATER FLOW DIRECTION

NOTES

1. BASE MAP WAS DEVELOPED FROM HATCHER-SAYRE, INC., 1992.
2. ELEVATIONS EXPRESSED IN FEET ABOVE MEAN SEA LEVEL.
3. RANNEY COLLECTOR CONSTRUCTION DATA USED TO DEVELOP THIS MAP IS APPROXIMATE.

N

0 200 400

SCALE: 1"=200'

WATER TABLE MAP
GLACIAL DRIFT - SPRING 1996
COOK COMPOSITES AND POLYMERS SAUKVILLE, WISCONSIN

RMT INC.

Dwn.By:	JRW
Approved By:	COB
Date:	JANUARY 1997
Proj.#:	3333.02
File #:	33330205.DGN

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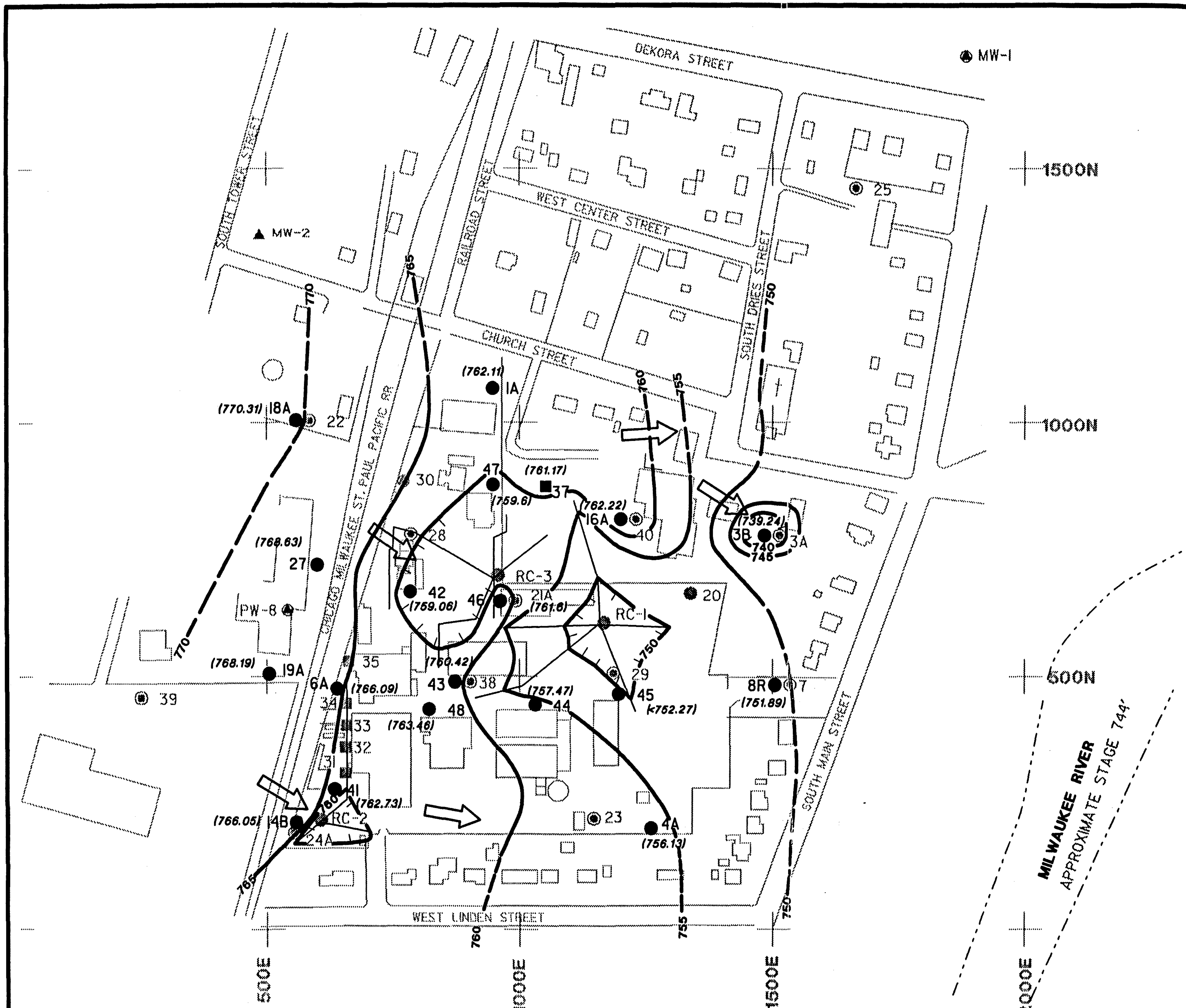
FIGURE 3B



LEGEND

- DEEP DOLOMITE WELL
- SHALLOW DOLOMITE WELL
- GLACIAL OVERBURDEN WELL
- GLACIAL OVERBURDEN WITHDRAWAL WELL
- RANNEY COLLECTOR
- *(762.22)* WATER TABLE ELEVATION (JULY 1996)
- 750 WATER TABLE CONTOUR (5-foot INTERVAL)
- GROUNDWATER FLOW DIRECTION

NOTES

1. BASE MAP WAS DEVELOPED FROM HATCHER-SAYRE, INC., 1992.
2. ELEVATIONS EXPRESSED IN FEET ABOVE MEAN SEA LEVEL.
3. RANNEY COLLECTOR CONSTRUCTION DATA USED TO DEVELOP THIS MAP IS APPROXIMATE.

0 200 400

SCALE: 1"=200'

WATER TABLE MAP
GLACIAL DRIFT - SUMMER 1996
COOK COMPOSITES AND POLYMERS SAUKVILLE, WISCONSIN

RMT INC.

Dwn. By:	JRW
Approved By:	COB
Date:	JANUARY 1997
Proj. #:	3333.02
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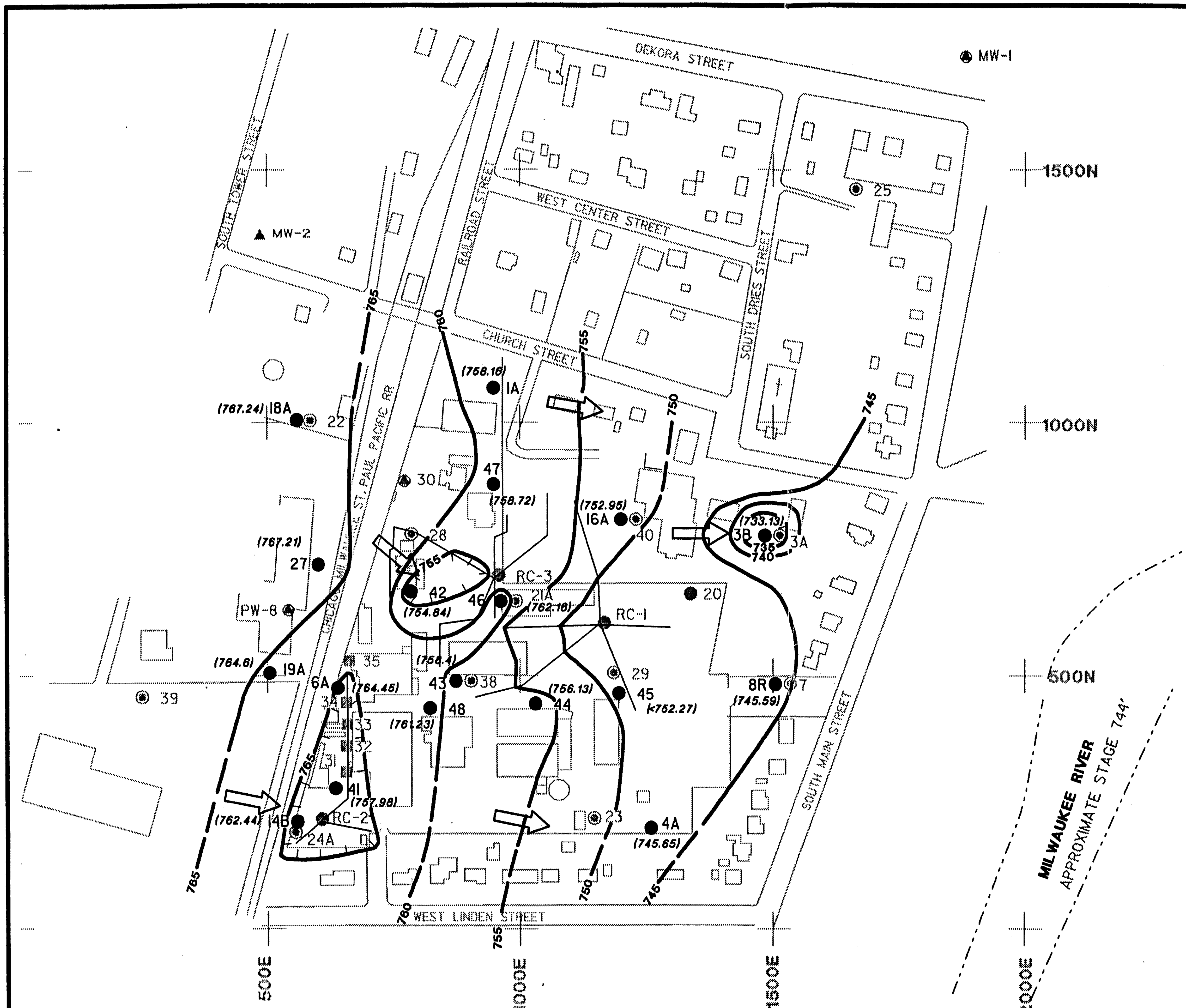

LEGEND

- DEEP DOLOMITE WELL
- SHALLOW DOLOMITE WELL
- GLACIAL OVERBURDEN WELL
- GLACIAL OVERBURDEN WITHDRAWAL WELL
- RANNEY COLLECTOR
- (752.95) WATER TABLE ELEVATION (SEPTEMBER 1996)
- 750 WATER TABLE CONTOUR (5-foot INTERVAL)
- GROUNDWATER FLOW DIRECTION

NOTES

1. BASE MAP WAS DEVELOPED FROM HATCHER-SAYRE, INC., 1992.
2. ELEVATIONS EXPRESSED IN FEET ABOVE MEAN SEA LEVEL.
3. RANNEY COLLECTOR CONSTRUCTION DATA USED TO DEVELOP THIS MAP IS APPROXIMATE.

N

0 200 400

SCALE: 1"=200'

WATER TABLE MAP
GLACIAL DRIFT - FALL 1996
COOK COMPOSITES AND POLYMERS
SAUKVILLE, WISCONSIN

RMT INC.

Dwn.By:	JRW
Approved By:	COB
Date:	JANUARY 1997
Proj.#:	3333.02
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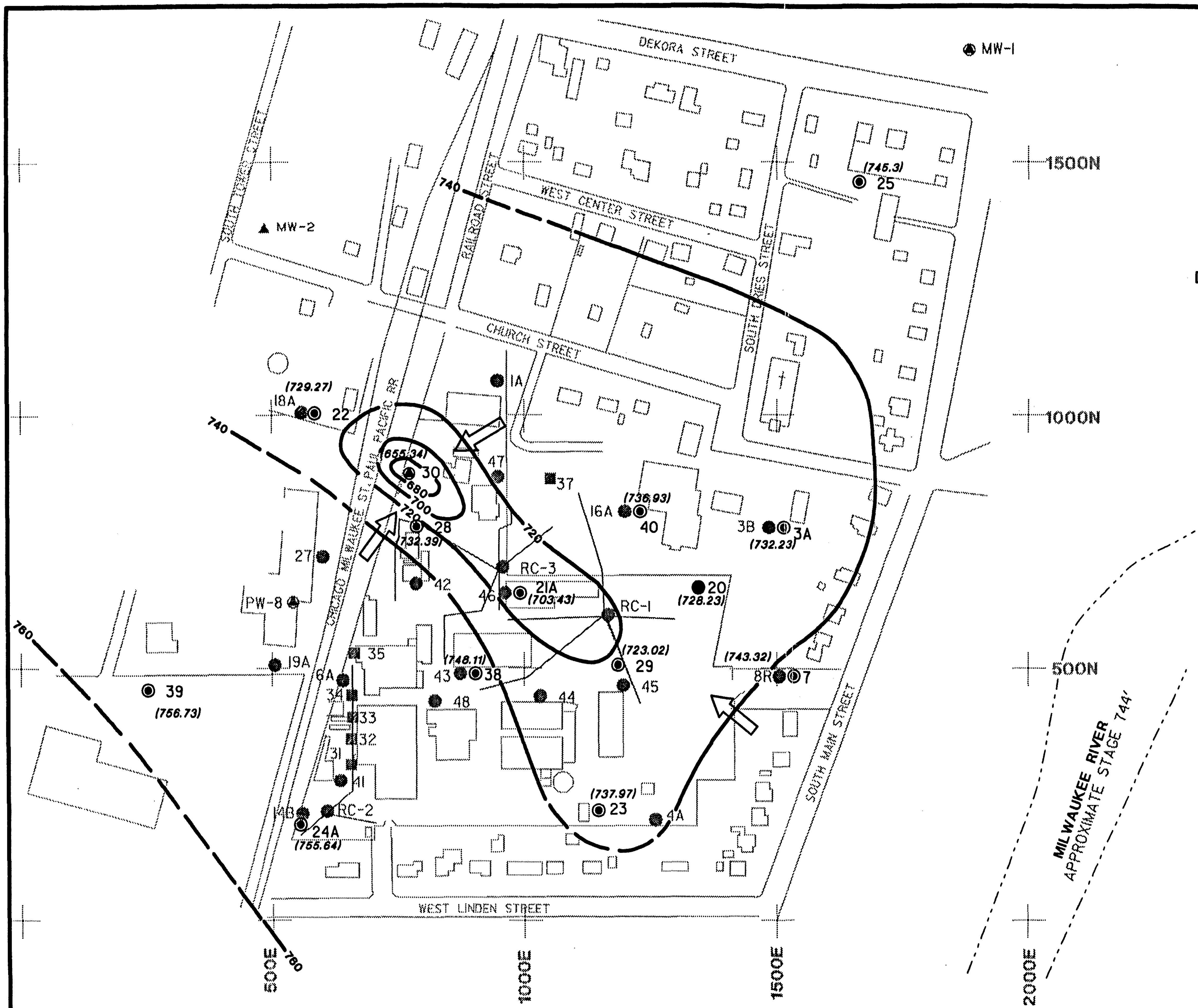

LEGEND

- DEEP DOLOMITE WELL
- SHALLOW DOLOMITE WELL
- GLACIAL OVERBURDEN WELL
- GLACIAL OVERBURDEN WITHDRAWAL WELL
- RANNEY COLLECTOR
- (655.34) POTENTIOMETRIC ELEVATION (JANUARY 1996)
- 740 POTENTIOMETRIC CONTOUR (20-foot INTERVAL)
- GROUNDWATER FLOW DIRECTION

NOTES

1. BASE MAP WAS DEVELOPED FROM HATCHER-SAYRE, INC., 1992.
2. ELEVATIONS EXPRESSED IN FEET ABOVE MEAN SEA LEVEL.
3. THE ELEVATIONS OF THE BOTTOMS OF THE SHALLOW DOLOMITE WELLS USED TO CONSTRUCT THIS FIGURE ARE BETWEEN 680 AND 735 FEET ABOVE MSL, EXCEPT FOR W-3A (WITH BOTTOM AT 534' MSL) AND W-20 (WITH BOTTOM AT 641' MSL) BOTH INSTALLED IN THE SINK HOLE ON THE EAST SIDE OF THE SITE, AND W-30 WHICH IS CONSTRUCTED TO OBTAIN WATER FROM BOTH THE SHALLOW AND DEEP DOLOMITE.
3. W-30 IS THE ON-SITE PRODUCTION WELL AND W-21A IS A RECOVERY WELL. PUMPING FROM THESE WELLS IS CONTROLLING OFFSITE MIGRATION OF VOCS IN THE SHALLOW DOLOMITE.

POTENTIOMETRIC SURFACE MAP
SHALLOW DOLOMITE - WINTER 1996

COOK COMPOSITES AND POLYMERS
SAUKVILLE, WISCONSIN

RMT INC.

Dwn. By:	JRW
Approved By:	COB
Date:	JANUARY 1997
Proj. #:	3333.02
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FIGURE 5A

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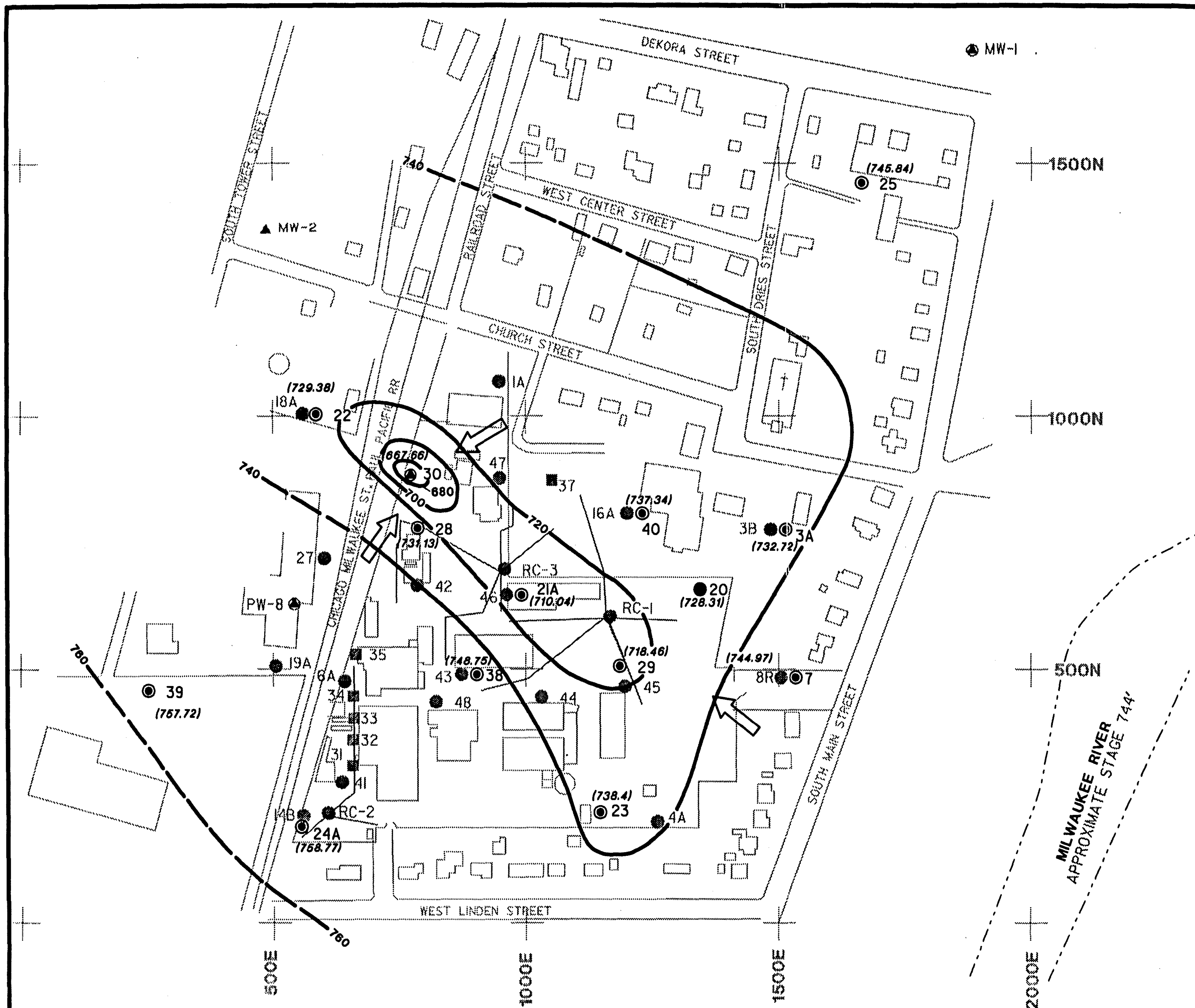

LEGEND

- DEEP DOLOMITE WELL
- SHALLOW DOLOMITE WELL
- GLACIAL OVERBURDEN WELL
- GLACIAL OVERBURDEN WITHDRAWAL WELL
- RANNEY COLLECTOR
- (567.66) POTENTIOMETRIC ELEVATION (APRIL 1996)
- 740 POTENTIOMETRIC CONTOUR (20-foot INTERVAL)
- GROUNDWATER FLOW DIRECTION

NOTES

1. BASE MAP WAS DEVELOPED FROM HATCHER-SAYRE, INC., 1992.
2. ELEVATIONS EXPRESSED IN FEET ABOVE MEAN SEA LEVEL.
3. THE ELEVATIONS OF THE BOTTOMS OF THE SHALLOW DOLOMITE WELLS USED TO CONSTRUCT THIS FIGURE ARE BETWEEN 680 AND 735 FEET ABOVE MSL, EXCEPT FOR W-3A (WITH BOTTOM AT 534' MSL) AND W-20 (WITH BOTTOM AT 641' MSL) BOTH INSTALLED IN THE SINK HOLE ON THE EAST SIDE OF THE SITE, AND W-30 WHICH IS CONSTRUCTED TO OBTAIN WATER FROM BOTH THE SHALLOW AND DEEP DOLOMITE.
3. W-30 IS THE ON-SITE PRODUCTION WELL AND W-21A IS A RECOVERY WELL. PUMPING FROM THESE WELLS IS CONTROLLING OFFSITE MIGRATION OF VOCS IN THE SHALLOW DOLOMITE.

POTENTIOMETRIC SURFACE MAP
SHALLOW DOLOMITE - SPRING 1996

COOK COMPOSITES AND POLYMERS
SAUKVILLE, WISCONSIN

RMT, INC.

Dwn. By:	JRW
Approved By:	COB
Date:	JANUARY 1997
Proj. #:	3333.02
File #:	33330208.DGN

FIGURE 5B

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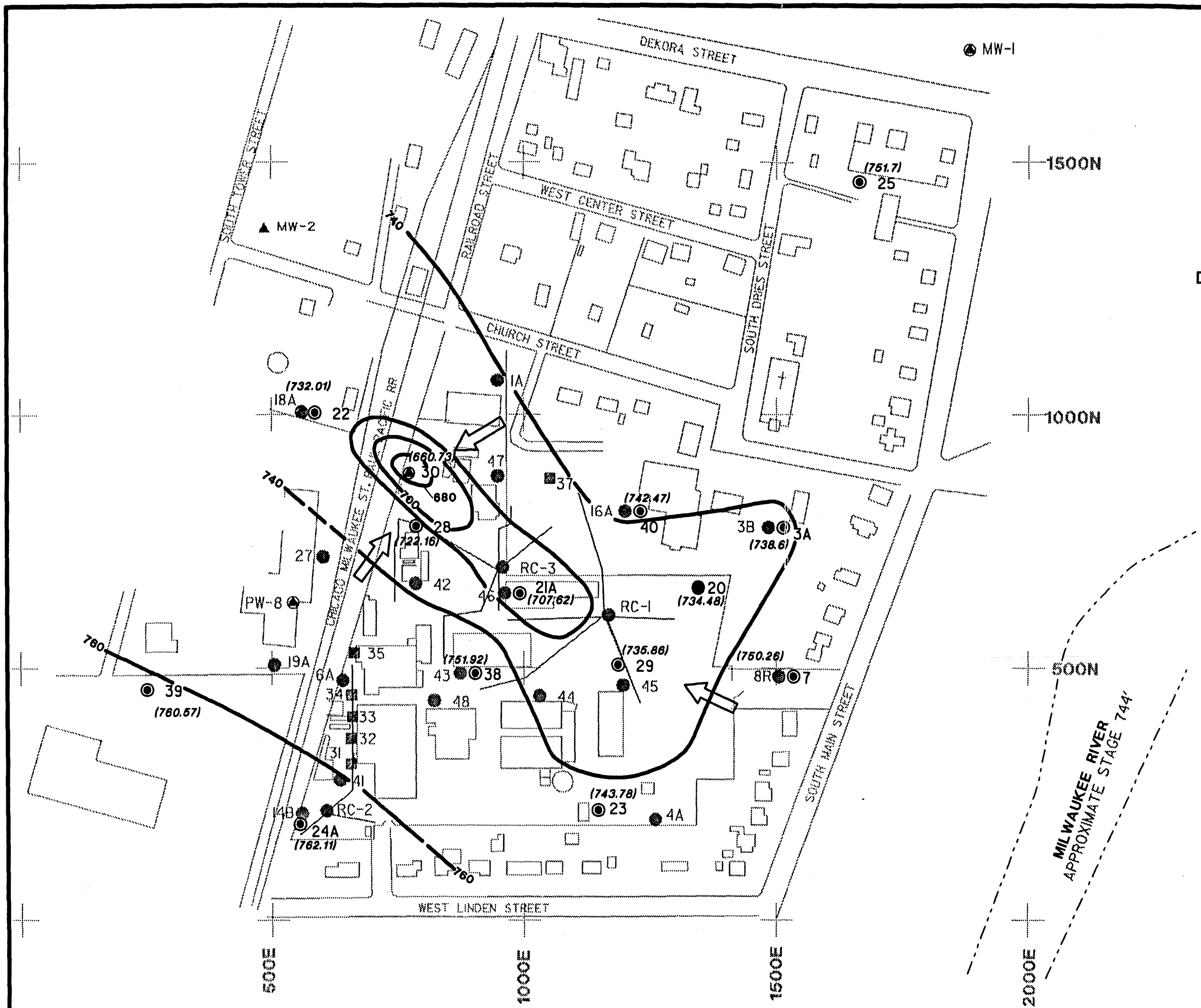
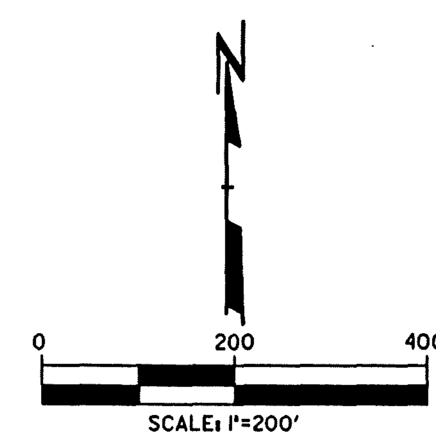


LEGEND

- DEEP DOLOMITE WELL
- SHALLOW DOLOMITE WELL
- GLACIAL OVERBURDEN WELL
- GLACIAL OVERBURDEN WITHDRAWAL WELL
- RANNEY COLLECTOR
- (660.73) POTENTIOMETRIC ELEVATION (JULY 1996)
- 740 POTENTIOMETRIC CONTOUR (20-foot INTERVAL)
- GROUNDWATER FLOW DIRECTION

NOTES

1. BASE MAP WAS DEVELOPED FROM HATCHER-SAYRE, INC., 1992.
2. ELEVATIONS EXPRESSED IN FEET ABOVE MEAN SEA LEVEL.
3. THE ELEVATIONS OF THE BOTTOMS OF THE SHALLOW DOLOMITE WELLS USED TO CONSTRUCT THIS FIGURE ARE BETWEEN 680 AND 735 FEET ABOVE MSL, EXCEPT FOR W-3A (WITH BOTTOM AT 534' MSL) AND W-20 (WITH BOTTOM AT 641' MSL) BOTH INSTALLED IN THE SINK HOLE ON THE EAST SIDE OF THE SITE, AND W-30 WHICH IS CONSTRUCTED TO OBTAIN WATER FROM BOTH THE SHALLOW AND DEEP DOLOMITE.
3. W-30 IS THE ON-SITE PRODUCTION WELL AND W-21A IS A RECOVERY WELL. PUMPING FROM THESE WELLS IS CONTROLLING OFFSITE MIGRATION OF VOCS IN THE SHALLOW DOLOMITE.



POTENTIOMETRIC SURFACE MAP
SHALLOW DOLOMITE - SUMMER 1996

COOK COMPOSITES AND POLYMERS
SAUKVILLE, WISCONSIN

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Approved By:	COB
Date:	JANUARY 1997
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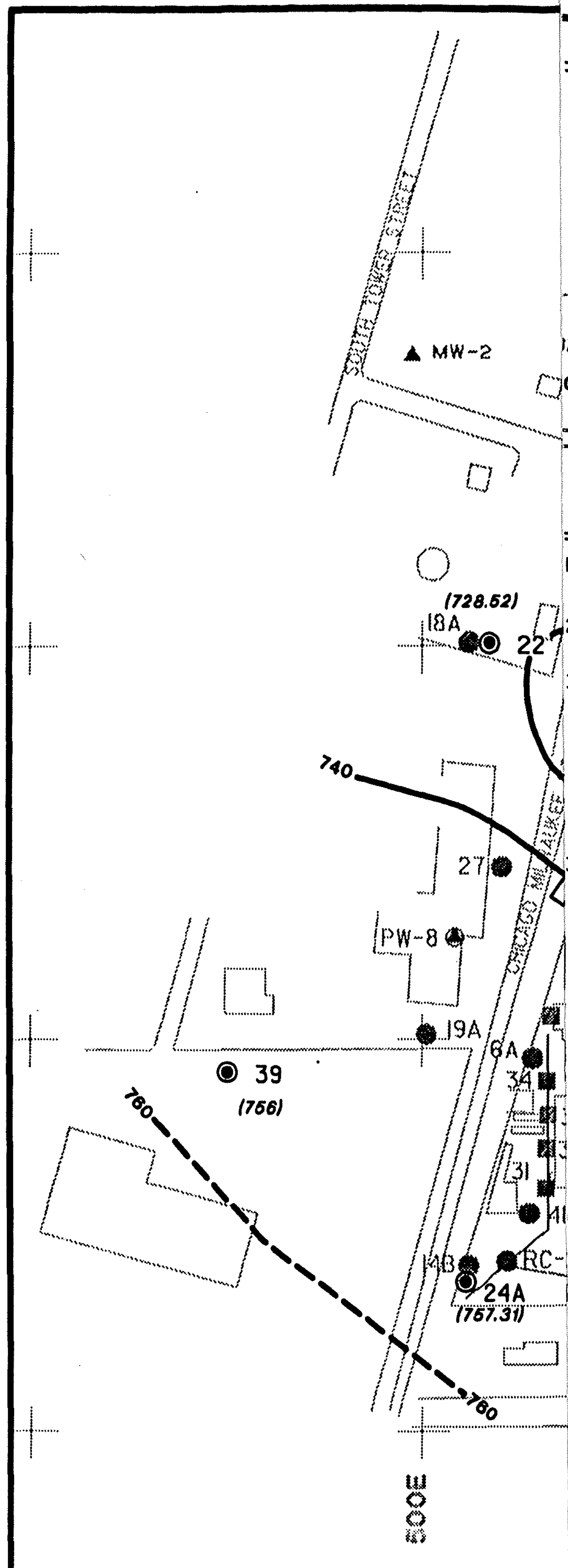
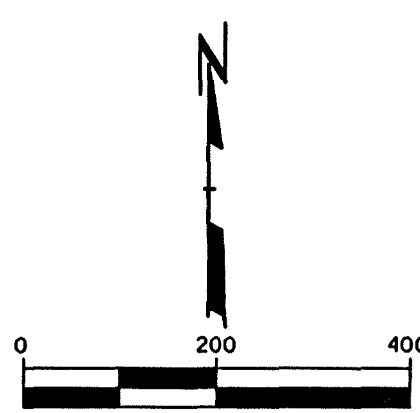


LEGEND

- DEEP DOLOMITE WELL
- SHALLOW DOLOMITE WELL
- GLACIAL OVERBURDEN WELL
- GLACIAL OVERBURDEN WITHDRAWAL WELL
- RANNEY COLLECTOR
- (79.24) POTENTIOMETRIC ELEVATION (SEPTEMBER 1996)
- 0 POTENTIOMETRIC CONTOUR (20-foot INTERVAL)
- GROUNDWATER FLOW DIRECTION

NOTES

1. BASE MAP WAS DEVELOPED FROM HATCHER-SAYRE, INC., 1992.
2. ELEVATIONS EXPRESSED IN FEET ABOVE MEAN SEA LEVEL.
3. THE ELEVATIONS OF THE BOTTOMS OF THE SHALLOW DOLOMITE WELLS USED TO CONSTRUCT THIS FIGURE ARE BETWEEN 680 AND 735 FEET ABOVE MSL, EXCEPT FOR W-3A (WITH BOTTOM AT 534' MSL) AND W-20 (WITH BOTTOM AT 641' MSL) BOTH INSTALLED IN THE SINK HOLE ON THE EAST SIDE OF THE SITE, AND W-30 WHICH IS CONSTRUCTED TO OBTAIN WATER FROM BOTH THE SHALLOW AND DEEP DOLOMITE.
3. W-30 IS THE ON-SITE PRODUCTION WELL AND W-21A IS A RECOVERY WELL. PUMPING FROM THESE WELLS IS CONTROLLING OFFSITE MIGRATION OF VOCS IN THE SHALLOW DOLOMITE.



SCALE: 1"=200'

POTENTIOMETRIC SURFACE MAP SHALLOW DOLOMITE - FALL 1996

COOK COMPOSITES AND POLYMERS SAUKVILLE, WISCONSIN

RMT INC.

Dwn.By:	JRW
Approved By:	CDB
Date:	JANUARY 1997
Proj.#:	3333.02
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FIGURE 5D

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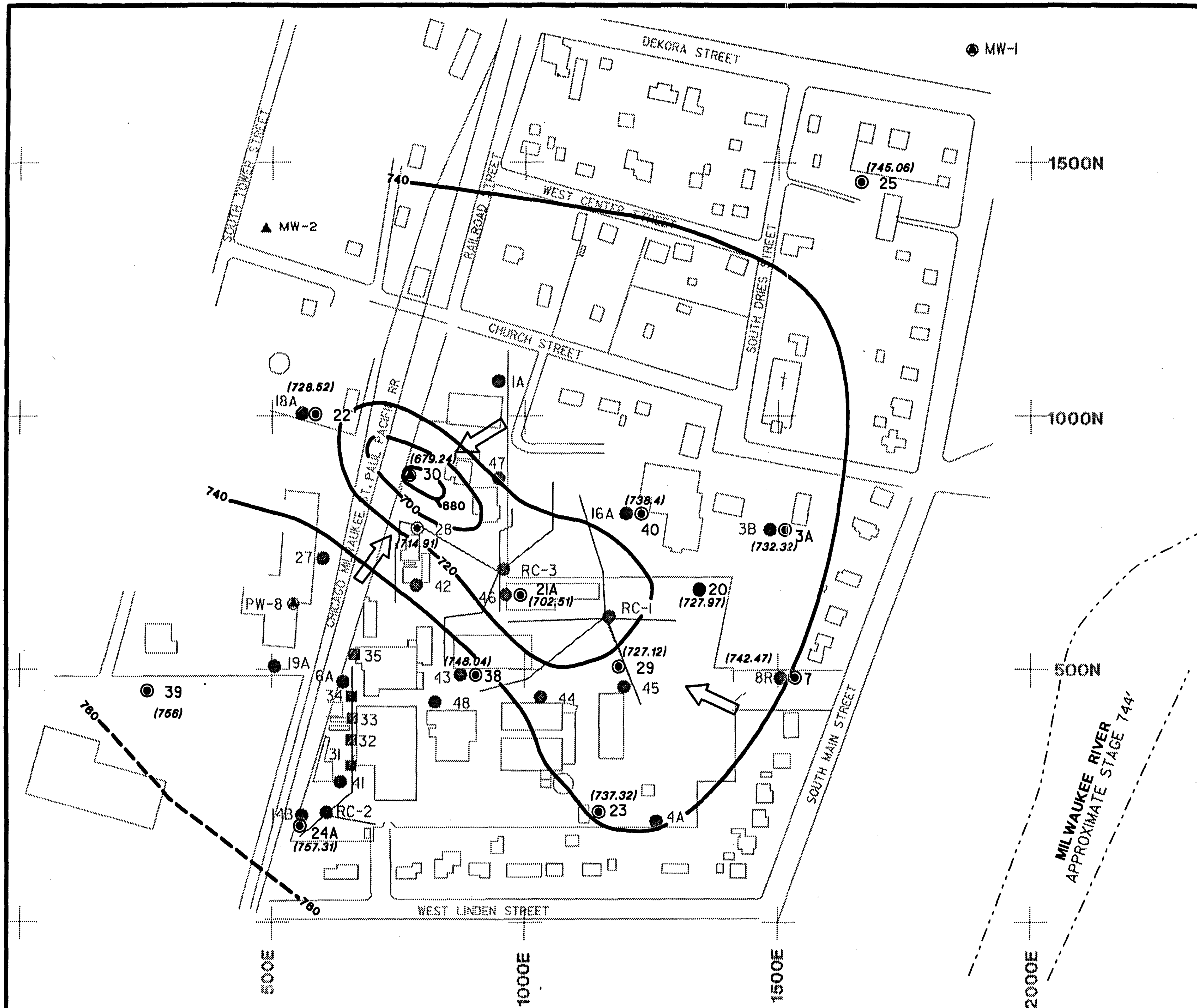


LEGEND

- DEEP DOLOMITE WELL
- SHALLOW DOLOMITE WELL
- GLACIAL OVERBURDEN WELL
- GLACIAL OVERBURDEN WITHDRAWAL WELL
- RANNEY COLLECTOR
- (679.24) POTENTIOMETRIC ELEVATION (SEPTEMBER 1996)
- 740 POTENTIOMETRIC CONTOUR (20-foot INTERVAL)
- GROUNDWATER FLOW DIRECTION

NOTES

1. BASE MAP WAS DEVELOPED FROM HATCHER-SAYRE, INC., 1992.
2. ELEVATIONS EXPRESSED IN FEET ABOVE MEAN SEA LEVEL.
3. THE ELEVATIONS OF THE BOTTOMS OF THE SHALLOW DOLOMITE WELLS USED TO CONSTRUCT THIS FIGURE ARE BETWEEN 680 AND 735 FEET ABOVE MSL, EXCEPT FOR W-3A (WITH BOTTOM AT 534' MSL) AND W-20 (WITH BOTTOM AT 641' MSL) BOTH INSTALLED IN THE SINK HOLE ON THE EAST SIDE OF THE SITE, AND W-30 WHICH IS CONSTRUCTED TO OBTAIN WATER FROM BOTH THE SHALLOW AND DEEP DOLOMITE.
3. W-30 IS THE ON-SITE PRODUCTION WELL AND W-21A IS A RECOVERY WELL. PUMPING FROM THESE WELLS IS CONTROLLING OFFSITE MIGRATION OF VOCS IN THE SHALLOW DOLOMITE.

0 200 400

SCALE: 1"=200'

POTENTIOMETRIC SURFACE MAP SHALLOW DOLOMITE - FALL 1996

COOK COMPOSITES AND POLYMERS SAUKVILLE, WISCONSIN

RMT INC.

Dwn.By:	JRW
Approved By:	CDB
Date:	JANUARY 1997
Proj.#:	3333.02
File #:	33330210.DGN

FIGURE 5D

APPENDIX B

HYDROGEOLOGIC CALCULATIONS
SUMMER 1996

APPENDIX B

HYDROGEOLOGIC CALCULATIONS
SUMMER 1996

Horizontal

Glacial Drift Unit:

$$i = \frac{dH}{dL} = \frac{765 - 750}{900} \approx 0.02 \text{ (eastward)}$$

Vertical Gradient

Between Glacial Drift Unit and Shallow Dolomite Unit

W-14B/W-24A
center D = (771.81-85) + 1/2(54) = 713.81

$$i_v = \frac{WLS - WLD}{WLS - center\ D} = \frac{766.05 - 762.11}{766.05 - 713.81} = 0.08 \textit{ (downward)}$$

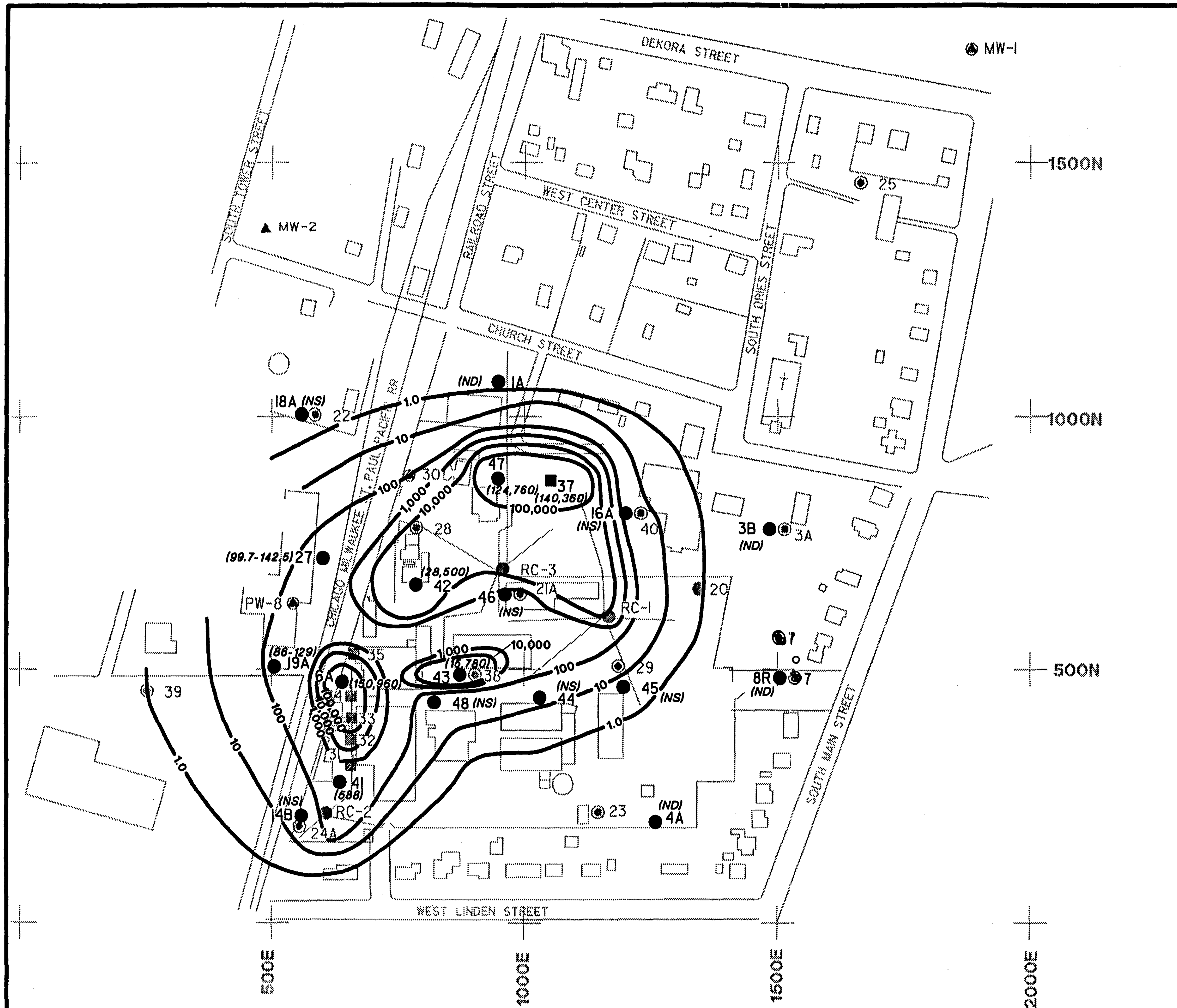
W-16A/W-40
center D = (766.69-48) + 1/2(20) = 728.69

$$i_v = \frac{WLS - WLD}{WLS - center\ D} = \frac{762.22 - 742.47}{762.22 - 728.69} = 0.59 \textit{ (downward)}$$

I:\WPMSN\PJT\00-01832\91\R0001832.91F 01/23/96

APPENDIX C

ISOCONCENTRATION MAPS



LEGEND

- DEEP DOLOMITE WELL
- SHALLOW DOLOMITE WELL
- GLACIAL OVERBURDEN WELL
- GLACIAL OVERBURDEN WITHDRAWAL WELL
- RANNEY COLLECTOR
- (140,360) TOTAL VOC CONCENTRATION (ug/L)
- 0.01 TOTAL VOC ISOCONCENTRATION CONTOUR (ug/L)
- (ND) NOT DETECTED
- (NS) NOT SAMPLED

NOTES

1. BASE MAP WAS DEVELOPED FROM HATCHER-SAYRE, INC., 1992.
2. FIGURE INCLUDES CONCENTRATION DATA FROM SEVERAL QUARTERLY GROUNDWATER MONITORING EVENTS IN 1996.

N

0 200 400

SCALE: 1"=200'

COMPOSITE 1996
TOTAL VOC CONCENTRATIONS
- GLACIAL DRIFT WELLS

COOK COMPOSITES AND POLYMERS
SAUKVILLE, WISCONSIN

RMT INC.

Dwn.By:	JRW
Approved By:	COB
Date:	JANUARY 1997
Proj.#:	3333.02
File #:	33330203.DGN

FIGURE 7

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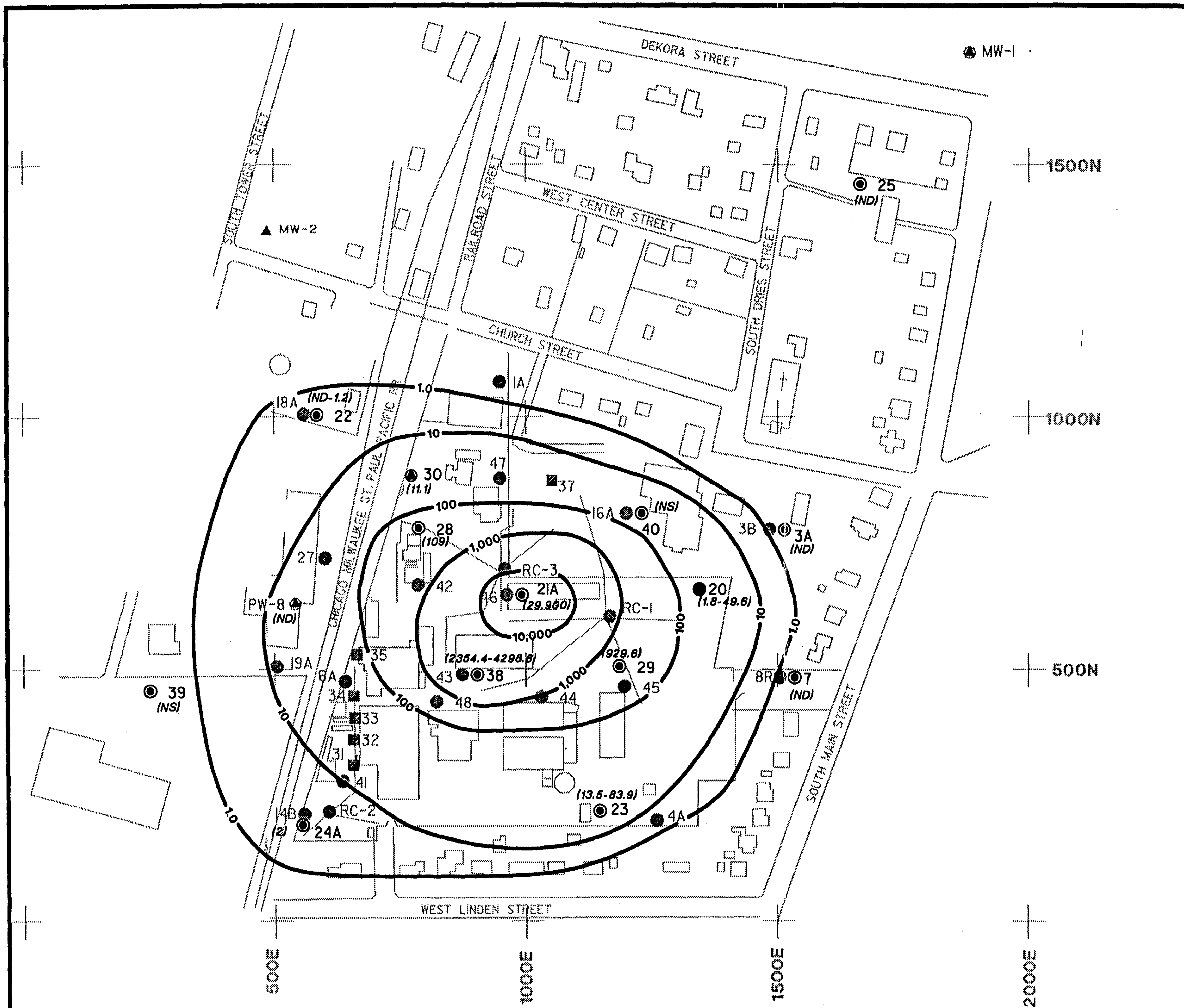

LEGEND

- DEEP DOLOMITE WELL
- SHALLOW DOLOMITE WELL
- GLACIAL OVERBURDEN WELL
- GLACIAL OVERBURDEN WITHDRAWAL WELL
- RANNEY COLLECTOR
- *(ND-1.2)* TOTAL VOC ISOCONCENTRATION (ug/L)
- 10 TOTAL VOC ISOCONCENTRATION CONTOUR (ug/L)
- *(ND)* NOT DETECTED
- *(NS)* NOT SAMPLED

NOTES

1. BASE MAP WAS DEVELOPED FROM HATCHER-SAYRE, INC., 1992.
2. SHALLOW DOLOMITE WELLS PENETRATE UP TO APPROXIMATELY THE TOP 60' OF THE DOLOMITE UNIT.
3. FIGURE INCLUDES CONCENTRATION DATA FROM SEVERAL QUARTERLY GROUNDWATER MONITORING EVENTS IN 1996.

0 200 400

SCALE: 1"=200'

COMPOSITE 1996 TOTAL VOC CONCENTRATIONS SHALLOW DOLOMITE WELLS

COOK COMPOSITES AND POLYMERS SAUKVILLE, WISCONSIN

RMT INC.

Dwn.By:	JRW
Approved By:	COB
Date:	JANUARY 1997
Proj.#:	3333.02
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FIGURE 8

APPENDIX D

TREND ANALYSIS PLOTS

APPENDIX D

TREND ANALYSIS PLOTS

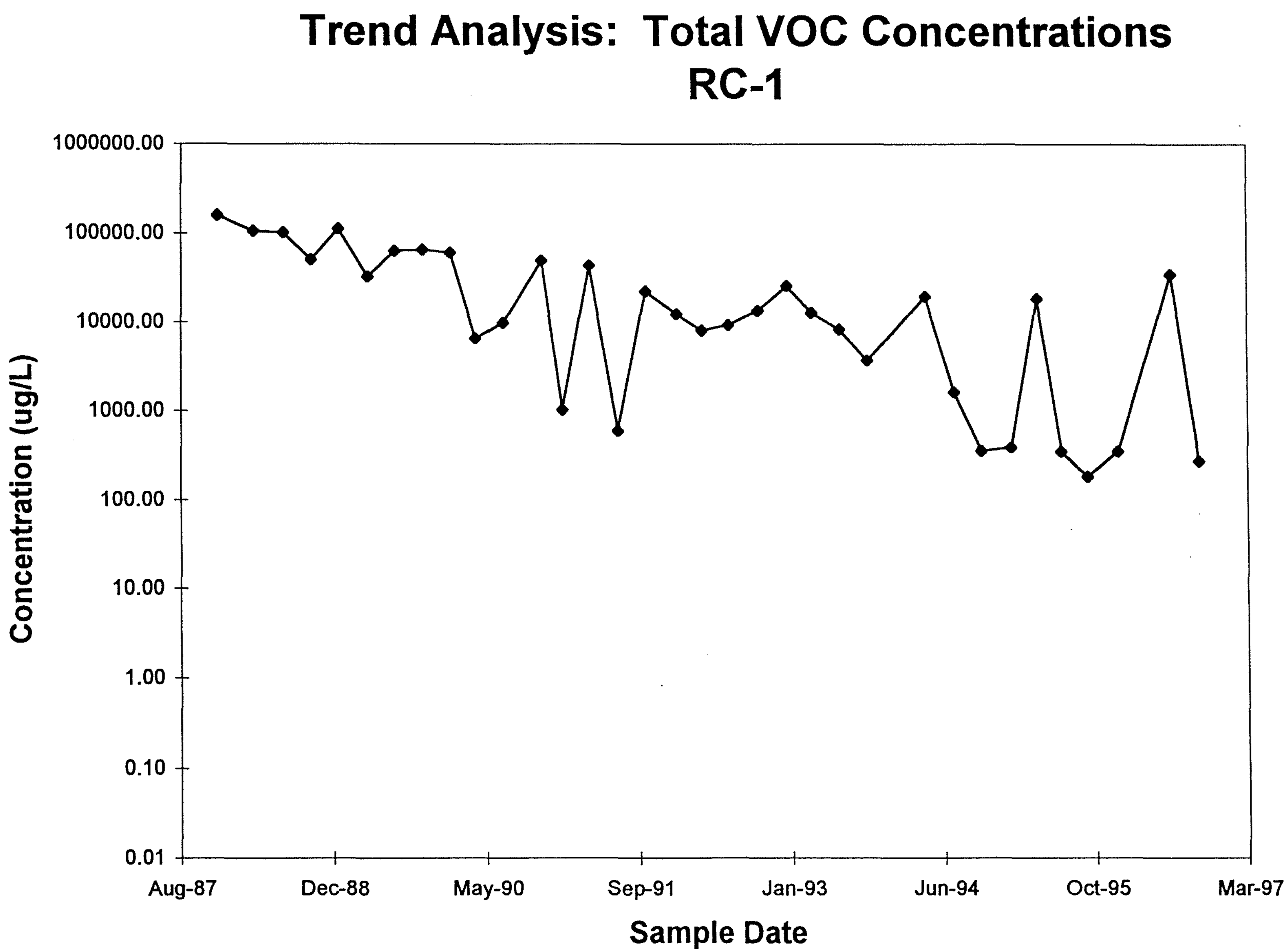
Glacial Drift Wells

Receptor:	RC-1, RC-2, RC-3
Perimeter:	W-01A, W-03B, W-04A, W-08, W-20, W-27
Remediation progress:	W-06A, W-19A, W-37, W-41, W-42, W-43, W-47

Dolomite Wells

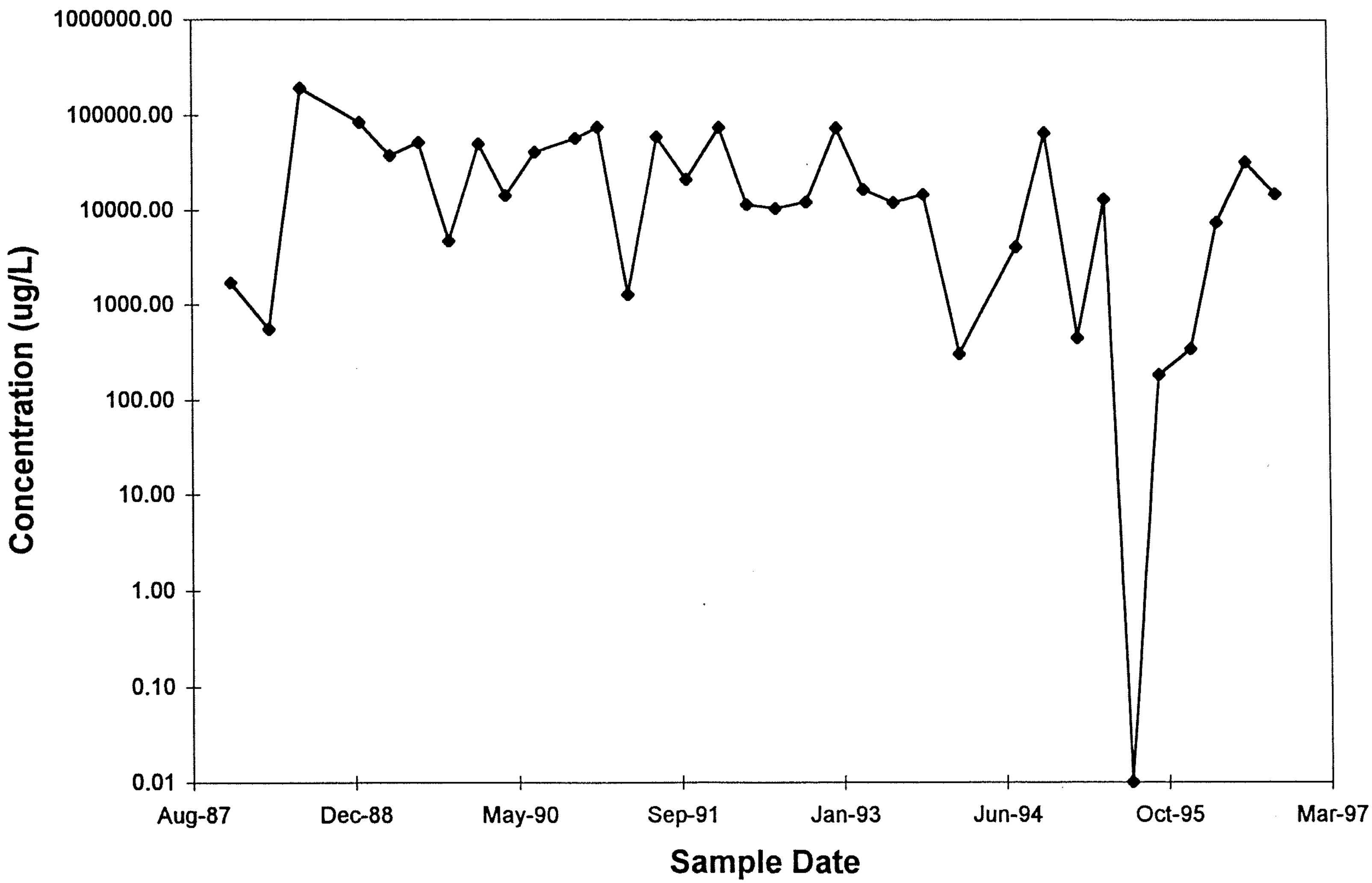
Receptor:	MW-1, MW-2, MW-3, MW-4
Perimeter:	W-03A, W-07, W-22, W-23, W-25, PW-08
Remediation progress:	W-21A, W-24A, W-28, W-29, W-30, W-38

NOTES: When sample analyses indicate nondetectable levels of total VOCs, these events are depicted on the following plots by a symbolic value of 0.01 µg/L. Because of changes in laboratories, methods, and detection limits since 1983, this value does not represent the detection limit (or the absolute concentration).

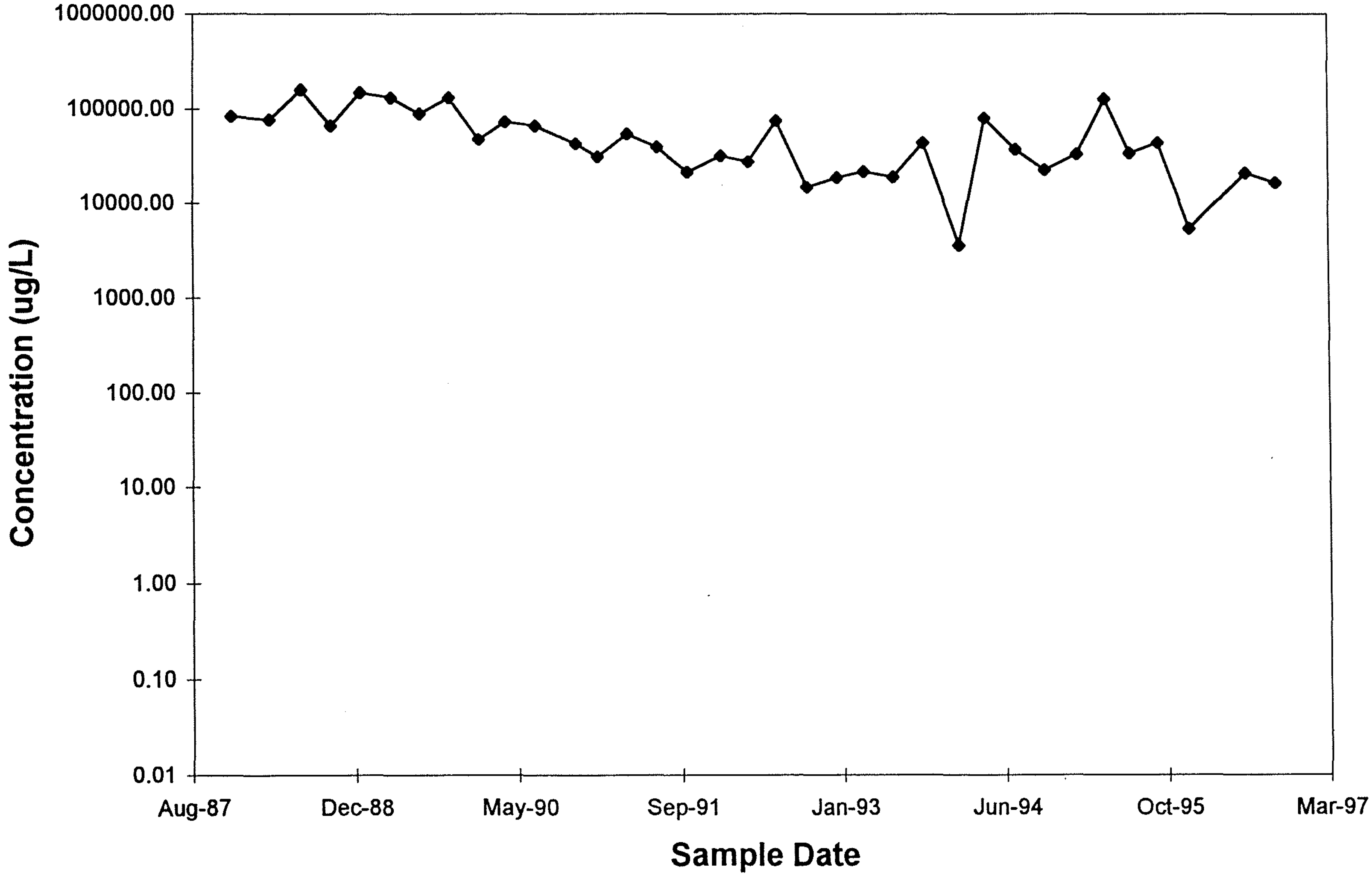


Trend Analysis: Total VOC Concentrations
RC-1
1000000.00
100000.00
10000.00
1000.00
100.00
10.00
1.00
0.10
0.01
Concentration (ug/L)
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Sample Date

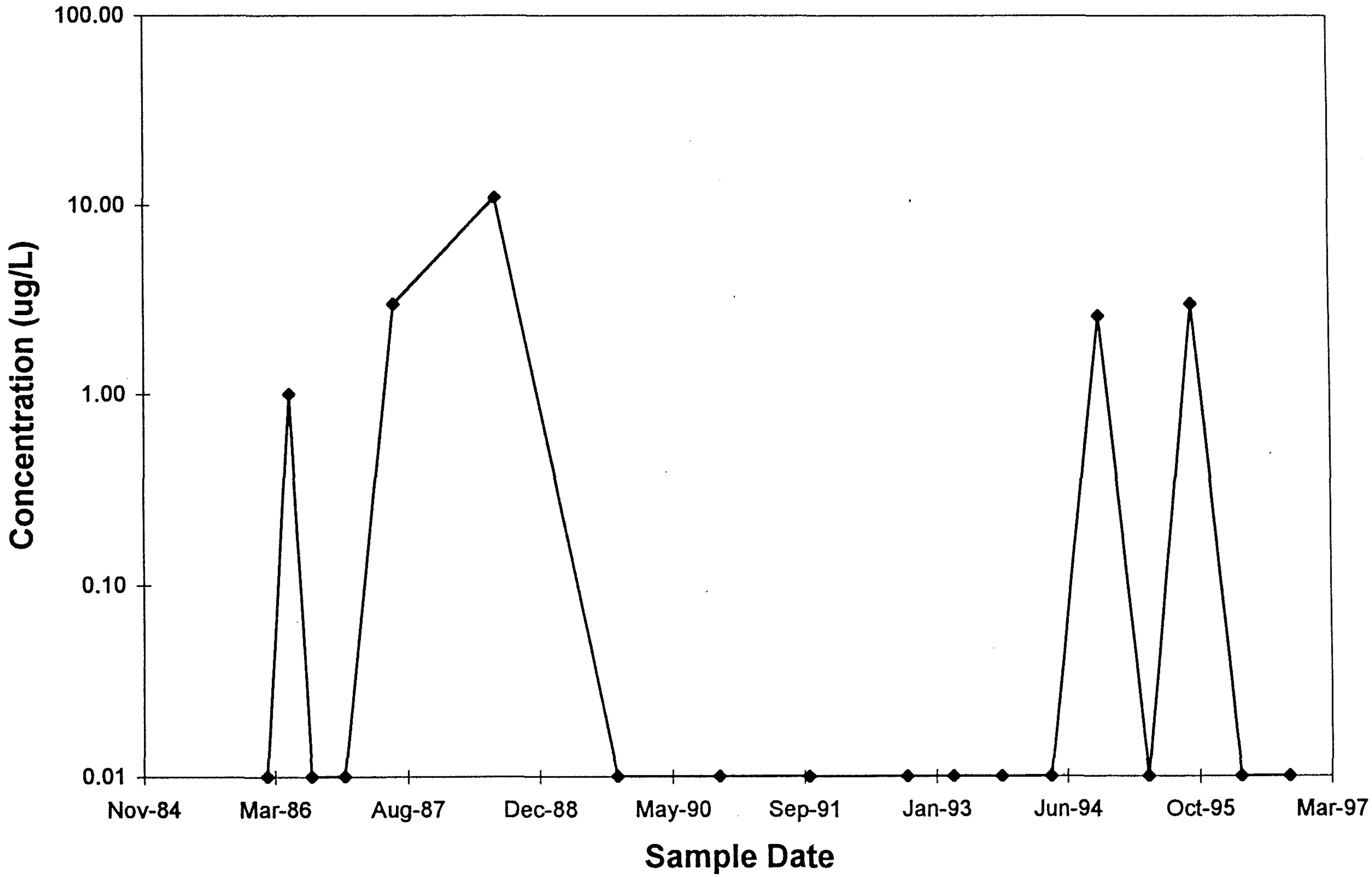
Trend Analysis: Total VOC Concentrations
RC-2



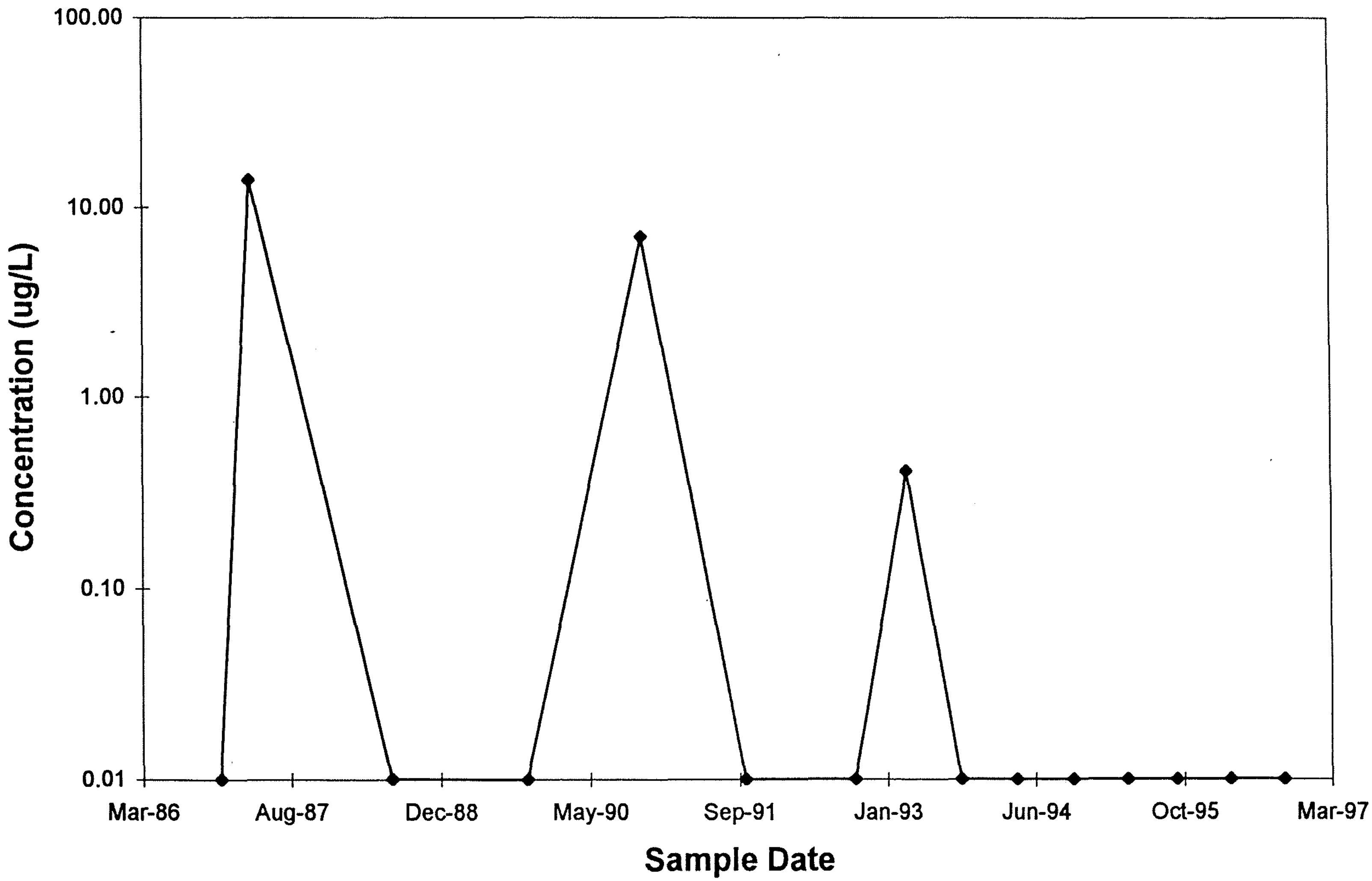
Trend Analysis: Total VOC Concentrations
RC-3

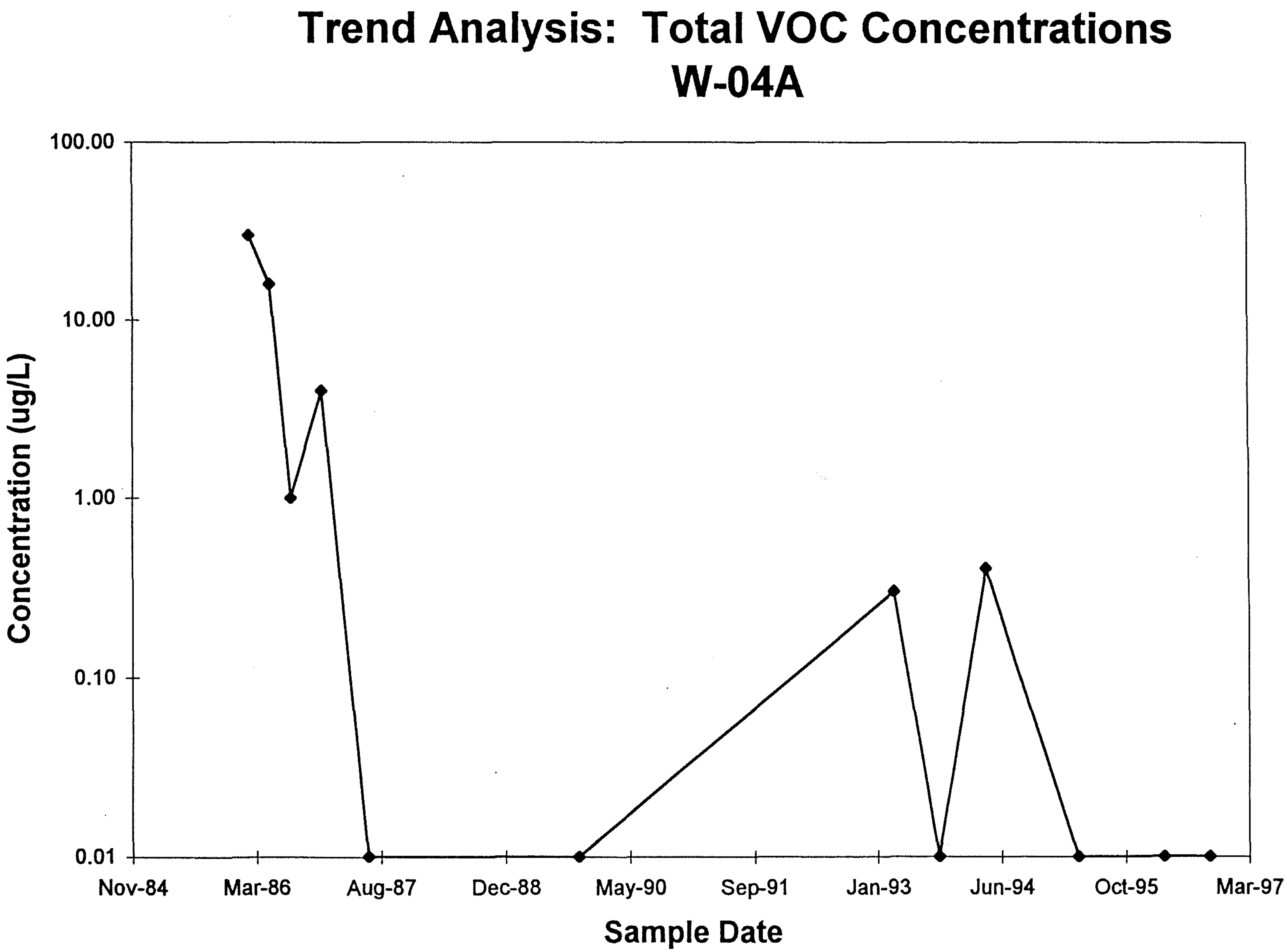


Trend Analysis: Total VOC Concentrations
W-01A

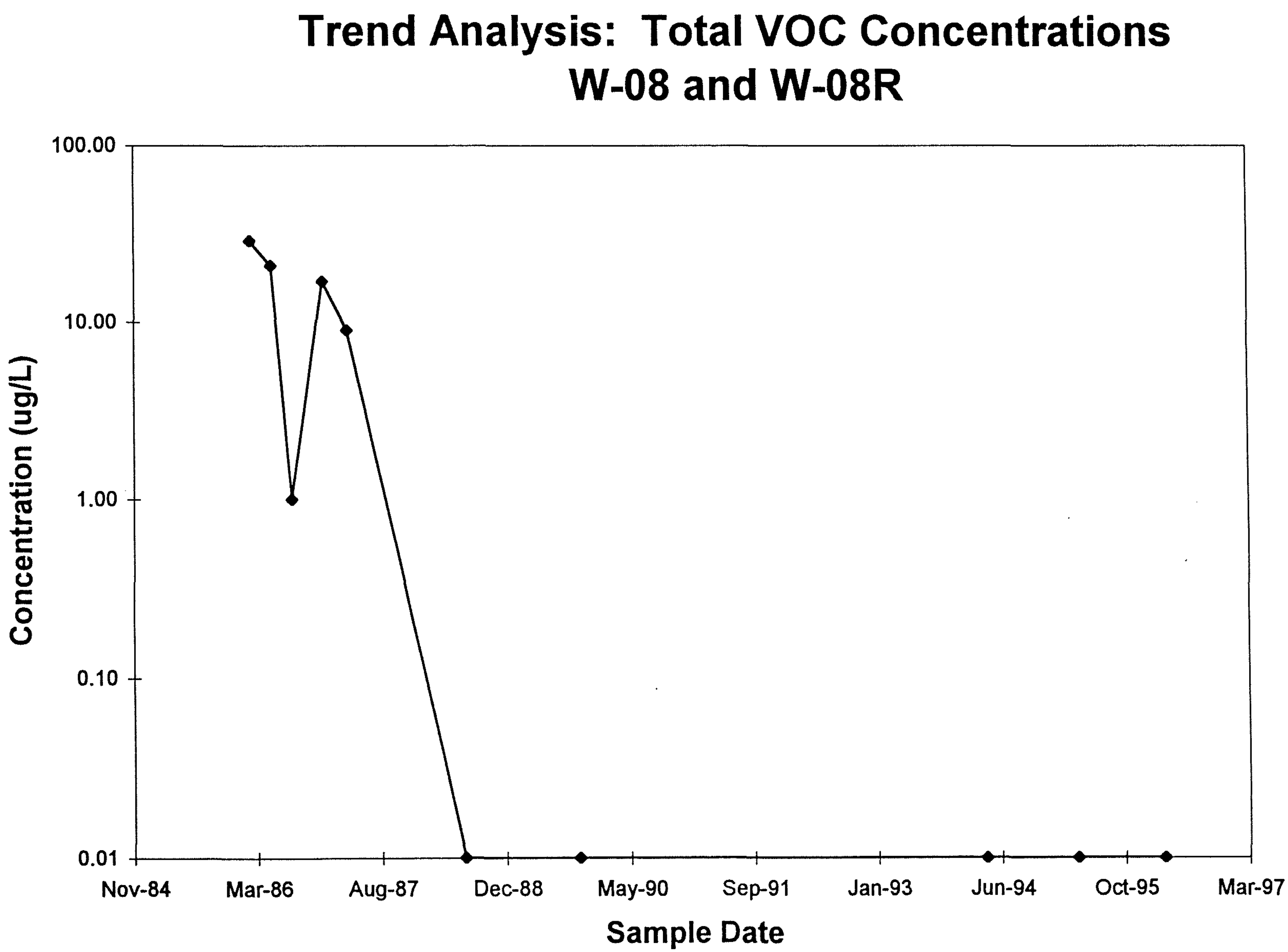


Trend Analysis: Total VOC Concentrations
W-03B

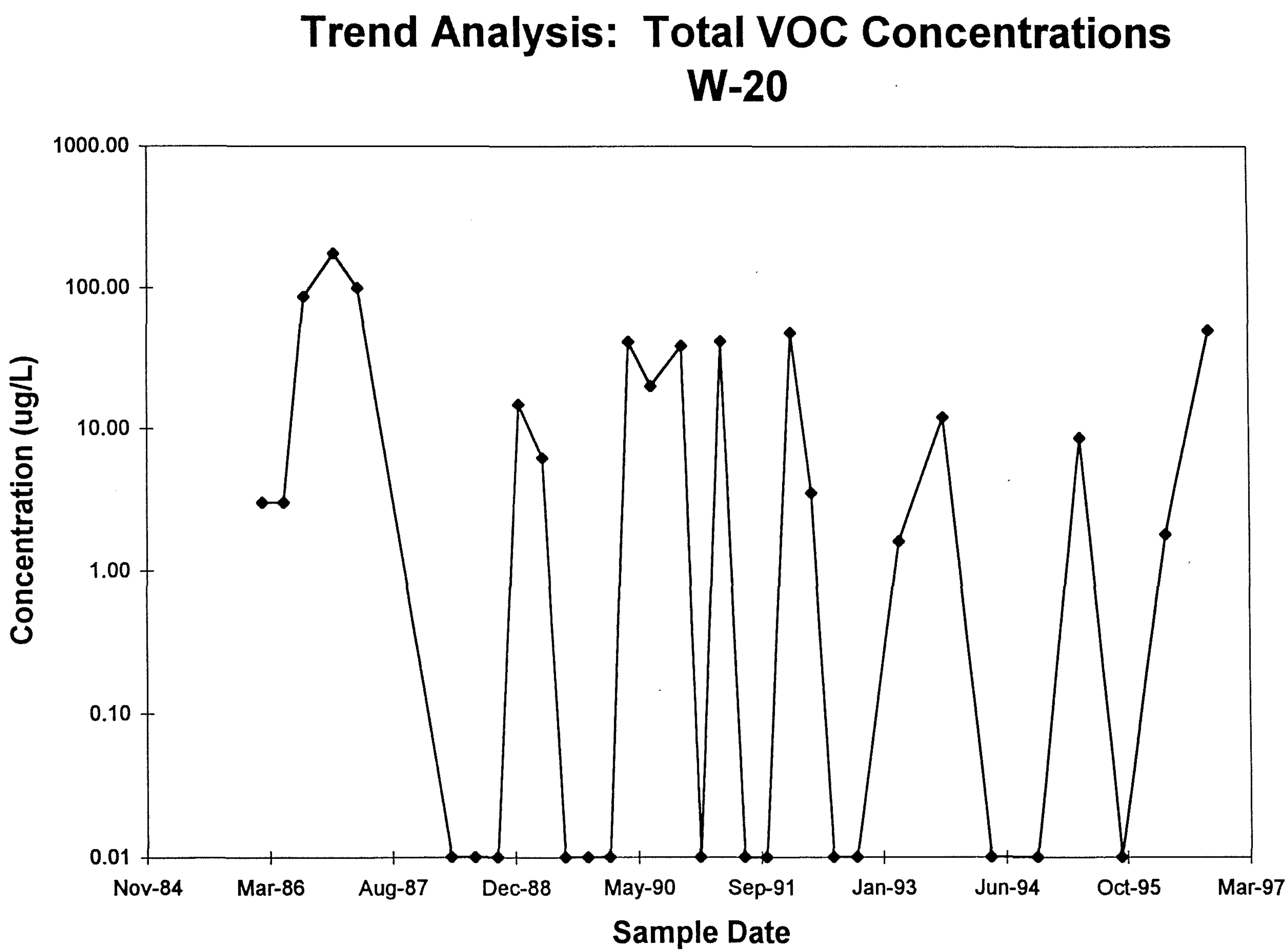




Trend Analysis: Total VOC Concentrations
W-04A
100.00
10.00
1.00
0.10
0.01
Concentration (ug/L)
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Sample Date

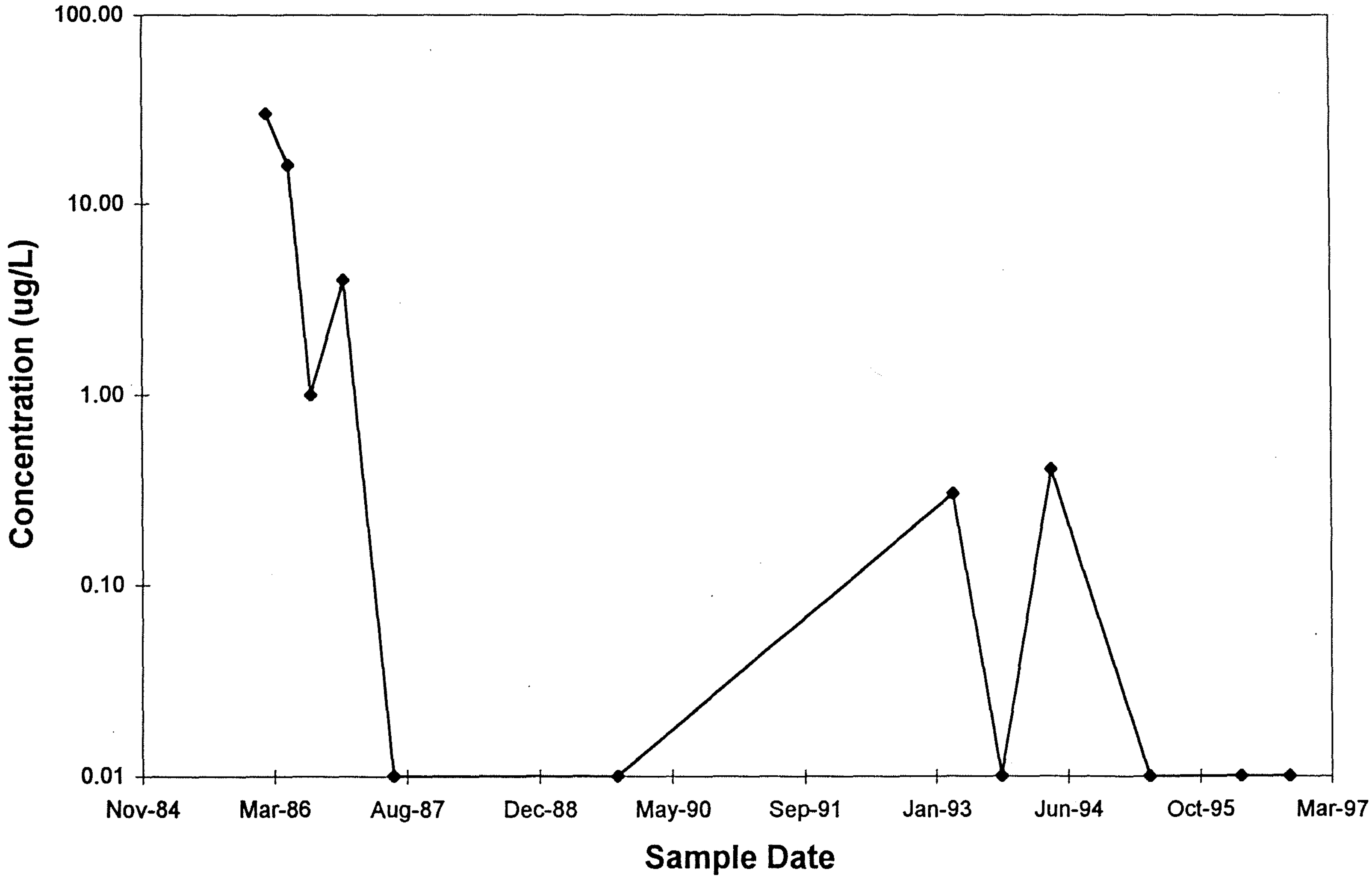


Trend Analysis: Total VOC Concentrations
W-08 and W-08R
100.00
10.00
1.00
0.10
0.01
Concentration (ug/L)
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Sample Date

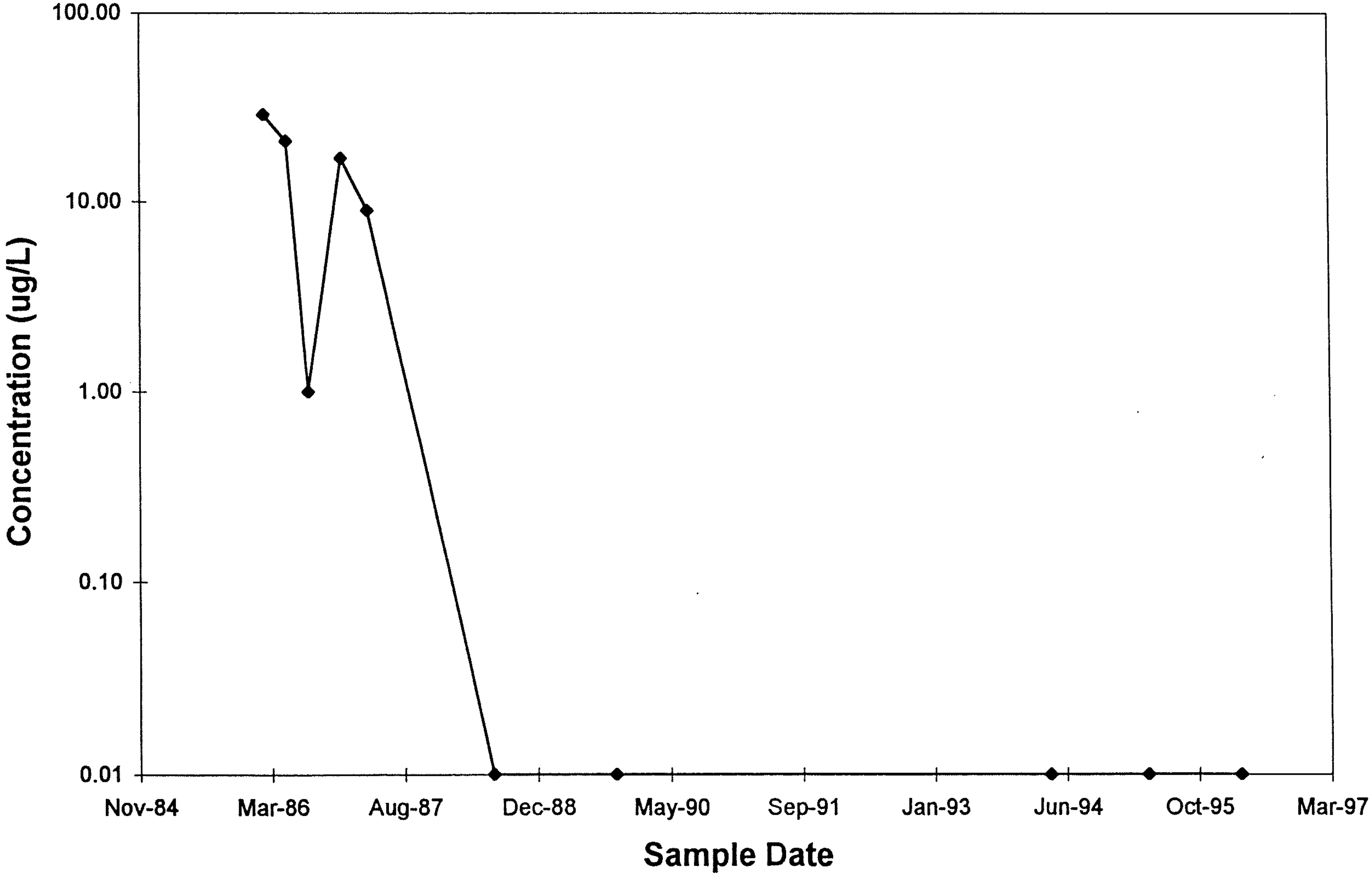


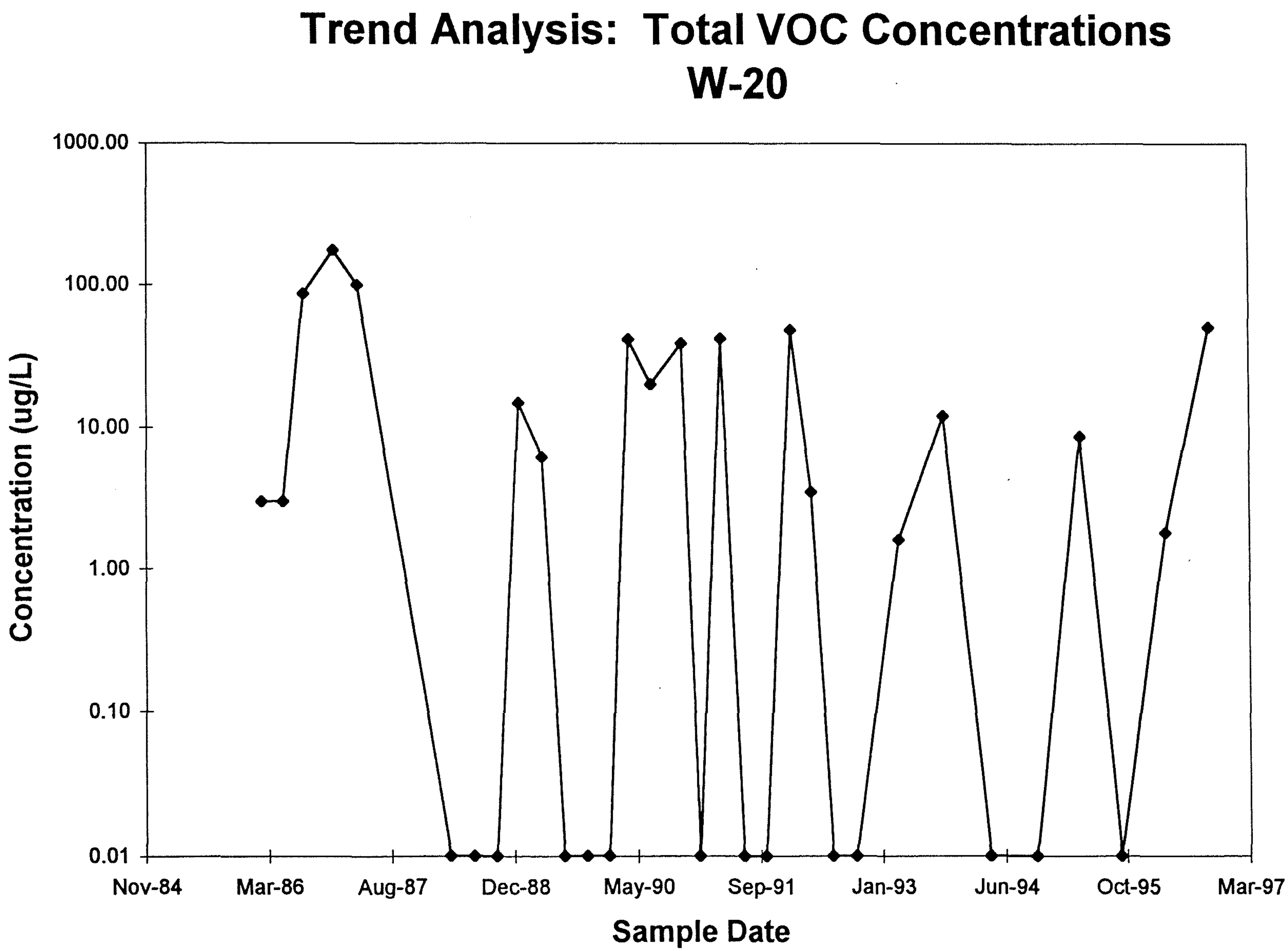
Trend Analysis: Total VOC Concentrations
W-20
1000.00
100.00
10.00
1.00
0.10
0.01
Concentration (ug/L)
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Sample Date

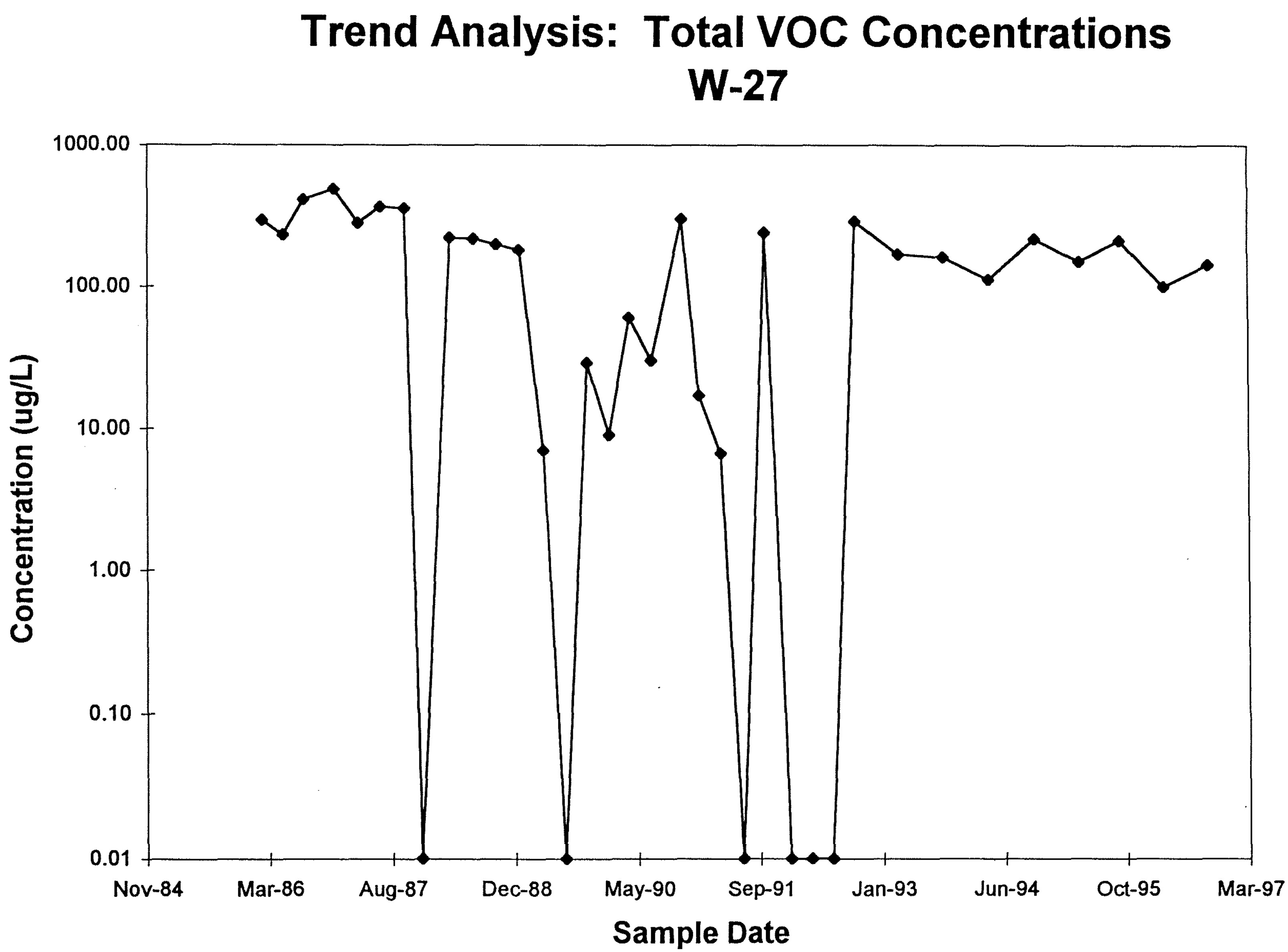
Trend Analysis: Total VOC Concentrations
W-04A

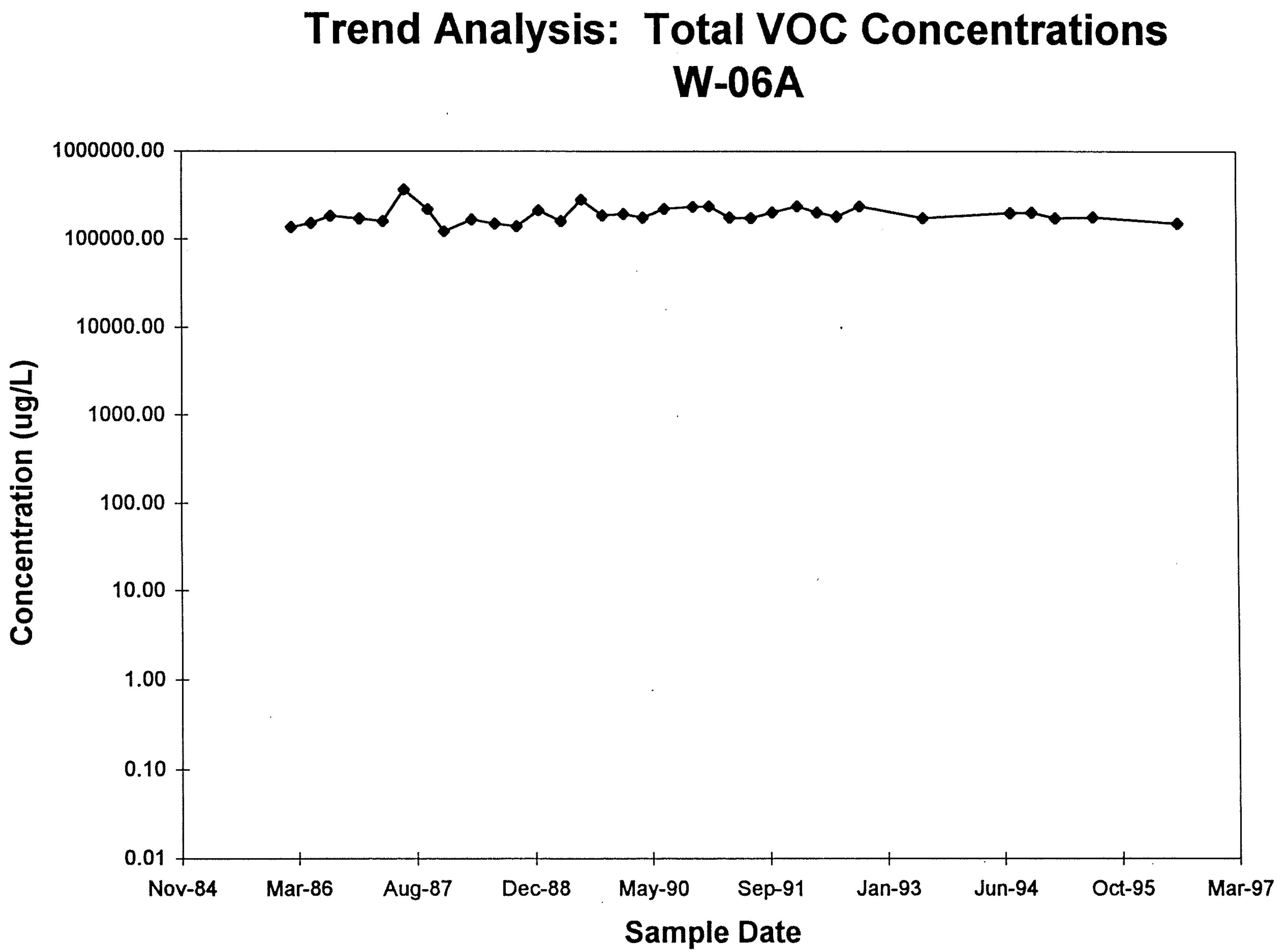


Trend Analysis: Total VOC Concentrations
W-08 and W-08R



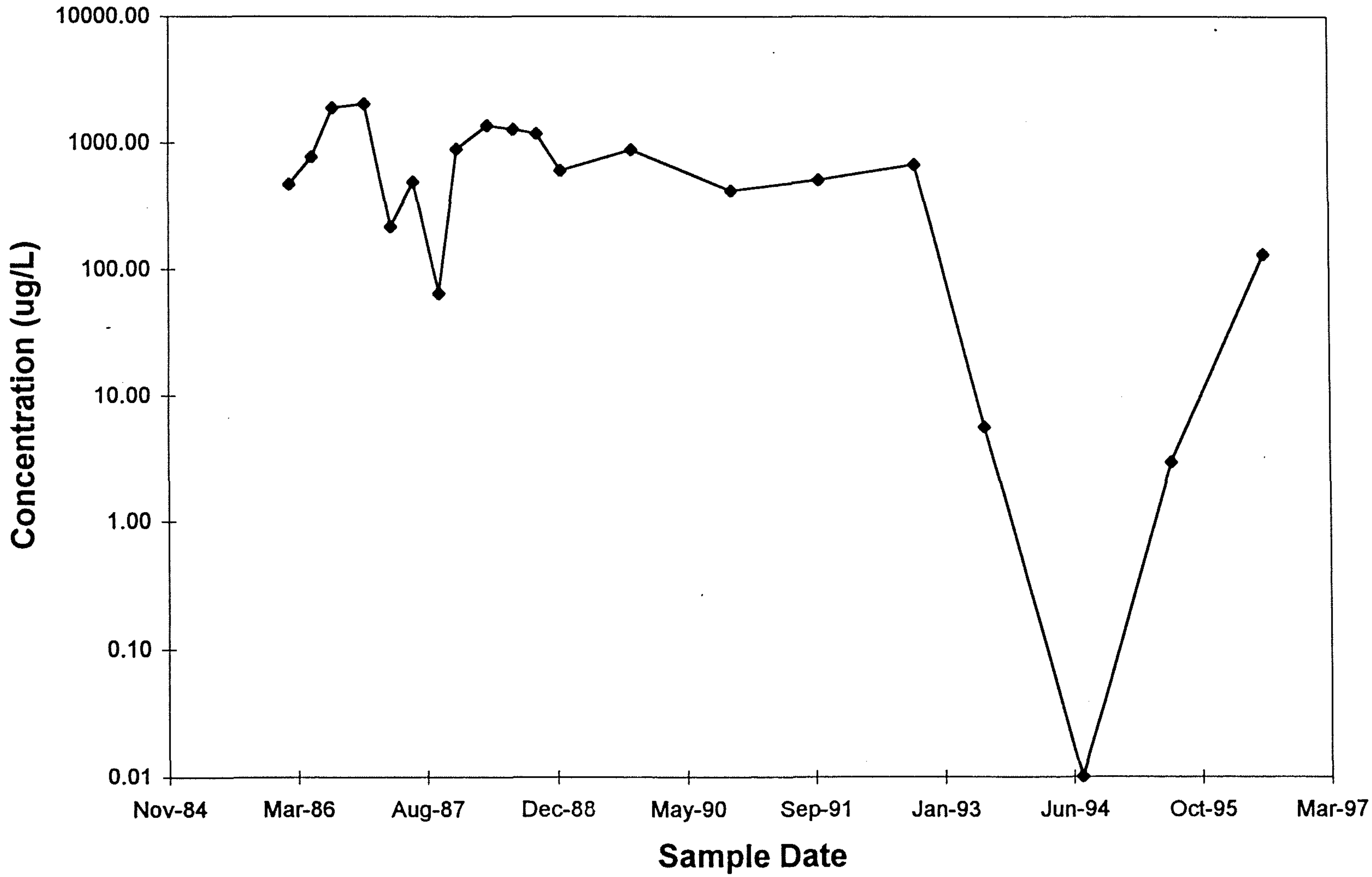

Trend Analysis: Total VOC Concentrations
W-20
1000.00
100.00
10.00
1.00
0.10
0.01
Concentration (ug/L)
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Sample Date

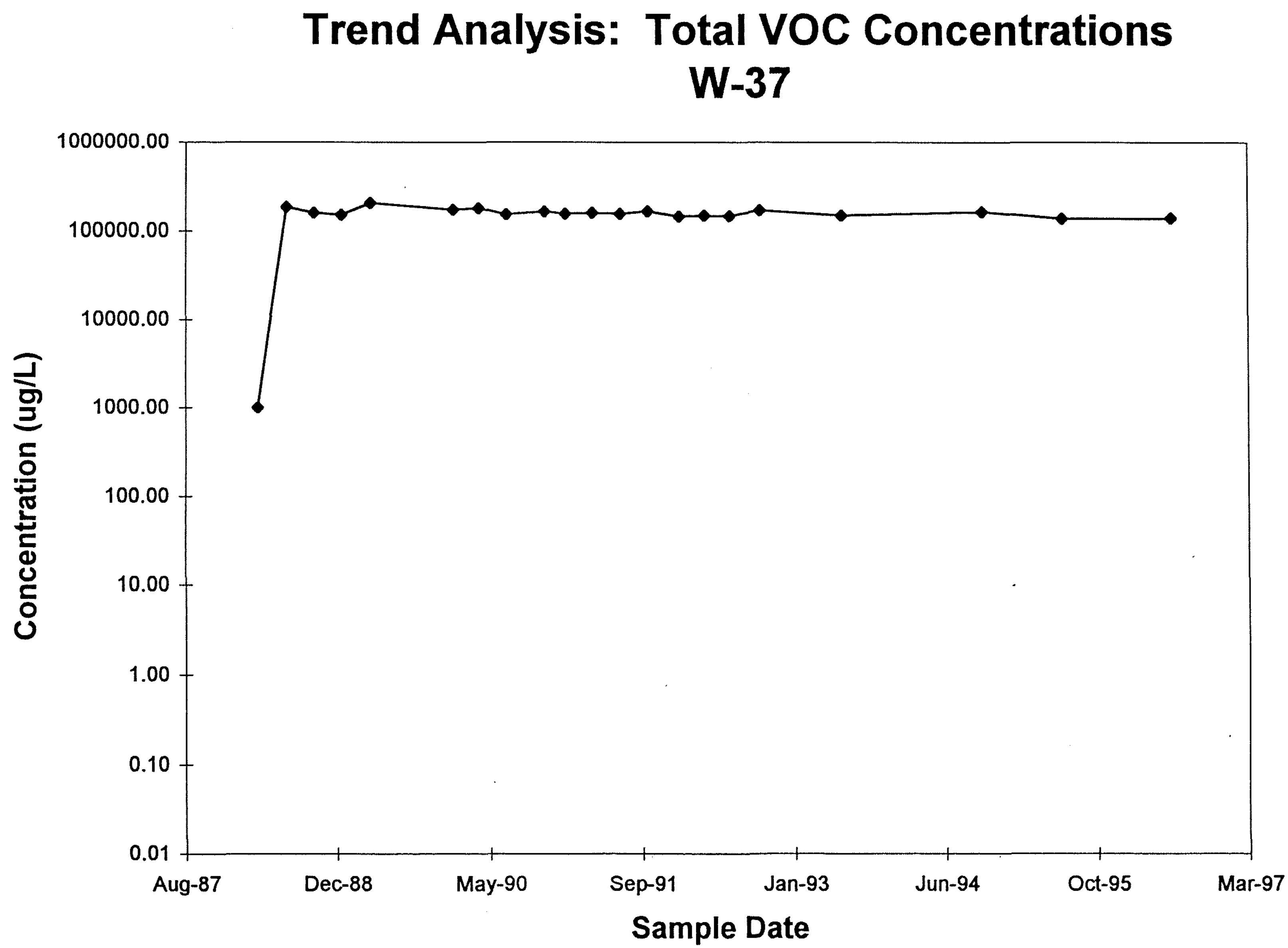

Trend Analysis: Total VOC Concentrations
W-27
1000.00
100.00
10.00
1.00
0.10
0.01
Concentration (ug/L)
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Sample Date



Trend Analysis: Total VOC Concentrations
W-06A
1000000.00
100000.00
10000.00
1000.00
100.00
10.00
1.00
0.10
0.01
Concentration (ug/L)
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Sample Date

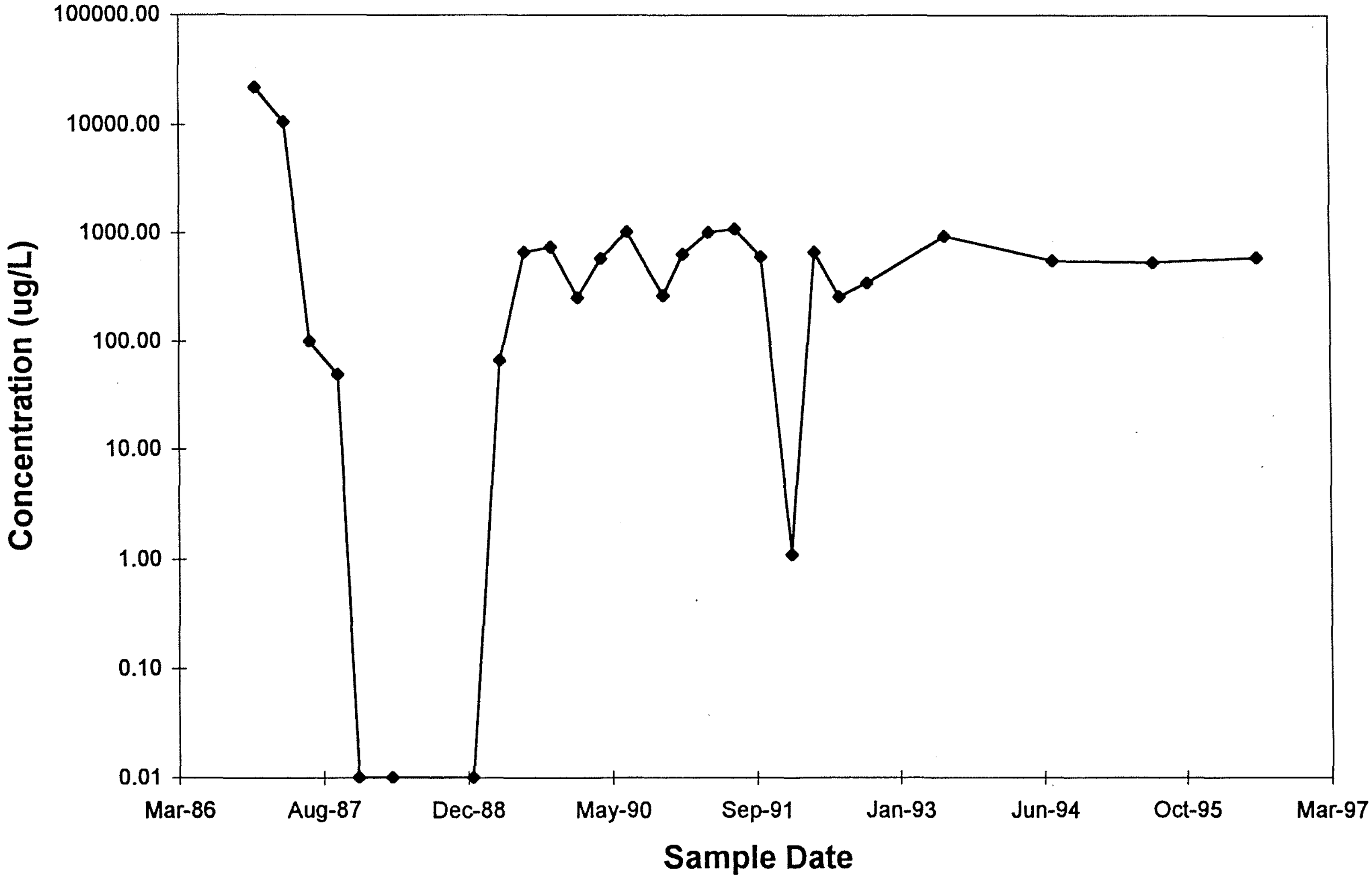
Trend Analysis: Total VOC Concentrations
W-19A

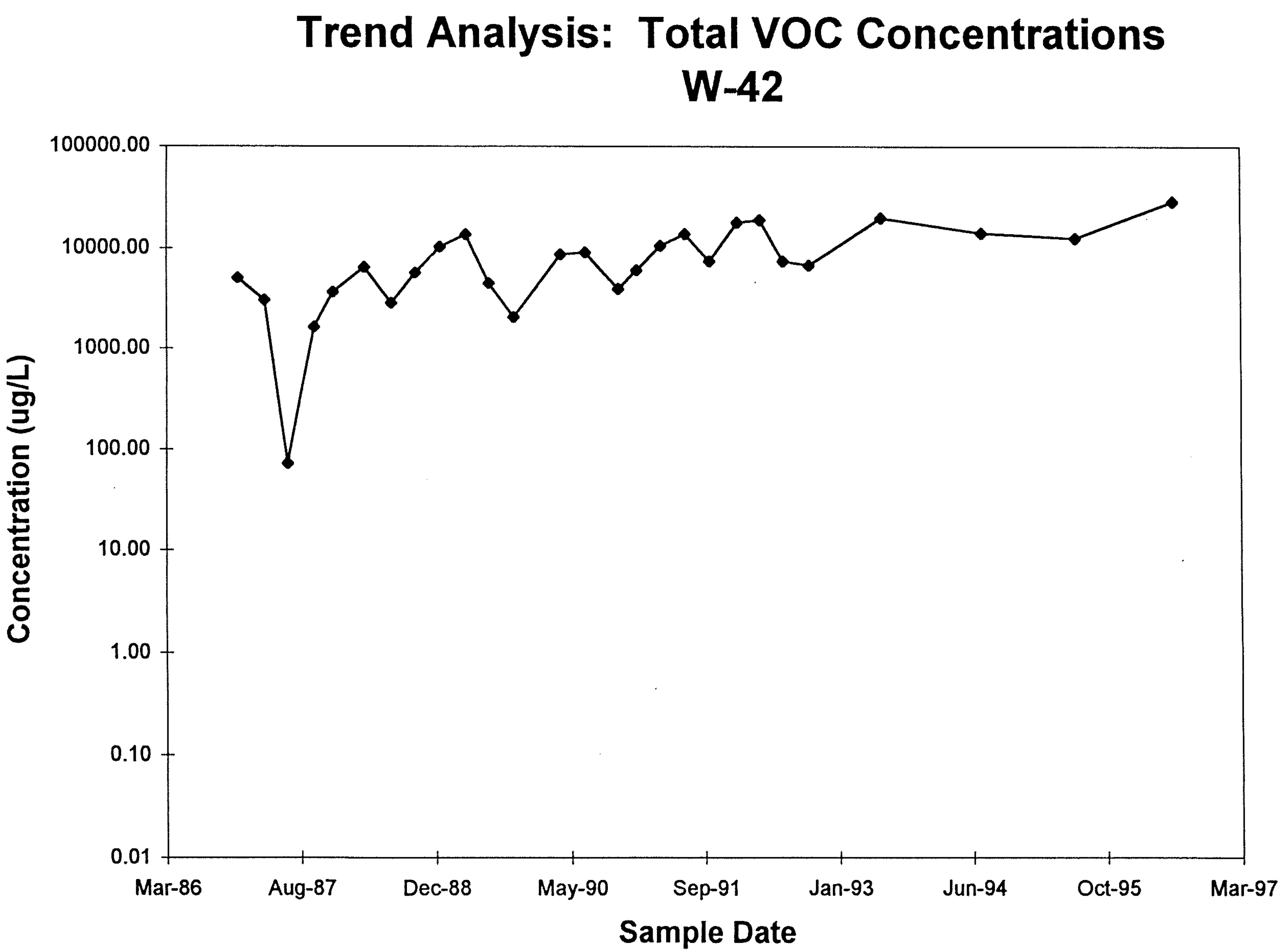




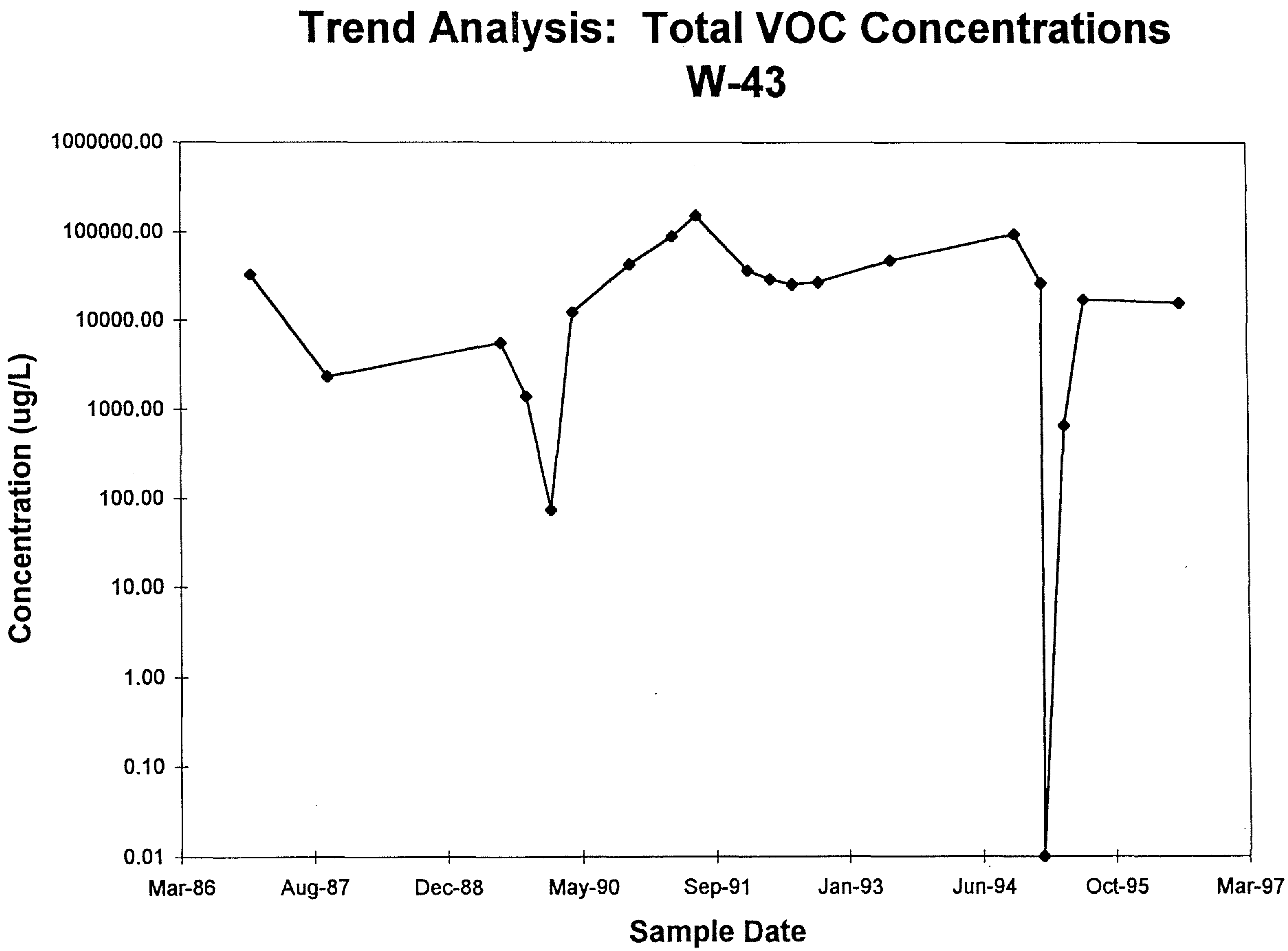
Trend Analysis: Total VOC Concentrations
W-37
1000000.00
100000.00
10000.00
1000.00
100.00
10.00
1.00
0.10
0.01
Concentration (ug/L)
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Sample Date

Trend Analysis: Total VOC Concentrations
W-41

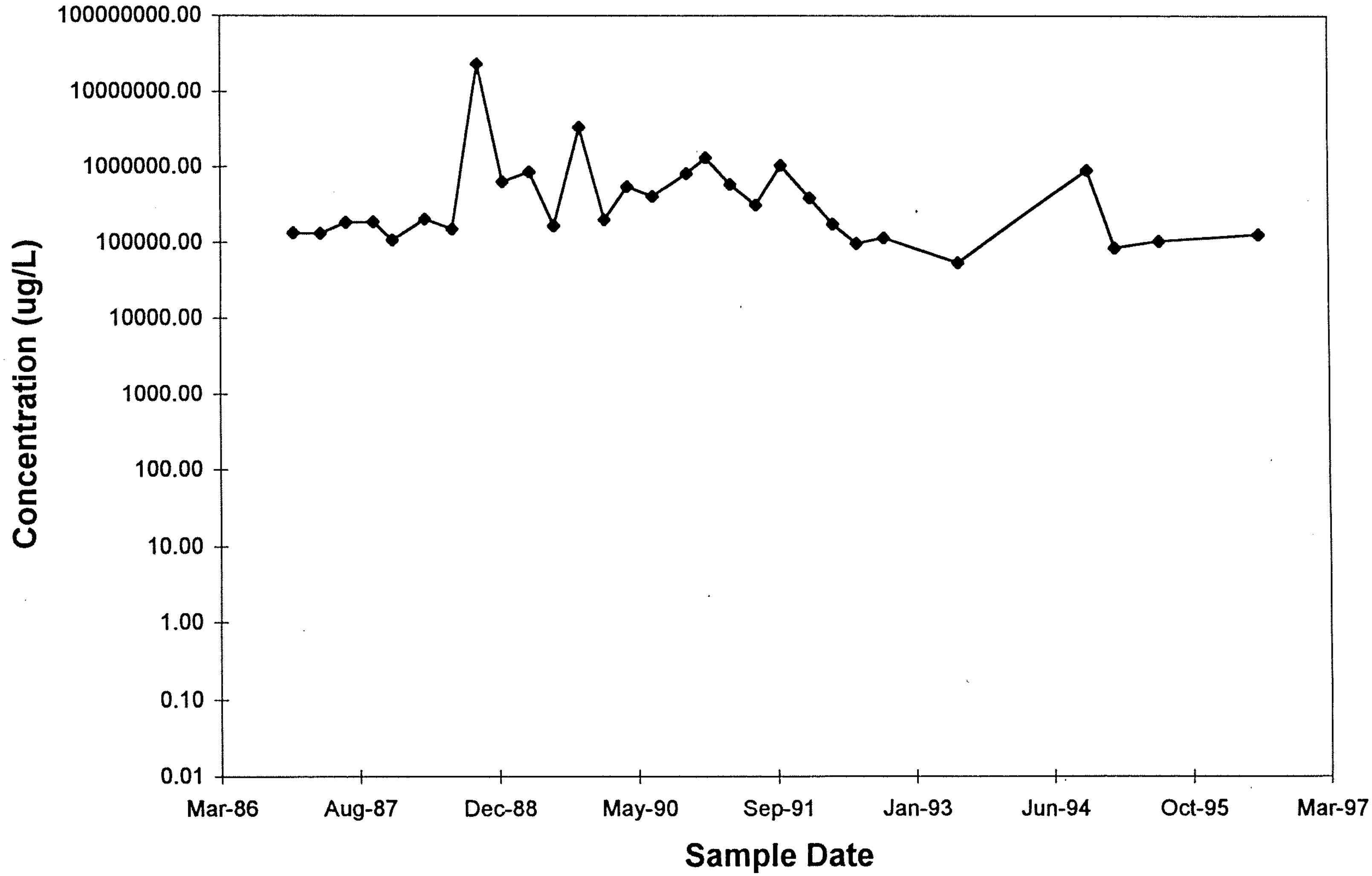


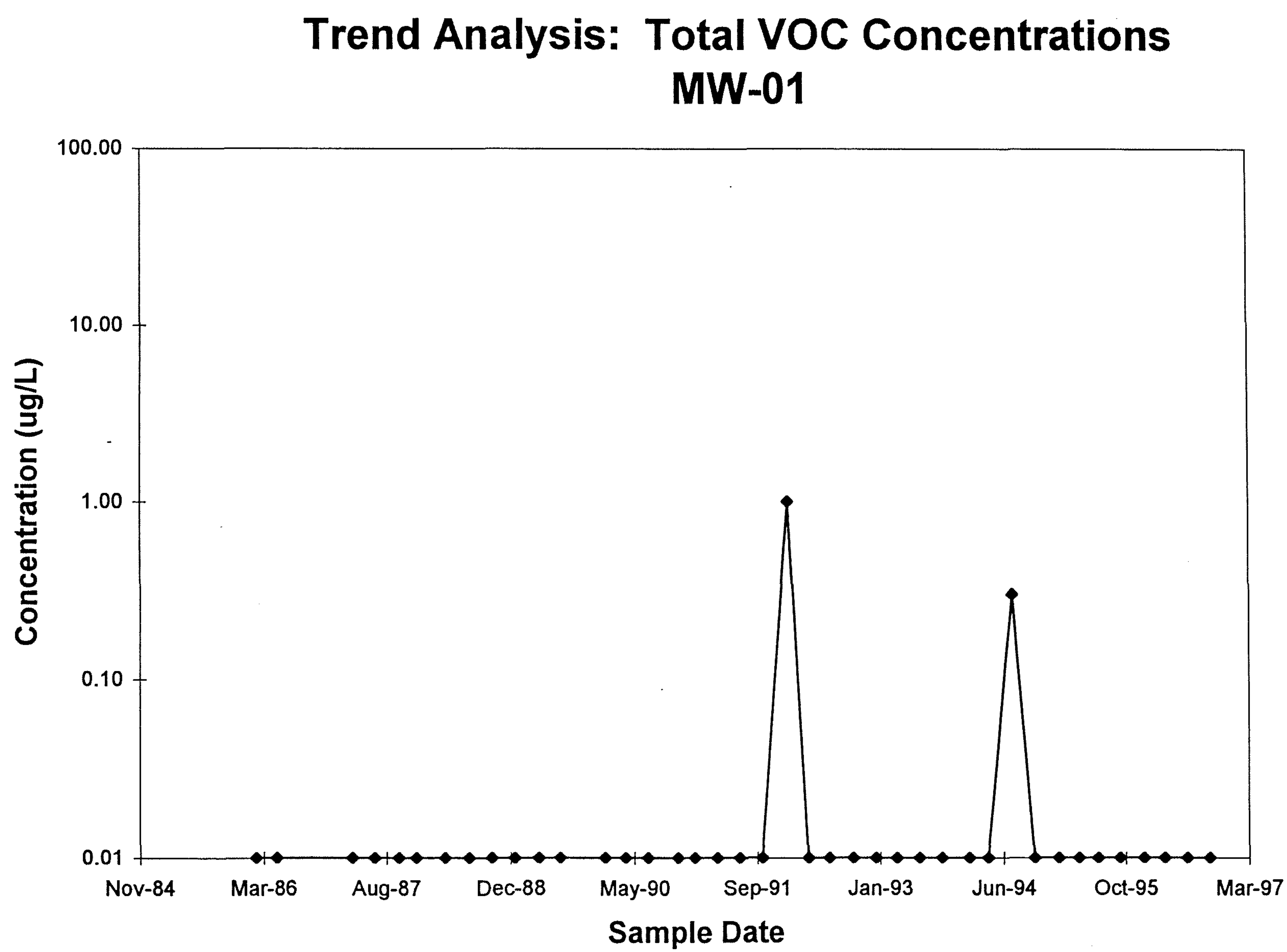


Trend Analysis: Total VOC Concentrations
W-42
100000.00
10000.00
1000.00
100.00
10.00
1.00
0.10
0.01
Concentration (ug/L)
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Sample Date


Trend Analysis: Total VOC Concentrations
W-43
1000000.00
100000.00
10000.00
1000.00
100.00
10.00
1.00
0.10
0.01
Concentration (ug/L)
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Sample Date

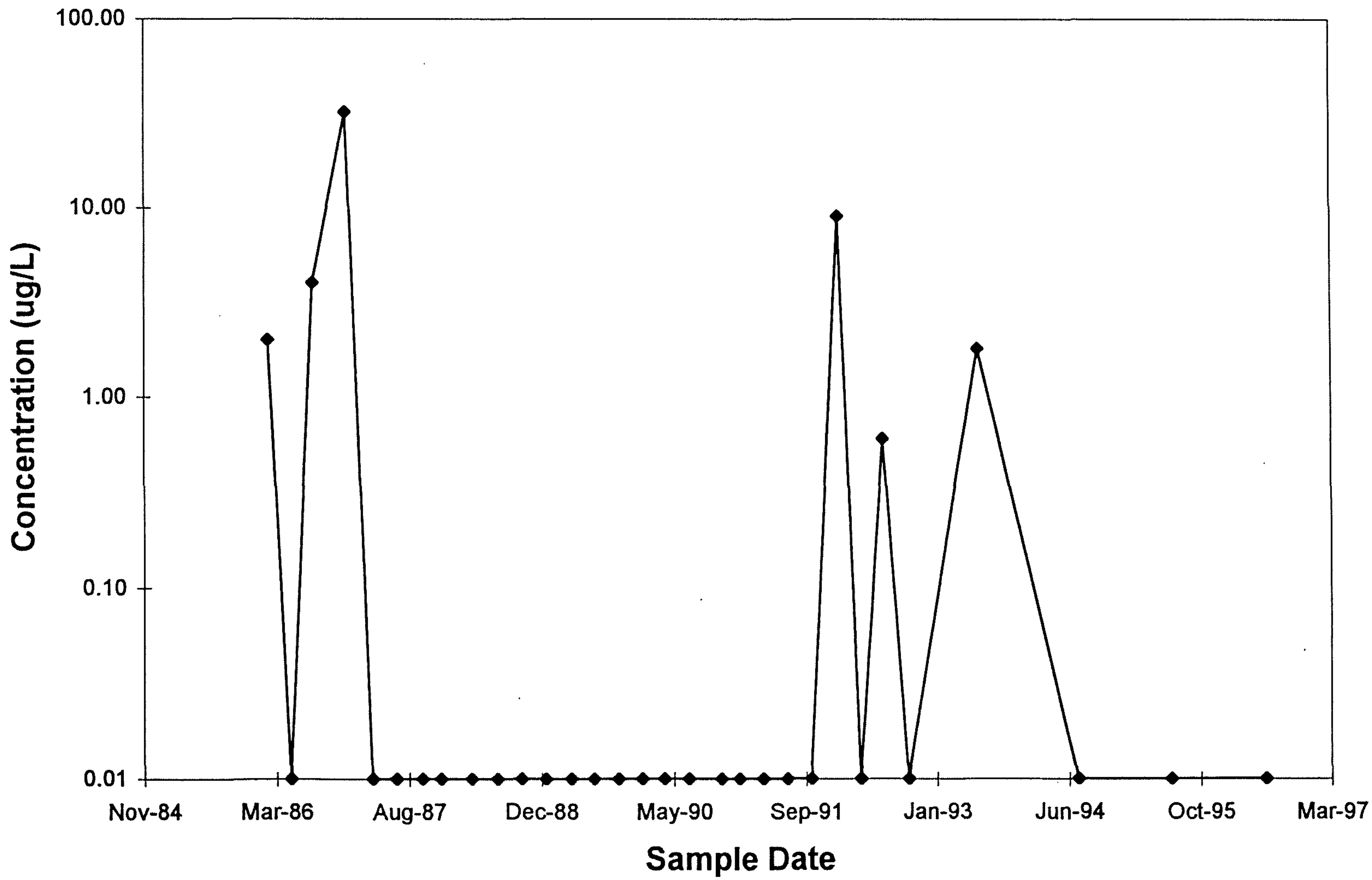
Trend Analysis: Total VOC Concentrations
W-47

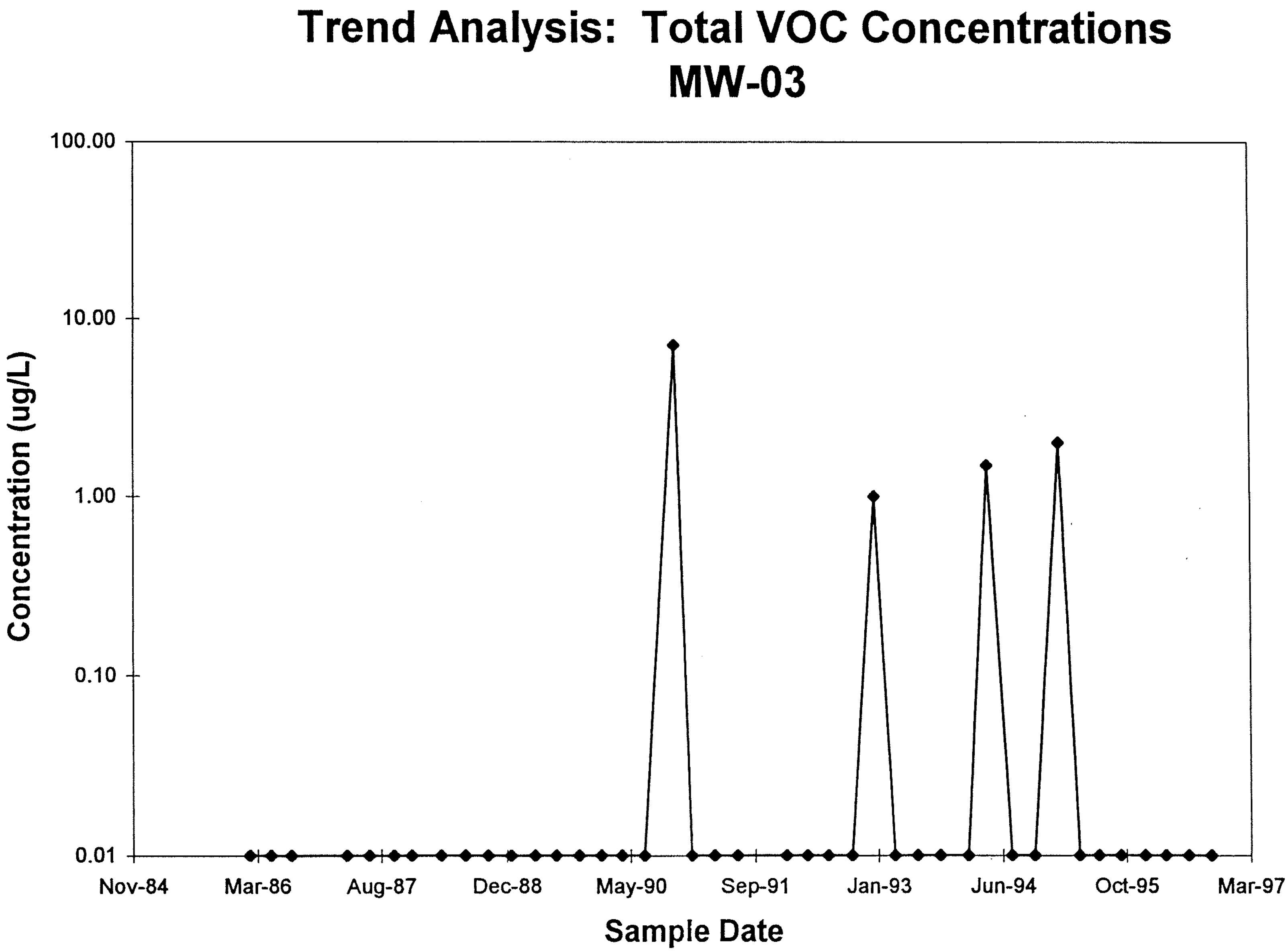




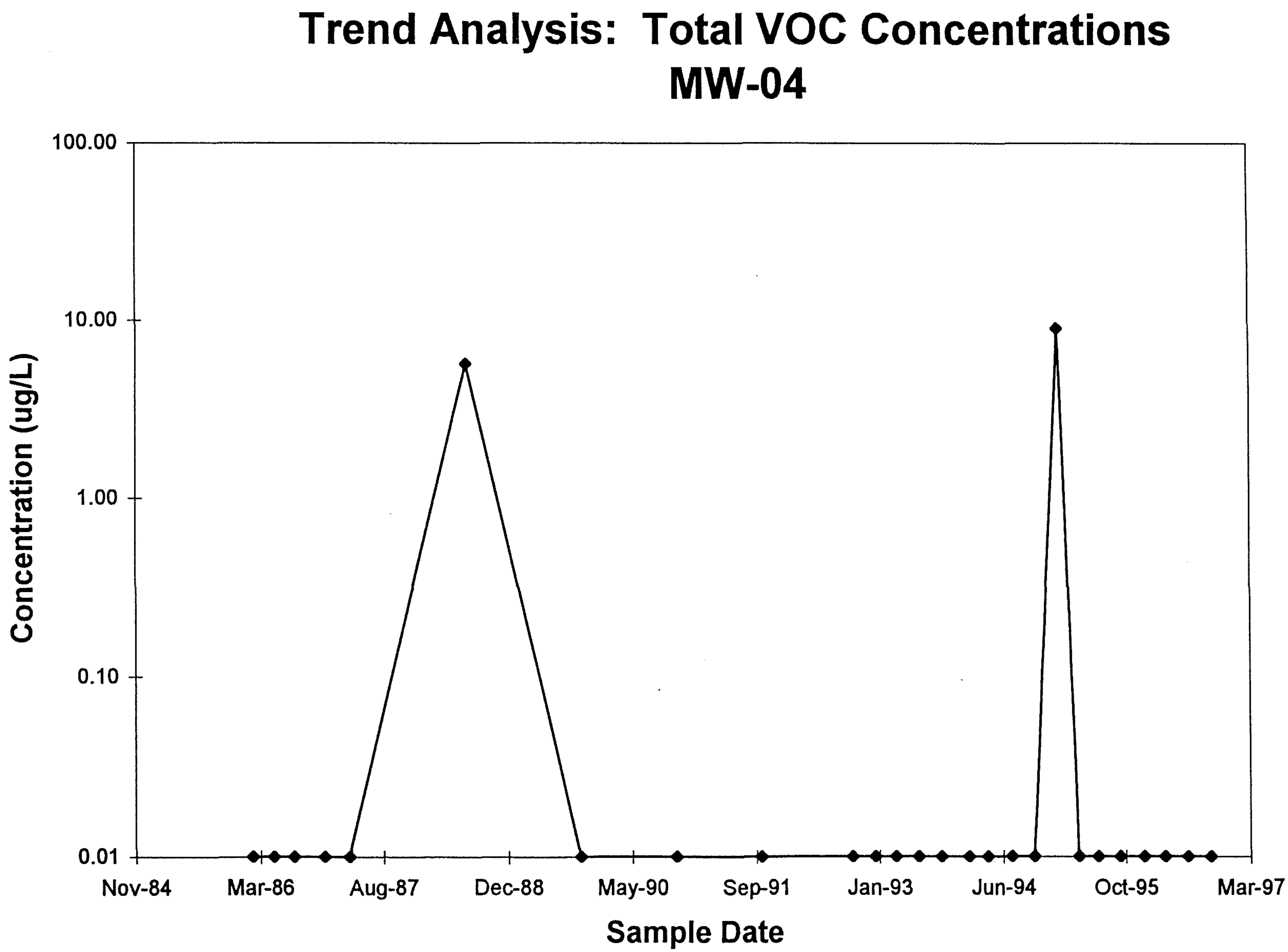
Trend Analysis: Total VOC Concentrations
MW-01
100.00
10.00
1.00
0.10
0.01
Concentration (ug/L)
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Sample Date

Trend Analysis: Total VOC Concentrations
MW-02

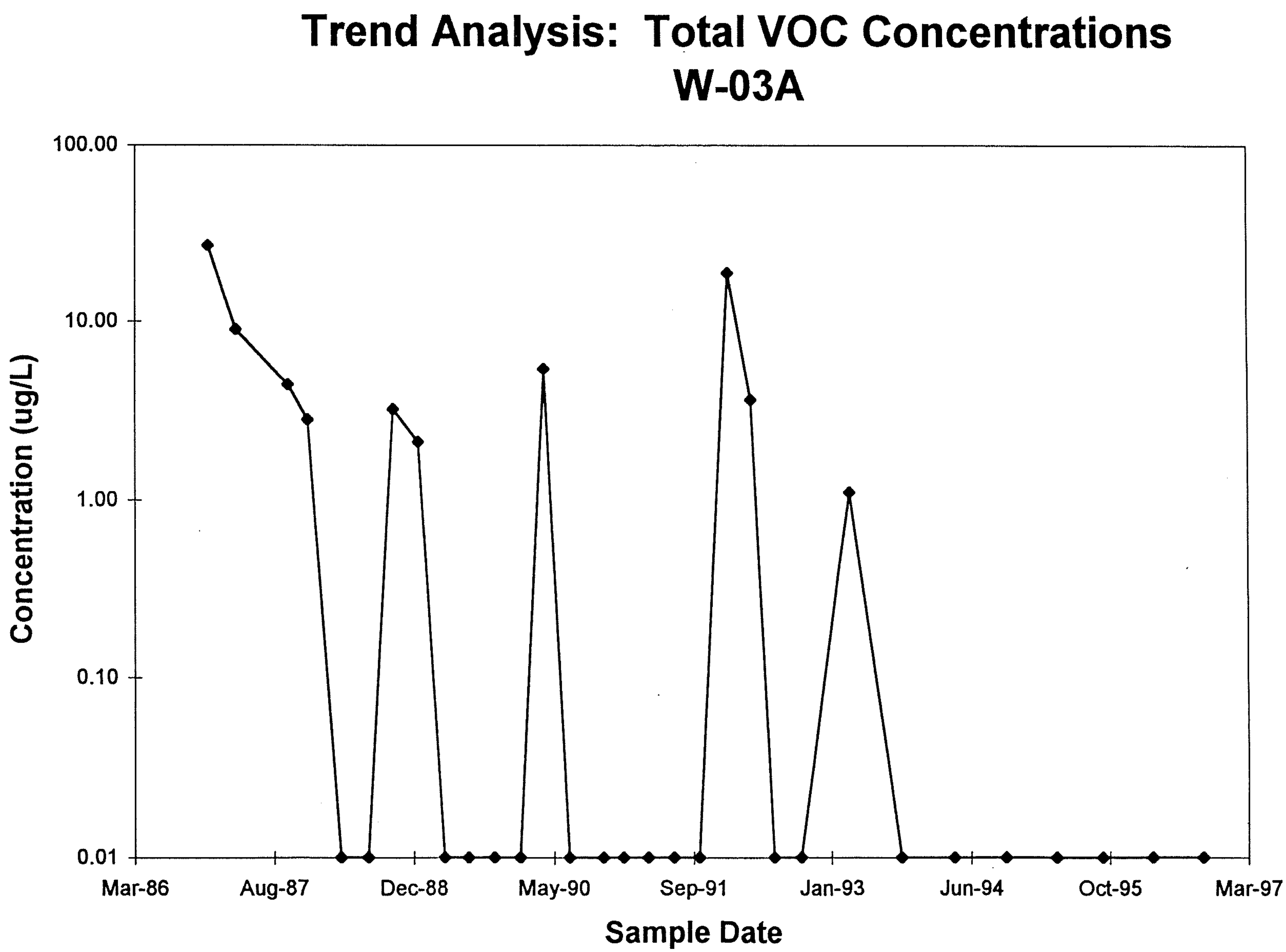




Trend Analysis: Total VOC Concentrations
MW-03
100.00
10.00
1.00
0.10
0.01
Concentration (ug/L)
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Sample Date

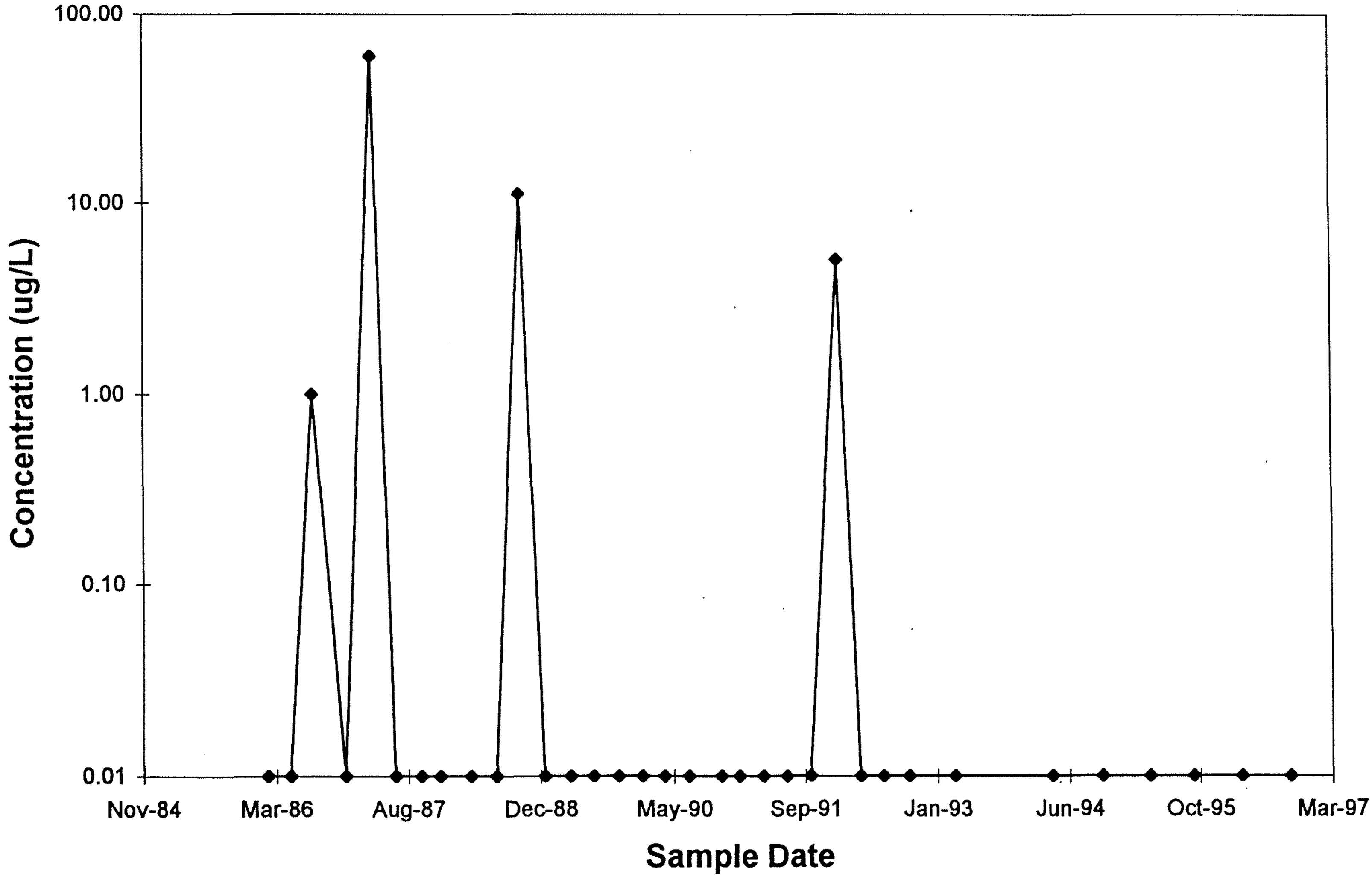


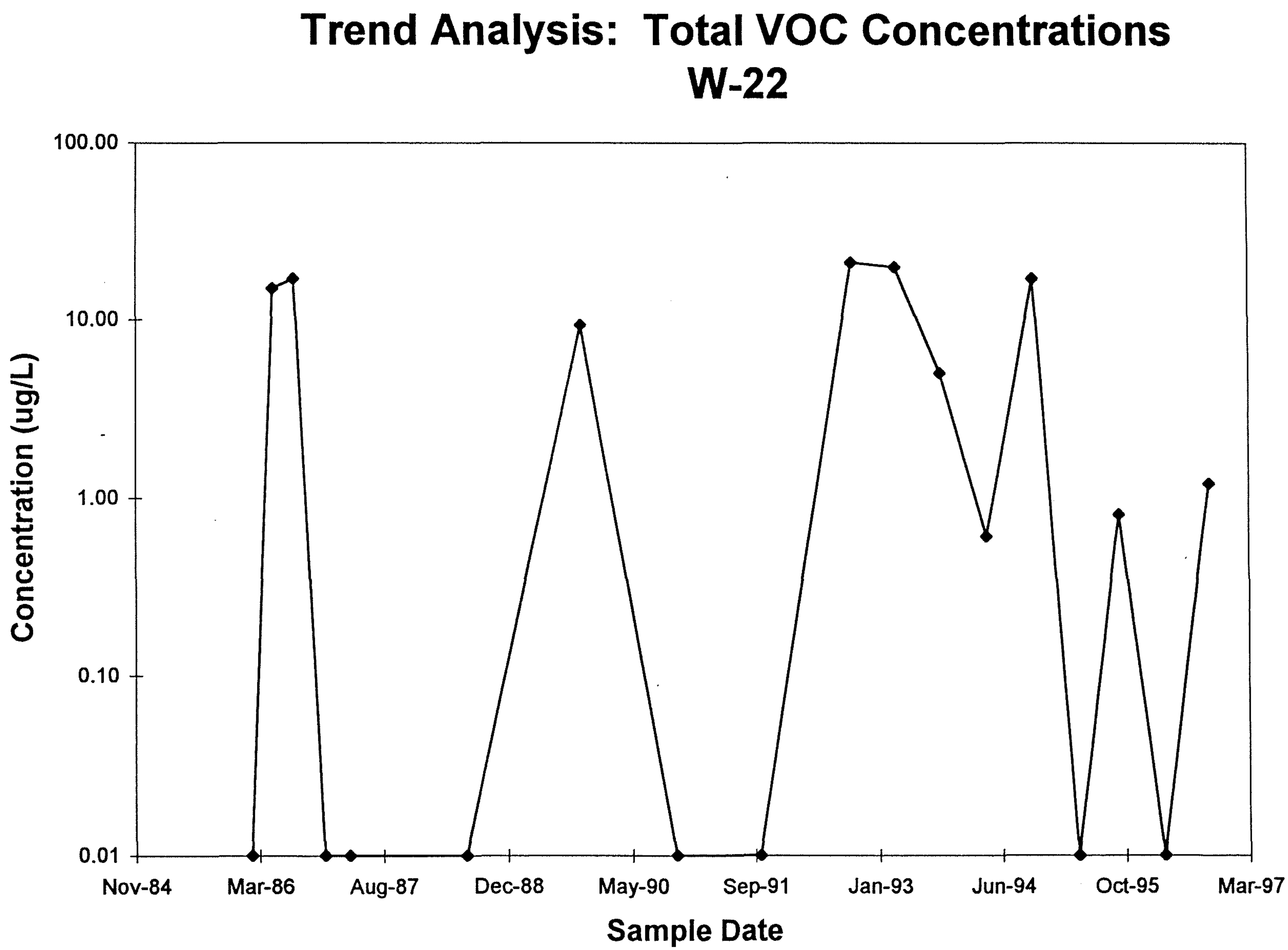
Trend Analysis: Total VOC Concentrations
MW-04
100.00
10.00
1.00
0.10
0.01
Concentration (ug/L)
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Sample Date



Trend Analysis: Total VOC Concentrations
W-03A
100.00
10.00
1.00
0.10
0.01
Concentration (ug/L)
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Sample Date

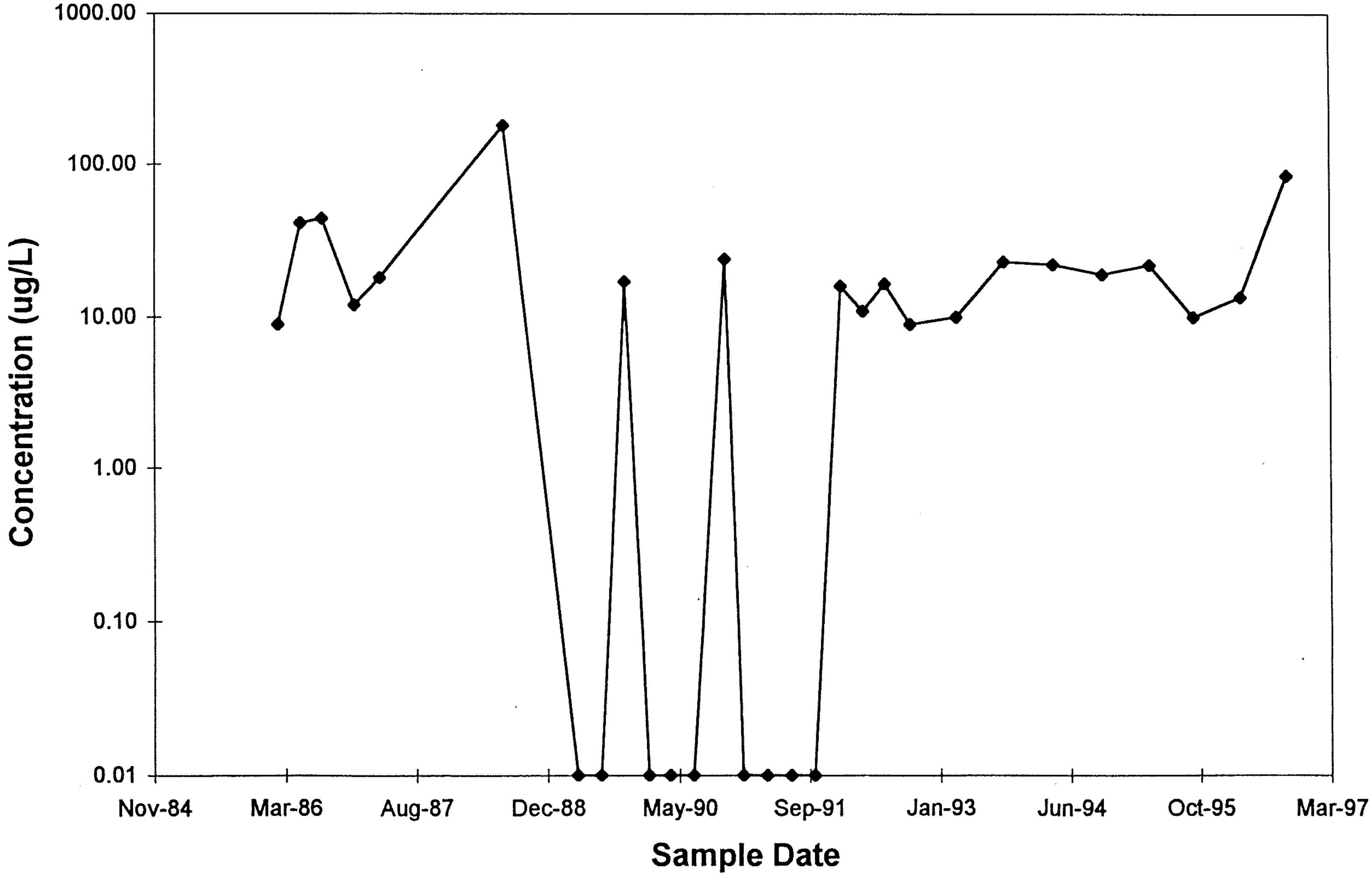
Trend Analysis: Total VOC Concentrations W-07



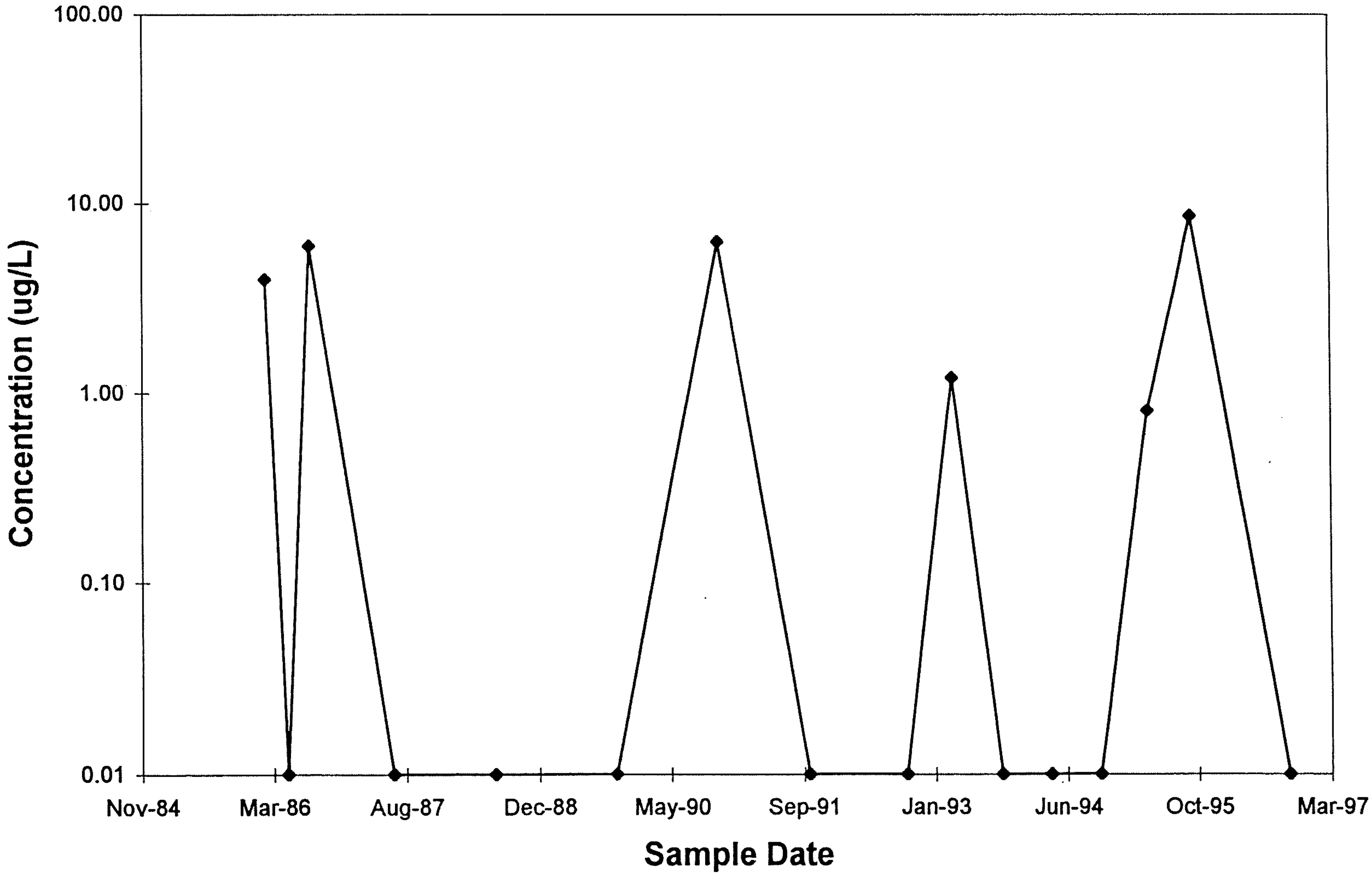


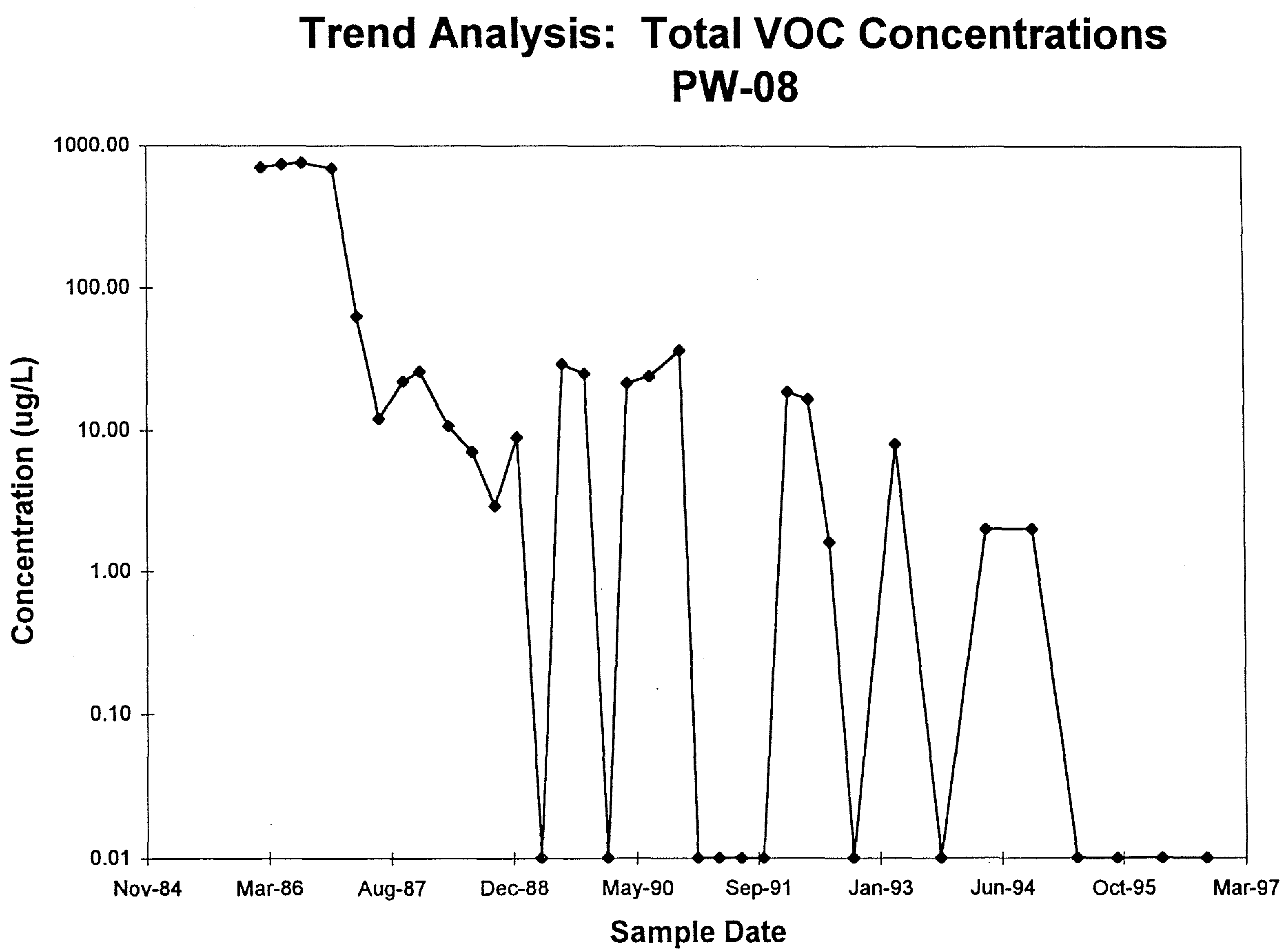
Trend Analysis: Total VOC Concentrations
W-22
100.00
10.00
1.00
0.10
0.01
Concentration (ug/L)
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Sample Date

Trend Analysis: Total VOC Concentrations
W-23



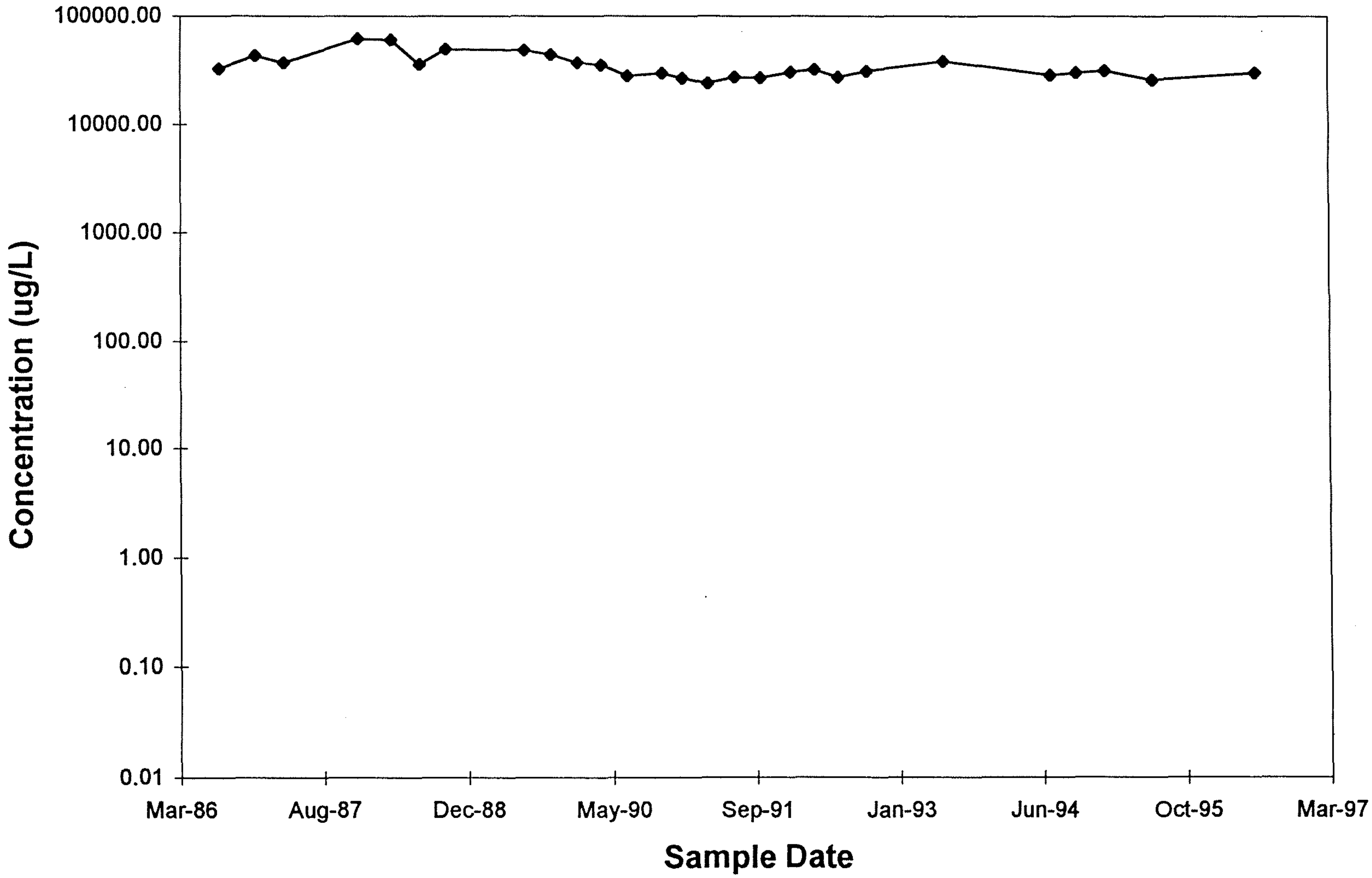
Trend Analysis: Total VOC Concentrations
W-25

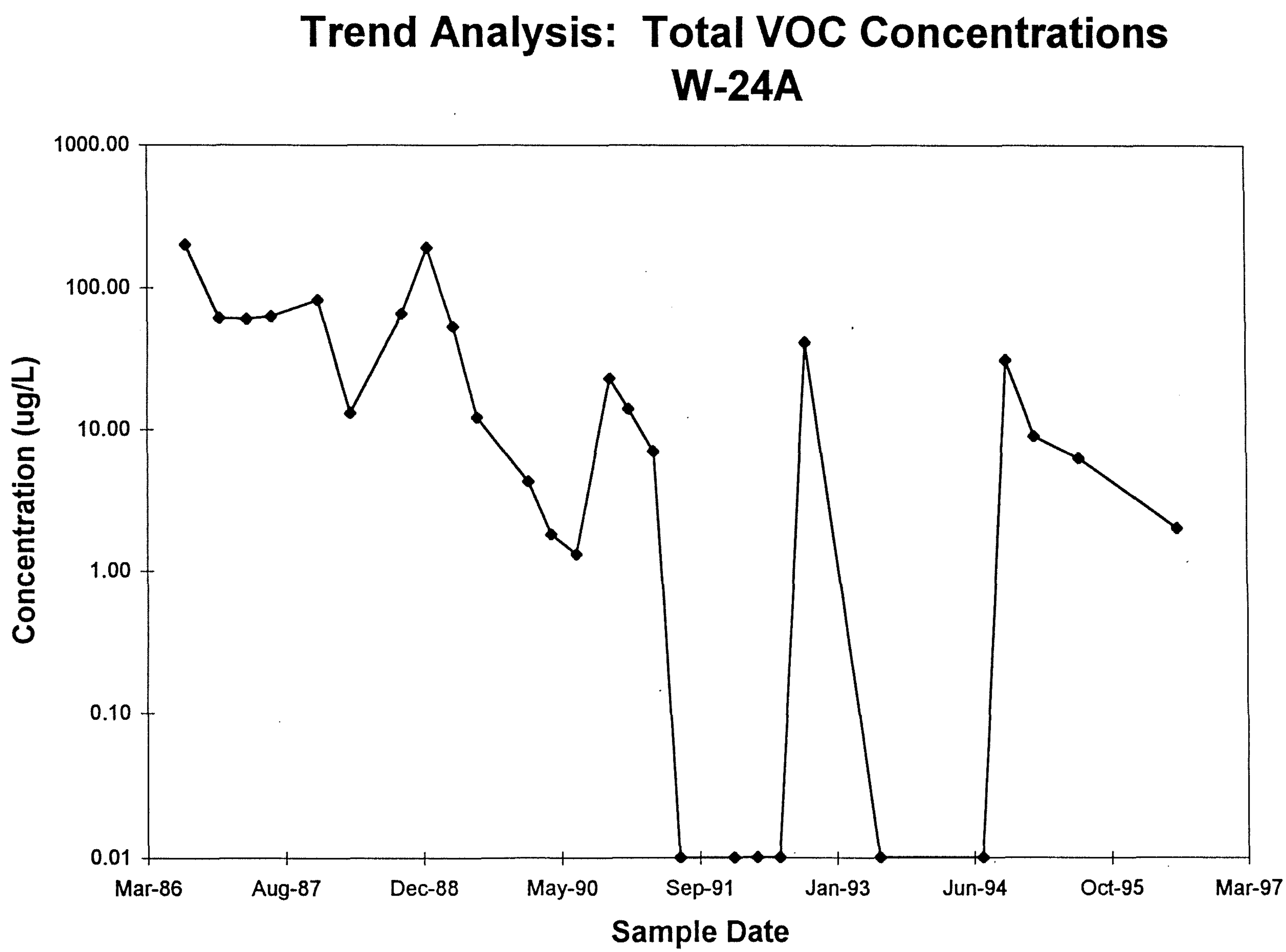




Trend Analysis: Total VOC Concentrations
PW-08
1000.00
100.00
10.00
1.00
0.10
0.01
Concentration (ug/L)
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Sample Date

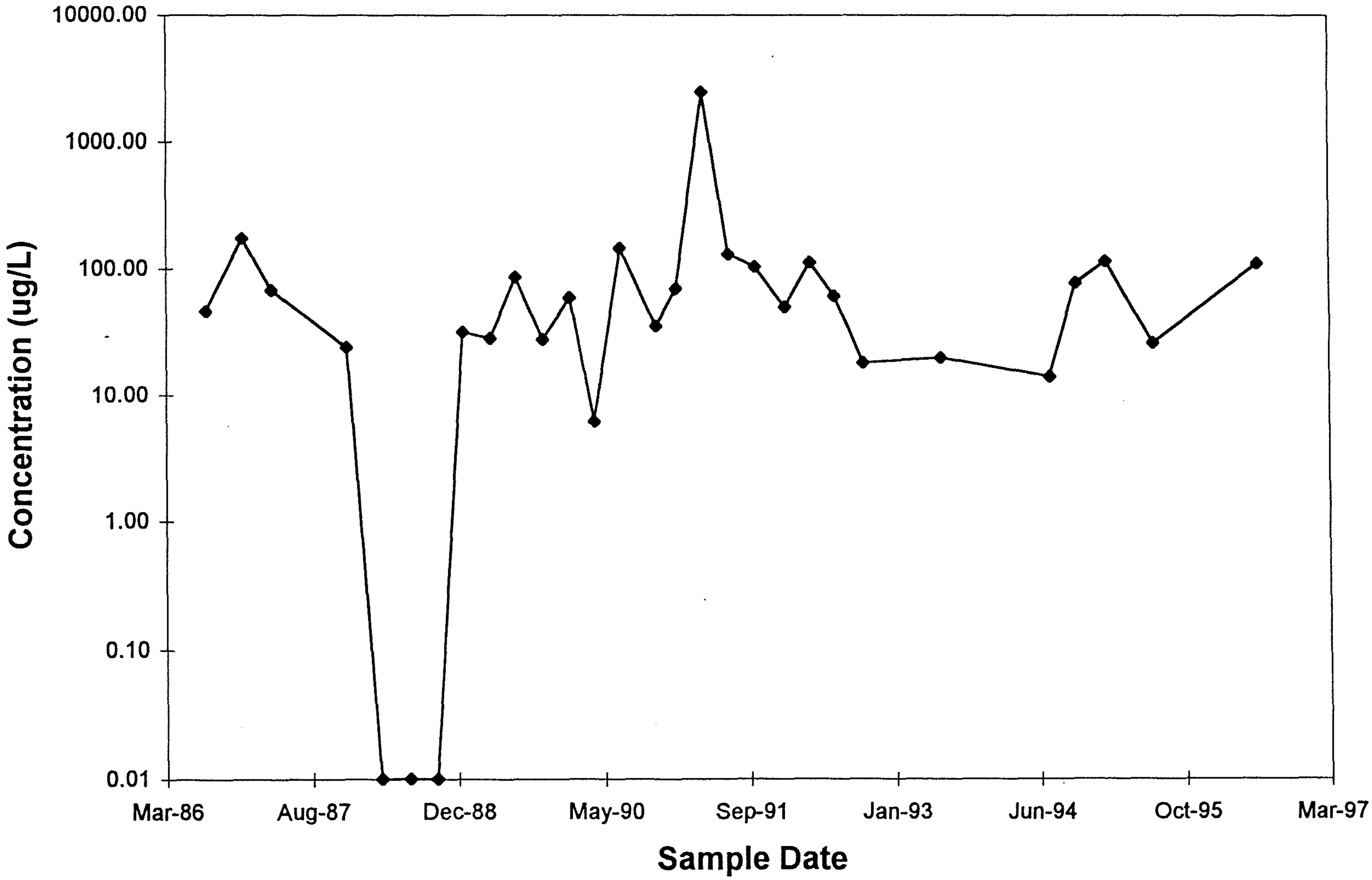
Trend Analysis: Total VOC Concentrations W-21A



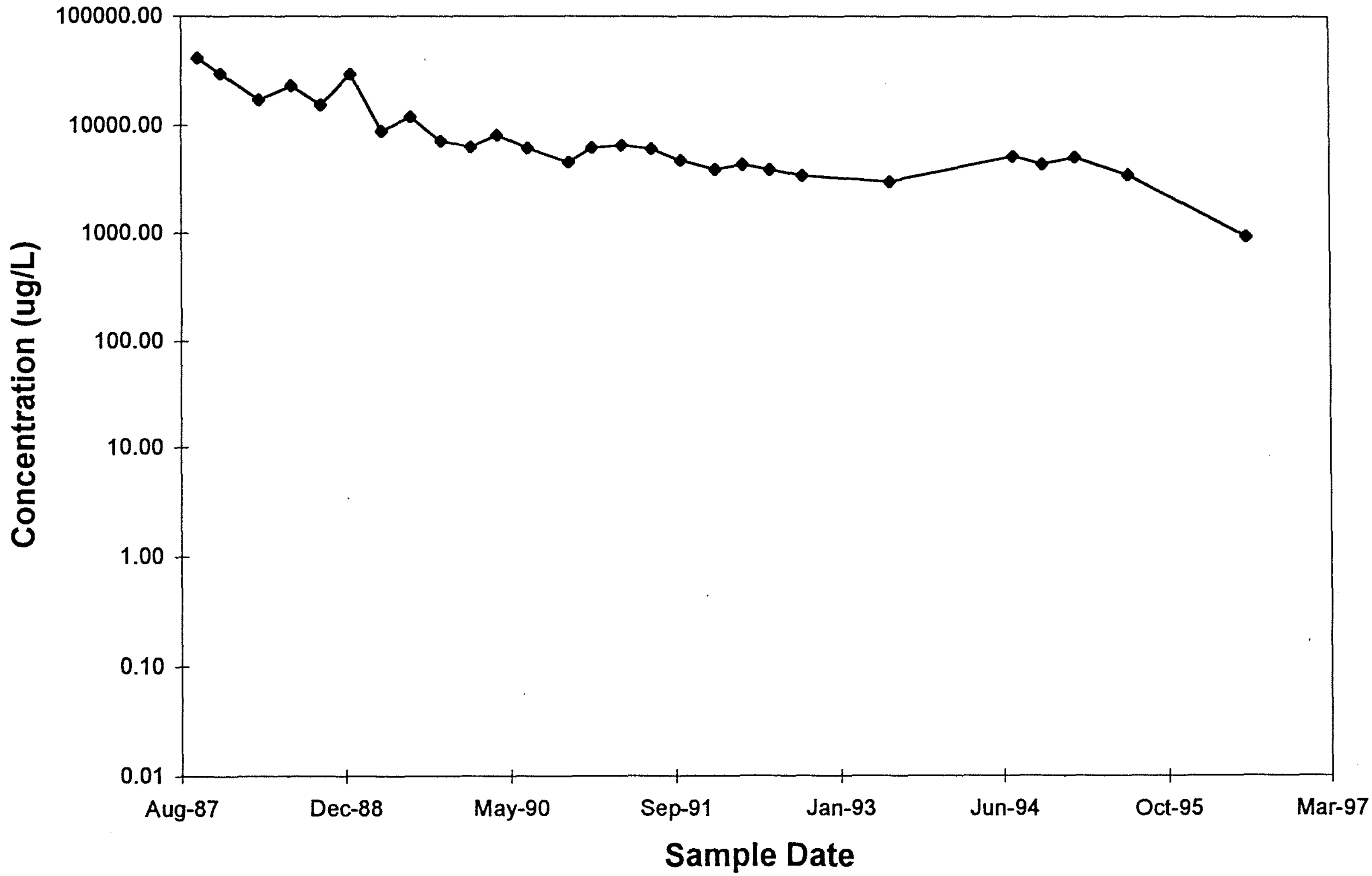


Trend Analysis: Total VOC Concentrations
W-24A
1000.00
100.00
10.00
1.00
0.10
0.01
Concentration (ug/L)
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Sample Date

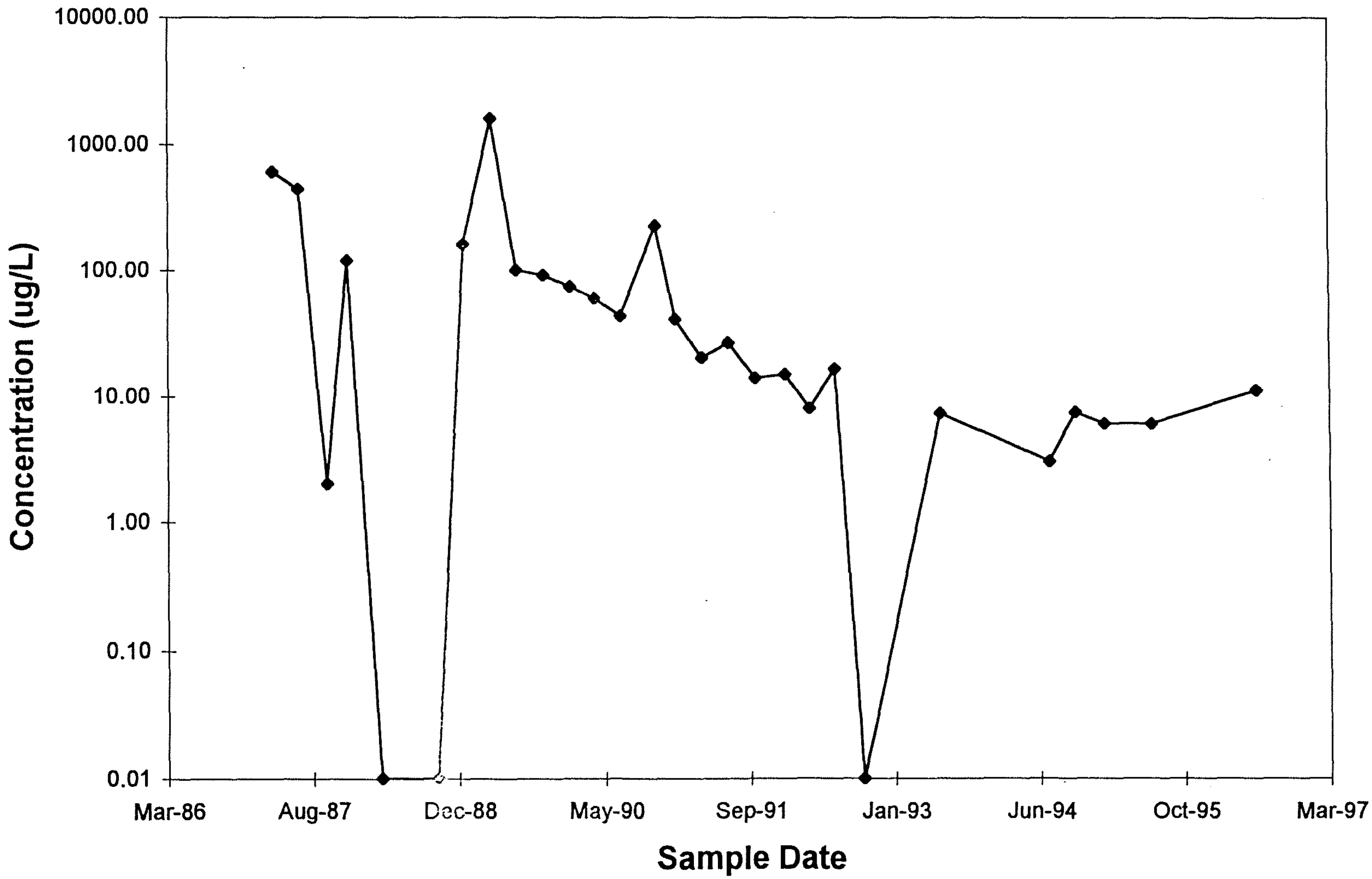
Trend Analysis: Total VOC Concentrations
W-28



Trend Analysis: Total VOC Concentrations
W-29



Trend Analysis: Total VOC Concentrations
W-30



Trend Analysis: Total VOC Concentrations
W-38